

Transient Voltage Suppressors (TVS) Data Sheet

Features

- Glass passivated junction
- Low zener impedance
- Excellent clamping capability
- 1500W peak pulse power capability at 10/1000µs waveform, repetition rate (duty cycle):0.01%
- Fast response time
- Typical I_R less than 1µA above 11V.
- Plastic package has underwriters laboratory flammability 94V-0
- Meets MSL level 1, per J-STD-020.

Mechanical Data

- Case: JEDEC DO-214AB Moulded plastic
- Terminal: solderplated, 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°C ambient temperature unless otherwise specified.

| Rating | Symbol | Value | Units |
|--|-----------------|--------------|-------|
| Peak pulse power dissipation at 10/1000µs waveform (Note1, Fig.1) | P_{PPM} | Minimum 1500 | Watts |
| Peak pulse current of at 10/1000µs waveform (Note 1, Fig.3) | I_{PPM} | See Table | Amps |
| Steady state power dissipation at $T_L=75^\circ\text{C}$ (Fig.4) | $P_{M(AV)}$ | 6.5 | Watts |
| Peak forward surge current, 8.3ms single half sine-wave superimposed on rated load, (JEDEC Method) (Note2) | I_{FSM} | 200 | Amps |
| Operating junction and Storage Temperature Range. | T_J, T_{STG} | -55 to +150 | °C |
| Typical thermal resistance junction to lead | $R_{\theta JL}$ | 15 | °C/W |
| Typical thermal resistance junction to ambient | $R_{\theta JA}$ | 75 | °C/W |

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

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

Dimensions (DO-214AB/SMC)

| Symbol | Millimeters | | Inches | |
|--------|-------------|------|--------|-------|
| | Min. | Max. | Min. | Max. |
| L | 6.60 | 7.71 | 0.260 | 0.280 |
| D | 5.59 | 6.22 | 0.220 | 0.245 |
| D1 | 2.9 | 3.20 | 0.114 | 0.126 |
| T | 7.75 | 8.13 | 0.305 | 0.320 |
| T1 | 0.76 | 1.52 | 0.030 | 0.060 |
| d | - | 0.20 | - | 0.008 |
| H | 2.06 | 2.62 | 0.079 | 0.103 |

Electrical Characteristics (TA=25°C)

