



## SMAJ SERIES

### Surface Mount Transient Voltage Suppressor

Voltage Range  
5.0 to 170 Volts

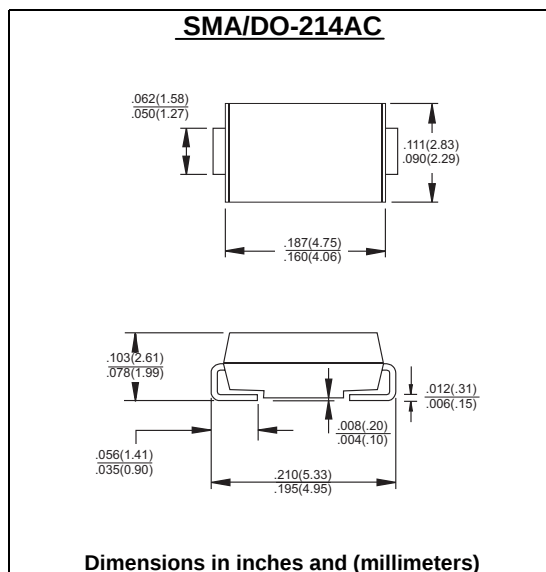
400 Watts Peak Power

#### Features

- ✧ For surface mounted application
- ✧ Low profile package
- ✧ Built-in strain relief
- ✧ Glass passivated junction
- ✧ Excellent clamping capability
- ✧ Fast response time: Typically less than 1.0ps from 0 volt to BV min.
- ✧ Typical  $I_R$  less than  $1\mu A$  above 10V
- ✧ High temperature soldering guaranteed:  
260°C / 10 seconds at terminals
- ✧ Plastic material used carries Underwriters Laboratory  
Flammability Classification 94V-0
- ✧ 400 watts peak pulse power capability with a 10 x 1000 us  
waveform by 0.01% duty cycle (300W above 78V).

#### Mechanical Data

- ✧ Case: Molded plastic
- ✧ Terminals: Solder plated
- ✧ Polarity: Indicated by cathode band
- ✧ Standard packaging: 12mm tape (EIA STD RS-481)
- ✧ Weight: 0.064 gram



#### Maximum Ratings and Electrical Characteristics

Rating at 25°C ambient temperature unless otherwise specified.

| Type Number                                                                                                    | Symbol         | Value        | Units |
|----------------------------------------------------------------------------------------------------------------|----------------|--------------|-------|
| Peak Power Dissipation at $T_A=25^\circ\text{C}$ , $T_p=1\text{ms}$ (Note 1)                                   | $P_{PK}$       | Minimum 400  | Watts |
| Steady State Power Dissipation                                                                                 | $P_d$          | 1            | Watts |
| Peak Forward Surge Current, 8.3 ms Single Half Sine-wave Superimposed on Rated Load (JEDEC method) (Note 2, 3) | $I_{FSM}$      | 40.0         | Amps  |
| Maximum Instantaneous Forward Voltage at 25.0A for Unidirectional Only                                         | $V_F$          | 3.5          | Volts |
| Operating 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 x 5mm) Copper Pads to Each Terminal.

3. 8.3ms Single Half Sine-wave or Equivalent Square Wave, Duty Cycle=4 Pulses Per Minute Maximum.

Devices for Bipolar Applications

1. For Bidirectional Use C or CA Suffix for Types SMAJ5.0 through Types SMAJ170.
2. Electrical Characteristics Apply in Both Directions.



