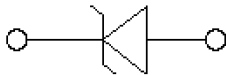
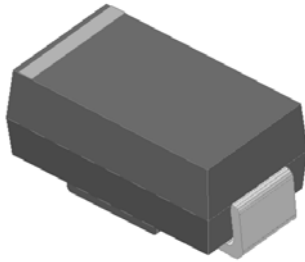
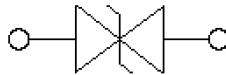
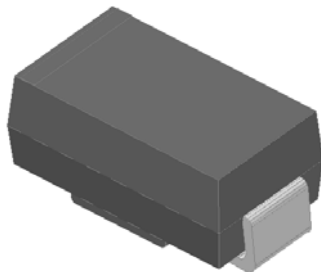


## Surface Mount Transient Voltage Suppressor Diodes

### Uni-directional



### Bi-directional



### Features

- For surface mounted applications
- Low-profile package
- Ideal for automated placement
- Available in Unidirectional and Bidirectional
- 400 W peak pulse power capability with a 10/1000  $\mu$ s waveform
- Low incremental surge resistance, excellent clamping capability
- Very fast response time
- High temperature soldering guaranteed: 260 °C/10 s at terminals
- Meets MSL level 1
- Component in accordance to RoHS

### Typical Applications

Use in sensitive electronics protection against voltage transients induced by inductive load switching and lighting on ICs, MOSFET, signal lines of sensor units for consumer, computer, industrial, telecommunication.

### Mechanical Data

- **Package:** DO-214AC (SMA)  
Molding compound meets UL 94 V-0 flammability rating, RoHS-compliant, halogen-free
- **Terminals:** Tin plated leads, solderable per J-STD-002 and JESD22-B102
- **Polarity:** For uni-directional types the band denotes cathode end, no marking on bi-directional types

### ■Maximum Ratings ( $T_a=25^\circ\text{C}$ Unless otherwise specified)

| PARAMETER                                                                                   | SYMBOL         | UNIT             | Max            |
|---------------------------------------------------------------------------------------------|----------------|------------------|----------------|
| Peak power dissipation, with a 10/1000us waveform <sup>(1) (2)</sup> (Fig.1)                | $P_{PPM}$      | W                | 400            |
| Peak pulse current, with a 10/1000us waveform <sup>(1)</sup>                                | $I_{PPM}$      | A                | See Next Table |
| Power dissipation, on infinite heat sink at $T_L=75^\circ\text{C}$                          | $P_D$          | W                | 1.0            |
| Peak forward surge current, 8.3 ms single half sine-wave unidirectional only <sup>(2)</sup> | $I_{FSM}$      | A                | 40             |
| Operating junction and storage temperature range                                            | $T_J, T_{STG}$ | $^\circ\text{C}$ | -55 to +150    |
| Electrostatic Discharge (IEC61000-4-2 air discharge)                                        | ESD            | KV               | $\pm 30$       |
| Electrostatic Discharge (IEC61000-4-2 contact discharge)                                    |                |                  |                |

### ■Electrical Characteristics ( $T_a=25^\circ\text{C}$ Unless otherwise specified)

| PARAMETER                                                                             | SYMBOL | UNIT | VALUE   |
|---------------------------------------------------------------------------------------|--------|------|---------|
| Maximum instantaneous forward voltage @ at 25A for unidirectional only <sup>(3)</sup> | $V_F$  | V    | 3.5/5.0 |
| Maximum instantaneous forward voltage @ at 1A for unidirectional only                 | $V_F$  | V    | 1.5     |



# SMAJ SERIES

## ■ Thermal Characteristics (T<sub>a</sub>=25°C Unless otherwise specified)

| PARAMETER                   | SYMBOL           | UNIT | Conditions          | VALUE |
|-----------------------------|------------------|------|---------------------|-------|
| Thermal resistance(Typical) | R <sub>θJL</sub> | °C/W | junction to lead    | 30    |
|                             | R <sub>θJA</sub> | °C/W | junction to ambient | 120   |

Notes:

- (1) Non-repetitive current pulse, per Fig. 3 and derated above T<sub>A</sub> = 25°C per Fig.2.
- (2) Thermal resistance from junction to ambient and from junction to lead mounted on P.C.B. with 0.2" x 0.2" (5.0 mm x 5.0 mm) copper pad areas
- (3) V<sub>F</sub><3.5V for devices of V<sub>BR</sub><200V and V<sub>F</sub><5.0V for devices of V<sub>BR</sub>>201V

## ■ Electrical Characteristics (T<sub>a</sub>=25°C Unless otherwise specified)

| Part Number<br>(Uni) | Part Number<br>(Bi) | Breakdown Voltage V <sub>BR</sub> @I <sub>T</sub> |         |                                    | Maximum<br>Reverse Leakage<br>I <sub>R</sub> <sup>(6)</sup> @ V <sub>RWM</sub><br>(μA) | Working Peak<br>Reverse Voltage<br>V <sub>RWM</sub> (V) | Maximum<br>Reverse Surge<br>Current I <sub>PP</sub> <sup>(5)</sup><br>(A) | Maximum<br>Clamping<br>Voltage V <sub>c</sub><br>@ I <sub>PP</sub><br>(V) |
|----------------------|---------------------|---------------------------------------------------|---------|------------------------------------|----------------------------------------------------------------------------------------|---------------------------------------------------------|---------------------------------------------------------------------------|---------------------------------------------------------------------------|
|                      |                     | Min(V)                                            | Max (V) | I <sub>T</sub> <sup>(4)</sup> (mA) |                                                                                        |                                                         |                                                                           |                                                                           |
| SMAJ5.0A             | SMAJ5.0CA           | 6.40                                              | 7.07    | 10                                 | 800                                                                                    | 5.0                                                     | 43.38                                                                     | 9.2                                                                       |
| SMAJ6.0A             | SMAJ6.0CA           | 6.67                                              | 7.37    | 10                                 | 800                                                                                    | 6.0                                                     | 38.83                                                                     | 10.3                                                                      |
| SMAJ6.5A             | SMAJ6.5CA           | 7.22                                              | 7.98    | 10                                 | 500                                                                                    | 6.5                                                     | 35.71                                                                     | 11.2                                                                      |
| SMAJ7.0A             | SMAJ7.0CA           | 7.78                                              | 8.60    | 10                                 | 200                                                                                    | 7.0                                                     | 33.33                                                                     | 12.0                                                                      |
| SMAJ7.5A             | SMAJ7.5CA           | 8.33                                              | 9.21    | 1                                  | 100                                                                                    | 7.5                                                     | 31.01                                                                     | 12.9                                                                      |
| SMAJ8.0A             | SMAJ8.0CA           | 8.89                                              | 9.83    | 1                                  | 50                                                                                     | 8.0                                                     | 29.41                                                                     | 13.6                                                                      |
| SMAJ8.5A             | SMAJ8.5CA           | 9.44                                              | 10.40   | 1                                  | 10                                                                                     | 8.5                                                     | 27.78                                                                     | 14.4                                                                      |
| SMAJ9.0A             | SMAJ9.0CA           | 10.00                                             | 11.10   | 1                                  | 5                                                                                      | 9.0                                                     | 25.97                                                                     | 15.4                                                                      |
| SMAJ10A              | SMAJ10CA            | 11.10                                             | 12.30   | 1                                  | 5                                                                                      | 10.0                                                    | 23.53                                                                     | 17.0                                                                      |
| SMAJ11A              | SMAJ11CA            | 12.20                                             | 13.50   | 1                                  | 5                                                                                      | 11.0                                                    | 21.98                                                                     | 18.2                                                                      |
| SMAJ12A              | SMAJ12CA            | 13.30                                             | 14.70   | 1                                  | 1                                                                                      | 12.0                                                    | 20.10                                                                     | 19.9                                                                      |
| SMAJ13A              | SMAJ13CA            | 14.40                                             | 15.90   | 1                                  | 1                                                                                      | 13.0                                                    | 18.60                                                                     | 21.5                                                                      |
| SMAJ14A              | SMAJ14CA            | 15.60                                             | 17.20   | 1                                  | 1                                                                                      | 14.0                                                    | 17.24                                                                     | 23.2                                                                      |
| SMAJ15A              | SMAJ15CA            | 16.70                                             | 18.50   | 1                                  | 1                                                                                      | 15.0                                                    | 16.39                                                                     | 24.4                                                                      |
