

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

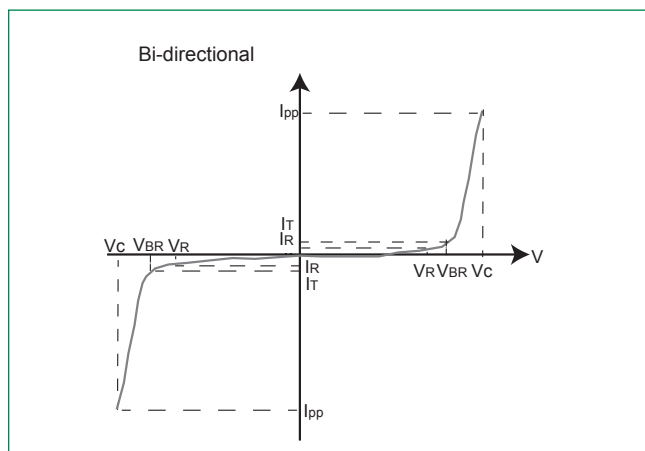
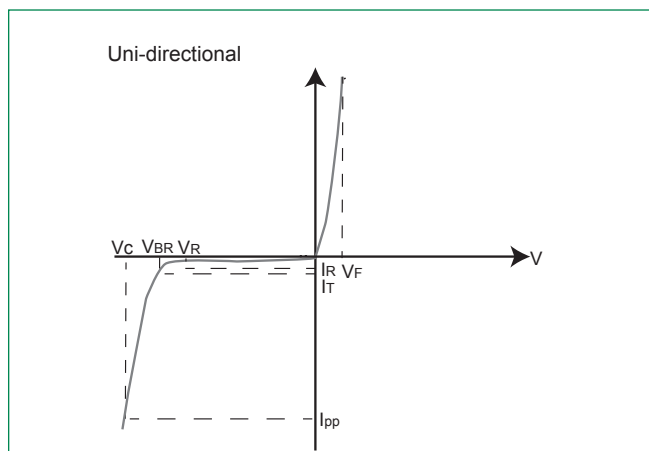
| Part Number (Uni) | Part Number (Bi) | Marking |      | Reverse Stand off Voltage V <sub>R</sub> (Volts) | Breakdown Voltage V <sub>BR</sub> (Volts) @ I <sub>T</sub> |        | Test Current I <sub>T</sub> (mA) | Maximum Clamping Voltage V <sub>C</sub> @ I <sub>pp</sub> (V) | Maximum Peak Pulse Current 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                                                         | 4.2                                            | 1                                                            | X                                                                                                   |
| 1.5SMC400A*       | 1.5SMC400CA*     | 400A    | 400C | 342.00                                           | 380.00                                                     | 420.00 | 1                                | 548.0                                                         | 3.7                                            | 1                                                            | X                                                                                                   |
| 1.5SMC440A*       | 1.5SMC440CA*     | 440A    | 440C | 376.00                                           | 418.00                                                     | 462.00 | 1                                | 602.0                                                         | 3.4                                            | 1                                                            | X                                                                                                   |
| 1.5SMC480A*       | 1.5SMC480CA*     | 480A    | 480C | 408.00                                           | 456.00                                                     | 504.00 | 1                                | 658.0                                                         | 3.1                                            | 1                                                            | X                                                                                                   |
| 1.5SMC510A*       | 1.5SMC510CA*     | 510A    | 510C | 434.00                                           | 485.00                                                     | 535.00 | 1                                | 698.0                                                         | 2.9                                            | 1                                                            | X                                                                                                   |
| 1.5SMC530A*       | 1.5SMC530CA*     | 530A    | 530C | 451.00                                           | 503.50                                                     | 556.50 | 1                                | 725.0                                                         | 2.8                                            | 1                                                            | X                                                                                                   |
| 1.5SMC540A*       | 1.5SMC540CA*     | 540A    | 540C | 460.00                                           | 513.00                                                     | 567.00 | 1                                | 740.0                                                         | 2.8                                            | 1                                                            | X                                                                                                   |
| 1.5SMC550A*       | 1.5SMC550CA*     | 550A    | 550C | 468.00                                           | 522.50                                                     | 577.50 | 1                                | 760.0                                                         | 2.7                                            | 1                                                            | X                                                                                                   |
| 1.5SMC600A*       | 1.5SMC600CA*     | 600A    | 600C | 512.00                                           | 570.00                                                     | 630.00 | 1                                | 828.0                                                         | 2.5                                            | 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, the parts without A are currently available, but not recommended for new designs. The parts with A are preferred.

For stack-die parts, use \* to label the part number.

