

## SURFACE MOUNT TRANSIENT VOLTAGE SUPPRESSOR

### SMAJ5.0 THRU SMAJ170CA

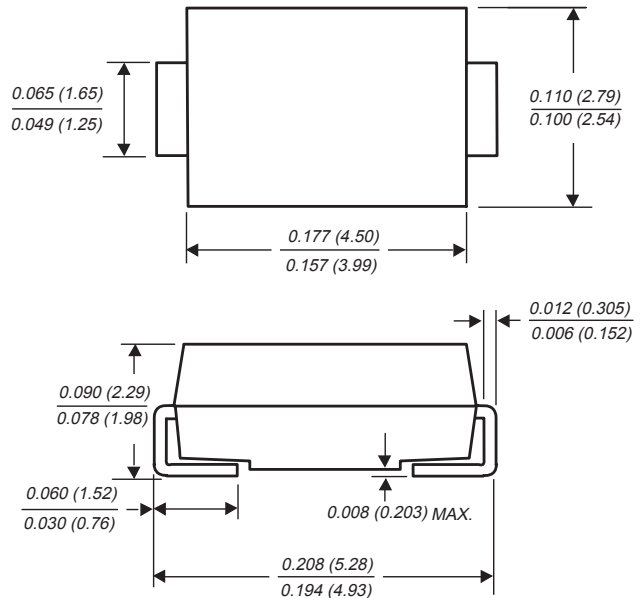
#### FEATURES

- Optimized for LAN protection applications
- Ideal for ESD protection of data lines in accordance with IEC 1000-4-2 (IEC801-2)
- Ideal for EFT protection of data lines in accordance with IEC 1000-4-4 (IEC801-4)
- Plastic package has Underwriters Laboratory Flammability Classification 94V-0
- Glass passivated junction
- Excellent clamping capability
- Low incremental surge resistance
- Fast response time: typically less than 1.0ps from 0 Volts to  $V_{(BR)}$  min.
- 300W peak pulse power capability with a 10/1000 $\mu$ s waveform, repetition soldering guaranteedL 250 °C/10 seconds at terminals

#### MECHANICAL DATA

- Case: JEDEC DO-214AC molded plastic body over passivated chip.
- Terminals: Solder plated, solderable per MIL - STD - 750 Method 2026
- Polarity: For uni-directional types the color band denotes the cathode, which is positive with respect to the anode under normal TVS operation
- Mounting Position: Any
- Weight: 0.002 ounce, 0.064 gram

#### DO-214AC



*Dimensions in inches and (millimeters)*

### DEVICES FOR BIDIRECTIONAL APPLICATIONS

For bi-directional use suffix C or CA for types SMAJ5.0 thru SMAJ170 (e.g. SMAJ5.0C, SMAJ170CA)  
Electrical characteristics apply in both directions.

### MAXIMUM RATINGS AND ELECTRICAL CHARACTERISTICS

Ratings at 25°C ambient temperature unless otherwise specified.

|   | SYMBOLS        | VALUE       | UNITS |
|---|----------------|-------------|-------|
| Peak pulse power dissipation with a 10/1000 $\mu$ s waveform (NOTE 1, 2, FIG.1)   | PPM            | 400         | Watts |
| Peak pulse current with a 10/1000 $\mu$ s waveform (NOTE 1)   | IPPM           | SEE TABLE 1 | Amps  |
| Peak forward surge current 8.3ms single half sine-wave superimposed on rated load (JEDEC Method) (NOTES 2, 3) - unidirectional only | IFSM           | 40.0        | Amps  |
| Maximum instantaneous forward voltage at 25A (NOTE 3)   | $V_F$          | 3.5         | Volts |
| Operating junction and storage temperature range  | $T_J, T_{STG}$ | -55 to +150 | °C    |

#### NOTES:

- (1) Non-repetitive current pulse, per Fig.3 and derated above  $T_A=25^\circ\text{C}$  per Fig. 2
- (2) Mounted on 0.2 x 0.2" (5.0 x 5.0mm) copper pads to each terminal
- (3) Measured on 8.3ms single half sine-wave. For uni-directional devices only.