| SMAJ16A              | SMAJ16CA            | 17.80                                             | 19.70   | 1                                  | 1                                                                                      | 16.0                                                    | 15.40                                                                     | 26.0                                                                      |
| SMAJ17A              | SMAJ17CA            | 18.90                                             | 20.90   | 1                                  | 1                                                                                      | 17.0                                                    | 14.49                                                                     | 27.6                                                                      |
| SMAJ18A              | SMAJ18CA            | 20.00                                             | 22.10   | 1                                  | 1                                                                                      | 18.0                                                    | 13.70                                                                     | 29.2                                                                      |
| SMAJ19A              | SMAJ19CA            | 21.10                                             | 23.30   | 1                                  | 1                                                                                      | 19.0                                                    | 13.00                                                                     | 30.8                                                                      |
| SMAJ20A              | SMAJ20CA            | 22.20                                             | 24.50   | 1                                  | 1                                                                                      | 20.0                                                    | 12.35                                                                     | 32.4                                                                      |
| SMAJ22A              | SMAJ22CA            | 24.40                                             | 26.90   | 1                                  | 1                                                                                      | 22.0                                                    | 11.27                                                                     | 35.5                                                                      |
| SMAJ24A              | SMAJ24CA            | 26.70                                             | 29.50   | 1                                  | 1                                                                                      | 24.0                                                    | 10.28                                                                     | 38.9                                                                      |
| SMAJ26A              | SMAJ26CA            | 28.90                                             | 31.90   | 1                                  | 1                                                                                      | 26.0                                                    | 9.50                                                                      | 42.1                                                                      |
| SMAJ28A              | SMAJ28CA            | 31.10                                             | 34.40   | 1                                  | 1                                                                                      | 28.0                                                    | 8.81                                                                      | 45.4                                                                      |
| SMAJ30A              | SMAJ30CA            | 33.3                                              | 36.8    | 1                                  | 1                                                                                      | 30.0                                                    | 8.26                                                                      | 48.4                                                                      |
| SMAJ33A              | SMAJ33CA            | 36.7                                              | 40.6    | 1                                  | 1                                                                                      | 33.0                                                    | 7.5                                                                       | 53.3                                                                      |
| SMAJ36A              | SMAJ36CA            | 40                                                | 44.2    | 1                                  | 1                                                                                      | 36.0                                                    | 6.88                                                                      | 58.1                                                                      |
| SMAJ40A              | SMAJ40CA            | 44.4                                              | 49.1    | 1                                  | 1                                                                                      | 40.0                                                    | 6.2                                                                       | 64.5                                                                      |
| SMAJ43A              | SMAJ43CA            | 47.8                                              | 52.8    | 1                                  | 1                                                                                      | 43.0                                                    | 5.76                                                                      | 69.4                                                                      |
| SMAJ45A              | SMAJ45CA            | 50                                                | 55.3    | 1                                  | 1                                                                                      | 45.0                                                    | 5.5                                                                       | 72.7                                                                      |
| SMAJ48A              | SMAJ48CA            | 53.3                                              | 58.9    | 1                                  | 1                                                                                      | 48.0                                                    | 5.17                                                                      | 77.4                                                                      |
| SMAJ51A              | SMAJ51CA            | 56.7                                              | 62.7    | 1                                  | 1                                                                                      | 51.0                                                    | 4.85                                                                      | 82.4                                                                      |
| SMAJ54A              | SMAJ54CA            | 60                                                | 66.3    | 1                                  | 1                                                                                      | 54.0                                                    | 4.59                                                                      | 87.1                                                                      |