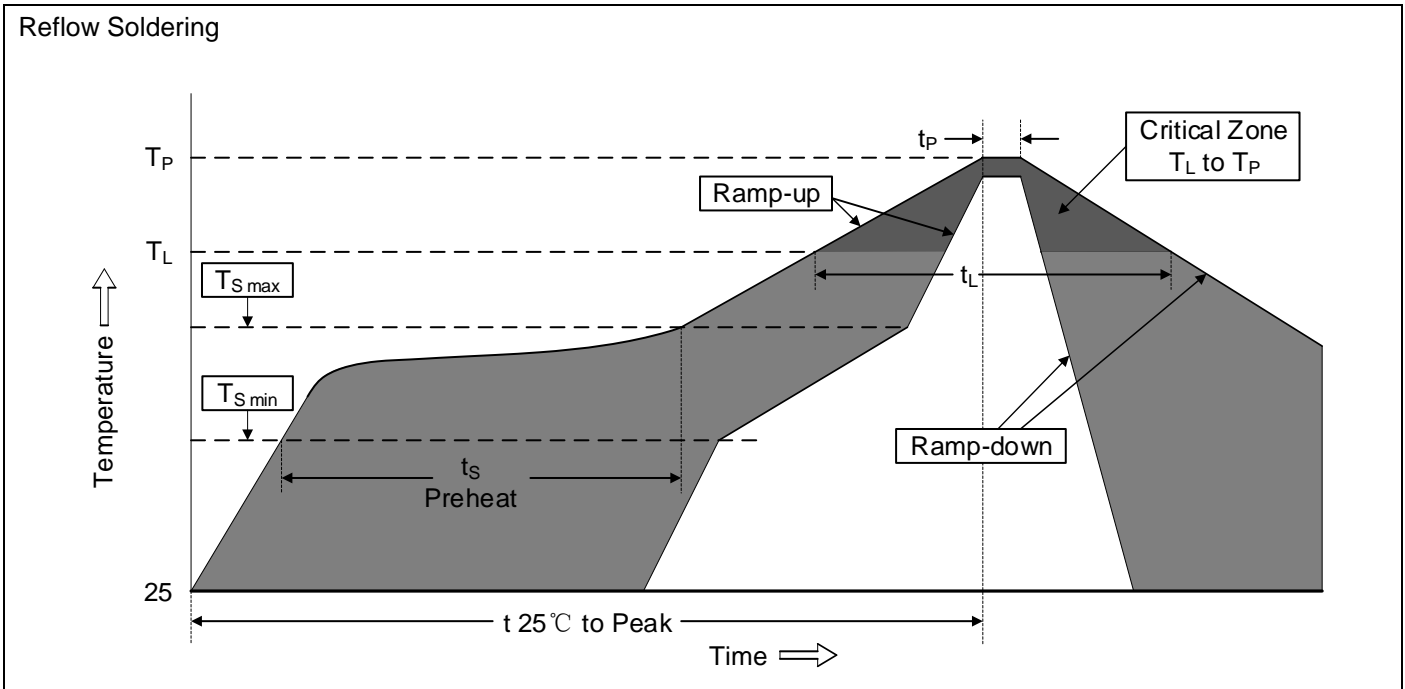
| Part Number | | Device Marking Code | | Reverse Stand-Off Voltage | Breakdown Voltage @I _T | Test Current | Maximum Clamping Voltage @I _{PP} | Peak Pulse Current | Reverse Leakage @V _{RWM} |
|----------------|---------------|---------------------|-----|---------------------------|-----------------------------------|---------------------|---|---------------------|-----------------------------------|
| Unidirectional | Bidirectional | UNI | BI | V _{RWM} (V) | V _{BR} (V) | I _T (mA) | V _C (V) | I _{PP} (A) | I _R (μA) |
| SMCJ5.0A | SMCJ5.0CA | GDE | BDE | 5.0 | 6.4~7.0 | 10 | 9.2 | 163.0 | 800 |
| SMCJ6.0A | SMCJ6.0CA | GDG | BDG | 6.0 | 6.7~7.4 | 10 | 10.3 | 145.6 | 800 |
| SMCJ6.5A | SMCJ6.5CA | GDK | BDK | 6.5 | 7.2~8.0 | 10 | 11.2 | 133.9 | 500 |
| SMCJ7.0A | SMCJ7.0CA | GDM | BDM | 7.0 | 7.8~8.6 | 10 | 12.0 | 125.0 | 200 |
| SMCJ7.5A | SMCJ7.5CA | GDP | BDP | 7.5 | 8.3~9.2 | 1 | 12.9 | 116.3 | 100 |
| SMCJ8.0A | SMCJ8.0CA | GDR | BDR | 8.0 | 8.9~9.8 | 1 | 13.6 | 110.3 | 50 |
| SMCJ8.5A | SMCJ8.5CA | GDT | BDT | 8.5 | 9.4~10.4 | 1 | 14.4 | 104.2 | 20 |
| SMCJ9.0A | SMCJ9.0CA | GDV | BDV | 9.0 | 10.0~11.0 | 1 | 15.4 | 97.4 | 10 |
| SMCJ10A | SMCJ10CA | GDX | BDX | 10.0 | 11.1~12.3 | 1 | 17.0 | 88.3 | 5 |
| SMCJ11A | SMCJ11CA | GDZ | BDZ | 11.0 | 12.2~13.5 | 1 | 18.2 | 82.4 | 1 |
| SMCJ12A | SMCJ12CA | GEE | BEE | 12.0 | 13.3~14.7 | 1 | 19.9 | 75.4 | 1 |
| SMCJ13A | SMCJ13CA | GEG | BEG | 13.0 | 14.4~15.9 | 1 | 21.5 | 69.8 | 1 |
| SMCJ14A | SMCJ14CA | GEK | BEK | 14.0 | 15.6~17.2 | 1 | 23.2 | 64.7 | 1 |
| SMCJ15A | SMCJ15CA | GEM | BEM | 15.0 | 16.7~18.5 | 1 | 24.4 | 61.5 | 1 |
| SMCJ16A | SMCJ16CA | GEP | BEP | 16.0 | 17.8~19.7 | 1 | 26.0 | 57.7 | 1 |
| SMCJ17A | SMCJ17CA | GER | BER | 17.0 | 18.9~20.9 | 1 | 27.6 | 54.4 | 1 |
| SMCJ18A | SMCJ18CA | GET | BET | 18.0 | 20.0~22.1 | 1 | 29.2 | 51.4 | 1 |
| SMCJ19A | SMCJ19CA | GEW | BEW | 19.0 | 21.1~23.3 | 1 | 30.8 | 48.7 | 1 |
| SMCJ20A | SMCJ20CA | GEV | BEV | 20.0 | 22.2~24.5 | 1 | 32.4 | 46.3 | 1 |
| SMCJ22A | SMCJ22CA | GEX | BEX | 22.0 | 24.4~26.9 | 1 | 35.5 | 42.3 | 1 |
| SMCJ24A | SMCJ24CA | GEZ | BEZ | 24.0 | 26.7~29.5 | 1 | 38.9 | 38.6 | 1 |
| SMCJ26A | SMCJ26CA | GFE | BFE | 26.0 | 28.9~31.9 | 1 | 42.1 | 35.6 | 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) |
| SMCJ28A | SMCJ28CA | GFG | BFG | 28.0 | 31.1~34.4 | 1 | 45.4 | 33.1 | 1 |
| SMCJ30A | SMCJ30CA | GFK | BFK | 30.0 | 33.3~36.8 | 1 | 48.4 | 31.0 | 1 |
| SMCJ33A | SMCJ33CA | GFM | BFM | 33.0 | 36.7~40.6 | 1 | 53.3 | 28.1 | 1 |
