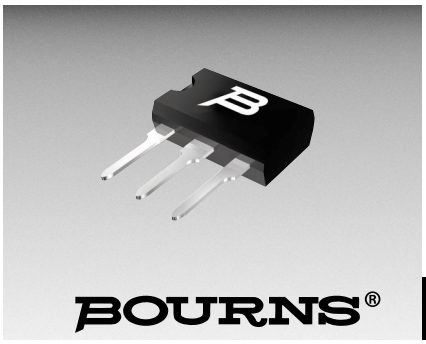

BOURNS®

TISP3070H3SL THRU TISP3115H3SL, TISP3125H3SL THRU TISP3210H3SL, TISP3250H3SL THRU TISP3350H3SL

DUAL BIDIRECTIONAL THYRISTOR OVERVOLTAGE PROTECTORS

TISP3xxxH3SL Overvoltage Protector Series

TISP3xxxH3SL Overview

This TISP® device series protects central office, access and customer premise equipment against overvoltages on the telecom line. The TISP3xxxH3SL protects R-G and T-G. In addition, the device is rated for simultaneous R-G and T-G impulse conditions. The TISP3xxxH3SL is available in a wide range of voltages and has a high current capability, allowing minimal series resistance to be used. These protectors have been specified mindful of the following standards and recommendations: GR-1089-CORE, FCC Part 68, UL1950, EN 60950, IEC 60950, ITU-T K.20, K.21 and K.45. The TISP3350H3SL meets the FCC Part 68 "B" ringer voltage requirement and survives both Type A and B impulse tests. These devices are housed in a through-hole 3-pin single-in-line (SL) plastic package.

Summary Electrical Characteristics

Part #	V_{DRM} V	$V_{(BO)}$ V	V_T @ I_T V	I_{DRM} µA	$I_{(BO)}$ mA	I_T A	I_H mA	C_o @ -2 V pF	Functionally Replaces
TISP3070H3	58	70	3	5	600	5	150	140	P1402AC†
TISP3080H3	65	80	3	5	600	5	150	140	P1602AC†
TISP3095H3	75	95	3	5	600	5	150	140	
TISP3115H3	90	115	3	5	600	5	150	74	P2202AC†
TISP3125H3	100	125	3	5	600	5	150	74	
TISP3135H3	110	135	3	5	600	5	150	74	
TISP3145H3	120	145	3	5	600	5	150	74	P2702AC†
TISP3180H3	145	180	3	5	600	5	150	74	P3002AC
TISP3210H3	160	210	3	5	600	5	150	74	P3602AC†
TISP3250H3	190	250	3	5	600	5	150	62	P4202AC
TISP3290H3	220	290	3	5	600	5	150	62	P4802AC†
TISP3350H3	275	350	3	5	600	5	150	62	P6002AC

† Bourns part has an improved protection voltage

Summary Current Ratings

Parameter	I_{TSP} A						I_{TSM} A	di/dt A/µs
Waveshape	2/10	1.2/50, 8/20	10/160	5/320	10/560	10/1000	1 cycle 60 Hz	2/10 Wavefront
Value	500	300	250	200	130	100	60	400

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TISP3xxxH3SL Overvoltage Protector Series

BOURNS®

ITU-T K.20/21 Rating . . . . . 8 kV 10/700, 200 A 5/310

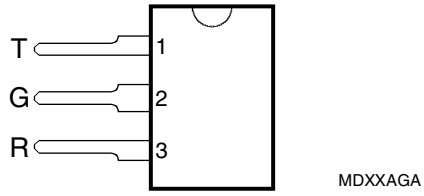
Ion-Implanted Breakdown Region
Precise and Stable Voltage
Low Voltage Overshoot under Surge

Device	V_{DRM} V	$V_{(BO)}$ V
‘3070	58	70
‘3080	65	80
‘3095	75	95
‘3115	90	115
‘3125	100	125
‘3135	110	135
‘3145	120	145
‘3180	145	180
‘3210	160	210
‘3250	190	250
‘3290	220	290
‘3350	275	350

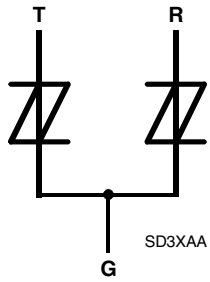
Rated for International Surge Wave Shapes
- Single and Simultaneous Impulses

Waveshape	Standard	I_{TSP} A
2/10 µs	GR-1089-CORE	500
8/20 µs	IEC 61000-4-5	300
10/160 µs	FCC Part 68	250
10/700 µs	FCC Part 68 ITU-T K.20/21	200
10/560 µs	FCC Part 68	160
10/1000 µs	GR-1089-CORE	100

SL Package (Top View)



Device Symbol



Terminals T, R and G correspond to the alternative line designators of A, B and C

3-Pin Through-Hole Packaging
- Compatible with TO-220AB pin-out
- Low Height 8.3mm

Low Differential Capacitance ..... < 67 pF

..... UL Recognized Component

Description

The TISP3xxxH3SL 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.

How To Order

Device	Package	Carrier	Order As
TISP3xxxH3	SL (Single-in-Line)	Tube	TISP3xxxH3SL

Insert xxx value corresponding to protection voltages of 070, 080, 095, 115 etc.

