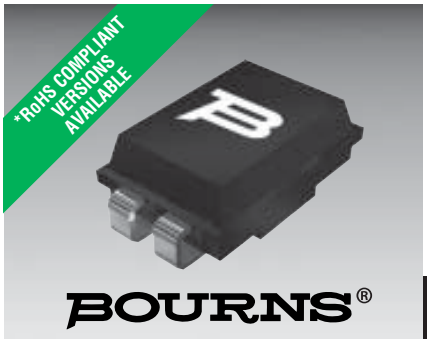


TISP1070H3BJ THRU TISP1120H3BJ

DUAL FORWARD-CONDUCTING UNIDIRECTIONAL THYRISTOR OVERVOLTAGE PROTECTORS

TISP1xxxH3BJ Overvoltage Protector Series

Overvoltage Protection for Negative Rail SLICs

Dual High Current Protectors in a Space Efficient Package
- **2 x 100 A 10/1000 Current Rating**
- **SMB03 Package (3-pin Modified SMB/DO-214AA)**
  50 % Space Saving over Two SMBs

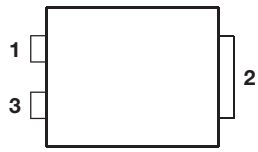
Ion-Implanted Breakdown Region
- **Precise and Stable Voltage**
- **Low Voltage Overshoot under Surge**

Device Name	V_{DRM} V	$V_{(BO)}$ V
TISP1070H3BJ	-58	-70
TISP1080H3BJ	-65	-80
TISP1095H3BJ	-75	-95
TISP1120H3BJ	-95	-120

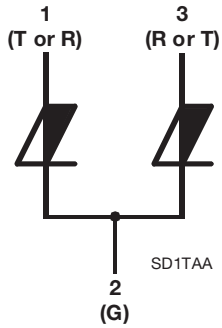
Rated for International Surge Wave Shapes

Wave Shape	Standard	I_{PPSM} A
2/10	GR-1089-CORE	500
8/20	IEC 61000-4-5	300
10/160	TIA-968-A (FCC Part 68)	200
10/700	ITU-T K.20/21/45	150
10/560	TIA-968-A (FCC Part 68)	120
10/1000	GR-1089-CORE	100

SMB03 Package (Top View)



Device Symbol



..... UL Recognized Component

Description

These dual unidirectional thyristor devices protect SLICs and ISDN power feeds in central office, access and customer premises equipment against overvoltages on the telecom line. Each protector section consists of a voltage-triggered unidirectional thyristor with an anti-parallel diode. In the negative polarity, the thyristor allows signal voltages, without clipping, up to the maximum off-state voltage value, V_{DRM}, see Figure 1. Voltages exceeding V_{DRM} are limited and will not exceed the breakover voltage, $V_{(BO)}$, level. If sufficient current flows due to the overvoltage, the thyristor switches into a low-voltage on-state condition, which diverts the current from the overvoltage through the thyristor. When the diverted current falls below the holding current, I_H, level the thyristor switches off and restores normal system operation. Positive overvoltages are limited by the conduction of the anti-parallel diode.

The TISP1xxxH3BJ is available in four voltages and has a 100 A 10/1000 current rating. These protectors have been designed particularly for use in equipment that must meet the following standards and recommendations: GR-1089-CORE, TIA-968-A (replaces FCC Part 68), ITU-T K.20, K.21 and K.45. Housed in a SMB03 package (3-pin modified SMB/DO-214AA), these parts are space efficient to replace protection designs of 100 A 10/1000 or less which use multiple SMBs or a 6-pin SMT package.

How to Order

Device	Package	Carrier	For Standard Termination Finish Order As	For Lead Free Termination Finish Order As	Marking Code	Std. Qty.
TISP1xxxH3BJ	SMB03 (3-pin modified SMB/DO-214AA)	Embossed Tape Reeled	TISP1xxxH3BJR	TISP1xxxH3BJR-S	1xxxH3	3000

Insert xxx value corresponding to device name.

*RoHS Directive 2002/95/EC Jan 27 2003 including Annex

JUNE 2003 - REVISED FEBRUARY 2005

Specifications are subject to change without notice.
Customers should verify actual device performance in their specific applications.

