

Transient Voltage Suppressors (TVS) Data Sheet

Features

- Glass passivated junction
- Low zener impedance
- Excellent clamping capability
- 600W 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-214AAMoulded 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 600 | 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) | $P_{M(AV)}$ | 5.0 | Watts |
| Peak forward surge current, 8.3ms single half sine-wave superimposed on rated load, (JEDEC Method) (Note2) | I_{FSM} | 100 | Amps |
| Operating junction and Storage Temperature Range. | T_J, T_{STG} | -55 to +150 | °C |
| Typical thermal resistance junction to lead | $R_{\theta JL}$ | 20 | °C/W |
| Typical thermal resistance junction to ambient | $R_{\theta JA}$ | 100 | °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-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 ($T_A=25^\circ\text{C}$)

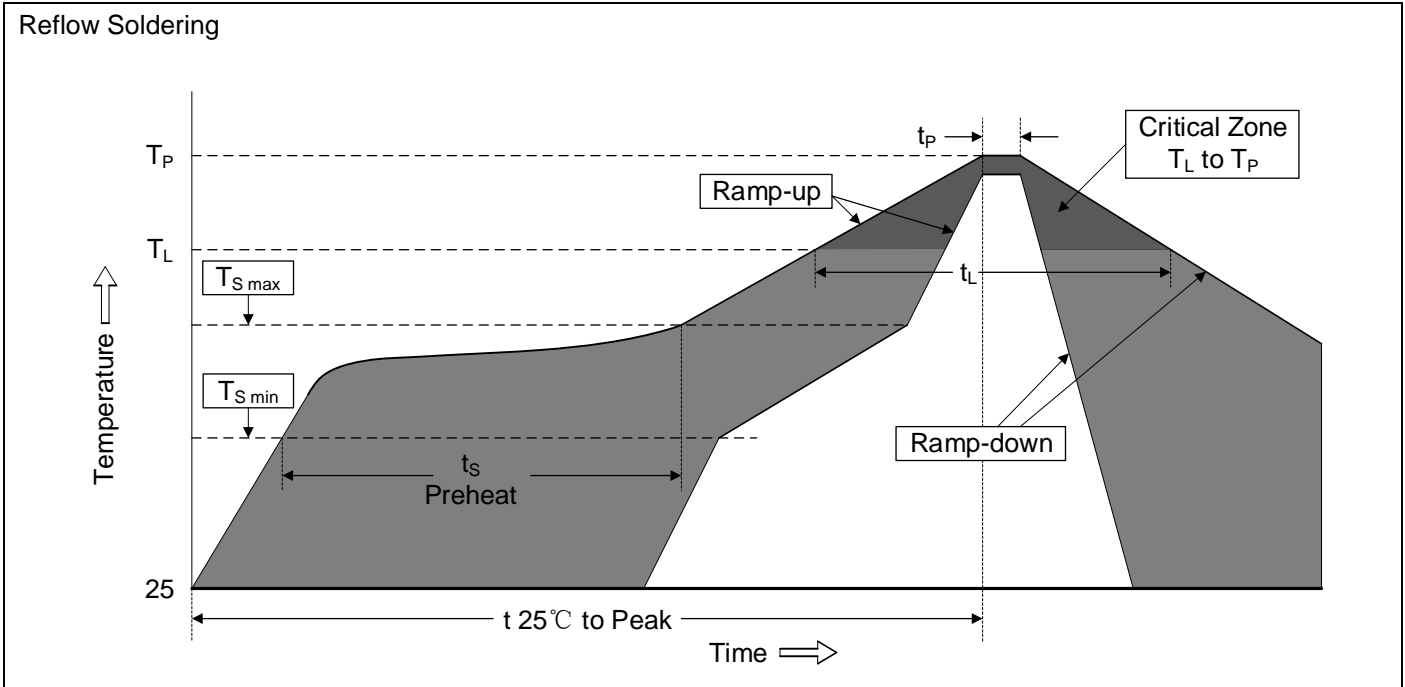
| Part Number | | Device Marking Code | | Reverse Stand-Off Voltage | Breakdown Voltage @ I_T | Test Current | Maximum Clamping Voltage @ I_{PP} | Peak Pulse Current | Reverse Leakage @ V_{RWM} |
|----------------|---------------|---------------------|----|---------------------------|---------------------------|--------------|-------------------------------------|--------------------|-----------------------------|
| Unidirectional | Bidirectional | UNI | BI | $V_{RWM}(V)$ | $V_{BR}(V)$ | $I_T(mA)$ | $V_C(V)$ | $I_{PP}(A)$ | $I_R(\mu A)$ |
| SMBJ5.0A | SMBJ5.0CA | KE | AE | 5.0 | 6.4~7.0 | 10 | 9.2 | 65.2 | 800 |
