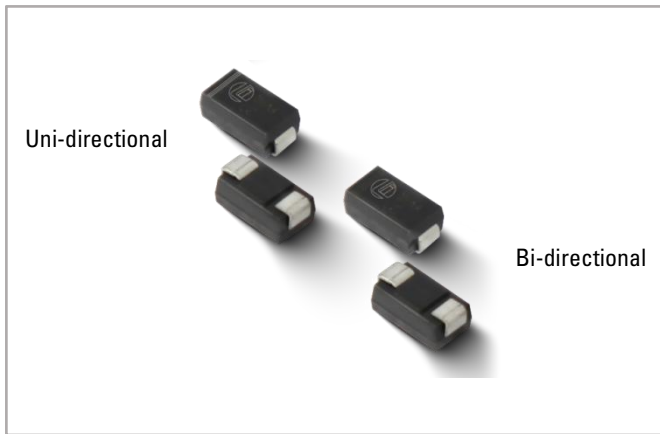


# SMAJ-Q Series

## Surface Mount – 400W



### Additional Information



Resources



Accessories



Samples

### Maximum Ratings and Thermal Characteristics

( $T_A=25^{\circ}\text{C}$  unless otherwise noted)

Parameter	Symbol	Value	Unit
Peak Pulse Power Dissipation by 10/1000 $\mu\text{s}$ Waveform(Fig.1)(Note 1),(Note 2) -Single Die Parts	$P_{PPM}$	400	W
Power Dissipation on Infinite Heat Sink at $T_L=50^{\circ}\text{C}$	$P_D$	3.3	W
Peak Forward Surge Current, 8.3ms Single Half Sine Wave (Note 3)	$I_{FSM}$	60	A
Maximum Instantaneous Forward Voltage at 25A for Unidirectional Only (Note 4)	$V_F$	3.5/5.0	V
Operating Temperature Range	$T_J$	-55 to 150	$^{\circ}\text{C}$
Storage Temperature Range	$T_{STG}$	-55 to 150	$^{\circ}\text{C}$
Typical Thermal Resistance Junction to Lead	$R_{\theta JL}$	30	$^{\circ}\text{C}/\text{W}$
Typical Thermal Resistance Junction to Ambient	$R_{\theta JA}$	120	$^{\circ}\text{C}/\text{W}$

#### Notes:

- Non-repetitive current pulse, per Fig.3 and derated above  $T_J$  (initial)  $=25^{\circ}\text{C}$  per Fig.2.
- Mounted on 5.0x5.0mm copper pad to each terminal.
- Measured on 8.3ms single half sine wave or equivalent square wave for unidirectional device only.
- $V_F < 3.5\text{V}$  for single die parts and  $V_F < 5.0\text{V}$  for stacked-die parts.

### Description

The SMAJ-Q series is designed specifically to protect sensitive electronic equipment from voltage transients induced by lightning and other transient voltage events.

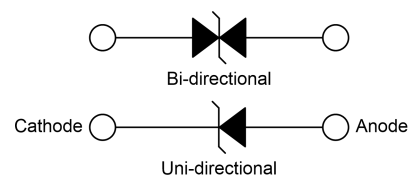
### Features

- High reliability application and automotive grade AEC-Q101 qualified
- 400W peak pulse power capability at 10/1000 $\mu\text{s}$  waveform, repetition rate (duty cycles):0.01%
- Excellent clamping capability
- Typical  $I_R$  less than 1 $\mu\text{A}$  when  $V_B \text{ min} > 12\text{V}$
- Surface mount footprint for compact PCB layout
- Low profile package
- Typical failure mode is short from over-specified voltage or current
- Whisker test is conducted based on JEDEC JESD201A per its table 4a and 4c
- ESD protection of data lines in accordance with IEC 61000-4-2, 30kV(Air), 30kV (Contact)
- EFT protection of data lines in accordance with IEC 61000-4-4
- Built-in strain relief
- Fast response time: typically less than 1.0ps from 0 Volts to  $V_B \text{ min}$
- Glass passivated junction
- Low inductance
- High temperature to reflow soldering guaranteed: 260 $^{\circ}\text{C}/20\sim 40\text{sec}$ .
- $V_B @ T_J = V_B @ 25^{\circ}\text{C} \times (1 + \alpha \times (T_J - 25))$  ( $\alpha$  T:Temperature Coefficient, typical value is 0.1%)
- Meet MSL level1, per J-STD-020, LF maximum peak of 260 $^{\circ}\text{C}$
- Matte tin, lead-free plated
- Halogen free and RoHS compliant
- Pb-free E3 means 2nd level interconnect is Pb-free and the terminal finish material is tin(Sn) (IPC/JEDEC J-STD 609A.01)

