

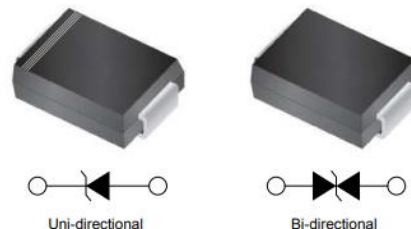
Transient Voltage Suppression Diodes: SMBJ Series

SMD Type 600 W



■ Features

1. Glass passivated chip
2. 600W peak pulse power capability at 10/1000μs waveform, repetition rate (duty cycle): 0.01%
3. Excellent clamping capability
4. Very fast response time
5. Low clamping voltage
6. Low leakage current
7. Meets MSL level 1, per J-STD-020, LF maximum peak of 260°C
8. JESD22-A114-B ESD Voltage: HBM 15KV
9. JEDEC EIA/JESD22-C101F ESD Voltage: CDM 500V
10. JEDEC EIA/JESD22-A115 ESD Voltage: MM 400V
11. ESD-immunity acc. IEC 61000-4-2 ±30kV(contact), ±30kV(air)
12. Halogen free and RoHS compliant



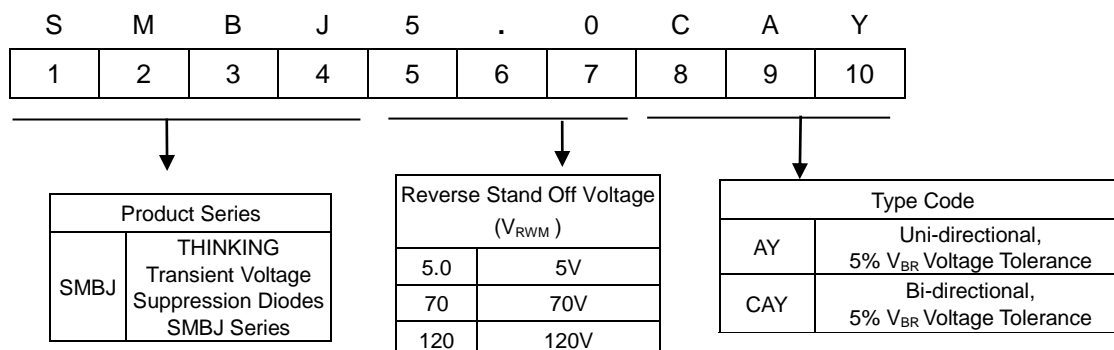
■ Recommended Applications

1. Computers
2. Telecom system
3. Industrial equipment
4. Consumer electronic applications
5. Other VCC bus and I/O interfaces

■ Mechanical Data

1. Case: Molded plastic, SMB/ DO-214AA
2. Epoxy: UL 94V-0 rate flame retardant
3. Terminals: Solderable per MIL-STD-750, method 2026
4. Polarity: Color band denotes cathode end
5. Mounting Position: Any

■ Part Number Code

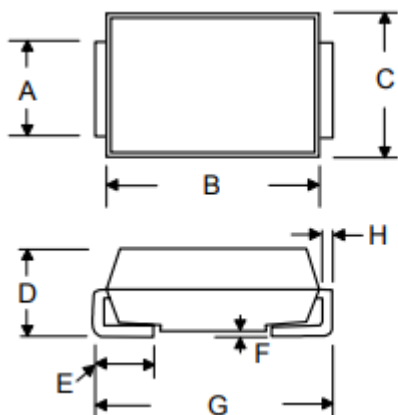


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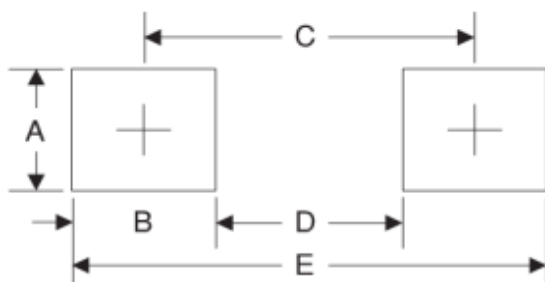
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Structures and Dimensions



