



TISP3070H3SLL, TISP3250H3SLL, TISP3290H3SLL

**DUAL BIDIRECTIONAL
THYRISTOR OVERVOLTAGE PROTECTORS**

TISP3xxxH3SLL Overvoltage Protector Series

ITU-T K.20/21 Rating8 kV 10/700, 200 A 5/310

Low Differential Capacitance< 67 pF

3-Pin Through-Hole Packaging
- Compatible with TO-220AB pin-out

Ion-Implanted Breakdown Region
- Precise and Stable Voltage

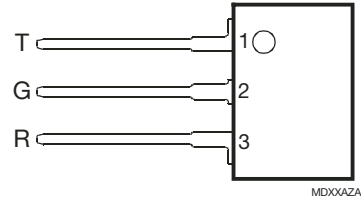
Low Voltage Overshoot Under Surge

Device Name	V _{DRM} V	V _(BO) V
TISP3070H3SLL	58	70
TISP3250H3SLL	190	250
TISP3290H3SLL	220	290

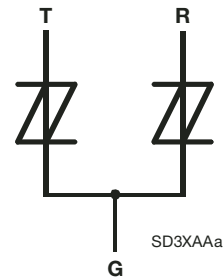
Rated for International Surge Wave Shapes
- Single and Simultaneous Impulses

Wave Shape	Standard	I _{PPSM} A
2/10	GR-1089-CORE	500
8/20	IEC 61000-4-5	300
10/160	TIA-968-A	250
10/700	TIA-968-A ITU-T K.20/21	200
10/560	TIA-968-A	160
10/1000	GR-1089-CORE	100

3-SIP (Long Lead) Package (Top View)



Device Symbol



UL Recognized Component

Description

The TISP3xxxH3SLL limits overvoltages between the telephone line Ring and Tip conductors and Ground. Overvoltages are normally caused by a.c. power system or lightning flash disturbances which are induced or conducted on to the telephone line.

The protector consists of two symmetrical voltage-triggered bidirectional thyristors. Overvoltages are initially clipped by breakdown clamping until the voltage rises to the breakover level, which causes the device to crowbar into a low-voltage on state. This low-voltage on state causes the current resulting from the overvoltage to be safely diverted through the device. The high crowbar holding current prevents d.c. latchup as the diverted current subsides.

The TISP3xxxH3SLL range is designed to voltage limit and withstand the listed international lightning surges in both polarities. These high current protection devices are in a 3-pin long-lead single-in-line (SLL) plastic package and are supplied in tube pack. 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.

How to Order

Device	Package	Carrier	Order As	Marking Code	Tube Qty.	Std. Qty.
TISP3xxxH3SLL	3-SIP (Long Lead)	Tube	TISP3xxxH3SLL-S	SP3xxxH3	50	1000

*RoHS Directive 2002/95/EC Jan 27 2003 including Annex
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Specifications are subject to change without notice.
Customers should verify actual device performance in their specific applications.

TISP3xxxH3SLL Overvoltage Protector Series

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Absolute Maximum Ratings, $T_A = 25\text{ }^\circ\text{C}$ (Unless Otherwise Noted)

Rating	Symbol	Value	Unit
Repetitive peak off-state voltage	'3070	±58	V
	'3250	±190	
	'3290	±220	
Non-repetitive peak impulse current (see Notes 1, 2 and 3) 2/10 μs (GR-1089-CORE, 2/10 μs voltage wave shape) 8/20 μs (IEC 61000-4-5, 1.2/50 μs voltage wave shape, 8/20 μs current combination wave generator) 10/160 μs (TIA-968-A, 10/160 μs voltage wave shape) 5/200 μs (VDE 0433, 10/700 μs voltage waveshape) 0.2/310 μs (I 31-24, 0.5/700 μs voltage waveshape) 5/310 μs (ITU-T K.20/21, 10/700 μs voltage wave shape) 5/310 μs (FTZ R12, 10/700 μs voltage waveshape) 5/320 μs (TIA-968-A, 9/720 μs voltage wave shape) 10/560 μs (TIA-968-A, 10/560 μs voltage wave shape) 10/1000 μs (GR-1089-CORE, 10/1000 μs voltage wave shape)	I_{PPSM}	±500	A
		±300	
		±250	
		±220	
		±200	
		±200	
		±200	
		±200	
		±160	
		±100	
Non-repetitive peak on-state current (see Notes 1, 2 and 4) 20 ms, 50 Hz (full sine wave) 16.7 ms 60 Hz (full sine wave) 1000 s, 50 Hz a.c.	I_{TSM}	55	A
		60	
		1	
Initial rate of rise of on-state current, exponential current ramp, maximum ramp value < 200 A	di_T/dt	400	A/ μs
Junction temperature	T_J	-40 to +150	$^\circ\text{C}$
Storage temperature range	T_{stg}	-65 to +150	$^\circ\text{C}$

NOTES: 1. Initially the device must be in thermal equilibrium with $T_J = 25\text{ }^\circ\text{C}$.

