

Transient Voltage Suppressors (TVS) Data Sheet

Features

- Glass passivated junction
- Low zener impedance
- Excellent clamping capability
- 1000W peak pulse power capability at 10/1000 μ s waveform, repetition rate (duty cycle):0.01%
- Fast response time
- Typical I_R less than 1 μ A above 11V.
- Plastic package has underwriters laboratory flammability 94V-0
- Meets MSL level 1, per J-STD-020.
- AEC-Q101 Qualified

Mechanical Data

- Case: JEDEC DO-214AA Moulded plastic
- Terminal: solder plated, solderable per MIL-STD-750, Method 2026
- Polarity: Color band denotes cathode except bi-directional models
- Mounting Position: Any

Applications

- I/O interface
- AC/DC power supply
- Low frequency signal transmission line (RS232, RS485, etc.)

Maximum Ratings and Characteristics

Ratings at 25 $^{\circ}$ C ambient temperature unless otherwise specified.

| Rating | Symbol | Value | Units |
|--|-----------------|--------------|----------------|
| Peak pulse power dissipation at 10/1000 μ s waveform (Note1, Fig.1) | P_{PPM} | Minimum 1000 | Watts |
| Peak pulse current of at 10/1000 μ s waveform (Note 1, Fig.3) | I_{PPM} | See Table | Amps |
| Steady state power dissipation at $T_L=75^{\circ}$ C (Fig.4) | $P_{M(AV)}$ | 5 | Watts |
| Peak forward surge current, 8.3ms single half sine-wave superimposed on rated load, (JEDEC Method) (Note2) | I_{FSM} | 120 | Amps |
| Operating junction and Storage Temperature Range. | T_J, T_{STG} | -55 to +150 | $^{\circ}$ C |
| Typical thermal resistance junction to lead | $R_{\theta JL}$ | 20 | $^{\circ}$ C/W |
| Typical thermal resistance junction to ambient | $R_{\theta JA}$ | 100 | $^{\circ}$ C/W |

Notes: 1. Non-repetitive current pulse, per Fig.3 and derated above $T_A=25^{\circ}$ C per Fig.2.

2. 8.3ms single half sine-wave, or equivalent square wave, duty cycle=4 pulses per minutes maximum.

Dimensions (DO-214AA/SMB)

| Symbol | Millimeters | | Inches | |
|--------|-------------|-------|--------|-------|
| | Min. | Max. | Min. | Max. |
| L | 4.06 | 4.75 | 0.160 | 0.187 |
| D | 3.30 | 3.94 | 0.130 | 0.155 |
| D1 | 1.95 | 2.20 | 0.077 | 0.086 |
| T | 5.18 | 5.59 | 0.204 | 0.220 |
| T1 | 0.76 | 1.52 | 0.030 | 0.060 |
| d | - | 0.203 | - | 0.008 |
| H | 1.99 | 2.61 | 0.078 | 0.103 |

Electrical Characteristics (TA=25°C)

