

## FEATURES

- | Low profile package
- | Ideal for automated placement
- | 400 Watt peak pulse power capability with a 10/1000µs waveform
- | For surface mounted applications to optimize board space
- | Excellent clamping capability
- | Very fast response time
- | Low incremental surge resistance



DO-214AC(SMA)



Uni-directional



Bi-directional

## APPLICATIONS

- | Power supply protection
- | Automotive application
- | Industrial application
- | Power management

## APPROVALS

|             |                                    |
|-------------|------------------------------------|
| <b>RoHS</b> | Compliance with 2011/65/EU         |
| <b>HF</b>   | Compliance with IEC61249-2-21:2003 |

## MAXIMUM RATINGS (T<sub>A</sub>=25°C)

| Parameter   | Symbol           | Value | Unit  |
|---|------------------|-------|-------|
| Peak Pulse Power Dissipation on 10/1000µs waveform (Note1, Note2).                        | P <sub>PPM</sub> | 400   | Watts |
| Steady State Power Dissipation at T <sub>L</sub> =75°C, Lead lengths.375"(9.5mm) ( Note2) | P <sub>D</sub>   | 3.3   | Watts |

- Notes :** 1.Non-repetitive current pulse,T<sub>A</sub>=25°C.  
 2.Mounted on 5.0mm x 5.0mm (0.03mm thick) Copper Pads to each terminal.

## THERMAL CONSIDERATIONS

| Parameter                              | Symbol           | Value       | Unit |
|--|------------------|-------------|------|
| Operating Junction Temperature         | T <sub>J</sub>   | -55 to +150 | °C   |
| Storage Temperature Range              | T <sub>STG</sub> | -55 to +150 | °C   |
| Junction to Ambient on printed circuit | R <sub>θJA</sub> | 120         | °C/W |

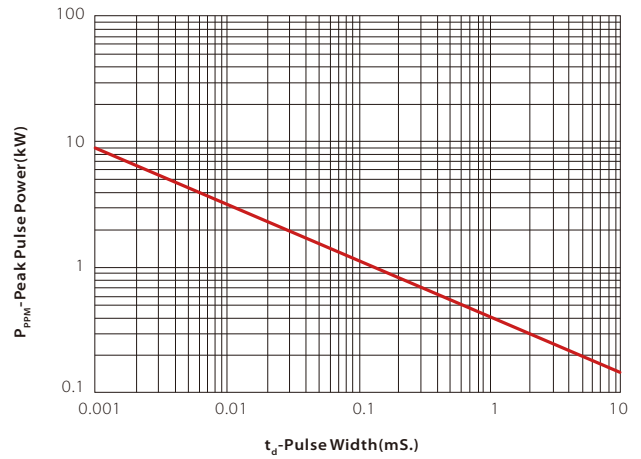
## ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25°C)

