

DESCRIPTION

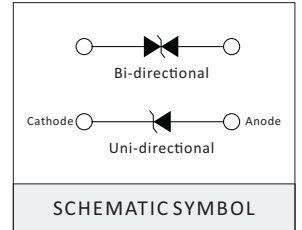
The SMBJ series is designed specifically to protect sensitive electronic equipment from voltage transients induced by lightning and other transient voltage events.

FEATURES

- > Low profile package
- > Ideal for automated placement
- > Available in uni-directional and Bi-directional
- > 600W peak pulse power capability with a 10/1000 μ s waveform
- > For surface mounted applications to optimize board space
- > Excellent clamping capability
- > Very fast response time
- > Low incremental surge resistance

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 CHARACTERISTICS Ratings at 25°C ambient temperature unless otherwise specified.

| RATING | SYMBOL | VALUE | UNITS |
|---|--------------------|-----------|-------|
| Peak Pulse Power Dissipation on 10/1000us waveform (Note1,Note2). | P _{PPM} | 600 | Watts |
| Peak Pulse Current of on 10/1000us waveform(Note1). | I _{PPM} | See Table | Amps |
| Steady State Power Dissipation at T _A =50°C (Note2). | P _{M(AV)} | 5.0 | Watts |
| Maximum Instantaneous Forward Voltage at 50A for Unidirectional Only (Note 4) | V _F | 3.5/5.0 | Volts |
| Peak Forward Surge Current,8.3ms Single Half Sine-Wave Superimposed on Rated Load, (JEDEC Method) (Note 3). | I _{FSM} | 100 | Amps |

NOTES:

1. Non-repetitive current pulse, T_A = 25°C.
2. Mounted on 5.0mm x 5.0mm (0.03mm thick) Copper Pads to each terminal.
3. 8.3ms single half sine-wave, or equivalent square wave, Duty cycle=4 pulses per minutes maximum.
4. V_F<3.5V for V_{BR} ≤ 200V and V_F<5.0V for V_{BR} ≥201V.

THERMAL CONSIDERATIONS

| Symbol | Parameter | Value | Unit |
|------------------|--|-------------|------|
| T _J | Operating Junction Temperature | -55 to +150 | °C |
| T _{STG} | Storage Temperature Range | -55to +150 | °C |
| R _{θJA} | Junction to Ambient on Printed Circuit | 90 | °C/W |



