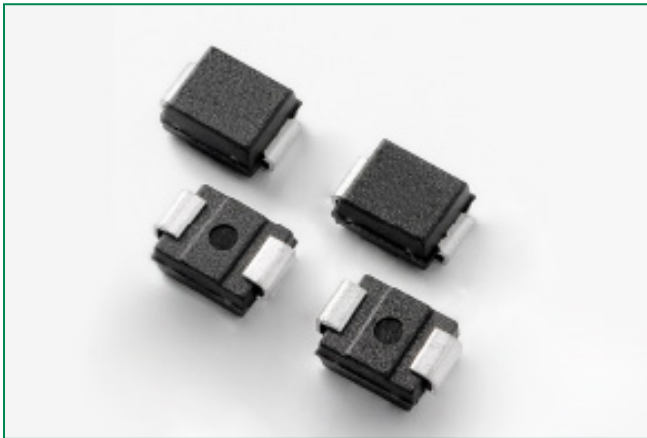




**THE DATASHEET OF  
P6SMB20CAT3G**



### P6SMB11AT3G Series



#### Description

The P6SMB11AT3G series is designed to protect voltage sensitive components from high voltage, high energy transients. They have excellent clamping capability, high surge capability, low zener impedance and fast response time. The P6SMB11AT3G series is supplied in the Littelfuse exclusive, cost-effective, highly reliable package and is ideally suited for use in communication systems, automotive, numerical controls, process controls, medical equipment, business machines, power supplies and many other industrial/consumer applications.

#### Features

- Working Peak Reverse Voltage Range – 9.4 to 77.8 V
- Standard Zener Breakdown Voltage Range – 11 to 91 V
- Peak Power – 600 W @ 1 ms
- ESD Rating of Class 3 (> 16 kV) per Human Body Model
- Maximum Clamp Voltage @ Peak Pulse Current
- Low Leakage < 5  $\mu$ A Above 10 V
- UL 497B for Isolated Loop Circuit Protection
- Response Time is Typically < 1 ns
- These are Pb-Free Devices

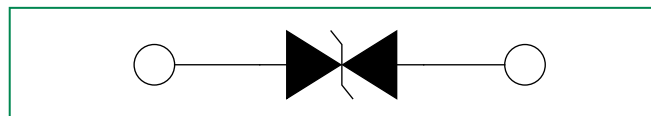
#### Maximum Ratings and Thermal Characteristics

Parameter	Symbol	Value	Unit
Peak Power Dissipation (Note 1) @ $T_L = 25^\circ\text{C}$ , Pulse Width = 1 ms	$P_{PK}$	600	W
DC Power Dissipation @ $T_L = 75^\circ\text{C}$ Measured Zero Lead Length (Note 2) Derate Above $75^\circ\text{C}$	PD	3.0 40	W mW/ $^\circ\text{C}$
Thermal Resistance from Junction-to-Lead	$R_{JL}$	25	$^\circ\text{C}/\text{W}$
DC Power Dissipation (Note 3) @ $T_A = 25^\circ\text{C}$ Derate Above $25^\circ\text{C}$	PD	0.55 4.4	W mW/ $^\circ\text{C}$
Thermal Resistance from Junction-to-Ambient	$R_{\theta JA}$	226	$^\circ\text{C}/\text{W}$
Operating and Storage Temperature Range	$T_J, T_{stg}$	-65 to +150	$^\circ\text{C}$

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1. 10 X 1000  $\mu$ s, non-repetitive.
2. 1" square copper pad, FR-4 board.
3. FR-4 board, using Littelfuse minimum recommended footprint, as shown in 403A-03 case outline dimensions spec.
4. 1/2 sine wave (or equivalent square wave), PW = 8.3 ms, duty cycle = 4 pulses per minute maximum.

