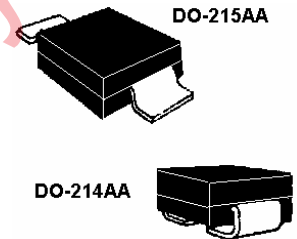


**DESCRIPTION**

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.

**APPEARANCE**



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

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

**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°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 JAN, JANTX, and JANTXV by adding MQ, MX, or MV prefixes respectively to part numbers.
- 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

**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

**MAXIMUM RATINGS**

- Peak Pulse Power dissipation at 25°C: 600 watts at 10/1000  $\mu$ s (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°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)

**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<br>$V_{WM}$<br>Volts | BREAKDOWN VOLTAGE<br>$V_{(BR)}$ @ $I_{(BR)}$<br>Volts |      | MAXIMUM CLAMPING VOLTAGE<br>@ $I_{PP}$<br>Volts | PEAK PULSE CURRENT<br>(See Fig. 2)<br>$I_{PP}$<br>Amps | MAXIMUM STANDBY CURRENT<br>@ $V_{WM}$<br>$I_D$<br>$\mu A$ |
|-----------------------|------------------------|--|---|------|---|--|---|
| 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

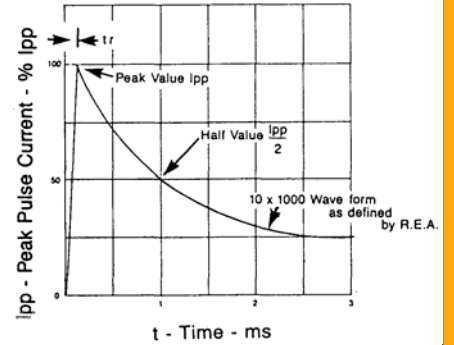
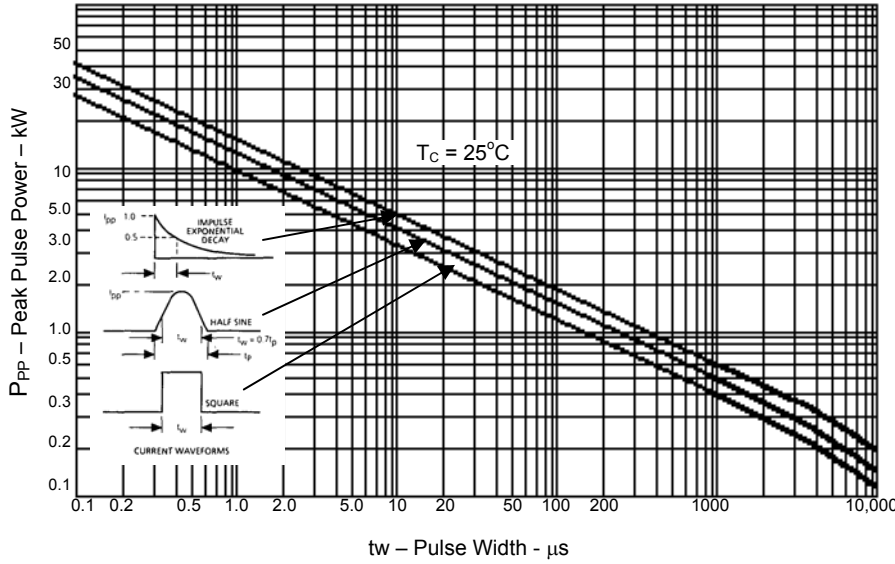
| MICROSEMI PART NUMBER |                        | REVERSE STAND-OFF VOLTAGE<br>$V_{WM}$ | BREAKDOWN VOLTAGE<br>$V_{(BR)}$ @ $I_{(BR)}$<br>Volts |      | MAXIMUM CLAMPING VOLTAGE<br>@ $I_{PP}$ | PEAK PULSE CURRENT<br>(See Fig. 2)<br>$I_{PP}$ | MAXIMUM STANDBY CURRENT<br>@ $V_{WM}$<br>$I_D$<br>$\mu A$ |                  |
|-----------------------|------------------------|---------------------------------------|---|------|--|--|---|------------------|
| GULL-WING LEAD        | MODIFIED "J" BEND LEAD |                                       | MIN.  | MAX. |  |  |   | $I_{(BR)}$<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.

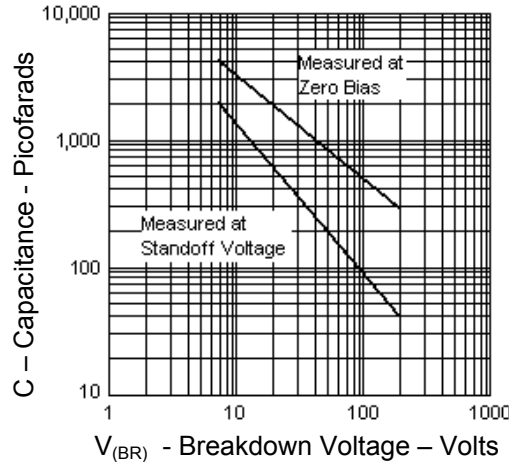
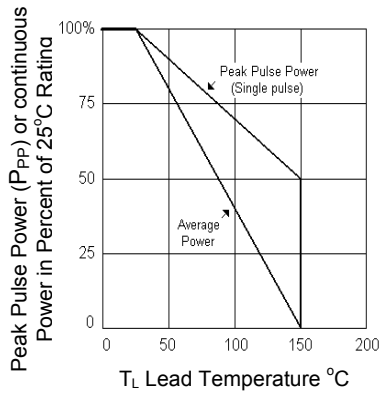
**SYMBOLS & DEFINITIONS**

| 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                 |            |                                  |

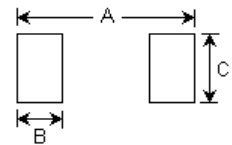
**GRAPHS**



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



**PAD LAYOUT**



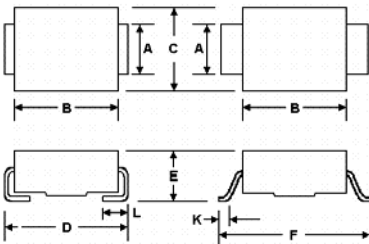
**SMBJ**

|   | 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 |