| Symbol | Dimensions in millimeters | |
|--------|---------------------------|------|
| | Min | Max |
| A | 1.80 | 2.20 |
| B | 4.06 | 4.75 |
| C | 3.30 | 3.94 |
| D | 1.99 | 2.61 |
| E | 0.76 | 1.52 |
| F | - | 0.20 |
| G | 5.08 | 5.59 |
| H | 0.15 | 0.31 |



| Symbol | Unit (mm) | Unit (inch) |
|--------|-----------|-------------|
| A | 2.30 | 0.091 |
| B | 2.00 | 0.078 |
| C | 4.10 | 0.161 |
| D | 2.10 | 0.083 |
| E | 6.10 | 0.240 |

Maximum Rating (TA=25°C unless otherwise noted)

| Parameter | Symbol | Value | Unit |
|---|-----------------------------------|----------------|------|
| Peak power dissipation with a 10/1000µs waveform (Note 1,2) | P _{PPM} | 600 | W |
| Peak pulse current with 10/1000 µs waveform (Note 1) | I _{PPM} | See next table | A |
| Peak forward surge current, 8.3 ms single half sine-wave (Note 3) | I _{FSM} | 100 | A |
| Power dissipation on infinite heatsink at T _L =75°C | P _D | 5 | W |
| Typical thermal resistance junction to ambient | R _{θJA} | 100 | °C/W |
| Typical thermal resistance junction to lead | R _{θJL} | 20 | °C/W |
| Operating junction and storage temperature range | T _J , T _{STG} | -55 to +150 | °C |

Note:

1. Non-repetitive current pulse, per Fig. 3 and derated above T_A=25°C per Fig. 2.
2. Mounted on 5.0 x 5.0mm 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.

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■ Electrical Characteristics (T_A=25°C unless otherwise noted)