## ELECTRICAL CHARACTERISTICS

Rating at Ta = 25 °C ambient temperature unless otherwise specified

| TYPE     | Marking Code | Breakdown Voltage @ $I_T$<br>(Note 1) |      |       | Working Peak<br>Reverse<br>Voltage | Maximum<br>Reverse<br>Leakage<br>@ $V_{WM}$ | Maximum<br>Peak Impulse<br>Surge Current<br>(Note 1) | Maximum<br>Clamping<br>Voltage @ $I_{PPM}$<br>(Note 1) |
|----------|--------------|---------------------------------------|------|-------|------------------------------------|---------------------------------------------|------------------------------------------------------|--------------------------------------------------------|
|          |              | $V_{BR}$ (V)                          |      | $I_T$ |                                    |                                             |                                                      |                                                        |
|          |              | Min.                                  | Max. | (mA)  |                                    |                                             |                                                      |                                                        |
|          |              |                                       |      |       | $V_{WM}$<br>(V)                    | $I_D$<br>( $\mu A$ )                        | $I_{PPM}$<br>(A)                                     | $V_C$<br>(V)                                           |
| SMAJ5.0  | SMAJ5.0      | 6.40                                  | 7.3  | 10    | 5.0                                | 800                                         | 41.6                                                 | 9.6                                                    |
| SMAJ5.0A | SMAJ5.0A     | 6.40                                  | 7.0  | 10    | 5.0                                | 800                                         | 43.5                                                 | 9.2                                                    |
| SMAJ6.0  | SMAJ6.0      | 6.67                                  | 8.15 | 10    | 6.0                                | 800                                         | 35.1                                                 | 11.4                                                   |
| SMAJ6.0A | SMAJ6.0A     | 6.67                                  | 7.37 | 10    | 6.0                                | 800                                         | 38.8                                                 | 10.3                                                   |
| SMAJ6.5  | SMAJ6.5      | 7.22                                  | 8.82 | 10    | 6.5                                | 500                                         | 32.5                                                 | 12.3                                                   |
| SMAJ6.5A | SMAJ6.5A     | 7.22                                  | 7.98 | 10    | 6.5                                | 500                                         | 35.7                                                 | 11.2                                                   |
| SMAJ7.0  | SMAJ7.0      | 7.78                                  | 9.51 | 10    | 7.0                                | 200                                         | 30.1                                                 | 13.3                                                   |
| SMAJ7.0A | SMAJ7.0A     | 7.78                                  | 8.6  | 10    | 7.0                                | 200                                         | 33.3                                                 | 12.0                                                   |
| SMAJ7.5  | SMAJ7.5      | 8.33                                  | 10.3 | 1.0   | 7.5                                | 100                                         | 28.0                                                 | 14.3                                                   |
| SMAJ7.5A | SMAJ7.5A     | 8.33                                  | 9.21 | 1.0   | 7.5                                | 100                                         | 31.0                                                 | 12.9                                                   |
| SMAJ8.0  | SMAJ8.0      | 8.89                                  | 10.9 | 1.0   | 8.0                                | 50                                          | 26.5                                                 | 15.0                                                   |
| SMAJ8.0A | SMAJ8.0A     | 8.89                                  | 9.83 | 1.0   | 8.0                                | 50                                          | 29.4                                                 | 13.6                                                   |
| SMAJ8.5  | SMAJ8.5      | 9.44                                  | 11.5 | 1.0   | 8.5                                | 10                                          | 25.1                                                 | 15.9                                                   |
| SMAJ8.5A | SMAJ8.5A     | 9.44                                  | 10.4 | 1.0   | 8.5                                | 10                                          | 27.7                                                 | 14.4                                                   |
| SMAJ9.0  | SMAJ9.0      | 10.0                                  | 12.2 | 1.0   | 9.0                                | 5.0                                         | 23.6                                                 | 16.9                                                   |
| SMAJ9.0A | SMAJ9.0A     | 10.0                                  | 11.1 | 1.0   | 9.0                                | 5.0                                         | 26.0                                                 | 15.4                                                   |
| SMAJ10   | SMAJ10       | 11.1                                  | 13.6 | 1.0   | 10                                 | 5.0                                         | 21.2                                                 | 18.8                                                   |
| SMAJ10A  | SMAJ10A      | 11.1                                  | 12.3 | 1.0   | 10                                 | 5.0                                         | 23.5                                                 | 17.0                                                   |
| SMAJ11   | SMAJ11       | 12.2                                  | 14.9 | 1.0   | 11                                 | 5.0                                         | 20.0                                                 | 20.1                                                   |
| SMAJ11A  | SMAJ11A      | 12.2                                  | 13.5 | 1.0   | 11                                 | 5.0                                         | 22.0                                                 | 18.2                                                   |
