

**GENERAL DATA APPLICABLE TO ALL SERIES IN  
THIS GROUP  
Zener Transient Voltage Suppressors**

The SMB 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 SMB series is supplied in Motorola's exclusive, cost-effective, highly reliable Surmetic package and is ideally suited for use in communication systems, numerical controls, process controls, medical equipment, business machines, power supplies and many other industrial/consumer applications.

**Specification Features:**

- Standard Zener Breakdown Voltage Range — 6.8 to 200 V
- Stand-off Voltage Range — 5 to 170 V
- Peak Power — 600 Watts @ 1 ms
- Maximum Clamp Voltage @ Peak Pulse Current
- Low Leakage < 5  $\mu$ A Above 10 V
- UL Recognition
- Response Time Typically < 1 ns

**Mechanical Characteristics:**

**CASE:** Void-free, transfer-molded, thermosetting plastic

**FINISH:** All external surfaces are corrosion resistant and leads are readily solderable

**POLARITY:** Cathode indicated by molded polarity notch. When operated in zener mode, will be positive with respect to anode

**MOUNTING POSITION:** Any

**LEADS:** Modified L-Bend providing more contact area to bond pad

**MAXIMUM CASE TEMPERATURE FOR SOLDERING PURPOSES:** 260°C for 10 seconds

**WAFER FAB LOCATION:** Phoenix, Arizona

**ASSEMBLY/TEST LOCATION:** Seremban, Malaysia

**MAXIMUM RATINGS**

Rating	Symbol	Value	Unit
Peak Power Dissipation (1) @ $T_L \leq 25^\circ\text{C}$	$P_{PK}$	600	Watts
Forward Surge Current (2) @ $T_A = 25^\circ\text{C}$	$I_{FSM}$	100	Amps
Thermal Resistance from Junction to Lead (typical)	$R_{\theta JL}$	25	$^\circ\text{C/W}$
Operating and Storage Temperature Range	$T_J, T_{stg}$	- 65 to +150	$^\circ\text{C}$

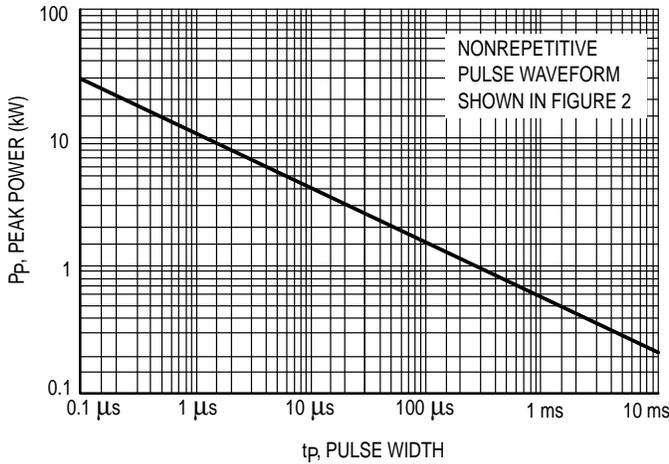
NOTES: 1. Nonrepetitive current pulse per Figure 2 and derated above  $T_A = 25^\circ\text{C}$  per Figure 3.  
2. 1/2 sine wave (or equivalent square wave), PW = 8.3 ms, duty cycle = 4 pulses per minute maximum.

**GENERAL  
DATA  
600 WATT  
PEAK POWER**

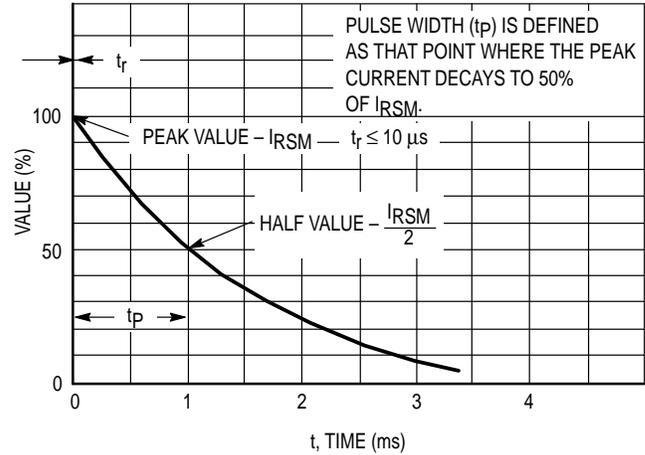
**PLASTIC SURFACE MOUNT  
ZENER OVERVOLTAGE  
TRANSIENT  
SUPPRESSORS  
6.8-200 VOLTS  
600 WATT PEAK POWER**