ELECTRICAL CHARACTERISTICS

| Part Number | | Device Marking Code | | Reverse Stand-off Voltage | Breakdown Voltage Min.@I _T | Breakdown Voltage Max.@I _T | Test Current | Maximum Clamping Voltage @I _{PP} | Peak Pulse Current | Reverse Leakage @V _{RWM} |
|-------------|-----------|---------------------|----|---------------------------|---------------------------------------|---------------------------------------|---------------------|---|---------------------|-----------------------------------|
| UNI | BI | UNI | BI | V _{RWM} (V) | V _{BR} (V) | V _{BR} (V) | I _T (mA) | V _c (V) | I _{PP} (A) | I _R (μ A) |
| SMBJ5.0A | SMBJ5.0CA | KE | AE | 5.0 | 6.40 | 7.00 | 10 | 9.2 | 65.3 | 800 |
| SMBJ6.0A | SMBJ6.0CA | KG | AG | 6.0 | 6.67 | 7.37 | 10 | 10.3 | 58.3 | 800 |
| SMBJ6.5A | SMBJ6.5CA | KK | AK | 6.5 | 7.22 | 7.98 | 10 | 11.2 | 53.6 | 500 |
| SMBJ7.0A | SMBJ7.0CA | KM | AM | 7.0 | 7.78 | 8.60 | 10 | 12.0 | 50.0 | 200 |
| SMBJ7.5A | SMBJ7.5CA | KP | AP | 7.5 | 8.33 | 9.21 | 1 | 12.9 | 46.6 | 100 |
| SMBJ8.0A | SMBJ8.0CA | KR | AR | 8.0 | 8.89 | 9.83 | 1 | 13.6 | 44.2 | 50 |
| SMBJ8.5A | SMBJ8.5CA | KT | AT | 8.5 | 9.44 | 10.4 | 1 | 14.4 | 41.7 | 20 |
| SMBJ9.0A | SMBJ9.0CA | KV | AV | 9.0 | 10.0 | 11.1 | 1 | 15.4 | 39.0 | 10 |
| SMBJ10A | SMBJ10CA | KX | AX | 10 | 11.1 | 12.3 | 1 | 17.0 | 35.3 | 5 |
| SMBJ11A | SMBJ11CA | KZ | AZ | 11 | 12.2 | 13.5 | 1 | 18.2 | 33.0 | 1 |
| SMBJ12A | SMBJ12CA | LE | BE | 12 | 13.3 | 14.7 | 1 | 19.9 | 30.2 | 1 |
| SMBJ13A | SMBJ13CA | LG | BG | 13 | 14.4 | 15.9 | 1 | 21.5 | 28.0 | 1 |
| SMBJ14A | SMBJ14CA | LK | BK | 14 | 15.6 | 17.2 | 1 | 23.2 | 25.9 | 1 |
| SMBJ15A | SMBJ15CA | LM | BM | 15 | 16.7 | 18.5 | 1 | 24.4 | 24.6 | 1 |
| SMBJ16A | SMBJ16CA | LP | BP | 16 | 17.8 | 19.7 | 1 | 26.0 | 23.1 | 1 |
| SMBJ17A | SMBJ17CA | LR | BR | 17 | 18.9 | 20.9 | 1 | 27.6 | 21.8 | 1 |
| SMBJ18A | SMBJ18CA | LT | BT | 18 | 20.0 | 22.1 | 1 | 29.2 | 20.6 | 1 |
| SMBJ20A | SMBJ20CA | LV | BV | 20 | 22.2 | 24.5 | 1 | 32.4 | 18.6 | 1 |
| SMBJ22A | SMBJ22CA | LX | BX | 22 | 24.4 | 26.9 | 1 | 35.5 | 16.9 | 1 |
| SMBJ24A | SMBJ24CA | LZ | BZ | 24 | 26.7 | 29.5 | 1 | 38.9 | 15.5 | 1 |
| SMBJ26A | SMBJ26CA | ME | CE | 26 | 28.9 | 31.9 | 1 | 42.1 | 14.3 | 1 |
| SMBJ28A | SMBJ28CA | MG | CG | 28 | 31.1 | 34.4 | 1 | 45.4 | 13.3 | 1 |
| SMBJ30A | SMBJ30CA | MK | CK | 30 | 33.3 | 36.8 | 1 | 48.4 | 12.4 | 1 |
| SMBJ33A | SMBJ33CA | MM | CM | 33 | 36.7 | 40.6 | 1 | 53.3 | 11.3 | 1 |
| SMBJ36A | SMBJ36CA | MP | CP | 36 | 40.0 | 44.2 | 1 | 58.1 | 10.4 | 1 |
| SMBJ40A | SMBJ40CA | MR | CR | 40 | 44.4 | 49.1 | 1 | 64.5 | 9.3 | 1 |
| SMBJ43A | SMBJ43CA | MT | CT | 43 | 47.8 | 52.8 | 1 | 69.4 | 8.7 | 1 |
| SMBJ45A | SMBJ45CA | MV | CV | 45 | 50.0 | 55.3 | 1 | 72.7 | 8.3 | 1 |
| SMBJ48A | SMBJ48CA | MX | CX | 48 | 53.3 | 58.9 | 1 | 77.4 | 7.8 | 1 |
| SMBJ51A | SMBJ51CA | MZ | CZ | 51 | 56.7 | 62.7 | 1 | 82.4 | 7.3 | 1 |
| SMBJ54A | SMBJ54CA | NE | DE | 54 | 60.0 | 66.3 | 1 | 87.1 | 6.9 | 1 |

