

# 大容量積層セラミックコンデンサ

## HIGH VALUE MULTILAYER CERAMIC CAPACITORS

|                 | Code | Temp.characteristics | Operating temp. range |
|-----------------|------|----------------------|-----------------------|
| OPERATING TEMP. | BJ   | B                    | -25~+85°C             |
|                 |      | X5R*                 | -55~+85°C             |
|                 | B7   | X7R                  | -55~+125°C            |
|                 |      | F                    | -25~+85°C             |
|                 | F    | Y5V                  | -30~+85°C             |

\*個別仕様の取扱いにより、X7R 仕様に対応している場合があります。

\*We may provide X7R for some items according to the individual specification.



フロー/WAVE

リフロー/REFLOW

### 特長 FEATURES

- 電極にNi金属を使用し、端子電極部にメッキをしてあることにより、はんだ付け性および耐熱性にすぐれ、マイグレーションもほとんど発生せず、高い信頼性を示します
- 等価直列抵抗 (ESR) が小さく、ノイズ吸収性にすぐれています。
- 特にタンタルおよびアルミ電解コンデンサに比較した場合：
  - 高い許容リップル電流値
  - 高い定格電圧でありながら小型形状
  - 絶縁抵抗、破壊電圧が高く信頼性にすぐれている
  - 等の特徴があります

- The use of Nickel(Ni) as material for both the internal electrodes improves the solderability and heat resistance characteristics. This almost completely eliminates migration and raises the level of reliability significantly.
- Low equivalent series resistance(ESR) provides excellent noise absorption characteristics.
- Compared to tantalum or aluminum electrolytic capacitors these ceramic capacitors offer a number of excellent features, including:
  - Higher permissible ripple current values
  - Smaller case sizes relative to rated voltage
  - Improved reliability due to higher insulation resistance and breakdown voltage.

### 用途 APPLICATIONS

- デジタル回路全般
- 電源バイパスコンデンサ
  - 液晶モジュール用
  - 液晶駆動電圧ライン用
  - 電源電圧の高いLSI、IC、OPアンプ用
- 平滑コンデンサ
  - DC-DCコンバータ (入力、出力側用)
  - スイッチング電源 (2次側用)

- General digital circuit
- Power supply bypass capacitors
  - Liquid crystal modules
  - Liquid crystal drive voltage lines
  - LSI, IC, converters(both for input and output)
- Smoother capacitors
  - DC-DC converters (both for input and output)
  - Switching power supplies (secondary side)

### 形名表記法 ORDERING CODE

| 1 | 定格電圧 [VDC] |
|---|------------|
| A | 4          |
| J | 6.3        |
| L | 10         |
| E | 16         |
| T | 25         |
| G | 35         |
| U | 50         |

| 2 | シリーズ名   |
|---|---------|
| M | 積層コンデンサ |

| 3          | 端子電極               |
|------------|--------------------|
| K          | メッキ品               |
| 4          | 形状寸法(EIA) L×W (mm) |
| 107 (0603) | 1.6×0.8            |
| 212 (0805) | 2.0×1.25           |
| 316 (1206) | 3.2×1.6            |
| 325 (1210) | 3.2×2.5            |

| 5      | 温度特性 |
|--------|------|
| BJ     | B    |
| B7     | X5R  |
| △F     | F    |
|        | Y5V  |
| △=スペース |      |

| 6   | 公称静電容量 [pF] |
|-----|-------------|
| 例   |             |
| 473 | 47,000      |
| 105 | 1,000,000   |

| 7 | 容量許容差        |
|---|--------------|
| K | ±10%         |
| M | ±20%         |
| Z | +80%<br>-20% |
| 8 | 製品厚み [mm]    |
| K | 0.45         |
| A | 0.8          |
| D | 0.85         |
| F | 1.15         |
| G | 1.25         |
| H | 1.5          |
| L | 1.6          |
| N | 1.9          |
| Y | 2.0max       |
| M | 2.5          |

| 9      | 個別仕様                                        |
|--------|---------------------------------------------|
| —      | 標準                                          |
| 10     | 包装                                          |
| T      | φ178mm テーピング (4mmピッチ) 全形状                   |
| P      | φ178mm テーピング (4mmピッチ, 1000個/リール) 325形状 厚み:M |
| 11     | 当社管理記号                                      |
| △      | 標準品                                         |
| △=スペース |                                             |

|   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |
|---|---|---|---|---|---|---|---|---|----|----|---|---|---|---|---|
| J | M | K | 3 | 1 | 6 | B | J | 1 | 0  | 6  | M | L | — | T | △ |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |   |   |   |   |   |

| 1 | Rated voltage [VDC] |
|---|---------------------|
| A | 4                   |
| J | 6.3                 |
| L | 10                  |
| E | 16                  |
| T | 25                  |
| G | 35                  |
| U | 50                  |

| 2 | Series name                   |
|---|-------------------------------|
| M | Multilayer ceramic capacitors |

| 3          | End termination             |
|------------|-----------------------------|
| K          | Plated                      |
| 4          | Dimensions [case size] (mm) |
| 107 (0603) | 1.6×0.8                     |
| 212 (0805) | 2.0×1.25                    |
| 316 (1206) | 3.2×1.6                     |
| 325 (1210) | 3.2×2.5                     |

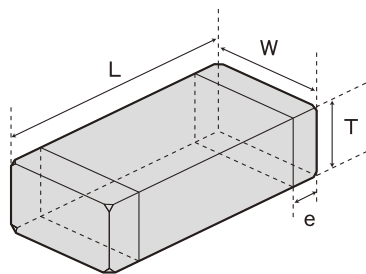
| 5             | Temperature characteristics code |
|---------------|----------------------------------|
| BJ            | B                                |
| B7            | X5R                              |
| △F            | F                                |
|               | Y5V                              |
| △=Blank space |                                  |

| 6       | Nominal capacitance [pF] |
|---------|--------------------------|
| example |                          |
| 473     | 47,000                   |
| 105     | 1,000,000                |

| 7 | Capacitance tolerance |
|---|-----------------------|
| K | ±10%                  |
| M | ±20%                  |
| Z | +80%<br>-20%          |
| 8 | Thickness [mm]        |
| K | 0.45                  |
| A | 0.8                   |
| D | 0.85                  |
| F | 1.15                  |
| G | 1.25                  |
| H | 1.5                   |
| L | 1.6                   |
| N | 1.9                   |
| Y | 2.0max                |
| M | 2.5                   |

| 9             | Special code                                                 |
|---------------|--------------------------------------------------------------|
| —             | Standard products                                            |
| 10            | Packaging                                                    |
| T             | φ178mm Taping (4mm pitch) All types                          |
| P             | φ178mm Taping (4mm pitch, 1000pcs/reel) 1210Type Thickness:M |
| 11            | Internal code                                                |
| △             | Standard products                                            |
| △=Blank space |                                                              |

# 外形寸法 EXTERNAL DIMENSIONS



注: \*1. ±0.15mm公差あり  
 \*2. ±0.3mm公差あり  
 \*3. ±0.2mm公差あり  
 \*4. +0.15/-0.1mm公差あり  
 Note: \*1. Including dimension tolerance±0.15mm (±0.006 inch).  
 Note: \*2. Including dimension tolerance±0.3mm (±0.012 inch).  
 Note: \*3. Including dimension tolerance±0.2mm (±0.008 inch).  
 Note: \*4. Including dimension tolerance+0.15/-0.1mm (+0.006/-0.004 inch).

| Type (EIA)       | L                                         | W                                          | T                                                                                                                                                                                                                                                                                 | e                                                                                                    |
|------------------|-------------------------------------------|--------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|
| □MK107<br>(0603) | 1.6±0.10 <sup>*3,4</sup><br>(0.063±0.004) | 0.8±0.10 <sup>*3,4</sup><br>(0.031±0.004)  | 0.45±0.05<br>(0.018±0.002)<br>0.8±0.10 <sup>*3,4</sup><br>(0.031±0.004)                                                                                                                                                                                                           | K<br>A<br>0.35±0.25<br>(0.014±0.010)                                                                 |
| □MK212<br>(0805) | 2.0±0.10 <sup>*1,3</sup><br>(0.079±0.004) | 1.25±0.10 <sup>*1,3</sup><br>(0.049±0.004) | 0.45±0.05<br>(0.018±0.002)<br>0.85±0.10<br>(0.033±0.004)<br>1.25±0.10 <sup>*1,3</sup><br>(0.049±0.004)                                                                                                                                                                            | K<br>D<br>G<br>0.5±0.25<br>(0.020±0.010)                                                             |
| □MK316<br>(1206) | 3.2±0.15 <sup>*3</sup><br>(0.126±0.006)   | 1.6±0.15 <sup>*3</sup><br>(0.063±0.006)    | 0.85±0.10<br>(0.033±0.004)<br>1.15±0.10<br>(0.045±0.004)<br>1.25±0.10<br>(0.049±0.004)                                                                                                                                                                                            | D<br>F<br>G<br>0.5 <sup>+0.35</sup> <sub>-0.25</sub><br>(0.020 <sup>+0.014</sup> <sub>-0.010</sub> ) |
| □MK325<br>(1210) | 3.2±0.30<br>(0.126±0.012)                 | 2.5±0.20 <sup>*2</sup><br>(0.098±0.008)    | 1.6±0.20<br>(0.063±0.008)<br>0.85±0.10<br>(0.033±0.004)<br>1.15±0.10<br>(0.045±0.004)<br>1.5±0.10<br>(0.059±0.004)<br>1.9±0.20<br>(0.075±0.008)<br>1.9 <sup>+0.1</sup> <sub>-0.2</sub><br>(0.075 <sup>+0.004</sup> <sub>-0.008</sub> )<br>2.5±0.20 <sup>*2</sup><br>(0.098±0.008) | D<br>F<br>H<br>N<br>Y<br>M<br>0.6±0.3<br>(0.024±0.012)                                               |

Unit:mm (inch)

## 概略バリエーション AVAILABLE CAPACITANCE RANGE

| Type      | 107   |    |       |    |     |    |       |    |       |    | 212   |    |     |    |       |    |       |    |       |    | 316 |    |       |    |       |    |       |    |     |    | 325   |    |    |    |    |  |  |  |  |  |
|-----------|-------|----|-------|----|-----|----|-------|----|-------|----|-------|----|-----|----|-------|----|-------|----|-------|----|-----|----|-------|----|-------|----|-------|----|-----|----|-------|----|----|----|----|--|--|--|--|--|
| TC        | B/X7R |    | B/X5R |    | X5R |    | F/Y5V |    | B/X7R |    | B/X5R |    | X5R |    | F/Y5V |    | B/X7R |    | B/X5R |    | X5R |    | F/Y5V |    | B/X7R |    | B/X5R |    | X5R |    | F/Y5V |    |    |    |    |  |  |  |  |  |
| Cap. [μF] | 10    | 16 | 22    | 33 | 47  | 10 | 16    | 22 | 33    | 47 | 10    | 16 | 22  | 33 | 47    | 10 | 16    | 22 | 33    | 47 | 10  | 16 | 22    | 33 | 47    | 10 | 16    | 22 | 33  | 47 | 10    | 16 | 22 | 33 | 47 |  |  |  |  |  |
| 0.1       |       |    |       |    |     |    |       |    |       |    |       |    |     |    |       |    |       |    |       |    |     |    |       |    |       |    |       |    |     |    |       |    |    |    |    |  |  |  |  |  |
| 0.15      |       |    |       |    |     |    |       |    |       |    |       |    |     |    |       |    |       |    |       |    |     |    |       |    |       |    |       |    |     |    |       |    |    |    |    |  |  |  |  |  |
| 0.22      | A     | A  | A     |    |     |    |       |    |       |    |       |    |     |    |       |    |       |    |       |    |     |    |       |    |       |    |       |    |     |    |       |    |    |    |    |  |  |  |  |  |
| 0.33      |       |    |       |    |     |    |       |    |       |    |       |    |     |    |       |    |       |    |       |    |     |    |       |    |       |    |       |    |     |    |       |    |    |    |    |  |  |  |  |  |
| 0.47      | A     | A  |       |    |     |    |       |    |       |    |       |    |     |    |       |    |       |    |       |    |     |    |       |    |       |    |       |    |     |    |       |    |    |    |    |  |  |  |  |  |
| 0.68      |       |    |       |    |     |    |       |    |       |    |       |    |     |    |       |    |       |    |       |    |     |    |       |    |       |    |       |    |     |    |       |    |    |    |    |  |  |  |  |  |
| 1         | A     | A  | A     | A  | A   |    |       |    |       |    |       |    |     |    |       |    |       |    |       |    |     |    |       |    |       |    |       |    |     |    |       |    |    |    |    |  |  |  |  |  |
| 2.2       |       |    |       |    |     |    |       |    |       |    |       |    |     |    |       |    |       |    |       |    |     |    |       |    |       |    |       |    |     |    |       |    |    |    |    |  |  |  |  |  |
| 3.3       |       |    |       |    |     |    |       |    |       |    |       |    |     |    |       |    |       |    |       |    |     |    |       |    |       |    |       |    |     |    |       |    |    |    |    |  |  |  |  |  |
| 4.7       |       |    |       |    |     |    |       |    |       |    |       |    |     |    |       |    |       |    |       |    |     |    |       |    |       |    |       |    |     |    |       |    |    |    |    |  |  |  |  |  |
| 6.8       |       |    |       |    |     |    |       |    |       |    |       |    |     |    |       |    |       |    |       |    |     |    |       |    |       |    |       |    |     |    |       |    |    |    |    |  |  |  |  |  |
| 10        |       |    |       |    |     |    |       |    |       |    |       |    |     |    |       |    |       |    |       |    |     |    |       |    |       |    |       |    |     |    |       |    |    |    |    |  |  |  |  |  |
| 22        |       |    |       |    |     |    |       |    |       |    |       |    |     |    |       |    |       |    |       |    |     |    |       |    |       |    |       |    |     |    |       |    |    |    |    |  |  |  |  |  |
| 47        |       |    |       |    |     |    |       |    |       |    |       |    |     |    |       |    |       |    |       |    |     |    |       |    |       |    |       |    |     |    |       |    |    |    |    |  |  |  |  |  |
| 100       |       |    |       |    |     |    |       |    |       |    |       |    |     |    |       |    |       |    |       |    |     |    |       |    |       |    |       |    |     |    |       |    |    |    |    |  |  |  |  |  |

注: グラフの記号は製品の厚み記号です。 Note: Letters in the table indicate thickness.

### ■低背積層セラミックコンデンサ Low profile Multilayer Ceramic Capacitors

| Type      | 107   |    |    |    |    |     |    |    |    |    | 212   |    |       |   |     |       |       |   |       |    | 316 |       |       |    |       |    |     |       |       |    | 325   |    |     |       |    |    |    |     |    |    |    |    |     |    |    |    |    |     |    |    |    |    |     |    |    |    |    |     |    |    |    |    |     |    |    |    |    |     |    |    |    |    |     |    |    |    |    |     |    |    |    |    |     |    |    |    |    |     |    |    |    |    |     |    |    |    |    |     |    |    |    |    |     |    |    |    |    |     |    |    |    |    |     |    |    |    |    |     |    |    |    |    |     |    |    |    |    |     |    |    |    |    |     |    |    |    |    |     |    |    |    |    |     |    |    |    |    |     |    |    |    |    |     |    |    |    |    |     |    |    |    |    |     |    |    |    |    |     |    |    |    |    |     |    |    |    |    |     |    |    |    |    |     |    |    |    |    |     |    |    |    |    |     |    |    |    |    |     |    |    |    |    |     |    |    |    |    |     |    |    |    |    |     |    |    |    |    |     |    |    |    |    |     |    |    |    |    |     |    |    |    |    |     |    |    |    |    |     |    |    |    |    |     |    |    |    |    |     |    |    |    |    |     |    |    |    |    |     |    |    |    |    |     |    |    |    |    |     |    |    |    |    |     |    |    |    |    |     |    |    |    |    |     |    |    |    |    |     |    |    |    |    |     |    |    |    |    |     |    |    |    |    |     |    |    |    |    |     |    |    |    |    |     |    |    |    |    |     |    |    |    |    |     |    |    |    |    |     |    |    |    |    |     |    |    |    |    |     |    |    |    |    |     |    |    |    |    |     |    |    |    |    |     |    |    |    |    |     |    |    |    |    |     |    |    |    |    |     |    |    |    |    |     |    |    |    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   |    |    |    |     |    |    |    |    |     |    |    |    |    |     |    |    |    |    |     |    |    |    |    |     |    |    |    |    |     |    |    |    |    |     |    |    |    |    |     |    |    |    |    |     |    |    |    |    |     |    |    |    |    |     |    |    |    |    |     |    |    |    |    |     |    |    |    |    |     |    |    |    |    |     |    |    |    |    |     |    |    |    |    |     |    |    |    |    |     |    |    |    |    |     |    |    |    |    |     |    |    |    |    |     |    |    |    |    |     |    |    |    |    |     |    |    |    |    |     |    |    |    |    |     |    |    |    |    |     |    |    |    |    |     |    |    |    |    |     |    |    |    |    |     |    |    |    |    |     |    |    |    |    |     |    |    |    |    |     |    |    |    |    |     |    |    |    |    |     |    |    |    |    |     |    |    |    |    |     |    |    |    |    |     |    |    |    |    |     |    |    |    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[μF] | 10    | 16 | 22 | 33 | 47 | 10  | 16 | 22 | 33 | 47 | 16    | 10 | 6.3   | 4 | 16  | 10    | 6.3   | 4 | 50    | 10 | 6.3 | 25    | 16    | 10 | 6.3   | 25 | 16  | 10    | 6.3   | 25 | 16    | 10 | 6.3 | 50    | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 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25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 | 16 | 10 | 6.3 | 50 | 25 |  |

注: グラフの記号は製品の厚み記号です。 Note: Letters in the table indicate thickness.

| 温度特性コード<br>Temp.char.Code | 温度特性<br>Temperature characteristics |                               |                        |                                  |         | 静電容量許容差[%]<br>Capacitance tolerance | tan δ[%]<br>Dissipation factor |
|---------------------------|-------------------------------------|-------------------------------|------------------------|----------------------------------|---------|-------------------------------------|--------------------------------|
|                           | 準拠規格<br>Applicable standard         | 温度範囲[°C]<br>Temperature range | 基準温度[°C]<br>Ref. Temp. | 静電容量変化率[%]<br>Capacitance change |         |                                     |                                |
| BJ                        | JIS                                 | B                             | -25~+85                | 20                               | ±10     | ±10 (K)<br>±20 (M)                  | 2.5 max.*                      |
|                           | EIA                                 | X5R                           | -55~+85                | 25                               | ±15     |                                     |                                |
| B7                        | EIA                                 | X7R                           | -55~+125               | 25                               | ±15     | +80<br>-20 (Z)                      | 7.0 max.*                      |
|                           | JIS                                 | F                             | -25~+85                | 20                               | +30/-80 |                                     |                                |
| F                         | EIA                                 | Y5V                           | -30~+85                | 25                               | +22/-82 |                                     |                                |

\*: 代表的な値を記載しています。詳細はアイテム一覧表を参照ください。\*: The figure indicates typical value. Please refer to PART NUMBERS table.

セレクトションガイド  
Selection Guide

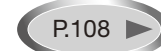
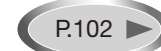
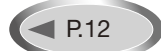
アイテム一覧  
Part Numbers

特性図  
Electrical Characteristics

梱包  
Packaging

信頼性  
Reliability Data

使用上の注意  
Precautions



etc

アイテム一覧 PART NUMBERS

107TYPE

【温度特性 Temp.char. BJ:B/X5R】

| 定格電圧<br>Rated Voltage | 形 名<br>Ordering code |      | EHS<br>(Environmental<br>Hazardous<br>Substances) | 公 称<br>静電容量<br>Capacitance<br>〔μF〕 | 温度特性<br>Temperature<br>characteristics | tan δ<br>Dissipation<br>factor<br>〔%〕Max. | 実装条件<br>Soldering method<br>R:リフロー Reflow soldering<br>W: フロー Wave soldering | 静電容量<br>許 容 差<br>Capacitance<br>tolerance | 厚 み<br>Thickness<br>〔mm〕 |               |
|-----------------------|----------------------|------|---------------------------------------------------|------------------------------------|----------------------------------------|-------------------------------------------|------------------------------------------------------------------------------|-------------------------------------------|--------------------------|---------------|
| 35V                   | GMK107 BJ105□A*1     |      | RoHS                                              | 1                                  | B/X5R                                  | 5                                         | R                                                                            | ±10%<br>±20%                              | 0.8±0.1                  |               |
| 25V                   | TMK107 BJ105□K*1     |      | RoHS                                              | 1                                  | X5R                                    | 10                                        |                                                                              |                                           |                          | 0.45±0.05     |
|                       | TMK107 BJ224□A       |      | RoHS                                              | 0.22                               | B/X5R                                  | 3.5                                       |                                                                              |                                           | R/W                      | 0.8±0.1       |
|                       | TMK107 BJ474□A*1     |      | RoHS                                              | 0.47                               | B/X5R                                  | 3.5                                       |                                                                              |                                           | R                        | 0.8±0.1       |
|                       | TMK107 BJ105□A*1     |      | RoHS                                              | 1                                  | B/X5R                                  | 5                                         |                                                                              |                                           |                          | 0.8±0.1       |
|                       | EMK107 BJ105□K*1     |      | RoHS                                              | 1                                  | X5R                                    | 10                                        | R                                                                            |                                           |                          | 0.45±0.05     |
| 16V                   | EMK107 BJ224□A       |      | RoHS                                              | 0.22                               | B/X5R*2                                | 3.5                                       | R/W                                                                          |                                           |                          | 0.8±0.1       |
|                       | EMK107 BJ474□A       |      | RoHS                                              | 0.47                               | B/X5R                                  | 3.5                                       | R                                                                            |                                           |                          | 0.8±0.1       |
|                       | EMK107 BJ105□A*1     |      | RoHS                                              | 1                                  | B/X5R                                  | 5                                         |                                                                              |                                           |                          | 0.8±0.1       |
|                       | EMK107 BJ225□A*1     |      | RoHS                                              | 2.2                                | B/X5R                                  | 10                                        |                                                                              |                                           |                          | 0.8±0.1       |
|                       | LMK107 BJ105□K*1     |      | RoHS                                              | 1                                  | B/X5R                                  | 10                                        |                                                                              |                                           | R/W                      |               |
| LMK107 BJ225□K*1      |                      | RoHS | 2.2                                               | X5R                                | 10                                     |                                           |                                                                              |                                           |                          | 0.45±0.05     |
| 10V                   | LMK107 BJ224□A       |      | RoHS                                              | 0.22                               | B/X5R*2                                | 3.5                                       |                                                                              |                                           |                          | 0.8±0.1       |
|                       | LMK107 BJ474□A       |      | RoHS                                              | 0.47                               | B/X5R*2                                | 3.5                                       |                                                                              |                                           |                          | 0.8±0.1       |
|                       | LMK107 BJ105□A*1     |      | RoHS                                              | 1                                  | B/X5R*2                                | 5                                         |                                                                              |                                           |                          | 0.8±0.1       |
|                       | LMK107 BJ225□A*1     |      | RoHS                                              | 2.2                                | B/X5R                                  | 10                                        |                                                                              |                                           | 0.8±0.1                  |               |
|                       | LMK107 BJ475□A*1     |      | RoHS                                              | 4.7                                | X5R                                    | 10                                        |                                                                              |                                           | 0.8±0.1                  |               |
| 6.3V                  | JMK107 BJ474□K       |      | RoHS                                              | 0.47                               | B/X5R                                  | 5                                         | R                                                                            |                                           |                          | 0.45±0.05     |
|                       | JMK107 BJ105□K*1     |      | RoHS                                              | 1                                  | B/X5R                                  | 10                                        |                                                                              |                                           | 0.45±0.05                |               |
|                       | JMK107 BJ225□K*1     |      | RoHS                                              | 2.2                                | X5R                                    | 10                                        |                                                                              |                                           | 0.45±0.05                |               |
|                       | JMK107 BJ475MK*1,*3  |      | RoHS                                              | 4.7                                | X5R                                    | 10                                        |                                                                              |                                           | ±20%                     | 0.45±0.05     |
|                       | JMK107 BJ225□A*1     |      | RoHS                                              | 2.2                                | B/X5R                                  | 10                                        |                                                                              |                                           | ±10%                     | 0.8±0.1       |
|                       | JMK107 BJ475□A*1     |      | RoHS                                              | 4.7                                | X5R                                    | 10                                        |                                                                              |                                           | ±20%                     | 0.8±0.1       |
|                       | JMK107 BJ106MA*1,*3  |      | RoHS                                              | 10                                 | X5R                                    | 10                                        |                                                                              |                                           | ±20%                     | 0.8+0.15/−0.1 |
| 4V                    | AMK107 BJ225□K*1     |      | RoHS                                              | 2.2                                | X5R                                    | 10                                        |                                                                              |                                           | ±10%<br>±20%             | 0.45±0.05     |
|                       | AMK107 BJ475MK*1     |      | RoHS                                              | 4.7                                | X5R                                    | 10                                        |                                                                              |                                           | ±20%                     | 0.45±0.05     |
|                       | AMK107 BJ106MA*1     |      | RoHS                                              | 10                                 | X5R                                    | 10                                        |                                                                              |                                           |                          | 0.8±0.1       |
|                       | AMK107 BJ226MA*1,*3  |      | RoHS                                              | 22                                 | X5R                                    | 10                                        |                                                                              |                                           |                          | 0.8±0.2       |

形名の□には静電容量許容差記号が入ります。

\*1 高温負荷試験の試験電圧は定格電圧の 1.5 倍

\*2 個別仕様の取扱いにより、X7R仕様に対応している場合があります。

\*3 ご使用の回路や機器により、個別仕様の取り交わしが必要になります。  
必ず正規販売チャンネルにお問い合わせください。

□ Please specify the capacitance tolerance code.

\*1 Test Voltage of Loading at high temperature test is 1.5 time of the rated voltage.

\*2 We may provide X7R for some items according to the individual specification.

\*3 The exchange of individual specification is necessary depending on the application and circuit condition. Please contact Taiyo Yuden sales channel.

【温度特性 Temp.char. B7:X7R】

| 定格電圧<br>Rated Voltage | 形 名<br>Ordering code |  | EHS<br>(Environmental<br>Hazardous<br>Substances) | 公 称<br>静電容量<br>Capacitance<br>〔μF〕 | 温度特性<br>Temperature<br>characteristics | tan δ<br>Dissipation<br>factor<br>〔%〕Max. | 実装条件<br>Soldering method<br>R:リフロー= Reflow soldering<br>W: フロー= Wave soldering | 静電容量<br>許 容 差<br>Capacitance<br>tolerance | 厚 み<br>Thickness<br>〔mm〕 |
|-----------------------|----------------------|--|---------------------------------------------------|------------------------------------|----------------------------------------|-------------------------------------------|--------------------------------------------------------------------------------|-------------------------------------------|--------------------------|
| 16V                   | EMK107 B7 224□A*1    |  | RoHS                                              | 0.22                               | X7R                                    | 3.5                                       | R/W                                                                            | ±10%<br>±20%                              | 0.8±0.1                  |
|                       | EMK107 B7 105□A*1    |  | RoHS                                              | 1                                  | X7R                                    | 5                                         | R                                                                              |                                           | 0.8±0.1                  |
| 10V                   | LMK107 B7 224□A      |  | RoHS                                              | 0.22                               | X7R                                    | 3.5                                       | R/W                                                                            |                                           | 0.8±0.1                  |
|                       | LMK107 B7 474□A      |  | RoHS                                              | 0.47                               | X7R                                    | 3.5                                       | R                                                                              |                                           | 0.8±0.1                  |
|                       | LMK107 B7 105□A*1    |  | RoHS                                              | 1                                  | X7R                                    | 5                                         |                                                                                |                                           | 0.8±0.1                  |
| 6.3V                  | JMK107 B7 224□A      |  | RoHS                                              | 0.22                               | X7R                                    | 3.5                                       | R/W                                                                            |                                           | 0.8±0.1                  |
|                       | JMK107 B7 474□A      |  | RoHS                                              | 0.47                               | X7R                                    | 3.5                                       | R                                                                              |                                           | 0.8±0.1                  |
|                       | JMK107 B7 105□A*1    |  | RoHS                                              | 1                                  | X7R                                    | 5                                         |                                                                                |                                           | 0.8±0.1                  |

形名の□には静電容量許容差記号が入ります。

\*1 高温負荷試験の試験電圧は定格電圧の 1.5 倍

□ Please specify the capacitance tolerance code.

\*1 Test Voltage of Loading at high temperature test is 1.5 time of the rated voltage.

【温度特性 Temp.char. F:F/Y5V】

| 定格電圧<br>Rated Voltage | 形 名<br>Ordering code |  | EHS<br>(Environmental<br>Hazardous<br>Substances) | 公 称<br>静電容量<br>Capacitance<br>〔μF〕 | 温度特性<br>Temperature<br>characteristics | tanδ<br>Dissipation<br>factor<br>〔%〕Max. | 実装条件<br>Soldering method<br>R:リフロー Reflow soldering<br>W: フロー Wave soldering | 静電容量<br>許 容 差<br>Capacitance<br>tolerance | 厚 み<br>Thickness<br>〔mm〕 |
|-----------------------|----------------------|--|---------------------------------------------------|------------------------------------|----------------------------------------|------------------------------------------|------------------------------------------------------------------------------|-------------------------------------------|--------------------------|
| 50V                   | UMK107 F104ZA        |  | RoHS                                              | 0.1                                | F/Y5V                                  | 7                                        | R/W                                                                          | +80%<br>−20%                              | 0.8±0.1                  |
| 25V                   | TMK107 F474ZA        |  | RoHS                                              | 0.47                               | F/Y5V                                  | 7                                        |                                                                              |                                           | 0.8±0.1                  |
|                       | EMK107 F224ZA        |  | RoHS                                              | 0.22                               | F/Y5V                                  | 7                                        |                                                                              |                                           | 0.8±0.1                  |
| 16V                   | EMK107 F474ZA        |  | RoHS                                              | 0.47                               | F/Y5V                                  | 7                                        |                                                                              |                                           | 0.8±0.1                  |
|                       | EMK107 F105ZA        |  | RoHS                                              | 1                                  | F/Y5V                                  | 16                                       | 0.8±0.1                                                                      |                                           |                          |
|                       | EMK107 F225ZA        |  | RoHS                                              | 2.2                                | F/Y5V                                  | 16                                       | 0.8±0.1                                                                      |                                           |                          |
| 10V                   | LMK107 F105ZA        |  | RoHS                                              | 1                                  | F/Y5V                                  | 16                                       | R                                                                            |                                           | 0.8±0.1                  |
|                       | LMK107 F225ZA        |  | RoHS                                              | 2.2                                | F/Y5V                                  | 16                                       |                                                                              | 0.8±0.1                                   |                          |

■ 212TYPE

【温度特性 Temp.char. BJ:B/X5R】

| 定格電圧<br>Rated Voltage | 形 名<br>Ordering code |      | EHS<br>(Environmental<br>Hazardous<br>Substances) | 公 称<br>静電容量<br>Capacitance<br>〔μF〕 | 温度特性<br>Temperature<br>characteristics | tanδ<br>Dissipation<br>factor<br>〔%〕Max. | 実装条件<br>Soldering method<br>R:リフロー Reflow soldering<br>W: フロー Wave soldering | 静電容量<br>許 容 差<br>Capacitance<br>tolerance | 厚 み<br>Thickness<br>〔mm〕 |
|-----------------------|----------------------|------|---------------------------------------------------|------------------------------------|----------------------------------------|------------------------------------------|------------------------------------------------------------------------------|-------------------------------------------|--------------------------|
| 50V                   | UMK212 BJ104□G       |      | RoHS                                              | 0.1                                | B/X5R*2                                | 3.5                                      | R/W                                                                          | ±10%<br>±20%                              | 1.25±0.1                 |
|                       | UMK212 BJ224□G*1     |      | RoHS                                              | 0.22                               | B/X5R*2                                | 3.5                                      |                                                                              |                                           | 1.25±0.1                 |
|                       | UMK212 BJ474□G*1     |      | RoHS                                              | 0.47                               | B/X5R                                  | 3.5                                      |                                                                              |                                           | 1.25±0.1                 |
|                       | UMK212 BJ105□G*1     |      | RoHS                                              | 1                                  | X5R                                    | 5                                        |                                                                              |                                           | 1.25±0.1                 |
| 35V                   | GMK212 BJ474□G       |      | RoHS                                              | 0.47                               | B/X5R                                  | 3.5                                      | R                                                                            |                                           | 1.25±0.1                 |
|                       | GMK212 BJ105□G*1     |      | RoHS                                              | 1                                  | B/X5R*2                                | 3.5                                      |                                                                              |                                           | 1.25±0.1                 |
| 25V                   | TMK212 BJ474□D       |      | RoHS                                              | 0.47                               | B/X5R                                  | 3.5                                      |                                                                              |                                           | 0.85±0.1                 |
|                       | TMK212 BJ105□D       |      | RoHS                                              | 1                                  | B/X5R                                  | 5                                        |                                                                              |                                           | 0.85±0.1                 |
|                       | TMK212 BJ105□G       |      | RoHS                                              | 1                                  | B/X5R                                  | 5                                        |                                                                              |                                           | 1.25±0.1                 |
|                       | TMK212 BJ225□G*1     |      | RoHS                                              | 2.2                                | B/X5R                                  | 5                                        |                                                                              |                                           | 1.25±0.1                 |
|                       | TMK212 BJ475□G*1     |      | RoHS                                              | 4.7                                | X5R                                    | 10                                       | 1.25±0.15                                                                    |                                           |                          |
| 16V                   | EMK212 BJ105□D       |      | RoHS                                              | 1                                  | B/X5R                                  | 5                                        | R                                                                            |                                           | 0.85±0.1                 |
|                       | EMK212 BJ225□D       |      | RoHS                                              | 2.2                                | B/X5R                                  | 5                                        |                                                                              | 0.85±0.1                                  |                          |
|                       | EMK212 BJ475□D*1,*3  |      | RoHS                                              | 4.7                                | B/X5R                                  | 10                                       | R/W                                                                          | 0.85±0.1                                  |                          |
|                       | EMK212 BJ105□G       |      | RoHS                                              | 1                                  | B/X5R*2                                | 3.5                                      |                                                                              | 1.25±0.1                                  |                          |
|                       | EMK212 BJ225□G       |      | RoHS                                              | 2.2                                | B/X5R*2                                | 5                                        | R                                                                            | 1.25±0.1                                  |                          |
|                       | EMK212 BJ475□G*1     |      | RoHS                                              | 4.7                                | B/X5R                                  | 5                                        |                                                                              | 1.25±0.15                                 |                          |
|                       | EMK212 BJ106□G*1,*3  |      | RoHS                                              | 10                                 | X5R                                    | 10                                       |                                                                              | 1.25±0.15                                 |                          |
| 10V                   | LMK212 BJ475□K*1     |      | RoHS                                              | 4.7                                | X5R                                    | 10                                       | R                                                                            | ±20%<br>±10%<br>±20%                      | 0.45±0.05                |
|                       | LMK212 BJ105□D       |      | RoHS                                              | 1                                  | B/X5R*2                                | 3.5                                      |                                                                              |                                           | 0.85±0.1                 |
|                       | LMK212 BJ225□D       |      | RoHS                                              | 2.2                                | B/X5R                                  | 5                                        |                                                                              |                                           | 0.85±0.1                 |
|                       | LMK212 BJ475□D       |      | RoHS                                              | 4.7                                | B/X5R                                  | 10                                       |                                                                              |                                           | 0.85±0.1                 |
|                       | LMK212 BJ106□D*1     |      | RoHS                                              | 10                                 | X5R                                    | 10                                       |                                                                              |                                           | 0.85±0.1                 |
|                       | LMK212 BJ105□G       |      | RoHS                                              | 1                                  | B/X5R*2                                | 3.5                                      | R/W                                                                          |                                           | 1.25±0.1                 |
|                       | LMK212 BJ225□G       |      | RoHS                                              | 2.2                                | B/X5R*2                                | 5                                        |                                                                              |                                           | 1.25±0.1                 |
|                       | LMK212 BJ475□G       |      | RoHS                                              | 4.7                                | B/X5R                                  | 5                                        |                                                                              |                                           | 1.25±0.15                |
|                       | LMK212 BJ106□G       |      | RoHS                                              | 10                                 | X5R                                    | 10                                       |                                                                              |                                           | 1.25±0.15                |
|                       | LMK212 BJ226MG*1,*3  |      | RoHS                                              | 22                                 | X5R                                    | 10                                       |                                                                              |                                           |                          |
| 6.3V                  | JMK212 BJ475□K*1     |      | RoHS                                              | 4.7                                | X5R                                    | 10                                       | R                                                                            | ±10%<br>±20%                              | 0.45±0.05                |
|                       | JMK212 BJ106MK*1,*3  |      | RoHS                                              | 10                                 | X5R                                    | 10                                       |                                                                              | ±20%                                      | 0.45±0.05                |
|                       | JMK212 BJ475□D       |      | RoHS                                              | 4.7                                | X5R                                    | 10                                       |                                                                              | ±10%<br>±20%                              | 0.85±0.1                 |
|                       | JMK212 BJ106□D       |      | RoHS                                              | 10                                 | X5R                                    | 10                                       |                                                                              | ±20%                                      | 0.85±0.1                 |
|                       | JMK212 BJ226MD*1,*3  |      | RoHS                                              | 22                                 | X5R                                    | 10                                       |                                                                              | ±10%<br>±20%                              | 1.25±0.15                |
|                       | JMK212 BJ475□G       |      | RoHS                                              | 4.7                                | B/X5R                                  | 5                                        |                                                                              | ±20%                                      | 1.25±0.15                |
|                       | JMK212 BJ106□G       |      | RoHS                                              | 10                                 | X5R                                    | 10                                       |                                                                              |                                           | 1.25±0.15                |
|                       | JMK212 BJ226MG*1,*3  |      | RoHS                                              | 22                                 | X5R                                    | 10                                       |                                                                              | ±20%                                      | 1.25±0.15                |
| JMK212 BJ476MG*1,*3   |                      | RoHS | 47                                                | X5R                                | 10                                     | 1.25±0.2                                 |                                                                              |                                           |                          |
| 4V                    | AMK212 BJ226MD*1     |      | RoHS                                              | 22                                 | X5R                                    | 10                                       |                                                                              | 0.85±0.1                                  |                          |

形名の□には静電容量許容差記号が入ります。

\*1 高温負荷試験の試験電圧は定格電圧の 1.5 倍

\*2 個別仕様の取扱いにより、X7R仕様に対応している場合があります。

\*3 ご使用の回路や機器により、個別仕様の取り交わしが必要になります。  
必ず正規販売チャンネルにお問い合わせください。

□ Please specify the capacitance tolerance code.

\*1 Test Voltage of Loading at high temperature test is 1.5 time of the rated voltage.

\*2 We may provide X7R for some items according to the individual specification.

\*3 The exchange of individual specification is necessary depending on the application and circuit condition. Please contact Taiyo Yuden sales channel.

【温度特性 Temp.char. B7:X7R】

| 定格電圧<br>Rated Voltage | 形 名<br>Ordering code          |  | EHS<br>(Environmental<br>Hazardous<br>Substances) | 公 称<br>静電容量<br>Capacitance<br>〔μF〕 | 温度特性<br>Temperature<br>characteristics | tanδ<br>Dissipation<br>factor<br>〔%〕Max. | 実装条件<br>Soldering method<br>R:リフロー Reflow soldering<br>W: フロー Wave soldering | 静電容量<br>許 容 差<br>Capacitance<br>tolerance | 厚 み<br>Thickness<br>〔mm〕 |
|-----------------------|-------------------------------|--|---------------------------------------------------|------------------------------------|----------------------------------------|------------------------------------------|------------------------------------------------------------------------------|-------------------------------------------|--------------------------|
| 50V                   | UMK212 B7 104□G               |  | RoHS                                              | 0.1                                | X7R                                    | 3.5                                      | R/W                                                                          | ±10%<br>±20%                              | 1.25±0.1                 |
|                       | UMK212 B7 224□G* <sup>1</sup> |  | RoHS                                              | 0.22                               | X7R                                    | 3.5                                      |                                                                              |                                           | 1.25±0.1                 |
|                       | UMK212 B7 474□G* <sup>1</sup> |  | RoHS                                              | 0.47                               | X7R                                    | 3.5                                      |                                                                              |                                           | 1.25±0.1                 |
| 35V                   | GMK212 B7 105□G* <sup>1</sup> |  | RoHS                                              | 1                                  | X7R                                    | 3.5                                      |                                                                              |                                           | 1.25±0.1                 |
| 25V                   | TMK212 B7 105□G* <sup>1</sup> |  | RoHS                                              | 1                                  | X7R                                    | 5                                        | R                                                                            |                                           | 1.25±0.1                 |
| 16V                   | EMK212 B7 474□D               |  | RoHS                                              | 0.47                               | X7R                                    | 3.5                                      | R/W                                                                          |                                           | 0.85±0.1                 |
|                       | EMK212 B7 105□D               |  | RoHS                                              | 1                                  | X7R                                    | 5                                        | R                                                                            |                                           | 0.85±0.1                 |
|                       | EMK212 B7 105□G               |  | RoHS                                              | 1                                  | X7R                                    | 3.5                                      | R/W                                                                          |                                           | 1.25±0.1                 |
|                       | EMK212 B7 225□G* <sup>1</sup> |  | RoHS                                              | 2.2                                | X7R                                    | 10                                       | R                                                                            |                                           | 1.25±0.1                 |
| 10V                   | LMK212 B7 105□D               |  | RoHS                                              | 1                                  | X7R                                    | 3.5                                      |                                                                              |                                           |                          |
|                       | LMK212 B7 105□G               |  | RoHS                                              | 1                                  | X7R                                    | 3.5                                      | R/W                                                                          |                                           | 1.25±0.1                 |
|                       | LMK212 B7 225□G               |  | RoHS                                              | 2.2                                | X7R                                    | 5                                        | R                                                                            |                                           | 1.25±0.1                 |
|                       | LMK212 B7 475□G* <sup>1</sup> |  | RoHS                                              | 4.7                                | X7R                                    | 10                                       | R/W                                                                          |                                           | 1.25±0.1                 |

形名の□には静電容量許容差記号が入ります。

□ Please specify the capacitance tolerance code.

\*1 高温負荷試験の試験電圧は定格電圧の 1.5 倍

\*1 Test Voltage of Loading at high temperature test is 1.5 time of the rated voltage.

【温度特性 Temp.char. F/Y5V】

| 定格電圧<br>Rated Voltage | 形 名<br>Ordering code |  | EHS<br>(Environmental<br>Hazardous<br>Substances) | 公 称<br>静電容量<br>Capacitance<br>〔μF〕 | 温度特性<br>Temperature<br>characteristics | tanδ<br>Dissipation<br>factor<br>〔%〕Max. | 実装条件<br>Soldering method<br>R:リフロー Reflow soldering<br>W: フロー Wave soldering | 静電容量<br>許 容 差<br>Capacitance<br>tolerance | 厚 み<br>Thickness<br>〔mm〕 |
|-----------------------|----------------------|--|---------------------------------------------------|------------------------------------|----------------------------------------|------------------------------------------|------------------------------------------------------------------------------|-------------------------------------------|--------------------------|
| 50V                   | UMK212 F224ZD        |  | RoHS                                              | 0.22                               | F/Y5V                                  | 7                                        | R/W                                                                          | +80%<br>-20%                              | 0.85±0.1                 |
|                       | UMK212 F474ZG        |  | RoHS                                              | 0.47                               | F/Y5V                                  | 7                                        |                                                                              |                                           | 1.25±0.1                 |
|                       | UMK212 F105ZG        |  | RoHS                                              | 1                                  | F/Y5V                                  | 7                                        |                                                                              |                                           | 1.25±0.1                 |
| 16V                   | EMK212 F225ZG        |  | RoHS                                              | 2.2                                | F/Y5V                                  | 7                                        | R                                                                            |                                           | 1.25±0.1                 |
| 10V                   | LMK212 F225ZD        |  | RoHS                                              | 2.2                                | F/Y5V                                  | 9                                        |                                                                              |                                           | 0.85±0.1                 |
|                       | LMK212 F475ZG        |  | RoHS                                              | 4.7                                | F/Y5V                                  | 9                                        |                                                                              |                                           | 1.25±0.1                 |
|                       | LMK212 F106ZG        |  | RoHS                                              | 10                                 | F/Y5V                                  | 16                                       |                                                                              |                                           | 1.25±0.1                 |
| 6.3V                  | JMK212 F475ZD        |  | RoHS                                              | 4.7                                | F/Y5V                                  | 16                                       |                                                                              |                                           | 0.85±0.1                 |
|                       | JMK212 F106ZG        |  | RoHS                                              | 10                                 | F/Y5V                                  | 16                                       |                                                                              |                                           | 1.25±0.1                 |

■ 316TYPE

【温度特性 Temp.char. BJ:B/X5R】

| 定格電圧<br>Rated Voltage | 形 名<br>Ordering code            |  | EHS<br>(Environmental<br>Hazardous<br>Substances) | 公 称<br>静電容量<br>Capacitance<br>〔μF〕 | 温度特性<br>Temperature<br>characteristics | tan δ<br>Dissipation<br>factor<br>〔%〕Max. | 実装条件<br>Soldering method<br>R:リフロー Reflow soldering<br>W: フロー Wave soldering | 静電容量<br>許 容 差<br>Capacitance<br>tolerance | 厚 み<br>Thickness<br>〔mm〕 |          |          |
|-----------------------|---------------------------------|--|---------------------------------------------------|------------------------------------|----------------------------------------|-------------------------------------------|------------------------------------------------------------------------------|-------------------------------------------|--------------------------|----------|----------|
| 50V                   | UMK316 BJ224□L                  |  | RoHS                                              | 0.22                               | B/X5R <sup>*2</sup>                    | 2.5                                       | R/W                                                                          |                                           | 1.6±0.2                  |          |          |
|                       | UMK316 BJ474□L                  |  | RoHS                                              | 0.47                               | B/X5R <sup>*2</sup>                    | 3.5                                       |                                                                              |                                           | 1.6±0.2                  |          |          |
|                       | UMK316 BJ105□L                  |  | RoHS                                              | 1                                  | B/X5R <sup>*2</sup>                    | 3.5                                       |                                                                              |                                           | 1.6±0.2                  |          |          |
|                       | UMK316 BJ475□L <sup>*1</sup>    |  | RoHS                                              | 4.7                                | X5R                                    | 10                                        |                                                                              |                                           | 1.6±0.2                  |          |          |
| 25V                   | TMK316 BJ105□D                  |  | RoHS                                              | 1                                  | B/X5R                                  | 3.5                                       | R                                                                            | ±10%<br>±20%                              | 0.85±0.1                 |          |          |
|                       | TMK316 BJ225□D <sup>*1</sup>    |  | RoHS                                              | 2.2                                | B/X5R                                  | 3.5                                       |                                                                              |                                           | 0.85±0.1                 |          |          |
|                       | TMK316 BJ475□D <sup>*1</sup>    |  | RoHS                                              | 4.7                                | X5R                                    | 5                                         |                                                                              |                                           | 0.85±0.1                 |          |          |
|                       | TMK316 BJ225□L                  |  | RoHS                                              | 2.2                                | B/X5R <sup>*2</sup>                    | 3.5                                       |                                                                              |                                           | 1.6±0.2                  |          |          |
|                       | TMK316 BJ475□L <sup>*1</sup>    |  | RoHS                                              | 4.7                                | B/X5R                                  | 5                                         |                                                                              |                                           | 1.6±0.2                  |          |          |
|                       | TMK316 BJ106□L <sup>*1</sup>    |  | RoHS                                              | 10                                 | X5R                                    | 5                                         |                                                                              |                                           | 1.6±0.2                  |          |          |
|                       |                                 |  |                                                   |                                    |                                        |                                           |                                                                              |                                           |                          |          |          |
| 16V                   | EMK316 BJ225□D                  |  | RoHS                                              | 2.2                                | B/X5R                                  | 3.5                                       |                                                                              |                                           |                          |          | 0.85±0.1 |
|                       | EMK316 BJ475□D                  |  | RoHS                                              | 4.7                                | X5R                                    | 5                                         |                                                                              |                                           |                          |          | 0.85±0.1 |
|                       | EMK316 BJ106□D <sup>*1</sup>    |  | RoHS                                              | 10                                 | X5R                                    | 10                                        |                                                                              |                                           |                          |          | 0.85±0.1 |
|                       | EMK316 BJ105□F                  |  | RoHS                                              | 1                                  | B/X5R <sup>*2</sup>                    | 3.5                                       |                                                                              |                                           | R/W                      |          | 1.15±0.1 |
|                       | EMK316 BJ106□F <sup>*1</sup>    |  | RoHS                                              | 10                                 | X5R                                    | 10                                        |                                                                              |                                           | R                        |          | 1.15±0.1 |
|                       | EMK316 BJ225□L                  |  | RoHS                                              | 2.2                                | B/X5R <sup>*2</sup>                    | 3.5                                       |                                                                              |                                           | R/W                      |          | 1.6±0.2  |
|                       | EMK316 BJ475□L                  |  | RoHS                                              | 4.7                                | B/X5R                                  | 5                                         |                                                                              |                                           |                          |          | 1.6±0.2  |
|                       | EMK316 BJ106□L <sup>*1</sup>    |  | RoHS                                              | 10                                 | B/X5R                                  | 5                                         | 1.6±0.2                                                                      |                                           |                          |          |          |
|                       | EMK316 BJ226ML <sup>*1</sup>    |  | RoHS                                              | 22                                 | B/X5R                                  | 10                                        | ±20%                                                                         | 1.6±0.2                                   |                          |          |          |
| 10V                   | LMK316 BJ475□D                  |  | RoHS                                              | 4.7                                | B/X5R                                  | 5                                         | R                                                                            |                                           | ±10%                     | 0.85±0.1 |          |
|                       | LMK316 BJ106□D                  |  | RoHS                                              | 10                                 | B/X5R                                  | 10                                        |                                                                              |                                           | ±20%                     | 0.85±0.1 |          |
|                       | LMK316 BJ226MD <sup>*1,*3</sup> |  | RoHS                                              | 22                                 | X5R                                    | 10                                        |                                                                              |                                           | ±20%                     | 0.85±0.1 |          |
|                       | LMK316 BJ106□L                  |  | RoHS                                              | 10                                 | B/X5R                                  | 5                                         |                                                                              |                                           | ±10%<br>±20%             | 1.6±0.2  |          |
|                       | LMK316 BJ226ML <sup>*1</sup>    |  | RoHS                                              | 22                                 | B/X5R                                  | 10                                        |                                                                              |                                           | ±20%                     | 1.6±0.2  |          |
|                       | LMK316 BJ476ML <sup>*1,*3</sup> |  | RoHS                                              | 47                                 | X5R                                    | 10                                        |                                                                              |                                           |                          | 1.6±0.2  |          |
| 6.3V                  | JMK316 BJ106□D                  |  | RoHS                                              | 10                                 | B/X5R                                  | 10                                        |                                                                              |                                           | ±10%<br>±20%             | 0.85±0.1 |          |
|                       | JMK316 BJ226MD <sup>*1,*3</sup> |  | RoHS                                              | 22                                 | X5R                                    | 10                                        |                                                                              |                                           |                          | ±20%     | 0.85±0.1 |
|                       | JMK316 BJ476MD <sup>*1,*3</sup> |  | RoHS                                              | 47                                 | X5R                                    | 10                                        |                                                                              |                                           | ±10%<br>±20%             |          | 1.6±0.2  |
|                       | JMK316 BJ106□L                  |  | RoHS                                              | 10                                 | B/X5R <sup>*2</sup>                    | 5                                         |                                                                              |                                           |                          | 1.6±0.2  |          |
|                       | JMK316 BJ226□L                  |  | RoHS                                              | 22                                 | B/X5R                                  | 10                                        |                                                                              |                                           | ±20%                     | 1.6±0.2  |          |
|                       | JMK316 BJ476ML <sup>*3</sup>    |  | RoHS                                              | 47                                 | X5R                                    | 10                                        |                                                                              |                                           |                          | 1.6±0.2  |          |
|                       | JMK316 BJ107ML <sup>*1,*3</sup> |  | RoHS                                              | 100                                | X5R                                    | 10                                        |                                                                              |                                           |                          | 1.6±0.2  |          |
| 4V                    | AMK316 BJ107ML <sup>*1</sup>    |  | RoHS                                              | 100                                | X5R                                    | 10                                        |                                                                              |                                           |                          |          | 1.6±0.2  |

形名の□には静電容量許容差記号が入ります。

\*1 高温負荷試験の試験電圧は定格電圧の 1.5 倍

\*2 個別仕様の取扱いにより、X7R仕様に該当している場合があります。

\*3 ご使用の回路や機器により、個別仕様の取り交わしが必要になります。  
必ず正規販売チャンネルにお問い合わせください。

□ Please specify the capacitance tolerance code.

