

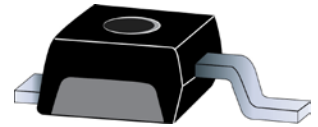


SURFACE MOUNT TRANSIENT VOLTAGE SUPPRESSORS

DESCRIPTION

Microsemi's new Powermite UPT 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 (cathode) side that eliminates the possibility of solder flux entrapment at assembly and a unique locking tab serves as an integral heat sink. Its innovative design makes this device fully compatible for use with automatic insertion equipment. Microsemi also offers numerous other products to meet higher and lower power voltage regulation applications.

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



**DO-216AA
Package**

FEATURES

- Powermite package with standoff voltages 5 to 48 V.
- Both unidirectional and bidirectional polarities:
 - Anode to case bottom (UPT5e3 thru UPT48e3)
 - Cathode to case bottom (UPT5Re3 thru UPT48Re3)
 - Bidirectional (UPTB8e3 thru UPTB48e3)
- Clamping time less than 100 pico-seconds for unidirectional and 5 nano-seconds for bidirectional version.
- Moisture classification is Level 1 with no dry pack required per IPC/JEDEC J-STD-020B.
- RoHS compliant versions available.

APPLICATIONS / BENEFITS

- Protects sensitive components such as IC's, CMOS, Bipolar, BiCMOS, ECL, DTL, T²L, etc.
- Protection from switching and induced RF transients.
- New improved lower leakage current for the UPT5Re3:
 - 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: UPT5//UPT5R/UPTB8 to17
 - Class 2: UPT5//UPT5R/UPTB8 to12

MAXIMUM RATINGS

| Parameters/Test Conditions | Symbol | Value | | Unit | |
|---|-----------------------------------|------------------------|------------|------|-----|
| Junction and Storage Temperature | T _J / T _{STG} | -65 to +150 | | °C | |
| Thermal Resistance Junction-to-Ambient ⁽¹⁾ | R _{θJA} | 240 | | °C/W | |
| Thermal Resistance Junction-to-Case (base tab) | R _{θJC} | 15 | | °C/W | |
| Peak Pulse Power (see Figure 1 and Figure 2) | P _{PP} | @ 8/20 μs | @10/1000μs | W | |
| | | UPT5Re3: | 600 | | 100 |
| | | UPT5e3 thru UPT48e3: | 1000 | | 150 |
| | | UPT8Re3 thru UPT48Re3: | 1000 | | 150 |
| | | UPTB8e3 thru UPTB48e3: | 1000 | | 150 |
| Steady-State Power Dissipation (base tab < 112 °C) | P _D | 2.5 | | W | |
| Impulse Repetition Rate (duty factor) | | 0.01 | | % | |
| Solder Temperature @ 10 s | T _{SP} | 260 | | °C | |

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

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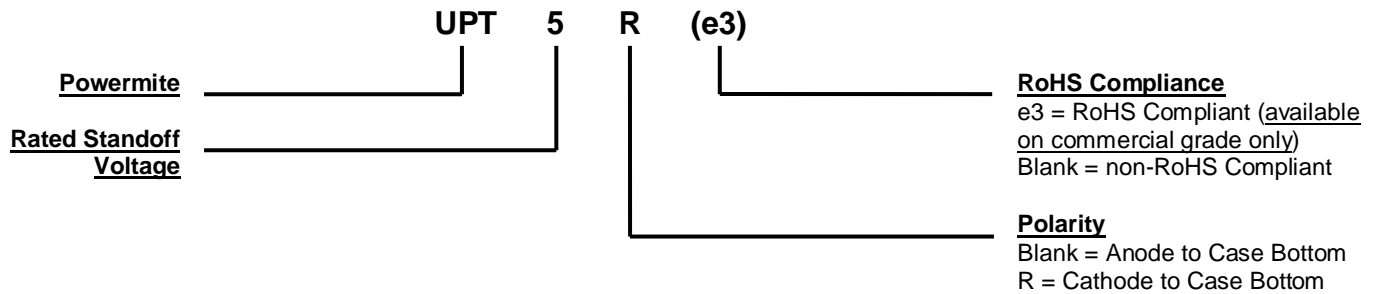
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MECHANICAL and PACKAGING

