

**TELECOMMUNICATION SYSTEM SECONDARY PROTECTION**

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

DEVICE	V <sub>(Z)</sub> V	V <sub>(BO)</sub> V
T1082	- 58	- 82

- **Planar Passivated Junctions**  
**Low Off-State Current < 10 µA**
- **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
10/700 µs	FTZ R12	50
	VDE 0433	50
	CCITT IX K17/K20	50
10/1000 µs	REA PE-60	50

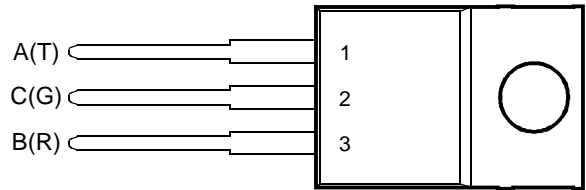
- **UL Recognized, E132482**

**description**

The TISP1082 is designed specifically for telephone line card protection against lightning and transients induced by a.c. power lines. These devices will suppress voltage transients between terminals A and C, B and C, and A and B.

Negative 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. Positive transients are clipped by diode action.

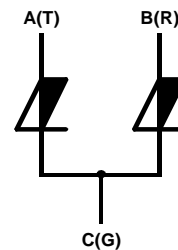
TO-220 PACKAGE  
(TOP VIEW)



Pin 2 is in electrical contact with the mounting base.

MDXXANA

**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.

**PRODUCT INFORMATION**

Information is current as of publication date. Products conform to specifications in accordance with the terms of Power Innovations standard warranty. Production processing does not necessarily include testing of all parameters.



# TISP1082

## DUAL ASYMMETRICAL TRANSIENT VOLTAGE SUPPRESSORS

NOVEMBER 1986 - 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 $\mu$ s (ANSI C62.41, open-circuit voltage wave shape 1.2/50 $\mu$ s)		60	
10/160 $\mu$ s (FCC Part 68, open-circuit voltage wave shape 10/160 $\mu$ s)		50	
5/200 $\mu$ s (VDE 0433, open-circuit voltage wave shape 2 kV, 10/700 $\mu$ s)		38	
0.2/310 $\mu$ s (RLM 88, open-circuit voltage wave shape 1.5 kV, 0.5/700 $\mu$ s)		50	
5/310 $\mu$ s (CCITT IX K17/K20, open-circuit voltage wave shape 2 kV, 10/700 $\mu$ s)		50	
5/310 $\mu$ s (FTZ R12, open-circuit voltage wave shape 2 kV, 10/700 $\mu$ s)		45	
10/560 $\mu$ s (FCC Part 68, open-circuit voltage wave shape 10/560 $\mu$ s)		50	
10/1000 $\mu$ s (REA PE-60, open-circuit voltage wave shape 10/1000 $\mu$ 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/ $\mu$ 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 for the A and B terminals, $T_J = 25^\circ\text{C}$

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
$V_Z$ Reference zener voltage	$I_Z = \pm 1\text{mA}$	$\pm 58$			V
$I_D$ Off-state leakage current	$V_D = \pm 50\text{V}$			$\pm 10$	$\mu\text{A}$
$C_{off}$ Off-state capacitance	$V_D = 0$ f = 1 kHz (see Note 4)		1	5	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, $T_J = 25^\circ\text{C}$

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
$V_Z$ Reference zener voltage	$I_Z = -1\text{mA}$	- 58			V
$\alpha V_Z$ Temperature coefficient of reference voltage			0.1		%/°C
$V_{(BO)}$ Breakover voltage	(see Notes 5 and 6)			- 82	V
$I_{(BO)}$ Breakover current	(see Note 5)	- 0.15		- 0.6	A
$V_F$ Forward voltage	$I_F = 5\text{A}$ (see Notes 5 and 6)			3	V
$V_{TM}$ Peak on-state voltage	$I_T = -5\text{A}$ (see Notes 5 and 6)		- 2.2	- 3	V
$I_H$ Holding current	(see Note 5)	- 150			mA
$dv/dt$ Critical rate of rise of off-state voltage	(see Note 7)			- 5	kV/ $\mu$ s
$I_D$ Off-state leakage current	$V_D = -50\text{V}$			- 10	$\mu\text{A}$
$C_{off}$ Off-state capacitance	$V_D = 0$ f = 1 kHz (see Note 4)		300	500	pF

- NOTES: 5. These parameters must be measured using pulse techniques,  $t_w = 100\ \mu\text{s}$ , duty cycle  $\leq 2\%$ .  
 6. 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.  
 7. Linear rate of rise, maximum voltage limited to 80 %  $V_Z$  (minimum)..