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

Rating		Symbol	Value	Unit
Repetitive peak off-state voltage, (Terminals 1-2 and 3-2) (see Note 1)	'1070	V_{DRM}	-58	V
	'1080		-65	
	'1095		-75	
	'1120		-95	
Non-repetitive peak on-state pulse current (see Notes 2 and 3)		I_{PPSM}		A
2/10 (Telcordia GR-1089-CORE, 2/10 voltage wave shape)			2x500	
8/20 (IEC 61000-4-5, combination wave generator, 1.2/50 voltage wave shape)			2x300	
10/160 (TIA-968-A (replaces FCC Part 68), 10/160 µs voltage wave shape)			2x200	
5/310 (ITU-T K.44, 10/700 µs voltage wave shape used in K.20/45/21)			2x150	
5/320 (TIA-968-A (replaces FCC Part 68), 9/720 µs voltage wave shape)			2x150	
10/560 (TIA-968-A (replaces FCC Part 68), 10/560 µs voltage wave shape)			2x120	
10/1000 (Telcordia GR-1089-CORE, 10/1000 voltage wave shape)			2x100	
Non-repetitive peak on-state current (see Notes 2 and 3)		I_{TSM}		A
50 Hz, 1 cycle			2x30	
60 Hz, 1 cycle			2x35	
1000 s 50 Hz/60 Hz a.c.			2x1.2	
Initial rate of rise of on-state current, Linear current ramp, Maximum ramp value < 50 A		di_T/dt	500	A/µs
Junction temperature		T_J	-40 to +150	°C
Storage temperature range		T_{stg}	-65 to +150	°C

NOTES: 1. At -40 °C derate linearly to 0.93 x V_{DRM} (25 °C)
2. Initially the device must be in thermal equilibrium with T_J = 25 °C.
3. These non-repetitive rated currents are peak values of either polarity. The rated current values are applied to the terminals 1 and 3 simultaneously (in this case the terminal 2 return current will be the sum of the currents applied to the terminals 1 and 3). The surge may be repeated after the device returns to its initial conditions.

Electrical Characteristics for the 1 and 2 or the 3 and 2 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	
$V_{(BO)}$	AC breakover voltage	dv/dt = -250 V/ms, R_{SOURCE} = 300 Ω	'1070			-70	V
			'1080			-80	
			'1095			-95	
			'1120			-120	
$I_{(BO)}$	Breakover current	dv/dt = -250 V/ms, R_{SOURCE} = 300 Ω				-800	mA
I_H	Holding current	I_T = -5 A, di/dt = +30 mA/ms		-150			mA
dv/dt	Critical rate of rise of off-state voltage	Linear voltage ramp, Maximum ramp value < 0.85 x V_{DRM}		-5			kV/µs
I_D	Off-state current	V_D = -50 V	T_A = 85 °C			-10	µA
V_F	Forward voltage	I_F = +5 A, t_W = 500 µs				3	V

Specifications are subject to change without notice.
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Electrical Characteristics for the 1 and 2 or the 3 and 2 Terminals, T_A = 25 °C (Unless Otherwise Noted)

Parameter	Test Conditions		Min	Typ	Max	Unit
C_{off} Off-state capacitance	f = 1 MHz, V_d = 1 V rms, V_D = -2 V	'1070		161		pF
		'1080		152		
		'1095		139		
		'1120		116		
	f = 1 MHz, V_d = 1 V rms, V_D = -50 V	'1070		58		
		'1080		55		
		'1095		50		
		'1120		42		

Thermal Characteristics

Parameter	Test Conditions	Min	Typ	Max	Unit
$R_{\theta JA}$ Junction to free air thermal resistance	EIA/JESD51-3 PCB, T_A = 25 °C, (see Note 4)			113	°C/W
	265 mm x 210 mm populated line card, 4-layer PCB, $I_T = I_{TSM(1000)}$, T_A = 25 °C		52		

NOTE 4: EIA/JESD51-2 environment and PCB have standard footprint dimensions connected with 5 A rated printed wiring track widths.

