



**THE DATASHEET OF
SMAJ170CA-Q**





Features

- Surface Mount SMA package
- Standoff Voltage: 5 to 220 volts
- Power Dissipation: 400 watts
- RoHS compliant*
- AEC-Q101 compliant**

Applications

- Protection of power buses
- Protection of I/O interfaces
- Overvoltage transient protection
- Telecom, computer, industrial and consumer electronics applications

SMAJ-Q Transient Voltage Suppressor Diode Series

General Information

Bourns offers Transient Voltage Suppressor Diodes for surge and ESD protection applications, in compact chip package DO-214AC (SMA) size format. The Transient Voltage Suppressor series offers a choice of Working Peak Reverse Voltage from 5 V up to 220 V. Typical fast response times are less than 1.0 picosecond from 0 V to Breakdown Voltage.

Bourns® Chip Diodes conform to JEDEC standards, are easy to handle with standard pick and place equipment and the flat configuration minimizes roll away.

Electrical Characteristics (@ T_A = 25 °C Unless Otherwise Noted)

| Parameter | Symbol | Value | Unit |
|---|------------------|-------------|-------|
| Minimum Peak Pulse Power Dissipation (T _P = 1 ms) (Note 1,2) | P _{PK} | 400 | Watts |
| Peak Forward Surge Current 8.3 ms Single Half Sine Wave Superimposed on Rated Load (JEDEC Method) (Note 3) | I _{FSM} | 40 | Amps |
| Operating Temperature Range | T _J | -55 to +150 | °C |
| Storage Temperature Range | T _{STG} | -55 to +150 | °C |

1. Non-repetitive current pulse, per Pulse Waveform graph and derated above T_A = 25 °C per Pulse Derating Curve.
2. Mounted on 5.0 mm² (0.03 mm thick) copper pads to each terminal.
3. 8.3 ms Single Half-Sine Wave duty cycle = 4 pulses maximum per minute (unidirectional units only).

Additional Information

Click these links for more information:



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Agency Recognition

| Description | |
|-------------|--------------------------------------|
| UL | File Number: E153537 |



WARNING Cancer and Reproductive Harm

www.P65Warnings.ca.gov

*RoHS Directive 2015/863, Mar 31, 2015 and Annex. ***Q* part number suffix indicates AEC-Q101 compliance.

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Electrical Characteristics (@ T_A = 25 °C Unless Otherwise Noted)

