

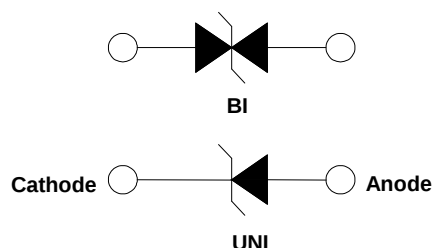
## Description

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

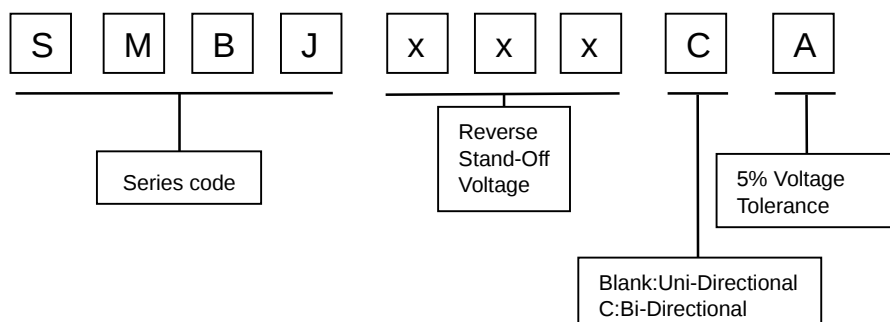
## Features

- I Very fast response time
- I Halogen free and RoHS compliant
- I Low incremental surge resistance
- I Optimized for LAN protection applications
- I Matte tin lead-free Plated
- I Typical IR less than 1μA above 10V
- I For surface mounted applications to optimize board space
- I 600W peak pulse power capability with at 10/1000μs waveform, repetition rate (duty cycle): 0.01%
- I High temperature soldering: 260°C/10 seconds at terminals

## Electrical symbol



## Part Number Code



## Mechanical Characteristics

| Rating                                                                                                 | Symbol    | Value      | Units            |
|--------------------------------------------------------------------------------------------------------|-----------|------------|------------------|
| Peak Pulse Power Dissipation at $T_A=25^\circ\text{C}$ by 10/1000μs Waveform (Fig.2)(Note 1), (Note 2) | $P_{PP}$  | 600        | W                |
| Power Dissipation on Infinite Heat Sink at $T_L=75^\circ\text{C}$ (Fig.6)                              | $P_D$     | 5.0        | W                |
| Peak Forward Surge Current, 8.3ms Single Half Sine Wave (Note 3)                                       | $I_{FSM}$ | 100        | A                |
| Operating Temperature Range                                                                            | $T_J$     | -55 to 150 | $^\circ\text{C}$ |
| Storage Temperature Range                                                                              | $T_{STG}$ | -55 to 150 | $^\circ\text{C}$ |

Notes:

1. Non-repetitive current pulse, per Fig.4 and derated above  $T_A=25^\circ\text{C}$  per Fig. 3.
2. Mounted on 5.0x5.0mm copper pad to each terminal.
3. Measured on 8.3ms single half sine wave or equivalent square wave for unidirectional device only, duty cycle=4 per minute maximum.



