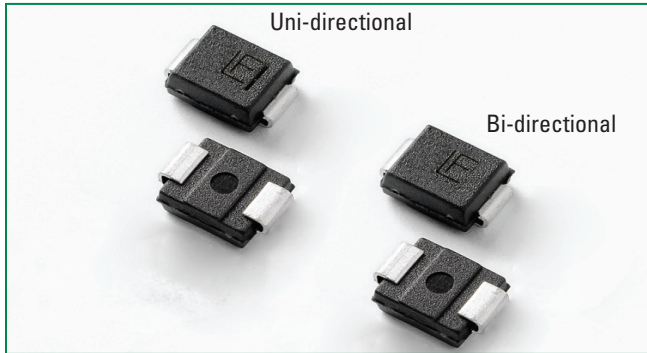


**TPSMB Series**



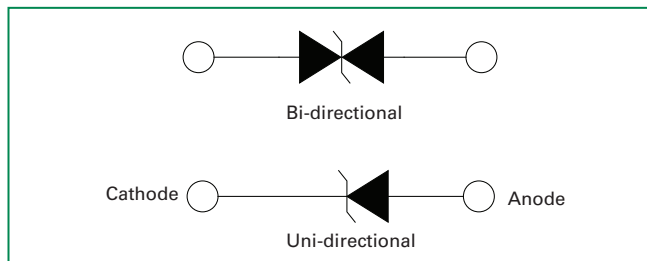
**Maximum Ratings and Thermal Characteristics**  
( $T_A=25^{\circ}\text{C}$  unless otherwise noted)

Parameter	Symbol	Value	Unit
Peak Pulse Power Dissipation at $T_A=25^{\circ}\text{C}$ by 10x1000 $\mu\text{s}$ waveform (Fig.1)(Note 1), (Note 2)	$P_{PPM}$	600	W
Power Dissipation on infinite heat sink at $T_A=50^{\circ}\text{C}$	$P_{M(AV)}$	5.0	W
Peak Forward Surge Current, 8.3ms Single Half Sine Wave (Note 3)	$I_{FSM}$	100	A
Maximum Instantaneous Forward Voltage at 50A for Unidirectional only	$V_F$	3.5V	V
Operating Junction and Storage Temperature Range	$T_J, T_{STG}$	-65 to 150	$^{\circ}\text{C}$
Typical Thermal Resistance Junction to Lead	$R_{WJL}$	20	$^{\circ}\text{C/W}$
Typical Thermal Resistance Junction to Ambient	$R_{WJA}$	100	$^{\circ}\text{C/W}$

**Notes:**

1. Non-repetitive current pulse, per Fig. 3 and derated above  $T_A = 25^{\circ}\text{C}$  per Fig. 2.
2. Mounted on copper pad area of 0.2x0.2" (5.0 x 5.0mm) to each terminal.
3. Measured on 8.3ms single half sine wave or equivalent square wave for unidirectional device only, duty cycle=4 per minute maximum.

**Functional Diagram**



**Description**

The TPSMB series is designed specifically to protect sensitive electronic equipment from voltage transients induced by lightning and other transient voltage events.

**Features**

- Hi reliability application and automotive grade AEC-Q101 qualified
- For surface mounted applications to optimize board space
- Low profile package
- Typical failure mode is short from over-specified voltage or current
- Whisker test is conducted based on JEDEC JESD201A per its table 4a and 4c
- IEC-61000-4-2 ESD 15kV(Air), 8kV (Contact)
- ESD protection of data lines in accordance with IEC 61000-4-2 (IEC801-2)
- EFT protection of data lines in accordance with IEC 61000-4-4 (IEC801-4)
- Typical maximum temperature coefficient  $\Delta V_{BR} = 0.1\% \times V_{BR}@25^{\circ}\text{C} \times \Delta T$
- Glass passivated chip junction
- 600W peak pulse power capability at 10x1000 $\mu\text{s}$  waveform, repetition rate (duty cycles):0.01 %
- Fast response time: typically less than 1.0ns from 0V to BV min
- Excellent clamping capability
- Low incremental surge resistance
- Typical  $I_R$  less than 1 $\mu\text{A}$  above 12V
- High temperature soldering guaranteed: 260 $^{\circ}\text{C}$ /40 seconds at terminals
- Plastic package has Underwriters Laboratories flammability 94V-O
- Matte tin lead-free plated
- Halogen free and RoHS compliant

