

Surface Mount Transient Voltage Suppressors

SMAJ-AT Series 400W Transient Voltage Suppressor

Description

TVS diodes can be used in a wide range of applications which like consumer electronic products, automotive industries, munitions, telecommunications, aerospace industries, and intelligent control systems.

Working Voltage: 5.0 to 440 V

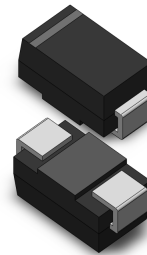
Features

- ◆ Glass passivated or planar junction
- ◆ Excellent clamping capability
- ◆ Repetition rate (duty cycle): 0.01%
- ◆ Low profile package and low inductance
- ◆ 400W Peak Pulse power capability at 10×1000μs waveform.
- ◆ Fast response time: typically less than 1.0ps from 0V to V_{BR} min.
- ◆ High temperature soldering: 260°C/10s at terminals.
- ◆ Plastic package has Underwriters Laboratory Flammability 94V-0.
- ◆ For surface mounted applications in order to optimize board space.
- ◆ High reliability application and automotive grade AECQ101 qualified .

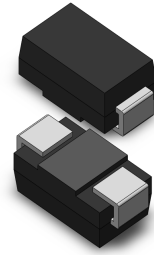
Applications

- ◆ I/O Interface.
- ◆ AC/DC Power supply
- ◆ Low frequency signal transmission line (RS232, RS485, etc.)

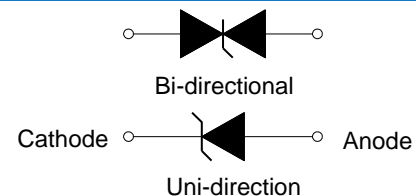
Uni-directional



Bi-directional



Functional Diagram



Mechanical Data

- ◆ Package: SMA/DO-214AC
- ◆ Case Material: "Green" Molding Compound.
- ◆ UL Flammability Classification Rating 94V-0
- ◆ Polarity: Color band denotes cathode except bi-directional models
- ◆ Standard Packaging: 12mm tape (EIA STD RS-481)
- ◆ Weight: 0.07g
- ◆ Terminal Connections: See Diagram Below
- ◆ Marking Information: See Below

Maximum Ratings and Thermal Characteristics ($T_A=25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Value	Units
Peak power dissipation with a 10/1000μs waveform	P_{PPM}	400	W
Steady state power dissipation at $T_L=75^\circ\text{C}$	$P_{M(AV)}$	3.3	W
Maximum Instantaneous Forward Voltage at 30A for Unidirectional	V_F	5.0	V
Storage temperature range	T_{stg}	-55 to +150	$^\circ\text{C}$
Operating junction temperature range	T_j	-55 to +150	$^\circ\text{C}$

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Electrical Characteristics (@ 25°C Unless Otherwise Specified)

