

**Absolute Maximum Ratings** ( $T_A = 25^\circ\text{C}$  Unless otherwise specified)

Stresses exceeding the absolute maximum ratings may damage the device. The device may not function or be operable above the recommended operating conditions and stressing the parts to these levels is not recommended. In addition, extended exposure to stresses above the recommended operating conditions may affect device reliability. The absolute maximum ratings are stress ratings only.

| Symbol             | Parameter   | Device | Value          | Units |
|--------------------|---|--------|----------------|-------|
| TOTAL DEVICE       |   |        |                |       |
| T <sub>STG</sub>   | Storage Temperature   | All    | -40 to +150    | °C    |
| T <sub>OPR</sub>   | Operating Temperature                                       | All    | -40 to +100    | °C    |
| T <sub>SOL</sub>   | Lead Solder Temperature                                     | All    | 260 for 10 sec | °C    |
| P <sub>D</sub>     | Total Device Power Dissipation<br>Derate Linearly From 25°C | All    | 250            | mW    |
|                    |   |        | 2.94           | mW/°C |
| EMITTER            |   |        |                |       |
| I <sub>F</sub>     | Continuous Forward Current                                  | All    | 60             | mA    |
| I <sub>F(pk)</sub> | Forward Current – Peak (1µs pulse, 300 pps)                 | All    | ±1.0           | A     |
| P <sub>D</sub>     | LED Power Dissipation<br>Derate Linearly From 25°C          | All    | 120            | mW    |
|                    |   |        | 1.41           | mW/°C |
| DETECTOR           |   |        |                |       |
| I <sub>C</sub>     | Continuous Collector Current                                | All    | 50             | mA    |
| P <sub>D</sub>     | Detector Power Dissipation<br>Derate linearity from 25°C    | All    | 150            | mW    |
|                    |   |        | 1.76           | mW/°C |

**Electrical Characteristics** ( $T_A = 25^\circ\text{C}$  Unless otherwise specified.)**Individual Component Characteristics**

| Symbol          | Parameter                                 | Test Conditions                         | Device                        | Min. | Typ.* | Max. | Unit |
|-----------------|---|---|-------------------------------|------|-------|------|------|
| <b>EMITTER</b>  |   |   |                               |      |       |      |      |
| $V_F$           | Input Forward Voltage                     | $I_F = \pm 10\text{mA}$                 | All                           |      | 1.17  | 1.5  | V    |
| $C_J$           | Capacitance                               | $V_F = 0\text{V}$ , $f = 1.0\text{MHz}$ | All                           |      | 80    |      | pF   |
| <b>DETECTOR</b> |   |   |                               |      |       |      |      |
| $BV_{CEO}$      | Breakdown Voltage<br>Collector to Emitter | $I_C = 1.0\text{mA}$ , $I_F = 0$        | All                           | 30   | 100   |      | V    |
| $BV_{CBO}$      | Collector to Base                         | $I_C = 100\mu\text{A}$ , $I_F = 0$      | All                           | 70   | 120   |      | V    |
| $BV_{EBO}$      | Emitter to Base                           | $I_E = 100\mu\text{A}$ , $I_F = 0$      | All                           | 5    | 10    |      | V    |
| $BV_{ECO}$      | Emitter to Collector                      | $I_E = 100\mu\text{A}$ , $I_F = 0$      | All                           | 7    | 10    |      | V    |
| $I_{CEO}$       | Leakage Current<br>Collector to Emitter   | $V_{CE} = 10\text{V}$ , $I_F = 0$       | H11AA1M<br>H11AA3M<br>H11AA4M |      | 1     | 50   | nA   |
|                 |   |   | H11AA2M                       |      | 1     | 200  |      |
| $C_{CE}$        | Capacitance Collector<br>to Emitter       | $V_{CE} = 0$ , $f = 1\text{MHz}$        | All                           |      | 10    |      | pF   |
| $C_{CB}$        | Collector to Base                         | $V_{CB} = 0$ , $f = 1\text{MHz}$        | All                           |      | 80    |      | pF   |
| $C_{EB}$        | Emitter to Base                           | $V_{EB} = 0$ , $f = 1\text{MHz}$        | All                           |      | 15    |      | pF   |

