

Transient Voltage Suppressors (TVS) Data Sheet

Features

- For surface mounted applications in order to optimize board space
- Low profile package
- Built-in strain relief
- Glass passivated junction
- Low inductance
- Excellent clamping capability
- 500W peak pulse power capability at 10/1000 μ s waveform, repetition rate (duty cycle): 0.01%
- Fast response time
- Typical I_R less than 1 μ A above 10V
- High Temperature soldering: 260 $^{\circ}$ C/10 seconds at terminals
- Plastic package has underwriters laboratory flammability 94V-0
- Meets MSL level 1, per J-STD-020
- Safety certification: UL: E244458



Mechanical Data

- Case: JEDEC DO-214AC. Molded plastic over glass passivated junction
- Terminal: Solder plated, solderable per MIL-STD-750, Method 2026
- Polarity: Color band denotes cathode except bi-directional models
- Standard Packaging: 12mm tape (EIA STD RS-481)
- Weight: 0.07g

Applications

- I/O interface
- AC/DC power supply
- Low frequency signal transmission line (RS232, RS485, etc.)

Maximum Ratings and Characteristics

Ratings at 25 $^{\circ}$ C ambient temperature unless otherwise specified.

Rating	Symbol	Value	Units
Peak pulse power dissipation at 10/1000 μ s waveform (Note1, Note2, Fig.1)	P_{PPM}	Minimum 500	Watts
Peak pulse current of at 10/1000 μ s waveform (Note 1, Fig.3)	I_{PPM}	See Table	Amps
Steady state power dissipation at $T_A=50^{\circ}$ C (Fig.5)	$P_{M(AV)}$	3.3	Watts
Peak forward surge current, 8.3ms single half sine-wave superimposed on rated load, (JEDEC Method) (Note3, Fig.6)	I_{FSM}	100	Amps
Operating junction and Storage Temperature Range.	T_J, T_{STG}	-65 to +150	$^{\circ}$ C
Typical thermal resistance junction to lead	$R_{\theta JL}$	20	$^{\circ}$ C/W
Typical thermal resistance junction to ambient	$R_{\theta JA}$	100	$^{\circ}$ C/W

Notes: 1. Non-repetitive current pulse, per Fig.3 and derated above $T_A=25^{\circ}$ C per Fig.2.

2. Mounted on 5.0mm \times 5.0mm (0.03mm thick) copper pads to each terminal.

3. 8.3ms single half sine-wave, or equivalent square wave, duty cycle=4 pulses per minutes maximum.

Dimensions (SMA/DO-214AC)

	Symbol	Millimeters		Inches	
		Min.	Max.	Min.	Max.
	L	3.99	4.50	0.157	0.177
	D	2.54	2.79	0.100	0.110
	D1	1.25	1.65	0.049	0.065
	T	4.93	5.28	0.194	0.208
	T1	0.76	1.52	0.030	0.060
	d	-	0.203	-	0.008
	H	2.00	2.50	0.079	0.098
H1	1.98	2.29	0.078	0.090	

Electrical Characteristics (T_A=25°C)

