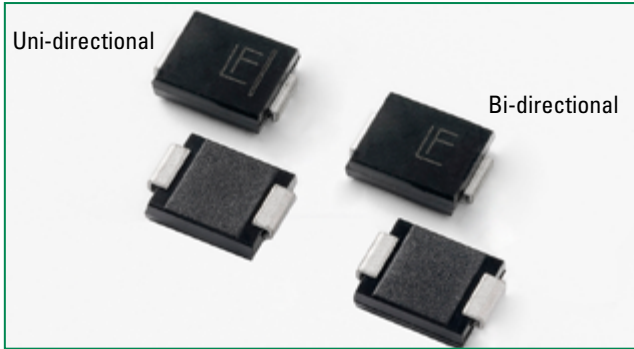





**THE DATASHEET OF  
1.5SMC36A**



### 1.5SMC Series



#### Agency Approvals

| AGENCY  | AGENCY FILE NUMBER |
|---|--------------------|
|  | E230531            |

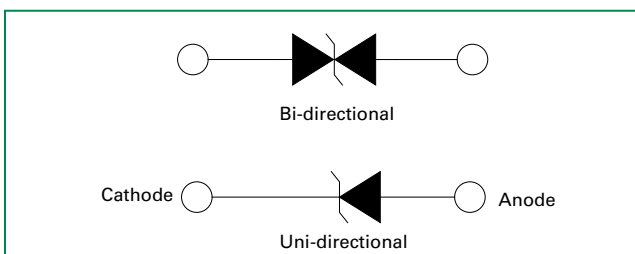
#### Maximum Ratings and Thermal Characteristics (T<sub>A</sub> = 25°C unless otherwise noted)

| Parameter   | Symbol           | Value      | Unit |
|---|------------------|------------|------|
| Peak Pulse Power Dissipation at T <sub>A</sub> = 25°C by 10/1000µs Waveform (Fig.2)(Note 1), (Note 2), (Note 5) | P <sub>PPM</sub> | 1500       | 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> | 200        | A    |
| Maximum Instantaneous Forward Voltage at 100A for Unidirectional Only (Note 4)                                  | V <sub>F</sub>   | 3.5/5.0    | 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:

- Non-repetitive current pulse, per Fig. 4 and derated above T<sub>J</sub> (initial) = 25°C per Fig. 3.
- Mounted on copper pad area of 0.31x0.31" (8.0 x 8.0mm) to each terminal.
- Measured on 8.3ms single half sine wave or equivalent square wave for unidirectional device only, duty cycle=4 per minute maximum.
- V<sub>F</sub> < 3.5V for single die parts and V<sub>F</sub> < 5.0V for stacked-die parts.
- The P<sub>PPM</sub> of stacked-die parts is 2000W and please contact littelfuse for the detail stacked-die parts.

#### Functional Diagram



#### Descriptions

The 1.5SMC series is designed specifically to protect sensitive electronic equipment from voltage transients induced by lightning and other transient voltage events.

#### Features

- 1500W peak pulse power capability at 10/1000µs waveform, repetition rate (duty cycles):0.01%
- Excellent clamping capability
- Low incremental surge resistance
- Typical I<sub>R</sub> less than 1µA when V<sub>BR</sub> min > 12V
- For surface mounted applications to optimize board space
- Low profile package
- Built-in strain relief
- 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
- Fast response time: typically less than 1.0ps from 0V to BV min
- Glass passivated chip junction
- 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, typical value is 0.1%)
- Plastic package is flammability rated V-0 per Underwriters Laboratories
- 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)