2. These non-repetitive rated currents are peak values of either polarity. The rated current values may be applied to the R or T terminals. Additionally, both R and T terminals may have their rated current values applied simultaneously (in this case the G terminal return current will be the sum of the currents applied to the R and T terminals). The surge may be repeated after the device returns to its initial conditions.

3. Above $85\text{ }^\circ\text{C}$, derate linearly to zero at $150\text{ }^\circ\text{C}$ lead temperature.

4. EIA/JESD51-2 environment and EIA/JESD51-3 PCB with standard footprint dimensions connected with 5 A rated printed wiring track widths. Derate current values at $-0.61\%/^\circ\text{C}$ for ambient temperatures above $25\text{ }^\circ\text{C}$.

Electrical Characteristics for the R and G or T and G Terminals, $T_A = 25\text{ }^\circ\text{C}$ (Unless Otherwise Noted)

Parameter	Test Conditions	Min	Typ	Max	Unit
I_{DRM} Repetitive peak off-state current	$V_D = V_{DRM}$ $T_A = 25\text{ }^\circ\text{C}$ $T_A = 85\text{ }^\circ\text{C}$			±5 ±10	μA
$V_{(BO)}$ Breakover voltage	$dv/dt = \pm 750\text{ V/ms}$, $R_{SOURCE} = 300\ \Omega$			±70 ±250 ±290	V
$V_{(BO)}$ Impulse breakover voltage	$dv/dt \leq \pm 1000\text{ V}/\mu\text{s}$, Linear voltage ramp, Maximum ramp value = $\pm 500\text{ V}$ $di/dt = \pm 20\text{ A}/\mu\text{s}$, Linear current ramp, Maximum ramp value = $\pm 10\text{ A}$			±78 ±261 ±302	V
$I_{(BO)}$ Breakover current	$dv/dt = \pm 750\text{ V/ms}$, $R_{SOURCE} = 300\ \Omega$	±150		±600	mA
V_T On-state voltage	$I_T = \pm 5\text{ A}$, $t_w = 100\ \mu\text{s}$			±3	V
I_H Holding current	$I_T = \pm 5\text{ A}$, $di/dt = \pm 30\text{ mA/ms}$	±150		±600	mA
dv/dt Critical rate of rise of off-state voltage	Linear voltage ramp, maximum ramp value < $0.85V_{DRM}$	±5			kV/ μs
I_D Off-state current	$V_D = \pm 50\text{ V}$ $T_A = 85\text{ }^\circ\text{C}$			±10	μA

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TISP3xxxH3SSL Overtolerance Protector Series

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Electrical Characteristics for the R and G or T and G Terminals, $T_A = 25\text{ }^\circ\text{C}$ (Unless Otherwise Noted) (Continued)

Parameter		Test Conditions	Min	Typ	Max	Unit
C _O	Off-state capacitance	f = 100 kHz, V _d = 1 V rms, V _D = 0 V			170	pF
			'3070		84	
		f = 100 kHz, V _d = 1 V rms, V _D = -1 V			150	
			'3070		67	
		f = 100 kHz, V _d = 1 V rms, V _D = -2 V			140	
			'3070		62	
	f = 100 kHz, V _d = 1 V rms, V _D = -50 V			73		
		'3070		28		
	f = 100 kHz, V _d = 1 V rms, V _D = -100 V			26		
		'3070 & '3290				

Electrical Characteristics for the R and T Terminals, $T_A = 25\text{ }^\circ\text{C}$ (Unless Otherwise Noted)

