
# TISP4C125H3BJ THRU TISP4C395H3BJ

## LOW CAPACITANCE BIDIRECTIONAL THYRISTOR OVERVOLTAGE PROTECTORS

## TISP4CxxxH3BJ Overvoltage Protector Series

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

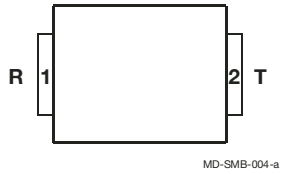
| Device Name | $V_{DRM}$ V | $V_{(BO)}$ V |
|---|---|---|
| TISP4C125H3BJ | 100 | 125 |
| TISP4C145H3BJ | 120 | 145 |
| TISP4C180H3BJ | 145 | 180 |
| TISP4C220H3BJ | 180 | 220 |
| TISP4C250H3BJ | 190 | 250 |
| TISP4C290H3BJ | 220 | 290 |
| TISP4C350H3BJ | 275 | 350 |
| TISP4C395H3BJ | 320 | 395 |

**Rated for International Surge Wave Shapes**

| Wave Shape | Standard | $I_{PPSM}$ A |
|---|---|---|
| 2/10 | GR-1089-CORE | 500 |
| 10/160 | TIA-968-A | 200 |
| 10/700 | ITU-T K.20/21/45 | 150 |
| 10/560 | TIA-968-A | 100 |
| 10/1000 | GR-1089-CORE | 100 |

**..... TISP4C290H3BJ, TISP4C350H3BJ & TISP4C395H3BJ are UL Recognized Components**

### SMB Package (Top View)




MD-SMB-004-a

### Device Symbol


SD-TISP4xxx-001-a

### Description

This device is designed to limit overvoltages on the telephone line. 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 2-wire telecommunication equipment (e.g. between the Ring and Tip wires for telephones and modems). Combinations of devices can be used for multi-point protection (e.g. 3-point protection between Ring, Tip and Ground).

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.

Please contact your Bourns representative if the protection voltage you require is not listed.

### How to Order

| Device | Package | Carrier | For Standard Termination Finish Order As | For Lead Free Termination Finish Order As | Marking Code | Std. Qty. |
|---|---|---|---|---|---|---|
| TISP4CxxxH3BJ | SMB | Embossed Tape Reeled | TISP4CxxxH3BJR | TISP4CxxxH3BJR-S | 4CxxxH | 3000 |

Insert xxx corresponding to device name.

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

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

| Rating | | Symbol | Value | Unit |
|---|---|---|---|---|
| Repetitive peak off-state voltage | '4C125H3BJ | $V_{DRM}$ | ±100 | V |
| | '4C145H3BJ | | ±120 | |
| | '4C180H3BJ | | ±145 | |
| | '4C220H3BJ | | ±180 | |
| | '4C250H3BJ | | ±190 | |
| | '4C290H3BJ | | ±220 | |
| | '4C350H3BJ | | ±275 | |
| | '4C395H3BJ | | ±320 | |
| Non-repetitive peak impulse current (see Notes 1 and 2) | | $I_{PPSM}$ | | A |
| 2/10 µs (GR-1089-CORE, 2/10 µs voltage wave shape) | | | ±500 | |
| 10/160 µs (TIA-968-A, 10/160 µs voltage wave shape) | | | ±200 | |
| 5/310 µs (ITU-T K.44, 10/700 µs voltage wave shape used in K.20/21/45) | | | ±150 | |
| 10/560 µs (TIA-968-A, 10/560 µs voltage wave shape) | | | ±100 | |
| 10/1000 µs (GR-1089-CORE, 10/1000 µs voltage wave shape) | | | ±100 | |
| Non-repetitive peak on-state current (see Notes 1, 2 and 3) | | $I_{TSM}$ | | A |
| 20 ms, 50 Hz (full sine wave) | | | 30 | |
| 1000 s, 50 Hz | | | 2.1 | |
| Junction temperature | | $T_J$ | -40 to +150 | °C |
| Storage temperature range | | $T_{stg}$ | -65 to +150 | °C |

