

## Suface Mount Transient Voltage Suppressor

### FEATURES

- Low profile package
- Ideal for automated placement
- Glass passivated junction
- Built-in strain relief
- Excellent clamping capability
- Fast response time: Typically less than 1.0ps from 0 volt to BV min
- Typical IR less than 1μA above 10V
- Moisture sensitivity level: level 1, per J-STD-020
- Compliant to RoHS Directive 2011/65/EU and in accordance to WEEE 2002/96/EC
- Halogen-free according to IEC 61249-2-21 definition



DO-214AA (SMB)

### MECHANICAL DATA

**Case:** DO-214AA (SMB)

Molding compound, UL flammability classification rating 94V-0

Base P/N with suffix "G" on packing code - green compound (halogen-free)

Base P/N with prefix "H" on packing code - AEC-Q101 qualified

**Terminal:** Matte tin plated leads, solderable per JESD22-B102

Meet JESD 201 class 1A whisker test

with prefix "H" on packing code meet JESD 201 class 2 whisker test

**Polarity:** Indicated by cathode band

**Weight:** 0.09 g (approximately)

| MAXIMUM RATINGS AND ELECTRICAL CHARACTERISTICS (T <sub>A</sub> =25°C unless otherwise noted) |                  |              |       |
|----------------------------------------------------------------------------------------------|------------------|--------------|-------|
| PARAMETER                                                                                    | SYMBOL           | VALUE        | UNIT  |
| Peak power dissipation at T <sub>A</sub> =25°C, tp=1ms (Note 1)                              | P <sub>PK</sub>  | 600          | Watts |
| Steady state power dissipation                                                               | P <sub>D</sub>   | 3            | Watts |
| Peak forward surge current, 8.3 ms single half sine-wave superimposed on rated load          | I <sub>FSM</sub> | 100          | A     |
| Maximum instantaneous forward voltage at 50 A for Unidirectional only (Note 2)               | V <sub>F</sub>   | 3.5 / 5.0    | Volts |
| Typical thermal resistance                                                                   | R <sub>θJC</sub> | 10           | °C/W  |
|                                                                                              | R <sub>θJA</sub> | 55           |       |
| Operating junction temperature range                                                         | T <sub>J</sub>   | - 55 to +150 | °C    |
| Storage temperature range                                                                    | T <sub>STG</sub> | - 55 to +150 | °C    |

Note 1: Non-repetitive Current Pulse Per Fig. 3 and Derated above T<sub>A</sub>=25°C Per Fig. 2

Note 2: V<sub>F</sub>=3.5V on SMBJ5.0 thru SMBJ90 Devices and V<sub>F</sub>=5.0V on SMBJ100 thru SMBJ170 Devices

### Devices for Bipolar Applications

1. For Bidirectional Use C or CA Suffix for Types SMBJ5.0 thru Types SMBJ170
2. Electrical Characteristics Apply in Both Directions

| ORDERING INFORMATION |                    |              |                     |         |                          |
|----------------------|--------------------|--------------|---------------------|---------|--------------------------|
| PART NO.             | AEC-Q101 QUALIFIED | PACKING CODE | GREEN COMPOUND CODE | PACKAGE | PACKING                  |
| SMBJxxxx<br>(Note 1) | Prefix "H"         | R5           | Suffix "G"          | SMB     | 850 / 7" Plastic reel    |
|                      |                    | R4           |                     | SMB     | 3,000 / 13" Paper reel   |
|                      |                    | M4           |                     | SMB     | 3,000 / 13" Plastic reel |

Note 1: "xxxx" defines voltage from 5.0V (SMBJ5.0) to 170V (SMBJ170A)

| EXAMPLE       |          |                    |              |                |                    |
|---------------|----------|--------------------|--------------|----------------|--------------------|
| PREFERRED P/N | PART NO. | AEC-Q101 QUALIFIED | PACKING CODE | GREEN COMPOUND | DESCRIPTION        |
| SMBJ20A R5    | SMBJ20A  |                    | R5           |                |                    |
| SMBJ20A R5G   | SMBJ20A  |                    | R5           | G              | Green compound     |
| SMBJ20AHR5    | SMBJ20A  | H                  | R5           |                | AEC-Q101 qualified |

