

# 1 Characteristics

**Table 1. Absolute maximum ratings ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ )**

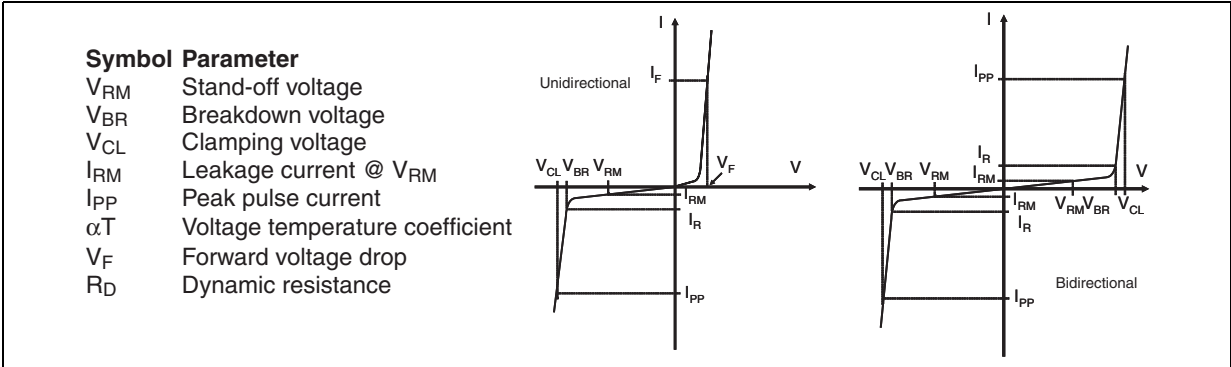
| Symbol    | Parameter                                                                | Value       | Unit               |
|-----------|--------------------------------------------------------------------------|-------------|--------------------|
| $P_{PP}$  | Peak pulse power dissipation <sup>(1)</sup><br>$T_j$ initial = $T_{amb}$ | 1500        | W                  |
| $T_{stg}$ | Storage temperature range                                                | -65 to +150 | $^{\circ}\text{C}$ |
| $T_j$     | Operating junction temperature range                                     | -55 to +150 | $^{\circ}\text{C}$ |
| $T_L$     | Maximum lead temperature for soldering during 10 s.                      | 260         | $^{\circ}\text{C}$ |

1. For a surge greater than the maximum values, the diode will fail in short-circuit.

**Table 2. Thermal resistances**

| Symbol        | Parameter                                                        | Value | Unit                 |
|---------------|------------------------------------------------------------------|-------|----------------------|
| $R_{th(j-l)}$ | Junction to leads                                                | 15    | $^{\circ}\text{C/W}$ |
| $R_{th(j-a)}$ | Junction to ambient on printed circuit on recommended pad layout | 90    | $^{\circ}\text{C/W}$ |

**Figure 1. Electrical characteristics - definitions**



**Figure 2. Pulse definition for electrical characteristics**

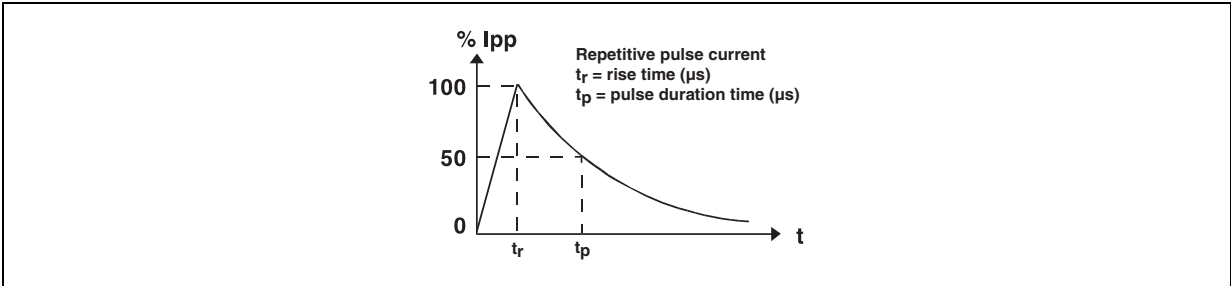


Table 3. Electrical characteristics - parameter values ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ )

