

# 1PMT5.0AT1/T3 Series

## Zener Transient Voltage Suppressor POWERMITE® Package

The 1PMT5.0AT1/T3 Series is designed to protect voltage sensitive components from high voltage, high energy transients. Excellent clamping capability, high surge capability, low zener impedance and fast response time. The advanced packaging technique provides for a highly efficient micro miniature, space saving surface mount with its unique heat sink design. The POWERMITE has the same thermal performance as the SMA while being 50% smaller in footprint area, and delivering one of the lowest height profiles (1.1 mm) in the industry. Because of its small size, it is ideal for use in cellular phones, portable devices, business machines, power supplies and many other industrial/consumer applications.

### Specification Features:

- Stand-off Voltage: 5 – 58 V
- Peak Power – 200 W @ 1 ms (1PMT5.0A – 1PMT36A)  
– 175 W @ 1 ms (1PMT40A – 1PMT58A)
- Maximum Clamp Voltage @ Peak Pulse Current
- Low Leakage
- Response Time is Typically < 1 ns
- ESD Rating of Class 3 (> 16 kV) per Human Body Model
- Low Profile – Maximum Height of 1.1 mm
- Integral Heat Sink/Locking Tabs
- Full Metallic Bottom Eliminates Flux Entrapment
- Small Footprint – Footprint Area of 8.45 mm<sup>2</sup>
- POWERMITE is JEDEC Registered as DO-216AA
- Cathode Indicated by Polarity Band
- Pb-Free Package is Available

### Mechanical Characteristics:

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

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

**MOUNTING POSITION:** Any

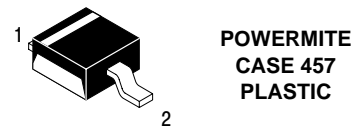
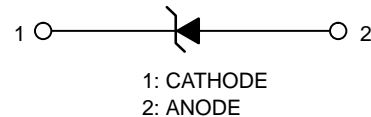
**MAXIMUM CASE TEMPERATURE FOR SOLDERING PURPOSES:**  
260°C for 10 Seconds



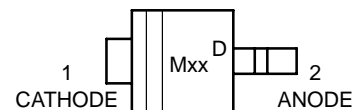
ON Semiconductor®

<http://onsemi.com>

### PLASTIC SURFACE MOUNT ZENER OVERVOLTAGE TRANSIENT SUPPRESSOR 5 – 58 V 200 W PEAK POWER



### MARKING DIAGRAM



Mxx = Specific Device Code  
xx = 5 – 58  
(See Table Next Page)  
D = Date Code

### LEAD ORIENTATION IN TAPE:

Cathode (Short) Lead to Sprocket Holes

### ORDERING INFORMATION

| Device      | Package                | Shipping†          |
|-------------|------------------------|--------------------|
| 1PMT5.0AT1  | POWERMITE              | 3,000/Tape & Reel  |
| 1PMT5.0AT3  | POWERMITE              | 12,000/Tape & Reel |
| 1PMT5.0AT3G | POWERMITE<br>(Pb-Free) | 12,000/Tape & Reel |

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

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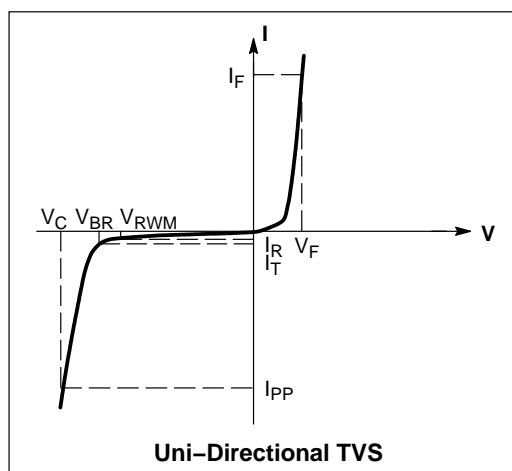
## MAXIMUM RATINGS

