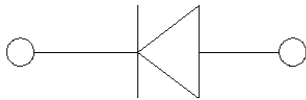
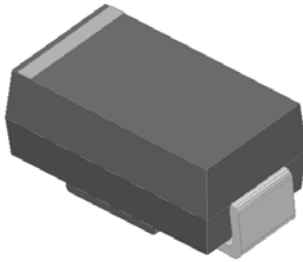
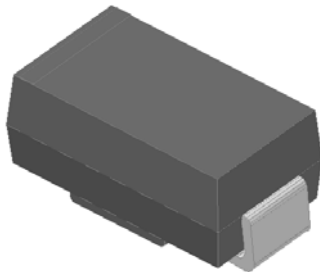


Surface Mount Transient Voltage Suppressor Diodes

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 μ 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 2002/95/EC and WEEE 2002/96/EC

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 (1) (2) (Fig.1) | P_{PPM} | W | 400 |
| Peak pulse current, with a 10/1000us waveform (1) | 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 (2) | I_{FSM} | A | 40 |
| Operating junction and storage temperature range | T_J, T_{STG} | $^\circ\text{C}$ | -55 to +150 |

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

| PARAMETER | SYMBOL | UNIT | VALUE |
|--|--------|------|---------|
| Maximum instantaneous forward voltage @ at 25A for unidirectional only (3) | 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_A=25°C Unless otherwise specified)

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

Notes:

- (1) Non-repetitive current pulse, per Fig. 3 and derated above T_A = 25°C per Fig.2.
- (2) Mounted on 0.2 x 0.2" (5.0 x 5.0 mm) copper pads to each terminal
- (3) V_F<3.5V for devices of V_{BR}<200V and V_F<5.0V for devices of V_{BR}>201V

■ Electrical Characteristics (T_A=25°C Unless otherwise specified)

| Part Number (Uni) | Part Number (Bi) | Breakdown Voltage V _{BR} @I _T | | | Maximum Reverse Leakage I _R ⁽⁶⁾ @ V _{RWM} (μA) | Working Peak Reverse Voltage V _{RWM} (V) | Maximum Reverse Surge Current I _{PP} ⁽⁵⁾ (A) | Maximum Clamping Voltage V _c @ I _{PP} (V) |
|-------------------|------------------|---|---------|------------------------------------|---|---|--|---|
| | | Min(V) | Max (V) | I _T ⁽⁴⁾ (mA) | | | | |
| SMAJ5.0 | SMAJ5.0C | 6.40 | 7.30 | 10 | 800 | 5.0 | 41.67 | 9.6 |