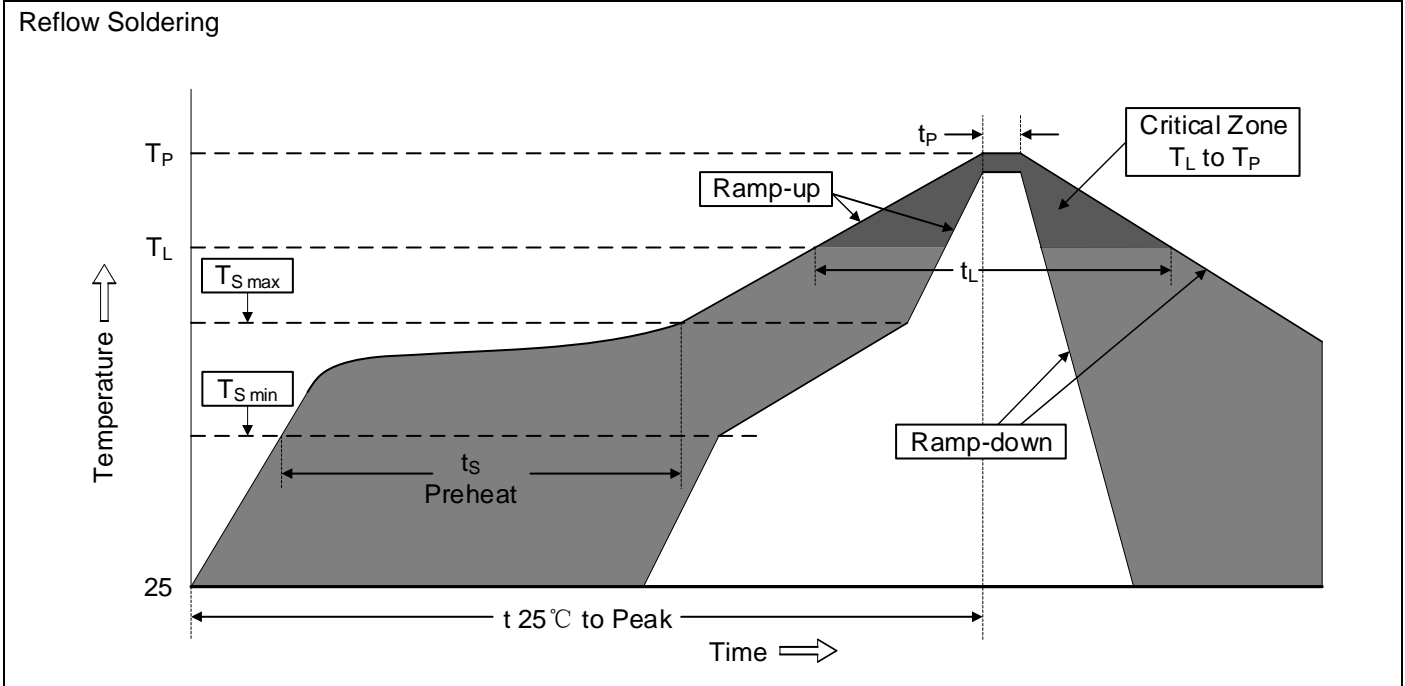
| Part Number | | Device Marking Code | | Reverse Stand-Off Voltage | Breakdown Voltage @I _T | Test Current | Maximum Clamping Voltage @I _{PP} | Peak Pulse Current | Reverse Leakage @V _{RWM} |
|----------------|-----------------|---------------------|-------|---------------------------|-----------------------------------|---------------------|---|---------------------|-----------------------------------|
| Unidirectional | Bidirectional | UNI | BI | V _{RWM} (V) | V _{BR} (V) | I _T (mA) | V _C (V) | I _{PP} (A) | I _R (μA) |
| 1.0SMBJ5.0A-AR | 1.0SMBJ5.0CA-AR | 1.0KE | 1.0AE | 5.0 | 6.4~7.0 | 10 | 9.2 | 108.7 | 800 |
| 1.0SMBJ6.0A-AR | 1.0SMBJ6.0CA-AR | 1.0KG | 1.0AG | 6.0 | 6.7~7.4 | 10 | 10.3 | 97.1 | 800 |
| 1.0SMBJ6.5A-AR | 1.0SMBJ6.5CA-AR | 1.0KK | 1.0AK | 6.5 | 7.2~8.0 | 10 | 11.2 | 89.3 | 500 |
| 1.0SMBJ7.0A-AR | 1.0SMBJ7.0CA-AR | 1.0KM | 1.0AM | 7.0 | 7.8~8.6 | 10 | 12.0 | 83.3 | 200 |
| 1.0SMBJ7.5A-AR | 1.0SMBJ7.5CA-AR | 1.0KP | 1.0AP | 7.5 | 8.3~9.2 | 1 | 12.9 | 77.5 | 100 |
| 1.0SMBJ8.0A-AR | 1.0SMBJ8.0CA-AR | 1.0KR | 1.0AR | 8.0 | 8.9~9.8 | 1 | 13.6 | 73.5 | 50 |
| 1.0SMBJ8.5A-AR | 1.0SMBJ8.5CA-AR | 1.0KT | 1.0AA | 8.5 | 9.4~10.4 | 1 | 14.4 | 69.4 | 20 |
| 1.0SMBJ9.0A-AR | 1.0SMBJ9.0CA-AR | 1.0KV | 1.0AV | 9.0 | 10.0~11.0 | 1 | 15.4 | 64.9 | 10 |
