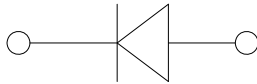
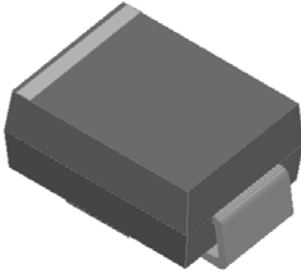


## Surface Mount Transient Voltage Suppressors

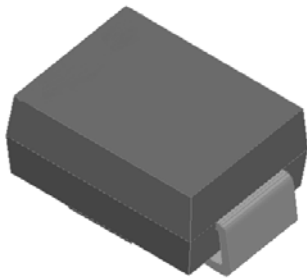
### Uni-directional



### Features

- Low profile package
- Ideal for automated placement
- Available in Uni-directional and Bi-directional
- 400 W peak pulse power capability with a 10/1000  $\mu$ s waveform
- Excellent clamping capability
- Very fast response time
- Low incremental surge resistance
- Meets MSL level 1, per J-STD-020, LF maximum peak of 260 °C
- ESD protection of data lines in accordance with IEC 61000-4-2, 30kV(Air), 30kV (Contact)
- Part no. with suffix "Q" means AEC-Q101 qualified

### Bi-directional



### Typical Applications

For 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, automotive, and 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)</sup> <sup>(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, $T_a=25^\circ\text{C}$   | $P_D$     | W                | 1.25           |
| Peak forward surge current, 8.3 ms single half sine-wave unidirectional only <sup>(2)</sup> | $I_{FSM}$ | A                | 40             |
| Operating junction  | $T_J$     | $^\circ\text{C}$ | -55 to +175    |
| Storage temperature range   | $T_{STG}$ | $^\circ\text{C}$ | -55 to +175    |

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

| PARAMETER   | SYMBOL | UNIT | VALUE |
|---|--------|------|-------|
| Maximum instantaneous forward voltage @ at 1A for unidirectional only | $V_F$  | V    | 1.5   |