# SMAJ SERIES

## ■Electrical Characteristics (T<sub>a</sub>=25℃ Unless otherwise specified)

| Part Number<br>(Uni) | Part Number<br>(Bi) | Breakdown Voltage V <sub>BR</sub> @I <sub>T</sub> |         |                                    | Maximum<br>Reverse Leakage<br>I <sub>R</sub> <sup>(6)</sup> @ V <sub>RWM</sub><br>(μA) | Working Peak<br>Reverse Voltage<br>V <sub>RWM</sub> (V) | Maximum<br>Reverse Surge<br>Current I <sub>PP</sub> <sup>(5)</sup><br>(A) | Maximum<br>Clamping<br>Voltage V <sub>c</sub><br>@ I <sub>PP</sub><br>(V) |
|----------------------|---------------------|---------------------------------------------------|---------|------------------------------------|----------------------------------------------------------------------------------------|---------------------------------------------------------|---------------------------------------------------------------------------|---------------------------------------------------------------------------|
|                      |                     | Min(V)                                            | Max (V) | I <sub>T</sub> <sup>(4)</sup> (mA) |                                                                                        |                                                         |                                                                           |                                                                           |
| SMAJ58A              | SMAJ58CA            | 64.4                                              | 71.2    | 1                                  | 1                                                                                      | 58.0                                                    | 4.27                                                                      | 93.6                                                                      |
| SMAJ60A              | SMAJ60CA            | 66.7                                              | 73.7    | 1                                  | 1                                                                                      | 60.0                                                    | 4.13                                                                      | 96.8                                                                      |
| SMAJ64A              | SMAJ64CA            | 71.1                                              | 78.6    | 1                                  | 1                                                                                      | 64.0                                                    | 3.88                                                                      | 103                                                                       |
| SMAJ70A              | SMAJ70CA            | 77.8                                              | 86      | 1                                  | 1                                                                                      | 70.0                                                    | 3.54                                                                      | 113                                                                       |
| SMAJ75A              | SMAJ75CA            | 83.3                                              | 92.1    | 1                                  | 1                                                                                      | 75.0                                                    | 3.31                                                                      | 121                                                                       |
| SMAJ78A              | SMAJ78CA            | 86.7                                              | 95.8    | 1                                  | 1                                                                                      | 78.0                                                    | 3.17                                                                      | 126                                                                       |
| SMAJ80A              | SMAJ80CA            | 88.8                                              | 97.6    | 1                                  | 1                                                                                      | 80.0                                                    | 3.09                                                                      | 129                                                                       |
| SMAJ85A              | SMAJ85CA            | 94.4                                              | 104     | 1                                  | 1                                                                                      | 85.0                                                    | 2.92                                                                      | 137                                                                       |
| SMAJ90A              | SMAJ90CA            | 100                                               | 111     | 1                                  | 1                                                                                      | 90.0                                                    | 2.74                                                                      | 146                                                                       |
| SMAJ100A             | SMAJ100CA           | 111                                               | 123     | 1                                  | 1                                                                                      | 100.0                                                   | 2.47                                                                      | 162                                                                       |
| SMAJ110A             | SMAJ110CA           | 122                                               | 135     | 1                                  | 1                                                                                      | 110.0                                                   | 2.26                                                                      | 177                                                                       |
| SMAJ120A             | SMAJ120CA           | 133                                               | 147     | 1                                  | 1                                                                                      | 120.0                                                   | 2.07                                                                      | 193                                                                       |
| SMAJ130A             | SMAJ130CA           | 144                                               | 159     | 1                                  | 1                                                                                      | 130.0                                                   | 1.91                                                                      | 209                                                                       |
| SMAJ140A             | SMAJ140CA           | 155                                               | 171     | 1                                  | 1                                                                                      | 140.0                                                   | 1.76                                                                      | 226.8                                                                     |
| SMAJ150A             | SMAJ150CA           | 167                                               | 185     | 1                                  | 1                                                                                      | 150.0                                                   | 1.65                                                                      | 243                                                                       |
| SMAJ160A             | SMAJ160CA           | 178                                               | 197     | 1                                  | 1                                                                                      | 160.0                                                   | 1.54                                                                      | 259                                                                       |
| SMAJ170A             | SMAJ170CA           | 189                                               | 209     | 1                                  | 1                                                                                      | 170.0                                                   | 1.45                                                                      | 275                                                                       |
| SMAJ180A             | SMAJ180CA           | 200                                               | 220     | 1                                  | 1                                                                                      | 180.0                                                   | 1.37                                                                      | 291.6                                                                     |
| SMAJ190A             | SMAJ190CA           | 211                                               | 232     | 1                                  | 1                                                                                      | 190.0                                                   | 1.3                                                                       | 307.8                                                                     |
| SMAJ200A             | SMAJ200CA           | 224                                               | 247     | 1                                  | 1                                                                                      | 200.0                                                   | 1.23                                                                      | 324                                                                       |
| SMAJ220A             | SMAJ220CA           | 246                                               | 272     | 1                                  | 1                                                                                      | 220.0                                                   | 1.12                                                                      | 356                                                                       |
| SMAJ250A             | SMAJ250CA           | 279                                               | 309     | 1                                  | 1                                                                                      | 250.0                                                   | 0.99                                                                      | 405                                                                       |
| SMAJ300A             | SMAJ300CA           | 335                                               | 371     | 1                                  | 1                                                                                      | 300.0                                                   | 0.82                                                                      | 486                                                                       |
| SMAJ350A             | SMAJ350CA           | 391                                               | 432     | 1                                  | 1                                                                                      | 350.0                                                   | 0.71                                                                      | 567                                                                       |
| SMAJ400A             | SMAJ400CA           | 447                                               | 494     | 1                                  | 1                                                                                      | 400.0                                                   | 0.62                                                                      | 648                                                                       |
| SMAJ440A             | SMAJ440CA           | 492                                               | 543     | 1                                  | 1                                                                                      | 440.0                                                   | 0.56                                                                      | 713                                                                       |