| SMBJ6.0A | SMBJ6.0CA | KG | AG | 6.0 | 6.7~7.4 | 10 | 10.3 | 58.3 | 800 |
| SMBJ6.5A | SMBJ6.5CA | KK | AK | 6.5 | 7.2~8.0 | 10 | 11.2 | 53.57 | 500 |
| SMBJ7.0A | SMBJ7.0CA | KM | AM | 7.0 | 7.8~8.6 | 10 | 12.0 | 50.0 | 200 |
| SMBJ7.5A | SMBJ7.5CA | KP | AP | 7.5 | 8.3~9.2 | 1 | 12.9 | 46.5 | 100 |
| SMBJ8.0A | SMBJ8.0CA | KR | AR | 8.0 | 8.9~9.8 | 1 | 13.6 | 44.1 | 50 |
| SMBJ8.5A | SMBJ8.5CA | KT | AT | 8.5 | 9.4~10.4 | 1 | 14.4 | 41.7 | 10 |
| SMBJ9.0A | SMBJ9.0CA | KV | AV | 9.0 | 10.0~11.0 | 1 | 15.4 | 39.0 | 5 |
| SMBJ10A | SMBJ10CA | KX | AX | 10.0 | 11.1~12.3 | 1 | 17.0 | 35.3 | 5 |
| SMBJ11A | SMBJ11CA | KZ | AZ | 11.0 | 12.2~13.5 | 1 | 18.2 | 33.0 | 1 |
| SMBJ12A | SMBJ12CA | LE | BE | 12.0 | 13.3~14.7 | 1 | 19.9 | 30.2 | 1 |
| SMBJ13A | SMBJ13CA | LG | BG | 13.0 | 14.4~15.9 | 1 | 21.5 | 28.0 | 1 |
| SMBJ14A | SMBJ14CA | LK | BK | 14.0 | 15.6~17.2 | 1 | 23.2 | 25.9 | 1 |
| SMBJ15A | SMBJ15CA | LM | BM | 15.0 | 16.7~18.5 | 1 | 24.4 | 24.6 | 1 |
| SMBJ16A | SMBJ16CA | LP | BP | 16.0 | 17.8~19.7 | 1 | 26.0 | 23.1 | 1 |
| SMBJ17A | SMBJ17CA | LR | BR | 17.0 | 18.9~20.9 | 1 | 27.6 | 21.8 | 1 |
| SMBJ18A | SMBJ18CA | LT | BT | 18.0 | 20.0~22.1 | 1 | 29.2 | 20.6 | 1 |
| SMBJ19A | SMBJ19CA | LW | BW | 19.0 | 21.1~23.3 | 1 | 30.8 | 19.5 | 1 |
| SMBJ20A | SMBJ20CA | LV | BV | 20.0 | 22.2~24.5 | 1 | 32.4 | 18.6 | 1 |
| SMBJ22A | SMBJ22CA | LX | BX | 22.0 | 24.4~26.9 | 1 | 35.5 | 16.9 | 1 |
| SMBJ24A | SMBJ24CA | LZ | BZ | 24.0 | 26.7~29.5 | 1 | 38.9 | 15.5 | 1 |
| SMBJ26A | SMBJ26CA | ME | CE | 26.0 | 28.9~31.9 | 1 | 42.1 | 14.3 | 1 |