## PRODUCT INFORMATION

PARAMETER MEASUREMENT INFORMATION

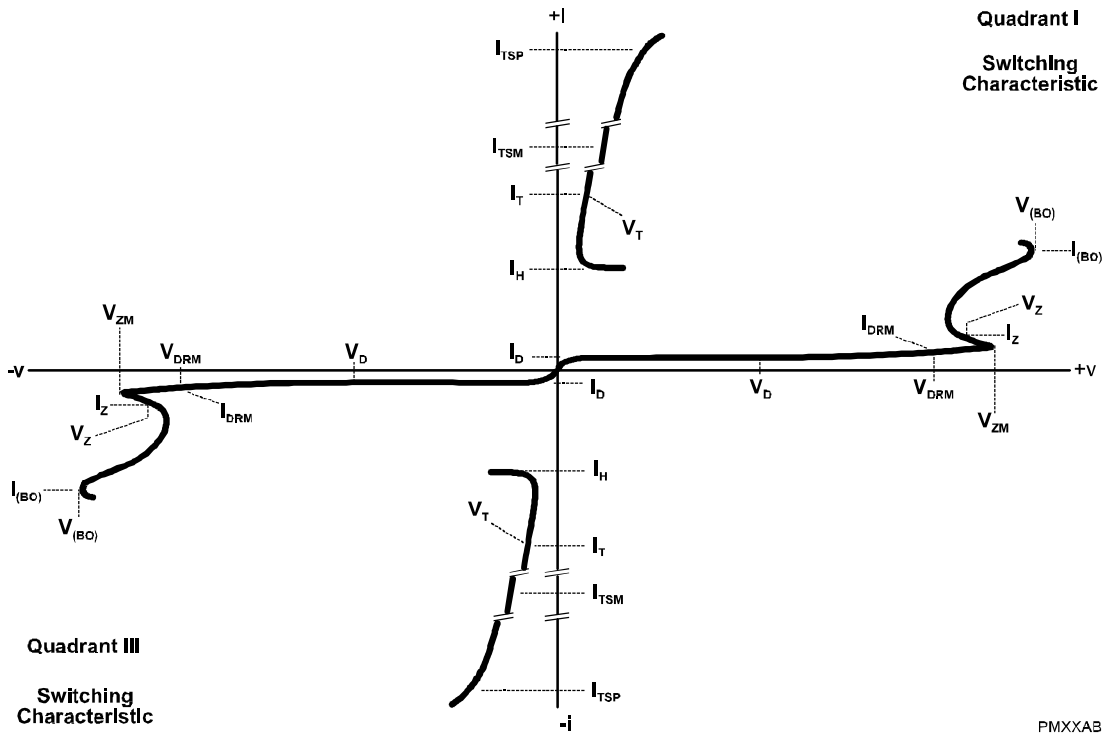


Figure 1. VOLTAGE-CURRENT CHARACTERISTIC FOR TERMINALS A AND B

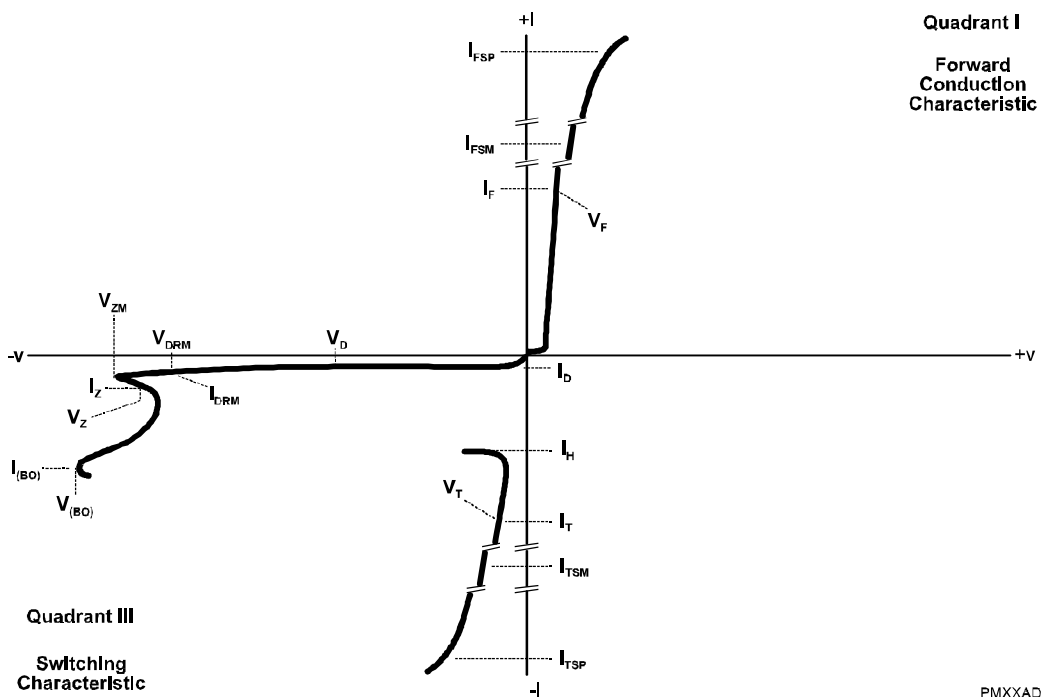


Figure 2. VOLTAGE-CURRENT CHARACTERISTIC FOR TERMINALS A AND C OR B AND C†

†Polarity is determined at terminal A or B with respect to C

**TISP1082**  
**DUAL ASYMMETRICAL TRANSIENT**  
**VOLTAGE SUPPRESSORS**

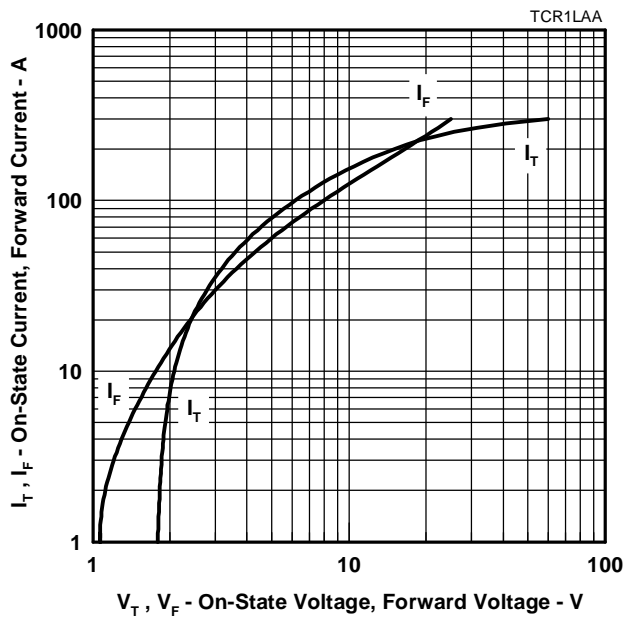
NOVEMBER 1986 - REVISED SEPTEMBER 1997

**thermal characteristics**

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

