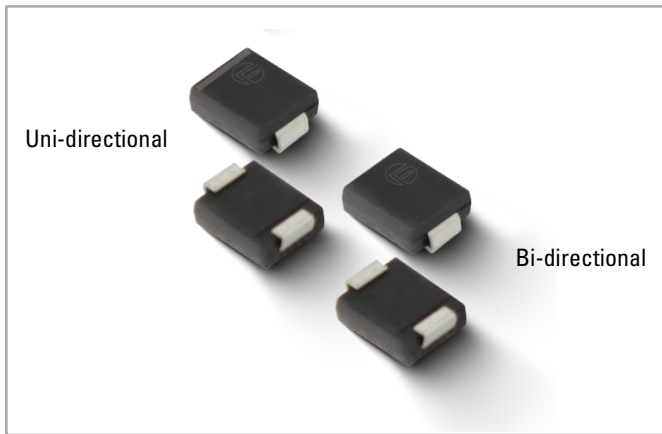


# 1.5SMC Series

## Surface Mount – 1500W



### Additional Information



Resources



Accessories



Samples

### Agency Approvals

| Agency | Agency File Number |
|--------|--------------------|
|        | E528309            |

### Maximum Ratings and Thermal Characteristics

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

| Parameter  | Symbol          | Value      | Unit                        |
|--|-----------------|------------|-----------------------------|
| Peak Pulse Power Dissipation by 10/1000 $\mu\text{s}$ Waveform (Fig.1)(Note1)(Note2) -Single Die Parts | $P_{PPM}$       | 1500       | 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)                                       | $I_{FSM}$       | 200        | A                           |
| Maximum Instantaneous Forward Voltage at 100A for Unidirectional Only (Note 4)                         | $V_F$           | 3.5/5.0    | V                           |
| Operating Temperature Range  | $T_J$           | -55 to 150 | $^{\circ}\text{C}$          |
| Storage Temperature Range  | $T_{STG}$       | -55 to 150 | $^{\circ}\text{C}$          |
| Typical Thermal Resistance Junction to Lead  | $R_{\theta JL}$ | 15         | $^{\circ}\text{C}/\text{W}$ |
| Typical Thermal Resistance Junction to Ambient   | $R_{\theta JA}$ | 75         | $^{\circ}\text{C}/\text{W}$ |

#### Notes:

- Non-repetitive current pulse, per Fig.3 and derated above  $T_J$  (initial)  $=25^{\circ}\text{C}$  per Fig.2.
- 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.
- $V_F < 3.5\text{V}$  for single die parts and  $V_F < 5.0\text{V}$  for stacked-die parts.

### Description

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

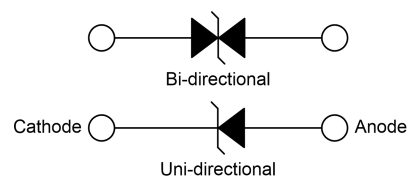
### Features

- 1500W peak pulse power capability at 10/1000 $\mu\text{s}$  waveform, repetition rate (duty cycles):0.01%
- Excellent clamping capability
- Low incremental surge resistance
- Typical  $I_R$  less than 1 $\mu\text{A}$  when  $V_B \text{ min} > 12\text{V}$
- 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
- ESD protection of data lines in accordance with IEC 61000-4-2, 30kV(Air), 30kV (Contact)
- EFT protection of data lines in accordance with IEC 61000-4-4
- Fast response time: typically less than 1.0ps from 0V to  $V_B \text{ min}$
- Glass passivated chip junction
- High temperature to reflow soldering guaranteed: 260 $^{\circ}\text{C}/20\sim 40\text{sec}$ .
- $V_B @ T_J = V_B @ 25^{\circ}\text{C} \times (1 + \alpha T (T_J - 25))$  ( $\alpha$  T: Temperature Coefficient, typical value is 0.1%)
- 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)