**Electrical Characteristics**

| Type Number |           | Marking |    | Reverse<br>Stand-Off<br>Voltage | Breakdown<br>Voltage |      | Test<br>Current | Max.<br>Clamping<br>Voltage<br>10/1000 $\mu$ s | Max.<br>Peak Pulse<br>Current<br>10/1000 $\mu$ s | Reverse<br>Leakage |
|-------------|-----------|---------|----|---------------------------------|----------------------|------|-----------------|------------------------------------------------|--------------------------------------------------|--------------------|
|             |           |         |    | $V_{RWM}$                       | $V_{BR} @ I_T$       |      | $I_T$           | $V_C @ I_{PP}$                                 | $I_{PP}$                                         | $I_R @ V_{RWM}$    |
|             |           |         |    |                                 | Min                  | Max  |                 |                                                |                                                  |                    |
| UNI         | BI        | UNI     | BI | V                               | V                    | V    | mA              | V                                              | A                                                | $\mu$ A            |
| SMBJ5.0A    | SMBJ5.0CA | KE      | AE | 5.0                             | 6.40                 | 7.07 | 10              | 9.2                                            | 65.2                                             | 500                |
| SMBJ6.0A    | SMBJ6.0CA | KG      | AG | 6.0                             | 6.67                 | 7.37 | 10              | 10.3                                           | 58.3                                             | 300                |
| SMBJ6.5A    | SMBJ6.5CA | KK      | AK | 6.5                             | 7.22                 | 7.98 | 10              | 11.2                                           | 53.6                                             | 200                |
| SMBJ7.0A    | SMBJ7.0CA | KM      | AM | 7.0                             | 7.78                 | 8.60 | 10              | 12.0                                           | 50.0                                             | 100                |
| SMBJ7.5A    | SMBJ7.5CA | KP      | AP | 7.5                             | 8.33                 | 9.21 | 1               | 12.9                                           | 46.6                                             | 50                 |
| SMBJ8.0A    | SMBJ8.0CA | KR      | AR | 8.0                             | 8.89                 | 9.83 | 1               | 13.6                                           | 44.2                                             | 50                 |
| SMBJ8.5A    | SMBJ8.5CA | KT      | AT | 8.5                             | 9.44                 | 10.4 | 1               | 14.4                                           | 41.7                                             | 30                 |
| SMBJ9.0A    | SMBJ9.0CA | KV      | AV | 9.0                             | 10.00                | 11.1 | 1               | 15.4                                           | 39.0                                             | 30                 |
| SMBJ10A     | SMBJ10CA  | KX      | AX | 10.0                            | 11.10                | 12.3 | 1               | 17.0                                           | 35.3                                             | 3                  |
| SMBJ11A     | SMBJ11CA  | KZ      | AZ | 11.0                            | 12.20                | 13.5 | 1               | 18.2                                           | 33.0                                             | 1                  |
| SMBJ12A     | SMBJ12CA  | LE      | BE | 12.0                            | 13.30                | 14.7 | 1               | 19.9                                           | 30.2                                             | 1                  |
| SMBJ13A     | SMBJ13CA  | LG      | BG | 13.0                            | 14.40                | 15.9 | 1               | 21.5                                           | 28.0                                             | 1                  |
| SMBJ14A     | SMBJ14CA  | LK      | BK | 14.0                            | 15.60                | 17.2 | 1               | 23.2                                           | 25.9                                             | 1                  |
| SMBJ15A     | SMBJ15CA  | LM      | BM | 15.0                            | 16.70                | 18.5 | 1               | 24.4                                           | 24.6                                             | 1                  |
| SMBJ16A     | SMBJ16CA  | LP      | BP | 16.0                            | 17.80                | 19.7 | 1               | 26.0                                           | 23.1                                             | 1                  |
| SMBJ17A     | SMBJ17CA  | LR      | BR | 17.0                            | 18.90                | 20.9 | 1               | 27.6                                           | 21.8                                             | 1                  |
| SMBJ18A     | SMBJ18CA  | LT      | BT | 18.0                            | 20.00                | 22.1 | 1               | 29.2                                           | 20.6                                             | 1                  |
| SMBJ20A     | SMBJ20CA  | LV      | BV | 20.0                            | 22.20                | 24.5 | 1               | 32.4                                           | 18.6                                             | 1                  |
| SMBJ22A     | SMBJ22CA  | LX      | BX | 22.0                            | 24.40                | 26.9 | 1               | 35.5                                           | 16.9                                             | 1                  |
| SMBJ24A     | SMBJ24CA  | LZ      | BZ | 24.0                            | 26.70                | 29.5 | 1               | 38.9                                           | 15.5                                             | 1                  |
| SMBJ26A     | SMBJ26CA  | ME      | CE | 26.0                            | 28.90                | 31.9 | 1               | 42.1                                           | 14.3                                             | 1                  |
| SMBJ28A     | SMBJ28CA  | MG      | CG | 28.0                            | 31.10                | 34.4 | 1               | 45.4                                           | 13.3                                             | 1                  |
| SMBJ30A     | SMBJ30CA  | MK      | CK | 30.0                            | 33.30                | 36.8 | 1               | 48.4                                           | 12.4                                             | 1                  |
| SMBJ33A     | SMBJ33CA  | MM      | CM | 33.0                            | 36.70                | 40.6 | 1               | 53.3                                           | 11.3                                             | 1                  |
| SMBJ36A     | SMBJ36CA  | MP      | CP | 36.0                            | 40.00                | 44.2 | 1               | 58.1                                           | 10.4                                             | 1                  |
| SMBJ40A     | SMBJ40CA  | MR      | CR | 40.0                            | 44.40                | 49.1 | 1               | 64.5                                           | 9.3                                              | 1                  |
| SMBJ43A     | SMBJ43CA  | MT      | CT | 43.0                            | 47.80                | 52.8 | 1               | 69.4                                           | 8.7                                              | 1                  |
| SMBJ45A     | SMBJ45CA  | MV      | CV | 45.0                            | 50.00                | 55.3 | 1               | 72.7                                           | 8.3                                              | 1                  |
| SMBJ48A     | SMBJ48CA  | MX      | CX | 48.0                            | 53.30                | 58.9 | 1               | 77.4                                           | 7.8                                              | 1                  |
| SMBJ51A     | SMBJ51CA  | MZ      | CZ | 51.0                            | 56.70                | 62.7 | 1               | 82.4                                           | 7.3                                              | 1                  |