This TISP3xxxH3SL range consists of twelve voltage variants to meet various maximum system voltage levels (58 V to 275 V). They are guaranteed to voltage limit and withstand the listed international lightning surges in both polarities. These high current protection devices are in a 3-pin single-in-line (SL) plastic package and are supplied in tube pack. For alternative impulse rating, voltage and holding current values in SL packaged protectors, consult the factory. For lower rated impulse currents in the SL package, the 35 A 10/1000 TISP3xxxF3SL series is available. 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.

Absolute Maximum Ratings, T_A = 25 °C (Unless Otherwise Noted)

Rating		Symbol	Value	Unit
Repetitive peak off-state voltage, (see Note 1)	'3070	V_{DRM}	± 58	V
	'3080		± 65	
	'3095		± 75	
	'3115		±90	
	'3125		±100	
	'3135		±110	
	'3145		±120	
	'3180		±145	
	'3210		±160	
	'3250		±190	
	'3290		±220	
	'3350		±275	
Non-repetitive peak on-state pulse current (see Notes 2, 3 and 4)		I_{TSP}		A
2/10 µs (GR-1089-CORE, 2/10 µs voltage wave shape)			500	
8/20 µs (IEC 61000-4-5, 1.2/50 µs voltage, 8/20 current combination wave generator)			300	
10/160 µs (FCC Part 68, 10/160 µs voltage wave shape)			250	
5/200 µs (VDE 0433, 10/700 µs voltage wave shape)			220	
0.2/310 µs (I3124, 0.5/700 µs voltage wave shape)			200	
5/310 µs (ITU-T K.20/21, 10/700 µs voltage wave shape)			200	
5/310 µs (FTZ R12, 10/700 µs voltage wave shape)			200	
5/320 µs (FCC Part 68, 9/720 µs voltage wave shape)			200	
10/560 µs (FCC Part 68, 10/560 µs voltage wave shape)			160	
10/1000 µs (GR-1089-CORE, 10/1000 µs voltage wave shape)			100	
Non-repetitive peak on-state current (see Notes 2, 3 and 5)		I_{TSM}		A
20 ms (50 Hz) full sine wave			55	
16.7 ms (60 Hz) full sine wave			60	
1000 s 50 Hz/60 Hz a.c.			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	°C
Storage temperature range		T_{stg}	-65 to +150	°C

NOTES: 1. See Figure 9 for voltage values at lower temperatures.
2. Initially the TISP3xxxH3SL must be in thermal equilibrium.
3. 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 TISP3xxxH3SL returns to its initial conditions.
4. See Figure 10 for impulse current ratings at other temperatures. Above 85 °C, derate linearly to zero at 150 °C lead temperature.
5. EIA/JESD51-2 environment and EIA/JESD51-3 PCB with standard footprint dimensions connected with 5 A rated printed wiring track widths. See Figure 8 for the current ratings at other durations. Figure 8 shows the R and T terminal current rating for simultaneous operation. In this condition, the G terminal current will be $2xI_{TSM(t)}$, the sum of the R and T terminal currents. Derate current values at -0.61 %/°C for ambient temperatures above 25 °C.

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Electrical Characteristics for the R and G or T and G Terminals, T_A = 25 °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 °C			±5	µA
			T_A = 85 °C			±10	
$V_{(BO)}$	Breakover voltage	dv/dt = ±750 V/ms, R_{SOURCE} = 300 Ω	'3070			±70	V
			'3080			±80	
			'3095			±95	
			'3115			±115	
			'3125			±125	
			'3135			±135	
			'3145			±145	
			'3180			±180	
			'3210			±210	
			'3250			±250	
			'3290			±290	
			'3350			±350	
$V_{(BO)}$	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	'3070			±78	V
			'3080			±88	
			'3095			±103	
			'3115			±124	
			'3125			±134	
			'3135			±144	
			'3145			±154	
			'3180			±189	
			'3210			±220	
			'3250			±261	
			'3290			±302	
			'3350			±362	
$I_{(BO)}$	Breakover current	dv/dt = ±750 V/ms, R_{SOURCE} = 300 Ω		±0.15		±0.6	A
V_T	On-state voltage	I_T = ±5 A, t_W = 100 µs				±3	V
I_H	Holding current	I_T = ±5 A, di/dt = - /+30 mA/ms		±0.15		±0.6	A
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 = ±50 V	T_A = 85 °C			±10	µA
C_{off}	Off-state capacitance	f = 100 kHz, V_d = 1 V rms, V_D = 0,	'3070 thru '3115			170	pF
			'3125 thru '3210			90	
			'3250 thru '3350			84	
		f = 100 kHz, V_d = 1 V rms, V_D = -1 V	'3070 thru '3115			150	
			'3125 thru '3210			79	
			'3250 thru '3350			67	
		f = 100 kHz, V_d = 1 V rms, V_D = -2 V	'3070 thru '3115			140	
			'3125 thru '3210			74	
			'3250 thru '3350			62	
		f = 100 kHz, V_d = 1 V rms, V_D = -50 V	'3070 thru '3115			73	
			'3125 thru '3210			35	
			'3250 thru '3350			28	
		f = 100 kHz, V_d = 1 V rms, V_D = -100 V (see Note 6)	'3125 thru '3210			33	
			'3250 thru '3350			26	

NOTE 6: To avoid possible voltage clipping, the '3125 is tested with V_D = -98 V.