

**List**

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## 400W Surface Mount Transient Voltage Suppressors- 5.0V- 440V

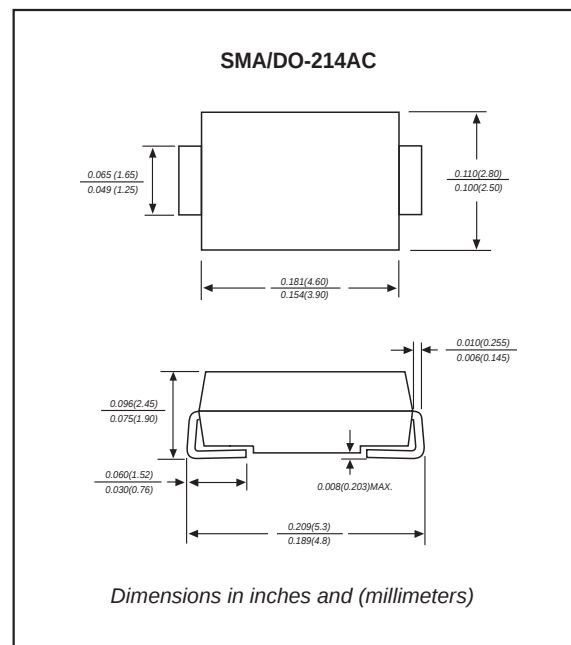
### Package outline

### Features

- 400W peak pulse power capability with a 10/1000  $\mu$ s waveform, repetition rate (duty cycle): 0.01%.
- Low profile surface mounted application in order to optimize board space.
- Excellent clamping capability.
- Low incremental surge resistance.
- Fast response time from 0V to VBR, typically less than 1 ps for uni-directional & 5 ns for bi-directional types.
- Glass passivated chip junction.
- Lead-free parts meet RoHS requirements.

### Mechanical data

- Epoxy:UL94-V0 rated flame retardant
- Case : Molded plastic, DO-214AC / SMA
- Terminals : Solder plated, solderable per MIL-STD-750, Method 2026
- Polarity : Indicated by cathode band
- Mounting Position : Any
- Weight : Approximated 0.05 gram



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

| PARAMETER                             | CONDITIONS                                          | Symbol      | Value       | UNIT             |
|---------------------------------------|-----------------------------------------------------|-------------|-------------|------------------|
| Peak Power Dissipation                | with a 10/1000 $\mu$ s waveform, Note 1, 2 & Fig. 1 | $P_{PPM}$   | 400         | W                |
| Peak Pulse current                    | with a 10/1000 $\mu$ s waveform                     | $I_{PPM}$   | See Table 1 | A                |
| Steady State Power Dissipation        | at $T_L=75^\circ\text{C}$ , Note 2                  | $P_{M(AV)}$ | 1.0         | W                |
| Peak Forward Surge Current            | 8.3ms Single Half Sine-Wave, Note 3                 | $I_{FSM}$   | 40          | A                |
| Maximum Instantaneous Forward Voltage | at 25A<br>For Uni-Directional Types Only, Note 4    | $V_F$       | 3.5/6.5     | V                |
| Operating Temperature                 |                                                     | $T_J$       | -55 ~ +150  | $^\circ\text{C}$ |
| Storage temperature                   |                                                     | $T_{STG}$   | -55 ~ +150  | $^\circ\text{C}$ |

Note 1. Non-repetitive current pulse, per Fig. 3 and derated above  $T_A=25^\circ\text{C}$  per Fig. 2

2. Mounted on copper pad area of 0.2"x0.2" (5.0x5.0 mm) per Fig 5

3. Measured on 8.3 ms single half sine-wave or equivalent square wave, duty cycle=4 pulses per minute maximum

4.  $V_F < 3.5\text{V}$  for  $V_{BR} < 200\text{V}$  and  $V_F < 6.5\text{V}$  for  $V_{BR} > 201\text{V}$ .