| Unidirectional Device | | Bidirectional Device | | Breakdown Voltage V _{BR} (Volts) | | | Working Peak Reverse Voltage | Maximum Reverse Leakage @ V _{RWM} | Maximum Clamping Voltage @ I _{pp} (10/1000 μs) | Maximum Peak Pulse Current @ I _{pp} (10/1000 μs) | Maximum Clamping Voltage @ I _{pp} (8/20 μs) | Maximum Peak Pulse Current @ I _{pp} (8/20 μs) |
|-----------------------|---------|----------------------|---------|---|------|-----------------------|------------------------------|--|---|---|--|--|
| Part No. | Marking | Part No. | Marking | Min. | Max. | @ I _T (mA) | V _{RWM} (V) | I _R (μA) | V _C (V) | I _{pp} (A) | V _C (V) | I _{pp} (A) |
| SMAJ5.0A-Q | HEQ | SMAJ5.0CA-Q | TEQ | 6.40 | 7.00 | 10 | 5.0 | 800 | 9.2 | 43.5 | 12.0 | 217.5 |
| SMAJ6.0A-Q | HGQ | SMAJ6.0CA-Q | TGQ | 6.67 | 7.37 | 10 | 6.0 | 800 | 10.3 | 38.8 | 13.4 | 194.0 |
| SMAJ6.5A-Q | HKQ | SMAJ6.5CA-Q | TKQ | 7.22 | 7.98 | 10 | 6.5 | 500 | 11.2 | 35.7 | 14.6 | 178.5 |
| SMAJ7.0A-Q | HMQ | SMAJ7.0CA-Q | TMQ | 7.78 | 8.60 | 10 | 7.0 | 200 | 12.0 | 33.3 | 15.6 | 166.5 |
| SMAJ7.5A-Q | HPQ | SMAJ7.5CA-Q | TPQ | 8.33 | 9.21 | 1.0 | 7.5 | 100 | 12.9 | 31.0 | 16.8 | 155.0 |
| SMAJ8.0A-Q | HRQ | SMAJ8.0CA-Q | TRQ | 8.89 | 9.83 | 1.0 | 8.0 | 50 | 13.6 | 29.4 | 17.7 | 147.0 |
| SMAJ8.5A-Q | HTQ | SMAJ8.5CA-Q | TTQ | 9.44 | 10.4 | 1.0 | 8.5 | 20 | 14.4 | 27.8 | 18.7 | 139.0 |
| SMAJ9.0A-Q | HVQ | SMAJ9.0CA-Q | TVQ | 10.0 | 11.1 | 1.0 | 9.0 | 10 | 15.4 | 26.0 | 20.0 | 130.0 |
| SMAJ10A-Q | HXQ | SMAJ10CA-Q | TXQ | 11.1 | 12.3 | 1.0 | 10 | 5 | 17.0 | 23.5 | 22.1 | 117.5 |
| SMAJ11A-Q | HZQ | SMAJ11CA-Q | TZQ | 12.2 | 13.5 | 1.0 | 11 | 1.0 | 18.2 | 22.0 | 23.7 | 110.0 |
| SMAJ12A-Q | IEQ | SMAJ12CA-Q | UEQ | 13.3 | 14.7 | 1.0 | 12 | 1.0 | 19.9 | 20.1 | 25.9 | 100.5 |
| SMAJ13A-Q | IGQ | SMAJ13CA-Q | UGQ | 14.4 | 15.9 | 1.0 | 13 | 1.0 | 21.5 | 18.6 | 28.0 | 93.0 |
| SMAJ14A-Q | IKQ | SMAJ14CA-Q | UKQ | 15.6 | 17.2 | 1.0 | 14 | 1.0 | 23.2 | 17.2 | 30.2 | 86.0 |
| SMAJ15A-Q | IMQ | SMAJ15CA-Q | UMQ | 16.7 | 18.5 | 1.0 | 15 | 1.0 | 24.4 | 16.4 | 31.7 | 82.0 |
| SMAJ16A-Q | IPQ | SMAJ16CA-Q | UPQ | 17.8 | 19.7 | 1.0 | 16 | 1.0 | 26.0 | 15.4 | 33.8 | 77.0 |

- Notes: 1. Suffix 'A' denotes a 5 % tolerance unidirectional device.
2. Suffix 'CA' denotes a 5 % tolerance bidirectional device.

~ Continued on next page ~

SMAJ-Q Transient Voltage Suppressor Diode Series

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Electrical Characteristics (@ T_A = 25 °C Unless Otherwise Noted) - Continued

