

## SMAJ5.0 ~ 188A

## SURFACE MOUNT TRANSIENT VOLTAGE SUPPRESSOR

**Stand-off Voltage** : 5.0 to 188V

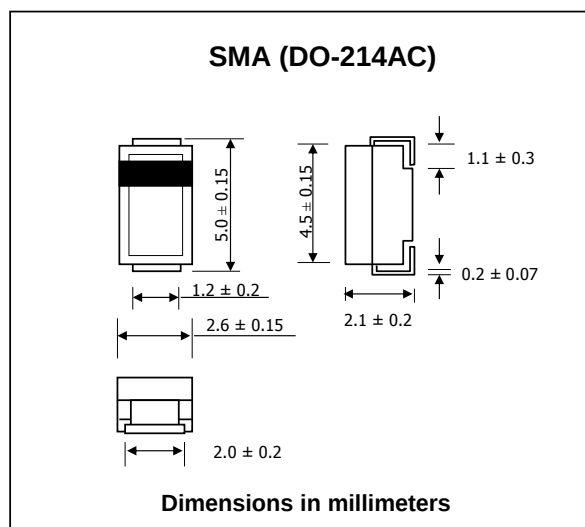
**Peak Pulse Power** : 400 W

### FEATURES :

- \* 400W peak pulse power capability with a 10/1000 $\mu$ s waveform(300W above 78V)
- \* Optimized for LAN protection applications
- \* Low clamping
- \* Very fast response time
- \* Pb / RoHS Free

### MECHANICAL DATA

- \* Case : SMA Molded plastic
- \* Epoxy : UL94V-0 rate flame retardant
- \* Lead : Lead Formed for Surface Mount
- \* Polarity : Color band denotes cathode end except Bipolar.
- \* Mounting position : Any
- \* Weight : 0.064 grams



### DEVICES FOR BIPOLAR APPLICATIONS

For Bi-directional use C or CA Suffix

Electrical characteristics apply in both directions

### MAXIMUM RATINGS

Rating at 25°C ambient temperature unless otherwise specified.

| Rating                                                          | Symbol                            | Value         | Units |
|-----------------------------------------------------------------|-----------------------------------|---------------|-------|
| Peak Pulse Power Dissipation (Note1,2,4) Fig. 4                 | P <sub>PPM</sub>                  | Minimum 400   | W     |
| Peak Pulse Current on 10/1000 $\mu$ s waveform (Note 1, Fig. 1) | I <sub>PPM</sub>                  | See Table     | A     |
| Typical thermal resistance, junction to ambient                 | R <sub>ΘJA</sub>                  | 120           | °C/W  |
| Typical thermal resistance, junction to leads                   | R <sub>ΘJL</sub>                  | 30            | °C/W  |
| Operating Junction and Storage Temperature Range                | T <sub>J</sub> , T <sub>STG</sub> | - 55 to + 150 | °C    |

#### Notes :

- (1) Non-repetitive Current pulse, per Fig. 3 and derated above Ta = 25 °C per Fig. 1
- (2) Mounted on 0.2 x 0.2"(5.0 x 5.0 mm) copper pads to each terminal.
- (3) Peak pulse power waveform is 10/1000 $\mu$ s.

