

TELECOMMUNICATION SYSTEM SECONDARY PROTECTION

- **Ion-Implanted Breakdown Region**
Precise and Stable Voltage
Low Voltage Overshoot under Surge

| DEVICE | V _(Z) V | V _(BO) V |
|--------|-----------------------|------------------------|
| 4180 | 145 | 180 |

- **Planar Passivated Junctions**
Low Off-State Current < 10 µA
- **Rated for International Surge Wave Shapes**

| WAVE SHAPE | STANDARD | I _{TSP} A |
|------------|------------------|-----------------------|
| 8/20 µs | ANSI C62.41 | 150 |
| 10/160 µs | FCC Part 68 | 60 |
| 10/560 µs | FCC Part 68 | 45 |
| 0.2/310 µs | RLM 88 | 38 |
| 10/700 µs | FTZ R12 | 50 |
| | VDE 0433 | 50 |
| | CCITT IX K17/K20 | 50 |
| 10/1000 µs | REA PE-60 | 50 |

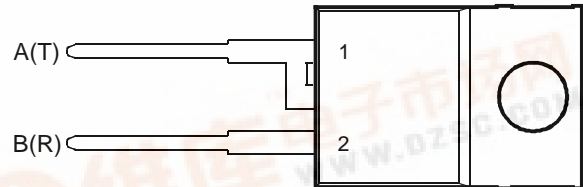
- **UL Recognized, E132482**

description

The TISP4180 is designed specifically for telephone equipment protection against lightning and transients induced by a.c. power lines. These devices consist of a bidirectional suppressor element connecting the A and B terminals. They will suppress inter-wire voltage transients.

Transients are initially clipped by zener action until the voltage rises to the breakover level, which causes the device to crowbar. The high crowbar holding current prevents d.c. latchup as the transient subsides.

DO-220 PACKAGE
(TOP VIEW)



Pin 1 is in electrical contact with the mounting base.

MD4XAB

device symbol



These monolithic protection devices are fabricated in ion-implanted planar structures to ensure precise and matched breakover control and are virtually transparent to the system in normal operation.



TISP4180

SYMMETRICAL TRANSIENT VOLTAGE SUPPRESSORS

APRIL 1987 - REVISED SEPTEMBER 1997

absolute maximum ratings at 25°C case temperature (unless otherwise noted)

| RATING | SYMBOL | VALUE | UNIT |
|--|------------|-------------|------------|
| Non-repetitive peak on-state pulse current (see Notes 1, 2 and 3) | I_{TSP} | 150 | A |
| 8/20 μ s (ANSI C62.41, open-circuit voltage wave shape 1.2/50 μ s) | | 60 | |
| 10/160 μ s (FCC Part 68, open-circuit voltage wave shape 10/160 μ s) | | 50 | |
| 5/200 μ s (VDE 0433, open-circuit voltage wave shape 2 kV, 10/700 μ s) | | 38 | |
| 0.2/310 μ s (RLM 88, open-circuit voltage wave shape 1.5 kV, 0.5/700 μ s) | | 50 | |
| 5/310 μ s (CCITT IX K17/K20, open-circuit voltage wave shape 2 kV, 10/700 μ s) | | 50 | |
| 5/310 μ s (FTZ R12, open-circuit voltage wave shape 2 kV, 10/700 μ s) | | 45 | |
| 10/560 μ s (FCC Part 68, open-circuit voltage wave shape 10/560 μ s) | | 50 | |
| 10/1000 μ s (REA PE-60, open-circuit voltage wave shape 10/1000 μ s) | | | |
| Non-repetitive peak on-state current, 50 Hz, 2.5 s (see Notes 1 and 2) | I_{TSM} | 10 | A rms |
| Initial rate of rise of on-state current, Linear current ramp, Maximum ramp value < 38 A | di_T/dt | 250 | A/ μ s |
| Junction temperature | T_J | 150 | °C |
| Operating free - air temperature range | | 0 to 70 | °C |
| Storage temperature range | T_{stg} | -40 to +150 | °C |
| Lead temperature 1.5 mm from case for 10 s | T_{lead} | 260 | °C |