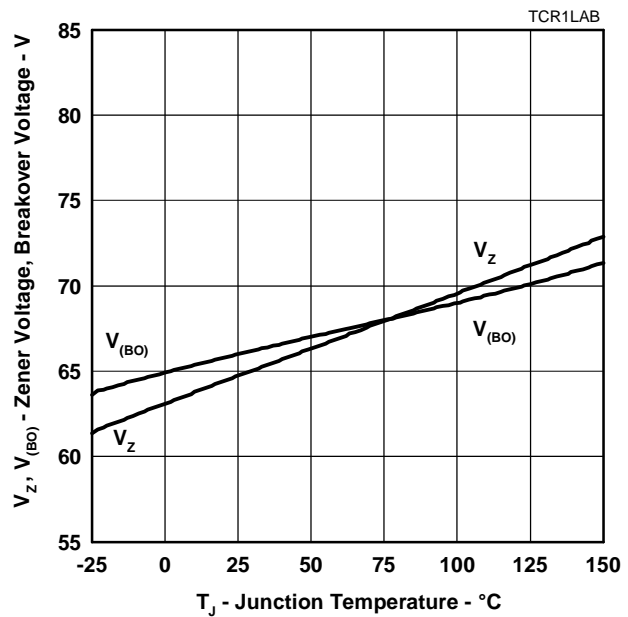
**TYPICAL CHARACTERISTICS**  
**A and C, or B and C terminals**

**ON-STATE AND FORWARD CURRENTS**  
**vs**  
**ON-STATE AND FORWARD VOLTAGES**



**Figure 3.**

**ZENER AND BREAKOVER VOLTAGE**  
**vs**  
**JUNCTION TEMPERATURE**



**Figure 4.**

TYPICAL CHARACTERISTICS  
 A and C, or B and C terminals

HOLDING CURRENT & BREAKOVER CURRENT  
 VS

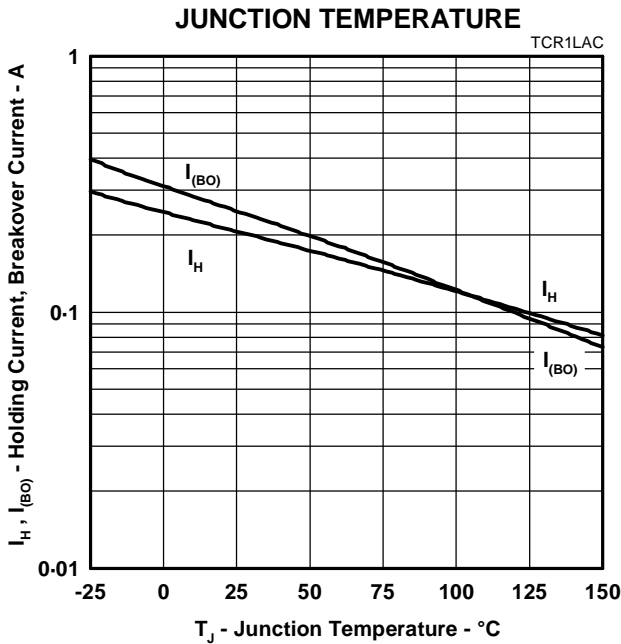


Figure 5.

OFF-STATE CURRENT  
 VS

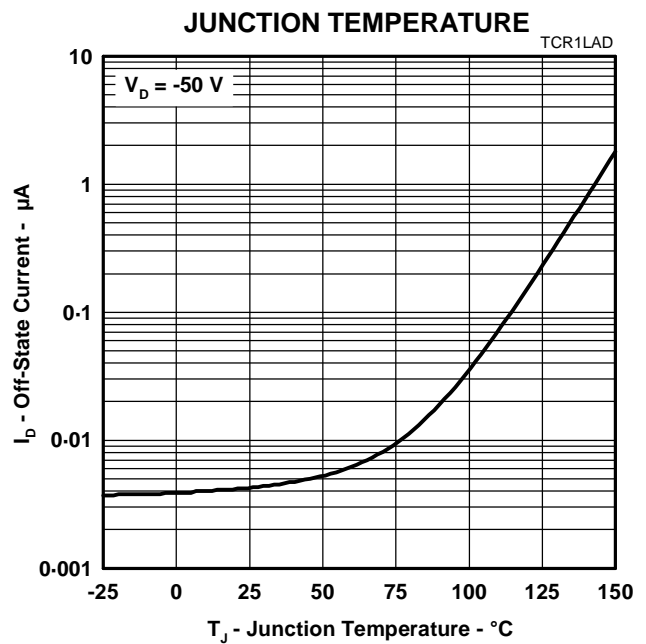


Figure 6.