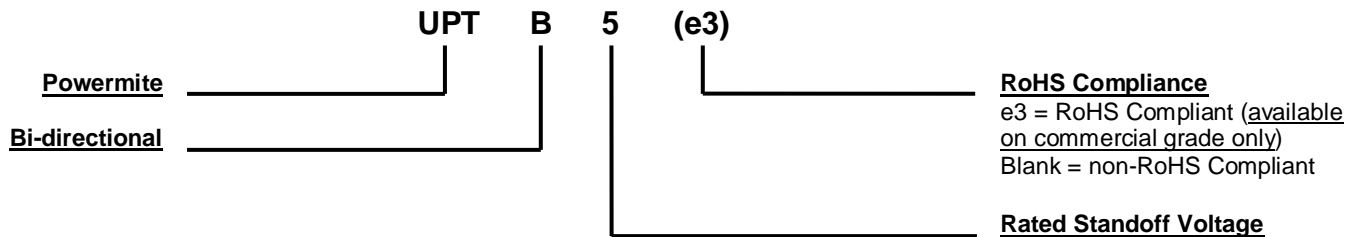
- CASE: Void-free transfer molded thermosetting epoxy compound meeting UL94V-0.
- TERMINALS: Annealed matte-tin plating over copper and readily solderable per MIL-STD-750, method 2026.
- MARKING:
 - Anode to TAB 1:** T plus the last two digits of part number, e.g. UPT5e3 is T05•, UPT12e3 is T12•
 - Cathode to TAB1:** U plus last two digits of part number, e.g. UPT5Re3 is U05•, UPT12Re3 is U12•
 - Bipolar:** B plus the last two digits of part number, e.g. UPTB8e3 is B08•, UPTB12e3 is B12•, etc.
Please note dot suffix (for e3 suffix)
- POLARITY: Cathode or anode to TAB 1 (bottom) as described in marking below and last page.
- TAPE & REEL option: Standard per EIA-481-B using 12 mm tape. Consult factory for quantities.
- WEIGHT: 0.016 gram (approximate).
- See [Package Dimensions](#) on last page.

PART NOMENCLATURE

Applicable to UPT5e3 – UPT48e3, UPT5Re3 – UPT48Re3 only:



Applicable to UPTB8e3 – UPTB48e3 only:



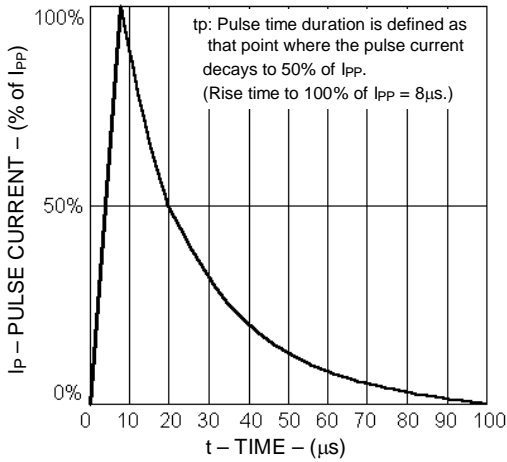
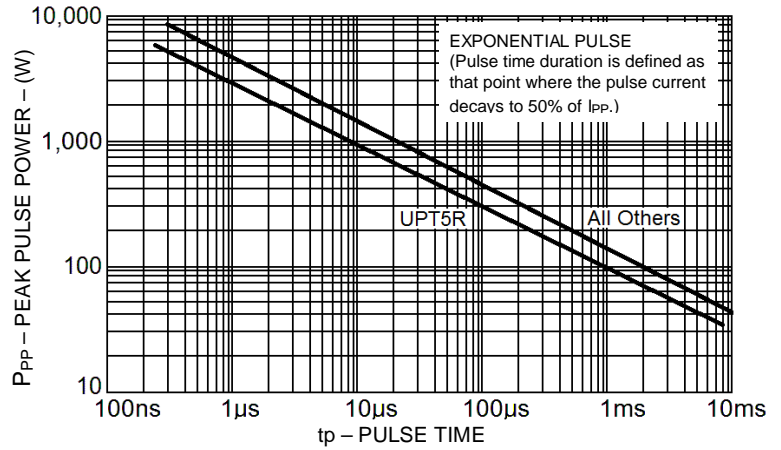
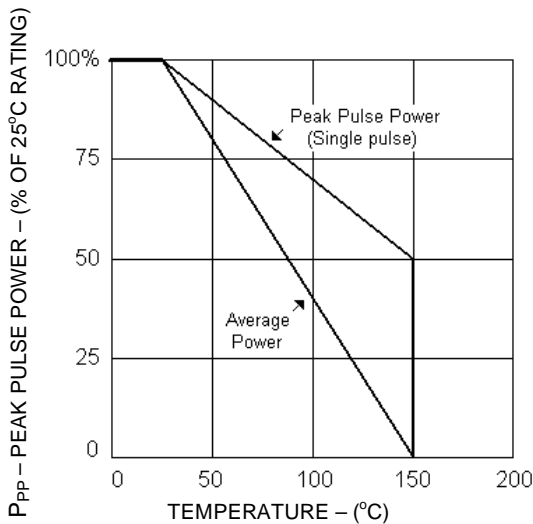
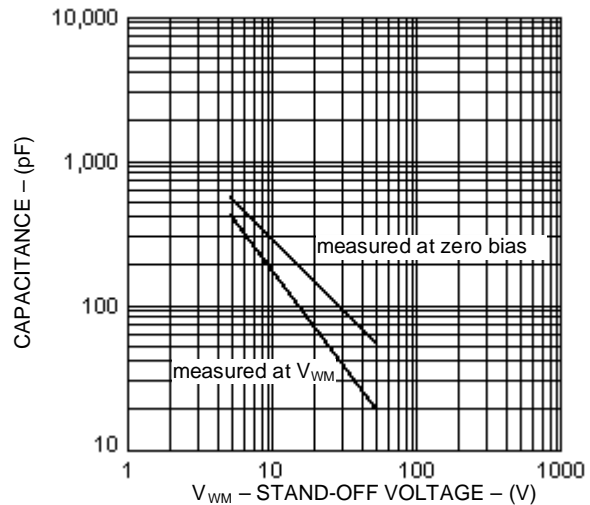
SYMBOLS & DEFINITIONS

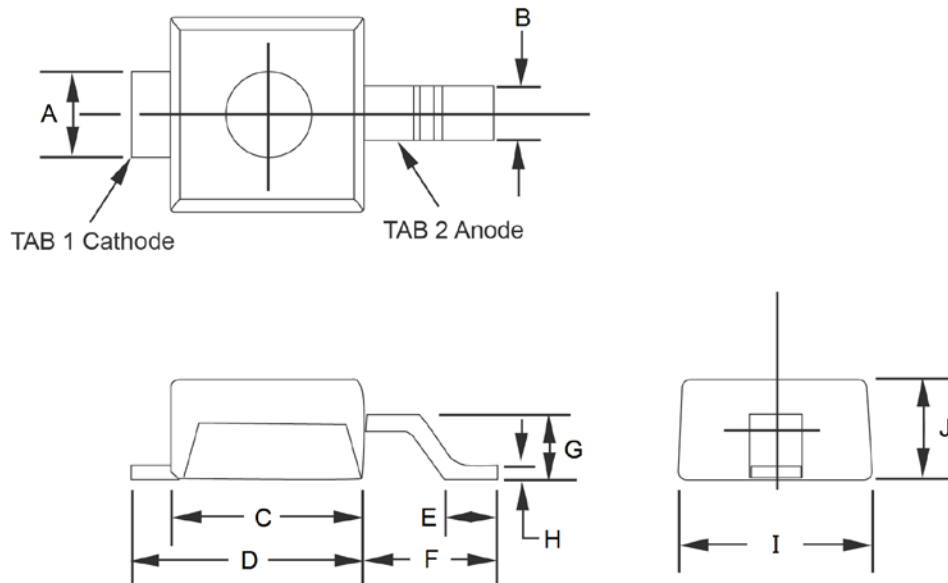
| Symbol | Definition |
|------------|---|
| $V_{(BR)}$ | Breakdown Voltage: The minimum voltage the device will exhibit at a specified current. |
| V_{WM} | Working Peak Standoff Voltage: The maximum peak voltage that can be applied over the operating temperature range. |
| P_{PP} | Peak Pulse Power: 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