## ELECTRICAL CHARACTERISTICS

Rating at 25°C ambient temperature unless otherwise specified

| Device Type             | Breakdown Voltage @ $I_T^{(1)}$ |      |       | Working Peak Reverse Voltage | Maximum Reverse Leakage @ $V_{WM}$ | Maximum Peak Pulse Surge Current | Maximum Clamping Voltage @ $I_{PPM}$ |
|-------------------------|---------------------------------|------|-------|------------------------------|------------------------------------|----------------------------------|--------------------------------------|
|                         | $V_{BR}$ (V)                    |      | $I_T$ |                              |                                    |                                  |                                      |
|                         | Min.                            | Max. | (mA)  | (V)                          | ( $\mu A$ )                        | (A)                              | (V)                                  |
| SMAJ5.0                 | 6.40                            | 7.82 | 10    | 5.0                          | 800                                | 41.7                             | 9.6                                  |
| SMAJ5.0A <sup>(4)</sup> | 6.40                            | 7.07 | 10    | 5.0                          | 800                                | 43.5                             | 9.2                                  |
| SMAJ6.0                 | 6.67                            | 8.15 | 10    | 6.0                          | 800                                | 35.1                             | 11.4                                 |
| SMAJ6.0A                | 6.67                            | 7.37 | 10    | 6.0                          | 800                                | 38.8                             | 10.3                                 |
| SMAJ6.5                 | 7.22                            | 8.82 | 10    | 6.5                          | 500                                | 32.5                             | 12.3                                 |
| SMAJ6.5A                | 7.22                            | 7.98 | 10    | 6.5                          | 500                                | 35.7                             | 11.2                                 |
| SMAJ7.0                 | 7.78                            | 9.51 | 10    | 7.0                          | 200                                | 30.1                             | 13.3                                 |
| SMAJ7.0A                | 7.78                            | 8.6  | 10    | 7.0                          | 200                                | 33.3                             | 12.0                                 |
| SMAJ7.5                 | 8.33                            | 10.2 | 1.0   | 7.5                          | 100                                | 28.0                             | 14.3                                 |
| SMAJ7.5A                | 8.33                            | 9.21 | 1.0   | 7.5                          | 100                                | 31.0                             | 12.9                                 |
| SMAJ8.0                 | 8.89                            | 10.9 | 1.0   | 8.0                          | 50                                 | 26.7                             | 15.0                                 |
| SMAJ8.0A                | 8.89                            | 9.83 | 1.0   | 8.0                          | 50                                 | 29.4                             | 13.6                                 |
| SMAJ8.5                 | 9.44                            | 11.5 | 1.0   | 8.5                          | 10                                 | 25.2                             | 15.9                                 |
| SMAJ8.5A                | 9.44                            | 10.4 | 1.0   | 8.5                          | 10                                 | 27.8                             | 14.4                                 |
| SMAJ9.0                 | 10.0                            | 12.2 | 1.0   | 9.0                          | 5.0                                | 23.7                             | 16.9                                 |
| SMAJ9.0A                | 10.0                            | 11.1 | 1.0   | 9.0                          | 5.0                                | 26.0                             | 15.4                                 |
| SMAJ10                  | 11.1                            | 13.6 | 1.0   | 10                           | 1.0                                | 21.2                             | 18.8                                 |
| SMAJ10A                 | 11.1                            | 12.3 | 1.0   | 10                           | 1.0                                | 23.5                             | 17.0                                 |
| SMAJ11                  | 12.2                            | 14.9 | 1.0   | 11                           | 1.0                                | 19.9                             | 20.1                                 |
| SMAJ11A                 | 12.2                            | 13.5 | 1.0   | 11                           | 1.0                                | 22.0                             | 18.2                                 |
| SMAJ12                  | 13.3                            | 16.3 | 1.0   | 12                           | 1.0                                | 18.2                             | 22.0                                 |
| SMAJ12A                 | 13.3                            | 14.7 | 1.0   | 12                           | 1.0                                | 20.1                             | 19.9                                 |
| SMAJ13                  | 14.4                            | 17.6 | 1.0   | 13                           | 1.0                                | 16.8                             | 23.8                                 |
