



## TISP7290H3SLL Overvoltage Protector

**3-Pin Long Lead Through-Hole Package**  
– Compatible with TO-220AB Pin-Out

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

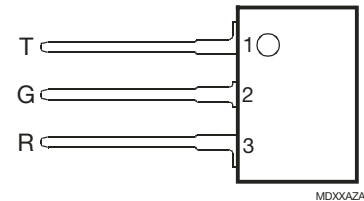
**Low Voltage Overshoot Under Surge**

| Device Name   | $V_{DRM}$<br>V | $V_{(BO)}$<br>V |
|---------------|----------------|-----------------|
| TISP7290H3SLL | 230            | 290             |

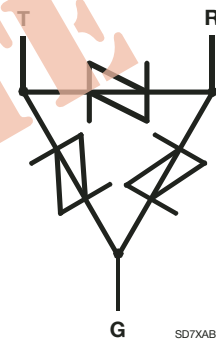
**Rated for International Surge Wave Shapes**  
– Single and Simultaneous Impulses

| Wave Shape | Standard                   | $I_{PPSM}$<br>A |
|------------|----------------------------|-----------------|
| 2/10       | GR-1089-CORE               | 500             |
| 8/20       | IEC 61000-4-5              | 350             |
| 10/160     | TIA-968-A                  | 250             |
| 10/700     | TIA-968-A<br>ITU-T K.20/21 | 200             |
| 10/560     | TIA-968-A                  | 130             |
| 10/1000    | GR-1089-CORE               | 100             |

**3-SIP (Long Lead) Package (Top View)**



**Device Symbol**



**UL Recognized Component**

### Description

The TISP7290H3SLL 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.

Each terminal pair, T-G, R-G and T-R, has a symmetrical voltage-triggered bidirectional thyristor protection characteristic. 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 helps prevent d.c. latchup as the diverted current subsides.

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. They are designed to voltage limit and withstand the listed international lightning surges in both polarities.

### How To Order

| Device        | Package           | Carrier | Order As        | Marking Code | Std. Qty. |
|---------------|-------------------|---------|-----------------|--------------|-----------|
| TISP7290H3SLL | 3-SIP (Long Lead) | Tube    | TISP7290H3SLL-S | SP7290H3     | 1000      |

# TISP7290H3SL Overvoltage Protector

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## Absolute Maximum Ratings, $T_A = 25\text{ }^\circ\text{C}$ (Unless Otherwise Noted)

| Rating   | Symbol     | Value   | Unit             |
|--|------------|---|------------------|
| Repetitive peak off-state voltage (see Note 1)   | $V_{DRM}$  | $\pm 230$   | V                |
| Non-repetitive peak impulse current (see Notes 2 and 3)<br>2/10 $\mu\text{s}$ (GR-1089-CORE, 2/10 $\mu\text{s}$ voltage wave shape)<br>8/20 $\mu\text{s}$ (IEC 61000-4-5, 1.2/50 $\mu\text{s}$ voltage wave shape, 8/20 current combination wave generator)<br>10/160 $\mu\text{s}$ (TIA-968-A, 10/160 $\mu\text{s}$ voltage wave shape)<br>4/250 $\mu\text{s}$ (ITU-T K.20/21, 10/700 $\mu\text{s}$ voltage waveshape, dual)<br>0.2/310 $\mu\text{s}$ (CNET I 31-24, 0.5/700 $\mu\text{s}$ voltage waveshape)<br>5/310 $\mu\text{s}$ (ITU-T K.20/21, 10/700 $\mu\text{s}$ voltage wave shape, single)<br>5/320 $\mu\text{s}$ (TIA-968-A, 9/720 $\mu\text{s}$ voltage wave shape)<br>10/560 $\mu\text{s}$ (TIA-968-A, 10/560 $\mu\text{s}$ voltage wave shape)<br>10/1000 $\mu\text{s}$ (GR-1089-CORE, 10/1000 $\mu\text{s}$ voltage wave shape) | $I_{PPSM}$ | $\pm 500$<br>$\pm 350$<br>$\pm 250$<br>$\pm 225$<br>$\pm 200$<br>$\pm 200$<br>$\pm 200$<br>$\pm 130$<br>$\pm 100$ | A                |
| Non-repetitive peak on-state current (see Notes 2, 3 and 4)<br>20 ms, 50 Hz (full sine wave)<br>16.7 ms 60 Hz (full sine wave)<br>1000 s, 50 Hz a.c.   | $I_{TSM}$  | 55<br>60<br>0.9   | A                |
| Initial rate of rise of on-state current, exponential current ramp, maximum ramp value < 200 A   | $di_T/dt$  | 400   | A/ $\mu\text{s}$ |
| Junction temperature   | $T_J$      | -40 to +150   | $^\circ\text{C}$ |
| Storage temperature range  | $T_{stg}$  | -65 to +150   | $^\circ\text{C}$ |

