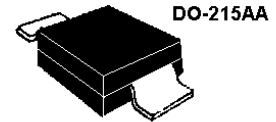


DESCRIPTION

This SMBJ5.0-170A or SMBG5.0-170A series of surface mount 600 W Transient Voltage Suppressors (TVSs) protects a variety of voltage-sensitive components from destruction or degradation. It is available in J-bend design (SMBJ) with the DO-214AA package for greater PC board mounting density or in a Gull-wing design (SMBG) in the DO-215AA for visible solder connections. It is also available in both unidirectional and bidirectional configurations with a C or CA suffix part number as well as RoHS Compliant with an e3 suffix. Their response time is virtually instantaneous. As a result, they can be used for protection from ESD or EFT per IEC61000-4-2 and IEC61000-4-4, or for inductive switching environments and induced RF protection. They can also protect from secondary lightning effects per IEC61000-4-5 and class levels defined herein. Microsemi also offers numerous other TVS products to meet higher and lower power demands and special applications.

IMPORTANT: For the most current data, consult MICROSEMI's website: <http://www.microsemi.com>

APPEARANCE



NOTE: All SMB series are equivalent to prior SMS package identifications.

FEATURES

- Available in both unidirectional and bidirectional construction (add C or CA suffix for bidirectional)
- Selections for 5.0 to 170 volts standoff voltages (V_{WM})
- Optional 100% **screening for avionics grade** is available by adding MA prefix to part number for 100% temperature cycle -55°C to $+125^{\circ}\text{C}$ (10X) as well as surge (3X) and 24 hours HTRB with post test V_Z & I_R (in operating direction for unidirectional or both directions for bidirectional)
- Options for screening in accordance with MIL-PRF-19500 for JANTX are available by adding MX prefix to the part number.
- Axial-lead equivalent packages for thru-hole mounting available as P6KE6.8 to P6KE200CA (consult factory for other surface mount options)
- Moisture classification is Level 1 with no dry pack required per IPC/JEDEC J-STD-020B
- RoHS compliant devices available by adding an "e3" suffix

MAXIMUM RATINGS

- Peak Pulse Power dissipation at 25°C : 600 watts at 10/1000 μs (also see Fig 1,2, and 3).
- Impulse repetition rate (duty factor): 0.01%
- $t_{clamping}$ (0 volts to $V_{(BR)}$ min.): < 100 ps theoretical for unidirectional and < 5 ns for bidirectional
- Operating and Storage temperature: -65°C to $+150^{\circ}\text{C}$
- Thermal resistance: 25°C/W junction to lead, or 90°C/W junction to ambient when mounted on FR4 PC board (1oz Cu) with recommended footprint (see last page)
- Steady-State Power dissipation: 5 watts at $T_L = 25^{\circ}\text{C}$, or 1.38 watts at $T_A = 25^{\circ}\text{C}$ when mounted on FR4 PC board with recommended footprint
- Forward Surge at 25°C : 100 Amps peak impulse of 8.3 ms half-sine wave (unidirectional only)
- Solder temperatures: 260°C for 10 s (maximum)

APPLICATIONS / BENEFITS

- Economical surface mount design in both J-bend or Gull-wing terminations
- Protects sensitive components such as IC's, CMOS, Bipolar, BiCMOS, ECL, DTL, T^2L , etc.
- Protection from switching transients & induced RF
- Compliant to IEC61000-4-2 and IEC61000-4-4 for ESD and EFT protection respectively
- Secondary lightning protection per IEC61000-4-5 with 42 Ohms source impedance:
 - Class 1: SMB 5.0 to SMB 120A or CA
 - Class 2: SMB 5.0 to SMB 60A or CA
 - Class 3: SMB 5.0 to SMB 30A or CA
 - Class 4: SMB 5.0 to SMB 15A or CA
- Secondary lightning protection per IEC61000-4-5 with 12 Ohms source impedance:
 - Class 1: SMB 5.0 to SMB 36A or CA
 - Class 2: SMB 5.0 to SMB 18A or CA