# SMAJ5.0AQ THRU SMAJ190CAQ

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

| Part Number(Uni) | Part Number(Bi) | Breakdown Voltage V <sub>BR@IT</sub> |         |                                    | Maximum Reverse Leakage<br>I <sub>R@V<sub>RWM</sub></sub><br>(μA) | Working Peak Reverse Voltage<br>V <sub>RWM</sub> (V) | Maximum Reverse Surge Current I <sub>PP</sub> <sup>(4)</sup><br>(A) | Maximum Clamping Voltage V <sub>c</sub><br>@ I <sub>PP</sub><br>(V) |
|------------------|-----------------|--------------------------------------|---------|------------------------------------|---|--|---|---|
|                  |                 | Min(V)                               | Max (V) | I <sub>T</sub> <sup>(3)</sup> (mA) |   |  |   |   |
| SMAJ5.0AQ        | SMAJ5.0CAQ      | 6.40                                 | 7.07    | 10                                 | 800   | 5.0  | 43.4  | 9.2   |
| SMAJ6.0AQ        | SMAJ6.0CAQ      | 6.67                                 | 7.37    | 10                                 | 800   | 6.0  | 38.8  | 10.3  |
| SMAJ6.5AQ        | SMAJ6.5CAQ      | 7.22                                 | 7.98    | 10                                 | 500   | 6.5  | 35.7  | 11.2  |
| SMAJ7.0AQ        | SMAJ7.0CAQ      | 7.78                                 | 8.60    | 10                                 | 200   | 7.0  | 33.3  | 12.0  |
| SMAJ7.5AQ        | SMAJ7.5CAQ      | 8.33                                 | 9.21    | 1                                  | 100   | 7.5  | 31.0  | 12.9  |
| SMAJ8.0AQ        | SMAJ8.0CAQ      | 8.89                                 | 9.83    | 1                                  | 50  | 8.0  | 29.4  | 13.6  |
| SMAJ8.5AQ        | SMAJ8.5CAQ      | 9.44                                 | 10.40   | 1                                  | 10  | 8.5  | 27.8  | 14.4  |
| SMAJ9.0AQ        | SMAJ9.0CAQ      | 10.00                                | 11.10   | 1                                  | 5   | 9.0  | 26.0  | 15.4  |
| SMAJ10AQ         | SMAJ10CAQ       | 11.10                                | 12.30   | 1                                  | 5   | 10.0   | 23.5  | 17.0  |
| SMAJ11AQ         | SMAJ11CAQ       | 12.20                                | 13.50   | 1                                  | 1   | 11.0   | 22.0  | 18.2  |
| SMAJ12AQ         | SMAJ12CAQ       | 13.30                                | 14.70   | 1                                  | 1   | 12.0   | 20.1  | 19.9  |
| SMAJ13AQ         | SMAJ13CAQ       | 14.40                                | 15.90   | 1                                  | 1   | 13.0   | 18.6  | 21.5  |
| SMAJ14AQ         | SMAJ14CAQ       | 15.60                                | 17.20   | 1                                  | 1   | 14.0   | 17.2  | 23.2  |
| SMAJ15AQ         | SMAJ15CAQ       | 16.70                                | 18.50   | 1                                  | 1   | 15.0   | 16.4  | 24.4  |
| SMAJ16AQ         | SMAJ16CAQ       | 17.80                                | 19.70   | 1                                  | 1   | 16.0   | 15.4  | 26.0  |
| SMAJ17AQ         | SMAJ17CAQ       | 18.90                                | 20.90   | 1                                  | 1   | 17.0   | 14.5  | 27.6  |
| SMAJ18AQ         | SMAJ18CAQ       | 20.00                                | 22.10   | 1                                  | 1   | 18.0   | 13.7  | 29.2  |
| SMAJ19AQ         | SMAJ19CAQ       | 21.10                                | 23.30   | 1                                  | 1   | 19.0   | 13.0  | 30.8  |
| SMAJ20AQ         | SMAJ20CAQ       | 22.20                                | 24.50   | 1                                  | 1   | 20.0   | 12.4  | 32.4  |
| SMAJ22AQ         | SMAJ22CAQ       | 24.40                                | 26.90   | 1                                  | 1   | 22.0   | 11.3  | 35.5  |
| SMAJ24AQ         | SMAJ24CAQ       | 26.70                                | 29.50   | 1                                  | 1   | 24.0   | 10.3  | 38.9  |
| SMAJ26AQ         | SMAJ26CAQ       | 28.90                                | 31.90   | 1                                  | 1   | 26.0   | 9.5   | 42.1  |
| SMAJ28AQ         | SMAJ28CAQ       | 31.10                                | 34.40   | 1                                  | 1   | 28.0   | 8.8   | 45.4  |