ON-STATE VOLTAGE & FORWARD VOLTAGE  
 VS  
 JUNCTION TEMPERATURE

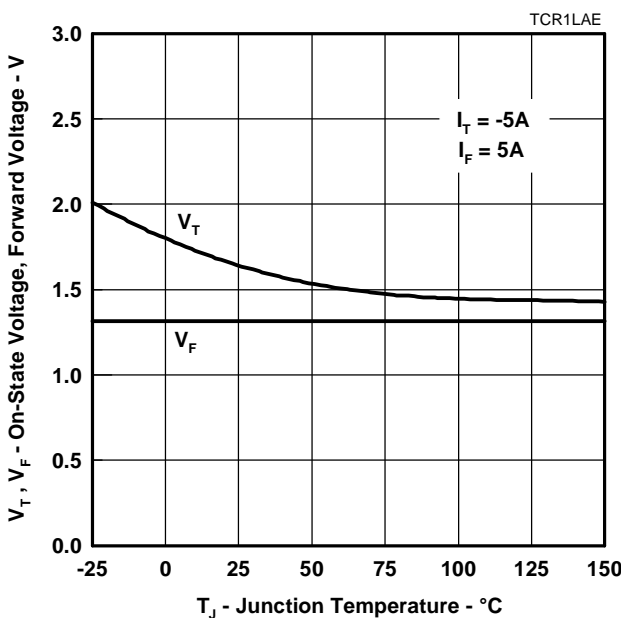


Figure 7.

NORMALISED BREAKOVER VOLTAGE  
 VS  
 RATE OF RISE OF PRINCIPLE CURRENT

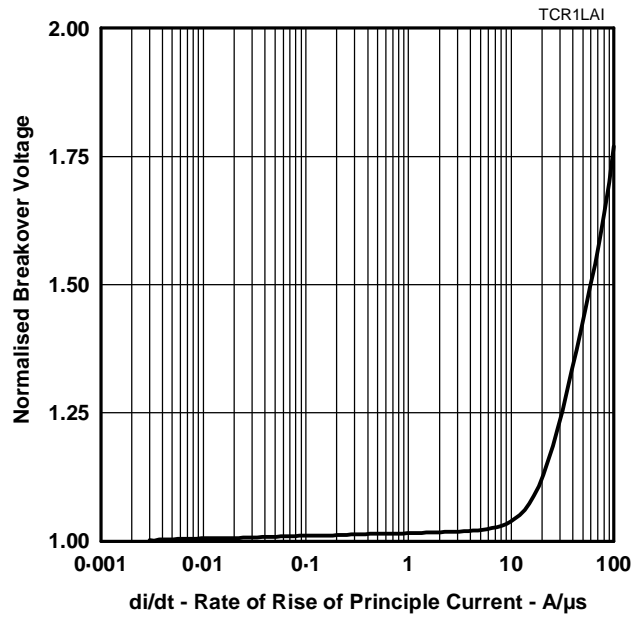


Figure 8.

**TISP1082  
DUAL ASYMMETRICAL TRANSIENT  
VOLTAGE SUPPRESSORS**

NOVEMBER 1986 - REVISED SEPTEMBER 1997

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

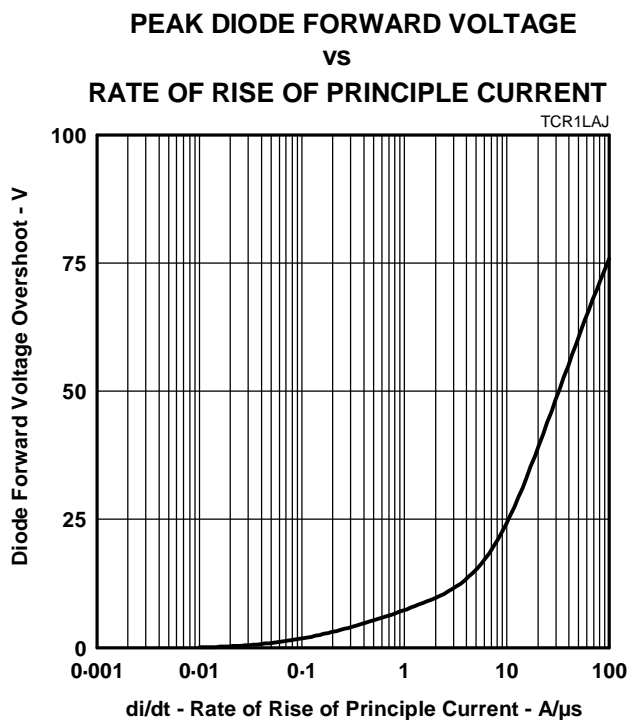


Figure 9.