Part Number		Type ①	Device Marking Code		Reverse Stand-Off Voltage	Breakdown Voltage @I _T	Test Current	Maximum Clamping Voltage @I _{PP}	Peak Pulse Current	Reverse Leakage @V _{RWM}
Unidirectional	Bidirectional		UNI	BI	V _{RWM} (V)	V _{BR} (V)	I _T (mA)	V _C (V)	I _{PP} (A)	I _R (μA)
SMAJ5.0A	SMAJ5.0CA	HP	AE	WE	5.0	6.40~7.00	10	9.2	55.5	800
SMAJ6.0A	SMAJ6.0CA	HP	AG	WG	6.0	6.67~7.37	10	10.3	49.6	800
SMAJ6.5A	SMAJ6.5CA	HP	AK	WK	6.5	7.22~7.98	10	11.2	45.6	500
SMAJ7.0A	SMAJ7.0CA	HP	AM	WM	7.0	7.78~8.60	10	12.0	42.5	200
SMAJ7.5A	SMAJ7.5CA	HP	AP	WP	7.5	8.33~9.21	1	12.9	39.6	100
SMAJ8.0A	SMAJ8.0CA	HP	AR	WR	8.0	8.89~9.83	1	13.6	37.6	50
SMAJ8.5A	SMAJ8.5CA	HP	AT	WT	8.5	9.44~10.40	1	14.4	35.4	20
SMAJ9.0A	SMAJ9.0CA	HP	AV	WV	9.0	10.00~11.10	1	15.4	33.2	10
SMAJ10A	SMAJ10CA	HP	AX	WX	10.0	11.10~12.30	1	17.0	30.0	5
SMAJ11A	SMAJ11CA	HP	AZ	WZ	11.0	12.20~13.50	1	18.2	28.1	1
SMAJ12A	SMAJ12CA	HP	BE	XE	12.0	13.30~14.70	1	19.9	25.7	1
SMAJ13A	SMAJ13CA	HP	BG	XG	13.0	14.40~15.90	1	21.5	23.8	1
SMAJ14A	SMAJ14CA	HP	BK	XK	14.0	15.60~17.20	1	23.2	22.0	1
SMAJ15A	SMAJ15CA	HP	BM	XM	15.0	16.70~18.50	1	24.4	24.5	1
SMAJ16A	SMAJ16CA	HP	BP	XP	16.0	17.80~19.70	1	26.0	19.6	1
SMAJ17A	SMAJ17CA	HP	BR	XR	17.0	18.90~20.90	1	27.6	18.5	1

Electrical Characteristics

Part Number		Type ①	Device Marking Code		Reverse Stand-Off Voltage	Breakdown Voltage @ I_T	Test Current	Maximum Clamping Voltage @ I_{PP}	Peak Pulse Current	Reverse Leakage @ V_{RWM}
Unidirectional	Bidirectional		UNI	BI	$V_{RWM}(V)$	$V_{BR}(V)$	$I_T(mA)$	$V_C(V)$	$I_{PP}(A)$	$I_R(\mu A)$
SMAJ18A	SMAJ18CA	HP	BT	XT	18.0	20.00~22.10	1	29.2	17.5	1
SMAJ20A	SMAJ20CA	HP	BV	XV	20.0	22.20~24.50	1	32.4	15.8	1
SMAJ22A	SMAJ22CA	HP	BX	XX	22.0	24.40~26.90	1	35.5	14.4	1
SMAJ24A	SMAJ24CA	HP	BZ	XZ	24.0	26.70~29.50	1	38.9	13.2	1
SMAJ26A	SMAJ26CA	HP	CE	YE	26.0	28.90~31.90	1	42.1	12.2	1
SMAJ28A	SMAJ28CA	HP	CG	YG	28.0	31.10~34.40	1	45.4	11.3	1
SMAJ30A	SMAJ30CA	HP	CK	YK	30.0	33.30~36.80	1	48.4	10.5	1
SMAJ33A	SMAJ33CA	HP	CM	YM	33.0	36.70~40.60	1	53.3	9.6	1
SMAJ36A	SMAJ36CA	HP	CP	YP	36.0	40.00~44.20	1	58.1	8.8	1
SMAJ40A	SMAJ40CA	HP	CR	YR	40.0	44.40~49.10	1	64.5	7.9	1
SMAJ43A	SMAJ43CA	HP	CT	YT	43.0	47.80~52.80	1	69.4	7.4	1
SMAJ45A	SMAJ45CA	HP	CV	YV	45.0	50.00~55.30	1	72.7	7.1	1
SMAJ48A	SMAJ48CA	HP	CX	YX	48.0	53.30~58.90	1	77.4	6.6	1
SMAJ51A	SMAJ51CA	HP	CZ	YZ	51.0	56.70~62.70	1	82.4	6.2	1
SMAJ54A	SMAJ54CA	HP	RE	ZE	54.0	60.00~66.30	1	87.1	5.9	1
SMAJ58A	SMAJ58CA	HP	RG	ZG	58.0	64.40~71.20	1	93.6	5.5	1
SMAJ60A	SMAJ60CA	HP	RK	ZK	60.0	66.70~73.70	1	96.8	5.3	1
SMAJ64A	SMAJ64CA	HP	RM	ZM	64.0	71.10~78.60	1	103.0	5.0	1
SMAJ70A	SMAJ70CA	HP	RP	ZP	70.0	77.80~86.00	1	113.0	4.5	1
SMAJ75A	SMAJ75CA	HP	RR	ZR	75.0	83.30~92.10	1	121.0	4.3	1
SMAJ78A	SMAJ78CA	HP	RT	ZT	78.0	86.70~95.80	1	126.0	4.1	1
SMAJ85A	SMAJ85CA	HP	RV	ZV	85.0	94.40~104.00	1	137.0	3.7	1
SMAJ90A	SMAJ90CA	HP	RX	ZX	90.0	100.00~111.00	1	146.0	3.5	1
SMAJ100A	SMAJ100CA	HP	RZ	ZZ	100.0	111.00~123.00	1	162.0	3.1	1
SMAJ110A	SMAJ110CA	HP	SE	VE	110.0	122.00~135.00	1	177.0	2.9	1
SMAJ120A	SMAJ120CA	HP	SG	VG	120.0	133.00~147.00	1	193.0	2.6	1
SMAJ130A	SMAJ130CA	HP	SK	VK	130.0	144.00~159.00	1	209.0	2.5	1
SMAJ150A	SMAJ150CA	HP	SM	VM	150.0	167.00~185.00	1	243.0	2.1	1

