

## Surface 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-214AB (SMC)**

### MECHANICAL DATA

**Case:** DO-214AB (SMC)

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:** 0.21 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>  | 1500         | Watts |
| Steady state power dissipation                                                               | P <sub>D</sub>   | 5            | Watts |
| Peak forward surge current, 8.3 ms single half sine-wave superimposed on rated load          | I <sub>FSM</sub> | 200          | A     |
| Maximum instantaneous forward voltage at 100 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 SMCJ5.0 thru SMCJ90 Devices and V<sub>F</sub>=5.0V on SMCJ100 thru SMCJ170 Devices

### Devices for Bipolar Applications

1. For Bidirectional Use C or CA Suffix for Types SMCJ5.0 through Types SMCJ170
2. Electrical Characteristics Apply in Both Directions

| ORDERING INFORMATION |                    |              |                     |         |                          |
|----------------------|--------------------|--------------|---------------------|---------|--------------------------|
| PART NO.             | AEC-Q101 QUALIFIED | PACKING CODE | GREEN COMPOUND CODE | PACKAGE | PACKING                  |
| SMCJxxxx<br>(Note 1) | Prefix "H"         | R7           | Suffix "G"          | SMC     | 850 / 7" Plastic reel    |
|                      |                    | R6           |                     | SMC     | 3,000 / 13" Paper reel   |
|                      |                    | M6           |                     | SMC     | 3,000 / 13" Plastic reel |

Note 1: "xxxx" defines voltage from 5.0V (SMCJ5.0) to 170V (SMCJ170A)

| EXAMPLE       |          |                    |              |                |                    |
|---------------|----------|--------------------|--------------|----------------|--------------------|
| PREFERRED P/N | PART NO. | AEC-Q101 QUALIFIED | PACKING CODE | GREEN COMPOUND | DESCRIPTION        |
| SMC170A R7    | SMCJ170A |                    | R7           |                |                    |
| SMC170A R7G   | SMCJ170A |                    | R7           | G              | Green compound     |
| SMC170AHR7    | SMCJ170A | H                  | R7           |                | AEC-Q101 qualified |

RATINGS AND CHARACTERISTICS CURVES (TA=25°C unless otherwise noted)

