

Transient Voltage Suppressors (TVS) Data Sheet

Features

- For surface mounted applications in order to optimize board space
- Low profile package
- Glass passivated junction
- Low inductance
- Excellent clamping capability
- 600W 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 600	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)
SMAJ6.0A	SMAJ6.0CA	HP6	AG	WG	6.0	6.67~7.37	10	10.3	58.3	800
SMAJ6.5A	SMAJ6.5CA	HP6	AK	WK	6.5	7.22~7.98	10	11.2	53.6	500
SMAJ7.0A	SMAJ7.0CA	HP6	AM	WM	7.0	7.78~8.60	10	12.0	50.0	200
SMAJ7.5A	SMAJ7.5CA	HP6	AP	WP	7.5	8.33~9.21	1	12.9	46.6	100
SMAJ8.0A	SMAJ8.0CA	HP6	AR	WR	8.0	8.89~9.83	1	13.6	44.2	50
SMAJ8.5A	SMAJ8.5CA	HP6	AT	WT	8.5	9.44~10.40	1	14.4	41.7	20
SMAJ9.0A	SMAJ9.0CA	HP6	AV	WV	9.0	10.00~11.10	1	15.4	39.0	10
SMAJ10A	SMAJ10CA	HP6	AX	WX	10.0	11.10~12.30	1	17.0	35.3	5
SMAJ11A	SMAJ11CA	HP6	AZ	WZ	11.0	12.20~13.50	1	18.2	33.0	1
SMAJ12A	SMAJ12CA	HP6	BE	XE	12.0	13.30~14.70	1	19.9	30.2	1
SMAJ13A	SMAJ13CA	HP6	BG	XG	13.0	14.40~15.90	1	21.5	28.0	1
SMAJ14A	SMAJ14CA	HP6	BK	XK	14.0	15.60~17.20	1	23.2	25.9	1
SMAJ15A	SMAJ15CA	HP6	BM	XM	15.0	16.70~18.50	1	24.4	24.6	1
SMAJ16A	SMAJ16CA	HP6	BP	XP	16.0	17.80~19.70	1	26.0	23.1	1

Electrical Characteristics

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Unidirectional	Bidirectional		UNI	BI	V _{RWM} (V)	V _{BR} (V)	I _T (mA)	V _C (V)	I _{PP} (A)	I _R (μA)
SMAJ17A	SMAJ17CA	HP6	BR	XR	17.0	18.90~20.90	1	27.6	21.8	1
SMAJ18A	SMAJ18CA	HP6	BT	XT	18.0	20.00~22.10	1	29.2	20.6	1
SMAJ20A	SMAJ20CA	HP6	BV	XV	20.0	22.20~24.50	1	32.4	18.6	1
SMAJ22A	SMAJ22CA	HP6	BX	XX	22.0	24.40~26.90	1	35.5	16.9	1
SMAJ24A	SMAJ24CA	HP6	BZ	XZ	24.0	26.70~29.50	1	38.9	15.5	1
SMAJ26A	SMAJ26CA	HP6	CE	YE	26.0	28.90~31.90	1	42.1	14.3	1
SMAJ28A	SMAJ28CA	HP6	CG	YG	28.0	31.10~34.40	1	45.4	13.3	1
SMAJ30A	SMAJ30CA	HP6	CK	YK	30.0	33.30~36.80	1	48.4	12.4	1
SMAJ33A	SMAJ33CA	HP6	CM	YM	33.0	36.70~40.60	1	53.3	11.3	1
SMAJ36A	SMAJ36CA	HP6	CP	YP	36.0	40.00~44.20	1	58.1	10.4	1
SMAJ40A	SMAJ40CA	HP6	CR	YR	40.0	44.40~49.10	1	64.5	9.3	1

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

① Specific code by request.