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

| Type Number |           | Marking |      | Reverse Stand-Off Voltage | Breakdown Voltage Min. @ $I_T$ | Breakdown Voltage Max. @ $I_T$ | Test Current | Maximum Clamping Voltage @ $I_{PP}$ | Peak Pulse Current | Reverse Leakage @ $V_{RMW}$ |
|-------------|-----------|---------|------|---------------------------|--------------------------------|--------------------------------|--------------|-------------------------------------|--------------------|-----------------------------|
| (Uni)       | (Bi)      | (Uni)   | (Bi) | $V_{RMW}(V)$              | $V_{BR\ MIN}(V)$               | $V_{BR\ MAX}(V)$               | $I_T\ (mA)$  | $V_C(V)$                            | $I_{PP}(A)$        | $I_R(\mu A)$                |
| SMAJ5.0     | SMAJ5.0C  | HD      | TD   | 5.0                       | 6.40                           | 7.55                           | 10.0         | 9.6                                 | 41.7               | 800.0                       |
| SMAJ5.0A    | SMAJ5.0CA | HE      | TE   | 5.0                       | 6.40                           | 7.25                           | 10.0         | 9.2                                 | 43.5               | 800.0                       |
| SMAJ6.0     | SMAJ6.0C  | HF      | TF   | 6.0                       | 6.67                           | 8.45                           | 10.0         | 11.4                                | 35.1               | 800.0                       |
| SMAJ6.0A    | SMAJ6.0CA | HG      | TG   | 6.0                       | 6.67                           | 7.67                           | 10.0         | 10.3                                | 38.8               | 800.0                       |
| SMAJ6.5     | SMAJ6.5C  | HH      | TH   | 6.5                       | 7.22                           | 9.14                           | 10.0         | 12.3                                | 32.5               | 500.0                       |
| SMAJ6.5A    | SMAJ6.5CA | HK      | TK   | 6.5                       | 7.22                           | 8.30                           | 10.0         | 11.2                                | 35.7               | 500.0                       |
| SMAJ7.0     | SMAJ7.0C  | HL      | TL   | 7.0                       | 7.78                           | 9.86                           | 10.0         | 13.3                                | 30.1               | 200.0                       |
| SMAJ7.0A    | SMAJ7.0CA | HM      | TM   | 7.0                       | 7.78                           | 8.95                           | 10.0         | 12.0                                | 33.3               | 200.0                       |
| SMAJ7.5     | SMAJ7.5C  | HN      | TN   | 7.5                       | 8.33                           | 10.67                          | 1.0          | 14.3                                | 28.0               | 100.0                       |
| SMAJ7.5A    | SMAJ7.5CA | HP      | TP   | 7.5                       | 8.33                           | 9.58                           | 1.0          | 12.9                                | 31.0               | 100.0                       |
| SMAJ8.0     | SMAJ8.0C  | HQ      | TQ   | 8.0                       | 8.89                           | 11.3                           | 1.0          | 15.0                                | 26.7               | 50.0                        |
| SMAJ8.0A    | SMAJ8.0CA | HR      | TR   | 8.0                       | 8.89                           | 10.23                          | 1.0          | 13.6                                | 29.4               | 50.0                        |
| SMAJ8.5     | SMAJ8.5C  | HS      | TS   | 8.5                       | 9.44                           | 11.92                          | 1.0          | 15.9                                | 25.2               | 20.0                        |
| SMAJ8.5A    | SMAJ8.5CA | HT      | TT   | 8.5                       | 9.44                           | 10.82                          | 1.0          | 14.4                                | 27.8               | 20.0                        |
| SMAJ9.0     | SMAJ9.0C  | HU      | TU   | 9.0                       | 10.0                           | 12.6                           | 1.0          | 16.9                                | 23.7               | 10.0                        |
| SMAJ9.0A    | SMAJ9.0CA | HV      | TV   | 9.0                       | 10.0                           | 11.5                           | 1.0          | 15.4                                | 26.0               | 10.0                        |
| SMAJ10      | SMAJ10C   | HW      | TW   | 10                        | 11.1                           | 14.1                           | 1.0          | 18.8                                | 21.3               | 5.0                         |
| SMAJ10A     | SMAJ10CA  | HX      | TX   | 10                        | 11.1                           | 12.8                           | 1.0          | 17.0                                | 23.5               | 5.0                         |
| SMAJ11      | SMAJ11C   | HY      | TY   | 11                        | 12.2                           | 15.4                           | 1.0          | 20.1                                | 19.9               | 5.0                         |
| SMAJ11A     | SMAJ11CA  | HZ      | TZ   | 11                        | 12.2                           | 14.0                           | 1.0          | 18.2                                | 22.0               | 5.0                         |
| SMAJ12      | SMAJ12C   | ID      | UD   | 12                        | 13.3                           | 16.9                           | 1.0          | 22.0                                | 18.2               | 5.0                         |
| SMAJ12A     | SMAJ12CA  | IE      | UE   | 12                        | 13.3                           | 15.3                           | 1.0          | 19.9                                | 20.1               | 5.0                         |
| SMAJ13      | SMAJ13C   | IF      | UF   | 13                        | 14.4                           | 18.2                           | 1.0          | 23.8                                | 16.8               | 5.0                         |
| SMAJ13A     | SMAJ13CA  | IG      | UG   | 13                        | 14.4                           | 16.5                           | 1.0          | 21.5                                | 18.6               | 5.0                         |
| SMAJ14      | SMAJ14C   | IH      | UH   | 14                        | 15.6                           | 19.8                           | 1.0          | 25.8                                | 15.5               | 5.0                         |
| SMAJ14A     | SMAJ14CA  | IK      | UK   | 14                        | 15.6                           | 17.9                           | 1.0          | 23.2                                | 17.2               | 5.0                         |
| SMAJ15      | SMAJ15C   | IL      | UL   | 15                        | 16.7                           | 21.1                           | 1.0          | 26.9                                | 14.9               | 5.0                         |
| SMAJ15A     | SMAJ15CA  | IM      | UM   | 15                        | 16.7                           | 19.2                           | 1.0          | 24.4                                | 16.4               | 5.0                         |
| SMAJ16      | SMAJ16C   | IN      | UN   | 16                        | 17.8                           | 22.6                           | 1.0          | 28.8                                | 13.9               | 5.0                         |
| SMAJ16A     | SMAJ16CA  | IP      | UP   | 16                        | 17.8                           | 20.5                           | 1.0          | 26.0                                | 15.4               | 5.0                         |
| SMAJ17      | SMAJ17C   | IQ      | UQ   | 17                        | 18.9                           | 23.9                           | 1.0          | 30.5                                | 13.1               | 5.0                         |
| SMAJ17A     | SMAJ17CA  | IR      | UR   | 17                        | 18.9                           | 21.7                           | 1.0          | 27.6                                | 14.5               | 5.0                         |
| SMAJ18      | SMAJ18C   | IS      | US   | 18                        | 20.0                           | 25.3                           | 1.0          | 32.2                                | 12.4               | 5.0                         |
| SMAJ18A     | SMAJ18CA  | IT      | UT   | 18                        | 20.0                           | 23.3                           | 1.0          | 29.2                                | 13.7               | 5.0                         |
| SMAJ20      | SMAJ20C   | IU      | UU   | 20                        | 22.2                           | 28.1                           | 1.0          | 35.8                                | 11.2               | 5.0                         |
| SMAJ20A     | SMAJ20CA  | IV      | UV   | 20                        | 22.2                           | 25.5                           | 1.0          | 32.4                                | 12.3               | 5.0                         |