#### Functional Diagram



#### Additional Information



Datasheet



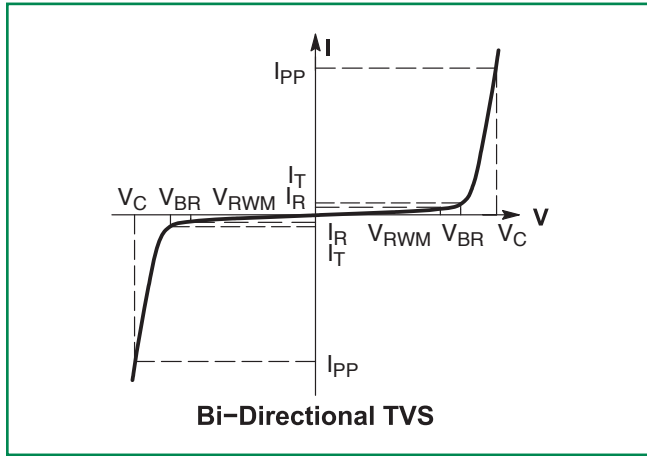
Resources



Samples

\*Please see P6SMB6.8AT3 to P6SMB200AT3 for Unidirectional devices.

**I-V Curve Characteristics** ( $T_A = 25^\circ\text{C}$  unless otherwise noted)



Symbol	Parameter
$I_{PP}$	Maximum Reverse Peak Pulse Current
$V_C$	Clamping Voltage @ $I_{PP}$
$V_{RWM}$	Working Peak Reverse Voltage
$I_R$	Maximum Reverse Leakage Current @ $V_{RWM}$
$V_{BR}$	Breakdown Voltage @ $I_T$
$I_T$	Test Current
$eV_{BR}$	Maximum Temperature Coefficient of $V_{BR}$

### Electrical Characteristics (Devices listed in bold, italic are Littelfuse Preferred devices)

Device*	Device Marking	V <sub>RWM</sub> (Note 6)	I <sub>R</sub> @ V <sub>RWM</sub>	Breakdown Voltage				V <sub>C</sub> @ I <sub>PP</sub> (Note 6)		V <sub>BR</sub>	C <sub>Typ.</sub> (Note 7)
				V <sub>BR</sub> @ I <sub>T</sub> (V) (Note 5)			@ I <sub>T</sub>	V <sub>C</sub>	I <sub>PP</sub>		
				MIN	NOM	MAX	mA	Volts	Amps		
P6SMB11CAT3G	11C	9.4	5	10.5	11.05	11.6	1	15.6	38	0.075	865
P6SMB12CAT3G	12C	10.2	5	11.4	12	12.6	1	16.7	36	0.078	800
P6SMB15CAT3G	15C	12.8	5	14.3	15.05	15.8	1	21.2	28	0.084	645
P6SMB16CAT3G	16C	13.6	5	15.2	16	16.8	1	22.5	27	0.086	610
P6SMB18CAT3G	18C	15.3	5	17.1	18	18.9	1	25.2	24	0.088	545
P6SMB20CAT3G	20C	17.1	5	19	20	21	1	27.7	22	0.09	490
P6SMB22CAT3G	22C	18.8	5	20.9	22	23.1	1	30.6	20	0.09	450
P6SMB24CAT3G	24C	20.5	5	22.8	24	25.2	1	33.2	18	0.094	415
P6SMB27CAT3G	27C	23.1	5	25.7	27.05	28.4	1	37.5	16	0.096	370
P6SMB30CAT3G	30C	25.6	5	28.5	30	31.5	1	41.4	14.4	0.097	335
P6SMB33CAT3G	33C	28.2	5	31.4	33.05	34.7	1	45.7	13.2	0.098	305
P6SMB36CAT3G	36C	30.8	5	34.2	36	37.8	1	49.9	12	0.099	280
P6SMB39CAT3G	39C	33.3	5	37.1	39.05	41	1	53.9	11.2	0.1	260
P6SMB43CAT3G	43C	36.8	5	40.9	43.05	45.2	1	59.3	10.1	0.101	240
P6SMB47CAT3G	47C	40.2	5	44.7	47.05	49.4	1	64.8	9.3	0.101	220
P6SMB51CAT3G	51C	43.6	5	48.5	51.05	53.6	1	70.1	8.6	0.102	205
P6SMB56CAT3G	56C	47.8	5	53.2	56	58.8	1	77	7.8	0.103	185
P6SMB62CAT3G	62C	53	5	58.9	62	65.1	1	85	7.1	0.104	170
P6SMB68CAT3G	68C	58.1	5	64.6	68	71.4	1	92	6.5	0.104	155
P6SMB82CAT3G	82C	70.1	5	77.9	82	86.1	1	113	5.3	0.105	130

4. A transient suppressor is normally selected according to the working peak reverse voltage (V<sub>RWM</sub>), which should be equal to or greater than the DC or continuous peak operating voltage level.

