



## 5V – 48V Powermite1, Surface Mount Transient Voltage Suppressors

### DESCRIPTION

Microsemi's unique and new Powermite MUPT series of transient voltage suppressors feature oxide-passivated chips with high-temperature solder bonds for high surge capability and negligible electrical degradation under repeated surge conditions. Both unidirectional and bidirectional configurations are available. In addition to its size advantages, the Powermite package includes a fully metallic bottom (anode) side that eliminates the possibility of solder flux entrapment at assembly and a unique locking tab design serves as an integral heat sink. Its innovative design makes this device fully compatible for use with automatic insertion equipment.

**Important:** For the latest information, visit our website <http://www.microsemi.com>.

### FEATURES

- Powermite package with standoff voltages 5 to 48 V.
- Both unidirectional and bidirectional polarities:
  - Anode to case bottom (MUPT5e3 thru MUPT48e3)
  - Bidirectional (MUPTB5e3 thru MUPTB48e3)
- Clamping time less than 100 pico-seconds for unidirectional and 5 nano-seconds for bidirectional.
- 100% surge current testing of all parts.
- Moisture classification is Level 1 with no dry pack required per IPC/JEDEC J-STD-020B.
- Both RoHS and non-RoHS compliant versions available.

### APPLICATIONS / BENEFITS

- Protects sensitive components such as IC's, CMOS, Bipolar, BiCMOS, ECL, DTL, T<sup>2</sup>L, etc.
- Protection from switching and induced RF transients.
  - Integral heat sink / locking tabs
  - Fully metallic bottom side eliminates flux entrapment
- Compliant to IEC61000-4-2 and IEC61000-4-4 for ESD and EFT protection respectively.
- Secondary lightning protection per IEC61000-4-5 with 42 Ohms source impedance:
  - Class 1: MUPT5 /MUPTB8 to 17
  - Class 2: MUPT5 /MUPTB5 to 12

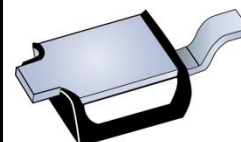
### MAXIMUM RATINGS

Parameters/Test Conditions	Symbol	Value		Unit
Junction and Storage Temperature	T <sub>J</sub> / T <sub>STG</sub>	-65 to +150		°C
Thermal Resistance Junction-to-Ambient <sup>(1)</sup>	R <sub>θJA</sub>	240		°C/W
Thermal Resistance Junction-to-Case (base tab)	R <sub>θJC</sub>	15		°C/W
Peak Pulse Power (see <a href="#">Figure 1</a> and <a href="#">Figure 2</a> )	P <sub>PP</sub>	@ 8/20 μs	@ 10/1000μs	W
MUPT5e3 thru MUPT48e3:		1000	150	
MUPTB5e3 thru MUPTB48e3:		1000	150	
Rated Average Power Dissipation (base tab ≤ 112 °C)	P <sub>M(AV)</sub>	2.5		W
Impulse Repetition Rate (duty factor)		0.01		%
Solder Temperature @ 10 s	T <sub>SP</sub>	260		°C

**Notes:** 1. When mounted on FR4 PC board with 1 oz copper.

*High-Reliability  
Screening available in  
reference to  
MIL-PRF-19500*

*Tested in accordance  
with the requirements of  
AEC-Q101*



**DO-216AA  
Package**

Power Discretes & Modules  
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Microsemi Corporation

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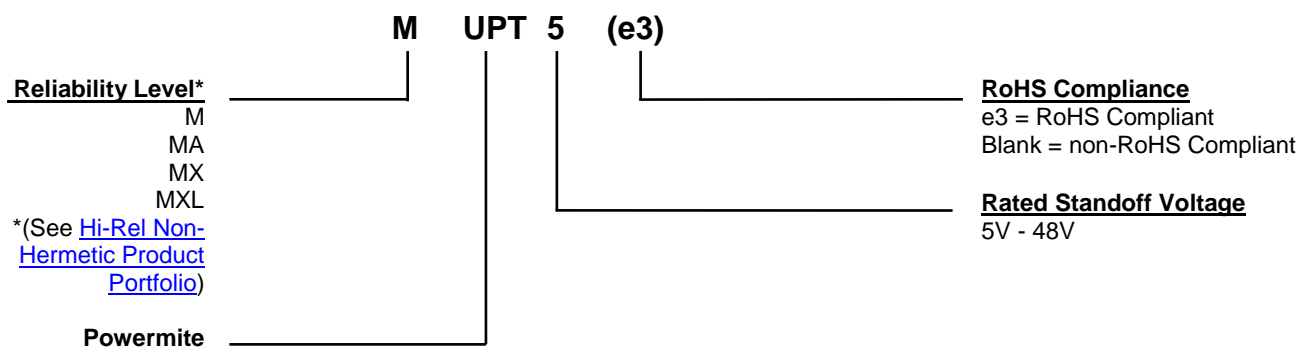
[www.microsemi.com](http://www.microsemi.com)