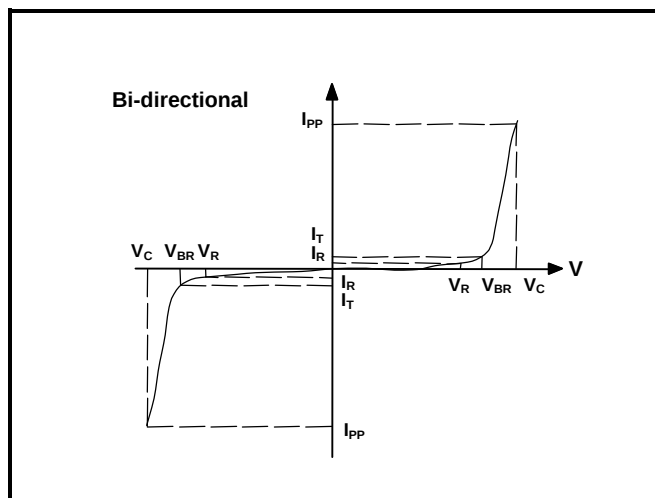
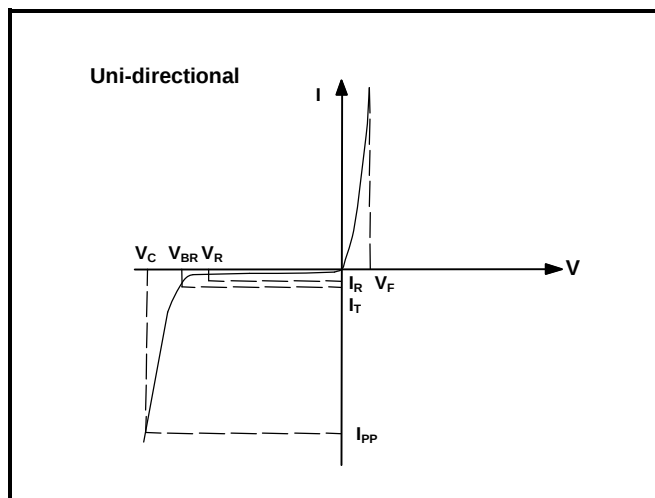
**Electrical Characteristics**