Parameter		Test Conditions	Min	Typ	Max	Unit
I _{DRM}	Repetitive peak off-state current	V _D = 2V _{DRM}			±5	μA
V _(BO)	Breakover voltage	dv/dt = ±750 V/ms, R _{SOURCE} = 300 Ω			±140 ±500 ±580	V
			'3070			
			'3250			
			'3290			
V _(BO)	Impulse breakover voltage	dv/dt ≤ ±1000 V/μs, Linear voltage ramp, Maximum ramp value = ±500 V di/dt = ±20 A/μs, Linear current ramp, Maximum ramp value = ±10 A			±156 ±522 ±604	V
			'3070			
			'3250			
			'3290			

Thermal Characteristics, $T_A = 25\text{ }^\circ\text{C}$ (Unless Otherwise Noted)

Parameter		Test Conditions	Min	Typ	Max	Unit
R _{θJA}	Junction to ambient thermal resistance	EIA/JESD51-3 PCB, I _T = I _{TSM(1000)} (see Note 5)			50	°C/W

NOTE: 5. EIA/JESD51-2 environment and PCB has standard footprint dimensions connected with 5 A rated printed wiring track widths.

Parameter Measurement Information

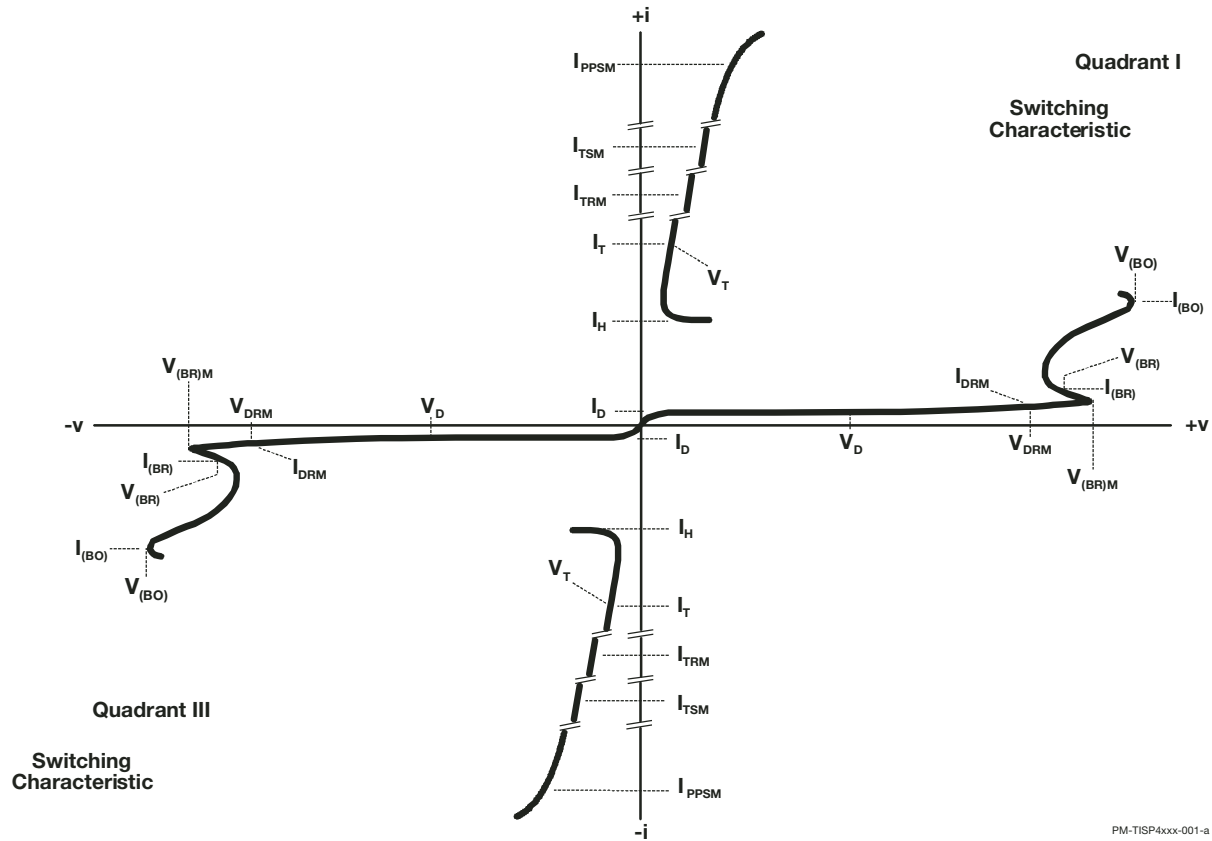


Figure 1. Voltage-Current Characteristic for Terminal Pairs

PM-TISP4xxx-001-a

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