



## General Semiconductor



### SMA (DO-214AC)

Cathode

Anode



(unidirectional)



(bidirectional)

### Surface-Mount



- Package: SMA plastic package.
- Lead Finish: Matte Tin
- Case Material: Epoxy Molding Compound.
- UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020



**Description**

SMAJ Series transient voltage suppressors are excellent overvoltage protective devices. The Series is designed specifically to protect sensitive electronic equipment from voltage transients induced by lightning and other transient voltage events.

**Features**

- Excellent clamping capability
- Low leakage current
- Low capacitance
- High surge capability
- Glass passivated chip
- Epoxy resin package
- Built-in strain relief
- Will not fatigue
- RoHS Compliant
- Fast response time: typically less than 1.0ps from 0 Volts to VBR min

**Mechanical Characteristics**

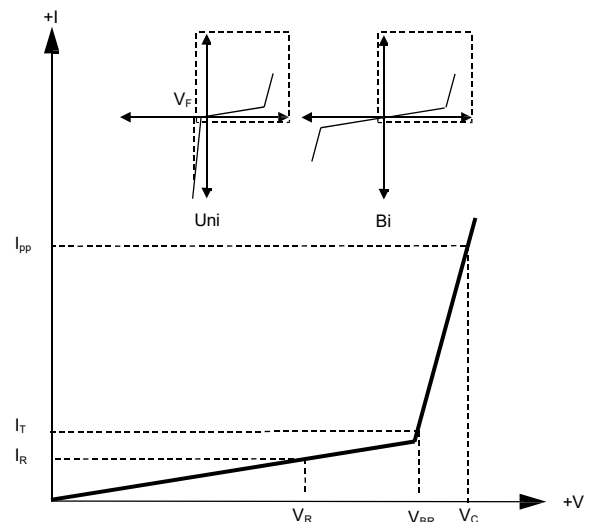
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**Applications**

- Telecom
- Computer
- Industrial electronic
- Consumer electronic

**Electrical Parameters**

Parameter	Definition
$C_J$	Junction Capacitance - typical capacitance measured with 0V or $V_R$ bias
$I_{PP}$	Peak Pulse Current - maximum rated peak impulse current
$V_C$	Clamping Voltage - Peak voltage measured across the suppressor at a specified $I_{ppm}$ (peak impulse current)
$V_{BR}$	Breakdown Voltage - Maximum voltage that flows through the TVS at a specified test current ( $I_T$ )
$I_R$	Leakage Current - maximum peak off-state current measured at $V_R$
$V_R$	Peak Off-state Voltage - maximum voltage that can be applied while maintaining off state



**Summary of Packing Options**

Package	Packing Description	Packing Quantity	Industry Standard
SMA	Tape/Reel, 11" reel	5000	EIA-481-1
	Tape/Reel, 7" reel	2000	EIA-481-1

**SMA(DO-214AC)**



**Absolute Maximum Ratings (TA=25°C unless otherwise noted)**

Parameter	Symbol	Value	Units	Remarks
Peak Pulse Power Dissipation	P <sub>PPM</sub>	400	W	(Note1)(Note2)
Steady State Power Dissipation	P <sub>D</sub>	3.3	W	(Note3)
Peak Forward Surge Current	I <sub>FSM</sub>	40	A	(Note4)
Maximum Instantaneous Forward Voltage at 20A	V <sub>FM</sub>	3.5/6.5	V	(Note5)
Typical Thermal Resistance Junction to Lead	R <sub>θJL</sub>		°C/W	
Typical Thermal Resistance Junction to Ambient	R <sub>θJA</sub>	120	°C/W	
Operating Temperature Range	T <sub>J</sub>	-55 to 150	°C	
Storage Temperature Range	T <sub>STG</sub>	-55 to 150		
Maximum junction capacitance	C	1500	PF	

Notes1: Non-repetitive current pulse , 10/1000us Waveform.

Notes2: Mounted on copper pad area of 5x5mm to each terminal.

Notes3: Infinite HeatSink at TA=50°C

Notes4: Measured on 8.3ms single half sine wave or equivalent square wave, duty cycle=4 perminute maximum.

Notes5: For UnidirectionalOnly, V<sub>FM</sub><3.5V for V<sub>BR</sub> ≤200V and V<sub>FM</sub><5.0V for V<sub>BR</sub> ≥201V.

