

DESCRIPTION

The 1.5SMB series is designed specifically to protect sensitive electronic equipment from voltage transients induced by lightning and other transient voltage events.



FEATURES

- 1500W peak pulsepower capability at 10 x 1000 μ s waveform, repetition rate (duty cycle): 0.01%
- Glass Passivated chip junction
- For surface mounted applications to optimize board space
- Low profile package
- Built-in strain relief
- Low incremental surge resistance
- Excellent clamping capability
- Plastic package has UL flammability classification 94V-0
- Fast response time: typically less than 1.0ps from 0 Volts to BV min
- Typical IR less than 1 μ A above 12V
- High temperature soldering: 260°C/40 seconds at terminals
- IEC-61000-4-2 ESD 15KV(Air),8KV(Contact)
- ESD protection of data lines in accordance with IEC 61000-4-2(IEC801-2)
- EFT protection of data lines in accordance with IEC61000-4-4(IEC801-4)

APPLICATIONS

TVS devices are ideal for the protection of I/O Interfaces, VCC bus and other vulnerable circuits used in Telecom, Computer, Industrial and Consumer electronic applications.

Maximum Ratings and Electrical Characteristics

(TA=25°C unless otherwise noted)

| Parameter | Symbol | Value | Unit |
|--|-----------------------------------|-------------|------|
| Peak Pulse Power Dissipation at TA=25°C by 10x1000µs waveform (Fig.2)(Note 1) (Note 2) | P _{PPM} | 1500 | W |
| Power Dissipation on infinite heat sink at TA=50°C | P _D | 6.5 | W |
| Peak Forward Surge Current, 8.3ms Single Half Sine Wave Unidirectional only(Note 3) | I _{FSM} | 200 | A |
| Maximum Instantaneous Forward Voltage at 100A for Unidirectional only | V _F | 3.5V/5.0 | V |
| Operating Junction and Storage Temperature Range | T _J , T _{STG} | -55 to +150 | °C |
| Typical Thermal Resistance Junction to Lead | R _{uJL} | 10 | °C/W |
| Typical Thermal Resistance Junction to Ambient | R _{uJA} | 75 | °C/W |

Notes:

1. Non-repetitive current pulse, per Fig.3 and derated above TA=25°C per Fig. 2.
2. Mounted on copper pad area of 0.31x0.31" (8.0 x 8.0mm) 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

