



**E480232**

## Features

- For Surface Mount Applications
- Excellent Clamping Capability
- High Temp Soldering: 260°C / 10 Seconds At Terminals
- Halogen Free. "Green" Device (Note 1)
- Moisture Sensitivity Level 1
- Epoxy Meets UL 94 V-0 Flammability Rating
- Lead Free Finish/RoHS Compliant (Note2) ("P" Suffix Designates RoHS Compliant. See Ordering Information)
- ESD protection of data lines in accordance with IEC 61000-4-2, ±30kV(Air), ±30kV (Contact)

## Maximum Ratings

| Parameter                                                          | Symbol    | Value          | Unit |
|--------------------------------------------------------------------|-----------|----------------|------|
| Peak Pulse Power Surge Current with a 10/1000µs Waveform (Note 3)  | $I_{PPM}$ | See Next Table | A    |
| Peak Pulse Power Dissipation (Note 3)                              | $P_{PPM}$ | 400            | W    |
| Power Dissipation on Infinite Heatsink at $T_L = 75^\circ\text{C}$ | $P_D$     | 1.5            | W    |
| Peak Forward Surge Current Unidirectional Only (Note 4)            | $I_{FSM}$ | 40             | A    |
| Operating Junction Temperature Range                               | $T_J$     | -55 to +175    | °C   |
| Storage Temperature Range                                          | $T_{STG}$ | -55 to +175    | °C   |

## Internal Structure

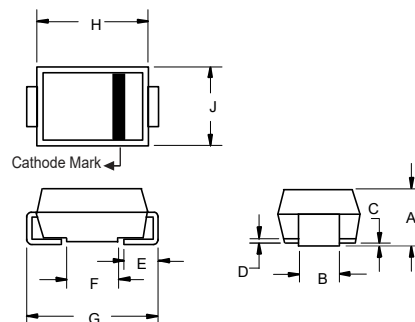
| Description     | Simplified outline | Graphic symbol |
|-----------------|--------------------|----------------|
| Uni-directional |                    |                |
| Bi-directional  |                    |                |

XXXX = Marking code

- The locations of the dots represent different product lines

**400Watt TVS**  
**5.0 to 440**  
**Volts**

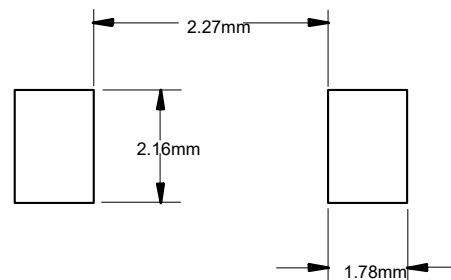
## SMA (DO-214AC) LEAD FRAME



### DIMENSIONS

| DIM | INCHES |       | MM    |       | NOTE |
|-----|--------|-------|-------|-------|------|
|     | MIN    | MAX   | MIN   | MAX   |      |
| A   | 0.075  | 0.090 | 1.90  | 2.30  |      |
| B   | 0.050  | 0.064 | 1.27  | 1.63  |      |
| C   | 0.002  | 0.008 | 0.051 | 0.203 |      |
| D   | ---    | 0.020 | ---   | 0.51  |      |
| E   | 0.030  | 0.060 | 0.76  | 1.52  |      |
| F   | 0.065  | 0.091 | 1.65  | 2.32  |      |
| G   | 0.189  | 0.220 | 4.80  | 5.59  |      |
| H   | 0.157  | 0.187 | 4.00  | 4.75  |      |
| J   | 0.090  | 0.115 | 2.25  | 2.92  |      |

### SUGGESTED SOLDER PAD LAYOUT



## Electrical Characteristics and Thermal Characteristics

| Parameter                                                                       | Symbol          | Value   | Unit |
|---------------------------------------------------------------------------------|-----------------|---------|------|
| Maximum instantaneous forward voltage @ at 25A for unidirectional only (Note 5) | $V_F$           | 3.5/5.0 | V    |
| Typical Thermal Resistance Junction to Lead                                     | $R_{\theta JL}$ | 30      | °C/W |
| Typical Thermal Resistance Junction to Ambient                                  | $R_{\theta JA}$ | 120     | °C/W |
| Typical Thermal Resistance Junction to Case                                     | $R_{\theta JC}$ | 20      | °C/W |

Note:

1. Halogen free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
2. High Temperature Solder Exemption Applied, see EU Directive Annex 7a.
3. Non-repetitive current pulse, per Fig.3 and derated above  $T_A=25^\circ\text{C}$  per Fig.4.
4. 8.3ms, single half sine wave duty cycle = 4 pulses per Minutes maximum, for unidirectional device only.
5.  $V_F<3.5\text{V}$  for devices of  $V_{BR}<200\text{V}$  and  $V_F<5.0\text{V}$  for devices of  $V_{BR}>201\text{V}$ .
6. Mounted on 0.2 x 0.2" (5.0 x 5.0 mm) copper pads to each terminal.