## RATINGS AND CHARACTERISTICS CURVES

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

FIG. 1 PEAK PULSE POWER RATING CURVE

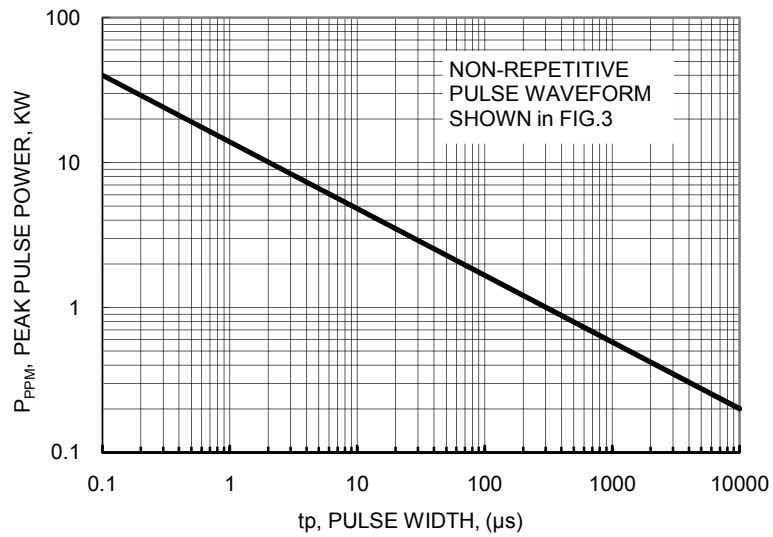


FIG.2 PULSE DERATING CURVE

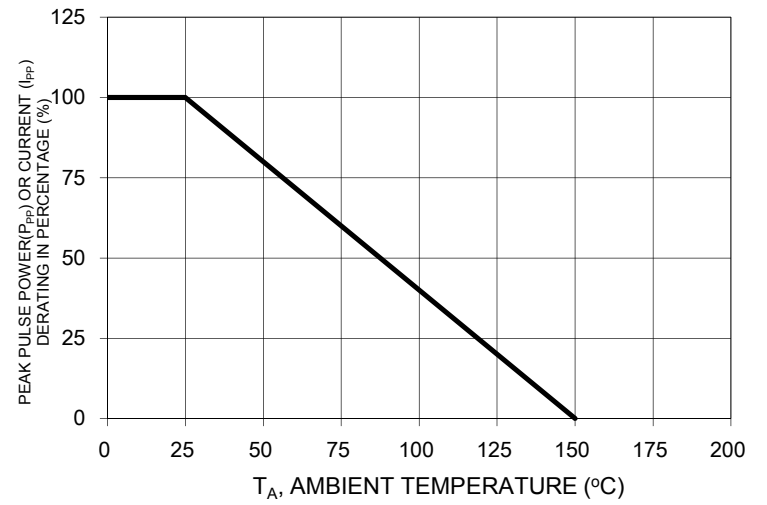


FIG. 3 CLAMPING POWER PULSE WAVEFORM

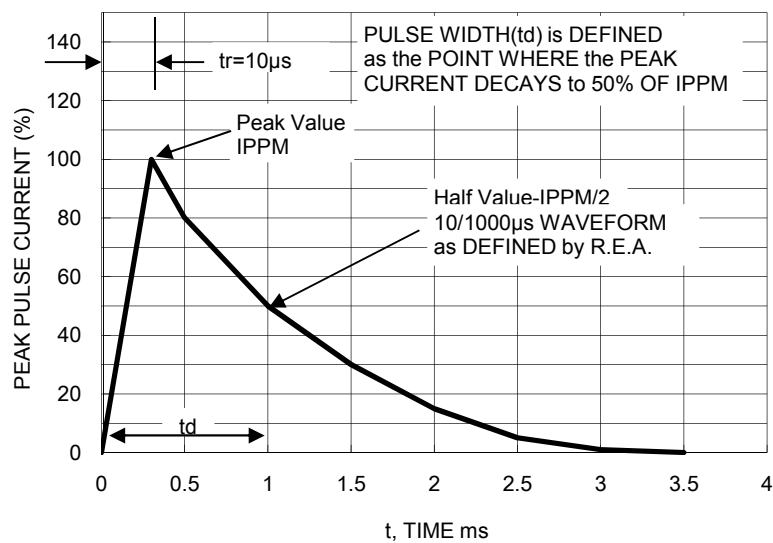


FIG. 4 MAXIMUM NON-REPETITIVE FORWARD SURGE CURRENT

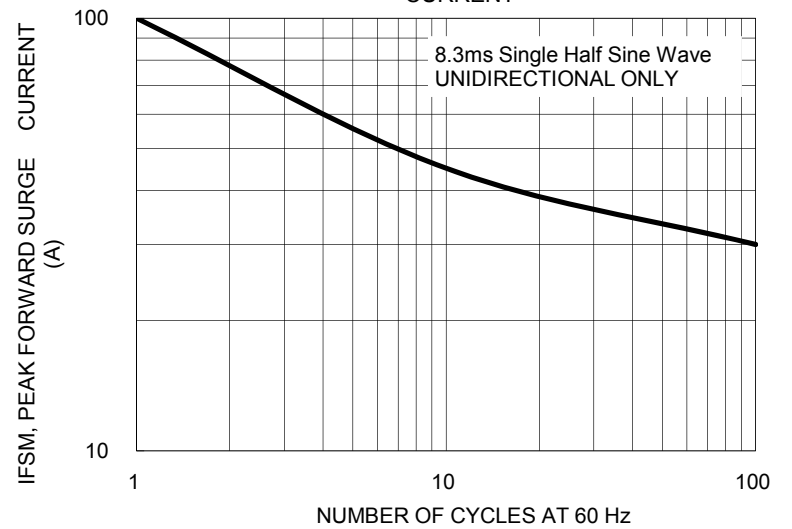
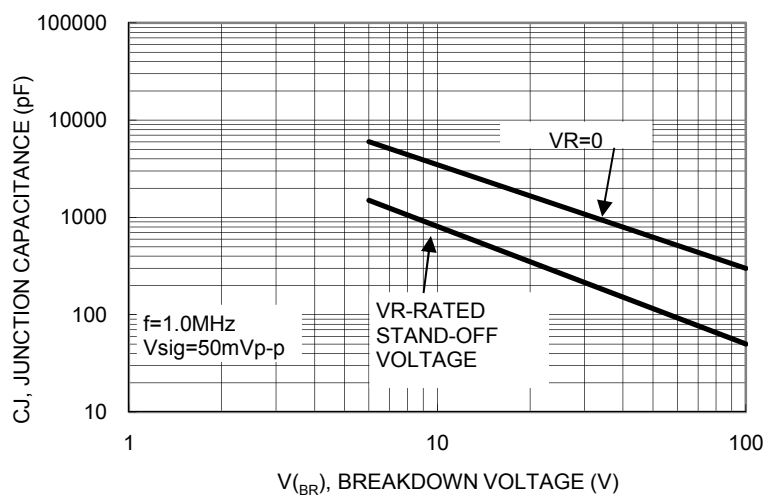