| SMAJ12   | SMAJ12       | 13.3                                  | 16.3 | 1.0   | 12                                 | 5.0                                         | 18.1                                                 | 22.0                                                   |
| SMAJ12A  | SMAJ12A      | 13.3                                  | 14.7 | 1.0   | 12                                 | 5.0                                         | 20.1                                                 | 19.9                                                   |
| SMAJ13   | SMAJ13       | 14.4                                  | 17.6 | 1.0   | 13                                 | 5.0                                         | 16.8                                                 | 23.8                                                   |
| SMAJ13A  | SMAJ13A      | 14.4                                  | 15.9 | 1.0   | 13                                 | 5.0                                         | 18.6                                                 | 21.5                                                   |
| SMAJ14   | SMAJ14       | 15.6                                  | 19.1 | 1.0   | 14                                 | 5.0                                         | 15.5                                                 | 25.8                                                   |
| SMAJ14A  | SMAJ14A      | 15.6                                  | 17.2 | 1.0   | 14                                 | 5.0                                         | 17.2                                                 | 23.2                                                   |
| SMAJ15   | SMAJ15       | 16.7                                  | 20.4 | 1.0   | 15                                 | 5.0                                         | 14.8                                                 | 26.9                                                   |
| SMAJ15A  | SMAJ15A      | 16.7                                  | 18.5 | 1.0   | 15                                 | 5.0                                         | 16.4                                                 | 24.4                                                   |
| SMAJ16   | SMAJ16       | 17.8                                  | 21.8 | 1.0   | 16                                 | 5.0                                         | 13.8                                                 | 28.8                                                   |
| SMAJ16A  | SMAJ16A      | 17.8                                  | 19.7 | 1.0   | 16                                 | 5.0                                         | 15.3                                                 | 26.0                                                   |
| SMAJ17   | SMAJ17       | 18.9                                  | 23.1 | 1.0   | 17                                 | 5.0                                         | 13.1                                                 | 30.5                                                   |
| SMAJ17A  | SMAJ17A      | 18.9                                  | 20.9 | 1.0   | 17                                 | 5.0                                         | 14.5                                                 | 27.6                                                   |
| SMAJ18   | SMAJ18       | 20.0                                  | 24.4 | 1.0   | 18                                 | 5.0                                         | 12.4                                                 | 32.2                                                   |
| SMAJ18A  | SMAJ18A      | 20.0                                  | 22.1 | 1.0   | 18                                 | 5.0                                         | 13.7                                                 | 29.2                                                   |
| SMAJ20   | SMAJ20       | 22.2                                  | 27.1 | 1.0   | 20                                 | 5.0                                         | 11.1                                                 | 35.8                                                   |
| SMAJ20A  | SMAJ20A      | 22.2                                  | 24.5 | 1.0   | 20                                 | 5.0                                         | 12.3                                                 | 32.4                                                   |
| SMAJ22   | SMAJ22       | 24.4                                  | 29.8 | 1.0   | 22                                 | 5.0                                         | 10.1                                                 | 39.4                                                   |
| SMAJ22A  | SMAJ22A      | 24.4                                  | 26.9 | 1.0   | 22                                 | 5.0                                         | 11.2                                                 | 35.5                                                   |
| SMAJ24   | SMAJ24       | 26.7                                  | 32.6 | 1.0   | 24                                 | 5.0                                         | 9.3                                                  | 43.0                                                   |
| SMAJ24A  | SMAJ24A      | 26.7                                  | 29.5 | 1.0   | 24                                 | 5.0                                         | 10.3                                                 | 38.9                                                   |
| SMAJ26   | SMAJ26       | 28.9                                  | 35.3 | 1.0   | 26                                 | 5.0                                         | 8.6                                                  | 46.6                                                   |
| SMAJ26A  | SMAJ26A      | 28.9                                  | 31.9 | 1.0   | 26                                 | 5.0                                         | 9.5                                                  | 42.1                                                   |
| SMAJ28   | SMAJ28       | 31.1                                  | 38.0 | 1.0   | 28                                 | 5.0                                         | 8.0                                                  | 60.0                                                   |
| SMAJ28A  | SMAJ28A      | 31.1                                  | 34.4 | 1.0   | 28                                 | 5.0                                         | 8.8                                                  | 45.4                                                   |
| SMAJ30   | SMAJ30       | 33.3                                  | 40.7 | 1.0   | 30                                 | 5.0                                         | 7.5                                                  | 53.5                                                   |
| SMAJ30A  | SMAJ30A      | 33.3                                  | 36.8 | 1.0   | 30                                 | 5.0                                         | 8.3                                                  | 48.4                                                   |