ELECTRICAL CHARACTERISTICS (T<sub>A</sub>=25°C unless otherwise noted) TABLE 1

| Device   | Device Marking Code |    | Breakdown Voltage V <sub>(BR)</sub> (Volts) at I <sub>T</sub><br>(NOTE 1) |      | Test Current I <sub>T</sub> (mA) | Working Peak Reverse Voltage V <sub>WM</sub> (Volts) | Maximum Reverse Leakage a V <sub>WM</sub><br>(NOTE 3) I <sub>D</sub> (μA) | Maximum Clamping Voltage at I <sub>PPM</sub><br>V <sub>C</sub> (Volts) | Maximum Peak Pulse Surge Current I <sub>PPM</sub><br>(NOTE 2) (Amps) |
|----------|---------------------|----|---|------|----------------------------------|--|---|--|--|
|          | UNI                 | BI | Min.  | Max. |                                  |  |   |  |  |
| SMAJ5.0  | AD                  | WD | 6.4   | 7.82 | 10                               | 5.0  | 800   | 9.6  | 31.3   |
| SMAJ5.0A | AE                  | WE | 6.4   | 7.07 | 10                               | 5.0  | 800   | 9.2  | 32.6   |
| SMAJ6.0  | AF                  | WF | 6.67  | 8.15 | 10                               | 6.0  | 800   | 11.4   | 26.3   |
| SMAJ6.0A | AG                  | WG | 6.67  | 7.37 | 10                               | 6.0  | 800   | 10.3   | 29.1   |
| SMAJ6.5  | AH                  | WH | 7.22  | 8.82 | 10                               | 6.5  | 500   | 12.3   | 24.4   |
| SMAJ6.5A | AK                  | WK | 7.22  | 7.98 | 10                               | 6.5  | 500   | 11.2   | 26.8   |
| SMAJ7.0  | AL                  | WL | 7.78  | 9.51 | 10                               | 7.0  | 200   | 13.3   | 22.6   |
| SMAJ7.0A | AM                  | WM | 7.78  | 8.6  | 10                               | 7.0  | 200   | 12.0   | 25.0   |
| SMAJ7.5  | AN                  | WN | 8.33  | 10.3 | 1.0                              | 7.5  | 100   | 14.3   | 21.0   |
| SMAJ7.5A | AP                  | WP | 8.33  | 9.21 | 1.0                              | 7.5  | 100   | 12.9   | 23.3   |
| SMAJ8.0  | AQ                  | WQ | 8.89  | 10.9 | 1.0                              | 8.0  | 50.0  | 15.0   | 20.0   |
| SMAJ8.0A | AR                  | WR | 8.89  | 9.83 | 1.0                              | 8.0  | 50.0  | 13.6   | 22.1   |
| SMAJ8.5  | AS                  | WS | 9.44  | 11.5 | 1.0                              | 8.5  | 10.0  | 15.9   | 18.9   |
| SMAJ8.5A | AT                  | WT | 9.44  | 10.4 | 1.0                              | 8.5  | 10.0  | 14.4   | 20.8   |
| SMAJ9.0  | AU                  | WU | 10.0  | 12.2 | 1.0                              | 9.0  | 5.0   | 16.9   | 17.8   |
| SMAJ9.0A | AV                  | VV | 10.0  | 11.1 | 1.0                              | 9.0  | 5.0   | 15.4   | 19.5   |
| SMAJ10   | AW                  | WW | 11.1  | 13.6 | 1.0                              | 10.0   | 5.0   | 18.8   | 16.0   |
| SMAJ10A  | AX                  | WX | 11.1  | 12.3 | 1.0                              | 10.0   | 5.0   | 17.0   | 17.6   |
| SMAJ11   | AY                  | WY | 12.2  | 14.9 | 1.0                              | 11.0   | 5.0   | 20.1   | 14.9   |
| SMAJ11A  | AZ                  | WZ | 12.2  | 13.5 | 1.0                              | 11.0   | 5.0   | 18.2   | 16.5   |
| SMAJ12   | BD                  | XD | 13.3  | 16.3 | 1.0                              | 12.0   | 5.0   | 22.0   | 13.6   |
| SMAJ12A  | BE                  | XE | 13.3  | 14.7 | 1.0                              | 12.0   | 5.0   | 19.9   | 15.1   |
| SMAJ13   | BF                  | XF | 14.4  | 17.6 | 1.0                              | 13.0   | 5.0   | 23.8   | 12.6   |
| SMAJ13A  | BG                  | XG | 14.4  | 15.9 | 1.0                              | 13.0   | 5.0   | 21.5   | 14.0   |
| SMAJ14   | BH                  | XH | 15.6  | 19.1 | 1.0                              | 14.0   | 5.0   | 25.8   | 11.6   |
| SMAJ14A  | BK                  | XK | 15.6  | 17.2 | 1.0                              | 14.0   | 5.0   | 23.2   | 12.9   |
| SMAJ15   | BL                  | XL | 16.7  | 20.4 | 1.0                              | 15.0   | 5.0   | 26.9   | 11.2   |