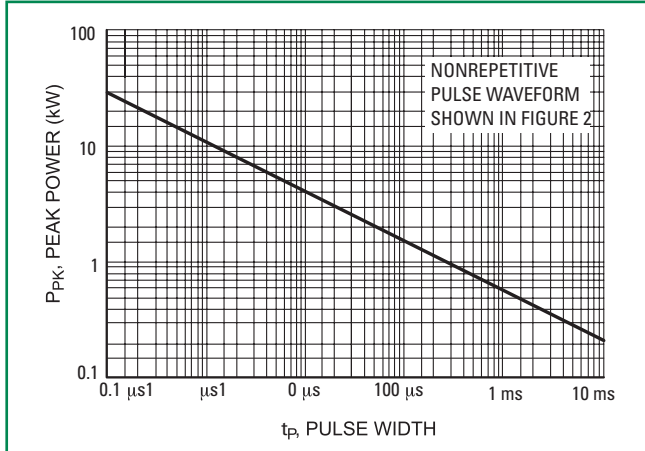
5. V<sub>BR</sub> measured at pulse test current I<sub>T</sub> at an ambient temperature of 25°C.

6. Surge current waveform per Figure 2 and derate per Figure 3 of the General Data – 600 Watt at the beginning of this group.

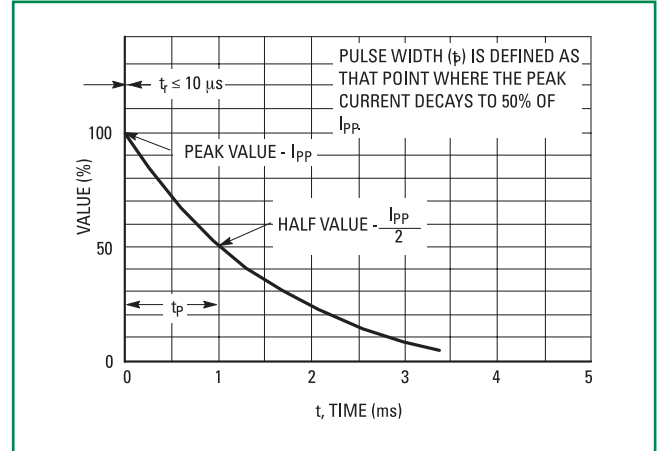
7. Bias Voltage = 0 V, F = 1 MHz, T<sub>J</sub> = 25°C