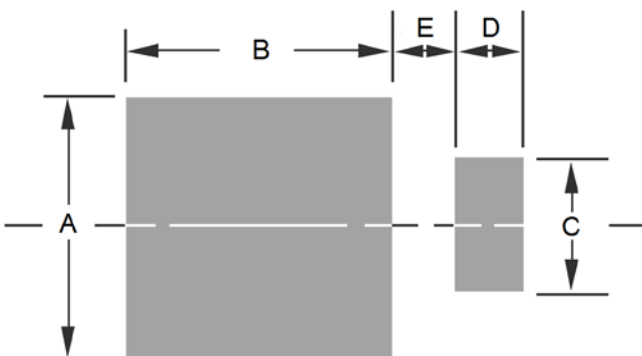
| DEVICE TYPE (add e3 suffix) | | RATED STANDOFF VOLTAGE | MINIMUM BREAKDOWN VOLTAGE | MAXIMUM STANDBY CURRENT | MAXIMUM PEAK PULSE CURRENT* | MAXIMUM CLAMPING VOLTAGE | MAXIMUM TEMPERATURE COEFFICIENT of $V_{(BR)}$ |
|--------------------------------|----------------|------------------------------|---------------------------------|-------------------------------|-----------------------------------|--------------------------------|--|
| | | V_{WM} | $V_{(BR)}$ @ 1 mA | I_D @ V_{WM} | I_{PP} @ 8/20 μ s | V_C @ 10A* | $\alpha_{V(BR)}$ |
| Unidirectional | Bi-directional | V | V | μ A | A | V | %/°C |
| UPT5 | | 5 | 6.0 | 50 | 89.4 | 9.5 | .030 |
| UPT5R | | 5 | 6.0 | 5 | 60 | 9.5 | .030 |
| UPT8 & UPT8R | UPTB8 | 8 | 9.0 | 2 | 62.1 | 13.7 | .040 |
| UPT10 & UPT10R | UPTB10 | 10 | 11.0 | 2 | 47.2 | 18.0 | .045 |
| UPT12 & UPT12R | UPTB12 | 12 | 13.8 | 1 | 40.3 | 21.6 | .050 |
| UPT15 & UPT15R | UPTB15 | 15 | 16.7 | 1 | 33.9 | 26.0 | .055 |
| UPT17 & UPT17R | UPTB17 | 17 | 19.0 | 1 | 30.8 | 29.2 | .060 |
| UPT24 & UPT24R | UPTB24 | 24 | 28.4 | 1 | 22.0 | 43.2 | .070 |
| UPT28 & UPT28R | UPTB28 | 28 | 31.0 | 1 | 19.2 | 47.8 | .075 |
| UPT33 & UPT33R | UPTB33 | 33 | 36.8 | 1 | 16.4 | 56.7 | .080 |
| UPT48 & UPT48R | UPTB48 | 48 | 54.0 | 1 | 11.2 | 84.3 | .090 |

* See [Figure 1](#) for I_{PP} waveform of 8/20 μ s.

GRAPHS

FIGURE 1
Pulse Waveform for 8/20 μ s Exponential Surge

FIGURE 2
Peak Pulse Power vs. Pulse Duration

FIGURE 3
Derating Curve

FIGURE 4
Typical Capacitance vs. Stand-Off Voltage

PACKAGE DIMENSIONS


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

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 |