| Part No. (Uni) | Part No. (Bi) | Reverse Stand off Voltage | Breakage Voltage V _{BR} @ I _T | | Test Current I _T (mA) | Maximum Clamping Voltage V _C @ I _{pp} | Maximum Peak Pulse Current I _{pp} (A) | Maximum Reverse Leakage I _R @ V _{RWM} | Marking Code | |
|-------------------|------------------|---------------------------------|---|----------|--|--|---|--|-----------------|-----|
| | | | V _{RWM} (V) | Min(V) | | | | | Max(V) | Uni |
| SMBJ5.0AY | SMBJ5.0CAY | 5 | 6.4 | 7 | 10 | 9.2 | 65.22 | 800 | KE | AE |
| SMBJ6.0AY | SMBJ6.0CAY | 6 | 6.7 | 7.37 | 10 | 10.3 | 58.25 | 800 | KG | AG |
| SMBJ6.5AY | SMBJ6.5CAY | 6.5 | 7.2 | 7.98 | 10 | 11.2 | 53.57 | 500 | KK | AK |
| SMBJ7.0AY | SMBJ7.0CAY | 7 | 7.8 | 8.6 | 10 | 12 | 50 | 200 | KM | AM |
| SMBJ7.5AY | SMBJ7.5CAY | 7.5 | 8.3 | 9.21 | 1 | 12.9 | 46.51 | 100 | KP | AP |
| SMBJ8.0AY | SMBJ8.0CAY | 8 | 8.9 | 9.83 | 1 | 13.6 | 44.12 | 50 | KR | AR |
| SMBJ8.5AY | SMBJ8.5CAY | 8.5 | 9.4 | 10.4 | 1 | 14.4 | 41.67 | 10 | KT | AT |
| SMBJ9.0AY | SMBJ9.0CAY | 9 | 10 | 11.1 | 1 | 15.4 | 38.96 | 5 | KV | AV |
| SMBJ10AY | SMBJ10CAY | 10 | 11.1 | 12.3 | 1 | 17 | 35.29 | 5 | KX | AX |
| SMBJ11AY | SMBJ11CAY | 11 | 12.2 | 13.5 | 1 | 18.2 | 32.97 | 1 | KZ | AZ |
| SMBJ12AY | SMBJ12CAY | 12 | 13.3 | 14.7 | 1 | 19.9 | 30.15 | 1 | LE | BE |
| SMBJ13AY | SMBJ13CAY | 13 | 14.4 | 15.9 | 1 | 21.5 | 27.91 | 1 | LG | BG |
| SMBJ14AY | SMBJ14CAY | 14 | 15.6 | 17.2 | 1 | 23.2 | 25.86 | 1 | LK | BK |
| SMBJ15AY | SMBJ15CAY | 15 | 16.7 | 18.5 | 1 | 24.4 | 24.59 | 1 | LM | BM |
| SMBJ16AY | SMBJ16CAY | 16 | 17.8 | 19.7 | 1 | 26 | 23.08 | 1 | LP | BP |
| SMBJ17AY | SMBJ17CAY | 17 | 18.9 | 20.9 | 1 | 27.6 | 21.75 | 1 | LR | BR |
| SMBJ18AY | SMBJ18CAY | 18 | 20 | 22.1 | 1 | 29.2 | 20.55 | 1 | LT | BT |
| SMBJ19AY | SMBJ19CAY | 19 | 21.1 | 23.3 | 1 | 30.8 | 19.49 | 1 | LW | BW |
| SMBJ20AY | SMBJ20CAY | 20 | 22.2 | 24.5 | 1 | 32.4 | 18.52 | 1 | LV | BV |
| SMBJ22AY | SMBJ22CAY | 22 | 24.4 | 26.9 | 1 | 35.5 | 16.9 | 1 | LX | BX |
| SMBJ24AY | SMBJ24CAY | 24 | 26.7 | 29.5 | 1 | 38.9 | 15.42 | 1 | LZ | BZ |
| SMBJ26AY | SMBJ26CAY | 26 | 28.9 | 31.9 | 1 | 42.1 | 14.25 | 1 | ME | CE |
| SMBJ28AY | SMBJ28CAY | 28 | 31.1 | 34.4 | 1 | 45.4 | 13.22 | 1 | MG | CG |
| SMBJ30AY | SMBJ30CAY | 30 | 33.3 | 36.8 | 1 | 48.4 | 12.4 | 1 | MK | CK |
| SMBJ33AY | SMBJ33CAY | 33 | 36.7 | 40.6 | 1 | 53.3 | 11.26 | 1 | MM | CM |
| SMBJ36AY | SMBJ36CAY | 36 | 40 | 44.2 | 1 | 58.1 | 10.33 | 1 | MP | CP |
| SMBJ40AY | SMBJ40CAY | 40 | 44.4 | 49.1 | 1 | 64.5 | 9.3 | 1 | MR | CR |
| SMBJ43AY | SMBJ43CAY | 43 | 47.8 | 52.8 | 1 | 69.4 | 8.65 | 1 | MT | CT |
| SMBJ45AY | SMBJ45CAY | 45 | 50 | 55.3 | 1 | 72.7 | 8.25 | 1 | MV | CV |
| SMBJ48AY | SMBJ48CAY | 48 | 53.3 | 58.9 | 1 | 77.4 | 7.75 | 1 | MX | CX |

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■ Electrical Characteristics (T_A=25°C unless otherwise noted)