### MECHANICAL and PACKAGING

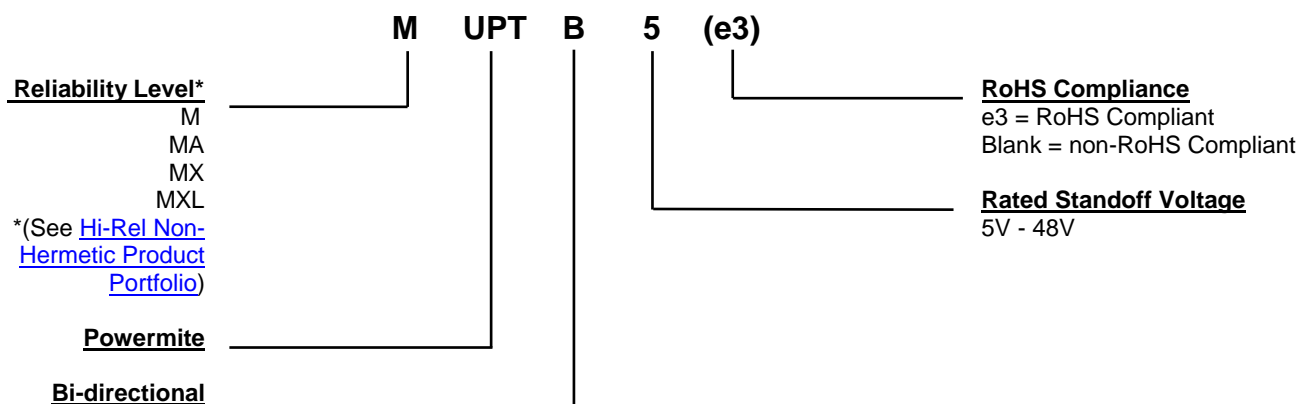
- CASE: Void-free transfer molded thermosetting epoxy compound meeting UL94V-0.
- TERMINALS: Annealed matte-tin plating over copper and readily solderable per MIL-STD-750, method 2026.
- MARKING:  
**Anode to TAB 1:** "T" plus the last two digits of part number underlined, e.g. MUPT5e3 is T05•, MUPT12e3 is T12•  
**Bipolar:** "B" plus the last two digits of part number underlined, e.g. MUPTB8e3 is B08•, MUPTB12e3 is B12•, etc.  
*Please note dot suffix (for e3 suffix)*
- POLARITY: Anode to TAB 1 (bottom) as described in marking above and on [last page](#).
- TAPE & REEL option: Standard per EIA-481-B using 12 mm tape. Consult factory for quantities.
- WEIGHT: Approximately 0.016 gram.
- See [package dimensions](#) on last page.

### PART NOMENCLATURE

Applicable to unidirectional MUPT5e3 – MUPT48e3 only:



Applicable to bidirectional MUPTB5e3 – MUPTB48e3 only:



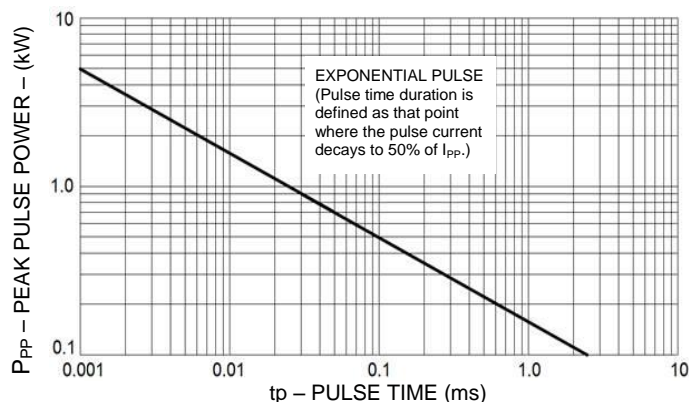
**SYMBOLS & DEFINITIONS**

Symbol	Definition
$V_{(BR)}$	Breakdown Voltage: The minimum voltage the device will exhibit at a specified current.
$V_{WM}$	Working Peak Standoff Voltage: The maximum peak voltage that can be applied over the operating temperature range.
$P_{PP}$	Peak Pulse Power: The peak power that can be applied for a specified pulse width and waveform.
$I_D$	Standby Current: The maximum current that will flow at the specified voltage and temperature.
$I_{PP}$	Peak Pulse Current: The peak current that can be applied for a specified pulse width and waveform.
C	Capacitance: The capacitance in picofarads of the TVS as defined @ 0 volts at a frequency of 1 MHz.

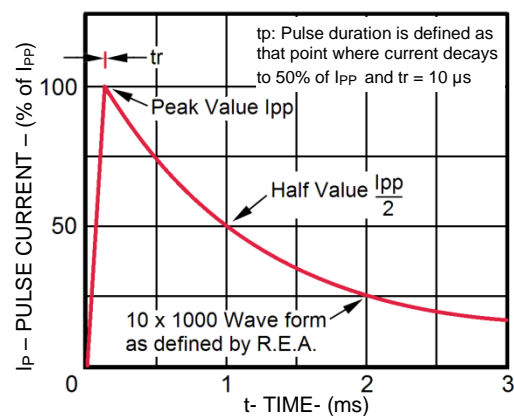
**ELECTRICAL CHARACTERISTICS**

DEVICE TYPE		RATED STANDOFF VOLTAGE $V_{WM}$	MINIMUM BREAKDOWN VOLTAGE $V_{(BR)} @ 1 \text{ mA}$	MAXIMUM STANDBY CURRENT $I_D @ V_{WM}$	MAXIMUM PEAK PULSE CURRENT* $I_{PP} @ 10/1000 \mu\text{s}$	MAXIMUM CLAMPING VOLTAGE $V_C @ I_{PP}$	MAXIMUM TEMPERATURE COEFFICIENT of $V_{(BR)}$ $\alpha_{V(BR)}$
Uni-directional	Bi-directional	V	V	$\mu\text{A}$	A	V	$\%/^{\circ}\text{C}$
MUPT5	MUPTB5	5	6.0	50	15.7	9.5	0.030
MUPT8	MUPTB8	8	9.0	2	10.9	13.7	0.040
MUPT10	MUPTB10	10	11.0	2	8.33	18.0	0.045
MUPT12	MUPTB12	12	13.8	1	6.94	21.6	0.050
MUPT15	MUPTB15	15	16.7	1	5.77	26.0	0.055
MUPT17	MUPTB17	17	19.0	1	5.14	29.2	0.060
MUPT24	MUPTB24	24	28.4	1	3.47	43.2	0.070
MUPT28	MUPTB28	28	31.0	1	3.13	47.8	0.075
MUPT33	MUPTB33	33	36.8	1	2.65	56.7	0.080
MUPT48	MUPTB48	48	54.0	1	1.78	84.3	0.090

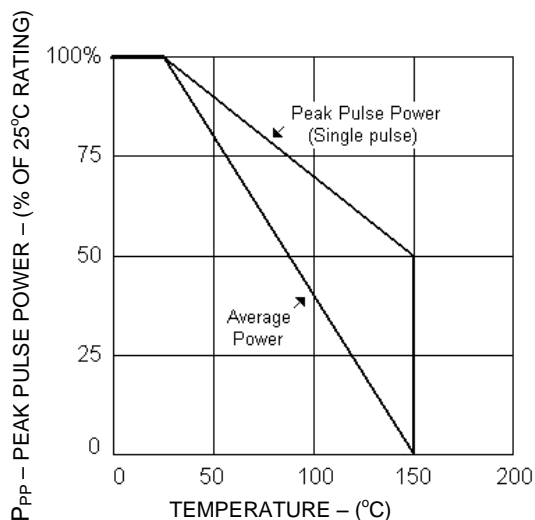
\* See [Figure 2](#) for  $I_{PP}$  waveform of 10/1000  $\mu\text{s}$  test pulse.