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Parameter Measurement Information

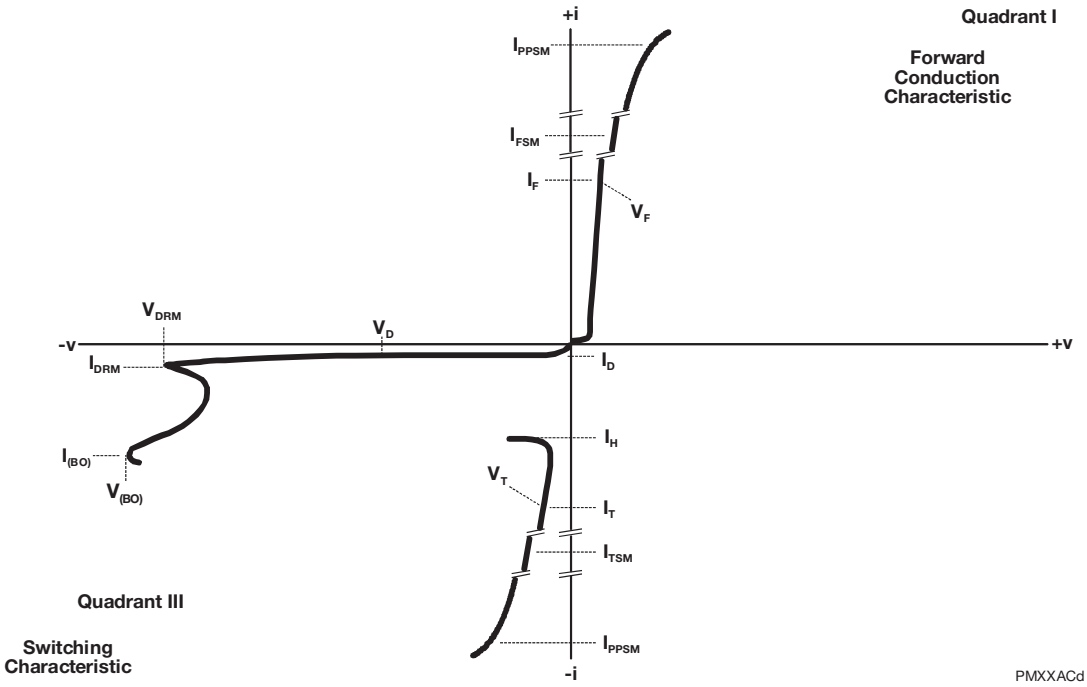

Figure 1. Voltage-Current Characteristic for Terminal Pairs 1-2 and 3-2
All Measurements are Referenced to Terminal 2

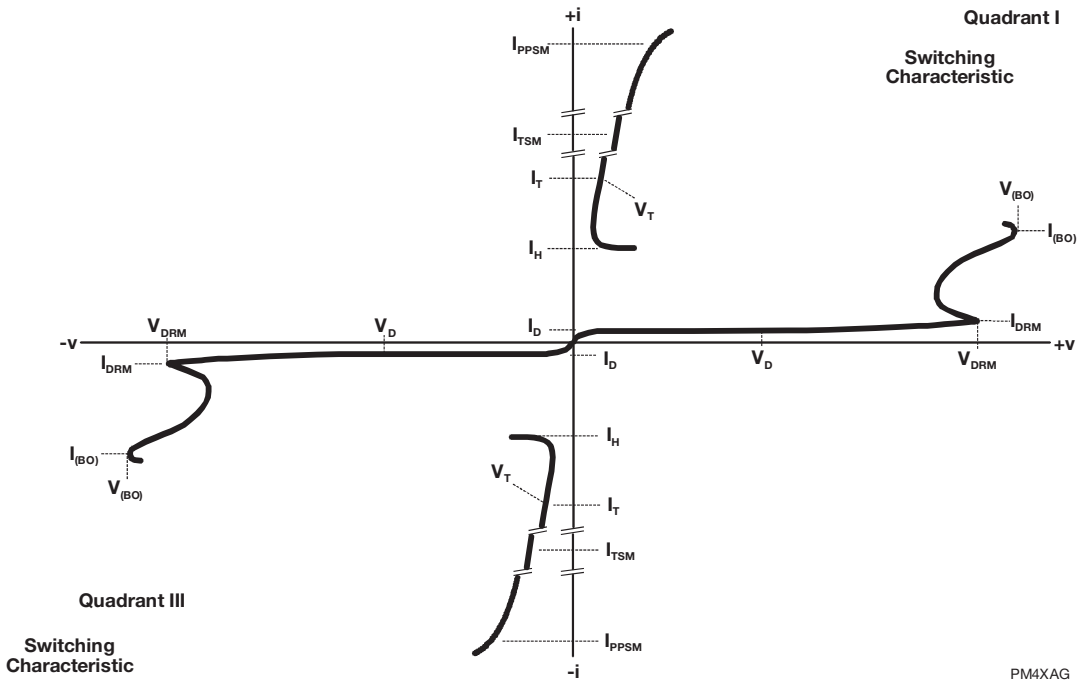

Figure 2. Voltage-Current Characteristic for Terminal Pair 1-3
All Measurements are Referenced to Terminal 3