| Rating  | Symbol                                | Value       | Unit                           |
|---|---------------------------------------|-------------|--------------------------------|
| Maximum $P_{pk}$ Dissipation, (PW=10/1000 $\mu$ s) (Note 1) (1PMT5.0A – 1PMT36A)            | $P_{pk}$                              | 200         | W                              |
| Maximum $P_{pk}$ Dissipation, (PW=10/1000 $\mu$ s) (Note 1) (1PMT40A – 1PMT58A)             | $P_{pk}$                              | 175         | W                              |
| Maximum $P_{pk}$ Dissipation, (PW=8/20 $\mu$ s) (Note 1)                                    | $P_{pk}$                              | 1000        | W                              |
| DC Power Dissipation @ $T_A = 25^\circ\text{C}$ (Note 2)<br>Derate above $25^\circ\text{C}$ | $P_D$                                 | 500         | mW                             |
| Thermal Resistance from Junction-to-Ambient   | $R_{\theta JA}$                       | 4.0         | $\text{mW}/^\circ\text{C}$     |
| Thermal Resistance from Junction-to-Lead (Anode)  | $R_{\theta J\text{anode}}$            | 248         | $^\circ\text{C}/\text{W}$      |
| Maximum DC Power Dissipation (Note 3)<br>Thermal Resistance from Junction to Tab (Cathode)  | $P_D$<br>$R_{\theta J\text{cathode}}$ | 3.2<br>23   | W<br>$^\circ\text{C}/\text{W}$ |
| Operating and Storage Temperature Range   | $T_J, T_{stg}$                        | -55 to +150 | $^\circ\text{C}$               |

1. Non-repetitive current pulse at  $T_A = 25^\circ\text{C}$ .
2. Mounted with recommended minimum pad size, DC board FR-4.
3. At Tab (Cathode) temperature,  $T_{tab} = 75^\circ\text{C}$

**ELECTRICAL CHARACTERISTICS** ( $T_A = 25^\circ\text{C}$  unless otherwise noted,  $V_F = 3.5\text{ V Max.}$  @  $I_F$  (Note 4) = 35 A)

| 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                                |
| $I_F$     | Forward Current                             |
| $V_F$     | Forward Voltage @ $I_F$                     |



**ELECTRICAL CHARACTERISTICS** ( $T_L = 30^\circ\text{C}$  unless otherwise noted,  $V_F = 1.25\text{ Volts}$  @ 200 mA)

| Device         | Marking | $V_{RWM}$<br>(Note 5) | $V_{BR}$ @ $I_T$ (V) (Note 6) |       |      | $I_T$<br>(mA) | $I_R$ @ $V_{RWM}$<br>( $\mu$ A) | $V_C$ @ $I_{PP}$<br>(V) | $I_{PP}$ (A)<br>(Note 7) |
|----------------|---------|-----------------------|-------------------------------|-------|------|---------------|---------------------------------|-------------------------|--------------------------|
|                |         |                       | Min                           | Nom   | Max  |               |                                 |                         |                          |
| 1PMT5.0AT1, T3 | MKE     | 5.0                   | 6.4                           | 6.7   | 7.0  | 10            | 800                             | 9.2                     | 21.7                     |
| 1PMT7.0AT1, T3 | MKM     | 7.0                   | 7.78                          | 8.2   | 8.6  | 10            | 500                             | 12                      | 16.7                     |
| 1PMT12AT1, T3  | MLE     | 12                    | 13.3                          | 14.0  | 14.7 | 1.0           | 5.0                             | 19.9                    | 10.1                     |
| 1PMT16AT1, T3  | MLP     | 16                    | 17.8                          | 18.75 | 19.7 | 1.0           | 5.0                             | 26                      | 7.7                      |
| 1PMT18AT1, T3  | MLT     | 18                    | 20.0                          | 21.0  | 22.1 | 1.0           | 5.0                             | 29.2                    | 6.8                      |
| 1PMT22AT1, T3  | MLX     | 22                    | 24.4                          | 25.6  | 26.9 | 1.0           | 5.0                             | 35.5                    | 5.6                      |
| 1PMT24AT1, T3  | MLZ     | 24                    | 26.7                          | 28.1  | 29.5 | 1.0           | 5.0                             | 38.9                    | 5.1                      |
| 1PMT26AT1, T3  | MME     | 26                    | 28.9                          | 30.4  | 31.9 | 1.0           | 5.0                             | 42.1                    | 4.8                      |
| 1PMT28AT1, T3  | MMG     | 28                    | 31.1                          | 32.8  | 34.4 | 1.0           | 5.0                             | 45.4                    | 4.4                      |
| 1PMT30AT1, T3  | MMK     | 30                    | 33.3                          | 35.1  | 36.8 | 1.0           | 5.0                             | 48.4                    | 4.1                      |
| 1PMT33AT1, T3  | MMM     | 33                    | 36.7                          | 38.7  | 40.6 | 1.0           | 5.0                             | 53.3                    | 3.8                      |
| 1PMT36AT1, T3  | MMP     | 36                    | 40.0                          | 42.1  | 44.2 | 1.0           | 5.0                             | 58.1                    | 3.4                      |
| 1PMT40AT1, T3  | MMR     | 40                    | 44.4                          | 46.8  | 49.1 | 1.0           | 5.0                             | 64.5                    | 2.7                      |
| 1PMT48AT1, T3  | MMX     | 48                    | 53.3                          | 56.1  | 58.9 | 1.0           | 5.0                             | 77.4                    | 2.3                      |
| 1PMT51AT1, T3  | MMZ     | 51                    | 56.7                          | 59.7  | 62.7 | 1.0           | 5.0                             | 82.4                    | 2.1                      |
| 1PMT58AT1, T3  | MNG     | 58                    | 64.4                          | 67.8  | 71.2 | 1.0           | 5.0                             | 93.6                    | 1.9                      |

