

# TISP70xxL1 (VLV) Overvoltage Protectors

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The TISP70xxL1 is guaranteed to withstand the listed international ESD (ElectroStatic Discharge), and lightning impulses in both polarities. Terminals marked NC do not have any internal connections and may be left floating or tied to some circuit point. The TISP7038L1 is a functional replacement for the TPN3021.

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

| Rating   | Symbol            | Value                                     | Unit             |
|--|-------------------|---|------------------|
| Repetitive peak off-state voltage<br>TISP7015L1<br>TISP7038L1  | $V_{\text{DRM}}$  | $\pm 8$<br>$\pm 28$                       | V                |
| Non-repetitive peak on-state pulse current (see Notes 1 and 2)<br>2/10 (Telcordia GR-1089-CORE, 2/10 voltage wave shape)<br>1/20 (ITU-T K.22, 1.2/50 voltage wave shape, also VDE0878)<br>8/20 (IEC 61000-4-5, Figure 12 generator, 1.2/50 voltage wave shape)<br>10/160 (TIA/EIA-IS-968 (formally FCC Part 68), 10/160 voltage wave shape)<br>5/310 (ITU-T K.20/21, 10/700 voltage wave shape, also IEC 61000-4-5 and VDE0433)<br>10/560 (TIA/EIA-IS-968 (formally FCC Part 68), 10/560 voltage wave shape)<br>10/1000 (Telcordia GR-1089-CORE, 10/1000 voltage wave shape) | $I_{\text{PPSM}}$ | 200<br>100<br>100<br>75<br>50<br>40<br>30 | A                |
| Non-repetitive peak on-state current (see Note 1)<br>16.7 ms (60 Hz) full sine wave<br>20 ms (50 Hz) full sine wave<br>0.2 s 50 Hz/60 Hz a.c.<br>2.0 s 50 Hz/60 Hz a.c.  | $I_{\text{TSM}}$  | 9<br>8<br>3<br>1.5                        | 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 TISP70xxL1 must be in thermal equilibrium at the specified TA. The surge may be repeated after the TISP70xxL1 returns to its initial conditions.

2. These non-repetitive rated currents are peak values of either polarity.

## EMC Immunity Test Ratings, $T_A = 25^\circ\text{C}$ (Unless Otherwise Noted)

| Rating  | Symbol           | Value  | Unit |
|---|------------------|--------|------|
| Level 3 open-circuit voltage, IEC 61000-4-2, 2001-4, ESD generator, also ITU-T K.20<br>contact discharge<br>air discharge | $V_{\text{O/C}}$ | 6<br>8 | kV   |

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

| Parameter  | Test Conditions   | Min      | Typ | Max                  | Unit          |
|--|---|----------|-----|----------------------|---------------|
| $I_{\text{DRM}}$ Repetitive peak off-state current | $V_D = \pm V_{\text{DRM}}$  |          |     | $\pm 4$              | $\mu\text{A}$ |
| $V_{(\text{BO})}$ Breakover voltage                | $dv/dt = \pm 250 \text{ V/ms}$ , $R_{\text{SOURCE}} = 300 \Omega$<br>TISP7015L1<br>TISP7038L1 |          |     | $\pm 15$<br>$\pm 38$ | V             |
| $I_{(\text{BO})}$ Breakover current                | $dv/dt = \pm 250 \text{ V/ms}$ , $R_{\text{SOURCE}} = 300 \Omega$                             |          |     | $\pm 300$            | mA            |
| $I_H$ Holding current                              | $I_T = \pm 5 \text{ A}$ , $di/dt = \pm 30 \text{ mA/ms}$                                      | $\pm 30$ |     |                      | mA            |

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

| Parameter                      | Test Conditions  | Min | Typ      | Max | Unit |
|--------------------------------|--|-----|----------|-----|------|
| $C_{KA}$ Off-state capacitance | $f = 1\text{ MHz}$ , $V_d = 1\text{ V rms}$ , $V_D = 0$ (see Note 3) |     | 24<br>17 |     | pF   |
|                                | TISP7015L1<br>TISP7038L1   |     |          |     |      |

NOTE 3: Value for any terminal pair, three-terminal guarded measurement with zero voltage bias on the unmeasured terminal.