| Type Number |           | Marking |    | Reverse<br>Stand-Off<br>Voltage | Breakdown<br>Voltage |       | Test<br>Current | Max.<br>Clamping<br>Voltage<br>10/1000 $\mu$ s | Max.<br>Peak Pulse<br>Current<br>10/1000 $\mu$ s | Reverse<br>Leakage |
|-------------|-----------|---------|----|---------------------------------|----------------------|-------|-----------------|------------------------------------------------|--------------------------------------------------|--------------------|
|             |           |         |    | $V_{RWM}$                       | $V_{BR} @ I_T$       |       | $I_T$           | $V_C @ I_{PP}$                                 | $I_{PP}$                                         | $I_R @ V_{RWM}$    |
|             |           |         |    |                                 | Min                  | Max   |                 |                                                |                                                  |                    |
| UNI         | BI        | UNI     | BI | V                               | V                    | V     | mA              | V                                              | A                                                | $\mu$ A            |
| SMBJ54A     | SMBJ54CA  | NE      | DE | 54.0                            | 60.00                | 66.3  | 1               | 87.1                                           | 6.9                                              | 1                  |
| SMBJ58A     | SMBJ58CA  | NG      | DG | 58.0                            | 64.40                | 71.2  | 1               | 93.6                                           | 6.5                                              | 1                  |
| SMBJ60A     | SMBJ60CA  | NK      | DK | 60.0                            | 66.70                | 73.7  | 1               | 96.8                                           | 6.2                                              | 1                  |
| SMBJ64A     | SMBJ64CA  | NM      | DM | 64.0                            | 71.10                | 78.6  | 1               | 103.0                                          | 5.9                                              | 1                  |
| SMBJ70A     | SMBJ70CA  | NP      | DP | 70.0                            | 77.80                | 86.0  | 1               | 113.0                                          | 5.3                                              | 1                  |
| SMBJ75A     | SMBJ75CA  | NR      | DR | 75.0                            | 83.30                | 92.1  | 1               | 121.0                                          | 5.0                                              | 1                  |
| SMBJ78A     | SMBJ78CA  | NT      | DT | 78.0                            | 86.70                | 95.8  | 1               | 126.0                                          | 4.8                                              | 1                  |
| SMBJ85A     | SMBJ85CA  | NV      | DV | 85.0                            | 94.40                | 104.0 | 1               | 137.0                                          | 4.4                                              | 1                  |
| SMBJ90A     | SMBJ90CA  | NX      | DX | 90.0                            | 100.0                | 111.0 | 1               | 146.0                                          | 4.1                                              | 1                  |
| SMBJ100A    | SMBJ100CA | NZ      | DZ | 100.0                           | 111.0                | 123.0 | 1               | 162.0                                          | 3.7                                              | 1                  |
| SMBJ110A    | SMBJ110CA | PE      | EE | 110.0                           | 122.0                | 135.0 | 1               | 177.0                                          | 3.4                                              | 1                  |
| SMBJ120A    | SMBJ120CA | PG      | EG | 120.0                           | 133.0                | 147.0 | 1               | 193.0                                          | 3.1                                              | 1                  |
| SMBJ130A    | SMBJ130CA | PK      | EK | 130.0                           | 144.0                | 159.0 | 1               | 209.0                                          | 2.9                                              | 1                  |
| SMBJ150A    | SMBJ150CA | PM      | EM | 150.0                           | 167.0                | 185.0 | 1               | 243.0                                          | 2.5                                              | 1                  |
| SMBJ160A    | SMBJ160CA | PP      | EP | 160.0                           | 178.0                | 197.0 | 1               | 259.0                                          | 2.3                                              | 1                  |
| SMBJ170A    | SMBJ170CA | PR      | ER | 170.0                           | 189.0                | 209.0 | 1               | 275.0                                          | 2.2                                              | 1                  |
| SMBJ180A    | SMBJ180CA | PT      | ET | 180.0                           | 201.0                | 222.0 | 1               | 292.0                                          | 2.1                                              | 1                  |
| SMBJ190A    | SMBJ190CA | PV      | EV | 190.0                           | 209.0                | 243.0 | 1               | 306.0                                          | 2.0                                              | 1                  |
| SMBJ200A    | SMBJ200CA | PX      | EX | 200.0                           | 224.0                | 247.0 | 1               | 324.0                                          | 1.9                                              | 1                  |
| SMBJ210A    | SMBJ210CA | PZ      | EZ | 210.0                           | 231.0                | 268.0 | 1               | 340.0                                          | 1.8                                              | 1                  |
| SMBJ220A    | SMBJ220CA | QE      | FE | 220.0                           | 246.0                | 272.0 | 1               | 356.0                                          | 1.7                                              | 1                  |
| SMBJ250A    | SMBJ250CA | QG      | FG | 250.0                           | 279.0                | 309.0 | 1               | 405.0                                          | 1.5                                              | 1                  |
| SMBJ300A    | SMBJ300CA | QK      | FK | 300.0                           | 335.0                | 371.0 | 1               | 486.0                                          | 1.3                                              | 1                  |
| SMBJ350A    | SMBJ350CA | QM      | FM | 350.0                           | 391.0                | 432.0 | 1               | 567.0                                          | 1.1                                              | 1                  |
| SMBJ400A    | SMBJ400CA | QP      | FP | 400.0                           | 447.0                | 494.0 | 1               | 648.0                                          | 0.9                                              | 1                  |
| SMBJ440A    | SMBJ440CA | QR      | FR | 440.0                           | 492.0                | 543.0 | 1               | 713.0                                          | 0.9                                              | 1                  |
| SMBJ500A    | SMBJ500CA | QV      | FV | 500.0                           | 558.0                | 618.0 | 1               | 762.0                                          | 0.8                                              | 1                  |