4. 1/2 sine wave (or equivalent square wave), PW = 8.3 ms, duty cycle = 4 pulses per minute maximum.
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 ambient temperature of  $25^\circ\text{C}$ .
7. Surge current waveform per Figure 2 and derate per Figure 4.

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## TYPICAL PROTECTION CIRCUIT

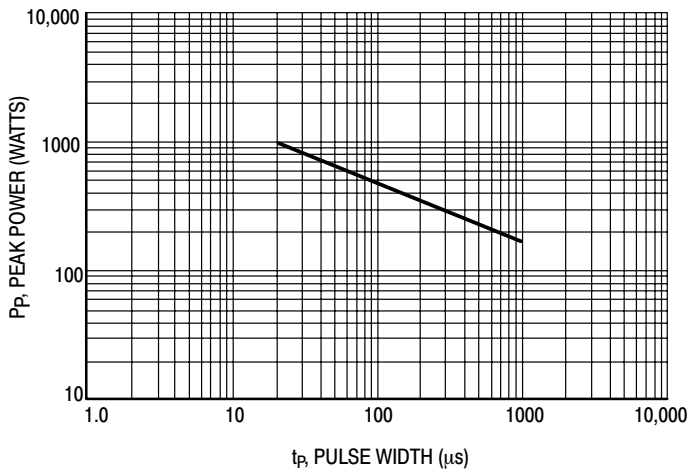
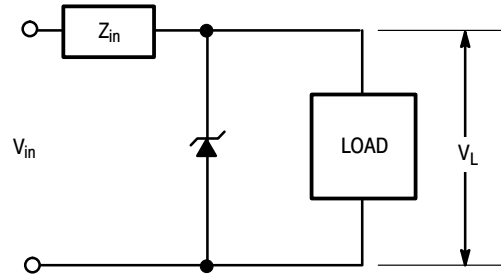