FIG. 5 TYPICAL JUNCTION CAPACITANCE



| Device   | Device<br>Marking<br>Code | Breakdown<br>Voltage<br>(Note 1) |      | Test<br>Current | Stand-Off<br>Voltage | Maximum<br>Reverse<br>Leakage<br>@ $V_{WM}$ | Maximum<br>Peak<br>Pulse<br>Current | Maximum<br>Clamping<br>Voltage<br>@ $I_{PPM}$ |
|----------|---------------------------|----------------------------------|------|-----------------|----------------------|---------------------------------------------|-------------------------------------|-----------------------------------------------|
|          |                           | $V_{BR}$                         |      | $I_T$           | $V_{WM}$             | $I_D$                                       | $I_{PPM}$                           | $V_C$                                         |
|          |                           | V                                |      | mA              | V                    | uA                                          | A                                   | V                                             |
|          |                           | Min.                             | Max. |                 |                      |                                             | (Note 2)                            |                                               |
| SMBJ5.0  | KD                        | 6.40                             | 7.30 | 10              | 5.0                  | 800                                         | 65.0                                | 9.6                                           |
| SMBJ5.0A | KE                        | 6.40                             | 7.00 | 10              | 5.0                  | 800                                         | 68.0                                | 9.2                                           |
| SMBJ6.0  | KF                        | 6.67                             | 8.15 | 10              | 6.0                  | 800                                         | 55.0                                | 11.4                                          |
| SMBJ6.0A | KG                        | 6.67                             | 7.37 | 10              | 6.0                  | 800                                         | 61.0                                | 10.3                                          |
| SMBJ6.5  | KH                        | 7.22                             | 8.82 | 10              | 6.5                  | 500                                         | 51.0                                | 12.3                                          |
| SMBJ6.5A | KK                        | 7.22                             | 7.98 | 10              | 6.5                  | 500                                         | 56.0                                | 11.2                                          |
| SMBJ7.0  | KL                        | 7.78                             | 9.51 | 10              | 7.0                  | 200                                         | 47.0                                | 13.3                                          |
| SMBJ7.0A | KM                        | 7.78                             | 8.60 | 10              | 7.0                  | 200                                         | 52.0                                | 12.0                                          |
| SMBJ7.5  | KN                        | 8.33                             | 10.3 | 1               | 7.5                  | 100                                         | 44.0                                | 14.3                                          |
| SMBJ7.5A | KP                        | 8.33                             | 9.21 | 1               | 7.5                  | 100                                         | 48.0                                | 12.9                                          |
| SMBJ8.0  | KQ                        | 8.89                             | 10.9 | 1               | 8.0                  | 50                                          | 42.0                                | 15.0                                          |
| SMBJ8.0A | KR                        | 8.89                             | 9.83 | 1               | 8.0                  | 50                                          | 46.0                                | 13.6                                          |
| SMBJ8.5  | KS                        | 9.44                             | 11.5 | 1               | 8.5                  | 10                                          | 39.0                                | 15.9                                          |
| SMBJ8.5A | KT                        | 9.44                             | 10.4 | 1               | 8.5                  | 10                                          | 43.0                                | 14.4                                          |
| SMBJ9.0  | KU                        | 10.0                             | 12.2 | 1               | 9.0                  | 5                                           | 37.0                                | 16.9                                          |
| SMBJ9.0A | KV                        | 10.0                             | 11.1 | 1               | 9.0                  | 5                                           | 40.0                                | 15.4                                          |
| SMBJ10   | KW                        | 11.1                             | 13.6 | 1               | 10                   | 5                                           | 33.0                                | 18.8                                          |
| SMBJ10A  | KX                        | 11.1                             | 12.3 | 1               | 10                   | 5                                           | 37.0                                | 17.0                                          |
| SMBJ11   | KY                        | 12.2                             | 14.9 | 1               | 11                   | 1                                           | 31.0                                | 20.1                                          |