\*1 Test Voltage of Loading at high temperature test is 1.5 time of the rated voltage.

\*2 We may provide X7R for some items according to the individual specification.

\*3 The exchange of individual specification is necessary depending on the application and circuit condition. Please contact Taiyo Yuden sales channel.

【温度特性 Temp.char. B7:X7R】

| 定格電圧<br>Rated Voltage | 形 名<br>Ordering code |  | EHS<br>(Environmental<br>Hazardous<br>Substances) | 公 称<br>静電容量<br>Capacitance<br>〔μF〕 | 温度特性<br>Temperature<br>characteristics | tanδ<br>Dissipation<br>factor<br>〔%〕Max. | 実装条件<br>Soldering method<br>R:リフロー- Reflow soldering<br>W: フロ- Wave soldering | 静電容量<br>許 容 差<br>Capacitance<br>tolerance | 厚 み<br>Thickness<br>〔mm〕 |
|-----------------------|----------------------|--|---------------------------------------------------|------------------------------------|----------------------------------------|------------------------------------------|-------------------------------------------------------------------------------|-------------------------------------------|--------------------------|
| 50V                   | UMK316 B7 224□L      |  | RoHS                                              | 0.22                               | X7R                                    | 2.5                                      | R/W                                                                           | ±10%<br>±20%                              | 1.6±0.2                  |
|                       | UMK316 B7 474□L      |  | RoHS                                              | 0.47                               | X7R                                    | 3.5                                      |                                                                               |                                           | 1.6±0.2                  |
|                       | UMK316 B7 105□L      |  | RoHS                                              | 1                                  | X7R                                    | 3.5                                      |                                                                               |                                           | 1.6±0.2                  |
| 25V                   | TMK316 B7 224□F      |  | RoHS                                              | 0.22                               | X7R                                    | 2.5                                      | R                                                                             |                                           | 1.15±0.1                 |
|                       | TMK316 B7 105□L      |  | RoHS                                              | 1                                  | X7R                                    | 3.5                                      |                                                                               |                                           | 1.6±0.2                  |
|                       | TMK316 B7 225□L      |  | RoHS                                              | 2.2                                | X7R                                    | 3.5                                      |                                                                               |                                           | 1.6±0.2                  |
| 16V                   | TMK316 B7 106□L*1    |  | RoHS                                              | 10                                 | X7R                                    | 10                                       | R/W                                                                           |                                           | 1.6±0.2                  |
|                       | EMK316 B7 105□F      |  | RoHS                                              | 1                                  | X7R                                    | 3.5                                      |                                                                               |                                           | 1.15±0.1                 |
|                       | EMK316 B7 225□L      |  | RoHS                                              | 2.2                                | X7R                                    | 3.5                                      |                                                                               |                                           | 1.6±0.2                  |
| 10V                   | EMK316 B7 106□L*1    |  | RoHS                                              | 10                                 | X7R                                    | 10                                       | R                                                                             |                                           | 1.6±0.2                  |
|                       | LMK316 B7 225□L      |  | RoHS                                              | 2.2                                | X7R                                    | 3.5                                      | R/W                                                                           |                                           | 1.6±0.2                  |
|                       | LMK316 B7 475□L      |  | RoHS                                              | 4.7                                | X7R                                    | 5                                        | R                                                                             |                                           | 1.6±0.2                  |
| 6.3V                  | LMK316 B7 106□L*1    |  | RoHS                                              | 10                                 | X7R                                    | 5                                        |                                                                               | 1.6±0.2                                   |                          |
|                       | JMK316 B7 106□L      |  | RoHS                                              | 10                                 | X7R                                    | 5                                        |                                                                               | 1.6±0.2                                   |                          |

形名の□には静電容量許容差記号が入ります。

\*1 高温負荷試験の試験電圧は定格電圧の 1.5 倍

□ Please specify the capacitance tolerance code.

\*1 Test Voltage of Loading at high temperature test is 1.5 time of the rated voltage.

【温度特性 Temp.char. F:F/Y5V】

| 定格電圧<br>Rated Voltage | 形 名<br>Ordering code |  | EHS<br>(Environmental<br>Hazardous<br>Substances) | 公 称<br>静電容量<br>Capacitance<br>〔μF〕 | 温度特性<br>Temperature<br>characteristics | tanδ<br>Dissipation<br>factor<br>〔%〕Max. | 実装条件<br>Soldering method<br>R:リフロー Reflow soldering<br>W: フロー Wave soldering | 静電容量<br>許 容 差<br>Capacitance<br>tolerance | 厚 み<br>Thickness<br>〔mm〕 |
|-----------------------|----------------------|--|---------------------------------------------------|------------------------------------|----------------------------------------|------------------------------------------|------------------------------------------------------------------------------|-------------------------------------------|--------------------------|
| 50V                   | UMK316 F225ZG        |  | RoHS                                              | 2.2                                | F/Y5V                                  | 7                                        | R/W                                                                          | +80%<br>-20%                              | 1.25±0.1                 |
| 35V                   | GMK316 F475ZG        |  | RoHS                                              | 4.7                                | F/Y5V                                  | 7                                        | R                                                                            |                                           | 1.25±0.1                 |
|                       | GMK316 F106ZL        |  | RoHS                                              | 10                                 | F/Y5V                                  | 9                                        |                                                                              |                                           | 1.6±0.2                  |
| 25V                   | TMK316 F106ZL        |  | RoHS                                              | 10                                 | F/Y5V                                  | 9                                        |                                                                              |                                           | 1.6±0.2                  |
| 16V                   | EMK316 F106ZL        |  | RoHS                                              | 10                                 | F/Y5V                                  | 9                                        |                                                                              |                                           | 1.6±0.2                  |
| 10V                   | LMK316 F475ZD        |  | RoHS                                              | 4.7                                | F/Y5V                                  | 9                                        |                                                                              |                                           | 0.85±0.1                 |
|                       | LMK316 F106ZF        |  | RoHS                                              | 10                                 | F/Y5V                                  | 16                                       |                                                                              |                                           | 1.15±0.1                 |
|                       | LMK316 F226ZL        |  | RoHS                                              | 22                                 | F/Y5V                                  | 16                                       |                                                                              |                                           | 1.6±0.2                  |
| 6.3V                  | JMK316 F106ZD        |  | RoHS                                              | 10                                 | F/Y5V                                  | 16                                       |                                                                              |                                           | 0.85±0.1                 |

■ 325TYPE

【温度特性 Temp.char. BJ:B/X5R】

| 定格電圧<br>Rated Voltage | 形 名<br>Ordering code            |  | EHS<br>(Environmental<br>Hazardous<br>Substances) | 公 称<br>静電容量<br>Capacitance<br>〔μF〕 | 温度特性<br>Temperature<br>characteristics | tanδ<br>Dissipation<br>factor<br>〔%〕Max. | 実装条件<br>Soldering method<br>R:リフロー Reflow soldering<br>W: フロー Wave soldering | 静電容量<br>許 容 差<br>Capacitance<br>tolerance | 厚 み<br>Thickness<br>〔mm〕 |
|-----------------------|---------------------------------|--|---------------------------------------------------|------------------------------------|----------------------------------------|------------------------------------------|------------------------------------------------------------------------------|-------------------------------------------|--------------------------|
| 50V                   | UMK325 BJ105□H                  |  | RoHS                                              | 1                                  | B/X5R <sup>*2</sup>                    | 3.5                                      | R/W                                                                          | ±10%<br>±20%                              | 1.5±0.1                  |
|                       | UMK325 BJ475MM <sup>*1</sup>    |  | RoHS                                              | 4.7                                | X5R                                    | 5                                        | R                                                                            | ±20%                                      | 2.5±0.2                  |
|                       | UMK325 BJ106MM <sup>*1</sup>    |  | RoHS                                              | 10                                 | X5R                                    | 5                                        |                                                                              |                                           | 2.5±0.2                  |
| 35V                   | GMK325 BJ225MN                  |  | RoHS                                              | 2.2                                | B/X5R                                  | 3.5                                      |                                                                              |                                           | 1.9±0.2                  |
|                       | GMK325 BJ475MN <sup>*1</sup>    |  | RoHS                                              | 4.7                                | X5R                                    | 10                                       |                                                                              |                                           | 1.9±0.2                  |
|                       | GMK325 BJ106MN <sup>*1</sup>    |  | RoHS                                              | 10                                 | B/X5R                                  | 5                                        |                                                                              |                                           | 1.9±0.2                  |
| 25V                   | TMK325 BJ106MD <sup>*1</sup>    |  | RoHS                                              | 10                                 | B/X5R                                  | 5                                        |                                                                              |                                           | 0.85±0.1                 |
|                       | TMK325 BJ225MH                  |  | RoHS                                              | 2.2                                | B/X5R <sup>*2</sup>                    | 3.5                                      |                                                                              |                                           | 1.5±0.1                  |
|                       | TMK325 BJ335MN                  |  | RoHS                                              | 3.3                                | B/X5R <sup>*2</sup>                    | 3.5                                      |                                                                              |                                           | 1.9±0.2                  |
|                       | TMK325 BJ475MN                  |  | RoHS                                              | 4.7                                | B/X5R <sup>*2</sup>                    | 3.5                                      |                                                                              |                                           | 1.9±0.2                  |
|                       | TMK325 BJ106MN                  |  | RoHS                                              | 10                                 | B/X5R                                  | 5                                        |                                                                              |                                           | 1.9±0.2                  |
|                       | TMK325 BJ106MM <sup>*1</sup>    |  | RoHS                                              | 10                                 | B/X5R                                  | 3.5                                      |                                                                              |                                           | 2.5±0.2                  |
| 16V                   | EMK325 BJ106MD <sup>*1</sup>    |  | RoHS                                              | 10                                 | B/X5R                                  | 5                                        |                                                                              |                                           | 0.85±0.1                 |
|                       | EMK325 BJ226MD <sup>*1,*3</sup> |  | RoHS                                              | 22                                 | B/X5R                                  | 10                                       |                                                                              |                                           | 0.85±0.1                 |
|                       | EMK325 BJ475MN                  |  | RoHS                                              | 4.7                                | B/X5R <sup>*2</sup>                    | 3.5                                      |                                                                              |                                           | 1.9±0.2                  |
|                       | EMK325 BJ106MN                  |  | RoHS                                              | 10                                 | B/X5R                                  | 3.5                                      |                                                                              |                                           | 1.9±0.2                  |
|                       | EMK325 BJ226MM <sup>*1</sup>    |  | RoHS                                              | 22                                 | B/X5R                                  | 5                                        |                                                                              |                                           | 2.5±0.2                  |
|                       | EMK325 BJ476MM <sup>*1</sup>    |  | RoHS                                              | 47                                 | X5R                                    | 10                                       |                                                                              |                                           | 2.5±0.2                  |
| 10V                   | LMK325 BJ335MD                  |  | RoHS                                              | 3.3                                | B/X5R                                  | 3.5                                      |                                                                              |                                           | 0.85±0.1                 |
|                       | LMK325 BJ475MD                  |  | RoHS                                              | 4.7                                | B/X5R                                  | 5                                        |                                                                              |                                           | 0.85±0.1                 |
|                       | LMK325 BJ106MD <sup>*1</sup>    |  | RoHS                                              | 10                                 | B/X5R                                  | 5                                        |                                                                              |                                           | 0.85±0.1                 |
|                       | LMK325 BJ226MY <sup>*1</sup>    |  | RoHS                                              | 22                                 | B/X5R                                  | 5                                        |                                                                              |                                           | 1.9±0.1/-0.2             |
|                       | LMK325 BJ106MN                  |  | RoHS                                              | 10                                 | B/X5R <sup>*2</sup>                    | 3.5                                      |                                                                              |                                           | 1.9±0.2                  |
|                       | LMK325 BJ226MM                  |  | RoHS                                              | 22                                 | B/X5R                                  | 5                                        |                                                                              |                                           | 2.5±0.2                  |
|                       | LMK325 BJ476MM <sup>*1</sup>    |  | RoHS                                              | 47                                 | X5R                                    | 10                                       |                                                                              |                                           | 2.5±0.2                  |
|                       | LMK325 BJ107MM <sup>*1,*3</sup> |  | RoHS                                              | 100                                | X5R                                    | 10                                       |                                                                              |                                           | 2.5±0.3                  |
| 6.3V                  | JMK325 BJ226MY                  |  | RoHS                                              | 22                                 | B/X5R                                  | 5                                        |                                                                              |                                           | 1.9±0.1/-0.2             |
|                       | JMK325 BJ107MY <sup>*1,*3</sup> |  | RoHS                                              | 100                                | X5R                                    | 10                                       |                                                                              |                                           | 1.9±0.1/-0.2             |
|                       | JMK325 BJ476MN <sup>*1</sup>    |  | RoHS                                              | 47                                 | X5R                                    | 10                                       |                                                                              |                                           | 1.9±0.2                  |
|                       | JMK325 BJ476MM <sup>*1</sup>    |  | RoHS                                              | 47                                 | X5R                                    | 10                                       |                                                                              |                                           | 2.5±0.2                  |
|                       | JMK325 BJ107MM <sup>*1</sup>    |  | RoHS                                              | 100                                | X5R                                    | 10                                       |                                                                              |                                           | 2.5±0.3                  |

形名の□には静電容量許容差記号が入ります。

\*1 高温負荷試験の試験電圧は定格電圧の 1.5 倍

\*2 個別仕様の取交しにより、X7R仕様に対応している場合があります。

\*3 ご使用の回路や機器により、個別仕様の取交しが必要になります。  
必ず正規販売チャンネルにお問い合わせください。

□ Please specify the capacitance tolerance code.

\*1 Test Voltage of Loading at high temperature test is 1.5 time of the rated voltage.

\*2 We may provide X7R for some items according to the individual specification.

\*3 The exchange of individual specification is necessary depending on the application and circuit condition. Please contact Taiyo Yuden sales channel.

【温度特性 Temp.char. B7:X7R】

| 定格電圧<br>Rated Voltage | 形 名<br>Ordering code          |  | EHS<br>(Environmental<br>Hazardous<br>Substances) | 公 称<br>静電容量<br>Capacitance<br>[ $\mu$ F] | 温度特性<br>Temperature<br>characteristics | $\tan \delta$<br>Dissipation<br>factor<br>[%] Max. | 実装条件<br>Soldering method<br>R: リフロー Reflow soldering<br>W: フロー Wave soldering | 静電容量<br>許 容 差<br>Capacitance<br>tolerance | 厚 み<br>Thickness<br>[mm] |
|-----------------------|-------------------------------|--|---------------------------------------------------|------------------------------------------|----------------------------------------|----------------------------------------------------|-------------------------------------------------------------------------------|-------------------------------------------|--------------------------|
| 50V                   | UMK325 B7 105□H               |  | RoHS                                              | 1                                        | X7R                                    | 3.5                                                | R/W                                                                           | ±10%<br>±20%                              | 1.5±0.1                  |
| 25V                   | TMK325 B7 225MH               |  | RoHS                                              | 2.2                                      | X7R                                    | 3.5                                                | R                                                                             | ±20%                                      | 1.5±0.1                  |
|                       | TMK325 B7 335MN               |  | RoHS                                              | 3.3                                      | X7R                                    | 3.5                                                |                                                                               |                                           | 1.9±0.2                  |
|                       | TMK325 B7 475MN* <sup>1</sup> |  | RoHS                                              | 4.7                                      | X7R                                    | 3.5                                                |                                                                               |                                           | 1.9±0.2                  |
|                       | TMK325 B7 106MN* <sup>1</sup> |  | RoHS                                              | 10                                       | X7R                                    | 5                                                  |                                                                               |                                           | 1.9±0.2                  |
| 16V                   | EMK325 B7 475MN               |  | RoHS                                              | 4.7                                      | X7R                                    | 3.5                                                |                                                                               |                                           | 1.9±0.2                  |
| 10V                   | LMK325 B7 106MN               |  | RoHS                                              | 10                                       | X7R                                    | 3.5                                                |                                                                               |                                           | 1.9±0.2                  |

形名の□には静電容量許容差記号が入ります。

\*<sup>1</sup> 高温負荷試験の試験電圧は定格電圧の 1.5 倍

□ Please specify the capacitance tolerance code.

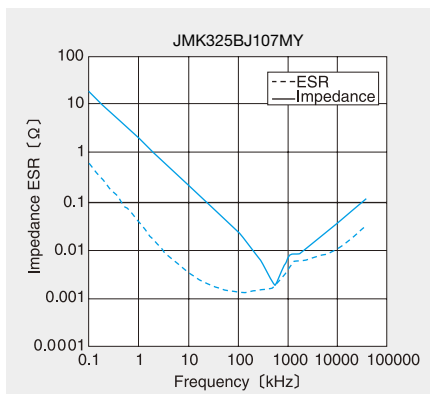
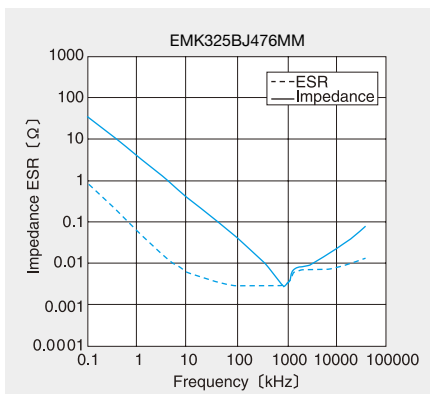
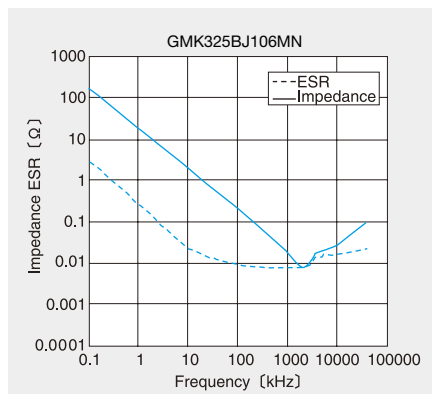
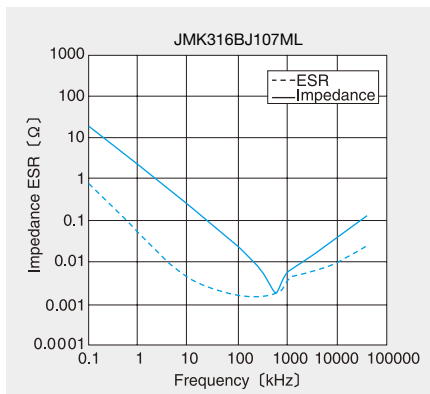
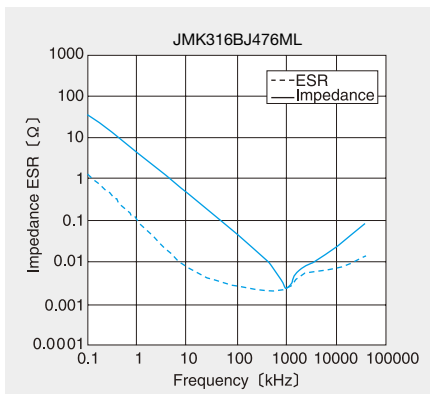
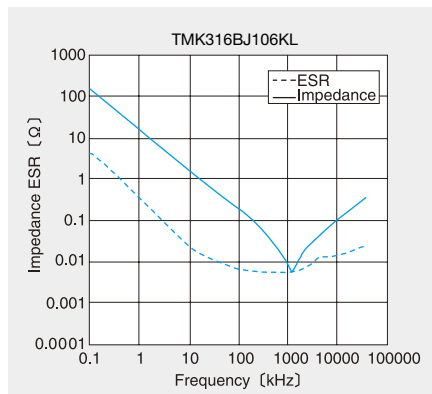
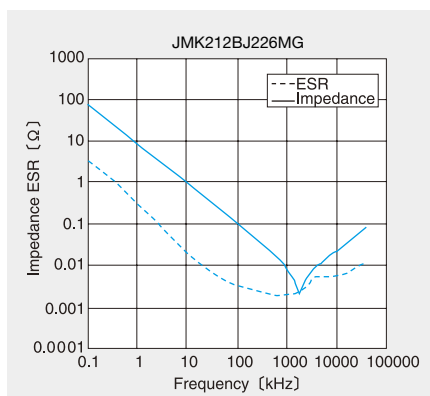
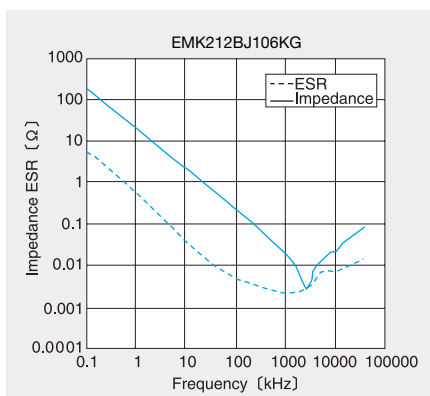
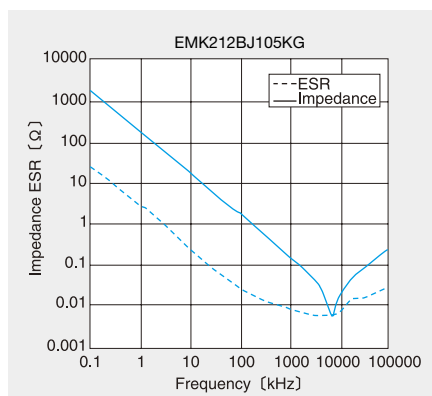
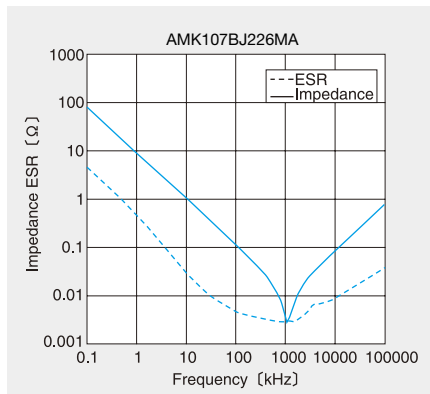
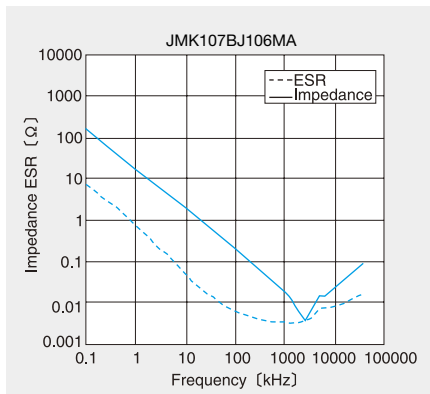
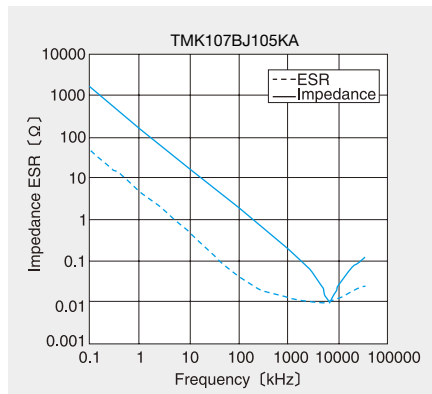
\*<sup>1</sup> Test Voltage of Loading at high temperature test is 1.5 time of the rated voltage.

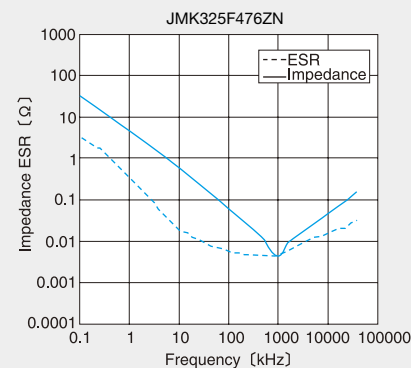
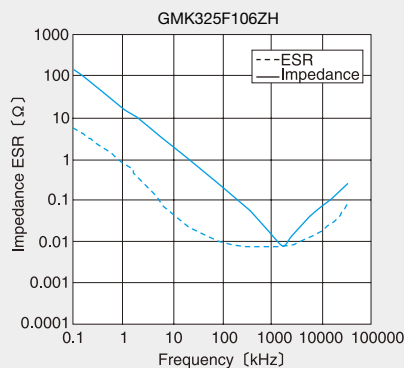
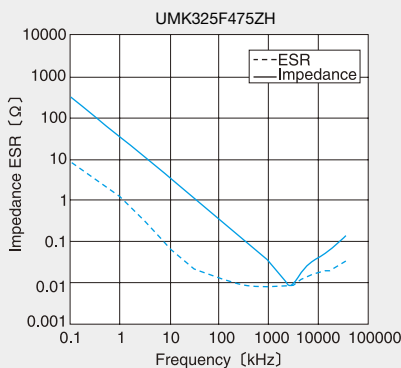
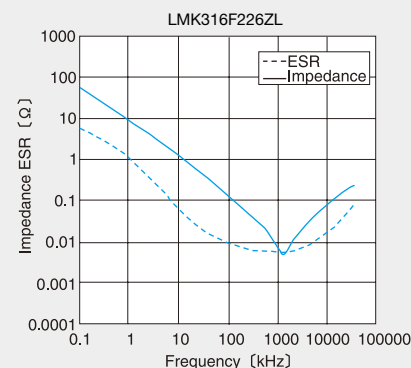
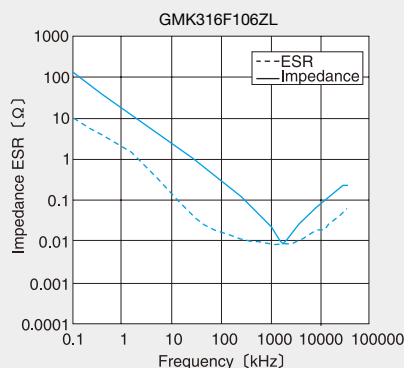
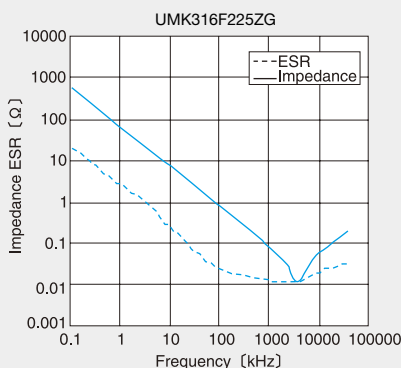
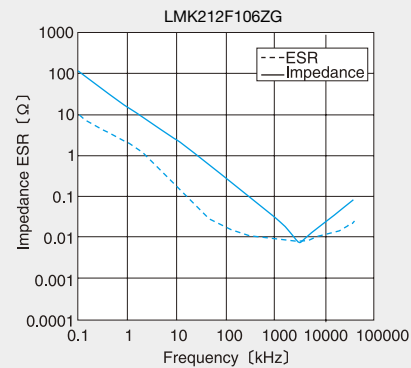
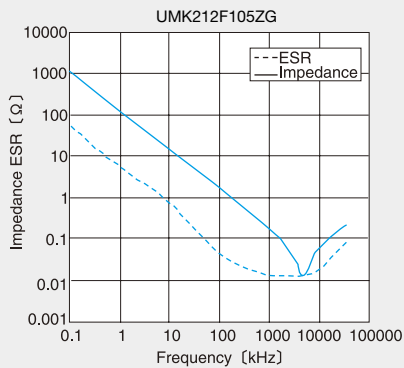
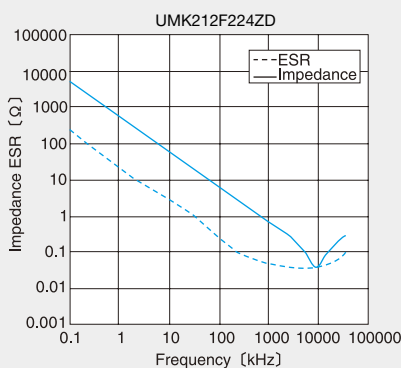
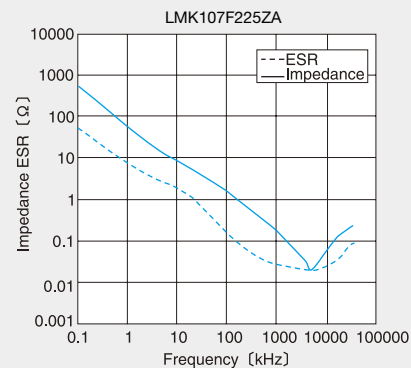
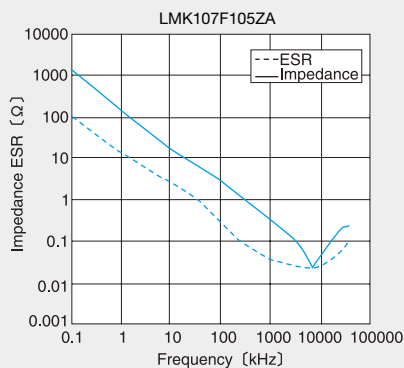
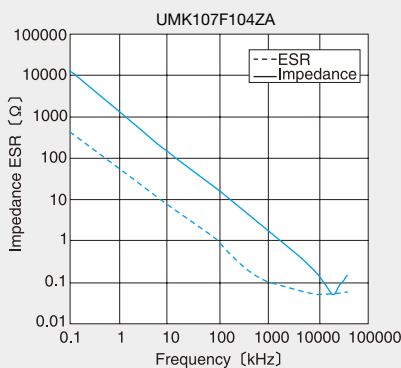
【温度特性 Temp.char. F:F/Y5V】

| 定格電圧<br>Rated Voltage | 形 名<br>Ordering code |  | EHS<br>(Environmental<br>Hazardous<br>Substances) | 公 称<br>静電容量<br>Capacitance<br>[ $\mu$ F] | 温度特性<br>Temperature<br>characteristics | $\tan \delta$<br>Dissipation<br>factor<br>[%] Max. | 実装条件<br>Soldering method<br>R: リフロー Reflow soldering<br>W: フロー Wave soldering | 静電容量<br>許 容 差<br>Capacitance<br>tolerance | 厚 み<br>Thickness<br>[mm] |
|-----------------------|----------------------|--|---------------------------------------------------|------------------------------------------|----------------------------------------|----------------------------------------------------|-------------------------------------------------------------------------------|-------------------------------------------|--------------------------|
| 50V                   | UMK325 F475ZH        |  | RoHS                                              | 4.7                                      | F/Y5V                                  | 7                                                  | R                                                                             | +80%<br>-20%                              | 1.5±0.1                  |
| 35V                   | GMK325 F106ZH        |  | RoHS                                              | 10                                       | F/Y5V                                  | 7                                                  |                                                                               |                                           | 1.5±0.1                  |
| 16V                   | EMK325 F226ZN        |  | RoHS                                              | 22                                       | F/Y5V                                  | 16                                                 |                                                                               |                                           | 1.9±0.2                  |
| 10V                   | LMK325 F106ZF        |  | RoHS                                              | 10                                       | F/Y5V                                  | 16                                                 |                                                                               |                                           | 1.15±0.1                 |
|                       | LMK325 F226ZN        |  | RoHS                                              | 22                                       | F/Y5V                                  | 16                                                 |                                                                               |                                           | 1.9±0.2                  |
| 6.3V                  | JMK325 F476ZN        |  | RoHS                                              | 47                                       | F/Y5V                                  | 16                                                 |                                                                               |                                           | 1.9±0.2                  |

インピーダンス・ESR—周波数特性例 Example of Impedance ESR vs. Frequency characteristics

・当社積層セラミックコンデンサ例 (Taiyo Yuden multilayer ceramic capacitor)





# 一般積層セラミックコンデンサ (温度補償用・Class 1) STANDARD MULTILAYER CERAMIC CAPACITORS (CLASS1: TEMPERATURE COMPENSATING DIELECTRIC TYPE)

OPERATING TEMP. -55~+125°C



リフロー／REFLOW

## 特長 FEATURES

- ・実装密度の向上が図れます
- ・モノリシックの構造のため、信頼性が高い
- ・同一形状、静電容量範囲が広い

- ・ Improve Higher Mounting Densities.
- ・ Multilayer block structure provides higher reliability
- ・ A wide range of capacitance values available in standard case sizes.

## 用途 APPLICATIONS

- ・一般電子機器用
- ・通信機器用(携帯電話、PHS、コードレス電話 etc.)

- ・ General electronic equipment
- ・ Communication equipment (cellular phone, PHS, other wireless applications, etc.)

## 形名表記法 ORDERING CODE

1

定格電圧 [VDC]

|   |    |
|---|----|
| E | 16 |
| T | 25 |
| U | 50 |

2

シリーズ名

|   |         |
|---|---------|
| M | 積層コンデンサ |
|---|---------|

3

端子電極

|   |      |
|---|------|
| K | メッキ品 |
|---|------|

4

形状寸法(EIA) L×W [mm]

|             |         |
|-------------|---------|
| 042 (01005) | 0.4×0.2 |
| 063 (0201)  | 0.6×0.3 |
| 105 (0402)  | 1.0×0.5 |

5

温度特性 [ppm/°C]

|     |                    |        |
|-----|--------------------|--------|
| C□  | 0 : CG, CH, CJ, CK |        |
| R□  | -220 : RH、         |        |
| S□  | -330 : SH, SJ, SK  | G ±30  |
| T□  | -470 : TJ, TK      | H ±60  |
| U□  | -750 : UJ, UK      | J ±120 |
| S L | +350~-1000         | K ±250 |

□=許容差

6

公称静電容量 [pF]

|     |     |
|-----|-----|
| 例   |     |
| 0R5 | 0.5 |
| 010 | 1   |
| 100 | 10  |

※R=小数点

7

容量許容差

|   |           |
|---|-----------|
| C | ± 0.25 pF |
| D | ± 0.5 pF  |
| F | ± 1 pF    |
| J | ± 5 %     |
| K | ± 10 %    |

8

製品厚み [mm]

|   |     |
|---|-----|
| C | 0.2 |
| P | 0.3 |
| V | 0.5 |
| W | 0.5 |

9

個別仕様

|   |    |
|---|----|
| — | 標準 |
|---|----|

10

包装

|   |                          |
|---|--------------------------|
| F | φ178mm テーピング<br>(2mmピッチ) |
|---|--------------------------|

11

当社管理記号

|   |     |
|---|-----|
| △ | 標準品 |
|---|-----|

△=スペース

|   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |
|---|---|---|---|---|---|---|---|---|----|----|---|---|---|---|---|
| U | M | K | 1 | 0 | 5 | C | H | 1 | 0  | 1  | J | V | — | F | △ |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |   |   |   |   |   |

1

Rated voltage [VDC]

|   |    |
|---|----|
| E | 16 |
| T | 25 |
| U | 50 |

2

Series name

|   |                              |
|---|------------------------------|
| M | Multilayer ceramic capacitor |
|---|------------------------------|

3

End termination

|   |        |
|---|--------|
| K | Plated |
|---|--------|

4

Dimensions (case size) (EIA) L×W[mm]

|             |         |
|-------------|---------|
| 042 (01005) | 0.4×0.2 |
| 063 (0201)  | 0.6×0.3 |
| 105 (0402)  | 1.0×0.5 |

5

Temperature characteristics [ppm/°C]

|     |                    |        |
|-----|--------------------|--------|
| C□  | 0 : CG, CH, CJ, CK |        |
| R□  | -220 : RH,         |        |
| S□  | -330 : SH, SJ, SK  | G ±30  |
| T□  | -470 : TJ, TK      | H ±60  |
| U□  | -750 : UJ, UK      | J ±120 |
| S L | +350~-1000         | K ±250 |

□=Tolerance

6

Nominal capacitance [pF]

|         |     |
|---------|-----|
| example |     |
| 0R5     | 0.5 |
| 010     | 1   |
| 100     | 10  |

\*R=decimal point

7

Capacitance tolerance

|   |           |
|---|-----------|
| C | ± 0.25 pF |
| D | ± 0.5 pF  |
| F | ± 1 pF    |
| J | ± 5 %     |
| K | ± 10 %    |

8

Thickness[mm]

|   |     |
|---|-----|
| C | 0.2 |
| P | 0.3 |
| V | 0.5 |
| W | 0.5 |

9

Special code

|   |                   |
|---|-------------------|
| — | Standard Products |
|---|-------------------|

10

Packaging

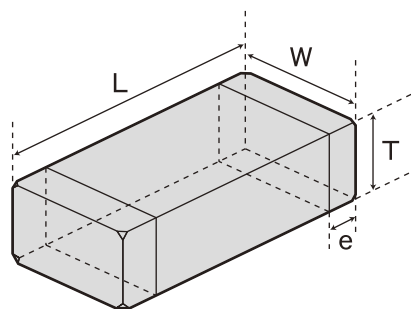
|   |                           |
|---|---------------------------|
| F | φ178mm Taping (2mm pitch) |
|---|---------------------------|

11

Internal code

|   |                   |
|---|-------------------|
| △ | Standard Products |
|---|-------------------|

△=Blank space



| Type (EIA)        | L                         | W                         | T                         | e                                  |
|-------------------|---------------------------|---------------------------|---------------------------|------------------------------------|
| □MK042<br>(01005) | 0.4±0.02<br>(0.016±0.001) | 0.2±0.02<br>(0.008±0.001) | 0.2±0.02<br>(0.008±0.001) | C<br>0.1±0.03<br>(0.004±0.001)     |
| □MK063<br>(0201)  | 0.6±0.03<br>(0.024±0.001) | 0.3±0.03<br>(0.012±0.001) | 0.3±0.03<br>(0.012±0.001) | P<br>0.15±0.05<br>(0.006±0.002)    |
| □MK105<br>(0402)  | 1.0±0.05<br>(0.039±0.002) | 0.5±0.05<br>(0.020±0.002) | 0.5±0.05<br>(0.020±0.002) | W, V<br>0.25±0.10<br>(0.010±0.004) |

Unit : mm (inch)

概略バリエーション AVAILABLE CAPACITANCE RANGE

| Cap<br>[pF] | Type                | 042 | 063 |     |    | 105 |    |    |    |    |  |
|-------------|---------------------|-----|-----|-----|----|-----|----|----|----|----|--|
|             | Temp.char.          | C□  | C□  | U□  | C□ | U□  | SL | R□ | S□ | T□ |  |
|             | VDC<br>[pF:3digits] | 16V | 25V | 50V |    |     |    |    |    |    |  |
| 0.5         | 0R5                 |     |     |     |    |     |    |    |    |    |  |
| 1           | 010                 |     |     |     |    |     |    |    |    |    |  |
| 1.5         | 1R5                 |     |     |     |    |     |    |    |    |    |  |
| 2           | 020                 |     |     |     |    |     |    |    |    |    |  |
| 3           | 030                 |     |     |     | W  |     |    |    |    |    |  |
| 4           | 040                 |     |     |     |    |     |    |    |    |    |  |
| 5           | 050                 |     |     | P   |    |     |    |    |    |    |  |
| 6           | 060                 |     |     |     | W  |     |    |    | W  | W  |  |
| 7           | 070                 |     |     |     |    |     |    |    |    |    |  |
| 8           | 080                 |     |     |     |    |     |    |    |    |    |  |
| 9           | 090                 |     |     |     |    |     |    |    |    |    |  |
| 10          | 100                 | C   | P   |     |    |     |    | W  |    |    |  |
| 12          | 120                 |     |     |     |    |     |    |    |    |    |  |
| 15          | 150                 |     |     |     |    |     |    |    |    |    |  |
| 18          | 180                 |     |     |     |    |     |    |    |    |    |  |
| 22          | 220                 |     |     |     |    |     |    |    |    |    |  |
| 27          | 270                 |     |     |     |    |     |    |    |    |    |  |
| 33          | 330                 |     |     |     |    |     |    |    |    |    |  |
| 39          | 390                 |     |     |     | V  |     |    |    |    |    |  |
| 47          | 470                 |     |     |     |    |     |    |    |    |    |  |
| 56          | 560                 |     |     |     |    |     |    |    |    |    |  |
| 68          | 680                 |     |     |     |    | V   |    |    |    |    |  |
| 82          | 820                 |     |     |     |    |     |    |    |    |    |  |
| 100         | 101                 |     |     |     |    |     |    |    |    |    |  |
| 120         | 121                 |     |     |     |    |     |    |    |    |    |  |
| 150         | 151                 |     |     |     |    |     |    | V  |    |    |  |
| 180         | 181                 |     |     |     |    |     |    |    |    |    |  |
| 220         | 221                 |     |     |     |    |     |    |    |    |    |  |
| 270         | 271                 |     |     |     |    |     |    |    |    |    |  |
| 330         | 331                 |     |     |     |    |     |    |    |    |    |  |
| 390         | 391                 |     |     |     |    |     |    |    |    |    |  |
| 470         | 471                 |     |     |     |    |     |    |    |    |    |  |
| 560         | 561                 |     |     |     |    |     |    |    |    |    |  |
| 680         | 681                 |     |     |     |    |     |    |    |    |    |  |
| 820         | 821                 |     |     |     |    |     |    |    |    |    |  |
| 1000        | 102                 |     |     |     |    |     |    |    |    |    |  |

注:グラフの記号は製品の厚み記号です。

Note: Letters in the table indicate thickness.

温度特性 Temperature Characteristics

| 温度特性<br>Temperature<br>char. (EIA) | 温度係数範囲<br>(ppm/°C) ※1<br>Temperature coefficient range | 使用温度範囲<br>Operating Temp. range |
|------------------------------------|--------------------------------------------------------|---------------------------------|
| C K (C0K)                          | 0±250                                                  | -55~+125°C                      |
| C J (C0J)                          | 0±120                                                  |                                 |
| C H (C0H)                          | 0±60                                                   |                                 |
| C G (C0G)                          | 0±30                                                   |                                 |
| R H (R2H)                          | -220±60                                                |                                 |
| S K (S2K)                          | -330±250                                               |                                 |
| S J (S2J)                          | -330±120                                               |                                 |
| S H (S2H)                          | -330±60                                                |                                 |
| T K (T2K)                          | -470±250                                               |                                 |
| T J (T2J)                          | -470±120                                               |                                 |
| U K (U2K)                          | -750±250                                               |                                 |
| U J (U2J)                          | -750±120                                               |                                 |
| S L                                | -1000~+350                                             |                                 |

※1: 20°Cにおける静電容量を基準。  
Based on the capacitance at 20°C

静電容量許容差 Capacitance Tolerance Symbol

| 記号<br>Symbol | 許容差<br>Tolerance | 区分<br>Item |
|--------------|------------------|------------|
| C            | ±0.25pF          | ~5pF       |
| D            | ±0.5 pF          | ~10pF      |
| F            | ±1pF             | 6~10 pF    |
| J            | ±5 %             | 11pF~      |
| K            | ±10 %            | 11pF~      |

Q

| Q※2<br>Symbol | 区分<br>Item |
|---------------|------------|
| ≥400+20・C※1   | ~27pF      |
| ≥1000         | 30pF~      |

※1: C=公称静電容量 Nominal capacitance [pF]

※2: 測定周波数 Measurement Frequency= 1±0.1MHz (C≤1000pF)  
1±0.1kHz (C>1000pF)

測定電圧 Measurement voltage = 0.5~5Vrms (C≤1000pF)  
1±0.2Vrms (C>1000pF)

セレクトションガイド  
Selection Guide

アイテム一覧  
Part Numbers

特性図  
Electrical Characteristics

梱包  
Packaging

信頼性  
Reliability Data

使用上の注意  
Precautions



etc

042TYPE

Class 1

| 定格電圧<br>Rated<br>Voltage<br>(DC) | 形 名<br>Ordering code | EHS<br>(Environmental<br>Hazardous<br>Substances) | 温度特性<br>Temperature characteristics (EIA) |             |             |             |             |             |             |             |             |             |             |             |             |             |             |             |             | 公称静電<br>容 量<br>Capacitance<br>[pF] | 静電容量<br>許 容 差<br>Capacitance<br>tolerance | 厚み<br>Thicknesses<br>[mm]<br>(inch) |                           |
|----------------------------------|----------------------|---------------------------------------------------|-------------------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|------------------------------------|-------------------------------------------|-------------------------------------|---------------------------|
|                                  |                      |                                                   | CK<br>(COK)                               | CJ<br>(CJL) | CH<br>(COH) | CG<br>(COG) | PK<br>(PKL) | PJ<br>(PJL) | PH<br>(PHL) | RK<br>(RKL) | RJ<br>(RJL) | RH<br>(RHL) | SK<br>(SKL) | SJ<br>(SJL) | SH<br>(SHL) | TK<br>(TKL) | TJ<br>(TJL) | TH<br>(THL) | UK<br>(UKL) | UJ<br>(UJL)                        | SL                                        |                                     |                           |
| 16V                              | EMK042 CK0R5□C       | RoHS                                              | ●                                         |             |             |             |             |             |             |             |             |             |             |             |             |             |             |             |             |                                    | 0.5                                       | ±0.25pF<br>±0.5pF                   | 0.2±0.02<br>(0.008±0.001) |
|                                  | EMK042 CK010□C       | RoHS                                              | ●                                         |             |             |             |             |             |             |             |             |             |             |             |             |             |             |             |             |                                    | 1                                         |                                     |                           |
|                                  | EMK042 CK1R5□C       | RoHS                                              | ●                                         |             |             |             |             |             |             |             |             |             |             |             |             |             |             |             |             |                                    | 1.5                                       |                                     |                           |
|                                  | EMK042 CK020□C       | RoHS                                              | ●                                         |             |             |             |             |             |             |             |             |             |             |             |             |             |             |             |             |                                    | 2                                         |                                     |                           |
|                                  | EMK042 CJ030□C       | RoHS                                              |                                           | ●           |             |             |             |             |             |             |             |             |             |             |             |             |             |             |             |                                    | 3                                         | ±0.5pF<br>±1pF                      |                           |
|                                  | EMK042 CH040□C       | RoHS                                              |                                           |             | ●           |             |             |             |             |             |             |             |             |             |             |             |             |             |             |                                    | 4                                         |                                     |                           |
|                                  | EMK042 CH050□C       | RoHS                                              |                                           |             | ●           |             |             |             |             |             |             |             |             |             |             |             |             |             |             |                                    | 5                                         |                                     |                           |
|                                  | EMK042 CH060□C       | RoHS                                              |                                           |             | ●           |             |             |             |             |             |             |             |             |             |             |             |             |             |             |                                    | 6                                         |                                     |                           |
|                                  | EMK042 CH070□C       | RoHS                                              |                                           |             | ●           |             |             |             |             |             |             |             |             |             |             |             |             |             |             |                                    | 7                                         | ±0.5pF<br>±1pF                      |                           |
|                                  | EMK042 CH080□C       | RoHS                                              |                                           |             | ●           |             |             |             |             |             |             |             |             |             |             |             |             |             |             |                                    | 8                                         |                                     |                           |
|                                  | EMK042 CH090□C       | RoHS                                              |                                           |             | ●           |             |             |             |             |             |             |             |             |             |             |             |             |             |             |                                    | 9                                         |                                     |                           |
|                                  | EMK042 CH100□C       | RoHS                                              |                                           |             | ●           |             |             |             |             |             |             |             |             |             |             |             |             |             |             |                                    | 10                                        |                                     |                           |
|                                  | EMK042 CH120□C       | RoHS                                              |                                           |             | ●           |             |             |             |             |             |             |             |             |             |             |             |             |             |             |                                    | 12                                        | ±5%<br>±10%                         |                           |
|                                  | EMK042 CH150□C       | RoHS                                              |                                           |             | ●           |             |             |             |             |             |             |             |             |             |             |             |             |             |             |                                    | 15                                        |                                     |                           |
|                                  | EMK042 CH180□C       | RoHS                                              |                                           |             | ●           |             |             |             |             |             |             |             |             |             |             |             |             |             |             |                                    | 18                                        |                                     |                           |
|                                  | EMK042 CH220□C       | RoHS                                              |                                           |             | ●           |             |             |             |             |             |             |             |             |             |             |             |             |             |             |                                    | 22                                        |                                     |                           |
|                                  | EMK042 CH270□C       | RoHS                                              |                                           |             | ●           |             |             |             |             |             |             |             |             |             |             |             |             |             |             |                                    | 27                                        |                                     |                           |
|                                  | EMK042 CH330□C       | RoHS                                              |                                           |             | ●           |             |             |             |             |             |             |             |             |             |             |             |             |             |             |                                    | 33                                        |                                     |                           |
|                                  | EMK042 CH390□C       | RoHS                                              |                                           |             | ●           |             |             |             |             |             |             |             |             |             |             |             |             |             |             |                                    | 39                                        |                                     |                           |
|                                  | EMK042 CH470□C       | RoHS                                              |                                           |             | ●           |             |             |             |             |             |             |             |             |             |             |             |             |             |             |                                    | 47                                        |                                     |                           |
|                                  | EMK042 CH560□C       | RoHS                                              |                                           |             | ●           |             |             |             |             |             |             |             |             |             |             |             |             |             |             |                                    | 56                                        |                                     |                           |
|                                  | EMK042 CH680□C       | RoHS                                              |                                           |             | ●           |             |             |             |             |             |             |             |             |             |             |             |             |             |             |                                    | 68                                        |                                     |                           |
|                                  | EMK042 CH820□C       | RoHS                                              |                                           |             | ●           |             |             |             |             |             |             |             |             |             |             |             |             |             |             |                                    | 82                                        |                                     |                           |
|                                  | EMK042 CH101□C       | RoHS                                              |                                           |             | ●           |             |             |             |             |             |             |             |             |             |             |             |             |             |             |                                    | 100                                       |                                     |                           |

注:形名の□には静電容量許容差記号が入ります。  
□ Please specify the capacitance tolerance code.