- NOTES: 1. Above 70°C, derate linearly to zero at 150°C case temperature
 2. This value applies when the initial case temperature is at (or below) 70°C. The surge may be repeated after the device has returned to thermal equilibrium.
 3. Most PTT's quote an unloaded voltage waveform. In operation the TISP essentially shorts the generator output. The resulting loaded current waveform is specified.

electrical characteristics, $T_J = 25^\circ\text{C}$

| PARAMETER | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|---|---|------------|-----------|-----------|-------------|
| V_Z Reference zener voltage | $I_Z = \pm 1\text{mA}$ | ± 145 | | | V |
| α_{V_Z} Temperature coefficient of reference voltage | | | 0.1 | | %/°C |
| $V_{(BO)}$ Breakover voltage | (see Notes 4 and 5) | | | ± 180 | V |
| $I_{(BO)}$ Breakover current | (see Note 4) | ± 0.15 | | ± 0.6 | A |
| V_{TM} Peak on-state voltage | $I_T = \pm 5\text{A}$ (see Notes 4 and 5) | | ± 2.2 | ± 3 | V |
| I_H Holding current | (see Note 4) | ± 150 | | | mA |
| dv/dt Critical rate of rise of off-state voltage | (see Note 6) | | | ± 5 | kV/ μ s |
| I_D Off-state leakage current | $V_D = \pm 50\text{V}$ | | | ± 10 | μ A |
| C_{off} Off-state capacitance | $V_D = 0$ $f = 1\text{kHz}$ | | 110 | 200 | pF |

- NOTES: 4. These parameters must be measured using pulse techniques, $t_w = 100\ \mu\text{s}$, duty cycle $\leq 2\%$.
 5. These parameters are measured with voltage sensing contacts separate from the current carrying contacts located within 3.2 mm (0.125 inch) from the device body.
 6. Linear rate of rise, maximum voltage limited to 80 % V_Z (minimum).

thermal characteristics

| PARAMETER | MIN | TYP | MAX | UNIT |
|---|-----|-----|------|------|
| $R_{\theta JA}$ Junction to free air thermal resistance | | | 62.5 | °C/W |