MECHANICAL AND PACKAGING

- CASE: Void-free transfer molded thermosetting epoxy body meeting UL94V-0
- TERMINALS: Gull-wing or C-bend (modified J-bend) tin-lead or RoHS compliant annealed matte-tin plating solderable per MIL-STD-750, method 2026
- POLARITY: Cathode indicated by band. No marking on bi-directional devices
- MARKING: Part number without standard prefix (e.g. 5.0, 5.0A, 5.0CA, 5.0Ae3, 36, MX36A, 36CAe3, etc.)
- TAPE & REEL option: Standard per EIA-481-1-A with 12 mm tape, 750 per 7 inch reel or 2500 per 13 inch reel (add "TR" suffix to part number)
- WEIGHT: 0.1 grams
- See package dimension on last page



**SMBJ5.0 thru SMBJ170A, CA, e3
and SMBG5.0 thru SMBG170A, CA, e3**

**SURFACE MOUNT 600 Watt
Transient Voltage Suppressor**

ELECTRICAL CHARACTERISTICS @ 25°C

| MICROSEMI PART NUMBER | | REVERSE STAND-OFF VOLTAGE V_{WM} Volts | BREAKDOWN VOLTAGE $V_{(BR)}$ @ $I_{(BR)}$ Volts | | MAXIMUM CLAMPING VOLTAGE @ I_{PP} Volts | PEAK PULSE CURRENT (See Fig. 2) I_{PP} Amps | MAXIMUM STANDBY CURRENT @ V_{WM} I_D μA |
|-----------------------|------------------------|--|---|------|---|--|---|
| GULL-WING LEAD | MODIFIED "J" BEND LEAD | | MIN. | MAX. | | | |
| SMBG5.0 | SMBJ5.0 | 5.0 | 6.40 - 7.30 | 10 | 9.6 | 62.5 | 800 |
| SMBG5.0A | SMBJ5.0A | 5.0 | 6.40 - 7.00 | 10 | 9.2 | 65.2 | 800 |
| SMBG6.0 | SMBJ6.0 | 6.0 | 6.67 - 8.15 | 10 | 11.4 | 52.6 | 800 |
| SMBG6.0A | SMBJ6.0A | 6.0 | 6.67 - 7.37 | 10 | 10.3 | 58.3 | 800 |
| SMBG6.5 | SMBJ6.5 | 6.5 | 7.22 - 8.82 | 10 | 12.3 | 48.7 | 500 |
| SMBG6.5A | SMBJ6.5A | 6.5 | 7.22 - 7.98 | 10 | 11.2 | 53.6 | 500 |
| SMBG7.0 | SMBJ7.0 | 7.0 | 7.78 - 9.51 | 10 | 13.3 | 45.1 | 200 |
| SMBG7.0A | SMBJ7.0A | 7.0 | 7.78 - 8.60 | 10 | 12.0 | 50.0 | 200 |
| SMBG7.5 | SMBJ7.5 | 7.5 | 8.33 - 10.2 | 1 | 14.3 | 42.0 | 100 |
| SMBG7.5A | SMBJ7.5A | 7.5 | 8.33 - 9.21 | 1 | 12.9 | 46.5 | 100 |
| SMBG8.0 | SMBJ8.0 | 8.0 | 8.89 - 10.9 | 1 | 15.0 | 40.0 | 50 |
| SMBG8.0A | SMBJ8.0A | 8.0 | 8.89 - 9.83 | 1 | 13.6 | 44.1 | 50 |
| SMBG8.5 | SMBJ8.5 | 8.5 | 9.44 - 11.5 | 1 | 15.9 | 37.7 | 10 |
| SMBG8.5A | SMBJ8.5A | 8.5 | 9.44 - 10.4 | 1 | 14.4 | 41.7 | 10 |
| SMBG9.0 | SMBJ9.0 | 9.0 | 10.0 - 12.2 | 1 | 16.9 | 35.5 | 5 |
| SMBG9.0A | SMBJ9.0A | 9.0 | 10.0 - 11.1 | 1 | 15.4 | 39.0 | 5 |
| SMBG10 | SMBJ10 | 10 | 11.1 - 13.6 | 1 | 18.8 | 31.9 | 5 |
| SMBG10A | SMBJ10A | 10 | 11.1 - 12.3 | 1 | 17.0 | 35.3 | 5 |