### Applications

TVS devices are ideal for the protection of I/O Interfaces,  $V_{CC}$  bus and other vulnerable circuits used in Telecom, Computer, Industrial and Consumer electronic applications.

### Functional Diagram



# SMAJ-Q Series

## Surface Mount – 400W

### Electrical Characteristics ( $T_A=25^\circ\text{C}$ unless otherwise noted)

Part Number		Type	Device Marking Code		Reverse Stand-Off Voltage $V_R$ (V)	Breakdown Voltage @ $I_T$		Test Current $I_T$ (mA)	Maximum Clamping Voltage @ $I_{PP}$ $V_C$ (V)	Peak Pulse Current $I_{PP}$ (A)	Reverse Leakage @ $V_R$ $I_R$ ( $\mu\text{A}$ )
Uni.	Bi.		Uni.	Bi.		$V_{B\text{ Min.}}$ (V)	$V_{B\text{ Max.}}$ (V)				
SMAJ5.0A	SMAJ5.0CA	Q	AE	WE	5.0	6.40	7.00	10	9.2	43.5	800
SMAJ6.0A	SMAJ6.0CA	Q	AG	WG	6.0	6.67	7.37	10	10.3	38.8	800
SMAJ6.5A	SMAJ6.5CA	Q	AK	WK	6.5	7.22	7.98	10	11.2	35.7	500
SMAJ7.0A	SMAJ7.0CA	Q	AM	WM	7.0	7.78	8.60	10	12.0	33.3	200
SMAJ7.5A	SMAJ7.5CA	Q	AP	WP	7.5	8.33	9.21	1	12.9	31.0	100
SMAJ8.0A	SMAJ8.0CA	Q	AR	WR	8.0	8.89	9.83	1	13.6	29.4	50
SMAJ8.5A	SMAJ8.5CA	Q	AT	WT	8.5	9.44	10.40	1	14.4	27.8	20
SMAJ9.0A	SMAJ9.0CA	Q	AV	WV	9.0	10.00	11.10	1	15.4	26.0	10
SMAJ10A	SMAJ10CA	Q	AX	WX	10.0	11.10	12.30	1	17.0	23.5	5
SMAJ11A	SMAJ11CA	Q	AZ	WZ	11.0	12.20	13.50	1	18.2	22.0	1
SMAJ12A	SMAJ12CA	Q	BE	XE	12.0	13.30	14.70	1	19.9	20.1	1
SMAJ13A	SMAJ13CA	Q	BG	XG	13.0	14.40	15.90	1	21.5	18.6	1
SMAJ14A	SMAJ14CA	Q	BK	XK	14.0	15.60	17.20	1	23.2	17.2	1
SMAJ15A	SMAJ15CA	Q	BM	XM	15.0	16.70	18.50	1	24.4	16.4	1
SMAJ16A	SMAJ16CA	Q	BP	XP	16.0	17.80	19.70	1	26.0	15.4	1
SMAJ17A	SMAJ17CA	Q	BR	XR	17.0	18.90	20.90	1	27.6	14.5	1
SMAJ18A	SMAJ18CA	Q	BT	XT	18.0	20.00	22.10	1	29.2	13.7	1
SMAJ20A	SMAJ20CA	Q	BV	XV	20.0	22.20	24.50	1	32.4	12.3	1
SMAJ22A	SMAJ22CA	Q	BX	XX	22.0	24.40	26.90	1	35.5	11.3	1
SMAJ24A	SMAJ24CA	Q	BZ	XZ	24.0	26.70	29.50	1	38.9	10.3	1