PARAMETER MEASUREMENT INFORMATION

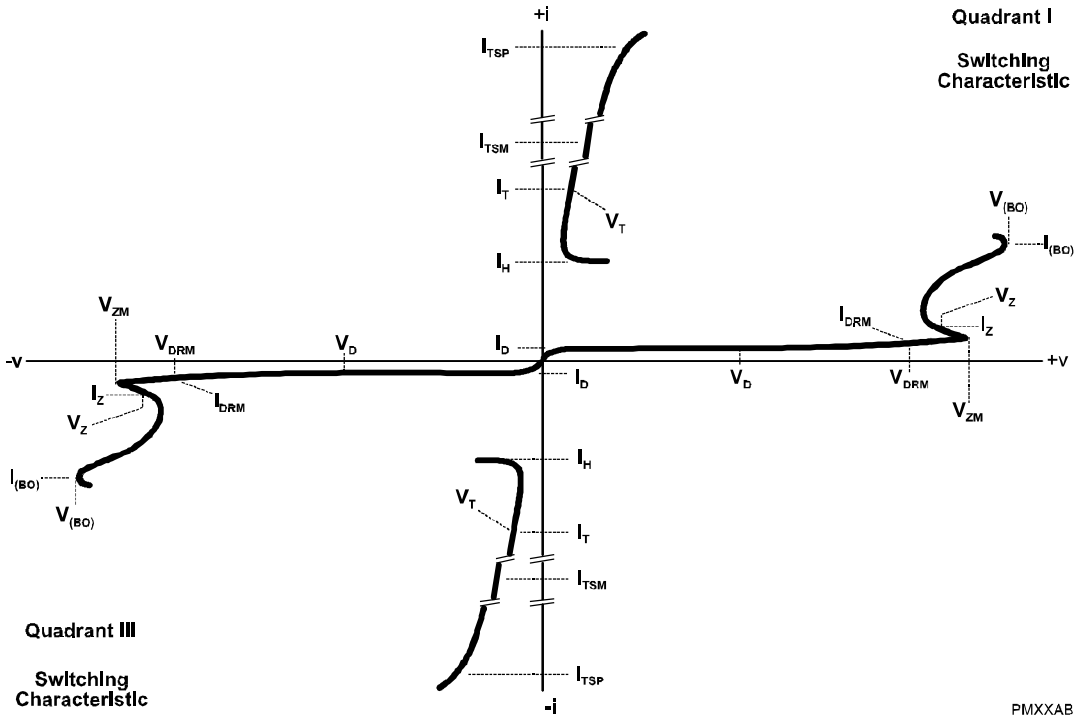
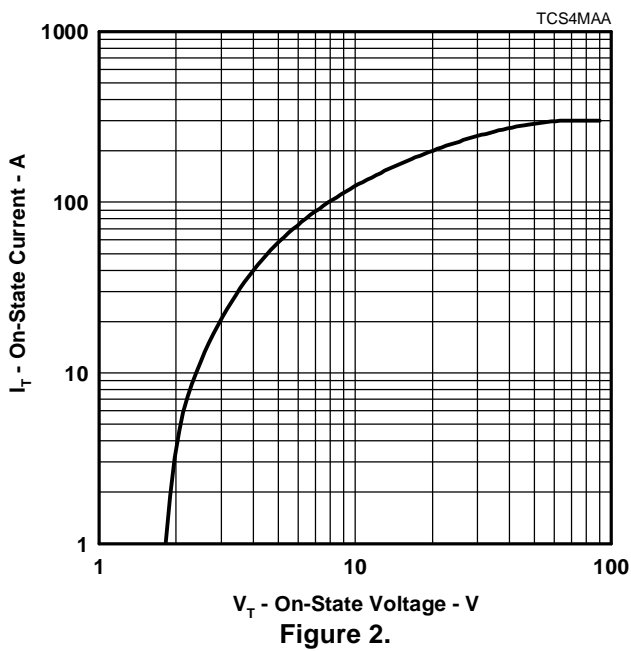