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



## 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

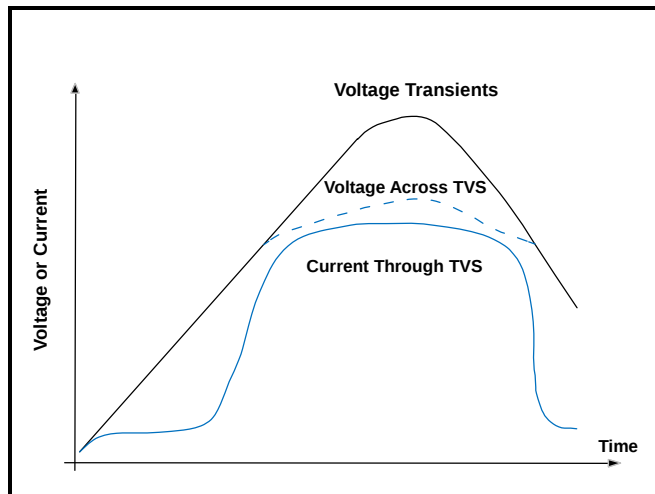
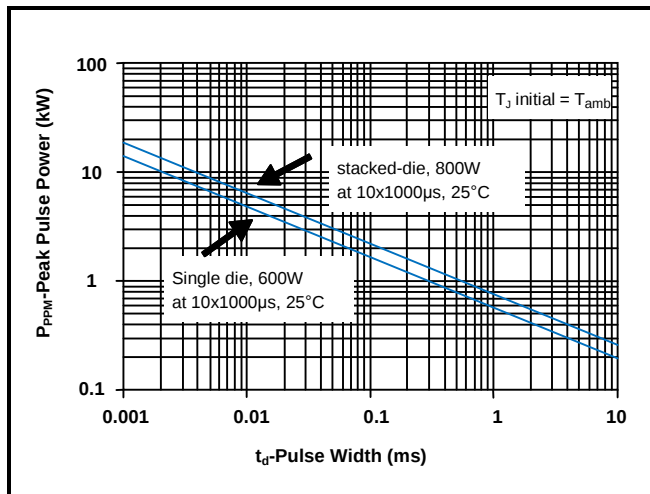