\*Typical values at  $T_A = 25^\circ\text{C}$ **Transfer Characteristics**

| Symbol        | Characteristics                                 | Test Conditions  | Device  | Min. | Typ.* | Max. | Units |
|---------------|---|--|---------|------|-------|------|-------|
| $CTR_{CE}$    | Current Transfer Ratio,<br>Collector to Emitter | $I_F = \pm 10\text{mA}$ , $V_{CE} = 10\text{V}$                | H11AA4M | 100  |       |      | %     |
|               |   |  | H11AA3M | 50   |       |      |       |
|               |   |  | H11AA1M | 20   |       |      |       |
|               |   |  | H11AA2M | 10   |       |      |       |
|               | Current Transfer Ratio,<br>Symmetry             | $I_F = \pm 10\text{mA}$ , $V_{CE} = 10\text{V}$<br>(Figure 11) | All     | .33  |       | 3.0  |       |
| $V_{CE(SAT)}$ | Saturation Voltage,<br>Collector to Emitter     | $I_F = \pm 10\text{mA}$ , $I_{CE} = 0.5\text{mA}$              | All     |      |       | .40  | V     |

**Isolation Characteristics**

| Symbol    | Characteristic                      | Test Conditions                        | Min.      | Typ.* | Max. | Units    |
|-----------|-------------------------------------|--|-----------|-------|------|----------|
| $C_{I-O}$ | Package Capacitance<br>Input/Output | $V_{I-O} = 0$ , $f = 1\text{MHz}$      |           | 0.7   |      | pF       |
| $V_{ISO}$ | Isolation Voltage                   | $f = 60\text{Hz}$ , $t = 1\text{sec.}$ | 7500      |       |      | Vac(pk)  |
| $R_{ISO}$ | Isolation Resistance                | $V_{I-O} = 500\text{VDC}$              | $10^{11}$ |       |      | $\Omega$ |

\*Typical values at  $T_A = 25^\circ\text{C}$

## Safety and Insulation Ratings

As per IEC 60747-5-2, this optocoupler is suitable for “safe electrical insulation” only within the safety limit data. Compliance with the safety ratings shall be ensured by means of protective circuits.

| Symbol     | Parameter   | Min.   | Typ.      | Max. | Unit       |
|------------|---|--------|-----------|------|------------|
|            | Installation Classifications per DIN VDE 0110/1.89 Table 1  |        |           |      |            |
|            | For Rated Main Voltage < 150Vrms  |        | I-IV      |      |            |
|            | For Rated Main voltage < 300Vrms  |        | I-IV      |      |            |
|            | Climatic Classification   |        | 55/100/21 |      |            |
|            | Pollution Degree (DIN VDE 0110/1.89)  |        | 2         |      |            |
| CTI        | Comparative Tracking Index  | 175    |           |      |            |
| $V_{PR}$   | Input to Output Test Voltage, Method b, $V_{IORM} \times 1.875 = V_{PR}$ , 100% Production Test with $t_m = 1$ sec, Partial Discharge < 5pC | 1594   |           |      | $V_{peak}$ |
|            | Input to Output Test Voltage, Method a, $V_{IORM} \times 1.5 = V_{PR}$ , Type and Sample Test with $t_m = 60$ sec, Partial Discharge < 5pC  | 1275   |           |      | $V_{peak}$ |
| $V_{IORM}$ | Max. Working Insulation Voltage   | 850    |           |      | $V_{peak}$ |
| $V_{IOTM}$ | Highest Allowable Over Voltage  | 6000   |           |      | $V_{peak}$ |
|            | External Creepage   | 7      |           |      | mm         |
|            | External Clearance  | 7      |           |      | mm         |
|            | Insulation Thickness  | 0.5    |           |      | mm         |
| RIO        | Insulation Resistance at $T_s$ , $V_{IO} = 500V$  | $10^9$ |           |      | $\Omega$   |

