

# 5-0SMDJ

## 5000 W Transient voltage suppressor



### Product features

- Low profile SMC package
- Excellent clamping capability
- 5000 W peak pulse power capability at 10/1000  $\mu$ s waveform
- Typical  $I_R$  less than 1  $\mu$ A above 30 V
- Fast response time: typically less than 1.0 ps from 0 V to  $V_{BR}$  minimum
- High temperature reflow soldering: +260 °C /40 s at terminal
- Plastic package meets UL 94 V-0 flammability rating
- Meets moisture sensitivity level (MSL) level 1
- Terminal: Solder plated leads, solderable per J-STD-002
- For surface mounted applications in order to optimize board space
- UL 497B recognized.  
File No. :E198449 Guide QVGQ2

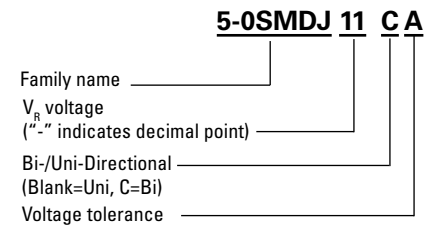
### Applications

- Consumer electronics
- Telecommunications
- Computing and servers
- Appliances
- Industrial automation
- Mobile and wearables

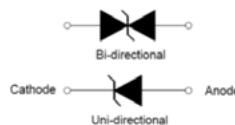
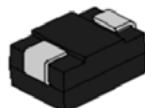
### Environmental compliance and general specifications



### Ordering part number



### PIN configuration



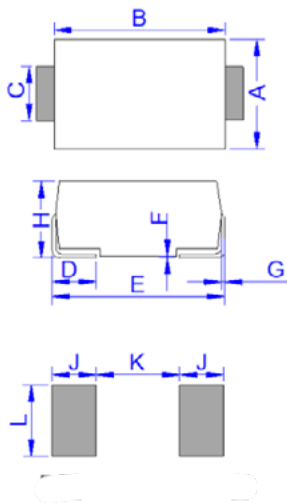
### Absolute maximum ratings

(+25 °C, RH=45%-75%, unless otherwise noted)

| Parameter   | Symbol          | Value       | Unit |
|---|-----------------|-------------|------|
| Storage operating junction temperature range                          | $T_{STG}/T_J$   | -55 to +150 | °C   |
| Steady state power dissipation at $T_L = +75$ °C                      | $P_{M(AV)}$     | 6.5         | W    |
| Peak pulse power dissipation on 10/1000 $\mu$ s waveform              | $P_{PP}$        | 5000        | W    |
| Maximum instantaneous forward voltage at 100 A for unidirectional     | $V_F$           | 5.0         | V    |
| Peak forward surge current, 8.3 ms single half sine wave <sup>1</sup> | $I_{FSM}$       | 300         | A    |
| Typical thermal resistance junction to lead                           | $R_{\theta JL}$ | 15          | °C/W |
| Typical thermal resistance junction to ambient                        | $R_{\theta JA}$ | 75          | °C/W |

1. Measured on 8.3 ms single half sine wave or equivalent square wave for unidirectional device only, duty cycle = 4 per minute maximum

### Mechanical parameters, pad layout- mm



| Dimension | Millimeters |         | Inches  |         |
|-----------|-------------|---------|---------|---------|
|           | Minimum     | Maximum | Minimum | Maximum |
| A         | 5.75        | 6.25    | 0.226   | 0.246   |
| B         | 6.90        | 7.40    | 0.272   | 0.291   |
| C         | 2.75        | 3.25    | 0.108   | 0.128   |
| D         | 0.95        | 1.52    | 0.037   | 0.060   |
| E         | 7.70        | 8.20    | 0.303   | 0.323   |
| F         | 0.051       | 0.203   | 0.002   | 0.008   |
| G         | 0.15        | 0.31    | 0.006   | 0.012   |
| H         | 2.15        | 2.62    | 0.085   | 0.103   |
| J         | 2.40        |         | 0.094   |         |
| K         |             | 4.20    |         | 0.165   |
| L         | 3.30        |         | 0.130   |         |