## ELECTRICAL CHARACTERISTICS

Rating at Ta = 25 °C ambient temperature unless otherwise specified

| TYPE     | Marking Code | Breakdown Voltage @ Ir<br>( Note 1 ) |       |      | Working Peak<br>Reverse<br>Voltage | Maximum<br>Reverse<br>Leakage<br>@ VWM | Maximum<br>Peak Impulse<br>Surge Current<br>(Note 1) | Maximum<br>Clamping<br>Voltage @ IPPM<br>(Note 1) |
|----------|--------------|--------------------------------------|-------|------|------------------------------------|----------------------------------------|------------------------------------------------------|---------------------------------------------------|
|          |              | VBR (V)                              |       | IT   | VWM                                | ID                                     | IPPM                                                 | Vc                                                |
|          |              | Min.                                 | Max.  | (mA) | (V)                                | ( $\mu$ A)                             | (A)                                                  | (V)                                               |
| SMAJ33   | SMAJ33       | 36.7                                 | 44.9  | 1.0  | 33                                 | 5.0                                    | 6.8                                                  | 59.0                                              |
| SMAJ33A  | SMAJ33A      | 36.7                                 | 40.6  | 1.0  | 33                                 | 5.0                                    | 7.5                                                  | 53.3                                              |
| SMAJ36   | SMAJ36       | 40.0                                 | 48.9  | 1.0  | 36                                 | 5.0                                    | 6.2                                                  | 64.3                                              |
| SMAJ36A  | SMAJ36A      | 40.0                                 | 44.2  | 1.0  | 36                                 | 5.0                                    | 6.9                                                  | 58.1                                              |
| SMAJ40   | SMAJ40       | 44.4                                 | 54.3  | 1.0  | 40                                 | 5.0                                    | 5.6                                                  | 71.4                                              |
| SMAJ40A  | SMAJ40A      | 44.4                                 | 49.1  | 1.0  | 40                                 | 5.0                                    | 6.2                                                  | 64.5                                              |
| SMAJ43   | SMAJ43       | 47.8                                 | 58.4  | 1.0  | 43                                 | 5.0                                    | 5.2                                                  | 76.7                                              |
| SMAJ43A  | SMAJ43A      | 47.8                                 | 52.8  | 1.0  | 43                                 | 5.0                                    | 5.7                                                  | 69.4                                              |
| SMAJ45   | SMAJ45       | 50.0                                 | 61.1  | 1.0  | 45                                 | 5.0                                    | 5.0                                                  | 80.3                                              |
| SMAJ45A  | SMAJ45A      | 50.0                                 | 55.3  | 1.0  | 45                                 | 5.0                                    | 5.5                                                  | 72.7                                              |
| SMAJ48   | SMAJ48       | 53.3                                 | 65.1  | 1.0  | 48                                 | 5.0                                    | 4.7                                                  | 85.5                                              |
| SMAJ48A  | SMAJ48A      | 53.3                                 | 58.9  | 1.0  | 48                                 | 5.0                                    | 5.2                                                  | 77.4                                              |
| SMAJ51   | SMAJ51       | 56.7                                 | 69.3  | 1.0  | 51                                 | 5.0                                    | 4.4                                                  | 91.1                                              |
| SMAJ51A  | SMAJ51A      | 56.7                                 | 62.7  | 1.0  | 51                                 | 5.0                                    | 4.9                                                  | 82.4                                              |
| SMAJ54   | SMAJ54       | 60.0                                 | 73.3  | 1.0  | 54                                 | 5.0                                    | 4.2                                                  | 96.3                                              |
| SMAJ54A  | SMAJ54A      | 60.0                                 | 66.3  | 1.0  | 54                                 | 5.0                                    | 4.6                                                  | 87.1                                              |
| SMAJ58   | SMAJ58       | 64.4                                 | 78.7  | 1.0  | 58                                 | 5.0                                    | 3.9                                                  | 103.0                                             |
| SMAJ58A  | SMAJ58A      | 64.4                                 | 71.2  | 1.0  | 58                                 | 5.0                                    | 4.3                                                  | 93.6                                              |
| SMAJ60   | SMAJ60       | 66.7                                 | 81.5  | 1.0  | 60                                 | 5.0                                    | 3.7                                                  | 107                                               |
| SMAJ60A  | SMAJ60A      | 66.7                                 | 73.7  | 1.0  | 60                                 | 5.0                                    | 4.1                                                  | 96.8                                              |
| SMAJ64   | SMAJ64       | 71.1                                 | 86.4  | 1.0  | 64                                 | 5.0                                    | 3.5                                                  | 114                                               |