Electrical Characteristics (T_A=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) |
| SMBJ28A | SMBJ28CA | MG | CG | 28.0 | 31.1~34.4 | 1 | 45.4 | 13.3 | 1 |
| SMBJ30A | SMBJ30CA | MK | CK | 30.0 | 33.3~36.8 | 1 | 48.4 | 12.4 | 1 |
| SMBJ33A | SMBJ33CA | MM | CM | 33.0 | 36.7~40.6 | 1 | 53.3 | 11.3 | 1 |
| SMBJ36A | SMBJ36CA | MP | CP | 36.0 | 40.0~44.2 | 1 | 58.1 | 10.4 | 1 |
| SMBJ40A | SMBJ40CA | MR | CR | 40.0 | 44.4~49.1 | 1 | 64.5 | 9.3 | 1 |
| SMBJ43A | SMBJ43CA | MT | CT | 43.0 | 47.8~52.8 | 1 | 69.4 | 8.7 | 1 |
| SMBJ45A | SMBJ45CA | MV | CV | 45.0 | 50.0~55.3 | 1 | 72.7 | 8.3 | 1 |
| SMBJ48A | SMBJ48CA | MX | CX | 48.0 | 53.3~58.9 | 1 | 77.4 | 7.8 | 1 |
| SMBJ51A | SMBJ51CA | MZ | CZ | 51.0 | 56.7~62.7 | 1 | 82.4 | 7.3 | 1 |
| SMBJ54A | SMBJ54CA | NE | DE | 54.0 | 60.0~66.3 | 1 | 87.1 | 6.9 | 1 |
| SMBJ58A | SMBJ58CA | NG | DG | 58.0 | 64.4~71.2 | 1 | 93.6 | 6.5 | 1 |
| SMBJ60A | SMBJ60CA | NK | DK | 60.0 | 66.7~73.7 | 1 | 96.8 | 6.2 | 1 |
| SMBJ64A | SMBJ64CA | NM | DM | 64.0 | 71.1~78.6 | 1 | 103.0 | 5.9 | 1 |
| SMBJ70A | SMBJ70CA | NP | DP | 70.0 | 77.8~86.0 | 1 | 113.0 | 5.3 | 1 |
| SMBJ75A | SMBJ75CA | NR | DR | 75.0 | 83.3~92.1 | 1 | 121.0 | 5.0 | 1 |
| SMBJ78A | SMBJ78CA | NT | DT | 78.0 | 86.7~95.8 | 1 | 126.0 | 4.8 | 1 |
| SMBJ80A | SMBJ80CA | NW | DW | 80.0 | 88.8~97.6 | 1 | 129.6 | 4.6 | 1 |
| SMBJ85A | SMBJ85CA | NV | DV | 85.0 | 94.4~104 | 1 | 137.0 | 4.4 | 1 |
| SMBJ90A | SMBJ90CA | NX | DX | 90.0 | 100~111 | 1 | 146.0 | 4.1 | 1 |
| SMBJ100A | SMBJ100CA | NZ | DZ | 100.0 | 111~123 | 1 | 162.0 | 3.7 | 1 |
| SMBJ110A | SMBJ110CA | PE | FE | 110.0 | 122~135 | 1 | 177.0 | 3.4 | 1 |
| SMBJ120A | SMBJ120CA | PG | FG | 120.0 | 133~147 | 1 | 193.0 | 3.2 | 1 |
| SMBJ130A | SMBJ130CA | PK | FK | 130.0 | 144~159 | 1 | 209.0 | 2.9 | 1 |
| SMBJ140A | SMBJ140CA | PL | FL | 140.0 | 155~171 | 1 | 227.0 | 2.7 | 1 |
| SMBJ150A | SMBJ150CA | PM | FM | 150.0 | 167~185 | 1 | 243.0 | 2.5 | 1 |
| SMBJ160A | SMBJ160CA | PP | FP | 160.0 | 178~197 | 1 | 259.0 | 2.3 | 1 |
| SMBJ170A | SMBJ170CA | PR | FR | 170.0 | 189~209 | 1 | 275.0 | 2.2 | 1 |
| SMBJ180A | SMBJ180CA | PT | FT | 180.0 | 200~220 | 1 | 291.0 | 2.1 | 1 |
| SMBJ190A | SMBJ190CA | PU | FU | 190.0 | 211~232 | 1 | 308.0 | 2.0 | 1 |
| SMBJ200A | SMBJ200CA | PV | FV | 200.0 | 224~247 | 1 | 324.0 | 1.9 | 1 |
| SMBJ220A | SMBJ220CA | PX | FX | 220.0 | 246~272 | 1 | 356.0 | 1.7 | 1 |
| SMBJ250A | SMBJ250CA | PZ | FZ | 250.0 | 279~309 | 1 | 405.0 | 1.5 | 1 |
| SMBJ300A | SMBJ300CA | QE | GE | 300.0 | 335~371 | 1 | 486.0 | 1.3 | 1 |
| SMBJ350A | SMBJ350CA | QG | GG | 350.0 | 391~432 | 1 | 567.0 | 1.1 | 1 |
| SMBJ400A | SMBJ400CA | QK | GK | 400.0 | 447~494 | 1 | 648.0 | 0.9 | 1 |
| SMBJ440A | SMBJ440CA | QM | FM | 440.0 | 492~543 | 1 | 713.0 | 0.9 | 1 |

