

## BIDIRECTIONAL THYRISTOR OVERVOLTAGE PROTECTORS



## TISP4500H3BJ Overvoltage Protector

## Non-Conductive During K.20/21/45 Power Contact Test

- Off-State Voltage ..... >245 V rms
- For Controlled Environment ..... 0 °C to 70 °C

## Ion-Implanted Breakdown Region

Precise and Stable Voltage

Low Voltage Overshoot under Surge

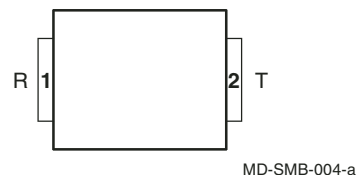
Device	$V_{\text{DRM}}$ V @ 0 °C	$V_{\text{(BO)}}$ V @ 70 °C
TISP4500H3BJ	350	500

## Rated for International Surge Wave Shapes

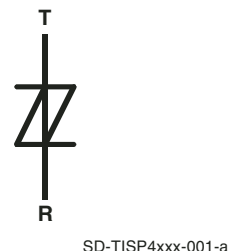
Wave Shape	Standard	$I_{\text{PPSM}}$ A
2/10	GR-1089-CORE	500
10/250	GR-1089-CORE	230
10/700	ITU-T K.20/21/45	200
10/1000	GR-1089-CORE	100

 ..... UL Recognized Component

## SMBJ Package (Top View)



## Device Symbol



## Description

This device is designed to limit overvoltages on the telephone line to  $\pm 500$  V over the temperature range. The minimum off-state voltage of  $\pm 350$  V allows a.c. power contact voltages of up to 245 V rms to occur without clipping. The combination of these two voltages gives protection for components having ratings of 500 V or above and ensures the protector is non-conducting for the ITU-T recommendations K.20/21/45 230 V rms power cross test condition (test number 2.3.1).

The protector consists of a symmetrical voltage-triggered bidirectional thyristor. 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	For Standard Termination Finish Order As	For Lead Free Termination Finish Order As	Marking Code	Std. Qty.
TISP4500H3BJ	SMB (DO-214AA)	Embossed Tape Reeled	TISP4500H3BJR	TISP4500H3BJR-S	4500H3	3000

# TISP4500H3BJ Overvoltage Protector

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## Absolute Maximum Ratings, $0\text{ }^{\circ}\text{C} \leq T_A \leq 70\text{ }^{\circ}\text{C}$ (Unless Otherwise Noted)

Rating	Symbol	Value	Unit
Repetitive peak off-state voltage	$V_{\text{DRM}}$	$\pm 350$	V
Non-repetitive peak on-state pulse current (see Notes 1 and 2) 2/10 (Telcordia GR-1089-CORE, 2/10 $\mu\text{s}$ voltage wave shape) 10/250 (Telcordia GR-1089-CORE, 10/250 $\mu\text{s}$ voltage wave shape) 10/700 (ITU-T K.20/21/45, 5/310 $\mu\text{s}$ current wave shape) 10/1000 (Telcordia GR-1089-CORE, 10/1000 $\mu\text{s}$ voltage wave shape)	$I_{\text{PPSM}}$	$T_A = 25\text{ }^{\circ}\text{C}$ 500 $T_A = 25\text{ }^{\circ}\text{C}$ 230 200 $T_A = 25\text{ }^{\circ}\text{C}$ 100	A
Non-repetitive peak on-state current (see Notes 1, 2 and 3) 50 Hz, 20 ms (1 cycle) 50 Hz, 1000 s	$I_{\text{TSM}}$	$\pm 55$ $\pm 2.0$	A
Junction temperature	$T_J$	-40 to +150	$^{\circ}\text{C}$
Storage temperature range	$T_{\text{stg}}$	-65 to +150	$^{\circ}\text{C}$

- NOTES: 1. Initially the device must be in thermal equilibrium.  
2. The surge may be repeated after the device returns to its initial conditions.  
3. EIA/JESD51-2 environment and EIA/JESD51-3 PCB with standard footprint dimensions connected with 5 A rated printed wiring track widths.