## Typical Performance Characteristics

Fig. 1 Input Voltage vs. Input Current

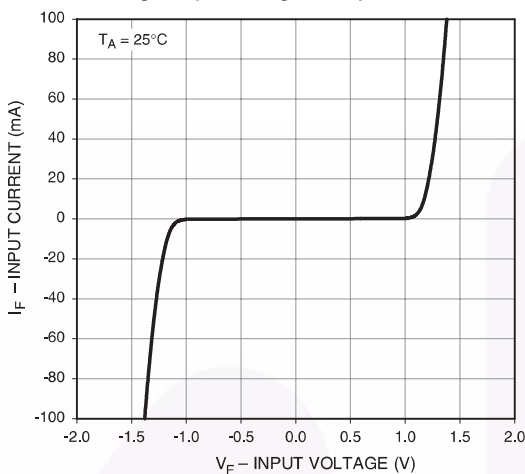


Fig. 2 Normalized CTR vs. Forward Current

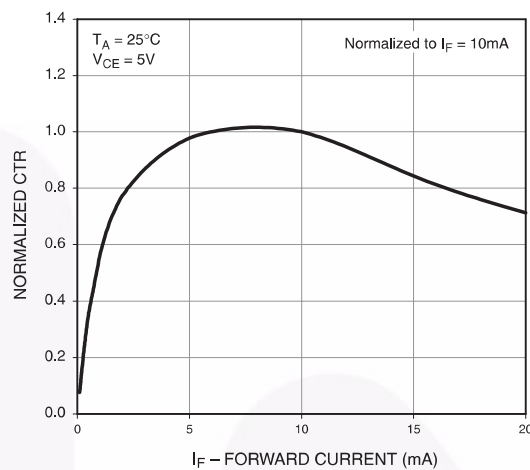


Fig. 3 Normalized CTR vs. Ambient Temperature

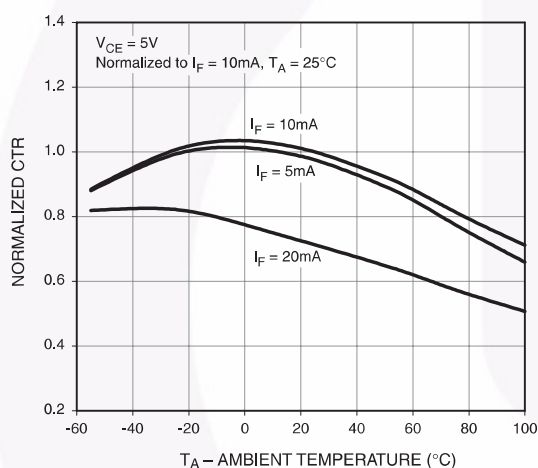


Fig. 4 CTR vs. RBE (Unsaturated)

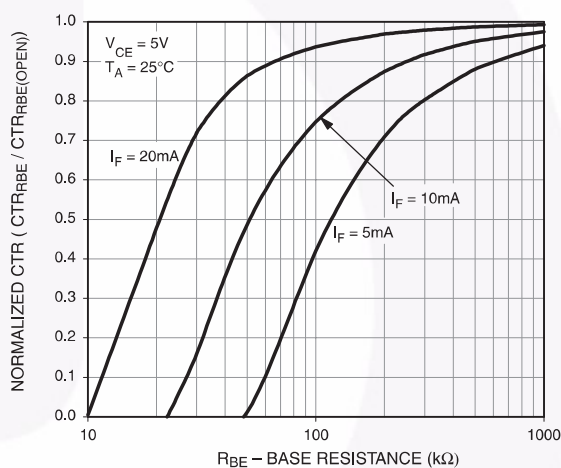


Fig. 5 CTR vs. RBE (Saturated)