| SMAJ30AQ         | SMAJ30CAQ       | 33.30                                | 36.80   | 1                                  | 1   | 30.0   | 8.3   | 48.4  |
| SMAJ33AQ         | SMAJ33CAQ       | 36.70                                | 40.60   | 1                                  | 1   | 33.0   | 7.5   | 53.3  |
| SMAJ36AQ         | SMAJ36CAQ       | 40.00                                | 44.20   | 1                                  | 1   | 36.0   | 6.9   | 58.1  |
| SMAJ40AQ         | SMAJ40CAQ       | 44.40                                | 49.10   | 1                                  | 1   | 40.0   | 6.2   | 64.5  |
| SMAJ43AQ         | SMAJ43CAQ       | 47.80                                | 52.80   | 1                                  | 1   | 43.0   | 5.8   | 69.4  |
| SMAJ45AQ         | SMAJ45CAQ       | 50.00                                | 55.30   | 1                                  | 1   | 45.0   | 5.5   | 72.7  |
| SMAJ48AQ         | SMAJ48CAQ       | 53.30                                | 58.90   | 1                                  | 1   | 48.0   | 5.2   | 77.4  |
| SMAJ51AQ         | SMAJ51CAQ       | 56.70                                | 62.70   | 1                                  | 1   | 51.0   | 4.9   | 82.4  |
| SMAJ54AQ         | SMAJ54CAQ       | 60.00                                | 66.30   | 1                                  | 1   | 54.0   | 4.6   | 87.1  |
| SMAJ58AQ         | SMAJ58CAQ       | 64.40                                | 71.20   | 1                                  | 1   | 58.0   | 4.3   | 93.6  |
| SMAJ60AQ         | SMAJ60CAQ       | 66.70                                | 73.70   | 1                                  | 1   | 60.0   | 4.1   | 96.8  |
| SMAJ64AQ         | SMAJ64CAQ       | 71.10                                | 78.60   | 1                                  | 1   | 64.0   | 3.9   | 103.0   |
| SMAJ70AQ         | SMAJ70CAQ       | 77.80                                | 86.00   | 1                                  | 1   | 70.0   | 3.5   | 113.0   |
| SMAJ75AQ         | SMAJ75CAQ       | 83.30                                | 92.10   | 1                                  | 1   | 75.0   | 3.3   | 121.0   |
| SMAJ78AQ         | SMAJ78CAQ       | 86.70                                | 95.80   | 1                                  | 1   | 78.0   | 3.2   | 126.0   |
| SMAJ80AQ         | SMAJ80CAQ       | 88.80                                | 97.60   | 1                                  | 1   | 80.0   | 3.1   | 129.0   |
| SMAJ85AQ         | SMAJ85CAQ       | 94.40                                | 104.00  | 1                                  | 1   | 85.0   | 2.9   | 137.0   |
| SMAJ90AQ         | SMAJ90CAQ       | 100.00                               | 111.00  | 1                                  | 1   | 90.0   | 2.7   | 146.0   |
| SMAJ100AQ        | SMAJ100CAQ      | 111.00                               | 123.00  | 1                                  | 1   | 100.0  | 2.5   | 162.0   |
| SMAJ110AQ        | SMAJ110CAQ      | 122.00                               | 135.00  | 1                                  | 1   | 110.0  | 2.3   | 177.0   |
| SMAJ120AQ        | SMAJ120CAQ      | 133.00                               | 147.00  | 1                                  | 1   | 120.0  | 2.1   | 193.0   |
| SMAJ130AQ        | SMAJ130CAQ      | 144.00                               | 159.00  | 1                                  | 1   | 130.0  | 1.9   | 209.0   |
| SMAJ140AQ        | SMAJ140CAQ      | 155.00                               | 171.00  | 1                                  | 1   | 140.0  | 1.8   | 226.8   |
| SMAJ150AQ        | SMAJ150CAQ      | 167.00                               | 185.00  | 1                                  | 1   | 150.0  | 1.7   | 243.0   |
| SMAJ160AQ        | SMAJ160CAQ      | 178.00                               | 197.00  | 1                                  | 1   | 160.0  | 1.5   | 259.0   |
| SMAJ170AQ        | SMAJ170CAQ      | 189.00                               | 209.00  | 1                                  | 1   | 170.0  | 1.5   | 275.0   |
| SMAJ180AQ        | SMAJ180CAQ      | 200.00                               | 220.00  | 1                                  | 1   | 180.0  | 1.4   | 291.6   |
| SMAJ190AQ        | SMAJ190CAQ      | 211.00                               | 232.00  | 1                                  | 1   | 190.0  | 1.3   | 307.8   |