| PART NUMBER | | REVERSE STAND-OFF VOLTAGE | BREAKDOWN N VOLTAGE VBR(V)MAX. @IT | | TEST CURRENT | REVERSE LEAKAGE @VRWM | PEAK PULSE CURRENT | MAXIMUM CLAMPING VOLTAGE @Ipp |
|--------------|-------------|---------------------------------|---|---------------|-----------------|-----------------------------|-----------------------|--|
| BI- POLAR | UNI-POLAR | VRWM (V) | VBR MIN(V) | VBR MAX(V) | IT (mA) | IR (μ A) | Ipp (A) | Vc (v) |
| 1.5SMB5.0CA | 1.5SMB5.0A | 5.0 | 6.4 | 7.25 | 10 | 800 | 163.0 | 9.2 |
| 1.5SMB6.0CA | 1.5SMB6.0A | 6.0 | 6.67 | 7.67 | 10 | 800 | 145.6 | 10.3 |
| 1.5SMB 6.5CA | 1.5SMB 6.5A | 6.5 | 7.22 | 8.30 | 10 | 500 | 133.9 | 11.2 |
| 1.5SMB7.0 CA | 1.5SMB7.0 A | 7.0 | 7.78 | 8.95 | 10 | 200 | 125.0 | 12.0 |
| 1.5SMB 7.5CA | 1.5SMB 7.5A | 7.5 | 8.33 | 9.58 | 1 | 100 | 116.3 | 12.9 |
| 1.5SMB 8.0CA | 1.5SMB 8.0A | 8.0 | 8.89 | 10.23 | 1 | 50 | 110.3 | 13.6 |
| 1.5SMB8.5 CA | 1.5SMB8.5 A | 8.5 | 9.44 | 10.82 | 1 | 20 | 104.2 | 14.4 |
| 1.5SMB9.0 CA | 1.5SMB9.0 A | 9.0 | 10.00 | 11.50 | 1 | 10 | 97.4 | 15.4 |
| 1.5SMB10CA | 1.5SMB10A | 10.0 | 11.1 | 12.30 | 1 | 10 | 88.2 | 17.0 |
| 1.5SMB11CA | 1.5SMB11A | 11.0 | 12.20 | 14.00 | 1 | 1 | 82.4 | 18.2 |
| 1.5SMB12CA | 1.5SMB12A | 12.0 | 13.30 | 14.70 | 1 | 1 | 75.4 | 19.9 |
| 1.5SMB13CA | 1.5SMB13A | 13.0 | 14.40 | 16.50 | 1 | 1 | 69.8 | 21.5 |
| 1.5SMB14CA | 1.5SMB14A | 14.0 | 15.60 | 17.20 | 1 | 1 | 64.7 | 23.2 |
| 1.5SMB15CA | 1.5SMB15A | 15.0 | 16.70 | 19.20 | 1 | 1 | 61.5 | 24.4 |
| 1.5SMB16CA | 1.5SMB16A | 16.0 | 17.80 | 19.70 | 1 | 1 | 57.7 | 26.0 |
| 1.5SMB17CA | 1.5SMB17A | 17.0 | 18.90 | 21.70 | 1 | 1 | 54.3 | 27.6 |
| 1.5SMB18CA | 1.5SMB18A | 18.0 | 20.00 | 23.30 | 1 | 1 | 51.4 | 29.2 |
| 1.5SMB20CA | 1.5SMB20A | 20.0 | 22.20 | 25.50 | 1 | 1 | 46.3 | 32.4 |
| 1.5SMB22CA | 1.5SMB22A | 22.0 | 24.40 | 28.00 | 1 | 1 | 42.3 | 35.5 |
| 1.5SMB24CA | 1.5SMB24A | 24.0 | 26.70 | 30.70 | 1 | 1 | 38.6 | 38.9 |
| 1.5SMB26CA | 1.5SMB26A | 26.0 | 28.90 | 33.20 | 1 | 1 | 35.6 | 42.1 |
| 1.5SMB28CA | 1.5SMB28A | 28.0 | 31.10 | 35.80 | 1 | 1 | 33.0 | 45.4 |
| 1.5SMB30CA | 1.5SMB30Adf | 30.0 | 33.30 | 38.30 | 1 | 1 | 31.0 | 48.4 |
| 1.5SMB33CA | 1.5SMB33A | 33.0 | 36.70 | 42.20 | 1 | 1 | 28.1 | 53.3 |
| 1.5SMB36CA | 1.5SMB36A | 36.0 | 40.00 | 46.00 | 1 | 1 | 25.8 | 58.1 |
| 1.5SMB40CA | 1.5SMB40A | 40.0 | 44.40 | 51.10 | 1 | 1 | 23.3 | 64.5 |
| 1.5SMB43CA | 1.5SMB43A | 43.0 | 47.8 | 52.8 | 1 | 1 | 21.6 | 69.4 |
| 1.5SMB45CA | 1.5SMB45A | 45.0 | 50.00 | 57.50 | 1 | 1 | 20.6 | 72.7 |
| 1.5SMB48CA | 1.5SMB48A | 48.0 | 53.30 | 58.90 | 1 | 1 | 19.4 | 77.4 |
| 1.5SMB51CA | 1.5SMB51A | 51.0 | 56.70 | 65.20 | 1 | 1 | 18.2 | 82.4 |
| 1.5SMB54CA | 1.5SMB54A | 54.0 | 60.00 | 69.00 | 1 | 1 | 17.2 | 87.1 |