Figure 1. VOLTAGE-CURRENT CHARACTERISTIC FOR TERMINALS A and B

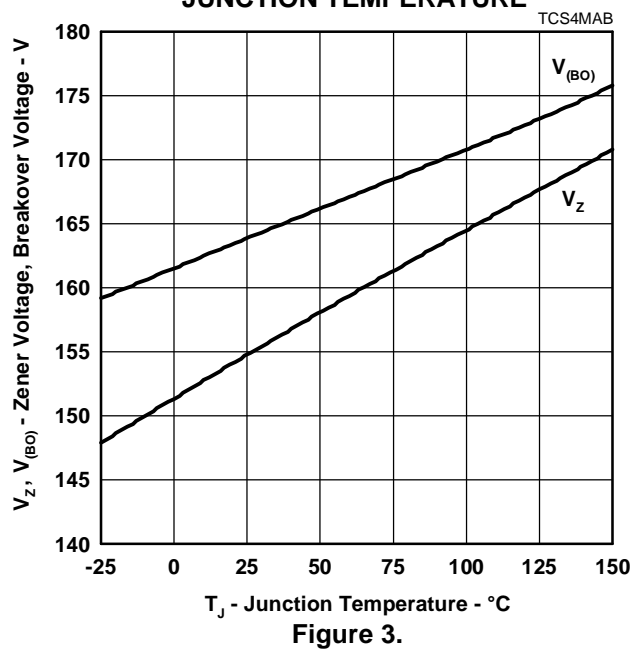
PMXXAB

TYPICAL CHARACTERISTICS
 A and B terminals

ON-STATE CURRENT
 vs
 ON-STATE VOLTAGE



ZENER VOLTAGE & BREAKOVER VOLTAGE
 vs
 JUNCTION TEMPERATURE



TYPICAL CHARACTERISTICS
 A and B terminals

HOLDING CURRENT & BREAKOVER CURRENT
 vs

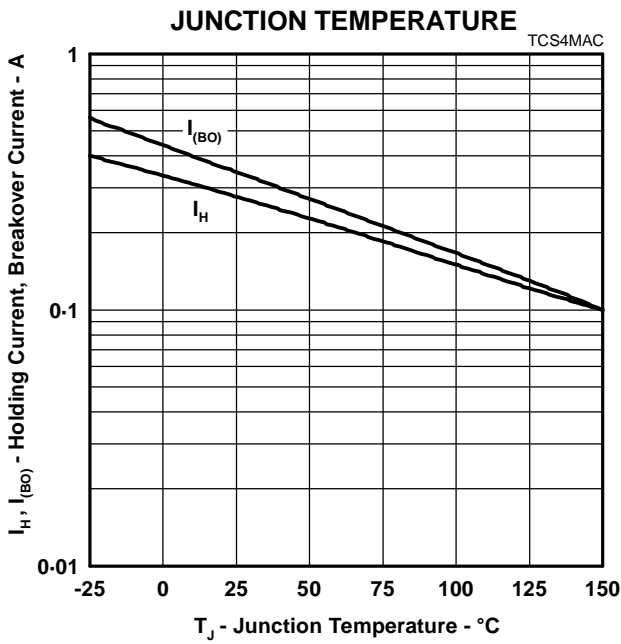


Figure 4.

OFF-STATE CURRENT
 vs

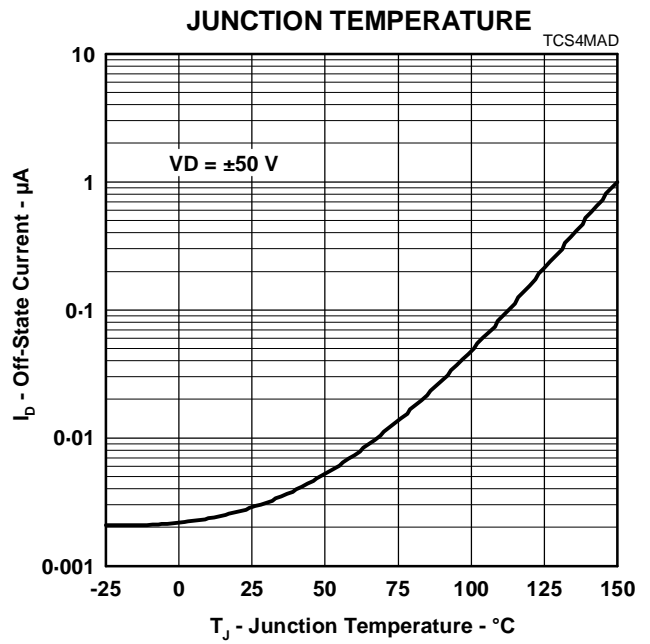


Figure 5.

ON-STATE VOLTAGE
 vs

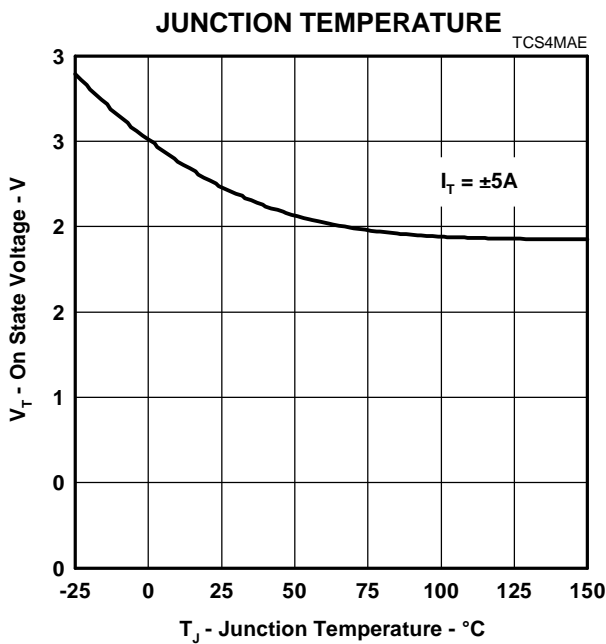


Figure 6.

