P6SMB-T3G Series

Surface Mount - 600 W, Low Leakage Performance

Description

The P6SMB-T3G series is designed to protect voltage sensitive components from high voltage, high energy transients. It has excellent clamping capability, high surge capability, low breakdown impedance and fast response time.

The P6SMB-T3G series with lower leakage is supplied in cost-effective, highly reliable DO-214AA package.

Features & Benefits

- 600 W peak pulse power capability at 10/1000µs waveform, repetition rate (duty cycles):0.01 %
- SMB low-profile surface-mount package minimizing PCB footprint
- Planar chip design with low leakage current performance
- 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 pass class 1 and 2
- IEC 61000-4-2 ESD 30 kV(Air), 30 kV (Contact)
- Low dynamic resistance
- V_{BR} @ T_J= V_{BR}@25 °C x (1+ αT x (T_J - 25))(αT:Temperature Coefficient, typical value is 0.1%)
- UL recognized compound meeting flammability rating UL94 V-0
- Halogen free and RoHS-compliant
- Pb-free E3 means 2nd level interconnect is Pb-free and the terminal finish material is tin(Sn) (IPC/JEDEC J-STD-609A.01)
- Recognized to UL 497B as an Isolated Loop Circuit Protector

Agency Approvals

Agency	Agency File Number
	E128662

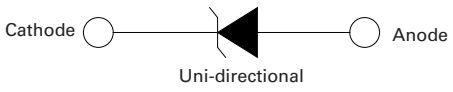
Maximum Ratings and Thermal Characteristics

Parameter	Symbol	Value	Unit
Peak Power Dissipation (Note 1) @T_L = 25 °C, Pulse Width = 1 ms	P_{PK}	600	W
DC Power Dissipation @T_L = 75 °C Measured Zero Lead Length (Note 2) Derate Above 75 °C	P_D	4.0 40	W mW/°C
DC Power Dissipation (Note 3) @T_A = 25 °C Derate Above 25 °C	P_D	1.5 10	W mW/°C
Forward Surge Current (Note 4) @T_A = 25 °C	I_{FSM}	100	A
Operating and Storage Temperature Range	T_J T_{stg}	-65 to +150	°C
Thermal Resistance from Junction-to-Lead	$R_{\theta JL}$	25	°C/W
Thermal Resistance from Junction-to-Ambient	$R_{\theta JA}$	100	°C/W

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

1. 10/1000 µs, non–repetitive.
2. 1" square copper pad, FR–4 board.
3. FR–4 board, using Littelfuse minimum recommended footprint
4. 1/2 sine wave (or equivalent square wave), PW = 8.3 ms, duty cycle = 4 pulses per minute maximum

Functional Diagram



Uni-directional

Electrical Characteristics

Device	Device Marking	V_{RWM} (Note 5)	I_R @ V_{RWM}	Breakdown Voltage				V_C @ I_{PP} (Note 7)		Typ. Temp Coefficient of V_{BR}	Capacitance (Typical) (Note 8)	Agency Approval
				V_{BR} @ I_T (V) (Note 6)			@ I_T	V_C	I_{PP}			
		Volts	µA	Min	Nom	Max	mA	Volts	Amps	%/°C	pF	
P6SMB6.8AT3G	6V8A	5.8	20	6.45	6.80	7.14	10	10.5	57	0.057	2380	X

5. A transient suppressor is normally selected according to the working peak reverse voltage (V_{RWM}), which should be equal to or greater than the DC or continuous peak operating voltage level.
6. V_{BR} measured at pulse test current I_T at an ambient temperature of 25 °C.
7. Surge current waveform per Figure 2 and derate per figure 3 of the general data – 600 watt at the beginning of this group.
8. Bias Voltage = 0 V, F = 1 MHz, T_J = 25 °C

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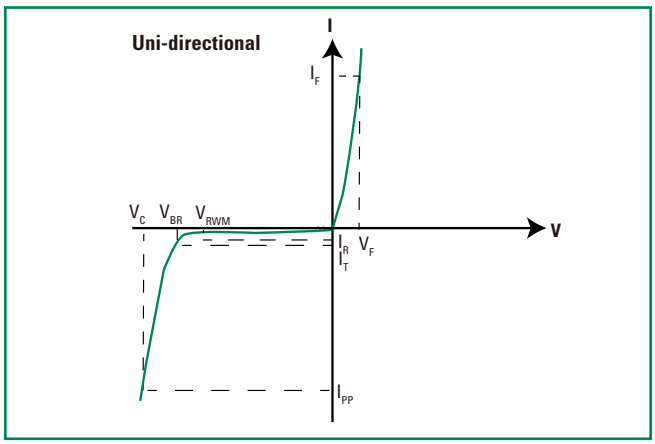
I-V Curve Characteristics (T_A = 25 °C unless otherwise noted, V_F = 3.5 V max. @ I_F (Note 9) = 30 A)



Symbol	Parameter
I_{PP}	Maximum Reverse Peak Pulse Current
V_C	Clamping Voltage @ I_{PP}
V_R	Working Peak Reverse Voltage
I_R	Maximum Reverse Leakage Current @ V_{RWM}
V_{BR}	Breakdown Voltage @ I_T
I_T	Breakdown Current
V_F	Forward Voltage @ I_F
I_F	Forward Current

9. 1/2 sine wave (or equivalent square wave), PW = 8.3 ms, non–repetitive duty cycle.