# SMAJ5.0AQ THRU SMAJ190CAQ

## ■ 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   |

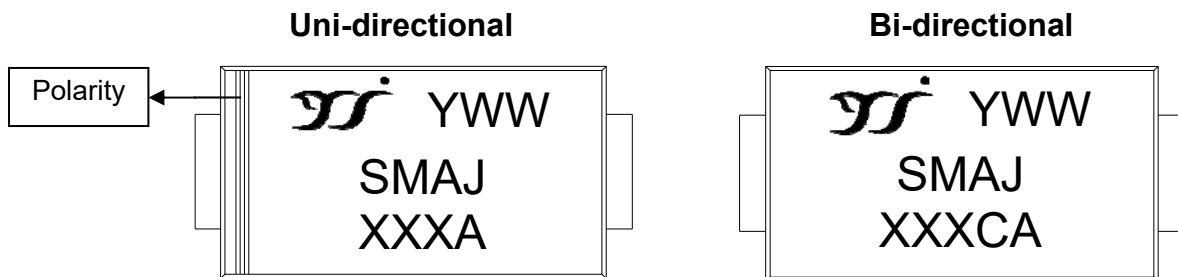
Notes:

- (1) Non-repetitive current pulse, per Fig.3 and derated above T<sub>j</sub> = 75°C per Fig.2.
- (2) Mounted on 0.2 x 0.2" (5.0 x 5.0 mm) copper pads to each terminal
- (3) Pulse test: t<sub>p</sub> ≤ 50ms
- (4) Surge current waveform per Fig. 3 and derated per Fig.2.

## ■ Ordering Information (Example)

| PREFERRED P/N | PACKAGE CODE | UNIT WEIGHT(g)    | MINIMUM PACKAGE(pcs) | OUTER CARTON QUANTITY(pcs) | DELIVERY MODE |
|---------------|--------------|-------------------|----------------------|----------------------------|---------------|
| SMAJ SERIES   | F2           | Approximate 0.067 | 7500                 | 120000                     | 13" reel      |

## ■ Marking Information



Note:

1. All marking is at middle of the product body
2. All marking is in laser printing
3. XXX is marking code, like 190A\190CA marking code is 190
4. Body color: Black
5. YWW is date code, "Y" is year. "WW" is week.

For instance:

The 17<sup>th</sup> week of 2021, date code is 117

The 17<sup>th</sup> week of 2022, date code is 217



# SMAJ5.0AQ THRU SMAJ190CAQ

## ■ Characteristics (Typical)

Fig.1 Peak Pulse Power Rating Curve

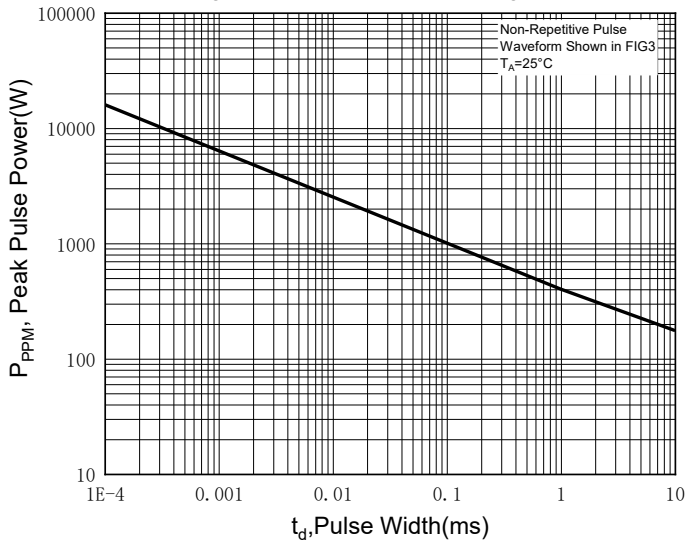


Fig.2 Pulse Power or Current vs. Initial Junction Temperature

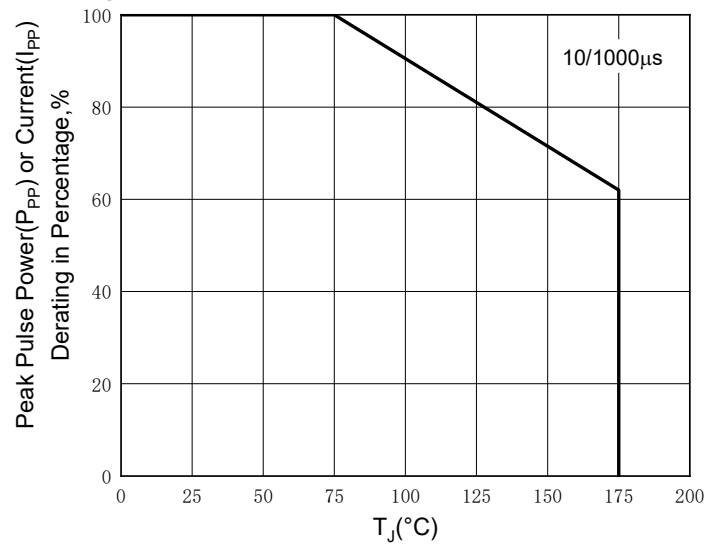


Fig.3 Pulse Waveform

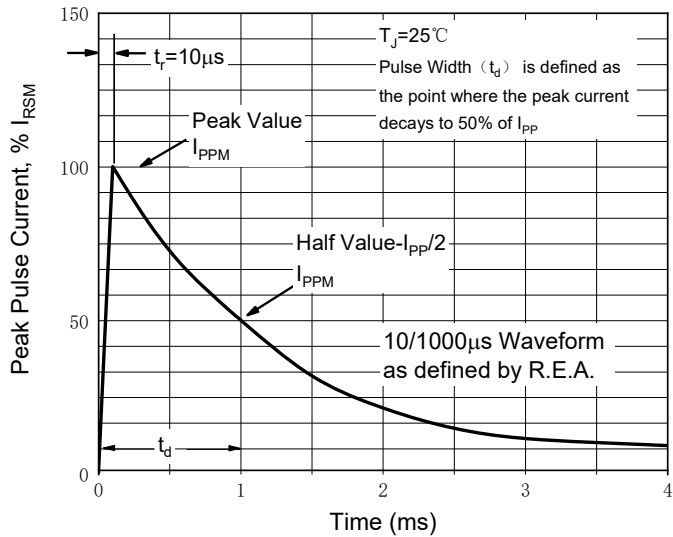


Fig.4 Typical Transient Thermal Impedance

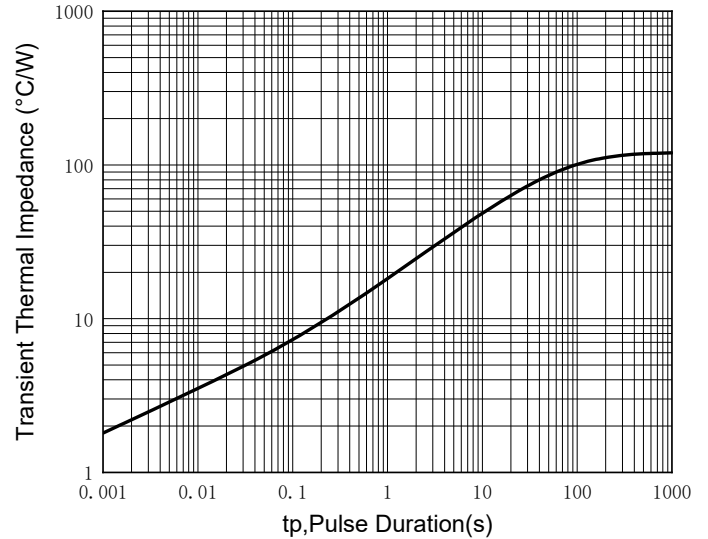
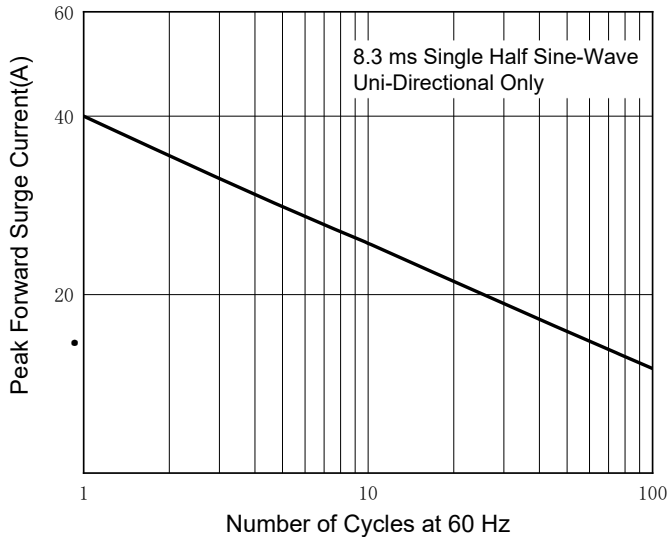


