

5.0SMDJ Series

Surface Mount – 5000W



Additional Information



Resources



Accessories



Samples

Agency Approvals

| Agency | Agency File Number |
|--------|--------------------|
| | E230531 |

Maximum Ratings and Thermal Characteristics ($T_A=25^{\circ}\text{C}$ unless otherwise noted)

| Parameter | Symbol | Value | Unit |
|--|-----------------------|------------|----------------------|
| Peak Pulse Power Dissipation at $T_L=25^{\circ}\text{C}$ by 10/1000 μs Waveform (Fig.2)(Note 1), (Note 2) | P_{PPM} | 5000 | W |
| Power Dissipation on Infinite Heat Sink at $T_L=50^{\circ}\text{C}$ | P_D | 6.5 | W |
| Peak Forward Surge Current, 8.3ms Single Half Sine Wave (Note 3) | I_{FSM} | 300 | A |
| Maximum Instantaneous Forward Voltage at 100A for Unidirectional Only | V_F | 5.0 | V |
| Operating Temperature Range | T_J | -65 to 150 | $^{\circ}\text{C}$ |
| Storage Temperature Range | T_{STG} | -65 to 175 | $^{\circ}\text{C}$ |
| Typical Thermal Resistance Junction to Lead | $R_{\theta\text{JL}}$ | 15 | $^{\circ}\text{C/W}$ |
| Typical Thermal Resistance Junction to Ambient | $R_{\theta\text{JA}}$ | 75 | $^{\circ}\text{C/W}$ |

Notes:

1. Non-repetitive current pulse, per Fig. 4 and derated above T_J (initial) $=25^{\circ}\text{C}$ per Fig. 3.
2. Mounted on copper pad area of 0.31x0.31" (8.0 x 8.0mm) to each terminal.
3. Measured on 8.3ms single half sine wave or equivalent square wave for unidirectional component only, duty cycle = 4 per minute maximum.

Description

The 5.0SMDJ series is designed specifically to protect sensitive electronic equipment from voltage transients induced by lightning and other transient voltage events.

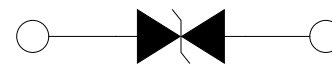
Features & Benefits

- 5000W peak pulse power capability at 10/1000 μs waveform, repetition rate (duty cycles):0.01 %
- SMD low profile surface mount package minimizing PCB footprint
- Typical failure mode is short from over-specified voltage or current
- Whisker test is conducted based on JEDEC JESD201A per its table 4a and 4c
- IEC 61000-4-2 ESD 30kV(Air), 30kV (Contact)
- ESD protection of data lines in accordance with IEC 61000-4-2
- EFT protection of data lines in accordance with IEC 61000-4-4
- Built-in strain relief
- Glass passivated chip junction
- Fast response time: typically less than 1.0ps from 0V to BV min
- Excellent clamping capability
- Low incremental surge resistance
- Typical IR less than 5 μA when $V_{\text{BR min}} > 22\text{V}$
- High temperature to reflow soldering guaranteed: 260 $^{\circ}\text{C}/40\text{sec}$
- $V_{\text{BR}} @ T_J = V_{\text{BR}} @ 25^{\circ}\text{C} \times (1 + \alpha_T \times (T_J - 25))$ (α_T : Temperature Coefficient,)
- UL Recognized compound meeting flammability rating V-0
- Meet MSL level1, per J-STD-020, LF maximum peak of 260 $^{\circ}\text{C}$
- Matte tin lead-free plated
- Halogen free and RoHS compliant
- Pb-free E3 means 2nd level interconnect is Pb-free and the terminal finish material is tin(Sn) (IPC/JEDEC J-STD-609A.01)
- Recognized to UL 497B as an Isolated Loop Circuit Protector

Applications

TVS devices are ideal for the protection of I/O Interfaces, VCC bus and other vulnerable circuits used in Telecom, Computer, Industrial and Consumer electronic applications.