| Order code  | $I_{RM} \text{ max@}V_{RM}$ |                       |     | $V_{BR} \text{ @}I_R^{(1)}$ |      |    | $V_{CL} \text{ @}I_{PP}$<br>10/1000 $\mu\text{s}$ |                  | $R_D^{(2)}$<br>10/1000 $\mu\text{s}$ | $V_{CL} \text{ @}I_{PP}$<br>8/20 $\mu\text{s}$ |                  | $R_D^{(2)}$<br>8/20 $\mu\text{s}$ | $\alpha T^{(3)}$         |
|-------------|-----------------------------|-----------------------|-----|-----------------------------|------|----|---------------------------------------------------|------------------|--------------------------------------|------------------------------------------------|------------------|-----------------------------------|--------------------------|
|             | 25 $^{\circ}\text{C}$       | 85 $^{\circ}\text{C}$ |     | min                         | typ  |    | max                                               |                  |                                      | max                                            |                  |                                   | max                      |
|             | $\mu\text{A}$               |                       | V   | V                           |      | mA | V                                                 | A <sup>(4)</sup> | $\Omega$                             | V                                              | A <sup>(4)</sup> | m $\Omega$                        | 10-4/ $^{\circ}\text{C}$ |
| SMCJ5.0A/CA | 500                         | 2000                  | 5.0 | 6.4                         | 6.74 | 10 | 9.2                                               | 171              | 0.012                                | 13.4                                           | 746              | 8.5                               | 5.7                      |
| SMCJ6.0A/CA | 500                         | 2000                  | 6.0 | 6.7                         | 7.05 | 10 | 10.3                                              | 152              | 0.019                                | 13.7                                           | 730              | 8.6                               | 5.9                      |
| SMCJ6.5A/CA | 250                         | 1000                  | 6.5 | 7.2                         | 7.58 | 10 | 11.2                                              | 140              | 0.023                                | 14.5                                           | 690              | 9.5                               | 6.1                      |
| SMCJ8.5A/CA | 10                          | 50                    | 8.5 | 9.4                         | 9.9  | 1  | 14.4                                              | 105              | 0.038                                | 19.5                                           | 512              | 18                                | 7.3                      |
| SMCJ10A/CA  | 0.2                         | 1                     | 10  | 11.1                        | 11.7 | 1  | 17                                                | 92               | 0.051                                | 21.7                                           | 461              | 20                                | 7.8                      |
| SMCJ12A/CA  | 0.2                         | 1                     | 12  | 13.3                        | 14   | 1  | 19.9                                              | 79               | 0.066                                | 25.3                                           | 394              | 27                                | 8.3                      |
| SMCJ13A/CA  | 0.2                         | 1                     | 13  | 14.4                        | 15.2 | 1  | 21.5                                              | 73               | 0.076                                | 27.2                                           | 368              | 31                                | 8.4                      |
| SMCJ15A/CA  | 0.2                         | 1                     | 15  | 16.7                        | 17.6 | 1  | 24.4                                              | 64               | 0.092                                | 32.5                                           | 308              | 46                                | 8.8                      |
| SMCJ18A/CA  | 0.2                         | 1                     | 18  | 20.0                        | 21.1 | 1  | 29.2                                              | 53               | 0.133                                | 39.3                                           | 254              | 68                                | 9.2                      |
| SMCJ20A/CA  | 0.2                         | 1                     | 20  | 22.2                        | 23.4 | 1  | 32.4                                              | 48               | 0.163                                | 42.8                                           | 234              | 78                                | 9.4                      |
| SMCJ22A/CA  | 0.2                         | 1                     | 22  | 24.4                        | 25.7 | 1  | 35.5                                              | 44               | 0.194                                | 48.3                                           | 207              | 103                               | 9.6                      |