NORMALISED BREAKOVER VOLTAGE
 vs

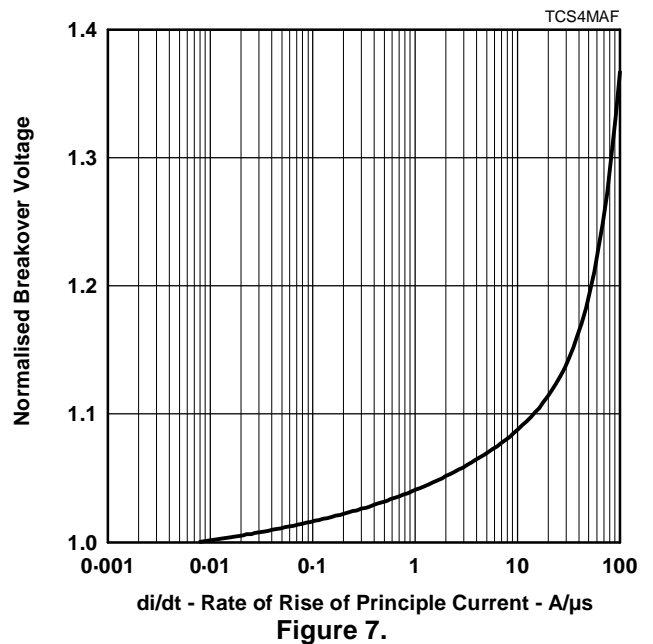
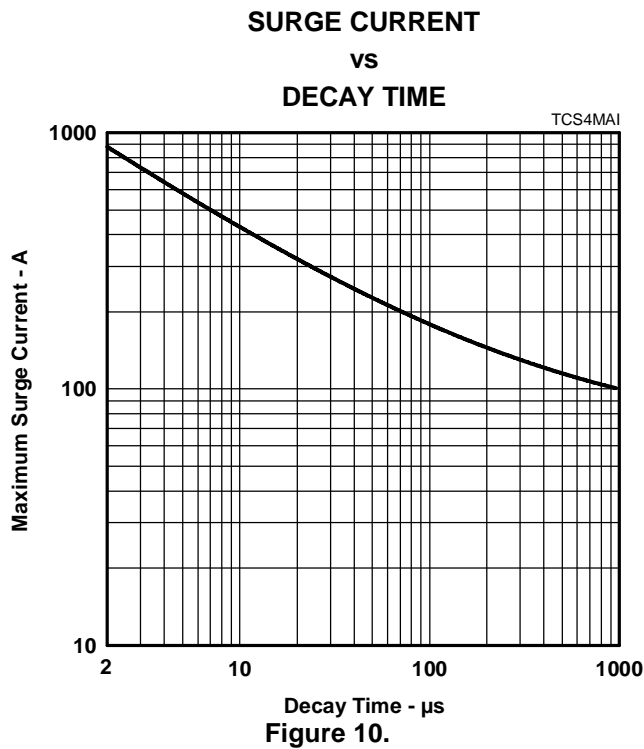
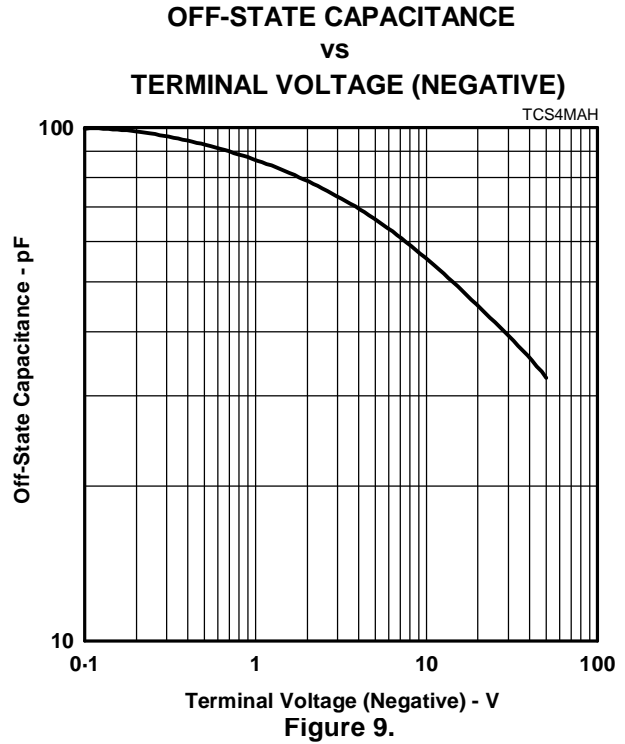
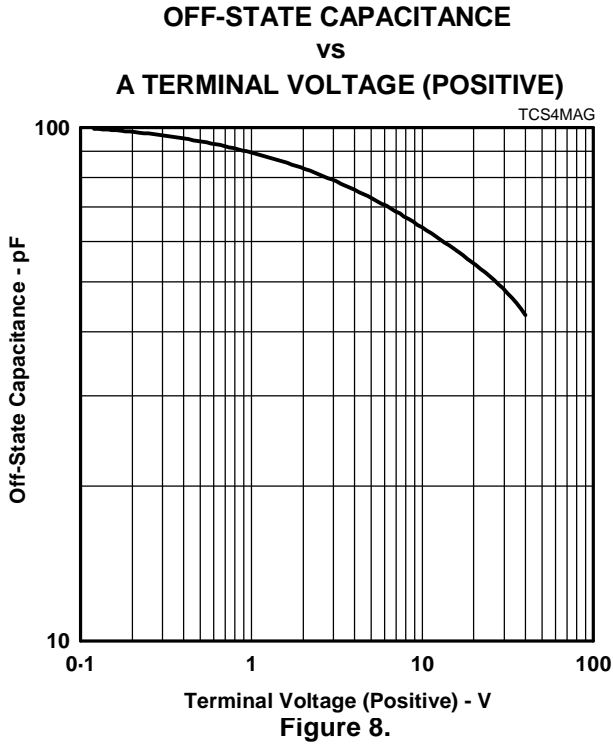