| SMAJ13A                 | 14.4                            | 15.9 | 1.0   | 13                           | 1.0                                | 18.6                             | 21.5                                 |
| SMAJ14                  | 15.6                            | 19.1 | 1.0   | 14                           | 1.0                                | 15.5                             | 25.8                                 |
| SMAJ14A                 | 15.6                            | 17.2 | 1.0   | 14                           | 1.0                                | 17.2                             | 23.2                                 |
| SMAJ15                  | 16.7                            | 20.4 | 1.0   | 15                           | 1.0                                | 14.8                             | 26.9                                 |
| SMAJ15A                 | 16.7                            | 18.5 | 1.0   | 15                           | 1.0                                | 16.4                             | 24.4                                 |
| SMAJ16                  | 17.8                            | 21.8 | 1.0   | 16                           | 1.0                                | 13.9                             | 28.8                                 |
| SMAJ16A                 | 17.8                            | 19.7 | 1.0   | 16                           | 1.0                                | 15.4                             | 26.0                                 |
| SMAJ17                  | 18.9                            | 23.1 | 1.0   | 17                           | 1.0                                | 13.1                             | 30.5                                 |
| SMAJ17A                 | 18.9                            | 20.9 | 1.0   | 17                           | 1.0                                | 14.5                             | 27.6                                 |
| SMAJ18                  | 20.0                            | 24.4 | 1.0   | 18                           | 1.0                                | 12.4                             | 32.2                                 |
| SMAJ18A                 | 20.0                            | 22.1 | 1.0   | 18                           | 1.0                                | 13.7                             | 29.2                                 |
| SMAJ20                  | 22.2                            | 27.1 | 1.0   | 20                           | 1.0                                | 11.2                             | 35.8                                 |
| SMAJ20A                 | 22.2                            | 24.5 | 1.0   | 20                           | 1.0                                | 12.3                             | 32.4                                 |
| SMAJ22                  | 24.4                            | 29.8 | 1.0   | 22                           | 1.0                                | 10.2                             | 39.4                                 |
| SMAJ22A                 | 24.4                            | 26.9 | 1.0   | 22                           | 1.0                                | 11.3                             | 35.5                                 |
| SMAJ24                  | 26.7                            | 32.6 | 1.0   | 24                           | 1.0                                | 9.3                              | 43.0                                 |
| SMAJ24A                 | 26.7                            | 29.5 | 1.0   | 24                           | 1.0                                | 10.3                             | 38.9                                 |
| SMAJ26                  | 28.9                            | 35.3 | 1.0   | 26                           | 1.0                                | 8.6                              | 46.6                                 |
| SMAJ26A                 | 28.9                            | 31.9 | 1.0   | 26                           | 1.0                                | 9.5                              | 42.1                                 |
| SMAJ28                  | 31.1                            | 38.0 | 1.0   | 28                           | 1.0                                | 8.0                              | 50.0                                 |
| SMAJ28A                 | 31.1                            | 34.4 | 1.0   | 28                           | 1.0                                | 8.8                              | 45.4                                 |
| SMAJ30                  | 33.3                            | 40.7 | 1.0   | 30                           | 1.0                                | 7.5                              | 53.5                                 |
| SMAJ30A                 | 33.3                            | 36.8 | 1.0   | 30                           | 1.0                                | 8.3                              | 48.4                                 |
| SMAJ33                  | 36.7                            | 44.9 | 1.0   | 33                           | 1.0                                | 6.8                              | 59.0                                 |
| SMAJ33A                 | 36.7                            | 40.6 | 1.0   | 33                           | 1.0                                | 7.5                              | 53.3                                 |
| SMAJ36                  | 40.0                            | 48.9 | 1.0   | 36                           | 1.0                                | 6.2                              | 64.3                                 |
| SMAJ36A                 | 40.0                            | 44.2 | 1.0   | 36                           | 1.0                                | 6.9                              | 58.1                                 |