| SMAJ5.0A | SMAJ5.0CA | 6.40 | 7.07 | 10 | 800 | 5.0 | 43.38 | 9.2 |
| SMAJ6.0 | SMAJ6.0C | 6.67 | 8.15 | 10 | 800 | 6.0 | 35.09 | 11.4 |
| SMAJ6.0A | SMAJ6.0CA | 6.67 | 7.37 | 10 | 800 | 6.0 | 38.83 | 10.3 |
| SMAJ6.5 | SMAJ6.5C | 7.22 | 8.82 | 10 | 500 | 6.5 | 32.52 | 12.3 |
| SMAJ6.5A | SMAJ6.5CA | 7.22 | 7.98 | 10 | 500 | 6.5 | 35.71 | 11.2 |
| SMAJ7.0 | SMAJ7.0C | 7.78 | 9.51 | 10 | 200 | 7.0 | 30.08 | 13.3 |
| SMAJ7.0A | SMAJ7.0CA | 7.78 | 8.60 | 10 | 200 | 7.0 | 33.33 | 12.0 |
| SMAJ7.5 | SMAJ7.5C | 8.33 | 10.20 | 1 | 100 | 7.5 | 27.97 | 14.3 |
| SMAJ7.5A | SMAJ7.5CA | 8.33 | 9.21 | 1 | 100 | 7.5 | 31.01 | 12.9 |
| SMAJ8.0 | SMAJ8.0C | 8.89 | 10.90 | 1 | 50 | 8.0 | 26.67 | 15.0 |
| SMAJ8.0A | SMAJ8.0CA | 8.89 | 9.83 | 1 | 50 | 8.0 | 29.41 | 13.6 |
| SMAJ8.5 | SMAJ8.5C | 9.44 | 11.50 | 1 | 10 | 8.5 | 25.16 | 15.9 |
| SMAJ8.5A | SMAJ8.5CA | 9.44 | 10.40 | 1 | 10 | 8.5 | 27.78 | 14.4 |
| SMAJ9.0 | SMAJ9.0C | 10.00 | 12.20 | 1 | 5 | 9.0 | 23.67 | 16.9 |
| SMAJ9.0A | SMAJ9.0CA | 10.00 | 11.10 | 1 | 5 | 9.0 | 25.97 | 15.4 |
| SMAJ10 | SMAJ10C | 11.10 | 13.60 | 1 | 5 | 10.0 | 21.28 | 18.8 |
| SMAJ10A | SMAJ10CA | 11.10 | 12.30 | 1 | 5 | 10.0 | 23.53 | 17.0 |
| SMAJ11 | SMAJ11C | 12.20 | 14.90 | 1 | 5 | 11.0 | 19.90 | 20.1 |
| SMAJ11A | SMAJ11CA | 12.20 | 13.50 | 1 | 5 | 11.0 | 21.98 | 18.2 |
| SMAJ12 | SMAJ12C | 13.30 | 16.30 | 1 | 5 | 12.0 | 18.18 | 22.0 |
| SMAJ12A | SMAJ12CA | 13.30 | 14.70 | 1 | 5 | 12.0 | 20.10 | 19.9 |
| SMAJ13 | SMAJ13C | 14.40 | 17.60 | 1 | 5 | 13.0 | 16.81 | 23.8 |
| SMAJ13A | SMAJ13CA | 14.40 | 15.90 | 1 | 5 | 13.0 | 18.60 | 21.5 |
| SMAJ14 | SMAJ14C | 15.60 | 19.10 | 1 | 5 | 14.0 | 15.50 | 25.8 |
| SMAJ14A | SMAJ14CA | 15.60 | 17.20 | 1 | 5 | 14.0 | 17.24 | 23.2 |
| SMAJ15 | SMAJ15C | 16.70 | 20.40 | 1 | 5 | 15.0 | 14.87 | 26.9 |
| SMAJ15A | SMAJ15CA | 16.70 | 18.50 | 1 | 5 | 15.0 | 16.39 | 24.4 |