| 1.0SMBJ10A-AR | 1.0SMBJ10CA-AR | 1.0KX | 1.0AX | 10.0 | 11.1~12.3 | 1 | 17.0 | 58.8 | 5 |
| 1.0SMBJ11A-AR | 1.0SMBJ11CA-AR | 1.0KZ | 1.0AZ | 11.0 | 12.2~13.5 | 1 | 18.2 | 54.9 | 1 |
| 1.0SMBJ12A-AR | 1.0SMBJ12CA-AR | 1.0LE | 1.0BE | 12.0 | 13.3~14.7 | 1 | 19.9 | 50.3 | 1 |
| 1.0SMBJ13A-AR | 1.0SMBJ13CA-AR | 1.0LG | 1.0BG | 13.0 | 14.4~15.9 | 1 | 21.5 | 46.5 | 1 |
| 1.0SMBJ14A-AR | 1.0SMBJ14CA-AR | 1.0LK | 1.0BK | 14.0 | 15.6~17.2 | 1 | 23.2 | 43.1 | 1 |
| 1.0SMBJ15A-AR | 1.0SMBJ15CA-AR | 1.0LM | 1.0BM | 15.0 | 16.7~18.5 | 1 | 24.4 | 41.0 | 1 |
| 1.0SMBJ16A-AR | 1.0SMBJ16CA-AR | 1.0LP | 1.0BP | 16.0 | 17.8~19.7 | 1 | 26.0 | 38.5 | 1 |
| 1.0SMBJ17A-AR | 1.0SMBJ17CA-AR | 1.0LR | 1.0BR | 17.0 | 18.9~20.9 | 1 | 27.6 | 36.2 | 1 |
| 1.0SMBJ18A-AR | 1.0SMBJ18CA-AR | 1.0LT | 1.0BT | 18.0 | 20.0~22.1 | 1 | 29.2 | 34.2 | 1 |
| 1.0SMBJ19A-AR | 1.0SMBJ19CA-AR | 1.0LW | 1.0BW | 19.0 | 21.1~23.3 | 1 | 30.8 | 32.5 | 1 |
| 1.0SMBJ20A-AR | 1.0SMBJ20CA-AR | 1.0LV | 1.0BV | 20.0 | 22.2~24.5 | 1 | 32.4 | 30.9 | 1 |
| 1.0SMBJ22A-AR | 1.0SMBJ22CA-AR | 1.0LX | 1.0BX | 22.0 | 24.4~26.9 | 1 | 35.5 | 28.2 | 1 |
| 1.0SMBJ24A-AR | 1.0SMBJ24CA-AR | 1.0LZ | 1.0BZ | 24.0 | 26.7~29.5 | 1 | 38.9 | 25.7 | 1 |
| 1.0SMBJ26A-AR | 1.0SMBJ26CA-AR | 1.0ME | 1.0CE | 26.0 | 28.9~31.9 | 1 | 42.1 | 23.8 | 1 |

