TISP229A
DUAL SYMMETRICAL TRANSIENT VOLTAGE SUPPRESSOR

D2929, MARCH 1986

FOR APPLICATIONS IN TELECOMMUNICATIONS EQUIPMENT

- **Breakover Voltage to Common . . . 290 V Max**
- **Surge Current 8/20 μs . . . 150 A**
- **Holding Current . . . 150 mA Min**

description

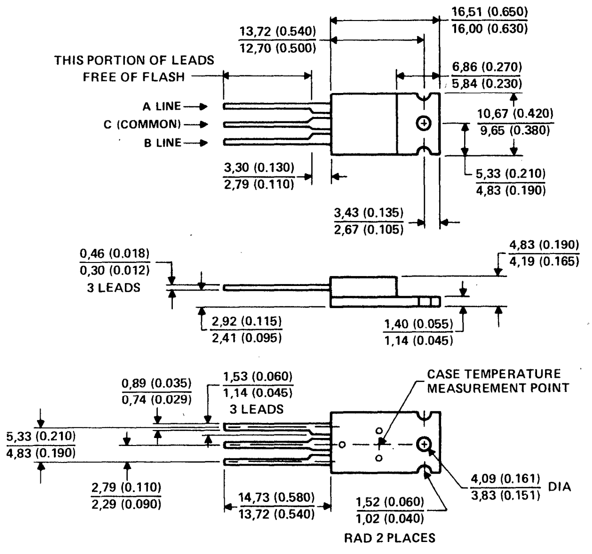
The TISP229A is designed specifically for telephone line card protection against lightning and transients, induced by ac lines when A and B are connected to the TIP and RING circuits. These devices consist of three bidirectional suppressor sections that will suppress voltage transients between terminals A and C, B and C, and A and B.

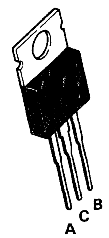
Transients are initially clipped by zener action until the voltage rises to the breakover level, which causes the device to crowbar. The high crowbar holding current prevents dc latchup as the transient subsides.

These monolithic protection devices are fabricated in ion-implanted planar structures to ensure precise and symmetrical breakover control.

mechanical data

THE COMMON PIN IS IN ELECTRICAL CONTACT WITH THE MOUNTING PAD





ALL DIMENSIONS ARE IN MILLIMETERS AND PARENTHETICALLY IN INCHES

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

Nonrepetitive peak on-state pulse current 8/20 μs (see Notes 1, 2, and 3)	150 A
Nonrepetitive peak on-state current, t_W = 10 μs, half sine-wave (see Notes 2 and 3)	15 A
Rate of rise of on-state current	100 A/μs
Operating junction temperature	110°C
Operating case temperature range	−10°C to 85°C
Storage temperature range	−40°C to 125°C
Lead temperature 1,6 mm (1/16 inch) from case for 10 seconds	230°C

NOTES: 1. The notation "8/20 μs" refers to a waveshape having a rise time of 8 μs and a duration of 20 μs ending at 50% of the peak value (see ANSI Standard C62.1).
2. Above 85°C, derate linearly to zero at 110°C case temperature.
3. This value applies when the case temperature is at (or below) 85°C. The surge may be repeated after the device has returned to thermal equilibrium.

electrical characteristics for the A and B terminals†, T_J = 25°C

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
V_Z	Reference voltage	I_Z = ±1 mA	±200			V
I_D	Off-state current	V_D = ±50 V			±500	μA
C_{off}	Off-state capacitance	V_D = 0, f = 1 kHz, See Note 4		40	100	pF

electrical characteristics for the A and C or the B and C terminals†, T_J = 25°C

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
V_Z	Reference voltage	I_Z = ±1 mA	±200			V
α_{VZ}	Temperature coefficient of reference voltage				0.1	%/°C
$V_{(BO)}$	Breakover voltage	See Note 5			±290	V
$I_{(BO)}$	Breakover current	See Note 5	±0.15		±1.3	A
V_T	On-state voltage	I_T = ±5 A, See Note 5		±2.2	±3	V
I_H	Holding current	See Note 5	±150			mA
dv/dt	Critical rate of rise of off-state voltage				5	kV/μs
I_D	Off-state current	V_D = ±50 V			±500	μA
C_{off}	Off-state capacitance	V_D = 0, f = 1 kHz, See Note 4		110	200	pF

†Polarity may be determined arbitrarily.

