TISP5xxx - Single Unidirectional Thyristor Surge Protector

Device Number	TISP5070H3	TISP5080H3	TISP5095H3	TISP5110H3	TISP5115H3
Package Options	BJR	BJR	BJR	BJR	BJR
Standoff Voltage (V)	-58	-65	-75	-80	-90
Protection Voltage (V)	-70	-80	-95	-110	-115
Ratings for Lightning Surge Standards - GR-1089-CORE 2/10 us (A)	500	500	500	500	500
Ratings for Lightning Surge Standards - ANSI C62.41 8/20 us (A)	300	300	300	300	300
Ratings for Lightning Surge Standards - TIA/EIA-IS-968 10/560 us (A)	160	160	160	160	160
Ratings for Lightning Surge Standards - GR-1089-CORE 10/1000 us (A)	100	100	100	100	100

Device Number	TISP5150H3	TISP5190H3
Package Options	BJR	BJR
Standoff Voltage (V)	-120	-160
Protection Voltage (V)	-150	-190
Ratings for Lightning Surge Standards - GR-1089-CORE 2/10 us (A)	500	500
Ratings for Lightning Surge Standards - ANSI C62.41 8/20 us (A)	300	300
Ratings for Lightning Surge Standards - TIA/EIA-IS-968 10/560 us (A)	160	160
Ratings for Lightning Surge Standards - GR-1089-CORE 10/1000 us (A)	100	100

TISP5070H3BJ THRU TISP5190H3BJ

FORWARD-CONDUCTING UNIDIRECTIONAL THYRISTOR OVERVOLTAGE PROTECTORS

TISP5xxxH3BJ Overvoltage Protector Series

Analogue Line Card and ISDN Protection
- **Analogue SLIC**
- **ISDN U Interface**
- **ISDN Power Supply**

8 kV 10/700, 200 A 5/310 ITU-T K.20/21/45 rating

Ion-Implanted Breakdown Region
- **Precise and Stable Voltage**

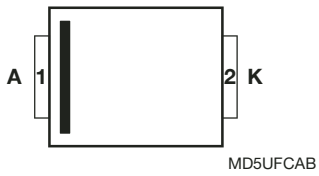
Low Voltage Overshoot under Surge

Device Name	V_{DRM} V	$V_{(BO)}$ V
TISP5070H3BJ	-58	-70
TISP5080H3BJ	-65	-80
TISP5095H3BJ	-75	-95
TISP5110H3BJ	-80	-110
TISP5115H3BJ	-90	-115
TISP5150H3BJ	-120	-150
TISP5190H3BJ	-160	-190

Rated for International Surge Wave Shapes

Wave Shape	Standard	I_{PPSM} A
2/10	GR-1089-CORE	500
8/20	ANSI C62.41	300
10/160	TIA-968-A	250
10/700	ITU-T K.20/21/45	200
10/560	TIA-968-A	160
10/1000	GR-1089-CORE	100

SMB Package (Top View)



Device Symbol

..... UL Recognized Component

Description

These devices are designed to limit overvoltages on the telephone and data lines. Overvoltages are normally caused by a.c. power system or lightning flash disturbances which are induced or conducted on to the telephone line. A single device provides 2-point protection and is typically used for the protection of ISDN power supply feeds. Two devices, one for the Ring output and the other for the Tip output, will provide protection for single supply analogue SLICs. A combination of three devices will give a low capacitance protector network for the 3-point protection of ISDN lines.

The protector consists of a voltage-triggered unidirectional thyristor with an anti-parallel diode. Negative 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. Positive overvoltages are limited by the conduction of the anti-parallel diode.

How to Order

Device	Package	Carrier	Order As	Marking Code	Std. Quantity
TISP5xxxH3BJ	BJ (J-Bend DO-214AA/SMB)	Embossed Tape Reeled	TISP5xxxH3BJR-S	5xxxH3	3000

Insert xxx value corresponding to protection voltages of 070, 080, 110, 115 and 150.