SMAJ SERIES

■Electrical Characteristics (T_a=25°C Unless otherwise specified)

| Part Number (Uni) | Part Number (Bi) | Breakdown Voltage V _{BR} @I _T | | | Maximum Reverse Leakage I _R ⁽⁶⁾ @ V _{RWM} (μA) | Working Peak Reverse Voltage V _{RWM} (V) | Maximum Reverse Surge Current I _{PP} ⁽⁵⁾ (A) | Maximum Clamping Voltage V _c @ I _{PP} (V) |
|----------------------|---------------------|---|---------|------------------------------------|--|---|---|---|
| | | Min(V) | Max (V) | I _T ⁽⁴⁾ (mA) | | | | |
| SMAJ16 | SMAJ16C | 17.80 | 21.80 | 1 | 5 | 16.0 | 13.89 | 28.8 |
| SMAJ16A | SMAJ16CA | 17.80 | 19.70 | 1 | 5 | 16.0 | 15.40 | 26.0 |
| SMAJ17 | SMAJ17C | 18.90 | 23.10 | 1 | 5 | 17.0 | 13.11 | 30.5 |
| SMAJ17A | SMAJ17CA | 18.90 | 20.90 | 1 | 5 | 17.0 | 14.49 | 27.6 |
| SMAJ18 | SMAJ18C | 20.00 | 24.40 | 1 | 5 | 18.0 | 12.42 | 32.2 |
| SMAJ18A | SMAJ18CA | 20.00 | 22.10 | 1 | 5 | 18.0 | 13.70 | 29.2 |
| SMAJ19 | SMAJ19C | 21.10 | 25.70 | 1 | 5 | 19.0 | 11.76 | 34.0 |
| SMAJ19A | SMAJ19CA | 21.10 | 23.30 | 1 | 5 | 19.0 | 13.00 | 30.8 |
| SMAJ20 | SMAJ20C | 22.20 | 27.10 | 1 | 5 | 20.0 | 11.17 | 35.8 |
| SMAJ20A | SMAJ20CA | 22.20 | 24.50 | 1 | 5 | 20.0 | 12.35 | 32.4 |
| SMAJ22 | SMAJ22C | 24.40 | 29.80 | 1 | 5 | 22.0 | 10.15 | 39.4 |
| SMAJ22A | SMAJ22CA | 24.40 | 26.90 | 1 | 5 | 22.0 | 11.27 | 35.5 |
| SMAJ24 | SMAJ24C | 26.70 | 32.60 | 1 | 5 | 24.0 | 9.30 | 43.0 |
| SMAJ24A | SMAJ24CA | 26.70 | 29.50 | 1 | 5 | 24.0 | 10.28 | 38.9 |
| SMAJ26 | SMAJ26C | 28.90 | 35.30 | 1 | 5 | 26.0 | 8.58 | 46.6 |
| SMAJ26A | SMAJ26CA | 28.90 | 31.90 | 1 | 5 | 26.0 | 9.50 | 42.1 |
| SMAJ28 | SMAJ28C | 31.10 | 38.00 | 1 | 5 | 28.0 | 8.00 | 50.0 |
| SMAJ28A | SMAJ28CA | 31.10 | 34.40 | 1 | 5 | 28.0 | 8.81 | 45.4 |
| SMAJ30 | SMAJ30C | 33.30 | 40.70 | 1 | 5 | 30.0 | 7.48 | 53.5 |
| SMAJ30A | SMAJ30CA | 33.30 | 36.80 | 1 | 5 | 30.0 | 8.26 | 48.4 |
| SMAJ33 | SMAJ33C | 36.70 | 44.90 | 1 | 5 | 33.0 | 6.78 | 59.0 |
| SMAJ33A | SMAJ33CA | 36.70 | 40.60 | 1 | 5 | 33.0 | 7.50 | 53.3 |
| SMAJ36 | SMAJ36C | 40.00 | 48.90 | 1 | 5 | 36.0 | 6.22 | 64.3 |
| SMAJ36A | SMAJ36CA | 40.00 | 44.20 | 1 | 5 | 36.0 | 6.88 | 58.1 |
| SMAJ40 | SMAJ40C | 44.40 | 54.30 | 1 | 5 | 40.0 | 5.60 | 71.4 |
| SMAJ40A | SMAJ40CA | 44.40 | 49.10 | 1 | 5 | 40.0 | 6.20 | 64.5 |
| SMAJ43 | SMAJ43C | 47.80 | 58.40 | 1 | 5 | 43.0 | 5.22 | 76.7 |
| SMAJ43A | SMAJ43CA | 47.80 | 52.80 | 1 | 5 | 43.0 | 5.76 | 69.4 |
| SMAJ45 | SMAJ45C | 50.00 | 61.10 | 1 | 5 | 45.0 | 4.98 | 80.3 |
| SMAJ45A | SMAJ45CA | 50.00 | 55.30 | 1 | 5 | 45.0 | 5.50 | 72.7 |
| SMAJ48 | SMAJ48C | 53.30 | 65.10 | 1 | 5 | 48.0 | 4.68 | 85.5 |
| SMAJ48A | SMAJ48CA | 53.30 | 58.90 | 1 | 5 | 48.0 | 5.17 | 77.4 |
| SMAJ51 | SMAJ51C | 56.70 | 69.30 | 1 | 5 | 51.0 | 4.39 | 91.1 |
| SMAJ51A | SMAJ51CA | 56.70 | 62.70 | 1 | 5 | 51.0 | 4.85 | 82.4 |
| SMAJ54 | SMAJ54C | 60.00 | 73.30 | 1 | 5 | 54.0 | 4.15 | 96.3 |
| SMAJ54A | SMAJ54CA | 60.00 | 66.30 | 1 | 5 | 54.0 | 4.59 | 87.1 |
| SMAJ58 | SMAJ58C | 64.40 | 78.70 | 1 | 5 | 58.0 | 3.88 | 103.0 |
| SMAJ58A | SMAJ58CA | 64.40 | 71.20 | 1 | 5 | 58.0 | 4.27 | 93.6 |
| SMAJ60 | SMAJ60C | 66.70 | 81.50 | 1 | 5 | 60.0 | 3.74 | 107.0 |
| SMAJ60A | SMAJ60CA | 66.70 | 73.70 | 1 | 5 | 60.0 | 4.13 | 96.8 |