NOTES: 4. These capacitance measurements employ a three-terminal capacitance bridge incorporating a guard circuit. The third terminal and the mounting tab are connected to the guard terminal of the bridge.
5. These parameters must be measured using pulse techniques, t_W = 100 μs, duty cycle ≤ 2%.

thermal characteristics

PARAMETER		MIN	TYP	MAX	UNIT
$R_{\theta JC}$	Junction-to-case thermal resistance			3.5	°C/W
$R_{\theta JA}$	Junction-to-free-air thermal resistance			62.5	°C/W

PARAMETER MEASUREMENT INFORMATION

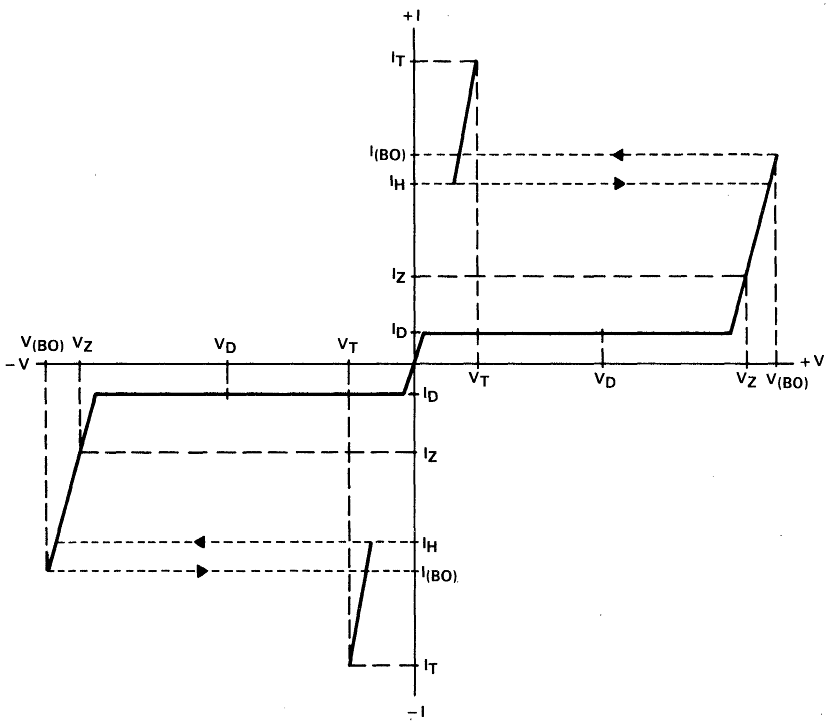

FIGURE 1. VOLTAGE-CURRENT CHARACTERISTICS FOR ANY PAIR OF TERMINALS†

†Polarity may be determined arbitrarily.

TYPICAL APPLICATION DATA

The breakover voltage represents the highest level of stress applied to the system being protected by the suppressor. With an increase in ambient temperature, the reference voltage (the level at which transient voltage clipping just begins) increases at typically 0.09%/°C. Breakover current, however, decreases at typically −0.06%/°C, but operating along the reference resistance line reduces its effect. The net result is that the breakover voltage level is only slightly dependent on ambient temperature.

D-C lockup: The suppressor will remain in a crowbar condition as long as the line can supply a short-circuit current greater than the holding current, I_H. To prevent this from happening, the following conditions must be obtained.:

$$\frac{V_{battery}}{R_{line}} < I_H$$

Continuous operation: Line short-circuits to external power supplies can result in overdissipation of the suppressor. Conventional protection techniques such as the use of fuses or PTC thermistors should be used to eliminate or reduce the fault current.

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