**Applications**

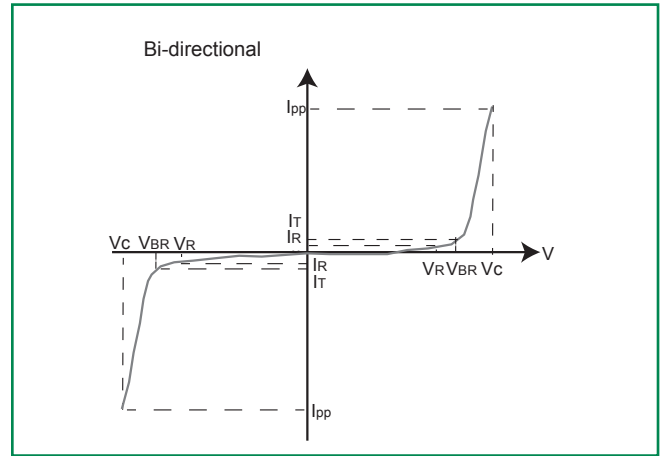
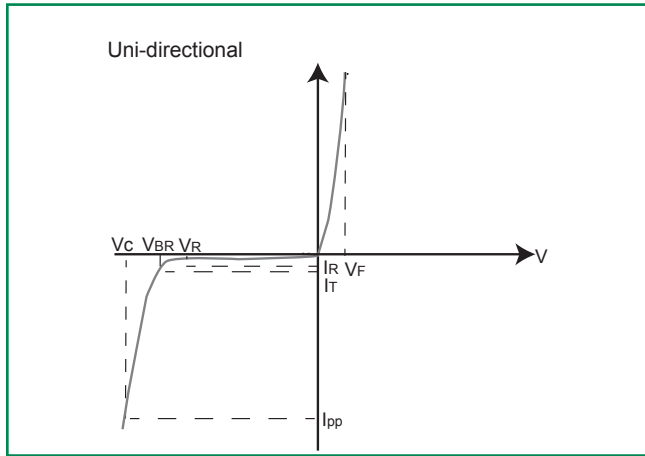
TVS devices are ideal for the protection of I/O interfaces,  $V_{CC}$  bus and other vulnerable circuits used in a automotive applications.

**Electrical Characteristics** ( $T_A=25^\circ\text{C}$  unless otherwise noted)

Part Number (Uni)	Part Number (Bi)	Marking		Reverse Stand off Voltage $V_R$ (Volts)	Breakdown Voltage $V_{BR}$ (Volts) @ $I_T$		Test Current $I_T$ (mA)	Maximum Clamping Voltage $V_C$ @ $I_{PP}$ (V) <sup>1</sup>	Maximum Peak Pulse Current $I_{PP}$ (A)	Maximum Reverse Leakage $I_R$ @ $V_R$ ( $\mu\text{A}$ )
		UNI	BI		MIN	MAX				
TPSMB12A	TPSMB12CA	12AA	12CA	10.20	11.40	12.60	1	16.7	36.5	5
TPSMB13A	TPSMB13CA	13AA	13CA	11.10	12.40	13.70	1	18.2	33.5	1
TPSMB15A	TPSMB15CA	15AA	15CA	12.80	14.30	15.80	1	21.2	28.8	1
TPSMB16A	TPSMB16CA	16AA	16CA	13.60	15.20	16.80	1	22.5	27.1	1
TPSMB18A	TPSMB18CA	18AA	18CA	15.30	17.10	18.90	1	25.5	24.2	1
TPSMB20A	TPSMB20CA	20AA	20CA	17.10	19.00	21.00	1	27.7	22.0	1
TPSMB22A	TPSMB22CA	22AA	22CA	18.80	20.90	23.10	1	30.6	19.9	1
TPSMB24A	TPSMB24CA	24AA	24CA	20.50	22.80	25.20	1	33.2	18.4	1
TPSMB27A	TPSMB27CA	27AA	27CA	23.10	25.70	28.40	1	37.5	16.3	1
TPSMB30A	TPSMB30CA	30AA	30CA	25.60	28.50	31.50	1	41.4	14.7	1
TPSMB33A	TPSMB33CA	33AA	33CA	28.20	31.40	34.70	1	45.7	13.3	1
TPSMB36A	TPSMB36CA	36AA	36CA	30.80	34.20	37.80	1	49.9	12.2	1
TPSMB39A	TPSMB39CA	39AA	39CA	33.30	37.10	41.00	1	53.9	11.3	1
TPSMB43A	TPSMB43CA	43AA	43CA	36.80	40.90	45.20	1	59.3	10.3	1
TPSMB47A	TPSMB47CA	47AA	47CA	40.20	44.70	49.40	1	64.8	9.4	1
TPSMB51A	TPSMB51CA	51AA	51CA	43.60	48.50	53.60	1	70.1	8.7	1
TPSMB56A	TPSMB56CA	56AA	56CA	47.80	53.20	58.80	1	77.0	7.9	1
TPSMB62A	TPSMB62CA	62AA	62CA	53.00	58.90	65.10	1	85.0	7.2	1
TPSMB68A	TPSMB68CA	68AA	68CA	58.10	64.60	71.40	1	92.0	6.6	1
TPSMB75A	TPSMB75CA	75AA	75CA	64.10	71.30	78.80	1	103.0	5.9	1
TPSMB82A	TPSMB82CA	82AA	82CA	70.10	77.90	86.10	1	113.0	5.4	1
TPSMB91A	TPSMB91CA	91AA	91CA	77.80	86.50	95.50	1	125.0	4.9	1

