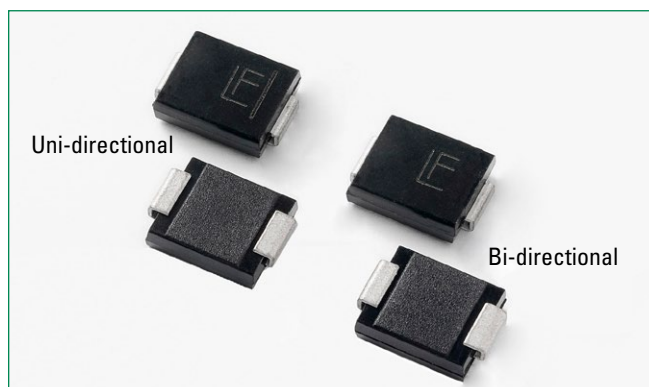



5.0SMDJ Series



Agency Approvals

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

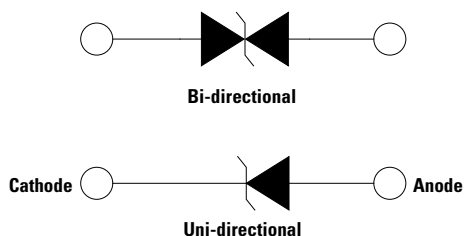
Maximum Ratings and Thermal Characteristics (T_A=25°C unless otherwise noted)

| Parameter | Symbol | Value | Unit |
|--|------------------|------------|------|
| Peak Pulse Power Dissipation at T _J =25°C by 10/1000µs Waveform (Fig.2)(Note 1), (Note 2) | P _{PPM} | 5000 | W |
| Power Dissipation on Infinite Heat Sink at T _J =50°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 | °C |
| Storage Temperature Range | T _{STG} | -65 to 175 | °C |
| Typical Thermal Resistance Junction to Lead | R _{θJL} | 15 | °C/W |
| Typical Thermal Resistance Junction to Ambient | R _{θJA} | 75 | °C/W |

Notes:

1. Non-repetitive current pulse, per Fig. 4 and derated above T_J (initial) = 25°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.

Functional Diagram



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

- 5000W peak pulse power capability at 10/1000µs 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 I_R less than 5µA when V_{BR} min>22V
- High temperature to reflow soldering guaranteed: 260°C/40sec
- V_{BR} @ T_J = V_{BR} @ 25°C x (1 + α T x (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°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, V_{CC} bus and other vulnerable circuits used in Telecom, Computer, Industrial and Consumer electronic applications.

Additional Information



Datasheet




Resources



Samples

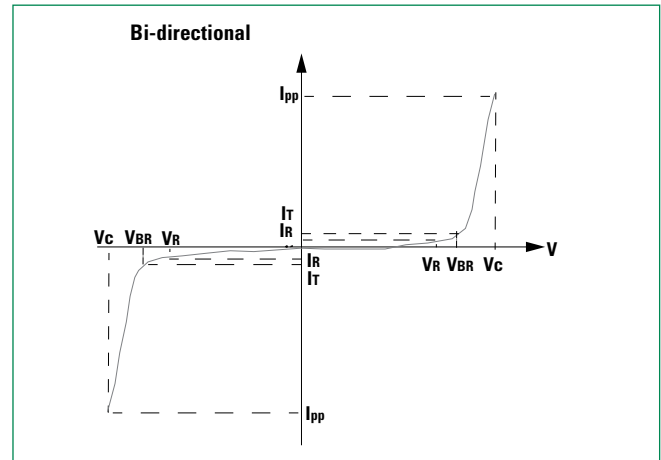
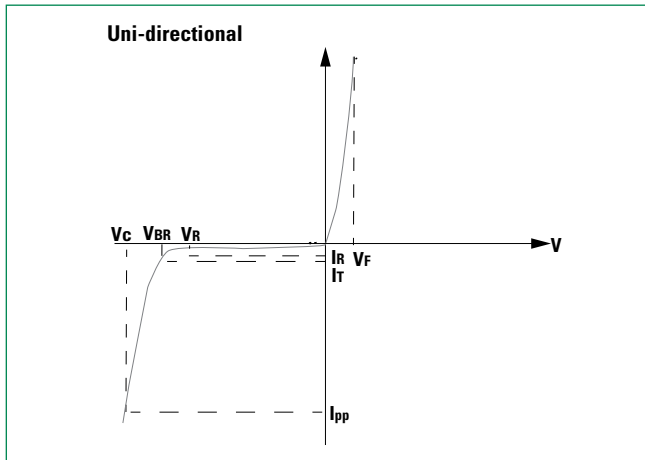
Electrical Characteristics (T_A=25°C unless otherwise noted)

| 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} (10/1000μs) (V) | Maximum Peak Pulse Current I _{pp} (10/1000μs) (A) | Maximum Clamping Voltage V _C @I _{pp} (8/20μs) (V) | Maximum Peak Pulse Current I _{pp} (8/20μs) (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 | 5PFK | 5BFK | 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_T limit is double.