**Ratings and Characteristic Curves**

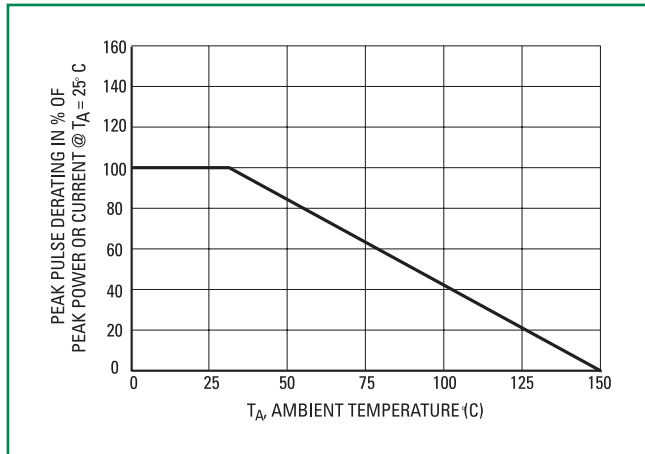
**Figure 1. Pulse Rating Curve**



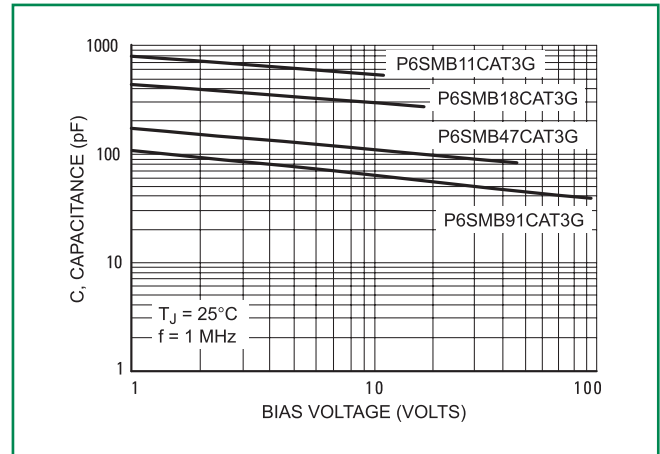
**Figure 2. Pulse Waveform**



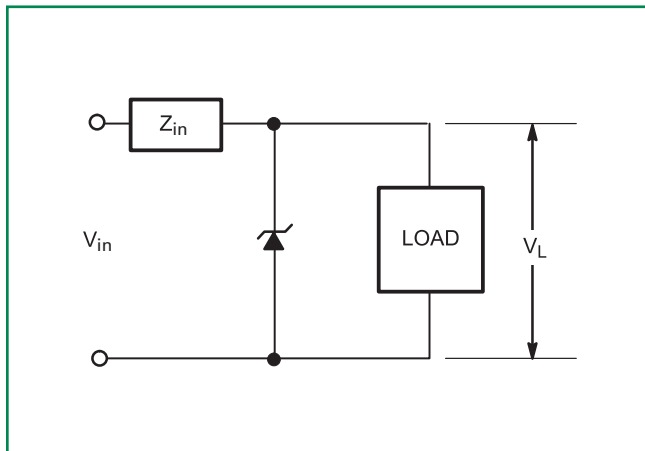
**Figure 3 - Pulse Derating Curve**



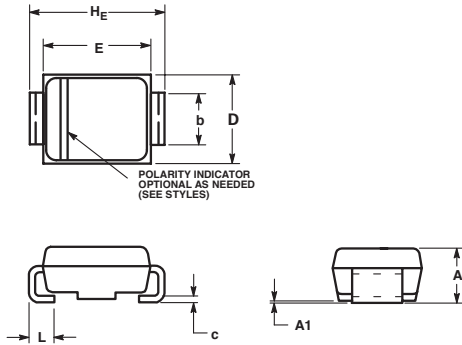
**Figure 4. Typical Junction Capacitance vs. Bias Voltage**



**Figure 5. Typical Protection Circuit**



**Dimensions**

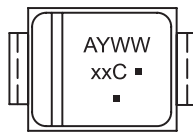


Dim	Inches			Millimeters		
	Min	Nom	Max	Min	Nom	Max
A	0.077	0.091	0.097	1.95	2.30	2.47
A1	0.002	0.004	0.008	0.05	0.10	0.20
b	0.077	0.080	0.087	1.96	2.03	2.20
c	0.006	0.009	0.012	0.15	0.23	0.31
D	0.130	0.140	0.156	3.30	3.56	3.95
E	0.160	0.170	0.181	4.06	4.32	4.60
H <sub>E</sub>	0.205	0.214	0.220	5.21	5.44	5.60
L	0.030	0.040	0.063	0.76	1.02	1.60
L1	0.020 REF			0.51 REF		

NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. D DIMENSION SHALL BE MEASURED WITHIN DIMENSION P.

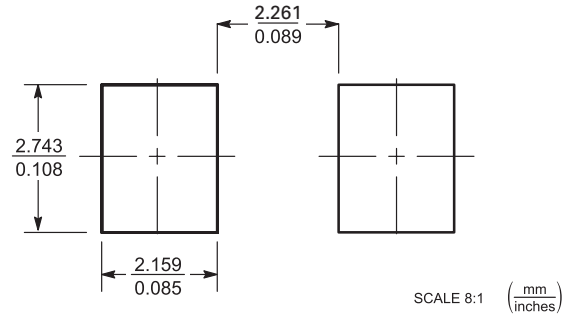
**Part Marking System**



- xxC = Device Code
- A = Assembly Location
- Y = Year
- WW = Work Week
- = Pb-Free Package

(Note: Microdot may be in either location)

**Soldering Footprint**



**ORDERING INFORMATION**

Device	Package	Shipping
P6SMBxxxAT3G	SMB (Pb-Free)	2,500 / Tape & Reel

**Flow/Wave Soldering (Solder Dipping)**

Peak Temperature :	260°C
Dipping Time :	10 seconds

**Physical Specifications**

Case	Void-free, transfer-molded, thermosetting plastic
Polarity	Cathode indicated by polarity band
Mounting Position	Any
Finish	All external surfaces are corrosion resistant and leads are readily solderable
Leads	Modified L-Bend providing more contact area to bond pads

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