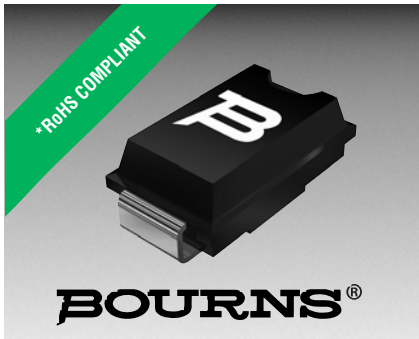




**THE DATASHEET OF
TISP4290L3AJR-S**





TISP4070L3AJ THRU TISP4395L3AJ

BIDIRECTIONAL THYRISTOR OVERVOLTAGE PROTECTORS

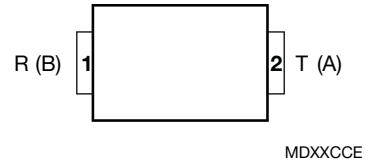
TISP4xxxL3AJ Overvoltage Protector Series

SMA (DO-214AC) Package
25% Smaller Placement Area than SMB

Ion-Implanted Breakdown Region
Precise and Stable Voltage

| Device | V _{DRM} V | V _(BO) V |
|--------|-----------------------|------------------------|
| '4070 | 58 | 70 |
| '4080 | 65 | 80 |
| '4090 | 70 | 90 |
| '4125 | 100 | 125 |
| '4145 | 120 | 145 |
| '4165 | 135 | 165 |
| '4180 | 145 | 180 |
| '4220 | 160 | 220 |
| '4240 | 180 | 240 |
| '4260 | 200 | 260 |
| '4290 | 230 | 290 |
| '4320 | 240 | 320 |
| '4350 | 275 | 350 |
| '4360 | 290 | 360 |
| '4395 | 320 | 395 |

SMAJ Package (Top View)



Device Symbol



Terminals T and R correspond to the alternative line designators of A and B

.....UL Recognized Components

Rated for International Surge Wave Shapes

| Wave Shape | Standard | I _{TSP} A |
|------------|------------------|-----------------------|
| 2/10 μs | GR-1089-CORE | 125 |
| 8/20 μs | IEC 61000-4-5 | 100 |
| 10/160 μs | FCC Part 68 | 65 |
| 10/700 μs | ITU-T K.20/21/45 | 50 |
| 10/560 μs | FCC Part 68 | 40 |
| 10/1000 μs | GR-1089-CORE | 30 |

How to Order

| Device | Package | Carrier | Order As |
|--------------|----------------|-------------------------|-----------------|
| TISP4xxxL3AJ | SMA (DO-214AC) | Embossed Tape Reel Pack | TISP4xxxL3AJR-S |

Insert xxx value corresponding to protection voltages of 070, 080, 090, etc.

*RoHS Directive 2002/95/EC Jan. 27, 2003 including annex and RoHS Recast 2011/65/EU June 8, 2011.

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Users should verify actual device performance in their specific applications.

TISP4xxxL3AJ Overvoltage Protector Series

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Description

These devices are 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 helps prevent d.c. latchup as the diverted current subsides.

The TISP4xxxL3 range consists of fifteen voltage variants to meet various maximum system voltage levels (58 V to 320 V). They are guaranteed to voltage limit and withstand the listed international lightning surges in both polarities. These protection devices are in an SMAJ (JEDEC DO-214AC with J-bend leads) plastic package. These devices are supplied in embossed tape reel carrier pack. For alternative voltage and holding current values, consult the factory. For higher rated impulse currents, the 50 A 10/1000 TISP4xxxM3AJ series in SMA and the 100 A 10/1000 TISP4xxxH3BJ series in SMB are available.

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) | '4070 | ± 58 | V |
| | '4080 | ± 65 | |
| | '4090 | ± 70 | |
| | '4125 | ± 100 | |
| | '4145 | ± 120 | |
| | '4165 | ± 135 | |
| | '4180 | ± 145 | |
| | '4220 | ± 160 | |
| | '4240 | ± 180 | |
| | '4260 | ± 200 | |
| | '4290 | ± 230 | |
| | '4320 | ± 240 | |
| | '4350 | ± 275 | |
| | '4360 | ± 290 | |
| | '4395 | ± 320 | |
| Non-repetitive peak on-state pulse current (see Notes 2, 3 and 4) | I_{TSP} | 125 | A |
| 2/10 μs (GR-1089-CORE, 2/10 μs voltage wave shape) | | 100 | |
| 8/20 μs (IEC 61000-4-5, combination wave generator, 1.2/50 voltage, 8/20 current) | | 65 | |
| 10/160 μs (FCC Part 68, 10/160 μs voltage wave shape) | | 50 | |
| 5/310 μs (ITU-T K.20/21/45, K.44 10/700 μs voltage wave shape) | | 50 | |
| 5/310 μs (FTZ R12, 10/700 μs voltage wave shape) | | 40 | |
| 10/560 μs (FCC Part 68, 10/560 μs voltage wave shape) | | 30 | |
| 10/1000 μs (GR-1089-CORE, 10/1000 μs voltage wave shape) | | | |
| Non-repetitive peak on-state current (see Notes 2, 3 and 4) | I_{TSM} | 18 | A |
| 20 ms (50 Hz) full sine wave | | 7 | |
| 1 s (50 Hz) full sine wave | | 1.6 | |
| 1000 s 50 Hz/60 Hz a.c. | | | |
| Junction temperature | T_J | -40 to +150 | $^\circ\text{C}$ |
| Storage temperature range | T_{stg} | -65 to +150 | $^\circ\text{C}$ |