#### 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



Datasheet



Resources



Samples

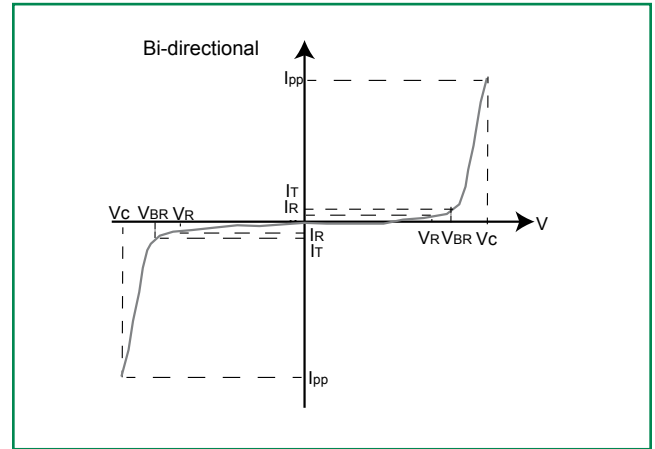
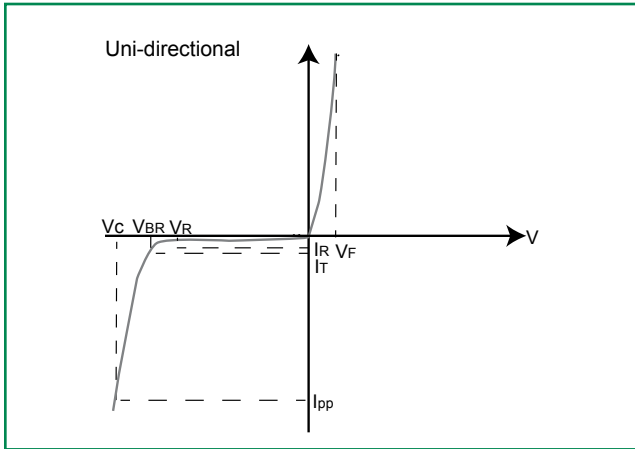
### Electrical Characteristics (T<sub>A</sub>=25°C unless otherwise noted)