FIG. 1 PEAK PULSE POWER RATING CURVE

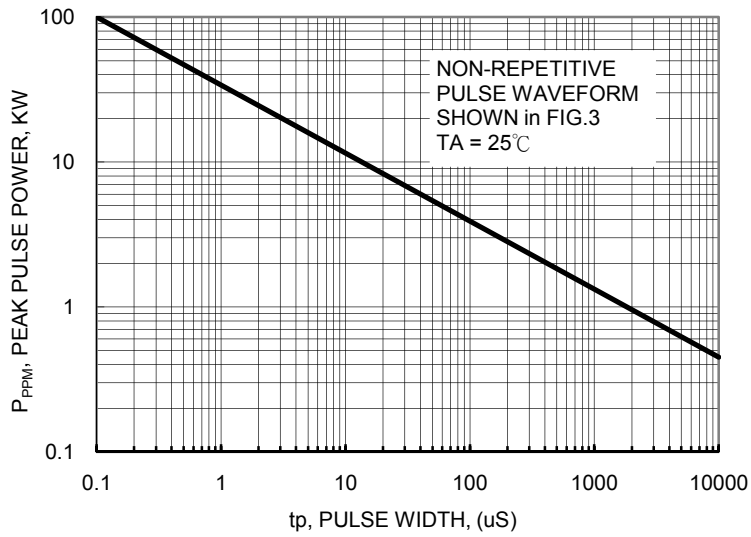


FIG.2 PULSE DERATING CURVE

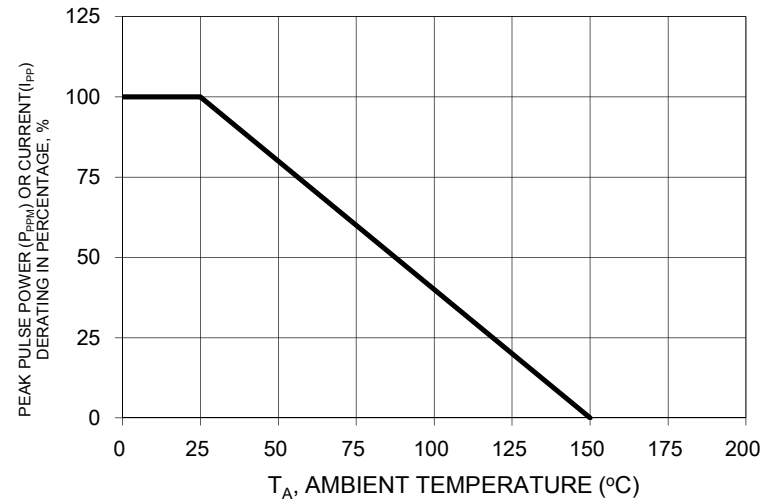


FIG. 3 CLAMPING POWER PULSE WAVEFORM

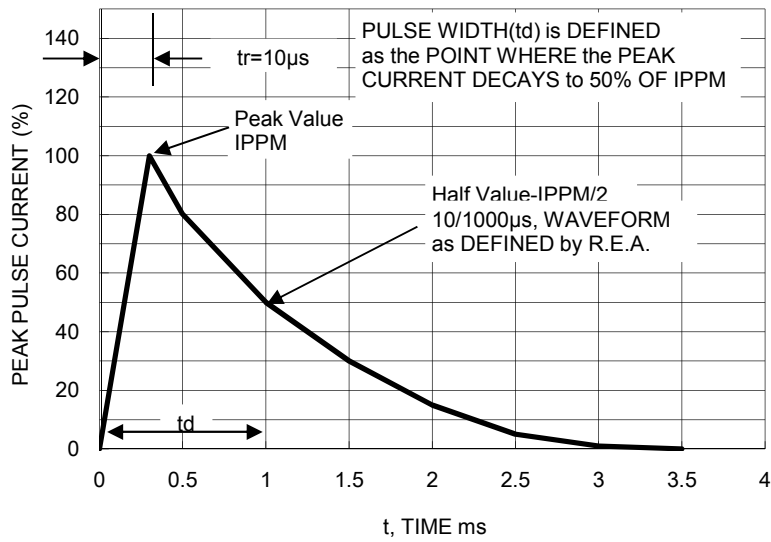


FIG. 4 MAXIMUM NON-REPETITIVE FORWARD SURGE CURRENT

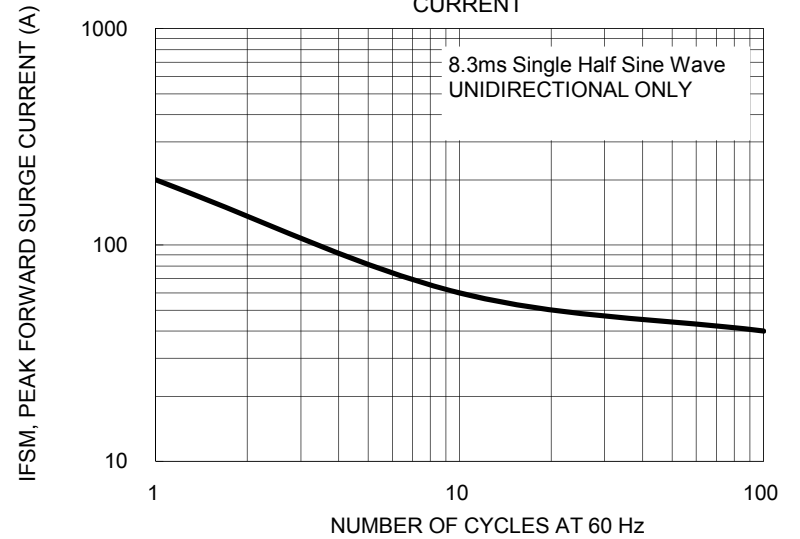
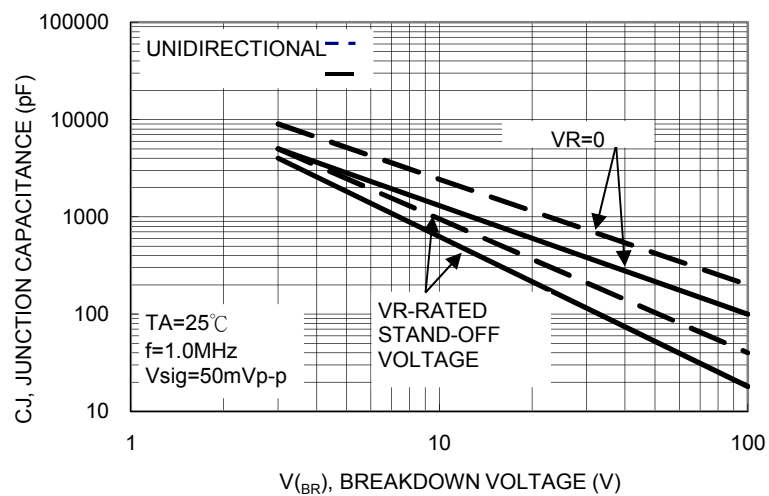