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

Rating		Symbol	Value	Unit
Repetitive peak off-state voltage (see Note 1)	'5070H3BJ	V_{DRM}	-58	V
	'5080H3BJ		-65	
	'5095H3BJ		-75	
	'5110H3BJ		-80	
	'5115H3BJ		-90	
	'5150H3BJ		-120	
	'5190H3BJ		-160	
Non-repetitive peak impulse current (see Notes 2, 3 and 4)				
2/10 µs (GR-1089-CORE, 2/10 µs voltage wave shape)		I_{PPSM}	±500	A
8/20 µs (IEC 61000-4-5, 1.2/50 µs voltage, 8/20 µs current combination wave generator)			±300	
10/160 µs (TIA-968-A, 10/160 µs voltage wave shape)			±250	
5/200 µs (VDE 0433, 10/700 µs voltage waveshape)			±220	
0.2/310 µs (I3124, 0.5/700 µs waveshape)			±200	
5/310 µs (ITU-T K.44, 10/700 µs voltage waveshape used in K.20/21/45)			±200	
5/310 µs (FTZ R12, 10/700 µs voltage waveshape)			±200	
10/560 µs (TIA-968-A, 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)				
20 ms, 50 Hz (full sine wave)		I_{TSM}	55	A
16.7 ms, 60 Hz (full sine wave)			60	
1000 s 50 Hz/60 Hz a.c.			2.1	
Initial rate of rise of on-state current, GR-1089-CORE 2/10 µs wave shape		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 device must be in thermal equilibrium with T_J = 25 °C.
3. The surge may be repeated after the device returns to its initial condtions.
4. See Figure 10 for current ratings at other temperatures.
5. 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 %/°C for ambient temperatures above 25 °C. See Figure 8 for current ratings at other durations.

Electrical Characteristics, 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 = -250 V/ms, R_{SOURCE} = 300 Ω	'5070H3BJ			-70	V
			'5080H3BJ			-80	
			'5095H3BJ			-95	
			'5110H3BJ			-110	
			'5115H3BJ			-115	
			'5150H3BJ			-150	
			'5190H3BJ			-190	
$V_{(BO)}$	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	'5070H3BJ			-80	V
			'5080H3BJ			-90	
			'5095H3BJ			-105	
			'5110H3BJ			-120	
			'5115H3BJ			-125	
			'5150H3BJ			-160	
			'5190H3BJ			-200	

Electrical Characteristics, T_A = 25 °C (Unless Otherwise Noted) (Continued)

Parameter		Test Conditions		Min	Typ	Max	Unit
$I_{(BO)}$	Breakover current	dv/dt = -250 V/ms, R_{SOURCE} = 300 Ω		-150		-600	mA
V_F	Forward voltage	I_F = 5 A, t_W = 500 µs				3	V
V_{FRM}	Peak forward recovery 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				5	V
V_T	On-state voltage	I_T = -5 A, t_w = 500 µs				-3	V
I_H	Holding current	I_T = -5 A, di/dt = +30 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 = -50 V	T_A = 85 °C			-10	µA
C_O	Off-state capacitance (see Note 6)	f = 1 MHz, V_d = 1 V rms, V_D = -1 V	'5070H3BJ		300	420	pF
			'5080H3BJ		280	390	
			'5095H3BJ		260	365	
			'5110H3BJ		240	335	
			'5115H3BJ		214	300	
			'5150H3BJ		140	195	
			'5190H3BJ		140	195	
		f = 1 MHz, V_d = 1 V rms, V_D = -2 V	'5070H3BJ		260	365	
			'5080H3BJ		245	345	
			'5095H3BJ		225	315	
			'5110H3BJ		205	285	
			'5115H3BJ		180	250	
			'5150H3BJ		120	170	
			'5190H3BJ		120	170	
		f = 1 MHz, V_d = 1 V rms, V_D = -50 V	'5070H3BJ		90	125	
			'5080H3BJ		80	110	
			'5095H3BJ		73	100	
			'5110H3BJ		65	90	
			'5115H3BJ		56	80	
			'5150H3BJ		35	50	
			'5190H3BJ		35	50	
		f = 1 MHz, V_d = 1 V rms, V_D = -100 V	'5150H3BJ		30	40	
			'5190H3BJ		30	30	

NOTE: 6. Up to 10 MHz the capacitance is essentially independent of frequency. Above 10 MHz the effective capacitance is strongly dependent on connection inductance.

Thermal Characteristics, T_A = 25 °C (Unless Otherwise Noted)

Parameter		Test Conditions	Min	Typ	Max	Unit
$R_{\theta JA}$	Junction to ambient thermal resistance	EIA/JESD51-3 PCB, $I_T = I_{TSM(1000)}$ (see Note 7)			113	°C/W
		265 mm x 210 mm populated line card, 4-layer PCB, $I_T = I_{TSM(1000)}$		50		

NOTE: 7. EIA/JESD51-2 environment and PCB has standard footprint dimensions connected with 5 A rated printed wiring track widths.