| SMBG11 | SMBJ11 | 11 | 12.2 - 14.9 | 1 | 20.1 | 29.9 | 5 |
| SMBG11A | SMBJ11A | 11 | 12.2 - 13.5 | 1 | 18.2 | 33.0 | 5 |
| SMBG12 | SMBJ12 | 12 | 13.3 - 16.3 | 1 | 22.0 | 27.3 | 5 |
| SMBG12A | SMBJ12A | 12 | 13.3 - 14.7 | 1 | 19.9 | 30.2 | 5 |
| SMBG13 | SMBJ13 | 13 | 14.4 - 17.6 | 1 | 23.8 | 25.2 | 1 |
| SMBG13A | SMBJ13A | 13 | 14.4 - 15.9 | 1 | 21.5 | 27.9 | 1 |
| SMBG14 | SMBJ14 | 14 | 15.6 - 19.1 | 1 | 25.8 | 23.3 | 1 |
| SMBG14A | SMBJ14A | 14 | 15.6 - 17.2 | 1 | 23.2 | 25.8 | 1 |
| SMBG15 | SMBJ15 | 15 | 16.7 - 20.4 | 1 | 26.9 | 22.3 | 1 |
| SMBG15A | SMBJ15A | 15 | 16.7 - 18.5 | 1 | 24.4 | 24.0 | 1 |
| SMBG16 | SMBJ16 | 16 | 17.8 - 21.8 | 1 | 28.8 | 20.8 | 1 |
| SMBG16A | SMBJ16A | 16 | 17.8 - 19.7 | 1 | 26.0 | 23.1 | 1 |
| SMBG17 | SMBJ17 | 17 | 18.9 - 23.1 | 1 | 30.5 | 19.7 | 1 |
| SMBG17A | SMBJ17A | 17 | 18.9 - 20.9 | 1 | 27.6 | 21.7 | 1 |
| SMBG18 | SMBJ18 | 18 | 20.0 - 24.4 | 1 | 32.2 | 18.6 | 1 |
| SMBG18A | SMBJ18A | 18 | 20.0 - 22.1 | 1 | 29.2 | 20.5 | 1 |
| SMBG20 | SMBJ20 | 20 | 22.2 - 27.1 | 1 | 35.8 | 16.7 | 1 |
| SMBG20A | SMBJ20A | 20 | 22.2 - 24.5 | 1 | 32.4 | 18.5 | 1 |
| SMBG22 | SMBJ22 | 22 | 24.4 - 29.8 | 1 | 39.4 | 15.2 | 1 |
| SMBG22A | SMBJ22A | 22 | 24.4 - 26.9 | 1 | 35.5 | 16.9 | 1 |
| SMBG24 | SMBJ24 | 24 | 26.7 - 32.6 | 1 | 43.0 | 14.0 | 1 |
| SMBG24A | SMBJ24A | 24 | 26.7 - 29.5 | 1 | 38.9 | 15.4 | 1 |
| SMBG26 | SMBJ26 | 26 | 28.9 - 35.3 | 1 | 46.6 | 12.4 | 1 |
| SMBG26A | SMBJ26A | 26 | 28.9 - 31.9 | 1 | 42.1 | 14.2 | 1 |
| SMBG28 | SMBJ28 | 28 | 31.1 - 38.0 | 1 | 50.0 | 12.0 | 1 |
| SMBG28A | SMBJ28A | 28 | 31.1 - 34.4 | 1 | 45.4 | 13.2 | 1 |
| SMBG30 | SMBJ30 | 30 | 33.3 - 40.7 | 1 | 53.5 | 11.2 | 1 |
| SMBG30A | SMBJ30A | 30 | 33.3 - 36.8 | 1 | 48.4 | 12.4 | 1 |
| SMBG33 | SMBJ33 | 33 | 36.7 - 44.9 | 1 | 59.0 | 10.2 | 1 |
| SMBG33A | SMBJ33A | 33 | 36.7 - 40.6 | 1 | 53.3 | 11.3 | 1 |
| SMBG36 | SMBJ36 | 36 | 40.0 - 48.9 | 1 | 64.3 | 9.3 | 1 |
| SMBG36A | SMBJ36A | 36 | 40.0 - 44.2 | 1 | 58.1 | 10.3 | 1 |
| SMBG40 | SMBJ40 | 40 | 44.4 - 54.3 | 1 | 71.4 | 8.4 | 1 |
| SMBG40A | SMBJ40A | 40 | 44.4 - 49.1 | 1 | 64.5 | 9.3 | 1 |
| SMBG43 | SMBJ43 | 43 | 47.8 - 58.4 | 1 | 76.7 | 7.8 | 1 |
| SMBG43A | SMBJ43A | 43 | 47.8 - 52.8 | 1 | 69.4 | 8.6 | 1 |
| SMBG45 | SMBJ45 | 45 | 50.0 - 61.1 | 1 | 80.3 | 7.5 | 1 |
| SMBG45A | SMBJ45A | 45 | 50.0 - 55.3 | 1 | 72.7 | 8.3 | 1 |