FIG. 5 TYPICAL JUNCTION CAPACITANCE



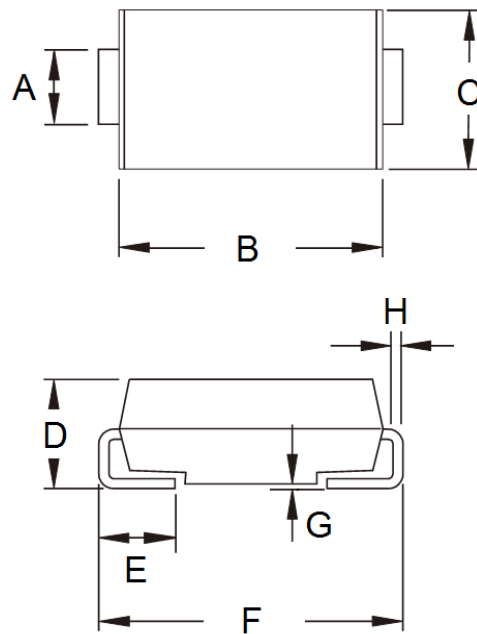
| Device   | Device<br>Marking<br>Code | Breakdown Voltage<br>VBR (V)<br>at I <sub>T</sub> |       | Test<br>Current<br>I <sub>T</sub><br>(mA) | Stand-Off<br>Voltage<br>V <sub>WM</sub><br>(V) | Maximum<br>Reverse Leakage<br>@ V <sub>WM</sub><br>I <sub>D</sub> (uA) (Note3) | Maximum<br>Peak Surge<br>Current<br>I <sub>PPM</sub><br>(A) (Note2) | Maximum<br>Clamping<br>Voltage at IPPM<br>V <sub>c</sub> (V)<br>(Note5) |
|----------|---------------------------|---------------------------------------------------|-------|-------------------------------------------|------------------------------------------------|--------------------------------------------------------------------------------|---------------------------------------------------------------------|-------------------------------------------------------------------------|
|          |                           | Min                                               | Max   |                                           |                                                |                                                                                |                                                                     |                                                                         |
| SMCJ5.0  | GDD                       | 6.4                                               | 7.3   | 10                                        | 5                                              | 1000                                                                           | 164                                                                 | 9.6                                                                     |
| SMCJ5.0A | GDE                       | 6.4                                               | 7     | 10                                        | 5                                              | 1000                                                                           | 171                                                                 | 9.2                                                                     |
| SMCJ6.0  | GDF                       | 6.67                                              | 8.15  | 10                                        | 6                                              | 1000                                                                           | 138                                                                 | 11.4                                                                    |
| SMCJ6.0A | GDG                       | 6.67                                              | 7.37  | 10                                        | 6                                              | 1000                                                                           | 152                                                                 | 10.3                                                                    |
| SMCJ6.5  | GDH                       | 7.22                                              | 8.82  | 10                                        | 6.5                                            | 500                                                                            | 128                                                                 | 12.3                                                                    |
| SMCJ6.5A | GDK                       | 7.22                                              | 7.98  | 10                                        | 6.5                                            | 500                                                                            | 140                                                                 | 11.2                                                                    |
| SMCJ7.0  | GDL                       | 7.78                                              | 9.51  | 10                                        | 7                                              | 200                                                                            | 118                                                                 | 13.3                                                                    |
| SMCJ7.0A | GDM                       | 7.78                                              | 8.6   | 10                                        | 7                                              | 200                                                                            | 131                                                                 | 12.0                                                                    |
| SMCJ7.5  | GDN                       | 8.33                                              | 10.30 | 1                                         | 7.5                                            | 100                                                                            | 110                                                                 | 14.3                                                                    |
| SMCJ7.5A | GDP                       | 8.33                                              | 9.21  | 1                                         | 7.5                                            | 100                                                                            | 122                                                                 | 12.9                                                                    |
| SMCJ8.0  | GDQ                       | 8.89                                              | 10.9  | 1                                         | 8                                              | 50                                                                             | 105                                                                 | 15.0                                                                    |
| SMCJ8.0A | GDR                       | 8.89                                              | 9.83  | 1                                         | 8                                              | 50                                                                             | 115                                                                 | 13.6                                                                    |
| SMCJ8.5  | GDS                       | 9.44                                              | 11.5  | 1                                         | 8.5                                            | 20                                                                             | 99                                                                  | 15.9                                                                    |
| SMCJ8.5A | GDT                       | 9.44                                              | 10.4  | 1                                         | 8.5                                            | 20                                                                             | 109                                                                 | 14.4                                                                    |
| SMCJ9.0  | GDU                       | 10                                                | 12.2  | 1                                         | 9                                              | 10                                                                             | 93                                                                  | 16.9                                                                    |
| SMCJ9.0A | GDV                       | 10                                                | 11.1  | 1                                         | 9                                              | 10                                                                             | 102                                                                 | 15.4                                                                    |
| SMCJ10   | GDW                       | 11.1                                              | 13.6  | 1                                         | 10                                             | 5                                                                              | 83                                                                  | 18.8                                                                    |
| SMCJ10A  | GDX                       | 11.1                                              | 12.3  | 1                                         | 10                                             | 5                                                                              | 92                                                                  | 17.0                                                                    |
| SMCJ11   | GDY                       | 12.2                                              | 14.9  | 1                                         | 11                                             | 1                                                                              | 78                                                                  | 20.1                                                                    |
| SMCJ11A  | GDZ                       | 12.2                                              | 13.5  | 1                                         | 11                                             | 1                                                                              | 86                                                                  | 18.2                                                                    |
| SMCJ12   | GED                       | 13.3                                              | 16.3  | 1                                         | 12                                             | 1                                                                              | 71                                                                  | 22.0                                                                    |
| SMCJ12A  | GEE                       | 13.3                                              | 14.7  | 1                                         | 12                                             | 1                                                                              | 79                                                                  | 19.9                                                                    |
| SMCJ13   | GEF                       | 14.4                                              | 17.6  | 1                                         | 13                                             | 1                                                                              | 66                                                                  | 23.8                                                                    |