Functional Diagram



Bi-directional




Uni-directional

5.0SMDJ Series

Surface Mount – 5000W

Electrical Characteristics ($T_A=25^\circ\text{C}$ unless otherwise noted)

| Part Number (Uni) | Part Number (Bi) | Marking | | Reverse Stand off Voltage V_R (Volts) | Breakdown Voltage V_{BR} (Volts) @ I_T | | Test Current I_T (mA) | Maximum Clamping Voltage V_C @ I_{PP} (10/1000 μs) (V) | Maximum Peak Pulse Current I_{PP} (10/1000 μs) (A) | Maximum Clamping Voltage V_C @ I_{PP} (8/20 μs) (V) | Maximum Peak Pulse Current I_{PP} (8/20 μs) (A) | Maximum Reverse Leakage I_R @ V_R (μA) | Maximum Temperature Coefficient of V_{BR} (%/C) | Agency Approval  |
|-------------------|------------------|---------|------|---|--|-------|-------------------------|--|--|---|---|---|---|---|
| | | Uni | Bi | | Min. | Max. | | | | | | | | |
| 5.0SMDJ12A | 5.0SMDJ12CA | 5PEP | 5BEP | 12.0 | 13.3 | 14.7 | 10 | 19.9 | 252.0 | 25.7 | 1890.0 | 800 | 0.075 | X |
| 5.0SMDJ13A | 5.0SMDJ13CA | 5PEQ | 5BEQ | 13.0 | 14.4 | 15.9 | 10 | 21.5 | 233.0 | 27.8 | 1747.5 | 500 | 0.076 | X |
| 5.0SMDJ14A | 5.0SMDJ14CA | 5PER | 5BER | 14.0 | 15.6 | 17.2 | 10 | 23.2 | 216.0 | 30.0 | 1620.0 | 200 | 0.08 | X |
| 5.0SMDJ15A | 5.0SMDJ15CA | 5PES | 5BES | 15.0 | 16.7 | 18.5 | 1 | 24.4 | 205.0 | 31.5 | 1537.5 | 100 | 0.083 | X |
| 5.0SMDJ16A | 5.0SMDJ16CA | 5PET | 5BET | 16.0 | 17.8 | 19.7 | 1 | 26.0 | 193.0 | 33.6 | 1447.5 | 50 | 0.084 | X |
| 5.0SMDJ17A | 5.0SMDJ17CA | 5PEU | 5BEU | 17.0 | 18.9 | 20.9 | 1 | 27.6 | 181.0 | 35.7 | 1357.5 | 20 | 0.085 | X |
| 5.0SMDJ18A | 5.0SMDJ18CA | 5PEV | 5BEV | 18.0 | 20.0 | 22.1 | 1 | 29.2 | 172.0 | 37.7 | 1290.0 | 10 | 0.088 | X |
| 5.0SMDJ20A | 5.0SMDJ20CA | 5PEW | 5BEW | 20.0 | 22.2 | 24.5 | 1 | 32.4 | 155.0 | 41.9 | 850.0 | 5 | 0.091 | X |
| 5.0SMDJ22A | 5.0SMDJ22CA | 5PEX | 5BEX | 22.0 | 24.4 | 26.9 | 1 | 35.5 | 141.0 | 45.9 | 1057.5 | 5 | 0.092 | X |
| 5.0SMDJ24A | 5.0SMDJ24CA | 5PEZ | 5BEZ | 24.0 | 26.7 | 29.5 | 1 | 38.9 | 129.0 | 50.3 | 967.5 | 5 | 0.092 | X |
| 5.0SMDJ26A | 5.0SMDJ26CA | 5PFE | 5BFE | 26.0 | 28.9 | 31.9 | 1 | 42.1 | 119.0 | 54.4 | 892.5 | 5 | 0.093 | X |
| 5.0SMDJ28A | 5.0SMDJ28CA | 5PFG | 5BFG | 28.0 | 31.1 | 34.4 | 1 | 45.4 | 110.0 | 58.7 | 825.0 | 5 | 0.094 | X |
| 5.0SMDJ30A | 5.0SMDJ30CA | 5PFG | 5BFG | 30.0 | 33.3 | 36.8 | 1 | 48.4 | 103.0 | 62.5 | 772.5 | 5 | 0.096 | X |
| 5.0SMDJ33A | 5.0SMDJ33CA | 5PFM | 5BFM | 33.0 | 36.7 | 40.6 | 1 | 53.3 | 93.9 | 68.9 | 704.3 | 5 | 0.097 | X |
| 5.0SMDJ36A | 5.0SMDJ36CA | 5PFP | 5BFP | 36.0 | 40.0 | 44.2 | 1 | 58.1 | 86.1 | 75.1 | 645.8 | 5 | 0.098 | X |