## Thermal Characteristics

| Parameter   | Test Conditions   | Min | Typ | Max | Unit                 |
|---|---|-----|-----|-----|----------------------|
| $R_{\theta JA}$ Junction to free air thermal resistance | $P_{tot} = 0.8\text{ W}$ , $T_A = 25\text{ }^{\circ}\text{C}$ , $5\text{ cm}^2$ , FR4 PCB |     |     | 170 | $^{\circ}\text{C/W}$ |

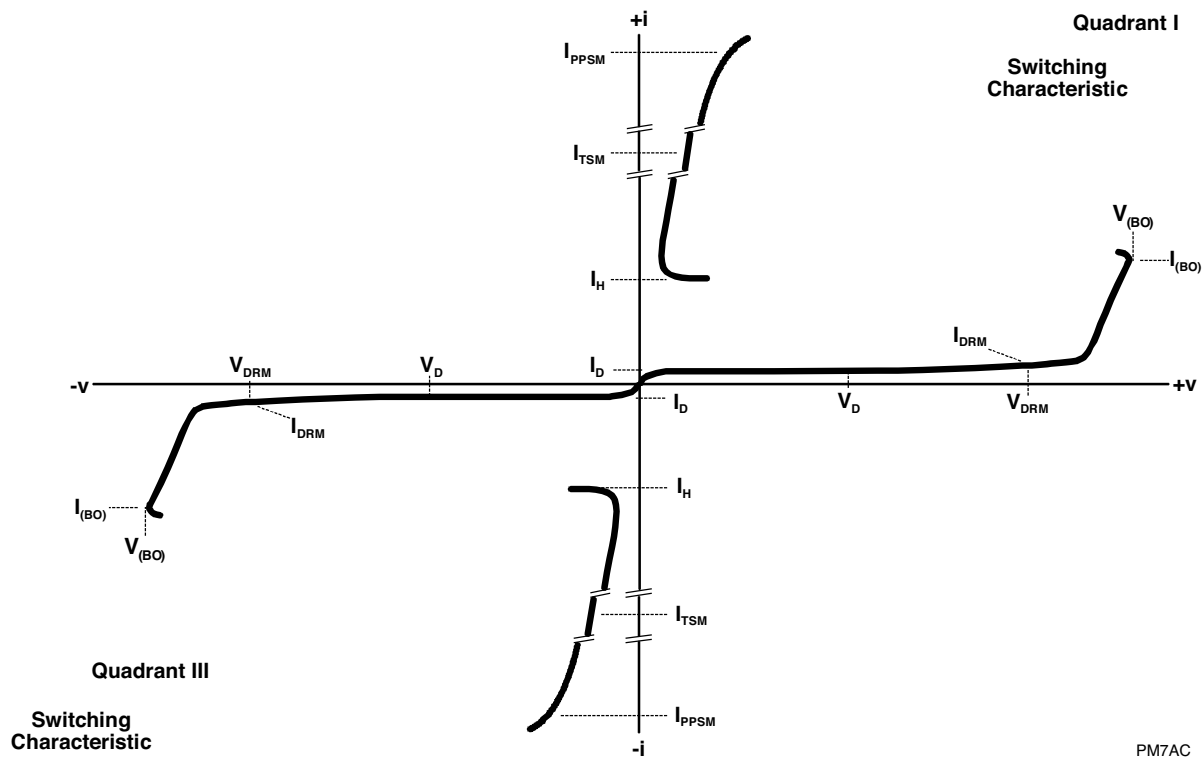
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## Parameter Measurement Information