| SMCJ13A  | GEG                       | 14.4                                              | 15.9  | 1                                         | 13                                             | 1                                                                              | 73                                                                  | 21.5                                                                    |
| SMCJ14   | GEH                       | 15.6                                              | 19.1  | 1                                         | 14                                             | 1                                                                              | 61                                                                  | 25.8                                                                    |
| SMCJ14A  | GEK                       | 15.6                                              | 17.2  | 1                                         | 14                                             | 1                                                                              | 67                                                                  | 23.2                                                                    |
| SMCJ15   | GEL                       | 16.7                                              | 20.4  | 1                                         | 15                                             | 1                                                                              | 58                                                                  | 26.9                                                                    |
| SMCJ15A  | GEM                       | 16.7                                              | 18.5  | 1                                         | 15                                             | 1                                                                              | 64                                                                  | 24.4                                                                    |
| SMCJ16   | GEN                       | 17.8                                              | 21.8  | 1                                         | 16                                             | 1                                                                              | 54                                                                  | 28.8                                                                    |
| SMCJ16A  | GEP                       | 17.8                                              | 19.7  | 1                                         | 16                                             | 1                                                                              | 60                                                                  | 26.0                                                                    |
| SMCJ17   | GEQ                       | 18.9                                              | 23.1  | 1                                         | 17                                             | 1                                                                              | 51                                                                  | 30.5                                                                    |
| SMCJ17A  | GER                       | 18.9                                              | 20.9  | 1                                         | 17                                             | 1                                                                              | 57                                                                  | 27.6                                                                    |
| SMCJ18   | GES                       | 20                                                | 24.4  | 1                                         | 18                                             | 1                                                                              | 48                                                                  | 32.2                                                                    |
| SMCJ18A  | GET                       | 20                                                | 22.1  | 1                                         | 18                                             | 1                                                                              | 53                                                                  | 29.2                                                                    |
| SMCJ20   | GEU                       | 22.2                                              | 27.1  | 1                                         | 20                                             | 1                                                                              | 43                                                                  | 35.8                                                                    |
| SMCJ20A  | GEV                       | 22.2                                              | 24.5  | 1                                         | 20                                             | 1                                                                              | 48                                                                  | 32.4                                                                    |
| SMCJ22   | GEW                       | 24.4                                              | 29.8  | 1                                         | 22                                             | 1                                                                              | 39                                                                  | 39.4                                                                    |
| SMCJ22A  | GEX                       | 24.4                                              | 26.9  | 1                                         | 22                                             | 1                                                                              | 44                                                                  | 35.5                                                                    |
| SMCJ24   | GEY                       | 26.7                                              | 32.6  | 1                                         | 24                                             | 1                                                                              | 36                                                                  | 43.0                                                                    |
| SMCJ24A  | GEZ                       | 26.7                                              | 29.5  | 1                                         | 24                                             | 1                                                                              | 40                                                                  | 38.9                                                                    |
| SMCJ26   | GFD                       | 28.9                                              | 35.3  | 1                                         | 26                                             | 1                                                                              | 33                                                                  | 46.6                                                                    |
| SMCJ26A  | GFE                       | 28.9                                              | 31.9  | 1                                         | 26                                             | 1                                                                              | 37                                                                  | 42.1                                                                    |
| SMCJ28   | GFF                       | 31.1                                              | 38    | 1                                         | 28                                             | 1                                                                              | 31                                                                  | 50.0                                                                    |
| SMCJ28A  | GFG                       | 31.1                                              | 34.4  | 1                                         | 28                                             | 1                                                                              | 34                                                                  | 45.4                                                                    |
| SMCJ30   | GFH                       | 33.3                                              | 40.7  | 1                                         | 30                                             | 1                                                                              | 29                                                                  | 53.5                                                                    |
| SMCJ30A  | GFK                       | 33.3                                              | 36.8  | 1                                         | 30                                             | 1                                                                              | 32                                                                  | 48.4                                                                    |
| SMCJ33   | GFL                       | 36.7                                              | 44.9  | 1                                         | 33                                             | 1                                                                              | 26                                                                  | 59.0                                                                    |
| SMCJ33A  | GFM                       | 36.7                                              | 40.6  | 1                                         | 33                                             | 1                                                                              | 29                                                                  | 53.3                                                                    |
| SMCJ36   | GFN                       | 40                                                | 48.9  | 1                                         | 36                                             | 1                                                                              | 24                                                                  | 64.3                                                                    |
| SMCJ36A  | GFP                       | 40                                                | 44.2  | 1                                         | 36                                             | 1                                                                              | 27                                                                  | 58.1                                                                    |