(4) Pulse test: t<sub>p</sub>≤50ms

(5) Surge current waveform per Fig. 3 and derated per Fig.2.

(6) For bi-directional types having V<sub>RWM</sub> of 10 V and less, the I<sub>R</sub> limit is doubled.

## ■ Characteristics (Typical)

FIG1:Peak Pulse Power Rating Curve

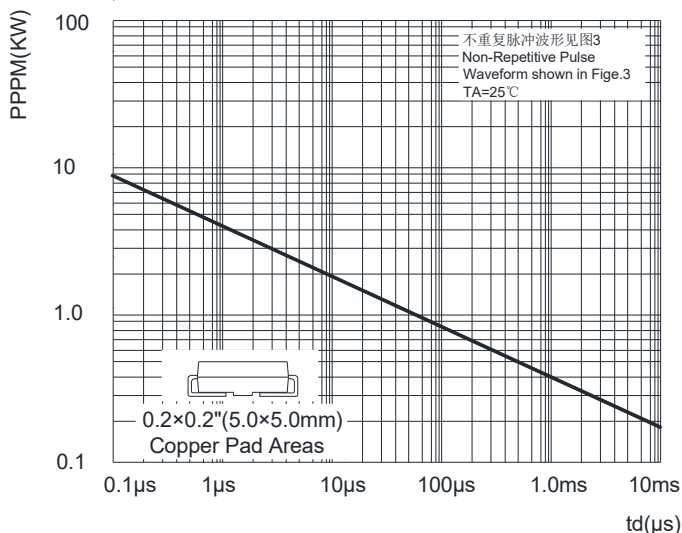
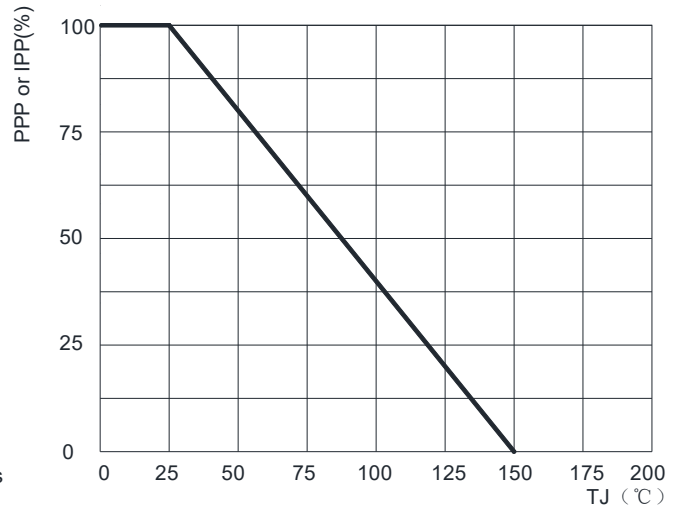