| SMCJ24A/CA  | 0.2                         | 1                     | 24  | 26.7                        | 28.1 | 1  | 38.9                                              | 40               | 0.235                                | 50                                             | 200              | 102                               | 9.6                      |
| SMCJ26A/CA  | 0.2                         | 1                     | 26  | 28.9                        | 30.4 | 1  | 42.1                                              | 37               | 0.275                                | 53.5                                           | 187              | 115                               | 9.7                      |
| SMCJ28A/CA  | 0.2                         | 1                     | 28  | 31.1                        | 32.7 | 1  | 45.4                                              | 34               | 0.325                                | 59                                             | 169              | 146                               | 9.8                      |
| SMCJ30A/CA  | 0.2                         | 1                     | 30  | 33.3                        | 35.1 | 1  | 48.4                                              | 32               | 0.361                                | 64.3                                           | 156              | 176                               | 9.9                      |
| SMCJ33A/CA  | 0.2                         | 1                     | 33  | 36.7                        | 38.6 | 1  | 53.3                                              | 29               | 0.440                                | 69.7                                           | 143              | 204                               | 10.0                     |
| SMCJ40A/CA  | 0.2                         | 1                     | 40  | 44.4                        | 46.7 | 1  | 64.5                                              | 24               | 0.644                                | 84                                             | 119              | 294                               | 10.1                     |
| SMCJ48A/CA  | 0.2                         | 1                     | 48  | 53.3                        | 56.1 | 1  | 77.4                                              | 20               | 0.925                                | 100                                            | 100              | 411                               | 10.3                     |
| SMCJ58A/CA  | 0.2                         | 1                     | 58  | 64.4                        | 67.8 | 1  | 93.6                                              | 16               | 1.40                                 | 121                                            | 83               | 600                               | 10.4                     |
| SMCJ70A/CA  | 0.2                         | 1                     | 70  | 77.8                        | 81.9 | 1  | 113                                               | 13.9             | 1.94                                 | 146                                            | 69               | 870                               | 10.5                     |
| SMCJ85A/CA  | 0.2                         | 1                     | 85  | 94                          | 99   | 1  | 137                                               | 11.5             | 2.87                                 | 178                                            | 56               | 1322                              | 10.6                     |
| SMCJ100A/CA | 0.2                         | 1                     | 100 | 111                         | 117  | 1  | 162                                               | 9.7              | 4.04                                 | 212                                            | 47               | 1897                              | 10.7                     |
| SMCJ130A/CA | 0.2                         | 1                     | 130 | 144                         | 152  | 1  | 209                                               | 7.5              | 6.59                                 | 265                                            | 38               | 2774                              | 10.8                     |
| SMCJ154A/CA | 0.2                         | 1                     | 154 | 171                         | 180  | 1  | 246                                               | 6.1              | 9.34                                 | 317                                            | 31.5             | 4063                              | 10.8                     |
| SMCJ170A/CA | 0.2                         | 1                     | 170 | 189                         | 199  | 1  | 275                                               | 5.7              | 11.6                                 | 353                                            | 28               | 5145                              | 10.8                     |
| SMCJ188A/CA | 0.2                         | 1                     | 188 | 209                         | 220  | 1  | 328                                               | 4.6              | 21.1                                 | 388                                            | 26               | 6038                              | 10.8                     |