| SMCJ36A | SMCJ36CA | GFP | BFP | 36.0 | 40.0~44.2 | 1 | 58.1 | 25.8 | 1 |
| SMCJ40A | SMCJ40CA | GFR | BFR | 40.0 | 44.4~49.1 | 1 | 64.5 | 23.3 | 1 |
| SMCJ43A | SMCJ43CA | GFT | BFT | 43.0 | 47.8~52.8 | 1 | 69.4 | 21.6 | 1 |
| SMCJ45A | SMCJ45CA | GFV | BFV | 45.0 | 50.0~55.3 | 1 | 72.7 | 20.6 | 1 |
| SMCJ48A | SMCJ48CA | GFX | BFX | 48.0 | 53.3~58.9 | 1 | 77.4 | 19.4 | 1 |
| SMCJ51A | SMCJ51CA | GFZ | BFZ | 51.0 | 56.7~62.7 | 1 | 82.4 | 18.2 | 1 |
| SMCJ54A | SMCJ54CA | GGE | BGE | 54.0 | 60.0~66.3 | 1 | 87.1 | 17.2 | 1 |
| SMCJ58A | SMCJ58CA | GGG | BGG | 58.0 | 64.4~71.2 | 1 | 93.6 | 16.0 | 1 |
| SMCJ60A | SMCJ60CA | GGK | BGK | 60.0 | 66.7~73.7 | 1 | 96.8 | 15.5 | 1 |
| SMCJ64A | SMCJ64CA | GGM | BGM | 64.0 | 71.1~78.6 | 1 | 103.0 | 14.6 | 1 |
| SMCJ70A | SMCJ70CA | GGP | BGP | 70.0 | 77.8~86.0 | 1 | 113.0 | 13.3 | 1 |
| SMCJ75A | SMCJ75CA | GGR | BGR | 75.0 | 83.3~92.1 | 1 | 121.0 | 12.4 | 1 |
| SMCJ78A | SMCJ78CA | GGT | BGT | 78.0 | 86.7~95.8 | 1 | 126.0 | 11.9 | 1 |
| SMCJ80A | SMCJ80CA | GGW | BGW | 80.0 | 88.8~97.6 | 1 | 129.6 | 11.6 | 1 |
| SMCJ85A | SMCJ85CA | GGV | BGV | 85.0 | 94.4~104 | 1 | 137.0 | 11.0 | 1 |
| SMCJ90A | SMCJ90CA | GGX | BGX | 90.0 | 100~111 | 1 | 146.0 | 10.3 | 1 |
| SMCJ100A | SMCJ100CA | GGZ | BGZ | 100.0 | 111~123 | 1 | 162.0 | 9.3 | 1 |
| SMCJ110A | SMCJ110CA | GHE | BHE | 110.0 | 122~135 | 1 | 177.0 | 8.5 | 1 |
| SMCJ120A | SMCJ120CA | GHG | BHG | 120.0 | 133~147 | 1 | 193.0 | 7.8 | 1 |
| SMCJ130A | SMCJ130CA | GHK | BHK | 130.0 | 144~159 | 1 | 209.0 | 7.2 | 1 |
| SMCJ140A | SMCJ140CA | GHL | BHL | 140.0 | 155~171 | 1 | 227.0 | 6.6 | 1 |
| SMCJ150A | SMCJ150CA | GHM | BHM | 150.0 | 167~185 | 1 | 243.0 | 6.2 | 1 |
| SMCJ160A | SMCJ160CA | GHP | BHP | 160.0 | 178~197 | 1 | 259.0 | 5.8 | 1 |
| SMCJ170A | SMCJ170CA | GHR | BHR | 170.0 | 189~209 | 1 | 275.0 | 5.5 | 1 |
| SMCJ180A | SMCJ180CA | GHT | BHT | 180.0 | 200~220 | 1 | 291.0 | 5.1 | 1 |
| SMCJ190A | SMCJ190CA | GHW | BHW | 190.0 | 211~232 | 1 | 308.0 | 4.9 | 1 |
| SMCJ200A | SMCJ200CA | GHV | BHV | 200.0 | 224~247 | 1 | 324.0 | 4.6 | 1 |
| SMCJ220A | SMCJ220CA | GHX | BHX | 220.0 | 246~272 | 1 | 356.0 | 4.2 | 1 |
| SMCJ250A | SMCJ250CA | GHZ | BHZ | 250.0 | 279~309 | 1 | 405.0 | 3.7 | 1 |
| SMCJ300A | SMCJ300CA | GJE | BJE | 300.0 | 335~371 | 1 | 486.0 | 3.1 | 1 |
| SMCJ350A | SMCJ350CA | GJG | BJG | 350.0 | 391~432 | 1 | 567.0 | 2.6 | 1 |
| SMCJ400A | SMCJ400CA | GJK | BJK | 400.0 | 447~494 | 1 | 648.0 | 2.3 | 1 |
| SMCJ440A | SMCJ440CA | GJM | BJM | 440.0 | 492~543 | 1 | 713.0 | 2.1 | 1 |