### 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.


### Functional Diagram



# 1.5SMC Series

## Surface Mount – 1500W

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

| Part Number |             | Device Marking Code |      | Reverse Stand-Off Voltage | Breakdown Voltage @ $I_T$ |                 | Test Current | Maximum Clamping Voltage @ $I_{PP}$ | Peak Pulse Current | Reverse Leakage @ $V_R$ | Agency Approvals  |
|-------------|-------------|---------------------|------|---------------------------|---------------------------|-----------------|--------------|-------------------------------------|--------------------|-------------------------|---|
| Uni.        | Bi.         | Uni.                | Bi.  | $V_R(V)$                  | $V_{B Min.}(V)$           | $V_{B Max.}(V)$ | $I_T(mA)$    | $V_C(V)$                            | $I_{PP}(A)$        | $I_R(\mu A)$            |  |
| 1.5SMC6.8A  | 1.5SMC6.8CA | 6V8A                | 6V8C | 5.80                      | 6.45                      | 7.14            | 10           | 10.5                                | 144.8              | 1000                    |   |
| 1.5SMC7.5A  | 1.5SMC7.5CA | 7V5A                | 7V5C | 6.40                      | 7.13                      | 7.88            | 10           | 11.3                                | 134.5              | 500                     | ✓   |
| 1.5SMC8.2A  | 1.5SMC8.2CA | 8V2A                | 8V2C | 7.02                      | 7.79                      | 8.61            | 10           | 12.1                                | 125.6              | 200                     | ✓   |
| 1.5SMC9.1A  | 1.5SMC9.1CA | 9V1A                | 9V1C | 7.78                      | 8.65                      | 9.55            | 1            | 13.4                                | 113.4              | 50                      | ✓   |
| 1.5SMC10A   | 1.5SMC10CA  | 10A                 | 10C  | 8.55                      | 9.50                      | 10.50           | 1            | 14.5                                | 104.8              | 10                      | ✓   |
| 1.5SMC11A   | 1.5SMC11CA  | 11A                 | 11C  | 9.40                      | 10.50                     | 11.60           | 1            | 15.6                                | 97.4               | 5                       | ✓   |
| 1.5SMC12A   | 1.5SMC12CA  | 12A                 | 12C  | 10.20                     | 11.40                     | 12.60           | 1            | 16.7                                | 91.0               | 5                       | ✓   |
| 1.5SMC13A   | 1.5SMC13CA  | 13A                 | 13C  | 11.10                     | 12.40                     | 13.70           | 1            | 18.2                                | 83.5               | 1                       | ✓   |
| 1.5SMC15A   | 1.5SMC15CA  | 15A                 | 15C  | 12.80                     | 14.30                     | 15.80           | 1            | 21.2                                | 71.7               | 1                       | ✓   |
| 1.5SMC16A   | 1.5SMC16CA  | 16A                 | 16C  | 13.60                     | 15.20                     | 16.80           | 1            | 22.5                                | 67.6               | 1                       | ✓   |
| 1.5SMC18A   | 1.5SMC18CA  | 18A                 | 18C  | 15.30                     | 17.10                     | 18.90           | 1            | 25.2                                | 60.3               | 1                       | ✓   |
| 1.5SMC20A   | 1.5SMC20CA  | 20A                 | 20C  | 17.10                     | 19.00                     | 21.00           | 1            | 27.7                                | 54.9               | 1                       | ✓   |
| 1.5SMC22A   | 1.5SMC22CA  | 22A                 | 22C  | 18.80                     | 20.90                     | 23.10           | 1            | 30.6                                | 49.7               | 1                       | ✓   |
| 1.5SMC24A   | 1.5SMC24CA  | 24A                 | 24C  | 20.50                     | 22.80                     | 25.20           | 1            | 33.2                                | 45.8               | 1                       | ✓   |
| 1.5SMC27A   | 1.5SMC27CA  | 27A                 | 27C  | 23.10                     | 25.70                     | 28.40           | 1            | 37.5                                | 40.5               | 1                       | ✓   |
| 1.5SMC30A   | 1.5SMC30CA  | 30A                 | 30C  | 25.60                     | 28.50                     | 31.50           | 1            | 41.4                                | 36.7               | 1                       | ✓   |
| 1.5SMC33A   | 1.5SMC33CA  | 33A                 | 33C  | 28.20                     | 31.40                     | 34.70           | 1            | 45.7                                | 33.3               | 1                       | ✓   |
| 1.5SMC36A   | 1.5SMC36CA  | 36A                 | 36C  | 30.80                     | 34.20                     | 37.80           | 1            | 49.9                                | 30.5               | 1                       | ✓   |
| 1.5SMC39A   | 1.5SMC39CA  | 39A                 | 39C  | 33.30                     | 37.10                     | 41.00           | 1            | 53.9                                | 28.2               | 1                       | ✓   |
| 1.5SMC43A   | 1.5SMC43CA  | 43A                 | 43C  | 36.80                     | 40.90                     | 45.20           | 1            | 59.3                                | 25.6               | 1                       | ✓   |
| 1.5SMC47A   | 1.5SMC47CA  | 47A                 | 47C  | 40.20                     | 44.70                     | 49.40           | 1            | 64.8                                | 23.5               | 1                       | ✓   |