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SMB5.0-170AC, e3



**SMBJ5.0 thru SMBJ170A, CA, e3
and SMBG5.0 thru SMBG170A, CA, e3**

**SURFACE MOUNT 600 Watt
Transient Voltage Suppressor**

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SMB5.0-170AC, e3

| MICROSEMI PART NUMBER | | REVERSE STAND-OFF VOLTAGE V_{WM} | BREAKDOWN VOLTAGE $V_{(BR)}$ @ $I_{(BR)}$ Volts | | MAXIMUM CLAMPING VOLTAGE @ I_{PP} | PEAK PULSE CURRENT (See Fig. 2) I_{PP} | MAXIMUM STANDBY CURRENT @ V_{WM} I_D μA | |
|-----------------------|------------------------|---------------------------------------|---|------|--|--|---|------------------|
| GULL-WING LEAD | MODIFIED "J" BEND LEAD | | MIN. | MAX. | | | | $I_{(BR)}$ mA |
| | | Volts | | | Volts | Amps | | |
| SMBG48 | SMBJ48 | 48 | 53.3 | 65.1 | 1 | 85.5 | 7.0 | 1 |
| SMBG48A | SMBJ48A | 48 | 53.3 | 58.9 | 1 | 77.4 | 7.7 | 1 |
| SMBG51 | SMBJ51 | 51 | 56.7 | 69.3 | 1 | 91.1 | 6.6 | 1 |
| SMBG51A | SMBJ51A | 51 | 56.7 | 62.7 | 1 | 82.4 | 7.3 | 1 |
| SMBG54 | SMBJ54 | 54 | 60.0 | 73.3 | 1 | 96.3 | 6.2 | 1 |
| SMBG54A | SMBJ54A | 54 | 60.0 | 66.3 | 1 | 87.1 | 6.9 | 1 |
| SMBG58 | SMBJ58 | 58 | 64.4 | 78.7 | 1 | 103 | 5.8 | 1 |
| SMBG58A | SMBJ58A | 58 | 64.4 | 71.2 | 1 | 93.6 | 6.4 | 1 |
| SMBG60 | SMBJ60 | 60 | 66.7 | 81.5 | 1 | 107 | 5.6 | 1 |
| SMBG60A | SMBJ60A | 60 | 66.7 | 73.7 | 1 | 96.8 | 6.2 | 1 |
| SMBG64 | SMBJ64 | 64 | 71.1 | 86.9 | 1 | 114 | 5.3 | 1 |
| SMBG64A | SMBJ64A | 64 | 71.1 | 78.6 | 1 | 103 | 5.8 | 1 |
| SMBG70 | SMBJ70 | 70 | 77.8 | 95.1 | 1 | 125 | 4.8 | 1 |
| SMBG70A | SMBJ70A | 70 | 77.8 | 86.0 | 1 | 113 | 5.3 | 1 |
| SMBG75 | SMBJ75 | 75 | 83.3 | 102 | 1 | 134 | 4.5 | 1 |
| SMBG75A | SMBJ75A | 75 | 83.3 | 92.1 | 1 | 121 | 4.9 | 1 |
| SMBG78 | SMBJ78 | 78 | 86.7 | 106 | 1 | 139 | 4.3 | 1 |
| SMBG78A | SMBJ78A | 78 | 86.7 | 95.8 | 1 | 126 | 4.7 | 1 |
| SMBG85 | SMBJ85 | 85 | 94.4 | 115 | 1 | 151 | 3.9 | 1 |
| SMBG85A | SMBJ85A | 85 | 94.4 | 104 | 1 | 137 | 4.4 | 1 |
| SMBG90 | SMBJ90 | 90 | 100 | 122 | 1 | 160 | 3.8 | 1 |
| SMBG90A | SMBJ90A | 90 | 100 | 111 | 1 | 146 | 4.1 | 1 |
| SMBG100 | SMBJ100 | 100 | 111 | 136 | 1 | 179 | 3.4 | 1 |
| SMBG100A | SMBJ100A | 100 | 111 | 123 | 1 | 162 | 3.7 | 1 |
| SMBG110 | SMBJ110 | 110 | 122 | 149 | 1 | 196 | 3.0 | 1 |
| SMBG110A | SMBJ110A | 110 | 122 | 135 | 1 | 177 | 3.4 | 1 |
| SMBG120 | SMBJ120 | 120 | 133 | 163 | 1 | 214 | 2.8 | 1 |
| SMBG120A | SMBJ120A | 120 | 133 | 147 | 1 | 193 | 3.1 | 1 |
| SMBG130 | SMBJ130 | 130 | 144 | 176 | 1 | 231 | 2.6 | 1 |
| SMBG130A | SMBJ130A | 130 | 144 | 159 | 1 | 209 | 2.9 | 1 |
| SMBG150 | SMBJ150 | 150 | 167 | 204 | 1 | 268 | 2.2 | 1 |
| SMBG150A | SMBJ150A | 150 | 167 | 185 | 1 | 243 | 2.5 | 1 |
| SMBG160 | SMBJ160 | 160 | 178 | 218 | 1 | 287 | 2.1 | 1 |
| SMBG160A | SMBJ160A | 160 | 178 | 197 | 1 | 259 | 2.3 | 1 |
| SMBG170 | SMBJ170 | 170 | 189 | 231 | 1 | 304 | 2.0 | 1 |
| SMBG170A | SMBJ170A | 170 | 189 | 209 | 1 | 275 | 2.2 | 1 |