- NOTES: 1. Derate value at  $-0.13\text{ }^\circ\text{C}$  for ambient temperatures below  $25\text{ }^\circ\text{C}$ .  
 2. Initially the device must be in thermal equilibrium with  $T_J = 25\text{ }^\circ\text{C}$ .  
 3. These non-repetitive rated currents are peak values of either polarity. The rated current values may be applied to any terminal pair. 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 device returns to its initial conditions.  
 4. 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  $-0.61\text{ }^\circ\text{C}$  for ambient temperatures above  $25\text{ }^\circ\text{C}$ .

## Electrical Characteristics for any Terminal Pair, $T_A = 25\text{ }^\circ\text{C}$ (Unless Otherwise Noted)

| Parameter  | Test Conditions   | Min       | Typ | Max                        | Unit              |
|--|---|-----------|-----|----------------------------|-------------------|
| $I_{DRM}$ Repetitive peak off-state current        | $V_D = V_{DRM}$<br>$T_A = 25\text{ }^\circ\text{C}$<br>$T_A = 85\text{ }^\circ\text{C}$   |           |     | $\pm 5$<br>$\pm 10$        | $\mu\text{A}$     |
| $V_{(BO)}$ Breakover voltage                       | $dv/dt = \pm 750\text{ V/ms}$ , $R_{SOURCE} = 300\ \Omega$  |           |     | $\pm 290$                  | V                 |
| $V_{(BO)}$ Impulse breakover voltage               | $dv/dt \leq \pm 1000\text{ V}/\mu\text{s}$ , Linear voltage ramp,<br>Maximum ramp value = $\pm 500\text{ V}$<br>$di/dt = \pm 20\text{ A}/\mu\text{s}$ , Linear current ramp,<br>Maximum ramp value = $\pm 10\text{ A}$  |           |     | $\pm 302$                  | V                 |
| $I_{(BO)}$ Breakover current                       | $dv/dt = \pm 750\text{ V/ms}$ , $R_{SOURCE} = 300\ \Omega$  | $\pm 100$ |     | $\pm 800$                  | mA                |
| $V_T$ On-state voltage                             | $I_T = \pm 5\text{ A}$ , $t_w = 100\ \mu\text{s}$   |           |     | $\pm 5$                    | V                 |
| $I_H$ Holding current                              | $I_T = \pm 5\text{ A}$ , $di/dt = \pm 30\text{ mA/ms}$  | $\pm 150$ |     | $\pm 600$                  | mA                |
| $dv/dt$ Critical rate of rise of off-state voltage | Linear voltage ramp, maximum ramp value < $0.85V_{DRM}$   | $\pm 5$   |     |                            | kV/ $\mu\text{s}$ |
| $I_D$ Off-state current                            | $V_D = \pm 50\text{ V}$<br>$T_A = 85\text{ }^\circ\text{C}$   |           |     | $\pm 10$                   | $\mu\text{A}$     |
| $C_O$ Off-state capacitance                        | $f = 1\text{ MHz}$ , $V_d = 1\text{ V rms}$ , $V_D = 0\text{ V}$<br>$f = 1\text{ MHz}$ , $V_d = 1\text{ V rms}$ , $V_D = -1\text{ V}$<br>$f = 1\text{ MHz}$ , $V_d = 1\text{ V rms}$ , $V_D = -2\text{ V}$<br>$f = 1\text{ MHz}$ , $V_d = 1\text{ V rms}$ , $V_D = -50\text{ V}$<br>$f = 1\text{ MHz}$ , $V_d = 1\text{ V rms}$ , $V_D = -100\text{ V}$ |           |     | 84<br>67<br>62<br>28<br>26 | pF                |