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

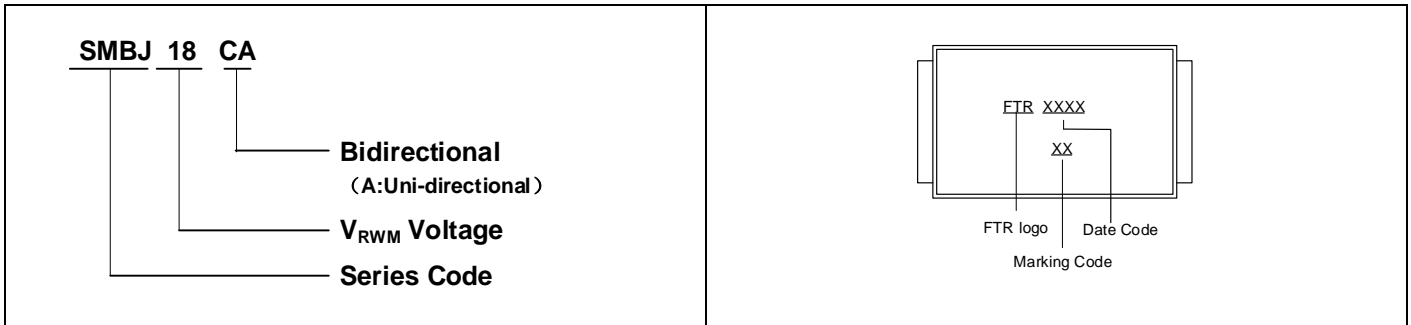
Recommended Soldering Conditions



Recommended Conditions

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

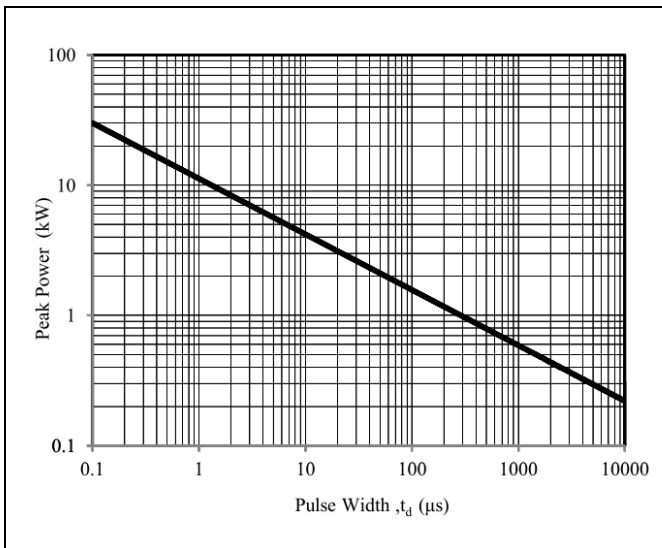


Figure 2. Pulse Derating Curve

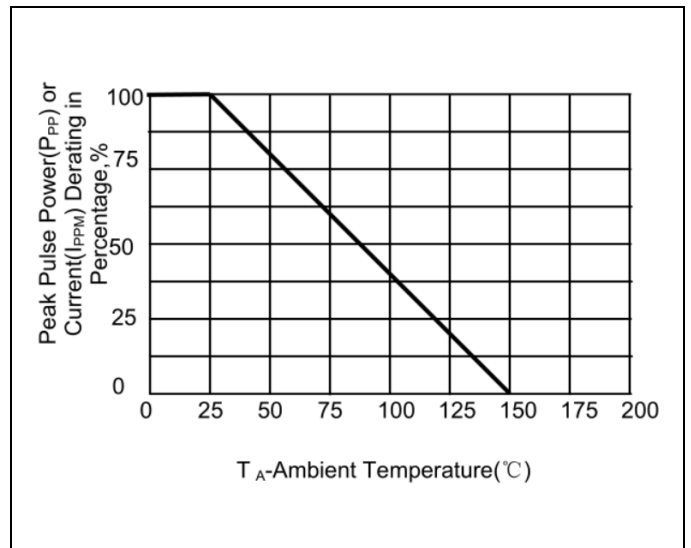
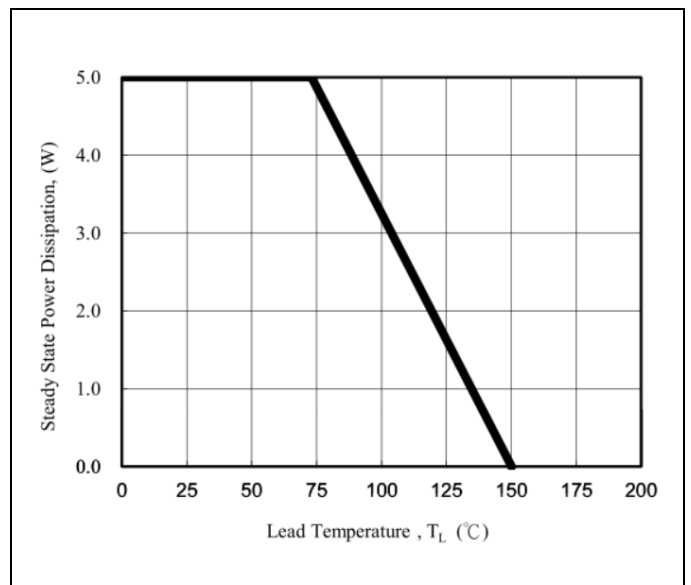


Figure 3. Pulse Waveform



Figure 4. Steady State Power Dissipation Derating Curve



Packaging

| Tape | | Symbol | Dimension (mm) | | |
|-------------------|----------|--------|----------------|----|------------|
| | | W | 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 | | |
| | | Reel | | D5 | Φ330.0±2.0 |
| | | | | D6 | Φ13.5±0.5 |
| H | 2.5±1.0 | | | | |
| W2 | 16.0±2.0 | | | | |
| Quantity: 3000PCS | | | | | |

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