063TYPE

Class 1

| 定格電圧<br>Rated<br>Voltage<br>(DC) | 形 名<br>Ordering code |  | EHS<br>(Environmental<br>Hazardous<br>Substances) | 温度特性<br>Temperature characteristics (EIA) |             |             |             |             |             |             |             |             |             |             |             |             |             |             |             |             | 公称静電<br>容 量<br>Capacitance<br>[pF] | 静電容量<br>許 容 差<br>Capacitance<br>tolerance | 厚み<br>Thicknees<br>[mm]<br>(inch) |
|----------------------------------|----------------------|--|---------------------------------------------------|-------------------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|------------------------------------|-------------------------------------------|-----------------------------------|
|                                  |                      |  |                                                   |                                           |             |             |             |             |             |             |             |             |             |             |             |             |             |             |             |             |                                    |                                           |                                   |
|                                  |                      |  |                                                   | CK<br>(C0K)                               | CJ<br>(C0J) | CH<br>(C0H) | CG<br>(C0G) | PK<br>(P2K) | PJ<br>(P2J) | PH<br>(P2H) | RK<br>(R2K) | RJ<br>(R2J) | RH<br>(R2H) | SK<br>(S2K) | SJ<br>(S2J) | SH<br>(S2H) | TK<br>(T2K) | TJ<br>(T2J) | TH<br>(T2H) | UK<br>(U2K) |                                    |                                           |                                   |
| 25V                              | TMK063 △0R5□P        |  | RoHS                                              | ●                                         |             |             |             |             |             |             |             |             |             |             |             |             |             | ●           |             |             | 0.5                                | ±0.25pF                                   | 0.3±0.03<br>(0.012±0.001)         |
|                                  | TMK063 △010□P        |  | RoHS                                              | ●                                         |             |             |             |             |             |             |             |             |             |             |             |             |             | ●           |             |             | 1                                  |                                           |                                   |
|                                  | TMK063 △1R5□P        |  | RoHS                                              | ●                                         |             |             |             |             |             |             |             |             |             |             |             |             |             | ●           |             |             | 1.5                                |                                           |                                   |
|                                  | TMK063 △020□P        |  | RoHS                                              | ●                                         |             |             |             |             |             |             |             |             |             |             |             |             |             | ●           |             |             | 2                                  |                                           |                                   |
|                                  | TMK063 △030□P        |  | RoHS                                              |                                           | ●           |             |             |             |             |             |             |             |             |             |             |             |             |             | ●           |             | 3                                  | ±0.5pF                                    |                                   |
|                                  | TMK063 △040□P        |  | RoHS                                              |                                           |             | ●           |             |             |             |             |             |             |             |             |             |             |             |             | ●           |             | 4                                  |                                           |                                   |
|                                  | TMK063 △050□P        |  | RoHS                                              |                                           |             | ●           |             |             |             |             |             |             |             |             |             |             |             |             | ●           |             | 5                                  |                                           |                                   |
|                                  | TMK063 △060□P        |  | RoHS                                              |                                           |             | ●           |             |             |             |             |             |             |             |             |             |             |             |             | ●           |             | 6                                  |                                           |                                   |
|                                  | TMK063 △070□P        |  | RoHS                                              |                                           |             | ●           |             |             |             |             |             |             |             |             |             |             |             |             | ●           |             | 7                                  |                                           |                                   |
|                                  | TMK063 △080□P        |  | RoHS                                              |                                           |             | ●           |             |             |             |             |             |             |             |             |             |             |             |             | ●           |             | 8                                  |                                           |                                   |
|                                  | TMK063 △090□P        |  | RoHS                                              |                                           |             | ●           |             |             |             |             |             |             |             |             |             |             |             |             | ●           |             | 9                                  | ±5%<br>±10%                               |                                   |
|                                  | TMK063 △100□P        |  | RoHS                                              |                                           |             | ●           |             |             |             |             |             |             |             |             |             |             |             |             | ●           |             | 10                                 |                                           |                                   |
|                                  | TMK063 △120□P        |  | RoHS                                              |                                           |             | ●           |             |             |             |             |             |             |             |             |             |             |             |             | ●           |             | 12                                 |                                           |                                   |
|                                  | TMK063 △150□P        |  | RoHS                                              |                                           |             | ●           |             |             |             |             |             |             |             |             |             |             |             |             | ●           |             | 15                                 |                                           |                                   |
|                                  | TMK063 CH180□P       |  | RoHS                                              |                                           |             | ●           |             |             |             |             |             |             |             |             |             |             |             |             |             |             | 18                                 | ±5%<br>±10%                               |                                   |
|                                  | TMK063 CH220□P       |  | RoHS                                              |                                           |             | ●           |             |             |             |             |             |             |             |             |             |             |             |             |             |             | 22                                 |                                           |                                   |
|                                  | TMK063 CH270□P       |  | RoHS                                              |                                           |             | ●           |             |             |             |             |             |             |             |             |             |             |             |             |             |             | 27                                 |                                           |                                   |
|                                  | TMK063 CH330□P       |  | RoHS                                              |                                           |             | ●           |             |             |             |             |             |             |             |             |             |             |             |             |             |             | 33                                 |                                           |                                   |
|                                  | TMK063 CH390□P       |  | RoHS                                              |                                           |             | ●           |             |             |             |             |             |             |             |             |             |             |             |             |             |             | 39                                 |                                           |                                   |
|                                  | TMK063 CH470□P       |  | RoHS                                              |                                           |             | ●           |             |             |             |             |             |             |             |             |             |             |             |             |             |             | 47                                 |                                           |                                   |
|                                  | TMK063 CH560□P       |  | RoHS                                              |                                           |             | ●           |             |             |             |             |             |             |             |             |             |             |             |             |             |             | 56                                 |                                           |                                   |
|                                  | TMK063 CH680□P       |  | RoHS                                              |                                           |             | ●           |             |             |             |             |             |             |             |             |             |             |             |             |             |             | 68                                 |                                           |                                   |
|                                  | TMK063 CH820□P       |  | RoHS                                              |                                           |             | ●           |             |             |             |             |             |             |             |             |             |             |             |             |             |             | 82                                 |                                           |                                   |
|                                  | TMK063 CH101□P       |  | RoHS                                              |                                           |             | ●           |             |             |             |             |             |             |             |             |             |             |             |             |             |             | 100                                |                                           |                                   |

注:形名の△には温度特性、□には静電容量許容差記号が入ります。  
△ Please specify the temperature characteristics code and □ the capacitance tolerance code.

# 105TYPE

Class 1

| 定格電圧<br>Rated<br>Voltage<br>(DC) | 形 名<br>Ordering code | EHS<br>(Environmental<br>Hazardous<br>Substances) | 温度特性<br>Temperature characteristics (EIA) |             |             |             |             |             |             |             |             |             |             |             |             |             |             |             |             |             | 公称静電<br>容 量<br>Capacitance<br>[pF] | 静電容量<br>許 容 差<br>Capacitance<br>tolerance | 厚み<br>Thickness<br>[mm]<br>(inch) |                |     |             |
|----------------------------------|----------------------|---------------------------------------------------|-------------------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|------------------------------------|-------------------------------------------|-----------------------------------|----------------|-----|-------------|
|                                  |                      |                                                   | CK<br>(C0K)                               | CJ<br>(C0J) | CH<br>(C0H) | CG<br>(C0G) | PK<br>(P2K) | PJ<br>(P2J) | PH<br>(P2H) | RK<br>(R2K) | RJ<br>(R2J) | RH<br>(R2H) | SK<br>(S2K) | SJ<br>(S2J) | SH<br>(S2H) | TK<br>(T2K) | TJ<br>(T2J) | TH<br>(T2H) | UK<br>(U2K) | UJ<br>(U2J) | SL                                 |                                           |                                   |                |     |             |
| 50V                              | UMK105 △ 0R5□W       | RoHS                                              | ●                                         |             |             |             |             |             |             |             |             |             |             |             |             |             |             | ●           |             |             | 0.5                                | ±0.25pF<br>±0.5pF                         | 0.5±0.05<br>(0.020±0.002)         |                |     |             |
|                                  | UMK105 △ 010□W       | RoHS                                              | ●                                         |             |             |             |             |             |             |             |             |             |             |             |             |             |             | ●           |             |             | 1                                  |                                           |                                   |                |     |             |
|                                  | UMK105 △ 1R5□W       | RoHS                                              | ●                                         |             |             |             |             |             |             |             |             |             |             |             |             |             |             | ●           |             |             | 1.5                                |                                           |                                   |                |     |             |
|                                  | UMK105 △ 020□W       | RoHS                                              | ●                                         |             |             |             |             |             |             |             |             |             |             |             |             |             |             | ●           |             |             | 2                                  |                                           |                                   |                |     |             |
|                                  | UMK105 △ 030□W       | RoHS                                              |                                           | ●           |             |             |             |             |             |             |             |             |             |             |             |             |             | ●           |             |             | 3                                  |                                           |                                   |                |     |             |
|                                  | UMK105 △ 040□W       | RoHS                                              |                                           |             | ●           |             |             |             |             |             |             |             |             |             |             |             |             |             | ●           |             |                                    | 4                                         |                                   | ±0.5pF<br>±1pF |     |             |
|                                  | UMK105 △ 050□W       | RoHS                                              |                                           |             | ●           |             |             |             |             |             |             |             |             |             |             |             |             |             | ●           |             |                                    | 5                                         |                                   |                |     |             |
|                                  | UMK105 △ 060□W       | RoHS                                              |                                           |             | ●           |             |             |             |             |             |             |             |             |             |             |             |             |             | ●           |             |                                    | 6                                         |                                   |                |     |             |
|                                  | UMK105 △ 070□W       | RoHS                                              |                                           |             | ●           |             |             |             |             |             |             |             |             |             |             |             |             |             | ●           |             |                                    | 7                                         |                                   |                |     |             |
|                                  | UMK105 △ 080□○       | RoHS                                              |                                           |             | ●           |             |             |             |             |             |             |             |             |             |             |             |             |             |             | ●           |                                    |                                           |                                   |                | 8   | ±5%<br>±10% |
|                                  | UMK105 △ 090□○       | RoHS                                              |                                           |             | ●           |             |             |             |             |             |             |             |             |             |             |             |             |             |             | ●           |                                    |                                           |                                   | 9              |     |             |
|                                  | UMK105 △ 100□○       | RoHS                                              |                                           |             | ●           |             |             |             |             |             |             |             |             |             |             |             |             |             |             | ●           |                                    |                                           |                                   | 10             |     |             |
|                                  | UMK105 △ 120□○       | RoHS                                              |                                           |             | ●           |             |             |             |             |             |             |             |             |             |             |             |             |             |             | ●           |                                    |                                           |                                   | 12             |     |             |
|                                  | UMK105 △ 150□○       | RoHS                                              |                                           |             | ●           |             |             |             |             |             |             |             |             |             |             |             |             |             |             | ●           |                                    |                                           |                                   | 15             |     |             |
|                                  | UMK105 △ 180□○       | RoHS                                              |                                           |             | ●           |             |             |             |             |             |             |             |             |             |             |             |             |             |             |             | ●                                  |                                           |                                   |                | 18  | ±5%<br>±10% |
|                                  | UMK105 △ 220□V       | RoHS                                              |                                           |             | ●           |             |             |             |             |             |             |             |             |             |             |             |             |             |             |             | ●                                  |                                           |                                   |                | 22  |             |
|                                  | UMK105 △ 270□V       | RoHS                                              |                                           |             | ●           |             |             |             |             |             |             |             |             |             |             |             |             |             |             |             | ●                                  |                                           |                                   |                | 27  |             |
|                                  | UMK105 △ 330□V       | RoHS                                              |                                           |             | ●           |             |             |             |             |             |             |             |             |             |             |             |             |             |             |             | ●                                  |                                           |                                   |                | 33  |             |
|                                  | UMK105 △ 390□V       | RoHS                                              |                                           |             | ●           |             |             |             |             |             |             |             |             |             |             |             |             |             |             |             | ●                                  |                                           |                                   |                | 39  |             |
|                                  | UMK105 △ 470□V       | RoHS                                              |                                           |             | ●           |             |             |             |             |             |             |             |             |             |             |             |             |             |             |             | ●                                  |                                           |                                   |                | 47  |             |
|                                  | UMK105 △ 560□V       | RoHS                                              |                                           |             | ●           |             |             |             |             |             |             |             |             |             |             |             |             |             |             |             | ●                                  |                                           |                                   |                | 56  |             |
|                                  | UMK105 △ 680□V       | RoHS                                              |                                           |             | ●           |             |             |             |             |             |             |             |             |             |             |             |             |             |             |             | ●                                  |                                           |                                   |                | 68  |             |
|                                  | UMK105 △ 820□V       | RoHS                                              |                                           |             | ●           |             |             |             |             |             |             |             |             |             |             |             |             |             |             |             | ●                                  |                                           |                                   |                | 82  |             |
|                                  | UMK105 △ 101□V       | RoHS                                              |                                           |             | ●           |             |             |             |             |             |             |             |             |             |             |             |             |             |             |             | ●                                  |                                           |                                   |                | 100 |             |
|                                  | UMK105 △ 121□V       | RoHS                                              |                                           |             | ●           |             |             |             |             |             |             |             |             |             |             |             |             |             |             |             | ●                                  |                                           |                                   |                | 120 |             |
|                                  | UMK105 △ 151□V       | RoHS                                              |                                           |             | ●           |             |             |             |             |             |             |             |             |             |             |             |             |             |             |             | ●                                  |                                           |                                   |                | 150 |             |
|                                  | UMK105 △ 181□V       | RoHS                                              |                                           |             | ●           |             |             |             |             |             |             |             |             |             |             |             |             |             |             |             | ●                                  |                                           |                                   |                | 180 |             |
|                                  | UMK105 △ 221□V       | RoHS                                              |                                           |             | ●           |             |             |             |             |             |             |             |             |             |             |             |             |             |             |             | ●                                  |                                           |                                   |                | 220 |             |
|                                  | UMK105 △ 271□V       | RoHS                                              |                                           |             | ●           |             |             |             |             |             |             |             |             |             |             |             |             |             |             |             | ●                                  |                                           |                                   |                | 270 |             |
|                                  | UMK105 △ 331□V       | RoHS                                              |                                           |             | ●           |             |             |             |             |             |             |             |             |             |             |             |             |             |             |             | ●                                  |                                           |                                   |                | 330 |             |
|                                  | UMK105 SL121□V       | RoHS                                              |                                           |             |             |             |             |             |             |             |             |             |             |             |             |             |             |             |             |             | ●                                  |                                           |                                   |                | 120 |             |
|                                  | UMK105 SL151□V       | RoHS                                              |                                           |             |             |             |             |             |             |             |             |             |             |             |             |             |             |             |             |             | ●                                  |                                           |                                   |                | 150 |             |
|                                  | UMK105 SL181□V       | RoHS                                              |                                           |             |             |             |             |             |             |             |             |             |             |             |             |             |             |             |             |             | ●                                  |                                           |                                   |                | 180 |             |
|                                  | UMK105 SL221□V       | RoHS                                              |                                           |             |             |             |             |             |             |             |             |             |             |             |             |             |             |             |             |             | ●                                  |                                           |                                   |                | 220 |             |
|                                  | UMK105 SL271□V       | RoHS                                              |                                           |             |             |             |             |             |             |             |             |             |             |             |             |             |             |             |             |             | ●                                  |                                           |                                   |                | 270 |             |
|                                  | UMK105 SL331□V       | RoHS                                              |                                           |             |             |             |             |             |             |             |             |             |             |             |             |             |             |             |             |             | ●                                  |                                           |                                   |                | 330 |             |

注:形名の△には温度特性、□には静電容量許容差記号、○にはCHの時には「V」、UJの時は「W」が入ります。  
 △ Please specify the temperature characteristics code. □ Please specify the capacitance tolerance code.  
 ○ comes to "V" when △ is "CH" and "W" when △ is "UJ".

# 105TYPE

Class 1

| 定格電圧<br>Rated<br>Voltage<br>(DC) | 形 名<br>Ordering code |  | EHS<br>(Environmental<br>Hazardous<br>Substances) | 温度特性<br>Temperature characteristics (EIA) |             |             |             |             |             |             |             |             |             |             |             |             |             |             |             |             |             | 公称静電<br>容 量<br>Capacitance<br>[pF] | 静電容量<br>許 容 差<br>Capacitance<br>tolerance | 厚み<br>Thickness<br>[mm]<br>[inch] |
|----------------------------------|----------------------|--|---------------------------------------------------|-------------------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|------------------------------------|-------------------------------------------|-----------------------------------|
|                                  |                      |  |                                                   | CK<br>(C0K)                               | CJ<br>(C0J) | CH<br>(C0H) | CG<br>(C0G) | PK<br>(P2K) | PJ<br>(P2J) | PH<br>(P2H) | RK<br>(R2K) | RJ<br>(R2J) | RH<br>(R2H) | SK<br>(S2K) | SJ<br>(S2J) | SH<br>(S2H) | TK<br>(T2K) | TJ<br>(T2J) | TH<br>(T2H) | UK<br>(U2K) | UJ<br>(U2J) | SL                                 |                                           |                                   |
| 50V                              | UMK105 △ 0R5BW       |  | RoHS                                              |                                           |             |             |             |             |             |             |             | ●           |             |             | ●           |             |             |             |             |             | 0.5         | ±0.1pF                             | 0.5±0.05<br>(0.020±0.002)                 |                                   |
|                                  | UMK105 △ 010BW       |  | RoHS                                              |                                           |             |             |             |             |             |             |             | ●           |             |             | ●           |             |             |             |             |             | 1           |                                    |                                           |                                   |
|                                  | UMK105 △ 1R2BW       |  | RoHS                                              |                                           |             |             |             |             |             |             |             | ●           |             |             | ●           |             |             |             |             |             | 1.2         |                                    |                                           |                                   |
|                                  | UMK105 △ 1R5BW       |  | RoHS                                              |                                           |             |             |             |             |             |             |             | ●           |             |             | ●           |             |             |             |             |             | 1.5         |                                    |                                           |                                   |
|                                  | UMK105 △ 1R8BW       |  | RoHS                                              |                                           |             |             |             |             |             |             |             | ●           |             |             | ●           |             |             |             |             |             | 1.8         |                                    |                                           |                                   |
|                                  | UMK105 △ 2R2JW       |  | RoHS                                              |                                           |             |             |             |             |             |             |             | ●           |             |             | ●           |             |             |             |             |             | 2.2         | ±5%                                |                                           |                                   |
|                                  | UMK105 △ 2R7JW       |  | RoHS                                              |                                           |             |             |             |             |             |             |             | ●           |             |             | ●           |             |             |             |             |             | 2.7         |                                    |                                           |                                   |
|                                  | UMK105 △ 3R3JW       |  | RoHS                                              |                                           |             |             |             |             |             |             |             |             | ●           | ●           |             | ●           |             |             |             |             | 3.3         |                                    |                                           |                                   |
|                                  | UMK105 △ 3R9JW       |  | RoHS                                              |                                           |             |             |             |             |             |             |             |             | ●           | ●           |             | ●           |             |             |             |             | 3.9         |                                    |                                           |                                   |
|                                  | UMK105 △ 4R7JW       |  | RoHS                                              |                                           |             |             |             |             |             |             |             |             |             | ●           |             | ●           |             |             |             |             | 4.7         |                                    |                                           |                                   |
|                                  | UMK105 △ 5R6JW       |  | RoHS                                              |                                           |             |             |             |             |             |             | ●           |             |             | ●           |             | ●           |             |             |             |             | 5.6         |                                    |                                           |                                   |
|                                  | UMK105 △ 6R8JW       |  | RoHS                                              |                                           |             |             |             |             |             |             |             | ●           |             | ●           |             | ●           |             |             |             |             | 6.8         |                                    |                                           |                                   |
|                                  | UMK105 △ 8R2JW       |  | RoHS                                              |                                           |             |             |             |             |             |             | ●           |             |             | ●           |             | ●           |             |             |             |             | 8.2         |                                    |                                           |                                   |
|                                  | UMK105 △ 100JW       |  | RoHS                                              |                                           |             |             |             |             |             |             | ●           |             |             | ●           |             | ●           |             |             |             |             | 10          |                                    |                                           |                                   |
|                                  | UMK105 △ 120JW       |  | RoHS                                              |                                           |             |             |             |             |             |             | ●           |             |             | ●           |             | ●           |             |             |             |             | 12          |                                    |                                           |                                   |
|                                  | UMK105 △ 150JW       |  | RoHS                                              |                                           |             |             |             |             |             |             | ●           |             |             | ●           |             | ●           |             |             |             |             | 15          |                                    |                                           |                                   |
|                                  | UMK105 △ 180JW       |  | RoHS                                              |                                           |             |             |             |             |             |             | ●           |             |             | ●           |             | ●           |             |             |             |             | 18          |                                    |                                           |                                   |
|                                  | UMK105 △ 200JW       |  | RoHS                                              |                                           |             |             |             |             |             |             | ●           |             |             | ●           |             | ●           |             |             |             |             | 20          |                                    |                                           |                                   |

注:形名の△には温度特性が入ります。  
 △ Please specify the temperature characteristics code.

# 一般積層セラミックコンデンサ

(高誘電率系・Class 2)

STANDARD MULTILAYER CERAMIC CAPACITORS  
(CLASS2 :HIGH DIELECTRIC CONSTANT TYPE)

|                 | Code | Temp.characteristics | Operating temp. range |
|-----------------|------|----------------------|-----------------------|
| OPERATING TEMP. | BJ   | B                    | -25~+85°C             |
|                 |      | X5R*                 | -55~+85°C             |
|                 | B7   | X7R                  | -55~+125°C            |
|                 |      | F                    | -25~+85°C             |
|                 | F    | Y5V                  | -30~+85°C             |

\*個別仕様の取交しにより、X7R/X7S 仕様に対応している場合があります。

\*We may provide X7R/X7S for some items according to the individual specification.



## 特長 FEATURES

- ・実装密度の向上が図れます
- ・モノリシックの構造のため、信頼性が高い
- ・同一形状、静電容量範囲が広い

- ・ Improve Higher Mounting Densities.
- ・ Multilayer block structure provides higher reliability
- ・ A wide range of capacitance values available in standard case sizes.

## 用途 APPLICATIONS

- ・ 一般電子機器用
- ・ 通信機器用 (携帯電話、PHS、コードレス電話 etc.)

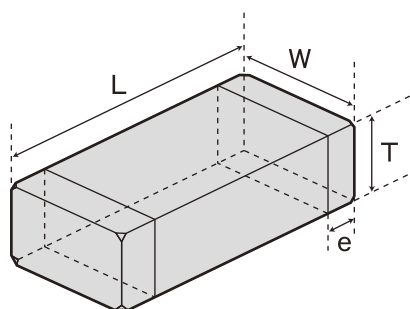
- ・ General electronic equipment
- ・ Communication equipment (cellular phone, PHS, other wireless applications, etc.)

## 形名表記法 ORDERING CODE

|                                                                                |                                                                                                 |                                                    |                                                         |                                               |
|--------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|----------------------------------------------------|---------------------------------------------------------|-----------------------------------------------|
| <b>1</b><br>定格電圧 (VDC)<br>A 4<br>J 6.3<br>L 10<br>E 16<br>T 25<br>G 35<br>U 50 | <b>4</b><br>形状寸法 (EIA) L×W (mm)<br>042(01005) 0.4×0.2<br>063(0201) 0.6×0.3<br>105(0402) 1.0×0.5 | <b>6</b><br>公称静電容量 (pF)<br>例 102 1000<br>223 22000 | <b>7</b><br>容量許容差<br>K ±10%<br>M ±20%<br>Z +80%<br>-20% | <b>9</b><br>個別仕様<br>- 標準                      |
| <b>2</b><br>シリーズ名<br>M 積層コンデンサ                                                 | <b>5</b><br>温度特性<br>BJ B<br>X5R<br>B7 X7R<br>F<br>Y5V<br>△=スペース                                 |                                                    | <b>8</b><br>製品厚み (mm)<br>C 0.2<br>P 0.3<br>V 0.5        | <b>10</b><br>包装<br>F φ178mm テーピング<br>(2mmピッチ) |
| <b>3</b><br>端子電極<br>K メッキ品                                                     |                                                                                                 |                                                    |                                                         | <b>11</b><br>当社管理記号<br>△ 標準<br>△=スペース         |

|   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |
|---|---|---|---|---|---|---|---|---|----|----|---|---|---|---|---|
| L | M | K | 1 | 0 | 5 | B | J | 1 | 0  | 4  | K | V | - | F | △ |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |   |   |   |   |   |

|                                                                                         |                                                                                                               |                                                                       |                                                                         |                                                                    |
|-----------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------|-------------------------------------------------------------------------|--------------------------------------------------------------------|
| <b>1</b><br>Rated voltage [VDC]<br>A 4<br>J 6.3<br>L 10<br>E 16<br>T 25<br>G 35<br>U 50 | <b>4</b><br>Dimensions (case size) (L×W) (mm)<br>042(01005) 0.4×0.2<br>063(0201) 0.6×0.3<br>105(0402) 1.0×0.5 | <b>6</b><br>Nominal capacitance [pF]<br>example 102 1000<br>223 22000 | <b>7</b><br>Capacitance tolerance<br>K ±10%<br>M ±20%<br>Z +80%<br>-20% | <b>9</b><br>Special code<br>- Standard products                    |
| <b>2</b><br>Series name<br>M Multilayer ceramic capacitor                               | <b>5</b><br>Temperature characteristics code<br>BJ B<br>X5R<br>B7 X7R<br>F<br>Y5V<br>△=Blank space            |                                                                       | <b>8</b><br>Thickness (mm)<br>C 0.2<br>P 0.3<br>V 0.5                   | <b>10</b><br>Packaging<br>F φ178mm Taping<br>(2mm pitch)           |
| <b>3</b><br>End termination<br>K Plated                                                 |                                                                                                               |                                                                       |                                                                         | <b>11</b><br>Internal code<br>△ Standard Products<br>△=Blank space |



| Type (EIA)        | L                           | W                           | T                           | e                               |
|-------------------|-----------------------------|-----------------------------|-----------------------------|---------------------------------|
| □MK042<br>(01005) | 0.4±0.02<br>(0.016±0.001)   | 0.2±0.02<br>(0.008±0.001)   | 0.2±0.02<br>(0.008±0.001)   | C<br>0.1±0.03<br>(0.004±0.001)  |
| □MK063<br>(0201)  | 0.6±0.03<br>(0.024±0.001)   | 0.3±0.03<br>(0.012±0.001)   | 0.3±0.03<br>(0.012±0.001)   | P<br>0.15±0.05<br>(0.006±0.002) |
| □MK105<br>(0402)  | 1.0±0.05*1<br>(0.039±0.002) | 0.5±0.05*1<br>(0.020±0.002) | 0.5±0.05*1<br>(0.020±0.002) | V<br>0.25±0.10<br>(0.010±0.004) |

注: \*1 ±0.1mm 公差あり

Note: \*1. Including dimension tolerance±0.1mm

Unit: mm (inch)

概略バリエーション AVAILABLE CAPACITANCE RANGE

■汎用積層セラミックコンデンサ (General Multilayer Ceramic capacitors)

| Cap<br>[pF] | Type         | 042   |      | 063   |     |     |     |      |    |     |     | 105   |     |     |       |     |     |      |     |      |     |     |     | F/Y5V |     |      |  |  |  |
|-------------|--------------|-------|------|-------|-----|-----|-----|------|----|-----|-----|-------|-----|-----|-------|-----|-----|------|-----|------|-----|-----|-----|-------|-----|------|--|--|--|
|             | Temp.char.   | B/X5R |      | B/X5R |     |     |     | X5R  |    |     |     | B/X7R |     |     | B/X5R |     |     |      |     |      | X5R |     |     | F/Y5V |     |      |  |  |  |
|             | VDC          | 10V   | 6.3V | 25V   | 16V | 10V | 10V | 6.3V | 4V | 50V | 25V | 16V   | 50V | 35V | 25V   | 16V | 10V | 6.3V | 10V | 6.3V | 4V  | 50V | 25V | 16V   | 10V | 6.3V |  |  |  |
|             | [pF:3digits] |       |      |       |     |     |     |      |    |     |     |       |     |     |       |     |     |      |     |      |     |     |     |       |     |      |  |  |  |
| 100         | 101          |       |      |       |     |     |     |      |    |     |     |       |     |     |       |     |     |      |     |      |     |     |     |       |     |      |  |  |  |
| 150         | 151          |       |      |       |     |     |     |      |    |     |     |       |     |     |       |     |     |      |     |      |     |     |     |       |     |      |  |  |  |
| 220         | 221          |       |      |       |     |     |     |      |    |     |     |       |     |     |       |     |     |      |     |      |     |     |     |       |     |      |  |  |  |
| 330         | 331          |       |      |       |     |     |     |      |    |     |     |       |     |     |       |     |     |      |     |      |     |     |     |       |     |      |  |  |  |
| 470         | 471          |       |      |       |     |     |     |      |    |     |     |       |     |     |       |     |     |      |     |      |     |     |     |       |     |      |  |  |  |
| 680         | 681          |       |      |       |     |     |     |      |    |     |     |       |     |     |       |     |     |      |     |      |     |     |     |       |     |      |  |  |  |
| 1000        | 102          |       |      |       |     |     |     |      |    |     |     |       |     |     |       |     |     |      |     |      |     |     |     |       |     |      |  |  |  |
| 1500        | 152          |       |      |       |     |     |     |      |    |     |     |       |     |     |       |     |     |      |     |      |     |     |     |       |     |      |  |  |  |
| 2200        | 222          |       |      |       |     |     |     |      |    |     |     |       |     |     |       |     |     |      |     |      |     |     |     |       |     |      |  |  |  |
| 3300        | 332          |       |      |       |     |     |     |      |    |     |     |       |     |     |       |     |     |      |     |      |     |     |     |       |     |      |  |  |  |
| 4700        | 472          |       |      |       |     |     |     |      |    |     |     |       |     |     |       |     |     |      |     |      |     |     |     |       |     |      |  |  |  |
| 6800        | 682          |       |      |       |     |     |     |      |    |     |     |       |     |     |       |     |     |      |     |      |     |     |     |       |     |      |  |  |  |
| 10000       | 103          |       |      |       |     |     |     |      |    |     |     |       |     |     |       |     |     |      |     |      |     |     |     |       |     |      |  |  |  |
| 15000       | 153          |       |      |       |     |     |     |      |    |     |     |       |     |     |       |     |     |      |     |      |     |     |     |       |     |      |  |  |  |
| 22000       | 223          |       |      |       |     |     |     |      |    |     |     |       |     |     |       |     |     |      |     |      |     |     |     |       |     |      |  |  |  |
| 33000       | 333          |       |      |       |     |     |     |      |    |     |     |       |     |     |       |     |     |      |     |      |     |     |     |       |     |      |  |  |  |
| 47000       | 473          |       |      |       |     |     |     |      |    |     |     |       |     |     |       |     |     |      |     |      |     |     |     |       |     |      |  |  |  |
| 68000       | 683          |       |      |       |     |     |     |      |    |     |     |       |     |     |       |     |     |      |     |      |     |     |     |       |     |      |  |  |  |
| 100000      | 104          |       |      |       |     |     |     |      |    |     |     |       |     |     |       |     |     |      |     |      |     |     |     |       |     |      |  |  |  |
| 220000      | 224          |       |      |       |     |     |     |      |    |     |     |       |     |     |       |     |     |      |     |      |     |     |     |       |     |      |  |  |  |
| 330000      | 334          |       |      |       |     |     |     |      |    |     |     |       |     |     |       |     |     |      |     |      |     |     |     |       |     |      |  |  |  |
| 470000      | 474          |       |      |       |     |     |     |      |    |     |     |       |     |     |       |     |     |      |     |      |     |     |     |       |     |      |  |  |  |
| 1000000     | 105          |       |      |       |     |     |     |      |    |     |     |       |     |     |       |     |     |      |     |      |     |     |     |       |     |      |  |  |  |
| 2200000     | 225          |       |      |       |     |     |     |      |    |     |     |       |     |     |       |     |     |      |     |      |     |     |     |       |     |      |  |  |  |
| 3300000     | 335          |       |      |       |     |     |     |      |    |     |     |       |     |     |       |     |     |      |     |      |     |     |     |       |     |      |  |  |  |
| 4700000     | 475          |       |      |       |     |     |     |      |    |     |     |       |     |     |       |     |     |      |     |      |     |     |     |       |     |      |  |  |  |

注: グラフの記号は製品厚み記号です。Note: Letters in the table indicate thickness.

| 温度特性コード<br>Temp.char.Code | 温度特性<br>Temperature characteristics |     |                               |                        |                                  | 静電容量許容差[%]<br>Capacitance tolerance | tanδ[%]<br>Dissipation factor |
|---------------------------|-------------------------------------|-----|-------------------------------|------------------------|----------------------------------|-------------------------------------|-------------------------------|
|                           | 準拠規格<br>Applicable standard         |     | 温度範囲[°C]<br>Temperature range | 基準温度[°C]<br>Ref. Temp. | 静電容量変化率[%]<br>Capacitance change |                                     |                               |
|                           | JIS                                 | B   | −25~+85                       | 20                     | ±10                              |                                     |                               |
| B/BJ                      | EIA                                 | X5R | −55~+85                       | 25                     | ±15                              | ±10 (K)<br>±20 (M)                  | 2.5 max.*                     |
| B7                        | EIA                                 | X7R | −55~+125                      | 25                     | ±15                              |                                     |                               |
| F                         | JIS                                 | F   | −25~+85                       | 20                     | +30/−80                          | +80 (Z)<br>−20                      | 7.0 max.*                     |
|                           | EIA                                 | Y5V | −30~+85                       | 25                     | +22/−82                          |                                     |                               |

\*: 代表的な値を記載しています。詳細はアイテム一覧を参照ください。

\*: The figure indicate typical value. Please refer to PART NUMBERS table.

セクションガイド  
Selection Guide

アイテム一覧  
Part Numbers

特性図  
Electrical Characteristics

梱包  
Packaging

信頼性  
Reliability Data

使用上の注意  
Precautions



etc

■ 042TYPE(01005 case size)

【温度特性 Temp.char. BJ:B/X5R】

| 定格電圧<br>Rated Voltage | 形 名<br>Ordering code |  | EHS<br>(Environmental<br>Hazardous<br>Substances) | 公 称<br>静電容量<br>Capacitance<br>[pF] | 温度特性<br>Temperature<br>characteristics | tanδ<br>Dissipation<br>factor<br>[%] Max. | 実装条件<br>Soldering method<br>R:リフロー Reflow soldering<br>W: フロー Wave soldering | 静電容量<br>許 容 差<br>Capacitance<br>tolerance | 厚 み<br>Thickness<br>[mm]<br>(inch) |
|-----------------------|----------------------|--|---------------------------------------------------|------------------------------------|----------------------------------------|-------------------------------------------|------------------------------------------------------------------------------|-------------------------------------------|------------------------------------|
| 10V                   | LMK042 BJ101 □ C     |  | RoHS                                              | 100                                | B/X5R*2                                | 5                                         | R                                                                            | ± 10%<br>± 20%                            | 0.2 ± 0.02<br>(0.008 ± 0.001)      |
|                       | LMK042 BJ151 □ C     |  | RoHS                                              | 150                                |                                        |                                           |                                                                              |                                           |                                    |
|                       | LMK042 BJ221 □ C     |  | RoHS                                              | 220                                |                                        |                                           |                                                                              |                                           |                                    |
|                       | LMK042 BJ331 □ C     |  | RoHS                                              | 330                                |                                        |                                           |                                                                              |                                           |                                    |
|                       | LMK042 BJ471 □ C     |  | RoHS                                              | 470                                |                                        |                                           |                                                                              |                                           |                                    |
|                       | LMK042 BJ681 □ C     |  | RoHS                                              | 680                                |                                        |                                           |                                                                              |                                           |                                    |
| 6.3V                  | LMK042 BJ102 □ C     |  | RoHS                                              | 1000                               |                                        | 10                                        |                                                                              |                                           |                                    |
|                       | JMK042 BJ152 □ C*1   |  | RoHS                                              | 1500                               |                                        |                                           |                                                                              |                                           |                                    |
|                       | JMK042 BJ222 □ C*1   |  | RoHS                                              | 2200                               |                                        |                                           |                                                                              |                                           |                                    |
|                       | JMK042 BJ332 □ C*1   |  | RoHS                                              | 3300                               |                                        |                                           |                                                                              |                                           |                                    |
|                       | JMK042 BJ472 □ C*1   |  | RoHS                                              | 4700                               |                                        |                                           |                                                                              |                                           |                                    |
|                       | JMK042 BJ682 □ C*1   |  | RoHS                                              | 6800                               |                                        |                                           |                                                                              |                                           |                                    |
|                       | JMK042 BJ103 □ C*1   |  | RoHS                                              | 10000                              |                                        |                                           |                                                                              |                                           |                                    |

形名の□には静電容量許容差記号が入ります。

\*1 高温負荷試験の試験電圧は定格電圧の 1.5 倍

\*2 個別仕様の取扱いにより、X7R/X7S仕様に对应している場合があります。

□ Please specify the capacitance tolerance code.

\*1 Test Voltage of Loading at high temperature test is 1.5 time of the rated voltage.

\*2 We may provide X7R/X7S for some items according to the individual specification.

■ 063TYPE(0201 case size)

【温度特性 Temp.char. BJ:B/X5R】

| 定格電圧<br>Rated Voltage | 形 名<br>Ordering code |  | EHS<br>(Environmental<br>Hazardous<br>Substances) | 公 称<br>静電容量<br>Capacitance<br>[pF] | 温度特性<br>Temperature<br>characteristics | tanδ<br>Dissipation<br>factor<br>[%] Max. | 実装条件<br>Soldering method<br>R:リフロー Reflow soldering<br>W: フロー Wave soldering | 静電容量<br>許 容 差<br>Capacitance<br>tolerance | 厚 み<br>Thickness<br>[mm]<br>(inch) |  |
|-----------------------|----------------------|--|---------------------------------------------------|------------------------------------|----------------------------------------|-------------------------------------------|------------------------------------------------------------------------------|-------------------------------------------|------------------------------------|--|
| 25V                   | TMK063 BJ101□P       |  | RoHS                                              | 100                                | B/X5R*2                                | 3.5                                       | R                                                                            | ±10%<br>±20%                              | 0.3±0.03<br>(0.012 ± 0.001)        |  |
|                       | TMK063 BJ151□P       |  | RoHS                                              | 150                                |                                        |                                           |                                                                              |                                           |                                    |  |
|                       | TMK063 BJ221□P       |  | RoHS                                              | 220                                |                                        |                                           |                                                                              |                                           |                                    |  |
|                       | TMK063 BJ331□P       |  | RoHS                                              | 330                                |                                        |                                           |                                                                              |                                           |                                    |  |
|                       | TMK063 BJ471□P       |  | RoHS                                              | 470                                |                                        |                                           |                                                                              |                                           |                                    |  |
|                       | TMK063 BJ681□P       |  | RoHS                                              | 680                                |                                        |                                           |                                                                              |                                           |                                    |  |
| 16V                   | TMK063 BJ102□P       |  | RoHS                                              | 1000                               |                                        | 5                                         |                                                                              |                                           |                                    |  |
|                       | EMK063 BJ152□P       |  | RoHS                                              | 1500                               |                                        |                                           |                                                                              |                                           |                                    |  |
|                       | EMK063 BJ222□P       |  | RoHS                                              | 2200                               |                                        |                                           |                                                                              |                                           |                                    |  |
| 10V                   | EMK063 BJ332□P       |  | RoHS                                              | 3300                               |                                        | 7.5                                       |                                                                              |                                           |                                    |  |
|                       | LMK063 BJ472□P       |  | RoHS                                              | 4700                               |                                        |                                           |                                                                              |                                           |                                    |  |
|                       | LMK063 BJ682□P       |  | RoHS                                              | 6800                               |                                        |                                           |                                                                              |                                           |                                    |  |
|                       | LMK063 BJ103□P       |  | RoHS                                              | 10000                              |                                        |                                           |                                                                              |                                           |                                    |  |
|                       | LMK063 BJ223□P*1     |  | RoHS                                              | 22000                              |                                        |                                           |                                                                              |                                           |                                    |  |
|                       | LMK063 BJ473□P*1     |  | RoHS                                              | 47000                              |                                        |                                           |                                                                              |                                           |                                    |  |
| 6.3V                  | LMK063 BJ104□P*1     |  | RoHS                                              | 100000                             | X5R                                    | 10                                        |                                                                              |                                           |                                    |  |
|                       | JMK063 BJ473□P*1     |  | RoHS                                              | 47000                              |                                        | 7.5                                       |                                                                              |                                           |                                    |  |
|                       | JMK063 BJ104□P*1     |  | RoHS                                              | 100000                             |                                        |                                           |                                                                              |                                           |                                    |  |
| 4V                    | JMK063 BJ224MP*1,*3  |  | RoHS                                              | 220000                             |                                        | 10                                        |                                                                              |                                           |                                    |  |
|                       | AMK063 BJ224MP*1     |  | RoHS                                              | 220000                             |                                        |                                           |                                                                              |                                           |                                    |  |
|                       | AMK063 BJ334MP*1,*3  |  | RoHS                                              | 330000                             |                                        |                                           |                                                                              |                                           |                                    |  |
|                       | AMK063 BJ474MP*1,*3  |  | RoHS                                              | 470000                             |                                        |                                           |                                                                              |                                           |                                    |  |

形名の□には静電容量許容差記号が入ります。

\*1 高温負荷試験の試験電圧は定格電圧の 1.5 倍

\*2 個別仕様の取扱いにより、X7R仕様に对应している場合があります。

\*3 ご使用の回路や機器により、個別仕様の取り交わしが必要になります。  
必ず正規販売チャンネルにお問い合わせください。

□ Please specify the capacitance tolerance code.

\*1 Test Voltage of Loading at high temperature test is 1.5 time of the rated voltage.

\*2 We may provide X7R for some items according to the individual specification.

\*3 The exchange of individual specification is necessary depending on the application and circuit condition. Please contact Taiyo Yuden sales channel.

■ 105TYPE (0402 case size)

【温度特性 Temp.char. BJ:B/X5R】

| 定格電圧<br>Rated Voltage | 形 名<br>Ordering code |      | EHS<br>(Environmental<br>Hazardous<br>Substances) | 公 称<br>静電容量<br>Capacitance<br>[pF] | 温度特性<br>Temperature<br>characteristics | tan δ<br>Dissipation<br>factor<br>[%] Max. | 実装条件<br>Soldering method<br>R: リフロー Reflow soldering<br>W: フロー Wave soldering | 静電容量<br>許 容 差<br>Capacitance<br>tolerance | 厚 み<br>Thickness<br>[mm]<br>(inch) |
|-----------------------|----------------------|------|---------------------------------------------------|------------------------------------|----------------------------------------|--------------------------------------------|-------------------------------------------------------------------------------|-------------------------------------------|------------------------------------|
| 50V                   | UMK105 BJ221□V       |      | RoHS                                              | 220                                | B/X5R*2                                | 2.5                                        | R                                                                             | ±10%<br>±20%                              | 0.5±0.05<br>(0.02 ± 0.002)         |
|                       | UMK105 BJ331□V       |      | RoHS                                              | 330                                |                                        |                                            |                                                                               |                                           |                                    |
|                       | UMK105 BJ471□V       |      | RoHS                                              | 470                                |                                        |                                            |                                                                               |                                           |                                    |
|                       | UMK105 BJ681□V       |      | RoHS                                              | 680                                |                                        |                                            |                                                                               |                                           |                                    |
|                       | UMK105 BJ102□V       |      | RoHS                                              | 1000                               |                                        |                                            |                                                                               |                                           |                                    |
|                       | UMK105 BJ152□V       |      | RoHS                                              | 1500                               |                                        |                                            |                                                                               |                                           |                                    |
|                       | UMK105 BJ222□V       |      | RoHS                                              | 2200                               |                                        |                                            |                                                                               |                                           |                                    |
|                       | UMK105 BJ332□V       |      | RoHS                                              | 3300                               |                                        |                                            |                                                                               |                                           |                                    |
|                       | UMK105 BJ472□V       |      | RoHS                                              | 4700                               |                                        |                                            |                                                                               |                                           |                                    |
|                       | UMK105 BJ682□V*1     |      | RoHS                                              | 6800                               |                                        |                                            |                                                                               |                                           |                                    |
| UMK105 BJ103□V        |                      | RoHS | 10000                                             | 3.5                                |                                        |                                            |                                                                               |                                           |                                    |
| 35V                   | GMK105 BJ104□V*1     |      | RoHS                                              | 100000                             | B/X5R                                  | 5                                          |                                                                               |                                           |                                    |
| 25V                   | TMK105 BJ682□V       |      | RoHS                                              | 6800                               | B/X5R*2                                | 2.5                                        |                                                                               |                                           |                                    |
|                       | TMK105 BJ103□V       |      | RoHS                                              | 10000                              |                                        | 3.5                                        |                                                                               |                                           |                                    |
|                       | TMK105 BJ153□V       |      | RoHS                                              | 15000                              |                                        |                                            |                                                                               |                                           |                                    |
|                       | TMK105 BJ223□V       |      | RoHS                                              | 22000                              |                                        |                                            |                                                                               |                                           |                                    |
|                       | TMK105 BJ333□V*1     |      | RoHS                                              | 33000                              |                                        |                                            |                                                                               |                                           |                                    |
|                       | TMK105 BJ473□V*1     |      | RoHS                                              | 47000                              |                                        |                                            |                                                                               |                                           |                                    |
|                       | TMK105 BJ104□V*1     |      | RoHS                                              | 100000                             | B/X5R                                  | 5                                          |                                                                               |                                           |                                    |
| 16V                   | EMK105 BJ333□V       |      | RoHS                                              | 33000                              | B/X5R*2                                | 3.5                                        |                                                                               |                                           |                                    |
|                       | EMK105 BJ473□V       |      | RoHS                                              | 47000                              |                                        |                                            |                                                                               |                                           |                                    |
|                       | EMK105 BJ683□V       |      | RoHS                                              | 68000                              | B/X5R                                  | 5                                          |                                                                               |                                           |                                    |
|                       | EMK105 BJ104□V*1     |      | RoHS                                              | 100000                             |                                        |                                            |                                                                               |                                           |                                    |
|                       | EMK105 BJ224□V*1     |      | RoHS                                              | 220000                             |                                        |                                            |                                                                               |                                           |                                    |
| 10V                   | LMK105 BJ104□V       |      | RoHS                                              | 100000                             | B/X5R                                  |                                            |                                                                               |                                           |                                    |
|                       | LMK105 BJ224□V*1     |      | RoHS                                              | 220000                             |                                        |                                            |                                                                               |                                           |                                    |
|                       | LMK105 BJ474□V*1     |      | RoHS                                              | 470000                             | X5R                                    | 10                                         |                                                                               |                                           |                                    |
|                       | LMK105 BJ105□V*1     |      | RoHS                                              | 1000000                            |                                        |                                            |                                                                               |                                           |                                    |
| 6.3V                  | JMK105 BJ224□V*1     |      | RoHS                                              | 220000                             | B/X5R                                  | 5                                          |                                                                               |                                           |                                    |
|                       | JMK105 BJ474□V*1     |      | RoHS                                              | 470000                             |                                        |                                            |                                                                               |                                           |                                    |
|                       | JMK105 BJ105□V*1     |      | RoHS                                              | 1000000                            |                                        |                                            |                                                                               |                                           |                                    |
|                       | JMK105 BJ225MV*1,*3  |      | RoHS                                              | 2200000                            |                                        |                                            |                                                                               |                                           |                                    |
| 4V                    | AMK105 BJ335MV*1,*3  |      | RoHS                                              | 3300000                            | X5R                                    | 10                                         |                                                                               |                                           |                                    |
|                       | AMK105 BJ475MV*1,*3  |      | RoHS                                              | 4700000                            |                                        |                                            |                                                                               |                                           |                                    |
|                       |                      |      |                                                   |                                    |                                        |                                            | ±20%                                                                          | 0.5±0.1<br>(0.02 ± 0.004)                 |                                    |

形名の□には静電容量許容差記号が入ります。

\*1 高温負荷試験の試験電圧は定格電圧の 1.5 倍

\*2 個別仕様の取交しにより、X7R仕様に对应している場合があります。

\*3 ご使用の回路や機器により、個別仕様の取り交わしが必要になります。  
必ず正規販売チャンネルにお問い合わせください。

□ Please specify the capacitance tolerance code.