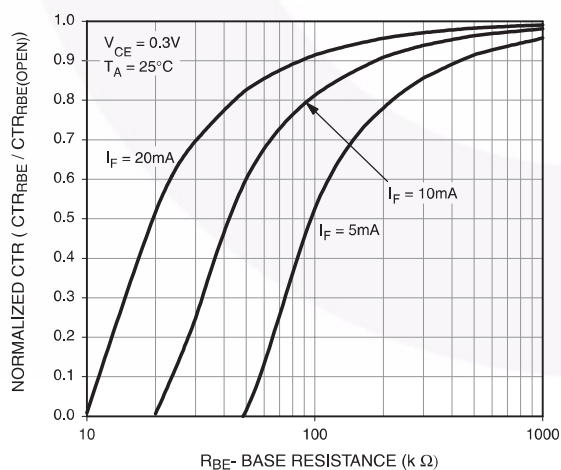
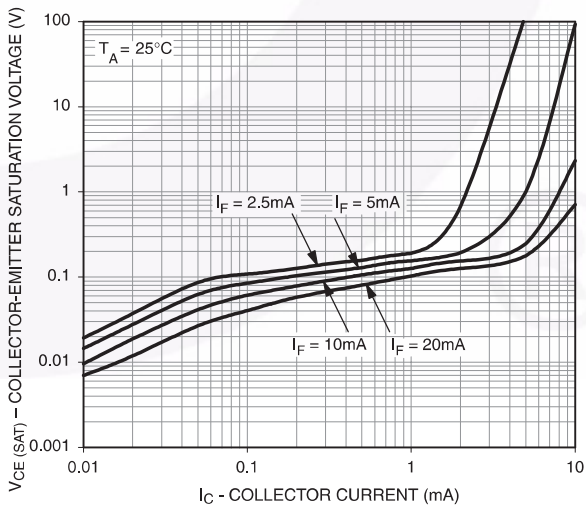