### Part marking

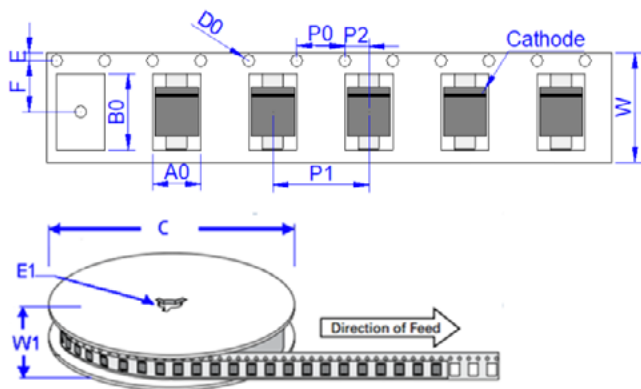


Cathode band (Uni-polar only)  
Part marking: xxxx = Date code  
yyyy- Refer to marking designator listed in Electrical Characteristics table

### Packaging information (mm)

Drawing not to scale.

Supplied in tape and reel packaging, 3,000 parts per 13" diameter reel (EIA-481 compliant)



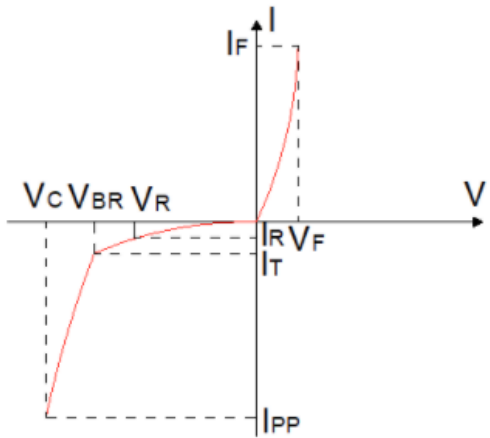
| Dimensions | Millimeters | Inches        |
|------------|-------------|---------------|
| A0         | 6.05 ± 0.3  | 0.238 ± 0.012 |
| B0         | 8.31 ± 0.3  | 0.327 ± 0.012 |
| C          | 330.0       | 13.0          |
| D0         | 1.55 ± 0.1  | 0.061 ± 0.004 |
| E          | 1.75 ± 0.2  | 0.069 ± 0.008 |
| E1         | 13.3 ± 0.3  | 0.524 ± 0.012 |
| F          | 7.50 ± 0.2  | 0.295 ± 0.008 |
| P0         | 4.00 ± 0.2  | 0.157 ± 0.008 |
| P1         | 8.00 ± 0.2  | 0.315 ± 0.008 |
| P2         | 2.00 ± 0.2  | 0.079 ± 0.008 |
| W          | 16.0 ± 0.2  | 0.630 ± 0.008 |
| W1         | 19.7 ± 2.0  | 0.776 ± 0.079 |