Figure 1. Pulse Rating Curve

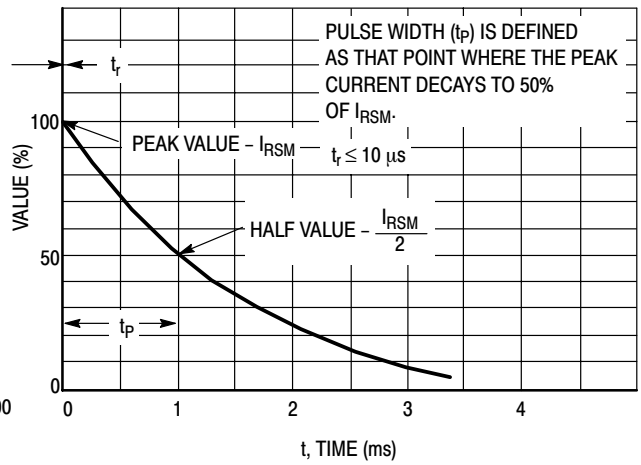


Figure 2. 10 X 1000  $\mu$ s Pulse Waveform

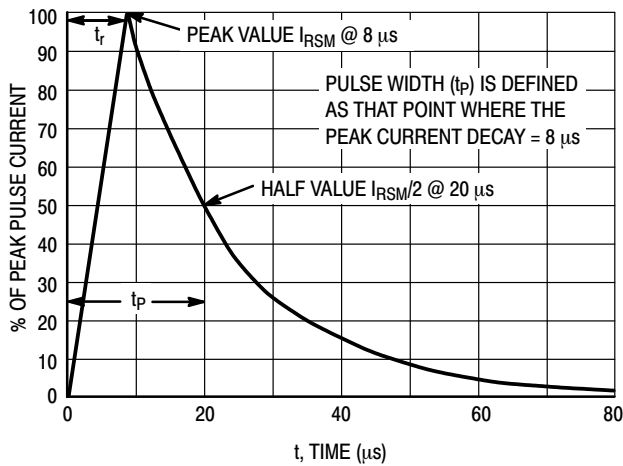


Figure 3. 8 X 20  $\mu$ s Pulse Waveform

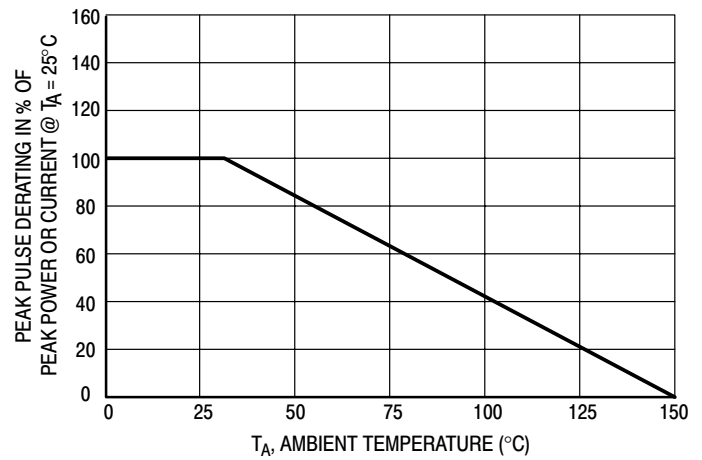


Figure 4. Pulse Derating Curve

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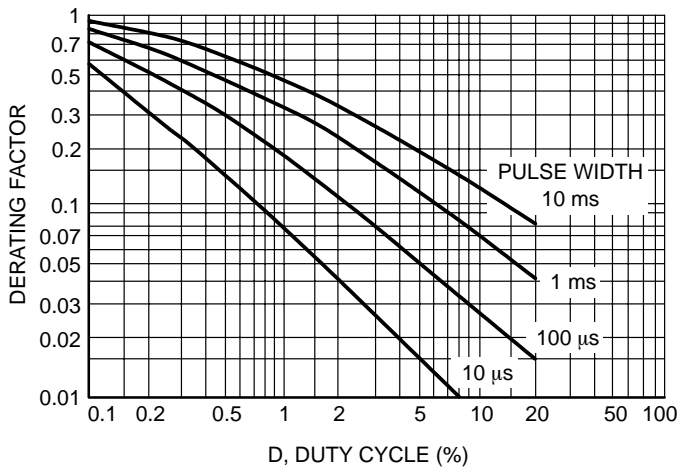