For parts without A, the V_{BR} is ± 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.

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

Figure 1 - TVS Transients Clamping Waveform

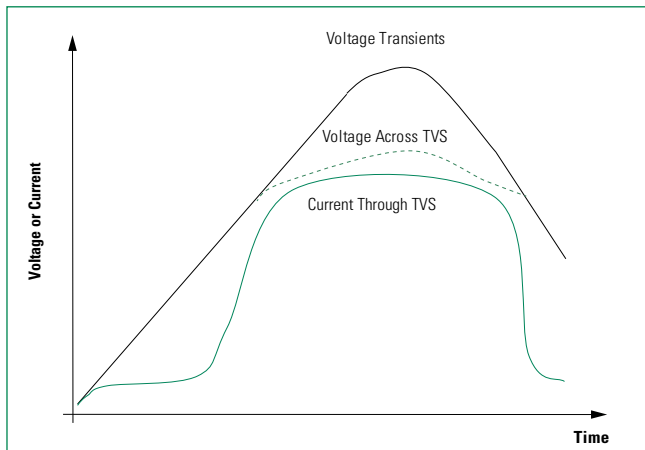
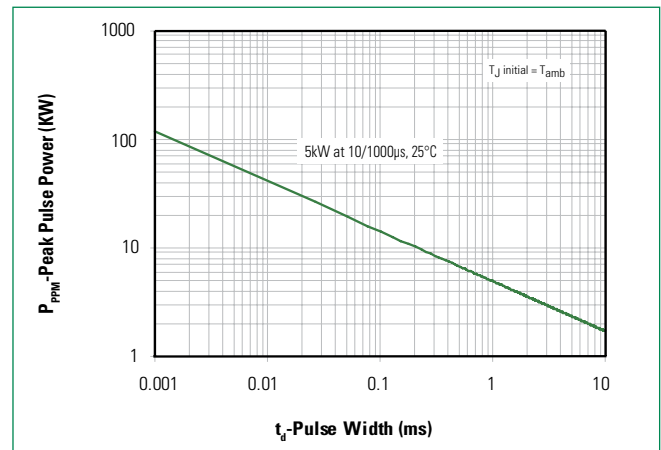