| SMAJ15A  | BM                  | XM | 16.7  | 18.5 | 1.0                              | 15.0   | 5.0   | 24.4   | 12.3   |
| SMAJ16   | BN                  | XN | 17.8  | 21.8 | 1.0                              | 16.0   | 5.0   | 28.8   | 10.4   |
| SMAJ16A  | BP                  | XP | 17.8  | 19.7 | 1.0                              | 16.0   | 5.0   | 26.0   | 11.5   |
| SMAJ17   | BQ                  | XQ | 18.9  | 23.1 | 1.0                              | 17.0   | 5.0   | 30.5   | 9.8  |
| SMAJ17A  | BR                  | XR | 18.9  | 20.9 | 1.0                              | 17.0   | 5.0   | 27.6   | 10.9   |
| SMAJ18   | BS                  | XS | 20.0  | 24.4 | 1.0                              | 18.0   | 5.0   | 32.2   | 9.3  |
| SMAJ18A  | BT                  | XT | 20.0  | 22.1 | 1.0                              | 18.0   | 5.0   | 29.2   | 10.3   |
| SMAJ20   | BU                  | XU | 22.2  | 27.1 | 1.0                              | 20.0   | 5.0   | 35.8   | 8.4  |
| SMAJ20A  | BV                  | XV | 22.2  | 24.5 | 1.0                              | 20.0   | 5.0   | 32.4   | 9.3  |
| SMAJ22   | BW                  | XW | 24.4  | 29.8 | 1.0                              | 22.0   | 5.0   | 39.4   | 7.6  |
| SMAJ22A  | BX                  | XX | 24.4  | 26.9 | 1.0                              | 22.0   | 5.0   | 35.5   | 8.5  |
| SMAJ24   | BY                  | XY | 26.7  | 32.6 | 1.0                              | 24.0   | 5.0   | 43.0   | 7.0  |
| SMAJ24A  | BZ                  | XZ | 26.7  | 29.5 | 1.0                              | 24.0   | 5.0   | 38.9   | 7.7  |
| SMAJ26   | CD                  | YD | 28.9  | 35.3 | 1.0                              | 26.0   | 5.0   | 46.6   | 6.4  |
| SMAJ26A  | CE                  | YE | 28.9  | 31.9 | 1.0                              | 26.0   | 5.0   | 42.1   | 7.1  |
| SMAJ28   | CF                  | YF | 31.1  | 38.0 | 1.0                              | 28.0   | 5.0   | 50.0   | 6.0  |
| SMAJ28A  | CG                  | YG | 31.1  | 34.4 | 1.0                              | 28.0   | 5.0   | 45.4   | 6.6  |
| SMAJ30   | CH                  | YH | 33.3  | 40.7 | 1.0                              | 30.0   | 5.0   | 53.5   | 5.6  |
| SMAJ30A  | CK                  | YK | 33.3  | 36.8 | 1.0                              | 30.0   | 5.0   | 48.4   | 6.2  |
| SMAJ33   | CL                  | YL | 36.7  | 44.9 | 1.0                              | 33.0   | 5.0   | 59.0   | 5.1  |
| SMAJ33A  | CM                  | YM | 36.7  | 40.6 | 1.0                              | 33.0   | 5.0   | 53.3   | 5.6  |
| SMAJ36   | CN                  | YN | 40.0  | 48.9 | 1.0                              | 36.0   | 5.0   | 64.3   | 4.7  |
| SMAJ36A  | CP                  | YP | 40.0  | 44.2 | 1.0                              | 36.0   | 5.0   | 58.1   | 5.2  |
| SMAJ40   | CQ                  | YQ | 44.4  | 54.3 | 1.0                              | 40.0   | 5.0   | 71.4   | 4.2  |
| SMAJ40A  | CR                  | YR | 44.4  | 49.1 | 1.0                              | 40.0   | 5.0   | 64.5   | 4.7  |
| SMAJ43   | CS                  | YS | 47.8  | 58.4 | 1.0                              | 43.0   | 5.0   | 76.7   | 3.9  |
| SMAJ43A  | CT                  | YT | 47.8  | 52.8 | 1.0                              | 43.0   | 5.0   | 69.4   | 4.3  |
| SMAJ45   | CU                  | YU | 50.0  | 61.1 | 1.0                              | 45.0   | 5.0   | 80.3   | 3.7  |
| SMAJ45A  | CV                  | YV | 50.0  | 55.3 | 1.0                              | 45   | 5.0   | 72.7   | 4.1  |
| SMAJ48   | CW                  | YW | 53.3  | 65.1 | 1.0                              | 48   | 5.0   | 85.5   | 3.5  |
| SMAJ48A  | CX                  | YX | 53.3  | 58.9 | 1.0                              | 48   | 5.0   | 77.4   | 3.9  |
| SMAJ51   | CY                  | YY | 56.7  | 69.3 | 1.0                              | 51   | 5.0   | 91.1   | 3.3  |
| SMAJ51A  | CZ                  | YZ | 56.7  | 62.7 | 1.0                              | 51   | 5.0   | 82.4   | 3.6  |