| 5.0SMDJ40A | 5.0SMDJ40CA | 5PFR | 5BFR | 40.0 | 44.4 | 49.1 | 1 | 64.5 | 77.6 | 83.3 | 582.0 | 5 | 0.099 | X |
| 5.0SMDJ43A | 5.0SMDJ43CA | 5PFT | 5BFT | 43.0 | 47.8 | 52.8 | 1 | 69.4 | 72.1 | 89.7 | 540.8 | 5 | 0.1 | X |
| 5.0SMDJ45A | 5.0SMDJ45CA | 5PFV | 5BFV | 45.0 | 50.0 | 55.3 | 1 | 72.7 | 68.8 | 93.9 | 516.0 | 5 | 0.101 | X |
| 5.0SMDJ48A | 5.0SMDJ48CA | 5PFX | 5BFX | 48.0 | 53.3 | 58.9 | 1 | 77.4 | 64.7 | 100.0 | 485.3 | 5 | 0.101 | X |
| 5.0SMDJ51A | 5.0SMDJ51CA | 5PFZ | 5BFZ | 51.0 | 56.7 | 62.7 | 1 | 82.4 | 60.7 | 106.5 | 455.3 | 5 | 0.101 | X |
| 5.0SMDJ54A | 5.0SMDJ54CA | 5PGE | 5BGE | 54.0 | 60.0 | 66.3 | 1 | 87.1 | 57.5 | 112.5 | 431.3 | 5 | 0.102 | X |
| 5.0SMDJ58A | 5.0SMDJ58CA | 5PGG | 5BGG | 58.0 | 64.4 | 71.2 | 1 | 93.6 | 53.5 | 120.9 | 401.3 | 5 | 0.103 | X |
| 5.0SMDJ60A | 5.0SMDJ60CA | 5PGK | 5BGK | 60.0 | 66.7 | 73.7 | 1 | 96.8 | 51.7 | 125.1 | 387.8 | 5 | 0.103 | X |
| 5.0SMDJ64A | 5.0SMDJ64CA | 5PGM | 5BGM | 64.0 | 71.1 | 78.6 | 1 | 103.0 | 48.6 | 133.1 | 364.5 | 5 | 0.104 | X |
| 5.0SMDJ70A | 5.0SMDJ70CA | 5PGP | 5BGP | 70.0 | 77.8 | 86.0 | 1 | 113.0 | 44.3 | 146.0 | 332.3 | 5 | 0.105 | X |
| 5.0SMDJ75A | 5.0SMDJ75CA | 5PGR | 5BGR | 75.0 | 83.3 | 92.1 | 1 | 121.0 | 41.4 | 156.3 | 310.5 | 5 | 0.106 | X |
| 5.0SMDJ78A | 5.0SMDJ78CA | 5PGT | 5BGT | 78.0 | 86.7 | 95.8 | 1 | 126.0 | 39.7 | 162.8 | 297.8 | 5 | 0.106 | X |
| 5.0SMDJ85A | 5.0SMDJ85CA | 5PGV | 5BGV | 85.0 | 94.4 | 104.0 | 1 | 137.0 | 36.5 | 177.0 | 273.8 | 5 | 0.106 | X |
| 5.0SMDJ90A | 5.0SMDJ90CA | 5PGX | 5BGX | 90.0 | 100.0 | 111.0 | 1 | 146.0 | 34.3 | 188.6 | 257.3 | 5 | 0.107 | X |
| 5.0SMDJ100A | 5.0SMDJ100CA | 5PGZ | 5BGZ | 100.0 | 111.0 | 123.0 | 1 | 162.0 | 30.9 | 209.3 | 231.8 | 5 | 0.107 | X |
| 5.0SMDJ110A | 5.0SMDJ110CA | 5PHE | 5BHE | 110.0 | 122.0 | 135.0 | 1 | 177.0 | 28.3 | 228.7 | 212.3 | 5 | 0.107 | X |
| 5.0SMDJ120A | 5.0SMDJ120CA | 5PHG | 5BHG | 120.0 | 133.0 | 147.0 | 1 | 193.0 | 26.0 | 249.4 | 195.0 | 5 | 0.108 | X |
| 5.0SMDJ130A | 5.0SMDJ130CA | 5PHK | 5BHK | 130.0 | 144.0 | 159.0 | 1 | 209.0 | 24.0 | 270.0 | 180.0 | 5 | 0.108 | X |
| 5.0SMDJ140A | 5.0SMDJ140CA | 5PHL | 5BHL | 140.0 | 156.0 | 172.0 | 1 | 226.1 | 22.2 | 292.1 | 166.5 | 5 | 0.108 | X |
| 5.0SMDJ150A | 5.0SMDJ150CA | 5PHM | 5BHM | 150.0 | 167.0 | 185.0 | 1 | 243.0 | 20.6 | 314.0 | 154.5 | 5 | 0.108 | X |
| 5.0SMDJ160A | 5.0SMDJ160CA | 5PHP | 5BHB | 160.0 | 178.0 | 197.0 | 1 | 259.0 | 19.3 | 334.6 | 144.8 | 5 | 0.108 | X |
| 5.0SMDJ170A | 5.0SMDJ170CA | 5PHR | 5BHR | 170.0 | 189.0 | 209.0 | 1 | 275.0 | 18.2 | 355.3 | 136.5 | 5 | 0.108 | X |