| Part No. (Uni) | Part No. (Bi) | Reverse Stand off Voltage V _{RWM} (V) | Breakage Voltage V _{BR} @ I _T | | Test Current I _T (mA) | Maximum Clamping Voltage V _C @ I _{pp} V _C (V) | Maximum Peak Pulse Current I _{pp} (A) | Maximum Reverse Leakage I _R @ V _{RWM} I _R (μA) | Marking Code | |
|-------------------|------------------|---|---|----------|--|--|--|---|-----------------|----|
| | | | Min(V) | Max(V) | | | | | Uni | Bi |
| SMBJ51AY | SMBJ51CAY | 51 | 56.7 | 62.7 | 1 | 82.4 | 7.28 | 1 | MZ | CZ |
| SMBJ54AY | SMBJ54CAY | 54 | 60 | 66.3 | 1 | 87.1 | 6.89 | 1 | NE | DE |
| SMBJ58AY | SMBJ58CAY | 58 | 64.4 | 71.2 | 1 | 93.6 | 6.41 | 1 | NG | DG |
| SMBJ60AY | SMBJ60CAY | 60 | 66.7 | 73.7 | 1 | 96.8 | 6.2 | 1 | NK | DK |
| SMBJ64AY | SMBJ64CAY | 64 | 71.1 | 78.6 | 1 | 103 | 5.83 | 1 | NM | DM |
| SMBJ70AY | SMBJ70CAY | 70 | 77.8 | 86 | 1 | 113 | 5.31 | 1 | NP | DP |
| SMBJ75AY | SMBJ75CAY | 75 | 83.3 | 92.1 | 1 | 121 | 4.96 | 1 | NR | DR |
| SMBJ78AY | SMBJ78CAY | 78 | 86.7 | 95.8 | 1 | 126 | 4.76 | 1 | NT | DT |
| SMBJ80AY | SMBJ80CAY | 80 | 88.8 | 97.6 | 1 | 129.6 | 4.63 | 1 | NW | DW |
| SMBJ85AY | SMBJ85CAY | 85 | 94.4 | 104 | 1 | 137 | 4.38 | 1 | NV | DV |
| SMBJ90AY | SMBJ90CAY | 90 | 100 | 111 | 1 | 146 | 4.11 | 1 | NX | DX |
| SMBJ100AY | SMBJ100CAY | 100 | 111 | 123 | 1 | 162 | 3.7 | 1 | NZ | DZ |
| SMBJ110AY | SMBJ110CAY | 110 | 122 | 135 | 1 | 177 | 3.39 | 1 | PE | FE |
| SMBJ120AY | SMBJ120CAY | 120 | 133 | 147 | 1 | 193 | 3.11 | 1 | PG | FG |
| SMBJ130AY | SMBJ130CAY | 130 | 144 | 159 | 1 | 209 | 2.87 | 1 | PK | FK |
| SMBJ140AY | SMBJ140CAY | 140 | 155 | 171 | 1 | 226.8 | 2.65 | 1 | PL | FL |
| SMBJ150AY | SMBJ150CAY | 150 | 167 | 185 | 1 | 243 | 2.47 | 1 | PM | FM |
| SMBJ160AY | SMBJ160CAY | 160 | 178 | 197 | 1 | 259 | 2.32 | 1 | PP | FP |
| SMBJ170AY | SMBJ170CAY | 170 | 189 | 209 | 1 | 275 | 2.18 | 1 | PR | FR |
| SMBJ180AY | SMBJ180CAY | 180 | 200 | 220 | 1 | 291.6 | 2.06 | 1 | PT | FT |
| SMBJ190AY | SMBJ190CAY | 190 | 211 | 232 | 1 | 307.8 | 1.95 | 1 | PU | FU |
| SMBJ200AY | SMBJ200CAY | 200 | 224 | 247 | 1 | 324 | 1.85 | 1 | PV | FV |
| SMBJ220AY | SMBJ220CAY | 220 | 246 | 272 | 1 | 356 | 1.69 | 1 | PX | FX |
| SMBJ250AY | SMBJ250CAY | 250 | 279 | 309 | 1 | 405 | 1.48 | 1 | PZ | FZ |
| SMBJ300AY | SMBJ300CAY | 300 | 335 | 371 | 1 | 486 | 1.23 | 1 | QE | GE |
| SMBJ350AY | SMBJ350CAY | 350 | 391 | 432 | 1 | 567 | 1.06 | 1 | QG | GG |
| SMBJ400AY | SMBJ400CAY | 400 | 447 | 494 | 1 | 648 | 0.93 | 1 | QK | GK |
| SMBJ440AY | SMBJ440CAY | 440 | 492 | 543 | 1 | 713 | 0.84 | 1 | QM | GM |