Notes: For bidirectional type having V_{RWM} of 10V and less, the I_R limit is double.

① Specific code by request.

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

Figure 1. Peak Pulse Power Rating Curve

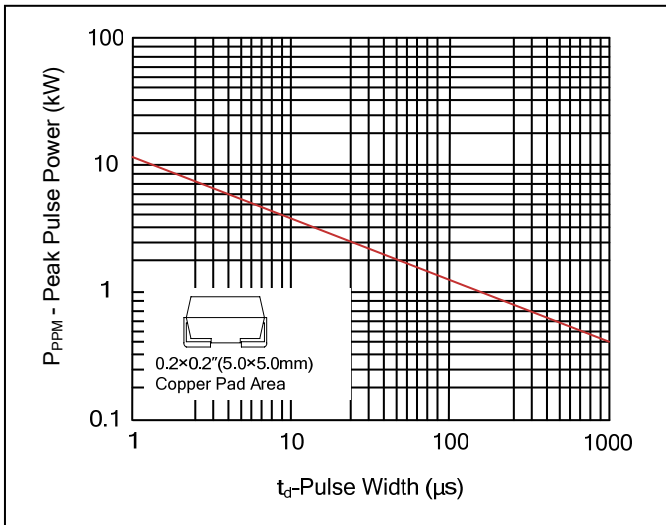


Figure 2. Pulse Derating Curve

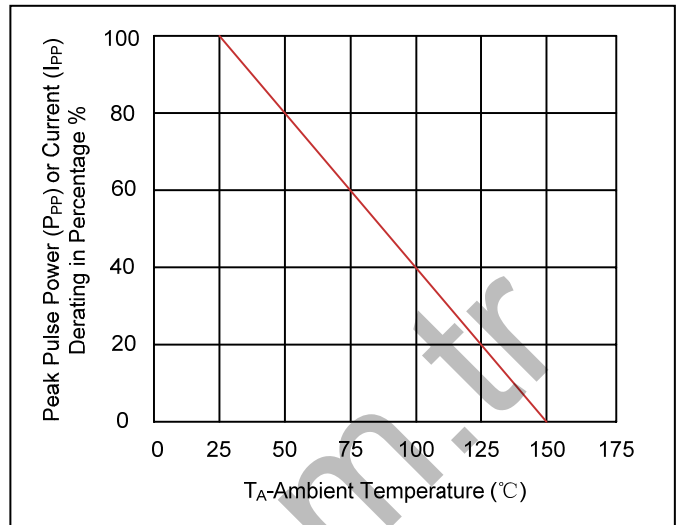


Figure 3. Pulse Waveform

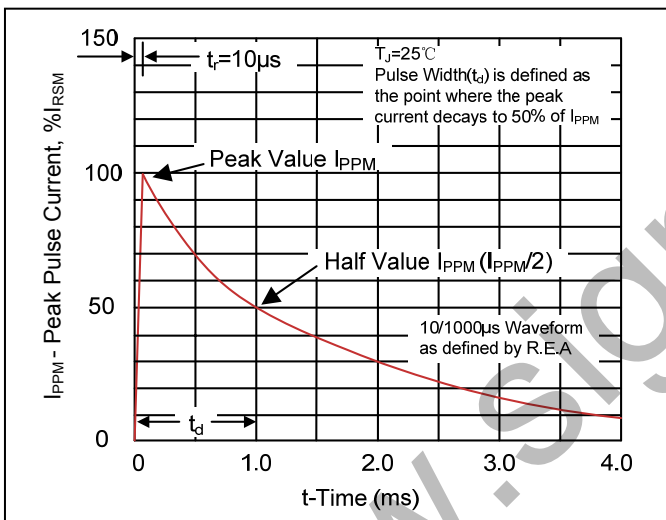


Figure 4. Typical Junction Capacitance