PM7AC

Figure 1. Voltage-Current Characteristic for any Terminal Pair

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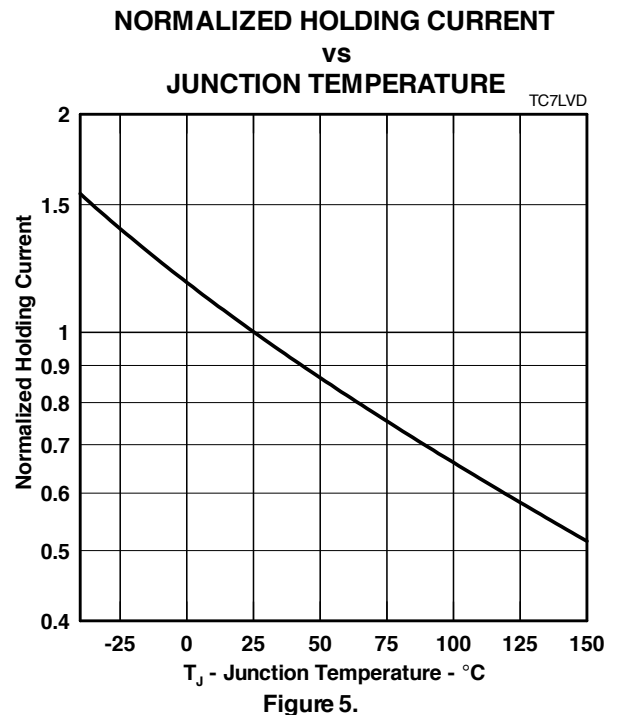
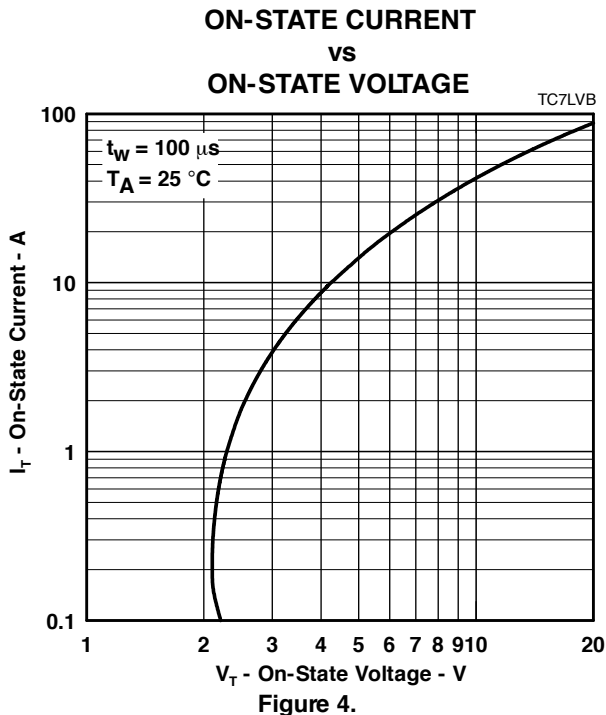
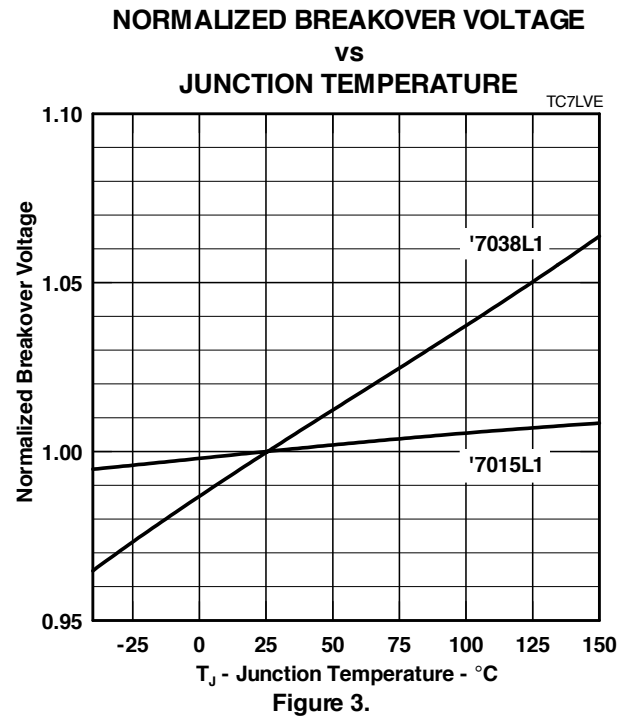
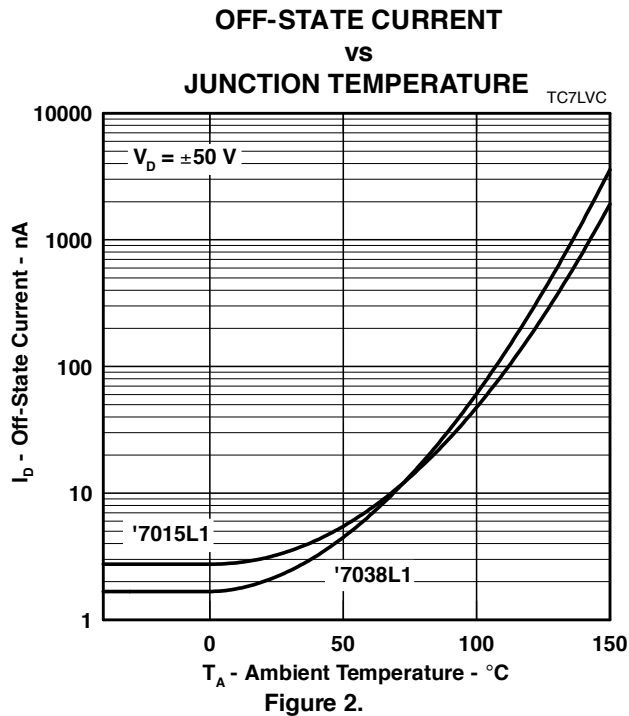
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## Typical Characteristics