**Electrical characteristics** (+25 °C)

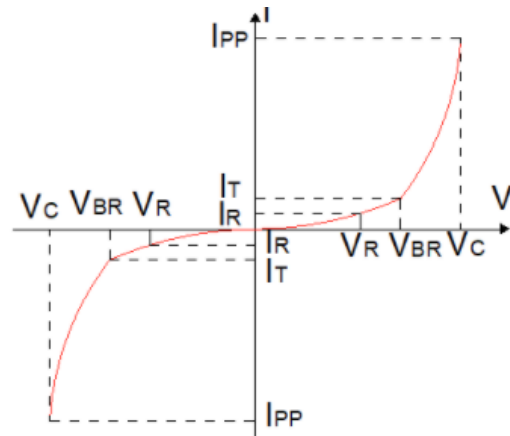
| Part number | Uni-polar    | Bi-polar | Marking |     | $V_R$<br>(V) | $I_R @ V_R$<br>( $\mu$ A) | $V_{BR} @ I_T$<br>min (V) | max (V) | $I_T$<br>(mA) | $V_C @ I_{PP}$<br>max (V) | $I_{PP}$<br>(A) |
|-------------|--------------|----------|---------|-----|--------------|---------------------------|---------------------------|---------|---------------|---------------------------|-----------------|
|             |              |          | Uni     | Bi  |              |                           |                           |         |               |                           |                 |
| 5-0SMDJ11A  | 5-0SMDJ11CA  | 5PEN     | 5BEN    | 11  | 5            | 12.2                      | 13.5                      | 10      | 18.2          | 275                       |                 |
| 5-0SMDJ12A  | 5-0SMDJ12CA  | 5PEP     | 5BEP    | 12  | 5            | 13.3                      | 14.7                      | 10      | 19.9          | 252                       |                 |
| 5-0SMDJ13A  | 5-0SMDJ13CA  | 5PEQ     | 5BEQ    | 13  | 5            | 14.4                      | 15.9                      | 10      | 21.5          | 233                       |                 |
| 5-0SMDJ14A  | 5-0SMDJ14CA  | 5PER     | 5BER    | 14  | 5            | 15.6                      | 17.2                      | 10      | 23.2          | 216                       |                 |
| 5-0SMDJ15A  | 5-0SMDJ15CA  | 5PES     | 5BES    | 15  | 5            | 16.7                      | 18.5                      | 1       | 24.4          | 205                       |                 |
| 5-0SMDJ16A  | 5-0SMDJ16CA  | 5PET     | 5BET    | 16  | 5            | 17.8                      | 19.7                      | 1       | 26            | 193                       |                 |
| 5-0SMDJ17A  | 5-0SMDJ17CA  | 5PEU     | 5BEU    | 17  | 5            | 18.9                      | 20.9                      | 1       | 27.6          | 181                       |                 |
| 5-0SMDJ18A  | 5-0SMDJ18CA  | 5PEV     | 5BEV    | 18  | 5            | 20                        | 22.1                      | 1       | 29.2          | 172                       |                 |
| 5-0SMDJ20A  | 5-0SMDJ20CA  | 5PEW     | 5BEW    | 20  | 5            | 22.2                      | 24.5                      | 1       | 32.4          | 155                       |                 |
| 5-0SMDJ22A  | 5-0SMDJ22CA  | 5PEX     | 5BEX    | 22  | 5            | 24.4                      | 26.9                      | 1       | 35.5          | 141                       |                 |
| 5-0SMDJ24A  | 5-0SMDJ24CA  | 5PEZ     | 5BEZ    | 24  | 5            | 26.7                      | 29.5                      | 1       | 38.9          | 129                       |                 |
| 5-0SMDJ26A  | 5-0SMDJ26CA  | 5PFE     | 5BFE    | 26  | 5            | 28.9                      | 31.9                      | 1       | 42.1          | 119                       |                 |
| 5-0SMDJ28A  | 5-0SMDJ28CA  | 5PFG     | 5BFG    | 28  | 5            | 31.1                      | 34.4                      | 1       | 45.4          | 110                       |                 |
| 5-0SMDJ30A  | 5-0SMDJ30CA  | 5PFK     | 5BFK    | 30  | 5            | 33.3                      | 36.8                      | 1       | 48.4          | 103                       |                 |
| 5-0SMDJ33A  | 5-0SMDJ33CA  | 5PFM     | 5BFM    | 33  | 1            | 36.7                      | 40.6                      | 1       | 53.3          | 93.9                      |                 |
| 5-0SMDJ36A  | 5-0SMDJ36CA  | 5PFP     | 5BFP    | 36  | 1            | 40                        | 44.2                      | 1       | 58.1          | 86.1                      |                 |
| 5-0SMDJ40A  | 5-0SMDJ40CA  | 5PFR     | 5BFR    | 40  | 1            | 44.4                      | 49.1                      | 1       | 64.5          | 77.6                      |                 |