Figure 7.

TYPICAL CHARACTERISTICS
 A and B terminals



THERMAL INFORMATION

THERMAL RESPONSE

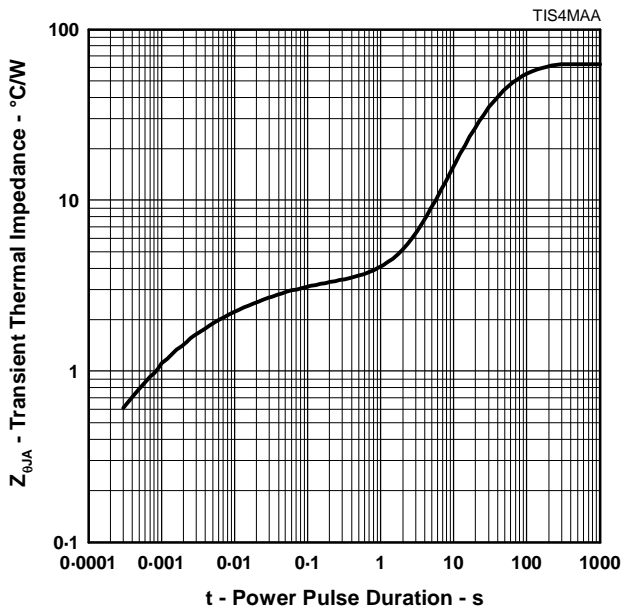


Figure 11.

