Microsemi
SCOTTSDALE DIVISION

# ICTE-5 thru ICTE-45C, e3

## TRANSIENT VOLTAGE SUPPRESSOR

ALSO AVAILABLE IN SURFACE MOUNT

www.Microsemi.COM

## DESCRIPTION

The ICTE-5 through ICTE-45C series of Transient Voltage Suppressors (TVSs) are designed for the protection of integrated circuits that require very low Clamping Voltages ($V_C$) during a transient threat. Due to their very fast response time, protection level and high Peak Pulse Power ($P_{PP}$) capability, they are extremely effective in providing protection against line transients generated by: voltage reversals, capacitive or inductive load switching, electromechanical switching, electrostatic discharge and electromagnetic coupling.

## APPEARANCE

**IMPORTANT:** For the most current data, consult *MICROSEMI's* website: http://www.microsemi.com

## FEATURES

- This series of TVS devices is designed to protect Bipolar, MOS and Schottky improved integrated circuits.
- Transient protection for CMOS, MOS, Bipolar, ICS (TTL, ECL, DTL, RTL and linear functions)
- 5.0 to 45 volts
- Low clamping ratio
- RoHS Compliant devices available by adding "e3" suffix

## APPLICATIONS / BENEFITS

- These transient voltage suppressors are designed for the protection of integrated circuits. Characterized by a very low clamping voltage together with a low standoff voltage, they afford a high degree of protection to: TTL, ECL, DTL, MOS, CMOS, VMOS, HMOS, NMOS and static memory circuits.

## MAXIMUM RATINGS

- 1500 Watts of Peak Pulse Power ($P_{PP}$) dissipation at 25°C and 10x1000µs
- $t_{clamping}$ (0 volts to $V_{(BR)}$ min): <100 ps theoretical for unidirectional and <5 ns for bidirectional
- Operating and Storage temperatures: -65°C to +150°C.
- Forward surge rating: 200 amps, 1/120 second at 25°C. (Applies to Unidirectional or single direction only).
- Steady State power dissipation: 5 watts.
- Repetition rate (duty cycle): .05%
- Clamping Factor: 1.33 @ Full rated power.
  1.20 @ 50% rated power.
- Clamping Factor: The ratio of the actual $V_C$ (Clamping Voltage) to the actual $V_{(BR)}$ (Breakdown Votlage) as measured on a specific device.

## MECHANICAL AND PACKAGING

- CASE: Void-free, transfer molded thermosetting epoxy body meeting UL94V-0
- FINISH: Tin-lead or RoHS Compliant matte-Tin plating solderable per MIL-STD-750, method 2026
- POLARITY: Cathode connected to case and marked. Bidirectional not marked.
- WEIGHT: 1.5 grams (approx.)
- MOUNTING POSITION: Any
- See package dimension on last page






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## ELECTRICAL CHARACTERISTICS @ 25°C (UNIDIRECTIONAL)

| MICROSEMI PART NUMBER | STAND-OFF VOLTAGE (NOTE 1) $V_{WM}$ VOLTS | MAXIMUM REVERSE LEAKAGE @$V_{WM}$ $I_D$ µA | MINIMUM* BREAKDOWN VOLTAGE @ 1.0 mA $V_{(BR)}$ VOLTS | MAXIMUM CLAMPING VOLTAGE (Fig. 2) $I_{PP1}$ = 1A $V_C$ VOLTS | MAXIMUM CLAMPING VOLTAGE (Fig. 2) @ $I_{PP2}$ = 10A $V_C$ VOLTS | MAXIMUM PEAK PULSE CURRENT @ 10 x 1000µs $I_{PP3}$ A |
|---|---|---|---|---|---|---|
| ICTE-5 | 5.0 | 300 | 6.0 | 7.1 | 7.5 | 160 |
| ICTE-8 | 8.0 | 25 | 9.4 | 11.3 | 11.5 | 100 |
| ICTE-10 | 10.0 | 2 | 11.7 | 13.7 | 14.1 | 90 |
| ICTE-12 | 12.0 | 2 | 14.1 | 16.1 | 16.5 | 70 |
| ICTE-15 | 15.0 | 2 | 17.6 | 20.1 | 20.6 | 60 |
| ICTE-18 | 18.0 | 2 | 21.2 | 24.2 | 25.2 | 50 |
| ICTE-22 | 22.0 | 2 | 25.9 | 29.8 | 32.0 | 40 |
| ICTE-36 | 36.0 | 2 | 42.4 | 50.6 | 54.3 | 23 |
| ICTE-45 | 45.0 | 2 | 52.9 | 63.3 | 70.0 | 19 |

$V_F$ at 100 amps peak, 8.3 msec sine wave equals 3.5 volts maximum.