## Electrical Characteristics @ 25°C Unless Otherwise Specified

| MCC Part Number |           | Working Peak Reverse Voltage | Breakdown Voltage $V_{BR}$ @ $I_T$ |         |            | Maximum Clamping Voltage @ $I_{PP}$ | Maximum Reverse Surge Current | Maximum Reverse Leakage @ $V_{RWM}$ | Device Marking Code |    |
|-----------------|-----------|------------------------------|------------------------------------|---------|------------|-------------------------------------|-------------------------------|-------------------------------------|---------------------|----|
| (Uni)           | (Bi)      | $V_{RWM}(V)$                 | Min (V)                            | Max (V) | $I_T$ (mA) | $V_C(V)$                            | $I_{PP}(A)$                   | $I_R(\mu A)$                        | Uni                 | Bi |
| SMAJ5.0A        | SMAJ5.0CA | 5.0                          | 6.40                               | 7.00    | 10         | 9.2                                 | 43.5                          | 800                                 | AE                  | WE |
| SMAJ6.0A        | SMAJ6.0CA | 6.0                          | 6.67                               | 7.37    | 10         | 10.3                                | 38.8                          | 800                                 | AG                  | WG |
| SMAJ6.5A        | SMAJ6.5CA | 6.5                          | 7.22                               | 7.98    | 10         | 11.2                                | 35.7                          | 500                                 | AK                  | WK |
| SMAJ7.0A        | SMAJ7.0CA | 7.0                          | 7.78                               | 8.60    | 10         | 12.0                                | 33.3                          | 200                                 | AM                  | WM |
| SMAJ7.5A        | SMAJ7.5CA | 7.5                          | 8.33                               | 9.21    | 1          | 12.9                                | 31.0                          | 100                                 | AP                  | WP |
| SMAJ8.0A        | SMAJ8.0CA | 8.0                          | 8.89                               | 9.83    | 1          | 13.6                                | 29.4                          | 50                                  | AR                  | WR |
| SMAJ8.5A        | SMAJ8.5CA | 8.5                          | 9.44                               | 10.40   | 1          | 14.4                                | 27.7                          | 20                                  | AT                  | WT |
| SMAJ9.0A        | SMAJ9.0CA | 9.0                          | 10.00                              | 11.10   | 1          | 15.4                                | 26.0                          | 10                                  | AV                  | WV |
| SMAJ10A         | SMAJ10CA  | 10.0                         | 11.10                              | 12.30   | 1          | 17.0                                | 23.5                          | 5                                   | AX                  | WX |
| SMAJ11A         | SMAJ11CA  | 11.0                         | 12.20                              | 13.50   | 1          | 18.2                                | 22.0                          | 1                                   | AZ                  | WZ |
| SMAJ12A         | SMAJ12CA  | 12.0                         | 13.30                              | 14.70   | 1          | 19.9                                | 20.1                          | 1                                   | BE                  | XE |
| SMAJ13A         | SMAJ13CA  | 13.0                         | 14.40                              | 15.90   | 1          | 21.5                                | 18.6                          | 1                                   | BG                  | XG |
| SMAJ14A         | SMAJ14CA  | 14.0                         | 15.60                              | 17.20   | 1          | 23.2                                | 17.2                          | 1                                   | BK                  | XK |
| SMAJ15A         | SMAJ15CA  | 15.0                         | 16.70                              | 18.50   | 1          | 24.4                                | 16.4                          | 1                                   | BM                  | XM |
| SMAJ16A         | SMAJ16CA  | 16.0                         | 17.80                              | 19.70   | 1          | 26.0                                | 15.3                          | 1                                   | BP                  | XP |
| SMAJ17A         | SMAJ17CA  | 17.0                         | 18.90                              | 20.90   | 1          | 27.6                                | 14.5                          | 1                                   | BR                  | XR |
| SMAJ18A         | SMAJ18CA  | 18.0                         | 20.00                              | 22.10   | 1          | 29.2                                | 13.7                          | 1                                   | BT                  | XT |