Fig. 6 Collector-Emitter Saturation Voltage vs. Collector Current



## Typical Performance Characteristics (Continued)

Fig. 7 Switching Speed vs. Load Resistor

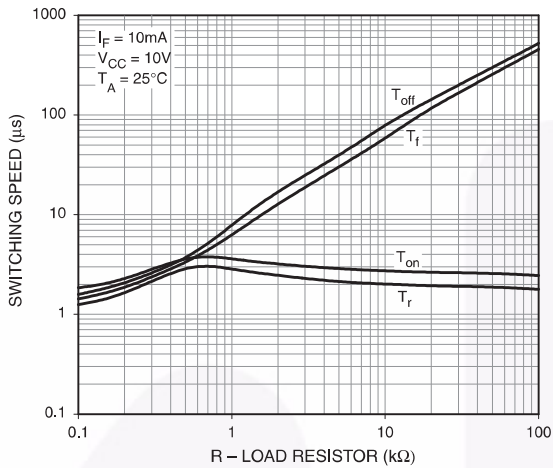


Fig. 8 Normalized  $t_{on}$  vs.  $R_{BE}$

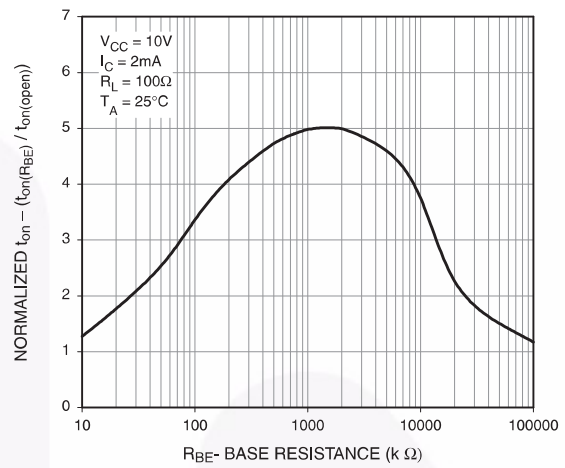


Fig. 9 Normalized  $t_{off}$  vs.  $R_{BE}$

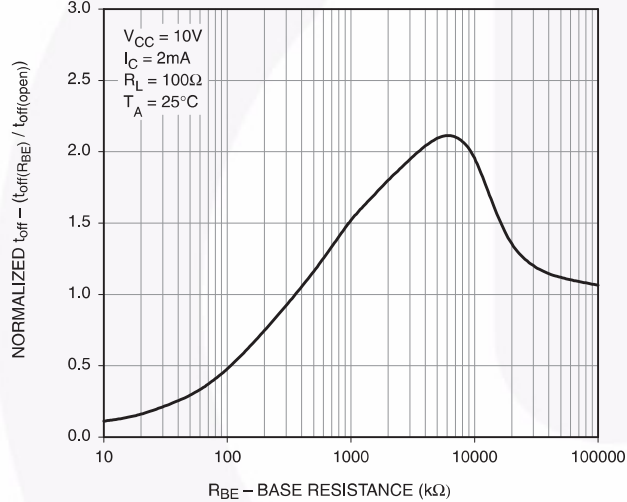


Fig. 10 Dark Current vs. Ambient Temperature

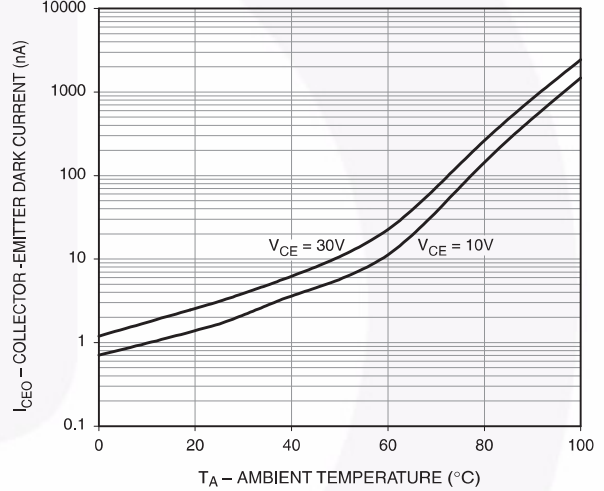
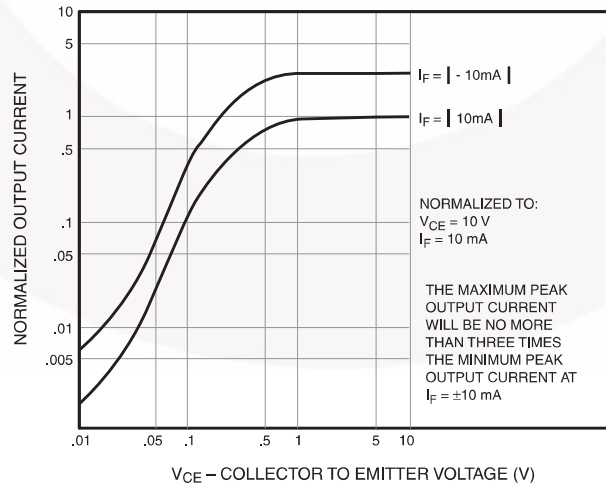
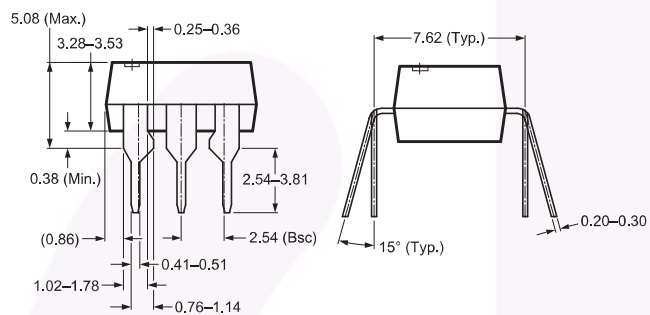
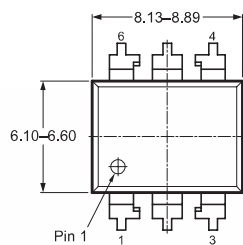