Part Number		Marking		Reverse Stand-Off Voltage $V_{RWM}(V)$	Breakdown Voltage V_{BR} (V) @ I_T		Test Current I_T (mA)	Maximum Clamping Voltage V_C @ I_{PP} (V)	Maximum Peak Pulse Current I_{PP} (A)	Maximum Reverse Leakage I_R @ V_{RWM} (μA)
Uni	Bi	Uni	Bi		MIN	MAX				
SMAJ5.0A-AT	SMAJ5.0CA-AT	AET	WET	5.0	6.40	7.00	10	9.2	43.5	800
SMAJ6.0A-AT	SMAJ6.0CA-AT	AGT	WGT	6.0	6.67	7.37	10	10.3	38.8	800
SMAJ6.5A-AT	SMAJ6.5CA-AT	AKT	WKT	6.5	7.22	7.98	10	11.2	35.7	500
SMAJ7.0A-AT	SMAJ7.0CA-AT	AMT	WMT	7.0	7.78	8.60	10	12.0	33.3	200
SMAJ7.5A-AT	SMAJ7.5CA-AT	APT	WPT	7.5	8.33	9.21	1	12.9	31.0	100
SMAJ8.0A-AT	SMAJ8.0CA-AT	ART	WRT	8.0	8.89	9.83	1	13.6	29.4	50
SMAJ8.5A-AT	SMAJ8.5CA-AT	ATT	WTT	8.5	9.44	10.40	1	14.4	27.8	20
SMAJ9.0A-AT	SMAJ9.0CA-AT	AVT	WVT	9.0	10.00	11.10	1	15.4	26.0	10
SMAJ10A-AT	SMAJ10CA-AT	AXT	WXT	10	11.10	12.30	1	17.0	23.5	5
SMAJ11A-AT	SMAJ11CA-AT	AZT	WZT	11	12.20	13.50	1	18.2	22.0	1
SMAJ12A-AT	SMAJ12CA-AT	BET	XET	12	13.30	14.70	1	19.9	20.1	1
SMAJ13A-AT	SMAJ13CA-AT	BGT	XGT	13	14.40	15.90	1	21.5	18.6	1
SMAJ14A-AT	SMAJ14CA-AT	BKT	XKT	14	15.60	17.20	1	23.2	17.3	1
SMAJ15A-AT	SMAJ15CA-AT	BMT	XMT	15	16.70	18.50	1	24.4	16.4	1
SMAJ16A-AT	SMAJ16CA-AT	BPT	XPT	16	17.80	19.70	1	26.0	15.4	1
SMAJ17A-AT	SMAJ17CA-AT	BRT	XRT	17	18.90	20.90	1	27.6	14.5	1
SMAJ18A-AT	SMAJ18CA-AT	BTT	XTT	18	20.00	22.10	1	29.2	13.7	1
SMAJ20A-AT	SMAJ20CA-AT	BVT	XVT	20	22.20	24.50	1	32.4	12.4	1
SMAJ22A-AT	SMAJ22CA-AT	BXT	XXT	22	24.40	26.90	1	35.5	11.3	1
SMAJ24A-AT	SMAJ24CA-AT	BZT	XZT	24	26.70	29.50	1	38.9	10.3	1
SMAJ26A-AT	SMAJ26CA-AT	CET	YET	26	28.90	31.90	1	42.1	9.5	1
SMAJ28A-AT	SMAJ28CA-AT	CGT	YGT	28	31.10	34.40	1	45.4	8.8	1
SMAJ30A-AT	SMAJ30CA-AT	CKT	YKT	30	33.30	36.80	1	48.4	8.3	1
SMAJ33A-AT	SMAJ33CA-AT	CMT	YMT	33	36.70	40.60	1	53.3	7.5	1
SMAJ36A-AT	SMAJ36CA-AT	CPT	YPT	36	40.00	44.20	1	58.1	6.9	1
SMAJ40A-AT	SMAJ40CA-AT	CRT	YRT	40	44.40	49.10	1	64.5	6.2	1
SMAJ43A-AT	SMAJ43CA-AT	CTT	YTT	43	47.80	52.80	1	69.4	5.8	1
SMAJ45A-AT	SMAJ45CA-AT	CVT	YVT	45	50.00	55.30	1	72.7	5.5	1
SMAJ48A-AT	SMAJ48CA-AT	CXT	YXT	48	53.30	58.90	1	77.4	5.2	1