SMAJ26A	SMAJ26CA	Q	CE	YE	26.0	28.90	31.90	1	42.1	9.5	1
SMAJ28A	SMAJ28CA	Q	CG	YG	28.0	31.10	34.40	1	45.4	8.8	1
SMAJ30A	SMAJ30CA	Q	CK	YK	30.0	33.30	36.80	1	48.4	8.3	1
SMAJ33A	SMAJ33CA	Q	CM	YM	33.0	36.70	40.60	1	53.3	7.5	1
SMAJ36A	SMAJ36CA	Q	CP	YP	36.0	40.00	44.20	1	58.1	6.9	1
SMAJ40A	SMAJ40CA	Q	CR	YR	40.0	44.40	49.10	1	64.5	6.2	1
SMAJ43A	SMAJ43CA	Q	CT	YT	43.0	47.80	52.80	1	69.4	5.8	1
SMAJ45A	SMAJ45CA	Q	CV	YV	45.0	50.00	55.30	1	72.7	5.5	1
SMAJ48A	SMAJ48CA	Q	CX	YX	48.0	53.30	58.90	1	77.4	5.2	1
SMAJ51A	SMAJ51CA	Q	CZ	YZ	51.0	56.70	62.70	1	82.4	4.9	1
SMAJ54A	SMAJ54CA	Q	RE	ZE	54.0	60.00	66.30	1	87.1	4.6	1
SMAJ58A	SMAJ58CA	Q	RG	ZG	58.0	64.40	71.20	1	93.6	4.3	1
SMAJ60A	SMAJ60CA	Q	RK	ZK	60.0	66.70	73.70	1	96.8	4.1	1
SMAJ64A	SMAJ64CA	Q	RM	ZM	64.0	71.10	78.60	1	103.0	3.9	1
SMAJ70A	SMAJ70CA	Q	RP	ZP	70.0	77.80	86.00	1	113.0	3.5	1
SMAJ75A	SMAJ75CA	Q	RR	ZR	75.0	83.30	92.10	1	121.0	3.3	1
SMAJ78A	SMAJ78CA	Q	RT	ZT	78.0	86.70	95.80	1	126.0	3.2	1
SMAJ85A	SMAJ85CA	Q	RV	ZV	85.0	94.40	104.00	1	137.0	2.9	1
SMAJ90A	SMAJ90CA	Q	RX	ZX	90.0	100.00	111.00	1	146.0	2.7	1
SMAJ100A	SMAJ100CA	Q	RZ	ZZ	100.0	111.00	123.00	1	162.0	2.5	1
SMAJ110A	SMAJ110CA	Q	SE	VE	110.0	122.00	135.00	1	177.0	2.3	1
SMAJ120A	SMAJ120CA	Q	SG	VG	120.0	133.00	147.00	1	193.0	2.1	1
SMAJ130A	SMAJ130CA	Q	SK	VK	130.0	144.00	159.00	1	209.0	1.9	1
SMAJ150A	SMAJ150CA	Q	SM	VM	150.0	167.00	185.00	1	243.0	1.6	1
SMAJ160A	SMAJ160CA	Q	SP	VP	160.0	178.00	197.00	1	259.0	1.5	1
SMAJ170A	SMAJ170CA	Q	SR	VR	170.0	189.00	209.00	1	275.0	1.5	1
SMAJ180A	SMAJ180CA	Q	ST	VT	180.0	201.00	222.00	1	292.0	1.4	1
SMAJ190A	SMAJ190CA	Q	SU	YU	190.0	211.00	233.00	1	308.0	1.3	1
SMAJ200A	SMAJ200CA	Q	SV	VV	200.0	224.00	247.00	1	324.0	1.2	1
SMAJ210A	SMAJ210CA	Q	SW	YW	210.0	237.00	263.00	1	340.0	1.2	1
SMAJ220A	SMAJ220CA	Q	GE	VX	220.0	246.00	272.00	1	356.0	1.1	1
SMAJ250A	SMAJ250CA	Q	SZ	VZ	250.0	279.00	309.00	1	405.0	1.0	1