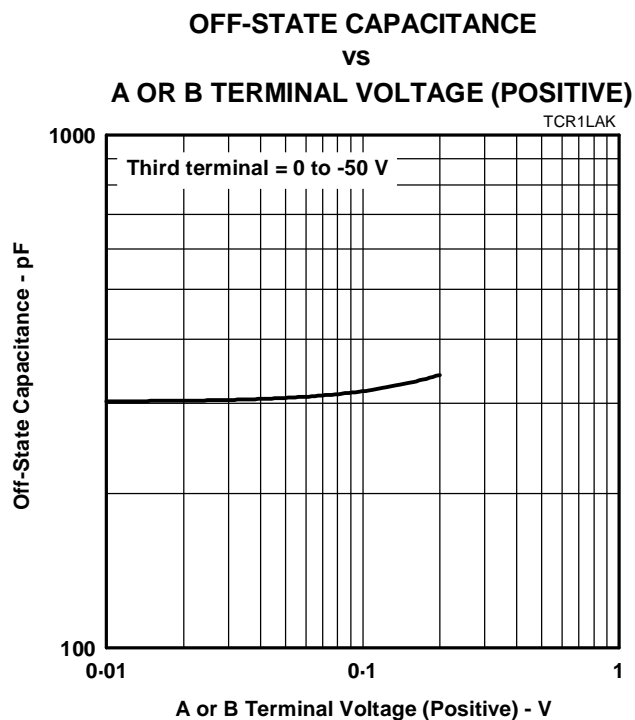


Figure 10.

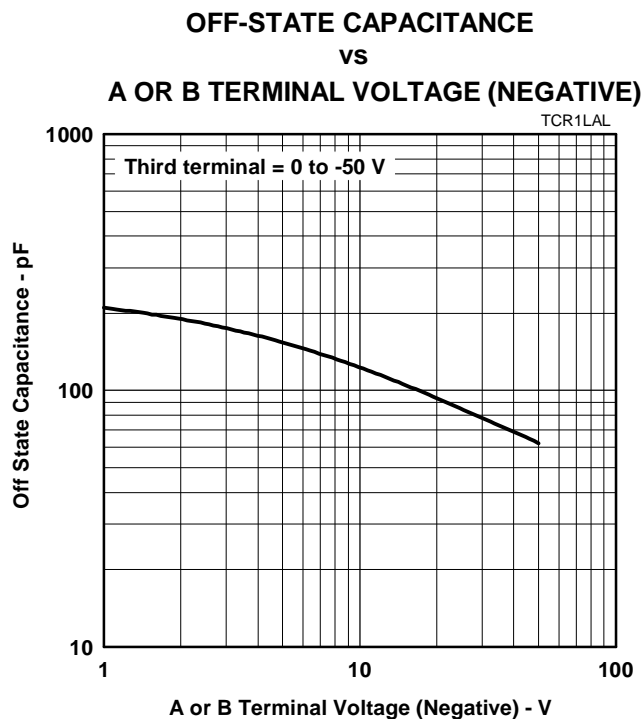


Figure 11.

TYPICAL CHARACTERISTICS  
 A and B terminals

ZENER VOLTAGE & BREAKOVER VOLTAGE

vs

JUNCTION TEMPERATURE

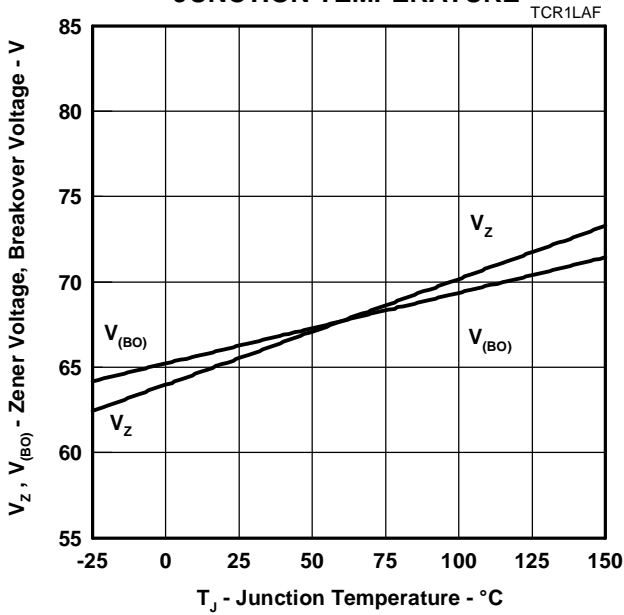


Figure 12.

HOLDING CURRENT & BREAKOVER CURRENT

vs

JUNCTION TEMPERATURE

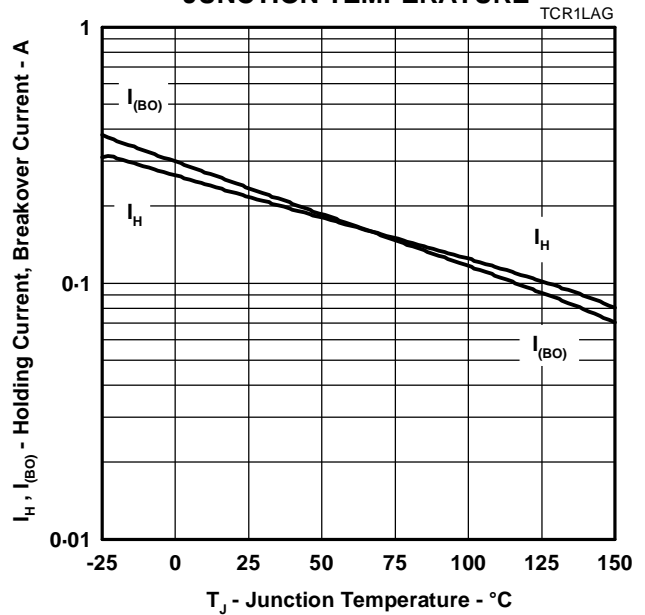


Figure 13.