| SMBJ11A  | KZ                        | 12.2                             | 13.5 | 1               | 11                   | 1                                           | 34.0                                | 18.2                                          |
| SMBJ12   | LD                        | 13.3                             | 16.3 | 1               | 12                   | 1                                           | 28.0                                | 22.0                                          |
| SMBJ12A  | LE                        | 13.3                             | 14.7 | 1               | 12                   | 1                                           | 31.0                                | 19.9                                          |
| SMBJ13   | LF                        | 14.4                             | 17.6 | 1               | 13                   | 1                                           | 26.0                                | 23.8                                          |
| SMBJ13A  | LG                        | 14.4                             | 15.9 | 1               | 13                   | 1                                           | 29.0                                | 21.5                                          |
| SMBJ14   | LH                        | 15.6                             | 19.1 | 1               | 14                   | 1                                           | 24.4                                | 25.8                                          |
| SMBJ14A  | LK                        | 15.6                             | 17.2 | 1               | 14                   | 1                                           | 27.0                                | 23.2                                          |
| SMBJ15   | LL                        | 16.7                             | 20.4 | 1               | 15                   | 1                                           | 23.1                                | 26.9                                          |
| SMBJ15A  | LM                        | 16.7                             | 18.5 | 1               | 15                   | 1                                           | 25.1                                | 24.4                                          |
| SMBJ16   | LN                        | 17.8                             | 21.8 | 1               | 16                   | 1                                           | 21.8                                | 28.8                                          |
| SMBJ16A  | LP                        | 17.8                             | 19.7 | 1               | 16                   | 1                                           | 24.2                                | 26.0                                          |
| SMBJ17   | LQ                        | 18.9                             | 23.1 | 1               | 17                   | 1                                           | 20.0                                | 30.5                                          |
| SMBJ17A  | LR                        | 18.9                             | 20.9 | 1               | 17                   | 1                                           | 22.8                                | 27.6                                          |
| SMBJ18   | LS                        | 20.0                             | 24.4 | 1               | 18                   | 1                                           | 19.5                                | 32.2                                          |
| SMBJ18A  | LT                        | 20.0                             | 22.1 | 1               | 18                   | 1                                           | 21.5                                | 29.2                                          |
| SMBJ20   | LU                        | 22.2                             | 27.1 | 1               | 20                   | 1                                           | 17.6                                | 35.8                                          |
| SMBJ20A  | LV                        | 22.2                             | 24.5 | 1               | 20                   | 1                                           | 19.4                                | 32.4                                          |
| SMBJ22   | LW                        | 24.4                             | 29.8 | 1               | 22                   | 1                                           | 15.0                                | 39.4                                          |
| SMBJ22A  | LX                        | 24.4                             | 26.9 | 1               | 22                   | 1                                           | 17.7                                | 35.5                                          |
| SMBJ24   | LY                        | 26.7                             | 32.6 | 1               | 24                   | 1                                           | 14.6                                | 43.0                                          |
| SMBJ24A  | LZ                        | 26.7                             | 29.5 | 1               | 24                   | 1                                           | 16.0                                | 38.9                                          |
| SMBJ26   | MD                        | 28.9                             | 35.3 | 1               | 26                   | 1                                           | 13.5                                | 46.6                                          |
| SMBJ26A  | ME                        | 28.9                             | 31.9 | 1               | 26                   | 1                                           | 14.9                                | 42.1                                          |
| SMBJ28   | MF                        | 31.1                             | 38.0 | 1               | 28                   | 1                                           | 12.6                                | 50.0                                          |
| SMBJ28A  | MG                        | 31.1                             | 34.4 | 1               | 28                   | 1                                           | 13.8                                | 45.4                                          |