| Unidirectional Device | | Bidirectional Device | | Breakdown Voltage V _{BR} (Volts) | | | Working Peak Reverse Voltage | Maximum Reverse Leakage @ V _{RWM} | Maximum Clamping Voltage @ I _{pp} (10/1000 μs) | Maximum Peak Pulse Current (10/1000 μs) | Maximum Clamping Voltage @ I _{pp} (8/20 μs) | Maximum Peak Pulse Current (8/20 μs) |
|-----------------------|---------|----------------------|---------|---|------|-----------------------|------------------------------|--|---|---|--|--------------------------------------|
| Part No. | Marking | Part No. | Marking | Min. | Max. | @ I _T (mA) | V _{RWM} (V) | I _R (μA) | V _C (V) | I _{pp} (A) | V _C (V) | I _{pp} (A) |
| SMAJ17A-Q | IRQ | SMAJ17CA-Q | URQ | 18.9 | 20.9 | 1.0 | 17 | 1.0 | 27.6 | 14.5 | 35.9 | 72.5 |
| SMAJ18A-Q | ITQ | SMAJ18CA-Q | UTQ | 20.0 | 22.1 | 1.0 | 18 | 1.0 | 29.2 | 13.7 | 38.0 | 68.5 |
| SMAJ20A-Q | IVQ | SMAJ20CA-Q | UVQ | 22.2 | 24.5 | 1.0 | 20 | 1.0 | 32.4 | 12.3 | 42.1 | 61.5 |
| SMAJ22A-Q | IXQ | SMAJ22CA-Q | UXQ | 24.4 | 26.9 | 1.0 | 22 | 1.0 | 35.5 | 11.3 | 46.2 | 56.5 |
| SMAJ24A-Q | IZQ | SMAJ24CA-Q | UZQ | 26.7 | 29.5 | 1.0 | 24 | 1.0 | 38.9 | 10.3 | 50.6 | 51.5 |
| SMAJ26A-Q | JEQ | SMAJ26CA-Q | VEQ | 28.9 | 31.9 | 1.0 | 26 | 1.0 | 42.1 | 9.5 | 54.7 | 47.5 |
| SMAJ28A-Q | JGQ | SMAJ28CA-Q | VGQ | 31.1 | 34.4 | 1.0 | 28 | 1.0 | 45.4 | 8.8 | 59.0 | 44.0 |
| SMAJ30A-Q | JKQ | SMAJ30CA-Q | VKQ | 33.3 | 36.8 | 1.0 | 30 | 1.0 | 48.4 | 8.3 | 62.9 | 41.5 |
| SMAJ33A-Q | JMQ | SMAJ33CA-Q | VMQ | 36.7 | 40.6 | 1.0 | 33 | 1.0 | 53.3 | 7.5 | 69.3 | 37.5 |
| SMAJ36A-Q | JPQ | SMAJ36CA-Q | VPQ | 40 | 44.2 | 1.0 | 36 | 1.0 | 58.1 | 6.9 | 75.5 | 34.5 |
| SMAJ40A-Q | JRQ | SMAJ40CA-Q | VRQ | 44.4 | 49.1 | 1.0 | 40 | 1.0 | 64.5 | 6.2 | 83.9 | 31.0 |
| SMAJ43A-Q | JTQ | SMAJ43CA-Q | VTQ | 47.8 | 52.8 | 1.0 | 43 | 1.0 | 69.4 | 5.8 | 90.2 | 29.0 |
| SMAJ45A-Q | JVQ | SMAJ45CA-Q | VVQ | 50 | 55.3 | 1.0 | 45 | 1.0 | 72.7 | 5.5 | 94.5 | 27.5 |
| SMAJ48A-Q | JXQ | SMAJ48CA-Q | VXQ | 53.3 | 58.9 | 1.0 | 48 | 1.0 | 77.4 | 5.2 | 100.6 | 26.0 |