OFF-STATE CURRENT  
 vs

JUNCTION TEMPERATURE

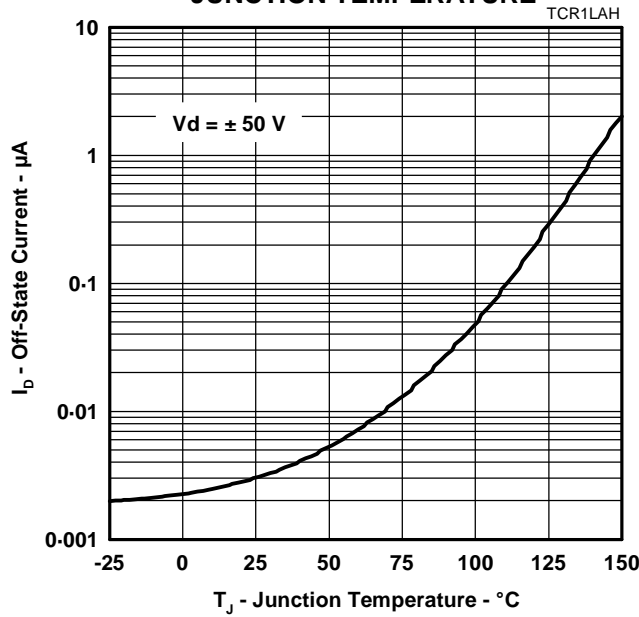


Figure 14.

**TISP1082  
DUAL ASYMMETRICAL TRANSIENT  
VOLTAGE SUPPRESSORS**

NOVEMBER 1986 - REVISED SEPTEMBER 1997

**TYPICAL CHARACTERISTICS  
A and B terminals**

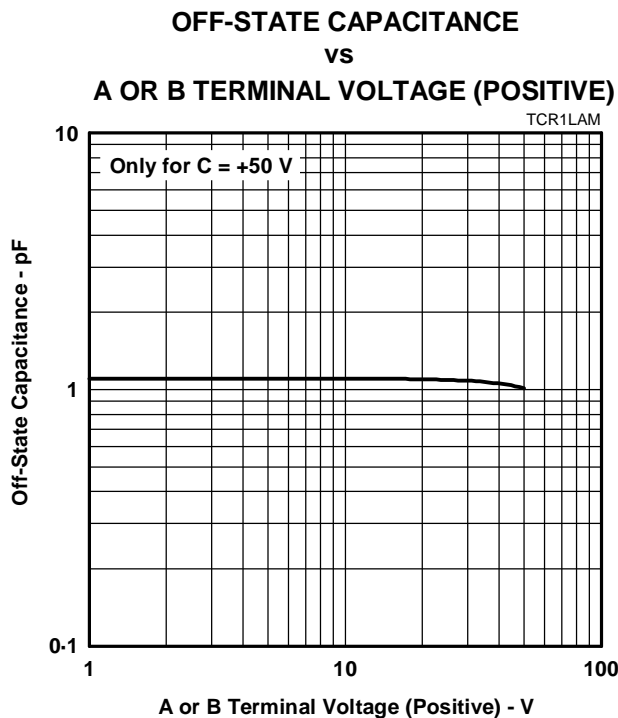


Figure 15.

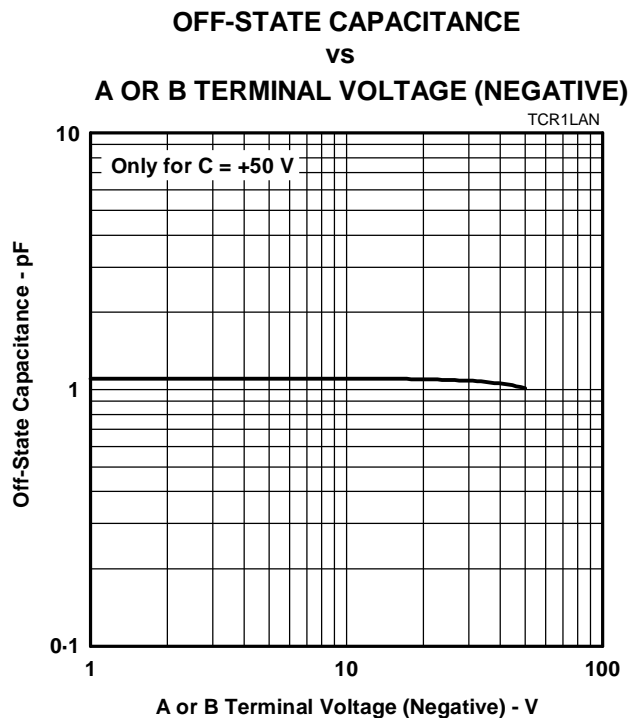


Figure 16.