**Notes:**

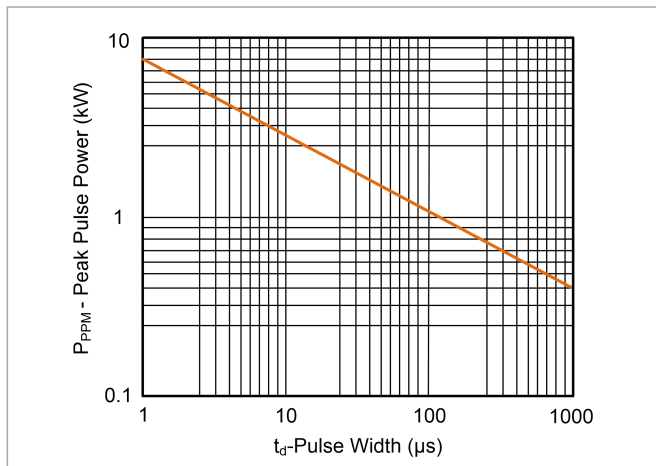
For bidirectional type having  $V_0$  of 10 volts and less, the  $I_R$  limit is double.

# SMAJ-Q Series

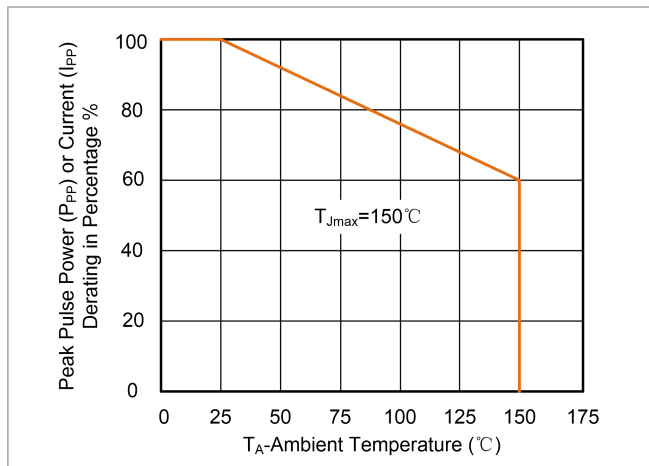
## Surface Mount – 400W

### Ratings and Characteristic Curves ( $T_A=25^\circ\text{C}$ unless otherwise noted)

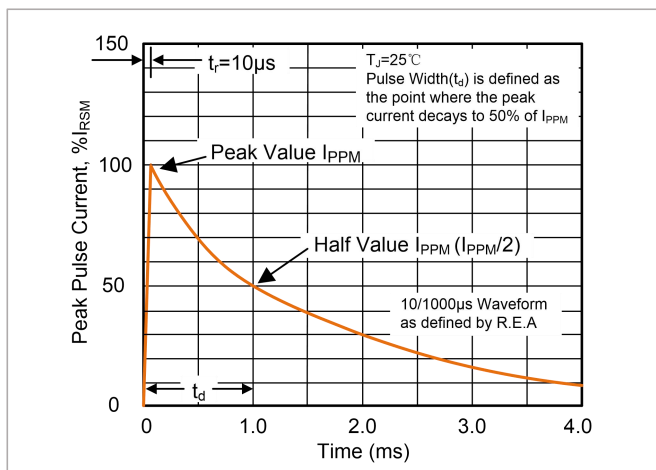
**Figure 1:**  
Peak Pulse Power Rating Curve