ELECTRICAL CHARACTERISTICS

| Part Number | | Device Marking Code | | Reverse Stand-off Voltage | Breakdown Voltage Min.@I _T | Breakdown Voltage Max.@I _T | Test Current | Maximum Clamping Voltage @I _{PP} | Peak Pulse Current | Reverse Leakage @V _{RWM} |
|-------------|-----------|---------------------|----|---------------------------|---------------------------------------|---------------------------------------|---------------------|---|---------------------|-----------------------------------|
| UNI | BI | UNI | BI | V _{RWM} (V) | V _{BR} (V) | V _{BR} (V) | I _T (mA) | V _c (V) | I _{PP} (A) | I _R (uA) |
| SMBJ58A | SMBJ58CA | NG | DG | 58 | 64.4 | 71.2 | 1 | 93.6 | 6.5 | 1 |
| SMBJ60A | SMBJ60CA | NK | DK | 60 | 66.7 | 73.7 | 1 | 96.8 | 6.2 | 1 |
| SMBJ64A | SMBJ64CA | NM | DM | 64 | 71.1 | 78.6 | 1 | 103 | 5.9 | 1 |
| SMBJ70A | SMBJ70CA | NP | DP | 70 | 77.8 | 86.0 | 1 | 113 | 5.3 | 1 |
| SMBJ75A | SMBJ75CA | NR | DR | 75 | 83.3 | 92.1 | 1 | 121 | 5.0 | 1 |
| SMBJ78A | SMBJ78CA | NT | DT | 78 | 86.7 | 95.8 | 1 | 126 | 4.8 | 1 |
| SMBJ85A | SMBJ85CA | NV | DV | 85 | 94.4 | 104 | 1 | 137 | 4.4 | 1 |
| SMBJ90A | SMBJ90CA | NX | DX | 90 | 100 | 111 | 1 | 146 | 4.1 | 1 |
| SMBJ100A | SMBJ100CA | NZ | DZ | 100 | 111 | 123 | 1 | 162 | 3.7 | 1 |
| SMBJ110A | SMBJ110CA | PE | EE | 110 | 122 | 135 | 1 | 177 | 3.4 | 1 |
| SMBJ120A | SMBJ120CA | PG | EG | 120 | 133 | 147 | 1 | 193 | 3.1 | 1 |
| SMBJ130A | SMBJ130CA | PK | EK | 130 | 144 | 159 | 1 | 209 | 2.9 | 1 |
| SMBJ150A | SMBJ150CA | PM | EM | 150 | 167 | 185 | 1 | 243 | 2.5 | 1 |
| SMBJ160A | SMBJ160CA | PP | EP | 160 | 178 | 197 | 1 | 259 | 2.3 | 1 |
| SMBJ170A | SMBJ170CA | PR | ER | 170 | 189 | 209 | 1 | 275 | 2.2 | 1 |
| SMBJ180A | SMBJ180CA | PT | ET | 180 | 201 | 222 | 1 | 292 | 2.1 | 1 |
| SMBJ200A | SMBJ200CA | PV | EV | 200 | 224 | 247 | 1 | 324 | 1.9 | 1 |
| SMBJ220A | SMBJ220CA | PX | EX | 220 | 246 | 272 | 1 | 356 | 1.7 | 1 |
| SMBJ250A | SMBJ250CA | PZ | EZ | 250 | 279 | 309 | 1 | 405 | 1.5 | 1 |
| SMBJ300A | SMBJ300CA | QE | FE | 300 | 335 | 371 | 1 | 486 | 1.3 | 1 |
| SMBJ350A | SMBJ350CA | QG | FG | 350 | 391 | 432 | 1 | 567 | 1.1 | 1 |
| SMBJ400A | SMBJ400CA | QK | FK | 400 | 447 | 494 | 1 | 648 | 0.9 | 1 |
| SMBJ440A | SMBJ440CA | QM | FM | 440 | 492 | 543 | 1 | 713 | 0.9 | 1 |



RATINGS AND CHARACTERISTIC CURVES ($T_A=25^\circ\text{C}$ unless otherwise noted)

