

## 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
- 1000W peak pulse power capability at 10/1000 $\mu$ s waveform, repetition rate (duty cycle): 0.01%
- Fast response time
- Typical  $I_R$  less than 1 $\mu$ A above 12V
- High Temperature soldering: 260°C/10 seconds at terminals
- Plastic package has underwriters laboratory flammability 94V-0
- Meets MSL level 1, per J-STD-020
- AEC-Q101 qualified
- IEC61000-4-2 ESD 30KV Air, 30KV contact compliance



### Mechanical Data

- Case: JEDEC DO-214AA. Molded plastic over glass passivated junction
- Terminal: Tin 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: 0.10g

### Applications

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

### Maximum Ratings and Characteristics

Ratings at 25°C ambient temperature unless otherwise specified.

Rating	Symbol	Value	Units
Peak pulse power dissipation at 10/1000µs waveform (Note1, Note2, Fig.1)	$P_{PPM}$	Minimum 1000	Watts
Peak pulse current of at 10/1000µs waveform (Note 1, Fig.3)	$I_{PPM}$	See Table	Amps
Steady state power dissipation at $T_A=50^\circ\text{C}$ (Fig.5)	$P_{M(AV)}$	5.0	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.	$T_J, T_{STG}$	-55 to +150	°C
Typical thermal resistance junction to lead	$R_{\theta JL}$	20	°C/W
Typical thermal resistance junction to ambient	$R_{\theta JA}$	100	°C/W

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

2. Mounted on 5.0mm×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 (SMB/DO-214AA)

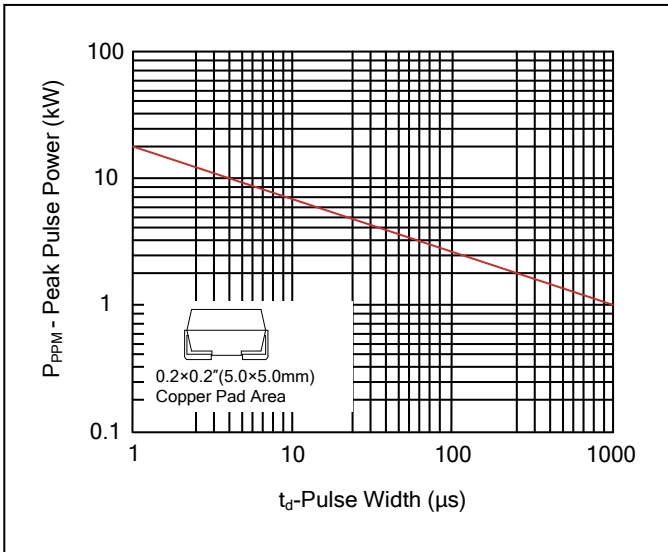
Product:	Symbol	Millimeters		Inches	
		Min.	Max.	Min.	Max.
<p><b>Product:</b></p> <p><b>Pad:</b></p>	L	4.06	4.57	0.160	0.180
	D	3.30	3.94	0.130	0.155
	D1	1.95	2.20	0.077	0.086
	T	5.21	5.59	0.205	0.220
	T1	0.76	1.52	0.030	0.060
	d	-	0.203	-	0.008
	H	2.15	2.65	0.085	0.104
	H1	2.13	2.47	0.084	0.097