## ELECTRICAL CHARACTERISTICS (T<sub>A</sub>=25°C unless otherwise noted) TABLE 1 (Cont'd)

| Device   | Device Marking Code |  | Breakdown Voltage V <sub>(BR)</sub> (Volts) at I <sub>T</sub> (NOTE 1) |      | Test Current I <sub>T</sub> (mA) | Working Peak Reverse Voltage V <sub>WM</sub> (Volts) | Maximum Reverse Leakage a V <sub>WM</sub> (NOTE 3) I <sub>D</sub> (μA) | Maximum Clamping Voltage at I <sub>PPM</sub> V <sub>c</sub> (Volts) | Maximum Peak Pulse Surge Current I <sub>PPM</sub> (NOTE 2) (Amps) |
|----------|---------------------|--|--|------|----------------------------------|--|--|---|---|
|          | UNI                 | BI   | Min.   | Max. |                                  |  |  |   |   |
| SMAJ54   | RD                  | ZD   | 60.0   | 73.3 | 1.0                              | 54   | 5.0  | 96.3  | 3.1   |
| SMAJ54A  | RE                  | ZE   | 60.0   | 66.3 | 1.0                              | 54   | 5.0  | 87.1  | 3.4   |
| SMAJ58   | RF                  | ZF   | 64.4   | 78.7 | 1.0                              | 58   | 5.0  | 103   | 2.9   |
| SMAJ58A  | RG                  | ZG   | 64.4   | 71.2 | 1.0                              | 58   | 5.0  | 93.6  | 3.2   |
| SMAJ60   | RH                  | ZH   | 66.7   | 81.5 | 1.0                              | 60   | 5.0  | 107   | 2.8   |
| SMAJ60A  | RK                  | ZK   | 66.7   | 73.7 | 1.0                              | 60   | 5.0  | 96.8  | 3.1   |
| SMAJ64   | RL                  | ZL   | 71.1   | 86.4 | 1.0                              | 64   | 5.0  | 114   | 2.6   |
| SMAJ64A  | RM                  | ZM   | 71.1   | 78.6 | 1.0                              | 64   | 5.0  | 103   | 2.9   |
| SMAJ70   | RN                  | ZN   | 77.8   | 95.1 | 1.0                              | 70   | 5.0  | 125   | 2.4   |
| SMAJ70A  | RP                  | ZP   | 77.8   | 86   | 1.0                              | 70   | 5.0  | 113   | 2.7   |
| SMAJ75   | RQ                  | ZQ   | 83.3   | 102  | 1.0                              | 75   | 5.0  | 134   | 2.2   |
| SMAJ75A  | RR                  | ZR   | 83.3   | 92.1 | 1.0                              | 75   | 5.0  | 121   | 2.5   |
| SMAJ78   | RS                  | ZS   | 86.7   | 106  | 1.0                              | 78   | 5.0  | 139   | 2.2   |
| SMAJ78A  | RT                  | ZT   | 86.7   | 95.8 | 1.0                              | 78   | 5.0  | 126   | 2.4   |
| SMAJ85   | RU                  | ZU   | 94.4   | 115  | 1.0                              | 85   | 5.0  | 151   | 2   |
| SMAJ85A  | RV                  | ZV   | 94.4   | 104  | 1.0                              | 85   | 5.0  | 137   | 2.2   |
| SMAJ90   | RW                  | ZW   | 100  | 122  | 1.0                              | 90   | 5.0  | 160   | 1.9   |
| SMAJ90A  | RX                  | ZX   | 100  | 111  | 1.0                              | 90   | 5.0  | 146   | 2.1   |
| SMAJ100  | RY                  | ZY   | 111  | 136  | 1.0                              | 100  | 5.0  | 179   | 1.7   |
| SMAJ100A | RZ                  | <td>111</td> <td>123</td> <td>1.0</td> <td>100</td> <td>5.0</td> <td>162</td> <td>1.9</td> | 111  | 123  | 1.0                              | 100  | 5.0  | 162   | 1.9   |
| SMAJ110  | SD                  | VD   | 122  | 149  | 1.0                              | 110  | 5.0  | 196   | 1.5   |
| SMAJ110A | SE                  | VE   | 122  | 135  | 1.0                              | 110  | 5.0  | 177   | 1.7   |
| SMAJ120  | SF                  | VF   | 133  | 163  | 1.0                              | 120  | 5.0  | 214   | 1.4   |
| SMAJ120A | SG                  | VG   | 133  | 147  | 1.0                              | 120  | 5.0  | 193   | 1.6   |
| SMAJ130  | SH                  | VH   | 144  | 176  | 1.0                              | 130  | 5.0  | 231   | 1.3   |
| SMAJ130A | SK                  | VK   | 144  | 159  | 1.0                              | 130  | 5.0  | 209   | 1.4   |
| SMAJ150  | SL                  | VL   | 167  | 204  | 1.0                              | 150  | 5.0  | 268   | 1.1   |
| SMAJ150A | SM                  | VM   | 167  | 185  | 1.0                              | 150  | 5.0  | 243   | 1.2   |
| SMAJ160  | SN                  | VN   | 178  | 218  | 1.0                              | 160  | 5.0  | 287   | 1.0   |
| SMAJ160A | SP                  | VP   | 178  | 197  | 1.0                              | 160  | 5.0  | 259   | 1.2   |
| SMAJ170  | SQ                  | VQ   | 189  | 231  | 1                                | 170  | 5.0  | 304   | 0.99  |
| SMAJ170A | SR                  | VR   | 189  | 209  | 1.0                              | 170  | 5.0  | 275   | 1.09  |