| 5-0SMDJ43A  | 5-0SMDJ43CA  | 5PFT     | 5BFT    | 43  | 1            | 47.8                      | 52.8                      | 1       | 69.4          | 72.1                      |                 |
| 5-0SMDJ45A  | 5-0SMDJ45CA  | 5PFV     | 5BFV    | 45  | 1            | 50                        | 55.3                      | 1       | 72.7          | 68.8                      |                 |
| 5-0SMDJ48A  | 5-0SMDJ48CA  | 5PFX     | 5BFX    | 48  | 1            | 53.3                      | 58.9                      | 1       | 77.4          | 64.7                      |                 |
| 5-0SMDJ51A  | 5-0SMDJ51CA  | 5PFZ     | 5BFZ    | 51  | 1            | 56.7                      | 62.7                      | 1       | 82.4          | 60.7                      |                 |
| 5-0SMDJ54A  | 5-0SMDJ54CA  | 5PGE     | 5BGE    | 54  | 1            | 60                        | 66.3                      | 1       | 87.1          | 57.5                      |                 |
| 5-0SMDJ58A  | 5-0SMDJ58CA  | 5PGG     | 5BGG    | 58  | 1            | 64.4                      | 71.2                      | 1       | 93.6          | 53.5                      |                 |
| 5-0SMDJ60A  | 5-0SMDJ60CA  | 5PGK     | 5BGK    | 60  | 1            | 66.7                      | 73.7                      | 1       | 96.8          | 51.7                      |                 |
| 5-0SMDJ64A  | 5-0SMDJ64CA  | 5PGM     | 5BGM    | 64  | 1            | 71.1                      | 78.6                      | 1       | 103           | 48.6                      |                 |
| 5-0SMDJ70A  | 5-0SMDJ70CA  | 5PGP     | 5BGP    | 70  | 1            | 77.8                      | 86                        | 1       | 113           | 44.3                      |                 |
| 5-0SMDJ75A  | 5-0SMDJ75CA  | 5PGR     | 5BGR    | 75  | 1            | 83.3                      | 92.1                      | 1       | 121           | 41.4                      |                 |
| 5-0SMDJ78A  | 5-0SMDJ78CA  | 5PGT     | 5BGT    | 78  | 1            | 86.7                      | 95.8                      | 1       | 126           | 39.7                      |                 |
| 5-0SMDJ85A  | 5-0SMDJ85CA  | 5PGV     | 5BGV    | 85  | 1            | 94.4                      | 104                       | 1       | 137           | 36.5                      |                 |
| 5-0SMDJ90A  | 5-0SMDJ90CA  | 5PGX     | 5BGX    | 90  | 1            | 100                       | 111                       | 1       | 146           | 34.3                      |                 |
| 5-0SMDJ100A | 5-0SMDJ100CA | 5PGZ     | 5BGZ    | 100 | 1            | 111                       | 123                       | 1       | 162           | 30.9                      |                 |
| 5-0SMDJ110A | 5-0SMDJ110CA | 5PHE     | 5BHE    | 110 | 1            | 122                       | 135                       | 1       | 177           | 28.3                      |                 |
| 5-0SMDJ120A | 5-0SMDJ120CA | 5PHG     | 5BHG    | 120 | 1            | 133                       | 147                       | 1       | 193           | 26                        |                 |
| 5-0SMDJ130A | 5-0SMDJ130CA | 5PHK     | 5BHK    | 130 | 1            | 144                       | 159                       | 1       | 209           | 24                        |                 |
| 5-0SMDJ150A | 5-0SMDJ150CA | 5PHM     | 5BHM    | 150 | 1            | 167                       | 185                       | 1       | 243           | 20.6                      |                 |
| 5-0SMDJ160A | 5-0SMDJ160CA | 5PHP     | 5BHP    | 160 | 1            | 178                       | 197                       | 1       | 259           | 19.3                      |                 |
| 5-0SMDJ170A | 5-0SMDJ170CA | 5PHR     | 5BHR    | 170 | 1            | 189                       | 209                       | 1       | 275           | 18.2                      |                 |