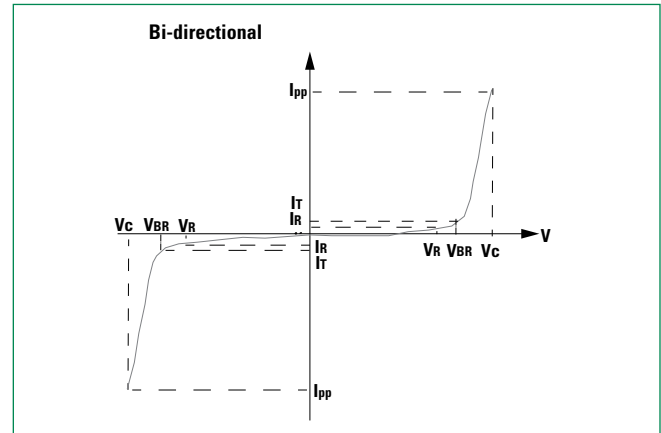
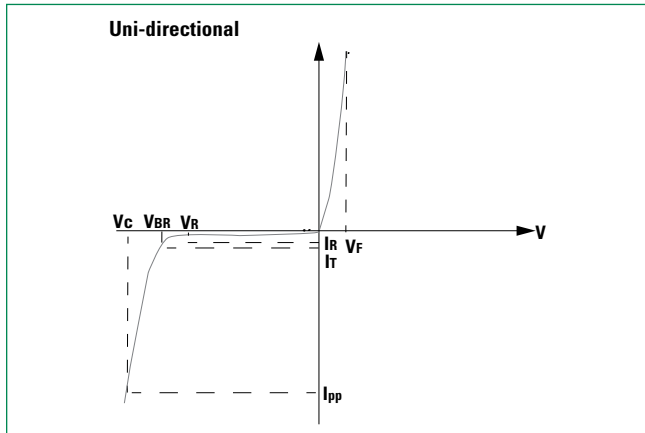
For bidirectional type having V_R of 20 volts and less, the I_R limit is double.

For parts without A, the V_{BR} is $\pm 10\%$ and V_C is 5% higher than with A parts, the parts without A are currently available, but not recommended for new designs. The parts with A are preferred.

5.0SMDJ Series

Surface Mount – 5000W

I-V Curve Characteristics



P_{PPM} Peak Pulse Power Dissipation – Max power dissipation
V_R Stand-off Voltage – Maximum voltage that can be applied to the TVS without operation
V_{BR} Breakdown Voltage – Maximum voltage that flows through the TVS at a specified test current (I_T)
V_C Clamping Voltage – Peak voltage measured across the TVS at a specified I_{ppm} (peak impulse current)
I_R Reverse Leakage Current – Current measured at V_R
V_F Forward Voltage Drop for Uni-directional

Ratings and Characteristic Curves (T_A = 25°C unless otherwise noted)