※ For Bi-directional type having VRWM of 10 Volts and less, the IR limit is double

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

| Type Number |          | Marking |      | Reverse Stand-Off Voltage | Breakdown Voltage Min. @ $I_T$ | Breakdown Voltage Max. @ $I_T$ | Test Current | Maximum Clamping Voltage @ $I_{PP}$ | Peak Pulse Current | Reverse Leakage @ $V_{RMW}$ |
|-------------|----------|---------|------|---------------------------|--------------------------------|--------------------------------|--------------|-------------------------------------|--------------------|-----------------------------|
| (Uni)       | (Bi)     | (Uni)   | (Bi) | $V_{RMW}(V)$              | $V_{BR\ MIN}(V)$               | $V_{BR\ MAX}(V)$               | $I_T\ (mA)$  | $V_C(V)$                            | $I_{PP}(A)$        | $I_R(\mu A)$                |
| SMAJ22      | SMAJ22C  | IW      | UW   | 22                        | 24.4                           | 30.9                           | 1.0          | 39.4                                | 10.2               | 5.0                         |
| SMAJ22A     | SMAJ22CA | IX      | UX   | 22                        | 24.4                           | 28.0                           | 1.0          | 35.5                                | 11.3               | 5.0                         |
| SMAJ24      | SMAJ24C  | IY      | UY   | 24                        | 26.7                           | 33.8                           | 1.0          | 43.0                                | 9.3                | 5.0                         |
| SMAJ24A     | SMAJ24CA | IZ      | UZ   | 24                        | 26.7                           | 30.7                           | 1.0          | 38.9                                | 10.3               | 5.0                         |
| SMAJ26      | SMAJ26C  | JD      | VD   | 26                        | 28.9                           | 36.6                           | 1.0          | 46.6                                | 8.6                | 5.0                         |
| SMAJ26A     | SMAJ26CA | JE      | VE   | 26                        | 28.9                           | 33.2                           | 1.0          | 42.1                                | 9.5                | 5.0                         |
| SMAJ28      | SMAJ28C  | JF      | VF   | 28                        | 31.1                           | 39.4                           | 1.0          | 50.0                                | 8.0                | 5.0                         |
| SMAJ28A     | SMAJ28CA | JG      | VG   | 28                        | 31.1                           | 35.8                           | 1.0          | 45.4                                | 8.8                | 5.0                         |
| SMAJ30      | SMAJ30C  | JH      | VH   | 30                        | 33.3                           | 42.2                           | 1.0          | 53.5                                | 7.5                | 5.0                         |
| SMAJ30A     | SMAJ30CA | JK      | VK   | 30                        | 33.3                           | 38.3                           | 1.0          | 48.4                                | 8.3                | 5.0                         |
| SMAJ33      | SMAJ33C  | JL      | VL   | 33                        | 36.7                           | 46.5                           | 1.0          | 59.0                                | 6.8                | 5.0                         |
| SMAJ33A     | SMAJ33CA | JM      | VM   | 33                        | 36.7                           | 42.2                           | 1.0          | 53.3                                | 7.5                | 5.0                         |
| SMAJ36      | SMAJ36C  | JN      | VN   | 36                        | 40.0                           | 50.7                           | 1.0          | 64.3                                | 6.2                | 5.0                         |
| SMAJ36A     | SMAJ36CA | JP      | VP   | 36                        | 40.0                           | 46.0                           | 1.0          | 58.1                                | 6.9                | 5.0                         |
| SMAJ40      | SMAJ40C  | JQ      | VQ   | 40                        | 44.4                           | 56.3                           | 1.0          | 71.4                                | 5.6                | 5.0                         |
| SMAJ40A     | SMAJ40CA | JR      | VR   | 40                        | 44.4                           | 51.1                           | 1.0          | 64.5                                | 6.2                | 5.0                         |
| SMAJ43      | SMAJ43C  | JS      | VS   | 43                        | 47.8                           | 60.5                           | 1.0          | 76.7                                | 5.2                | 5.0                         |