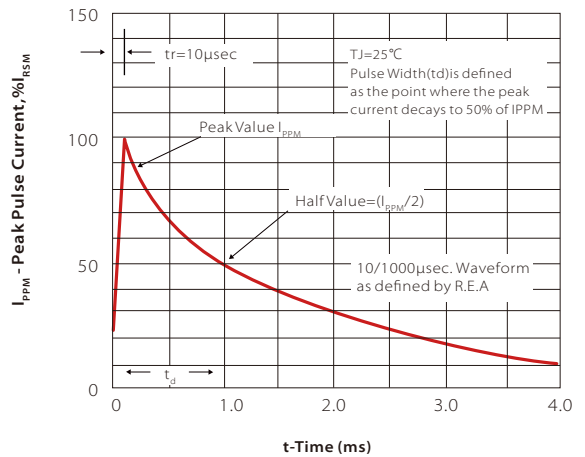
| Part Number |           | Device Marking Code |      | Reverse Stand-off Voltage | Breakdown Voltage Min.@I <sub>T</sub> | Breakdown Voltage Max.@I <sub>T</sub> | Test Current        | Maximum Clamping Voltage @I <sub>PP</sub> | Peak Pulse Current  | Reverse Leakage @V <sub>RWM</sub> |
|-------------|-----------|---------------------|------|---------------------------|---------------------------------------|---------------------------------------|---------------------|---|---------------------|-----------------------------------|
| Uni-Polar   | Bi-Polar  | Uni                 | Bi   | V <sub>RWM</sub> (V)      | V <sub>BR</sub> (V)                   | V <sub>BR</sub> (V)                   | I <sub>T</sub> (mA) | V <sub>C</sub> (V)                        | I <sub>PP</sub> (A) | I <sub>R</sub> (uA)               |
| SMAJ3.3A    | SMAJ3.3CA | 3V3                 | 3V3C | 3.3                       | 5.2                                   | 6.0                                   | 10                  | 8.3                                       | 50.0                | 800                               |
| SMAJ5.0A    | SMAJ5.0CA | AE                  | WE   | 5.0                       | 6.4                                   | 7.0                                   | 10                  | 9.2                                       | 43.5                | 800                               |
| SMAJ6.0A    | SMAJ6.0CA | AG                  | WG   | 6.0                       | 6.67                                  | 7.37                                  | 10                  | 10.3                                      | 38.8                | 800                               |
| SMAJ6.5A    | SMAJ6.5CA | AK                  | WK   | 6.5                       | 7.22                                  | 7.98                                  | 10                  | 11.2                                      | 35.7                | 500                               |
| SMAJ7.0A    | SMAJ7.0CA | AM                  | WM   | 7.0                       | 7.78                                  | 8.6                                   | 10                  | 12.0                                      | 33.3                | 200                               |
| SMAJ7.5A    | SMAJ7.5CA | AP                  | WP   | 7.5                       | 8.33                                  | 9.21                                  | 1                   | 12.9                                      | 31.0                | 100                               |
| SMAJ8.0A    | SMAJ8.0CA | AR                  | WR   | 8.0                       | 8.89                                  | 9.83                                  | 1                   | 13.6                                      | 29.4                | 50                                |
| SMAJ8.5A    | SMAJ8.5CA | AT                  | WT   | 8.5                       | 9.44                                  | 10.4                                  | 1                   | 14.4                                      | 27.8                | 20                                |
| SMAJ9.0A    | SMAJ9.0CA | AV                  | WV   | 9.0                       | 10.0                                  | 11.1                                  | 1                   | 15.4                                      | 26.0                | 10                                |
| SMAJ10A     | SMAJ10CA  | AX                  | WX   | 10.0                      | 11.1                                  | 12.3                                  | 1                   | 17.0                                      | 23.5                | 5                                 |
| SMAJ11A     | SMAJ11CA  | AZ                  | WZ   | 11.0                      | 12.2                                  | 13.5                                  | 1                   | 18.2                                      | 22.0                | 1                                 |
| SMAJ12A     | SMAJ12CA  | BE                  | XE   | 12.0                      | 13.3                                  | 14.7                                  | 1                   | 19.9                                      | 20.1                | 1                                 |
| SMAJ13A     | SMAJ13CA  | BG                  | XG   | 13.0                      | 14.4                                  | 15.9                                  | 1                   | 21.5                                      | 18.6                | 1                                 |
| SMAJ14A     | SMAJ14CA  | BK                  | XK   | 14.0                      | 15.6                                  | 17.2                                  | 1                   | 23.2                                      | 17.2                | 1                                 |