## Electrical Characteristics, $0\text{ }^{\circ}\text{C} \leq T_A \leq 70\text{ }^{\circ}\text{C}$ (Unless Otherwise Noted)

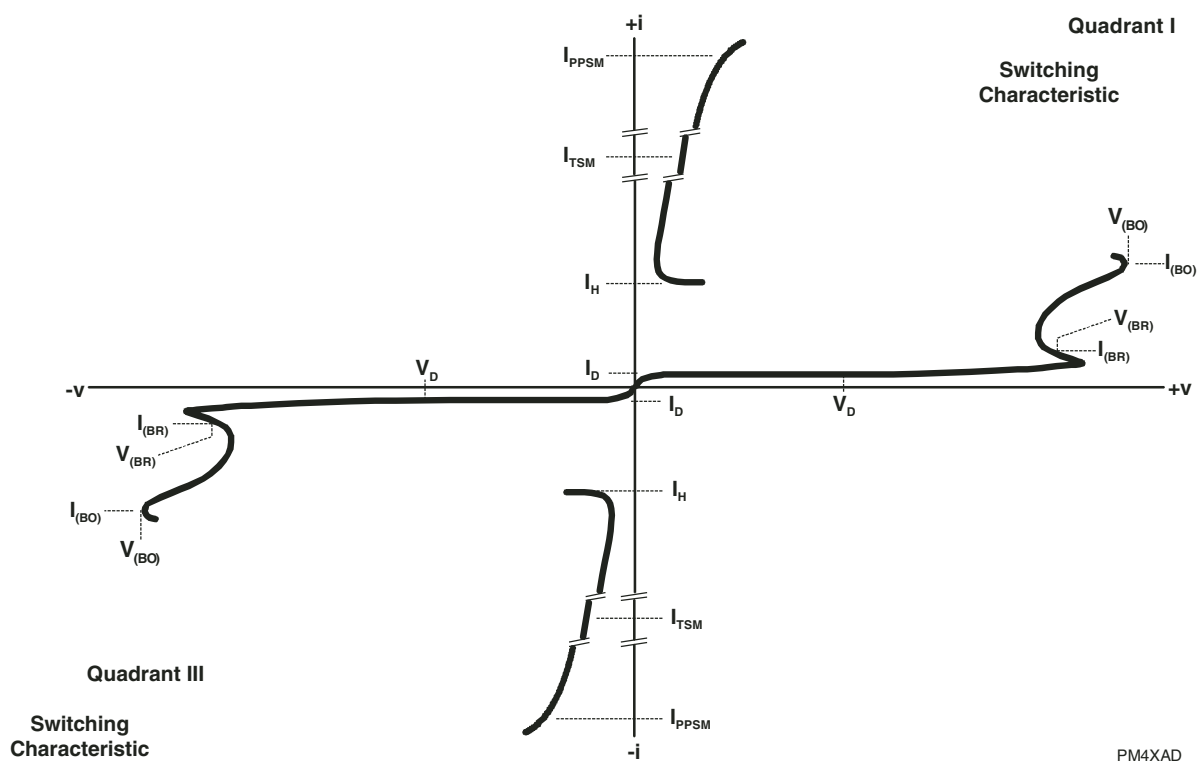
Parameter	Test Conditions	Min	Typ	Max	Unit
$I_{\text{DRM}}$ Repetitive peak off-state current	$V_D = V_{\text{DRM}}$ $T_A = 25\text{ }^{\circ}\text{C}$ $T_A = 70\text{ }^{\circ}\text{C}$			$\pm 5$ $\pm 10$	$\mu\text{A}$
$V_{(\text{BO})}$ Breakover voltage	$dv/dt = \pm 250\text{ V/ms}$ , $R_{\text{SOURCE}} = 300\text{ }\Omega$			$\pm 500$	V
$V_{(\text{BO})}$ Impulse breakover voltage	ITU-T recommendation K.44 (02/2000) Figure A.3-1/K.44 10/700 impulse generator Charge Voltage = $\pm 4\text{ kV}$			$\pm 500$	V
$I_{(\text{BO})}$ Breakover current	$dv/dt = \pm 250\text{ V/ms}$ , $R_{\text{SOURCE}} = 300\text{ }\Omega$			$\pm 0.6$	A
$I_H$ Holding current	$I_T = \pm 5\text{ A}$ , $di/dt = -/+30\text{ mA/ms}$	$\pm 0.15$			A
$I_D$ Off-state current	$V_D = \pm 50\text{ V}$ $T_A = 70\text{ }^{\circ}\text{C}$			$\pm 10$	$\mu\text{A}$
$C_{\text{off}}$ Off-state capacitance	$f = 1\text{ MHz}$ , $V_d = 1\text{ V rms}$ , $V_D = 0$ $f = 1\text{ MHz}$ , $V_d = 1\text{ V rms}$ , $V_D = -1\text{ V}$ $f = 1\text{ MHz}$ , $V_d = 1\text{ V rms}$ , $V_D = -2\text{ V}$ $f = 1\text{ MHz}$ , $V_d = 1\text{ V rms}$ , $V_D = -50\text{ V}$			84 67 62 31	pF