FIG2: Pulse Power or Current vs. Initial Junction Temperature





## SMAJ SERIES

FIG3: Pulse Waveform

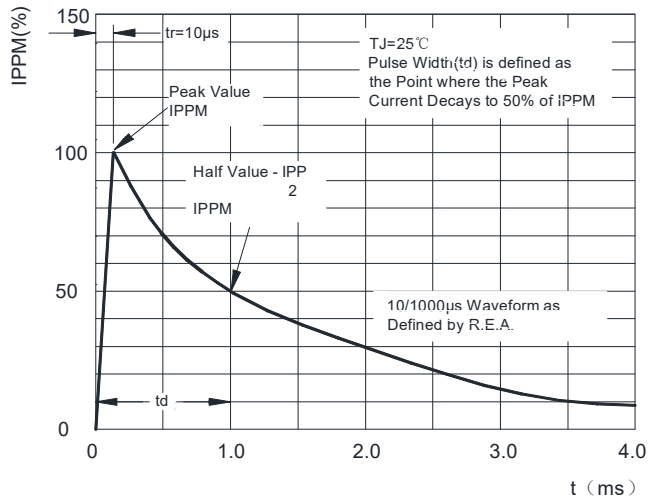


FIG4: Typical Transient Thermal Impedance

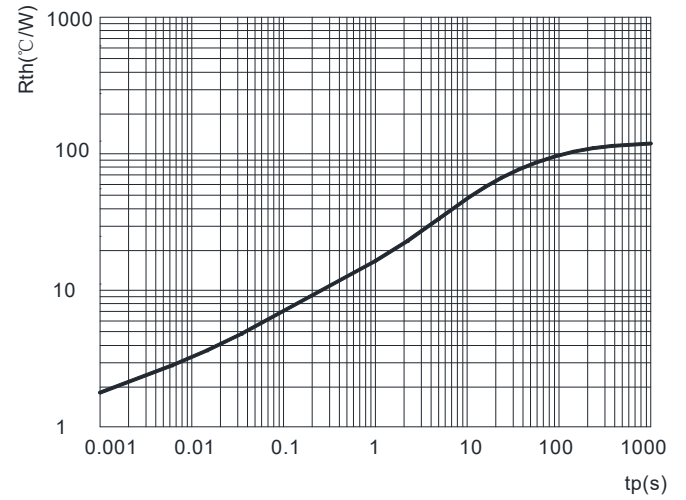
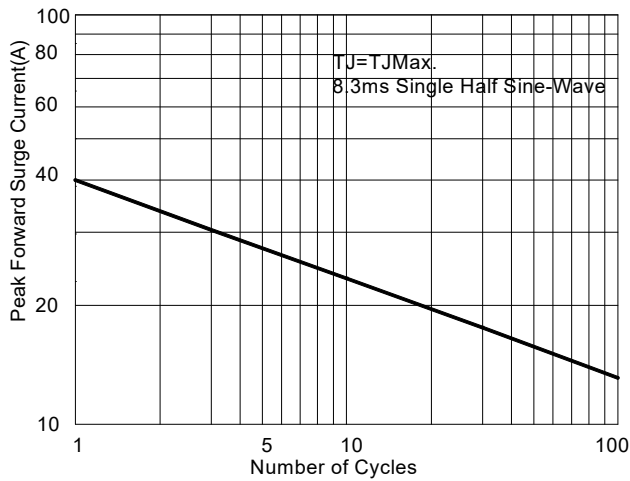