MAXIMUM NON-RECURRENT 50 Hz CURRENT
 VS
 CURRENT DURATION

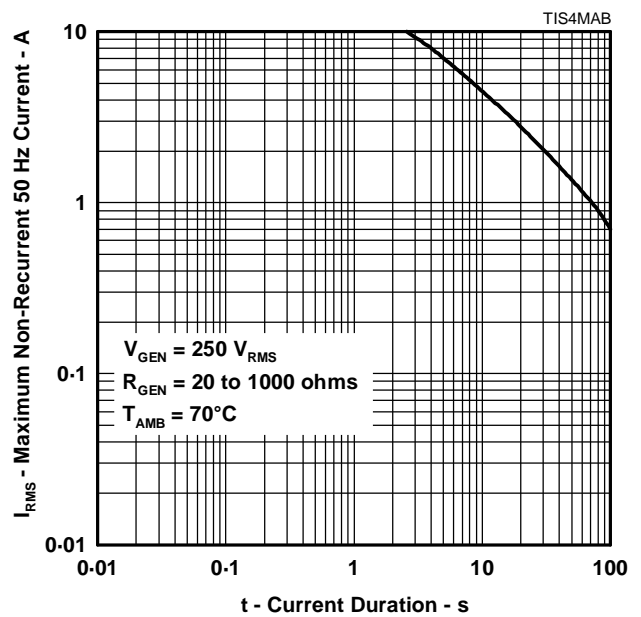


Figure 12.

FREE AIR TEMPERATURE

DERATING CURVE

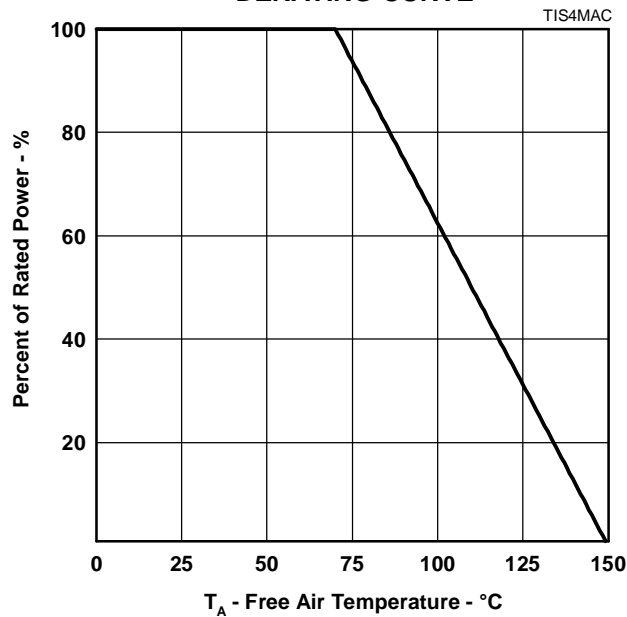


Figure 13.