1. Pulse test :  $t_p < 50\text{ ms}$
2. To calculate maximum clamping voltage at other surge level, use the following formula:  $V_{CLmax} = V_{CL} - R_D \times (I_{PP} - I_{PPappli})$   
where  $I_{PPappli}$  is the surge current in the application
3. To calculate  $V_{BR}$  or  $V_{CL}$  versus junction temperature, use the following formulas:  
 $V_{BR} \text{ @ } T_J = V_{BR} \text{ @ } 25^{\circ}\text{C} \times (1 + \alpha T \times (T_J - 25))$   
 $V_{CL} \text{ @ } T_J = V_{CL} \text{ @ } 25^{\circ}\text{C} \times (1 + \alpha T \times (T_J - 25))$
4. Surge capability given for both directions for unidirectional and bidirectional types.

Figure 3. Peak pulse power dissipation versus initial junction temperature

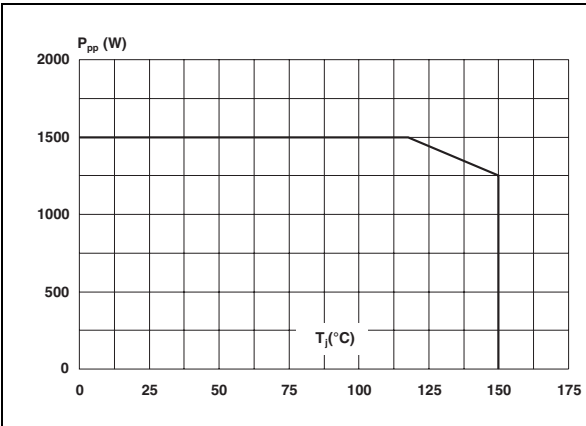


Figure 4. Peak pulse power versus exponential pulse duration ( $T_j$  initial = 25 °C)