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

Figure 1 - TVS Transients Clamping Waveform

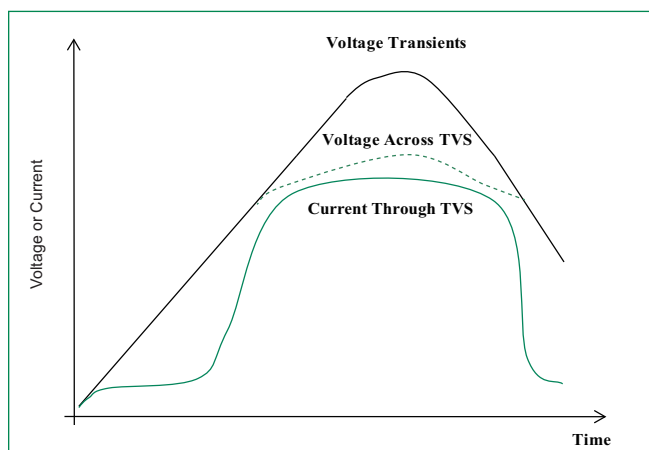
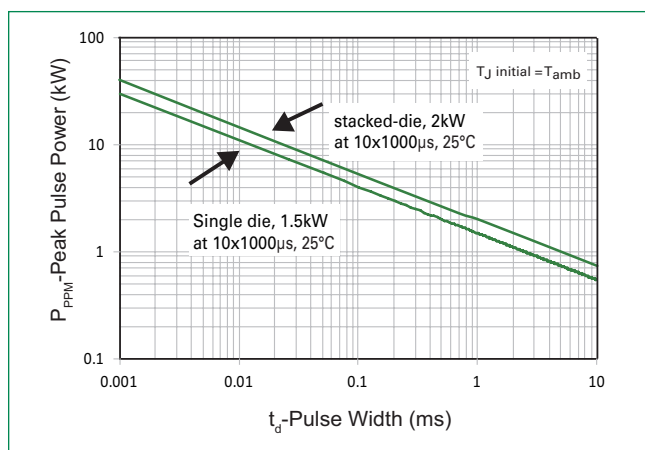
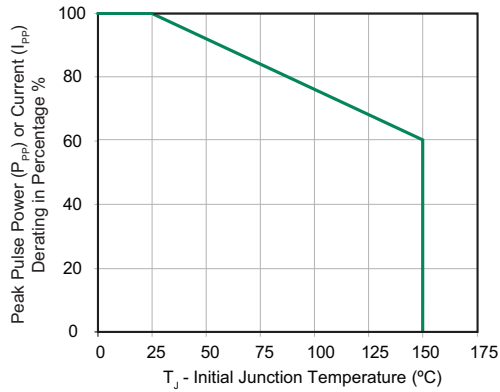


Figure 2 - Peak Pulse Power Rating

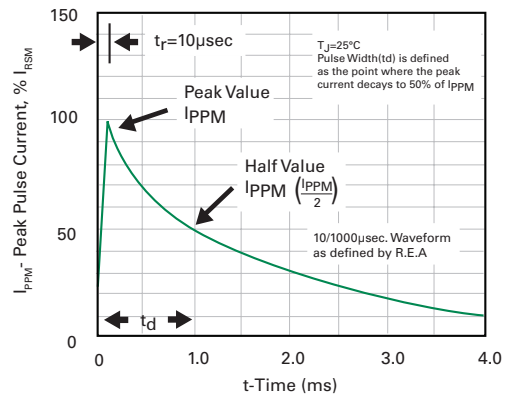


**Ratings and Characteristic Curves** ( $T_A=25^\circ\text{C}$  unless otherwise noted) (Continued)

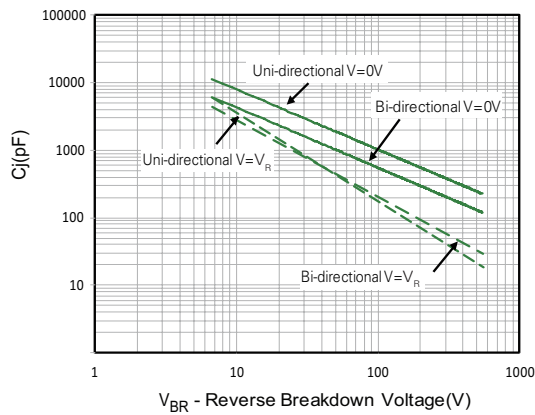
**Figure 3 - Peak Pulse Power Derating Curve**