Electrical Characteristics (TA=25°C)

| Part Number | | Device Marking Code | | Reverse Stand-Off Voltage | Breakdown Voltage @IT | Test Current | Maximum Clamping Voltage @ I _{PP} | Peak Pulse Current | Reverse Leakage @ V _{RWM} |
|----------------|-----------------|---------------------|-------|---------------------------|-----------------------|---------------------|--|---------------------|------------------------------------|
| Unidirectional | Bidirectional | UNI | BI | V _{RWM} (V) | V _{BR} (V) | I _T (mA) | V _C (V) | I _{PP} (A) | I _R (μA) |
| 1.0SMBJ28A-AR | 1.0SMBJ28CA-AR | 1.0MG | 1.0CG | 28.0 | 31.1~34.4 | 1 | 45.4 | 22.0 | 1 |
| 1.0SMBJ30A-AR | 1.0SMBJ30CA-AR | 1.0MK | 1.0CK | 30.0 | 33.3~36.8 | 1 | 48.4 | 20.7 | 1 |
| 1.0SMBJ33A-AR | 1.0SMBJ33CA-AR | 1.0MM | 1.0CM | 33.0 | 36.7~40.6 | 1 | 53.3 | 18.8 | 1 |
| 1.0SMBJ36A-AR | 1.0SMBJ36CA-AR | 1.0MP | 1.0CP | 36.0 | 40.0~44.2 | 1 | 58.1 | 17.2 | 1 |
| 1.0SMBJ40A-AR | 1.0SMBJ40CA-AR | 1.0MR | 1.0CR | 40.0 | 44.4~49.1 | 1 | 64.5 | 15.5 | 1 |
| 1.0SMBJ43A-AR | 1.0SMBJ43CA-AR | 1.0MT | 1.0CT | 43.0 | 47.8~52.8 | 1 | 69.4 | 14.4 | 1 |
| 1.0SMBJ45A-AR | 1.0SMBJ45CA-AR | 1.0MV | 1.0CV | 45.0 | 50.0~55.3 | 1 | 72.7 | 13.8 | 1 |
| 1.0SMBJ48A-AR | 1.0SMBJ48CA-AR | 1.0MX | 1.0CX | 48.0 | 53.3~58.9 | 1 | 77.4 | 12.9 | 1 |
| 1.0SMBJ51A-AR | 1.0SMBJ51CA-AR | 1.0MZ | 1.0CZ | 51.0 | 56.7~62.7 | 1 | 82.4 | 12.1 | 1 |
| 1.0SMBJ54A-AR | 1.0SMBJ54CA-AR | 1.0NE | 1.0DE | 54.0 | 60.0~66.3 | 1 | 87.1 | 11.5 | 1 |
| 1.0SMBJ58A-AR | 1.0SMBJ58CA-AR | 1.0NG | 1.0DG | 58.0 | 64.4~71.2 | 1 | 93.6 | 10.7 | 1 |
| 1.0SMBJ60A-AR | 1.0SMBJ60CA-AR | 1.0NK | 1.0DK | 60.0 | 66.7~73.7 | 1 | 96.8 | 10.3 | 1 |
| 1.0SMBJ64A-AR | 1.0SMBJ64CA-AR | 1.0NM | 1.0DM | 64.0 | 71.1~78.6 | 1 | 103.0 | 9.7 | 1 |
| 1.0SMBJ70A-AR | 1.0SMBJ70CA-AR | 1.0NP | 1.0DP | 70.0 | 77.8~86.0 | 1 | 113.0 | 8.8 | 1 |
| 1.0SMBJ75A-AR | 1.0SMBJ75CA-AR | 1.0NR | 1.0DR | 75.0 | 83.3~92.1 | 1 | 121.0 | 8.3 | 1 |
| 1.0SMBJ78A-AR | 1.0SMBJ78CA-AR | 1.0NT | 1.0DT | 78.0 | 86.7~95.8 | 1 | 126.0 | 7.9 | 1 |
| 1.0SMBJ80A-AR | 1.0SMBJ80CA-AR | 1.0NW | 1.0DW | 80.0 | 88.8~97.6 | 1 | 129.6 | 7.7 | 1 |
| 1.0SMBJ85A-AR | 1.0SMBJ85CA-AR | 1.0NV | 1.0DV | 85.0 | 94.4~104 | 1 | 137.0 | 7.3 | 1 |
| 1.0SMBJ90A-AR | 1.0SMBJ90CA-AR | 1.0NX | 1.0DX | 90.0 | 100~111 | 1 | 146.0 | 6.8 | 1 |
| 1.0SMBJ100A-AR | 1.0SMBJ100CA-AR | 1.0NZ | 1.0DZ | 100.0 | 111~123 | 1 | 162.0 | 6.2 | 1 |
| 1.0SMBJ110A-AR | 1.0SMBJ110CA-AR | 1.0PE | 1.0EE | 110.0 | 122~135 | 1 | 177.0 | 5.6 | 1 |
| 1.0SMBJ120A-AR | 1.0SMBJ120CA-AR | 1.0PG | 1.0EG | 120.0 | 133~147 | 1 | 193.0 | 5.2 | 1 |
| 1.0SMBJ130A-AR | 1.0SMBJ130CA-AR | 1.0PK | 1.0EK | 130.0 | 144~159 | 1 | 209.0 | 4.8 | 1 |
| 1.0SMBJ140A-AR | 1.0SMBJ140CA-AR | 1.0PL | 1.0EL | 140.0 | 155~171 | 1 | 227.0 | 4.4 | 1 |
| 1.0SMBJ150A-AR | 1.0SMBJ150CA-AR | 1.0PM | 1.0EM | 150.0 | 167~185 | 1 | 243.0 | 4.1 | 1 |
| 1.0SMBJ160A-AR | 1.0SMBJ160CA-AR | 1.0PP | 1.0EP | 160.0 | 178~197 | 1 | 259.0 | 3.9 | 1 |
| 1.0SMBJ170A-AR | 1.0SMBJ170CA-AR | 1.0PR | 1.0ER | 170.0 | 189~209 | 1 | 275.0 | 3.6 | 1 |
| 1.0SMBJ180A-AR | 1.0SMBJ180CA-AR | 1.0ET | 1.0PT | 180.0 | 200~220 | 1 | 291.0 | 3.4 | 1 |
| 1.0SMBJ190A-AR | 1.0SMBJ190CA-AR | 1.0EU | 1.0PU | 190.0 | 211~232 | 1 | 308.0 | 3.2 | 1 |
| 1.0SMBJ200A-AR | 1.0SMBJ200CA-AR | 1.0EV | 1.0PV | 200.0 | 224~247 | 1 | 324.0 | 3.0 | 1 |