Ratings and Characteristic Curves

Figure 1. Typical Peak Pulse Power Rating

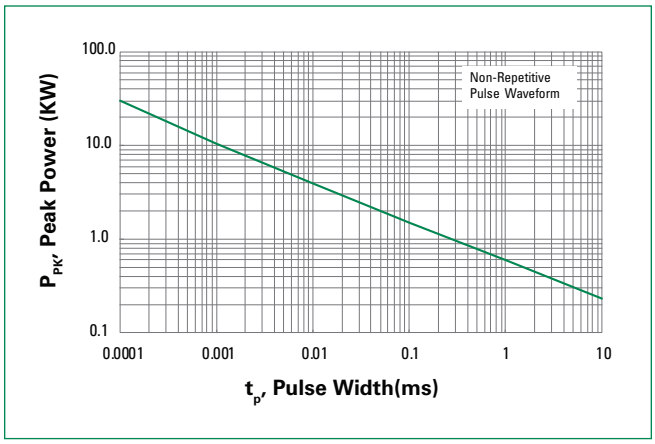


Figure 2. Pulse Waveform

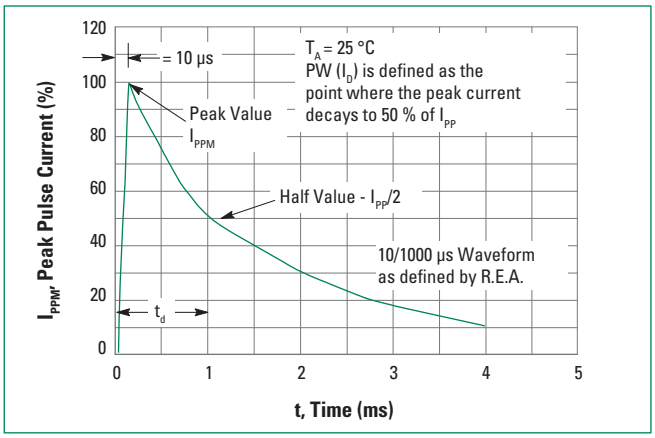


Figure 3. Peak Pulse Power Derating Curve

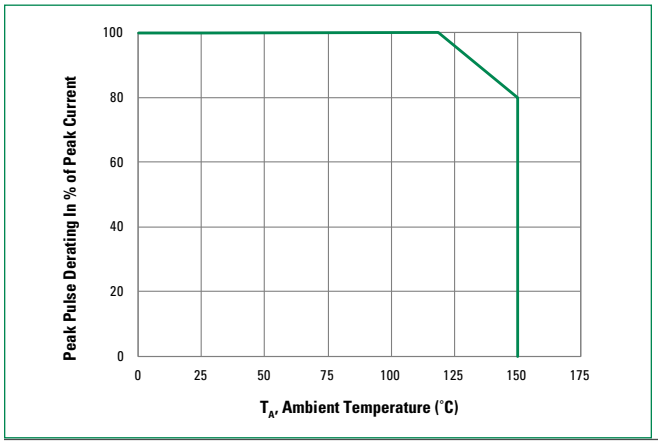


Figure 4. Typical Junction Capacitance vs. Bias Voltage

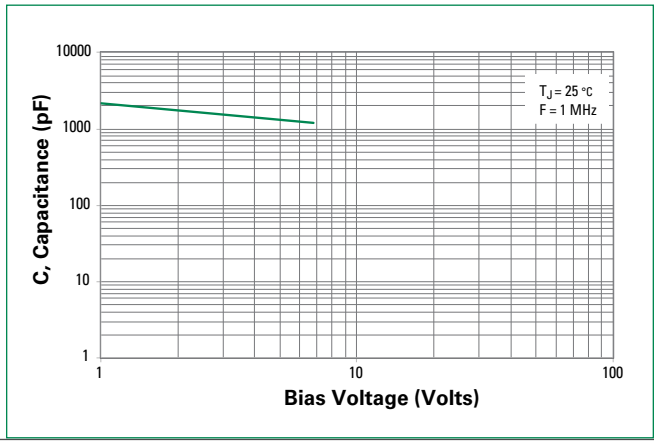


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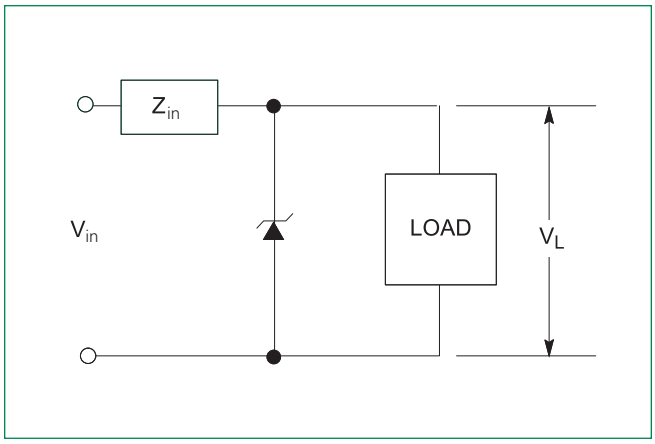
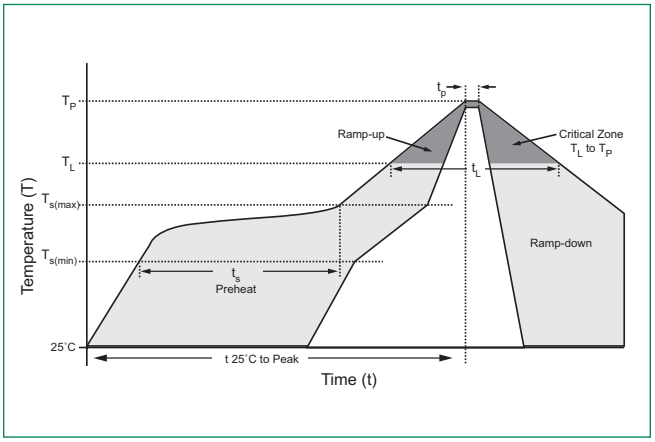
Figure 5. Typical Protection Circuit



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 – 120 seconds
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_L)	60 – 150 seconds
Peak Temperature (T_P)		$260^{+0/-5}$ °C
Time Within 5 °C of Actual Peak Temperature (t_p)		30 seconds max
Ramp-down Rate		6 °C/second max
Time 25 °C to Peak Temperature (T_P)		8 minutes max
Do Not Exceed		260 °C



Physical Specifications

Weight	0.00326 ounce, 0.1015 grams
Case	JEDEC DO214AA. Void-free, transfer-molded, thermosetting plastic epoxy meets UL 94V-0
Polarity	Uni-directional products are denoted with a cathode band
Terminal	Matte Tin-plated leads, solderable per JESD22-B102

Environmental Specifications