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Uni	Bi	Uni	Bi		MIN	MAX				
SMAJ51A-AT	SMAJ51CA-AT	CZT	YZT	51	56.70	62.70	1	82.4	4.9	1
SMAJ54A-AT	SMAJ54CA-AT	RET	ZE	54	60.00	66.30	1	87.1	4.6	1
SMAJ58A-AT	SMAJ58CA-AT	RGT	ZGT	58	64.40	71.20	1	93.6	4.3	1
SMAJ60A-AT	SMAJ60CA-AT	RKT	ZKT	60	66.70	73.70	1	96.8	4.1	1
SMAJ64A-AT	SMAJ64CA-AT	RMT	ZMT	64	71.10	78.60	1	103.0	3.9	1
SMAJ70A-AT	SMAJ70CA-AT	RPT	ZPT	70	77.80	86.00	1	113.0	3.6	1
SMAJ75A-AT	SMAJ75CA-AT	RRT	ZRT	75	83.30	92.10	1	121.0	3.3	1
SMAJ78A-AT	SMAJ78CA-AT	RTT	ZTT	78	86.70	95.80	1	126.0	3.2	1
SMAJ85A-AT	SMAJ85CA-AT	RVT	ZVT	85	94.40	104.0	1	137.0	2.9	1
SMAJ90A-AT	SMAJ90CA-AT	RXT	ZXT	90	100.0	111.0	1	146.0	2.8	1
SMAJ100A-AT	SMAJ100CA-AT	RZT	ZZT	100	100.0	111.0	1	162.0	2.5	1
SMAJ110A-AT	SMAJ110CA-AT	SET	VET	110	111.0	123.0	1	177.0	2.3	1
SMAJ120A-AT	SMAJ120CA-AT	SGT	VGT	120	122.0	135.0	1	193.0	2.1	1
SMAJ130A-AT	SMAJ130CA-AT	SKT	VKT	130	133.0	147.0	1	209.0	1.9	1
SMAJ150A-AT	SMAJ150CA-AT	SMT	VMT	150	144.0	159.0	1	243.0	1.7	1
SMAJ160A-AT	SMAJ160CA-AT	SPT	VPT	160	167.0	185.0	1	259.0	1.6	1
SMAJ170A-AT	SMAJ170CA-AT	SRT	VRT	170	178.0	197.0	1	275.0	1.5	1
SMAJ180A-AT	SMAJ180CA-AT	STT	VTT	180	189.0	209.0	1	292.0	1.4	1
SMAJ200A-AT	SMAJ200CA-AT	SWT	VWT	200	201.0	222.0	1	324.0	1.3	1
SMAJ220A-AT	SMAJ220CA-AT	SXT	VXT	220	211.0	234.0	1	356.0	1.1	1
SMAJ250A-AT	SMAJ250CA-AT	SZT	VZT	250	224.0	247.0	1	405.0	1.0	1
SMAJ300A-AT	SMAJ300CA-AT	DET	HET	300	233.0	258.0	1	486.0	0.8	1
SMAJ350A-AT	SMAJ350CA-AT	DGT	HGT	350	391.0	432.0	1	567.0	0.7	1
SMAJ400A-AT	SMAJ400CA-AT	DKT	HKT	400	447.0	494.0	1	648.0	0.6	1
SMAJ440A-AT	SMAJ440CA-AT	DKT	HKT	440	492.0	543.0	1	713.0	0.6	1

Note:

- (1) Add suffix ' CA ' after part number to specify Bi-directional devices
- (2) Suffix 'A ' denotes 5% tolerance device.