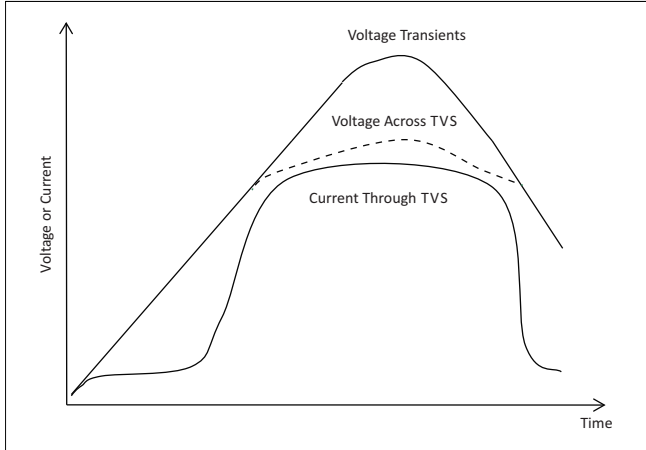


Figure 1 - TVS Transients Clamping Waveform

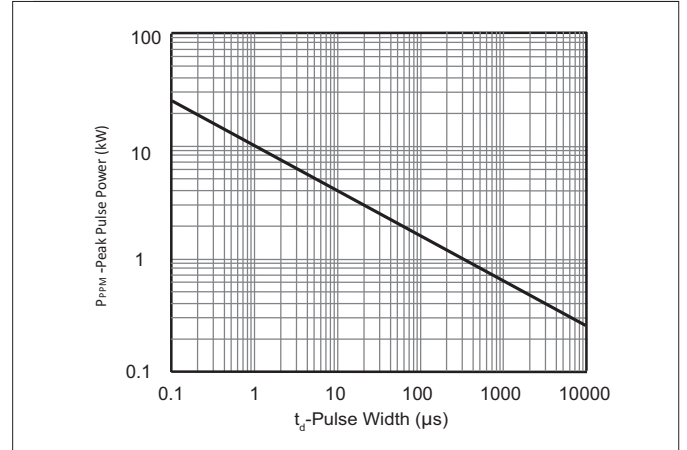


Figure 2 - Peak Pulse Power Rating Curve

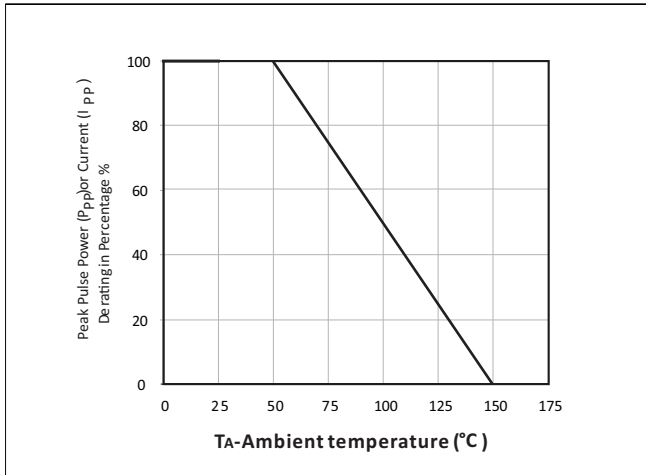


Figure 3 - Pulse Derating Curve

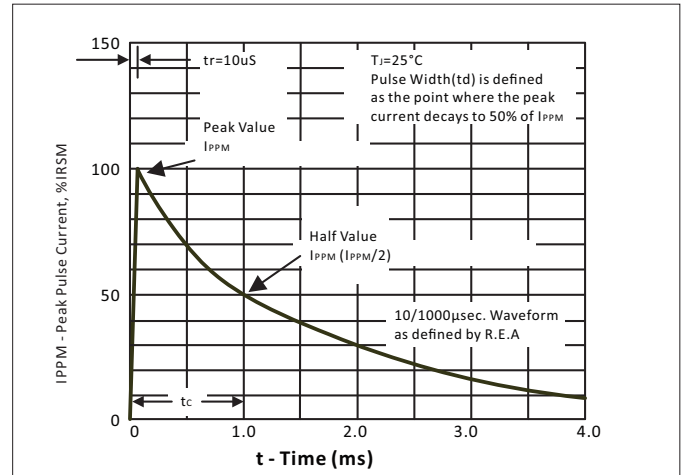


Figure 4. Pulse Waveform

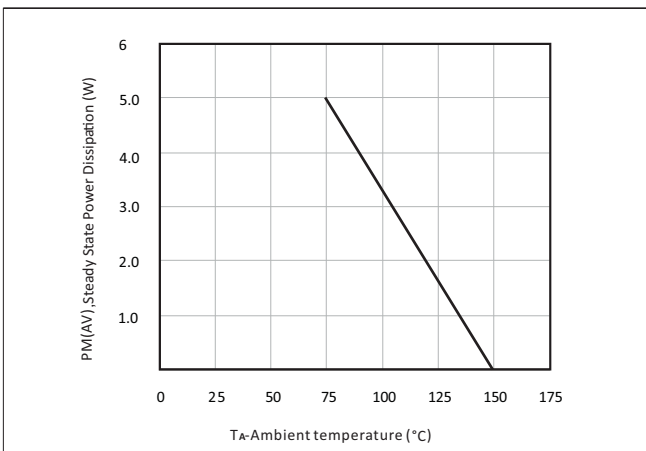


Figure 5 - Steady State Power Dissipation Derating Curve

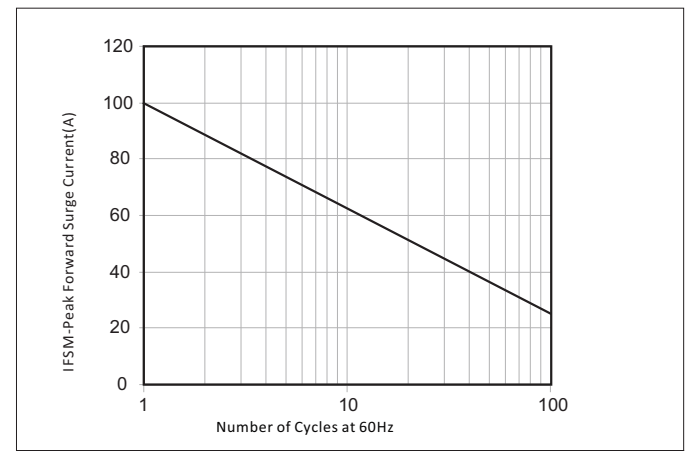
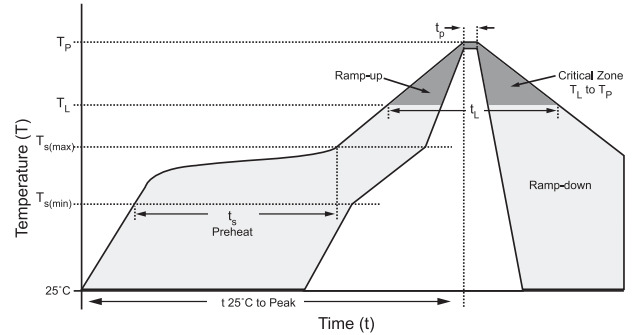


Figure 6. Maximum Non-Repetitive Forward Surge Current Uni-Directional Only

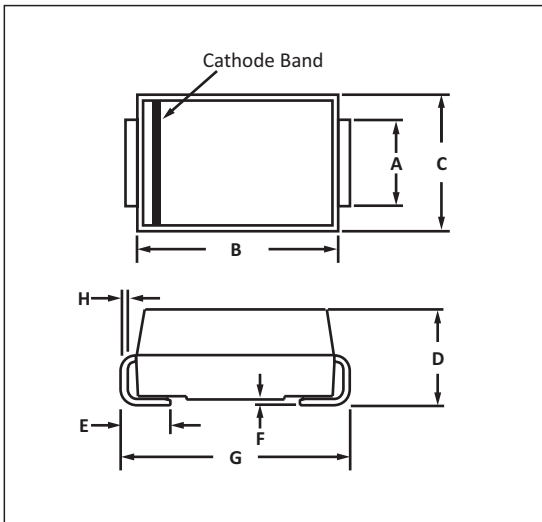


SOLDERING PARAMETERS

| Reflow Condition | | Lead-free assembly |
|---|-----------------------------|--------------------|
| Pre Heat | Temperature Min (Ts(min)) | 150°C |
| | Temperature Max (Ts(max)) | 200°C |
| | Time (min to max) (ts) | 60 – 180 secs |
| Average ramp up rate (Liquidus Temp (TL) to peak) | | 3°C/second max |
| Ts(max)to TL - Ramp-up Rate | | 3°C/second max |
| Reflow | Temperature (TL) (Liquidus) | 217°C |
| | Time (min to max) (tl) | 60 – 150 seconds |
| Peak Temperature (TP) | | 260°C |
| Time within 5°C of actual peak Temperature (tp) | | 20 – 40 seconds |
| Ramp-down Rate | | 6°C/second max |
| Time 25°C to peak Temperature (TP) | | 8 minutes Max. |
| Do not exceed | | 260°C |