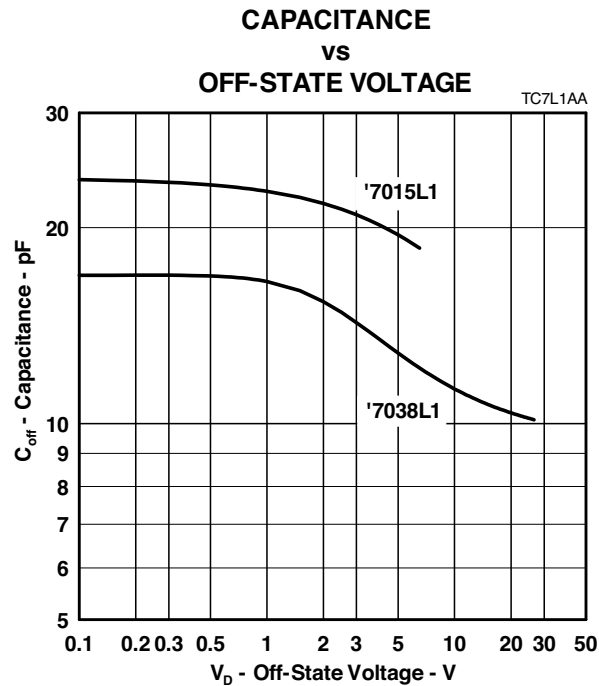
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## Typical Characteristics



**Figure 6.**

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## Rating and Thermal Information

### NON-REPETITIVE PEAK ON-STATE CURRENT VS CURRENT DURATION

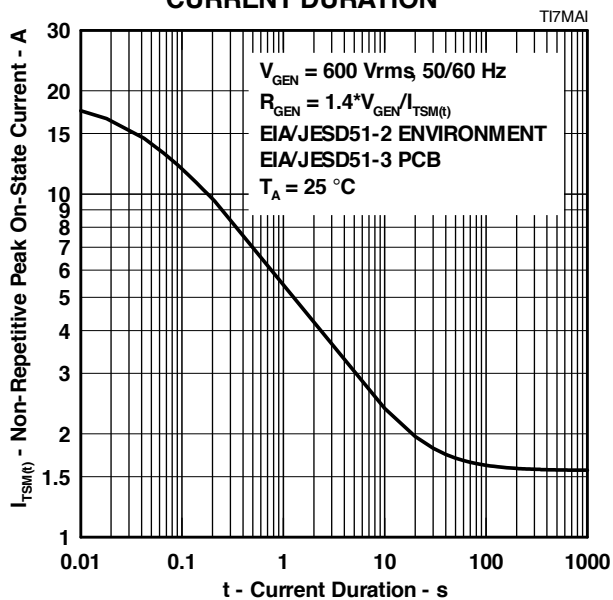


Figure 7.

### $V_{DRM}$ DERATING FACTOR VS MINIMUM AMBIENT TEMPERATURE

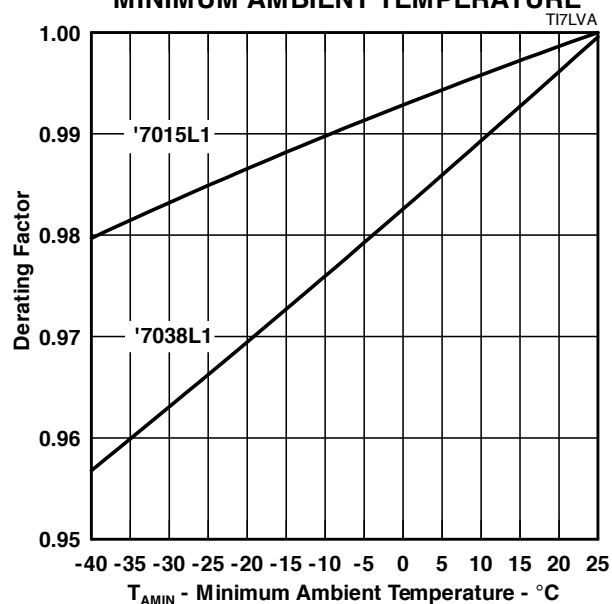


Figure 8.

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## MECHANICAL DATA

### Device Symbolization Code

Devices will be coded as below.

| Device         | Symbolization Code |
|----------------|--------------------|
| TISP7015L1DR-S | 7015L1             |
| TISP7038L1DR-S | 7038L1             |

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