Figure 2 - Peak Pulse Power Rating



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

Figure 3 - Peak Pulse Power Derating Curve

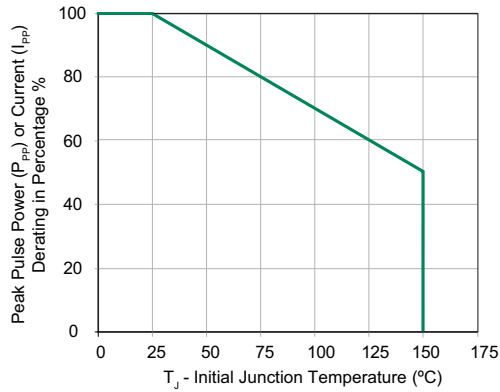


Figure 4 - Pulse Waveform

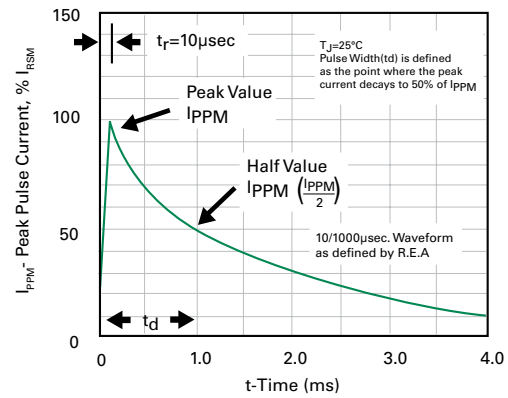


Figure 5 - Typical Junction Capacitance

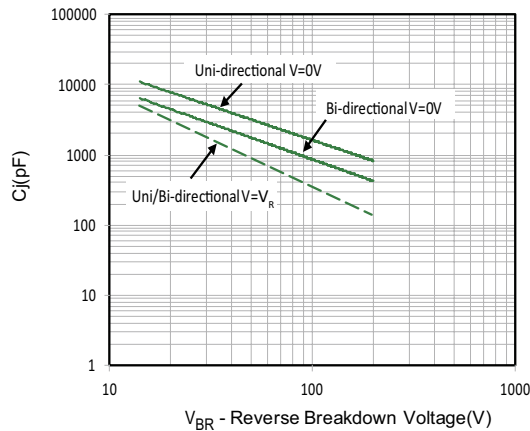


Figure 6 - Typical Transient Thermal Impedance

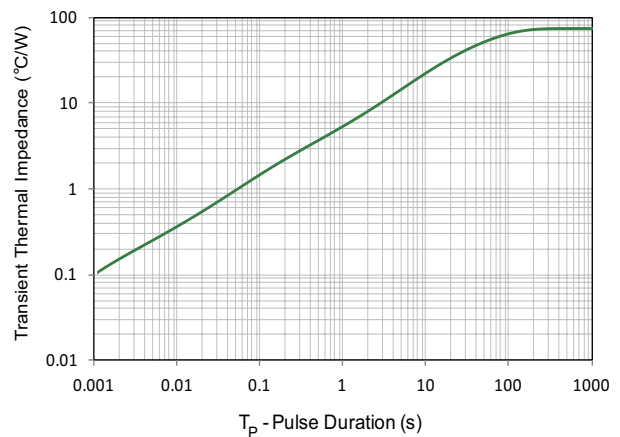


Figure 7 - Maximum Non-Repetitive Peak Forward Surge Current Uni-Directional Only

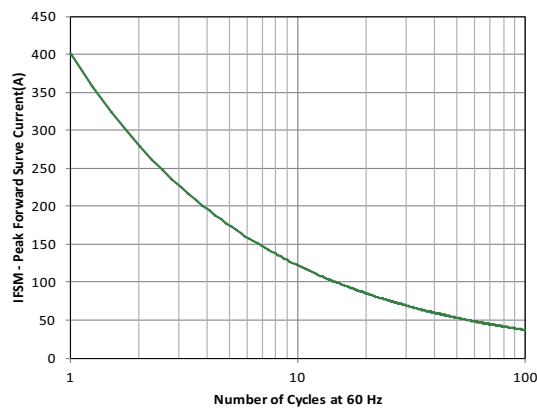
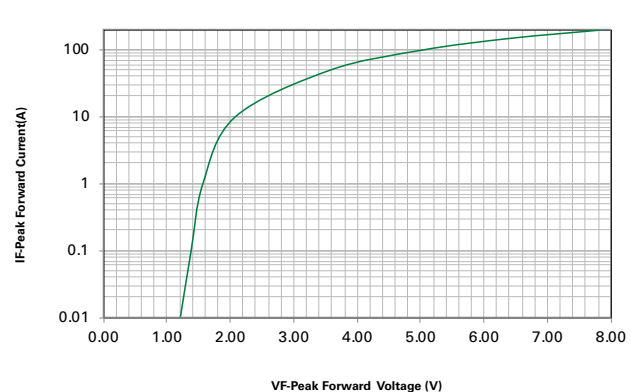
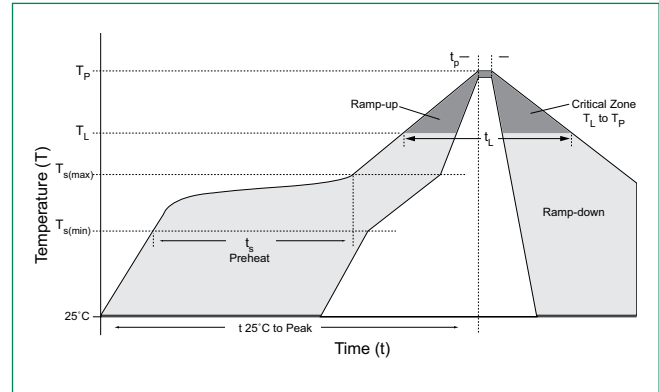


Figure 8 - Peak Forward Voltage Drop vs Peak Forward Current (Typical Values)