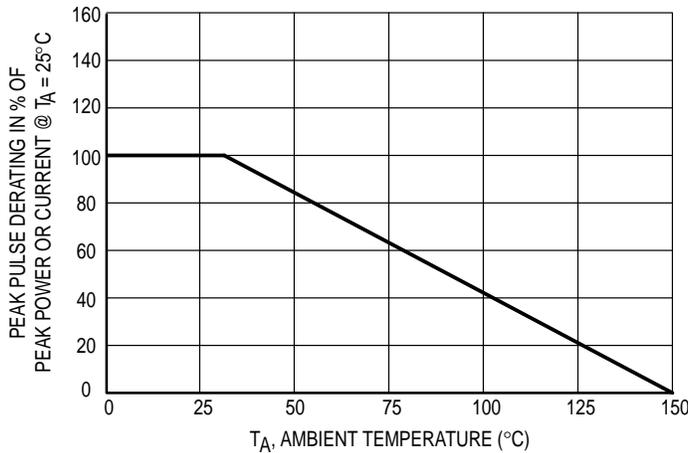
# GENERAL DATA — 600 WATT PEAK POWER



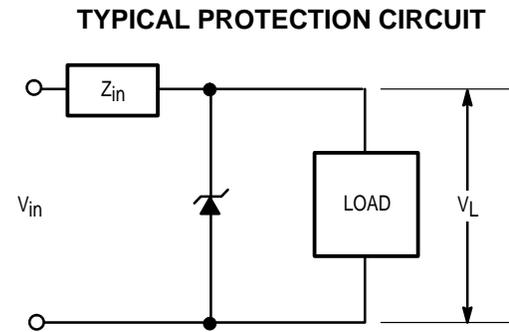
**Figure 1. Pulse Rating Curve**



**Figure 2. Pulse Waveform**



**Figure 3. Pulse Derating Curve**



## 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.

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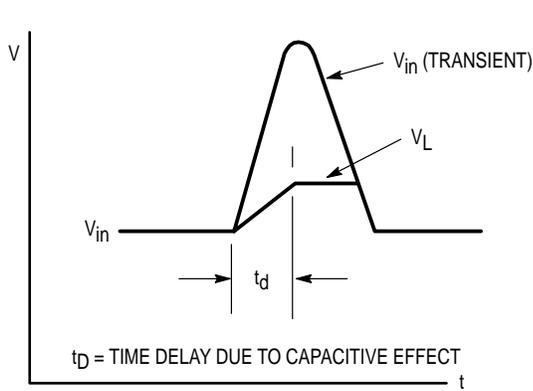


Figure 4.

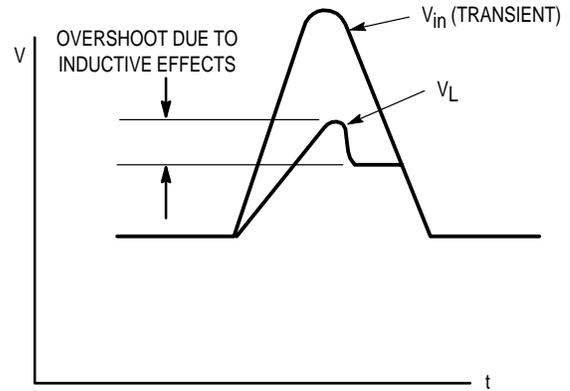


Figure 5.

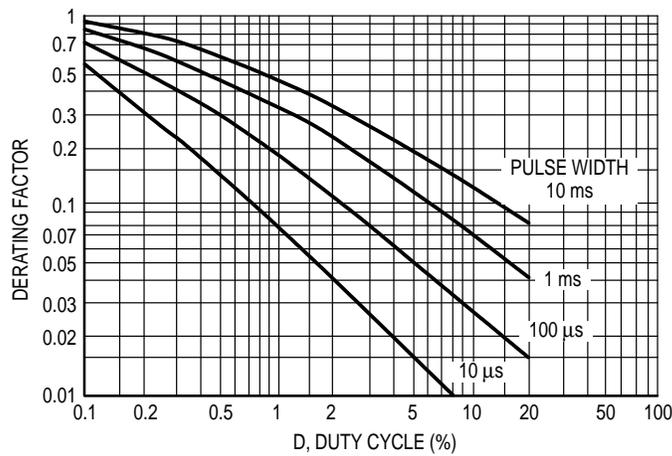


Figure 6. Typical Derating Factor for Duty Cycle

## UL RECOGNITION

The entire series has *Underwriters Laboratory Recognition* for the classification of protectors (QVGV2) under the UL standard for safety 497B and File #116110. 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.