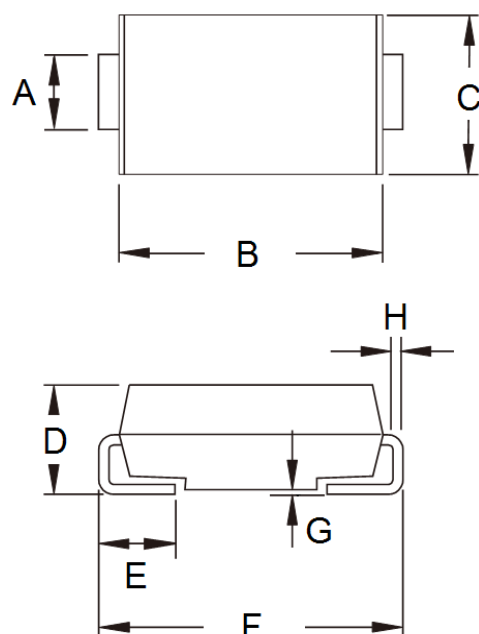
| Device   | Device Marking Code | Breakdown Voltage (Note 1) |      | Test Current | Stand-Off Voltage | Maximum Reverse Leakage @ V <sub>WM</sub> | Maximum Peak Pulse Current | Maximum Clamping Voltage @ I <sub>PPM</sub> |                |                 |                |                  |                |
|----------|---------------------|----------------------------|------|--------------|-------------------|-------------------------------------------|----------------------------|---------------------------------------------|----------------|-----------------|----------------|------------------|----------------|
|          |                     | V <sub>BR</sub>            |      |              |                   |                                           |                            |                                             | I <sub>T</sub> | V <sub>WM</sub> | I <sub>D</sub> | I <sub>PPM</sub> | V <sub>C</sub> |
|          |                     | V                          |      |              |                   |                                           |                            |                                             | mA             | V               | uA             | A                | V              |
|          |                     | Min.                       | Max. |              |                   |                                           |                            |                                             |                |                 |                | (Note 2)         |                |
| SMBJ30   | MH                  | 33.3                       | 40.7 | 1            | 30                | 1                                         | 11.7                       | 53.5                                        |                |                 |                |                  |                |
| SMBJ30A  | MK                  | 33.3                       | 36.8 | 1            | 30                | 1                                         | 13.0                       | 48.4                                        |                |                 |                |                  |                |
| SMBJ33   | ML                  | 36.7                       | 44.9 | 1            | 33                | 1                                         | 10.6                       | 59.0                                        |                |                 |                |                  |                |
| SMBJ33A  | MM                  | 36.7                       | 40.6 | 1            | 33                | 1                                         | 11.8                       | 53.3                                        |                |                 |                |                  |                |
| SMBJ36   | MN                  | 40.0                       | 48.9 | 1            | 36                | 1                                         | 9.8                        | 64.3                                        |                |                 |                |                  |                |
| SMBJ36A  | MP                  | 40.0                       | 44.2 | 1            | 36                | 1                                         | 10.8                       | 58.1                                        |                |                 |                |                  |                |
| SMBJ40   | MQ                  | 44.4                       | 54.3 | 1            | 40                | 1                                         | 8.8                        | 71.4                                        |                |                 |                |                  |                |
| SMBJ40A  | MR                  | 44.4                       | 49.1 | 1            | 40                | 1                                         | 9.7                        | 64.5                                        |                |                 |                |                  |                |
| SMBJ43   | MS                  | 47.8                       | 58.4 | 1            | 43                | 1                                         | 8.2                        | 76.7                                        |                |                 |                |                  |                |
| SMBJ43A  | MT                  | 47.8                       | 52.8 | 1            | 43                | 1                                         | 9.0                        | 69.4                                        |                |                 |                |                  |                |
| SMBJ45   | MU                  | 50.0                       | 61.1 | 1            | 45                | 1                                         | 7.8                        | 80.3                                        |                |                 |                |                  |                |
| SMBJ45A  | MV                  | 50.0                       | 55.3 | 1            | 45                | 1                                         | 8.6                        | 72.7                                        |                |                 |                |                  |                |
| SMBJ48   | MW                  | 53.3                       | 65.1 | 1            | 48                | 1                                         | 7.3                        | 85.5                                        |                |                 |                |                  |                |
| SMBJ48A  | MX                  | 53.3                       | 58.9 | 1            | 48                | 1                                         | 8.1                        | 77.4                                        |                |                 |                |                  |                |
| SMBJ51   | MY                  | 56.7                       | 69.3 | 1            | 51                | 1                                         | 6.9                        | 91.1                                        |                |                 |                |                  |                |
| SMBJ51A  | MZ                  | 56.7                       | 62.7 | 1            | 51                | 1                                         | 7.6                        | 82.4                                        |                |                 |                |                  |                |
| SMBJ54   | ND                  | 60.0                       | 73.3 | 1            | 54                | 1                                         | 6.5                        | 96.3                                        |                |                 |                |                  |                |
| SMBJ54A  | NE                  | 60.0                       | 66.3 | 1            | 54                | 1                                         | 7.2                        | 87.1                                        |                |                 |                |                  |                |