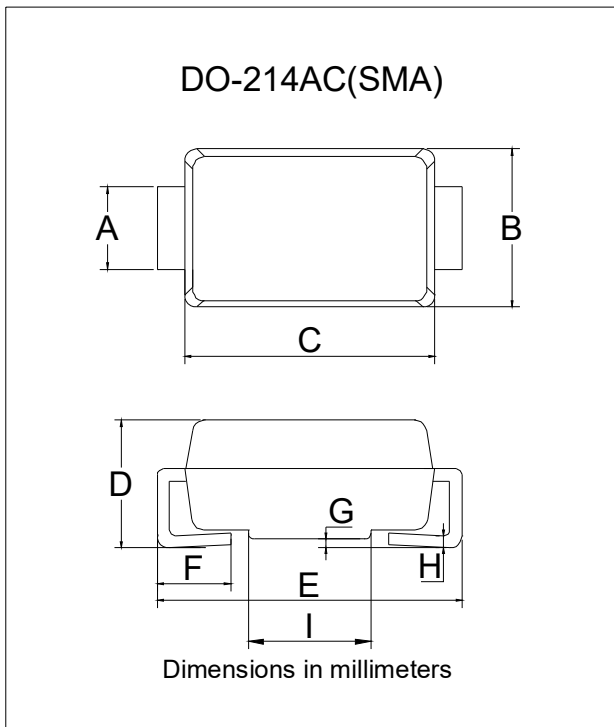
Fig.5 Maximum Non-Repetitive Forward Surge Current





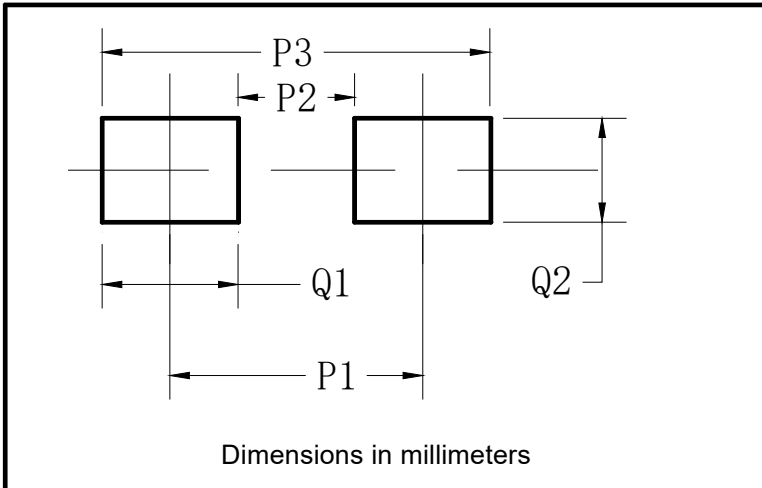
# SMAJ5.0AQ THRU SMAJ190CAQ

## ■ 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             | 1.7  | 2.1  |

## ■ Suggested Pad Layout



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



## SMAJ5.0AQ THRU SMAJ190CAQ

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[P6KE13CA](#) [P6KE43CA](#) [P6KE6.8CA](#) [P6KE8.2](#) [P6SMBJ20CA](#) [JANTX1N6072A](#) [SR2835ESKG](#) [SA90CA](#)