Figure 1. Peak Pulse Power Rating Curve

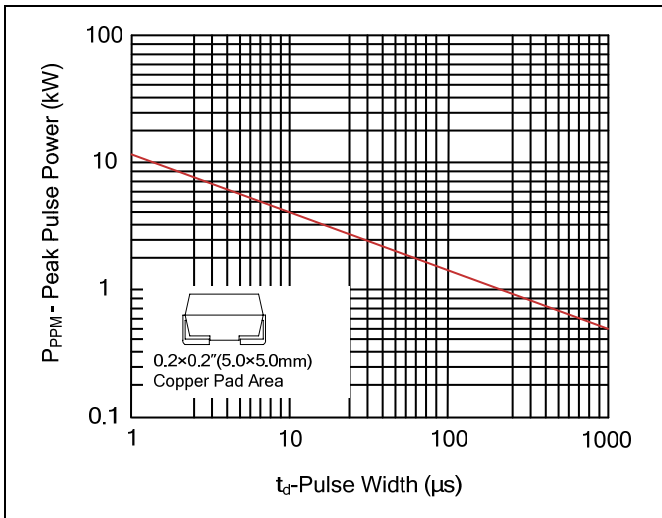


Figure 2. Pulse Derating Curve



Figure 3. Pulse Waveform



Figure 4. Typical Junction Capacitance

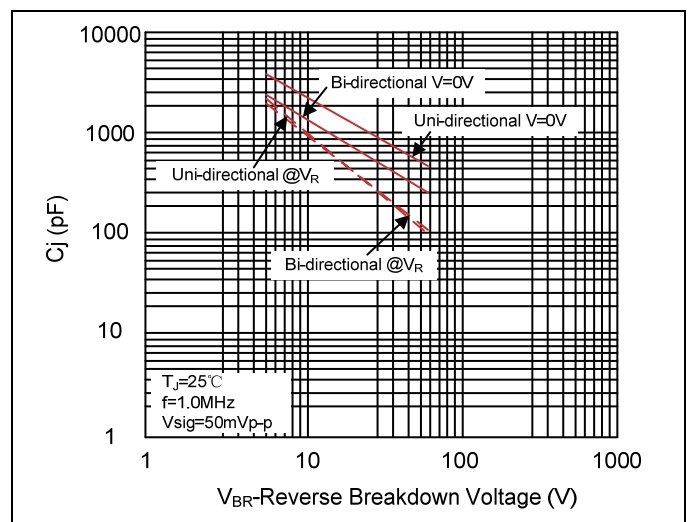


Figure 5. Steady State Power Dissipation Derating Curve

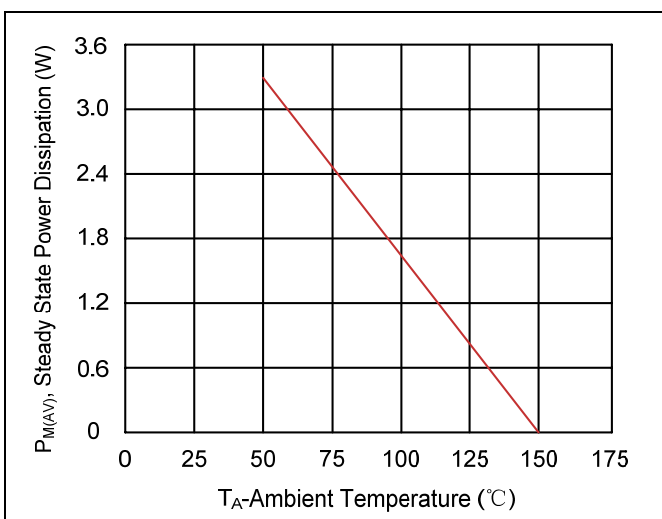
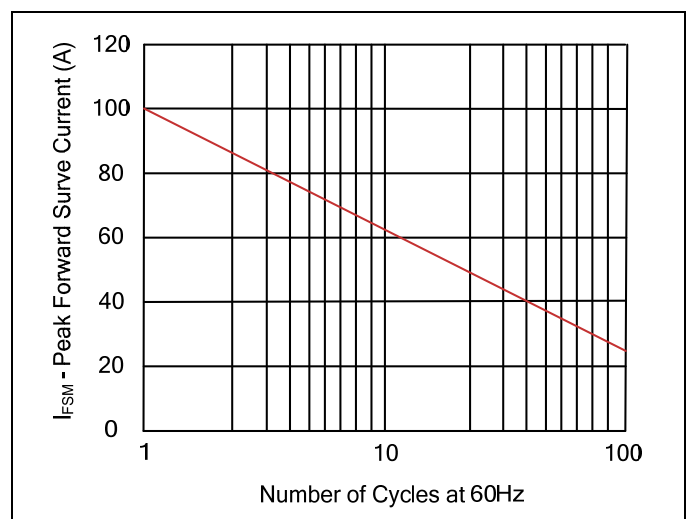


Figure 6. Maximum Non-Repetitive Forward Surge Current Uni-Directional Only



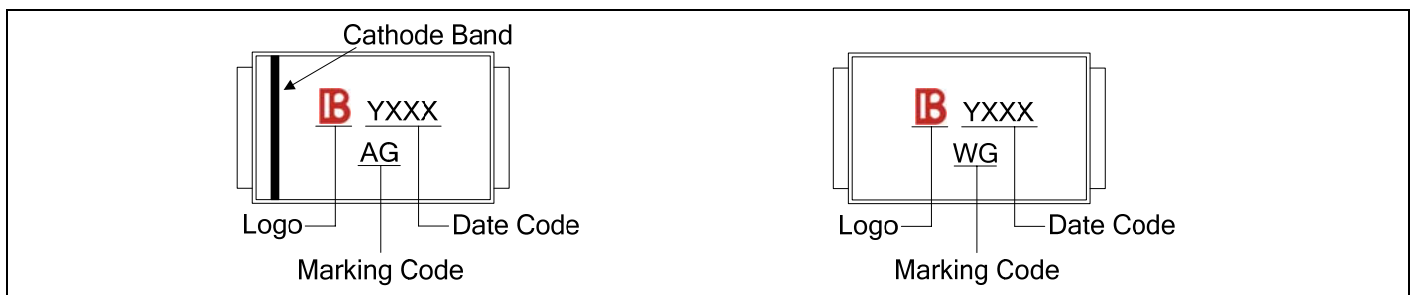
Recommended Soldering Conditions

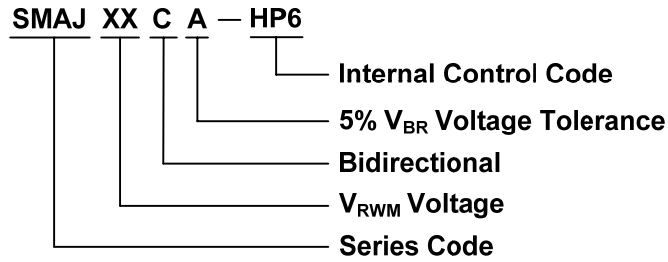


Recommended Conditions

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		
		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			