- For Bidirectional device types indicate a C or CA suffix after the part number. (i.e.: SMBG170CA or SMBJ170C). Bidirectional capacitance is half that shown in figure 4 at zero volts.
- Microsemi Corp's SMB series (600 W) surface mountable packages are designed specifically for transient voltage suppression. The wide leads assure a large surface contact for good heat dissipation, and a low resistance path for surge current flow to ground. These high speed transient voltage suppressors can be used to effectively protect sensitive components such as integrated circuits and MOS devices.

SYMBOLS & DEFINITIONS

| Symbol | Definition | Symbol | Definition |
|------------|---------------------------------|------------|----------------------------------|
| V_{WM} | Working Peak (Standoff) Voltage | I_{PP} | Peak Pulse Current |
| P_{PP} | Peak Pulse Power | V_C | Clamping Voltage |
| $V_{(BR)}$ | Breakdown Voltage | $I_{(BR)}$ | Breakdown Current for $V_{(BR)}$ |
| I_D | Standby Current | | |

GRAPHS

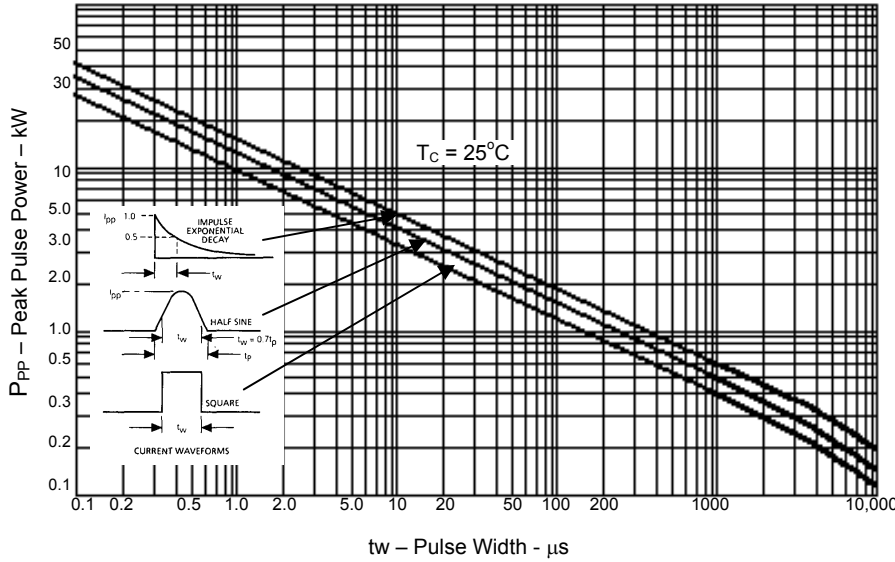
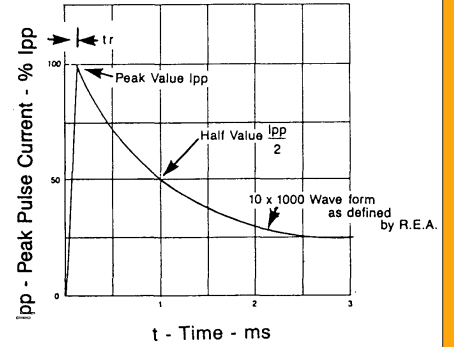