**Ratings and V-I characteristic curves** (+25 °C unless otherwise noted)

**V- I curve characteristics (Uni-directional)**



**V- I curve characteristics (Bi-directional)**



Surge waveform: 10/1000  $\mu$ s

$V_R$ : Stand-off voltage – Maximum voltage that can be applied

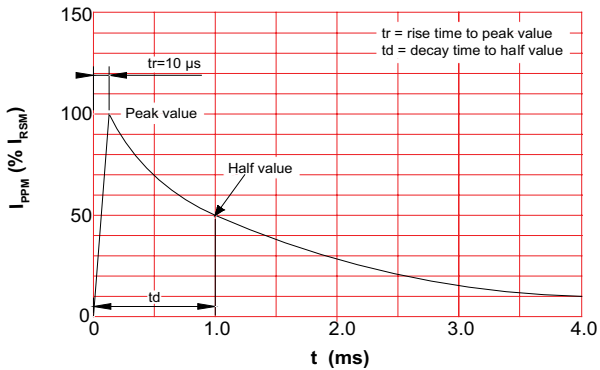
$V_{BR}$ : Breakdown voltage

$V_C$ : Clamping voltage – Peak voltage measured across the suppressor at a specified  $I_{PP}$

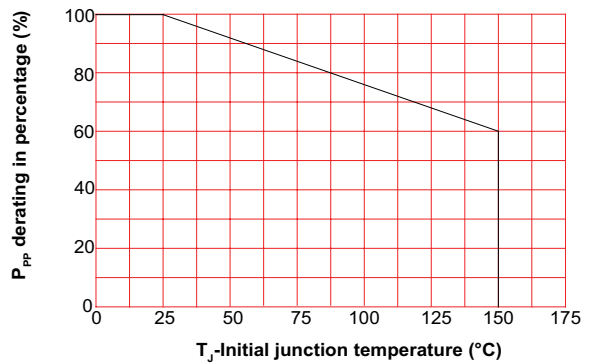
$I_R$ : Reverse leakage current

$I_T$ : Test current

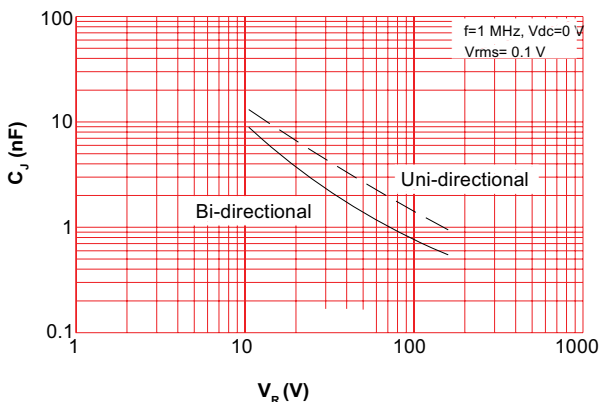
**Pulse waveform**



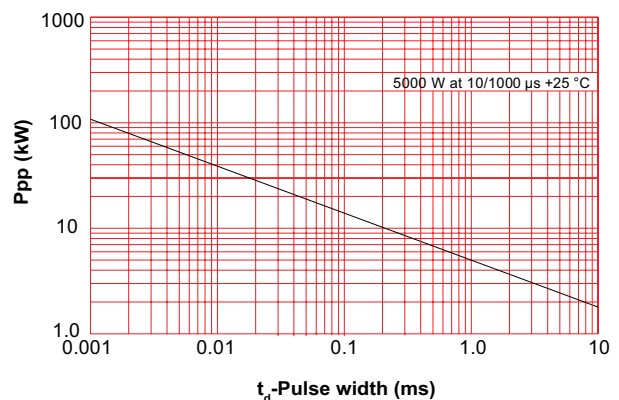
**Pulse derating curve**



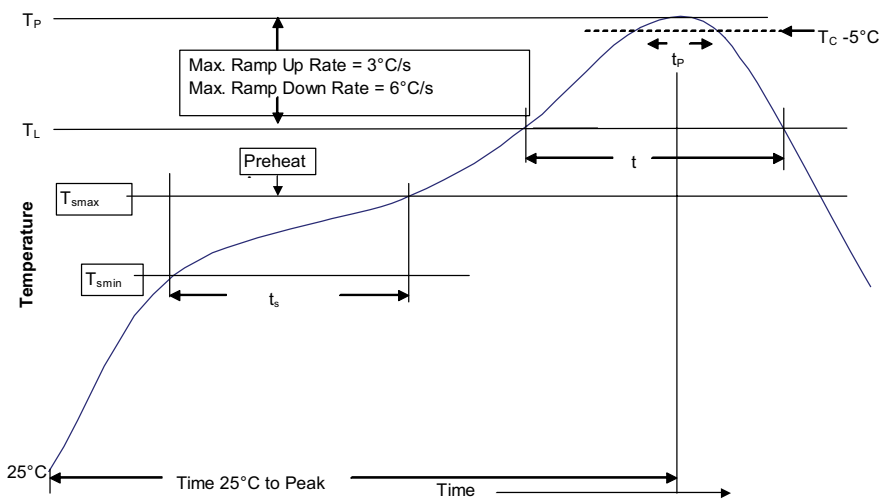
**Typical junction capacitance**



**Peak pulse power dissipation vs. pulse width**



**Solder reflow profile**



**Table 1 - Standard SnPb solder (T<sub>C</sub>)**

| Package thickness | Volume mm <sup>3</sup> <350 | Volume mm <sup>3</sup> ≥350 |
|-------------------|-----------------------------|-----------------------------|
| <2.5 mm           | 235 °C                      | 220 °C                      |
| ≥2.5 mm           | 220 °C                      | 220 °C                      |

**Table 2 - Lead (Pb) free solder (T<sub>C</sub>)**

| Package thickness | Volume mm <sup>3</sup> <350 | Volume mm <sup>3</sup> 350 - 2000 | Volume mm <sup>3</sup> >2000 |
|-------------------|-----------------------------|-----------------------------------|------------------------------|
| <1.6 mm           | 260 °C                      | 260 °C                            | 260 °C                       |
