



**THE DATASHEET OF  
SMAJ8.5CA-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<sub>A</sub> = 25 °C Unless Otherwise Noted)

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

1. Non-repetitive current pulse, per Pulse Waveform graph and derated above T<sub>A</sub> = 25 °C per Pulse Derating Curve.
2. Mounted on 5.0 mm<sup>2</sup> (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: <a href="#">E153537</a>



### WARNING Cancer and Reproductive Harm

[www.P65Warnings.ca.gov](http://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<sub>A</sub> = 25 °C Unless Otherwise Noted)

Unidirectional Device		Bidirectional Device		Breakdown Voltage V <sub>BR</sub> (Volts)			Working Peak Reverse Voltage	Maximum Reverse Leakage @ V <sub>RWM</sub>	Maximum Clamping Voltage @ I <sub>pp</sub> (10/1000 μs)	Maximum Peak Pulse Current @ I <sub>pp</sub> (10/1000 μs)	Maximum Clamping Voltage @ I <sub>pp</sub> (8/20 μs)	Maximum Peak Pulse Current @ I <sub>pp</sub> (8/20 μs)
Part No.	Marking	Part No.	Marking	Min.	Max.	@ I <sub>T</sub> (mA)	V <sub>RWM</sub> (V)	I <sub>R</sub> (μA)	V <sub>C</sub> (V)	I <sub>pp</sub> (A)	V <sub>C</sub> (V)	I <sub>pp</sub> (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<sub>A</sub> = 25 °C Unless Otherwise Noted) - Continued

Unidirectional Device		Bidirectional Device		Breakdown Voltage V <sub>BR</sub> (Volts)			Working Peak Reverse Voltage	Maximum Reverse Leakage @ V <sub>RWM</sub>	Maximum Clamping Voltage @ I <sub>pp</sub> (10/1000 μs)	Maximum Peak Pulse Current (10/1000 μs)	Maximum Clamping Voltage @ I <sub>pp</sub> (8/20 μs)	Maximum Peak Pulse Current (8/20 μs)
Part No.	Marking	Part No.	Marking	Min.	Max.	@ I <sub>T</sub> (mA)	V <sub>RWM</sub> (V)	I <sub>R</sub> (μA)	V <sub>c</sub> (V)	I <sub>pp</sub> (A)	V <sub>c</sub> (V)	I <sub>pp</sub> (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



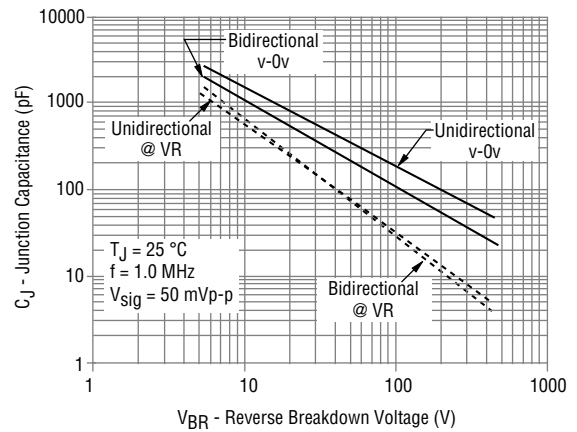
### Maximum Non-Repetitive Surge Current



### 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<sub>RWM</sub> (Volts)  
 Suffix .....  
 A = 5 % Tolerance Unidirectional Device  
 CA = 5 % Tolerance Bidirectional Device  
 AEC-Q101 Suffix .....  
 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

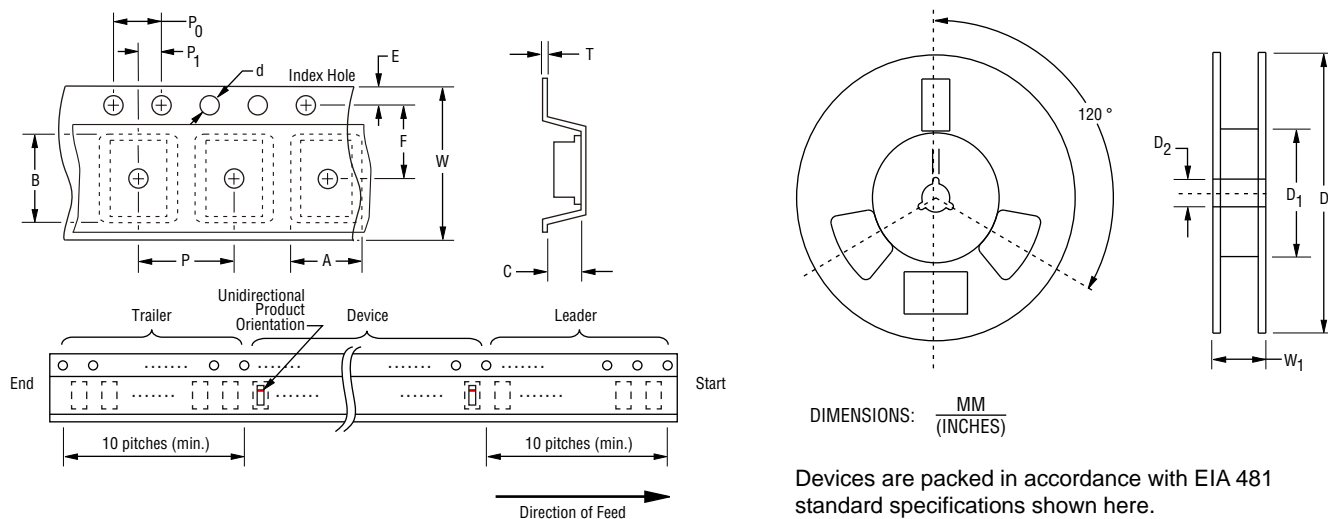
Moisture Sensitivity Level..... 1  
 ESD Classification (HBM).....3B

# 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).



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

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

REV. 03/20

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-  Cost Control Management
-  Shortage Management
-  Alternative Solution
-  Excess Inventory Management