MAXIMUM RATINGS

Rating	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 Thermal Resistance, Junction−to−Lead	P_D $R_{\theta JL}$	3.0 40 25	W mW/°C °C/W
DC Power Dissipation (Note 3) @ T_A = 25°C Derate Above 25°C Thermal Resistance, Junction−to−Ambient	P_D $R_{\theta JA}$	0.55 4.4 226	W mW/°C °C/W
Operating and Storage Temperature Range	T_J, T_{stg}	−65 to +150	°C

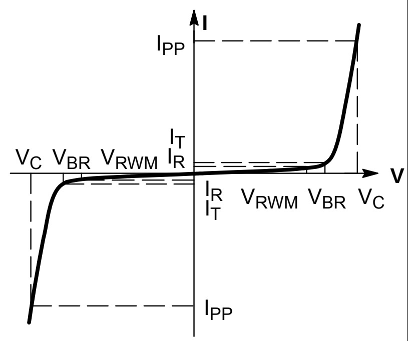
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1. 10 X 1000 μs, non−repetitive
2. 1″ square copper pad, FR−4 board
3. FR−4 board, using Littelfuse minimum recommended footprint, as shown in 403A case outline dimensions spec.

ELECTRICAL CHARACTERISTICS

(T_A = 25°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
ΘV_{BR}	Maximum Temperature Coefficient of V_{BR}



Bi−Directional TVS

ELECTRICAL CHARACTERISTICS (Devices listed in bold, italic are Littelfuse Preferred devices.)

Device*	Device Marking	V_{RWM} (Note 4)	I_R @ V_{RWM}	Breakdown Voltage V_{BR} Volts (Note 5)			@ I_T	V_C @ I_{PP} (Note 6) V_C	I_{PP}	ΘV_{BR}	C_{typ} (Note 7)
		Volts	μA	Min	Nom	Max	mA	Volts	Amps	%/°C	pF
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_{RWM}), which should be equal to or greater than the DC or continuous peak operating voltage level.
5. V_{BR} measured at pulse test current I_T 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_J = 25°C

*Include SZ-prefix devices where applicable.

