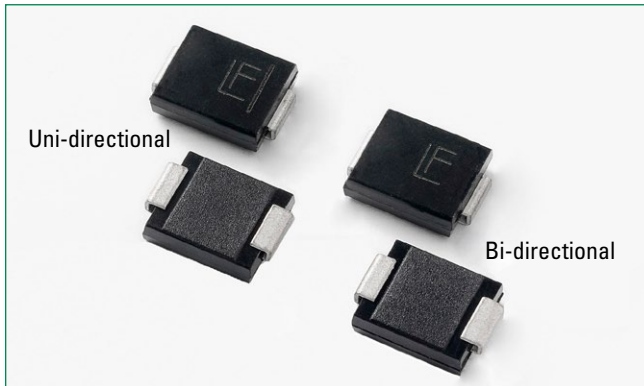


**5.0SMDJ Series**



**Agency Approvals**

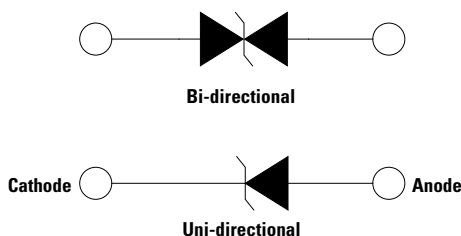
| Agency | Agency File Number |
|--------|--------------------|
|        | E230531            |

**Maximum Ratings and Thermal Characteristics (T<sub>A</sub>=25°C unless otherwise noted)**

| Parameter  | Symbol           | Value      | Unit |
|--|------------------|------------|------|
| Peak Pulse Power Dissipation at T <sub>L</sub> =25°C by 10/1000µs Waveform (Fig.2)(Note 1), (Note 2) | P <sub>PPM</sub> | 5000       | W    |
| Power Dissipation on Infinite Heat Sink at T <sub>L</sub> =50°C                                      | P <sub>D</sub>   | 6.5        | W    |
| Peak Forward Surge Current, 8.3ms Single Half Sine Wave (Note 3)                                     | I <sub>FSM</sub> | 300        | A    |
| Maximum Instantaneous Forward Voltage at 100A for Unidirectional Only                                | V <sub>F</sub>   | 5.0        | V    |
| Operating Temperature Range  | T <sub>J</sub>   | -65 to 150 | °C   |
| Storage Temperature Range  | T <sub>STG</sub> | -65 to 175 | °C   |
| Typical Thermal Resistance Junction to Lead  | R <sub>θJL</sub> | 15         | °C/W |
| Typical Thermal Resistance Junction to Ambient   | R <sub>θJA</sub> | 75         | °C/W |

**Notes:**  
 1. Non-repetitive current pulse, per Fig. 4 and derated above T<sub>J</sub> (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<sub>R</sub> less than 5µA when V<sub>BR</sub> min>22V
- High temperature to reflow soldering guaranteed: 260°C/40sec
- V<sub>BR</sub> @T<sub>J</sub>= V<sub>BR</sub> @25°C x (1+ α T x (T<sub>J</sub> - 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<sub>CC</sub> bus and other vulnerable circuits used in Telecom, Computer, Industrial and Consumer electronic applications.