For bidirectional type having  $V_R$  of 10 volts and less, the  $I_R$  limit is double.

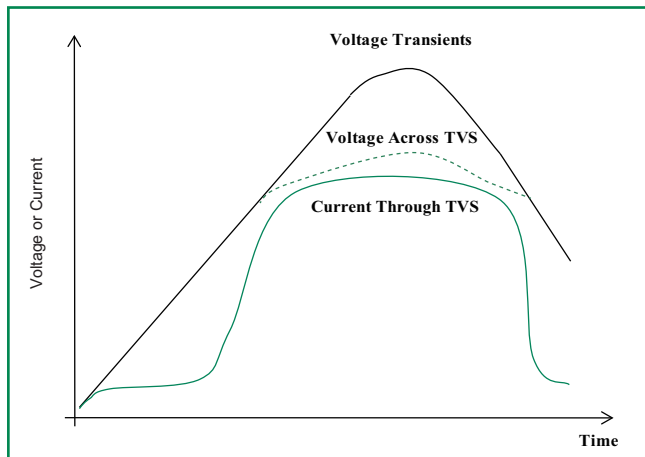
**I-V Curve Characteristics**



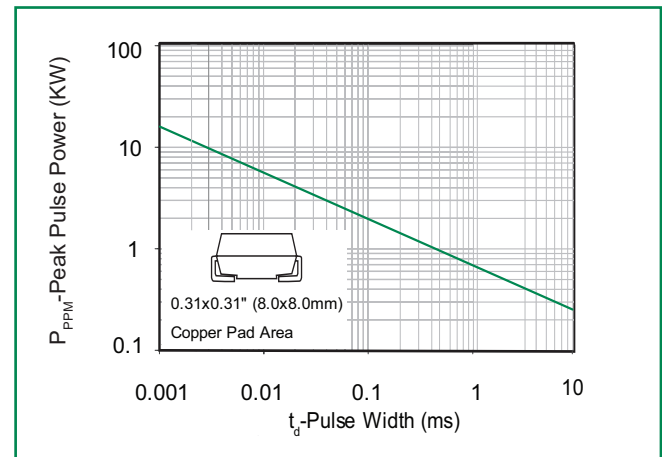
- $P_{PPM}$  Peak Pulse Power Dissipation** – Max power dissipation
- $V_R$  Stand-off Voltage** – Maximum voltage that can be applied to the TVS without operation
- $V_{BR}$  Breakdown Voltage** – Maximum current that flows through the TVS at a specified test current ( $I_T$ )
- $V_C$  Clamping Voltage** – Peak voltage measured across the suppressor at a specified  $I_{ppm}$  (peak impulse current)
- $I_R$  Reverse Leakage Current** – Current measured at  $V_R$
- $V_F$  Forward Voltage Drop for Uni-directional**