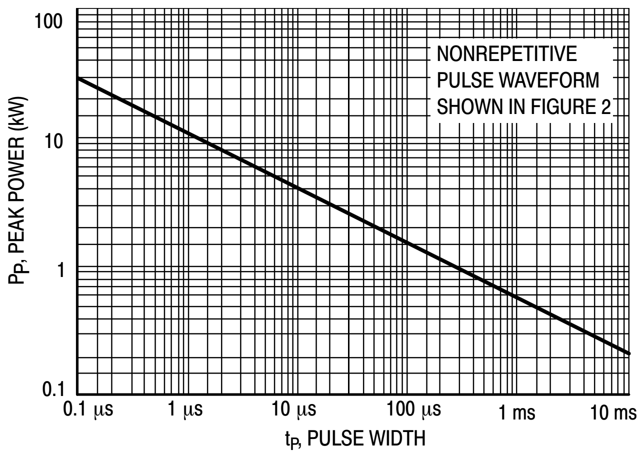


Figure 1. Pulse Rating Curve

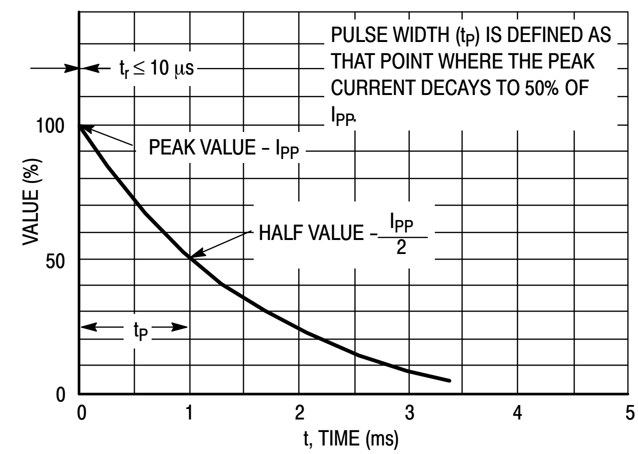


Figure 2. Pulse Waveform

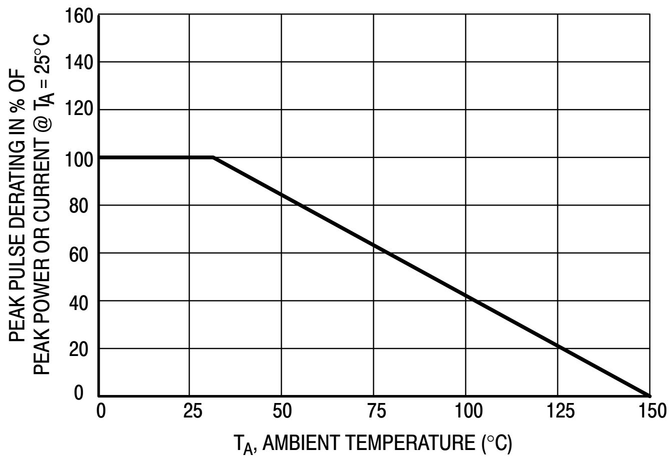


Figure 3. Pulse Derating Curve

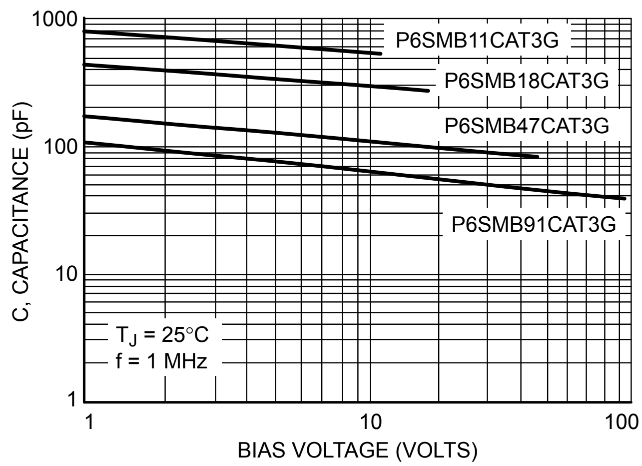
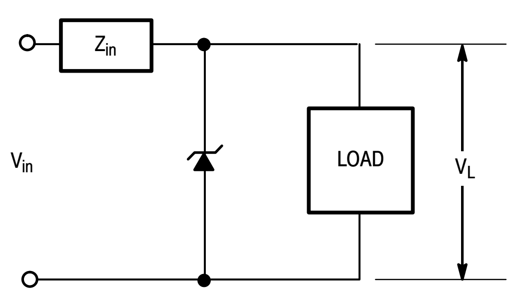


Figure 4. Typical Junction Capacitance vs. Bias Voltage

TYPICAL PROTECTION CIRCUIT



APPLICATION NOTES

Response Time

In most applications, the transient suppressor device is placed in parallel with the equipment or component to be protected. In this situation, there is a time delay associated with the capacitance of the device and an overshoot condition associated with the inductance of the device and the inductance of the connection method. The capacitive effect is of minor importance in the parallel protection scheme because it only produces a time delay in the transition from the operating voltage to the clamp voltage as shown in Figure 4.

The inductive effects in the device are due to actual turn-on time (time required for the device to go from zero current to full current) and lead inductance. This inductive effect produces an overshoot in the voltage across the equipment or component being protected as shown in Figure 5. Minimizing this overshoot is very important in the application, since the main purpose for adding a transient suppressor is to clamp voltage spikes. The SMB series have a very good response time, typically < 1 ns and negligible inductance. However, external inductive effects could produce unacceptable overshoot. Proper circuit layout, minimum lead lengths and placing the suppressor device as close as possible to the equipment or components to be protected will minimize this overshoot.

Some input impedance represented by Z_{in} is essential to prevent overstress of the protection device. This impedance should be as high as possible, without restricting the circuit operation.

Duty Cycle Derating

The data of Figure 1 applies for non-repetitive conditions and at a lead temperature of 25°C. If the duty cycle increases, the peak power must be reduced as indicated by the curves of Figure 6. Average power must be derated as the lead or ambient temperature rises above 25°C. The average power derating curve normally given on data sheets may be normalized and used for this purpose.

At first glance the derating curves of Figure 6 appear to be in error as the 10 ms pulse has a higher derating factor than the 10 μs pulse. However, when the derating factor for a given pulse of Figure 6 is multiplied by the peak power value of Figure 1 for the same pulse, the results follow the expected trend.

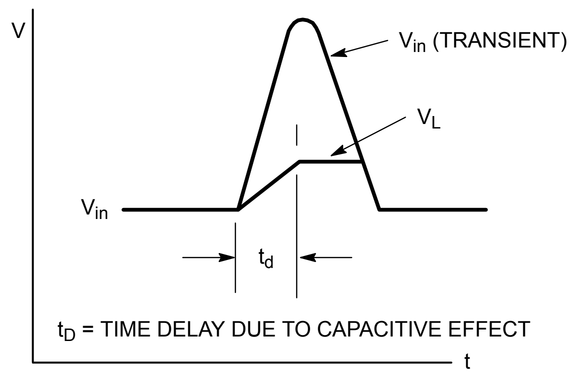


Figure 5.

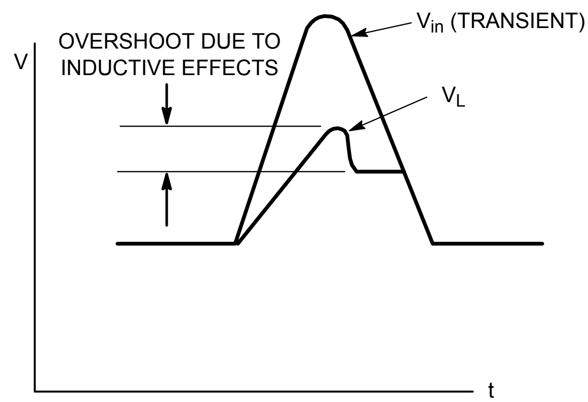


Figure 6.