NOTES: 1. Initially the device must be in thermal equilibrium with $T_J$ = 25 °C.
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, $T_A$ = 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 | '4C125H3BJ | | | ±125 | V |
| | | | '4C145H3BJ | | | ±145 | |
| | | | '4C180H3BJ | | | ±180 | |
| | | | '4C220H3BJ | | | ±220 | |
| | | | '4C250H3BJ | | | ±250 | |
| | | | '4C290H3BJ | | | ±290 | |
| | | | '4C350H3BJ | | | ±350 | |
| | | | '4C395H3BJ | | | ±395 | |
| $V_{(BO)}$ | Impulse breakover voltage | dv/dt ≤ ±1000 V/µs, Linear voltage ramp, Maximum ramp value = ±500 V di/dt = ±10 A/µs, Linear current ramp, Maximum ramp value = ±10 A | '4C125H3BJ | | | ±135 | V |
| | | | '4C145H3BJ | | | ±155 | |
| | | | '4C180H3BJ | | | ±190 | |
| | | | '4C220H3BJ | | | ±230 | |
| | | | '4C250H3BJ | | | ±260 | |
| | | | '4C290H3BJ | | | ±300 | |
| | | | '4C350H3BJ | | | ±360 | |
| | | | '4C395H3BJ | | | ±405 | |
| $I_{(BO)}$ | Breakover current | dv/dt = ±250 V/ms, $R_{SOURCE}$ = 300 Ω | | | | ±600 | mA |
| $V_T$ | 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 | | ±150 | | ±600 | mA |
| $C_O$ | Off-state capacitance | f = 1 MHz, $V_d$ = 1 V rms, $V_D$ = -2 V | '4C125H3BJ | | | 50 | pF |
| | | | '4C145H3BJ '4C180H3BJ '4C220H3BJ '4C250H3BJ | | | 45 | |
| | | | '4C290H3BJ '4C350H3BJ '4C395H3BJ | | | 40 | |

## 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 4) | | | 113 | °C/W |
| | | 265 mm x 210 mm populated line card, 4-layer PCB, $I_T = I_{TSM(1000)}$ | | 50 | | |

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

## Parameter Measurement Information

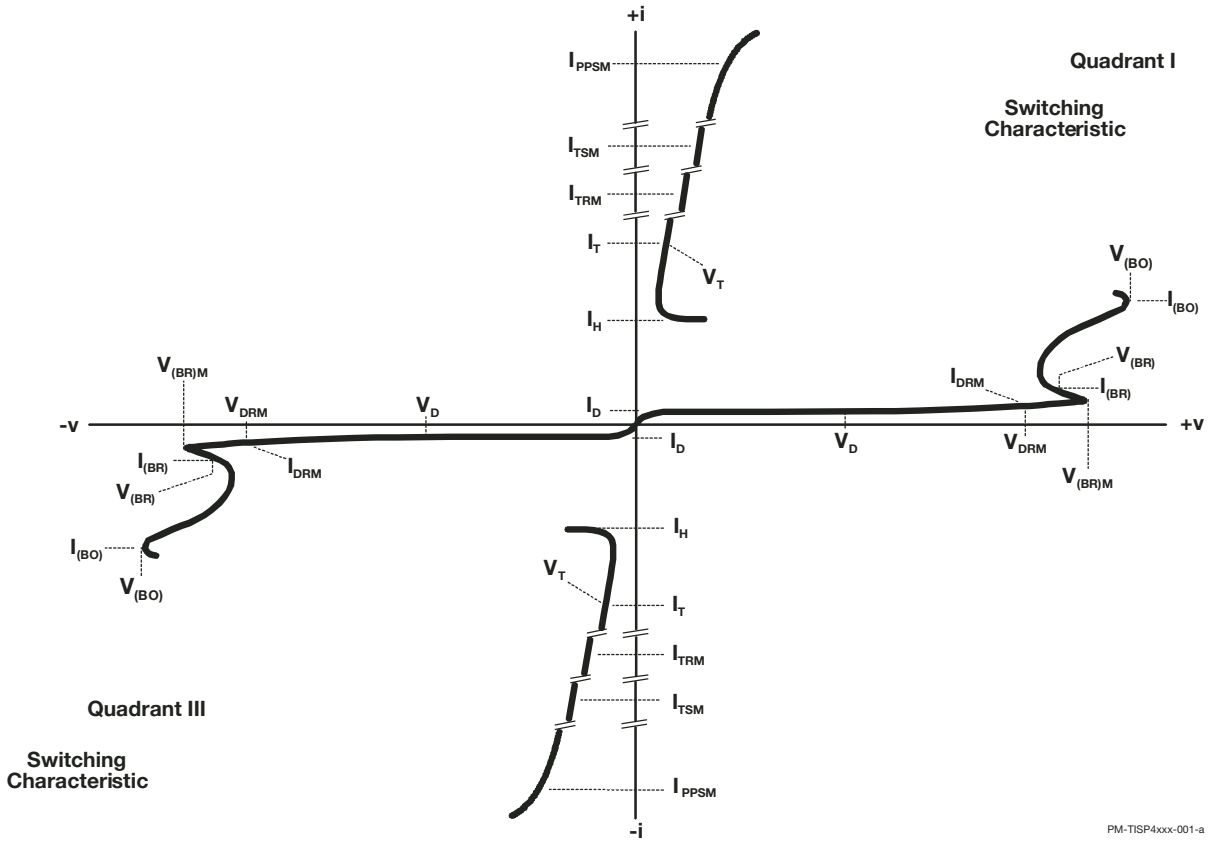


**Figure 1. Voltage-Current Characteristic for T and R Terminals**
**All Measurements are Referenced to the R Terminal**

## Typical Characteristics