**SURGE CURRENT  
vs  
DECAY TIME**

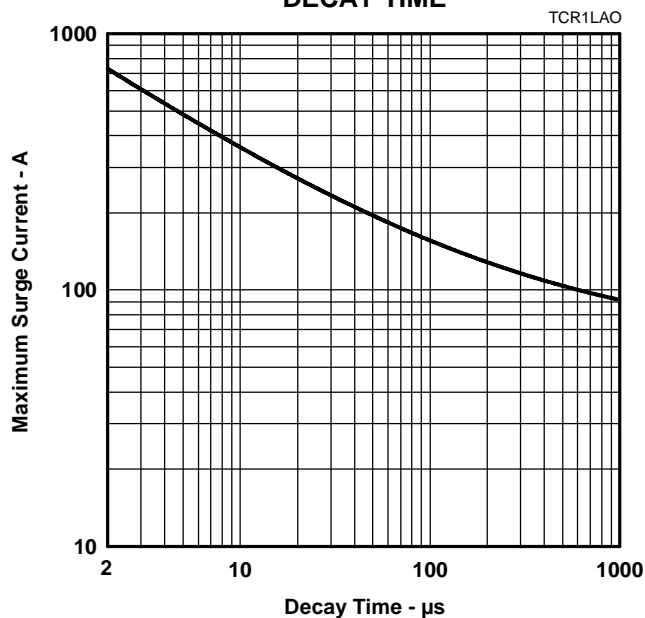


Figure 17.



THERMAL INFORMATION

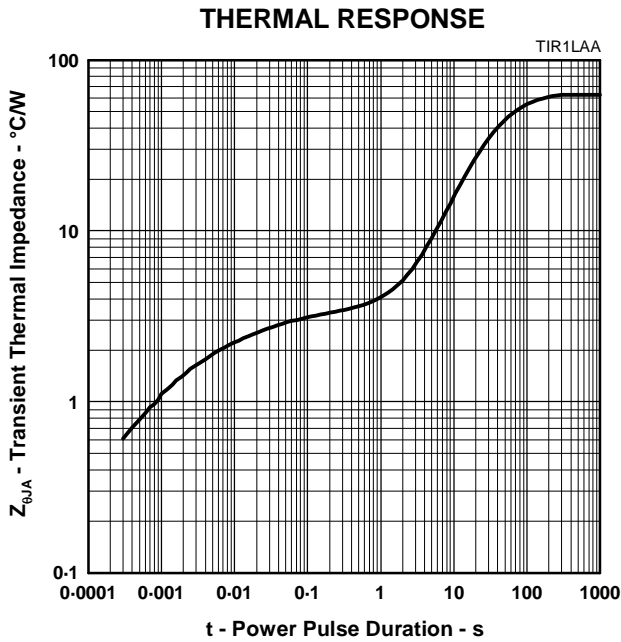


Figure 18.

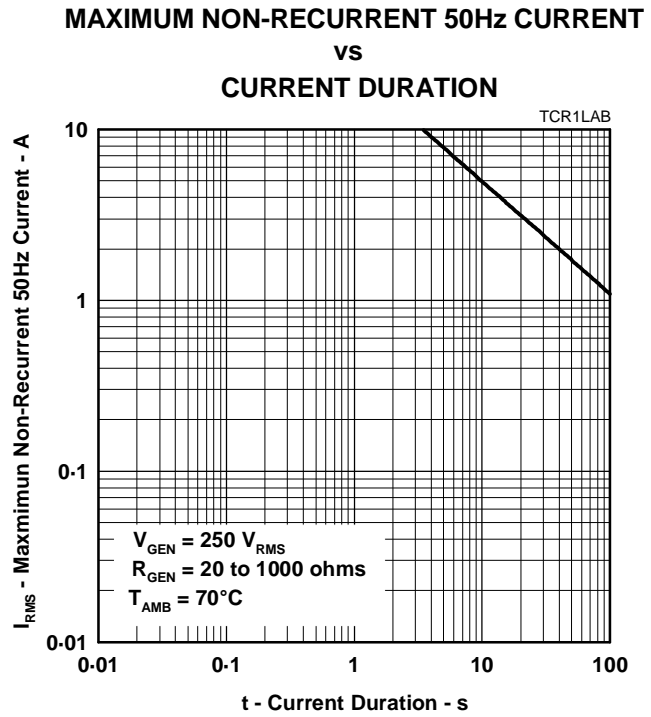


Figure 19.

FREE AIR TEMPERATURE

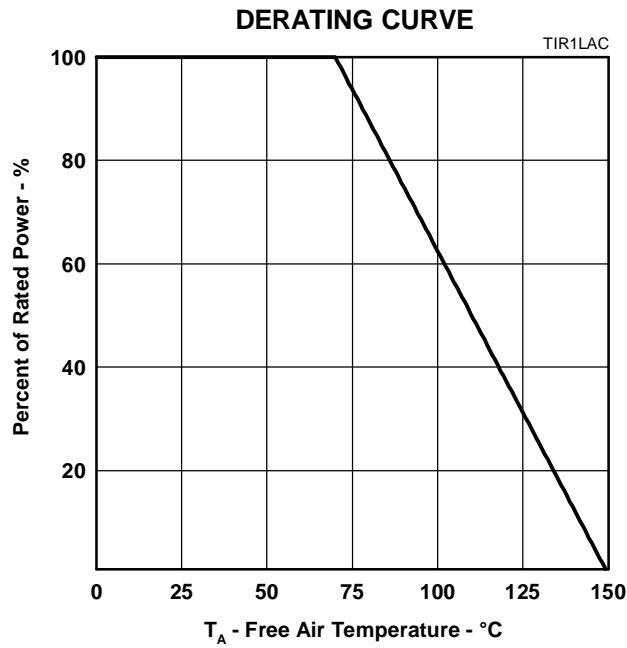


Figure 20.