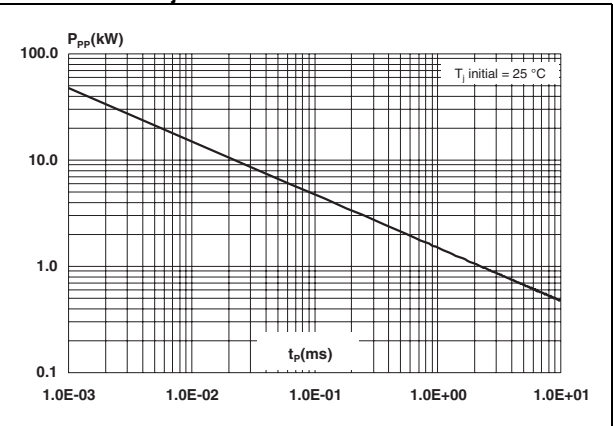
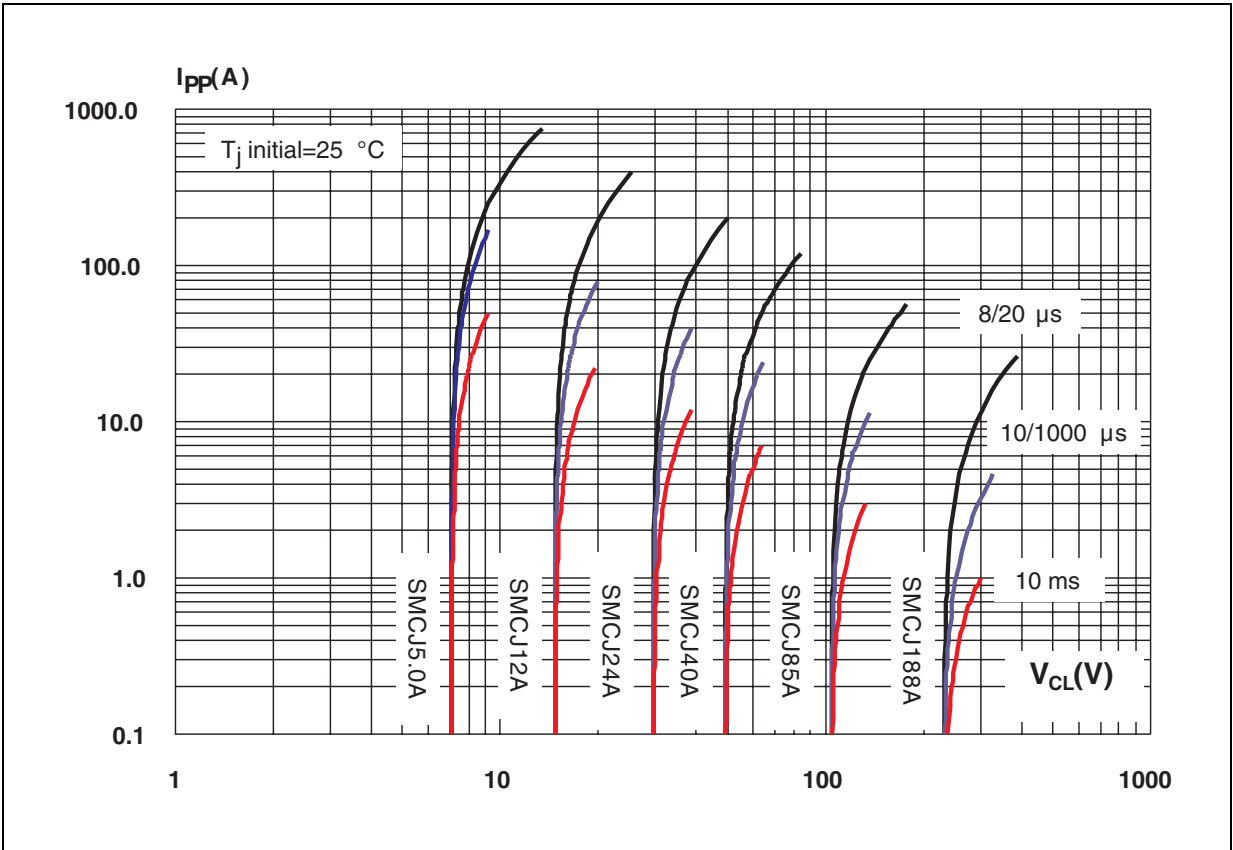
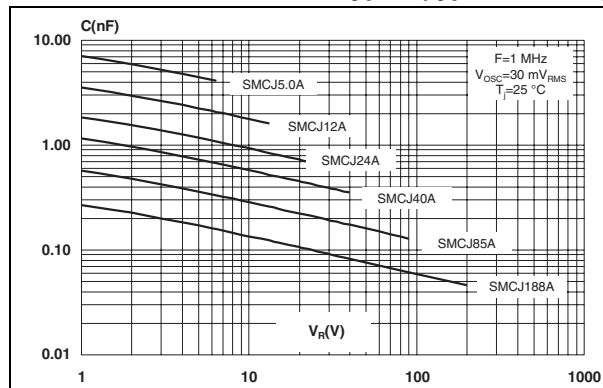


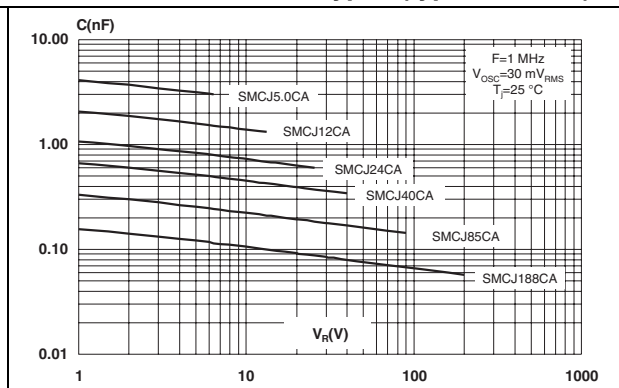
Figure 5. Clamping voltage versus peak pulse current (exponential waveform, maximum values)