Figure 2 - Peak Pulse Power Rating Curve



**Ratings and Characteristic Curves** (TA=25°C unless otherwise noted)

Figure 3 - Pulse Derating Curve

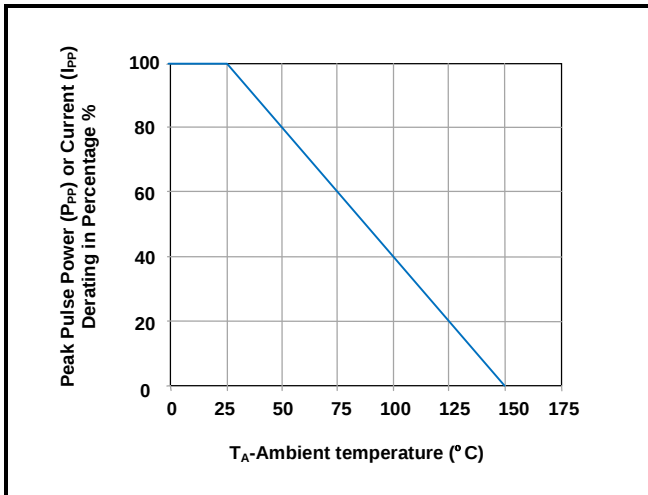


Figure 4 - Pulse Waveform

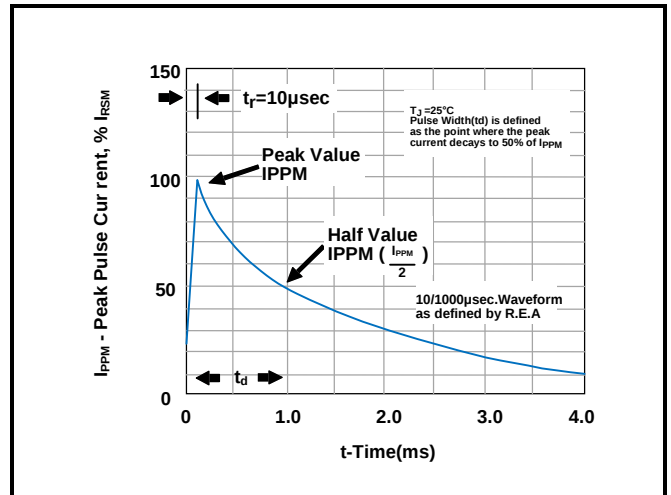


Figure 5 - Typical Junction Capacitance