## ELECTRICAL CHARACTERISTICS

Rating at 25°C ambient temperature unless otherwise specified

| Device Type | Breakdown Voltage @ $I_T^{(1)}$ |      |       | Working Peak Reverse Voltage | Maximum Reverse Leakage @ $V_{WM}$ | Maximum Peak Pulse Surge Current | Maximum Clamping Voltage @ $I_{PPM}$ |
|-------------|---------------------------------|------|-------|------------------------------|------------------------------------|----------------------------------|--------------------------------------|
|             | $V_{BR}$ (V)                    |      | $I_T$ |                              |                                    |                                  |                                      |
|             | Min.                            | Max. | (mA)  | (V)                          | ( $\mu A$ )                        | (A)                              | (V)                                  |
| SMAJ40      | 44.4                            | 54.3 | 1.0   | 40                           | 1.0                                | 5.6                              | 71.4                                 |
| SMAJ40A     | 44.4                            | 49.1 | 1.0   | 40                           | 1.0                                | 6.2                              | 64.5                                 |
| SMAJ43      | 47.8                            | 58.4 | 1.0   | 43                           | 1.0                                | 5.2                              | 76.7                                 |
| SMAJ43A     | 47.8                            | 52.8 | 1.0   | 43                           | 1.0                                | 5.7                              | 69.4                                 |
| SMAJ45      | 50.0                            | 61.1 | 1.0   | 45                           | 1.0                                | 5.0                              | 80.3                                 |
| SMAJ45A     | 50.0                            | 55.3 | 1.0   | 45                           | 1.0                                | 5.5                              | 72.7                                 |
| SMAJ48      | 53.3                            | 65.1 | 1.0   | 48                           | 1.0                                | 4.7                              | 85.5                                 |
| SMAJ48A     | 53.3                            | 58.9 | 1.0   | 48                           | 1.0                                | 5.2                              | 77.4                                 |
| SMAJ51      | 56.7                            | 69.3 | 1.0   | 51                           | 1.0                                | 4.4                              | 91.1                                 |
| SMAJ51A     | 56.7                            | 62.7 | 1.0   | 51                           | 1.0                                | 4.9                              | 82.4                                 |
| SMAJ54      | 60.0                            | 73.3 | 1.0   | 54                           | 1.0                                | 4.2                              | 96.3                                 |
| SMAJ54A     | 60.0                            | 66.3 | 1.0   | 54                           | 1.0                                | 4.6                              | 87.1                                 |
| SMAJ58      | 64.4                            | 78.7 | 1.0   | 58                           | 1.0                                | 3.9                              | 103                                  |
| SMAJ58A     | 64.4                            | 71.2 | 1.0   | 58                           | 1.0                                | 4.3                              | 93.6                                 |
| SMAJ60      | 66.7                            | 81.5 | 1.0   | 60                           | 1.0                                | 3.7                              | 107                                  |
| SMAJ60A     | 66.7                            | 73.7 | 1.0   | 60                           | 1.0                                | 4.1                              | 96.8                                 |
| SMAJ64      | 71.1                            | 86.4 | 1.0   | 64                           | 1.0                                | 3.5                              | 114                                  |
| SMAJ64A     | 71.1                            | 78.6 | 1.0   | 64                           | 1.0                                | 3.9                              | 103                                  |
| SMAJ70      | 77.8                            | 95.1 | 1.0   | 70                           | 1.0                                | 3.2                              | 125                                  |
| SMAJ70A     | 77.8                            | 86   | 1.0   | 70                           | 1.0                                | 3.5                              | 113                                  |
| SMAJ75      | 83.3                            | 102  | 1.0   | 75                           | 1.0                                | 3.0                              | 134                                  |
| SMAJ75A     | 83.3                            | 92.1 | 1.0   | 75                           | 1.0                                | 3.3                              | 121                                  |
| SMAJ78      | 86.7                            | 106  | 1.0   | 78                           | 1.0                                | 2.9                              | 139                                  |
| SMAJ78A     | 86.7                            | 95.8 | 1.0   | 78                           | 1.0                                | 3.2                              | 126                                  |
| SMAJ85      | 94.4                            | 115  | 1.0   | 85                           | 1.0                                | 2.0                              | 151                                  |
| SMAJ85A     | 94.4                            | 104  | 1.0   | 85                           | 1.0                                | 2.2                              | 137                                  |
| SMAJ90      | 100                             | 122  | 1.0   | 90                           | 1.0                                | 1.9                              | 160                                  |
| SMAJ90A     | 100                             | 111  | 1.0   | 90                           | 1.0                                | 2.1                              | 146                                  |
| SMAJ100     | 111                             | 136  | 1.0   | 100                          | 1.0                                | 1.7                              | 179                                  |
| SMAJ100A    | 111                             | 123  | 1.0   | 100                          | 1.0                                | 1.9                              | 162                                  |
| SMAJ110     | 122                             | 149  | 1.0   | 110                          | 1.0                                | 1.5                              | 196                                  |
| SMAJ110A    | 122                             | 135  | 1.0   | 110                          | 1.0                                | 1.7                              | 177                                  |
| SMAJ120     | 133                             | 163  | 1.0   | 120                          | 1.0                                | 1.4                              | 214                                  |
| SMAJ120A    | 133                             | 147  | 1.0   | 120                          | 1.0                                | 1.6                              | 193                                  |
| SMAJ130     | 144                             | 176  | 1.0   | 130                          | 1.0                                | 1.3                              | 231                                  |
| SMAJ130A    | 144                             | 159  | 1.0   | 130                          | 1.0                                | 1.4                              | 209                                  |
| SMAJ150     | 167                             | 204  | 1.0   | 150                          | 1.0                                | 1.1                              | 268                                  |
| SMAJ150A    | 167                             | 185  | 1.0   | 150                          | 1.0                                | 1.2                              | 243                                  |
| SMAJ160     | 178                             | 218  | 1.0   | 160                          | 1.0                                | 1.0                              | 287                                  |
| SMAJ160A    | 178                             | 197  | 1.0   | 160                          | 1.0                                | 1.2                              | 259                                  |
| SMAJ170     | 189                             | 231  | 1.0   | 170                          | 1.0                                | 0.99                             | 304                                  |
| SMAJ170A    | 189                             | 209  | 1.0   | 170                          | 1.0                                | 1.09                             | 275                                  |
| SMAJ188     | 209                             | 255  | 1.0   | 188                          | 1.0                                | 0.90                             | 344                                  |
| SMAJ188A    | 209                             | 231  | 1.0   | 188                          | 1.0                                | 0.91                             | 328                                  |