\*1 Test Voltage of Loading at high temperature test is 1.5 time of the rated voltage.

\*2 We may provide X7R for some items according to the individual specification.

\*3 The exchange of individual specification is necessary depending on the application and circuit condition. Please contact Taiyo Yuden sales channel.

【温度特性 Temp.char. B7:X7R】

| 定格電圧<br>Rated Voltage | 形 名<br>Ordering code |  | EHS<br>(Environmental<br>Hazardous<br>Substances) | 公 称<br>静電容量<br>Capacitance<br>[pF] | 温度特性<br>Temperature<br>characteristics | tan δ<br>Dissipation<br>factor<br>[%] Max. | 実装条件<br>Soldering method<br>R: リフロー Reflow soldering<br>W: フロー Wave soldering | 静電容量<br>許 容 差<br>Capacitance<br>tolerance | 厚 み<br>Thickness<br>[mm]<br>(inch) |
|-----------------------|----------------------|--|---------------------------------------------------|------------------------------------|----------------------------------------|--------------------------------------------|-------------------------------------------------------------------------------|-------------------------------------------|------------------------------------|
| 50V                   | UMK105 B7 221□V      |  | RoHS                                              | 220                                | X7R                                    | 2.5                                        | R                                                                             | ±10%<br>±20%                              | 0.5±0.05<br>(0.02 ± 0.002)         |
|                       | UMK105 B7 331□V      |  | RoHS                                              | 330                                |                                        |                                            |                                                                               |                                           |                                    |
|                       | UMK105 B7 471□V      |  | RoHS                                              | 470                                |                                        |                                            |                                                                               |                                           |                                    |
|                       | UMK105 B7 681□V      |  | RoHS                                              | 680                                |                                        |                                            |                                                                               |                                           |                                    |
|                       | UMK105 B7 102□V      |  | RoHS                                              | 1000                               |                                        |                                            |                                                                               |                                           |                                    |
|                       | UMK105 B7 152□V      |  | RoHS                                              | 1500                               |                                        |                                            |                                                                               |                                           |                                    |
|                       | UMK105 B7 222□V      |  | RoHS                                              | 2200                               |                                        |                                            |                                                                               |                                           |                                    |
|                       | UMK105 B7 332□V      |  | RoHS                                              | 3300                               |                                        |                                            |                                                                               |                                           |                                    |
|                       | UMK105 B7 472□V*1    |  | RoHS                                              | 4700                               |                                        |                                            |                                                                               |                                           |                                    |
|                       | UMK105 B7 682□V*1    |  | RoHS                                              | 6800                               |                                        |                                            |                                                                               |                                           |                                    |
|                       | UMK105 B7 103□V*1    |  | RoHS                                              | 10000                              |                                        | 3.5                                        |                                                                               |                                           |                                    |
| 25V                   | TMK105 B7 472□V      |  | RoHS                                              | 4700                               | X7R                                    | 2.5                                        | R                                                                             | ±10%<br>±20%                              | 0.5±0.05<br>(0.02 ± 0.002)         |
|                       | TMK105 B7 682□V      |  | RoHS                                              | 6800                               |                                        |                                            |                                                                               |                                           |                                    |
|                       | TMK105 B7 103□V      |  | RoHS                                              | 10000                              |                                        | 3.5                                        |                                                                               |                                           |                                    |
|                       | TMK105 B7 153□V*1    |  | RoHS                                              | 15000                              |                                        |                                            |                                                                               |                                           |                                    |
|                       | TMK105 B7 223□V*1    |  | RoHS                                              | 22000                              |                                        |                                            |                                                                               |                                           |                                    |
|                       | TMK105 B7 333□V*1    |  | RoHS                                              | 33000                              |                                        |                                            |                                                                               |                                           |                                    |
|                       | TMK105 B7 473□V*1    |  | RoHS                                              | 47000                              |                                        |                                            |                                                                               |                                           |                                    |
| 16V                   | EMK105 B7 153□V      |  | RoHS                                              | 15000                              | X7R                                    | 5                                          | R                                                                             | ±10%<br>±20%                              | 0.5±0.05<br>(0.02 ± 0.002)         |
|                       | EMK105 B7 223□V      |  | RoHS                                              | 22000                              |                                        |                                            |                                                                               |                                           |                                    |
|                       | EMK105 B7 333□V      |  | RoHS                                              | 33000                              |                                        |                                            |                                                                               |                                           |                                    |
|                       | EMK105 B7 473□V      |  | RoHS                                              | 47000                              |                                        |                                            |                                                                               |                                           |                                    |
|                       | EMK105 B7 104□V*1    |  | RoHS                                              | 100000                             |                                        |                                            |                                                                               |                                           |                                    |

形名の□には静電容量許容差記号が入ります。

\*1 高温負荷試験の試験電圧は定格電圧の 1.5 倍

□ Please specify the capacitance tolerance code.

\*1 Test Voltage of Loading at high temperature test is 1.5 time of the rated voltage.

【温度特性 Temp.char. F:Y5V】

| 定格電圧<br>Rated Voltage | 形 名<br>Ordering code |  | EHS<br>(Environmental<br>Hazardous<br>Substances) | 公 称<br>静電容量<br>Capacitance<br>[pF] | 温度特性<br>Temperature<br>characteristics | tan δ<br>Dissipation<br>factor<br>[%] Max. | 実装条件<br>Soldering method<br>R: リフロー Reflow soldering<br>W: フロー Wave soldering | 静電容量<br>許 容 差<br>Capacitance<br>tolerance | 厚 み<br>Thickness<br>[mm]<br>(inch) |
|-----------------------|----------------------|--|---------------------------------------------------|------------------------------------|----------------------------------------|--------------------------------------------|-------------------------------------------------------------------------------|-------------------------------------------|------------------------------------|
| 50V                   | UMK105 F103ZV        |  | RoHS                                              | 10000                              | F/Y5V                                  | 5                                          | R                                                                             | +80%<br>-20%                              | 0.5±0.05<br>(0.02 ± 0.002)         |
| 25V                   | TMK105 F223ZV        |  | RoHS                                              | 22000                              |                                        |                                            |                                                                               |                                           |                                    |
| 16V                   | EMK105 F473ZV        |  | RoHS                                              | 47000                              |                                        | 7                                          |                                                                               |                                           |                                    |
|                       | EMK105 F104ZV        |  | RoHS                                              | 100000                             |                                        | 9                                          |                                                                               |                                           |                                    |
| 10V                   | LMK105 F224ZV        |  | RoHS                                              | 220000                             |                                        | 11                                         |                                                                               |                                           |                                    |
| 6.3V                  | JMK105 F474ZV        |  | RoHS                                              | 470000                             |                                        | 12.5                                       |                                                                               |                                           |                                    |
|                       | JMK105 F105ZV*1      |  | RoHS                                              | 1000000                            |                                        | 20                                         |                                                                               |                                           |                                    |

\*1 高温負荷試験の試験電圧は定格電圧の 1.5 倍

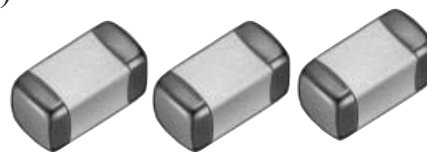
\*1 Test Voltage of Loading at high temperature test is 1.5 time of the rated voltage.

# 高周波積層セラミックコンデンサ

## MULTILAYER CERAMIC CAPACITORS

### FOR HIGH FREQUENCY APPLICATIONS(1GHz+)

OPERATING TEMP. -55~+125°C



リフロー/REFLOW

#### 特長 FEATURES

- ・積層磁器コンデンサとしては高いQ値が高周波で得られる
- ・1005形状であるため、実装密度の向上、軽量化が図れる
- ・ Q values in the high frequency range (1 GHz+) are excellent compared to other types of multilayer capacitors.
- ・ The 1005(0402) case size is designed for high density mounting and weight reduction in various applications.

#### 用途 APPLICATIONS

- ・高周波におけるコンデンサのQ値および小型化が求められる用途向き  
VCO、TCXO etc
- ・高周波回路の特性調整用途
- ・ Suitable for those high frequency applications in which a capacitor with both a high Q-value and small size is required such as portable communications and other wireless applications.  
VCO, TCXO. etc.
- ・ Adjustment of characteristics in high frequency circuit

#### 形名表記法 ORDERING CODE

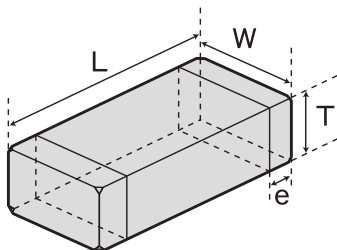
|                        |                                 |                         |                       |                            |
|------------------------|---------------------------------|-------------------------|-----------------------|----------------------------|
| <b>1</b><br>定格電圧 [VDC] | <b>4</b><br>形状寸法 (EIA) L×W [mm] | <b>6</b><br>公称静電容量 [pF] | <b>8</b><br>製品厚み [mm] | <b>10</b><br>包装            |
| E 16<br>U 50           | 105(0402) 1.0×0.5               | 例<br>020 2<br>4R3 4.3   | W 0.5                 | F φ178mm テーピング<br>(2mmピッチ) |
| <b>2</b><br>シリーズ名      | <b>5</b><br>温度特性 [ppm/°C]       | <b>7</b><br>容量許容差       | <b>9</b><br>個別仕様      |                            |
| V 高周波用積層コンデンサ          | CH 0±60<br>RH -220±60           | B ±0.1pF<br>J ±5%       | — 標準                  |                            |
| <b>3</b><br>端子電極       |                                 |                         |                       |                            |
| K メッキ品                 |                                 |                         |                       |                            |

U V K 1 0 5 R H 4 R 3 J W - F

1 2 3 4 5 6 7 8 9 10

|                                                          |                                                  |                                      |                            |                                |
|----------------------------------------------------------|--------------------------------------------------|--------------------------------------|----------------------------|--------------------------------|
| <b>1</b><br>Rated voltage [VDC]                          | <b>4</b><br>Dimensions (case size) (L×W) [mm]    | <b>6</b><br>Nominal capacitance [pF] | <b>8</b><br>Thickness [mm] | <b>10</b><br>Packaging         |
| E 16<br>U 50                                             | 105(0402) 1.0×0.5                                | example<br>020 2<br>4R3 4.3          | W 0.5                      | F φ178mm Taping<br>(2mm pitch) |
| <b>2</b><br>Series name                                  | <b>5</b><br>Temperature characteristics [ppm/°C] | <b>7</b><br>Capacitance tolerance    | <b>9</b><br>Special code   |                                |
| V MULTILAYER CERAMIC<br>CAPACITORS<br>FOR HIGH FREQUENCY | CH 0±60<br>RH -220±60                            | B ±0.1pF<br>J ±5%                    | — Standard Products        |                                |
| <b>3</b><br>End termination                              |                                                  |                                      |                            |                                |
| K Plated                                                 |                                                  |                                      |                            |                                |

# 外形寸法 EXTERNAL DIMENSIONS



| Type(EIA)        | L                         | W                         | T                         | e                         |
|------------------|---------------------------|---------------------------|---------------------------|---------------------------|
| □VK105<br>(0402) | 1.0±0.05<br>(0.039±0.002) | 0.5±0.05<br>(0.020±0.002) | 0.5±0.05<br>(0.020±0.002) | 0.25±0.1<br>(0.010±0.004) |

Unit : mm (inch)

# アイテム一覧 PART NUMBERS

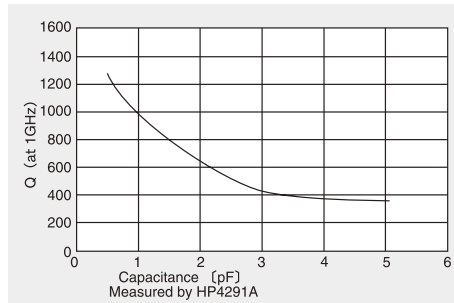
| 定格電圧<br>Rated<br>Voltage<br>(DC) | 形 名<br>Ordering code | EHS<br>(Environmental<br>Hazardous<br>Substances) | 温度特性<br>Temperature<br>characteristics |    | 公 称<br>静電容量<br>Capacitance<br>[pF] | 静電容量<br>許容差<br>Capacitance<br>tolerance | Q規格値<br>(at 1GHz)<br>Q (min) | 厚み<br>Thickness<br>[mm] | Q typ.値<br>(参考値)<br>Typical Q |
|----------------------------------|----------------------|---------------------------------------------------|----------------------------------------|----|------------------------------------|-----------------------------------------|------------------------------|-------------------------|-------------------------------|
|                                  |                      |                                                   | CH                                     | RH |                                    |                                         |                              |                         |                               |
| E: 16V<br>U: 50V                 | □VK105 CH0R3BW       | RoHS                                              | ●                                      |    | 0.3                                | ±0.1pF                                  | 300                          | 0.5±0.05                | 1200                          |
|                                  | □VK105 CH0R4BW       | RoHS                                              | ●                                      |    | 0.4                                |                                         | 300                          |                         | 1200                          |
|                                  | □VK105 CH0R5BW       | RoHS                                              | ●                                      |    | 0.5                                |                                         | 300                          |                         | 1200                          |
|                                  | □VK105 CH0R6BW       | RoHS                                              | ●                                      |    | 0.6                                |                                         | 300                          |                         | 1100                          |
|                                  | □VK105 CH0R7BW       | RoHS                                              | ●                                      |    | 0.7                                |                                         | 300                          |                         | 1100                          |
|                                  | □VK105 CH0R8BW       | RoHS                                              | ●                                      |    | 0.8                                |                                         | 300                          |                         | 1000                          |
|                                  | □VK105 CH0R9BW       | RoHS                                              | ●                                      |    | 0.9                                |                                         | 300                          |                         | 950                           |
|                                  | □VK105 CH010BW       | RoHS                                              | ●                                      |    | 1.0                                |                                         | 300                          |                         | 950                           |
|                                  | □VK105 CH1R1BW       | RoHS                                              | ●                                      |    | 1.1                                |                                         | 280                          |                         | 930                           |
|                                  | □VK105 CH1R2BW       | RoHS                                              | ●                                      |    | 1.2                                |                                         | 270                          |                         | 850                           |
|                                  | □VK105 CH1R3BW       | RoHS                                              | ●                                      |    | 1.3                                |                                         | 260                          |                         | 740                           |
|                                  | □VK105 CH1R5BW       | RoHS                                              | ●                                      |    | 1.5                                |                                         | 240                          |                         | 710                           |
|                                  | □VK105 CH1R6BW       | RoHS                                              | ●                                      |    | 1.6                                |                                         | 230                          |                         | 670                           |
|                                  | □VK105 CH1R8BW       | RoHS                                              | ●                                      |    | 1.8                                |                                         | 210                          |                         | 650                           |
|                                  | □VK105 CH020BW       | RoHS                                              | ●                                      |    | 2.0                                |                                         | 190                          |                         | 610                           |
|                                  | □VK105 CH2R2JW       | RoHS                                              | ●                                      |    | 2.2                                | ±5%                                     | 180                          |                         | 530                           |
|                                  | □VK105 CH2R4JW       | RoHS                                              | ●                                      |    | 2.4                                |                                         | 170                          |                         | 510                           |
|                                  | □VK105 CH2R7JW       | RoHS                                              | ●                                      |    | 2.7                                |                                         | 150                          |                         | 460                           |
|                                  | □VK105 CH030JW       | RoHS                                              | ●                                      |    | 3.0                                |                                         | 130                          |                         | 390                           |
|                                  | □VK105 CH3R3JW       | RoHS                                              | ●                                      |    | 3.3                                |                                         | 120                          |                         | 370                           |
|                                  | □VK105 CH3R6JW       | RoHS                                              | ●                                      |    | 3.6                                |                                         | 110                          |                         | 360                           |
|                                  | □VK105 CH3R9JW       | RoHS                                              | ●                                      |    | 3.9                                |                                         | 99                           |                         | 360                           |
|                                  | □VK105 CH4R3JW       | RoHS                                              | ●                                      |    | 4.3                                |                                         | 84                           |                         | 360                           |
|                                  | □VK105 CH4R7JW       | RoHS                                              | ●                                      |    | 4.7                                | ±0.1pF                                  | 84                           |                         | 340                           |
|                                  | □VK105 CH5R1JW       | RoHS                                              | ●                                      |    | 5.1                                |                                         | 84                           |                         | 320                           |
|                                  | □VK105 RH0R5BW       | RoHS                                              |                                        | ●  | 0.5                                |                                         | 300                          |                         | 1100                          |
|                                  | □VK105 RH0R6BW       | RoHS                                              |                                        | ●  | 0.6                                |                                         | 300                          |                         | 1000                          |
|                                  | □VK105 RH0R7BW       | RoHS                                              |                                        | ●  | 0.7                                |                                         | 300                          |                         | 1000                          |
|                                  | □VK105 RH0R8BW       | RoHS                                              |                                        | ●  | 0.8                                |                                         | 300                          |                         | 970                           |
|                                  | □VK105 RH0R9BW       | RoHS                                              |                                        | ●  | 0.9                                |                                         | 300                          |                         | 950                           |
|                                  | □VK105 RH010BW       | RoHS                                              |                                        | ●  | 1.0                                |                                         | 300                          |                         | 900                           |
|                                  | □VK105 RH1R1BW       | RoHS                                              |                                        | ●  | 1.1                                |                                         | 280                          |                         | 900                           |
|                                  | □VK105 RH1R2BW       | RoHS                                              |                                        | ●  | 1.2                                |                                         | 270                          |                         | 740                           |
|                                  | □VK105 RH1R3BW       | RoHS                                              |                                        | ●  | 1.3                                |                                         | 260                          |                         | 700                           |
|                                  | □VK105 RH1R5BW       | RoHS                                              |                                        | ●  | 1.5                                |                                         | 240                          |                         | 680                           |
|                                  | □VK105 RH1R6BW       | RoHS                                              |                                        | ●  | 1.6                                |                                         | 230                          |                         | 640                           |
|                                  | □VK105 RH1R8BW       | RoHS                                              |                                        | ●  | 1.8                                |                                         | 210                          |                         | 620                           |
|                                  | □VK105 RH020BW       | RoHS                                              |                                        | ●  | 2.0                                | ±5%                                     | 190                          |                         | 570                           |
|                                  | □VK105 RH2R2JW       | RoHS                                              |                                        | ●  | 2.2                                |                                         | 180                          |                         | 480                           |
|                                  | □VK105 RH2R4JW       | RoHS                                              |                                        | ●  | 2.4                                |                                         | 170                          |                         | 470                           |
|                                  | □VK105 RH2R7JW       | RoHS                                              |                                        | ●  | 2.7                                |                                         | 150                          |                         | 420                           |
|                                  | □VK105 RH030JW       | RoHS                                              |                                        | ●  | 3.0                                |                                         | 130                          |                         | 360                           |
|                                  | □VK105 RH3R3JW       | RoHS                                              |                                        | ●  | 3.3                                |                                         | 120                          |                         | 350                           |
|                                  | □VK105 RH3R6JW       | RoHS                                              |                                        | ●  | 3.6                                |                                         | 110                          |                         | 340                           |
|                                  | □VK105 RH3R9JW       | RoHS                                              |                                        | ●  | 3.9                                |                                         | 99                           |                         | 340                           |
|                                  | □VK105 RH4R3JW       | RoHS                                              |                                        | ●  | 4.3                                | ±5%                                     | 84                           |                         | 340                           |
|                                  | □VK105 RH4R7JW       | RoHS                                              |                                        | ●  | 4.7                                |                                         | 84                           |                         | 320                           |
|                                  | □VK105 RH5R1JW       | RoHS                                              |                                        | ●  | 5.1                                |                                         | 84                           |                         | 310                           |

注：□には定格電圧記号がはいります。□Please specify the Rated Voltage code.

# 仕様 SPECIFICATIONS

| 温度特性<br>Temperature<br>Characteristics | 使用温度範囲<br>Operating<br>Temperature<br>range | 温度係数範囲<br>Temperature<br>Coefficient range<br>[ppm/°C] | 静電容量許容差<br>Capacitance<br>Tolerance<br>(区分) |
|----------------------------------------|---------------------------------------------|--------------------------------------------------------|---------------------------------------------|
| CH                                     | -55~+125°C                                  | 0±60                                                   | ±0.1pF (～2.0pF)                             |
| RH                                     |                                             | -220±60                                                | ±5% (2.2pF～)                                |

■容量値とQの関係例 (CH特性例) Capacitance vs Q value (Typical for CH T.C.)



セクションガイド  
Selection Guide

アイテム一覧  
Part Numbers

特性図  
Electrical Characteristics

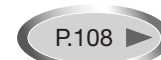
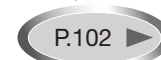
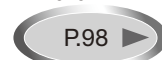
梱包  
Packaging

信頼性  
Reliability Data

使用上の注意  
Precautions



etc



# 超低歪積層セラミックコンデンサ (CFCAP™)

## SUPER LOW DISTORTION MULTILAYER CERAMIC CAPACITORS (CFCAP™)

OPERATING TEMP. -55~+125°C



リフロー/REFLOW

### 特長 FEATURES

- ・新規開発を行った誘電体材料を使用し優れた温度特性と内部電極にNiを用いることで、小型・高容量・低コストを実現しました
- ・低歪み率、低ショックノイズでアナログ回路や携帯機器のデジタル回路に最適です
- ・耐熱性、耐破壊電圧、機械的強度が高くフィルムコンデンサの置き換えに最適です

- ・ Newly developed dielectric material and the use of nickel for internal electrodes provide excellent temperature characteristics with high capacitance, small case size and low cost.
- ・ Low distortion and low shock noise make these capacitors well suited for use in analog or digital mobile devices.
- ・ Excellent heat-resistance, high break down voltage, and mechanical strength make these capacitors well suited for replacing film capacitors.

### 用途 APPLICATIONS

- ・ AV関連機器などの信号回路
- ・ アナログ信号のカップリング用途
- ・ 携帯電話のPLL回路
- ・ 良好な温度特性による時定数回路、発信回路、フィルタなど

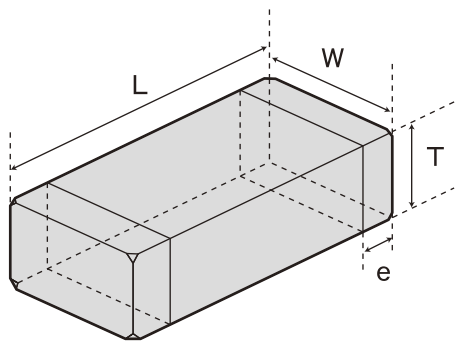
- ・ Signal line for AV products
- ・ Analog signal coupling applications
- ・ PLL circuit of mobile phones
- ・ Good temperature characteristics for time constant circuits, oscillation circuits and filters

### 形名表記法 ORDERING CODE

|                                      |                                                                                       |                           |                                                       |                                                                                |
|--------------------------------------|---------------------------------------------------------------------------------------|---------------------------|-------------------------------------------------------|--------------------------------------------------------------------------------|
| <b>1</b><br>定格電圧 [VDC]               | <b>3</b><br>端子電極                                                                      | <b>5</b><br>シリーズ記号        | <b>7</b><br>容量許容差                                     | <b>9</b><br>個別仕様                                                               |
| U 50<br>G 35<br>T 25<br>E 16<br>L 10 | K メッキ品                                                                                | SD スタンダード                 | K ±10%                                                | — 標準                                                                           |
| <b>2</b><br>シリーズ名                    | <b>4</b><br>形状寸法 (EIA) L×W (mm)                                                       | <b>6</b><br>公称静電容量 (μF)   | <b>8</b><br>製品厚み (mm)                                 | <b>10</b><br>包装                                                                |
| M 積層コンデンサ                            | 105 (0402) 1.0×0.5<br>107 (0603) 1.6×0.8<br>212 (0805) 2.0×1.25<br>316 (1206) 3.2×1.6 | 例<br>223 0.022<br>104 0.1 | V 0.5<br>A 0.8<br>D 0.85<br>F 1.15<br>G 1.25<br>L 1.6 | T φ178mm テーピング (4mmピッチ)<br>107, 212, 316形状<br>F φ178mm テーピング (2mmピッチ)<br>105形状 |
|                                      |                                                                                       |                           |                                                       | <b>11</b><br>当社管理記号                                                            |
|                                      |                                                                                       |                           |                                                       | △ 標準品<br>△=スペース                                                                |

|   |                     |                               |   |                            |          |   |                          |          |    |                       |      |    |              |                           |                   |
|---|---------------------|-------------------------------|---|----------------------------|----------|---|--------------------------|----------|----|-----------------------|------|----|--------------|---------------------------|-------------------|
| T | M                   | K                             | 3 | 1                          | 6        | S | D                        | 1        | 0  | 4                     | K    | L  | -            | T                         | △                 |
| 1 | 2                   | 3                             | 4 | 5                          | 6        | 7 | 8                        | 9        | 10 | 11                    |      |    |              |                           |                   |
| 1 | Rated voltage [VDC] |                               | 3 | End termination            |          | 5 | Series symbol            |          | 7  | Capacitance tolerance |      | 9  | Special code |                           |                   |
|   | U                   | 50                            |   | K                          | Plated   |   | SD                       | Standard |    | K                     | ±10% |    | -            | Standard products         |                   |
|   | G                   | 35                            |   |                            |          |   |                          |          |    |                       |      |    |              |                           |                   |
|   | T                   | 25                            |   |                            |          |   |                          |          |    |                       |      |    |              |                           |                   |
|   | E                   | 16                            |   |                            |          |   |                          |          |    |                       |      |    |              |                           |                   |
|   | L                   | 10                            |   |                            |          |   |                          |          |    |                       |      |    |              |                           |                   |
| 2 | Series name         |                               | 4 | Dimensions(case size) (mm) |          | 6 | Nominal capacitance (μF) |          | 8  | Thickness (mm)        |      | 10 | Packaging    |                           |                   |
|   | M                   | Multilayer ceramic capacitors |   | 105 (0402)                 | 1.0×0.5  |   | example                  |          |    | V                     | 0.5  |    | T            | φ178mm Taping (4mm pitch) |                   |
|   |                     |                               |   | 107 (0603)                 | 1.6×0.8  |   | 223                      | 0.022    |    | A                     | 0.8  |    |              | 0603, 0805, 1206Type      |                   |
|   |                     |                               |   | 212 (0805)                 | 2.0×1.25 |   | 104                      | 0.1      |    | D                     | 0.85 |    | F            | φ178mm Taping (2mm pitch) |                   |
|   |                     |                               |   | 316 (1206)                 | 3.2×1.6  |   |                          |          |    | F                     | 1.15 |    |              | 0402Type                  |                   |
|   |                     |                               |   |                            |          |   |                          |          |    | G                     | 1.25 |    |              |                           |                   |
|   |                     |                               |   |                            |          |   |                          |          |    | L                     | 1.6  |    |              |                           |                   |
|   |                     |                               |   |                            |          |   |                          |          |    |                       |      |    | 11           | Internal code             |                   |
|   |                     |                               |   |                            |          |   |                          |          |    |                       |      |    |              | △                         | Standard products |
|   |                     |                               |   |                            |          |   |                          |          |    |                       |      |    |              | △=Blank space             |                   |

# 外形寸法 EXTERNAL DIMENSIONS



| Type (EIA)       | L                         | W                          | T                          |   | e                                                                                     |
|------------------|---------------------------|----------------------------|----------------------------|---|---------------------------------------------------------------------------------------|
| □MK105<br>(0402) | 1.0±0.05<br>(0.039±0.002) | 0.5±0.05<br>(0.020±0.002)  | 0.5±0.05<br>(0.020±0.002)  | V | 0.25±0.10<br>(0.010±0.004)                                                            |
| □MK107<br>(0603) | 1.6±0.10<br>(0.063±0.004) | 0.8±0.10<br>(0.031±0.004)  | 0.8±0.10<br>(0.031±0.004)  | A | 0.35±0.25<br>(0.014±0.010)                                                            |
| □MK212<br>(0805) | 2.0±0.10<br>(0.079±0.004) | 1.25±0.10<br>(0.049±0.004) | 0.85±0.10<br>(0.033±0.004) | D | 0.5±0.25<br>(0.020±0.010)                                                             |
|                  |                           |                            | 1.25±0.10<br>(0.049±0.004) | G |                                                                                       |
| □MK316<br>(1206) | 3.2±0.15<br>(0.126±0.006) | 1.6±0.15<br>(0.063±0.006)  | 1.15±0.10<br>(0.045±0.004) | F | 0.5 <sup>+0.35</sup> <sub>-0.25</sub><br>(0.020 <sup>+0.014</sup> <sub>-0.010</sub> ) |
|                  |                           |                            | 1.6±0.20<br>(0.063±0.008)  | L |                                                                                       |

Unit : mm (inch)

## 概略バリエーション AVAILABLE CAPACITANCE RANGE

| Cap<br>[μF] | Type                | 105 |     |     |     | 107 |     |     |     | 212 |     |     |     | 316 |     |
|-------------|---------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
|             | Temp.Char           | SD  |     |     |     | SD  |     |     |     | SD  |     |     |     | SD  |     |
|             | VDC<br>[pF:3digits] | 50V | 25V | 16V | 10V | 50V | 25V | 16V | 10V | 50V | 35V | 16V | 10V | 35V | 25V |
| 0.00039     | 391                 | V   |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 0.00047     | 471                 | V   |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 0.00056     | 561                 | V   |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 0.00068     | 681                 |     | V   |     |     |     |     |     |     |     |     |     |     |     |     |
| 0.00082     | 821                 |     | V   |     |     |     |     |     |     |     |     |     |     |     |     |
| 0.001       | 102                 |     | V   |     |     | A   |     |     |     |     |     |     |     |     |     |
| 0.0012      | 122                 |     | V   |     |     | A   |     |     |     |     |     |     |     |     |     |
| 0.0015      | 152                 |     |     | V   |     | A   |     |     |     |     |     |     |     |     |     |
| 0.0018      | 182                 |     |     | V   |     | A   |     |     |     |     |     |     |     |     |     |
| 0.0022      | 222                 |     |     | V   |     | A   |     |     |     |     |     |     |     |     |     |
| 0.0027      | 272                 |     |     | V   |     | A   |     |     |     |     |     |     |     |     |     |
| 0.0033      | 332                 |     |     |     | V   | A   |     |     |     |     |     |     |     |     |     |
| 0.0039      | 392                 |     |     |     | V   |     | A   |     |     | D   |     |     |     |     |     |
| 0.0047      | 472                 |     |     |     | V   |     | A   |     |     | D   |     |     |     |     |     |
| 0.0056      | 562                 |     |     |     |     |     | A   |     |     | D   |     |     |     |     |     |
| 0.0068      | 682                 |     |     |     |     |     | A   |     |     | D   |     |     |     |     |     |
| 0.0082      | 822                 |     |     |     |     |     | A   |     |     | D   |     |     |     |     |     |
| 0.01        | 103                 |     |     |     |     |     | A   |     |     | D   |     |     |     |     |     |
| 0.012       | 123                 |     |     |     |     |     |     | A   |     | D   |     |     |     |     |     |
| 0.015       | 153                 |     |     |     |     |     |     | A   |     | D   |     |     |     |     |     |
| 0.018       | 183                 |     |     |     |     |     |     | A   |     | G   |     |     |     |     |     |
| 0.022       | 223                 |     |     |     |     |     |     | A   |     | G   |     |     |     |     |     |
| 0.027       | 273                 |     |     |     |     |     |     |     |     | G   |     |     |     |     |     |
| 0.033       | 333                 |     |     |     |     |     |     |     |     |     | D   |     |     | F   |     |
| 0.039       | 393                 |     |     |     |     |     |     |     |     |     |     |     |     | F   |     |
| 0.047       | 473                 |     |     |     |     |     |     |     |     |     |     |     | D   |     | F   |
| 0.056       | 563                 |     |     |     |     |     |     |     |     |     |     |     |     |     | F   |
| 0.068       | 683                 |     |     |     |     |     |     |     |     |     |     |     | G   |     | F   |
| 0.082       | 823                 |     |     |     |     |     |     |     |     |     |     |     | G   |     | L   |
| 0.1         | 104                 |     |     |     |     |     |     |     |     |     |     |     | G   |     | L   |

※グラフ記号は製品厚みを表します。 Letters in the table indicate thickness.

| シリーズコード<br>Series Code | 静電容量許容差 [%]<br>Capacitance tolerance | tan δ [%]<br>Dissipation factor |
|------------------------|--------------------------------------|---------------------------------|
| SD                     | ±10 (K)                              | 0.1max.                         |

セレクションガイド  
Selection Guide

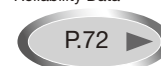
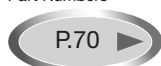
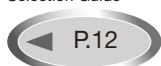
アイテム一覧  
Part Numbers

特性図  
Electrical Characteristics

梱包  
Packaging

信頼性  
Reliability Data

使用上の注意  
Precautions



# アイテム一覧 PART NUMBERS

## ■105TYPE (0402 case size)

| 定格電圧<br>Rated Voltage | 形名<br>Ordering code |  | EHS<br>(Environmental<br>Hazardous<br>Substances) | 公称<br>静電容量<br>Capacitance<br>[μF] | 温度特性<br>Temperature<br>characteristics<br>Standard type | tan δ<br>Dissipation<br>factor<br>[%] Max. | 実装条件<br>Soldering method<br>R: リフロー Reflow soldering<br>W: フロー Wave soldering | 静電容量<br>許容差<br>Capacitance<br>tolerance | 厚み<br>Thickness<br>[mm] (inch) |
|-----------------------|---------------------|--|---------------------------------------------------|-----------------------------------|---------------------------------------------------------|--------------------------------------------|-------------------------------------------------------------------------------|-----------------------------------------|--------------------------------|
| 50V                   | UMK105 SD391KV      |  | RoHS                                              | 0.00039                           | Standard type                                           | 0.1                                        | R                                                                             | ±10%*                                   | 0.5±0.05<br>(0.020±0.002)      |
|                       | UMK105 SD471KV      |  | RoHS                                              | 0.00047                           |                                                         |                                            |                                                                               |                                         |                                |
|                       | UMK105 SD561KV      |  | RoHS                                              | 0.00056                           |                                                         |                                            |                                                                               |                                         |                                |
| 25V                   | TMK105 SD681KV      |  | RoHS                                              | 0.00068                           |                                                         |                                            |                                                                               |                                         |                                |
|                       | TMK105 SD821KV      |  | RoHS                                              | 0.00082                           |                                                         |                                            |                                                                               |                                         |                                |
|                       | TMK105 SD102KV      |  | RoHS                                              | 0.0010                            |                                                         |                                            |                                                                               |                                         |                                |
| 16V                   | TMK105 SD122KV      |  | RoHS                                              | 0.0012                            |                                                         |                                            |                                                                               |                                         |                                |
|                       | EMK105 SD152KV      |  | RoHS                                              | 0.0015                            |                                                         |                                            |                                                                               |                                         |                                |
|                       | EMK105 SD182KV      |  | RoHS                                              | 0.0018                            |                                                         |                                            |                                                                               |                                         |                                |
|                       | EMK105 SD222KV      |  | RoHS                                              | 0.0022                            |                                                         |                                            |                                                                               |                                         |                                |
|                       | EMK105 SD272KV      |  | RoHS                                              | 0.0027                            |                                                         |                                            |                                                                               |                                         |                                |
| 10V                   | LMK105 SD332KV      |  | RoHS                                              | 0.0033                            |                                                         |                                            |                                                                               |                                         |                                |
|                       | LMK105 SD392KV      |  | RoHS                                              | 0.0039                            |                                                         |                                            |                                                                               |                                         |                                |
|                       | LMK105 SD472KV      |  | RoHS                                              | 0.0047                            |                                                         |                                            |                                                                               |                                         |                                |

\*: J公差(±5%)も対応致します。御相談ください。

\*: The product with "J" tolerance of ±5% is also available. Please contact our local sales.

## ■107TYPE (0603 case size)

| 定格電圧<br>Rated Voltage | 形名<br>Ordering code |  | EHS<br>(Environmental<br>Hazardous<br>Substances) | 公称<br>静電容量<br>Capacitance<br>[μF] | 温度特性<br>Temperature<br>characteristics<br>Standard type | tan δ<br>Dissipation<br>factor<br>[%] Max. | 実装条件<br>Soldering method<br>R: リフロー Reflow soldering<br>W: フロー Wave soldering | 静電容量<br>許容差<br>Capacitance<br>tolerance | 厚み<br>Thickness<br>[mm] (inch) |
|-----------------------|---------------------|--|---------------------------------------------------|-----------------------------------|---------------------------------------------------------|--------------------------------------------|-------------------------------------------------------------------------------|-----------------------------------------|--------------------------------|
| 50V                   | UMK107 SD102KA      |  | RoHS                                              | 0.0010                            | Standard type                                           | 0.1                                        | R                                                                             | ±10%*                                   | 0.8±0.1<br>(0.031±0.004)       |
|                       | UMK107 SD122KA      |  | RoHS                                              | 0.0012                            |                                                         |                                            |                                                                               |                                         |                                |
|                       | UMK107 SD152KA      |  | RoHS                                              | 0.0015                            |                                                         |                                            |                                                                               |                                         |                                |
|                       | UMK107 SD182KA      |  | RoHS                                              | 0.0018                            |                                                         |                                            |                                                                               |                                         |                                |
|                       | UMK107 SD222KA      |  | RoHS                                              | 0.0022                            |                                                         |                                            |                                                                               |                                         |                                |
|                       | UMK107 SD272KA      |  | RoHS                                              | 0.0027                            |                                                         |                                            |                                                                               |                                         |                                |
| 25V                   | UMK107 SD332KA      |  | RoHS                                              | 0.0033                            |                                                         |                                            |                                                                               |                                         |                                |
|                       | TMK107 SD392KA      |  | RoHS                                              | 0.0039                            |                                                         |                                            |                                                                               |                                         |                                |
|                       | TMK107 SD472KA      |  | RoHS                                              | 0.0047                            |                                                         |                                            |                                                                               |                                         |                                |
| 16V                   | EMK107 SD562KA      |  | RoHS                                              | 0.0056                            |                                                         |                                            |                                                                               |                                         |                                |
|                       | EMK107 SD682KA      |  | RoHS                                              | 0.0068                            |                                                         |                                            |                                                                               |                                         |                                |
|                       | EMK107 SD822KA      |  | RoHS                                              | 0.0082                            |                                                         |                                            |                                                                               |                                         |                                |
|                       | EMK107 SD103KA      |  | RoHS                                              | 0.010                             |                                                         |                                            |                                                                               |                                         |                                |
| 10V                   | LMK107 SD123KA      |  | RoHS                                              | 0.012                             |                                                         |                                            |                                                                               |                                         |                                |
|                       | LMK107 SD153KA      |  | RoHS                                              | 0.015                             |                                                         |                                            |                                                                               |                                         |                                |
|                       | LMK107 SD183KA      |  | RoHS                                              | 0.018                             |                                                         |                                            |                                                                               |                                         |                                |
|                       | LMK107 SD223KA      |  | RoHS                                              | 0.022                             |                                                         |                                            |                                                                               |                                         |                                |

\*: J公差(±5%)も対応致します。御相談ください。

\*: The product with "J" tolerance of ±5% is also available. Please contact our local sales.

## ■212TYPE (0805 case size)

| 定格電圧<br>Rated Voltage | 形名<br>Ordering code |  | EHS<br>(Environmental<br>Hazardous<br>Substances) | 公称<br>静電容量<br>Capacitance<br>[μF] | 温度特性<br>Temperature<br>characteristics<br>Standard type | tan δ<br>Dissipation<br>factor<br>[%] Max. | 実装条件<br>Soldering method<br>R: リフロー Reflow soldering<br>W: フロー Wave soldering | 静電容量<br>許容差<br>Capacitance<br>tolerance | 厚み<br>Thickness<br>[mm] (inch) |
|-----------------------|---------------------|--|---------------------------------------------------|-----------------------------------|---------------------------------------------------------|--------------------------------------------|-------------------------------------------------------------------------------|-----------------------------------------|--------------------------------|
| 50V                   | UMK212 SD392KD      |  | RoHS                                              | 0.0039                            | Standard type                                           | 0.1                                        | R                                                                             | ±10%*                                   | 0.85±0.1<br>(0.033±0.004)      |
|                       | UMK212 SD472KD      |  | RoHS                                              | 0.0047                            |                                                         |                                            |                                                                               |                                         |                                |
|                       | UMK212 SD562KD      |  | RoHS                                              | 0.0056                            |                                                         |                                            |                                                                               |                                         |                                |
|                       | UMK212 SD682KD      |  | RoHS                                              | 0.0068                            |                                                         |                                            |                                                                               |                                         |                                |
|                       | UMK212 SD822KD      |  | RoHS                                              | 0.0082                            |                                                         |                                            |                                                                               |                                         |                                |
|                       | UMK212 SD103KD      |  | RoHS                                              | 0.01                              |                                                         |                                            |                                                                               |                                         |                                |
| 35V                   | GMK212 SD123KD      |  | RoHS                                              | 0.012                             |                                                         |                                            |                                                                               |                                         | 1.25±0.1<br>(0.049±0.004)      |
|                       | GMK212 SD153KD      |  | RoHS                                              | 0.015                             |                                                         |                                            |                                                                               |                                         |                                |
|                       | GMK212 SD183KG      |  | RoHS                                              | 0.018                             |                                                         |                                            |                                                                               |                                         |                                |
|                       | GMK212 SD223KG      |  | RoHS                                              | 0.022                             |                                                         |                                            |                                                                               |                                         |                                |
|                       | GMK212 SD273KG      |  | RoHS                                              | 0.027                             |                                                         |                                            |                                                                               |                                         |                                |
| 16V                   | EMK212 SD333KD      |  | RoHS                                              | 0.033                             |                                                         |                                            |                                                                               |                                         | 0.85±0.1<br>(0.033±0.004)      |
|                       | LMK212 SD473KD      |  | RoHS                                              | 0.047                             |                                                         |                                            |                                                                               |                                         |                                |
| 10V                   | LMK212 SD683KG      |  | RoHS                                              | 0.068                             |                                                         |                                            |                                                                               |                                         | 1.25±0.1<br>(0.049±0.004)      |
|                       | LMK212 SD823KG      |  | RoHS                                              | 0.082                             |                                                         |                                            |                                                                               |                                         |                                |
|                       | LMK212 SD104KG      |  | RoHS                                              | 0.1                               |                                                         |                                            |                                                                               |                                         |                                |

\*: J公差(±5%)も対応致します。御相談ください。

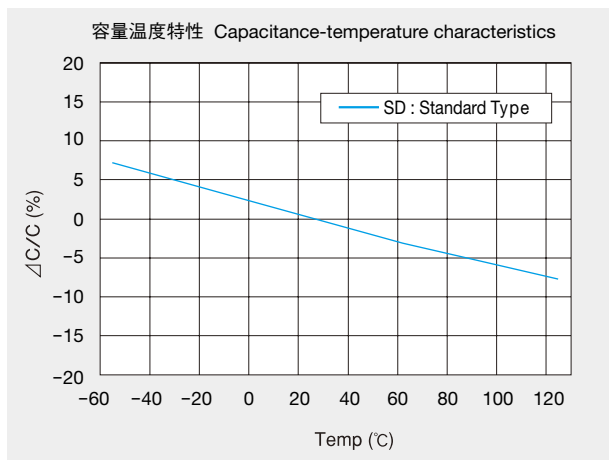
\*: The product with "J" tolerance of ±5% is also available. Please contact our local sales.

## ■316TYPE (1206 case size)

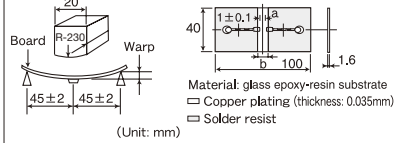
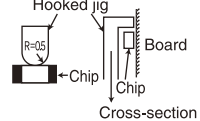
| 定格電圧<br>Rated Voltage | 形名<br>Ordering code |  | EHS<br>(Environmental<br>Hazardous<br>Substances) | 公称<br>静電容量<br>Capacitance<br>[μF] | 温度特性<br>Temperature<br>characteristics<br>Standard type | tan δ<br>Dissipation<br>factor<br>[%] Max. | 実装条件<br>Soldering method<br>R: リフロー Reflow soldering<br>W: フロー Wave soldering | 静電容量<br>許容差<br>Capacitance<br>tolerance | 厚み<br>Thickness<br>[mm] (inch) |
|-----------------------|---------------------|--|---------------------------------------------------|-----------------------------------|---------------------------------------------------------|--------------------------------------------|-------------------------------------------------------------------------------|-----------------------------------------|--------------------------------|
| 35V                   | GMK316 SD333KF      |  | RoHS                                              | 0.033                             | Standard type                                           | 0.1                                        | R                                                                             | ±10%*                                   | 1.15±0.1<br>(0.045±0.004)      |
|                       | GMK316 SD393KF      |  | RoHS                                              | 0.039                             |                                                         |                                            |                                                                               |                                         |                                |
| 25V                   | TMK316 SD473KF      |  | RoHS                                              | 0.047                             |                                                         |                                            |                                                                               |                                         |                                |
|                       | TMK316 SD563KF      |  | RoHS                                              | 0.056                             |                                                         |                                            |                                                                               |                                         |                                |
|                       | TMK316 SD683KF      |  | RoHS                                              | 0.068                             |                                                         |                                            |                                                                               |                                         |                                |
|                       | TMK316 SD823KL      |  | RoHS                                              | 0.082                             |                                                         |                                            |                                                                               |                                         |                                |
|                       | TMK316 SD104KL      |  | RoHS                                              | 0.1                               |                                                         |                                            |                                                                               |                                         |                                |

\*: J公差(±5%)も対応致します。御相談ください。

\*: The product with "J" tolerance of ±5% is also available. Please contact our local sales.



