#### TELECOMMUNICATION SYSTEM SECONDARY PROTECTION

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

DEVICE	V <sub>(Z)</sub>	V <sub>(BO)</sub>		
DEVICE	٧	V		
'2290L	200	290		

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

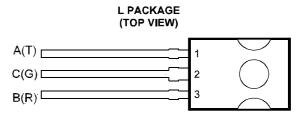
WAVE SHAPE	STANDARD	I <sub>TSP</sub> A
8/20 µs	ANSI C62.41	150
10/160 µs	FCC Part 68	60
10/560 µs	FCC Part 68	45
0.2/310 µs	RLM 88	38
	FTZ R12	50
10/700 μs	VDE 0433	50
	CCITT IX K17/K20	50
10/1000 μs	REA PE-60	50

#### UL Recognized, E132482

#### description

The TISP2290L is designed specifically for telephone equipment protection against lightning and transients induced by a.c. power lines. These devices will supress voltage transients between terminals A and C, B and C, and A and B.

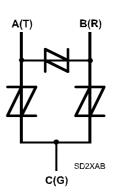
Transients are initially clipped by zener action until the voltage rises to the breakover level, which causes the device to crowbar. The high crowbar holding current prevents d.c. latchup as the transient subsides.



Pin 2 is in electrical contact with the mounting base.

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## 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.



# TISP2290L DUAL SYMMETRICAL TRANSIENT VOLTAGE SUPPRESSORS

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# 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)			
8/20 μs (ANSI C62.41, open-circuit voltage wave shape 1.2/50 μs)		150	
10/160 μs (FCC Part 68, open-circuit voltage wave shape 10/160 μs)		60	
5/200 μs (VDE 0433, open-circuit voltage wave shape 2 kV, 10/700 μs)		50	
0.2/310 µs (RLM 88, open-circuit voltage wave shape 1.5 kV, 0.5/700 µs)	I <sub>TSP</sub>	38	Α
5/310 μs (CCITT IX K17/K20, open-circuit voltage wave shape 2 kV, 10/700 μs)		50	
5/310 μs (FTZ R12, open-circuit voltage wave shape 2 kV, 10/700 μs)		50	
10/560 μs (FCC Part 68, open-circuit voltage wave shape 10/560 μs)		45	
10/1000 μs (REA PE-60, open-circuit voltage wave shape 10/1000 μs)		50	
Non-repetitive peak on-state current, 50 Hz, 0.7 s (see Notes 1 and 2)	I <sub>TSM</sub>	10	A rms
Initial rate of rise of on-state current, Linear current ramp, Maximum ramp value < 38 A	di <sub>T</sub> /dt	250	A/µs
Junction temperature	T <sub>J</sub>	150	°C
Operating free - air temperature range		0 to 70	°C
Storage temperature range	T <sub>stg</sub>	-40 to +150	°C
Lead temperature 1.5 mm from case for 10 s	T <sub>lead</sub>	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 for the A and B terminals, $T_J = 25$ °C

	PARAMETER		TEST CONDITI	ONS	MIN	TYP	MAX	UNIT
V <sub>7</sub>	Reference zener	$I_7 = \pm 1 \text{mA}$			± 200			V
٧Z	voltage	IZ = ± IIIIA			± 200			V
	Off-state leakage	V <sub>D</sub> = ± 50 V	V -+50 V				± 10	μΑ
I D	current	V <sub>D</sub> = ± 50 V					± 10	μΑ
C <sub>off</sub>	Off-state capacitance	$V_D = 0$	f = 1 kHz	(see Note 4)		40	100	pF

NOTE 4: These capacitance measurements employ a three terminal capacitance bridge incorporating a guard circuit. The third terminal is connected to the guard terminal of the bridge.

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

	PARAMETER		TEST CONDITIONS		MIN	TYP	MAX	UNIT
Vz	Reference zener	$I_Z = \pm 1 \text{mA}$			± 200			V
٧Z	voltage	IZ = T IIIIM			1 200			V
∝V <sub>Z</sub>	Temperature coefficient					0.1		%/°C
٧Z	of reference voltage					0.1		70/ C
V <sub>(BO)</sub>	Breakover voltage	(see Notes 5 and 6)					± 290	V
I <sub>(BO)</sub>	Breakover current	(see Note 5)			± 0.15		± 0.6	Α
$V_{TM}$	Peak on-state voltage	I <sub>T</sub> = ± 5 A	(see Notes 5 and 6)			± 1.9	± 3	V
I <sub>H</sub>	Holding current	(see Note 5)			± 150			mA
dv/dt	Critical rate of rise of	(see Note 7)					± 5	kV/μs
uv/ut	off-state voltage	(See Note 1)						κν/μδ
1_	Off-state leakage	V <sub>D</sub> = ± 50 V					± 10	μΑ
I <sub>D</sub>	current	ND = ∓ 20 A					10	μΑ
C <sub>off</sub>	Off-state capacitance	$V_D = 0$	f = 1 kHz	(see Note 4)		110	200	pF