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

**Figure 1 - TVS Transients Clamping Waveform**



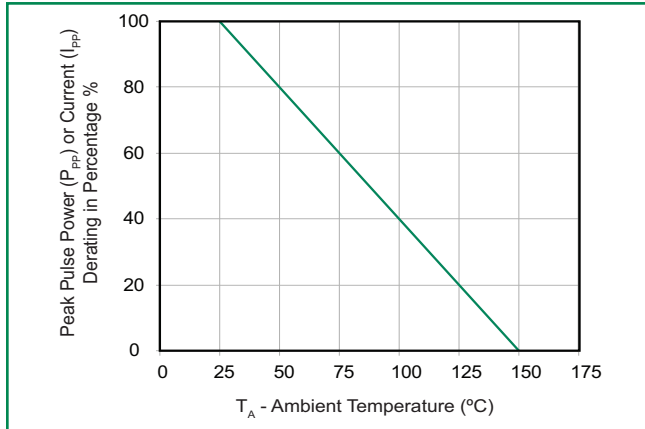
**Figure 2 - Peak Pulse Power Rating Curve**



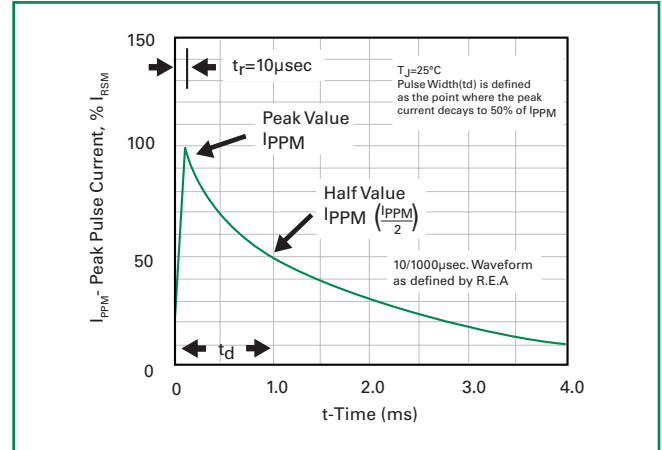
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### Ratings and Characteristic Curves ( $T_A=25^\circ\text{C}$ unless otherwise noted) (Continued)

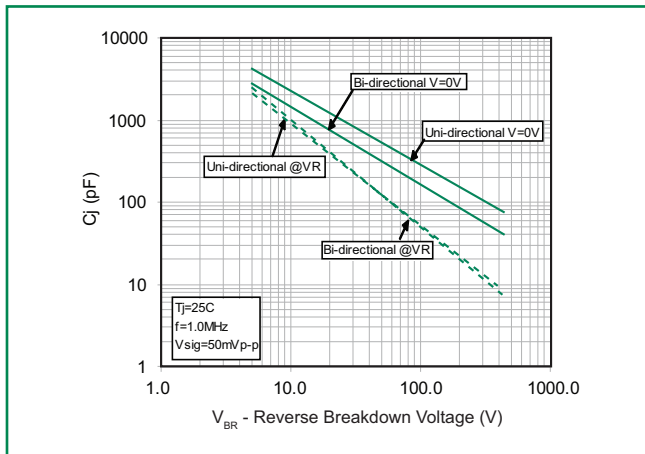
**Figure 3 - Peak Pulse Power or Current Derating Curve vs Initial Junction Temperature**