| 1.5SMC51A   | 1.5SMC51CA  | 51A                 | 51C  | 43.60                     | 48.50                     | 53.60           | 1            | 70.1                                | 21.7               | 1                       | ✓   |
| 1.5SMC56A   | 1.5SMC56CA  | 56A                 | 56C  | 47.80                     | 53.20                     | 58.80           | 1            | 77.0                                | 19.7               | 1                       | ✓   |
| 1.5SMC62A   | 1.5SMC62CA  | 62A                 | 62C  | 53.00                     | 58.90                     | 65.10           | 1            | 85.0                                | 17.9               | 1                       | ✓   |
| 1.5SMC68A   | 1.5SMC68CA  | 68A                 | 68C  | 58.10                     | 64.60                     | 71.40           | 1            | 92.0                                | 16.5               | 1                       | ✓   |
| 1.5SMC75A   | 1.5SMC75CA  | 75A                 | 75C  | 64.10                     | 71.30                     | 78.80           | 1            | 103.0                               | 14.8               | 1                       | ✓   |
| 1.5SMC82A   | 1.5SMC82CA  | 82A                 | 82C  | 70.10                     | 77.90                     | 86.10           | 1            | 113.0                               | 13.5               | 1                       | ✓   |
| 1.5SMC91A   | 1.5SMC91CA  | 91A                 | 91C  | 77.80                     | 86.50                     | 95.50           | 1            | 125.0                               | 12.2               | 1                       | ✓   |
| 1.5SMC100A  | 1.5SMC100CA | 100A                | 100C | 85.50                     | 95.00                     | 105.00          | 1            | 137.0                               | 11.1               | 1                       | ✓   |
| 1.5SMC110A  | 1.5SMC110CA | 110A                | 110C | 94.00                     | 105.00                    | 116.00          | 1            | 152.0                               | 10.0               | 1                       | ✓   |
| 1.5SMC120A  | 1.5SMC120CA | 120A                | 120C | 102.00                    | 114.00                    | 126.00          | 1            | 165.0                               | 9.2                | 1                       | ✓   |
| 1.5SMC130A  | 1.5SMC130CA | 130A                | 130C | 111.00                    | 124.00                    | 137.00          | 1            | 179.0                               | 8.5                | 1                       | ✓   |
| 1.5SMC150A  | 1.5SMC150CA | 150A                | 150C | 128.00                    | 143.00                    | 158.00          | 1            | 207.0                               | 7.3                | 1                       | ✓   |
| 1.5SMC160A  | 1.5SMC160CA | 160A                | 160C | 136.00                    | 152.00                    | 168.00          | 1            | 219.0                               | 6.9                | 1                       | ✓   |
| 1.5SMC170A  | 1.5SMC170CA | 170A                | 170C | 145.00                    | 162.00                    | 179.00          | 1            | 234.0                               | 6.5                | 1                       | ✓   |
| 1.5SMC180A  | 1.5SMC180CA | 180A                | 180C | 154.00                    | 171.00                    | 189.00          | 1            | 246.0                               | 6.2                | 1                       | ✓   |
| 1.5SMC200A  | 1.5SMC200CA | 200A                | 200C | 171.00                    | 190.00                    | 210.00          | 1            | 274.0                               | 5.5                | 1                       | ✓   |
| 1.5SMC220A  | 1.5SMC220CA | 220A                | 220C | 185.00                    | 209.00                    | 231.00          | 1            | 328.0                               | 4.6                | 1                       | ✓   |
| 1.5SMC250A  | 1.5SMC250CA | 250A                | 250C | 214.00                    | 237.00                    | 263.00          | 1            | 344.0                               | 4.4                | 1                       | ✓   |
| 1.5SMC300A  | 1.5SMC300CA | 300A                | 300C | 256.00                    | 285.00                    | 315.00          | 1            | 414.0                               | 3.7                | 1                       | ✓   |
| 1.5SMC350A  | 1.5SMC350CA | 350A                | 350C | 300.00                    | 332.00                    | 368.00          | 1            | 482.0                               | 3.2                | 1                       | ✓   |
| 1.5SMC400A  | 1.5SMC400CA | 400A                | 400C | 342.00                    | 380.00                    | 420.00          | 1            | 548.0                               | 2.8                | 1                       | ✓   |
| 1.5SMC440A  | 1.5SMC440CA | 440A                | 440C | 376.00                    | 418.00                    | 462.00          | 1            | 602.0                               | 2.5                | 1                       | ✓   |
| 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 | 450.00                    | 503.50                    | 556.50          | 1            | 725.0                               | 2.1                | 1                       | ✓   |
| 1.5SMC540A  | 1.5SMC540CA | 540A                | 540C | 459.00                    | 513.00                    | 567.00          | 1            | 740.0                               | 2.0                | 1                       | ✓   |
| 1.5SMC550A  | 1.5SMC550CA | 550A                | 550C | 467.00                    | 522.50                    | 577.50          | 1            | 760.0                               | 2.0                | 1                       | ✓   |