| SMAJ43A     | SMAJ43CA | JT      | VT   | 43                        | 47.8                           | 54.9                           | 1.0          | 69.4                                | 5.8                | 5.0                         |
| SMAJ45      | SMAJ45C  | JU      | VU   | 45                        | 50.0                           | 63.3                           | 1.0          | 80.3                                | 5.0                | 5.0                         |
| SMAJ45A     | SMAJ45CA | JV      | VV   | 45                        | 50.0                           | 57.5                           | 1.0          | 72.7                                | 5.5                | 5.0                         |
| SMAJ48      | SMAJ48C  | JW      | VW   | 48                        | 53.3                           | 67.5                           | 1.0          | 85.5                                | 4.7                | 5.0                         |
| SMAJ48A     | SMAJ48CA | JX      | VX   | 48                        | 53.3                           | 61.3                           | 1.0          | 77.4                                | 5.2                | 5.0                         |
| SMAJ51      | SMAJ51C  | JY      | VY   | 51                        | 56.7                           | 71.8                           | 1.0          | 91.1                                | 4.4                | 5.0                         |
| SMAJ51A     | SMAJ51CA | JZ      | VZ   | 51                        | 56.7                           | 65.2                           | 1.0          | 82.4                                | 4.9                | 5.0                         |
| SMAJ54      | SMAJ54C  | RD      | WD   | 54                        | 60.0                           | 76.0                           | 1.0          | 96.3                                | 4.2                | 5.0                         |
| SMAJ54A     | SMAJ54CA | RE      | WE   | 54                        | 60.0                           | 69.0                           | 1.0          | 87.1                                | 4.6                | 5.0                         |
| SMAJ58      | SMAJ58C  | RF      | WF   | 58                        | 64.4                           | 81.6                           | 1.0          | 103                                 | 3.9                | 5.0                         |
| SMAJ58A     | SMAJ58CA | RG      | WG   | 58                        | 64.4                           | 74.1                           | 1.0          | 93.6                                | 4.3                | 5.0                         |
| SMAJ60      | SMAJ60C  | RH      | WH   | 60                        | 66.7                           | 84.5                           | 1.0          | 107                                 | 3.7                | 5.0                         |
| SMAJ60A     | SMAJ60CA | RK      | WK   | 60                        | 66.7                           | 76.7                           | 1.0          | 96.8                                | 4.1                | 5.0                         |
| SMAJ64      | SMAJ64C  | RL      | WL   | 64                        | 71.1                           | 90.1                           | 1.0          | 114                                 | 3.5                | 5.0                         |
| SMAJ64A     | SMAJ64CA | RM      | WM   | 64                        | 71.1                           | 81.8                           | 1.0          | 103                                 | 3.9                | 5.0                         |
| SMAJ70      | SMAJ70C  | RN      | WN   | 70                        | 77.8                           | 98.6                           | 1.0          | 125                                 | 3.2                | 5.0                         |
| SMAJ70A     | SMAJ70CA | RP      | WP   | 70                        | 77.8                           | 89.5                           | 1.0          | 113                                 | 3.5                | 5.0                         |
| SMAJ75      | SMAJ75C  | RQ      | WQ   | 75                        | 83.0                           | 105.7                          | 1.0          | 134                                 | 3.0                | 5.0                         |
| SMAJ75A     | SMAJ75CA | RR      | WR   | 75                        | 83.0                           | 95.8                           | 1.0          | 121                                 | 3.3                | 5.0                         |
| SMAJ78      | SMAJ78C  | RS      | WS   | 78                        | 86.0                           | 109.8                          | 1.0          | 139                                 | 2.9                | 5.0                         |
| SMAJ78A     | SMAJ78CA | RT      | WT   | 78                        | 86.0                           | 99.7                           | 1.0          | 126                                 | 3.2                | 5.0                         |