| SMAJ51A-Q | JZQ | SMAJ51CA-Q | VZQ | 56.7 | 62.7 | 1.0 | 51 | 1.0 | 82.4 | 4.9 | 107.1 | 24.5 |
| SMAJ54A-Q | REQ | SMAJ54CA-Q | WEQ | 60 | 66.3 | 1.0 | 54 | 1.0 | 87.1 | 4.6 | 113.2 | 23.0 |
| SMAJ58A-Q | RGQ | SMAJ58CA-Q | WGQ | 64.4 | 71.2 | 1.0 | 58 | 1.0 | 93.6 | 4.3 | 121.7 | 21.5 |
| SMAJ60A-Q | RKQ | SMAJ60CA-Q | WKQ | 66.7 | 73.7 | 1.0 | 60 | 1.0 | 96.8 | 4.1 | 125.8 | 20.5 |
| SMAJ64A-Q | RMQ | SMAJ64CA-Q | WMQ | 71.1 | 78.6 | 1.0 | 64 | 1.0 | 103 | 3.9 | 133.9 | 19.5 |
| SMAJ70A-Q | RPQ | SMAJ70CA-Q | WPQ | 77.8 | 86.0 | 1.0 | 70 | 1.0 | 113 | 3.5 | 146.9 | 17.5 |
| SMAJ75A-Q | RRQ | SMAJ75CA-Q | WRQ | 83.3 | 92.1 | 1.0 | 75 | 1.0 | 121 | 3.3 | 157.3 | 16.5 |
| SMAJ78A-Q | RTQ | SMAJ78CA-Q | WTQ | 86.7 | 95.8 | 1.0 | 78 | 1.0 | 126 | 3.2 | 163.8 | 16.0 |
| SMAJ85A-Q | RVQ | SMAJ85CA-Q | WVQ | 94.4 | 104 | 1.0 | 85 | 1.0 | 137 | 2.9 | 178.1 | 14.5 |
| SMAJ90A-Q | RXQ | SMAJ90CA-Q | WXQ | 100 | 111 | 1.0 | 90 | 1.0 | 146 | 2.7 | 189.8 | 13.5 |
| SMAJ100A-Q | RZQ | SMAJ100CA-Q | WZQ | 111 | 123 | 1.0 | 100 | 1.0 | 162 | 2.5 | 210.6 | 12.5 |
| SMAJ110A-Q | SEQ | SMAJ110CA-Q | XEQ | 122 | 135 | 1.0 | 110 | 1.0 | 177 | 2.3 | 230.1 | 11.5 |
| SMAJ120A-Q | SGQ | SMAJ120CA-Q | XGQ | 133 | 147 | 1.0 | 120 | 1.0 | 193 | 2.1 | 250.9 | 10.5 |
| SMAJ130A-Q | SKQ | SMAJ130CA-Q | XKQ | 144 | 159 | 1.0 | 130 | 1.0 | 209 | 1.9 | 271.7 | 9.5 |
| SMAJ150A-Q | SMQ | SMAJ150CA-Q | XMQ | 167 | 185 | 1.0 | 150 | 1.0 | 243 | 1.6 | 315.9 | 8.0 |
| SMAJ160A-Q | SPQ | SMAJ160CA-Q | XPQ | 178 | 197 | 1.0 | 160 | 1.0 | 259 | 1.5 | 336.7 | 7.5 |
| SMAJ170A-Q | SRQ | SMAJ170CA-Q | XRQ | 189 | 209 | 1.0 | 170 | 1.0 | 275 | 1.5 | 357.5 | 7.5 |
| SMAJ180A-Q | STQ | SMAJ180CA-Q | XTQ | 201 | 222 | 1.0 | 180 | 1.0 | 292 | 1.4 | 379.6 | 7.0 |
| SMAJ200A-Q | SVQ | SMAJ200CA-Q | XVQ | 224 | 247 | 1.0 | 200 | 1.0 | 324 | 1.2 | 421.2 | 6.0 |
| SMAJ220A-Q | SXQ | SMAJ220CA-Q | XXQ | 246 | 272 | 1.0 | 220 | 1.0 | 356 | 1.1 | 462.8 | 5.5 |