| SMAJ15A     | SMAJ15CA  | BM                  | XM   | 15.0                      | 16.7                                  | 18.5                                  | 1                   | 24.4                                      | 16.4                | 1                                 |
| SMAJ16A     | SMAJ16CA  | BP                  | XP   | 16.0                      | 17.8                                  | 19.7                                  | 1                   | 26.0                                      | 15.4                | 1                                 |
| SMAJ17A     | SMAJ17CA  | BR                  | XR   | 17.0                      | 18.9                                  | 20.9                                  | 1                   | 27.6                                      | 14.5                | 1                                 |
| SMAJ18A     | SMAJ18CA  | BT                  | XT   | 18.0                      | 20.0                                  | 22.1                                  | 1                   | 29.2                                      | 13.7                | 1                                 |
| SMAJ20A     | SMAJ20CA  | BV                  | XV   | 20.0                      | 22.2                                  | 24.5                                  | 1                   | 32.4                                      | 12.3                | 1                                 |
| SMAJ22A     | SMAJ22CA  | BX                  | XX   | 22.0                      | 24.4                                  | 26.9                                  | 1                   | 35.5                                      | 11.3                | 1                                 |
| SMAJ24A     | SMAJ24CA  | BZ                  | XZ   | 24.0                      | 26.7                                  | 29.5                                  | 1                   | 38.9                                      | 10.3                | 1                                 |
| SMAJ26A     | SMAJ26CA  | CE                  | YE   | 26.0                      | 28.9                                  | 31.9                                  | 1                   | 42.1                                      | 9.5                 | 1                                 |
| SMAJ28A     | SMAJ28CA  | CG                  | YG   | 28.0                      | 31.1                                  | 34.4                                  | 1                   | 45.4                                      | 8.8                 | 1                                 |
| SMAJ30A     | SMAJ30CA  | CK                  | YK   | 30.0                      | 33.3                                  | 36.8                                  | 1                   | 48.4                                      | 8.3                 | 1                                 |
| SMAJ33A     | SMAJ33CA  | CM                  | YM   | 33.0                      | 36.7                                  | 40.6                                  | 1                   | 53.3                                      | 7.5                 | 1                                 |
| SMAJ36A     | SMAJ36CA  | CP                  | YP   | 36.0                      | 40.0                                  | 44.2                                  | 1                   | 58.1                                      | 6.9                 | 1                                 |
| SMAJ40A     | SMAJ40CA  | CR                  | YR   | 40.0                      | 44.4                                  | 49.1                                  | 1                   | 64.5                                      | 6.2                 | 1                                 |
| SMAJ43A     | SMAJ43CA  | CT                  | YT   | 43.0                      | 47.8                                  | 52.8                                  | 1                   | 69.4                                      | 5.8                 | 1                                 |
| SMAJ45A     | SMAJ45CA  | CV                  | YV   | 45.0                      | 50.0                                  | 55.3                                  | 1                   | 72.7                                      | 5.5                 | 1                                 |
| SMAJ48A     | SMAJ48CA  | CX                  | YX   | 48.0                      | 53.3                                  | 58.9                                  | 1                   | 77.4                                      | 5.2                 | 1                                 |
| SMAJ51A     | SMAJ51CA  | CZ                  | YZ   | 51.0                      | 56.7                                  | 62.7                                  | 1                   | 82.4                                      | 4.9                 | 1                                 |
| SMAJ54A     | SMAJ54CA  | RE                  | ZE   | 54.0                      | 60.0                                  | 66.3                                  | 1                   | 87.1                                      | 4.6                 | 1                                 |