FIG5: Maximum Non-Repetitive Surge Current



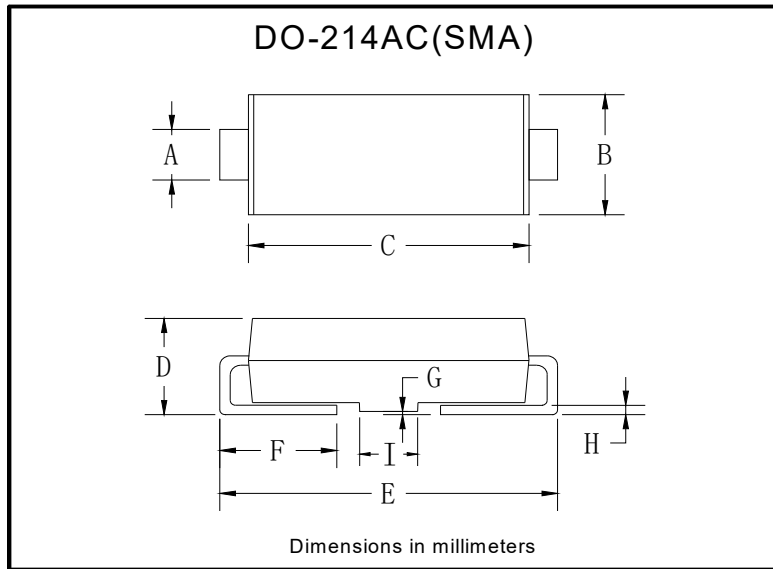
### ■ Ordering Information (Example)

| PREFERRED P/N | PACKAGE CODE | UNIT WEIGHT(g)    | MINIMUM PACKAGE(pcs) | INNER BOX QUANTITY(pcs) | OUTER CARTON QUANTITY(pcs) | DELIVERY MODE |
|---------------|--------------|-------------------|----------------------|-------------------------|----------------------------|---------------|
| SMAJ SERIES   | F1           | Approximate 0.059 | 5000                 | /                       | 80000                      | 13" reel      |
| SMAJ SERIES   | F2           | Approximate 0.059 | 7500                 | /                       | 120000                     | 13" reel      |
| SMAJ SERIES   | F3           | Approximate 0.059 | 7500                 | /                       | 60000                      | 13" reel      |
| SMAJ SERIES   | F4           | Approximate 0.059 | 1800                 | 7200                    | 57600                      | 7" reel       |
| SMAJ SERIES   | F5           | Approximate 0.059 | 2000                 | 8000                    | 64000                      | 7" reel       |
| SMAJ SERIES   | F6           | Approximate 0.059 | 5000                 | /                       | 100000                     | 13" reel      |



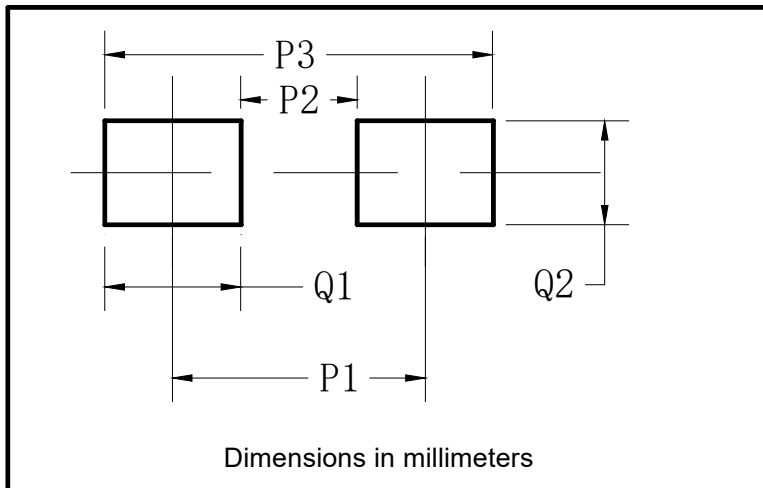
## SMAJ SERIES

### ■ Outline Dimensions



| DO-214AC(SMA) |      |      |
|---------------|------|------|
| Dim           | Min  | Max  |
| A             | 1.25 | 1.58 |
| B             | 2.40 | 2.83 |
| C             | 4.00 | 4.75 |
| D             | 1.90 | 2.30 |
| E             | 4.93 | 5.28 |
| F             | 0.76 | 1.41 |
| G             | 0.05 | 0.20 |
| H             | 0.15 | 0.31 |
| I             | 1.70 | 2.10 |

### ■Suggested Pad Layout



| DO-214AC(SMA) |             |
|---------------|-------------|
| Dim           | Millimeters |
| P1            | 4.00        |
| P2            | 1.50        |
| P3            | 6.50        |
| Q1            | 2.50        |
| Q2            | 1.70        |



## SMAJ SERIES

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