| SMBJ58   | NF                  | 64.4                       | 78.7 | 1            | 58                | 1                                         | 6.1                        | 103                                         |                |                 |                |                  |                |
| SMBJ58A  | NG                  | 64.4                       | 71.2 | 1            | 58                | 1                                         | 6.7                        | 93.6                                        |                |                 |                |                  |                |
| SMBJ60   | NH                  | 66.7                       | 81.5 | 1            | 60                | 1                                         | 5.8                        | 107                                         |                |                 |                |                  |                |
| SMBJ60A  | NK                  | 66.7                       | 73.7 | 1            | 60                | 1                                         | 6.5                        | 96.8                                        |                |                 |                |                  |                |
| SMBJ64   | NL                  | 71.1                       | 86.9 | 1            | 64                | 1                                         | 5.5                        | 114                                         |                |                 |                |                  |                |
| SMBJ64A  | NM                  | 71.1                       | 78.6 | 1            | 64                | 1                                         | 6.1                        | 103                                         |                |                 |                |                  |                |
| SMBJ70   | NN                  | 77.8                       | 95.1 | 1            | 70                | 1                                         | 5.0                        | 125                                         |                |                 |                |                  |                |
| SMBJ70A  | NP                  | 77.8                       | 86   | 1            | 70                | 1                                         | 5.5                        | 113                                         |                |                 |                |                  |                |
| SMBJ75   | NQ                  | 83.3                       | 102  | 1            | 75                | 1                                         | 4.7                        | 134                                         |                |                 |                |                  |                |
| SMBJ75A  | NR                  | 83.3                       | 92.1 | 1            | 75                | 1                                         | 5.2                        | 121                                         |                |                 |                |                  |                |
| SMBJ78   | NS                  | 86.7                       | 106  | 1            | 78                | 1                                         | 4.5                        | 139                                         |                |                 |                |                  |                |
| SMBJ78A  | NT                  | 86.7                       | 95.8 | 1            | 78                | 1                                         | 5.0                        | 126                                         |                |                 |                |                  |                |
| SMBJ85   | NU                  | 94.4                       | 115  | 1            | 85                | 1                                         | 4.1                        | 151                                         |                |                 |                |                  |                |
| SMBJ85A  | NV                  | 94.4                       | 104  | 1            | 85                | 1                                         | 4.6                        | 137                                         |                |                 |                |                  |                |
| SMBJ90   | NW                  | 100                        | 122  | 1            | 90                | 1                                         | 3.9                        | 160                                         |                |                 |                |                  |                |
| SMBJ90A  | NX                  | 100                        | 111  | 1            | 90                | 1                                         | 4.3                        | 146                                         |                |                 |                |                  |                |
| SMBJ100  | NY                  | 111                        | 136  | 1            | 100               | 1                                         | 3.5                        | 179                                         |                |                 |                |                  |                |
| SMBJ100A | NZ                  | 111                        | 123  | 1            | 100               | 1                                         | 3.8                        | 162                                         |                |                 |                |                  |                |
| SMBJ110  | PD                  | 122                        | 149  | 1            | 110               | 1                                         | 3.2                        | 196                                         |                |                 |                |                  |                |
| SMBJ110A | PE                  | 122                        | 135  | 1            | 110               | 1                                         | 3.5                        | 177                                         |                |                 |                |                  |                |
| SMBJ120  | PF                  | 133                        | 163  | 1            | 120               | 1                                         | 2.9                        | 214                                         |                |                 |                |                  |                |
| SMBJ120A | PG                  | 133                        | 147  | 1            | 120               | 1                                         | 3.2                        | 193                                         |                |                 |                |                  |                |
| SMBJ130  | PH                  | 144                        | 176  | 1            | 130               | 1                                         | 2.7                        | 231                                         |                |                 |                |                  |                |
| SMBJ130A | PK                  | 144                        | 159  | 1            | 130               | 1                                         | 3.0                        | 209                                         |                |                 |                |                  |                |