| SMAJ64A  | SMAJ64A      | 71.1                                 | 78.6  | 1.0  | 64                                 | 5.0                                    | 3.9                                                  | 103                                               |
| SMAJ70   | SMAJ70       | 77.8                                 | 95.1  | 1.0  | 70                                 | 5.0                                    | 3.2                                                  | 125                                               |
| SMAJ70A  | SMAJ70A      | 77.8                                 | 86    | 1.0  | 70                                 | 5.0                                    | 3.5                                                  | 113                                               |
| SMAJ75   | SMAJ75       | 83.3                                 | 102   | 1.0  | 75                                 | 5.0                                    | 3.0                                                  | 134                                               |
| SMAJ75A  | SMAJ75A      | 83.3                                 | 92.1  | 1.0  | 75                                 | 5.0                                    | 3.3                                                  | 121                                               |
| SMAJ78   | SMAJ78       | 86.7                                 | 106   | 1.0  | 78                                 | 5.0                                    | 2.9                                                  | 139                                               |
| SMAJ78A  | SMAJ78A      | 86.7                                 | 95.8  | 1.0  | 78                                 | 5.0                                    | 2.2                                                  | 126                                               |
| SMAJ85   | SMAJ85       | 94.4                                 | 115   | 1.0  | 85                                 | 5.0                                    | 2.6                                                  | 151                                               |
| SMAJ85A  | SMAJ85A      | 94.4                                 | 104   | 1.0  | 85                                 | 5.0                                    | 2.9                                                  | 137                                               |
| SMAJ90   | SMAJ90       | 100                                  | 122   | 1.0  | 90                                 | 5.0                                    | 2.5                                                  | 160                                               |
| SMAJ90A  | SMAJ90A      | 100                                  | 111   | 1.0  | 90                                 | 5.0                                    | 2.7                                                  | 146                                               |
| SMAJ100  | SMAJ100      | 111                                  | 136.0 | 1.0  | 100                                | 5.0                                    | 2.2                                                  | 179                                               |
| SMAJ100A | SMAJ100A     | 111                                  | 123.0 | 1.0  | 100                                | 5.0                                    | 2.5                                                  | 162                                               |
| SMAJ110  | SMAJ110      | 122                                  | 149   | 1.0  | 110                                | 5.0                                    | 2.0                                                  | 196                                               |
| SMAJ110A | SMAJ110A     | 122                                  | 135   | 1.0  | 110                                | 5.0                                    | 2.3                                                  | 177                                               |
| SMAJ120  | SMAJ120      | 133                                  | 163.0 | 1.0  | 120                                | 5.0                                    | 1.9                                                  | 214                                               |
| SMAJ120A | SMAJ120A     | 133                                  | 147.0 | 1.0  | 120                                | 5.0                                    | 2.0                                                  | 193                                               |
| SMAJ130  | SMAJ130      | 144                                  | 176   | 1.0  | 130                                | 5.0                                    | 1.7                                                  | 231                                               |
| SMAJ130A | SMAJ130A     | 144                                  | 159   | 1.0  | 130                                | 5.0                                    | 1.9                                                  | 209                                               |
| SMAJ150  | SMAJ150      | 167                                  | 204   | 1.0  | 150                                | 5.0                                    | 1.5                                                  | 268                                               |
| SMAJ150A | SMAJ150A     | 167                                  | 185   | 1.0  | 150                                | 5.0                                    | 1.6                                                  | 243                                               |
| SMAJ160  | SMAJ160      | 178                                  | 218.0 | 1.0  | 160                                | 5.0                                    | 1.4                                                  | 287                                               |
| SMAJ160A | SMAJ160A     | 178                                  | 197.0 | 1.0  | 160                                | 5.0                                    | 1.5                                                  | 259                                               |
| SMAJ170  | SMAJ170      | 189                                  | 231   | 1.0  | 170                                | 5.0                                    | 1.3                                                  | 304                                               |
| SMAJ170A | SMAJ170A     | 189                                  | 209   | 1.0  | 170                                | 5.0                                    | 1.4                                                  | 275                                               |