Specifications are subject to change without notice.
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Typical Characteristics

OFF-STATE CURRENT vs JUNCTION TEMPERATURE

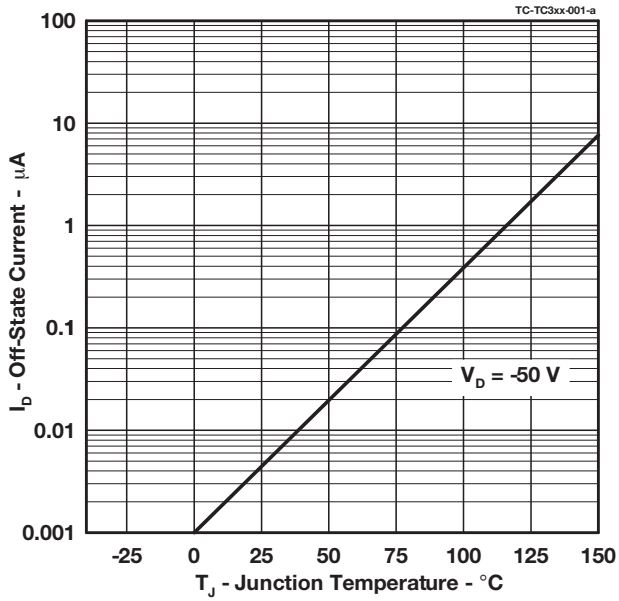

Figure 3.

NORMALIZED BREAKOVER VOLTAGE vs JUNCTION TEMPERATURE

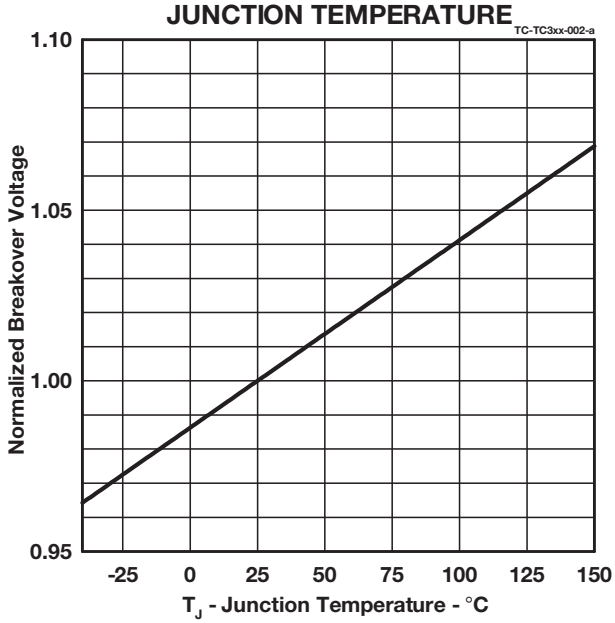

Figure 4.

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

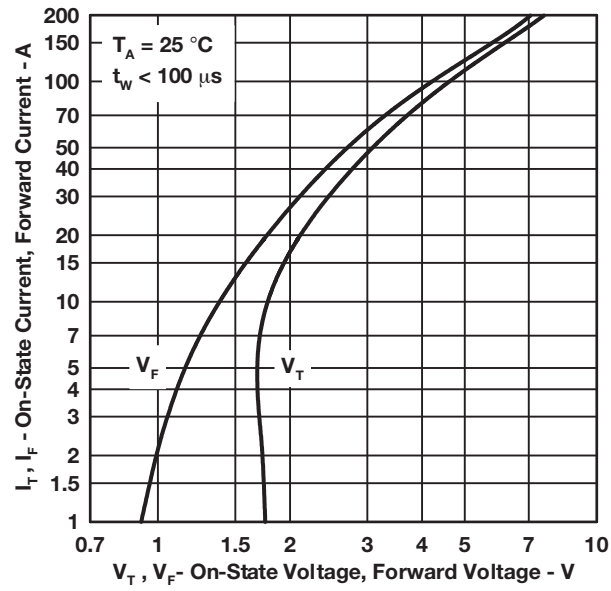

Figure 5.