| Device   | Device<br>Marking<br>Code | Breakdown<br>Voltage<br>(Note 1) |      | Test<br>Current | Stand-Off<br>Voltage | Maximum<br>Reverse<br>Leakage<br>@ $V_{WM}$ | Maximum<br>Peak<br>Pulse<br>Current | Maximum<br>Clamping<br>Voltage<br>@ $I_{PPM}$ |
|----------|---------------------------|----------------------------------|------|-----------------|----------------------|---------------------------------------------|-------------------------------------|-----------------------------------------------|
|          |                           | $V_{BR}$                         |      | $I_T$           | $V_{WM}$             | $I_D$                                       | $I_{PPM}$                           | $V_C$                                         |
|          |                           | V                                |      | mA              | V                    | uA                                          | A                                   | V                                             |
|          |                           | Min.                             | Max. |                 |                      |                                             | (Note 2)                            |                                               |
| SMBJ150  | PL                        | 167                              | 204  | 1               | 150                  | 1                                           | 2.3                                 | 266                                           |
| SMBJ150A | PM                        | 167                              | 185  | 1               | 150                  | 1                                           | 2.5                                 | 243                                           |
| SMBJ160  | PN                        | 178                              | 218  | 1               | 160                  | 1                                           | 2.2                                 | 287                                           |
| SMBJ160A | PP                        | 178                              | 197  | 1               | 160                  | 1                                           | 2.4                                 | 259                                           |
| SMBJ170  | PQ                        | 189                              | 231  | 1               | 170                  | 1                                           | 2.0                                 | 304                                           |
| SMBJ170A | PR                        | 189                              | 209  | 1               | 170                  | 1                                           | 2.2                                 | 275                                           |