| SMAJ19A         | SMAJ19CA  | 19.0                         | 21.10                              | 23.30   | 1          | 30.8                                | 13.0                          | 1                                   | BU                  | XU |
| SMAJ20A         | SMAJ20CA  | 20.0                         | 22.20                              | 24.50   | 1          | 32.4                                | 12.3                          | 1                                   | BV                  | XV |
| SMAJ22A         | SMAJ22CA  | 22.0                         | 24.40                              | 26.90   | 1          | 35.5                                | 11.2                          | 1                                   | BX                  | XX |
| SMAJ24A         | SMAJ24CA  | 24.0                         | 26.70                              | 29.50   | 1          | 38.9                                | 10.3                          | 1                                   | BZ                  | XZ |
| SMAJ26A         | SMAJ26CA  | 26.0                         | 28.90                              | 31.90   | 1          | 42.1                                | 9.5                           | 1                                   | CE                  | YE |
| SMAJ28A         | SMAJ28CA  | 28.0                         | 31.10                              | 34.40   | 1          | 45.4                                | 8.8                           | 1                                   | CG                  | YG |
| SMAJ30A         | SMAJ30CA  | 30.0                         | 33.30                              | 36.80   | 1          | 48.4                                | 8.3                           | 1                                   | CK                  | YK |
| SMAJ33A         | SMAJ33CA  | 33.0                         | 36.70                              | 40.60   | 1          | 53.3                                | 7.5                           | 1                                   | CM                  | YM |
| SMAJ36A         | SMAJ36CA  | 36.0                         | 40.00                              | 44.20   | 1          | 58.1                                | 6.9                           | 1                                   | CP                  | YP |
| SMAJ40A         | SMAJ40CA  | 40.0                         | 44.40                              | 49.10   | 1          | 64.5                                | 6.2                           | 1                                   | CR                  | YR |
| SMAJ43A         | SMAJ43CA  | 43.0                         | 47.80                              | 52.80   | 1          | 69.4                                | 5.7                           | 1                                   | CT                  | YT |
| SMAJ45A         | SMAJ45CA  | 45.0                         | 50.00                              | 55.30   | 1          | 72.7                                | 5.5                           | 1                                   | CV                  | YV |
| SMAJ48A         | SMAJ48CA  | 48.0                         | 53.30                              | 58.90   | 1          | 77.4                                | 5.2                           | 1                                   | CX                  | YX |
| SMAJ51A         | SMAJ51CA  | 51.0                         | 56.70                              | 62.70   | 1          | 82.4                                | 4.9                           | 1                                   | CZ                  | YZ |
| SMAJ54A         | SMAJ54CA  | 54.0                         | 60.00                              | 66.30   | 1          | 87.1                                | 4.6                           | 1                                   | RE                  | ZE |
| SMAJ58A         | SMAJ58CA  | 58.0                         | 64.40                              | 71.20   | 1          | 93.6                                | 4.3                           | 1                                   | RG                  | ZG |
| SMAJ60A         | SMAJ60CA  | 60.0                         | 66.70                              | 73.70   | 1          | 96.8                                | 4.1                           | 1                                   | RK                  | ZK |
| SMAJ64A         | SMAJ64CA  | 64.0                         | 71.10                              | 78.60   | 1          | 103.0                               | 3.9                           | 1                                   | RM                  | ZM |
| SMAJ70A         | SMAJ70CA  | 70.0                         | 77.80                              | 86.00   | 1          | 113.0                               | 3.5                           | 1                                   | RP                  | ZP |
| SMAJ75A         | SMAJ75CA  | 75.0                         | 83.30                              | 92.10   | 1          | 121.0                               | 3.3                           | 1                                   | RR                  | ZR |
| SMAJ78A         | SMAJ78CA  | 78.0                         | 86.70                              | 95.80   | 1          | 126.0                               | 3.2                           | 1                                   | RT                  | ZT |