| Device   | Device Marking Code | Breakdown Voltage<br>VBR (V)<br>at $I_T$ |      | Test Current<br>$I_T$<br>(mA) | Stand-Off Voltage<br>$V_{WM}$<br>(V) | Maximum Reverse Leakage<br>@ $V_{WM}$<br>$I_D$ (uA) (Note3) | Maximum Peak Surge Current<br>$I_{PPM}$<br>(A) (Note2) | Maximum Clamping Voltage at IPPM<br>$V_c$ (V)<br>(Note5) |
|----------|---------------------|------------------------------------------|------|-------------------------------|--------------------------------------|-------------------------------------------------------------|--------------------------------------------------------|----------------------------------------------------------|
|          |                     | Min                                      | Max  |                               |                                      |                                                             |                                                        |                                                          |
| SMCJ40   | GFQ                 | 44.4                                     | 54.3 | 1                             | 40                                   | 1                                                           | 22                                                     | 71.4                                                     |
| SMCJ40A  | GFR                 | 44.4                                     | 49.1 | 1                             | 40                                   | 1                                                           | 24                                                     | 64.5                                                     |
| SMCJ43   | GFS                 | 47.8                                     | 58.4 | 1                             | 43                                   | 1                                                           | 20                                                     | 76.7                                                     |
| SMCJ43A  | GFT                 | 47.8                                     | 52.8 | 1                             | 43                                   | 1                                                           | 22                                                     | 69.4                                                     |
| SMCJ45   | GFU                 | 50                                       | 61.1 | 1                             | 45                                   | 1                                                           | 19                                                     | 80.3                                                     |
| SMCJ45A  | GFV                 | 50                                       | 55.3 | 1                             | 45                                   | 1                                                           | 21                                                     | 72.7                                                     |
| SMCJ48   | GFW                 | 53.3                                     | 65.1 | 1                             | 48                                   | 1                                                           | 18                                                     | 85.5                                                     |
| SMCJ48A  | GFX                 | 53.3                                     | 58.9 | 1                             | 48                                   | 1                                                           | 20                                                     | 77.4                                                     |
| SMCJ51   | GFY                 | 56.7                                     | 69.3 | 1                             | 51                                   | 1                                                           | 17                                                     | 91.1                                                     |
| SMCJ51A  | GFZ                 | 56.7                                     | 62.7 | 1                             | 51                                   | 1                                                           | 19                                                     | 82.4                                                     |
| SMCJ54   | GGD                 | 60                                       | 73.3 | 1                             | 54                                   | 1                                                           | 16                                                     | 96.3                                                     |
| SMCJ54A  | GGE                 | 60                                       | 66.3 | 1                             | 54                                   | 1                                                           | 18                                                     | 87.1                                                     |
| SMCJ58   | GGF                 | 64.4                                     | 78.7 | 1                             | 58                                   | 1                                                           | 15                                                     | 103                                                      |
| SMCJ58A  | GGG                 | 64.4                                     | 71.2 | 1                             | 58                                   | 1                                                           | 16                                                     | 93.6                                                     |
| SMCJ60   | GGH                 | 66.7                                     | 81.5 | 1                             | 60                                   | 1                                                           | 14                                                     | 107                                                      |
| SMCJ60A  | GGK                 | 66.7                                     | 73.7 | 1                             | 60                                   | 1                                                           | 16                                                     | 96.8                                                     |
| SMCJ64   | GGL                 | 71.1                                     | 86.9 | 1                             | 64                                   | 1                                                           | 13.8                                                   | 114                                                      |
| SMCJ64A  | GGM                 | 71.1                                     | 78.6 | 1                             | 64                                   | 1                                                           | 15                                                     | 103                                                      |
| SMCJ70   | GGN                 | 77.8                                     | 95.1 | 1                             | 70                                   | 1                                                           | 12.6                                                   | 125                                                      |
| SMCJ70A  | GGP                 | 77.8                                     | 86   | 1                             | 70                                   | 1                                                           | 13.9                                                   | 113                                                      |