**Electrical Characteristics (TA=25°C unless otherwise noted)**

Part Number (Uni)	Part Number (Bi)	Marking Code		Reverse Stand off Voltage V <sub>R</sub> (V)	Breakdown Voltage V <sub>BR</sub> @ I <sub>T</sub> (V)		Test Current I <sub>T</sub> (mA)	Maximum Clamping Voltage V <sub>C</sub> @ I <sub>PP</sub> (V)	Maximum Peak Pulse Current I <sub>PP</sub> (A)	Maximum Reverse Leakage I <sub>R</sub> @ V <sub>R</sub> (μA)
		Uni	Bi		Min	Max				
SMAJ5.0A	SMAJ5.0CA	AE	WE	5	6.4	7	10	9.2	43.5	800
SMAJ6.0A	SMAJ6.0CA	AG	WG	6	6.67	7.37	10	10.3	38.8	800
SMAJ6.5A	SMAJ6.5CA	AK	WK	6.5	7.22	7.98	10	11.2	35.7	500
SMAJ7.0A	SMAJ7.0CA	AM	WM	7	7.78	8.6	10	12	33.3	200
SMAJ7.5A	SMAJ7.5CA	AP	WP	7.5	8.33	9.21	1	12.9	31	100
SMAJ8.0A	SMAJ8.0CA	AR	WR	8	8.89	9.83	1	13.6	29.4	50
SMAJ8.5A	SMAJ8.5CA	AT	WT	8.5	9.44	10.4	1	14.4	27.8	20
SMAJ9.0A	SMAJ9.0CA	AV	WV	9	10	11.1	1	15.4	26	10
SMAJ10A	SMAJ10CA	AX	WX	10	11.1	12.3	1	17	23.5	5
SMAJ11A	SMAJ11CA	AZ	WZ	11	12.2	13.5	1	18.2	22	1
SMAJ12A	SMAJ12CA	BE	XE	12	13.3	14.7	1	19.9	20.1	1
SMAJ13A	SMAJ13CA	BG	XG	13	14.4	15.9	1	21.5	18.6	1
SMAJ14A	SMAJ14CA	BK	XK	14	15.6	17.2	1	23.2	17.2	1
SMAJ15A	SMAJ15CA	BM	XM	15	16.7	18.5	1	24.4	16.4	1
SMAJ16A	SMAJ16CA	BP	XP	16	17.8	19.7	1	26	15.4	1
SMAJ17A	SMAJ17CA	BR	XR	17	18.9	20.9	1	27.6	14.5	1
SMAJ18A	SMAJ18CA	BT	XT	18	20	22.1	1	29.2	13.7	1
SMAJ20A	SMAJ20CA	BV	XV	20	22.2	24.5	1	32.4	12.3	1



Electrical Characteristics (T<sub>A</sub>=25°C unless otherwise noted)