NOTES: 5. These parameters must be measured using pulse techniques,  $t_w = 100 \mu s$ , duty cycle  $\leq 2\%$ .

- 6. These parameters are measured with voltage sensing contacts seperate from the current carrying contacts located within 3.2 mm (0.125 inch) from the device body.
- 7. Linear rate of rise, maximum voltage limited to 80 %  $V_Z$  (minimum)...

## PRODUCT INFORMATION

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## PARAMETER MEASUREMENT INFORMATION

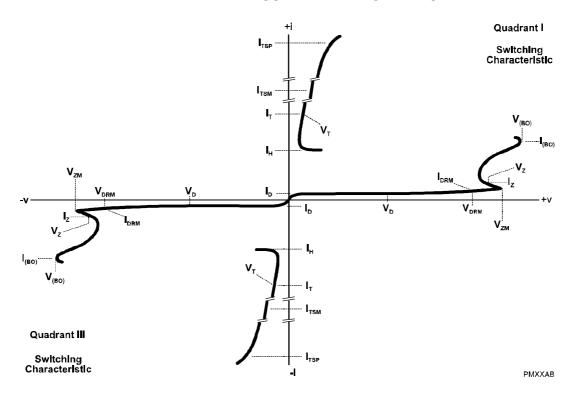


Figure 1. VOLTAGE-CURRENT CHARACTERISTIC FOR ANY PAIR OF TERMINALS

The high level characteristics for terminals A and B are not guaranteed.

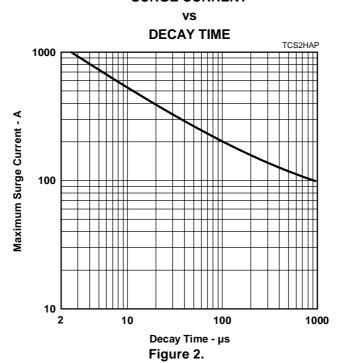
# thermal characteristics

Ī	PARAMETER	MIN	TYP	MAX	UNIT
	R <sub>θJA</sub> Junction to free air thermal resistance			100	°C/W



# TYPICAL CHARACTERISTICS A and C, or B and C terminals

## **SURGE CURRENT**

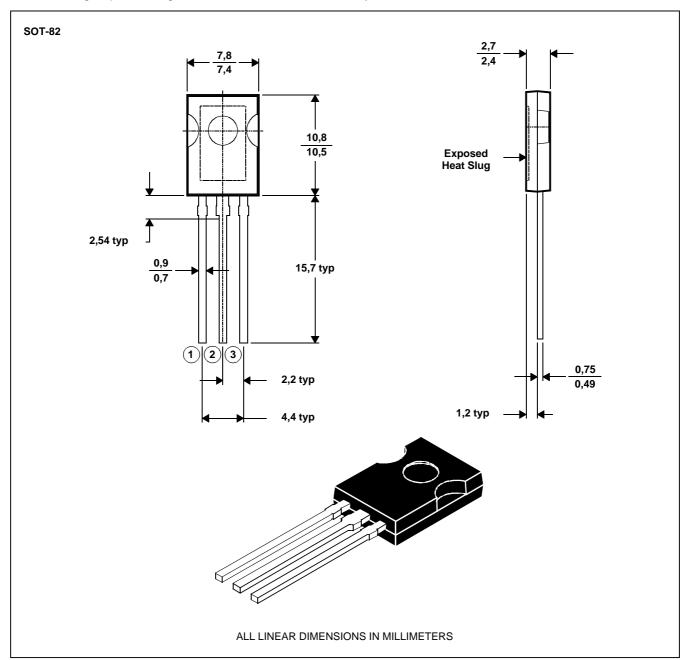


#### **MECHANICAL DATA**

#### **SOT-82**

## 3-pin plastic single-in-line 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.



NOTE A: The centre pin is in electrical contact with the heat slug.

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