| 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> (V) | Maximum Peak Pulse Current I <sub>pp</sub> (A) | Maximum Reverse Leakage I <sub>R</sub> @ V <sub>R</sub> (µA) | Agency Approval  |
|-------------------|------------------|---------|------|--|--|--------|----------------------------------|---|--|--|---|
|                   |                  | UNI     | BI   |  | MIN  | MAX    |                                  |   |  |  |   |
| 1.5SMC6.8A        | 1.5SMC6.8CA      | 6V8A    | 6V8C | 5.80   | 6.45   | 7.14   | 10                               | 10.5  | 144.8  | 1000   | X   |
| 1.5SMC7.5A        | 1.5SMC7.5CA      | 7V5A    | 7V5C | 6.40   | 7.13   | 7.88   | 10                               | 11.3  | 134.5  | 500  | X   |
| 1.5SMC8.2A        | 1.5SMC8.2CA      | 8V2A    | 8V2C | 7.02   | 7.79   | 8.61   | 10                               | 12.1  | 125.6  | 200  | X   |
| 1.5SMC9.1A        | 1.5SMC9.1CA      | 9V1A    | 9V1C | 7.78   | 8.65   | 9.50   | 1                                | 13.4  | 113.4  | 50   | X   |
| 1.5SMC10A         | 1.5SMC10CA       | 10A     | 10C  | 8.55   | 9.50   | 10.50  | 1                                | 14.5  | 104.8  | 10   | X   |
| 1.5SMC11A         | 1.5SMC11CA       | 11A     | 11C  | 9.40   | 10.50  | 11.60  | 1                                | 15.6  | 97.4   | 5  | X   |
| 1.5SMC12A         | 1.5SMC12CA       | 12A     | 12C  | 10.20  | 11.40  | 12.60  | 1                                | 16.7  | 91.0   | 5  | X   |
| 1.5SMC13A         | 1.5SMC13CA       | 13A     | 13C  | 11.10  | 12.40  | 13.70  | 1                                | 18.2  | 83.5   | 1  | X   |
| 1.5SMC15A         | 1.5SMC15CA       | 15A     | 15C  | 12.80  | 14.30  | 15.80  | 1                                | 21.2  | 71.7   | 1  | X   |
| 1.5SMC16A         | 1.5SMC16CA       | 16A     | 16C  | 13.60  | 15.20  | 16.80  | 1                                | 22.5  | 67.6   | 1  | X   |
| 1.5SMC18A         | 1.5SMC18CA       | 18A     | 18C  | 15.30  | 17.10  | 18.90  | 1                                | 25.2  | 60.3   | 1  | X   |
| 1.5SMC20A         | 1.5SMC20CA       | 20A     | 20C  | 17.10  | 19.00  | 21.00  | 1                                | 27.7  | 54.9   | 1  | X   |
| 1.5SMC22A         | 1.5SMC22CA       | 22A     | 22C  | 18.80  | 20.90  | 23.10  | 1                                | 30.6  | 49.7   | 1  | X   |
| 1.5SMC24A         | 1.5SMC24CA       | 24A     | 24C  | 20.50  | 22.80  | 25.20  | 1                                | 33.2  | 45.8   | 1  | X   |
| 1.5SMC27A         | 1.5SMC27CA       | 27A     | 27C  | 23.10  | 25.70  | 28.40  | 1                                | 37.5  | 40.5   | 1  | X   |
| 1.5SMC30A         | 1.5SMC30CA       | 30A     | 30C  | 25.60  | 28.50  | 31.50  | 1                                | 41.4  | 36.7   | 1  | X   |
| 1.5SMC33A         | 1.5SMC33CA       | 33A     | 33C  | 28.20  | 31.40  | 34.70  | 1                                | 45.7  | 33.3   | 1  | X   |
| 1.5SMC36A         | 1.5SMC36CA       | 36A     | 36C  | 30.80  | 34.20  | 37.80  | 1                                | 49.9  | 30.5   | 1  | X   |
| 1.5SMC39A         | 1.5SMC39CA       | 39A     | 39C  | 33.30  | 37.10  | 41.00  | 1                                | 53.9  | 28.2   | 1  | X   |
| 1.5SMC43A         | 1.5SMC43CA       | 43A     | 43C  | 36.80  | 40.90  | 45.20  | 1                                | 59.3  | 25.6   | 1  | X   |
| 1.5SMC47A         | 1.5SMC47CA       | 47A     | 47C  | 40.20  | 44.70  | 49.40  | 1                                | 64.8  | 23.5   | 1  | X   |
| 1.5SMC51A         | 1.5SMC51CA       | 51A     | 51C  | 43.60  | 48.50  | 53.60  | 1                                | 70.1  | 21.7   | 1  | X   |
| 1.5SMC56A         | 1.5SMC56CA       | 56A     | 56C  | 47.80  | 53.20  | 58.80  | 1                                | 77.0  | 19.7   | 1  | X   |
