



**THE DATASHEET OF  
SMAJ13CA-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:



[PRODUCT SELECTOR](#) [TECHNICAL LIBRARY](#) [INVENTORY](#) [SAMPLES](#) [CONTACT](#)

### 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.

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# 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

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## 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



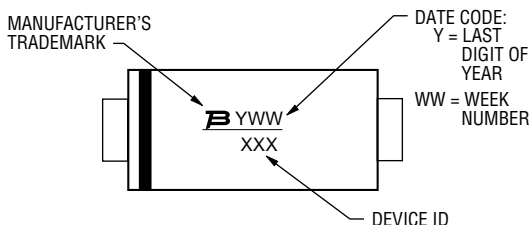
## Product Dimensions



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

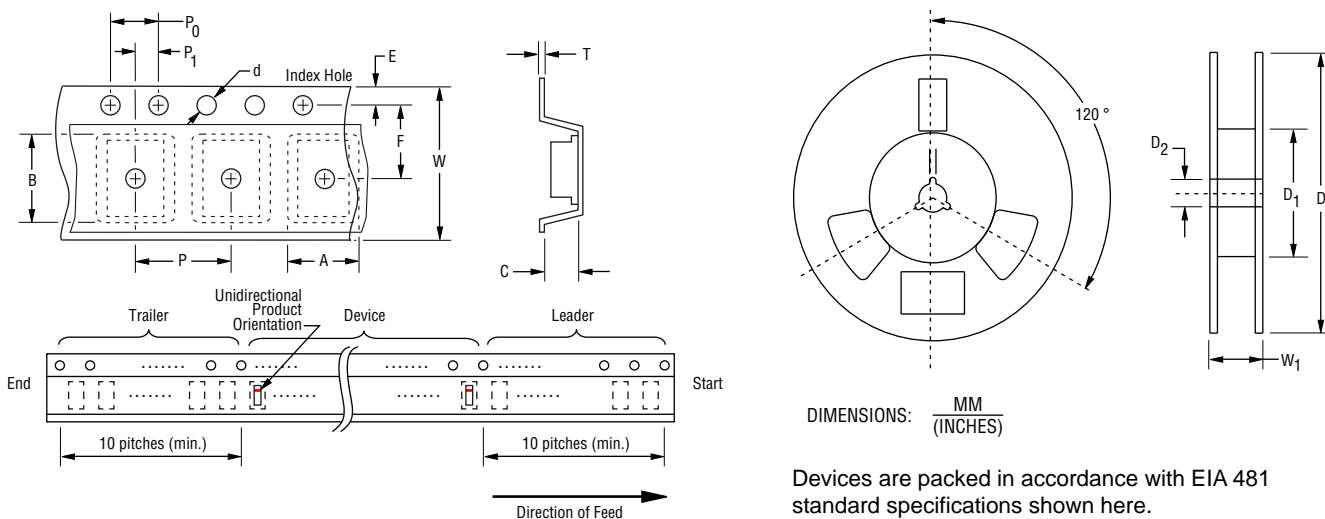
Moisture Sensitivity Level..... 1  
 ESD Classification (HBM).....3B

# 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).



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	$2.90 \pm 0.20$ (0.114 ± 0.008)	
Carrier Length	B	$5.50 \pm 0.20$ (0.217 ± 0.008)	
Carrier Depth	C	$2.26 \pm 0.20$ (0.089 ± 0.008)	
Sprocket Hole	d	$1.50 \pm 0.10$ (0.061 ± 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>	$13.0 \pm 0.20$ (0.512 ± 0.008)	
Sprocket Hole Position	E	$1.75 \pm 0.10$ (0.069 ± 0.004)	
Punch Hole Position	F	$5.50 \pm 0.05$ (0.217 ± 0.002)	
Punch Hole Pitch	P	$4.00 \pm 0.10$ (0.157 ± 0.004)	
Sprocket Hole Pitch	P <sub>0</sub>	$4.00 \pm 0.10$ (0.157 ± 0.004)	
Embossment Center	P <sub>1</sub>	$2.00 \pm 0.05$ (0.079 ± 0.002)	
Overall Tape Thickness	T	$0.30 \pm 0.10$ (0.012 ± 0.004)	
Tape Width	W	$12.00 \pm 0.30$ (0.472 ± 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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- ✓ Obsolete Management
- ✓ Cost Control Management
- ✓ Shortage Management
- ✓ Alternative Solution
- ✓ Excess Inventory Management