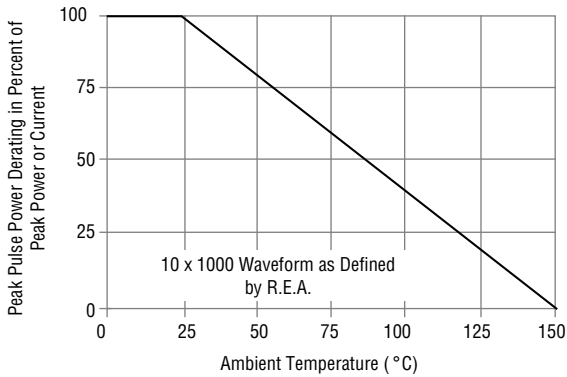
Notes: 1. Suffix 'A' denotes a 5 % tolerance unidirectional device.
 2. Suffix 'CA' denotes a 5 % tolerance bidirectional device.

SMAJ-Q Transient Voltage Suppressor Diode Series



Performance Graphs

Peak Pulse Power Derating Curve



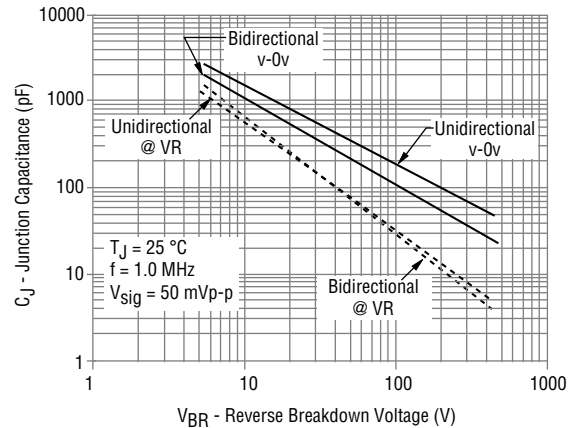
Maximum Non-Repetitive Surge Current



Pulse Waveform



Typical Junction Capacitance



Pulse Rating Curve



Steady State Power Derating Curve



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SMAJ-Q Transient Voltage Suppressor Diode Series



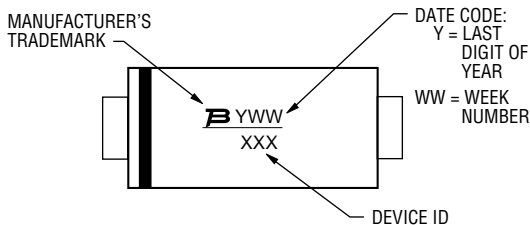
Product Dimensions



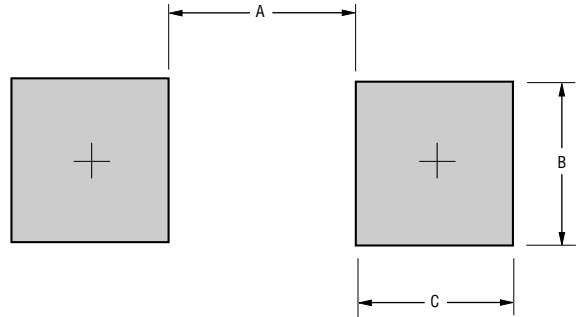
| Dimension | SMA (DO-214AC) |
|-----------|--------------------------------|
| A | 3.99 - 4.50 (0.157 - 0.177) |
| B | 2.54 - 2.79 (0.100 - 0.110) |
| C | 1.25 - 1.65 (0.049 - 0.065) |
| D | 0.15 - 0.31 (0.006 - 0.012) |
| E | 4.93 - 5.28 (0.194 - 0.208) |
| F | 0.203 MAX. (0.008) |
| G | 1.98 - 2.29 (0.078 - 0.090) |
| H | 0.76 - 1.52 (0.030 - 0.060) |

DIMENSIONS: $\frac{\text{MM}}{\text{(INCHES)}}$

Typical Part Marking



Recommended Footprint



| Dimension | SMA (DO-214AC) |
|-----------|-----------------|
| A (Max.) | 2.70 (0.106) |
| B (Min.) | 2.10 (0.083) |
| C (Min.) | 1.27 (0.050) |

DIMENSIONS: $\frac{\text{MM}}{\text{(INCHES)}}$

Physical Specifications

Case Molded plastic per UL Class 94V-0
 Polarity.....Cathode band indicates unidirectional device
 No cathode band indicates bidirectional device

How to Order

Package **SMAJ 12 CA - Q**
 SMAJ = SMA/DO-214AC
 Working Peak Reverse Voltage **12** = 12 V_{RWM} (Volts)
 Suffix **CA - Q**
 A = 5 % Tolerance Unidirectional Device
 CA = 5 % Tolerance Bidirectional Device
 AEC-Q101 Suffix **Q**
 Q = AEC-Q101 Compliant, 13-inch Reel
 QH = AEC-Q101 Compliant, 7-inch Reel
 (available only for 12 V to 58 V models)