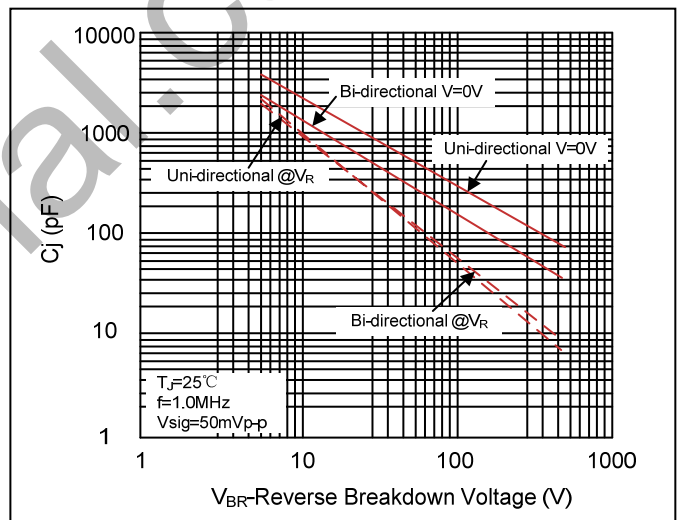


Figure 5. Steady State Power Dissipation Derating Curve

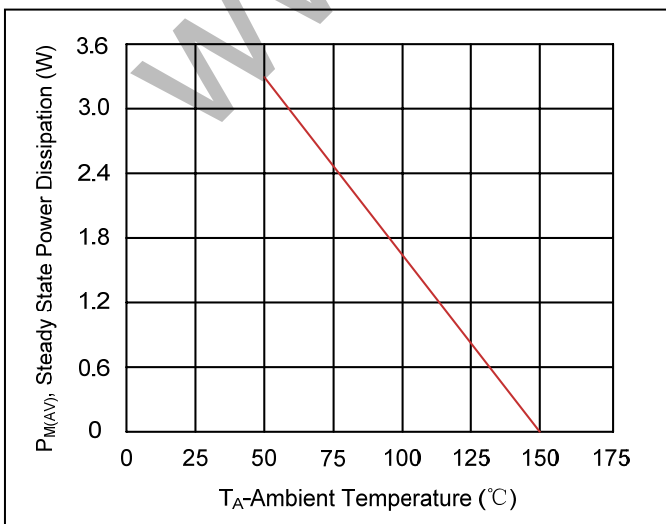
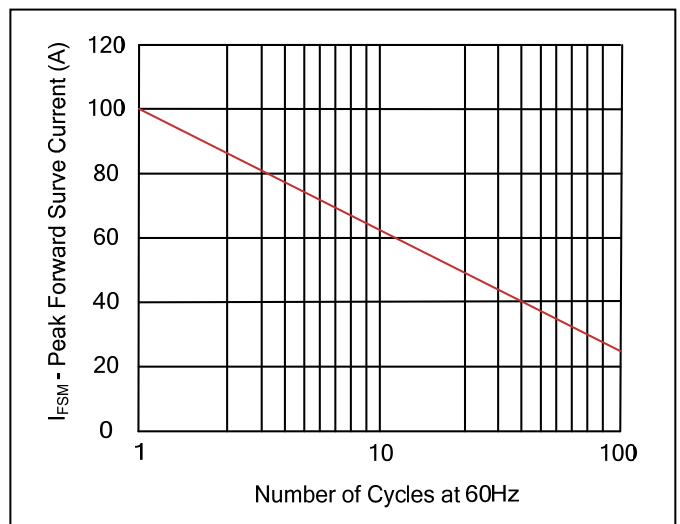
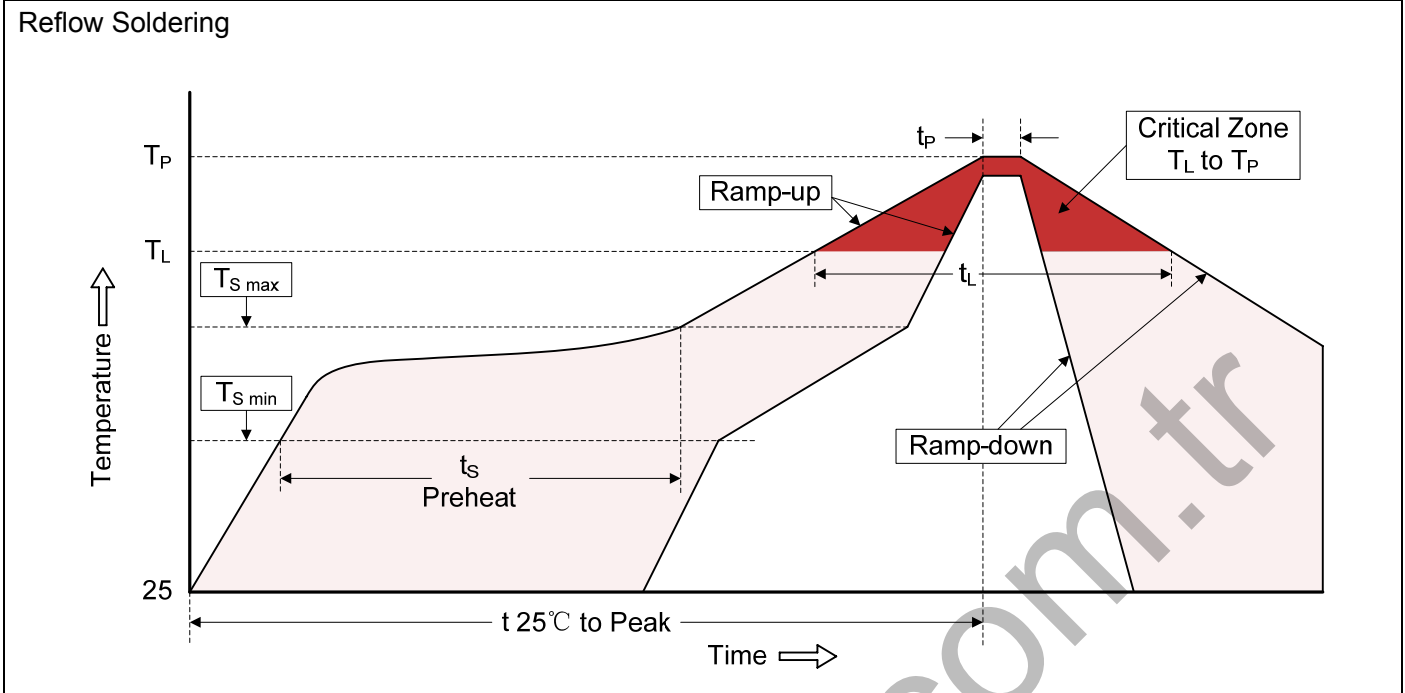