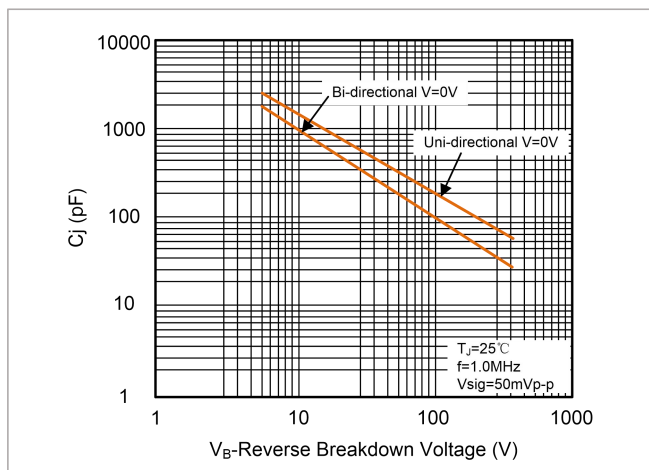
**Figure 2:**  
Pulse Derating Curve



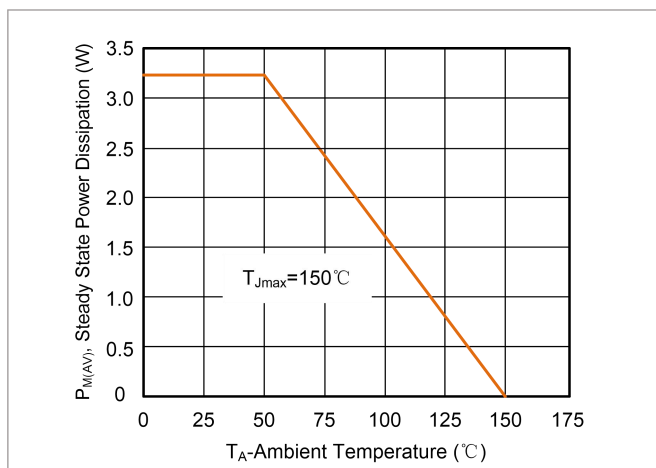
**Figure 3:**  
Pulse Waveform



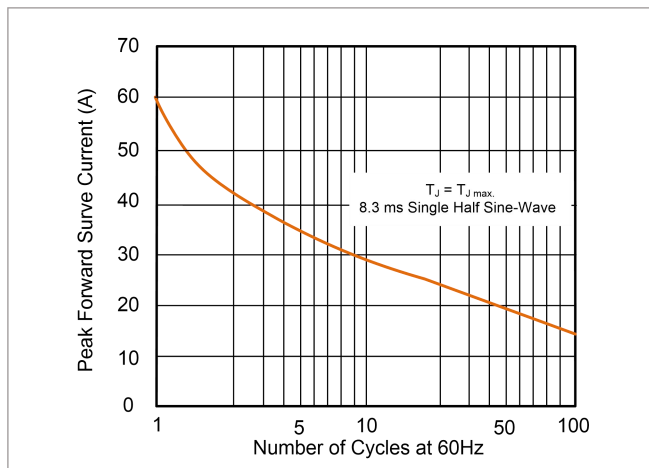
**Figure 4:**  
Typical Junction Capacitance