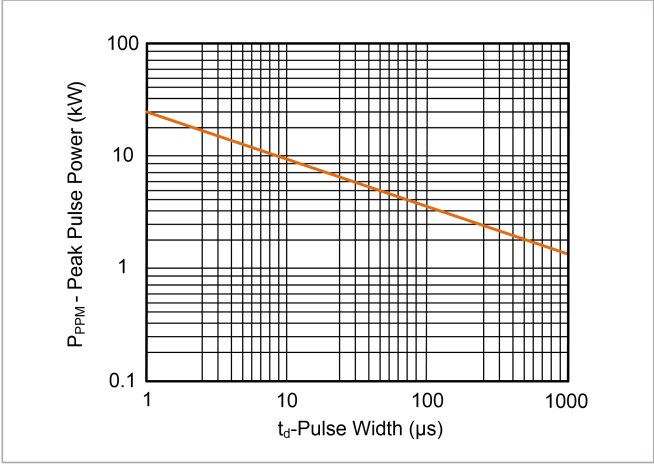
**Notes:**

For bidirectional type having  $V_R$  of 10 volts and less, the  $I_R$  limit is double.

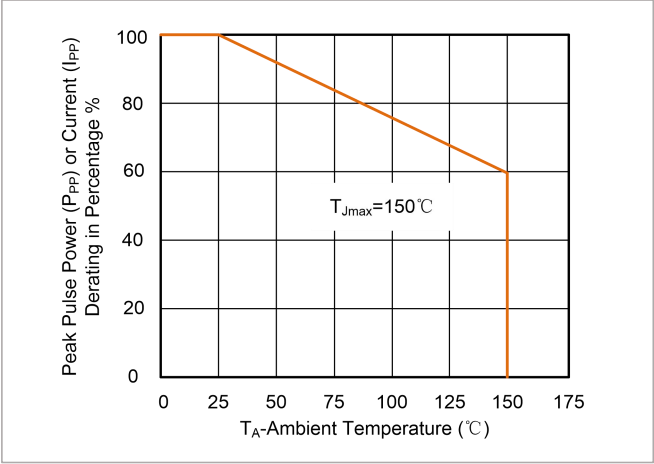
**1.5SMC Series**  
Surface Mount – 1500W

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

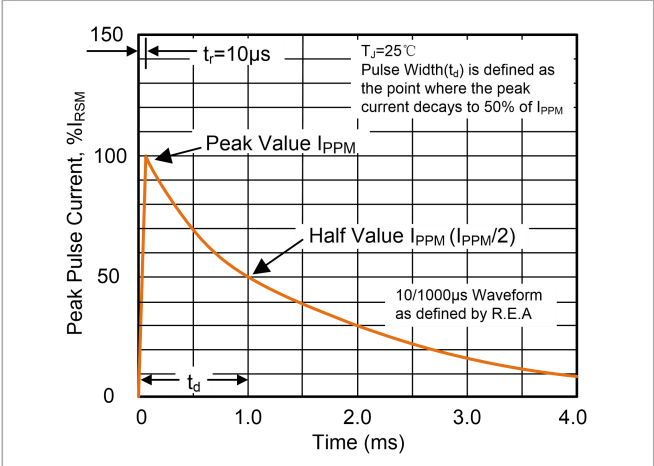
**Figure 1:**  
Peak Pulse Power Rating Curve