### Notes:

- (1) Pulse test :  $t_p \leq 50$ ms.
- (2) For bidirectional use C or CA suffix.
- (3) For bi-directional types have  $V_{WM}$  of 10 Volts and less , the  $I_D$  limit is doubled
- (4) For the bi-directional SMAJ5.0CA, the maximum  $V_{BR}$  is 7.25V
- (5) "SMAJ" will be omitted in marking on the diode.

## RATING AND CHARACTERISTIC CURVES ( SMAJ5.0 - SMAJ188A )

FIG.1 - PULSE DERATING CURVE

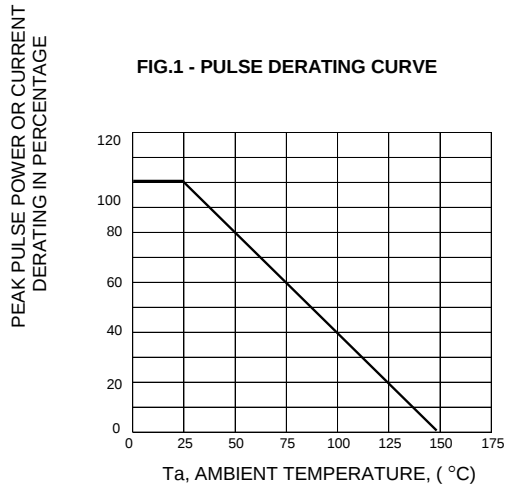


FIG.2 - TYPICAL JUNCTION CAPACITANCE

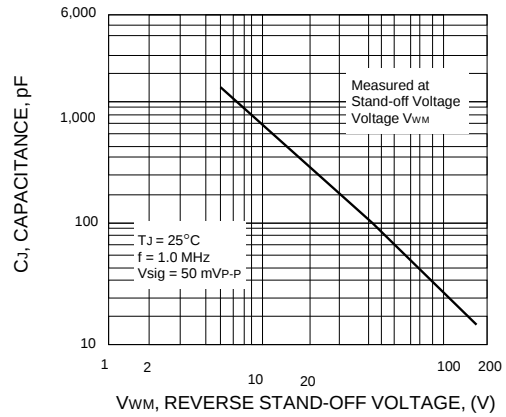


FIG.3 - PULSE WAVEFORM

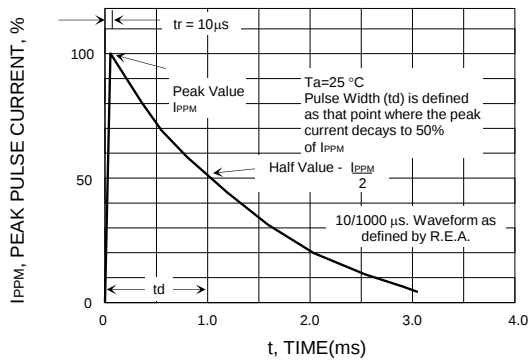


FIG.4 - PEAK PULSE POWER RATING CURVE