| Part Number |           | Device Marking Code |    | Reverse Stand-off Voltage | Breakdown Voltage Min.@I <sub>T</sub> | Breakdown Voltage Max.@I <sub>T</sub> | Test Current        | Maximum Clamping Voltage @I <sub>PP</sub> | Peak Pulse Current  | Reverse Leakage @V <sub>RWM</sub> |
|-------------|-----------|---------------------|----|---------------------------|---------------------------------------|---------------------------------------|---------------------|---|---------------------|-----------------------------------|
| Uni-Polar   | Bi-Polar  | Uni                 | Bi | V <sub>RWM</sub> (V)      | V <sub>BR</sub> (V)                   | V <sub>BR</sub> (V)                   | I <sub>T</sub> (mA) | V <sub>C</sub> (V)                        | I <sub>PP</sub> (A) | I <sub>R</sub> (uA)               |
| SMAJ58A     | SMAJ58CA  | RG                  | ZG | 58.0                      | 64.4                                  | 71.2                                  | 1                   | 93.6                                      | 4.3                 | 1                                 |
| SMAJ60A     | SMAJ60CA  | RK                  | ZK | 60.0                      | 66.7                                  | 73.7                                  | 1                   | 96.8                                      | 4.1                 | 1                                 |
| SMAJ64A     | SMAJ64CA  | RM                  | ZM | 64.0                      | 71.1                                  | 78.6                                  | 1                   | 103.0                                     | 3.9                 | 1                                 |
| SMAJ70A     | SMAJ70CA  | RP                  | ZP | 70.0                      | 77.8                                  | 86.0                                  | 1                   | 113.0                                     | 3.5                 | 1                                 |
| SMAJ75A     | SMAJ75CA  | RR                  | ZR | 75.0                      | 83.3                                  | 92.1                                  | 1                   | 121.0                                     | 3.3                 | 1                                 |
| SMAJ78A     | SMAJ78CA  | RT                  | ZT | 78.0                      | 86.7                                  | 95.8                                  | 1                   | 126.0                                     | 3.2                 | 1                                 |
| SMAJ85A     | SMAJ85CA  | RV                  | ZV | 85.0                      | 94.4                                  | 104.0                                 | 1                   | 137.0                                     | 2.9                 | 1                                 |
| SMAJ90A     | SMAJ90CA  | RX                  | ZX | 90.0                      | 100.0                                 | 111.0                                 | 1                   | 146.0                                     | 2.7                 | 1                                 |
| SMAJ100A    | SMAJ100CA | RZ                  | ZZ | 100.0                     | 111.0                                 | 123.0                                 | 1                   | 162.0                                     | 2.5                 | 1                                 |
| SMAJ110A    | SMAJ110CA | SE                  | VE | 110.0                     | 122.0                                 | 135.0                                 | 1                   | 177.0                                     | 2.3                 | 1                                 |
| SMAJ120A    | SMAJ120CA | SG                  | VG | 120.0                     | 133.0                                 | 147.0                                 | 1                   | 193.0                                     | 2.1                 | 1                                 |
| SMAJ130A    | SMAJ130CA | SK                  | VK | 130.0                     | 144.0                                 | 159.0                                 | 1                   | 209.0                                     | 1.9                 | 1                                 |
| SMAJ150A    | SMAJ150CA | SM                  | VM | 150.0                     | 167.0                                 | 185.0                                 | 1                   | 243.0                                     | 1.6                 | 1                                 |
| SMAJ160A    | SMAJ160CA | SP                  | VP | 160.0                     | 178.0                                 | 197.0                                 | 1                   | 259.0                                     | 1.5                 | 1                                 |
| SMAJ170A    | SMAJ170CA | SR                  | VR | 170.0                     | 189.0                                 | 209.0                                 | 1                   | 275.0                                     | 1.5                 | 1                                 |
| SMAJ180A    | SMAJ180CA | ST                  | VT | 180.0                     | 201.0                                 | 222.0                                 | 1                   | 292.0                                     | 1.4                 | 1                                 |
| SMAJ200A    | SMAJ200CA | SV                  | VV | 200.0                     | 224.0                                 | 247.0                                 | 1                   | 324.0                                     | 1.2                 | 1                                 |
| SMAJ220A    | SMAJ220CA | SX                  | VX | 220.0                     | 246.0                                 | 272.0                                 | 1                   | 356.0                                     | 1.1                 | 1                                 |
| SMAJ250A    | SMAJ250CA | SZ                  | VZ | 250.0                     | 279.0                                 | 309.0                                 | 1                   | 405.0                                     | 1.0                 | 1                                 |
| SMAJ300A    | SMAJ300CA | TE                  | UE | 300.0                     | 335.0                                 | 371.0                                 | 1                   | 486.0                                     | 0.8                 | 1                                 |
| SMAJ350A    | SMAJ350CA | TG                  | UG | 350.0                     | 391.0                                 | 432.0                                 | 1                   | 567.0                                     | 0.7                 | 1                                 |
| SMAJ400A    | SMAJ400CA | TK                  | UK | 400.0                     | 447.0                                 | 494.0                                 | 1                   | 648.0                                     | 0.6                 | 1                                 |
| SMAJ440A    | SMAJ440CA | TM                  | UM | 440.0                     | 492.0                                 | 543.0                                 | 1                   | 713.0                                     | 0.6                 | 1                                 |
| SMAJ480A    | SMAJ480CA | TP                  | UP | 480.0                     | 536.5                                 | 592.9                                 | 1                   | 780.0                                     | 0.52                | 1                                 |
| SMAJ500A    | SMAJ500CA | TR                  | UR | 500.0                     | 558.0                                 | 618.0                                 | 1                   | 810.0                                     | 0.50                | 1                                 |
| SMAJ510A    | SMAJ510CA | TT                  | UT | 510.0                     | 575.2                                 | 628.4                                 | 1                   | 828.0                                     | 0.49                | 1                                 |
| SMAJ550A    | SMAJ550CA | TU                  | UU | 550.0                     | 614.0                                 | 680.0                                 | 1                   | 891.0                                     | 0.46                | 1                                 |
| SMAJ600A    | SMAJ600CA | TV                  | UV | 600.0                     | 670.0                                 | 741.0                                 | 1                   | 971.0                                     | 0.42                | 1                                 |