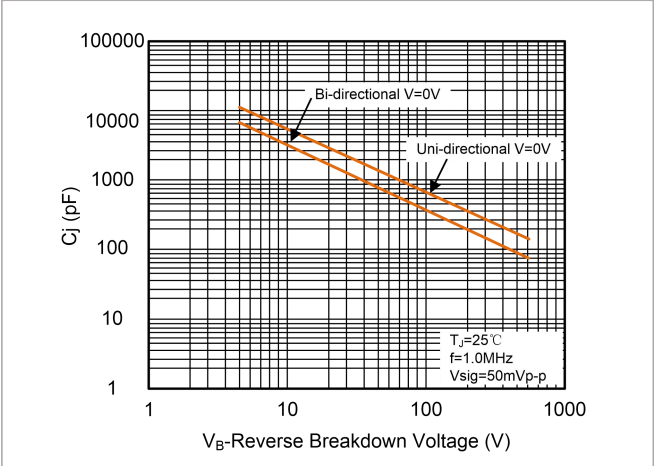
**Figure 2:**  
Pulse Derating Curve



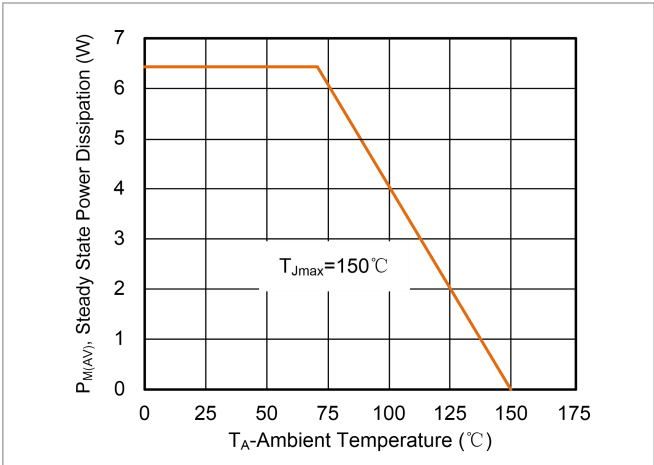
**Figure 3:**  
Pulse Waveform



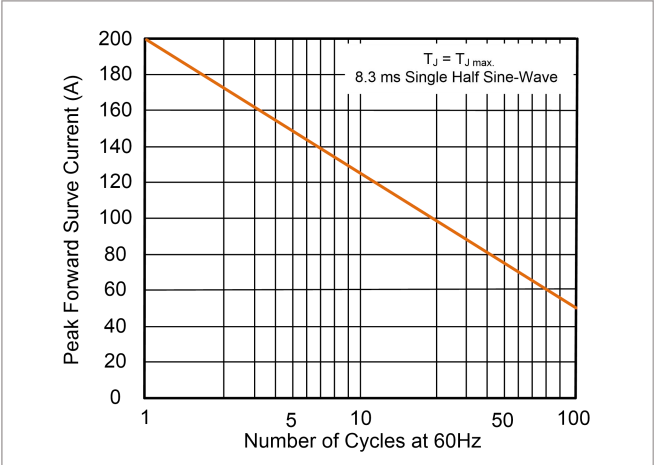
**Figure 4:**  
Typical Junction Capacitance



**Figure 5:**  
Steady State Power Dissipation Derating Curve



**Figure 6:**  
Maximum Non-Repetitive Forward Surge Current Uni-Directional

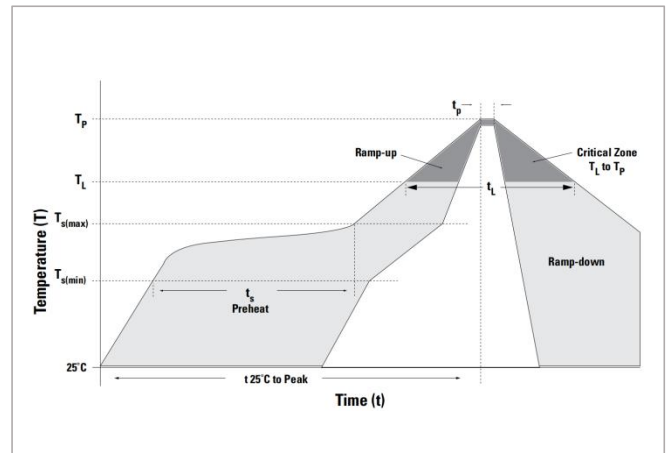


# 1.5SMC Series

## Surface Mount – 1500W

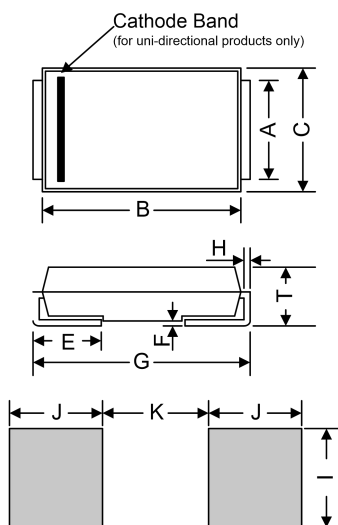
### Soldering Parameters

|   |                                   |                    |
|---|-----------------------------------|--------------------|
| <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_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°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</b>                                  |                                   | 8 minutes max.     |
| <b>Do not exceed</b>  |                                   | 260°C              |