## Super Low Distortion Multilayer Ceramic Capacitors (CFCAP)

| Item                                      | Specified Value                                                                                                                                                                          | Test Methods and Remarks                                                                                                                                                                                                                                                                                                                       |
|-------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. Operating Temperature Range            | -55 to +125°C                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                |
| 2. Storage Temperature Range              | -55 to +125°C                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                |
| 3. Rated Voltage                          | 10VDC, 16VDC, 25VDC, 35VDC, 50VDC,                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                |
| 4. Withstanding Voltage Between terminals | No breakdown or damage                                                                                                                                                                   | Applied voltage: Rated voltage × 3<br>Duration: 1 to 5 sec.<br>Charge/discharge current: 50mA max.                                                                                                                                                                                                                                             |
| 5. Insulation Resistance                  | 10000 MΩ or 500MΩ μF, whichever is smaller                                                                                                                                               | Applied voltage: Rated voltage<br>Duration: 60 ± 5 sec.<br>Charge/discharge current: 50mA max.                                                                                                                                                                                                                                                 |
| 6. Capacitance (Tolerance)                | ±10%                                                                                                                                                                                     | Measuring frequency: 1 k Hz ± 10%<br>Measuring voltage: 1 ± 0.2Vrms<br>Bias application: None                                                                                                                                                                                                                                                  |
| 7. Tangent of Loss Angle (tan δ)          | 0.1% max                                                                                                                                                                                 | Measuring frequency: 1 k Hz ± 10%<br>Measuring voltage: 1 ± 0.2Vrms<br>Bias application: None                                                                                                                                                                                                                                                  |
| 8. Resistance to Flexure of Substrate     | Appearance: No abnormality<br>Capacitance change: ±5%                                                                                                                                    | Warp: 1mm<br>Speed: 0.5mm/second<br>Duration: 10 seconds<br>The measurement shall be made with the board in the bent position.<br><br>(Unit: mm)                                                                                                            |
| 9. Body strength                          |                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                |
| 10. Adhesion of electrode                 | No separation or indication of separation of electrode.                                                                                                                                  | Applied force: 5N<br>Duration: 30 ± 5 seconds<br>                                                                                                                                                                                                         |
| 11. Solderability                         | At least 95% of terminal electrode is covered by new solder.                                                                                                                             | Solder temp.: 230 ± 5°C<br>Duration: 4 ± 1 seconds                                                                                                                                                                                                                                                                                             |
| 12. Resistance to soldering               | Appearance: No abnormality<br>Capacitance change: ±2.5% max.<br>tan δ: Initial value<br>Insulation resistance: Initial value<br>Withstanding voltage (between terminals): No abnormality | Solder temp.: 270 ± 5°C<br>Duration: 3 ± 0.5 seconds<br>Preheating conditions: 80 to 100°C, 2 to 5 min. or 5 to 10 min.<br>150 to 200°C, 2 to 5 min. or 5 to 10 min.<br>Recovery: Recovery for the following period under the standard condition after the test: 24 ± 2hrs                                                                     |
| 13. Thermal shock                         | Appearance: No abnormality<br>Capacitance change: ±2.5% max<br>tan δ: Initial value<br>Insulation resistance: Initial value<br>Withstanding voltage (between terminals): No abnormality  | Conditions for 1 cycle:<br>Step 1: Minimum operating temperature $+0_{-3}^{\circ}\text{C}$ 30 ± 3 minutes<br>Step 2: Room temperature 2 to 3 min.<br>Step 3: Maximum operating temperature $-0_{+3}^{\circ}\text{C}$ 30 ± 3 minutes<br>Step 4: Room temperature 2 to 3 min.<br>Number of cycles: 5 times<br>Recovery after the test: 24 ± 2hrs |
| 14. Damp heat (steady state)              | Appearance: No abnormality<br>Capacitance change: ±5% max<br>tan δ: 0.5% max<br>Insulation resistance 50MΩ μF or 1000MΩ whichever is smaller                                             | Temperature: 40 ± 2°C<br>Humidity: 90 to 95% RH<br>Duration: 500 ± 24 hrs<br>Recovery: Recovery for the following period under the standard condition after the removal from test chamber: 24 ± 2hrs                                                                                                                                           |

## Super Low Distortion Multilayer Ceramic Capacitors (CFCAP)

| Item                           | Specified Value                                                                                                                                                                                      | Test Methods and Remarks                                                                                                                                                                                                                                                                                                                         |
|--------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 15.Loading under Damp Heat     | Appearance: No abnormality<br>Capacitance change: $\pm 7.5\%$ max<br>$\tan \delta$ : 0.5% max<br>Insulation resistance: $25\text{M}\Omega$ $\mu\text{F}$ or $500\text{M}\Omega$ whichever is smaller | According to JIS C 5102 clause 9.9.<br>Temperature: $40 \pm 2^\circ\text{C}$<br>Humidity: 90 to 95% RH<br>Duration: $500^{+24}_{-0}$ hrs<br>Applied voltage: Rated voltage<br>Charge/discharge current: 50mA max<br>Recovery: Recovery for the following period under the standard condition after the removal from test chamber: $24 \pm 2$ hrs |
| 16.Loading at High Temperature | Appearance: No abnormality<br>Capacitance change: $\pm 3\%$ max<br>$\tan \delta$ : 0.35% max<br>Insulation resistance: $50\text{M}\Omega$ $\mu\text{F}$ or $1000\text{M}\Omega$ whichever is smaller | According to JIS C 5102 clause 9.9.<br>Temperature: $125 \pm 3^\circ\text{C}$<br>Duration: $1000^{+48}_{-0}$ hrs<br>Applied voltage: Rated voltage x 2<br>Recovery: Recovery for the following period under the standard condition after the removal from test chamber: $24 \pm 2$ hrs                                                           |

Note on standard condition: "standard condition" referred to herein is defined as follows.

Temperature: 5 to  $35^\circ\text{C}$ , Relative humidity: 45 to 85 %, Air pressure: 86 to 106kpa,

When there are questions concerning measurement results: In order to provide correlation data, the test shall be conducted under condition.

Temperature:  $20 \pm 2^\circ\text{C}$ , Relative humidity: 60 to 70 %, Air pressure: 86 to 106kpa

Unless otherwise specified, all the tests are conducted under the "standard condition."

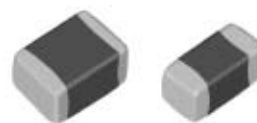
# 中高耐圧積層セラミックコンデンサ

## MEDIUM-HIGH VOLTAGE MULTILAYER CERAMIC CAPACITOR

|                 | Code | Temp.characteristics | Operating temp. range |
|-----------------|------|----------------------|-----------------------|
| OPERATING TEMP. | BJ   | B                    | -25~+85°C             |
|                 |      | X5R*                 | -55~+85°C             |
|                 | B7   | X7R                  | -55~+125°C            |
|                 | C7   | X7S                  | -55~+125°C            |

\*個別仕様の取交しにより、X7R/X7S仕様に対応している場合があります。

\*We may provide X7R/X7S for some items according to the individual specification.



リフロー／REFLOW

### 特長 FEATURES

- ・内部電極にNi金属を使用しており、マイグレーションが発生せず、高信頼性を示す。
- ・高定格電圧でありながら小型形状

- ・ The use of Nickel(Ni) as material for internal electrodes almost completely eliminates migration and high reliability
- ・ Small case sizes with high rated voltage

### 用途 APPLICATIONS

- ・ 一般電話交換機
- ・ インバータ
- ・ 無線、通信基地局
- ・ DC/DCコンバータ用

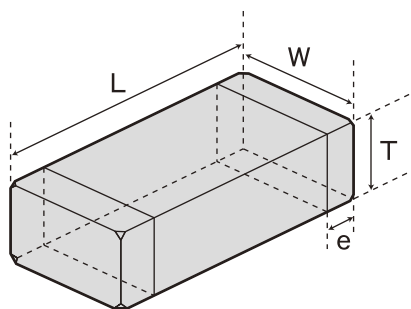
- ・ General telephone exchange
- ・ Inverter.
- ・ Wireless and Telecommunication base.
- ・ For DC/DC Converter

### 形名表記法 ORDERING CODE

|                                                   |                                                                                                                                                |                                                              |                                                                                         |                                            |
|---------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------|-----------------------------------------------------------------------------------------|--------------------------------------------|
| <b>1</b><br>定格電圧 (VDC)<br>H 100<br>Q 250<br>S 630 | <b>3</b><br>端子電極<br>K メッキ品                                                                                                                     | <b>5</b><br>温度特性<br>BJ B<br>X5R<br>B7 X7R<br>C7 X7S          | <b>7</b><br>容量許容差<br>K ±10%<br>M ±20%                                                   | <b>9</b><br>個別仕様<br>— 標準                   |
| <b>2</b><br>シリーズ名<br>M 積層コンデンサ                    | <b>4</b><br>形状寸法 (EIA) L×W (mm)<br>107 (0603) 1.6×0.8<br>212 (0805) 2.0×1.25<br>316 (1206) 3.2×1.6<br>325 (1210) 3.2×2.5<br>432 (1812) 4.5×3.2 | <b>6</b><br>公称静電容量 (pF)<br>例<br>104 100,000<br>105 1,000,000 | <b>8</b><br>製品厚み (mm)<br>A 0.8<br>D 0.85<br>G 1.25<br>F 1.15<br>L 1.6<br>N 1.9<br>M 2.5 | <b>10</b><br>包装<br>T φ178mm テーピング (4mmピッチ) |
|                                                   |                                                                                                                                                |                                                              |                                                                                         | <b>11</b><br>当社管理記号<br>△ 標準品<br>△=スペース     |

|   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |
|---|---|---|---|---|---|---|---|---|----|----|---|---|---|---|---|
| H | M | K | 3 | 1 | 6 | B | J | 1 | 0  | 4  | K | L | — | T | △ |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |   |   |   |   |   |

|                                                            |                                                                                                                                                       |                                                                                 |                                                                                              |                                                                    |
|------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------|--------------------------------------------------------------------|
| <b>1</b><br>Rated voltage (VDC)<br>H 100<br>Q 250<br>S 630 | <b>3</b><br>End termination<br>K Plated                                                                                                               | <b>5</b><br>Temperature characteristics code<br>BJ B<br>X5R<br>B7 X7R<br>C7 X7S | <b>7</b><br>Capacitance tolerance<br>K ±10%<br>M ±20%                                        | <b>9</b><br>Special code<br>— Standard products                    |
| <b>2</b><br>Series name<br>M Multilayer ceramic capacitors | <b>4</b><br>Dimensions(case size) (mm)<br>107 (0603) 1.6×0.8<br>212 (0805) 2.0×1.25<br>316 (1206) 3.2×1.6<br>325 (1210) 3.2×2.5<br>432 (1812) 4.5×3.2 | <b>6</b><br>Nominal capacitance (pF)<br>example<br>104 100,000<br>105 1,000,000 | <b>8</b><br>Thickness (mm)<br>A 0.8<br>D 0.85<br>G 1.25<br>F 1.15<br>L 1.6<br>N 1.9<br>M 2.5 | <b>10</b><br>Packaging<br>T φ178mm Taping (4mm pitch)              |
|                                                            |                                                                                                                                                       |                                                                                 |                                                                                              | <b>11</b><br>Internal code<br>△ Standard products<br>△=Blank space |



| Type (EIA)       | L                         | W                          | T                          | e                                                 |
|------------------|---------------------------|----------------------------|----------------------------|---------------------------------------------------|
| □MK107<br>(0603) | 1.6±0.10<br>(0.063±0.004) | 0.8±0.10<br>(0.031±0.004)  | 0.8±0.10<br>(0.031±0.004)  | A<br>0.35±0.25<br>(0.014±0.010)                   |
| □MK212<br>(0805) | 2.0±0.10<br>(0.079±0.004) | 1.25±0.10<br>(0.049±0.004) | 0.85±0.10<br>(0.033±0.004) | D<br>0.5±0.25<br>(0.020±0.010)                    |
|                  |                           |                            | 1.25±0.10<br>(0.049±0.004) | G                                                 |
| □MK316<br>(1206) | 3.2±0.15<br>(0.126±0.006) | 1.6±0.15<br>(0.063±0.006)  | 1.15±0.10<br>(0.045±0.004) | F<br>0.5 <sup>+0.35</sup> <sub>-0.25</sub>        |
|                  |                           |                            | 1.6±0.20<br>(0.063±0.008)  | L<br>(0.020 <sup>+0.014</sup> <sub>-0.010</sub> ) |
| □MK325<br>(1210) | 3.2±0.3<br>(0.126±0.012)  | 2.5±0.20<br>(0.098±0.008)  | 1.15±0.10<br>(0.045±0.004) | F<br>0.6±0.3<br>(0.024±0.012)                     |
|                  |                           |                            | 1.9±0.20<br>(0.075±0.008)  | N                                                 |
| □MK432<br>(1812) | 4.5±0.4<br>(0.177±0.016)  | 3.2±0.30<br>(0.126±0.012)  | 2.5±0.20<br>(0.098±0.008)  | M<br>0.9±0.6<br>(0.035±0.024)                     |

Unit : mm (inch)

## 概略バリエーション AVAILABLE CAPACITANCE RANGE

| Cap<br>[μF] | Type          | 107  |      |       | 212  |       |      |      | 316  |      |      |       |      |      | 325  |      |      |       |      |      | 432  |      |      |       |      |      |
|-------------|---------------|------|------|-------|------|-------|------|------|------|------|------|-------|------|------|------|------|------|-------|------|------|------|------|------|-------|------|------|
|             | Temp.<br>Char | X7R  | X7S  | B/X5R | X7R  | B/X5R |      |      | X7R  |      |      | B/X5R |      |      | X7R  |      |      | B/X5R |      |      | X7R  |      |      | B/X5R |      |      |
|             | VDC           | 100V | 100V | 100V  | 100V | 250V  | 100V | 250V | 100V | 250V | 630V | 100V  | 250V | 630V | 100V | 250V | 630V | 100V  | 250V | 630V | 100V | 250V | 630V | 100V  | 250V | 630V |
|             | [pF:3digits]  |      |      |       |      |       |      |      |      |      |      |       |      |      |      |      |      |       |      |      |      |      |      |       |      |      |
| 0.001       | 102           | A    |      | A     |      | D     |      | D    |      |      | F    |       |      | F    |      |      |      |       |      |      |      |      |      |       |      |      |
| 0.0015      | 152           | A    |      | A     |      | D     |      | D    |      |      | F    |       |      | F    |      |      |      |       |      |      |      |      |      |       |      |      |
| 0.0022      | 222           | A    |      | A     |      | D     |      | D    |      |      | F    |       |      | F    |      |      |      |       |      |      |      |      |      |       |      |      |
| 0.0033      | 332           | A    |      | A     |      | D     |      | D    |      |      | F    |       |      | F    |      |      |      |       |      |      |      |      |      |       |      |      |
| 0.0047      | 472           | A    |      | A     |      | G     |      | G    |      |      | F    |       |      | F    |      |      |      |       |      |      |      |      |      |       |      |      |
| 0.0068      | 682           | A    |      | A     |      | G     |      | G    |      |      | F    |       |      | F    |      |      |      |       |      |      |      |      |      |       |      |      |
| 0.01        | 103           | A    |      | A     | G    | G     | G    | G    |      |      | F    |       |      | F    |      |      |      |       |      |      |      |      |      |       |      |      |
| 0.015       | 153           | A    |      | A     | G    | G     | G    | G    |      |      | L    |       |      | L    |      |      |      |       |      |      |      |      |      |       |      |      |
| 0.022       | 223           | A    |      | A     | G    | G     | G    | G    |      |      | L    |       |      | L    |      |      | N    |       |      | N    |      |      |      |       |      |      |
| 0.033       | 333           | A    |      | A     | G    |       | G    |      |      | L    |      |       | L    |      |      |      | N    |       |      | N    |      |      |      |       |      |      |
| 0.047       | 473           |      |      |       | G    |       | G    |      | L    | L    |      | L     | L    |      |      | N    | N    |       | N    | N    |      |      | M    |       |      | M    |
| 0.068       | 683           |      |      |       | G    |       | G    |      | L    | L    |      | L     | L    |      |      |      |      |       |      |      |      | M    |      |       | M    | M    |
| 0.1         | 104           |      | A    | A     | G    |       | G    |      | L    | L    |      | L     | L    |      | F    | N    |      | F     | N    |      |      | M    | M    |       | M    | M    |
| 0.15        | 154           |      |      |       |      |       |      |      | L    |      |      | L     |      |      |      | N    |      |       | N    |      |      |      |      |       |      |      |
| 0.22        | 224           |      |      |       | G    |       | G    |      | L    |      |      | L     |      |      | N    | N    |      | N     | N    |      |      | M    |      |       | M    |      |
| 0.33        | 334           |      |      |       |      |       |      |      | L    |      |      | L     |      |      |      |      |      |       |      |      |      | M    |      |       | M    |      |
| 0.47        | 474           |      |      |       |      |       |      |      | L    |      |      | L     |      |      | N    |      |      | N     |      |      | M    | M    |      | M     | M    |      |
| 0.68        | 684           |      |      |       |      |       |      |      |      |      |      |       |      |      | N    |      |      | N     |      |      |      |      |      |       |      |      |
| 1.0         | 105           |      |      |       |      |       |      |      | L    |      |      | L     |      |      | N    |      |      | N     |      |      | M    |      |      | M     |      |      |
| 1.5         | 155           |      |      |       |      |       |      |      |      |      |      |       |      |      |      |      |      |       |      |      | M    |      |      | M     |      |      |
| 2.2         | 225           |      |      |       |      |       |      |      |      |      |      |       |      |      | N    |      |      | N     |      |      | M    |      |      | M     |      |      |

※グラフ記号は製品厚みを表します。Letters in the table indicate thickness.

| 温度特性コード<br>Temp.char.Code | 温度特性<br>Temperature characteristics |     |                               |                        |                                  | 静電容量許容差[%]<br>Capacitance tolerance | tan δ[%]<br>Dissipation factor |
|---------------------------|-------------------------------------|-----|-------------------------------|------------------------|----------------------------------|-------------------------------------|--------------------------------|
|                           | 準拠規格<br>Applicable standard         |     | 温度範囲[°C]<br>Temperature range | 基準温度[°C]<br>Ref. Temp. | 静電容量変化率[%]<br>Capacitance change |                                     |                                |
|                           | JIS                                 | B   | −25~+85                       | 20                     | ±10                              |                                     |                                |
| BJ                        | EIA                                 | X5R | −55~+85                       | 25                     | ±15                              | ±10 (K)<br>±20 (M)                  | 2.5 max.*                      |
| B7                        | EIA                                 | X7R | −55~+125                      | 25                     | ±15                              |                                     |                                |
| C7                        | EIA                                 | X7S | −55~+125                      | 25                     | ±22                              |                                     |                                |

\*: 代表的な値を記載しています。詳細はアイテム一覧表を参照ください。

\*: The figure indicates typical value. Please refer to PART NUMBERS table.

セクションガイド  
Selection Guideアイテム一覧  
Part Numbers特性図  
Electrical Characteristics梱包  
Packaging信頼性  
Reliability Data使用上の注意  
Precautions

etc



■ 107TYPE (0603 case size)

【温度特性 Temp.char. BJ:B/X5R】

| 定格電圧<br>Rated Voltage | 形 名<br>Ordering code |  | EHS<br>(Environmental<br>Hazardous<br>Substances) | 公 称<br>静電容量<br>Capacitance<br>[ $\mu$ F] | 温度特性<br>Temperature<br>characteristics | $\tan \delta$<br>Dissipation<br>factor<br>[%] Max. | 実装条件<br>Soldering method<br>R: リフロー Reflow soldering<br>W: フロー Wave soldering | 静電容量<br>許 容 差<br>Capacitance<br>tolerance | 厚 み<br>Thickness<br>[mm]<br>(inch) |
|-----------------------|----------------------|--|---------------------------------------------------|------------------------------------------|----------------------------------------|----------------------------------------------------|-------------------------------------------------------------------------------|-------------------------------------------|------------------------------------|
| 100V                  | HMK107 BJ102□A       |  | RoHS                                              | 0.001                                    | B/X5R*2                                | 3.5                                                | R                                                                             | ±10%<br>±20%                              | 0.8±0.1<br>(0.031±0.0041)          |
|                       | HMK107 BJ152□A       |  | RoHS                                              | 0.0015                                   |                                        |                                                    |                                                                               |                                           |                                    |
|                       | HMK107 BJ222□A       |  | RoHS                                              | 0.0022                                   |                                        |                                                    |                                                                               |                                           |                                    |
|                       | HMK107 BJ332□A       |  | RoHS                                              | 0.0033                                   |                                        |                                                    |                                                                               |                                           |                                    |
|                       | HMK107 BJ472□A       |  | RoHS                                              | 0.0047                                   |                                        |                                                    |                                                                               |                                           |                                    |
|                       | HMK107 BJ682□A       |  | RoHS                                              | 0.0068                                   |                                        |                                                    |                                                                               |                                           |                                    |
|                       | HMK107 BJ103□A       |  | RoHS                                              | 0.01                                     |                                        |                                                    |                                                                               |                                           |                                    |
|                       | HMK107 BJ153□A       |  | RoHS                                              | 0.015                                    |                                        |                                                    |                                                                               |                                           |                                    |
|                       | HMK107 BJ223□A       |  | RoHS                                              | 0.022                                    |                                        |                                                    |                                                                               |                                           |                                    |
|                       | HMK107 BJ333□A       |  | RoHS                                              | 0.033                                    |                                        |                                                    |                                                                               |                                           |                                    |
|                       | HMK107 BJ104□A       |  | RoHS                                              | 0.1                                      |                                        |                                                    |                                                                               |                                           |                                    |

形名の□には静電容量許容差記号が入ります。

☐ Please specify the capacitance tolerance code.

\*2 個別仕様の取扱いにより、X7R/X7S仕様に対応している場合があります。

\*2 We may provide X7R/X7S for some items according to the individual specification.

【温度特性 Temp.char. B7:X7R C7:X7S】

| 定格電圧<br>Rated Voltage | 形 名<br>Ordering code |  | EHS<br>(Environmental<br>Hazardous<br>Substances) | 公 称<br>静電容量<br>Capacitance<br>[ $\mu$ F] | 温度特性<br>Temperature<br>characteristics | $\tan \delta$<br>Dissipation<br>factor<br>[%] Max. | 実装条件<br>Soldering method<br>R: リフロー Reflow soldering<br>W: フロー Wave soldering | 静電容量<br>許 容 差<br>Capacitance<br>tolerance | 厚 み<br>Thickness<br>[mm]<br>(inch) |
|-----------------------|----------------------|--|---------------------------------------------------|------------------------------------------|----------------------------------------|----------------------------------------------------|-------------------------------------------------------------------------------|-------------------------------------------|------------------------------------|
| 100V                  | HMK107 B7 102□A      |  | RoHS                                              | 0.001                                    | X7R                                    | 3.5                                                | R                                                                             | ±10%<br>±20%                              | 0.8±0.1<br>(0.031±0.0041)          |
|                       | HMK107 B7 152□A      |  | RoHS                                              | 0.0015                                   |                                        |                                                    |                                                                               |                                           |                                    |
|                       | HMK107 B7 222□A      |  | RoHS                                              | 0.0022                                   |                                        |                                                    |                                                                               |                                           |                                    |
|                       | HMK107 B7 332□A      |  | RoHS                                              | 0.0033                                   |                                        |                                                    |                                                                               |                                           |                                    |
|                       | HMK107 B7 472□A      |  | RoHS                                              | 0.0047                                   |                                        |                                                    |                                                                               |                                           |                                    |
|                       | HMK107 B7 682□A      |  | RoHS                                              | 0.0068                                   |                                        |                                                    |                                                                               |                                           |                                    |
|                       | HMK107 B7 103□A      |  | RoHS                                              | 0.01                                     |                                        |                                                    |                                                                               |                                           |                                    |
|                       | HMK107 B7 153□A      |  | RoHS                                              | 0.015                                    |                                        |                                                    |                                                                               |                                           |                                    |
|                       | HMK107 B7 223□A      |  | RoHS                                              | 0.022                                    |                                        |                                                    |                                                                               |                                           |                                    |
|                       | HMK107 B7 333□A      |  | RoHS                                              | 0.033                                    |                                        |                                                    |                                                                               |                                           |                                    |
|                       | HMK107 C7 104□A      |  | RoHS                                              | 0.1                                      | X7S                                    |                                                    |                                                                               |                                           |                                    |

形名の□には静電容量許容差記号が入ります。

☐ Please specify the capacitance tolerance code.

■ 212TYPE (0805 case size)

【温度特性 Temp.char. BJ:B/X5R】

| 定格電圧<br>Rated Voltage | 形 名<br>Ordering code |      | EHS<br>(Environmental<br>Hazardous<br>Substances) | 公 称<br>静電容量<br>Capacitance<br>〔μF〕 | 温度特性<br>Temperature<br>characteristics | tan δ<br>Dissipation<br>factor<br>〔%〕 Max. | 実装条件<br>Soldering method<br>R:リフロー- Reflow soldering<br>W: フロー- Wave soldering | 静電容量<br>許 容 差<br>Capacitance<br>tolerance | 厚 み<br>Thickness<br>〔mm〕<br>〔inch〕 |  |                           |
|-----------------------|----------------------|------|---------------------------------------------------|------------------------------------|----------------------------------------|--------------------------------------------|--------------------------------------------------------------------------------|-------------------------------------------|------------------------------------|--|---------------------------|
| 100V                  | HMK212 BJ103□G       |      | RoHS                                              | 0.01                               | B/X5R*2                                | 3.5                                        | R                                                                              | ±10%<br>±20%                              | 1.25±0.1<br>(0.049±0.004)          |  |                           |
|                       | HMK212 BJ153□G       |      | RoHS                                              | 0.015                              |                                        |                                            |                                                                                |                                           |                                    |  |                           |
|                       | HMK212 BJ223□G       |      | RoHS                                              | 0.022                              |                                        |                                            |                                                                                |                                           |                                    |  |                           |
|                       | HMK212 BJ333□G       |      | RoHS                                              | 0.033                              |                                        |                                            |                                                                                |                                           |                                    |  |                           |
|                       | HMK212 BJ473□G       |      | RoHS                                              | 0.047                              |                                        |                                            |                                                                                |                                           |                                    |  |                           |
|                       | HMK212 BJ683□G       |      | RoHS                                              | 0.068                              |                                        |                                            |                                                                                |                                           |                                    |  |                           |
|                       | HMK212 BJ104□G       |      | RoHS                                              | 0.1                                |                                        |                                            |                                                                                |                                           |                                    |  |                           |
|                       | HMK212 BJ224□G       |      | RoHS                                              | 0.22                               |                                        |                                            |                                                                                |                                           |                                    |  |                           |
| 250V                  | QMK212 BJ102□D       |      | RoHS                                              | 0.001                              |                                        | 2.5                                        |                                                                                |                                           |                                    |  | 0.85±0.1<br>(0.033±0.004) |
|                       | QMK212 BJ152□D       |      | RoHS                                              | 0.0015                             |                                        |                                            |                                                                                |                                           |                                    |  |                           |
|                       | QMK212 BJ222□D       |      | RoHS                                              | 0.0022                             |                                        |                                            |                                                                                |                                           |                                    |  |                           |
|                       | QMK212 BJ332□D       |      | RoHS                                              | 0.0033                             |                                        |                                            |                                                                                |                                           |                                    |  |                           |
|                       | QMK212 BJ472□G       |      | RoHS                                              | 0.0047                             |                                        |                                            |                                                                                |                                           |                                    |  |                           |
|                       | QMK212 BJ682□G       |      | RoHS                                              | 0.0068                             |                                        |                                            |                                                                                |                                           |                                    |  |                           |
|                       | QMK212 BJ103□G       |      | RoHS                                              | 0.01                               |                                        |                                            |                                                                                |                                           |                                    |  |                           |
|                       | QMK212 BJ153□G       |      | RoHS                                              | 0.015                              |                                        |                                            |                                                                                |                                           |                                    |  |                           |
| QMK212 BJ223□G        |                      | RoHS | 0.022                                             |                                    |                                        |                                            | 1.25±0.1<br>(0.049±0.004)                                                      |                                           |                                    |  |                           |

形名の□には静電容量許容差記号が入ります。

□ Please specify the capacitance tolerance code.

\*2 個別仕様の取交しにより、X7R仕様に対応している場合があります。

\*2 We may provide X7R for some items according to the individual specification.

【温度特性 Temp.char. B7:X7R】

| 定格電圧<br>Rated Voltage | 形 名<br>Ordering code | EHS<br>(Environmental<br>Hazardous<br>Substances) | 公 称<br>静電容量<br>Capacitance<br>〔μF〕 | 温度特性<br>Temperature<br>characteristics | tanδ<br>Dissipation<br>factor<br>〔%〕Max. | 実装条件<br>Soldering method<br>R:リフロー Reflow soldering<br>W: フロー Wave soldering | 静電容量<br>許 容 差<br>Capacitance<br>tolerance | 厚 み<br>Thickness<br>〔mm〕<br>〔inch〕 |
|-----------------------|----------------------|---------------------------------------------------|------------------------------------|----------------------------------------|------------------------------------------|------------------------------------------------------------------------------|-------------------------------------------|------------------------------------|
| 100V                  | HMK212 B7 103□G      | RoHS                                              | 0.01                               | X7R                                    | 3.5                                      | R                                                                            | ±10%<br>±20%                              | 1.25±0.1<br>(0.049±0.004)          |
|                       | HMK212 B7 153□G      | RoHS                                              | 0.015                              |                                        |                                          |                                                                              |                                           |                                    |
|                       | HMK212 B7 223□G      | RoHS                                              | 0.022                              |                                        |                                          |                                                                              |                                           |                                    |
|                       | HMK212 B7 333□G      | RoHS                                              | 0.033                              |                                        |                                          |                                                                              |                                           |                                    |
|                       | HMK212 B7 473□G      | RoHS                                              | 0.047                              |                                        |                                          |                                                                              |                                           |                                    |
|                       | HMK212 B7 683□G      | RoHS                                              | 0.068                              |                                        |                                          |                                                                              |                                           |                                    |
|                       | HMK212 B7 104□G      | RoHS                                              | 0.1                                |                                        |                                          |                                                                              |                                           |                                    |
| HMK212 B7 224□G       | RoHS                 | 0.22                                              | 2.5                                |                                        |                                          |                                                                              |                                           |                                    |
| 250V                  | QMK212 B7 102□D      | RoHS                                              |                                    |                                        | 0.001                                    |                                                                              |                                           |                                    |
|                       | QMK212 B7 152□D      | RoHS                                              |                                    |                                        | 0.0015                                   |                                                                              |                                           |                                    |
|                       | QMK212 B7 222□D      | RoHS                                              |                                    |                                        | 0.0022                                   |                                                                              |                                           |                                    |
|                       | QMK212 B7 332□D      | RoHS                                              |                                    |                                        | 0.0033                                   |                                                                              |                                           |                                    |
|                       | QMK212 B7 472□G      | RoHS                                              |                                    |                                        | 0.0047                                   |                                                                              |                                           |                                    |
|                       | QMK212 B7 682□G      | RoHS                                              |                                    |                                        | 0.0068                                   |                                                                              |                                           |                                    |
|                       | QMK212 B7 103□G      | RoHS                                              |                                    |                                        | 0.01                                     |                                                                              |                                           |                                    |
|                       | QMK212 B7 153□G      | RoHS                                              |                                    |                                        | 0.015                                    |                                                                              |                                           |                                    |
|                       | QMK212 B7 223□G      | RoHS                                              | 0.022                              |                                        |                                          |                                                                              |                                           |                                    |

形名の□には静電容量許容差記号が入ります。

□ Please specify the capacitance tolerance code.

■ 316TYPE (1206 case size)

【温度特性 Temp.char. B/J:B/X5R】

| 定格電圧<br>Rated Voltage | 形 名<br>Ordering code | EHS<br>(Environmental<br>Hazardous<br>Substances) | 公 称<br>静電容量<br>Capacitance<br>〔μF〕 | 温度特性<br>Temperature<br>characteristics | tan δ<br>Dissipation<br>factor<br>〔%〕Max. | 実装条件<br>Soldering method<br>R: リフロー Reflow soldering<br>W: フロー Wave soldering | 静電容量<br>許 容 差<br>Capacitance<br>tolerance | 厚 み<br>Thickness<br>〔mm〕<br>〔inch〕 |     |                           |                          |
|-----------------------|----------------------|---------------------------------------------------|------------------------------------|----------------------------------------|-------------------------------------------|-------------------------------------------------------------------------------|-------------------------------------------|------------------------------------|-----|---------------------------|--------------------------|
| 100V                  | HMK316 BJ473□L       | RoHS                                              | 0.047                              | B/X5R*2                                | 3.5                                       | R                                                                             | ±10%<br>±20%                              | 1.6±0.2<br>(0.063±0.008)           |     |                           |                          |
|                       | HMK316 BJ104□L       | RoHS                                              | 0.1                                |                                        |                                           |                                                                               |                                           |                                    |     |                           |                          |
|                       | HMK316 BJ154□L       | RoHS                                              | 0.15                               |                                        |                                           |                                                                               |                                           |                                    |     |                           |                          |
|                       | HMK316 BJ224□L       | RoHS                                              | 0.22                               |                                        |                                           |                                                                               |                                           |                                    |     |                           |                          |
|                       | HMK316 BJ334□L       | RoHS                                              | 0.33                               |                                        |                                           |                                                                               |                                           |                                    |     |                           |                          |
|                       | HMK316 BJ474□L       | RoHS                                              | 0.47                               |                                        |                                           |                                                                               |                                           |                                    |     |                           |                          |
| 250V                  | HMK316 BJ105□L       | RoHS                                              | 1                                  |                                        | 2.5                                       |                                                                               |                                           |                                    | 2.5 | 1.15±0.1<br>(0.045±0.004) | 1.6±0.2<br>(0.063±0.008) |
|                       | QMK316 BJ333□L       | RoHS                                              | 0.033                              |                                        |                                           |                                                                               |                                           |                                    |     |                           |                          |
|                       | QMK316 BJ473□L       | RoHS                                              | 0.047                              |                                        |                                           |                                                                               |                                           |                                    |     |                           |                          |
|                       | QMK316 BJ683□L       | RoHS                                              | 0.068                              |                                        |                                           |                                                                               |                                           |                                    |     |                           |                          |
| 630V                  | QMK316 BJ104□L       | RoHS                                              | 0.1                                | SMK316 BJ102□F                         |                                           | RoHS                                                                          | 0.001                                     | 1.6±0.2<br>(0.063±0.008)           |     |                           |                          |
|                       | SMK316 BJ152□F       | RoHS                                              | 0.0015                             |                                        |                                           |                                                                               |                                           |                                    |     |                           |                          |
|                       | SMK316 BJ222□F       | RoHS                                              | 0.0022                             |                                        |                                           |                                                                               |                                           |                                    |     |                           |                          |
|                       | SMK316 BJ332□F       | RoHS                                              | 0.0033                             |                                        |                                           |                                                                               |                                           |                                    |     |                           |                          |
|                       | SMK316 BJ472□F       | RoHS                                              | 0.0047                             |                                        |                                           |                                                                               |                                           |                                    |     |                           |                          |
|                       | SMK316 BJ682□F       | RoHS                                              | 0.0068                             |                                        |                                           |                                                                               |                                           |                                    |     |                           |                          |
|                       | SMK316 BJ103□F       | RoHS                                              | 0.01                               |                                        |                                           |                                                                               |                                           |                                    |     |                           |                          |
|                       | SMK316 BJ153□L       | RoHS                                              | 0.015                              |                                        |                                           |                                                                               |                                           |                                    |     |                           |                          |
|                       | SMK316 BJ223□L       | RoHS                                              | 0.022                              |                                        |                                           |                                                                               |                                           |                                    |     |                           |                          |

形名の□には静電容量許容差記号が入ります。

☐ Please specify the capacitance tolerance code.

\*2 個別仕様の取扱いにより、X7R仕様に对应している場合があります。

\*2 We may provide X7R for some items according to the individual specification.

【温度特性 Temp.char. B7:X7R】

| 定格電圧<br>Rated Voltage | 形 名<br>Ordering code | EHS<br>(Environmental<br>Hazardous<br>Substances) | 公 称<br>静電容量<br>Capacitance<br>〔μF〕 | 温度特性<br>Temperature<br>characteristics | tan δ<br>Dissipation<br>factor<br>〔%〕Max. | 実装条件<br>Soldering method<br>R:リフロー Reflow soldering<br>W: フロー Wave soldering | 静電容量<br>許 容 差<br>Capacitance<br>tolerance | 厚 み<br>Thickness<br>〔mm〕<br>〔inch〕 |
|-----------------------|----------------------|---------------------------------------------------|------------------------------------|----------------------------------------|-------------------------------------------|------------------------------------------------------------------------------|-------------------------------------------|------------------------------------|
| 100V                  | HMK316 B7 473□L      | RoHS                                              | 0.047                              | X7R                                    | 3.5                                       | R                                                                            | ±10%<br>±20%                              | 1.6±0.2<br>(0.063±0.008)           |
|                       | HMK316 B7 104□L      | RoHS                                              | 0.1                                |                                        |                                           |                                                                              |                                           |                                    |
|                       | HMK316 B7 154□L      | RoHS                                              | 0.15                               |                                        |                                           |                                                                              |                                           |                                    |
|                       | HMK316 B7 224□L      | RoHS                                              | 0.22                               |                                        |                                           |                                                                              |                                           |                                    |
|                       | HMK316 B7 334□L      | RoHS                                              | 0.33                               |                                        |                                           |                                                                              |                                           |                                    |
|                       | HMK316 B7 474□L      | RoHS                                              | 0.47                               |                                        |                                           |                                                                              |                                           |                                    |
| 250V                  | HMK316 B7 105□L      | RoHS                                              | 1                                  |                                        | 2.5                                       |                                                                              |                                           |                                    |
|                       | QMK316 B7 333□L      | RoHS                                              | 0.033                              |                                        |                                           |                                                                              |                                           |                                    |
|                       | QMK316 B7 473□L      | RoHS                                              | 0.047                              |                                        |                                           |                                                                              |                                           |                                    |
|                       | QMK316 B7 683□L      | RoHS                                              | 0.068                              |                                        |                                           |                                                                              |                                           |                                    |
| QMK316 B7 104□L       | RoHS                 | 0.1                                               |                                    |                                        |                                           |                                                                              |                                           |                                    |
| 630V                  | SMK316 B7 102□F      | RoHS                                              | 0.001                              | 1.15±0.1<br>(0.045±0.004)              |                                           |                                                                              |                                           |                                    |
|                       | SMK316 B7 152□F      | RoHS                                              | 0.0015                             |                                        |                                           |                                                                              |                                           |                                    |
|                       | SMK316 B7 222□F      | RoHS                                              | 0.0022                             |                                        |                                           |                                                                              |                                           |                                    |
|                       | SMK316 B7 332□F      | RoHS                                              | 0.0033                             |                                        |                                           |                                                                              |                                           |                                    |
|                       | SMK316 B7 472□F      | RoHS                                              | 0.0047                             |                                        |                                           |                                                                              |                                           |                                    |
|                       | SMK316 B7 682□F      | RoHS                                              | 0.0068                             |                                        |                                           |                                                                              |                                           |                                    |
|                       | SMK316 B7 103□F      | RoHS                                              | 0.01                               |                                        |                                           |                                                                              |                                           |                                    |
|                       | SMK316 B7 153□L      | RoHS                                              | 0.015                              |                                        | 1.6±0.2<br>(0.063±0.008)                  |                                                                              |                                           |                                    |
| SMK316 B7 223□L       | RoHS                 | 0.022                                             |                                    |                                        |                                           |                                                                              |                                           |                                    |

形名の□には静電容量許容差記号が入ります。

☐ Please specify the capacitance tolerance code.

■ 325TYPE (1210 case size)

【温度特性 Temp.char. BJ:B/X5R】

| 定格電圧<br>Rated Voltage | 形 名<br>Ordering code |  | EHS<br>(Environmental<br>Hazardous<br>Substances) | 公 称<br>静電容量<br>Capacitance<br>〔μF〕 | 温度特性<br>Temperature<br>characteristics | tanδ<br>Dissipation<br>factor<br>〔%〕Max. | 実装条件<br>Soldering method<br>R:リフロー Reflow soldering<br>W: フロー Wave soldering | 静電容量<br>許 容 差<br>Capacitance<br>tolerance | 厚 み<br>Thickness<br>〔mm〕<br>〔inch〕 |  |                          |  |
|-----------------------|----------------------|--|---------------------------------------------------|------------------------------------|----------------------------------------|------------------------------------------|------------------------------------------------------------------------------|-------------------------------------------|------------------------------------|--|--------------------------|--|
| 100V                  | HMK325 BJ104□F       |  | RoHS                                              | 0.1                                | B/X5R*2                                | 3.5                                      | R                                                                            | ±10%<br>±20%                              | 1.15±0.1<br>(0.045±0.004)          |  |                          |  |
|                       | HMK325 BJ224□N       |  | RoHS                                              | 0.22                               |                                        |                                          |                                                                              |                                           |                                    |  |                          |  |
|                       | HMK325 BJ474□N       |  | RoHS                                              | 0.47                               |                                        |                                          |                                                                              |                                           |                                    |  |                          |  |
|                       | HMK325 BJ684□N       |  | RoHS                                              | 0.68                               |                                        |                                          |                                                                              |                                           |                                    |  |                          |  |
|                       | HMK325 BJ105□N       |  | RoHS                                              | 1                                  |                                        |                                          |                                                                              |                                           |                                    |  |                          |  |
|                       | HMK325 BJ225□N       |  | RoHS                                              | 2.2                                |                                        |                                          |                                                                              |                                           |                                    |  |                          |  |
| 250V                  | QMK325 BJ473□N       |  | RoHS                                              | 0.047                              |                                        | 2.5                                      |                                                                              |                                           |                                    |  | 1.9±0.2<br>(0.075±0.008) |  |
|                       | QMK325 BJ104□N       |  | RoHS                                              | 0.1                                |                                        |                                          |                                                                              |                                           |                                    |  |                          |  |
|                       | QMK325 BJ154□N       |  | RoHS                                              | 0.15                               |                                        |                                          |                                                                              |                                           |                                    |  |                          |  |
|                       | QMK325 BJ224□N       |  | RoHS                                              | 0.22                               |                                        |                                          |                                                                              |                                           |                                    |  |                          |  |
| 630V                  | SMK325 BJ223□N       |  | RoHS                                              | 0.022                              |                                        |                                          |                                                                              |                                           |                                    |  |                          |  |
|                       | SMK325 BJ333□N       |  | RoHS                                              | 0.033                              |                                        |                                          |                                                                              |                                           |                                    |  |                          |  |
|                       | SMK325 BJ473□N       |  | RoHS                                              | 0.047                              |                                        |                                          |                                                                              |                                           |                                    |  |                          |  |

形名の□には静電容量許容差記号が入ります。

□ Please specify the capacitance tolerance code.

\*2 個別仕様の取交しにより、X7R仕様に対応している場合があります。

\*2 We may provide X7R for some items according to the individual specification.

【温度特性 Temp.char. B7:X7R】

| 定格電圧<br>Rated Voltage | 形 名<br>Ordering code |  | EHS<br>(Environmental<br>Hazardous<br>Substances) | 公 称<br>静電容量<br>Capacitance<br>〔μF〕 | 温度特性<br>Temperature<br>characteristics | tan δ<br>Dissipation<br>factor<br>〔%〕Max. | 実装条件<br>Soldering method<br>R:リフロー Reflow soldering<br>W: フロー Wave soldering | 静電容量<br>許 容 差<br>Capacitance<br>tolerance | 厚 み<br>Thickness<br>〔mm〕<br>〔inch〕 |              |                          |  |
|-----------------------|----------------------|--|---------------------------------------------------|------------------------------------|----------------------------------------|-------------------------------------------|------------------------------------------------------------------------------|-------------------------------------------|------------------------------------|--------------|--------------------------|--|
| 100V                  | HMK325 B7 104□F      |  | RoHS                                              | 0.1                                | X7R                                    | 3.5                                       | R                                                                            | ±10%<br>±20%                              | 1.15±0.1<br>(0.045±0.004)          |              |                          |  |
|                       | HMK325 B7 224□N      |  | RoHS                                              | 0.22                               |                                        |                                           |                                                                              |                                           |                                    |              |                          |  |
|                       | HMK325 B7 474□N      |  | RoHS                                              | 0.47                               |                                        |                                           |                                                                              |                                           |                                    |              |                          |  |
|                       | HMK325 B7 684□N      |  | RoHS                                              | 0.68                               |                                        |                                           |                                                                              |                                           |                                    |              |                          |  |
|                       | HMK325 B7 105□N      |  | RoHS                                              | 1                                  |                                        |                                           |                                                                              |                                           |                                    |              |                          |  |
|                       | HMK325 B7 225□N      |  | RoHS                                              | 2.2                                |                                        |                                           |                                                                              |                                           |                                    |              |                          |  |
| 250V                  | QMK325 B7 473□N      |  | RoHS                                              | 0.047                              |                                        | 2.5                                       |                                                                              |                                           | R                                  | ±10%<br>±20% | 1.9±0.2<br>(0.075±0.008) |  |
|                       | QMK325 B7 104□N      |  | RoHS                                              | 0.1                                |                                        |                                           |                                                                              |                                           |                                    |              |                          |  |
|                       | QMK325 B7 154□N      |  | RoHS                                              | 0.15                               |                                        |                                           |                                                                              |                                           |                                    |              |                          |  |
|                       | QMK325 B7 224□N      |  | RoHS                                              | 0.22                               |                                        |                                           |                                                                              |                                           |                                    |              |                          |  |
| 630V                  | SMK325 B7 223□N      |  | RoHS                                              | 0.022                              |                                        |                                           |                                                                              |                                           |                                    |              |                          |  |
|                       | SMK325 B7 333□N      |  | RoHS                                              | 0.033                              |                                        |                                           |                                                                              |                                           |                                    |              |                          |  |
|                       | SMK325 B7 473□N      |  | RoHS                                              | 0.047                              |                                        |                                           |                                                                              |                                           |                                    |              |                          |  |

形名の□には静電容量許容差記号が入ります。

□ Please specify the capacitance tolerance code.

■ 432TYPE (1812 case size)

【温度特性 Temp.char. BJ:B/X5R】

| 定格電圧<br>Rated Voltage | 形 名<br>Ordering code |  | EHS<br>(Environmental<br>Hazardous<br>Substances) | 公 称<br>静電容量<br>Capacitance<br>〔μF〕 | 温度特性<br>Temperature<br>characteristics | tan δ<br>Dissipation<br>factor<br>〔%〕Max. | 実装条件<br>Soldering method<br>R: リフロー Reflow soldering<br>W: フロー Wave soldering | 静電容量<br>許 容 差<br>Capacitance<br>tolerance | 厚 み<br>Thickness<br>〔mm〕<br>(inch) |
|-----------------------|----------------------|--|---------------------------------------------------|------------------------------------|----------------------------------------|-------------------------------------------|-------------------------------------------------------------------------------|-------------------------------------------|------------------------------------|
| 100V                  | HMK432 BJ474□M       |  | RoHS                                              | 0.47                               | B/X5R*2                                | 3.5                                       | R                                                                             | ±10%<br>±20%                              | 2.5±0.2<br>(0.098±0.008)           |
|                       | HMK432 BJ105□M       |  | RoHS                                              | 1                                  |                                        |                                           |                                                                               |                                           |                                    |
|                       | HMK432 BJ155□M       |  | RoHS                                              | 1.5                                |                                        |                                           |                                                                               |                                           |                                    |
|                       | HMK432 BJ225□M       |  | RoHS                                              | 2.2                                |                                        |                                           |                                                                               |                                           |                                    |
| 250V                  | QMK432 BJ104□M       |  | RoHS                                              | 0.1                                |                                        | 2.5                                       |                                                                               |                                           |                                    |
|                       | QMK432 BJ224□M       |  | RoHS                                              | 0.22                               |                                        |                                           |                                                                               |                                           |                                    |
|                       | QMK432 BJ334□M       |  | RoHS                                              | 0.33                               |                                        |                                           |                                                                               |                                           |                                    |
|                       | QMK432 BJ474□M       |  | RoHS                                              | 0.47                               |                                        |                                           |                                                                               |                                           |                                    |
| 630V                  | SMK432 BJ473□M       |  | RoHS                                              | 0.047                              |                                        |                                           |                                                                               |                                           |                                    |
|                       | SMK432 BJ683□M       |  | RoHS                                              | 0.068                              |                                        |                                           |                                                                               |                                           |                                    |
|                       | SMK432 BJ104□M       |  | RoHS                                              | 0.1                                |                                        |                                           |                                                                               |                                           |                                    |

形名の□には静電容量許容差記号が入ります。

☐ Please specify the capacitance tolerance code.