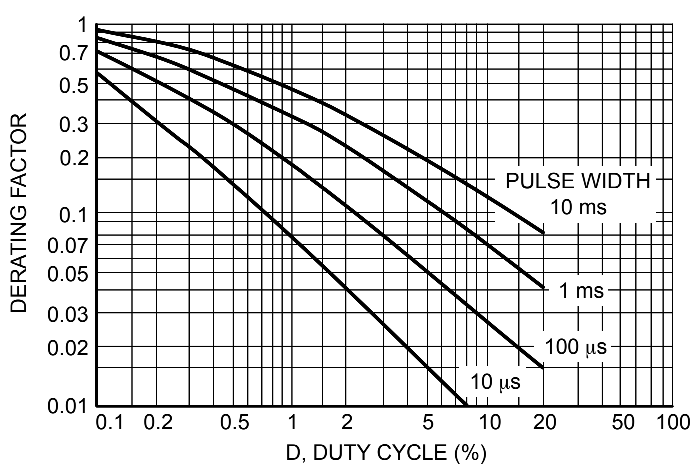


Figure 7. Typical Derating Factor for Duty Cycle

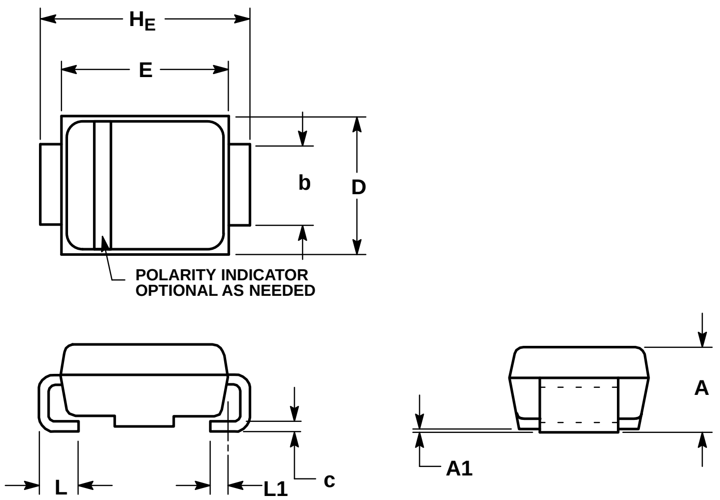
UL RECOGNITION

The entire series has *Underwriters Laboratory Recognition* for the classification of protectors (QVGQ2) under the UL standard for safety 497B and File #E128662. Many competitors only have one or two devices recognized or have recognition in a non-protective category. Some competitors have no recognition at all. With the UL497B recognition, our parts successfully passed several tests including Strike Voltage Breakdown test, Endurance Conditioning, Temperature test, Dielectric Voltage-Withstand test, Discharge test and several more.

Whereas, some competitors have only passed a flammability test for the package material, we have been recognized for much more to be included in their Protector category.

PACKAGE DIMENSIONS

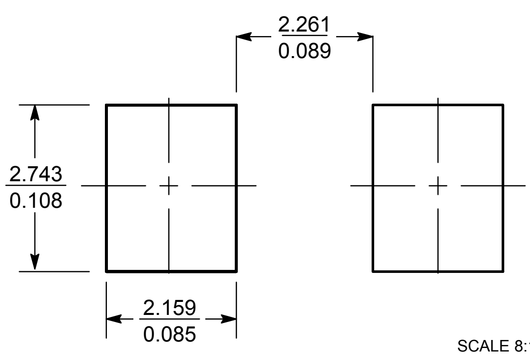
SMB
CASE 403A−03
ISSUE J



NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSION b SHALL BE MEASURED WITHIN DIMENSION L1.

	MILLIMETERS			INCHES		
DIM	MIN	NOM	MAX	MIN	NOM	MAX
A	1.95	2.30	2.47	0.077	0.091	0.097
A1	0.05	0.10	0.20	0.002	0.004	0.008
b	1.96	2.03	2.20	0.077	0.080	0.087
c	0.15	0.23	0.31	0.006	0.009	0.012
D	3.30	3.56	3.95	0.130	0.140	0.156
E	4.06	4.32	4.60	0.160	0.170	0.181
H_E	5.21	5.44	5.60	0.205	0.214	0.220
L	0.76	1.02	1.60	0.030	0.040	0.063
L1		0.51 REF			0.020 REF	

SOLDERING FOOTPRINT



SCALE 8:1 $\left(\frac{mm}{inches}\right)$

Littelfuse products are not designed for, and shall not be used for, any purpose (including, without limitation, automotive, military, aerospace, medical, life-saving, life-sustaining or nuclear facility applications, devices intended for surgical implant into the body, or any other application in which the failure or lack of desired operation of the product may result in personal injury, death, or property damage) other than those expressly set forth in applicable Littelfuse product documentation. Warranties granted by Littelfuse shall be deemed void for products used for any purpose not expressly set forth in applicable Littelfuse documentation. Littelfuse shall not be liable for any claims or damages arising out of products used in applications not expressly intended by Littelfuse as set forth in applicable Littelfuse documentation. The sale and use of Littelfuse products is subject to Littelfuse Terms and Conditions of Sale, unless otherwise agreed by Littelfuse.