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 |



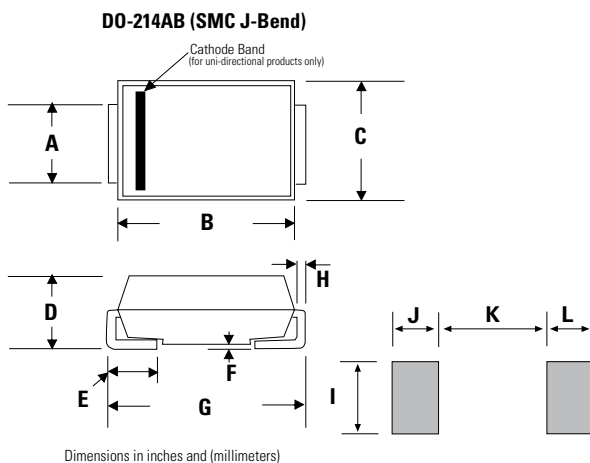
Physical Specifications

| | |
|-----------------|---|
| 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

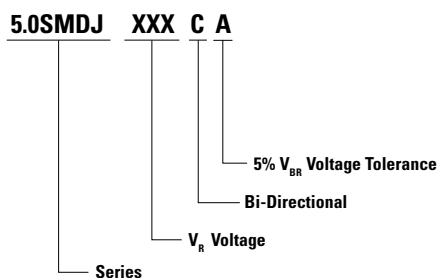
| | |
|----------------------------|--------------------------|
| High Temp. Storage | JESD22-A103 |
| HTRB | JESD22-A108 |
| Temperature Cycling | JESD22-A104 |
| MSL | JEDEC-J-STD-020, Level 1 |
| H3TRB | JESD22-A101 |
| RSH | JESD22-A111 |

Dimensions

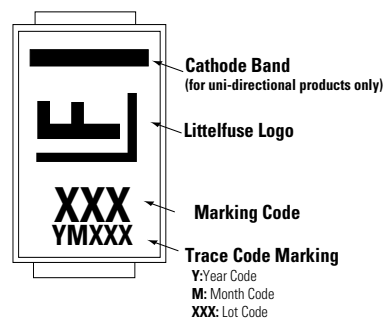


| Dimensions | Inches | | Millimeters | |
|------------|--------|-------|-------------|-------|
| | Min | Max | Min | Max |
| A | 0.114 | 0.126 | 2.900 | 3.200 |
| B | 0.260 | 0.280 | 6.600 | 7.110 |
| C | 0.220 | 0.245 | 5.590 | 6.220 |
| D | 0.079 | 0.103 | 2.060 | 2.620 |
| E | 0.030 | 0.060 | 0.760 | 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 | - |

Part Numbering System



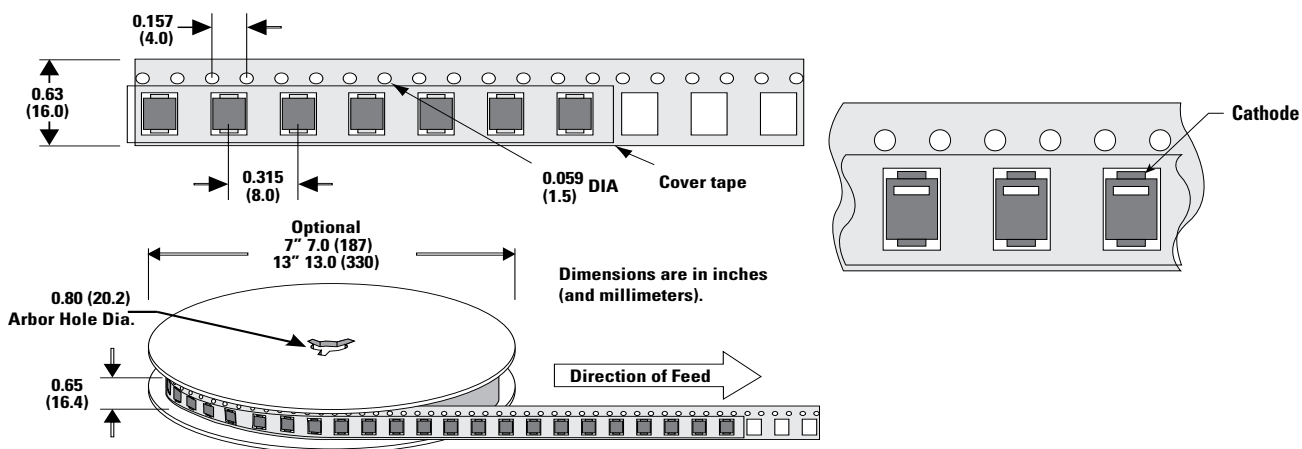
Part Marking System



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



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