FIGURE 1
Peak Pulse Power vs. Pulse Time



Test waveform parameters: $t_r=10 \mu s$, $t_w=1000 \mu s$

FIGURE 2
Pulse Waveform for Exponential Surge

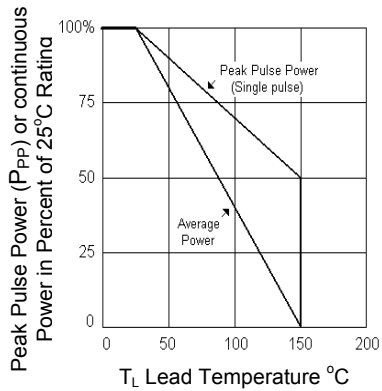


FIGURE 3 - Derating Curve

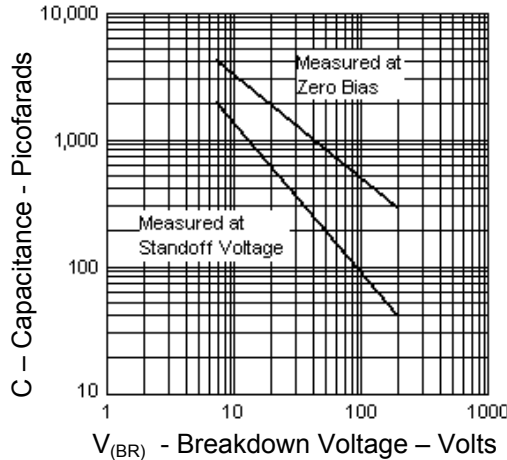
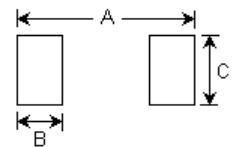


FIGURE 4
Typical Capacitance vs Breakdown Voltage

PAD LAYOUT



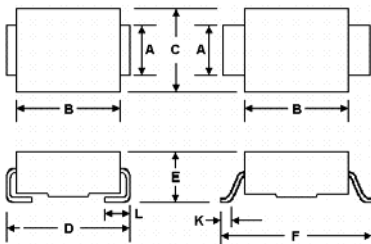
SMBJ

| | INCHES | mm |
|---|--------|------|
| A | .260 | 6.60 |
| B | .085 | 2.16 |
| C | .110 | 2.79 |

SMBG

| | INCHES | mm |
|---|--------|------|
| A | 0.320 | 8.13 |
| B | 0.085 | 2.16 |
| C | 0.110 | 2.79 |

PACKAGE DIMENSIONS



| | A | B | C | D | E | F | K | L |
|---------------------------|------|------|------|------|------|------|------|-------|
| MIN | .077 | .160 | .130 | .205 | .077 | .235 | .015 | .030 |
| MAX | .083 | .180 | .155 | .220 | .104 | .255 | .030 | .060 |
| DIMENSIONS IN MILLIMETERS | | | | | | | | |
| MIN | 1.96 | 4.06 | 3.30 | 5.21 | 1.95 | 5.97 | .381 | .760 |
| MAX | 2.10 | 4.57 | 3.94 | 5.59 | 2.65 | 6.48 | .762 | 1.520 |

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