Figure 1:
TVS Transients Clamping Waveform

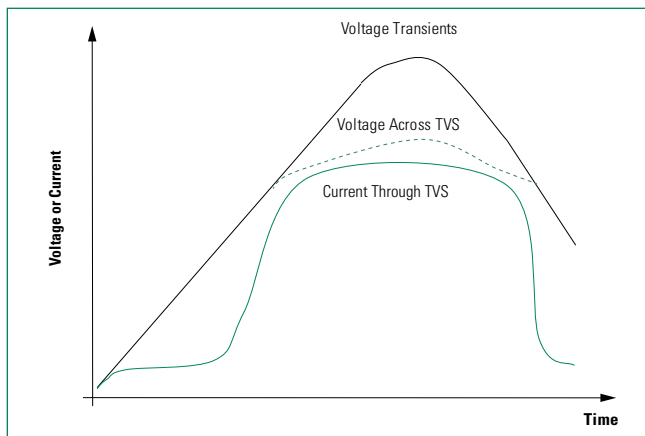
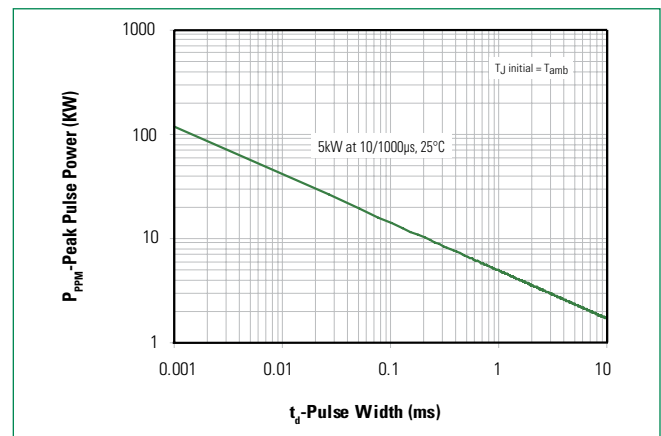


Figure 2:
Peak Pulse Power Rating



5.0SMDJ Series

Surface Mount – 5000W

Ratings and Characteristic Curves ($T_A = 25^\circ\text{C}$ unless otherwise noted) (Continued)