Note:

( 1 ) Peak pulse power waveform is 10/1000 $\mu$ s.



## RATINGS AND CHARACTERISTIC CURVES (SMAJ SERIES)

FIG.1- PEAK PULSE POWER RATING CURVE

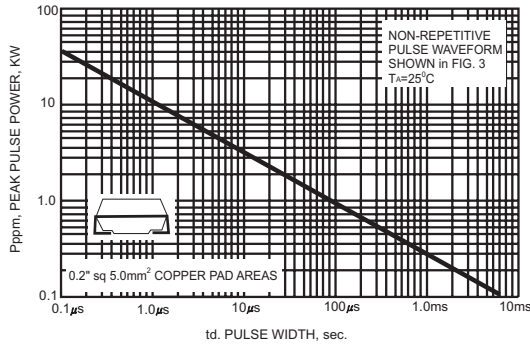


FIG.2- PULSE DERATING CURVE

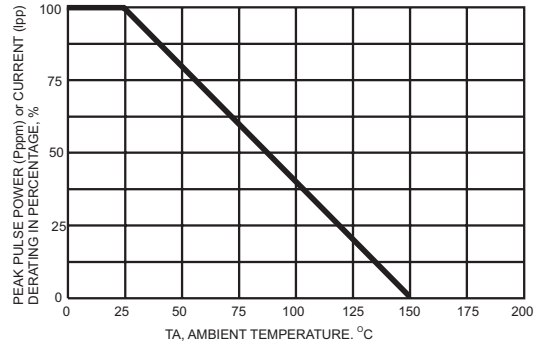


FIG.3- PULSE WAVEFORM

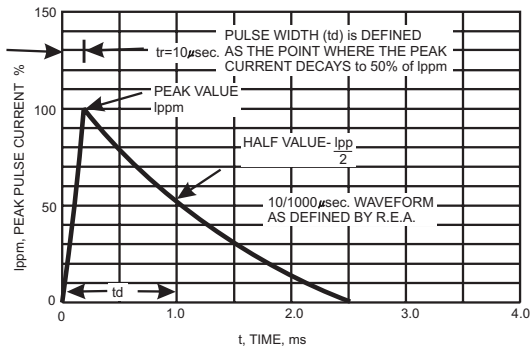


FIG.5- MAXIMUM NON-REPETITIVE PEAK FORWARD SURGE CURRENT

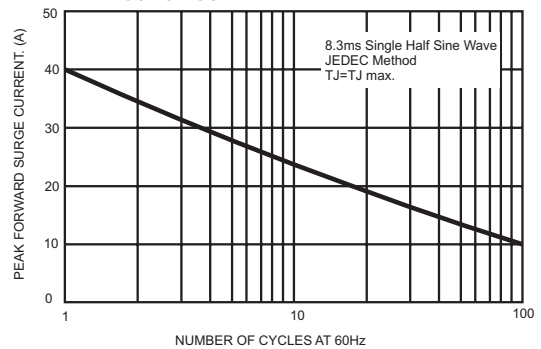


FIG.4- TYPICAL JUNCTION CAPACITANCE