Part Number (Uni)	Part Number (Bi)	Marking Code		Reverse Stand off Voltage V <sub>R</sub> (V)	Breakdown Voltage V <sub>BR</sub> @ I <sub>T</sub> (V)		Test Current I <sub>T</sub> (mA)	Maximum Clamping Voltage V <sub>C</sub> @ I <sub>PP</sub> (V)	Maximum Peak Pulse Current I <sub>PP</sub> (A)	Maximum Reverse Leakage I <sub>R</sub> @ V <sub>R</sub> (μA)
		Uni	Bi		Min	Max				
SMAJ22A	SMAJ22CA	BX	XX	22	24.4	26.9	1	35.5	11.3	1
SMAJ24A	SMAJ24CA	BZ	XZ	24	26.7	29.5	1	38.9	10.3	1
SMAJ26A	SMAJ26CA	CE	YE	26	28.9	31.9	1	42.1	9.5	1
SMAJ28A	SMAJ28CA	CG	YG	28	31.1	34.4	1	45.4	8.8	1
SMAJ30A	SMAJ30CA	CK	YK	30	33.3	36.8	1	48.4	8.3	1
SMAJ33A	SMAJ33CA	CM	YM	33	36.7	40.6	1	53.3	7.5	1
SMAJ36A	SMAJ36CA	CP	YP	36	40	44.2	1	58.1	6.9	1
SMAJ40A	SMAJ40CA	CR	YR	40	44.4	49.1	1	64.5	6.2	1
SMAJ43A	SMAJ43CA	CT	YT	43	47.8	52.8	1	69.4	5.8	1
SMAJ45A	SMAJ45CA	CV	YV	45	50	55.3	1	72.7	5.5	1
SMAJ48A	SMAJ48CA	CX	YX	48	53.3	58.9	1	77.4	5.2	1
SMAJ51A	SMAJ51CA	CZ	YZ	51	56.7	62.7	1	82.4	4.9	1
SMAJ54A	SMAJ54CA	RE	ZE	54	60	66.3	1	87.1	4.6	1
SMAJ58A	SMAJ58CA	RG	ZG	58	64.4	71.2	1	93.6	4.3	1
SMAJ60A	SMAJ60CA	RK	ZK	60	66.7	73.7	1	96.8	4.1	1
SMAJ64A	SMAJ64CA	RM	ZM	64	71.1	78.6	1	103	3.9	1
SMAJ70A	SMAJ70CA	RP	ZP	70	77.8	86	1	113	3.5	1
SMAJ75A	SMAJ75CA	RR	ZR	75	83.3	92.1	1	121	3.3	1
SMAJ78A	SMAJ78CA	RT	ZT	78	86.7	95.8	1	126	3.2	1
SMAJ85A	SMAJ85CA	RV	ZV	85	94.4	104	1	137	2.9	1
SMAJ90A	SMAJ90CA	RX	ZX	90	100	111	1	146	2.7	1
SMAJ100A	SMAJ100CA	RZ	ZZ	100	111	123	1	162	2.5	1
SMAJ110A	SMAJ110CA	SE	VE	110	122	135	1	177	2.3	1
SMAJ120A	SMAJ120CA	SG	VG	120	133	147	1	193	2.1	1
SMAJ130A	SMAJ130CA	SK	VK	130	144	159	1	209	1.9	1
SMAJ150A	SMAJ150CA	SM	VM	150	167	185	1	243	1.6	1
SMAJ160A	SMAJ160CA	SP	VP	160	178	197	1	259	1.5	1
SMAJ170A	SMAJ170CA	SR	VR	170	189	209	1	275	1.5	1
SMAJ180A	SMAJ180CA	ST	VT	180	201	222	1	292	1.4	1
SMAJ200A	SMAJ200CA	SV	VV	200	224	247	1	324	1.2	1
SMAJ220A	SMAJ220CA	SX	VX	220	246	272	1	356	1.1	1
SMAJ250A	SMAJ250CA	SZ	VZ	250	279	309	1	405	1	1
SMAJ300A	SMAJ300CA	TE	UE	300	335	371	1	486	0.8	1
SMAJ350A	SMAJ350CA	TG	UG	350	391	432	1	567	0.7	1
SMAJ400A	SMAJ400CA	TK	UK	400	447	494	1	648	0.6	1
SMAJ440A	SMAJ440CA	TM	UM	440	492	543	1	713	0.6	1



Rating And Characteristic Curves (TA=25°C unless otherwise noted)



Fig.1 - Peak Pulse Power Rating



Fig.2 - Pulse Derating Curve



Fig.3 - Pulse Waveform



Fig.4 - Typical Junction Capacitance



Fig.5 - Steady State Power Dissipation Derating Curve



Fig.6 - Maximum Non-Repetitive Peak Forward Surge Current Uni-Directional Only



Package Dimensions



SMA						
Dimension	Inches			Millimeters		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.1		0.11	2.54		2.8
B	0.194		0.223	4.93		5.66
C	0.051		0.067	1.3		1.7
D	0.157		0.177	3.99		4.5
F	0.006		0.012	0.152		0.305
G	-		0.008	-		0.203
H	0.078		0.095	1.98		2.42
L	0.03		0.06	0.76		1.52
X		0.085			2.16	
Y		0.07			1.78	
Z		0.079			2	



Soldering Parameters



Reflow Condition		Lead-free assembly
Pre Heat	- Temperature Min ( $T_{s(min)}$ )	150°C
	- Temperature Max ( $T_{s(max)}$ )	200°C
	- Time (min to max) ( $t_s$ )	60 – 180 secs
Average ramp up rate (Liquidus Temp ( $T_L$ ) to peak)		3°C/second max
$T_{s(max)}$ to $T_L$ - Ramp-up Rate		3°C/second max
Reflow	- Temperature ( $T_L$ ) (Liquidus)	217°C
	- Time ( $t_L$ )	60 – 150 secs
Peak Temperature ( $T_P$ )		260 <sup>+0/-5</sup> °C
Time within 5°C of actual peak Temperature ( $t_p$ )		20 – 40 secs
Ramp-down Rate		6°C/second max
Time 25°C to peak Temperature (t)		8 minutes Max.
Do not exceed		260°C



**Tape and Reel Specification**



Dimension	Inches			Millimeters		
	MIN	NOM	MAX	MIN	NOM	MAX
P		0.157			4	
P0		0.157			4	
W		0.472			12	
W1		0.492			12.5	
D1		7			177.8	
D2		11			279.4	



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