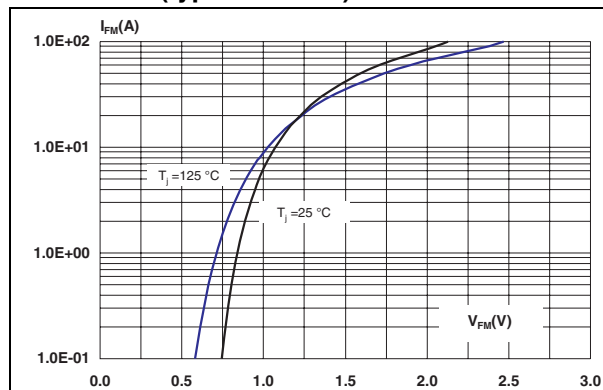
**Figure 6. Junction capacitance versus reverse applied voltage for unidirectional types (typical values)**



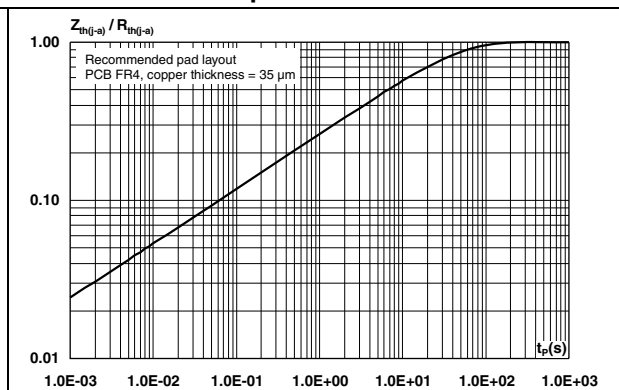
**Figure 7. Junction capacitance versus reverse applied voltage for bidirectional types (typical values)**



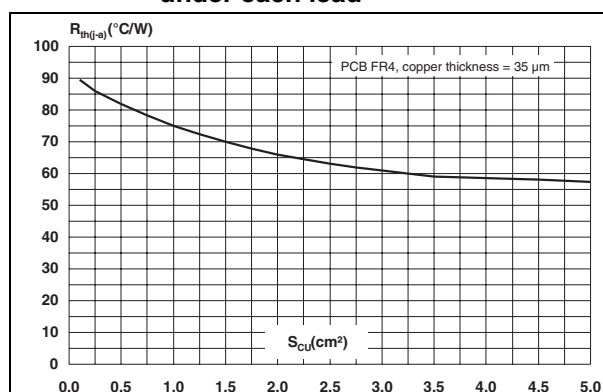
**Figure 8. Peak forward voltage drop versus peak forward current (typical values)**



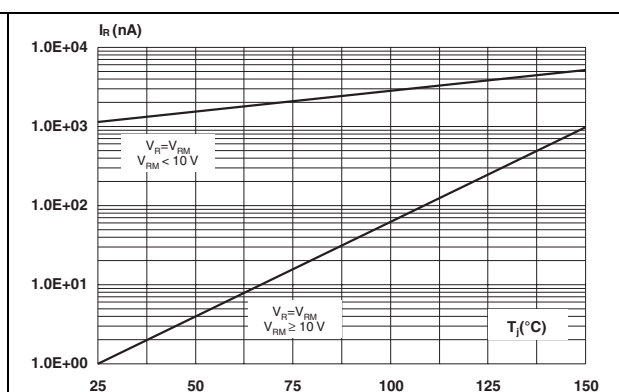
**Figure 9. Relative variation of thermal impedance, junction to ambient, versus pulse duration**