DO-214AA(SMB) PACKAGE DIMENSIONS

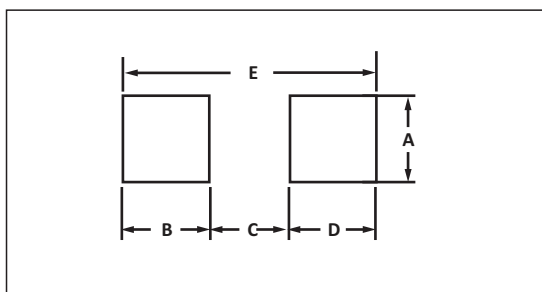


| SMB PACKAGE DIMENSIONS | | | | |
|------------------------|-------------|------|--------|-------|
| DIM | MILLIMETERS | | INCHES | |
| | MIN | MAX | MIN | MAX |
| A | 1.80 | 2.20 | 0.071 | 0.087 |
| B | 4.05 | 4.85 | 0.160 | 0.191 |
| C | 3.30 | 3.94 | 0.130 | 0.155 |
| D | 2.05 | 2.50 | 0.081 | 0.098 |
| E | 0.76 | 1.52 | 0.030 | 0.060 |
| F | 0.02 | 0.20 | 0.001 | 0.008 |
| G | 5.08 | 5.59 | 0.200 | 0.220 |
| H | 0.15 | 0.30 | 0.006 | 0.012 |

NOTES:

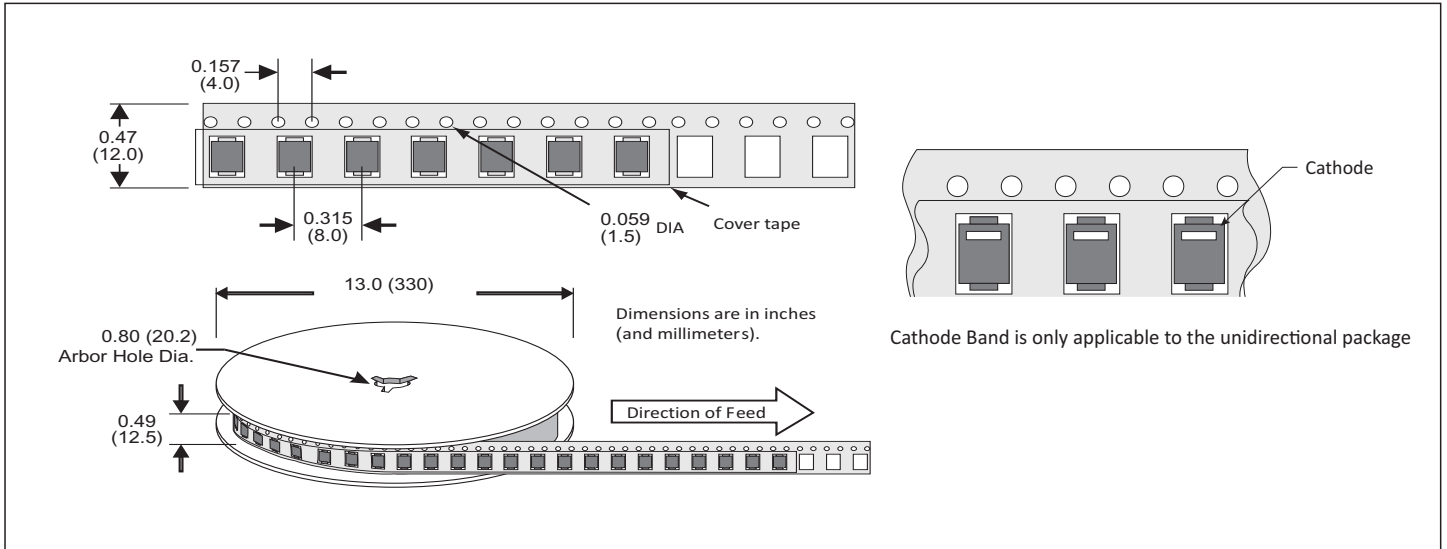
1. Dimensions are exclusive of mold flash and metal burrs
2. Cathode Band is only applicable to the unidirectional package

RECOMMENDED PAD LAYOUT DIMENSIONS



| RECOMMENDED PAD LAYOUT DIMENSIONS | | | | |
|-----------------------------------|-------------|------|-----------|-------|
| DIM | MILLIMETERS | | INCHES | |
| | MIN | MAX | MIN | MAX |
| A | 2.20 | - | 0.087 | - |
| B | 1.45 | - | 0.057 | - |
| C | - | 2.55 | - | 0.100 |
| D | 1.45 | - | 0.057 | - |
| E | 5.60 REF | | 0.220 REF | |

TAPE AND REEL SPECIFICATION



ORDERING INFORMATION

| Part Number | Component Package | QTY/Reel | Reel Size |
|-------------|-------------------|----------|-----------|
| SMBJxx(C)A | DO-214AA(SMB) | 3000PCS | 13" |

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