**Electrical Characteristics (T<sub>A</sub>=25°C)**

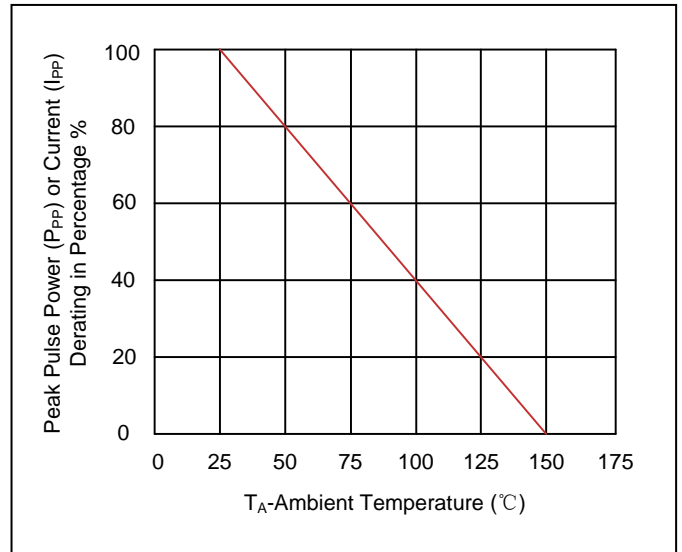
Part Number		Device Marking Code		Reverse Stand-Off Voltage	Breakdown Voltage @I <sub>T</sub>	Test Current	Maximum Clamping Voltage @I <sub>PP</sub>	Peak Pulse Current	Reverse Leakage @V <sub>RWM</sub>
Unidirectional	Bidirectional	UNI	BI	V <sub>RWM</sub> (V)	V <sub>BR</sub> (V)	I <sub>T</sub> (mA)	V <sub>C</sub> (V)	I <sub>PP</sub> (A)	I <sub>R</sub> (μA)
1.0SMB6.8A-AT	1.0SMB6.8CA-AT	6K8A	6K8C	5.80	6.45~7.14	10	10.5	96.8	1000
1.0SMB7.5A-AT	1.0SMB7.5CA-AT	7K5A	7K5C	6.40	7.13~7.88	10	11.3	90.0	500
1.0SMB8.2A-AT	1.0SMB8.2CA-AT	8K2A	8K2C	7.02	7.79~8.61	10	12.1	84.0	200
1.0SMB9.1A-AT	1.0SMB9.1CA-AT	9K1A	9K1C	7.78	8.65~9.55	1	13.4	75.8	50
1.0SMB10A-AT	1.0SMB10CA-AT	K10A	K10C	8.55	9.50~10.50	1	14.5	70.2	10
1.0SMB11A-AT	1.0SMB11CA-AT	K11A	K11C	9.40	10.50~11.60	1	15.6	65.2	5
1.0SMB12A-AT	1.0SMB12CA-AT	K12A	K12C	10.20	11.40~12.60	1	16.7	60.8	5
1.0SMB13A-AT	1.0SMB13CA-AT	K13A	K13C	11.10	12.40~13.70	1	18.2	55.8	1
1.0SMB15A-AT	1.0SMB15CA-AT	K15A	K15C	12.80	14.30~15.80	1	21.2	48.0	1
1.0SMB16A-AT	1.0SMB16CA-AT	K16A	K16C	13.60	15.20~16.80	1	22.5	45.2	1
1.0SMB18A-AT	1.0SMB18CA-AT	K18A	K18C	15.30	17.10~18.90	1	25.5	40.3	1
1.0SMB20A-AT	1.0SMB20CA-AT	K20A	K20C	17.10	19.00~21.00	1	27.7	36.7	1
1.0SMB22A-AT	1.0SMB22CA-AT	K22A	K22C	18.80	20.90~23.10	1	30.6	33.2	1
1.0SMB24A-AT	1.0SMB24CA-AT	K24A	K24C	20.50	22.80~25.20	1	33.2	30.7	1
1.0SMB27A-AT	1.0SMB27CA-AT	K27A	K27C	23.10	25.70~28.40	1	37.5	27.2	1
1.0SMB30A-AT	1.0SMB30CA-AT	K30A	K30C	25.60	28.50~31.50	1	41.4	24.5	1
1.0SMB33A-AT	1.0SMB33CA-AT	K33A	K33C	28.20	31.40~34.70	1	45.7	22.2	1
1.0SMB36A-AT	1.0SMB36CA-AT	K36A	K36C	30.80	34.20~37.80	1	49.9	20.3	1
1.0SMB39A-AT	1.0SMB39CA-AT	K39A	K39C	33.30	37.10~41.00	1	53.9	18.8	1
1.0SMB43A-AT	1.0SMB43CA-AT	K43A	K43C	36.80	40.90~45.20	1	59.3	17.2	1
1.0SMB47A-AT	1.0SMB47CA-AT	K47A	K47C	40.20	44.70~49.40	1	64.8	15.7	1
1.0SMB51A-AT	1.0SMB51CA-AT	K51A	K51C	43.60	48.50~53.60	1	70.1	14.5	1
1.0SMB56A-AT	1.0SMB56CA-AT	K56A	K56C	47.80	53.20~58.80	1	77.0	13.2	1
1.0SMB62A-AT	1.0SMB62CA-AT	K62A	K62C	53.00	58.90~65.10	1	85.0	12.0	1
1.0SMB68A-AT	1.0SMB68CA-AT	K68A	K68C	58.10	64.60~71.40	1	92.0	11.0	1