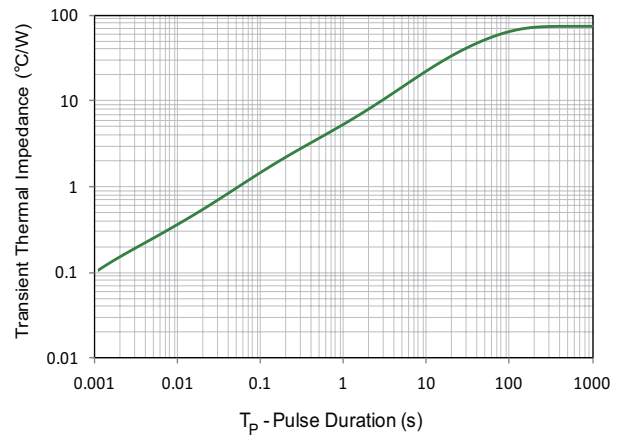
**Figure 4 - Pulse Waveform**



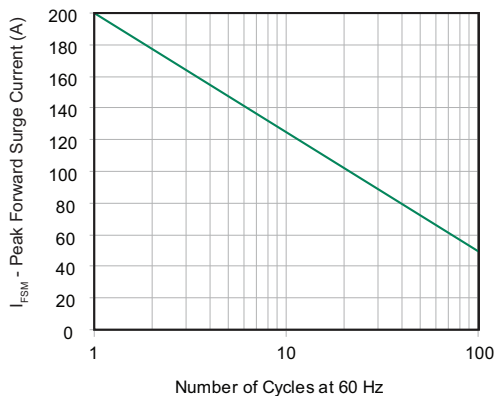
**Figure 5 - Typical Junction Capacitance**



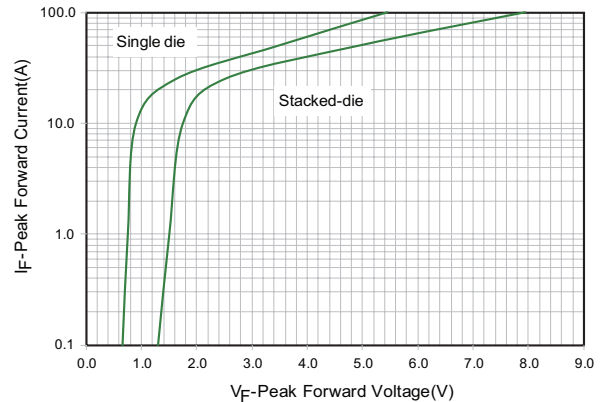
**Figure 6 - Typical Transient Thermal Impedance**



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

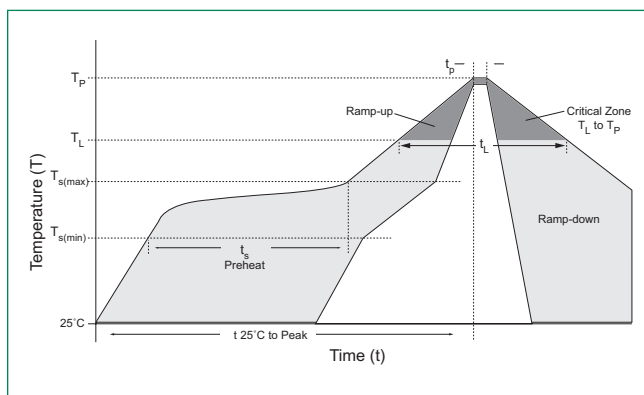


**Figure 8 - Peak Forward Voltage Drop vs Peak Forward Current (Typical Values)**



## 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 – 120 secs           |
| <b>Average ramp up rate (Liquidus Temp (<math>T_L</math>) to peak</b> |                                    | 3°C/second max          |
| <b><math>T_{s(max)}</math> to <math>T_L</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>  |                                    | 30 seconds max          |
| <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>                                                  |                                    | 260°C                   |