# TISP1082 DUAL ASYMMETRICAL TRANSIENT VOLTAGE SUPPRESSORS

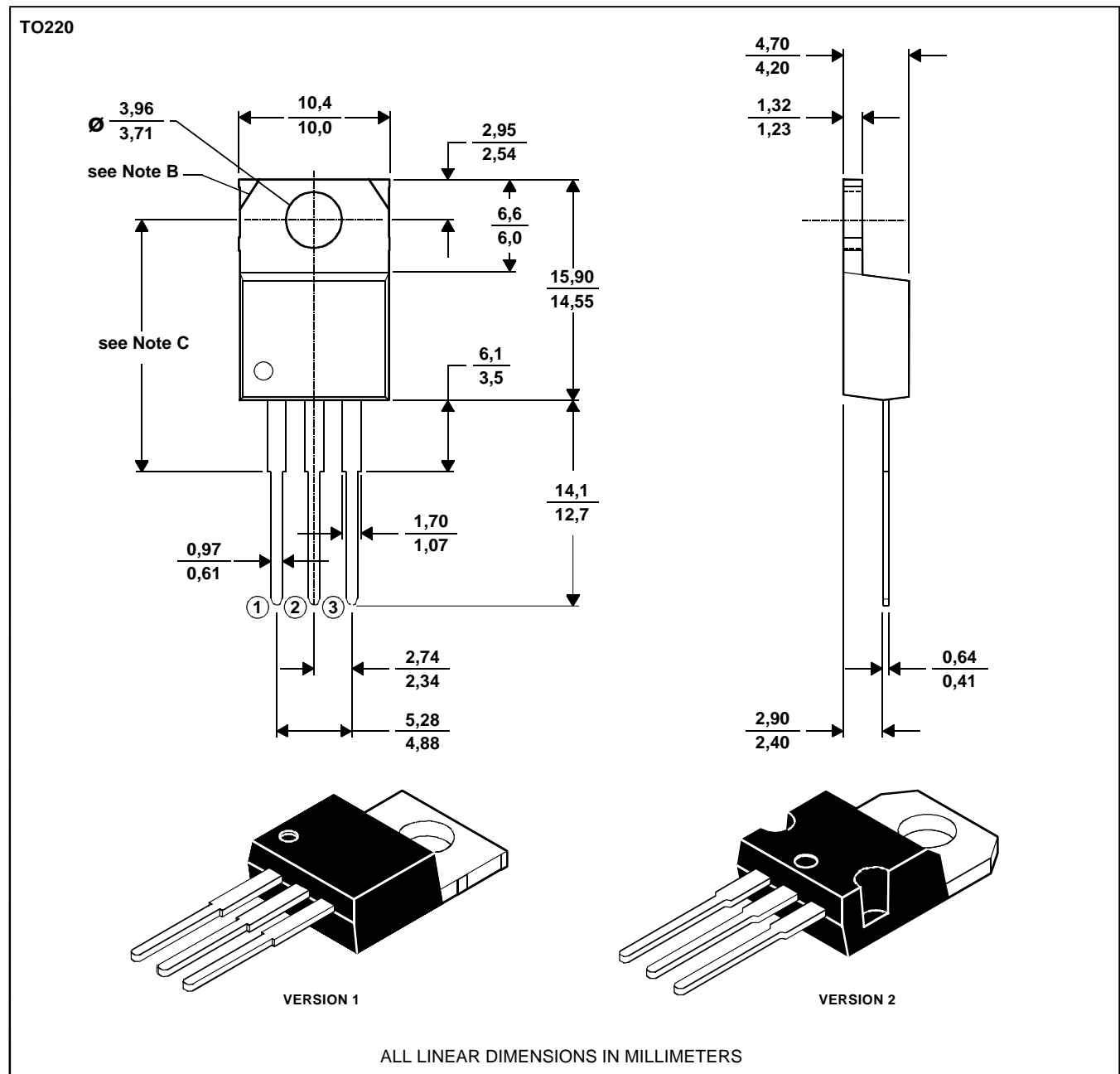
NOVEMBER 1986 - REVISED SEPTEMBER 1997

## MECHANICAL DATA

### TO-220

#### 3-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. The centre pin is in electrical contact with the mounting tab.  
 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.

MDXXBE

## PRODUCT INFORMATION

### **IMPORTANT NOTICE**

Power Innovations Limited (PI) reserves the right to make changes to its products or to discontinue any semiconductor product or service without notice, and advises its customers to verify, before placing orders, that the information being relied on is current.

PI warrants performance of its semiconductor products to the specifications applicable at the time of sale in accordance with PI's standard warranty. Testing and other quality control techniques are utilized to the extent PI deems necessary to support this warranty. Specific testing of all parameters of each device is not necessarily performed, except as mandated by government requirements.

PI accepts no liability for applications assistance, customer product design, software performance, or infringement of patents or services described herein. Nor is any license, either express or implied, granted under any patent right, copyright, design right, or other intellectual property right of PI covering or relating to any combination, machine, or process in which such semiconductor products or services might be or are used.

PI SEMICONDUCTOR PRODUCTS ARE NOT DESIGNED, INTENDED, AUTHORIZED, OR WARRANTED TO BE SUITABLE FOR USE IN LIFE-SUPPORT APPLICATIONS, DEVICES OR SYSTEMS.

Copyright © 1997, Power Innovations Limited