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

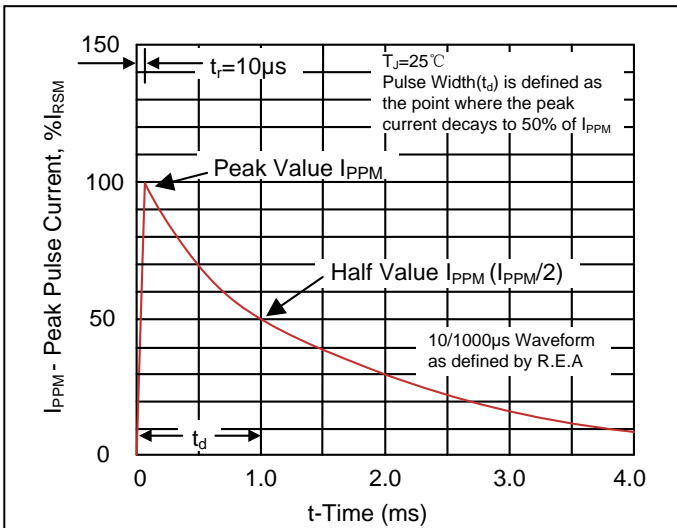
**Figure 1. Peak Pulse Power Rating Curve**



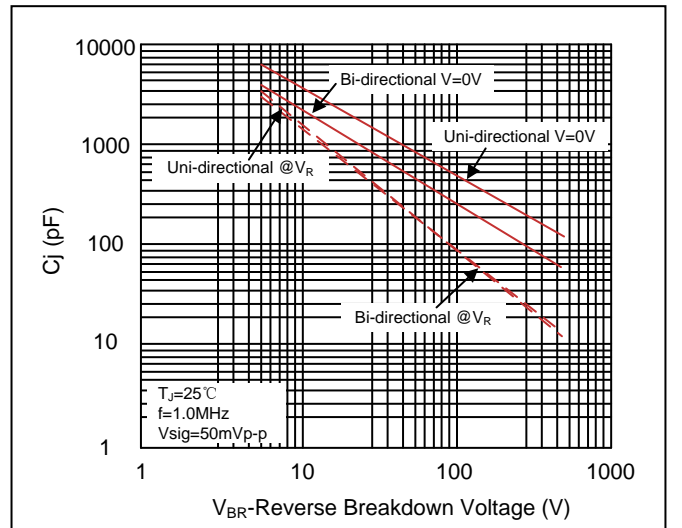
**Figure 2. Pulse Derating Curve**



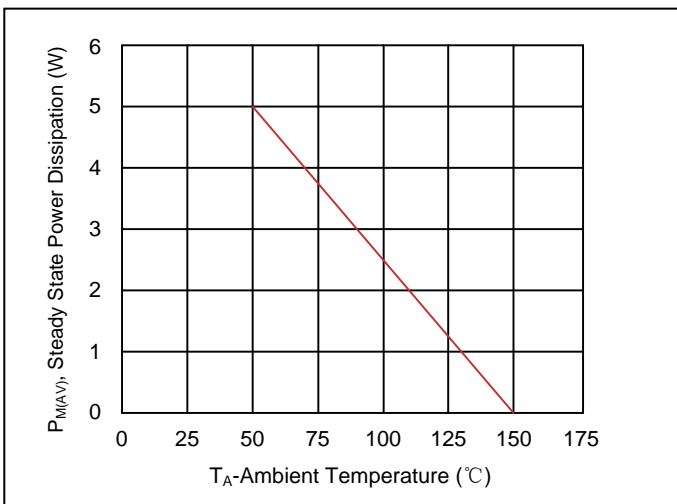