## Physical Specifications

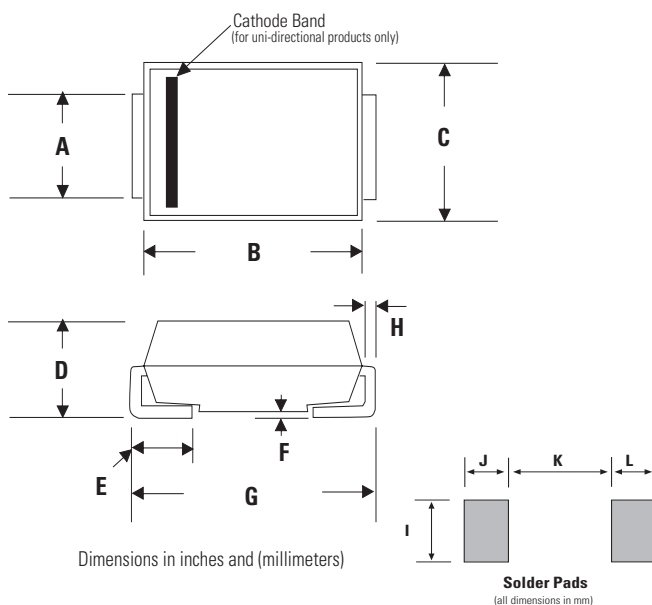
|                 |                                                                   |
|-----------------|-------------------------------------------------------------------|
| <b>Weight</b>   | 0.007 ounce, 0.21 grams                                           |
| <b>Case</b>     | JEDEC DO214AB. Molded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

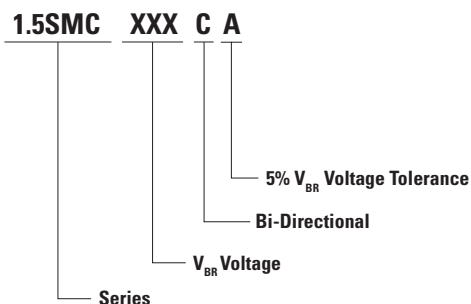
## Dimensions

### DO-214AB (SMC J-Bend)



| 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



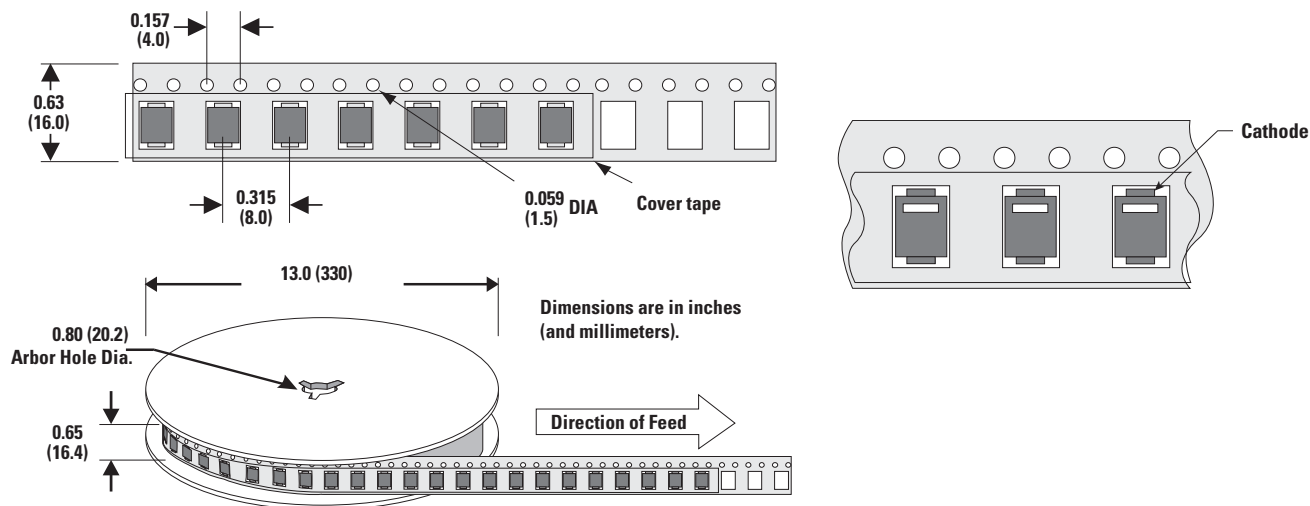
### Part Marking System



### Packaging

| 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



**Disclaimer Notice** - Littelfuse products are not designed for, and shall not be used for, any purpose (including, without limitation, automotive, military, aerospace, medical, life-saving, life-sustaining or nuclear facility applications, devices intended for surgical implant into the body, or any other application in which the failure or lack of desired operation of the product may result in personal injury, death, or property damage) other than those expressly set forth in applicable Littelfuse product documentation. Warranties granted by Littelfuse shall be deemed void for products used for any purpose not expressly set forth in applicable Littelfuse documentation. Littelfuse shall not be liable for any claims or damages arising out of products used in applications not expressly intended by Littelfuse as set forth in applicable Littelfuse documentation. The sale and use of Littelfuse products is subject to Littelfuse Terms and Conditions of Sale, unless otherwise agreed by Littelfuse. "Littelfuse" includes Littelfuse, Inc., and all of its affiliate entities. <http://www.littelfuse.com/disclaimer-electronics>