| 1.5SMC62A         | 1.5SMC62CA       | 62A     | 62C  | 53.00  | 58.90  | 65.10  | 1                                | 85.0  | 17.9   | 1  | X   |
| 1.5SMC68A         | 1.5SMC68CA       | 68A     | 68C  | 58.10  | 64.60  | 71.40  | 1                                | 92.0  | 16.5   | 1  | X   |
| 1.5SMC75A         | 1.5SMC75CA       | 75A     | 75C  | 64.10  | 71.30  | 78.80  | 1                                | 103.0   | 14.8   | 1  | X   |
| 1.5SMC82A         | 1.5SMC82CA       | 82A     | 82C  | 70.10  | 77.90  | 86.10  | 1                                | 113.0   | 13.5   | 1  | X   |
| 1.5SMC91A         | 1.5SMC91CA       | 91A     | 91C  | 77.80  | 86.50  | 95.50  | 1                                | 125.0   | 12.2   | 1  | X   |
| 1.5SMC100A        | 1.5SMC100CA      | 100A    | 100C | 85.50  | 95.00  | 105.00 | 1                                | 137.0   | 11.1   | 1  | X   |
| 1.5SMC110A        | 1.5SMC110CA      | 110A    | 110C | 94.00  | 105.00   | 116.00 | 1                                | 152.0   | 10.0   | 1  | X   |
| 1.5SMC120A        | 1.5SMC120CA      | 120A    | 120C | 102.00   | 114.00   | 126.00 | 1                                | 165.0   | 9.2  | 1  | X   |
| 1.5SMC130A        | 1.5SMC130CA      | 130A    | 130C | 111.00   | 124.00   | 137.00 | 1                                | 179.0   | 8.5  | 1  | X   |
| 1.5SMC150A        | 1.5SMC150CA      | 150A    | 150C | 128.00   | 143.00   | 158.00 | 1                                | 207.0   | 7.3  | 1  | X   |
| 1.5SMC160A        | 1.5SMC160CA      | 160A    | 160C | 136.00   | 152.00   | 168.00 | 1                                | 219.0   | 6.9  | 1  | X   |
| 1.5SMC170A        | 1.5SMC170CA      | 170A    | 170C | 145.00   | 162.00   | 179.00 | 1                                | 234.0   | 6.5  | 1  | X   |
| 1.5SMC180A        | 1.5SMC180CA      | 180A    | 180C | 154.00   | 171.00   | 189.00 | 1                                | 246.0   | 6.2  | 1  | X   |
| 1.5SMC200A        | 1.5SMC200CA      | 200A    | 200C | 171.00   | 190.00   | 210.00 | 1                                | 274.0   | 5.5  | 1  | X   |
| 1.5SMC220A        | 1.5SMC220CA      | 220A    | 220C | 185.00   | 209.00   | 231.00 | 1                                | 328.0   | 4.6  | 1  | X   |
| 1.5SMC250A        | 1.5SMC250CA      | 250A    | 250C | 214.00   | 237.00   | 263.00 | 1                                | 344.0   | 4.4  | 1  | X   |
| 1.5SMC300A        | 1.5SMC300CA      | 300A    | 300C | 256.00   | 285.00   | 315.00 | 1                                | 414.0   | 3.7  | 1  | X   |
| 1.5SMC350A        | 1.5SMC350CA      | 350A    | 350C | 300.00   | 332.00   | 368.00 | 1                                | 482.0   | 3.2  | 1  | X   |
| 1.5SMC400A        | 1.5SMC400CA      | 400A    | 400C | 342.00   | 380.00   | 420.00 | 1                                | 548.0   | 2.8  | 1  | X   |
| 1.5SMC440A        | 1.5SMC440CA      | 440A    | 440C | 376.00   | 418.00   | 462.00 | 1                                | 602.0   | 2.5  | 1  | X   |
| 1.5SMC480A        | 1.5SMC480CA      | 480A    | 480C | 408.00   | 456.00   | 504.00 | 1                                | 658.0   | 2.3  | 1  |   |
| 1.5SMC510A        | 1.5SMC510CA      | 510A    | 510C | 434.00   | 485.00   | 535.00 | 1                                | 698.0   | 2.1  | 1  |   |
| 1.5SMC530A        | 1.5SMC530CA      | 530A    | 530C | 451.00   | 503.50   | 556.50 | 1                                | 725.0   | 2.1  | 1  |   |
| 1.5SMC540A        | 1.5SMC540CA      | 540A    | 540C | 460.00   | 513.00   | 567.00 | 1                                | 740.0   | 2.0  | 1  |   |
| 1.5SMC550A        | 1.5SMC550CA      | 550A    | 550C | 468.00   | 522.50   | 577.50 | 1                                | 760.0   | 2.0  | 1  |   |