| 1.6 – 2.5 mm      | 260 °C                      | 250 °C                            | 245 °C                       |
| >2.5 mm           | 250 °C                      | 245 °C                            | 245 °C                       |

**Reference J-STD-020**

| Profile feature   | Standard SnPb solder | Lead (Pb) free solder |
|---|----------------------|-----------------------|
| Preheat and soak  |                      |                       |
| • Temperature min. (T <sub>smin</sub> )   | 100 °C               | 150 °C                |
| • Temperature max. (T <sub>smax</sub> )   | 150 °C               | 200 °C                |
| • Time (T <sub>smin</sub> to T <sub>smax</sub> ) (t <sub>s</sub> )                                | 60-120 seconds       | 60-180 seconds        |
| Ramp up rate T <sub>L</sub> to T <sub>p</sub>   | 3 °C/ second max.    | 3 °C/ second max.     |
| Liquidous temperature (T <sub>L</sub> )   | 183 °C               | 217 °C                |
| Time (t <sub>L</sub> ) maintained above T <sub>L</sub>  | 60-150 seconds       | 60-150 seconds        |
| Peak package body temperature (T <sub>p</sub> )*  | Table 1              | Table 2               |
| Time (t <sub>p</sub> )* within 5 °C of the specified classification temperature (T <sub>C</sub> ) | 20 seconds*          | 40 seconds*           |
| Ramp-down rate (T <sub>p</sub> to T <sub>L</sub> )  | 6 °C/ second max.    | 6 °C/ second max.     |
| Time 25 °C to peak temperature  | 6 minutes max.       | 8 minutes max.        |

\* Tolerance for peak profile temperature (T<sub>p</sub>) is defined as a supplier minimum and a user maximum.

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