| SMCJ75   | GGQ                 | 83.3                                     | 102  | 1                             | 75                                   | 1                                                           | 11.7                                                   | 134                                                      |
| SMCJ75A  | GGR                 | 83.3                                     | 92.1 | 1                             | 75                                   | 1                                                           | 13                                                     | 121                                                      |
| SMCJ78   | GGS                 | 86.7                                     | 106  | 1                             | 78                                   | 1                                                           | 11.3                                                   | 139                                                      |
| SMCJ78A  | GGT                 | 86.7                                     | 95.8 | 1                             | 78                                   | 1                                                           | 12.5                                                   | 126                                                      |
| SMCJ85   | GGU                 | 94.4                                     | 115  | 1                             | 85                                   | 1                                                           | 10.4                                                   | 151                                                      |
| SMCJ85A  | GGV                 | 94.4                                     | 104  | 1                             | 85                                   | 1                                                           | 11.5                                                   | 137                                                      |
| SMCJ90   | GGW                 | 100                                      | 122  | 1                             | 90                                   | 1                                                           | 9.8                                                    | 160                                                      |
| SMCJ90A  | GGX                 | 100                                      | 111  | 1                             | 90                                   | 1                                                           | 10.7                                                   | 146                                                      |
| SMCJ100  | GGY                 | 111                                      | 136  | 1                             | 100                                  | 1                                                           | 8.8                                                    | 179                                                      |
| SMCJ100A | GGZ                 | 111                                      | 123  | 1                             | 100                                  | 1                                                           | 9.7                                                    | 162                                                      |
| SMCJ110  | GHD                 | 122                                      | 149  | 1                             | 110                                  | 1                                                           | 8                                                      | 196                                                      |
| SMCJ110A | GHE                 | 122                                      | 135  | 1                             | 110                                  | 1                                                           | 8.9                                                    | 177                                                      |
| SMCJ120  | GHF                 | 133                                      | 163  | 1                             | 120                                  | 1                                                           | 7.3                                                    | 214                                                      |
| SMCJ120A | GHG                 | 133                                      | 147  | 1                             | 120                                  | 1                                                           | 8.1                                                    | 193                                                      |
| SMCJ130  | GHH                 | 144                                      | 176  | 1                             | 130                                  | 1                                                           | 6.8                                                    | 231                                                      |
| SMCJ130A | GHK                 | 144                                      | 159  | 1                             | 130                                  | 1                                                           | 7.5                                                    | 209                                                      |
| SMCJ150  | GHL                 | 167                                      | 204  | 1                             | 150                                  | 1                                                           | 5.8                                                    | 266                                                      |
| SMCJ150A | GHM                 | 167                                      | 185  | 1                             | 150                                  | 1                                                           | 6.4                                                    | 243                                                      |
| SMCJ160  | GHN                 | 178                                      | 218  | 1                             | 160                                  | 1                                                           | 5.4                                                    | 287                                                      |
| SMCJ160A | GHP                 | 178                                      | 197  | 1                             | 160                                  | 1                                                           | 6                                                      | 259                                                      |
| SMCJ170  | GHQ                 | 189                                      | 231  | 1                             | 170                                  | 1                                                           | 5.1                                                    | 304                                                      |
| SMCJ170A | GHR                 | 189                                      | 209  | 1                             | 170                                  | 1                                                           | 5.7                                                    | 275                                                      |