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

| Type Number |           | Marking |      | Reverse Stand-Off Voltage | Breakdown Voltage Min. @ $I_T$ | Breakdown Voltage Max. @ $I_T$ | Test Current | Maximum Clamping Voltage @ $I_{PP}$ | Peak Pulse Current | Reverse Leakage @ $V_{RMW}$ |
|-------------|-----------|---------|------|---------------------------|--------------------------------|--------------------------------|--------------|-------------------------------------|--------------------|-----------------------------|
| (Uni)       | (Bi)      | (Uni)   | (Bi) | $V_{RMW}(V)$              | $V_{BR\ MIN}(V)$               | $V_{BR\ MAX}(V)$               | $I_T\ (mA)$  | $V_C(V)$                            | $I_{PP}(A)$        | $I_R(\mu A)$                |
| SMAJ85      | SMAJ85C   | RU      | WU   | 85                        | 94.0                           | 119.2                          | 1.0          | 151                                 | 2.6                | 5.0                         |
| SMAJ85A     | SMAJ85CA  | RV      | WV   | 85                        | 94.0                           | 108.2                          | 1.0          | 137                                 | 2.9                | 5.0                         |
| SMAJ90      | SMAJ90C   | RW      | WW   | 90                        | 100                            | 126.5                          | 1.0          | 160                                 | 2.5                | 5.0                         |
| SMAJ90A     | SMAJ90CA  | RX      | WX   | 90                        | 100                            | 115.5                          | 1.0          | 146                                 | 2.7                | 5.0                         |
| SMAJ100     | SMAJ100C  | RY      | WY   | 100                       | 111                            | 141.0                          | 1.0          | 179                                 | 2.2                | 5.0                         |
| SMAJ100A    | SMAJ100CA | RZ      | WZ   | 100                       | 111                            | 128.0                          | 1.0          | 162                                 | 2.5                | 5.0                         |
| SMAJ110     | SMAJ110C  | SD      | XD   | 110                       | 122                            | 154.5                          | 1.0          | 196                                 | 2.0                | 5.0                         |
| SMAJ110A    | SMAJ110CA | SE      | XE   | 110                       | 122                            | 140.5                          | 1.0          | 177                                 | 2.3                | 5.0                         |
| SMAJ120     | SMAJ120C  | SF      | XF   | 120                       | 133                            | 169.0                          | 1.0          | 214                                 | 1.9                | 5.0                         |
| SMAJ120A    | SMAJ120CA | SG      | XG   | 120                       | 133                            | 153.0                          | 1.0          | 193                                 | 2.1                | 5.0                         |
| SMAJ130     | SMAJ130C  | SH      | XH   | 130                       | 144                            | 182.5                          | 1.0          | 231                                 | 1.7                | 5.0                         |
| SMAJ130A    | SMAJ130CA | SK      | XK   | 130                       | 144                            | 165.5                          | 1.0          | 209                                 | 1.9                | 5.0                         |
| SMAJ150     | SMAJ150C  | SL      | XL   | 150                       | 167                            | 211.5                          | 1.0          | 268                                 | 1.5                | 5.0                         |
| SMAJ150A    | SMAJ150CA | SM      | XM   | 150                       | 167                            | 192.5                          | 1.0          | 243                                 | 1.6                | 5.0                         |
| SMAJ160     | SMAJ160C  | SN      | XN   | 160                       | 178                            | 226.0                          | 1.0          | 287                                 | 1.4                | 5.0                         |
| SMAJ160A    | SMAJ160CA | SP      | XP   | 160                       | 178                            | 205.0                          | 1.0          | 259                                 | 1.5                | 5.0                         |
| SMAJ170     | SMAJ170C  | SQ      | XQ   | 170                       | 189                            | 239.5                          | 1.0          | 304                                 | 1.3                | 5.0                         |
| SMAJ170A    | SMAJ170CA | SR      | XR   | 170                       | 189                            | 217.5                          | 1.0          | 275                                 | 1.5                | 5.0                         |
| SMAJ180     | SMAJ180C  | SS      | XS   | 180                       | 200                            | 253.8                          | 1.0          | 321                                 | 1.2                | 5.0                         |
| SMAJ180A    | SMAJ180CA | ST      | XT   | 180                       | 200                            | 230.4                          | 1.0          | 290                                 | 1.4                | 5.0                         |
| SMAJ190     | SMAJ190C  | SU      | XU   | 190                       | 211                            | 267.9                          | 1.0          | 339                                 | 1.2                | 5.0                         |
| SMAJ190A    | SMAJ190CA | SV      | XV   | 190                       | 211                            | 243.2                          | 1.0          | 306                                 | 1.3                | 5.0                         |
| SMAJ200     | SMAJ200C  | SW      | XW   | 200                       | 222                            | 282.0                          | 1.0          | 356                                 | 1.1                | 5.0                         |
| SMAJ200A    | SMAJ200CA | SX      | XX   | 200                       | 222                            | 256.0                          | 1.0          | 322                                 | 1.2                | 5.0                         |
| SMAJ210     | SMAJ210C  | SY      | XY   | 210                       | 233                            | 296.1                          | 1.0          | 375                                 | 1.1                | 5.0                         |
| SMAJ210A    | SMAJ210CA | SZ      | XZ   | 210                       | 233                            | 268.8                          | 1.0          | 339                                 | 1.2                | 5.0                         |
| SMAJ220     | SMAJ220C  | ZD      | YD   | 220                       | 244                            | 310.2                          | 1.0          | 392                                 | 1.0                | 5.0                         |
| SMAJ220A    | SMAJ220CA | ZE      | YE   | 220                       | 244                            | 281.6                          | 1.0          | 355                                 | 1.1                | 5.0                         |
| SMAJ250     | SMAJ250C  | ZF      | YF   | 250                       | 278                            | 342.5                          | 1.0          | 447                                 | 0.9                | 5.0                         |
| SMAJ250A    | SMAJ250CA | ZG      | YG   | 250                       | 278                            | 309.0                          | 1.0          | 403                                 | 1.0                | 5.0                         |
| SMAJ300     | SMAJ300C  | ZH      | YH   | 300                       | 333                            | 411.0                          | 1.0          | 535                                 | 0.7                | 5.0                         |
| SMAJ300A    | SMAJ300CA | ZK      | YK   | 300                       | 333                            | 371.0                          | 1.0          | 484                                 | 0.8                | 5.0                         |
| SMAJ350     | SMAJ350C  | ZL      | YL   | 350                       | 389                            | 479.5                          | 1.0          | 624                                 | 0.6                | 5.0                         |
| SMAJ350A    | SMAJ350CA | ZM      | YM   | 350                       | 389                            | 432.0                          | 1.0          | 565                                 | 0.7                | 5.0                         |
| SMAJ400     | SMAJ400C  | ZN      | YN   | 400                       | 444                            | 548.0                          | 1.0          | 687                                 | 0.6                | 5.0                         |
| SMAJ400A    | SMAJ400CA | ZP      | YP   | 400                       | 444                            | 494.0                          | 1.0          | 645                                 | 0.6                | 5.0                         |
| SMAJ440     | SMAJ440C  | ZQ      | YQ   | 440                       | 489                            | 602.8                          | 1.0          | 786                                 | 0.5                | 5.0                         |
| SMAJ440A    | SMAJ440CA | ZR      | YR   | 440                       | 489                            | 543.0                          | 1.0          | 710                                 | 0.6                | 5.0                         |