Fig. 11 Output Symmetry Characteristics

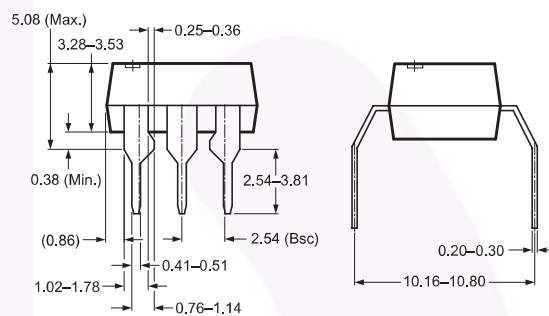
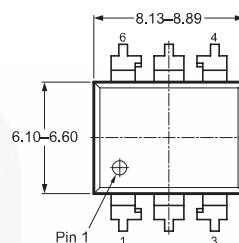


## Package Dimensions

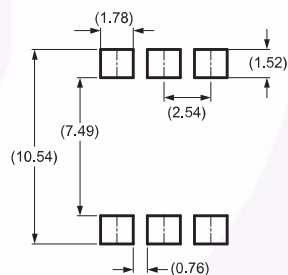
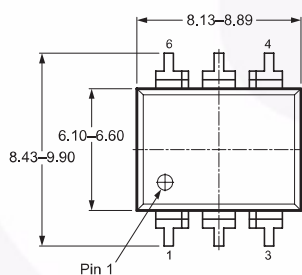
### Through Hole



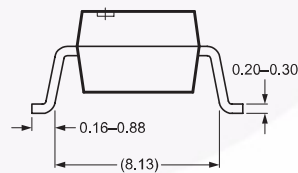
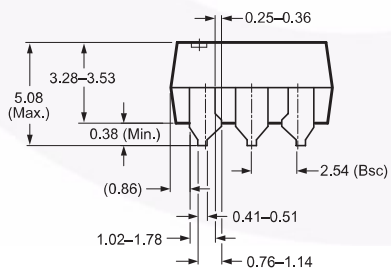
### 0.4" Lead Spacing



### Surface Mount



### Recommended Pad Layout

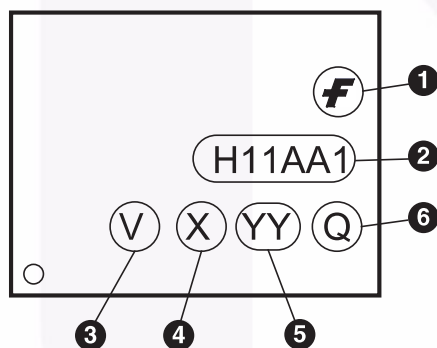


**Note:**  
All dimensions in mm.

## Ordering Information

| Option    | Order Entry Identifier<br>(Example) | Description                            |
|-----------|-------------------------------------|--|
| No option | H11AA1M                             | Standard Through Hole Device           |
| S         | H11AA1SM                            | Surface Mount Lead Bend                |
| SR2       | H11AA1SR2M                          | Surface Mount; Tape and Reel           |
| T         | H11AA1TM                            | 0.4" Lead Spacing                      |
| V         | H11AA1VM                            | VDE 0884                               |
| TV        | H11AA1TVM                           | VDE 0884, 0.4" Lead Spacing            |
| SV        | H11AA1SVM                           | VDE 0884, Surface Mount                |
| SR2V      | H11AA1SR2VM                         | VDE 0884, Surface Mount, Tape and Reel |