Figure 5. Typical Derating Factor for Duty Cycle

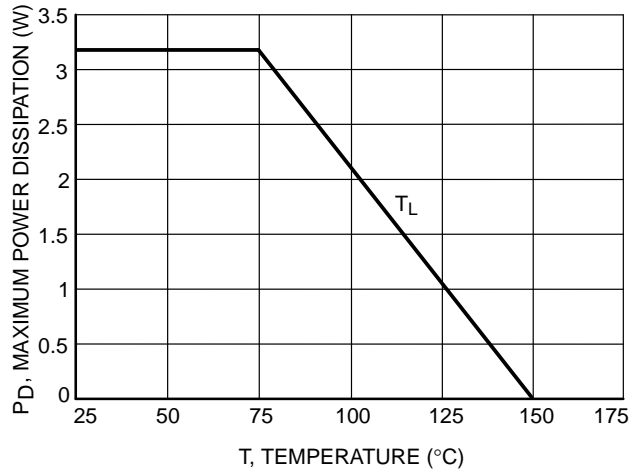


Figure 6. Steady State Power Derating

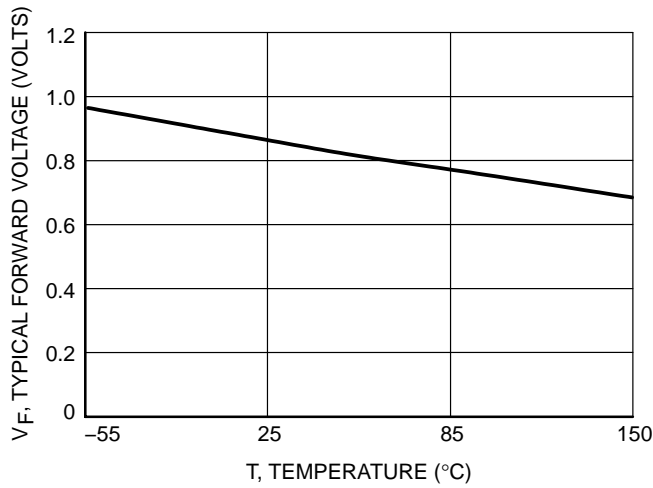


Figure 7. Forward Voltage

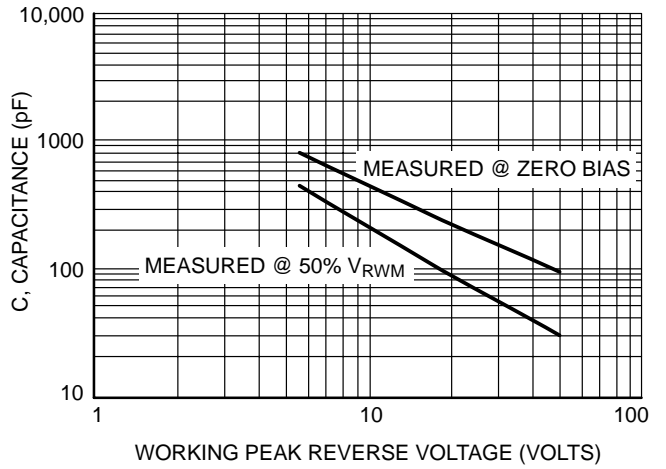
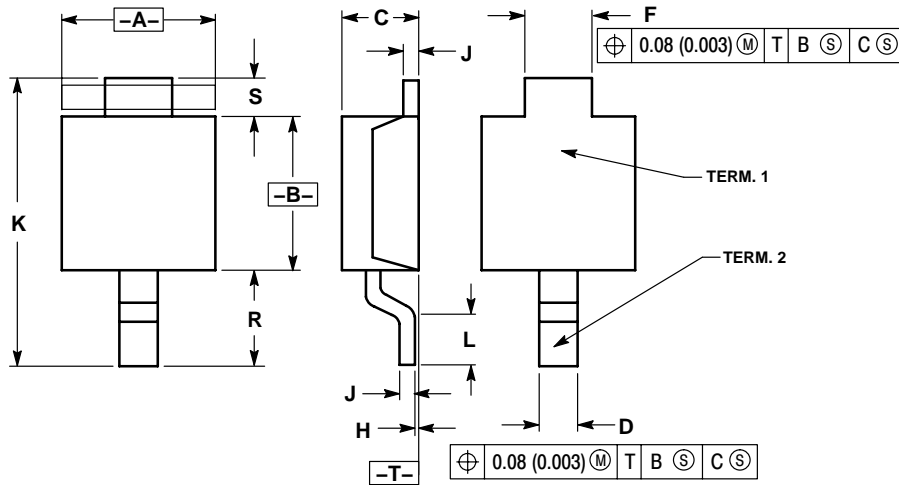


Figure 8. Capacitance versus Working Peak Reverse Voltage

# 1PMT5.0AT1/T3 Series

## OUTLINE DIMENSIONS

POWERMITE  
CASE 457-04  
ISSUE D

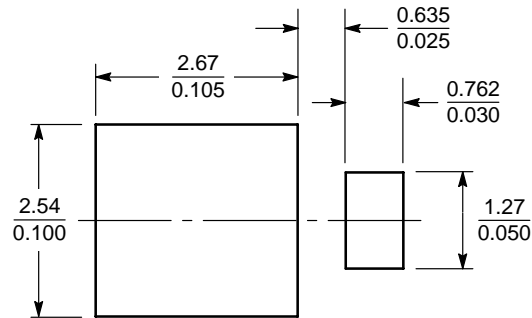


NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSION A DOES NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS. MOLD FLASH, PROTRUSIONS OR GATE BURRS SHALL NOT EXCEED 0.15 (0.006) PER SIDE.

| DIM | MILLIMETERS |       | INCHES    |        |
|-----|-------------|-------|-----------|--------|
|     | MIN         | MAX   | MIN       | MAX    |
| A   | 1.75        | 2.05  | 0.069     | 0.081  |
| B   | 1.75        | 2.18  | 0.069     | 0.086  |
| C   | 0.85        | 1.15  | 0.033     | 0.045  |
| D   | 0.40        | 0.69  | 0.016     | 0.027  |
| F   | 0.70        | 1.00  | 0.028     | 0.039  |
| H   | -0.05       | +0.10 | -0.002    | +0.004 |
| J   | 0.10        | 0.25  | 0.004     | 0.010  |
| K   | 3.60        | 3.90  | 0.142     | 0.154  |
| L   | 0.50        | 0.80  | 0.020     | 0.031  |
| R   | 1.20        | 1.50  | 0.047     | 0.059  |
| S   | 0.50 REF    |       | 0.019 REF |        |

### SOLDERING FOOTPRINT\*




SCALE 10:1  $\left( \frac{\text{mm}}{\text{inches}} \right)$

### POWERMITE®

\*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

# 1PMT5.0AT1/T3 Series

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