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

Figure 1 - Pulse Waveform

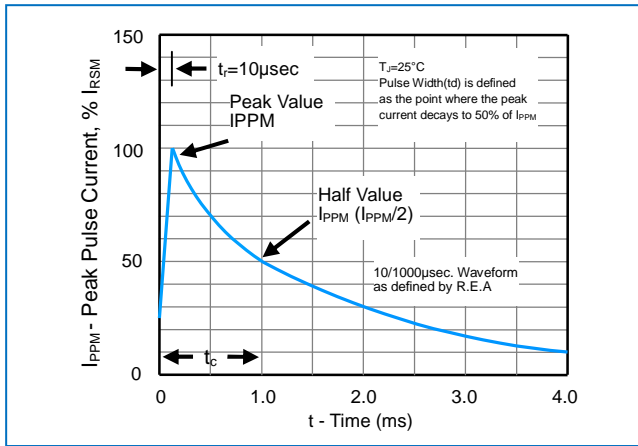


Figure 2 - Pulse Derating Curve

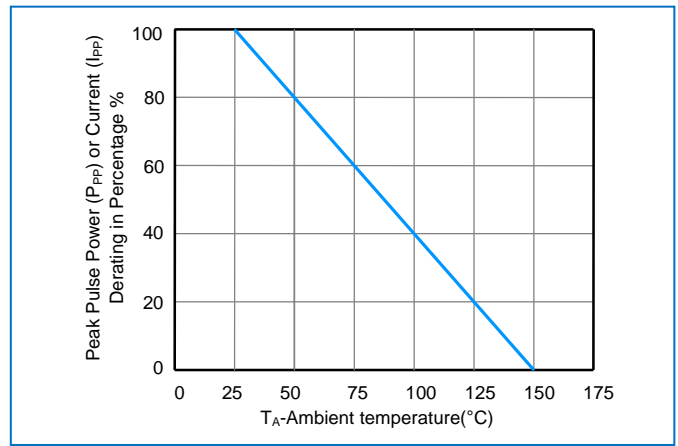


Figure 3 - Peak Pulse Power Rating Curve

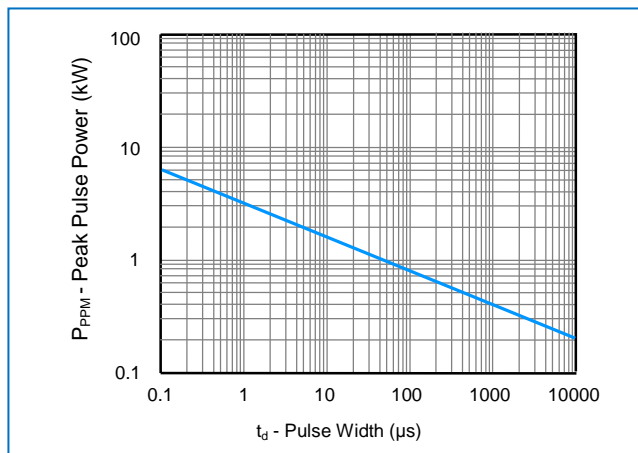


Figure 4 - Steady State Power Derating Curve