Notes: For bidirectional type having VRWM of 10V and less, the IR limit is double.

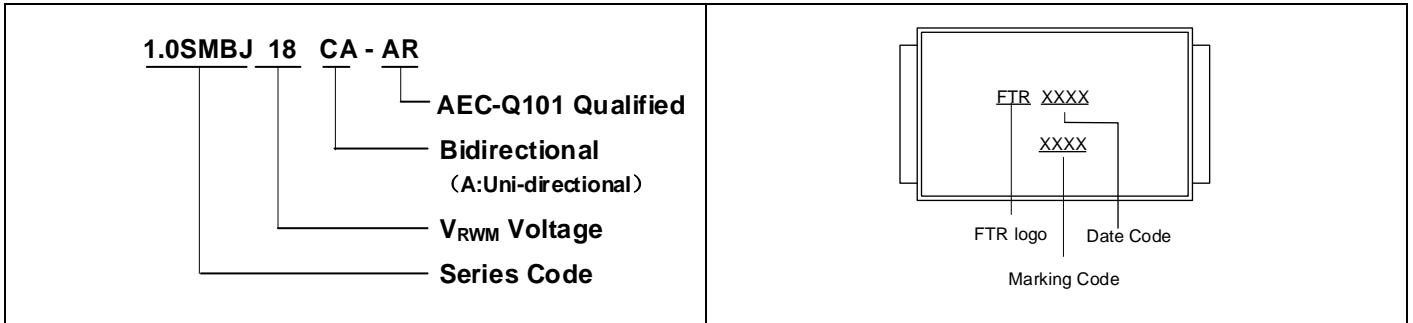
Recommended Soldering Conditions



Recommended Conditions

| Profile Feature | Pb-Free Assembly |
|--|------------------|
| Average ramp-up rate (T_L to T_P) | 3°C/second max. |
| Preheat | |
| -Temperature Min ($T_{S\ min}$) | 150°C |
| -Temperature Max ($T_{S\ max}$) | 200°C |
| -Time (min to max) (t_s) | 60-180 seconds |
| $T_{S\ max}$ to T_L | |
| -Ramp-up Rate | 3°C/second max. |
| Time maintained above: | |
| -Temperature (T_L) | 217°C |
| -Time (t_L) | 60-150 seconds |
| Peak Temperature (T_P) | 260°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 | 8 minutes max. |