※ For Bi-directional type having VRWM of 10 Volts and less, the IR limit is double

# Rating and characteristic curves (SMAJ SERIES)

Fig.1 - Peak Pulse Power Rating Curve

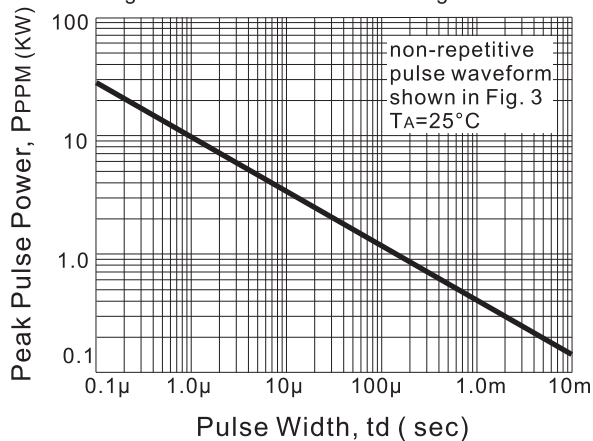


Fig.2 - Pulse Derating Curve

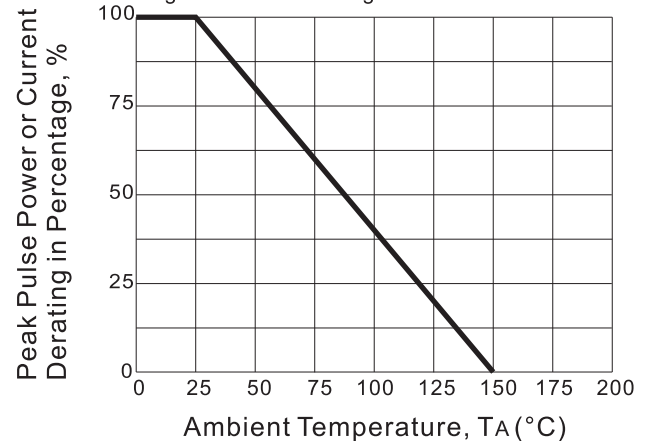


Fig.3 - Pulse Waveform

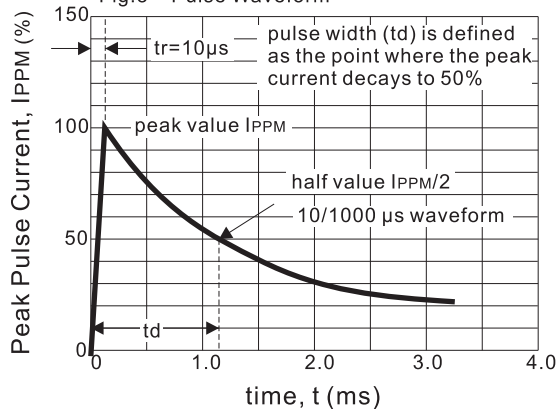


Fig.4 - Typical Junction Capacitance

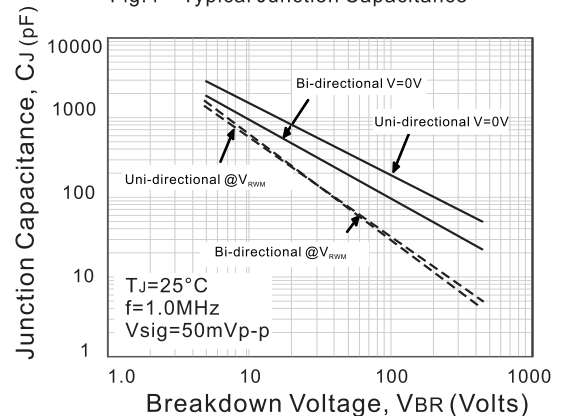


Fig.5 - Steady State Power Derating Curve

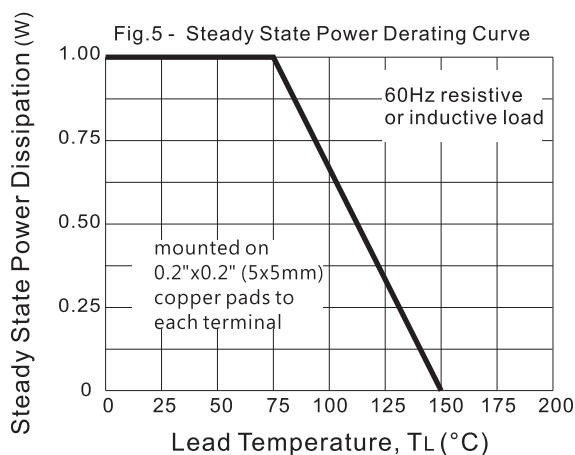
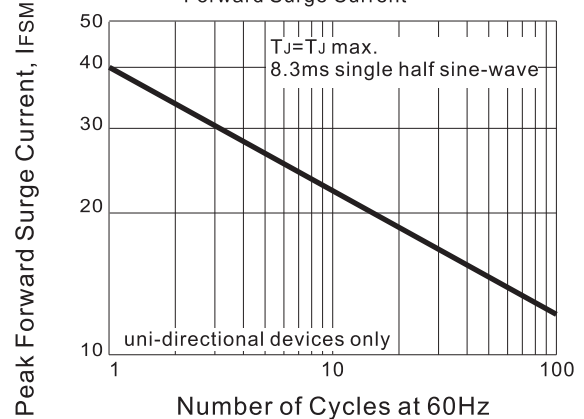


Fig.6 - Maximum Non-Repetitive Forward Surge Current



### Rating and characteristic curves (SMAJ SERIES)

Fig. 7 - Transients of several thousand volts can be clamped to a safe level by the TVS

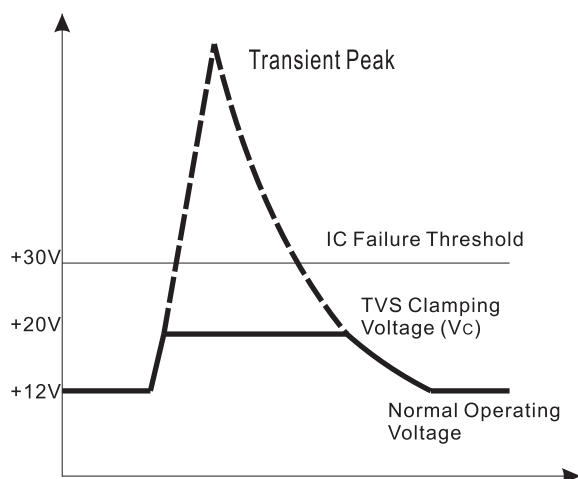
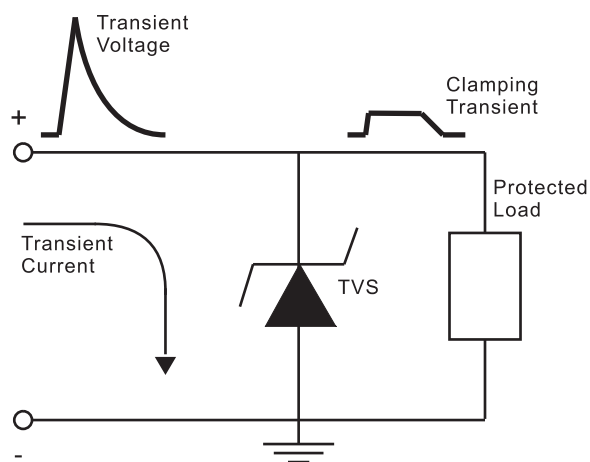
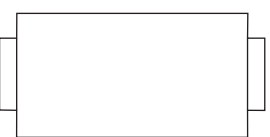


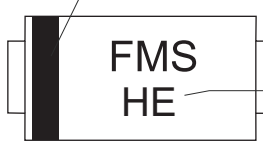
Fig. 8 - Transient current is diverted to ground thru TVS; the voltage seen by the protected load is limited to the clamping voltage level



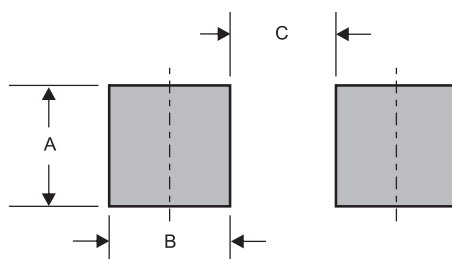
## Pinning information

| Pin                                           | Simplified outline                                                                 | Symbol                                                                              |
|-----------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Uni-Directional<br>Pin1 cathode<br>Pin2 anode |  |  |
| Bi-Directional                                |   |  |

## Marking

| Type number     | Example                                                                                                                                            |
|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------|
| Uni-Directional |  <p>Cathode band</p> <p>Marking code (see page 3 or page 4)</p> |
| Bi-Directional  |  <p>Marking code (see page 3 or page 4)</p>                     |