For bidirectional type having V<sub>R</sub> of 10 volts and less, the I<sub>R</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.

### I-V Curve Characteristics



**P<sub>PPM</sub> Peak Pulse Power Dissipation** – Max power dissipation

**V<sub>R</sub> Stand-off Voltage** – Maximum voltage that can be applied to the TVS without operation

**V<sub>BR</sub> Breakdown Voltage** – Maximum voltage that flows through the TVS at a specified test current (I<sub>T</sub>)

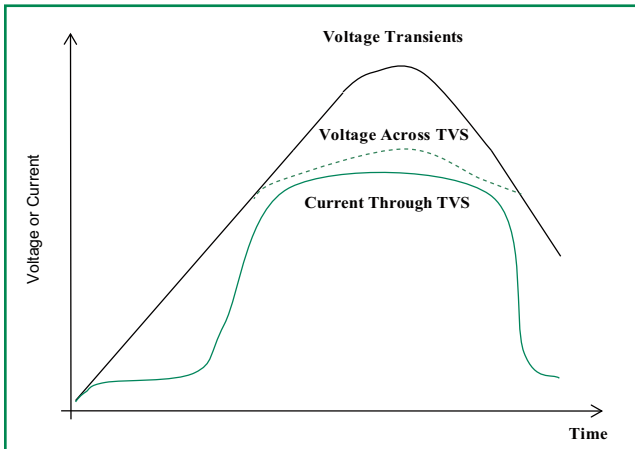
**V<sub>C</sub> Clamping Voltage** – Peak voltage measured across the TVS at a specified I<sub>ppm</sub> (peak impulse current)

**I<sub>R</sub> Reverse Leakage Current** – Current measured at V<sub>R</sub>

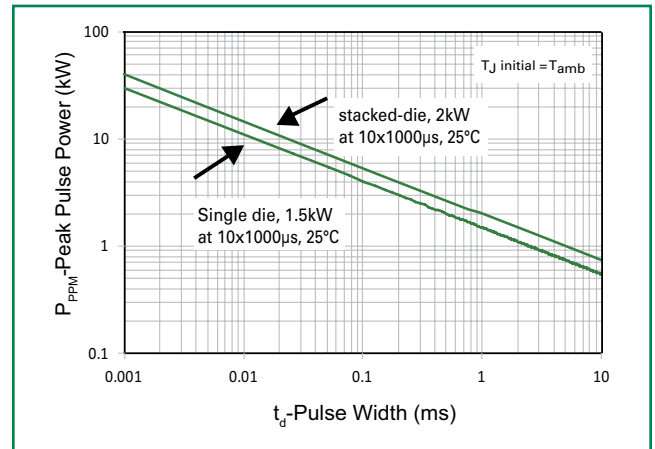
**V<sub>F</sub> Forward Voltage Drop for Uni-directional**

### Ratings and Characteristic Curves (T<sub>A</sub>=25°C unless otherwise noted)

**Figure 1 - TVS Transients Clamping Waveform**



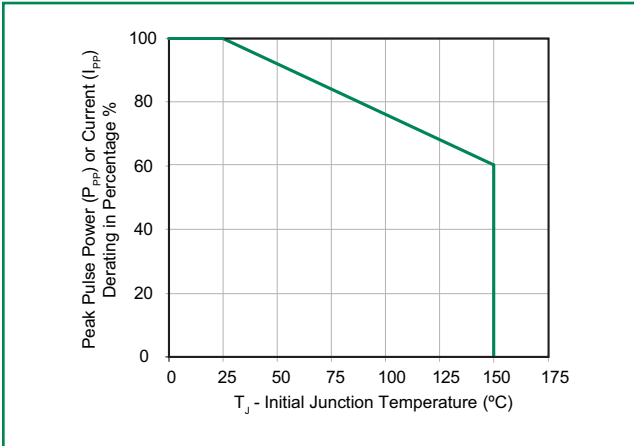
**Figure 2 - Peak Pulse Power Rating**



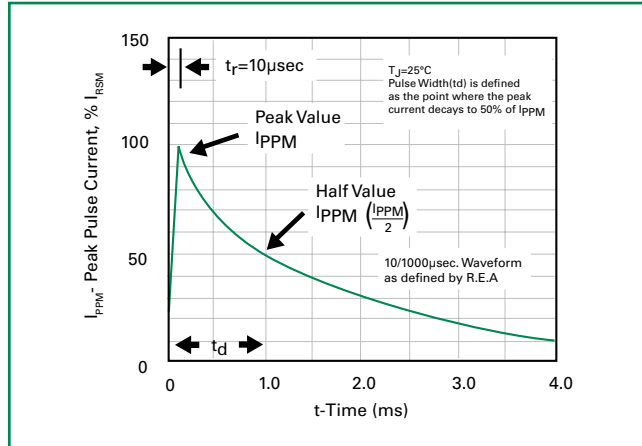
continues on next page.