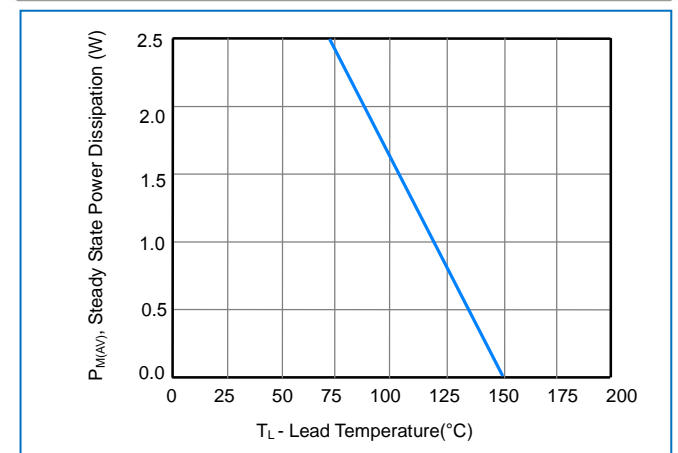


Figure 5 - Maximum Non-Repetitive Surge Current

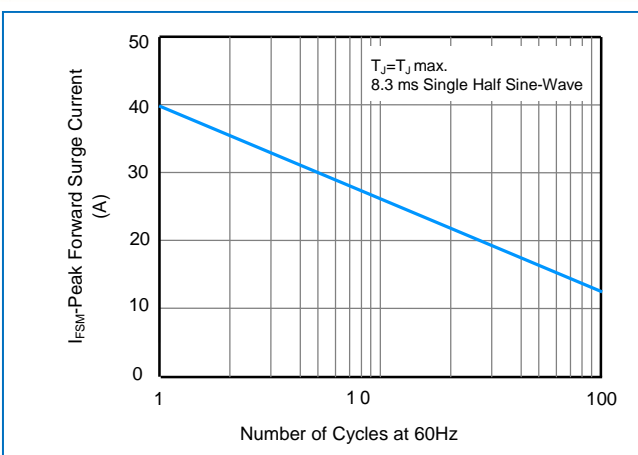
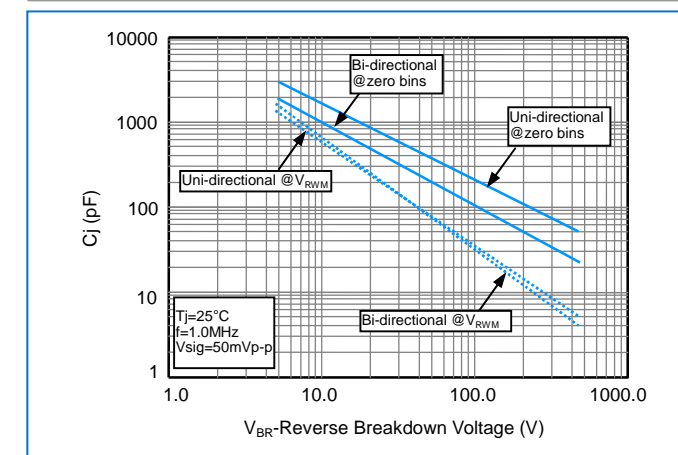


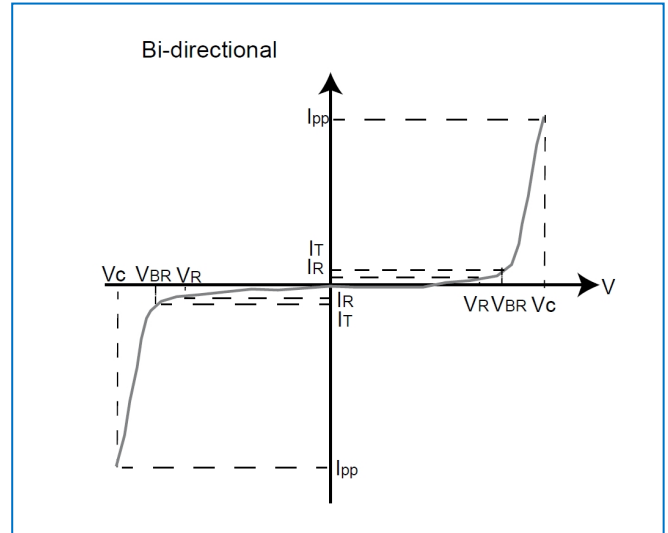
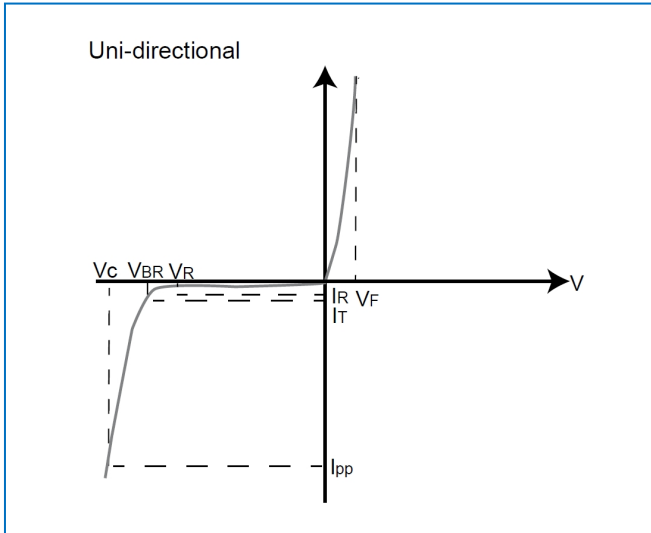
Figure 6 - Typical Junction Capacitance