## Suggested solder pad layout

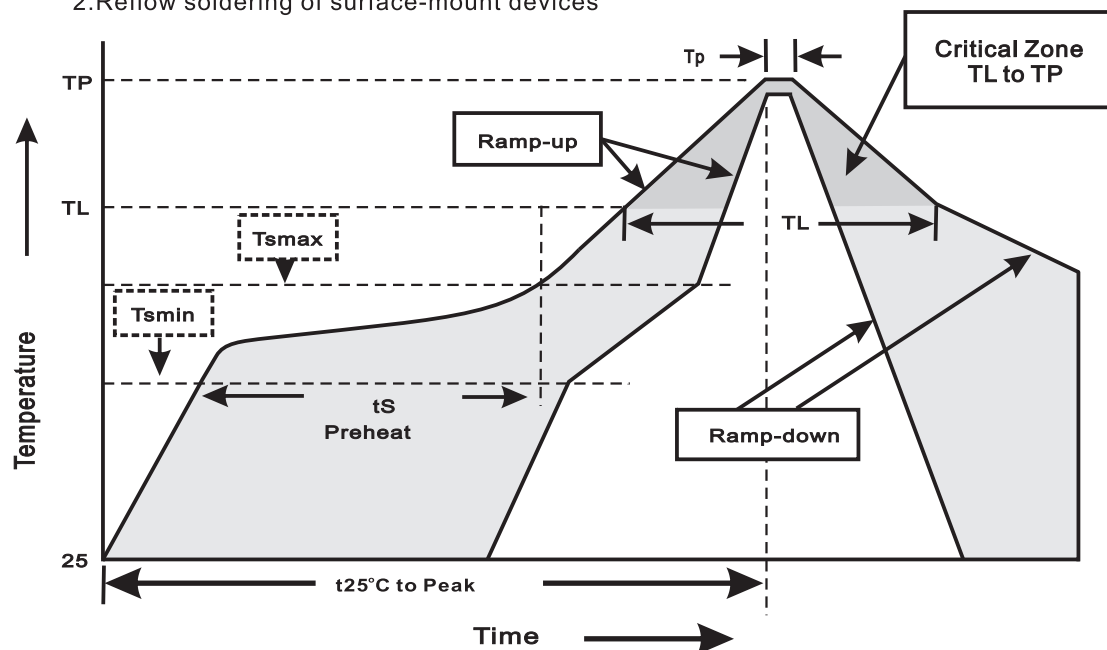


Dimensions in inches and (millimeters)

| PACKAGE | A            | B            | C            |
|---------|--------------|--------------|--------------|
| SMA     | 0.063 (1.60) | 0.059 (1.50) | 0.110 (2.80) |

## Suggested thermal profiles for soldering processes

- 1.Storage environment: Temperature=5°C~40°C Humidity=55%±25%
- 2.Reflow soldering of surface-mount devices



## 3.Reflow soldering

| Profile Feature                                                                                           | Soldering Condition         |
|-----------------------------------------------------------------------------------------------------------|-----------------------------|
| Average ramp-up rate( $T_L$ to $T_P$ )                                                                    | <3°C/sec                    |
| Preheat<br>-Temperature Min( $T_{smin}$ )<br>-Temperature Max( $T_{smax}$ )<br>-Time(min to max)( $t_s$ ) | 150°C<br>200°C<br>60~120sec |
| $T_{smax}$ to $T_L$<br>-Ramp-upRate                                                                       | <3°C/sec                    |
| Time maintained above:<br>-Temperature( $T_L$ )<br>-Time( $t_L$ )                                         | 217°C<br>60~260sec          |
| Peak Temperature( $T_P$ )                                                                                 | 255°C-0/+5°C                |
| Time within 5°C of actual Peak Temperature( $t_P$ )                                                       | 10~30sec                    |
| Ramp-down Rate                                                                                            | <6°C/sec                    |
| Time 25°C to Peak Temperature                                                                             | <6minutes                   |

**High reliability test capabilities**

| Item Test                        | Conditions                                                                                                        | Reference                   |
|----------------------------------|-------------------------------------------------------------------------------------------------------------------|-----------------------------|
| 1. Solder Resistance             | at $260\pm5^{\circ}\text{C}$ for $10\pm2\text{sec.}$<br>immerse body into solder $1/16''\pm 1/32''$               | MIL-STD-750D<br>METHOD-2031 |
| 2. Solderability                 | at $245\pm5^{\circ}\text{C}$ for 5 sec.                                                                           | MIL-STD-202F<br>METHOD-208  |
| 3. High Temperature Reverse Bias | $V_{\text{RWM}}=80\%$ rate at $T_{\text{J}}=150^{\circ}\text{C}$ for 168 hrs.                                     | MIL-STD-750D<br>METHOD-1038 |
| 4. Pressure Cooker               | $15P_{\text{SIG}}$ at $T_{\text{A}}=121^{\circ}\text{C}$ for 4 hrs.                                               | JESD22-A102                 |
| 5. Temperature Cycling           | $-55^{\circ}\text{C}$ to $+125^{\circ}\text{C}$ dwelled for 30 min.<br>and transferred for 5min. total 10 cycles. | MIL-STD-750D<br>METHOD-1051 |
| 6. Thermal Shock                 | $0^{\circ}\text{C}$ for 5 min. rise to $100^{\circ}\text{C}$ for 5 min. total 10 cycles.                          | MIL-STD-750D<br>METHOD-1056 |
| 7. Humidity                      | at $T_{\text{A}}=85^{\circ}\text{C}$ , RH=85% for 1000hrs.                                                        | MIL-STD-750D<br>METHOD-1021 |
| 8. High Temperature Storage Life | at $175^{\circ}\text{C}$ for 1000 hrs.                                                                            | MIL-STD-750D<br>METHOD-1031 |