**Figure 3. Pulse Waveform**



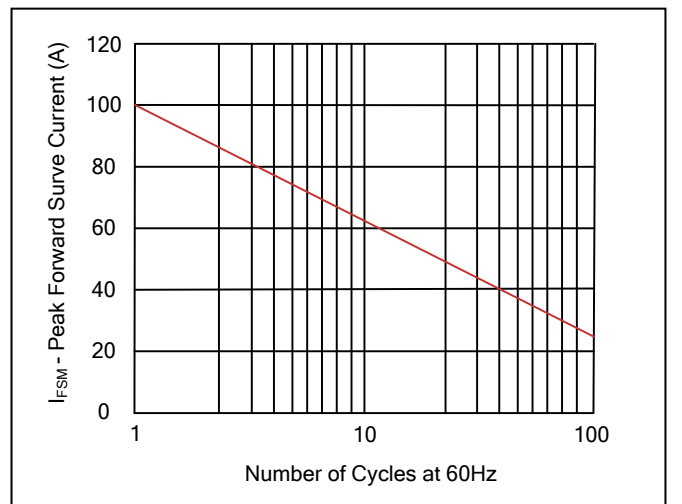
**Figure 4. Typical Junction Capacitance**



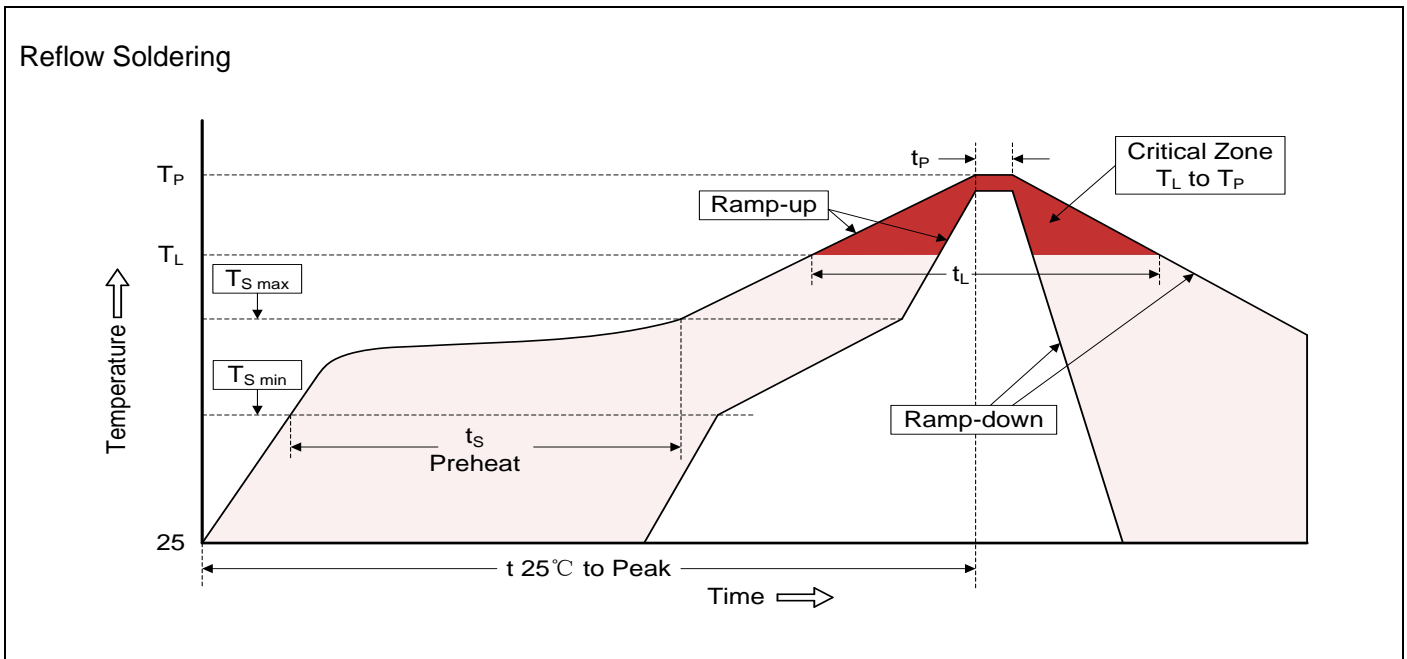
**Figure 5. Steady State Power Dissipation Derating**