Electrical Characteristics

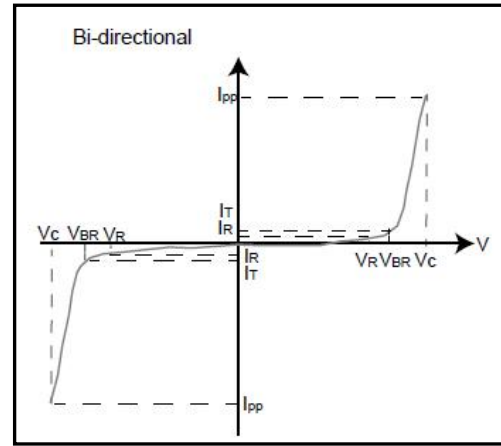
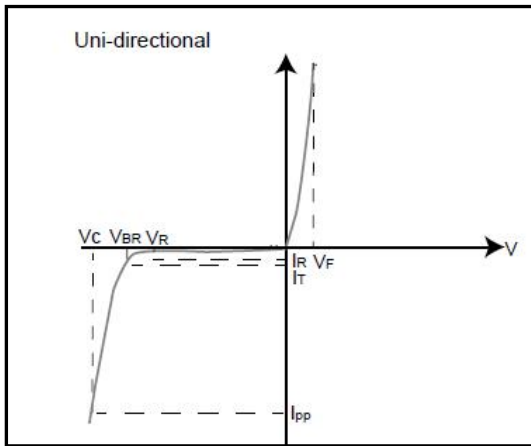
| PART NUMBER | | REVERSE STAND-OFF VOLTAGE | BREAKDOWN N VOLTAGE VBR(V)MAX. @IT | | TEST CURRENT | REVERSE LEAKAGE @VRWM | PEAK PULSE CURRENT | MAXIMUM CLAMPING VOLTAGE @Ipp |
|-------------|------------|---------------------------------|---|---------------|-----------------|-----------------------------|-----------------------|--|
| BI- POLAR | UNI-POLAR | VRWM (V) | VBR MIN(V) | VBR MAX(V) | IT (mA) | IR (μ A) | Ipp (A) | Vc (v) |
| 1.5SMB58CA | 1.5SMB58A | 58.0 | 64.4 | 71.2 | 1 | 1 | 16.0 | 93.6 |
| 1.5SMB60CA | 1.5SMB60A | 60.0 | 66.7 | 73.7 | 1 | 1 | 15.5 | 96.8 |
| 1.5SMB64CA | 1.5SMB64A | 64.0 | 71.10 | 81.80 | 1 | 1 | 14.6 | 103.0 |
| 1.5SMB70CA | 1.5SMB70A | 70.0 | 77.8 | 95.1 | 1 | 1 | 13.3 | 113.0 |
| 1.5SMB75CA | 1.5SMB75A | 75.0 | 83.3 | 92.1 | 1 | 1 | 12.4 | 121.0 |
| 1.5SMB78CA | 1.5SMB78A | 78.0 | 86.70 | 99.70 | 1 | 1 | 11.9 | 126.0 |
| 1.5SMB85CA | 1.5SMB85A | 85.0 | 94.40 | 108.20 | 1 | 1 | 10.9 | 137.0 |
| 1.5SMB90CA | 1.5SMB90A | 90.0 | 100.0 | 111.0 | 1 | 1 | 10.3 | 146.0 |
| 1.5SMB100CA | 1.5SMB100A | 100.0 | 111.00 | 123.00 | 1 | 1 | 9.3 | 162.0 |
| 1.5SMB110CA | 1.5SMB110A | 110.0 | 122.00 | 135.00 | 1 | 1 | 8.5 | 177.0 |
| 1.5SMB120CA | 1.5SMB120A | 110.0 | 133.00 | 147.00 | 1 | 1 | 7.8 | 193.0 |
| 1.5SMB130CA | 1.5SMB110A | 130.0 | 144.00 | 159.00 | 1 | 1 | 7.2 | 209.0 |
| 1.5SMB150CA | 1.5SMB150A | 150.0 | 167.00 | 185.00 | 1 | 1 | 6.2 | 243.0 |
| 1.5SMB160CA | 1.5SMB160A | 160.0 | 178.00 | 197.00 | 1 | 1 | 5.8 | 259.0 |
| 1.5SMB170CA | 1.5SMB170A | 170.0 | 189.00 | 209.00 | 1 | 1 | 5.5 | 275.0 |
| 1.5SMB180CA | 1.5SMB180A | 180.0 | 201.00 | 222.0 | 1 | 1 | 5.1 | 292.0 |
| 1.5SMB190CA | 1.5SMB190A | 190.0 | 211.00 | 233.00 | 1 | 1 | 4.9 | 308.0 |
| 1.5SMB200CA | 1.5SMB200A | 200.0 | 224.0 | 247.00 | 1 | 1 | 4.6 | 324.0 |
| 1.5SMB210CA | 1.5SMB220A | 210.0 | 237.00 | 263.00 | 1 | 1 | 4.2 | 356.0 |
| 1.5SMB220CA | 1.5SMB220A | 220.0 | 246.00 | 272.00 | 1 | 1 | 4.2 | 356.0 |
| 1.5SMB250CA | 1.5SMB250A | 250.0 | 279.00 | 309.00 | 1 | 1 | 3.7 | 405.0 |
| 1.5SMB300CA | 1.5SMB300A | 300.0 | 335.0 | 371.00 | 1 | 1 | 3.1 | 486.0 |
| 1.5SMB350CA | 1.5SMB350A | 350.0 | 391.00 | 432.00 | 1 | 1 | 2.6 | 567.0 |
| 1.5SMB400CA | 1.5SMB400A | 400.0 | 447.00 | 494.00 | 1 | 1 | 2.3 | 648.0 |
| 1.5SMB440CA | 1.5SMB440A | 440.0 | 492.00 | 543.00 | 1 | 1 | 2.1 | 713.0 |