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

Fig.1 - Peak Pulse Power Rating Curve

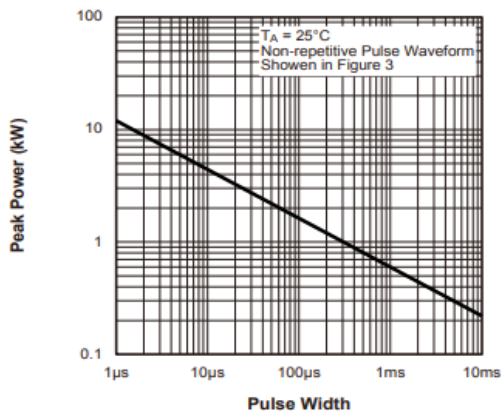


Fig.2 - Pulse Derating Curve

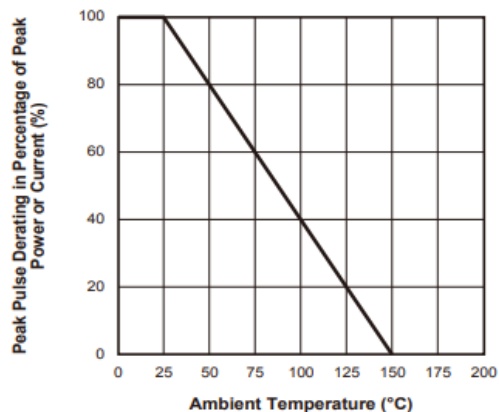


Fig.3 - Pulse Waveform

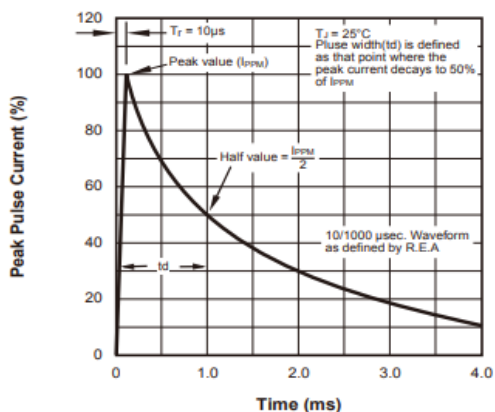
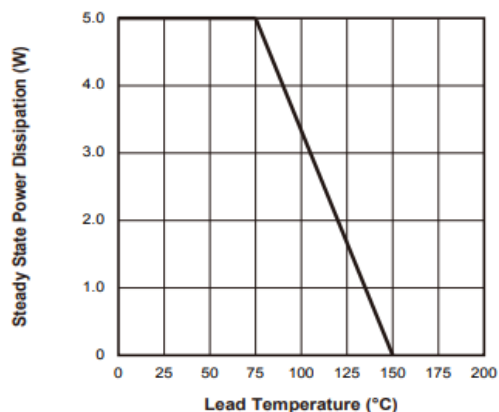