TISP4180
SYMMETRICAL TRANSIENT
VOLTAGE SUPPRESSORS

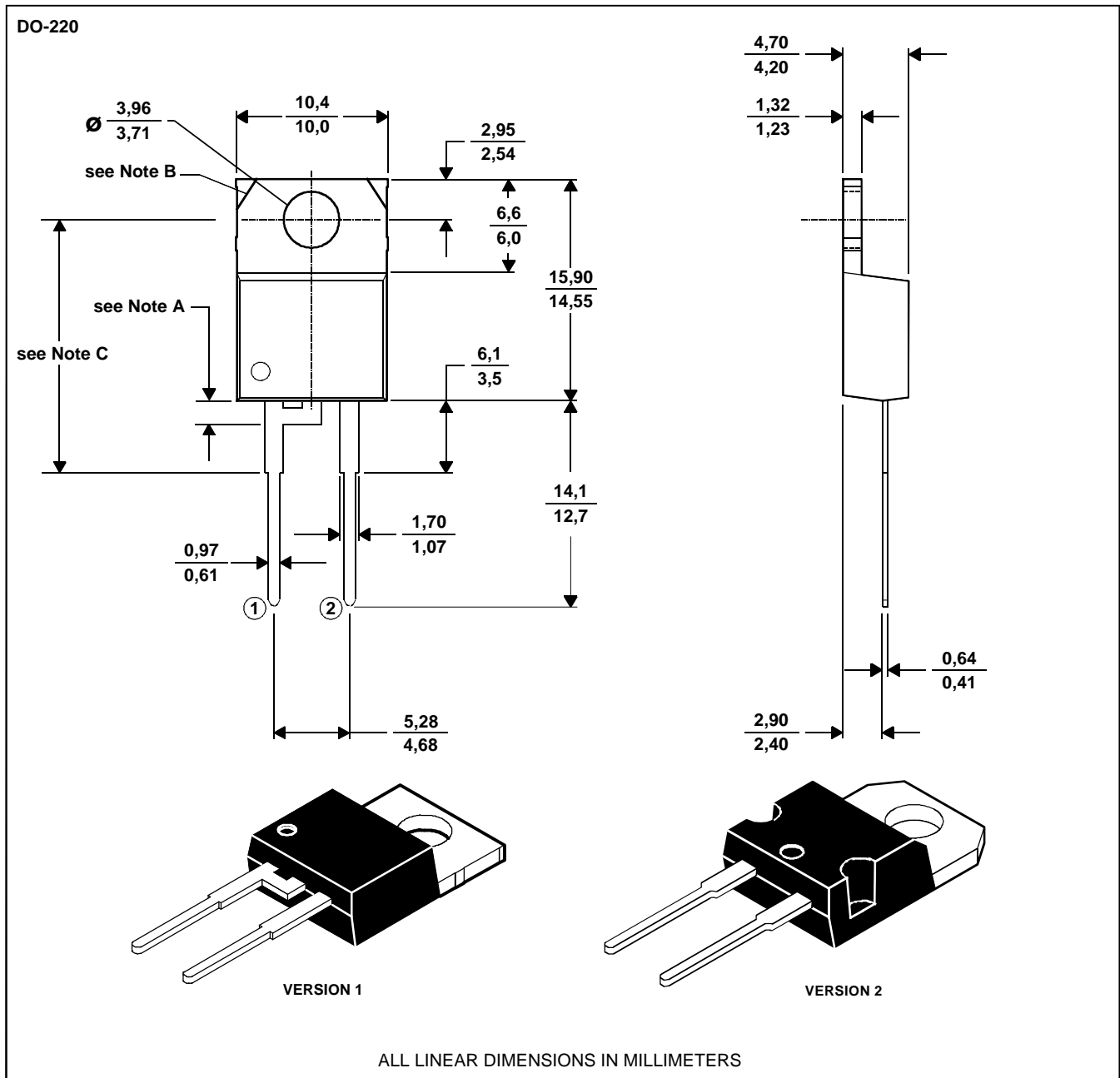
APRIL 1987 - REVISED SEPTEMBER 1997

MECHANICAL DATA

DO-220

2-pin plastic flange-mount package

This single-in-line package consists of a circuit mounted on a lead frame and encapsulated within a plastic compound. The compound will withstand soldering temperature with no deformation, and circuit performance characteristics will remain stable when operated in high humidity conditions. Leads require no additional cleaning or processing when used in soldered assembly.



- NOTES: A. Tie bar short stand off height according to package version.
 Version 1, pin 1 is in electrical contact with the mounting tab via tie bar short - stand off height : 2,0 mm maximum.
 Version 2, pin 1 is in electrical contact with the mounting tab (no external tie bar short).
 B. Mounting tab corner profile according to package version.
 C. Typical fixing hole centre stand off height according to package version.
 Version 1, 18,0 mm. Version 2, 17,6 mm.

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