Figure 3:
Peak Pulse Power Derating Curve

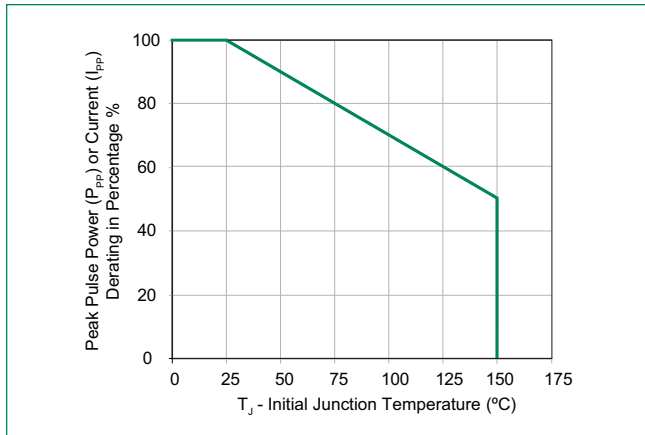


Figure 4:
Pulse Waveform

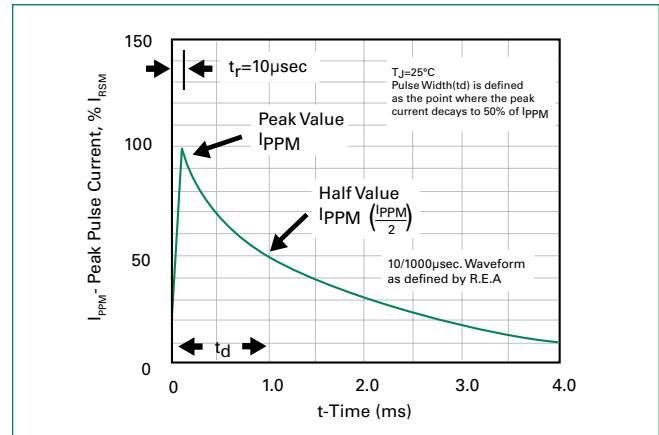


Figure 5:
Typical Junction Capacitance

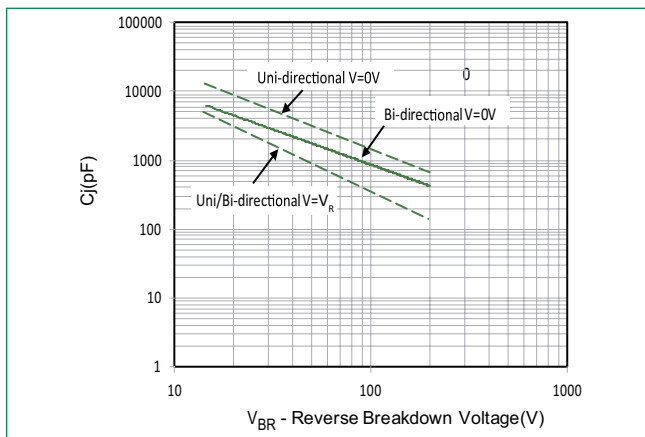


Figure 6:
Typical Transient Thermal Impedance

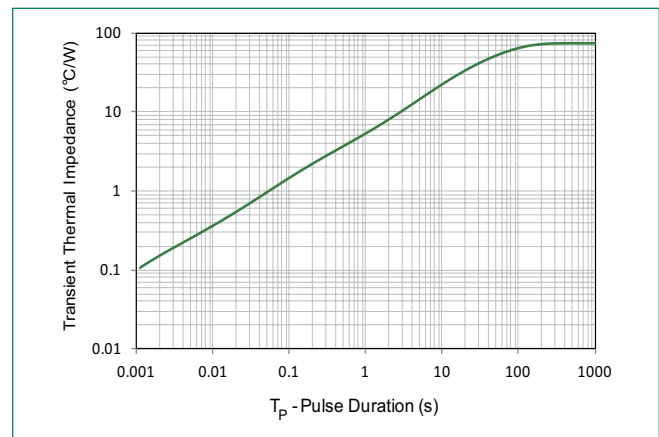


Figure 7:
Maximum Non-Repetitive Peak Forward Surge Current Uni-Directional Only

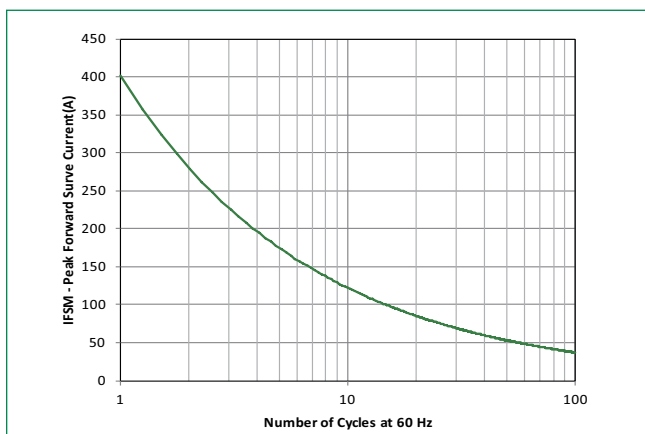
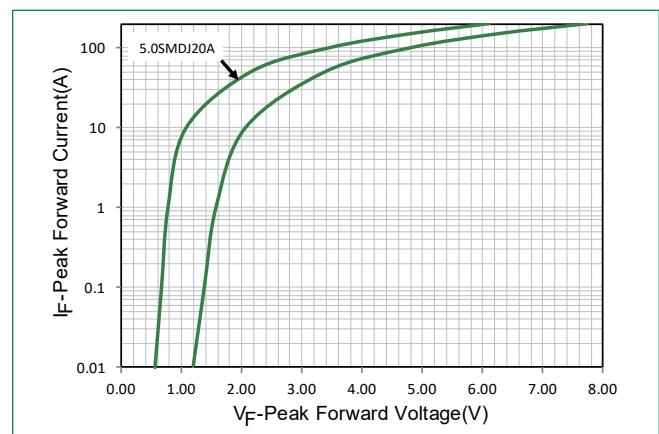


Figure 8:
Peak Forward Voltage Drop vs Peak Forward Current (Typical Values)