Partnumber code



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

Figure 1. Peak Pulse Power Rating Curve

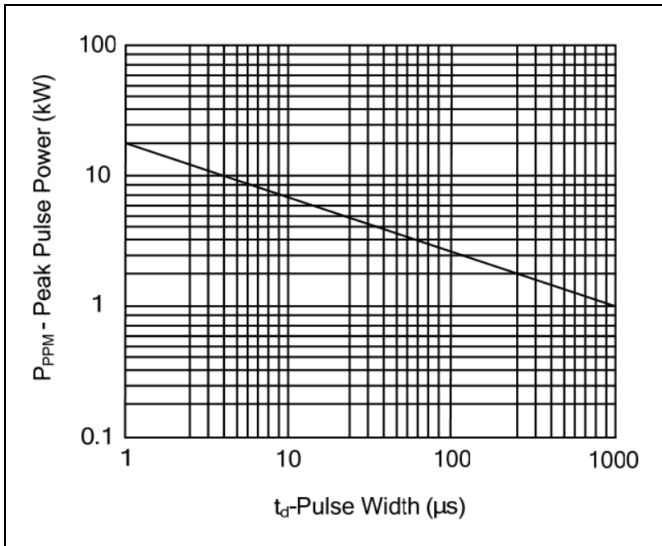


Figure 2. Pulse Derating Curve

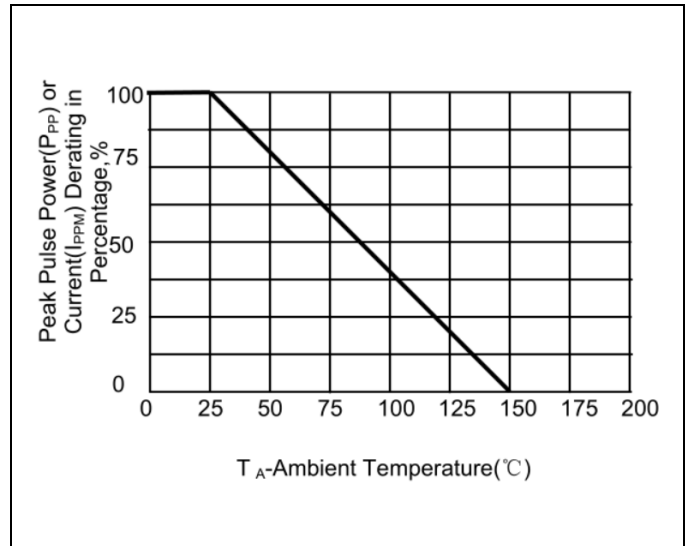


Figure 3. Pulse Waveform

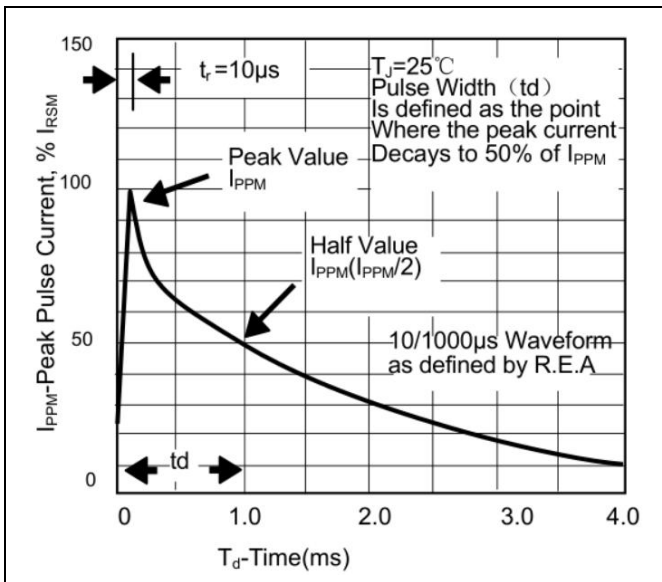
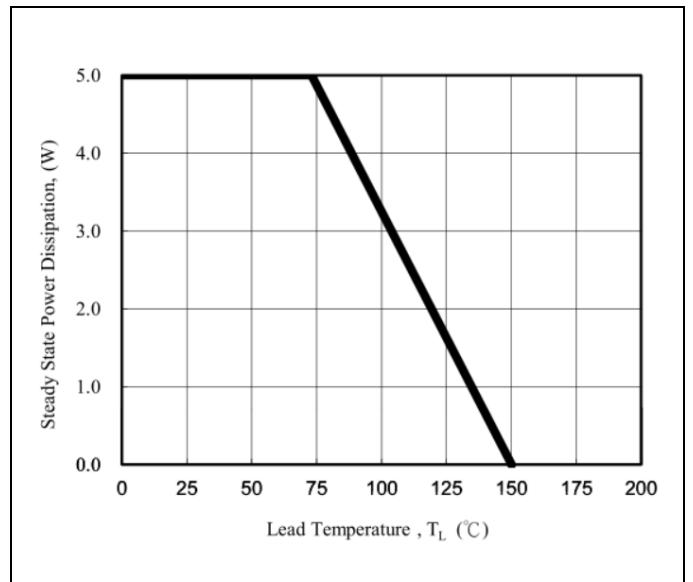
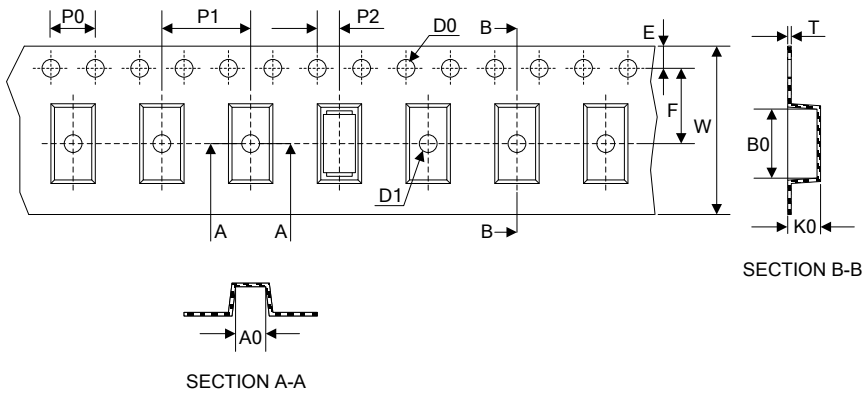
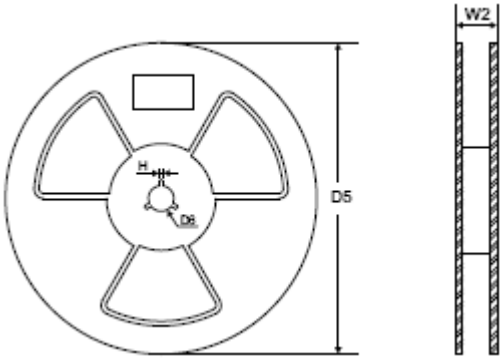


Figure 4. Steady State Power Dissipation Derating Curve



Packaging

| Tape | Symbol | Dimension (mm) |
|---|---|----------------|
|  | W | 12.00±0.10 |
| | P0 | 4.00±0.10 |
| | P1 | 8.00±0.10 |
| | P2 | 2.00±0.10 |
| | D0 | Φ1.55±0.10 |
| | D1 | Φ1.5±0.10 |
| | E | 1.75±0.10 |
| | F | 5.50±0.10 |
| | A0 | 3.80±0.1 |
| | B0 | 5.40±0.1 |
| | K0 | 2.45±0.1 |
| | T | 0.25±0.1 |
| |  | D5 |
| D6 | | Φ13.5±0.5 |
| H | | 2.5±1.0 |
| W2 | | 16.0±2.0 |
| Quantity: 3000PCS | | |