Figure 6. Maximum Non-Repetitive Forward Surge Current Uni-Directional Only



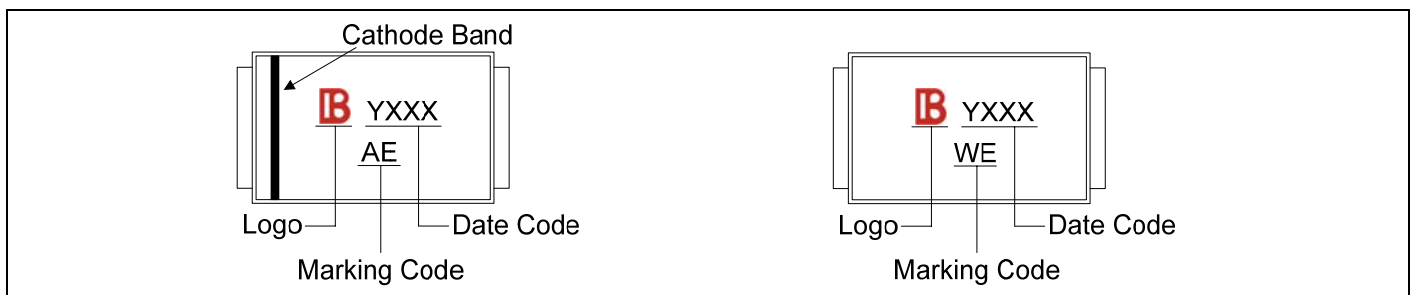
Recommended Soldering Conditions

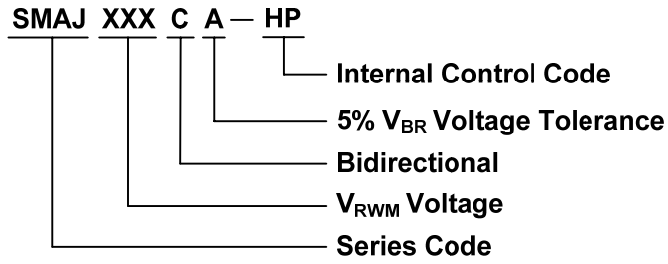


Recommended Conditions

Profile Feature	Pb-Free Assembly
Average ramp-up rate (T_L to T_P)	3°C/second max.
Preheat -Temperature Min ($T_{S\ min}$) -Temperature Max ($T_{S\ max}$) -Time (min to max) (t_s)	150°C 200°C 60-180 seconds
$T_{S\ max}$ to T_L -Ramp-up Rate	3°C/second max.
Time maintained above: -Temperature (T_L) -Time (t_L)	217°C 60-150 seconds
Peak Temperature (T_P)	260°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	8 minutes max.

Marking Code





Packaging

Tape	Symbol	Dimension (mm)	
	W	12.00±0.20	
	P0	4.00±0.10	
	P1	4.00±0.10	
	P2	2.00±0.10	
	D0	Φ1.5±0.10	
	D1	Φ1.5±0.10	
	E	1.75±0.10	
	F	5.50±0.05	
	A0	2.79±0.10	
	B0	5.33±0.10	
	K0	2.55±0.15	
	T	0.25±0.05	
	Quantity: 1000PCS		
	7" Reel	D2	Φ178.0±2.0
	D3	Φ50.0Min.	
	D4	Φ13.0±0.5	
	W1	16.0±2.0	
	Quantity: 1000PCS		
	13" Reel	D5	Φ330.0±2.0
	D6	Φ13.5±0.5	
	H	2.5±1.0	
	W2	16.0±2.0	
	Quantity: 5000PCS		