| SMAJ80A         | SMAJ80CA  | 80.0                         | 88.80                              | 97.60   | 1          | 129.0                               | 3.1                           | 1                                   | RB                  | ZB |
| SMAJ85A         | SMAJ85CA  | 85.0                         | 94.40                              | 104.00  | 1          | 137.0                               | 2.9                           | 1                                   | RV                  | ZV |
| SMAJ90A         | SMAJ90CA  | 90.0                         | 100.00                             | 111.00  | 1          | 146.0                               | 2.7                           | 1                                   | RX                  | ZX |
| SMAJ100A        | SMAJ100CA | 100.0                        | 111.00                             | 123.00  | 1          | 162.0                               | 2.5                           | 1                                   | RZ                  | ZZ |
| SMAJ110A        | SMAJ110CA | 110.0                        | 122.00                             | 135.00  | 1          | 177.0                               | 2.3                           | 1                                   | SE                  | VE |
| SMAJ120A        | SMAJ120CA | 120.0                        | 133.00                             | 147.00  | 1          | 193.0                               | 2.1                           | 1                                   | SG                  | VG |
| SMAJ130A        | SMAJ130CA | 130.0                        | 144.00                             | 159.00  | 1          | 209.0                               | 1.9                           | 1                                   | SK                  | VK |
| SMAJ140A        | SMAJ140CA | 140.0                        | 155.00                             | 171.00  | 1          | 226.8                               | 1.8                           | 1                                   | SL                  | VL |
| SMAJ150A        | SMAJ150CA | 150.0                        | 167.00                             | 185.00  | 1          | 243.0                               | 1.6                           | 1                                   | SM                  | VM |
| SMAJ160A        | SMAJ160CA | 160.0                        | 178.00                             | 197.00  | 1          | 259.0                               | 1.5                           | 1                                   | SP                  | VP |
| SMAJ170A        | SMAJ170CA | 170.0                        | 189.00                             | 209.00  | 1          | 275.0                               | 1.5                           | 1                                   | SR                  | VR |
| SMAJ180A        | SMAJ180CA | 180.0                        | 201.00                             | 222.00  | 1          | 292.0                               | 1.4                           | 1                                   | ST                  | VT |
| SMAJ190A        | SMAJ190CA | 190.0                        | 211.00                             | 232.00  | 1          | 307.8                               | 1.3                           | 1                                   | SU                  | VU |
| SMAJ200A        | SMAJ200CA | 200.0                        | 224.00                             | 247.00  | 1          | 324.0                               | 1.2                           | 1                                   | SV                  | VV |
| SMAJ220A        | SMAJ220CA | 220.0                        | 246.00                             | 272.00  | 1          | 356.0                               | 1.1                           | 1                                   | SX                  | VX |
| SMAJ250A        | SMAJ250CA | 250.0                        | 279.00                             | 309.00  | 1          | 405.0                               | 1.0                           | 1                                   | SZ                  | VZ |
| SMAJ300A        | SMAJ300CA | 300.0                        | 335.00                             | 371.00  | 1          | 486.0                               | 0.8                           | 1                                   | TE                  | UE |
| SMAJ350A        | SMAJ350CA | 350.0                        | 391.00                             | 432.00  | 1          | 567.0                               | 0.7                           | 1                                   | TG                  | UG |
| SMAJ400A        | SMAJ400CA | 400.0                        | 447.00                             | 494.00  | 1          | 648.0                               | 0.6                           | 1                                   | TK                  | UK |
| SMAJ440A        | SMAJ440CA | 440.0                        | 492.00                             | 543.00  | 1          | 713.0                               | 0.6                           | 1                                   | TM                  | UM |