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



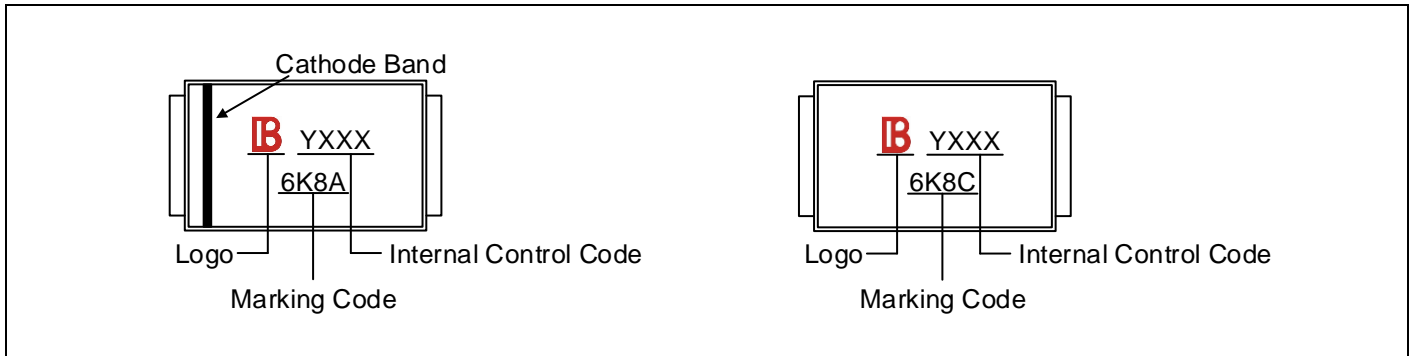
**Recommended Soldering Conditions**



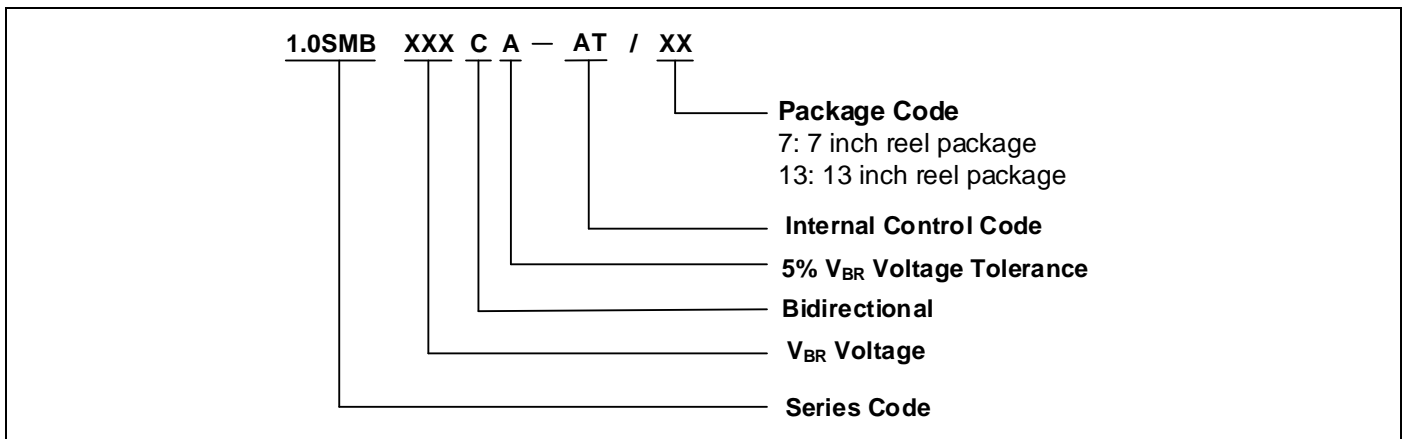
Recommended Conditions

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



### Part Number Code



### Ordering Code for Different Package

7 inch reel package: Add suffix “/7” at the end of the part number, such as 1.0SMBXXXCA-AT/7

13 inch reel package: Add suffix “/13” at the end of the part number, such as 1.0SMBXXXCA-AT/13

**Packaging**

Tape		Symbol	Dimension (mm)
		W	12.00±0.20
		P0	4.00±0.10
		P1	8.00±0.10
		P2	2.00±0.10
		D0	Φ1.55±0.10
		D1	Φ1.5±0.10
		E	1.75±0.10
		F	5.50±0.10
		A0	3.86±0.15
		B0	5.65±0.10
		K0	2.75±0.15
		T	0.25±0.05
<p>7" Reel</p>		D2	Φ178.0±2.0
		D3	Φ50.0Min.
		D4	Φ13.0±0.5
		W1	16.0±2.0
		Quantity: 500PCS	
<p>13" Reel</p>		D5	Φ330.0±2.0
		D6	Φ13.5±0.5
		H	2.5±1.0
		W2	16.0±2.0
		Quantity: 3000PCS	