**Figure 10. Thermal resistance junction to ambient versus copper surface under each lead**

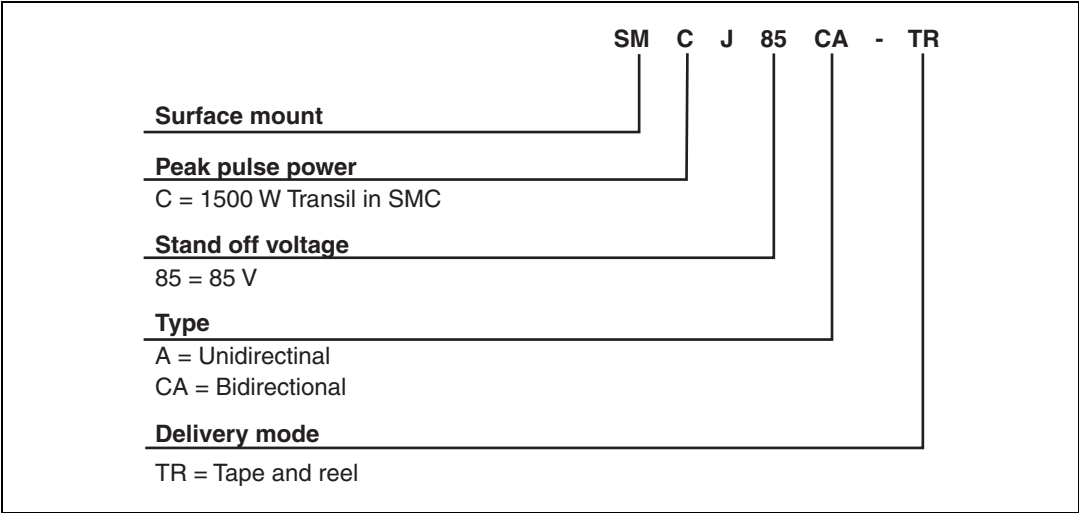


**Figure 11. Leakage current versus junction temperature (typical values)**



## 2 Ordering information scheme

Figure 12. Ordering information scheme



### 3 Package information

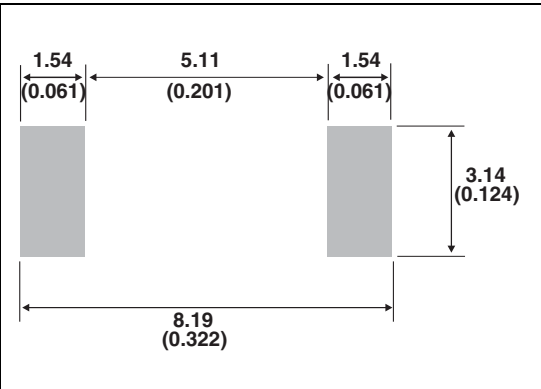
- Case: JEDEC DO-214AB molded plastic over planar junction
- Terminals: solder plated, solderable per MIL-STD-750, Method 2026
- Polarity: for unidirectional types the band indicates cathode
- Flammability: epoxy is rated UL94V-0
- RoHS package

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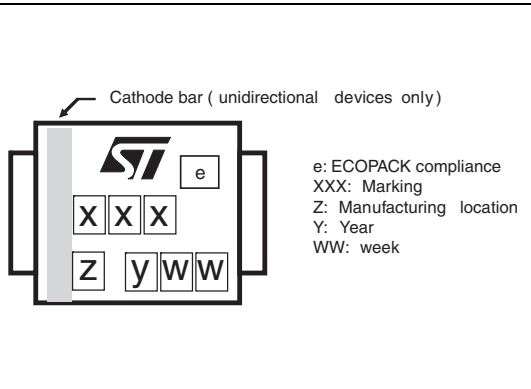
**Table 4. SMC dimensions**

| Ref. | dimensions  |      |        |       |
|------|-------------|------|--------|-------|
|      | Millimeters |      | Inches |       |
|      | Min.        | Max. | Min.   | Max.  |
| A1   | 1.90        | 2.45 | 0.075  | 0.096 |
| A2   | 0.05        | 0.20 | 0.002  | 0.008 |
| b    | 2.90        | 3.2  | 0.114  | 0.126 |
| c    | 0.15        | 0.41 | 0.006  | 0.016 |
| E    | 7.75        | 8.15 | 0.305  | 0.321 |
| E1   | 6.60        | 7.15 | 0.260  | 0.281 |
| E2   | 4.40        | 4.70 | 0.173  | 0.185 |
| D    | 5.55        | 6.25 | 0.218  | 0.246 |
| L    | 0.75        | 1.60 | 0.030  | 0.063 |