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

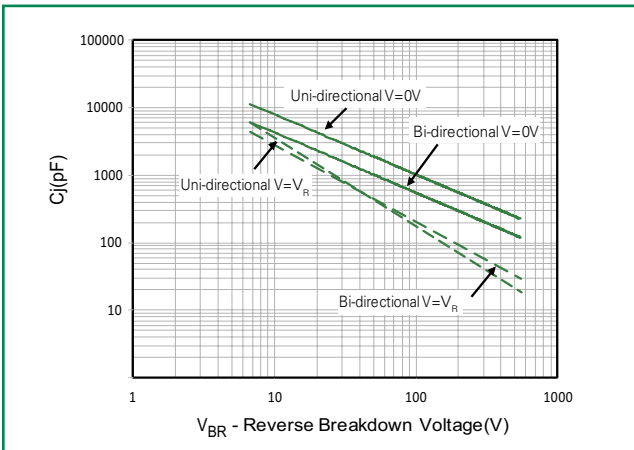
**Figure 3 - Peak Pulse Power Derating Curve**



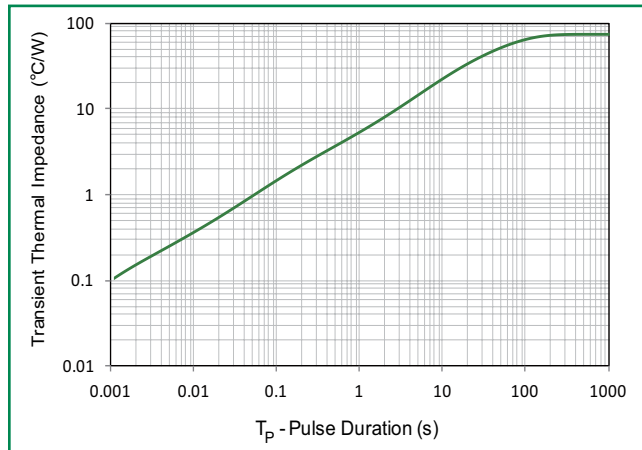
**Figure 4 - Pulse Waveform**



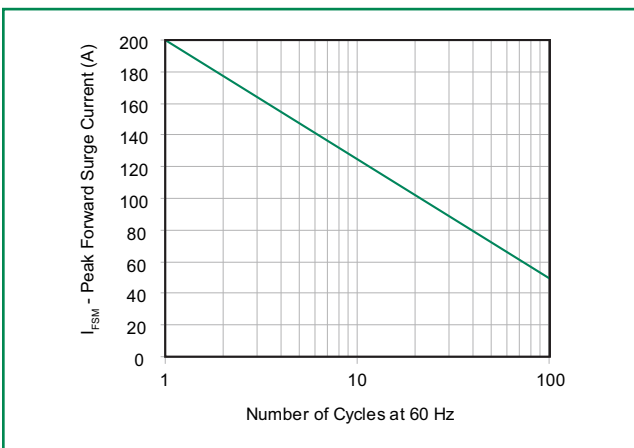
**Figure 5 - Typical Junction Capacitance**



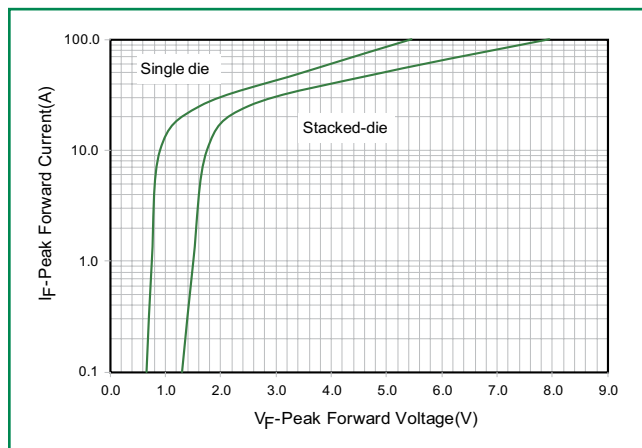
**Figure 6 - Typical Transient Thermal Impedance**