**Notes:**

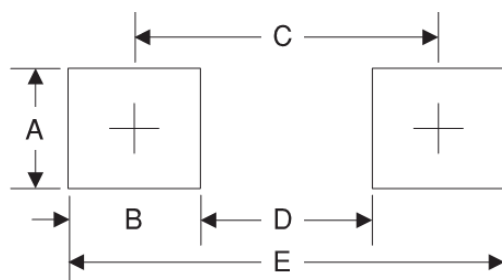
1.  $V_{BR}$  measure after  $I_T$  applied for 300us,  $I_T$ =square wave pulse or equivalent.
2. Surge current waveform per Figure. 3 and derate per Figure. 2.
3. For bipolar types having  $V_{WM}$  of 10 volts and less, the  $I_D$  limit is doubled.
4. All terms and symbols are consistent with ANSI/IEEE C62.35.

PACKAGE OUTLINE DIMENSIONS



| DIM. | Unit (mm) |      | Unit (inch) |       |
|------|-----------|------|-------------|-------|
|      | Min       | Max  | Min         | Max   |
| A    | 2.90      | 3.20 | 0.114       | 0.126 |
| B    | 6.60      | 7.11 | 0.260       | 0.280 |
| C    | 5.59      | 6.22 | 0.220       | 0.245 |
| D    | 2.00      | 2.62 | 0.079       | 0.103 |
| E    | 1.00      | 1.60 | 0.039       | 0.063 |
| F    | 7.75      | 8.13 | 0.305       | 0.320 |
| 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      | 3.3       | 0.130       |
| B      | 2.5       | 0.098       |
| C      | 6.8       | 0.268       |
| D      | 4.4       | 0.173       |
| E      | 9.4       | 0.370       |

MARKING DIAGRAM



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

### Notice

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