**Additional Information**

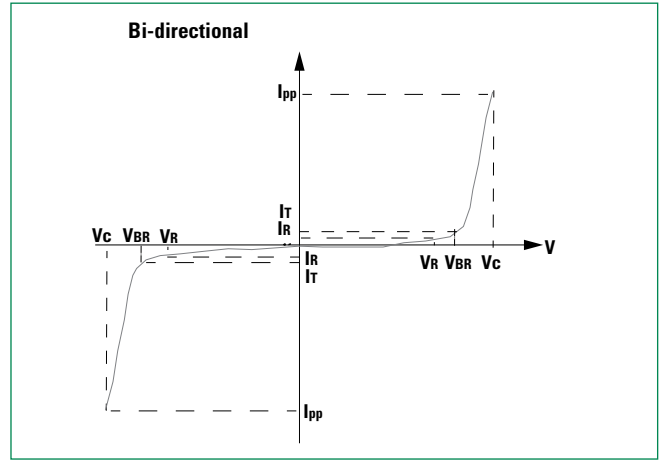
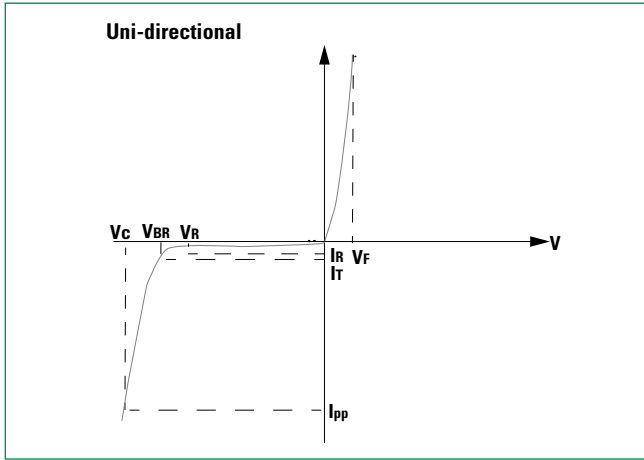


### Electrical Characteristics (T<sub>A</sub>=25°C unless otherwise noted)

| Part Number (Uni) | Part Number (Bi) | Marking |      | Reverse Stand off Voltage V <sub>R</sub> (Volts) | Breakdown Voltage V <sub>BR</sub> (Volts) @ I <sub>T</sub> |       | Test Current I <sub>T</sub> (mA) | Maximum Clamping Voltage V <sub>C</sub> @I <sub>pp</sub> (10/1000µs) (V) | Maximum Peak Pulse Current I <sub>pp</sub> (10/1000µs) (A) | Maximum Clamping Voltage V <sub>C</sub> @I <sub>pp</sub> (8/20µs) (V) | Maximum Peak Pulse Current I <sub>pp</sub> (8/20µs) (A) | Maximum Reverse Leakage I <sub>R</sub> @V <sub>R</sub> (µA) | Maximum Temperature Coefficient of V <sub>BR</sub> (%/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<sub>R</sub> of 20 volts and less, the I<sub>T</sub> limit is double.  
 For parts without A, the V<sub>BR</sub> is ± 10% and V<sub>C</sub> 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.

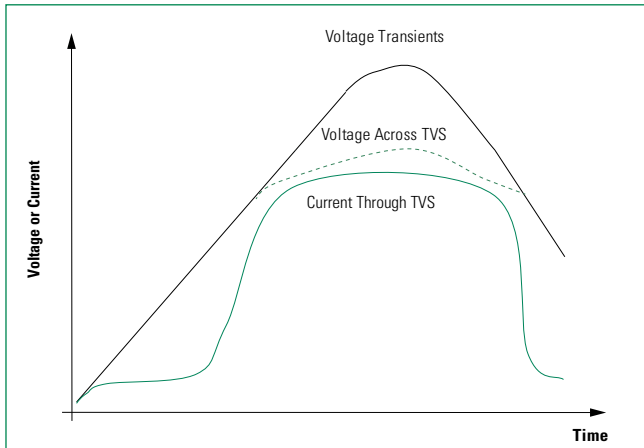
**I-V Curve Characteristics**



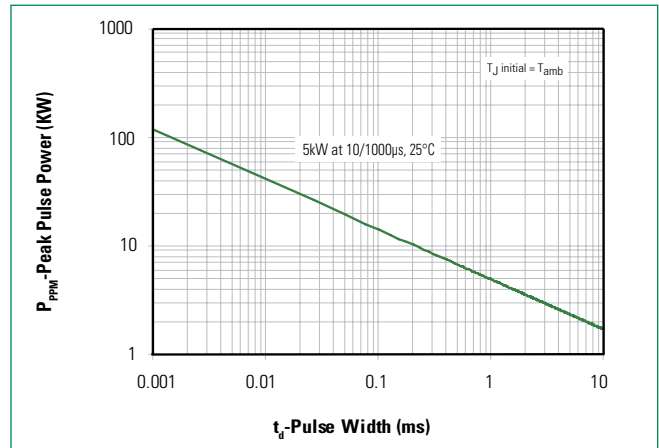
- $P_{PPM}$**  Peak Pulse Power Dissipation – Max power dissipation
- $V_R$**  Stand-off Voltage – Maximum voltage that can be applied to the TVS without operation
- $V_{BR}$**  Breakdown Voltage – Maximum voltage that flows through the TVS at a specified test current ( $I_r$ )
- $V_C$**  Clamping Voltage – 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**