Notes:

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

For parts without A (VBR is \pm 10% and VC is 5% higher than A parts)

I-V Curve Characteristics



RATINGS AND CHARACTERISTIC CURVES (T_A=25°C unless otherwise noted)

Figure 1 - Peak Pulse Power Rating Curve

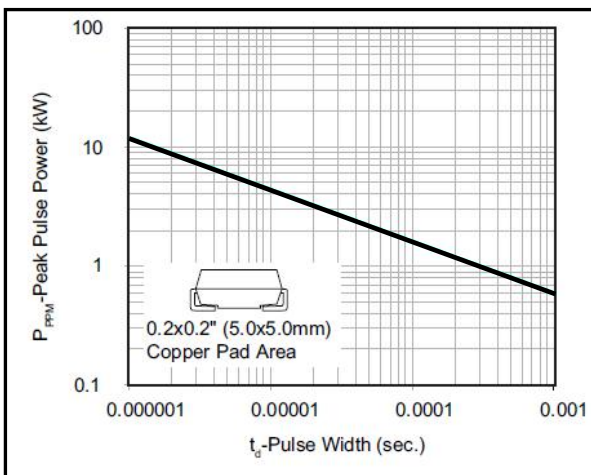


Figure 2 - Pulse Derating Curve

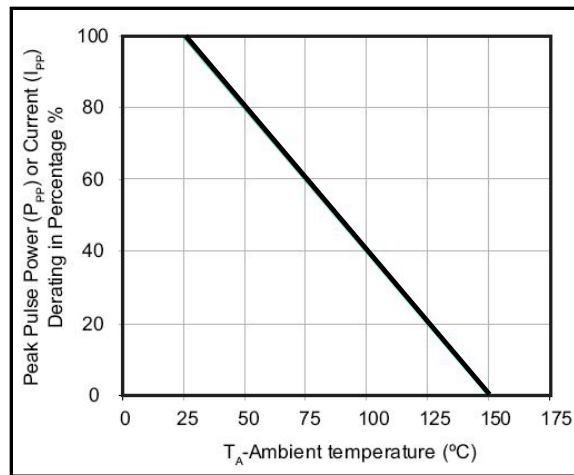


Figure 3 - Pulse Waveform

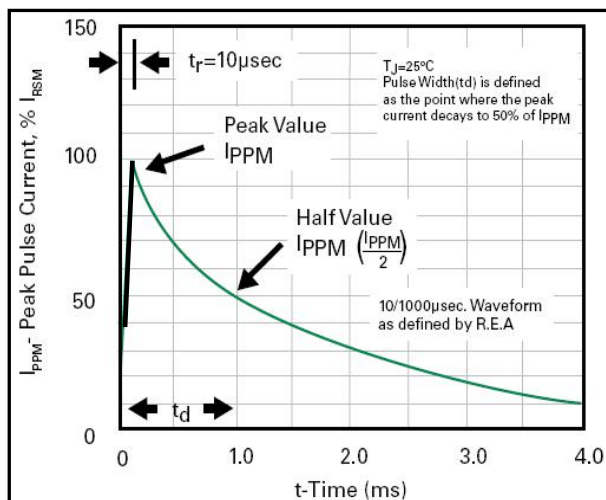


Figure 4 - Typical Junction Capacitance

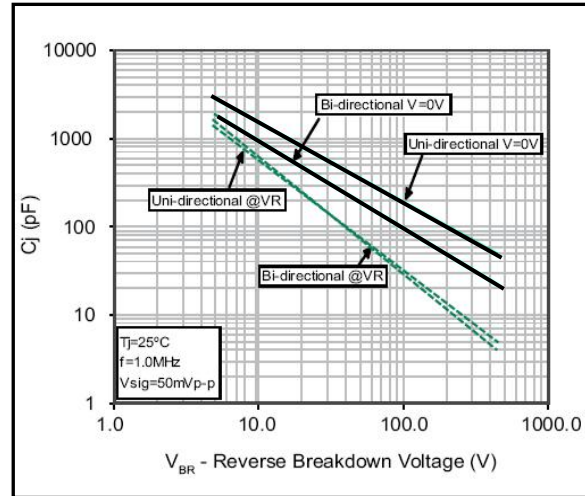


Figure 5 - Steady State Power Dissipation Derating Curve

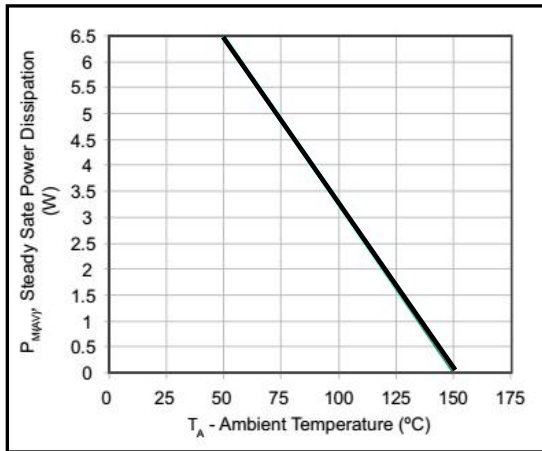
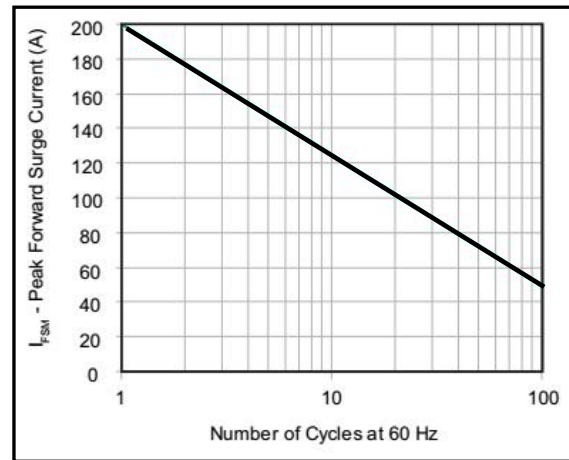