Environmental Specifications

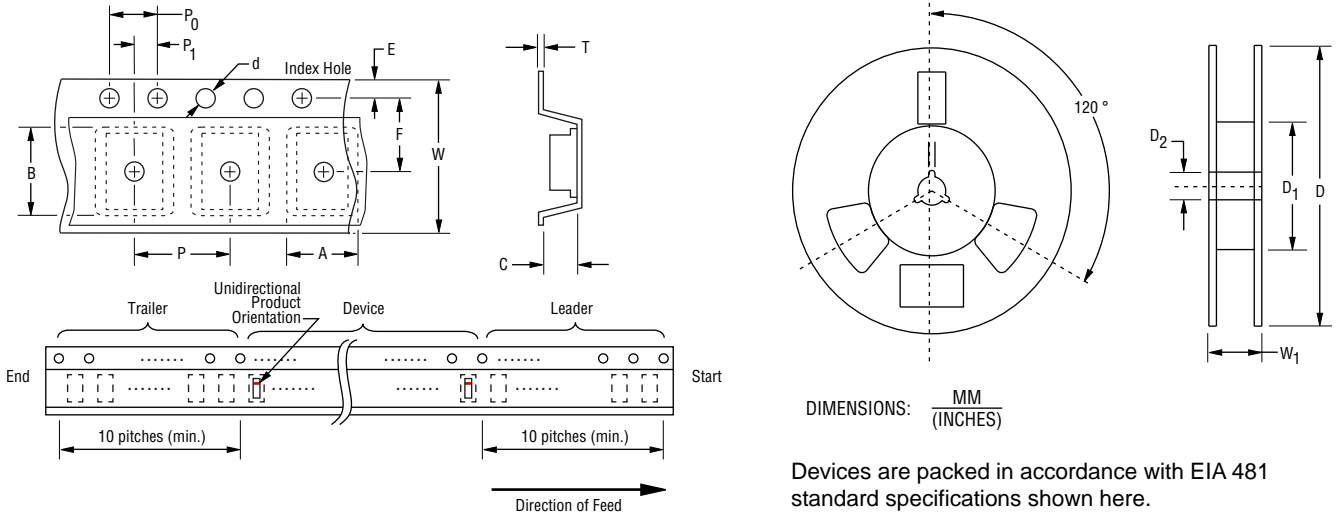
Moisture Sensitivity Level..... 1
 ESD Classification (HBM).....3B

SMAJ-Q Transient Voltage Suppressor Diode Series

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Packaging Information

The product will be dispensed in tape and reel format (see diagram below).



Devices are packed in accordance with EIA 481 standard specifications shown here.

| Item | Symbol | SMA (DO-214AC) | |
|------------------------|----------------|-------------------------------------|------------------------|
| | | 7-Inch Reel | 13-Inch Reel |
| Carrier Width | A | 2.90 ± 0.20 (0.114 ± 0.008) | |
| Carrier Length | B | 5.50 ± 0.20 (0.217 ± 0.008) | |
| Carrier Depth | C | 2.26 ± 0.20 (0.089 ± 0.008) | |
| Sprocket Hole | d | 1.50 ± 0.10 (0.061 ± 0.004) | |
| Reel Outside Diameter | D | $\frac{178}{(7.008)}$ | $\frac{330}{(12.992)}$ |
| Reel Inner Diameter | D ₁ | $\frac{50.0}{(1.969)}$ MIN. | |
| Feed Hole Diameter | D ₂ | 13.0 ± 0.20 (0.512 ± 0.008) | |
| Sprocket Hole Position | E | 1.75 ± 0.10 (0.069 ± 0.004) | |
| Punch Hole Position | F | 5.50 ± 0.05 (0.217 ± 0.002) | |
| Punch Hole Pitch | P | 4.00 ± 0.10 (0.157 ± 0.004) | |
| Sprocket Hole Pitch | P ₀ | 4.00 ± 0.10 (0.157 ± 0.004) | |
| Embossment Center | P ₁ | 2.00 ± 0.05 (0.079 ± 0.002) | |
| Overall Tape Thickness | T | 0.30 ± 0.10 (0.012 ± 0.004) | |
| Tape Width | W | 12.00 ± 0.30 (0.472 ± 0.012) | |
| Reel Width | W ₁ | $\frac{18.4}{(0.724)}$ MAX. | |
| Quantity per Reel | -- | 1,000 | 5,000 |

REV. 03/20

Specifications are subject to change without notice.

Users should verify actual device performance in their specific applications.

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- ⊖ [Bourns Inc. Information](#)

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- ✓ Shortage Management
- ✓ Alternative Solution
- ✓ Excess Inventory Management