# TISP7290H3SLL Overvoltage Protector

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## Thermal Characteristics, $T_A = 25\text{ }^\circ\text{C}$ (Unless Otherwise Noted)

| Parameter  | Test Conditions   | Min | Typ | Max | Unit               |
|--|---|-----|-----|-----|--------------------|
| $R_{\theta JA}$ Junction to ambient thermal resistance | EIA/JESD51-3 PCB, $I_T = I_{TSM(1000)}$<br>(see Note 5) |     |     | 50  | $^\circ\text{C/W}$ |

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

## Parameter Measurement Information

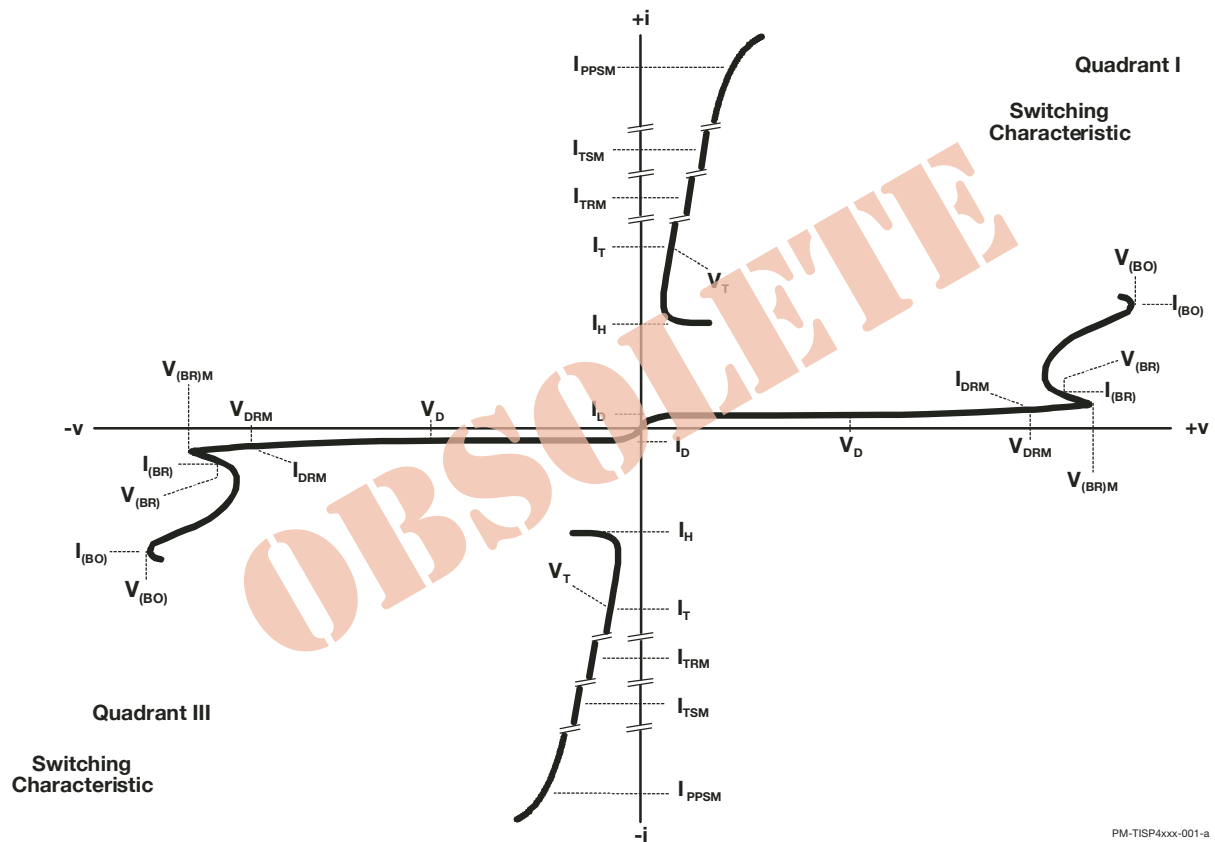


Figure 1. Voltage-Current Characteristic for Terminal Pairs

PM-TISP4xxx-001-a

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