SMAJ SERIES

■Electrical Characteristics (T_a=25°C Unless otherwise specified)

| Part Number(Uni) | Part Number(Bi) | Breakdown Voltage V _{BR} @I _T | | | Maximum Reverse Leakage I _R ⁽⁶⁾ @ V _{RWM} (μA) | Working Peak Reverse Voltage V _{RWM} (V) | Maximum Reverse Surge Current I _{PP} ⁽⁵⁾ (A) | Maximum Clamping Voltage V _c @ I _{PP} (V) |
|------------------|-----------------|---|---------|------------------------------------|---|---|--|---|
| | | Min(V) | Max (V) | I _T ⁽⁴⁾ (mA) | | | | |
| SMAJ64 | SMAJ64C | 71.10 | 86.90 | 1 | 5 | 64.0 | 3.51 | 114.0 |
| SMAJ64A | SMAJ64CA | 71.10 | 78.60 | 1 | 5 | 64.0 | 3.88 | 103.0 |
| SMAJ70 | SMAJ70C | 77.80 | 95.10 | 1 | 5 | 70.0 | 3.20 | 125.0 |
| SMAJ70A | SMAJ70CA | 77.80 | 86.00 | 1 | 5 | 70.0 | 3.54 | 113.0 |
| SMAJ75 | SMAJ75C | 83.30 | 102.00 | 1 | 5 | 75.0 | 2.99 | 134.0 |
| SMAJ75A | SMAJ75CA | 83.30 | 92.10 | 1 | 5 | 75.0 | 3.31 | 121.0 |
| SMAJ78 | SMAJ78C | 86.70 | 106.00 | 1 | 5 | 78.0 | 2.88 | 139.0 |
| SMAJ78A | SMAJ78CA | 86.70 | 95.80 | 1 | 5 | 78.0 | 3.17 | 126.0 |
| SMAJ80 | SMAJ80C | 88.90 | 108.80 | 1 | 5 | 80.0 | 2.79 | 143.2 |
| SMAJ80A | SMAJ80CA | 88.80 | 97.60 | 1 | 5 | 80.0 | 3.09 | 129.0 |
| SMAJ85 | SMAJ85C | 94.40 | 115.00 | 1 | 5 | 85.0 | 2.65 | 151.0 |
| SMAJ85A | SMAJ85CA | 94.40 | 104.00 | 1 | 5 | 85.0 | 2.92 | 137.0 |
| SMAJ90 | SMAJ90C | 100.00 | 122.00 | 1 | 5 | 90.0 | 2.50 | 160.0 |
| SMAJ90A | SMAJ90CA | 100.00 | 111.00 | 1 | 5 | 90.0 | 2.74 | 146.0 |
| SMAJ100 | SMAJ100C | 111.00 | 136.00 | 1 | 5 | 100.0 | 2.23 | 179.0 |
| SMAJ100A | SMAJ100CA | 111.00 | 123.00 | 1 | 5 | 100.0 | 2.47 | 162.0 |
| SMAJ110 | SMAJ110C | 122.00 | 149.00 | 1 | 5 | 110.0 | 2.04 | 196.0 |
| SMAJ110A | SMAJ110CA | 122.00 | 135.00 | 1 | 5 | 110.0 | 2.26 | 177.0 |