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

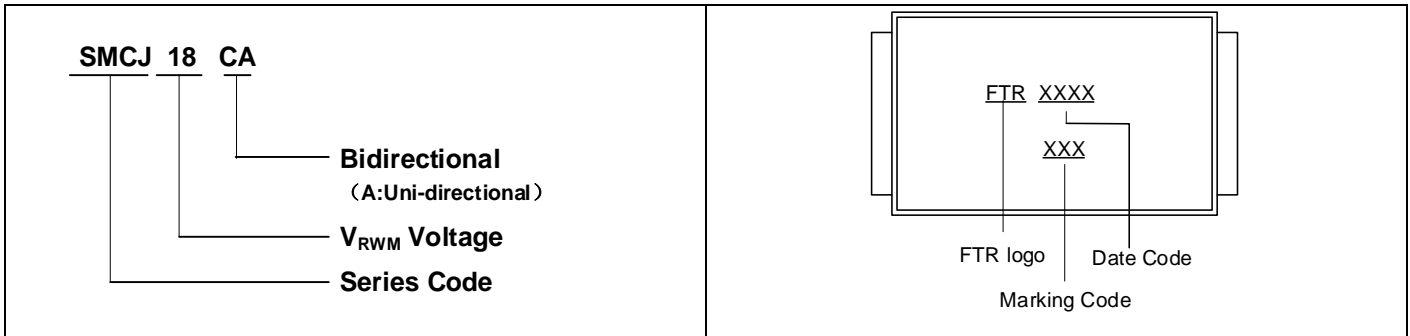
Recommended Soldering Conditions



Recommended Conditions

| Profile Feature | Pb-Free Assembly |
|---|----------------------------------|
| Average ramp-up rate (T_L to T_P) | 3°C/second max. |
| Preheat <ul style="list-style-type: none"> -Temperature Min ($T_{S\ min}$) -Temperature Max ($T_{S\ max}$) -Time (min to max) (t_s) | 150°C 200°C 60-180 seconds |
| $T_{S\ max}$ to T_L <ul style="list-style-type: none"> -Ramp-up Rate | 3°C/second max. |
| Time maintained above: <ul style="list-style-type: none"> -Temperature (T_L) -Time (t_L) | 217°C 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