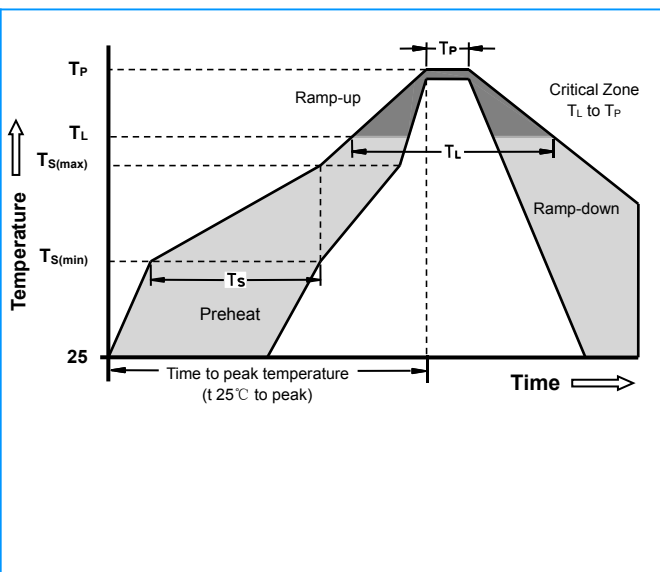
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1-V Curves Characteristics



Soldering Parameters

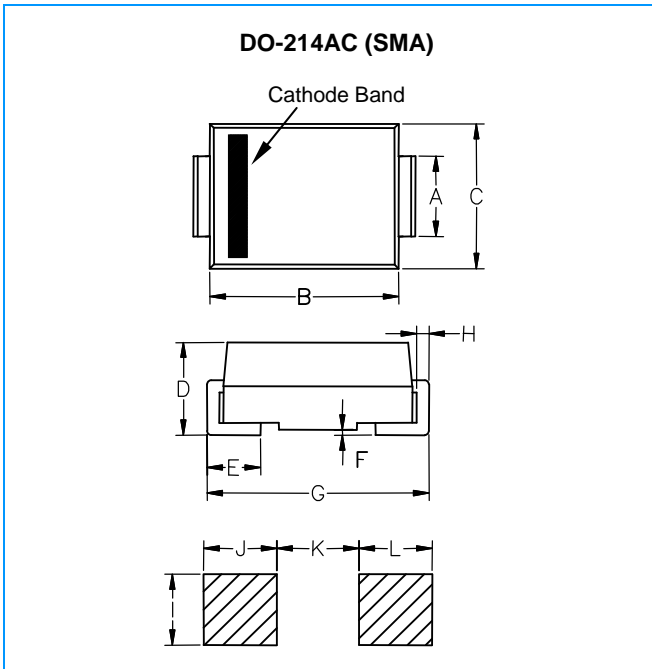


Reflow Condition		Lead-free assembly
Pre Heat	-Temperature Min ($T_{S(min)}$)	150°C
	-Temperature Max ($T_{S(max)}$)	200°C
	- Time (min to max) (t_s)	60 - 180 Seconds
Average ramp up rate (Liquidus Temp T_L) to peak		3°C/second max
$T_{S(max)}$ to T_L - Ramp-up Rate		3°C/second max
Reflow	- Temperature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

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Dimensions



Dimensions	Inches		Millimeters	
	Min	Max	Min	Max
A	0.049	0.064	1.230	1.630
B	0.162	0.179	4.10	4.550
C	0.099	0.109	2.510	2.760
D	0.077	0.089	1.960	2.260
E	0.030	0.060	0.750	1.510
F	-	0.008	-	0.203
G	0.192	0.206	4.87	5.220
H	0.006	0.012	0.152	0.305
I	0.070	-	1.800	-
J	0.082	-	2.100	-
K	-	0.090	-	2.300
L	0.082	-	2.100	-

Part Numbering