High Temp Voltage Blocking (HTRB)	100 % DC reverse voltage rated 150 °C, 1008 hours JEDEC, JESD22-A-108
Biased Temp & Humidity (H3TRB)	80 % breakdown voltage (+85 °C) 85 %RH, 1008 hours JEDEC, JESD22-A-101
Unbiased Highly Accelerated Stress Test (UHAST)	96 hours at T_A = 130 °C/85 %RH. JEDEC, JESD22-A-118
Temp Cycling (TC)	-55 °C to +150 °C, 15 min. dwell, 1000 cycles. JEDEC, JESD22-A104
Moisture Sensitivity Level (MSL)	85 %RH, +85 °C, 168 hours, 3 reflow cycles (+260 °C Peak). JEDEC, JEDEC-J-STD-020, Level 1
Resistance to Solder Heat (RSH)	+260 °C, 30 seconds JEDEC, JEDEC JESD22-A-111

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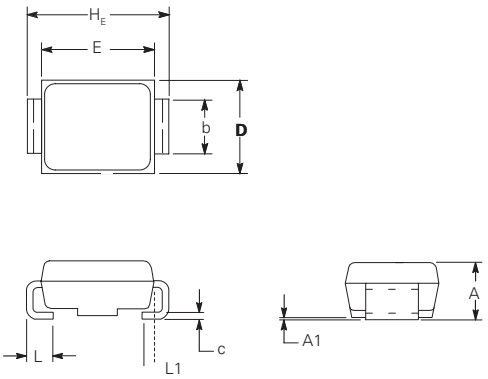
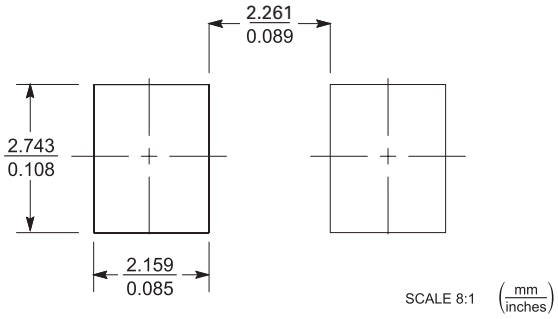
Dimensions



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
HE	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		

Soldering Footprint



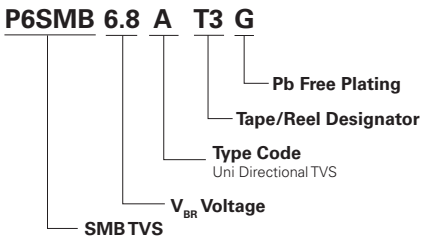
Ordering Information

Device	Package	Shipping
P6SMBxxAT3G	SMB (Pb–Free)	2,500 / Tape & Reel

Part Marking System

XXXX =Device Code (max four digits)
Y =Year
M =Month
WWW =Lot Code

Part Numbering System



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Tape and Reel Specification