**GRAPHS**


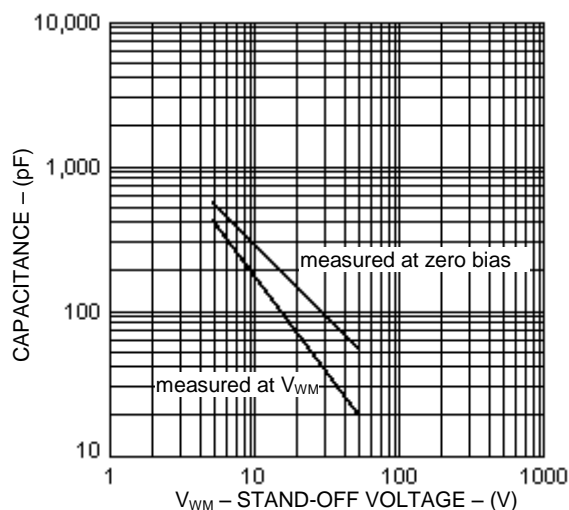
**FIGURE 1**  
Peak Pulse Power vs. Pulse Duration



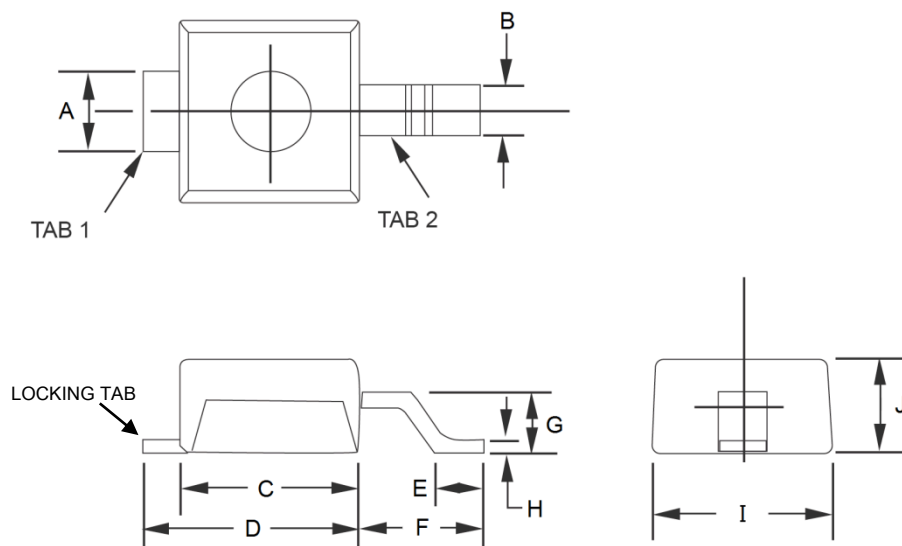
**FIGURE 2**  
Pulse Waveform for 10/1000  $\mu$ s Exponential Surge



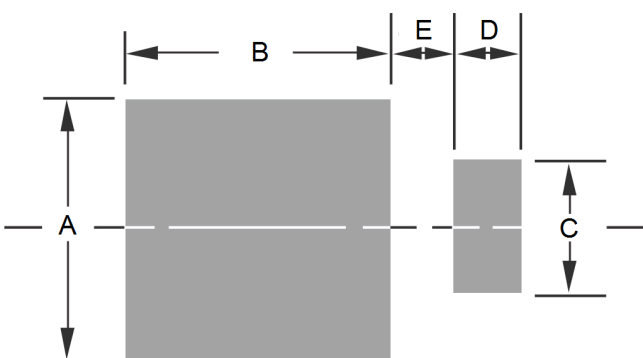
**FIGURE 3**  
Derating Curve



**FIGURE 4**  
Typical Capacitance vs. Stand-Off Voltage

**PACKAGE DIMENSIONS**


Ltr	Dimensions			
	Inch		Millimeters	
	Min	Max	Min	Max
A	0.029	0.039	0.73	0.99
B	0.016	0.026	0.40	0.66
C	0.070	0.080	1.77	2.03
D	0.087	0.097	2.21	2.46
E	0.020	0.030	0.50	0.76
F	0.051	0.061	1.29	1.54
G	0.021	0.031	0.53	0.78
H	0.004	0.008	0.10	0.20
I	0.070	0.080	1.77	2.03
J	0.035	0.045	0.89	1.14

**PAD LAYOUT**


Ltr	Dimensions	
	Inch	Millimeters
A	0.100	2.54
B	0.105	2.67
C	0.050	1.27
D	0.030	0.76
E	0.025	0.64