\*2 個別仕様の取交しにより、X7R仕様に对应している場合があります。

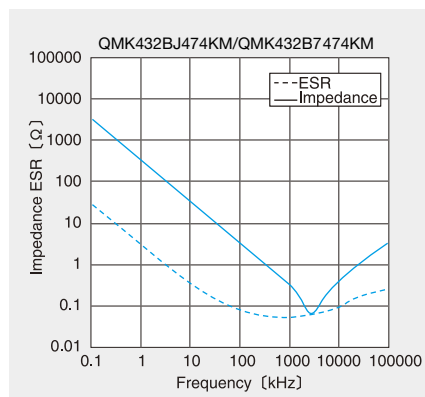
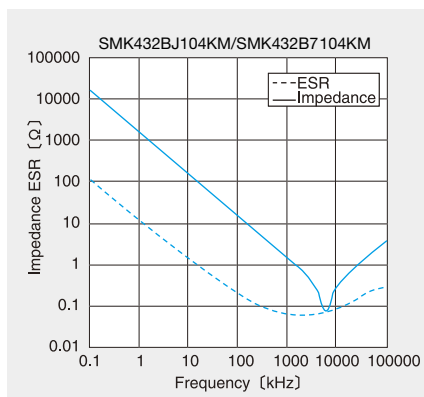
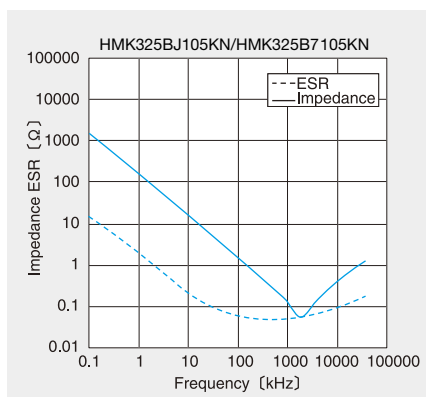
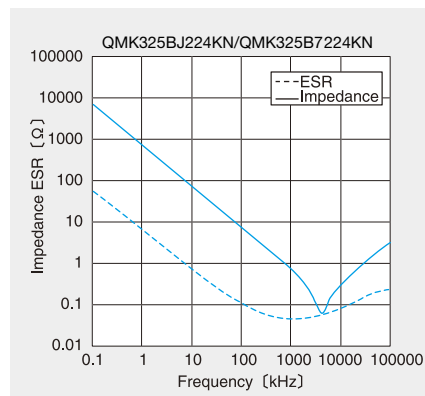
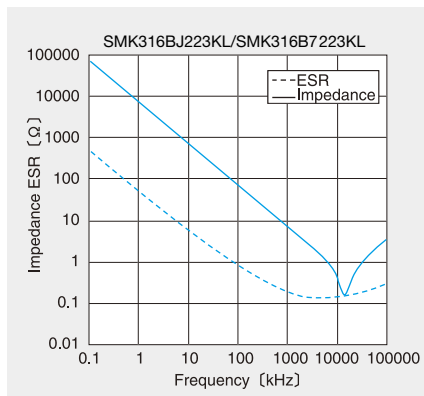
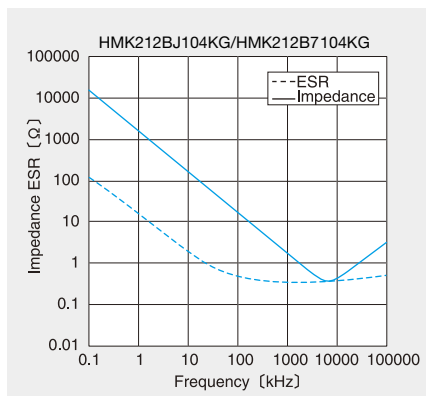
\*2 We may provide X7R for some items according to the individual specification.

【温度特性 Temp.char. B7:X7R】

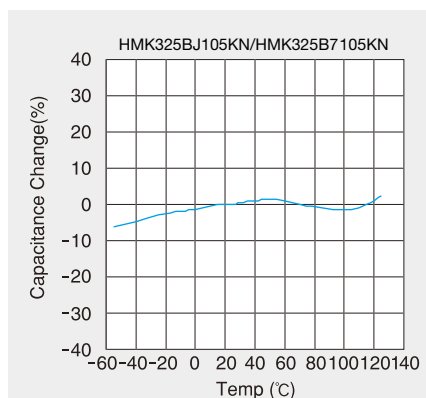
| 定格電圧<br>Rated Voltage | 形 名<br>Ordering code |  | EHS<br>(Environmental<br>Hazardous<br>Substances) | 公 称<br>静電容量<br>Capacitance<br>〔μF〕 | 温度特性<br>Temperature<br>characteristics | tanδ<br>Dissipation<br>factor<br>〔%〕Max. | 実装条件<br>Soldering method<br>R:リフロー Reflow soldering<br>W: フロー Wave soldering | 静電容量<br>許 容 差<br>Capacitance<br>tolerance | 厚 み<br>Thickness<br>〔mm〕<br>(inch) |
|-----------------------|----------------------|--|---------------------------------------------------|------------------------------------|----------------------------------------|------------------------------------------|------------------------------------------------------------------------------|-------------------------------------------|------------------------------------|
| 100V                  | HMK432 B7 474□M      |  | RoHS                                              | 0.47                               | X7R                                    | 3.5                                      | R                                                                            | ±10%<br>±20%                              | 2.5±0.2<br>(0.098±0.008)           |
|                       | HMK432 B7 105□M      |  | RoHS                                              | 1                                  |                                        |                                          |                                                                              |                                           |                                    |
|                       | HMK432 B7 155□M      |  | RoHS                                              | 1.5                                |                                        |                                          |                                                                              |                                           |                                    |
|                       | HMK432 B7 225□M      |  | RoHS                                              | 2.2                                |                                        |                                          |                                                                              |                                           |                                    |
| 250V                  | QMK432 B7 104□M      |  | RoHS                                              | 0.1                                |                                        | 2.5                                      |                                                                              |                                           |                                    |
|                       | QMK432 B7 224□M      |  | RoHS                                              | 0.22                               |                                        |                                          |                                                                              |                                           |                                    |
|                       | QMK432 B7 334□M      |  | RoHS                                              | 0.33                               |                                        |                                          |                                                                              |                                           |                                    |
|                       | QMK432 B7 474□M      |  | RoHS                                              | 0.47                               |                                        |                                          |                                                                              |                                           |                                    |
| 630V                  | SMK432 B7 473□M      |  | RoHS                                              | 0.047                              |                                        |                                          |                                                                              |                                           |                                    |
|                       | SMK432 B7 683□M      |  | RoHS                                              | 0.068                              |                                        |                                          |                                                                              |                                           |                                    |
|                       | SMK432 B7 104□M      |  | RoHS                                              | 0.1                                |                                        |                                          |                                                                              |                                           |                                    |

形名の□には静電容量許容差記号が入ります。

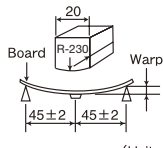
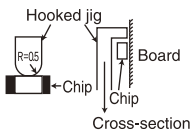
☐ Please specify the capacitance tolerance code.



静電容量—温度特性 Temperature characteristics



## MEDIUM—HIGH VOLTAGE MULTILAYER CERAMIC CAPACITOR

| Item                                         | Specified Value                                                                                                                                                                                                                          | Test Methods and Remarks                                                                                                                                                                                                                                                                                                                                                                      |
|----------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. Operating Temperature Range               | X7R, X7S: -55 to +125°C B: -25 to +85°C                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                               |
| 2. Storage Temperature Range                 | X7R, X7S: -55 to +125°C B: -25 to +85°C                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                               |
| 3. Rated Voltage                             | 100VDC, 250VDC, 630VDC                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                               |
| 4. Withstanding Voltage Between terminals    | No breakdown or damage                                                                                                                                                                                                                   | Applied voltage: Rated voltage $\times 2.5$ (100V) Rated voltage $\times 2$ (250V) Rated voltage $\times 1.2$ (630V)<br>Duration: 1~5sec.<br>Charge/discharge current: 50mAmax.                                                                                                                                                                                                               |
| 5. Insulation Resistance                     | 100M $\Omega$ $\mu$ F or 10G $\Omega$ , whichever is smaller.                                                                                                                                                                            | Applied voltage: Rated voltage (100V, 250V) 500V (630V)<br>Duration: 60 $\pm$ 5 sec.<br>Charge/discharge current: 50mAmax.                                                                                                                                                                                                                                                                    |
| 6. Capacitance (Tolerance)                   | $\pm 20\%$ , $\pm 10\%$                                                                                                                                                                                                                  | Measuring frequency: 1kHz $\pm 10\%$<br>Measuring voltage: 1 $\pm 0.2$ Vrms<br>Bias application: None                                                                                                                                                                                                                                                                                         |
| 7. Tangent of Loss Angel                     | 3.5%max (100V).<br>2.5%max (250V, 630V).                                                                                                                                                                                                 | Measuring frequency: 1kHz $\pm 10\%$<br>Measuring voltage: 1 $\pm 0.2$ Vrms<br>Bias application: None                                                                                                                                                                                                                                                                                         |
| 8. Temperature Characteristic of Capacitance | B: $\pm 10\%$ (-25 to +85°C)<br>X7R: $\pm 15\%$ (-55 to +125°C)<br>X7S: $\pm 22\%$ (-55 to +125°C)                                                                                                                                       | According to JIS 5102 clause 7.12.<br>Charge of maximum capacitance deviation in step 1 to 5<br>Temperature at step 1: +25°C<br>Temperature at step 2: minimum operating temperature<br>Temperature at step 3: +25°C (Reference temperature)<br>Temperature at step 4: maximum operating temperature<br>Temperature at step 5: +25°C<br>Reference temperature Characteristic B shall be +20°C |
| 9. Resistance to Flexure of Substrate        | Appearance: No abnormality Capacitance change: Within $\pm 10\%$                                                                                                                                                                         | Warp: 1mm<br>Testing board: glass epoxy—resin substrate<br>Thickness: 1.6mm<br>The measurement shall be made with board in the bent position<br><br>(Unit: mm)                                                                                                                                           |
| 10. Adhesion of Electrode                    | No separation or indication of separation of electrode                                                                                                                                                                                   | Applied force: 5N<br>Duration: 30 $\pm$ 5sec.<br><br>Cross-section                                                                                                                                                                                                                                       |
| 11. Solderability                            | At least 75% of terminal electrode is covered by solder                                                                                                                                                                                  | Solder temperature: 230 $\pm$ 5°C<br>Duration: 4 $\pm$ 1sec.                                                                                                                                                                                                                                                                                                                                  |
| 12. Resistance to Soldering                  | Appearance: No abnormality<br>Capacitance change: Within $\pm 15\%$ (100V), $\pm 10\%$ (250V, 630V)<br>$\tan \delta$ : Initial value<br>Insulation resistance: Initial value<br>Withstanding voltage (between terminals): No abnormality | Preconditioning: Thermal treatment (at 150°C for 1hr)<br>Solder temperature: 270 $\pm$ 5°C<br>Duration: 3 $\pm$ 0.5sec.<br>Preheating conditions: 80 to 100°C, 2 to 5 min.<br>150 to 200°C, 2 to 5 min.<br>Recovery: Recovery for the following period under the standard condition after the test.<br>24 $\pm$ 2hrs                                                                          |
| 13. Thermal shock                            | Appearance: No abnormality<br>Capacitance change: Within $\pm 15\%$ (100V), $\pm 7.5\%$ (250V, 630V)<br>$\tan \delta$ : Initial value<br>Insulation resistance: Initial value                                                            | Preconditioning: Thermal treatment (at 150°C for 1hr)<br>Conditions for 1 cycle<br>Step 1: Minimum operating temperature +0/-3°C 30 $\pm$ 3min.<br>Step 2: Room temperature 2 to 3min.<br>Step 3: Maximum operating temperature +0/-3°C 30 $\pm$ 3min.<br>Step 4: Room temperature 2 to 3min.<br>Number of cycles: 5 times<br>Recovery after the test: 24 $\pm$ 2hrs                          |

| Item                           | Specified Value                                                                                                                                                                                               | Test Methods and Remarks                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|--------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 14.Damp Heat (steady state)    | Appearance:No abnormality<br>Capacitance change: Within $\pm 15\%$<br>$\tan \delta$ : 7%max (100V), 5%max (250V, 630V).<br>Insulation resistance:25M $\Omega$ $\mu$ F or 1000M $\Omega$ Whichever is smaller. | Preconditioning:Thermal treatment (at 150°C for 1hr)<br>Temperature:40 $\pm$ 2°C<br>Humidity : 90 to 95%RH<br>Duration: 500+24/—0 hrs<br>Recovery:Recovery for the following period under the standerd condition after the removal from test chamber.<br>24 $\pm$ 2hrs                                                                                                                                                                                                                                         |
| 15.Loading under Damp Heat     | Appearance:No abnormality<br>Capacitance change: Within $\pm 15\%$<br>$\tan \delta$ : 7%max (100V), 5%max (250V, 630V).<br>Insulation resistance:10M $\Omega$ $\mu$ F or 500M $\Omega$ Whichever is smaller.  | Preconditioning:Thermal treatment (at 150°C for 1hr)<br>Preconditioning:Voltage treatment<br>Temperature:40 $\pm$ 2°C<br>Humidity : 90 to 95%RH<br>Applied voltage:Rated voltage<br>Chage/dischage current : 50mAmax.<br>Duration: 500+24/—0 hrs<br>Recovery:Recovery for the following period under the standerd condition after the removal from test chamber.<br>24 $\pm$ 2hrs                                                                                                                              |
| 16.Loading at High Temperature | Appearance:No abnormality<br>Capacitance change: Within $\pm 15\%$<br>$\tan \delta$ : 7%max (100V), 5%max (250V, 630V).<br>Insulation resistance:50M $\Omega$ $\mu$ F or 1000M $\Omega$ Whichever is smaller. | According to JIS 5102 clause 9.10.<br>Preconditioning:Voltage treatment<br>Temperature:125 $\pm$ 3°C (X7R, X7S) 85 $\pm$ 2°C (BJ)<br>Applied voltage:Rated voltage x 2 (100V)<br>Rated voltage x 1.5 (250V)<br>Rated voltage x 1.2 (630V)<br>Chage/dischage current : 50mAmax.<br>Duration: 1000+24/—0 hrs<br>Recovery:Recovery for the following period under the standerd condition after the removal from test chamber. As for thermal treatment shall be performed prior to the recovery.<br>24 $\pm$ 2hrs |

# LW逆転タイプ積層セラミックコンデンサ (LWDC™)

## LW REVERSAL DECOUPLING CAPACITOR (LWDC™)

|                 | Code | Temp.characteristics | Operating temp. range |
|-----------------|------|----------------------|-----------------------|
| OPERATING TEMP. | BJ   | B                    | -25~+85°C             |
|                 |      | X5R*                 | -55~+85°C             |
|                 | B7   | X7R                  | -55~+125°C            |
|                 | C6   | X6S                  | -55~+105°C            |
|                 | C7   | X7S                  | -55~+125°C            |

\*個別仕様の取交しにより、X6S/X7S/X7R 仕様に対応している場合があります。

\*We may provide X6S/X7S/X7R for some items according to the individual specification.



### 特長 FEATURES

- ・等価直列抵抗 (ESR) が小さい
- ・等価直列インダクタンス (ESL) が小さい
- ・高周波でのノイズ除去効果が高い
- ・リップル電圧低減
- ・小型大容量化を実現

- ・ Low equivalent series resistance (ESR)
- ・ Low equivalent series inductor (ESL)
- ・ The effect of noise removal in the high frequency
- ・ The ripple voltage is decreased
- ・ Small size, High capacitance

### 用途 APPLICATIONS

- ・デカップリングコンデンサ
- ・平滑コンデンサ (DC-DCコンバータ, スイッチング電源)

- ・ Decoupling capacitors
- ・ Filtering capacitors

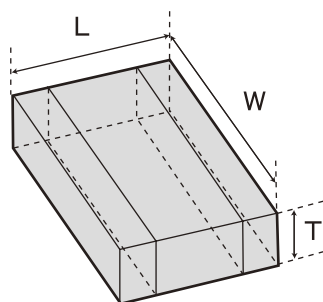
### 形名表記法 ORDERING CODE

|                                        |                                                                                                     |                                                                  |                                                            |                                                                                        |
|----------------------------------------|-----------------------------------------------------------------------------------------------------|------------------------------------------------------------------|------------------------------------------------------------|----------------------------------------------------------------------------------------|
| <b>1</b><br>定格電圧 (VDC)<br>A 4<br>J 6.3 | <b>3</b><br>端子電極<br>K メッキ品                                                                          | <b>5</b><br>温度特性<br>BJ B<br>B7 X5R<br>C6 X7R<br>C7 X6S<br>C7 X7S | <b>7</b><br>容量許容差<br>K ±10%<br>M ±20%                      | <b>9</b><br>個別仕様<br>- 標準                                                               |
| <b>2</b><br>シリーズ名<br>W LW逆転タイプ         | <b>4</b><br>形状寸法 (EIA) L×W (mm)<br>105 (0204) 0.52×1.0<br>107 (0306) 0.8×1.6<br>212 (0508) 1.25×2.0 | <b>6</b><br>公称静電容量 (μF)<br>例 105 1.0<br>106 10.0                 | <b>8</b><br>製品厚み (mm)<br>P 0.3<br>V 0.5<br>A 0.8<br>D 0.85 | <b>10</b><br>包装<br>T φ178mm テーピング (4mmピッチ) 107, 212形状<br>F φ178mm テーピング (2mmピッチ) 105形状 |
|                                        |                                                                                                     |                                                                  |                                                            | <b>11</b><br>当社管理記号<br>△ 標準品<br>△=スペース                                                 |

|   |   |   |   |   |   |   |   |   |    |    |   |   |   |   |   |
|---|---|---|---|---|---|---|---|---|----|----|---|---|---|---|---|
| J | W | K | 2 | 1 | 2 | B | J | 1 | 0  | 6  | M | D | - | T | △ |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |   |   |   |   |   |

|                                                 |                                                                                                            |                                                                                              |                                                                 |                                                                                                                |
|-------------------------------------------------|------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------|-----------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|
| <b>1</b><br>Rated voltage (VDC)<br>A 4<br>J 6.3 | <b>3</b><br>End termination<br>K Plated                                                                    | <b>5</b><br>Temperature characteristics code<br>BJ B<br>B7 X5R<br>C6 X7R<br>C7 X6S<br>C7 X7S | <b>7</b><br>Capacitance tolerance<br>K ±10%<br>M ±20%           | <b>9</b><br>Special code<br>- Standard products                                                                |
| <b>2</b><br>Series name<br>W LW Reverse Type    | <b>4</b><br>Dimensions(case size) (mm)<br>105 (0204) 0.52×1.0<br>107 (0306) 0.8×1.6<br>212 (0508) 1.25×2.0 | <b>6</b><br>Nominal capacitance (μF)<br>example 105 1.0<br>106 10.0                          | <b>8</b><br>Thickness (mm)<br>P 0.3<br>V 0.5<br>A 0.8<br>D 0.85 | <b>10</b><br>Packaging<br>T φ178mm Taping (4mm pitch) 0306, 0508 Type<br>F φ178mm Taping (2mm pitch) 0204 Type |
|                                                 |                                                                                                            |                                                                                              |                                                                 | <b>11</b><br>Internal code<br>△ Standard products<br>△=Blank space                                             |

## 外形寸法 EXTERNAL DIMENSIONS



| Type(EIA)        | L                          | W                          | T |                            |
|------------------|----------------------------|----------------------------|---|----------------------------|
| □WK105<br>(0204) | 0.52±0.05<br>(0.020±0.002) | 1.00±0.05<br>(0.039±0.002) | P | 0.30±0.05<br>(0.012±0.002) |
| □WK107<br>(0306) | 0.80±0.10<br>(0.031±0.004) | 1.60±0.10<br>(0.063±0.004) | V | 0.50±0.05<br>(0.020±0.002) |
|                  |                            |                            | A | 0.80±0.10<br>(0.031±0.004) |
| □WK212<br>(0508) | 1.25±0.15<br>(0.049±0.006) | 2.00±0.15<br>(0.079±0.006) | D | 0.85±0.10<br>(0.033±0.004) |

Unit:mm (inch)

## 概略バリエーション AVAILABLE CAPACITANCE RANGE

| Cap<br>[μF] | Type         | 105 |     |     |   | 107 |     |   |     | 212 |     |
|-------------|--------------|-----|-----|-----|---|-----|-----|---|-----|-----|-----|
|             | Temp.Char    | X7S | X6S | X5R |   | X7R | X7S |   | X5R | X6S | X5R |
|             | VDC          | 6.3 | 4   | 6.3 | 4 | 6.3 | 6.3 | 4 | 6.3 | 4   | 6.3 |
|             | [pF:3digits] |     |     |     |   |     |     |   |     |     |     |
| 0.10        | 104          | P   |     | P   |   |     |     |   |     |     |     |
| 0.22        | 224          |     | P   |     | P | V   |     |   | V   |     |     |
| 1.0         | 105          |     |     |     |   |     | V   |   | V   |     |     |
| 2.2         | 225          |     |     |     |   |     |     | V |     | V   |     |
| 4.7         | 475          |     |     |     |   |     |     |   |     | D   | D   |
| 10.0        | 106          |     |     |     |   |     |     |   |     | D   | D   |

※グラフ記号は製品厚みを表します。

Letters inside the shaded boxes indicate thickness.

| 温度特性コード<br>Temp.char.Code | 温度特性<br>Temperature characteristics |     |                               |                        |                                  | 静電容量許容差[%]<br>Capacitance tolerance | tan δ[%]<br>Dissipation factor |
|---------------------------|-------------------------------------|-----|-------------------------------|------------------------|----------------------------------|-------------------------------------|--------------------------------|
|                           | 準拠規格<br>Applicable standard         |     | 温度範囲[°C]<br>Temperature range | 基準温度[°C]<br>Ref. Temp. | 静電容量変化率[%]<br>Capacitance change |                                     |                                |
|                           | JIS                                 | B   | −25~+85                       | 20                     | ±10                              |                                     |                                |
| BJ                        | EIA                                 | X5R | −55~+85                       | 25                     | ±15                              | ±10 (K)<br>±20 (M)                  | 10 max.*                       |
| B7                        | EIA                                 | X7R | −55~+125                      | 25                     | ±15                              |                                     |                                |
| C6                        | EIA                                 | X6S | −55~+105                      | 25                     | ±22                              |                                     |                                |
| C7                        | EIA                                 | X7S | −55~+125                      | 25                     | ±22                              |                                     |                                |

\*: 代表的な値を記載しています。詳細はアイテム一覧表を参照ください。

\*: The figure indicates typical value. Please refer to PART NUMBERS table.

セレクトションガイド  
Selection Guide



etc

アイテム一覧  
Part Numbers



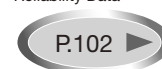
特性図  
Electrical Characteristics



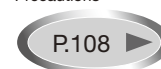
梱包  
Packaging



信頼性  
Reliability Data



使用上の注意  
Precautions



■ 105TYPE (0204 case size)

【温度特性 Temp.char. BJ:X5R】

| 定格電圧<br>Rated Voltage | 形 名<br>Ordering code |  | EHS<br>(Environmental<br>Hazardous<br>Substances) | 公 称<br>静電容量<br>Capacitance<br>〔μF〕 | 温度特性<br>Temperature<br>characteristics | tan δ<br>Dissipation<br>factor<br>〔%〕 Max. | 実装条件<br>Soldering method<br>R: リフロー Reflow soldering<br>W: フロー Wave soldering | 静電容量<br>許 容 差<br>Capacitance<br>tolerance | 厚 み<br>Thickness<br>〔mm〕<br>〔inch〕 |
|-----------------------|----------------------|--|---------------------------------------------------|------------------------------------|----------------------------------------|--------------------------------------------|-------------------------------------------------------------------------------|-------------------------------------------|------------------------------------|
| 6.3V                  | JWK105 BJ104MP*1     |  | RoHS                                              | 0.1                                | X5R*2                                  | 5                                          | R                                                                             | ±20%〔M〕                                   | 0.3±0.05<br>(0.012±0.002)          |
| 4V                    | AWK105 BJ224MP*1     |  | RoHS                                              | 0.22                               |                                        | 10                                         |                                                                               |                                           |                                    |

\*1 高温負荷試験の試験電圧は定格電圧の 1.5 倍

\*2 個別仕様の取交しにより、X6S/X7S仕様に対応している場合があります。

\*1 Test Voltage of Loading at high temperature test is 1.5 time of the rated voltage.

\*2 We may provide X6S/X7S for some items according to the individual specification.

【温度特性 Temp.char. C6:X6S C7:X7S】

| 定格電圧<br>Rated Voltage | 形 名<br>Ordering code |  | EHS<br>(Environmental<br>Hazardous<br>Substances) | 公 称<br>静電容量<br>Capacitance<br>〔μF〕 | 温度特性<br>Temperature<br>characteristics | tan δ<br>Dissipation<br>factor<br>〔%〕 Max. | 実装条件<br>Soldering method<br>R: リフロー Reflow soldering<br>W: フロー Wave soldering | 静電容量<br>許 容 差<br>Capacitance<br>tolerance | 厚 み<br>Thickness<br>〔mm〕<br>〔inch〕 |
|-----------------------|----------------------|--|---------------------------------------------------|------------------------------------|----------------------------------------|--------------------------------------------|-------------------------------------------------------------------------------|-------------------------------------------|------------------------------------|
| 6.3V                  | JWK105 C7 104MP*1    |  | RoHS                                              | 0.1                                | X7S                                    | 5                                          | R                                                                             | ±20%〔M〕                                   | 0.3±0.05<br>(0.012±0.002)          |
| 4V                    | AWK105 C6224MP*1     |  | RoHS                                              | 0.22                               | X6S                                    | 10                                         |                                                                               |                                           |                                    |

\*1 高温負荷試験の試験電圧は定格電圧の 1.5 倍

\*1 Test Voltage of Loading at high temperature test is 1.5 time of the rated voltage.

■ 107TYPE (0306 case size)

【温度特性 Temp.char. BJ:X5R】

| 定格電圧<br>Rated Voltage | 形 名<br>Ordering code |  | EHS<br>(Environmental<br>Hazardous<br>Substances) | 公 称<br>静電容量<br>Capacitance<br>〔μF〕 | 温度特性<br>Temperature<br>characteristics | tan δ<br>Dissipation<br>factor<br>〔%〕 Max. | 実装条件<br>Soldering method<br>R: リフロー Reflow soldering<br>W: フロー Wave soldering | 静電容量<br>許 容 差<br>Capacitance<br>tolerance | 厚 み<br>Thickness<br>〔mm〕<br>〔inch〕 |
|-----------------------|----------------------|--|---------------------------------------------------|------------------------------------|----------------------------------------|--------------------------------------------|-------------------------------------------------------------------------------|-------------------------------------------|------------------------------------|
| 6.3V                  | JWK107 BJ 224MV*1    |  | RoHS                                              | 0.22                               | X5R*2                                  | 5                                          | R                                                                             | ±20%〔M〕                                   | 0.5±0.05<br>(0.020±0.002)          |
|                       | JWK107 BJ 105MV*1    |  | RoHS                                              | 1                                  |                                        | 10                                         |                                                                               |                                           |                                    |
| 4V                    | AWK107 BJ 225MV*1    |  | RoHS                                              | 2.2                                |                                        |                                            |                                                                               |                                           |                                    |

\*1 高温負荷試験の試験電圧は定格電圧の 1.5 倍

\*2 個別仕様の取交しにより、X7R/X7S仕様に対応している場合があります。

\*1 Test Voltage of Loading at high temperature test is 1.5 time of the rated voltage.

\*2 We may provide X7R/X7S for some items according to the individual specification.

【温度特性 Temp.char. B7:X7R C7:X7S】

| 定格電圧<br>Rated Voltage | 形 名<br>Ordering code |  | EHS<br>(Environmental<br>Hazardous<br>Substances) | 公 称<br>静電容量<br>Capacitance<br>〔μF〕 | 温度特性<br>Temperature<br>characteristics | tan δ<br>Dissipation<br>factor<br>〔%〕 Max. | 実装条件<br>Soldering method<br>R: リフロー Reflow soldering<br>W: フロー Wave soldering | 静電容量<br>許 容 差<br>Capacitance<br>tolerance | 厚 み<br>Thickness<br>〔mm〕<br>〔inch〕 |
|-----------------------|----------------------|--|---------------------------------------------------|------------------------------------|----------------------------------------|--------------------------------------------|-------------------------------------------------------------------------------|-------------------------------------------|------------------------------------|
| 6.3V                  | JWK107 B7 224MV*1    |  | RoHS                                              | 0.22                               | X7R                                    | 5                                          | R                                                                             | ±20%〔M〕                                   | 0.5±0.05<br>(0.020±0.002)          |
|                       | JWK107 C7 105MV*1    |  | RoHS                                              | 1                                  | X7S                                    | 10                                         |                                                                               |                                           |                                    |
| 4V                    | AWK107 C7 225MV*1    |  | RoHS                                              | 2.2                                |                                        |                                            |                                                                               |                                           |                                    |

\*1 高温負荷試験の試験電圧は定格電圧の 1.5 倍

\*1 Test Voltage of Loading at high temperature test is 1.5 time of the rated voltage.

■ 212TYPE(0508 case size)

【温度特性 Temp.char. BJ:X5R】

| 定格電圧<br>Rated Voltage | 形 名<br>Ordering code |  | EHS<br>(Environmental<br>Hazardous<br>Substances) | 公 称<br>静電容量<br>Capacitance<br>[ $\mu$ F] | 温度特性<br>Temperature<br>characteristics | $\tan \delta$<br>Dissipation<br>factor<br>[%] Max. | 実装条件<br>Soldering method<br>R:リフロー Reflow soldering<br>W: フロー Wave soldering | 静電容量<br>許 容 差<br>Capacitance<br>tolerance | 厚 み<br>Thickness<br>[mm]<br>[inch] |
|-----------------------|----------------------|--|---------------------------------------------------|------------------------------------------|----------------------------------------|----------------------------------------------------|------------------------------------------------------------------------------|-------------------------------------------|------------------------------------|
| 6.3V                  | JWK212 BJ475□D*1     |  | RoHS                                              | 4.7                                      | X5R*2                                  | 10                                                 | R                                                                            | ±10% [K]<br>±20% [M]                      | 0.85±0.1<br>(0.033±0.004)          |
|                       | JWK212 BJ106MD*1     |  | RoHS                                              | 10                                       |                                        |                                                    |                                                                              | ±20% [M]                                  |                                    |

形名の□には静電容量許容差記号が入ります。

\*1 高温負荷試験の試験電圧は定格電圧の 1.5 倍

\*2 個別仕様の取交しにより、X6S仕様に対応している場合があります。

□ Please specify the capacitance tolerance code.

\*1 Test Voltage of Loading at high temperature test is 1.5 time of the rated voltage.

\*2 We may provide X6S for some items according to the individual specification.

【温度特性 Temp.char. C6:X6S】

| 定格電圧<br>Rated Voltage | 形 名<br>Ordering code |  | EHS<br>(Environmental<br>Hazardous<br>Substances) | 公 称<br>静電容量<br>Capacitance<br>[ $\mu$ F] | 温度特性<br>Temperature<br>characteristics | $\tan \delta$<br>Dissipation<br>factor<br>[%] Max. | 実装条件<br>Soldering method<br>R:リフロー Reflow soldering<br>W: フロー Wave soldering | 静電容量<br>許 容 差<br>Capacitance<br>tolerance | 厚 み<br>Thickness<br>[mm]<br>[inch] |
|-----------------------|----------------------|--|---------------------------------------------------|------------------------------------------|----------------------------------------|----------------------------------------------------|------------------------------------------------------------------------------|-------------------------------------------|------------------------------------|
| 6.3V                  | JWK212 C6475□D*1     |  | RoHS                                              | 4.7                                      | X6S                                    | 10                                                 | R                                                                            | ±10% [K]<br>±20% [M]                      | 0.85±0.1<br>(0.033±0.004)          |
|                       | JWK212 C6106MD*1     |  | RoHS                                              | 10                                       |                                        |                                                    |                                                                              | ±20% [M]                                  |                                    |

形名の□には静電容量許容差記号が入ります。

\*1 高温負荷試験の試験電圧は定格電圧の 1.5 倍

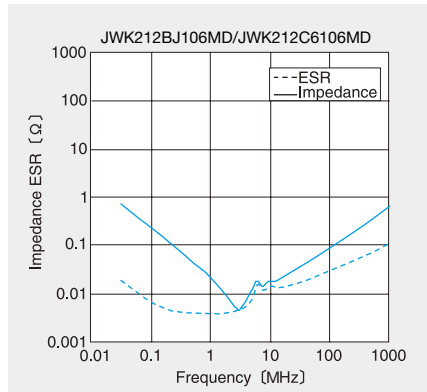
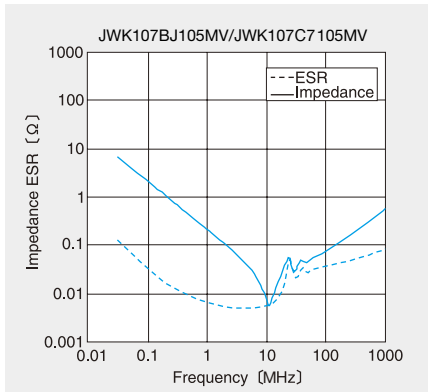
□ Please specify the capacitance tolerance code.

\*1 Test Voltage of Loading at high temperature test is 1.5 time of the rated voltage.

特性図 ELECTRICAL CHARACTERISTICS

インピーダンス・ESR-周波数特性例 Example of Impedance ESR vs. Frequency characteristics

・ 当社積層セラミックコンデンサ例 (Taiyo Yuden multilayer ceramic capacitor)



# アレイ形積層セラミックコンデンサ

## ARRAY TYPE MULTILAYER CERAMIC CAPACITOR

|                 | Code | Temp.characteristics | Operating temp. range |
|-----------------|------|----------------------|-----------------------|
| OPERATING TEMP. | BJ   | B                    | -25~+85°C             |
|                 |      | X5R*                 | -55~+85°C             |
|                 | B7   | X7R                  | -55~+125°C            |
|                 | CH   | C0H                  | -55~+125°C            |

\*個別仕様の取交しにより、X7R 仕様に対応している場合があります。

\*We may provide X7R for some items according to the individual specification.



リフロー／REFLOW

### 特長 FEATURES

- ・高密度、高効率な実装を実現
- ・内部電極には、信頼性とコストパフォーマンスに優れたNiを使用しています。
- ・ High density and high efficiency mounting.
- ・ Internal electrode is nickel for increased cost performance and reliability.

### 用途 APPLICATIONS

- ・ 一般電子機器用
- ・ 通信機器用 (携帯電話、PHS、コードレス電話etc)
- ・ General electronic equipment
- ・ Communication equipment (mobile phone, PHS, cordless phone, etc.)

### 形名表記法 ORDERING CODE

1

定格電圧 (VDC)

|   |     |
|---|-----|
| J | 6.3 |
| L | 10  |
| E | 16  |
| T | 25  |
| U | 50  |

2

シリーズ名

|   |           |
|---|-----------|
| 4 | 4連積層コンデンサ |
| 2 | 2連積層コンデンサ |

3

端子電極

|   |      |
|---|------|
| K | メッキ品 |
|---|------|

4

形状寸法 (EIA) L×W (mm)

|            |          |
|------------|----------|
| 096 (0302) | 0.9×0.6  |
| 110 (0504) | 1.4×1.0  |
| 212 (0805) | 2.0×1.25 |

5

温度特性

|    |     |
|----|-----|
| BJ | B   |
|    | X5R |
| B7 | X7R |
| CH | C0H |

6

公称静電容量 (pF)

|     |           |
|-----|-----------|
| 例   |           |
| 104 | 100,000   |
| 105 | 1,000,000 |

7

容量許容差

|   |      |
|---|------|
| M | ±20% |
| K | ±10% |
| F | ±1pF |

8

製品厚み (mm)

|   |      |
|---|------|
| P | 0.3  |
| K | 0.45 |
| V | 0.5  |
| B | 0.6  |
| A | 0.8  |
| D | 0.85 |

9

個別仕様

|   |    |
|---|----|
| — | 標準 |
|---|----|

10

包装

|   |                                        |
|---|----------------------------------------|
| T | φ178mm テーピング<br>(4mmピッチ)<br>110, 212形状 |
| F | φ178mm テーピング<br>(2mmピッチ)<br>096形状      |

11

当社管理記号

|   |     |
|---|-----|
| △ | 標準品 |
|---|-----|

△=スベース

E 4 K 2 1 2 B J 1 0 4 M D - T △

1

2

3

4

5

6

7

8

9

10

11

1

Rated voltage (VDC)

|   |     |
|---|-----|
| J | 6.3 |
| L | 10  |
| E | 16  |
| T | 25  |
| U | 50  |

2

Series name

|   |                                 |
|---|---------------------------------|
| 4 | 4 circuit multilayer capacitors |
| 2 | 2 circuit multilayer capacitors |

3

End termination

|   |        |
|---|--------|
| K | Plated |
|---|--------|

4

Dimensions(case size) (mm)

|            |          |
|------------|----------|
| 096 (0302) | 0.9×0.6  |
| 110 (0504) | 1.4×1.0  |
| 212 (0805) | 2.0×1.25 |

5

Temperature characteristics code

|    |     |
|----|-----|
| BJ | B   |
|    | X5R |
| B7 | X7R |
| CH | C0H |

6

Nominal capacitance (pF)

|         |           |
|---------|-----------|
| example |           |
| 104     | 100,000   |
| 105     | 1,000,000 |

7

Capacitance tolerance

|   |      |
|---|------|
| M | ±20% |
| K | ±10% |
| F | ±1pF |

8

Thickness (mm)

|   |      |
|---|------|
| P | 0.3  |
| K | 0.45 |
| V | 0.5  |
| B | 0.6  |
| A | 0.8  |
| D | 0.85 |

9

Special code

|   |                   |
|---|-------------------|
| — | Standard products |
|---|-------------------|

10

Packaging

|   |                                             |
|---|---------------------------------------------|
| T | φ178mm Taping (4mm pitch)<br>0504, 0805Type |
| F | φ178mm Taping (2mm pitch)<br>0302Type       |

11

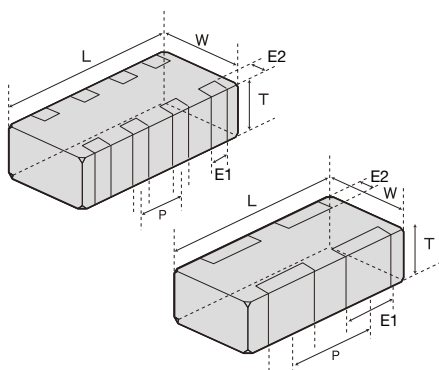
Internal code

|   |                   |
|---|-------------------|
| △ | Standard products |
|---|-------------------|

△=Blank space

△=Blank space

# 外形寸法 EXTERNAL DIMENSIONS



| Type(EIA)        | L                          | W                          | E1                         | E2                           | P                          | T |                            |
|------------------|----------------------------|----------------------------|----------------------------|------------------------------|----------------------------|---|----------------------------|
| □2K096<br>(0302) | 0.9±0.05<br>(0.035±0.002)  | 0.6±0.05<br>(0.024±0.002)  | 0.23±0.10<br>(0.009±0.004) | 0.125±0.075<br>(0.005±0.003) | 0.45±0.05<br>(0.018±0.002) | P | 0.30±0.03<br>(0.012±0.001) |
|                  |                            |                            |                            |                              |                            | K | 0.45±0.05<br>(0.018±0.002) |
| □2K110<br>(0504) | 1.37±0.07<br>(0.054±0.003) | 1.00±0.08<br>(0.039±0.003) | 0.36±0.10<br>(0.014±0.004) | 0.2±0.10<br>(0.008±0.004)    | 0.64±0.10<br>(0.025±0.004) | V | 0.5±0.05<br>(0.020±0.002)  |
|                  |                            |                            |                            |                              |                            | B | 0.60±0.06<br>(0.024±0.003) |
| □4K212<br>(0805) | 2.00±0.10<br>(0.079±0.004) | 1.25±0.10<br>(0.049±0.004) | 0.25±0.10<br>(0.010±0.004) | 0.25±0.15<br>(0.010±0.006)   | 0.50±0.10<br>(0.020±0.004) | A | 0.80±0.08<br>(0.031±0.003) |
|                  |                            |                            |                            |                              |                            | D | 0.85±0.10<br>(0.033±0.004) |
| □2K212<br>(0805) | 2.00±0.10<br>(0.079±0.004) | 1.25±0.10<br>(0.049±0.004) | 0.50±0.20<br>(0.020±0.008) | 0.25±0.15<br>(0.010±0.006)   | 1.00±0.10<br>(0.039±0.004) | D | 0.85±0.10<br>(0.033±0.004) |
|                  |                            |                            |                            |                              |                            |   |                            |

Unit:mm (inch)

## 概略バリエーション AVAILABLE CAPACITANCE RANGE

BJ/ X7R, BJ/ X5R

| Cap<br>[μF] | Type         | 096 2連 |      | 110 2連 |     |       |     |     |     |     |     |       |     | 212 2連 |       | 212 4連 |     |     |     |  |  |
|-------------|--------------|--------|------|--------|-----|-------|-----|-----|-----|-----|-----|-------|-----|--------|-------|--------|-----|-----|-----|--|--|
|             |              | □2K096 |      | □2K110 |     |       |     |     |     |     |     |       |     | □2K212 |       | □4K212 |     |     |     |  |  |
|             | Temp.Char    | B/X5R  | X5R  | B/X7R  |     | B/X5R |     |     |     | X5R |     | B/X5R | X5R | B/X7R  | B/X5R |        | X5R |     |     |  |  |
|             | VDC          | 10V    | 6.3V | 50V    | 25V | 16V   | 50V | 25V | 16V | 10V | 10V | 6.3V  | 25V | 10V    | 16V   | 25V    | 16V | 10V | 10V |  |  |
|             | [pF,3digits] |        |      |        |     |       |     |     |     |     |     |       |     |        |       |        |     |     |     |  |  |
| 0.001       | 102          |        |      | B      |     |       | B   |     |     |     |     |       |     |        |       |        |     |     |     |  |  |
| 0.0022      | 222          |        |      | B      |     |       | B   |     |     |     |     |       |     |        |       |        |     |     |     |  |  |
| 0.0047      | 472          |        |      | B      |     |       | B   |     |     |     |     |       |     |        |       |        |     |     |     |  |  |
| 0.01        | 103          | P      |      |        | B   |       |     | B   |     |     |     |       |     |        |       |        |     |     |     |  |  |
| 0.022       | 223          |        |      |        | B   |       |     | B   |     |     |     |       |     |        |       |        |     |     |     |  |  |
| 0.047       | 473          |        | K    |        |     | B     |     |     | B   |     |     |       |     |        |       |        |     |     |     |  |  |
| 0.1         | 104          |        | K    |        |     | B     |     | B   | B   |     |     |       |     |        | D     | D      | D   |     |     |  |  |
| 0.22        | 224          |        | K    |        |     |       |     |     |     |     |     |       |     |        |       |        |     | D   |     |  |  |
| 0.47        | 474          |        |      |        |     |       |     |     |     | A   |     |       |     |        |       |        |     | D   |     |  |  |
| 1.0         | 105          |        |      |        |     |       |     |     |     |     | A   | V     | D   |        |       |        |     |     |     |  |  |
| 2.2         | 225          |        |      |        |     |       |     |     |     |     |     | A     |     | D      |       |        |     |     | D   |  |  |

※グラフ記号は製品厚みを表します。 Letters in the table indicate thickness.

CH / C0H/CG (C0G)

| Cap<br>[pF] | Type             | 096 2連  | 110 2連  |
|-------------|------------------|---------|---------|
|             | □2K096           | □2K110  |         |
|             | Temp.Char<br>VDC | CH / CG | CH / CG |
|             | 25V              | 50V     |         |
| 10          | 100              | P       | B       |
| 12          | 120              | P       | B       |
| 15          | 150              | P       | B       |
| 18          | 180              | P       | B       |
| 22          | 220              | P       | B       |
| 27          | 270              | P       | B       |
| 33          | 330              | P       | B       |
| 39          | 390              | P       | B       |
| 47          | 470              | P       | B       |
| 56          | 560              | P       | B       |
| 68          | 680              | P       | B       |
| 82          | 820              | P       | B       |
| 100         | 101              | P       | B       |

※グラフ記号は製品厚みを表します。

Letters in the table indicate thickness.

| 温度特性コード<br>Temp.char.Code | 温度特性<br>Temperature characteristics |     |                               |                        |                               | 静電容量許容差[%]<br>Capacitance tolerance | tan δ[%]<br>Dissipation factor |
|---------------------------|-------------------------------------|-----|-------------------------------|------------------------|-------------------------------|-------------------------------------|--------------------------------|
|                           | 準拠規格<br>Applicable standard         |     | 温度範囲[°C]<br>Temperature range | 基準温度[°C]<br>Ref. Temp. | 静電容量変化率<br>Capacitance change |                                     |                                |
|                           | JIS                                 | B   | −25~+85                       | 20                     | ±10[%]                        |                                     |                                |
| BJ                        | EIA                                 | X5R | −55~+85                       | 25                     | ±15[%]                        | ±10 (K)<br>±20 (M)                  | 3.5, 5, 10 max.*               |
| B7                        | EIA                                 | X7R | −55~+125                      | 25                     | ±15[%]                        |                                     |                                |
| CH                        | JIS                                 | CH  | −55~+125                      | 20                     | ±60 [ppm/°C]                  | ±10 (K)                             | 0.1 max.**                     |
|                           | EIA                                 | C0H | −55~+125                      | 25                     | ±60 [ppm/°C]                  |                                     |                                |

\*: アイテムによって異なります。アイテム一覧表を参照下さい。

\*\* : 27pF以下 Q≥400+20・C 30pF以上 Q≥1000

\* : Different depending on the item. Please refer to the part numbers list for the differences.

\*\* : 27pF or over Q≥400+20・C 30pF or over Q≥1000

セクションガイド  
Selection Guide

アイテム一覧  
Part Numbers

特性図  
Electrical Characteristics

梱包  
Packaging

信頼性  
Reliability Data

使用上の注意  
Precautions



etc



■ 096TYPE(0302 case size) 2連タイプ(2 circuit type)

【温度特性 Temp.char. BJ:B/X5R】

| 定格電圧<br>Rated Voltage | 形 名<br>Ordering code         |  | EHS<br>(Environmental<br>Hazardous<br>Substances) | 公 称<br>静電容量<br>Capacitance<br>〔μF〕 | 温度特性<br>Temperature<br>characteristics | tan δ<br>Dissipation<br>factor<br>〔%〕Max. | 実装条件<br>Soldering method<br>R: リフロー Reflow soldering<br>W: フロー Wave soldering | 静電容量<br>許 容 差<br>Capacitance<br>tolerance | 厚 み<br>Thickness<br>〔mm〕<br>〔inch〕 |
|-----------------------|------------------------------|--|---------------------------------------------------|------------------------------------|----------------------------------------|-------------------------------------------|-------------------------------------------------------------------------------|-------------------------------------------|------------------------------------|
| 10V                   | L2K096 BJ103□P               |  | RoHS                                              | 0.01                               | B/X5R                                  | 5                                         | R                                                                             | ±10% [K]<br>±20% [M]                      | 0.3±0.03<br>(0.012±0.001)          |
| 6.3V                  | J2K096 BJ473□K* <sup>1</sup> |  | RoHS                                              | 0.047                              | X5R                                    |                                           |                                                                               |                                           | 10                                 |
|                       | J2K096 BJ104□K* <sup>1</sup> |  | RoHS                                              | 0.1                                |                                        |                                           |                                                                               |                                           |                                    |
|                       | J2K096 BJ224MK* <sup>1</sup> |  | RoHS                                              | 0.22                               |                                        |                                           |                                                                               |                                           |                                    |

形名の□には静電容量許容差記号が入ります。

\*1 高温負荷試験の試験電圧は、定格電圧の 1.5 倍

□ Please specify the capacitance tolerance code.

\*1 Test voltage of loading at high temperature test is 1.5 time of the rated voltage.