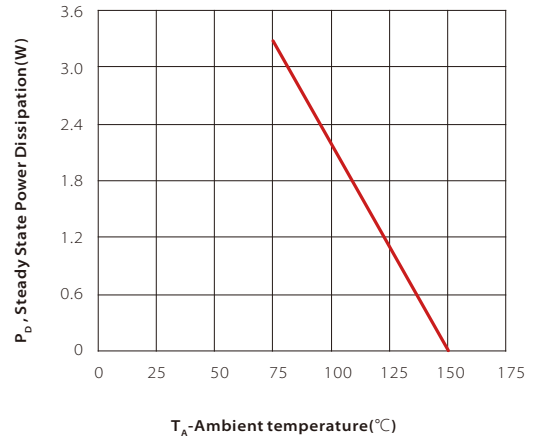
# CHARACTERISTIC CURVES

**TVS Transients Clamping Waveform**

**Peak Pulse Power Rating Curve**

**Pulse Derating Curve**

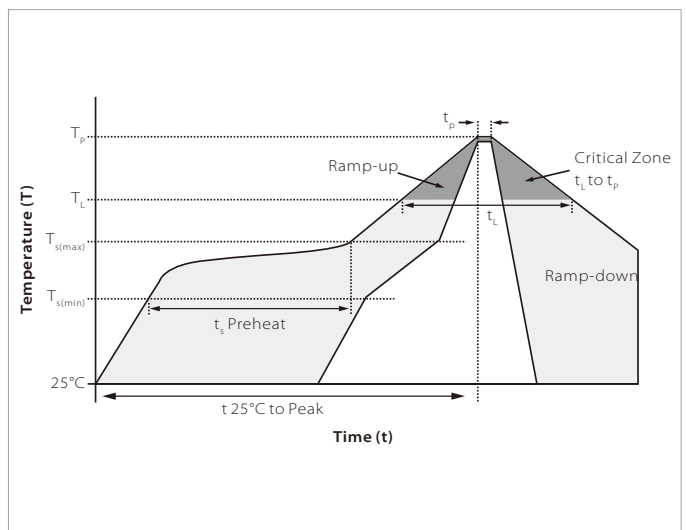
**Pulse Waveform**


**Typical Junction Capacitance**

**Steady State Power Dissipation Derating Curve**


## SOLDERING PARAMETERS

| Reflow Condition                                       |                                  | Lead-free assembly |
|--|----------------------------------|--------------------|
| Pre Heat   | Temperature Max ( $T_{s(min)}$ ) | 150°C              |
|  | Temperature Max ( $T_{s(max)}$ ) | 200°C              |
|  | Time (min to max) ( $t_s$ )      | 60 – 180 secs      |
| Average ramp up rate (Liquidus Temp ( $T_L$ ) to peak) |                                  | 3°C/second max     |
| $T_{s(max)}$ to $T_L$ - Ramp-up Rate                   |                                  | 3°C/second max     |
| Reflow   | Temperature ( $T_L$ ) (Liquidus) | 217°C              |
|  | Time (min to max) ( $t_r$ )      | 60 – 150 seconds   |
| Peak Temperature ( $T_p$ )                             |                                  | 260°C              |
| Time within 5°C of actual peak Temperature ( $t_p$ )   |                                  | 20 – 40 seconds    |
| Ramp-down Rate   |                                  | 6°C/second max     |
| Time 25°C to peak Temperature ( $T_p$ )                |                                  | 8 minutes max.     |
| Do not exceed  |                                  | 260°C              |



## DO-214AC(SMA) PACKAGE INFORMATION



| Ref. | Millimeters |      | Inches |       |
|------|-------------|------|--------|-------|
|      | Min.        | Max. | Min.   | Max.  |
| A    | 1.20        | 1.60 | 0.047  | 0.063 |
| B    | 4.20        | 4.60 | 0.165  | 0.181 |
| C    | 2.60        | 2.80 | 0.102  | 0.110 |
| D    | 2.10        | 2.40 | 0.083  | 0.094 |
| E    | 0.76        | 1.52 | 0.030  | 0.060 |
| F    | 0.02        | 0.20 | 0.001  | 0.008 |
| G    | 4.85        | 5.25 | 0.191  | 0.207 |
| H    | 0.15        | 0.30 | 0.006  | 0.012 |

## RECOMMENDED PAD LAYOUT DIMENSIONS



| Ref. | Millimeters |      | Inches   |       |
|------|-------------|------|----------|-------|
|      | Min.        | Max. | Min.     | Max.  |
| A    | 1.63        | -    | 0.064    | -     |
| B    | 1.45        | -    | 0.057    | -     |
| C    | -           | 2.80 | -        | 0.090 |
| D    | 1.45        | -    | 0.057    | -     |
| E    | 5.28REF     |      | 0.208REF |       |

## ORDERING INFORMATION

| Part Number | Component Package | QTY/Reel | Reel Size |
|-------------|-------------------|----------|-----------|
| SMAJxx(C)A  | DO-214AC(SMA)     | 5000PCS  | 13"       |

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