## ELECTRICAL CHARACTERISTICS @ 25°C (Test Both Polarities for BIDIRECTIONAL)

| | | | | | | |
|---|---|---|---|---|---|---|
| ICTE-5C | 5.0 | 300 | 6.0 | 7.1 | 7.5 | 160 |
| ICTE-8C | 8.0 | 25 | 9.4 | 11.4 | 11.6 | 100 |
| ICTE-10C | 10.0 | 2 | 11.7 | 14.1 | 14.5 | 90 |
| ICTE-12C | 12.0 | 2 | 14.1 | 16.7 | 17.1 | 70 |
| ICTE-15C | 15.0 | 2 | 17.6 | 20.8 | 21.4 | 60 |
| ICTE-18C | 18.0 | 2 | 21.2 | 24.8 | 25.5 | 50 |
| ICTE-22C | 22.0 | 2 | 25.9 | 30.8 | 32.0 | 40 |
| ICTE-36C | 36.0 | 2 | 42.4 | 50.6 | 54.3 | 23 |
| ICTE-45C | 45.0 | 2 | 52.9 | 63.3 | 70.0 | 19 |

C Suffix indicates Bidirectional

NOTE 1: TVSs are normally selected according to the reverse "Stand Off Voltage" ($V_{WM}$) which should be equal to or greater than the dc or continuous peak operating voltage level.

* The minimum breakdown voltage as shown takes into consideration the ±1 volt tolerance normally specified for power supply regulation on most integrated circuit manufacturers data sheets. Similar devices are available with reduced clamping voltages where tighter regulated power supply voltages are employed.