| SMAJ120 | SMAJ120C | 133.00 | 163.00 | 1 | 5 | 120.0 | 1.87 | 214.0 |
| SMAJ120A | SMAJ120CA | 133.00 | 147.00 | 1 | 5 | 120.0 | 2.07 | 193.0 |
| SMAJ130 | SMAJ130C | 144.00 | 176.00 | 1 | 5 | 130.0 | 1.73 | 231.0 |
| SMAJ130A | SMAJ130CA | 144.00 | 159.00 | 1 | 5 | 130.0 | 1.91 | 209.0 |
| SMAJ140 | SMAJ140C | 155.00 | 190.00 | 1 | 5 | 140.0 | 1.60 | 250.6 |
| SMAJ140A | SMAJ140CA | 155.00 | 171.00 | 1 | 5 | 140.0 | 1.76 | 226.8 |
| SMAJ150 | SMAJ150C | 167.00 | 204.00 | 1 | 5 | 150.0 | 1.49 | 268.0 |
| SMAJ150A | SMAJ150CA | 167.00 | 185.00 | 1 | 5 | 150.0 | 1.65 | 243.0 |
| SMAJ160 | SMAJ160C | 178.00 | 218.00 | 1 | 5 | 160.0 | 1.39 | 287.0 |
| SMAJ160A | SMAJ160CA | 178.00 | 197.00 | 1 | 5 | 160.0 | 1.54 | 259.0 |
| SMAJ170 | SMAJ170C | 189.00 | 231.00 | 1 | 5 | 170.0 | 1.32 | 304.0 |
| SMAJ170A | SMAJ170CA | 189.00 | 209.00 | 1 | 5 | 170.0 | 1.45 | 275.0 |
| SMAJ180 | SMAJ180C | 200.00 | 244.00 | 1 | 5 | 180.0 | 1.24 | 322.2 |
| SMAJ180A | SMAJ180CA | 200.00 | 220.00 | 1 | 5 | 180.0 | 1.37 | 291.6 |
| SMAJ190 | SMAJ190C | 211.00 | 258.00 | 1 | 5 | 190.0 | 1.18 | 340.1 |
| SMAJ190A | SMAJ190CA | 211.00 | 232.00 | 1 | 5 | 190.0 | 1.30 | 307.8 |
| SMAJ200A | SMAJ200CA | 224.00 | 247.00 | 1 | 1 | 200.0 | 1.23 | 324.0 |
| SMAJ220A | SMAJ220CA | 246.00 | 272.00 | 1 | 1 | 220.0 | 1.12 | 356.0 |
| SMAJ250A | SMAJ250CA | 279.00 | 309.00 | 1 | 1 | 250.0 | 0.99 | 405.0 |
| SMAJ300A | SMAJ300CA | 335.00 | 371.00 | 1 | 1 | 300.0 | 0.82 | 486.0 |
| SMAJ350A | SMAJ350CA | 391.00 | 432.00 | 1 | 1 | 350.0 | 0.71 | 567.0 |
| SMAJ400A | SMAJ400CA | 447.00 | 494.00 | 1 | 1 | 400.0 | 0.62 | 648.0 |
| SMAJ440A | SMAJ440CA | 492.00 | 543.00 | 1 | 1 | 440.0 | 0.56 | 713.0 |