【温度特性 Temp.char. CH:CH/C0H】

| 定格電圧<br>Rated Voltage | 形 名<br>Ordering code |  | EHS<br>(Environmental<br>Hazardous<br>Substances) | 公 称<br>静電容量<br>Capacitance<br>〔pF〕 | 温度特性<br>Temperature<br>characteristics | Q<br>Symbol | 実装条件<br>Soldering method<br>R: リフロー Reflow soldering<br>W: フロー Wave soldering | 静電容量<br>許 容 差<br>Capacitance<br>tolerance | 厚 み<br>Thickness<br>〔mm〕<br>(inch) |
|-----------------------|----------------------|--|---------------------------------------------------|------------------------------------|----------------------------------------|-------------|-------------------------------------------------------------------------------|-------------------------------------------|------------------------------------|
| 25V                   | T2K096 CH100FP       |  | RoHS                                              | 10                                 | CH/C0H                                 | 400+20・C    | R                                                                             | ±1pF〔F〕                                   | 0.3±0.03<br>(0.012±0.001)          |
|                       | T2K096 CH120KP       |  | RoHS                                              | 12                                 |                                        |             |                                                                               | ±10%〔K〕                                   |                                    |
|                       | T2K096 CH150KP       |  | RoHS                                              | 15                                 |                                        |             |                                                                               |                                           |                                    |
|                       | T2K096 CH180KP       |  | RoHS                                              | 18                                 |                                        |             |                                                                               |                                           |                                    |
|                       | T2K096 CH220KP       |  | RoHS                                              | 22                                 |                                        |             |                                                                               |                                           |                                    |
|                       | T2K096 CH270KP       |  | RoHS                                              | 27                                 |                                        |             |                                                                               |                                           |                                    |
|                       | T2K096 CH330KP       |  | RoHS                                              | 33                                 |                                        | 1000        |                                                                               |                                           |                                    |
|                       | T2K096 CH390KP       |  | RoHS                                              | 39                                 |                                        |             |                                                                               |                                           |                                    |
|                       | T2K096 CH470KP       |  | RoHS                                              | 47                                 |                                        |             |                                                                               |                                           |                                    |
|                       | T2K096 CH560KP       |  | RoHS                                              | 56                                 |                                        |             |                                                                               |                                           |                                    |
|                       | T2K096 CH680KP       |  | RoHS                                              | 68                                 |                                        |             |                                                                               |                                           |                                    |
|                       | T2K096 CH820KP       |  | RoHS                                              | 82                                 |                                        |             |                                                                               |                                           |                                    |
|                       | T2K096 CH101KP       |  | RoHS                                              | 100                                |                                        |             |                                                                               |                                           |                                    |

■ 110TYPE (0504 case size) 2連タイプ(2 circuit type)

【温度特性 Temp.char. BJ:B/X5R】

| 定格電圧<br>Rated Voltage | 形 名<br>Ordering code |  | EHS<br>(Environmental<br>Hazardous<br>Substances) | 公 称<br>静電容量<br>Capacitance<br>〔μF〕 | 温度特性<br>Temperature<br>characteristics | tanδ<br>Dissipation<br>factor<br>〔%〕Max. | 実装条件<br>Soldering method<br>R:リフロー- Reflow soldering<br>W: 7フロー- Wave soldering | 静電容量<br>許 容 差<br>Capacitance<br>tolerance | 厚 み<br>Thickness<br>〔mm〕<br>(inch) |
|-----------------------|----------------------|--|---------------------------------------------------|------------------------------------|----------------------------------------|------------------------------------------|---------------------------------------------------------------------------------|-------------------------------------------|------------------------------------|
| 50V                   | U2K110 BJ102□B       |  | RoHS                                              | 0.001                              | B/X5R*2                                | 3.5                                      | R                                                                               | ±10%〔K〕<br>±20%〔M〕                        | 0.6±0.06<br>(0.024±0.002)          |
|                       | U2K110 BJ222□B       |  | RoHS                                              | 0.0022                             |                                        |                                          |                                                                                 |                                           |                                    |
|                       | U2K110 BJ472□B       |  | RoHS                                              | 0.0047                             |                                        |                                          |                                                                                 |                                           |                                    |
| 25V                   | T2K110 BJ103□B       |  | RoHS                                              | 0.01                               | B/X5R                                  | 5                                        |                                                                                 |                                           |                                    |
|                       | T2K110 BJ223□B       |  | RoHS                                              | 0.022                              |                                        |                                          |                                                                                 |                                           |                                    |
|                       | T2K110 BJ104□B       |  | RoHS                                              | 0.1                                |                                        |                                          |                                                                                 |                                           |                                    |
| 16V                   | E2K110 BJ473□B       |  | RoHS                                              | 0.047                              | B/X5R*2                                | 3.5                                      |                                                                                 |                                           |                                    |
|                       | E2K110 BJ104□B       |  | RoHS                                              | 0.1                                |                                        |                                          |                                                                                 |                                           |                                    |
| 10V                   | L2K110 BJ224□B       |  | RoHS                                              | 0.22                               | B/X5R                                  | 5                                        |                                                                                 |                                           |                                    |
|                       | L2K110 BJ474□A       |  | RoHS                                              | 0.47                               |                                        |                                          |                                                                                 |                                           |                                    |
|                       | L2K110 BJ105□A*1     |  | RoHS                                              | 1.0                                |                                        |                                          |                                                                                 |                                           |                                    |
| 6.3V                  | J2K110 BJ105□V*1     |  | RoHS                                              | 1.0                                | X5R                                    | 10                                       |                                                                                 |                                           |                                    |
|                       | J2K110 BJ225□A*1     |  | RoHS                                              | 2.2                                |                                        |                                          |                                                                                 |                                           |                                    |
|                       |                      |  |                                                   |                                    |                                        |                                          |                                                                                 |                                           | 0.8±0.08<br>(0.031±0.003)          |
|                       |                      |  |                                                   |                                    |                                        |                                          |                                                                                 |                                           | 0.5±0.05<br>(0.02±0.002)           |
|                       |                      |  |                                                   |                                    |                                        |                                          |                                                                                 |                                           | 0.8±0.08<br>(0.031±0.003)          |

形名の□には静電容量許容差記号が入ります。

\*1 高温負荷試験の試験電圧は、定格電圧の 1.5 倍

\*2 個別仕様の取交しにより、X7R 仕様に対応している場合があります。

□ Please specify the capacitance tolerance code.

\*1 Test voltage of loading at high temperature test is 1.5 time of the rated voltage.

\*2 We may provide X7R for some items according to the individual specification.

【温度特性 Temp.char. B7:X7R】

| 定格電圧<br>Rated Voltage | 形 名<br>Ordering code |  | EHS<br>(Environmental<br>Hazardous<br>Substances) | 公 称<br>静電容量<br>Capacitance<br>〔μF〕 | 温度特性<br>Temperature<br>characteristics | tanδ<br>Dissipation<br>factor<br>〔%〕Max. | 実装条件<br>Soldering method<br>R:リフロー Reflow soldering<br>W: 7口ー Wave soldering | 静電容量<br>許 容 差<br>Capacitance<br>tolerance | 厚 み<br>Thickness<br>〔mm〕<br>〔inch〕 |   |  |  |  |
|-----------------------|----------------------|--|---------------------------------------------------|------------------------------------|----------------------------------------|------------------------------------------|------------------------------------------------------------------------------|-------------------------------------------|------------------------------------|---|--|--|--|
| 50V                   | U2K110 B7 102□B      |  | RoHS                                              | 0.001                              | X7R                                    | 3.5                                      | R                                                                            | ±10%〔K〕<br>±20%〔M〕                        | 0.6±0.06<br>(0.024±0.002)          |   |  |  |  |
|                       | U2K110 B7 222□B      |  | RoHS                                              | 0.0022                             |                                        |                                          |                                                                              |                                           |                                    |   |  |  |  |
|                       | U2K110 B7 472□B      |  | RoHS                                              | 0.0047                             |                                        |                                          |                                                                              |                                           |                                    |   |  |  |  |
| 25V                   | T2K110 B7 103□B      |  | RoHS                                              | 0.01                               |                                        |                                          |                                                                              |                                           |                                    |   |  |  |  |
|                       | T2K110 B7 223□B      |  | RoHS                                              | 0.022                              |                                        |                                          |                                                                              |                                           |                                    |   |  |  |  |
| 16V                   | E2K110 B7 473□B      |  | RoHS                                              | 0.047                              |                                        |                                          |                                                                              |                                           |                                    |   |  |  |  |
|                       | E2K110 B7 104□B      |  | RoHS                                              | 0.1                                |                                        |                                          |                                                                              |                                           |                                    | 5 |  |  |  |

形名の□には静電容量許容差記号が入ります。

□ Please specify the capacitance tolerance code.

【温度特性 Temp.char. CH:CH/C0H】

| 定格電圧<br>Rated Voltage | 形 名<br>Ordering code |  | EHS<br>(Environmental<br>Hazardous<br>Substances) | 公 称<br>静電容量<br>Capacitance<br>[pF] | 温度特性<br>Temperature<br>characteristics | Q<br>Symbol | 実装条件<br>Soldering method<br>R: リフロー Reflow soldering<br>W: フロー Wave soldering | 静電容量<br>許 容 差<br>Capacitance<br>tolerance | 厚 み<br>Thickness<br>[mm]<br>(inch) |
|-----------------------|----------------------|--|---------------------------------------------------|------------------------------------|----------------------------------------|-------------|-------------------------------------------------------------------------------|-------------------------------------------|------------------------------------|
| 50V                   | U2K110 CH100FB       |  | RoHS                                              | 10                                 | CH/C0H                                 | 400+20・C    | R                                                                             | ±1pF[F]                                   | 0.6±0.06<br>(0.024±0.002)          |
|                       | U2K110 CH120KB       |  | RoHS                                              | 12                                 |                                        |             |                                                                               | ±10%[K]                                   |                                    |
|                       | U2K110 CH150KB       |  | RoHS                                              | 15                                 |                                        |             |                                                                               |                                           |                                    |
|                       | U2K110 CH180KB       |  | RoHS                                              | 18                                 |                                        |             |                                                                               |                                           |                                    |
|                       | U2K110 CH220KB       |  | RoHS                                              | 22                                 |                                        |             |                                                                               |                                           |                                    |
|                       | U2K110 CH270KB       |  | RoHS                                              | 27                                 |                                        |             |                                                                               |                                           |                                    |
|                       | U2K110 CH330KB       |  | RoHS                                              | 33                                 |                                        | 1000        |                                                                               |                                           |                                    |
|                       | U2K110 CH390KB       |  | RoHS                                              | 39                                 |                                        |             |                                                                               |                                           |                                    |
|                       | U2K110 CH470KB       |  | RoHS                                              | 47                                 |                                        |             |                                                                               |                                           |                                    |
|                       | U2K110 CH560KB       |  | RoHS                                              | 56                                 |                                        |             |                                                                               |                                           |                                    |
|                       | U2K110 CH680KB       |  | RoHS                                              | 68                                 |                                        |             |                                                                               |                                           |                                    |
|                       | U2K110 CH820KB       |  | RoHS                                              | 82                                 |                                        |             |                                                                               |                                           |                                    |
|                       | U2K110 CH101KB       |  | RoHS                                              | 100                                |                                        |             |                                                                               |                                           |                                    |

■ 212TYPE(0805 case size) 2連タイプ(2 circuit type)

【温度特性 Temp.char. BJ:B/X5R】

| 定格電圧<br>Rated Voltage | 形 名<br>Ordering code         |  | EHS<br>(Environmental<br>Hazardous<br>Substances) | 公 称<br>静電容量<br>Capacitance<br>[ $\mu$ F] | 温度特性<br>Temperature<br>characteristics | $\tan \delta$<br>Dissipation<br>factor<br>[%] Max. | 実装条件<br>Soldering method<br>R:リフロー Reflow soldering<br>W: フロー Wave soldering | 静電容量<br>許 容 差<br>Capacitance<br>tolerance | 厚 み<br>Thickness<br>[mm]<br>(inch) |
|-----------------------|------------------------------|--|---------------------------------------------------|------------------------------------------|----------------------------------------|----------------------------------------------------|------------------------------------------------------------------------------|-------------------------------------------|------------------------------------|
| 25V                   | T2K212 BJ105□D               |  | RoHS                                              | 1.0                                      | B/X5R                                  | 5                                                  | R                                                                            | ±10% [K]<br>±20% [M]                      | 0.85±0.1<br>(0.033±0.004)          |
| 10V                   | L2K212 BJ225MD* <sup>1</sup> |  | RoHS                                              | 2.2                                      | X5R                                    | 10                                                 |                                                                              | ±20% [M]                                  |                                    |

形名の□には静電容量許容差記号が入ります。

\*1 高温負荷試験の試験電圧は定格電圧の 1.5 倍

☐ Please specify the capacitance tolerance code.

\*1 Test Voltage of Loading at high temperature test is 1.5 time of the rated voltage.

■ 212TYPE(0805 case size) 4連タイプ(4 circuit type)

【温度特性 Temp.char. BJ:B/X5R】

| 定格電圧<br>Rated Voltage | 形 名<br>Ordering code         |  | EHS<br>(Environmental<br>Hazardous<br>Substances) | 公 称<br>静電容量<br>Capacitance<br>〔μF〕 | 温度特性<br>Temperature<br>characteristics | tanδ<br>Dissipation<br>factor<br>〔%〕Max. | 実装条件<br>Soldering method<br>R:リフロー Reflow soldering<br>W: フロー Wave soldering | 静電容量<br>許 容 差<br>Capacitance<br>tolerance | 厚 み<br>Thickness<br>〔mm〕<br>〔inch〕 |
|-----------------------|------------------------------|--|---------------------------------------------------|------------------------------------|----------------------------------------|------------------------------------------|------------------------------------------------------------------------------|-------------------------------------------|------------------------------------|
| 25V                   | T4K212 BJ104□D               |  | RoHS                                              | 0.1                                | B/X5R                                  | 5                                        | R                                                                            | ±10%〔K〕<br>±20%〔M〕                        | 0.85±0.1<br>(0.033±0.004)          |
| 16V                   | E4K212 BJ104□D               |  | RoHS                                              | 0.1                                | B/X5R* <sup>2</sup>                    |                                          |                                                                              |                                           |                                    |
| 10V                   | L4K212 BJ224□D               |  | RoHS                                              | 0.22                               | B/X5R                                  |                                          |                                                                              |                                           |                                    |
|                       | L4K212 BJ474□D               |  | RoHS                                              | 0.47                               |                                        |                                          |                                                                              |                                           |                                    |
|                       | L4K212 BJ105□D* <sup>1</sup> |  | RoHS                                              | 1                                  | X5R                                    | 10                                       |                                                                              |                                           |                                    |

形名の□には静電容量許容差記号が入ります。

\*1 高温負荷試験の試験電圧は、定格電圧の 1.5 倍

\*2 個別仕様の取扱いにより、X7R 仕様に対応している場合があります。

☐ Please specify the capacitance tolerance code.

\*1 Test voltage of loading at high temperature test is 1.5 time of the rated voltage.

\*2 We may provide X7R for some items according to the individual specification.

【温度特性 Temp.char. B7:X7R】

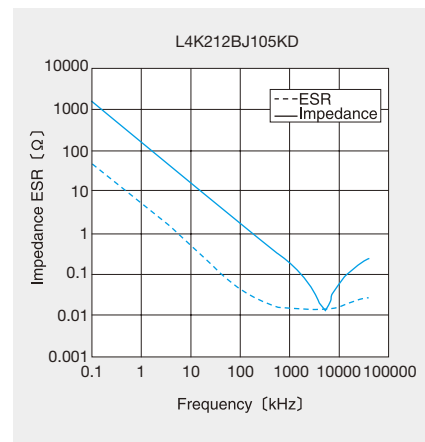
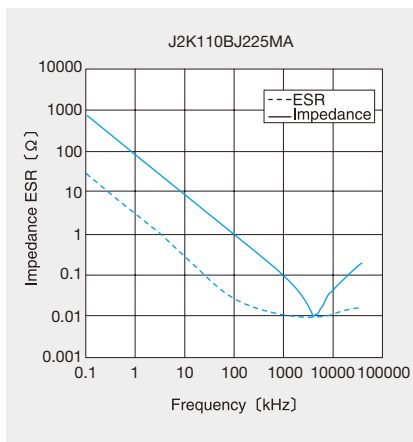
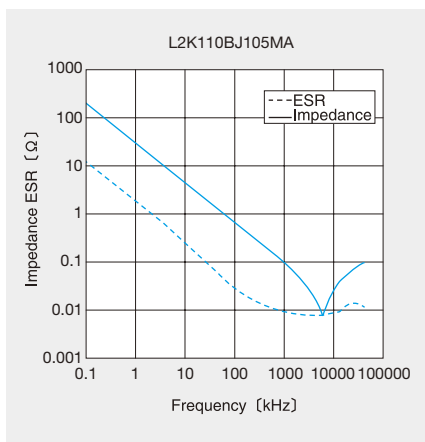
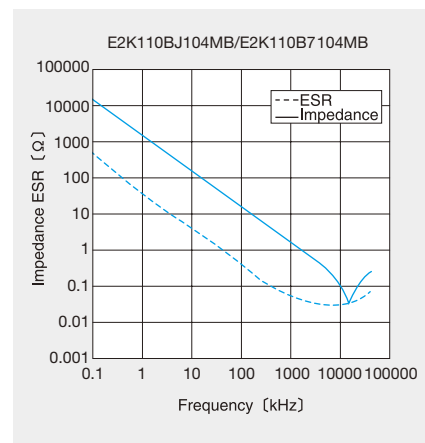
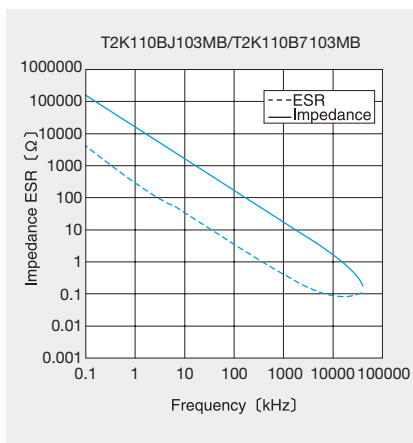
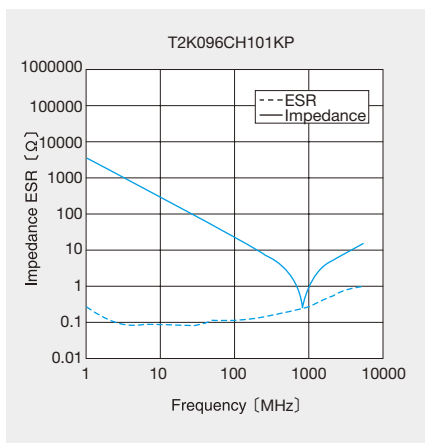
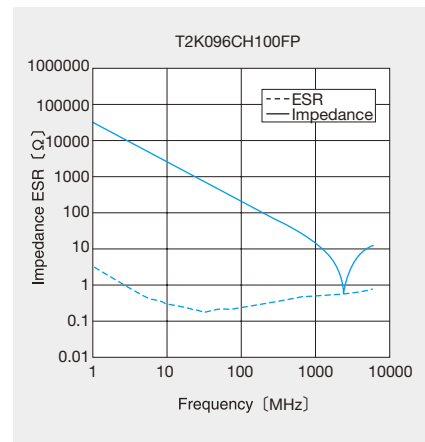
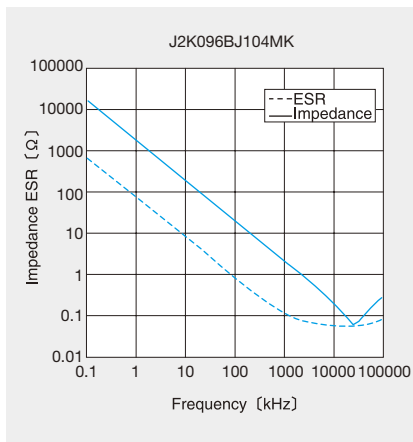
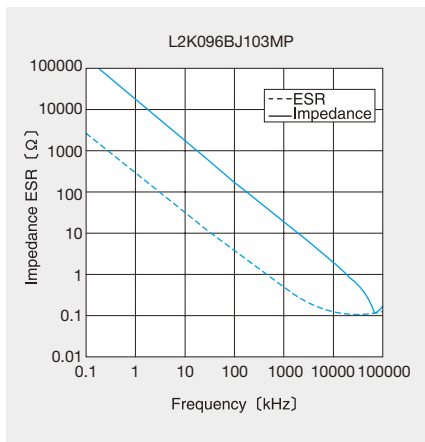
| 定格電圧<br>Rated Voltage | 形 名<br>Ordering code |  | EHS<br>(Environmental<br>Hazardous<br>Substances) | 公 称<br>静電容量<br>Capacitance<br>[ $\mu$ F] | 温度特性<br>Temperature<br>characteristics | $\tan \delta$<br>Dissipation<br>factor<br>[%] Max. | 実装条件<br>Soldering method<br>R:リフロー Reflow soldering<br>W: フロー Wave soldering | 静電容量<br>許 容 差<br>Capacitance<br>tolerance | 厚 み<br>Thickness<br>[mm]<br>(inch) |
|-----------------------|----------------------|--|---------------------------------------------------|------------------------------------------|----------------------------------------|----------------------------------------------------|------------------------------------------------------------------------------|-------------------------------------------|------------------------------------|
| 16V                   | E4K212 B7104□D       |  | RoHS                                              | 0.1                                      | X7R                                    | 5                                                  | R                                                                            | ±10% [K]<br>±20% [M]                      | 0.85±0.1<br>(0.033±0.004)          |

形名の□には静電容量許容差記号が入ります。

☐ Please specify the capacitance tolerance code.

インピーダンス・ESR-周波数特性例 Example of Impedance ESR vs. Frequency characteristics

・ 当社積層セラミックコンデンサ例 (Taiyo Yuden multilayer ceramic capacitor)



# 梱包 PACKAGING

## ①最小受注単位数 Minimum Quantity

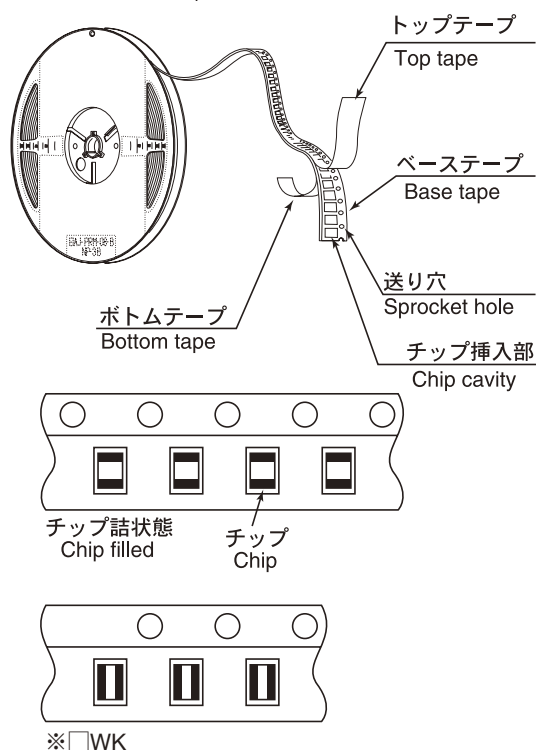
### ■テーピング梱包 Taped packaging

| 形式 (EIA)<br>Type               | 製品厚み<br>Thickness |      | 標準数量<br>Standard quantity<br>[ pcs ] |                          |
|--------------------------------|-------------------|------|--------------------------------------|--------------------------|
|                                | mm (inch)         | code | 紙テープ<br>paper                        | エンボステープ<br>Embossed tape |
| □MK042 (01005)                 | 0.2 (0.008)       | C    | 15000                                | —                        |
| □MK063 (0201)                  | 0.3 (0.012)       | P    | 15000                                | —                        |
| □2K096 (0302)                  | 0.3 (0.012)       | P    | 10000                                | —                        |
|                                | 0.45 (0.018)      | K    |                                      |                          |
| □WK105 (0204)                  | 0.3 (0.012)       | P    | 10000                                | —                        |
| □MK105 (0402)                  | 0.5 (0.020)       | V, W | 10000                                | —                        |
| □VK105 (0402)                  |                   | W    |                                      |                          |
| □MK107 (0603)<br>□WK107 (0306) | 0.45 (0.018)      | K    | 4000                                 | —                        |
|                                | 0.5 (0.020)       | V    | —                                    | 4000                     |
|                                | 0.8 (0.031)       | A    | 4000                                 | —                        |
| □2K110 (0504)                  | 0.5 (0.020)       | V    | 4000                                 | —                        |
|                                | 0.8 (0.031)       | A    | 4000                                 | —                        |
|                                | 0.6 (0.024)       | B    | 4000                                 | —                        |
| □MK212 (0805)<br>□WK212 (0508) | 0.45 (0.018)      | K    | 4000                                 | —                        |
|                                | 0.85 (0.033)      | D    | 4000                                 | —                        |
|                                | 1.25 (0.049)      | G    | —                                    | 3000                     |
| □4K212 (0805)<br>□2K212 (0805) | 0.85 (0.033)      | D    | 4000                                 | —                        |
|                                | 0.85 (0.033)      | D    | 4000                                 | —                        |
|                                | 0.85 (0.033)      | D    | 4000                                 | —                        |
| □MK316 (1206)                  | 1.15 (0.045)      | F    | —                                    | 3000                     |
|                                | 1.25 (0.049)      | G    | —                                    | 3000                     |
|                                | 1.6 (0.063)       | L    | —                                    | 2000                     |
| □MK325 (1210)                  | 0.85 (0.033)      | D    | —                                    | 2000                     |
|                                | 1.15 (0.045)      | F    |                                      |                          |
|                                | 1.5 (0.059)       | H    |                                      |                          |
|                                | 1.9 (0.075)       | N    |                                      |                          |
|                                | 2.0max (0.079)    | Y    | —                                    | 2000                     |
| □MK432 (1812)                  | 2.5 (0.098)       | M    | —                                    | 500 (T),<br>1000 (P)     |
|                                | 2.5 (0.098)       | M    | —                                    | 500                      |

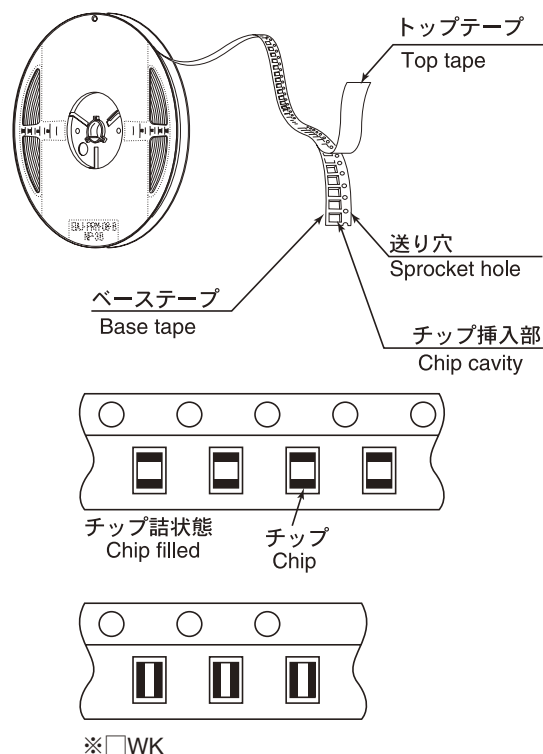
## ②テーピング材質 Taping material

紙テープ  
Card board carrier tape

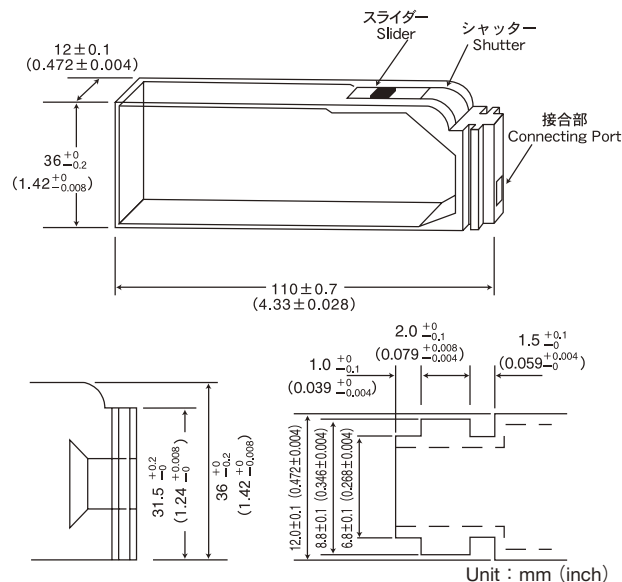
※プレスポケットタイプは、  
ボトムテープ無し。



## エンボステープ Embossed Tape



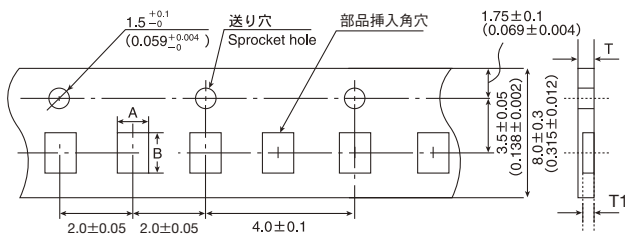
## ③バルクカセット Bulk Cassette



105, 107, 212形状で個別対応致しますのでお問い合わせ下さい。  
Please contact any of our offices for accepting your requirement according to dimensions 0402, 0603, 0805.(inch)

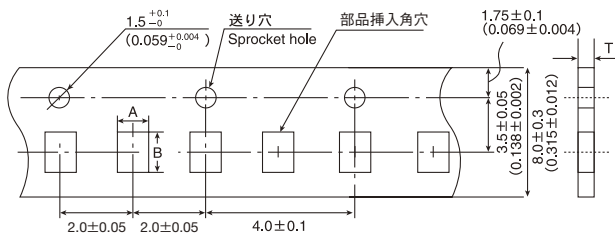
# 梱包 PACKAGING

## ③テーピング寸法 Taping dimensions 紙テープ Paper Tape (8mm幅) (0.315inches wide)



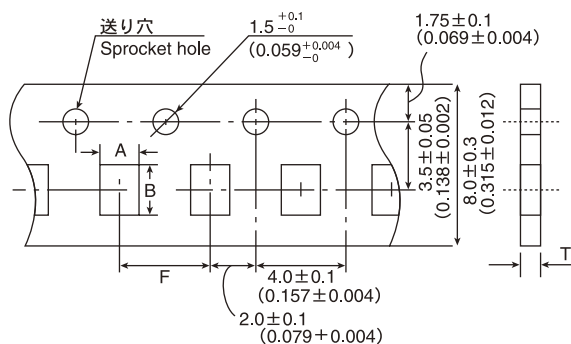
| Type<br>(EIA)  | チップ挿入部<br>Chip Cavity |                 | 挿入ピッチ<br>Insertion Pitch          | テープ厚み<br>Tape Thickness |                        |
|----------------|-----------------------|-----------------|-----------------------------------|-------------------------|------------------------|
|                | A                     | B               |                                   | T                       | T1                     |
| □MK042 (01005) | 0.25<br>(0.010)       | 0.45<br>(0.018) | $2.0 \pm 0.05$<br>(0.079 ± 0.002) | 0.36max.<br>(0.014)     | 0.27max.<br>(0.011)    |
| □MK063 (0201)  | 0.37<br>(0.016)       | 0.67<br>(0.027) | $2.0 \pm 0.05$<br>(0.079 ± 0.002) | 0.45max.<br>(0.018)     | 0.42max.<br>(0.017)    |
| □WK105 (0204)  | 0.65<br>(0.026)       | 1.15<br>(0.045) | $2.0 \pm 0.05$<br>(0.079 ± 0.002) | 0.45max.<br>(0.018max)  | 0.42max.<br>(0.017max) |

Unit : mm (inch)



| Type<br>(EIA) | チップ挿入部<br>Chip Cavity |                 | 挿入ピッチ<br>Insertion Pitch          | テープ厚み<br>Tape Thickness                 |  |
|---------------|-----------------------|-----------------|-----------------------------------|-----------------------------------------|--|
|               | A                     | B               |                                   | T                                       |  |
| □2K096 (0302) | 0.72<br>(0.028)       | 1.02<br>(0.040) | $2.0 \pm 0.05$<br>(0.079 ± 0.002) | 0.45max.(0.018max)<br>0.6max.(0.024max) |  |
| □MK105 (0402) | 0.65<br>(0.026)       | 1.15<br>(0.045) | $2.0 \pm 0.05$<br>(0.079 ± 0.002) | 0.8max.<br>(0.031max.)                  |  |
| □VK105 (0402) |                       |                 |                                   |                                         |  |

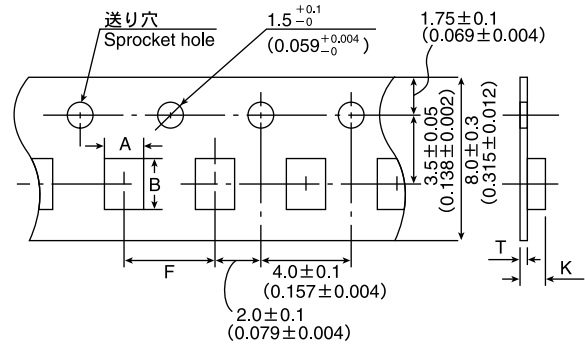
Unit : mm (inch)



| Type<br>(EIA) | チップ挿入部<br>Chip Cavity |                 | 挿入ピッチ<br>Insertion Pitch         | テープ厚み<br>Tape Thickness |  |
|---------------|-----------------------|-----------------|----------------------------------|-------------------------|--|
|               | A                     | B               |                                  | T                       |  |
| □MK107 (0603) | 1.0<br>(0.039)        | 1.8<br>(0.071)  | $4.0 \pm 0.1$<br>(0.157 ± 0.004) | 1.1max.<br>(0.043max.)  |  |
| □WK107 (0306) |                       |                 |                                  |                         |  |
| □2K110 (0504) | 1.15<br>(0.045)       | 1.55<br>(0.061) | $4.0 \pm 0.1$<br>(0.157 ± 0.004) | 1.0max.<br>(0.039max.)  |  |
| □MK212 (0805) | 1.65<br>(0.065)       | 2.4<br>(0.094)  | $4.0 \pm 0.1$<br>(0.157 ± 0.004) | 1.1max.<br>(0.043max.)  |  |
| □WK212 (0508) |                       |                 |                                  |                         |  |
| □4K212 (0805) |                       |                 |                                  |                         |  |
| □2K212 (0805) |                       |                 |                                  |                         |  |
| □MK316 (1206) | 2.0<br>(0.079)        | 3.6<br>(0.142)  |                                  |                         |  |

Unit : mm (inch)

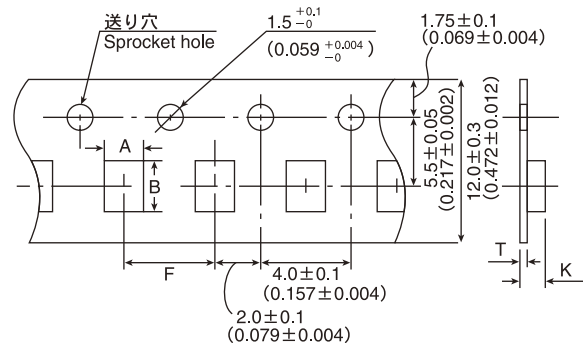
## エンボステープ Embossed tape (8mm幅) (0.315inches wide)



| Type<br>(EIA) | チップ挿入部<br>Chip cavity |                | 挿入ピッチ<br>Insertion Pitch         | テープ厚み<br>Tape Thickness |                                  |
|---------------|-----------------------|----------------|----------------------------------|-------------------------|----------------------------------|
|               | A                     | B              |                                  | K                       | T                                |
| □WK107 (0306) | 1.0<br>(0.039)        | 1.8<br>(0.071) | $4.0 \pm 0.1$<br>(0.157 ± 0.004) | 1.3max.<br>(0.051max.)  | $0.25 \pm 0.1$<br>(0.01 ± 0.004) |
| □MK212 (0805) | 1.65<br>(0.065)       | 2.4<br>(0.094) |                                  |                         |                                  |
| □MK316 (1206) | 2.0<br>(0.079)        | 3.6<br>(0.142) |                                  | 3.4max.<br>(0.134max.)  | 0.6max.<br>(0.024max.)           |
| □MK325 (1210) | 2.8<br>(0.110)        | 3.6<br>(0.142) |                                  |                         |                                  |

Unit : mm (inch)

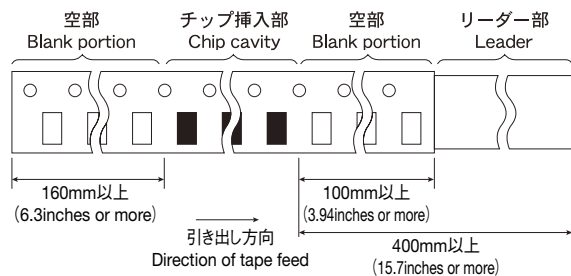
## エンボステープ Embossed tape (12mm幅) (0.472inches wide)



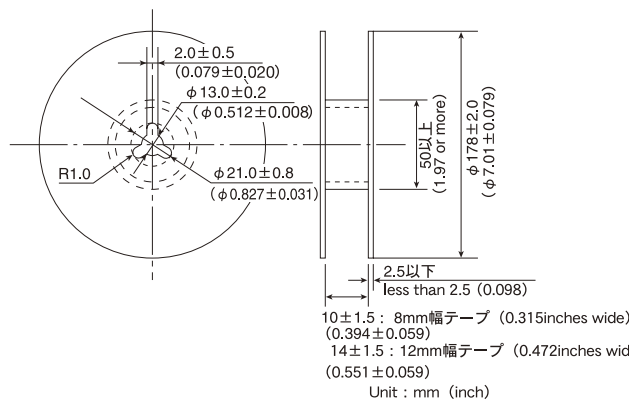
| Type<br>(EIA) | チップ挿入部<br>Chip cavity |                | 挿入ピッチ<br>Insertion Pitch         | テープ厚み<br>Tape Thickness |                        |
|---------------|-----------------------|----------------|----------------------------------|-------------------------|------------------------|
|               | A                     | B              |                                  | K                       | T                      |
| □MK432 (1812) | 3.7<br>(0.146)        | 4.9<br>(0.193) | $8.0 \pm 0.1$<br>(0.315 ± 0.004) | 4.0max.<br>(0.157max.)  | 0.6max.<br>(0.024max.) |

Unit : mm (inch)

## ④リーダー部／空部 Leader and Blank portion

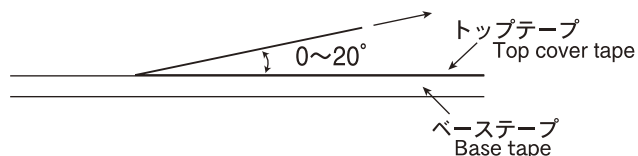


## ⑤リール寸法 Reel size

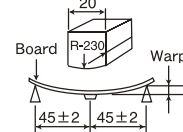


## ⑥トップテープ強度 Top Tape Strength

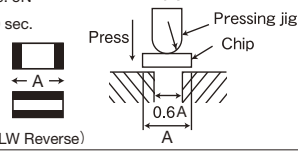
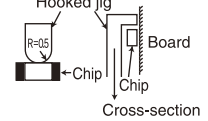
トップテープのはがし力とは図矢印方向にて0.1～0.7Nとなります。  
The top tape requires a peel-off force of 0.1～0.7N in the direction of the arrow as illustrated below.



## Multilayer Ceramic Capacitor Chips

| Item                                        |                               | Specified Value                                                                                                                                                                                                        |                                                                       |                                                                                               | Test Methods and Remarks                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|---------------------------------------------|-------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                             |                               | Temperature Compensating (Class 1)                                                                                                                                                                                     |                                                                       | High Permittivity (Class 2)                                                                   |                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|                                             |                               | Standard                                                                                                                                                                                                               | High Frequency Type                                                   | Standard Note1                                                                                |                                                                                                            | High Value                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 1.Operating Temperature Range               |                               | -55 to +125℃                                                                                                                                                                                                           |                                                                       | BJ : -55 to +125℃<br>F : -25 to +85℃                                                          | -25 to +85℃                                                                                                | High Capacitance Type BJ (X7R) : -55~+125℃, BJ (X5R) : -55~+85℃<br>E (Y5U) : -30~+85℃, F (Y5V) : -30~+85℃                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 2.Storage Temperature Range                 |                               | -55 to +125℃                                                                                                                                                                                                           |                                                                       | BJ : -55 to +125℃<br>F : -25 to +85℃                                                          | -25 to +85℃                                                                                                | High Capacitance Type BJ (X7R) : -55~+125℃, BJ (X5R) : -55~+85℃<br>E (Y5U) : -30~+85℃, F (Y5V) : -30~+85℃                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 3.Rated Voltage                             |                               | 50VDC,25VDC, 16VDC                                                                                                                                                                                                     | 16VDC<br>50VDC                                                        | 50VDC,25VDC                                                                                   | 50VDC,35VDC,25VDC<br>16VDC,10VDC,6.3VDC<br>4DVC, 2.5VDC                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| 4.Withstanding Voltage Between terminals    |                               | No breakdown or damage                                                                                                                                                                                                 | No abnormality                                                        | No breakdown or damage                                                                        |                                                                                                            | Applied voltage: Rated voltage×3 (Class 1)<br>Rated voltage×2.5 (Class 2)<br>Duration: 1 to 5 sec.<br>Charge/discharge current: 50mA max. (Class 1,2)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| 5.Insulation Resistance                     |                               | 10000 MΩ min.                                                                                                                                                                                                          |                                                                       | 500 MΩ μF. or 10000 MΩ., whichever is the smaller.<br>Note 5                                  |                                                                                                            | Applied voltage: Rated voltage<br>Duration: 60±5 sec.<br>Charge/discharge current: 50mA max.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| 6.Capacitance (Tolerance)                   |                               | 0.5 to 5 pF: ±0.25 pF<br>1 to 10pF: ±0.5 pF<br>5 to 10 pF: ±1 pF<br>11 pF or over: ± 5%<br>±10%<br>105TYPER△,S△,T△,U△ only<br>0.5~2pF: ±0.1pF<br>2.2~20pF: ±5%                                                         | 0.5 to 2 pF : ±0.1 pF<br>2.2 to 5.1 pF : ±5%                          | BJ: ±10%, ±20%<br>F : +80%<br>-20%                                                            | BJ : ±10%、±20%<br>F : -20%／+80%                                                                            | Measuring frequency :<br>Class1 : 1MHz±10% (C≦1000pF)<br>1 k Hz±10% (C>1000pF)<br>Class2 : 1 k Hz±10% (C≦10 μF)<br>120Hz±10Hz (C>10 μF)<br>Measuring voltage :<br>Note 4 Class1 : 0.5~5Vrms (C≦1000pF)<br>1±0.2Vrms (C>1000pF)<br>Class2 : 1±0.2Vrms (C≦10 μF)<br>0.5±0.1Vrms (C>10 μF)<br>Bias application: None                                                                                                                                                                                                                                                                                                                                                     |
| 7.Q or Tangent of Loss Angle (tan δ)        |                               | Under 30 pF<br>: Q≧400 + 20C<br>30 pF or over : Q≧1000<br>C= Nominal capacitance                                                                                                                                       | Refer to detailed specification                                       | BJ: 2.5% max. (50V, 25V)<br>F: 5.0% max. (50V, 25V)<br>Note 4                                 | BJ : 2.5% max.<br>F : 7% max.<br>Note 4                                                                    | Multilayer:<br>Measuring frequency :<br>Class1 : 1MHz±10% (C≦1000pF)<br>1 k Hz±10% (C>1000pF)<br>Class2 : 1 k Hz±10% (C≦10 μF)<br>120Hz±10Hz (C>10 μF)<br>Measuring voltage :<br>Note 4 Class1 : 0.5~5Vrms (C≦1000pF)<br>1±0.2Vrms (C>1000pF)<br>Class2 : 1±0.2Vrms (C≦10 μF)<br>0.5±0.1Vrms (C>10 μF)<br>Bias application: None<br>High—Frequency—Multilayer:<br>Measuring frequency: 1GHz<br>Measuring equipment: HP4291A<br>Measuring jig: HP16192A                                                                                                                                                                                                                |
| 8.Temperature Characteristic of Capacitance | (Without voltage application) | CK : 0±250<br>CJ : 0±120<br>CH : 0±60<br>CG : 0±30<br>RH : -220±60<br>SK : -330±250<br>SJ : -330±120<br>SH : -330±60<br>TK : -470±250<br>TJ : -470±120<br>UK : -750±250<br>UJ : -750±120<br>SL : +350 to -1000 (ppm/℃) | CH : 0±60<br>RH : -220±60 (ppm/℃)                                     | BJ : ±10% (-25~85℃)<br>F : +30% (-25~85℃)<br>-80<br>BJ (X7R) : ±15%<br>F (Y5V) : +22%<br>-82  | BJ : ±10%<br>(-25~+85℃)<br>F : +30%／-80%<br>(-25~+85℃)<br>BJ (X7R、X5R) :<br>±15%<br>F (Y5V) :<br>+22%／-82% | According to JIS C 5102 clause 7.12.<br>Temperature compensating:<br>Measurement of capacitance at 20℃ and 85℃ shall be made to calculate temperature characteristic by the following equation.<br>$\frac{(C_{85}-C_{20})}{C_{20} \times \Delta T} \times 10^6 \text{ (ppm/℃)}$<br>High permittivity:<br>Change of maximum capacitance deviation in step 1 to 5<br>Temperature at step 1: +20℃<br>Temperature at step 2: minimum operating temperature<br>Temperature at step 3: +20℃ (Reference temperature)<br>Temperature at step 4: maximum operating temperature<br>Temperature at step 5: +20℃<br>Reference temperature for X7R, X5R, Y5U and Y5V shall be +25℃ |
| 9.Resistance to Flexure of Substrate        |                               | Appearance:<br>No abnormality<br>Capacitance change:<br>Within ±5% or ±0.5 pF, whichever is larger.                                                                                                                    | Appearance:<br>No abnormality<br>Capacitance change:<br>Within±0.5 pF | Appearance:<br>No abnormality<br>Capacitance change:<br>BJ : Within ±12.5%<br>F : Within ±30% |                                                                                                            | Warp: 1mm<br>Testing board: glass epoxy—resin substrate<br>Thickness: 1.6mm (063 TYPE : 0.8mm)<br>The measurement shall be made with board in the bent position.<br><br>(Unit: mm)                                                                                                                                                                                                                                                                                                                                                                                               |

## Multilayer Ceramic Capacitor Chips

| Item                        | Specified Value                                                                                                                                                                                                                                                                         |                                                                                                                                                                                          |                                                                                                                                                                                                                            |                                                                                                                                                                                                               | Test Methods and Remarks                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
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|                             | Temperature Compensating (Class 1)                                                                                                                                                                                                                                                      |                                                                                                                                                                                          | High Permittivity (Class 2)                                                                                                                                                                                                |                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|                             | Standard                                                                                                                                                                                                                                                                                | High Frequency Type                                                                                                                                                                      | Standard Note1                                                                                                                                                                                                             | High Value                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 10.Body Strength            | —                                                                                                                                                                                                                                                                                       | No mechanical damage.                                                                                                                                                                    | —                                                                                                                                                                                                                          | —                                                                                                                                                                                                             | High Frequency Multilayer:<br>Applied force: 5N<br>Duration: 10 sec.<br>                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| 11.Adhesion of Electrode    | No separation or indication of separation of electrode.                                                                                                                                                                                                                                 |                                                                                                                                                                                          |                                                                                                                                                                                                                            |                                                                                                                                                                                                               | Applied force: 5N<br>Duration: 30±5 sec.<br>(01005, 0201, 0302 TYPE 2N)<br>                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| 12.Solderability            | At least 95% of terminal electrode is covered by new solder.                                                                                                                                                                                                                            |                                                                                                                                                                                          |                                                                                                                                                                                                                            |                                                                                                                                                                                                               | Solder temperature: 230±5℃<br>Duration: 4±1 sec.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| 13.Resistance to soldering  | Appearance: No abnormality<br>Capacitance change: Within ±2.5% or ±0.25pF, whichever is larger.<br>Q: Initial value<br>Insulation resistance: Initial value<br>Withstanding voltage (between terminals): No abnormality                                                                 | Appearance: No abnormality<br>Capacitance change: Within ±2.5%<br>Q: Initial value<br>Insulation resistance: Initial value<br>Withstanding voltage (between terminals): No abnormality   | Appearance: No abnormality<br>Capacitance change: Within ±7.5% (BJ)<br>Within ±20% (F)<br>tan δ : Initial value Note 4<br>Insulation resistance: Initial value<br>Withstanding voltage (between terminals): No abnormality |                                                                                                                                                                                                               | Preconditioning: Thermal treatment (at 150℃ for 1 hr)<br>(Applicable to Class 2.)<br>Solder temperature: 270±5℃<br>Duration: 3±0.5 sec.<br>Preheating conditions: 80 to 100℃, 2 to 5 min. or 5 to 10 min.<br>150 to 200℃, 2 to 5 min. or 5 to 10 min.<br>Recovery: Recovery for the following period under the standard condition after the test.<br>6~24 hrs (Class 1)<br>24±2 hrs (Class 2)                                                                                                                                                                                                       |
| 14.Thermal shock            | Appearance: No abnormality<br>Capacitance change: Within ±2.5% or ±0.25pF, whichever is larger.<br>Q: Initial value<br>Insulation resistance: Initial value<br>Withstanding voltage (between terminals): No abnormality                                                                 | Appearance: No abnormality<br>Capacitance change: Within ±0.25pF<br>Q: Initial value<br>Insulation resistance: Initial value<br>Withstanding voltage (between terminals): No abnormality | Appearance: No abnormality<br>Capacitance change: Within ±7.5% (BJ)<br>Within ±20% (F)<br>tan δ : Initial value Note 4<br>Insulation resistance: Initial value<br>Withstanding voltage (between terminals): No abnormality |                                                                                                                                                                                                               | Preconditioning: Thermal treatment (at 150℃ for 1 hr)<br>(Applicable to Class 2.)<br>Conditions for 1 cycle:<br>Step 1: Minimum operating temperature $+0_{-3}^{\circ}\text{C}$ 30±3 min.<br>Step 2: Room temperature 2 to 3 min.<br>Step 3: Maximum operating temperature $-0_{+3}^{\circ}\text{C}$ 30±3 min.<br>Step 4: Room temperature 2 to 3 min.<br>Number of cycles: 5 times<br>Recovery after the test: 6~24 hrs (Class 1)<br>24±2 hrs (Class 2)                                                                                                                                            |
| 15.Damp Heat (steady state) | Appearance: No abnormality<br>Capacitance change: Within ±5% or ±0.5pF, whichever is larger.<br>Q:<br>$C\geq 30\text{ pF} : Q\geq 350$<br>$10\leq C<30\text{ pF} : Q\geq 275+2.5C$<br>$C<10\text{ pF} : Q\geq 200+10C$<br>C: Nominal capacitance<br>Insulation resistance: 1000 MΩ min. | Appearance: No abnormality<br>Capacitance change: Within ±0.5pF,<br>Insulation resistance: 1000 MΩ min.                                                                                  | Appearance: No abnormality<br>Capacitance change: BJ: Within ±12.5%<br>F: Within ±30%<br>tan δ : BJ: 5.0% max.<br>F: 7.5% max.<br>Note 4<br>Insulation resistance: 50 MΩ μF or 1000 MΩ whichever is smaller.<br>Note 5     | Appearance: No abnormality<br>Capacitance change: BJ: Within ±12.5%<br>Note 4<br>tan δ : BJ: 5.0% max. Note 4.<br>F: 11.0% max.<br>Insulation resistance: 50 MΩ μF or 1000 MΩ whichever is smaller.<br>Note 5 | Multilayer :<br>Preconditioning: Thermal treatment (at 150℃ for 1 hr)<br>(Applicable to Class 2.)<br>Temperature: 40±2℃<br>Humidity: 90 to 95% RH<br>Duration: 500 $+24_{-0}$ hrs<br>Recovery: Recovery for the following period under the standard condition after the removal from test chamber.<br>6~24 hrs (Class 1)<br>24±2 hrs (Class 2)<br>High—Frequency Multilayer:<br>Temperature: 60±2℃<br>Humidity: 90 to 95% RH<br>Duration: 500 $+24_{-0}$ hrs<br>Recovery: Recovery for the following period under the standard condition after the removal from test chamber.<br>6~24 hrs (Class 1) |

## Multilayer Ceramic Capacitor Chips

| Item                           | Specified Value                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                               | Test Methods and Remarks                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|--------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                | Temperature Compensating (Class 1)                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                              | High Permittivity (Class 2)                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|                                | Standard                                                                                                                                                                                                                                                                                                                   | High Frequency Type                                                                                                                                                                                                          | Standard Note1                                                                                                                                                                                                                                                                            | High Value                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| 16.Loading under Damp Heat     | Appearance: No abnormality<br>Capacitance change: Within $\pm 7.5\%$ or $\pm 0.75\text{pF}$ , whichever is larger.<br>Q: $C\geq 30\text{ pF}$ : $Q\geq 200$<br>$C<30\text{ pF}$ : $Q\geq 100 + 10C/3$<br>C : Nominal capacitance<br>Insulation resistance: 500 M $\Omega$ min.                                             | Appearance: No abnormality<br>Capacitance change: $C\leq 2\text{ pF}$ : Within $\pm 0.4\text{ pF}$<br>$C>2\text{ pF}$ : Within $\pm 0.75\text{ pF}$<br>C : Nominal capacitance<br>Insulation resistance: 500 M $\Omega$ min. | Appearance: No abnormality<br>Capacitance change: BJ: Within $\pm 12.5\%$<br>F: Within $\pm 30\%$<br>Note 4<br>$\tan \delta$ : BJ: 5.0% max.<br>F: 7.5% max.<br>Note 4<br>Insulation resistance: 25 M $\Omega\text{ }\mu\text{F}$ or 500 M $\Omega$ , whichever is the smaller.<br>Note 5 | Appearance: No abnormality<br>Capacitance change: BJ : Within $\pm 12.5\%$<br>F : Within $\pm 30\%$<br>Note 4<br>$\tan \delta$ : BJ : 5.0%max.<br>F : 11%max.<br>Note 4<br>Insulation resistance: 25 M $\Omega\text{ }\mu\text{F}$ or 500 M $\Omega$ , whichever is the smaller.<br>Note 5                                                                    | According to JIS C 5102 Clause 9. 9.<br>Multilayer:<br>Preconditioning: Voltage treatment (Class 2)<br>Temperature: $40\pm 2^{\circ}\text{C}$<br>Humidity: 90 to 95% RH<br>Duration: 500 $\overset{+24}{-0}$ hrs<br>Applied voltage: Rated voltage<br>Charge and discharge current: 50mA max. (Class 1,2)<br>Recovery: Recovery for the following period under the standard condition after the removal from test chamber.<br>6~24 hrs (Class 1)<br>24 $\pm 2$ hrs (Class 2)<br>High—Frequency Multilayer:<br>Temperature: $60\pm 2^{\circ}\text{C}$<br>Humidity: 90 to 95% RH<br>Duration: 500 $\overset{+24}{-0}$ hrs<br>Applied voltage: Rated voltage<br>Charge and discharge current: 50mA max.<br>Recovery: 6~24 hrs of recovery under the standard condition after the removal from test chamber. |
| 17.Loading at High Temperature | Appearance: No abnormality<br>Capacitance change: Within $\pm 3\%$ or $\pm 0.3\text{pF}$ , whichever is larger.<br>Q: $C\geq 30\text{ pF}$ : $Q\geq 350$<br>$10\leq C<30\text{ pF}$ : $Q\geq 275 + 2.5C$<br>$C<10\text{ pF}$ : $Q\geq 200 + 10C$<br>C : Nominal capacitance<br>Insulation resistance: 1000 M $\Omega$ min. | Appearance: No abnormality<br>Capacitance change: Within $\pm 3\%$ or $\pm 0.3\text{pF}$ , whichever is larger.<br>Insulation resistance: 1000 M $\Omega$ min.                                                               | Appearance: No abnormality<br>Capacitance change: BJ: Within $\pm 12.5\%$<br>F: Within $\pm 30\%$<br>Note 4<br>$\tan \delta$ : BJ: 4.0% max.<br>F: 7.5% max.<br>Note 4<br>Insulation resistance: 50 M $\Omega\text{ }\mu\text{F}$ or 1000 M $\Omega$ , whichever is smaller.<br>Note 5    | Appearance: No abnormality<br>Capacitance change: BJ : Within $\pm 12.5\%$<br>Within $\pm 20\% \times \times$<br>Within $\pm 25\% \times \times$<br>F : Within $\pm 30\%$<br>Note 4<br>$\tan \delta$ : BJ : 5.0%max.<br>F : 11%max.<br>Note 4<br>Insulation resistance: 50 M $\Omega\text{ }\mu\text{F}$ or 1000 M $\Omega$ , whichever is smaller.<br>Note 5 | According to JIS C 5102 clause 9.10.<br>Multilayer:<br>Preconditioning: Voltage treatment (Class 2)<br>Temperature: $125\pm 3^{\circ}\text{C}$ (Class 1, Class 2: B, BJ (X7R))<br>$85\pm 2^{\circ}\text{C}$ (Class 2: BJ,F)<br>Duration: 1000 $\overset{+48}{-0}$ hrs<br>Applied voltage: Rated voltage $\times 2$ Note 6<br>Recovery: Recovery for the following period under the standard condition after the removal from test chamber.<br>6~24 hrs (Class 1)<br>24 $\pm 2$ hrs (Class 2)<br>High—Frequency Multilayer:<br>Temperature: $125\pm 3^{\circ}\text{C}$ (Class 1)<br>Duration: 1000 $\overset{+48}{-0}$ hrs<br>Applied voltage: Rated voltage $\times 2$<br>Recovery: 6~24 hrs of recovery under the standard condition after the removal from test chamber.                               |

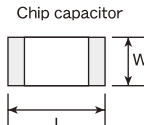
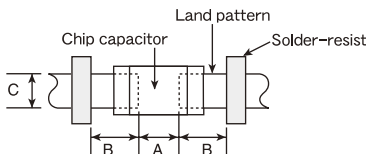
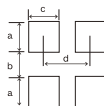
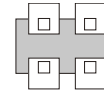
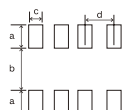
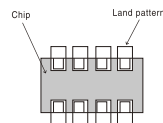
Note 1 :For 105 type, specified in "High value".