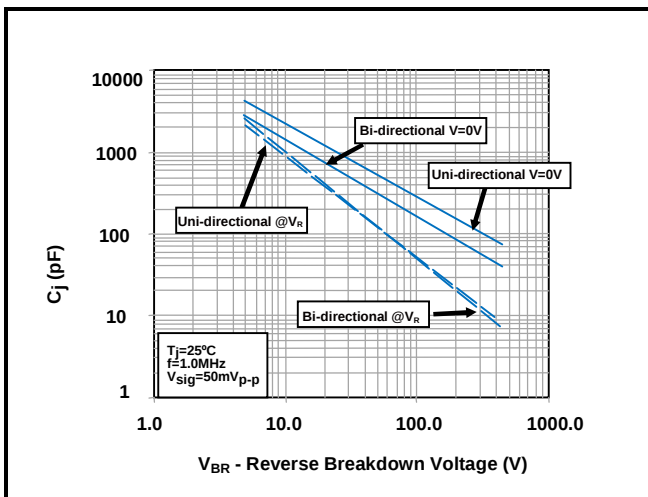


Figure 6 - Steady State Power Derating Curve

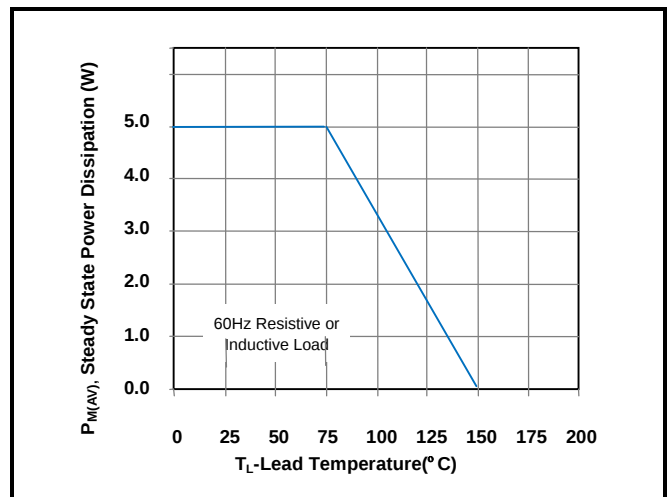
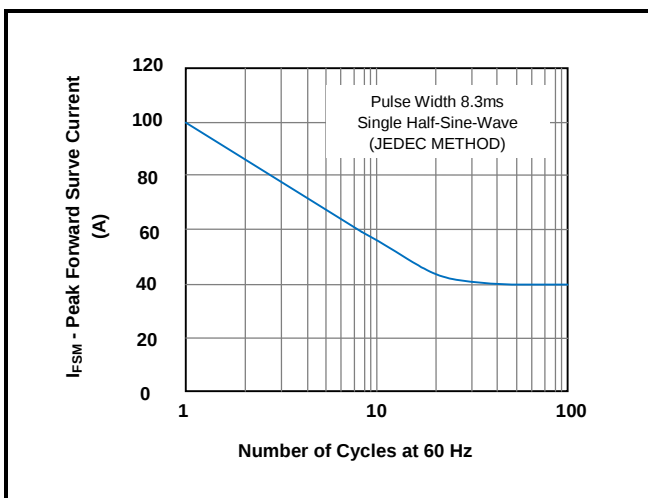
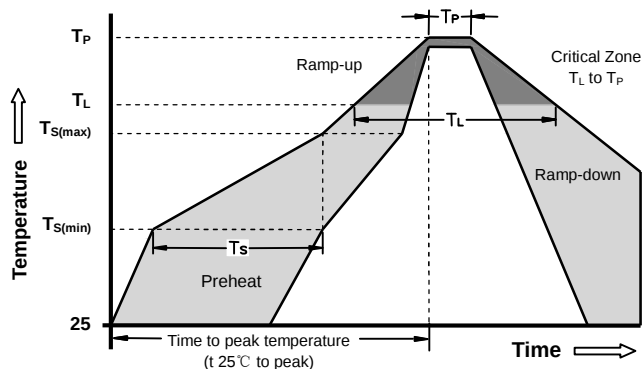
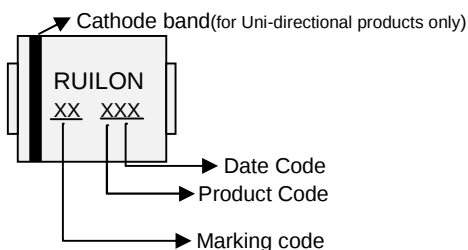
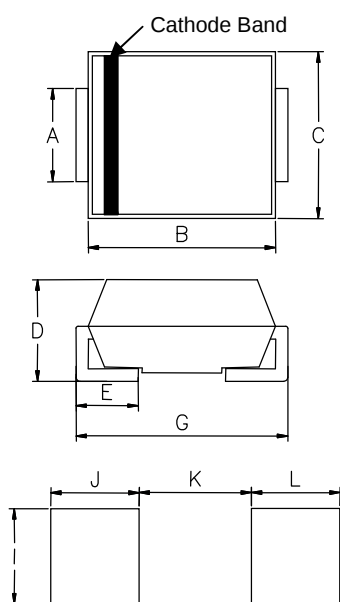