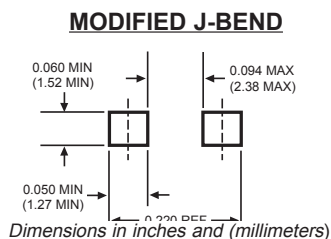
### NOTES:

- (1) V<sub>(BR)</sub> measured after I<sub>T</sub> applied for 300μs square wave pulse or equivalent
- (2) Surge current waveform per Fig. 3 and derate per Fig. 2
- (3) For bi-directional types having V<sub>WM</sub> of 10 Volts and less, the I<sub>D</sub> limit is doubled
- (4) For the bi-directional SMAJ5.0CA, the maximum V<sub>(BR)</sub> is 7.25V.
- (5) All terms and symbols are consistent with ANSI/IEEE C62.35

## APPLICATION NOTES

### RECOMMENDED PAD LAYOUT

The pad dimensions should be 0.010" (2.5mm) longer than the contact size in the lead axis. This allows a solder fillet to form, see figure below. Contact factory for soldering methods.



This device is designed specifically for transient voltage suppression from threats generated by ESD for board level load switching components.

The wide leads assure a large surface contact for good heat dissipation, and a low resistance path for surge current flow to ground.

This series is designed to optimize board space and for use with surface mount technology automated assembly equipment.

They can be easily mounted on printed circuit boards and ceramic substrates to protect sensitive components from transient voltage damage.

# MAXIMUM RATINGS AND CHARACTERISTIC CURVES SMAJ5.0 THRU SMAJ170CA