**Figure 5:**  
Steady State Power Dissipation Derating Curve



**Figure 6:**  
Maximum Non-Repetitive Forward Surge Current Uni-Directional

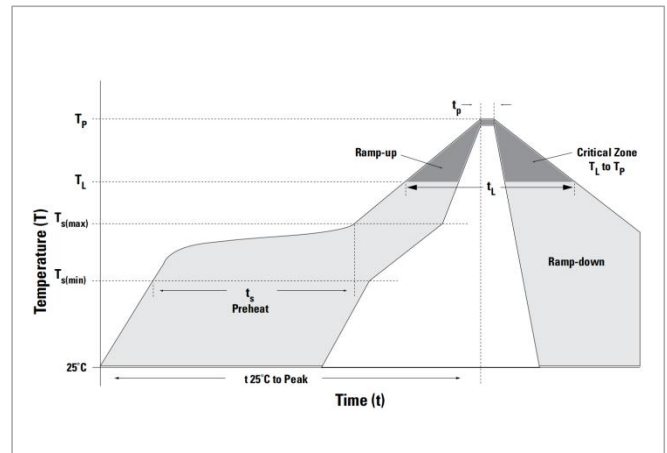


# SMAJ-Q Series

## Surface Mount – 400W

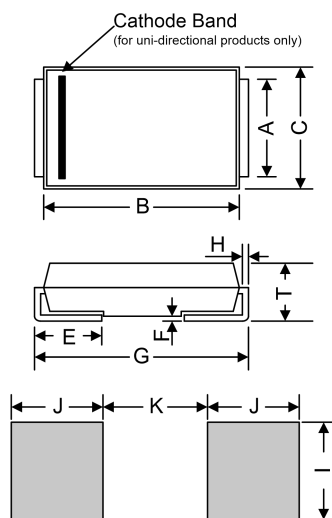
### Soldering Parameters

<b>Reflow Condition</b>		Lead-free assembly
<b>Pre Heat</b>	-Temperature Min ( $T_{S\ min}$ )	150°C
	-Temperature Max ( $T_{S\ max}$ )	200°C
	-Time (min to max) ( $t_s$ )	60 – 180 secs
<b>Average ramp-up rate(Liquidus Temp (<math>T_L</math>) to peak)</b>		3°C/second max.
<b><math>T_{S\ (max)}</math> to <math>T_L</math>-Ramp-up Rate</b>		3°C/second max.
<b>Reflow</b>	-Temperature ( $T_L$ ) (Liquidus)	217°C
	-Time (min to max) ( $t_L$ )	60-150 seconds
<b>Peak Temperature (<math>T_P</math>)</b>		260°C
<b>Time within 5°C of actual Peak Temperature (<math>t_p</math>)</b>		20-40 seconds
<b>Ramp-down Rate</b>		6°C/second max.
<b>Time 25°C to Peak Temperature</b>		8 minutes max.
<b>Do not exceed</b>		260°C



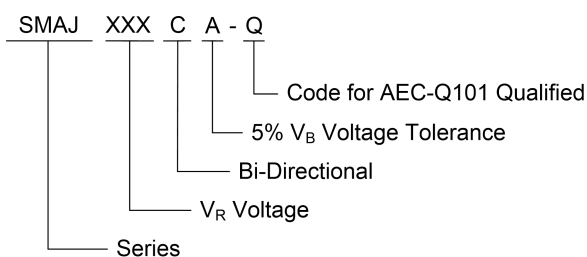
### Dimensions

#### DO-214AC (SMA)

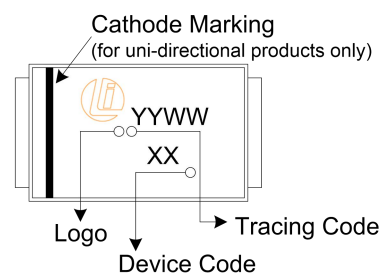


Symbol	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	1.250	1.650	0.049	0.065
B	3.990	4.600	0.157	0.181
C	2.400	2.790	0.095	0.110
E	0.780	1.520	0.030	0.060
F	-	0.203	-	0.008
G	4.800	5.280	0.189	0.208
H	0.152	0.305	0.006	0.012
T	1.900	2.290	0.075	0.090
I	1.800	-	0.070	-
J	2.100	-	0.082	-
K	-	2.300	-	0.090

### Part Numbering System



### Part Marking System



# SMAJ-Q Series

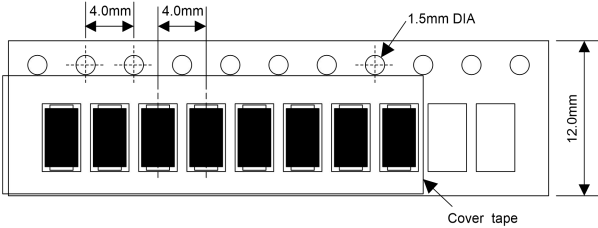
## Surface Mount – 400W

### Packaging

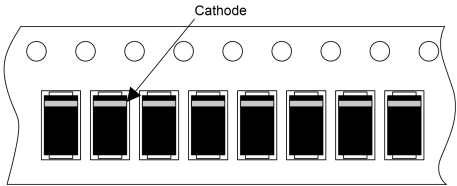
Part number	Component Package	Quantity	Packaging Option	Packaging Specification
SMAJxxxXX-Q	DO-214AC	5000	Tape & Reel - 12mm tape/13" reel	EIA STD RS-481

### Tape and Reel Specification

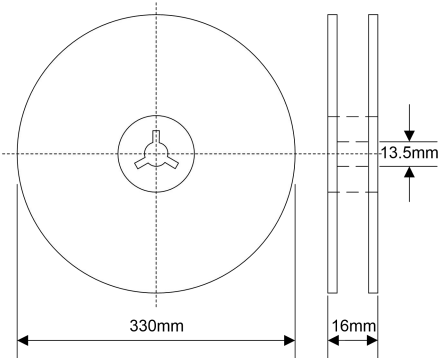
Tape



For Uni-Devices



13 Inches Reel



Quantity: 5000pcs/reel

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