For bi-directional type having  $V_{RWM}$  of 10 Volts and less, the  $I_R$  limit is double

## Curve Characteristics

Fig. 1 - Peak Pulse Power Rating Curve

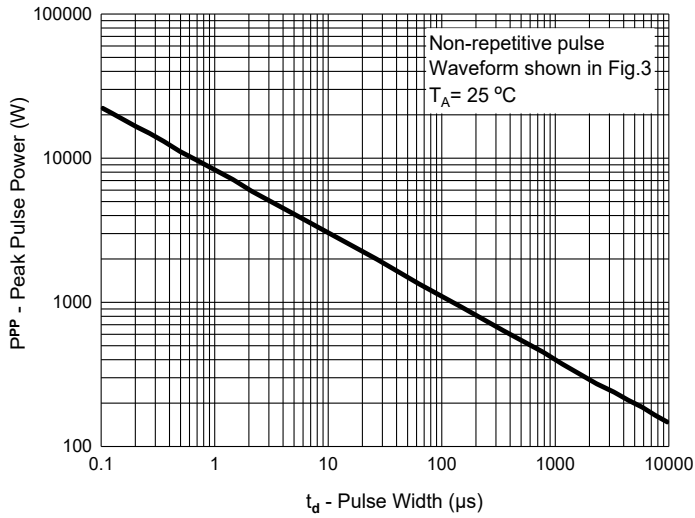


Fig. 2 - Typical Junction Capacitance

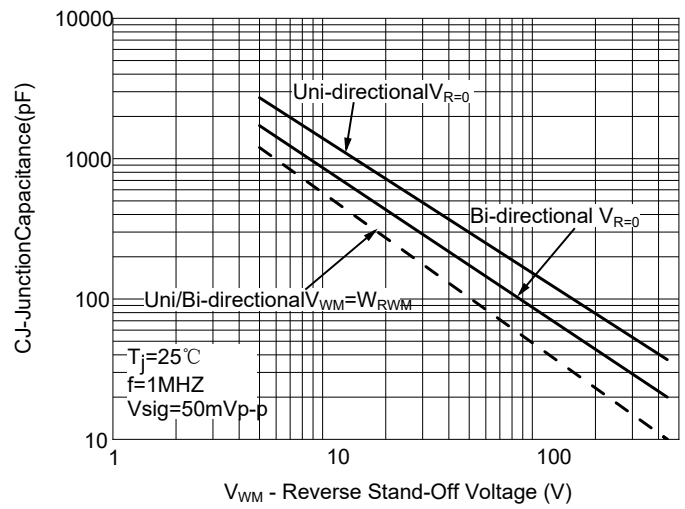


Fig. 3 - Pulse Waveform

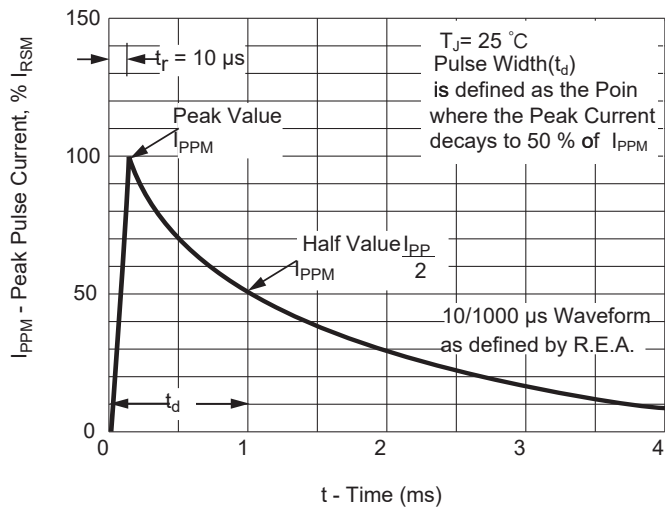


Fig. 4 - Pulse Derating Curve

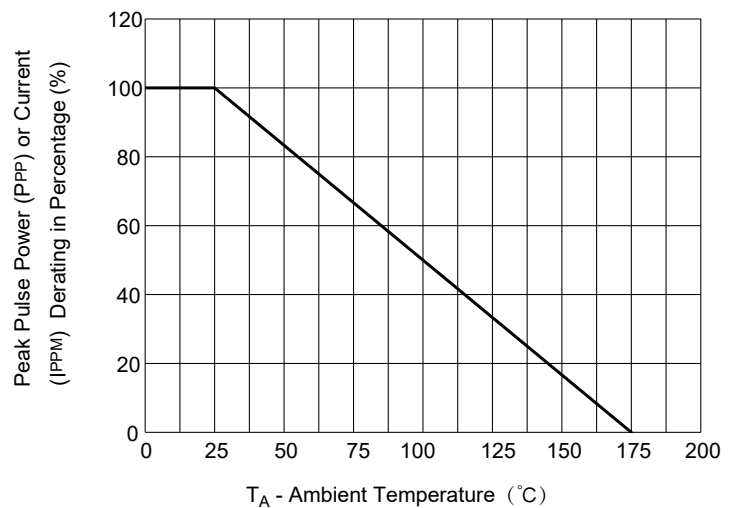
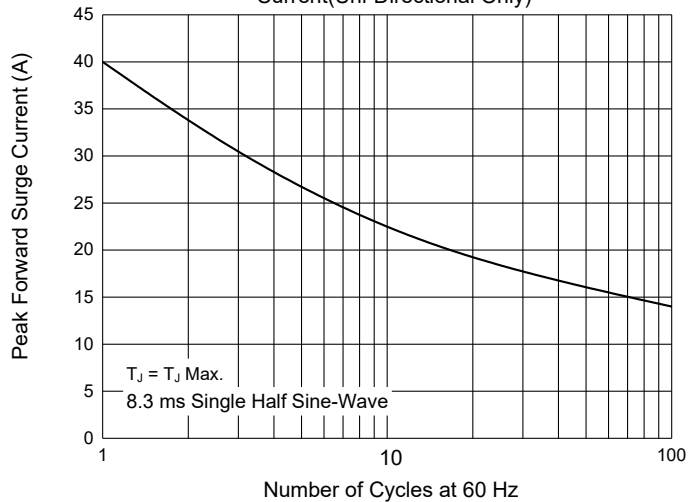


Fig. 5 - Maximum Non-Repetitive Peak Forward Surge Current (Uni-Directional Only)



## Ordering Information

| Device         | Packing              |
|----------------|----------------------|
| Part Number-TP | Tape&Reel:5Kpcs/Reel |

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