## Thermal Characteristics

Parameter	Test Conditions	Min	Typ	Max	Unit
$R_{\theta\text{JA}}$ Junction to free air thermal resistance	EIA/JESD51-3 PCB, $I_T = I_{\text{TSM}(1000)}$ , $T_A = 25\text{ }^{\circ}\text{C}$ , (see Note 5)			113	$^{\circ}\text{C/W}$
	265 mm x 210 mm populated line card, 4-layer PCB, $I_T = I_{\text{TSM}(1000)}$ , $T_A = 25\text{ }^{\circ}\text{C}$		50		

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

## Parameter Measurement Information

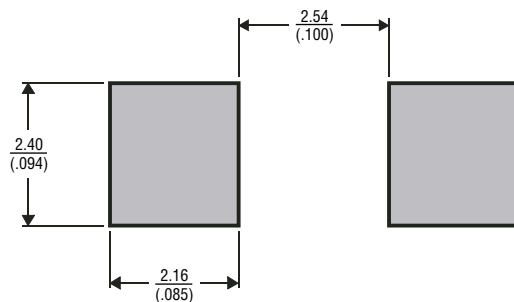


**Figure 1. Voltage-current Characteristic for T and R Terminals**  
**All Measurements are Referenced to the R Terminal**

## MECHANICAL DATA

## Recommended Printed Wiring Land Pattern Dimensions

## SMB Land Pattern

DIMENSIONS ARE:  $\frac{\text{MM}}{(\text{INCHES})}$ 

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## Device Symbolization Code

Devices will be coded as below. As the device parameters are symmetrical, terminal 1 is not identified.

Device	Symbolization Code
TISP4500H3BJ	4500H3

# TISP4500H3BJ Overvoltage Protector

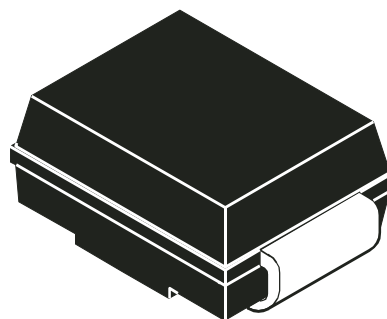
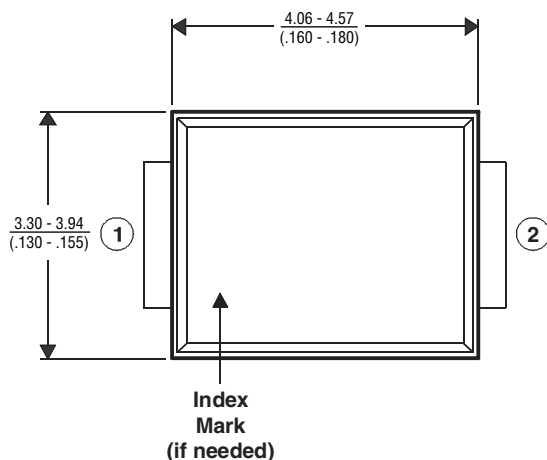
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## MECHANICAL DATA

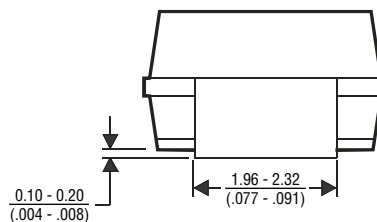
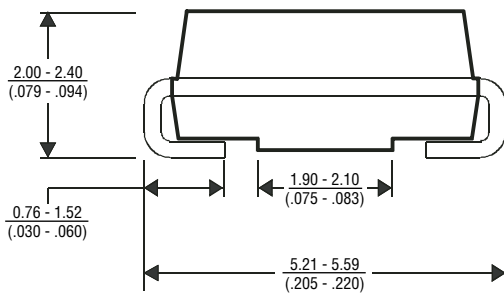
### SMBJ (DO-214AA) Plastic Surface Mount Diode Package

This surface mount 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.