**Figure 13. Footprint dimensions mm (inches)**



**Figure 14. Marking layout<sup>(1)</sup>**



1. Marking layout can vary according to assembly location.

Table 5. Marking

| Order code  | Marking | Order code   | Marking |
|-------------|---------|--------------|---------|
| SMCJ5.0A-TR | FUA     | SMCJ5.0CA-TR | FBA     |
| SMCJ6.0A-TR | FUB     | SMCJ6.0CA-TR | FBB     |
| SMCJ6.5A-TR | FUC     | SMCJ6.5CA-TR | FBC     |
| SMCJ8.5A-TR | FUD     | SMCJ8.5CA-TR | FBD     |
| SMCJ10A-TR  | FUF     | SMCJ10CA-TR  | FBF     |
| SMCJ12A-TR  | FUH     | SMCJ12CA-TR  | FBH     |
| SMCJ13A-TR  | FUI     | SMCJ13CA-TR  | FBI     |
| SMCJ15A-TR  | FUJ     | SMCJ15CA-TR  | FBJ     |
| SMCJ18A-TR  | FUL     | SMCJ18CA-TR  | FBL     |
| SMCJ20A-TR  | FUM     | SMCJ20CA-TR  | FBM     |
| SMCJ22A-TR  | FUN     | SMCJ22CA-TR  | FBN     |
| SMCJ24A-TR  | FUO     | SMCJ24CA-TR  | FBO     |
| SMCJ26A-TR  | FUP     | SMCJ26CA-TR  | FBP     |
| SMCJ28A-TR  | FUQ     | SMCJ28CA-TR  | FBQ     |
| SMCJ30A-TR  | FUR     | SMCJ30CA-TR  | FBR     |
| SMCJ33A-TR  | FUS     | SMCJ33CA-TR  | FBS     |
| SMCJ40A-TR  | FUU     | SMCJ40CA-TR  | FBU     |
| SMCJ48A-TR  | FUW     | SMCJ48CA-TR  | FBW     |
| SMCJ58A-TR  | FUZ     | SMCJ58CA-TR  | FBZ     |
| SMCJ70A-TR  | GUB     | SMCJ70CA-TR  | GBB     |
| SMCJ85A-TR  | GUE     | SMCJ85CA-TR  | GBE     |
| SMCJ100A-TR | GUG     | SMCJ100CA-TR | GBG     |
| SMCJ130A-TR | GUI     | SMCJ130CA-TR | GBI     |
| SMCJ154A-TR | GUL     | SMCJ154CA-TR | GBL     |
| SMCJ170A-TR | GUM     | SMCJ170CA-TR | GBM     |
| SMCJ188A-TR | GUN     | SMCJ188CA-TR | GBN     |

## 4 Ordering information

**Table 6. Ordering information**

| Order code                    | Marking                               | Package | Weight | Base qty | Delivery mode |
|-------------------------------|---------------------------------------|---------|--------|----------|---------------|
| SMCJxxxA/CA-TR <sup>(1)</sup> | See <a href="#">Table 5 on page 8</a> | SMC     | 0.25 g | 2500     | Tape and reel |

1. Where xxx is nominal value of  $V_{BR}$  and A or CA indicates unidirectional or bidirectional version. See [Table 3](#) for list of available devices and their order codes

## 5 Revision history

**Table 7. Document revision history**

| Date        | Revision | Changes                                                      |
|-------------|----------|--------------------------------------------------------------|
| August-1999 | 5A       | Previous update.                                             |
| 14-May-2009 | 6        | Reformatted to current standards. Updated ECOPACK statement. |
| 17-Sep-2009 | 7        | Document updated for low leakage current.                    |
| 12-Jul-2010 | 8        | Changed timescale in <a href="#">Figure 9</a> .              |

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