SMAJ SERIES

Notes:

- (4) Pulse test: $t_p \leq 50\text{ms}$
- (5) Surge current waveform per Fig. 3 and derated per Fig.2.
- (6) For bi-directional types having V_{RWM} of 10 V and less, the I_R limit is doubled.

■ Characteristics (Typical)

FIG1: Peak Pulse Power Rating Curve

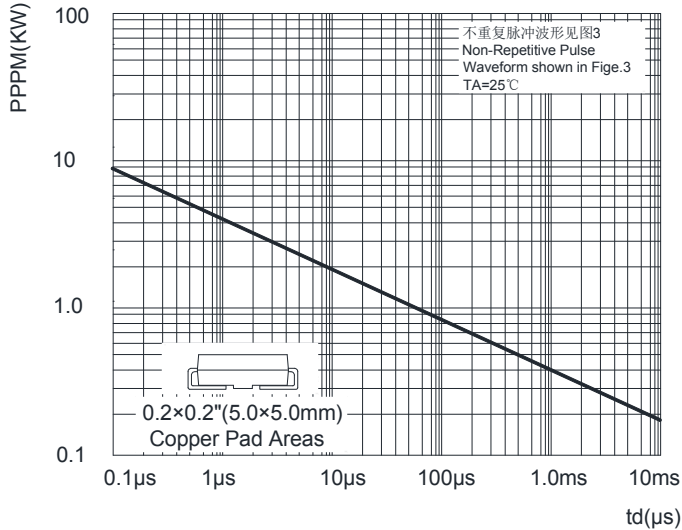


FIG2: Pulse Power or Current vs. Initial Junction Temperature

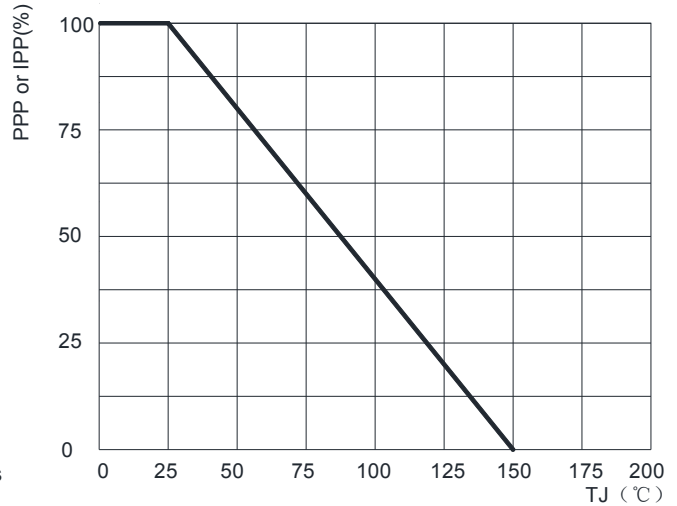


FIG3: Pulse Waveform

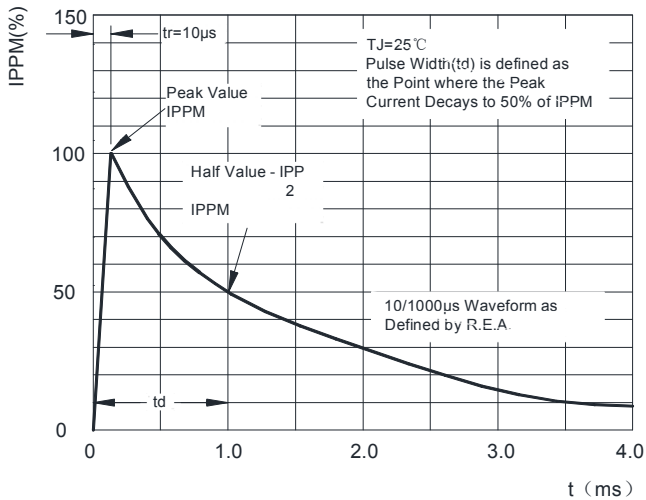


FIG4: Typical Transient Thermal Impedance

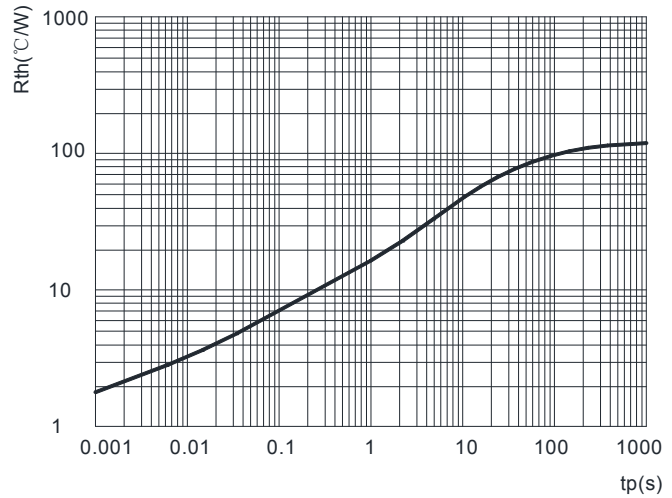
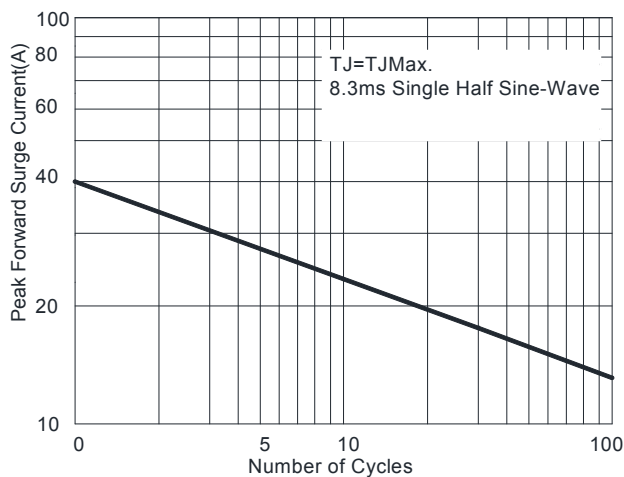