Fig.4 - Steady State Power Derating Curve

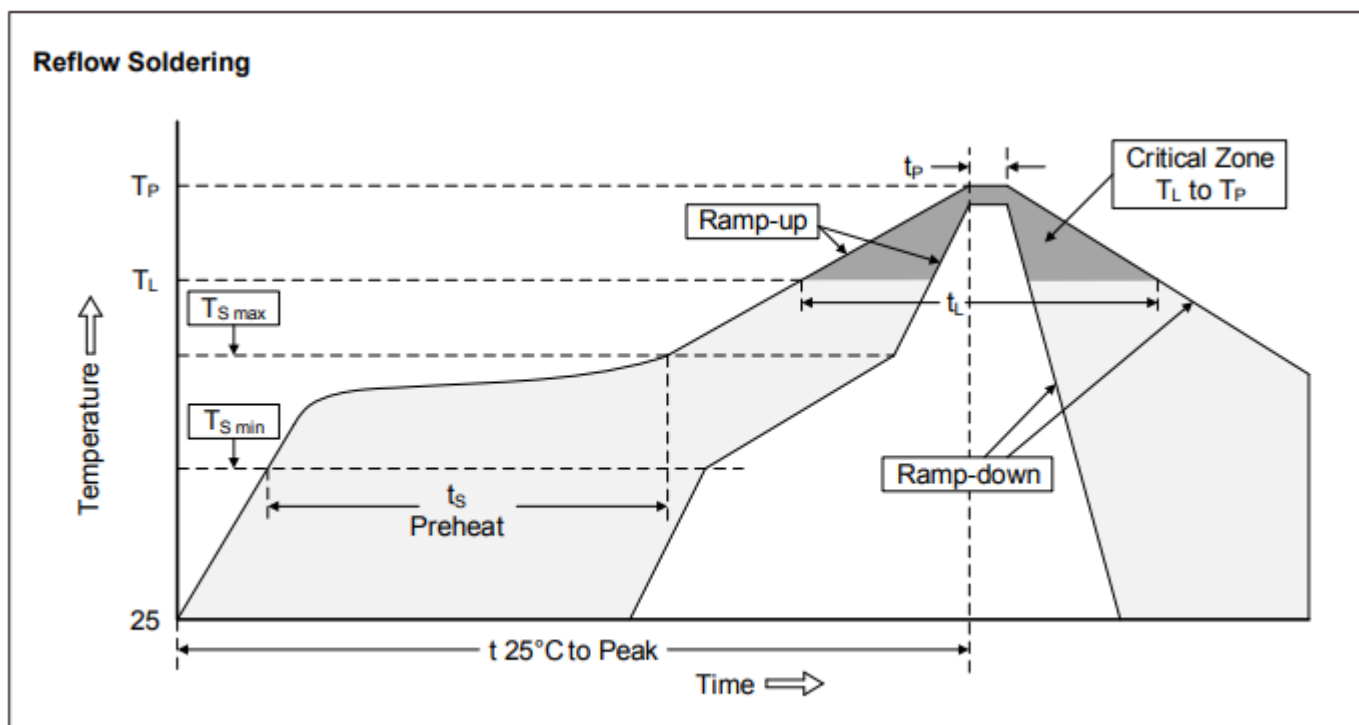


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■ Soldering Recommendation



Recommended Conditions

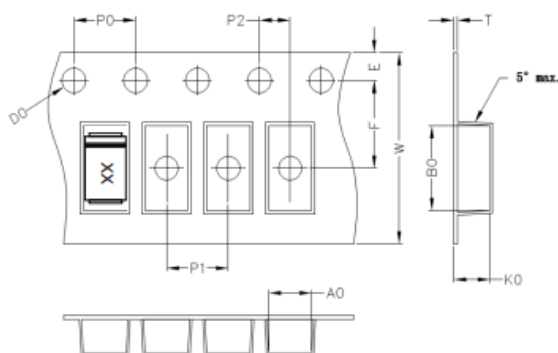
| Profile Feature | Pb-Free Assembly |
|---|----------------------------------|
| Average ramp-up rate (T_L to T_P) | 3°C/second max. |
| Preheat -Temperature Min ($T_{S\ min}$) -Temperature Max ($T_{S\ max}$) -Time (min to max) (t_s) | 150°C 200°C 60-180 seconds |
| $T_{S\ max}$ to T_L -Ramp-up Rate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

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■ Packaging



| | | | | | |
|------|------|------|------|------|-----------|
| A0 | B0 | K0 | D0 | E | F |
| 3.80 | 5.40 | 2.45 | 1.55 | 1.75 | 5.50 |
| P0 | P1 | P2 | T | W | Tolerance |
| 4.0 | 8.0 | 2.0 | 0.25 | 12 | 0.1 |

■ Quantity

| Series Type | Packaging option | Base quantity | Packaging specification |
|-------------|------------------|----------------|-------------------------|
| SMBJ | Tape and reel | 3000pcs / reel | EIA STD RS-481 |

■ Warehouse Storage Conditions of product

- Storage Condition:
 1. Storage Temperature: $-10^{\circ}\text{C} \sim +40^{\circ}\text{C}$
 2. Relative Humidity: $\leq 75\% \text{RH}$
 3. Keep away from corrosive atmosphere and sunlight.
- Period of Storage: 1 year.