**Notes:**

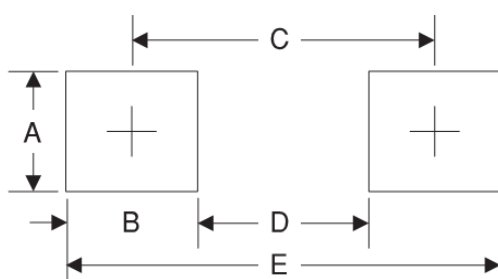
1.  $V_{BR}$  measure after  $I_T$  applied for 300 $\mu$ s,  $I_T$ =square wave pulse or equivalent.
2. Surge current waveform per Figure. 3 and derate per Figure. 2.
3. All terms and symbols are consistent with ANSI/IEEE C62.35.
4. For bidirectional use C or CA suffix for types SMBJ5.0 thru SMBJ170
5. For bipolar types having  $V_{WM}$  of 10 volts (SMBJ8.0C) and under, the  $I_D$  limit is doubled.

## PACKAGE OUTLINE DIMENSIONS



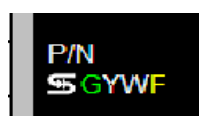
| DIM. | Unit (mm) |      | Unit (inch) |       |
|------|-----------|------|-------------|-------|
|      | Min       | Max  | Min         | Max   |
| A    | 1.95      | 2.10 | 0.077       | 0.083 |
| B    | 4.25      | 4.75 | 0.167       | 0.187 |
| C    | 3.48      | 3.73 | 0.137       | 0.147 |
| D    | 1.99      | 2.61 | 0.078       | 0.103 |
| E    | 0.90      | 1.41 | 0.035       | 0.056 |
| F    | 5.10      | 5.30 | 0.201       | 0.209 |
| G    | 0.10      | 0.20 | 0.004       | 0.008 |
| H    | 0.15      | 0.31 | 0.006       | 0.012 |

## SUGGESTED PAD LAYOUT



| Symbol | Unit (mm) | Unit (inch) |
|--------|-----------|-------------|
| A      | 2.3       | 0.091       |
| B      | 2.5       | 0.098       |
| C      | 4.3       | 0.169       |
| D      | 1.8       | 0.071       |
| E      | 6.8       | 0.268       |

## MARKING DIAGRAM



P/N = Device Marking Code  
G = Green Compound  
YW = Date Code  
F = Factory Code

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