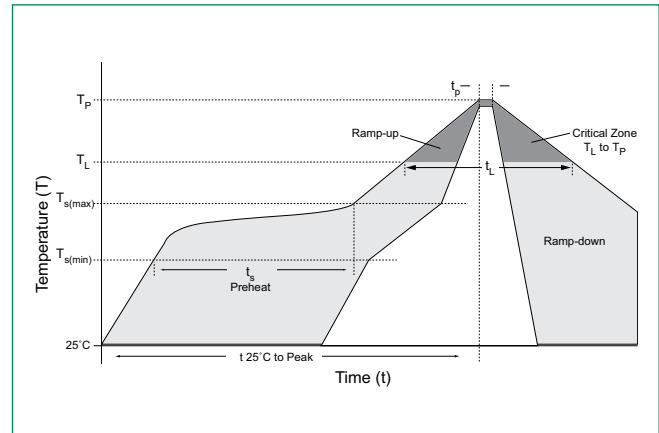


5.0SMDJ Series

Surface Mount – 5000W

Soldering Parameters

| | | |
|---|------------------------------------|-------------------------|
| Reflow Condition | | Lead-free assembly |
| Pre Heat | - Temperature Min ($T_{s(min)}$) | 150°C |
| | - Temperature Max ($T_{s(max)}$) | 200°C |
| | - Time (min to max) (t_s) | 60 – 180 secs |
| Average ramp up rate (Liquidus Temp (T_A) to peak | | 3°C/second max |
| $T_{s(max)}$ to T_A - Ramp-up Rate | | 3°C/second max |
| Reflow | - Temperature (T_L) (Liquidus) | 217°C |
| | - Time (min to max) (t_L) | 60 – 150 seconds |
| Peak Temperature (T_p) | | 260 ^{+0/-5} °C |
| Time within 5°C of actual peak Temperature (t_p) | | 20 – 40 seconds |
| Ramp-down Rate | | 6°C/second max |
| Time 25°C to peak Temperature (T_p) | | 8 minutes Max. |
| Do not exceed | | 280°C |



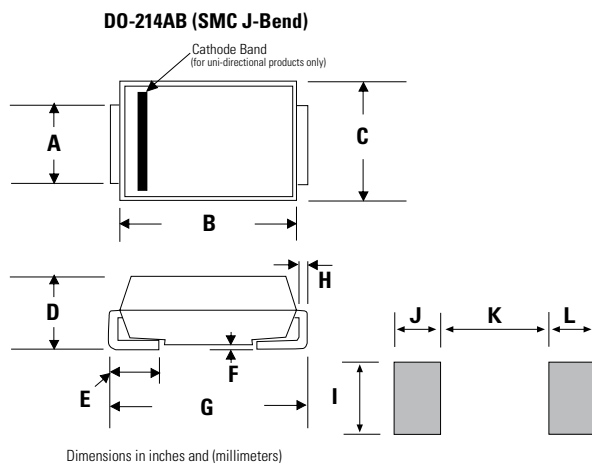
Physical Specifications

| | |
|-----------------|---|
| Weight | 0.007 ounce, 0.21 grams |
| Case | JEDEC DO214AB. Molded component over glass passivated junction |
| Polarity | Color band denotes positive end (cathode) except Bidirectional. |
| Terminal | Matte Tin-plated leads, Solderable per JESD22-B102 |

Environmental Specifications

| | |
|----------------------------|--------------------------|
| High Temp. Storage | JESD22-A103 |
| HTRB | JESD22-A108 |
| Temperature Cycling | JESD22-A104 |
| MSL | JEDEC-J-STD-020, Level 1 |
| H3TRB | JESD22-A101 |
| RSH | JESD22-A111 |