Figure 6 - Maximum Non-Repetitive Forward Surge Current Uni-Directional Only



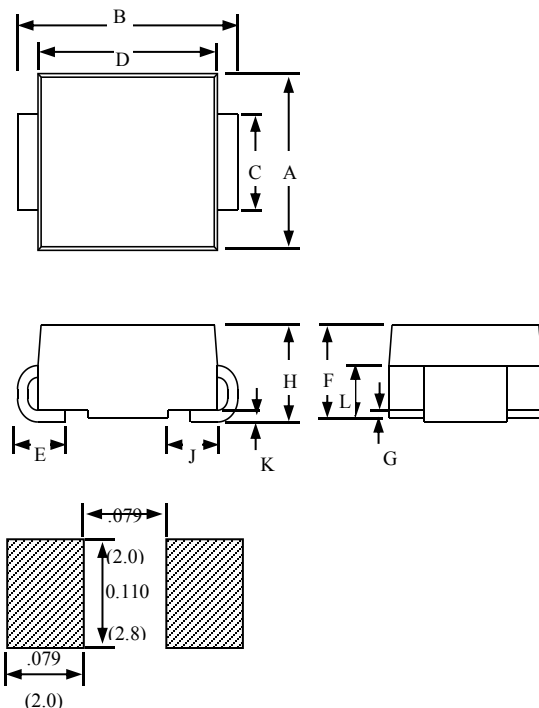
PART NUMBERING SYSTEM

1.5SMB **XXX** **C** **A**
 (1) (2) (3) (4)

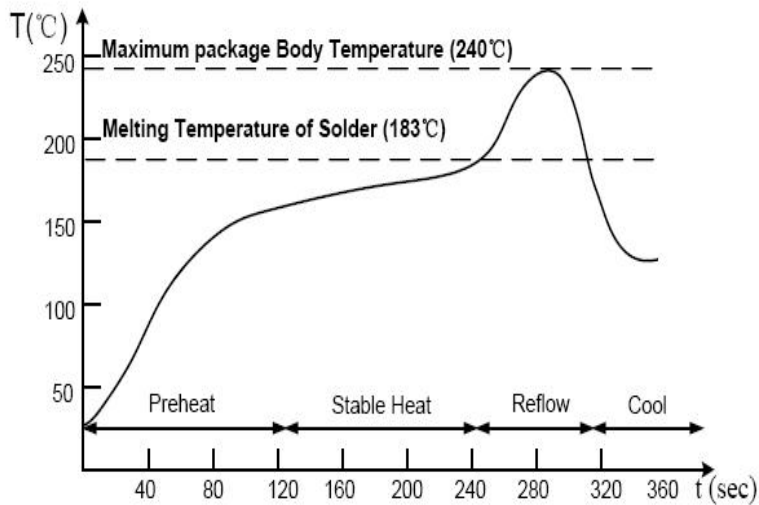
- (1) SERIES.
- (2) VR VOLTAGE.
- (3) BI-DIRECTIONAL AND UNI-DIRECTIONAL.
- (4) 5% VOLTAGE TOLERANCE.

PRODUCT DIMENSIONS

| Dimension | Inches | | Millimeters | |
|-----------|--------|-------|-------------|------|
| | MIN | MAX | MIN | MAX |
| A | 0.134 | 0.155 | 3.40 | 3.94 |
| B | 0.205 | 0.22 | 5.21 | 5.59 |
| C | 0.075 | 0.083 | 1.90 | 2.11 |
| D | 0.166 | 0.185 | 4.22 | 4.70 |
| E | 0.036 | 0.056 | 0.91 | 1.42 |
| F | 0.073 | 0.087 | 1.85 | 2.2 |
| G | 0.002 | 0.008 | 0.05 | 0.20 |
| H | 0.077 | 0.094 | 1.95 | 2.45 |
| J | 0.043 | 0.053 | 1.09 | 1.35 |
| K | 0.008 | 0.014 | 0.20 | 0.35 |
| L | 0.039 | 0.049 | 0.99 | 1.24 |




SOLDER REFLOW RECOMMENDATIONS



- Recommended reflow methods: IR, vapor phase oven, hot air oven, wave solder.
- The device can be exposed to a maximum temperature of 265°C for 10 seconds.
- Devices can be cleaned using standard industry methods and solvents.

Notes: If reflow temperatures exceed the recommended profile, devices may not meet the performance requirements.

SUMMARY OF PACKING OPTIONS

| Package Type | Description | Packing Quantity | Industry Standard |
|--|----------------------------|------------------|-------------------|
| DO-214AA(SMB)  | Embossed Carrier Reel Pack | 3000PCS | EIA-481-D |