Note 2 :Thermal treatment (Multilayer): 1 hr of thermal treatment at  $150 \pm 0 / -10^\circ\text{C}$  followed by  $24 \pm 2$  hrs of recovery under the standard condition shall be performed before the measurement.Note 3 :Voltage treatment (Multilayer): 1 hr of voltage treatment under the specified temperature and voltage for testing followed by  $24 \pm 2$  hrs of recovery under the standard condition shall be performed before the measurement.

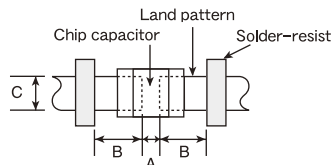
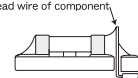
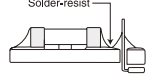
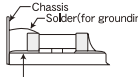
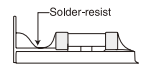
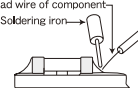
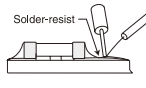
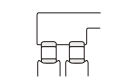
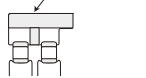
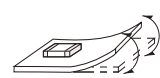
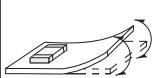
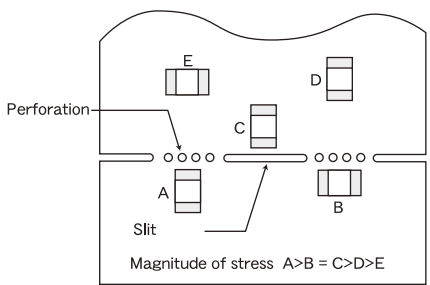
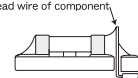
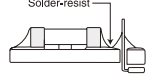
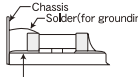
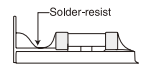
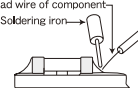
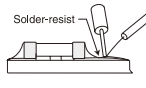
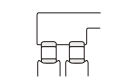
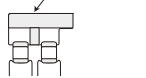
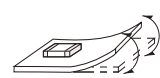
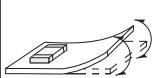
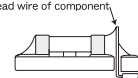
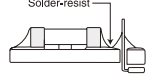
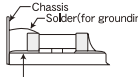
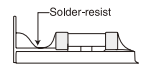
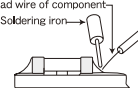
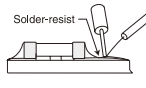
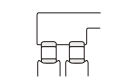
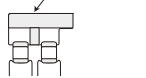
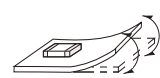
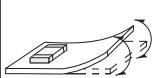
Note 4, 5 :The figure indicates typical inspection. Please refer to individual specifications.

Note 6 :Some of the parts are applicable in rated voltage  $\times 1.5$ . Please refer to individual specifications.Note on standard condition: "standard condition" referred to herein is defined as follows: 5 to  $35^\circ\text{C}$  of temperature, 45 to 85% relative humidity, and 86 to 106kPa of air pressure.When there are questions concerning measurement results: In order to provide correlation data, the test shall be conducted under condition of  $20 \pm 2^\circ\text{C}$  of temperature, 60 to 70% relative humidity, and 86 to 106kPa of air pressure. Unless otherwise specified, all the tests are conducted under the "standard condition."

## Precautions on the use of Multilayer Ceramic Capacitors

| Stages           | Precautions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Technical considerations                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          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      |           |         |         |         |         |         |      |                  |      |   |     |   |      |   |         |   |         |   |         |   |     |      |                  |                  |                  |      |   |     |      |     |   |      |     |     |   |         |           |           |   |         |           |           |   |         |         |           |   |     |      |      |
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-----------|-----------|---------|---------|---------|---------|---------|------|------------------|------|---|-----|---|------|---|---------|---|---------|---|---------|---|-----|------|------------------|------------------|------------------|------|---|-----|------|-----|---|------|-----|-----|---|---------|-----------|-----------|---|---------|-----------|-----------|---|---------|---------|-----------|---|-----|------|------|
| 1.Circuit Design | <p>Verification of operating environment, electrical rating and performance</p> <p>1. A malfunction in medical equipment, spacecraft, nuclear reactors, etc. may cause serious harm to human life or have severe social ramifications. As such, any capacitors to be used in such equipment may require higher safety and/or reliability considerations and should be clearly differentiated from components used in general purpose applications.</p> <p>Operating Voltage (Verification of Rated voltage)</p> <p>1. The operating voltage for capacitors must always be lower than their rated values.</p> <p>If an AC voltage is loaded on a DC voltage, the sum of the two peak voltages should be lower than the rated value of the capacitor chosen. For a circuit where both an AC and a pulse voltage may be present, the sum of their peak voltages should also be lower than the capacitor's rated voltage.</p> <p>2. Even if the applied voltage is lower than the rated value, the reliability of capacitors might be reduced if either a high frequency AC voltage or a pulse voltage having rapid rise time is present in the circuit.</p> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                  |         |         |         |         |         |   |     |     |     |   |     |      |     |   |         |         |         |         |   |         |         |         |         |   |         |         |         |         |      |     |     |     |     |     |     |     |     |      |   |     |     |     |     |     |     |     |   |     |     |     |     |      |     |     |   |           |           |           |         |         |         |         |         |   |           |           |           |         |         |         |         |         |   |           |           |           |         |         |         |         |         |      |                  |      |   |     |   |      |   |         |   |         |   |         |   |     |      |                  |                  |                  |      |   |     |      |     |   |      |     |     |   |         |           |           |   |         |           |           |   |         |         |           |   |     |      |      |
| 2.PCB Design     | <p>Pattern configurations<br/>(Design of Land-patterns)</p> <p>1. When capacitors are mounted on a PCB, the amount of solder used (size of fillet) can directly affect capacitor performance. Therefore, the following items must be carefully considered in the design of solder land patterns:</p> <p>(1) The amount of solder applied can affect the ability of chips to withstand mechanical stresses which may lead to breaking or cracking. Therefore, when designing land-patterns it is necessary to consider the appropriate size and configuration of the solder pads which in turn determines the amount of solder necessary to form the fillets.</p> <p>(2) When more than one part is jointly soldered onto the same land or pad, the pad must be designed so that each component's soldering point is separated by solder-resist.</p>                                                                                                                                                                                                                                                                                                      | <p>1.The following diagrams and tables show some examples of recommended patterns to prevent excessive solder amounts. (larger fillets which extend above the component end terminations)</p> <p>Examples of improper pattern designs are also shown.</p> <p>(1) Recommended land dimensions for a typical chip capacitor land patterns for PCBs</p> <div></div> <p>Recommended land dimensions for wave-soldering (unit: mm)</p> <table><tr><th>Type</th><th>107</th><th>212</th><th>316</th><th>325</th></tr><tr><td rowspan="2">Size</td><td>L</td><td>1.6</td><td>2.0</td><td>3.2</td></tr><tr><td>W</td><td>0.8</td><td>1.25</td><td>1.6</td></tr><tr><td>A</td><td>0.8~1.0</td><td>1.0~1.4</td><td>1.8~2.5</td><td>1.8~2.5</td></tr><tr><td>B</td><td>0.5~0.8</td><td>0.8~1.5</td><td>0.8~1.7</td><td>0.8~1.7</td></tr><tr><td>C</td><td>0.6~0.8</td><td>0.9~1.2</td><td>1.2~1.6</td><td>1.8~2.5</td></tr></table> <p>Recommended land dimensions for reflow-soldering (unit: mm)</p> <table><tr><th>Type</th><th>042</th><th>063</th><th>105</th><th>107</th><th>212</th><th>316</th><th>325</th><th>432</th></tr><tr><td rowspan="2">Size</td><td>L</td><td>0.4</td><td>0.6</td><td>1.0</td><td>1.6</td><td>2.0</td><td>3.2</td><td>4.5</td></tr><tr><td>W</td><td>0.2</td><td>0.3</td><td>0.5</td><td>0.8</td><td>1.25</td><td>1.6</td><td>3.2</td></tr><tr><td>A</td><td>0.15~0.25</td><td>0.20~0.30</td><td>0.45~0.55</td><td>0.8~1.0</td><td>0.8~1.2</td><td>1.8~2.5</td><td>1.8~2.5</td><td>2.5~3.5</td></tr><tr><td>B</td><td>0.10~0.20</td><td>0.20~0.30</td><td>0.40~0.50</td><td>0.6~0.8</td><td>0.8~1.2</td><td>1.0~1.5</td><td>1.0~1.5</td><td>1.5~1.8</td></tr><tr><td>C</td><td>0.15~0.30</td><td>0.25~0.40</td><td>0.45~0.55</td><td>0.6~0.8</td><td>0.9~1.6</td><td>1.2~2.0</td><td>1.8~3.2</td><td>2.3~3.5</td></tr></table> <p>Excess solder can affect the ability of chips to withstand mechanical stresses. Therefore, please take proper precautions when designing land-patterns.</p> <div></div> <table><tr><th>Type</th><th>212 (4 circuits)</th></tr><tr><td rowspan="2">Size</td><td>L</td><td>2.0</td></tr><tr><td>W</td><td>1.25</td></tr><tr><td>a</td><td>0.5~0.6</td></tr><tr><td>b</td><td>0.5~0.6</td></tr><tr><td>c</td><td>0.2~0.3</td></tr><tr><td>d</td><td>0.5</td></tr></table> <table><tr><th>Type</th><th>212 (2 circuits)</th><th>110 (2 circuits)</th><th>096 (2 circuits)</th></tr><tr><td rowspan="2">Size</td><td>L</td><td>2.0</td><td>1.37</td><td>0.9</td></tr><tr><td>W</td><td>1.25</td><td>1.0</td><td>0.6</td></tr><tr><td>a</td><td>0.5~0.6</td><td>0.35~0.45</td><td>0.25~0.35</td></tr><tr><td>b</td><td>0.5~0.6</td><td>0.55~0.65</td><td>0.15~0.25</td></tr><tr><td>c</td><td>0.5~0.6</td><td>0.3~0.4</td><td>0.15~0.25</td></tr><tr><td>d</td><td>1.0</td><td>0.64</td><td>0.45</td></tr></table> | Type             | 107     | 212     | 316     | 325     | Size    | L | 1.6 | 2.0 | 3.2 | W | 0.8 | 1.25 | 1.6 | A | 0.8~1.0 | 1.0~1.4 | 1.8~2.5 | 1.8~2.5 | B | 0.5~0.8 | 0.8~1.5 | 0.8~1.7 | 0.8~1.7 | C | 0.6~0.8 | 0.9~1.2 | 1.2~1.6 | 1.8~2.5 | Type | 042 | 063 | 105 | 107 | 212 | 316 | 325 | 432 | Size | L | 0.4 | 0.6 | 1.0 | 1.6 | 2.0 | 3.2 | 4.5 | W | 0.2 | 0.3 | 0.5 | 0.8 | 1.25 | 1.6 | 3.2 | A | 0.15~0.25 | 0.20~0.30 | 0.45~0.55 | 0.8~1.0 | 0.8~1.2 | 1.8~2.5 | 1.8~2.5 | 2.5~3.5 | B | 0.10~0.20 | 0.20~0.30 | 0.40~0.50 | 0.6~0.8 | 0.8~1.2 | 1.0~1.5 | 1.0~1.5 | 1.5~1.8 | C | 0.15~0.30 | 0.25~0.40 | 0.45~0.55 | 0.6~0.8 | 0.9~1.6 | 1.2~2.0 | 1.8~3.2 | 2.3~3.5 | Type | 212 (4 circuits) | Size | L | 2.0 | W | 1.25 | a | 0.5~0.6 | b | 0.5~0.6 | c | 0.2~0.3 | d | 0.5 | Type | 212 (2 circuits) | 110 (2 circuits) | 096 (2 circuits) | Size | L | 2.0 | 1.37 | 0.9 | W | 1.25 | 1.0 | 0.6 | a | 0.5~0.6 | 0.35~0.45 | 0.25~0.35 | b | 0.5~0.6 | 0.55~0.65 | 0.15~0.25 | c | 0.5~0.6 | 0.3~0.4 | 0.15~0.25 | d | 1.0 | 0.64 | 0.45 |
| Type             | 107                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 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| Size             | L                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 1.6                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               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|                  | W                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 0.8                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 1.25             | 1.6     |         |         |         |         |   |     |     |     |   |     |      |     |   |         |         |         |         |   |         |         |         |         |   |         |         |         |         |      |     |     |     |     |     |     |     |     |      |   |     |     |     |     |     |     |     |   |     |     |     |     |      |     |     |   |           |           |           |         |         |         |         |         |   |           |           |           |         |         |         |         |         |   |           |     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| A                | 0.8~1.0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 1.0~1.4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 1.8~2.5          | 1.8~2.5 |         |         |         |         |   |     |     |     |   |     |      |     |   |         |         |         |         |   |         |         |         |         |   |         |         |         |         |      |     |     |     |     |     |     |     |     |      |   |     |     |     |     |     |     |     |   |     |     |     |     |      |     |     |   |           |           |           |         |         |         |         |         |   |           |           |           |         |         |         |         |         |   |           |           |           |         |         |         |         |         |      |                  |      |   |     |   |      |   |         |   |         |   |         |   |     |      |                  |                  |                  |      |   |     |      |     |   |      |     |     |   |         |           |           |   |         |           |           |   |         |         |           |   |     |      |      |
| B                | 0.5~0.8                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 0.8~1.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 0.8~1.7          | 0.8~1.7 |         |         |         |         |   |     |     |     |   |     |      |     |   |         |         |         |         |   |         |         |         |         |   |         |         |         |         |      |     |     |     |     |     |     |     |     |      |   |     |     |     |     |     |     |     |   |     |     |     |     |      |     |     |   |           |           |           |         |         |         |         |         |   |           |           |           |         |         |         |         |         |   |           |           |           |         |         |         |         |         |      |                  |      |   |     |   |      |   |         |   |         |   |         |   |     |      |                  |                  |                  |      |   |     |      |     |   |      |     |     |   |         |           |           |   |         |           |           |   |         |         |           |   |     |      |      |
| C                | 0.6~0.8                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 0.9~1.2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 1.2~1.6          | 1.8~2.5 |         |         |         |         |   |     |     |     |   |     |      |     |   |         |         |         |         |   |         |         |         |         |   |         |         |         |         |      |     |     |     |     |     |     |     |     |      |   |     |     |     |     |     |     |     |   |     |     |     |     |      |     |     |   |           |           |           |         |         |         |         |         |   |           |           |           |         |         |         |         |         |   |           |     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| Type             | 042                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 063                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               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| Size             | L                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 0.4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 0.6              | 1.0     | 1.6     | 2.0     | 3.2     | 4.5     |   |     |     |     |   |     |      |     |   |         |         |         |         |   |         |         |         |         |   |         |         |         |         |      |     |     |     |     |     |     |     |     |      |   |     |     |     |     |     |     |     |   |     |     |     |     |      |     |     |   |           |           |           |         |         |         |         |         |   |           |           |           |         |         |         |         |         |   |           |           |           |         |         |         |         |         |      |                  |      |   |     |   |      |   |         |   |         |   |         |   |     |      |                  |                  |                  |      |   |     |      |     |   |      |     |     |   |         |           |           |   |         |           |           |   |         |         |           |   |     |      |      |
|                  | W                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 0.2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 0.3              | 0.5     | 0.8     | 1.25    | 1.6     | 3.2     |   |     |     |     |   |     |      |     |   |         |         |         |         |   |         |         |         |         |   |         |         |         |         |      |     |     |     |     |     |     |     |     |      |   |     |     |     |     |     |     |     |   |     |     |     |     |      |     |     |   |           |           |           |         |         |         |         |         |   |           |           |           |         |         |         |         |         |   |           |           |           |         |         |         |         |         |      |                  |      |   |     |   |      |   |         |   |         |   |         |   |     |      |                  |                  |                  |      |   |     |      |     |   |      |     |     |   |         |           |           |   |         |           |           |   |         |         |           |   |     |      |      |
| A                | 0.15~0.25                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 0.20~0.30                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 0.45~0.55        | 0.8~1.0 | 0.8~1.2 | 1.8~2.5 | 1.8~2.5 | 2.5~3.5 |   |     |     |     |   |     |      |     |   |         |         |         |         |   |         |         |         |         |   |         |         |         |         |      |     |     |     |     |     |     |     |     |      |   |     |     |     |     |     |     |     |   |     |     |     |     |      |     |     |   |           |           |           |         |         |         |         |         |   |           |           |           |         |         |         |         |         |   |           |           |           |         |         |         |         |         |      |                  |      |   |     |   |      |   |         |   |         |   |         |   |     |      |                  |                  |                  |      |   |     |      |     |   |      |     |     |   |         |           |           |   |         |           |           |   |         |         |           |   |     |      |      |
| B                | 0.10~0.20                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 0.20~0.30                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 0.40~0.50        | 0.6~0.8 | 0.8~1.2 | 1.0~1.5 | 1.0~1.5 | 1.5~1.8 |   |     |     |     |   |     |      |     |   |         |         |         |         |   |         |         |         |         |   |         |         |         |         |      |     |     |     |     |     |     |     |     |      |   |     |     |     |     |     |     |     |   |     |     |     |     |      |     |     |   |           |           |           |         |         |         |         |         |   |           |           |           |         |         |         |         |         |   |           |           |           |         |         |         |         |         |      |                  |      |   |     |   |      |   |         |   |         |   |         |   |     |      |                  |                  |                  |      |   |     |      |     |   |      |     |     |   |         |           |           |   |         |           |           |   |         |         |           |   |     |      |      |
| C                | 0.15~0.30                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 0.25~0.40                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 0.45~0.55        | 0.6~0.8 | 0.9~1.6 | 1.2~2.0 | 1.8~3.2 | 2.3~3.5 |   |     |     |     |   |     |      |     |   |         |         |         |         |   |         |         |         |         |   |         |         |         |         |      |     |     |     |     |     |     |     |     |      |   |     |     |     |     |     |     |     |   |     |     |     |     |      |     |     |   |           |           |           |         |         |         |         |         |   |           |           |           |         |         |         |         |         |   |           |           |           |         |         |         |         |         |      |                  |      |   |     |   |      |   |         |   |         |   |         |   |     |      |                  |                  |                  |      |   |     |      |     |   |      |     |     |   |         |           |           |   |         |           |           |   |         |         |           |   |     |      |      |
| Type             | 212 (4 circuits)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    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      |           |         |         |         |         |         |      |                  |      |   |     |   |      |   |         |   |         |   |         |   |     |      |                  |                  |                  |      |   |     |      |     |   |      |     |     |   |         |           |           |   |         |           |           |   |         |         |           |   |     |      |      |
| Size             | L                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   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      |           |         |         |         |         |         |      |                  |      |   |     |   |      |   |         |   |         |   |         |   |     |      |                  |                  |                  |      |   |     |      |     |   |      |     |     |   |         |           |           |   |         |           |           |   |         |         |           |   |     |      |      |
|                  | W                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 1.25                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              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| a                | 0.5~0.6                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             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      |           |         |         |         |         |         |      |                  |      |   |     |   |      |   |         |   |         |   |         |   |     |      |                  |                  |                  |      |   |     |      |     |   |      |     |     |   |         |           |           |   |         |           |           |   |         |         |           |   |     |      |      |
| b                | 0.5~0.6                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             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      |           |         |         |         |         |         |      |                  |      |   |     |   |      |   |         |   |         |   |         |   |     |      |                  |                  |                  |      |   |     |      |     |   |      |     |     |   |         |           |           |   |         |           |           |   |         |         |           |   |     |      |      |
| c                | 0.2~0.3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             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      |           |         |         |         |         |         |      |                  |      |   |     |   |      |   |         |   |         |   |         |   |     |      |                  |                  |                  |      |   |     |      |     |   |      |     |     |   |         |           |           |   |         |           |           |   |         |         |           |   |     |      |      |
| d                | 0.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   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      |           |         |         |         |         |         |      |                  |      |   |     |   |      |   |         |   |         |   |         |   |     |      |                  |                  |                  |      |   |     |      |     |   |      |     |     |   |         |           |           |   |         |           |           |   |         |         |           |   |     |      |      |
| Type             | 212 (2 circuits)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 110 (2 circuits)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 096 (2 circuits) |         |         |         |         |         |   |     |     |     |   |     |      |     |   |         |         |         |         |   |         |         |         |         |   |         |         |         |         |      |     |     |     |     |     |     |     |     |      |   |     |     |     |     |     |     |     |   |     |     |     |     |      |     |     |   |           |           |           |         |         |         |         |         |   |           |           |           |         |         |         |         |         |   |           |           |           |         |         |         |         |         |      |                  |      |   |     |   |      |   |         |   |         |   |         |   |     |      |                  |                  |                  |      |   |     |      |     |   |      |     |     |   |         |           |           |   |         |           |           |   |         |         |           |   |     |      |      |
| Size             | L                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 2.0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 1.37             | 0.9     |         |         |         |         |   |     |     |     |   |     |      |     |   |         |         |         |         |   |         |         |         |         |   |         |         |         |         |      |     |     |     |     |     |     |     |     |      |   |     |     |     |     |     |     |     |   |     |     |     |     |      |     |     |   |           |           |           |         |         |         |         |         |   |           |           |           |         |         |         |         |         |   |           |           |           |         |         |         |         |         |      |                  |      |   |     |   |      |   |         |   |         |   |         |   |     |      |                  |                  |                  |      |   |     |      |     |   |      |     |     |   |         |           |           |   |         |           |           |   |         |         |           |   |     |      |      |
|                  | W                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 1.25                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 1.0              | 0.6     |         |         |         |         |   |     |     |     |   |     |      |     |   |         |         |         |         |   |         |         |         |         |   |         |         |         |         |      |     |     |     |     |     |     |     |     |      |   |     |     |     |     |     |     |     |   |     |     |     |     |      |     |     |   |           |           |           |         |         |         |         |         |   |           |           |           |         |         |         |         |         |   |           |           |           |         |         |         |         |         |      |                  |      |   |     |   |      |   |         |   |         |   |         |   |     |      |                  |                  |                  |      |   |     |      |     |   |      |     |     |   |         |           |           |   |         |           |           |   |         |         |           |   |     |      |      |
| a                | 0.5~0.6                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 0.35~0.45                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 0.25~0.35        |         |         |         |         |         |   |     |     |     |   |     |      |     |   |         |         |         |         |   |         |         |         |         |   |         |         |         |         |      |     |     |     |     |     |     |     |     |      |   |     |     |     |     |     |     |     |   |     |     |     |     |      |     |     |   |           |           |           |         |         |         |         |         |   |           |           |           |         |         |         |         |         |   |           |           |           |         |         |         |         |         |      |                  |      |   |     |   |      |   |         |   |         |   |         |   |     |      |                  |                  |                  |      |   |     |      |     |   |      |     |     |   |         |           |           |   |         |           |           |   |         |         |           |   |     |      |      |
| b                | 0.5~0.6                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             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                                                                                                                                                                                                                                                                                                                                                                                                              | 0.15~0.25        |         |         |         |         |         |   |     |     |     |   |     |      |     |   |         |         |         |         |   |         |         |         |         |   |         |         |         |         |      |     |     |     |     |     |     |     |     |      |   |     |     |     |     |     |     |     |   |     |     |     |     |      |     |     |   |           |           |           |         |         |         |         |         |   |           |           |           |         |         |         |         |         |   |           |           |           |         |         |         |         |         |      |                  |      |   |     |   |      |   |         |   |         |   |         |   |     |      |                  |                  |                  |      |   |     |      |     |   |      |     |     |   |         |           |           |   |         |           |           |   |         |         |           |   |     |      |      |
| c                | 0.5~0.6                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 0.3~0.4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 0.15~0.25        |         |         |         |         |         |   |     |     |     |   |     |      |     |   |         |         |         |         |   |         |         |         |         |   |         |         |         |         |      |     |     |     |     |     |     |     |     |      |   |     |     |     |     |     |     |     |   |     |     |     |     |      |     |     |   |           |           |           |         |         |         |         |         |   |           |           |           |         |         |         |         |         |   |           |     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| d                | 1.0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 0.64                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              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## Precautions on the use of Multilayer Ceramic Capacitors

| Stages                                                      | Precautions                                                                           | Technical considerations                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |         |      |     |     |      |   |      |     |      |   |     |     |     |   |           |          |         |   |          |         |         |   |         |         |         |       |                 |             |                                             |                                                                                     |                                                                                     |                                          |                                                                                     |                                                                                     |                                                             |                                                                                      |                                                                                      |                                |                                                                                       |                                                                                       |  |                 |             |                         |                                                                                      |                                                                                       |
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| 2.PCB Design                                                |                                                                                       | <p>LWDC Recommended land dimensions for reflow-soldering</p> <div></div> <table><tr><th>Type</th><th>105</th><th>107</th><th>212</th></tr><tr><td rowspan="2">Size</td><td>L</td><td>0.52</td><td>0.8</td><td>1.25</td></tr><tr><td>W</td><td>1.0</td><td>1.6</td><td>2.0</td></tr><tr><td>A</td><td>0.18~0.22</td><td>0.25~0.3</td><td>0.5~0.7</td></tr><tr><td>B</td><td>0.2~0.25</td><td>0.3~0.4</td><td>0.4~0.5</td></tr><tr><td>C</td><td>0.9~1.1</td><td>1.5~1.7</td><td>1.9~2.1</td></tr></table> <p>(unit: mm)</p> <p>(2) Examples of good and bad solder application</p> <table><tr><th>Items</th><th>Not recommended</th><th>Recommended</th></tr><tr><td>Mixed mounting of SMD and leaded components</td><td></td><td></td></tr><tr><td>Component placement close to the chassis</td><td></td><td></td></tr><tr><td>Hand-soldering of leaded components near mounted components</td><td></td><td></td></tr><tr><td>Horizontal component placement</td><td></td><td></td></tr></table> <p>1-1. The following are examples of good and bad capacitor layout; SMD capacitors should be located to minimize any possible mechanical stresses from board warp or deflection.</p> <table><tr><th></th><th>Not recommended</th><th>Recommended</th></tr><tr><td>Deflection of the board</td><td></td><td></td></tr></table> <p>1-2. To layout the capacitors for the breakaway PC board, it should be noted that the amount of mechanical stresses given will vary depending on capacitor layout. The example below shows recommendations for better design.</p> <div></div> <p>1-3. When breaking PC boards along their perforations, the amount of mechanical stress on the capacitors can vary according to the method used. The following methods are listed in order from least stressful to most stressful: push-back, slit, V-grooving, and perforation. Thus, any ideal SMD capacitor layout must also consider the PCB splitting procedure.</p> | Type    | 105  | 107 | 212 | Size | L | 0.52 | 0.8 | 1.25 | W | 1.0 | 1.6 | 2.0 | A | 0.18~0.22 | 0.25~0.3 | 0.5~0.7 | B | 0.2~0.25 | 0.3~0.4 | 0.4~0.5 | C | 0.9~1.1 | 1.5~1.7 | 1.9~2.1 | Items | Not recommended | Recommended | Mixed mounting of SMD and leaded components |  |  | Component placement close to the chassis |  |  | Hand-soldering of leaded components near mounted components |  |  | Horizontal component placement |  |  |  | Not recommended | Recommended | Deflection of the board |  |  |
|                                                             | Type                                                                                  | 105                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 107     | 212  |     |     |      |   |      |     |      |   |     |     |     |   |           |          |         |   |          |         |         |   |         |         |         |       |                 |             |                                             |                                                                                     |                                                                                     |                                          |                                                                                     |                                                                                     |                                                             |                                                                                      |                                                                                      |                                |                                                                                       |                                                                                       |  |                 |             |                         |                                                                                      |                                                                                       |
| Size                                                        | L                                                                                     | 0.52                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 0.8     | 1.25 |     |     |      |   |      |     |      |   |     |     |     |   |           |          |         |   |          |         |         |   |         |         |         |       |                 |             |                                             |                                                                                     |                                                                                     |                                          |                                                                                     |                                                                                     |                                                             |                                                                                      |                                                                                      |                                |                                                                                       |                                                                                       |  |                 |             |                         |                                                                                      |                                                                                       |
|                                                             | W                                                                                     | 1.0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 1.6     | 2.0  |     |     |      |   |      |     |      |   |     |     |     |   |           |          |         |   |          |         |         |   |         |         |         |       |                 |             |                                             |                                                                                     |                                                                                     |                                          |                                                                                     |                                                                                     |                                                             |                                                                                      |                                                                                      |                                |                                                                                       |                                                                                       |  |                 |             |                         |                                                                                      |                                                                                       |
| A                                                           | 0.18~0.22                                                                             | 0.25~0.3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 0.5~0.7 |      |     |     |      |   |      |     |      |   |     |     |     |   |           |          |         |   |          |         |         |   |         |         |         |       |                 |             |                                             |                                                                                     |                                                                                     |                                          |                                                                                     |                                                                                     |                                                             |                                                                                      |                                                                                      |                                |                                                                                       |                                                                                       |  |                 |             |                         |                                                                                      |                                                                                       |
| B                                                           | 0.2~0.25                                                                              | 0.3~0.4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 0.4~0.5 |      |     |     |      |   |      |     |      |   |     |     |     |   |           |          |         |   |          |         |         |   |         |         |         |       |                 |             |                                             |                                                                                     |                                                                                     |                                          |                                                                                     |                                                                                     |                                                             |                                                                                      |                                                                                      |                                |                                                                                       |                                                                                       |  |                 |             |                         |                                                                                      |                                                                                       |
| C                                                           | 0.9~1.1                                                                               | 1.5~1.7                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 1.9~2.1 |      |     |     |      |   |      |     |      |   |     |     |     |   |           |          |         |   |          |         |         |   |         |         |         |       |                 |             |                                             |                                                                                     |                                                                                     |                                          |                                                                                     |                                                                                     |                                                             |                                                                                      |                                                                                      |                                |                                                                                       |                                                                                       |  |                 |             |                         |                                                                                      |                                                                                       |
| Items                                                       | Not recommended                                                                       | Recommended                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |         |      |     |     |      |   |      |     |      |   |     |     |     |   |           |          |         |   |          |         |         |   |         |         |         |       |                 |             |                                             |                                                                                     |                                                                                     |                                          |                                                                                     |                                                                                     |                                                             |                                                                                      |                                                                                      |                                |                                                                                       |                                                                                       |  |                 |             |                         |                                                                                      |                                                                                       |
| Mixed mounting of SMD and leaded components                 |    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |         |      |     |     |      |   |      |     |      |   |     |     |     |   |           |          |         |   |          |         |         |   |         |         |         |       |                 |             |                                             |                                                                                     |                                                                                     |                                          |                                                                                     |                                                                                     |                                                             |                                                                                      |                                                                                      |                                |                                                                                       |                                                                                       |  |                 |             |                         |                                                                                      |                                                                                       |
| Component placement close to the chassis                    |    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |         |      |     |     |      |   |      |     |      |   |     |     |     |   |           |          |         |   |          |         |         |   |         |         |         |       |                 |             |                                             |                                                                                     |                                                                                     |                                          |                                                                                     |                                                                                     |                                                             |                                                                                      |                                                                                      |                                |                                                                                       |                                                                                       |  |                 |             |                         |                                                                                      |                                                                                       |
| Hand-soldering of leaded components near mounted components |   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |         |      |     |     |      |   |      |     |      |   |     |     |     |   |           |          |         |   |          |         |         |   |         |         |         |       |                 |             |                                             |                                                                                     |                                                                                     |                                          |                                                                                     |                                                                                     |                                                             |                                                                                      |                                                                                      |                                |                                                                                       |                                                                                       |  |                 |             |                         |                                                                                      |                                                                                       |
| Horizontal component placement                              |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |         |      |     |     |      |   |      |     |      |   |     |     |     |   |           |          |         |   |          |         |         |   |         |         |         |       |                 |             |                                             |                                                                                     |                                                                                     |                                          |                                                                                     |                                                                                     |                                                             |                                                                                      |                                                                                      |                                |                                                                                       |                                                                                       |  |                 |             |                         |                                                                                      |                                                                                       |
|                                                             | Not recommended                                                                       | Recommended                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |         |      |     |     |      |   |      |     |      |   |     |     |     |   |           |          |         |   |          |         |         |   |         |         |         |       |                 |             |                                             |                                                                                     |                                                                                     |                                          |                                                                                     |                                                                                     |                                                             |                                                                                      |                                                                                      |                                |                                                                                       |                                                                                       |  |                 |             |                         |                                                                                      |                                                                                       |
| Deflection of the board                                     |   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |         |      |     |     |      |   |      |     |      |   |     |     |     |   |           |          |         |   |          |         |         |   |         |         |         |       |                 |             |                                             |                                                                                     |                                                                                     |                                          |                                                                                     |                                                                                     |                                                             |                                                                                      |                                                                                      |                                |                                                                                       |                                                                                       |  |                 |             |                         |                                                                                      |                                                                                       |

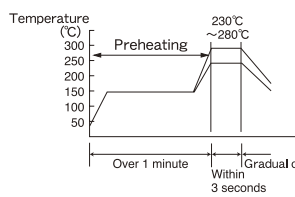
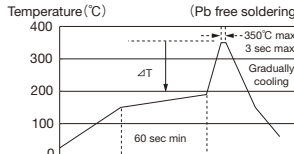
## Precautions on the use of Multilayer Ceramic Capacitors

| Stages                                    | Precautions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                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| 3.Considerations for auto-matic placement | <p>Adjustment of mounting machine</p> <p>1. Excessive impact load should not be imposed on the capacitors when mounting onto the PC boards.</p> <p>2. The maintenance and inspection of the mounters should be conducted periodically.</p><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br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## Precautions on the use of Multilayer Ceramic Capacitors

| Stages       | Precautions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Technical considerations                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
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| 4. Soldering | <p><b>Selection of Flux</b></p> <p>1. Since flux may have a significant effect on the performance of capacitors, it is necessary to verify the following conditions prior to use;</p> <p>(1) Flux used should be with less than or equal to 0.1 wt% (equivalent to chlorine) of halogenated content. Flux having a strong acidity content should not be applied.</p> <p>(2) When soldering capacitors on the board, the amount of flux applied should be controlled at the optimum level.</p> <p>(3) When using water-soluble flux, special care should be taken to properly clean the boards.</p> <p><b>Soldering</b></p> <p>Temperature, time, amount of solder, etc. are specified in accordance with the following recommended conditions.</p> <p><b>Sn-Zn solder paste can affect MLCC reliability performance. Please contact us prior to usage.</b></p> | <p>1-1. When too much halogenated substance (Chlorine, etc.) content is used to activate the flux, or highly acidic flux is used, an excessive amount of residue after soldering may lead to corrosion of the terminal electrodes or degradation of insulation resistance on the surface of the capacitors.</p> <p>1-2. Flux is used to increase solderability in flow soldering, but if too much is applied, a large amount of flux gas may be emitted and may detrimentally affect solderability. To minimize the amount of flux applied, it is recommended to use a flux-bubbling system.</p> <p>1-3. Since the residue of water-soluble flux is easily dissolved by water content in the air, the residue on the surface of capacitors in high humidity conditions may cause a degradation of insulation resistance and therefore affect the reliability of the components. The cleaning methods and the capability of the machines used should also be considered carefully when selecting water-soluble flux.</p> <p><b>1-1. Preheating when soldering</b></p> <p>Heating: Ceramic chip components should be preheated to within 100 to 130°C of the soldering.</p> <p>Cooling: The temperature difference between the components and cleaning process should not be greater than 100°C.</p> <p>Ceramic chip capacitors are susceptible to thermal shock when exposed to rapid or concentrated heating or rapid cooling. Therefore, the soldering process must be conducted with great care so as to prevent malfunction of the components due to excessive thermal shock.</p> <p><b>Recommended conditions for soldering</b></p> <p>[Reflow soldering]</p> <p><b>Temperature profile</b></p> <p>※ Ceramic chip components should be preheated to within 100 to 130°C of the soldering.<br/>※ Assured to be reflow soldering for 2 times.</p> <p><b>Caution</b></p> <p>1. The ideal condition is to have solder mass (fillet) controlled to <math>1/2</math> to <math>1/3</math> of the thickness of the capacitor, as shown below:</p> <p>2. Because excessive dwell times can detrimentally affect solderability, soldering duration should be kept as close to recommended times as possible.</p> <p>[Wave soldering]</p> <p><b>Temperature profile</b></p> <p>※ Ceramic chip components should be preheated to within 100 to 130°C of the soldering.<br/>※ Assured to be wave soldering for 1 time.<br/>※ Except for reflow soldering type.</p> <p><b>Caution</b></p> <p>1. Make sure the capacitors are preheated sufficiently.</p> <p>2. The temperature difference between the capacitor and melted solder should not be greater than 100 to 130°C</p> <p>3. Cooling after soldering should be as gradual as possible.</p> <p>4. Wave soldering must not be applied to the capacitors designated as for reflow soldering only.</p> |

## Precautions on the use of Multilayer Ceramic Capacitors

| Stages                    | Precautions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Technical considerations                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                   |               |                      |              |                           |                |
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| 4. Soldering              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <p>[Hand soldering]</p> <p>Temperature profile</p> <div></div> <div></div> <p>(Pb free soldering)</p> <p>Temperature (°C)</p> <p>400<br/>300<br/>200<br/>100<br/>0</p> <p>60 sec min</p> <p>3 sec max</p> <p>Gradually cooling</p> <p>(※ <math>\Delta T \leq 190^\circ\text{C}</math> (3216Type max), <math>\Delta T \leq 130^\circ\text{C}</math> (3225Type min))<br/>※ It is recommended to use 20W soldering iron and the tip is 1φ or less.<br/>※ The soldering iron should not directly touch the components.<br/>※ Assured to be soldering iron for 1 time.</p> <p>Note: The above profiles are the maximum allowable soldering condition, therefore these profiles are not always recommended.</p> <p>Caution</p> <ol style="list-style-type: none"><li>1. Use a 20W soldering iron with a maximum tip diameter of 1.0 mm.</li><li>2. The soldering iron should not directly touch the capacitor.</li></ol> |                   |               |                      |              |                           |                |
| 5.Cleaning                | <p>Cleaning conditions</p> <ol style="list-style-type: none"><li>1. When cleaning the PC board after the capacitors are all mounted, select the appropriate cleaning solution according to the type of flux used and purpose of the cleaning (e.g. to remove soldering flux or other materials from the production process.)</li><li>2. Cleaning conditions should be determined after verifying, through a test run, that the cleaning process does not affect the capacitor's characteristics.</li></ol>                                                                                                                                                                                                                                                                                                                                                | <ol style="list-style-type: none"><li>1. The use of inappropriate solutions can cause foreign substances such as flux residue to adhere to the capacitor or deteriorate the capacitor's outer coating, resulting in a degradation of the capacitor's electrical properties (especially insulation resistance).</li><li>2. Inappropriate cleaning conditions (insufficient or excessive cleaning) may detrimentally affect the performance of the capacitors.</li></ol> <p>(1) Excessive cleaning</p> <p>In the case of ultrasonic cleaning, too much power output can cause excessive vibration of the PC board which may lead to the cracking of the capacitor or the soldered portion, or decrease the terminal electrodes' strength. Thus the following conditions should be carefully checked;</p> <table><tr><td>Ultrasonic output</td><td>Below 20 W/ ℓ</td></tr><tr><td>Ultrasonic frequency</td><td>Below 40 kHz</td></tr><tr><td>Ultrasonic washing period</td><td>5 min. or less</td></tr></table>                                                                            | Ultrasonic output | Below 20 W/ ℓ | Ultrasonic frequency | Below 40 kHz | Ultrasonic washing period | 5 min. or less |
| Ultrasonic output         | Below 20 W/ ℓ                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                   |               |                      |              |                           |                |
| Ultrasonic frequency      | Below 40 kHz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                   |               |                      |              |                           |                |
| Ultrasonic washing period | 5 min. or less                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                   |               |                      |              |                           |                |
| 6.Post cleaning processes | <ol style="list-style-type: none"><li>1. With some type of resins a decomposition gas or chemical reaction vapor may remain inside the resin during the hardening period or while left under normal storage conditions resulting in the deterioration of the capacitor's performance.</li><li>2. When a resin's hardening temperature is higher than the capacitor's operating temperature, the stresses generated by the excess heat may lead to capacitor damage or destruction. The use of such resins, molding materials etc. is not recommended.</li></ol>                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                   |               |                      |              |                           |                |
| 7.Handling                | <p>Breakaway PC boards (splitting along perforations)</p> <ol style="list-style-type: none"><li>1. When splitting the PC board after mounting capacitors and other components, care is required so as not to give any stresses of deflection or twisting to the board.</li><li>2. Board separation should not be done manually, but by using the appropriate devices.</li></ol> <p>Mechanical considerations</p> <ol style="list-style-type: none"><li>1. Be careful not to subject the capacitors to excessive mechanical shocks.<ol style="list-style-type: none"><li>(1) If ceramic capacitors are dropped onto the floor or a hard surface, they should not be used.</li><li>(2) When handling the mounted boards, be careful that the mounted components do not come in contact with or bump against other boards or components.</li></ol></li></ol> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                   |               |                      |              |                           |                |

## Precautions on the use of Multilayer Ceramic Capacitors

| Stages               | Precautions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Technical considerations                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 8.Storage conditions | <p>Storage</p> <ol style="list-style-type: none"> <li>To maintain the solderability of terminal electrodes and to keep the packaging material in good condition, care must be taken to control temperature and humidity in the storage area. Humidity should especially be kept as low as possible.</li> </ol> <ul style="list-style-type: none"> <li>Recommended conditions <ul style="list-style-type: none"> <li>Ambient temperature Below 30°C</li> <li>Humidity Below 70% RH</li> </ul> </li> </ul> <p>The ambient temperature must be kept below 40°C. Even under ideal storage conditions capacitor electrode solderability decreases as time passes, so should be used within 6 months from the time of delivery.</p> <ul style="list-style-type: none"> <li>Ceramic chip capacitors should be kept where no chlorine or sulfur exists in the air.</li> </ul> <ol style="list-style-type: none"> <li>The capacitance value of high dielectric constant capacitors (type 2 &amp; 3) will gradually decrease with the passage of time, so this should be taken into consideration in the circuit design. If such a capacitance reduction occurs, a heat treatment of 150°C for 1hour will return the capacitance to its initial level.</li> </ol> | <ol style="list-style-type: none"> <li>If the parts are stored in a high temperature and humidity environment, problems such as reduced solderability caused by oxidation of terminal electrodes and deterioration of taping/packaging materials may take place. For this reason, components should be used within 6 months from the time of delivery. If exceeding the above period, please check solderability before using the capacitors.</li> </ol> |