Dimensions

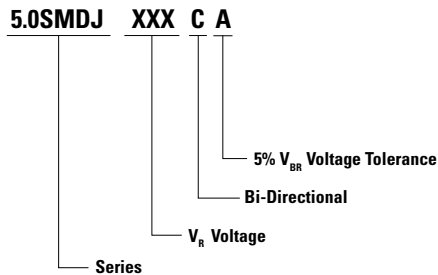


| Dimensions | Inches | | Millimeters | |
|------------|--------|-------|-------------|-------|
| | Min | Max | Min | Max |
| A | 0.114 | 0.126 | 2.900 | 3.200 |
| B | 0.260 | 0.280 | 6.600 | 7.110 |
| C | 0.220 | 0.245 | 5.590 | 6.220 |
| D | 0.079 | 0.103 | 2.060 | 2.620 |
| E | 0.030 | 0.060 | 0.760 | 1.520 |
| F | - | 0.008 | - | 0.203 |
| G | 0.305 | 0.320 | 7.750 | 8.130 |
| H | 0.006 | 0.012 | 0.152 | 0.305 |
| I | 0.129 | - | 3.300 | - |
| J | 0.094 | - | 2.400 | - |
| K | - | 0.165 | - | 4.200 |
| L | 0.094 | - | 2.400 | - |

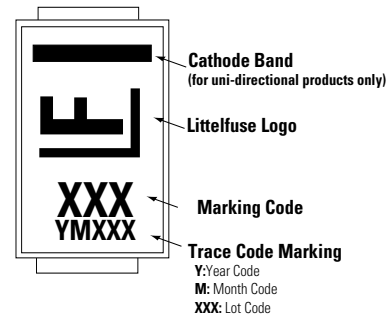
5.0SMDJ Series

Surface Mount – 5000W

Part Numbering System



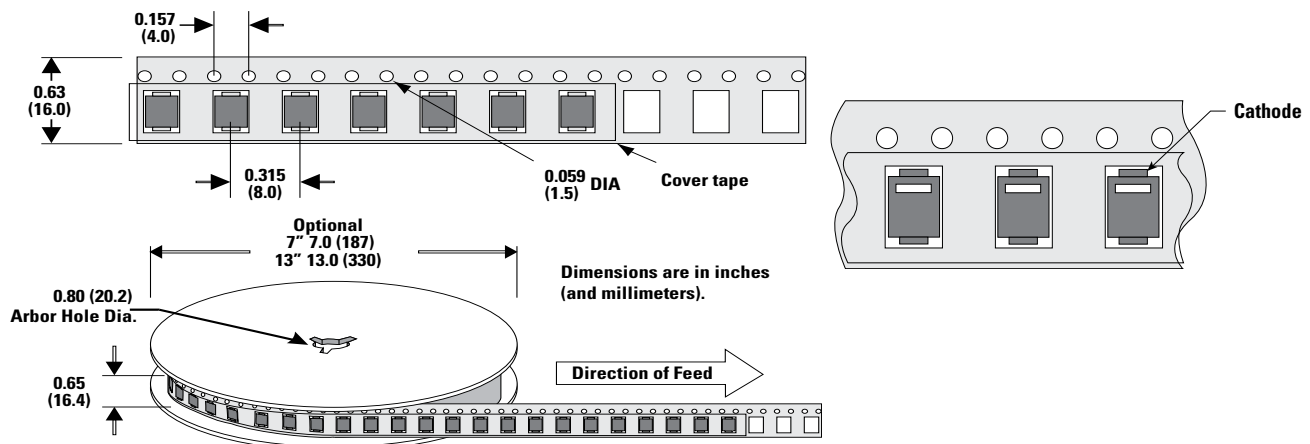
Part Marking System



Packaging Options

| Part number | Component Package | Quantity | Packaging Option | Packaging Specification |
|-----------------|-------------------|----------|----------------------------------|-------------------------|
| 5.0SMDJxxxXX | DO-214AB | 3000 | Tape & Reel - 16mm tape/13" reel | EIA STD RS-481 |
| 5.0SMDJxxxXX-T7 | DO-214AB | 500 | Tape & Reel - 16mm tape/7" reel | EIA STD RS-481 |

Tape and Reel Specification



Disclaimer Notice - Information furnished is believed to be accurate and reliable. However, users should independently evaluate the suitability of and test each product selected for their own applications. Littelfuse products are not designed for, and may not be used in, all applications. Read complete Disclaimer Notice at www.littelfuse.com/disclaimer-electronics.

Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

[Littelfuse:](#)

[5.0SMDJ58CA-T7](#) [5.0SMDJ48CA-T7](#) [5.0SMDJ150CA-T7](#) [5.0SMDJ140A-T7](#) [5.0SMDJ140CA-T7](#) [5.0SMDJ30CA-001T13](#)