## OUTLINE AND CIRCUIT

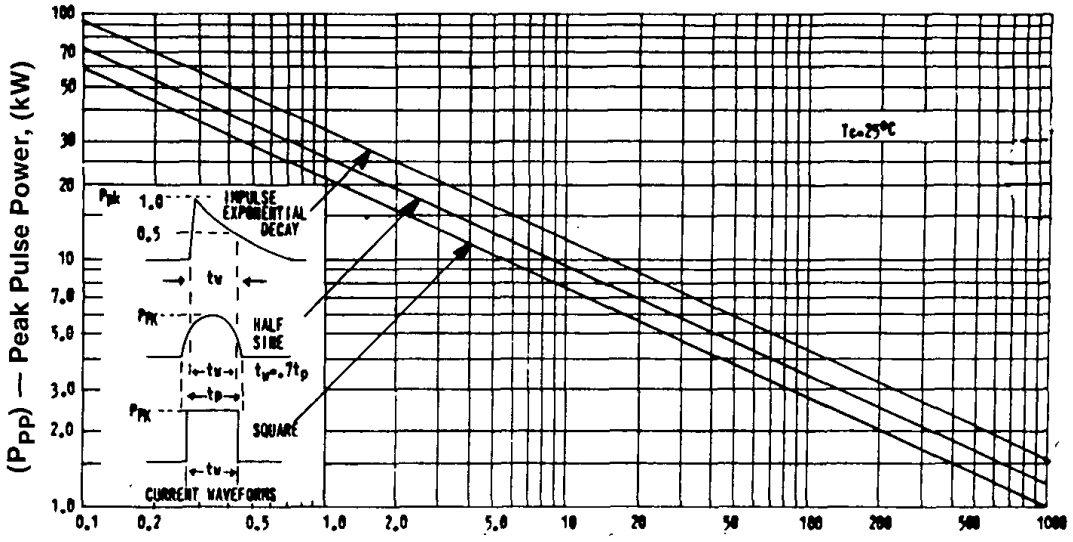



**FIGURE 1**
Peak Pulse Power vs. Pulse Time ($T_W$) in µs

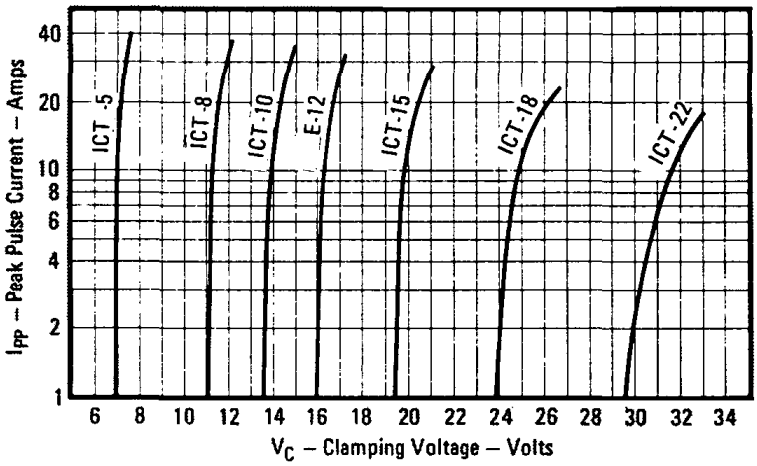



**FIGURE 2**
Typical Characteristic Clamping Voltage
vs. Peak Pulse Current

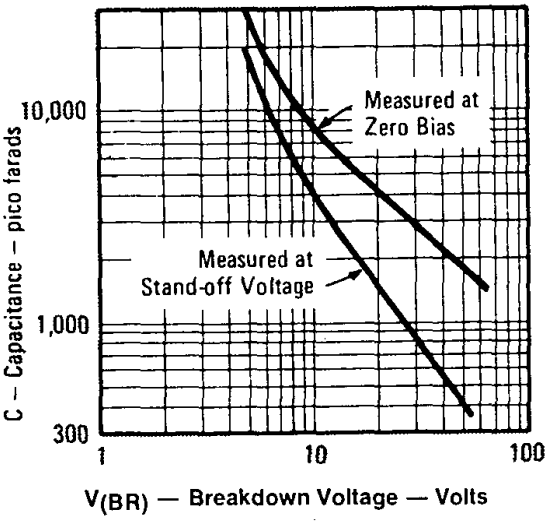



**FIGURE 3**
Typical Capacitance vs. Breakdown Voltage
(Unidirectional Types)

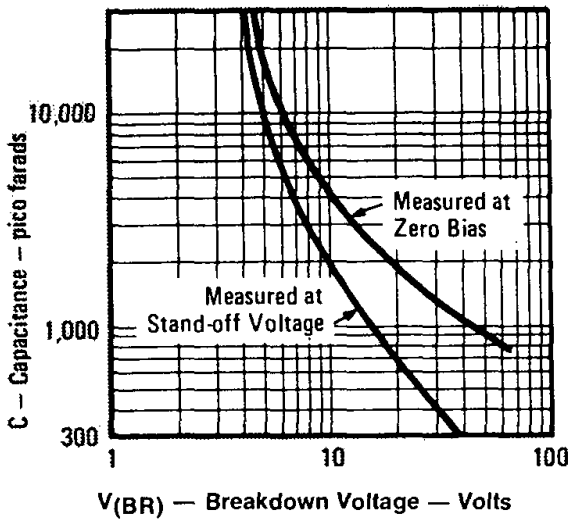
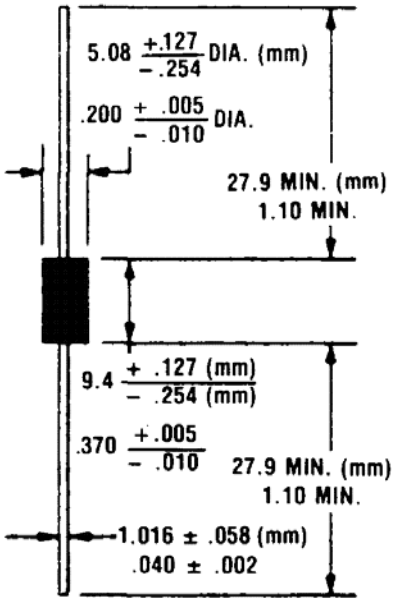



**FIGURE 4**
Typical Capacitance vs. Breakdown Voltage
(Bidirectional Types)

## PACKAGE DIMENSIONS




Dimensions in inches (mm)