**SMB**



DIMENSIONS ARE:  $\frac{\text{MM}}{(\text{INCHES})}$



MDXXBHAB

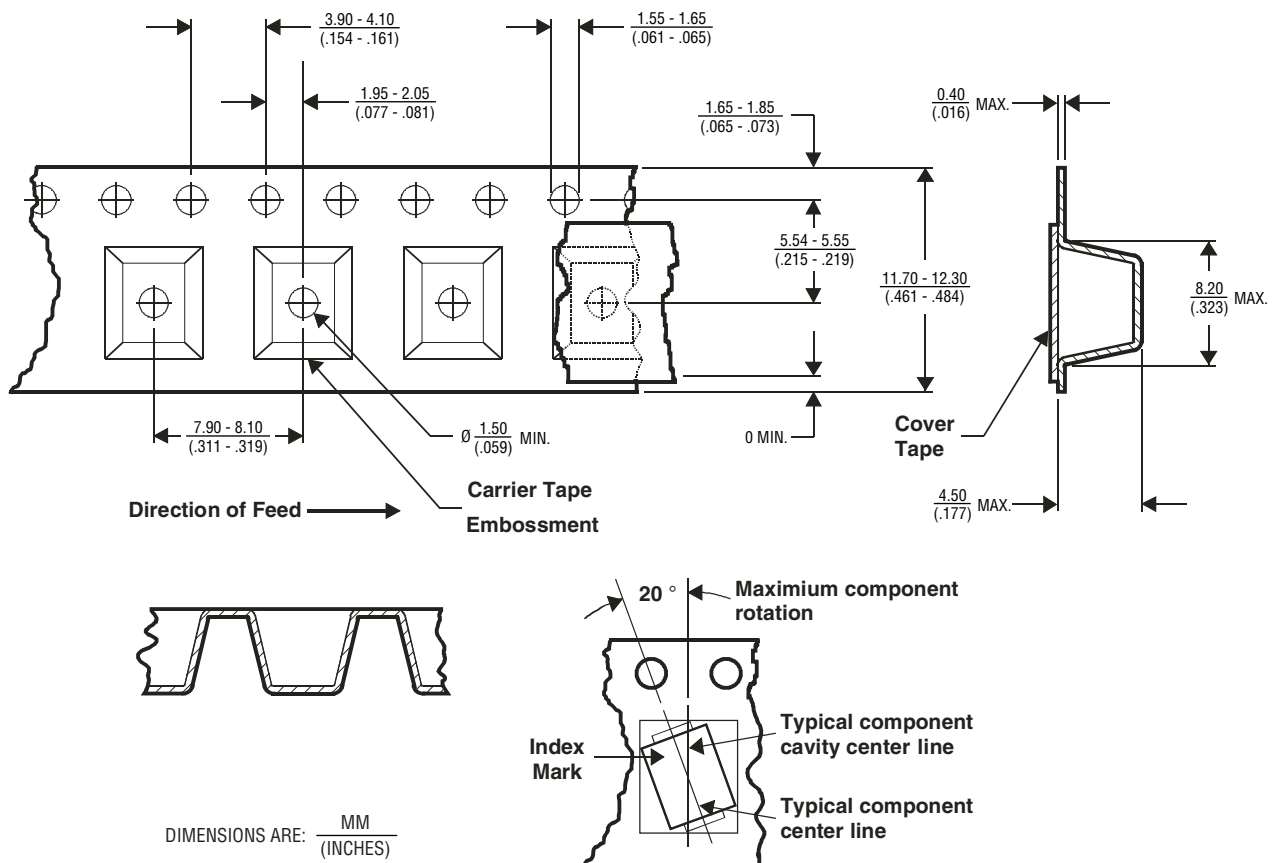
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## MECHANICAL DATA

### Tape Dimensions

#### SMB Package Single-Sprocket Tape



NOTES: A. The clearance between the component and the cavity must be within 0.05 mm (.002 in.) MIN. to 0.65 mm (.026 in.) MAX. so that the component cannot rotate more than  $20^\circ$  within the determined cavity. MDXXBJA

B. Taped devices are supplied on a reel of the following dimensions:-

Reel diameter:  $330 \pm 3.0$  mm (12.99  $\pm$  .118 in.)  
 Reel hub diameter: 75 mm (2.95 in.) MIN.  
 Reel axial hole:  $13.0 \pm 0.5$  mm (.512  $\pm$  .020 in.)

C. 3000 devices are on a reel.

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