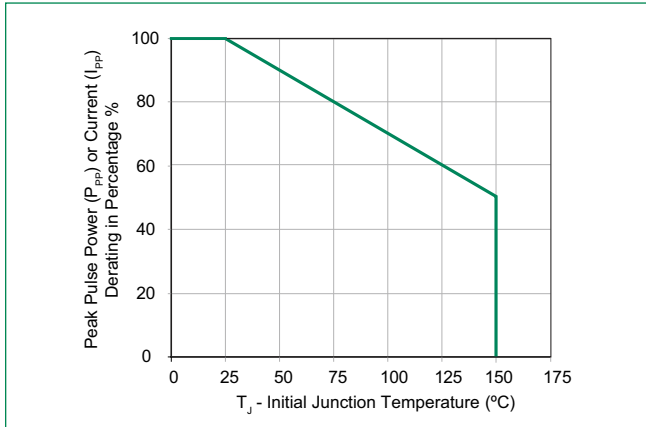


**Figure 2 - Peak Pulse Power Rating**

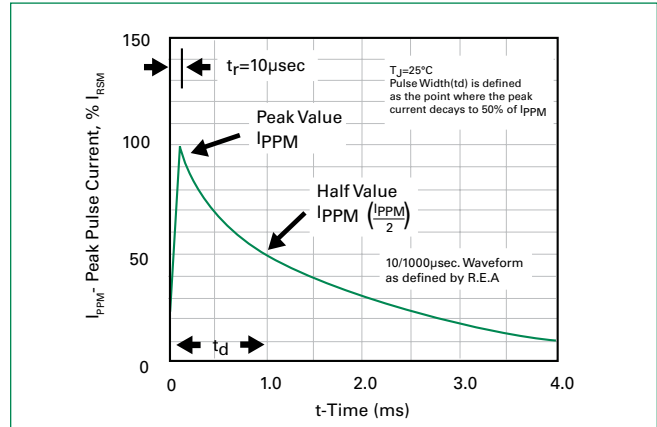


**Ratings and Characteristic Curves** ( $T_A=25^{\circ}\text{C}$  unless otherwise noted) (Continued)

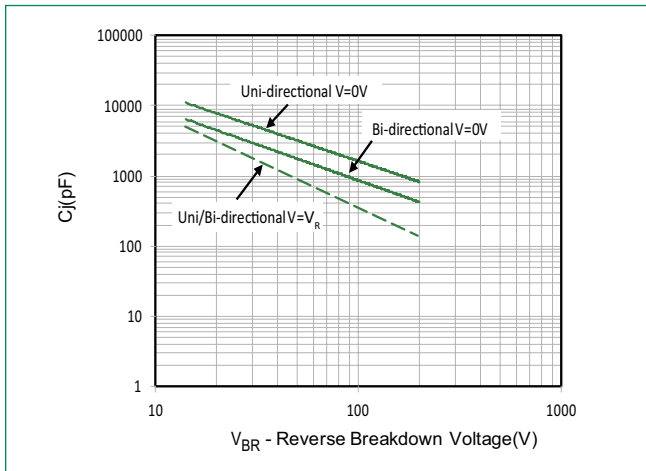
**Figure 3 - Peak Pulse Power Derating Curve**