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

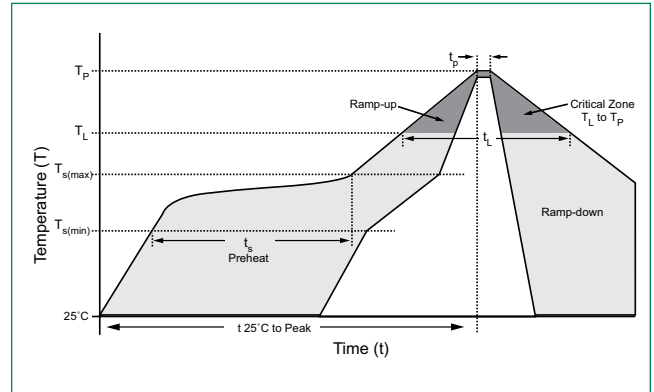


**Figure 8 - Peak Forward Voltage Drop vs Peak Forward Current (Typical Values)**



### 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 ( $T_A$ ) (Liquidus) | 217°C                   |
|  | - Time (min to max) ( $t_s$ )      | 60 – 150 seconds        |
| Peak Temperature ( $T_p$ )                             |                                    | 260 <sup>+0/-5</sup> °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  |                                    | 260°C                   |



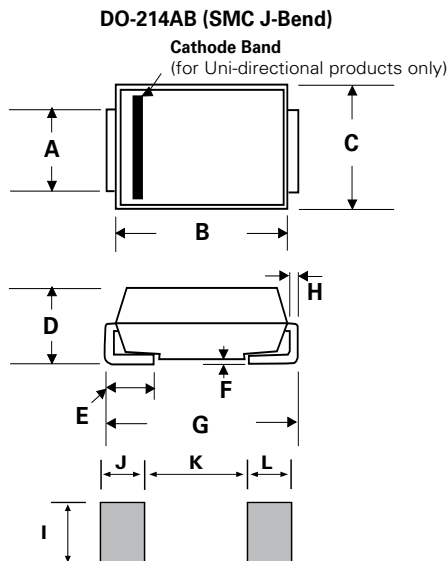
### Physical Specifications

|                 |   |
|-----------------|---|
| <b>Weight</b>   | 0.007 ounce, 0.21 grams   |
| <b>Case</b>     | JEDEC DO214AB. Molded plastic body 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

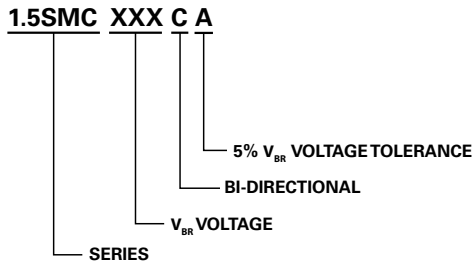
|                            |                          |
|----------------------------|--------------------------|
| <b>High Temp. Storage</b>  | JESD22-A103              |
| <b>HTRB</b>                | JESD22-A108              |
| <b>Temperature Cycling</b> | JESD22-A104              |
| <b>MSL</b>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

### Dimensions

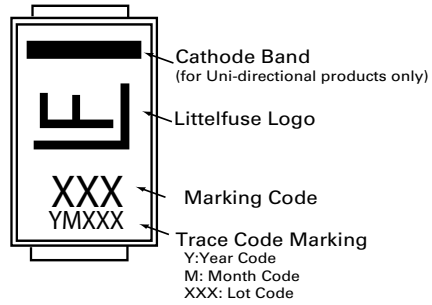


| Dimensions | Inches |       | Millimeters |       |
|------------|--------|-------|-------------|-------|
|            | Min    | Max   | Min         | Max   |
| A          | 0.114  | 0.126 | 2.900       | 3.200 |
| B          | 0.260  | 0.280 | 6.600       | 7.110 |
| C          | 0.220  | 0.245 | 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

| Part number | Component Package | Quantity | Packaging Option                 | Packaging Specification |
|-------------|-------------------|----------|----------------------------------|-------------------------|
| 1.5SMCxxxXX | DO-214AB          | 3000     | Tape & Reel - 16mm tape/13" reel | EIA STD RS-481          |

### Tape and Reel Specification



## Looking for pricing, stock, or lifecycle information?

Click below to explore more details on WIN SOURCE:

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 [Littelfuse Inc. Information](#)

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