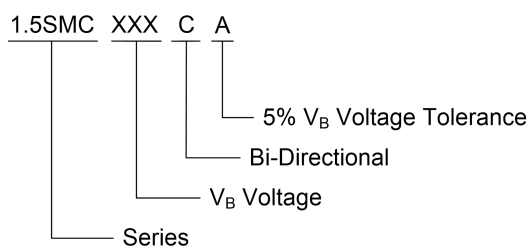
### Dimensions

#### DO-214AB (SMC)

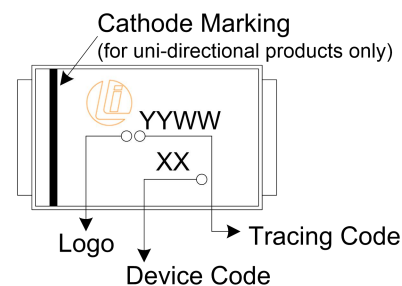


| Symbol | Millimeters |       | Inches |       |
|--------|-------------|-------|--------|-------|
|        | Min.        | Max.  | Min.   | Max.  |
| A      | 2.900       | 3.200 | 0.114  | 0.126 |
| B      | 6.600       | 7.110 | 0.260  | 0.280 |
| C      | 5.590       | 6.220 | 0.220  | 0.245 |
| E      | 0.760       | 1.520 | 0.030  | 0.060 |
| F      | -           | 0.203 | -      | 0.008 |
| G      | 7.750       | 8.130 | 0.305  | 0.320 |
| H      | 0.152       | 0.305 | 0.006  | 0.012 |
| T      | 2.200       | 2.750 | 0.087  | 0.108 |
| I      | 3.300       | -     | 0.129  | -     |
| J      | 2.400       | -     | 0.094  | -     |
| K      | -           | 4.200 | -      | 0.165 |

### Part Numbering System



### Part Marking System



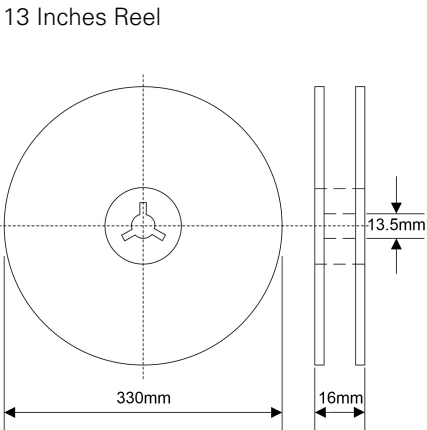
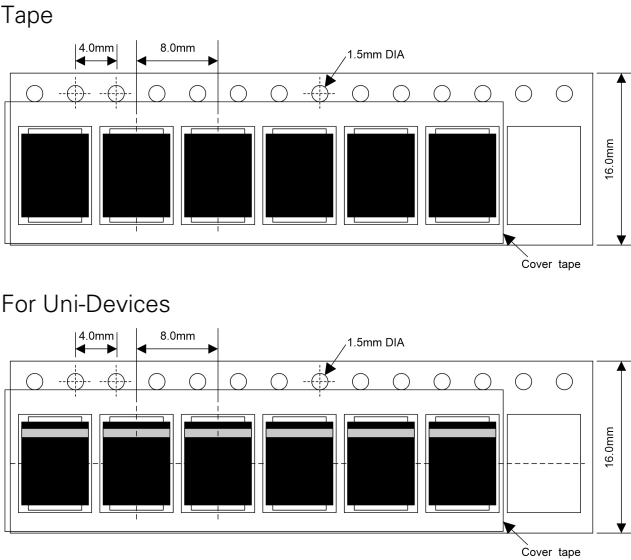
# 1.5SMC Series

## Surface Mount – 1500W

### 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



Quantity: 3000pcs/reel

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