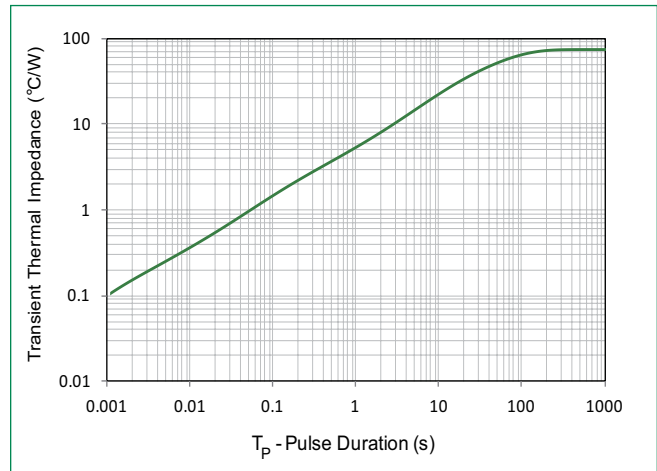
**Figure 4 - Pulse Waveform**



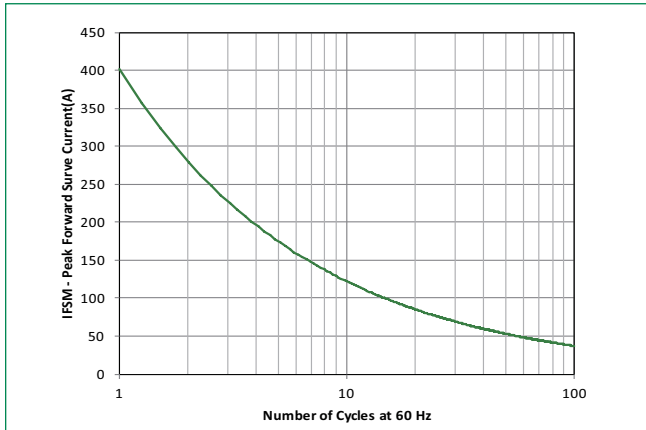
**Figure 5 - Typical Junction Capacitance**



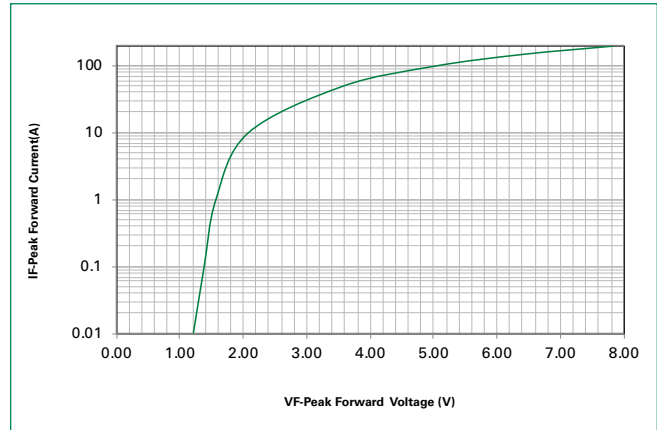
**Figure 6 - Typical Transient Thermal Impedance**