## Marking Information

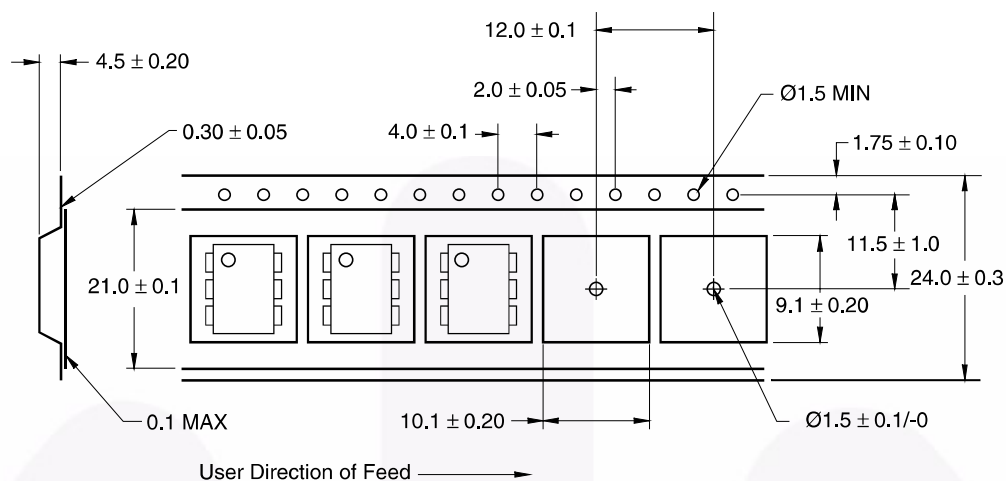


### Definitions

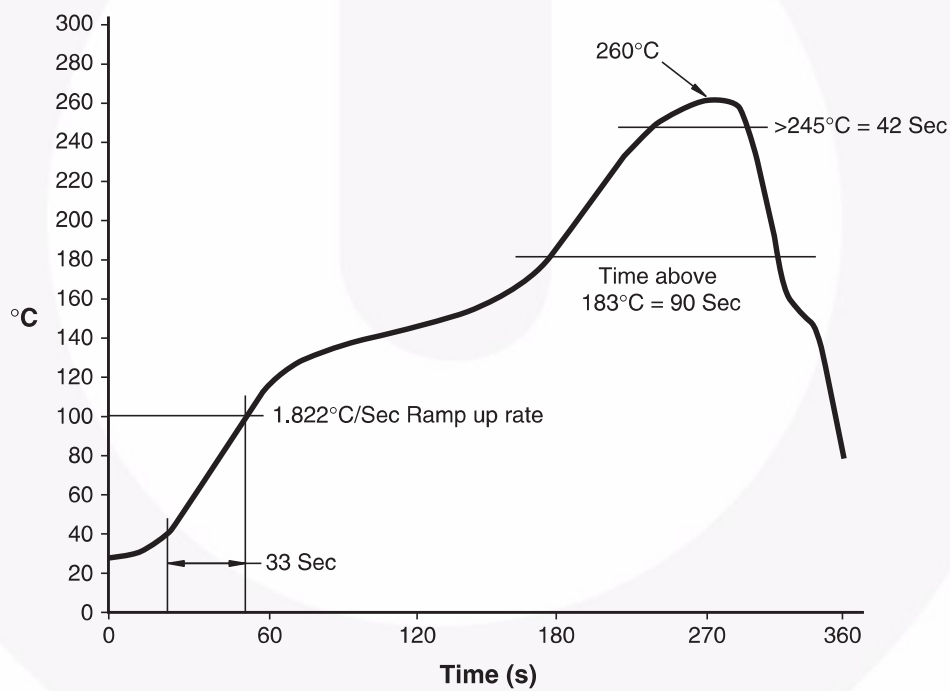
|   |  |
|---|--|
| 1 | Fairchild logo   |
| 2 | Device number  |
| 3 | VDE mark (Note: Only appears on parts ordered with VDE option – See order entry table) |
| 4 | One digit year code, e.g., '3'   |
| 5 | Two digit work week ranging from '01' to '53'  |
| 6 | Assembly package code  |

\*Note – Parts that do not have the 'V' option (see definition 3 above) that are marked with date code '325' or earlier are marked in portrait format.

## Carrier Tape Specification



## Reflow Profile




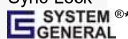


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