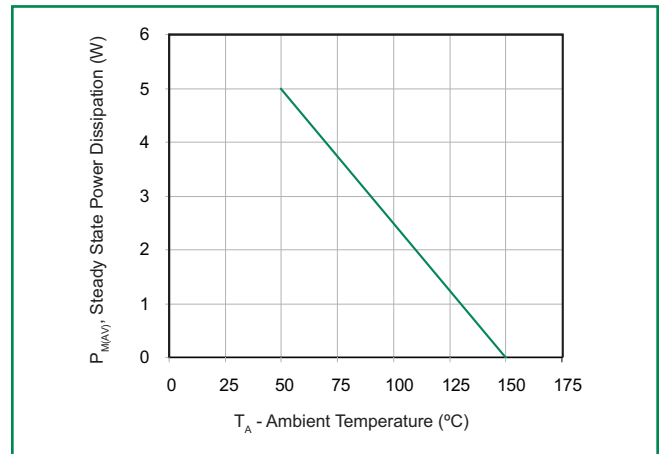
**Figure 4 - Pulse Waveform**



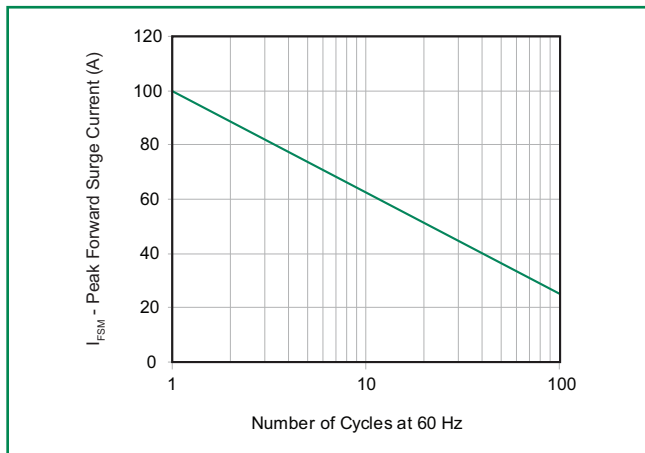
**Figure 5 - Typical Junction Capacitance**



**Figure 6 - Steady State Power Dissipation Derating Curve**



**Figure 7 - Maximum Non-Repetitive Peak Forward Surge Current Uni-Directional Only**



**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 (min to max) ( $t_s$ )	60 – 150 seconds
Peak Temperature ( $T_p$ )		260 <sup>+0/-5</sup> °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		280°C



**Physical Specifications**

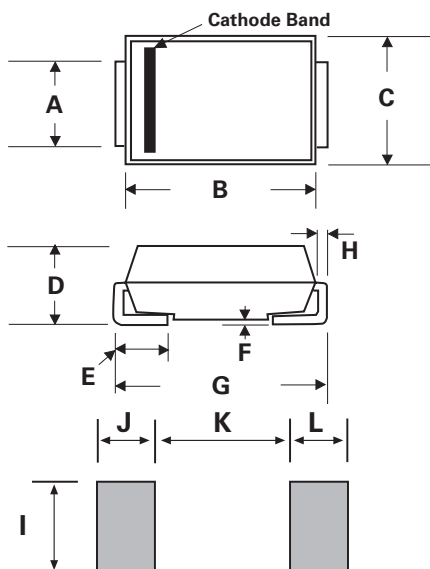
<b>Weight</b>	0.003 ounce, 0.093 grams
<b>Case</b>	JEDEC DO214AA. Molded plastic body over glass passivated junction
<b>Polarity</b>	Color band denotes cathode except bidirectional.
<b>Terminal</b>	Matte tin-plated leads, solderable per JESD22-B102D

**Environmental Specifications**

<b>Temperature Cycle</b>	JESD22-A104
<b>Pressure Cooker</b>	JESD22-A102
<b>High Temp. Storage</b>	JESD22-A103
<b>HTRB</b>	JESD22-A108
<b>Thermal Shock</b>	JESD22-A106

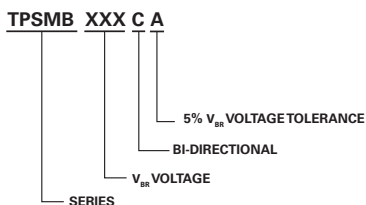
**Dimensions**

DO-214AA (SMB J-Bend)

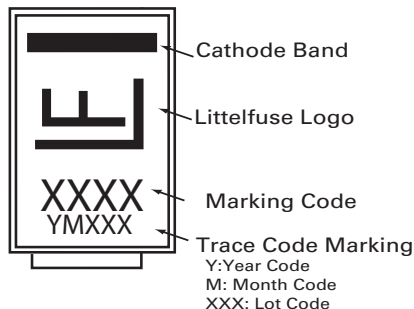


Dimensions	Inches		Millimeters	
	Min	Max	Min	Max
A	0.077	0.086	1.950	2.200
B	0.160	0.180	4.060	4.570
C	0.130	0.155	3.300	3.940
D	0.084	0.096	2.130	2.440
E	0.030	0.060	0.760	1.520
F	-	0.008	-	0.203
G	0.205	0.220	5.210	5.590
H	0.006	0.012	0.152	0.305
I	0.089	-	2.260	-
J	0.085	-	2.160	-
K	-	0.107	-	2.740
L	0.085	-	2.160	-

### Part Numbering System



### Part Marking System



### Packaging

Part number	Component Package	Quantity	Packaging Option	Packaging Specification
TPSMBxxxXX	DO-214AA	3000	Tape & Reel – 12mm/13" tape	EIA STD RS-481

### Tape and Reel Specification