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

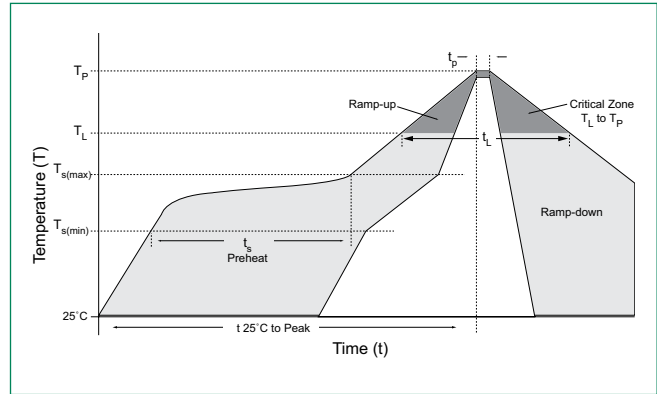


**Figure 8 - Peak Forward Voltage Drop vs Peak Forward Current (Typical Values)**



**Soldering Parameters**

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



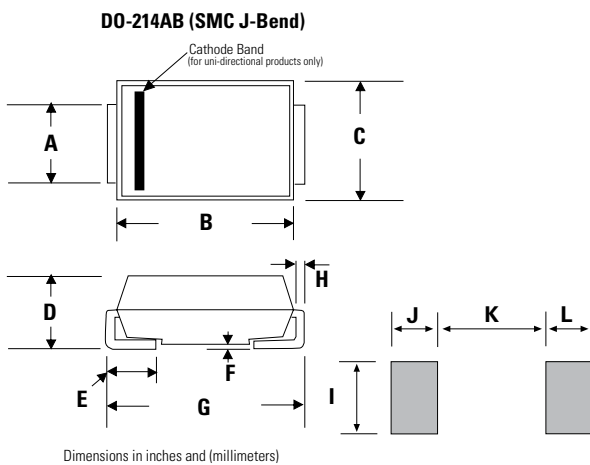
**Physical Specifications**

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

**Environmental Specifications**

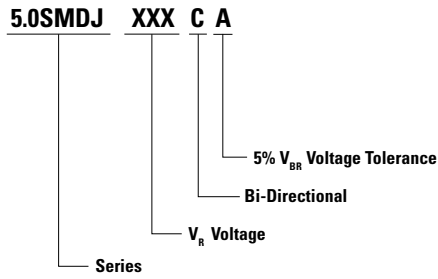
|                            |                          |
|----------------------------|--------------------------|
| <b>High Temp. Storage</b>  | JESD22-A103              |
| <b>HTRB</b>                | JESD22-A108              |
| <b>Temperature Cycling</b> | JESD22-A104              |
| <b>MSL</b>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

**Dimensions**

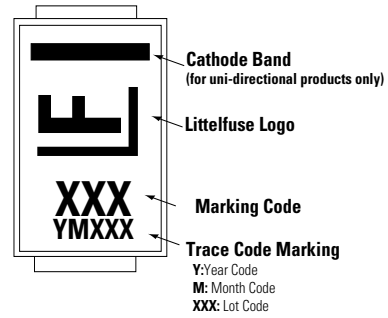


| Dimensions | Inches |       | Millimeters |       |
|------------|--------|-------|-------------|-------|
|            | Min    | Max   | Min         | Max   |
| <b>A</b>   | 0.114  | 0.126 | 2.900       | 3.200 |
| <b>B</b>   | 0.260  | 0.280 | 6.600       | 7.110 |
| <b>C</b>   | 0.220  | 0.245 |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

**Part Numbering System**



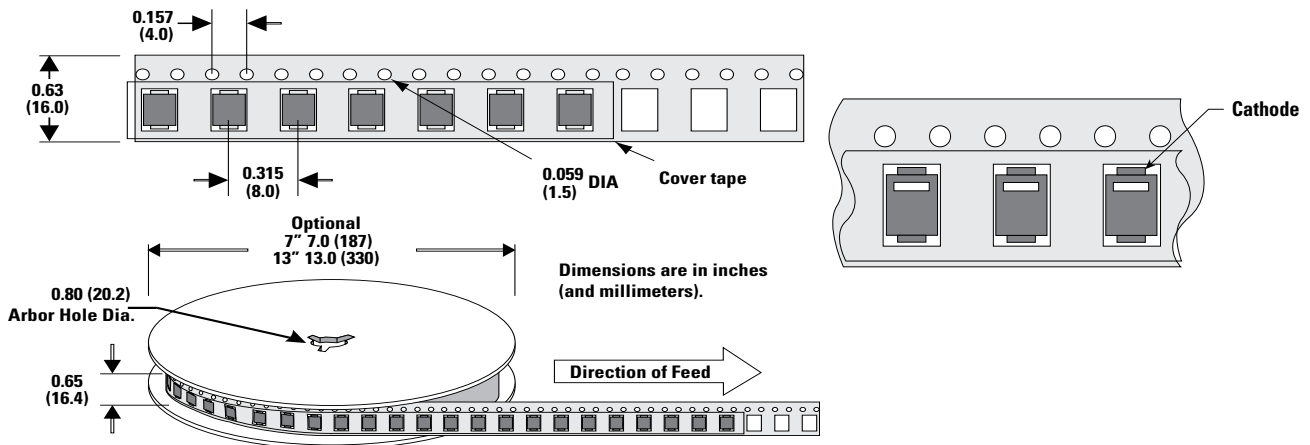
**Part Marking System**



**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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Revised: 08/26/20