NORMALIZED HOLDING CURRENT vs JUNCTION TEMPERATURE

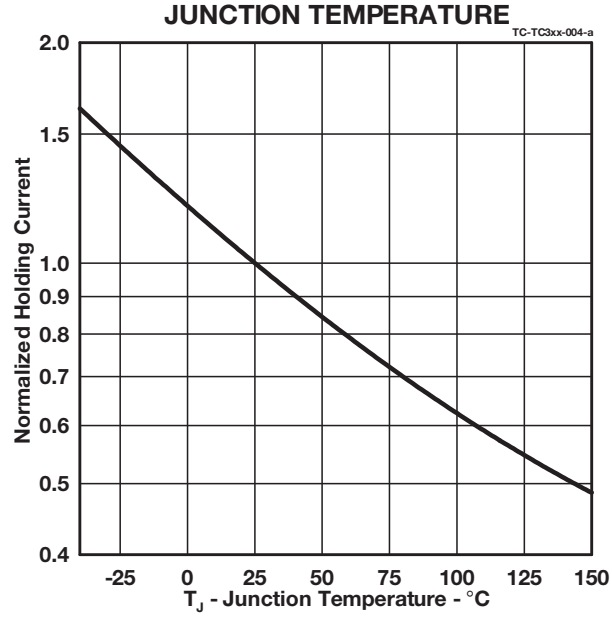

Figure 6.

Specifications are subject to change without notice.
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Typical Characteristics (Continued)

NORMALIZED CAPACITANCE
vs
OFF-STATE VOLTAGE

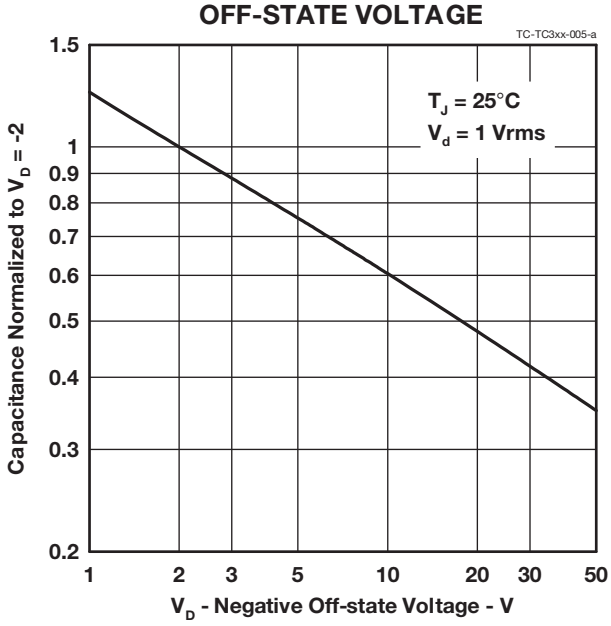

Figure 7.

Rating and Thermal Information

NON-REPETITIVE PEAK ON-STATE CURRENT
vs
CURRENT DURATION

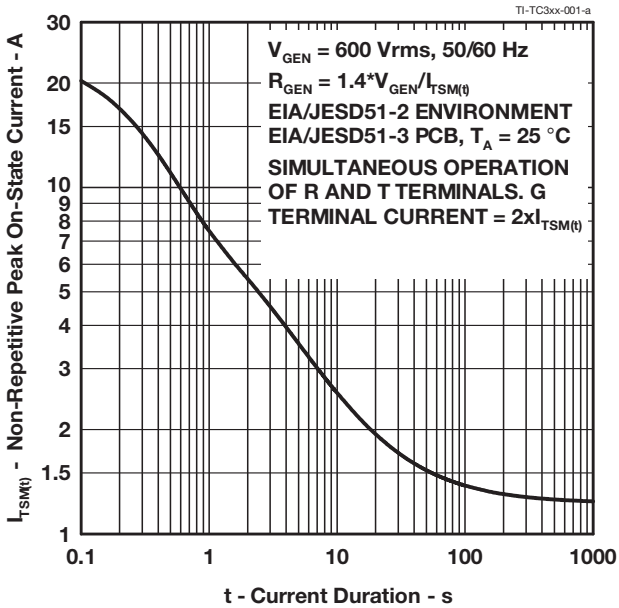

Figure 8.

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