Figure 7 - Maximum Non-Repetitive Surge Current



**Soldering Parameters - Reflow Soldering (Surface Mount Devices)**


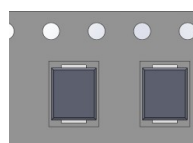
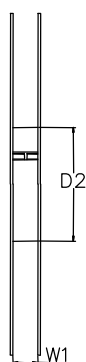
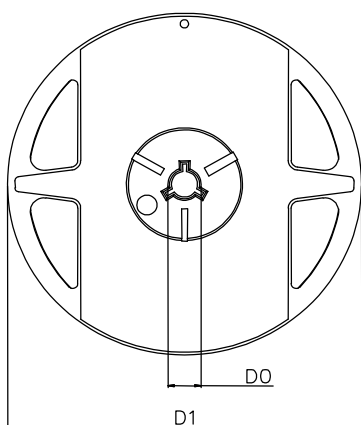
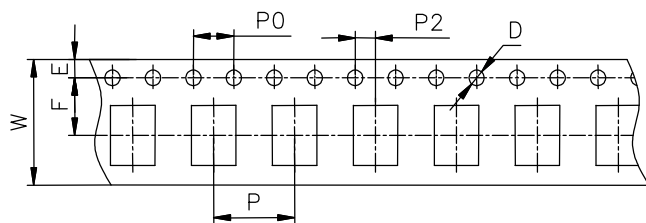
| Reflow Condition                                     |                                   | Pb - Free assembly |
|------------------------------------------------------|-----------------------------------|--------------------|
| Pre Heat                                             | -Temperature Min ( $T_{s(min)}$ ) | 150°C              |
|                                                      | -Temperature Max ( $T_{s(max)}$ ) | 200°C              |
|                                                      | - Time (min to max) ( $t_s$ )     | 60 -180 Seconds    |
| Average ramp up rate ( Liquids Temp $T_L$ ) to peak  |                                   | 3°C/second max     |
| $T_{s(max)}$ to $T_L$ - Ramp-up Rate                 |                                   | 3°C/second max     |
| Reflow                                               | - Temperature ( $T_L$ ) (Liquids) | 217°C              |
|                                                      | - Time (min to max) ( $t_s$ )     | 60 -150 Seconds    |
| Peak Temperature ( $T_P$ )                           |                                   | 260 +0/-5°C        |
| Time within 5°C of actual peak Temperature ( $t_p$ ) |                                   | 20 - 40 Seconds    |
| Ramp-down Rate                                       |                                   | 6°C/second max     |
| Time 25°C to peak Temperature ( $T_P$ )              |                                   | 8 minutes Max      |
| Do not exceed                                        |                                   | 260°C              |

**Part Marking System**

**Dimensions**


| DIM | Millimeters |      | Inches |       |
|-----|-------------|------|--------|-------|
|     | Min         | Max  | Min    | Max   |
| A   | 1.80        | 2.20 | 0.071  | 0.086 |
| B   | 4.05        | 4.65 | 0.160  | 0.183 |
| C   | 3.30        | 3.94 | 0.130  | 0.155 |
| D   | 2.05        | 2.45 | 0.081  | 0.096 |
| E   | 0.76        | 1.52 | 0.030  | 0.060 |
| G   | 5.11        | 5.59 | 0.201  | 0.220 |
| I   | 2.26        | -    | 0.089  | -     |
| J   | 2.16        | -    | 0.085  | -     |
| K   | -           | 2.74 | -      | 0.107 |
| L   | 2.16        | -    | 0.085  | -     |



**Taping and Reel Specifications**



Direction of Unreeling

| Symbol | Millimeters  | Inches             |
|--------|--------------|--------------------|
| W      | 12±0.3       | 0.472±0.012        |
| P      | 8±0.1        | 0.315±0.004        |
| F      | 5.5±0.1      | 0.217±0.004        |
| E      | 1.75±0.1     | 0.069±0.004        |
| D      | 1.5+0.1/-0.0 | 0.059+0.004/-0.0   |
| P0     | 4±0.1        | 0.157±0.004        |
| P2     | 2±0.1        | 0.079±0.004        |
| D0     | 16.7±0.15    | 0.657±0.006        |
| D1     | 178±2        | 7.007±0.079        |
| D2     | 59.6+1/-2    | 2.346+0.039/-0.079 |
| W1     | 12.64±0.4    | 0.498±0.016        |

| Part Number | Component package | Quantity | Packaging option      | Packaging specification |
|-------------|-------------------|----------|-----------------------|-------------------------|
| SMBJXXXA/CA | DO-214AA(SMB)     | 500      | Tape&Reel-12mm/7"tape | EIA STD RS-481          |