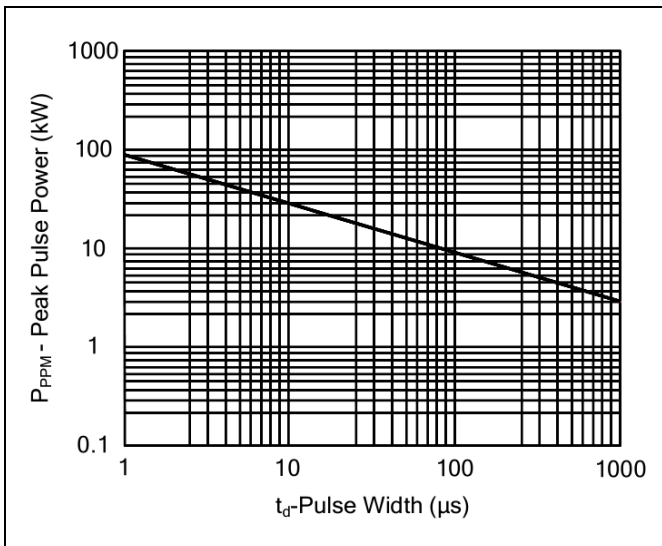


Figure 2. Pulse Derating Curve

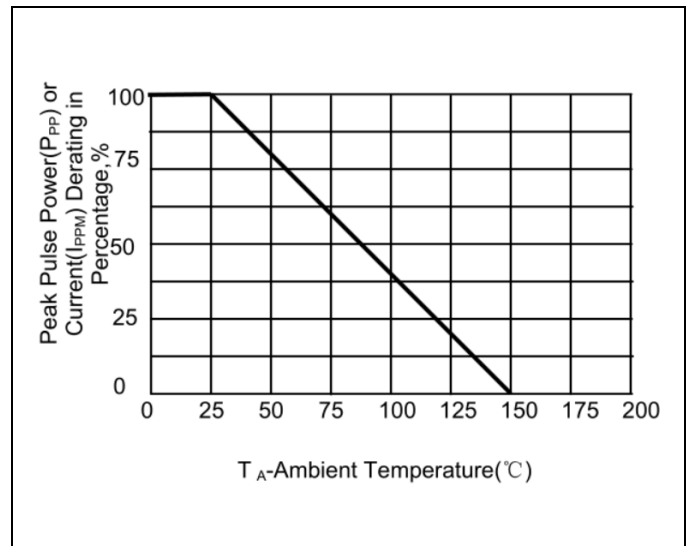


Figure 3. Pulse Waveform

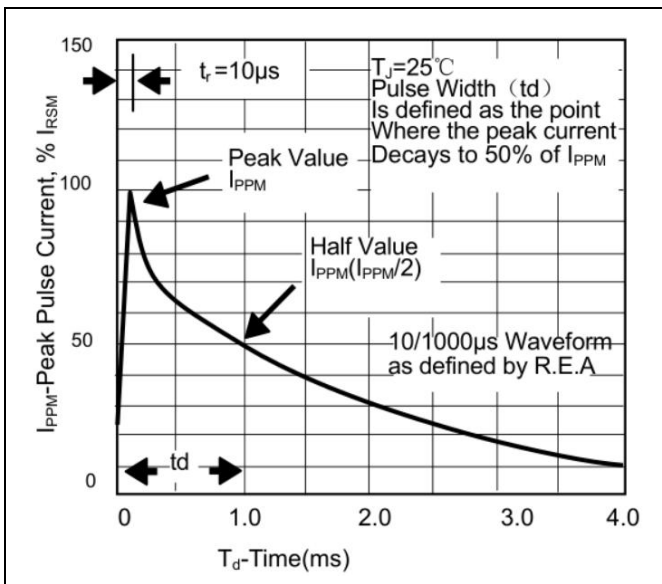
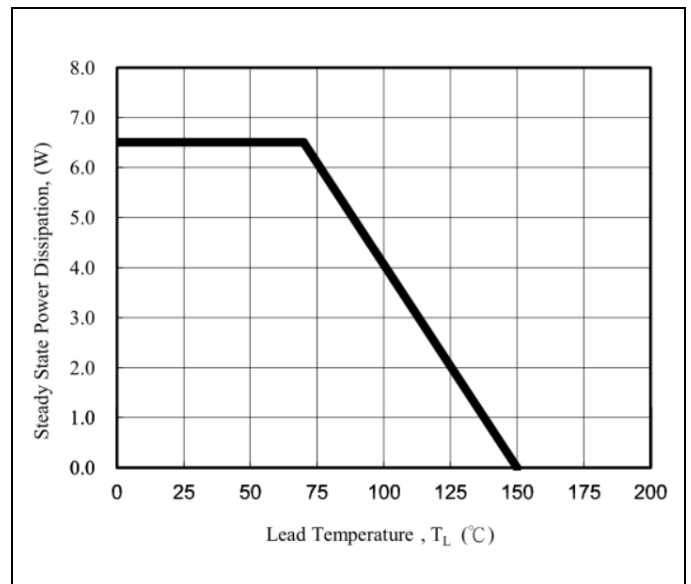
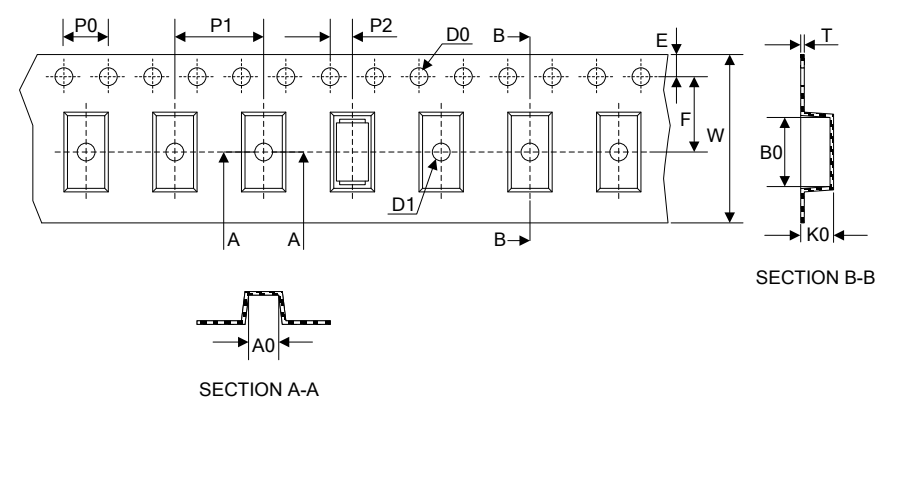
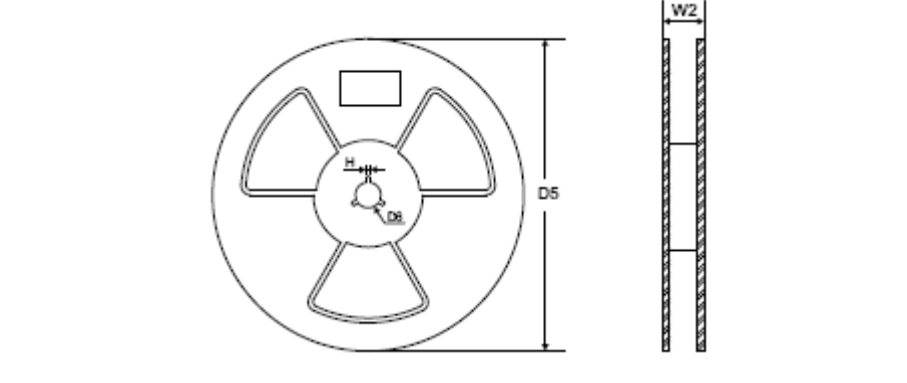


Figure 4. Steady State Power Dissipation Derating Curve



Packaging

| Tape | | Symbol | Dimension (mm) |
|---|----------|-------------------|----------------|
|  | | W | 16.00±0.10 |
| | | P0 | 4.00±0.10 |
| | | P1 | 8.00±0.10 |
| | | P2 | 2.00±0.10 |
| | | D0 | Φ1.55±0.10 |
| | | E | 1.75±0.10 |
| | | F | 7.50±0.10 |
| | | A0 | 6.05±0.1 |
| | | B0 | 8.31±0.1 |
| | | K0 | 2.54±0.1 |
| T | 0.25±0.1 | | |
|  | | D5 | Φ330.0±2.0 |
| | | D6 | Φ13.5±0.5 |
| | | H | 2.5±1.0 |
| | | W2 | 20.0±2.0 |
| | | Quantity: 3000PCS | |

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