FIG5: Maximum Non-Repetitive Surge Current



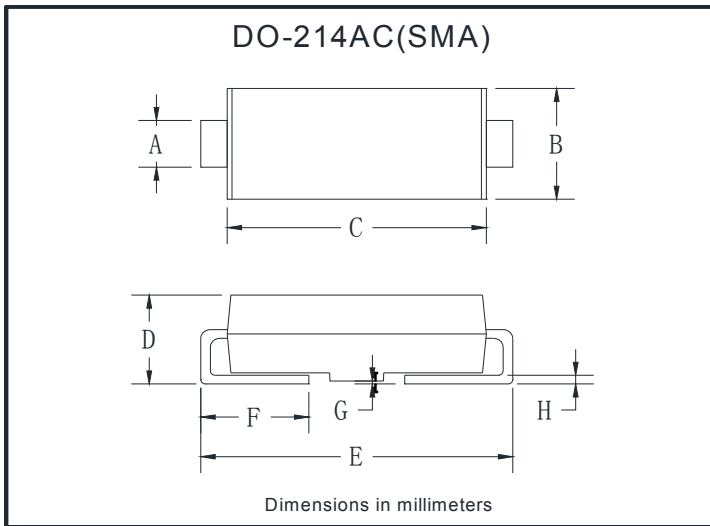


SMAJ SERIES

Ordering Information (Example)

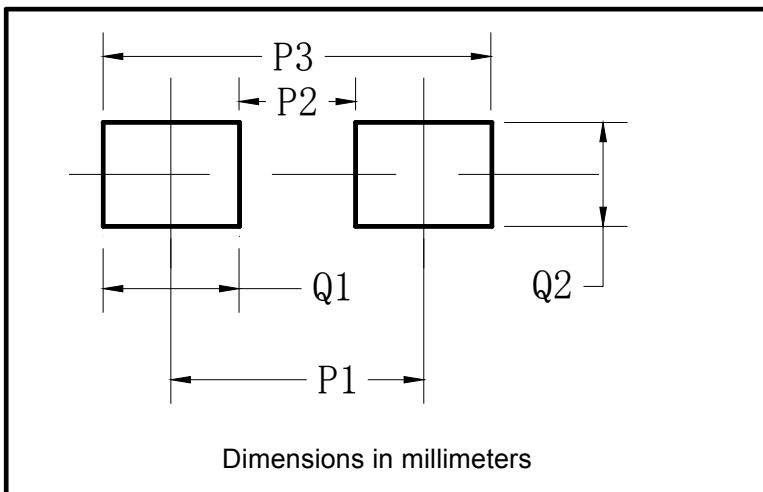
| PREFERRED P/N | PACKAGE CODE | UNIT WEIGHT(g) | MINIMUM PACKAGE(pcs) | INNER BOX QUANTITY(pcs) | OUTER CARTON QUANTITY(pcs) | DELIVERY MODE |
|---------------|--------------|-------------------|----------------------|-------------------------|----------------------------|---------------|
| SMAJ SERIES | F1 | Approximate 0.059 | 5000 | 10000 | 80000 | 13" reel |
| SMAJ SERIES | F2 | Approximate 0.059 | 7500 | 15000 | 120000 | 13" reel |
| SMAJ SERIES | F3 | Approximate 0.059 | 7500 | 15000 | 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 | 10000 | 100000 | 13" reel |

Outline Dimensions



| DO-214AC(SMA) | | |
|---------------|------|------|
| Dim | Min | Max |
| A | 1.25 | 1.58 |
| B | 2.40 | 2.83 |
| C | 4.25 | 4.75 |
| D | 1.90 | 2.30 |
| E | 4.93 | 5.28 |
| F | 0.76 | 1.41 |
| G | 0.08 | 0.20 |
| H | 0.15 | 0.31 |

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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[CPDUR24V-HF](#) [CPDQC5V0USP-HF](#) [CPDQC5V0-HF](#) [MPLAD30KP45CAE3](#) [MMBZ27VCLQ-7-F](#) [MMAD1108/TR13](#) [MPLAD30KP24A](#)
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[MPLAD30KP43CAE3](#) [SMAJ43A-TP](#) [D5V0F6U8LP33-7](#) [TVS5501V10MUT5G](#) [5.0SMLJ24CA-TP](#) [SMAJ110CA-TP](#) [MPLAD15KP75CAE3](#)
[MMAD1103e3/TR13](#) [DFLT40AQ-7](#)