- NOTES: 1. For voltage values at lower temperatures, derate at 0.13 %/ $^\circ\text{C}$.
 2. Initially, the TISP4xxxL3 must be in thermal equilibrium with $T_J = 25\text{ }^\circ\text{C}$.
 3. The surge may be repeated after the TISP4xxxL3 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 %/ $^\circ\text{C}$ for ambient temperatures above 25 $^\circ\text{C}$.

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TISP4xxxL3AJ Overvoltage Protector Series

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Recommended Operating Conditions

| Component | | Min | Typ | Max | Unit |
|----------------|---|-----|-----|-----|------|
| R _S | series resistor for FCC Part 68, 10/560 type A surge survival | 12 | | | Ω |
| | series resistor for FCC Part 68, 9/720 type B surge survival | 0 | | | Ω |
| | series resistor for GR-1089-CORE first-level and second-level surge survival | 23 | | | Ω |
| | series resistor for K.20, K.21 and K.45 1.5 kV, 10/700 surge survival | 0 | | | Ω |
| | series resistor for K.20, K.21 and K.45 coordination with a 400 V primary protector | 7 | | | Ω |

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 T _A = 85 °C | | | ±5 ±10 | μA |
| V _(BO) Breakover voltage | dv/dt = 50 V/ms, R _{SOURCE} = 300 Ω | | | '4070 '4080 '4090 '4125 '4145 '4165 '4180 '4220 '4240 '4260 '4290 '4320 '4350 '4360 '4395 | V |
| I _(BO) Breakover current | dv/dt = 50 V/ms, R _{SOURCE} = 300 Ω | | | ±0.1 | A |
| I _H Holding current | I _T = ±5 A, di/dt = +/-30 mA/ms | ±0.15 | | ±0.60 | A |
| dv/dt Critical rate of rise of off-state voltage | Linear voltage ramp, Maximum ramp value < 0.85V _{DRM} | ±5 | | | kV/μs |
| I _D Off-state current | '4070, V _D = ± 52V '4080, V _D = ± 59V '4090, V _D = ± 63V '4125, V _D = ±90 V '4145, V _D = ±108 V '4165, V _D = ±122 V '4180, V _D = ±131 V '4220, V _D = ±144 V '4240, V _D = ±162 V '4260, V _D = ±180 V '4290, V _D = ±207 V '4320, V _D = ±216 V '4350, V _D = ±248 V '4360, V _D = ±261 V '4395, V _D = ±288 V | | | ±2 | μA |
| I _D Off-state current | V _D = ±50 V | | | ±10 | μA |

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TISP4xxxL3AJ Overvoltage Protector Series

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

| Parameter | Test Conditions | Min | Typ | Max | Unit |
|---------------------------------|---|------------------|-----|-----|------|
| C_{off} Off-state capacitance | $f = 1\text{ MHz}$, $V_d = 1\text{ V rms}$, $V_D = \pm 1\text{ V}$ | 4070 thru '4090 | 53 | 64 | pF |
| | | '4125 thru '4220 | 40 | 48 | |
| | | '4240 thru '4395 | 33 | 40 | |
| | $f = 1\text{ MHz}$, $V_d = 1\text{ V rms}$, $V_D = \pm 50\text{ V}$ | '4070 thru '4090 | 25 | 30 | |
| | | '4125 thru '4220 | 18 | 22 | |
| | | '4240 thru '4395 | 14 | 17 | |

Thermal Characteristics

| Parameter | Test Conditions | Min | Typ | Max | Unit |
|---|---|-----|-----|-----|--------------------|
| $R_{\theta JA}$ Junction to free air thermal resistance | EIA/JESD51-3 PCB, $I_T = I_{TSM(1000)}$, $T_A = 25\text{ }^\circ\text{C}$, (see Note 75) | | | 115 | $^\circ\text{C/W}$ |
| | 265 mm x 210 mm populated line card, 4-layer PCB, $I_T = I_{TSM(1000)}$, $T_A = 25\text{ }^\circ\text{C}$ | | 52 | | |

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

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Parameter Measurement Information

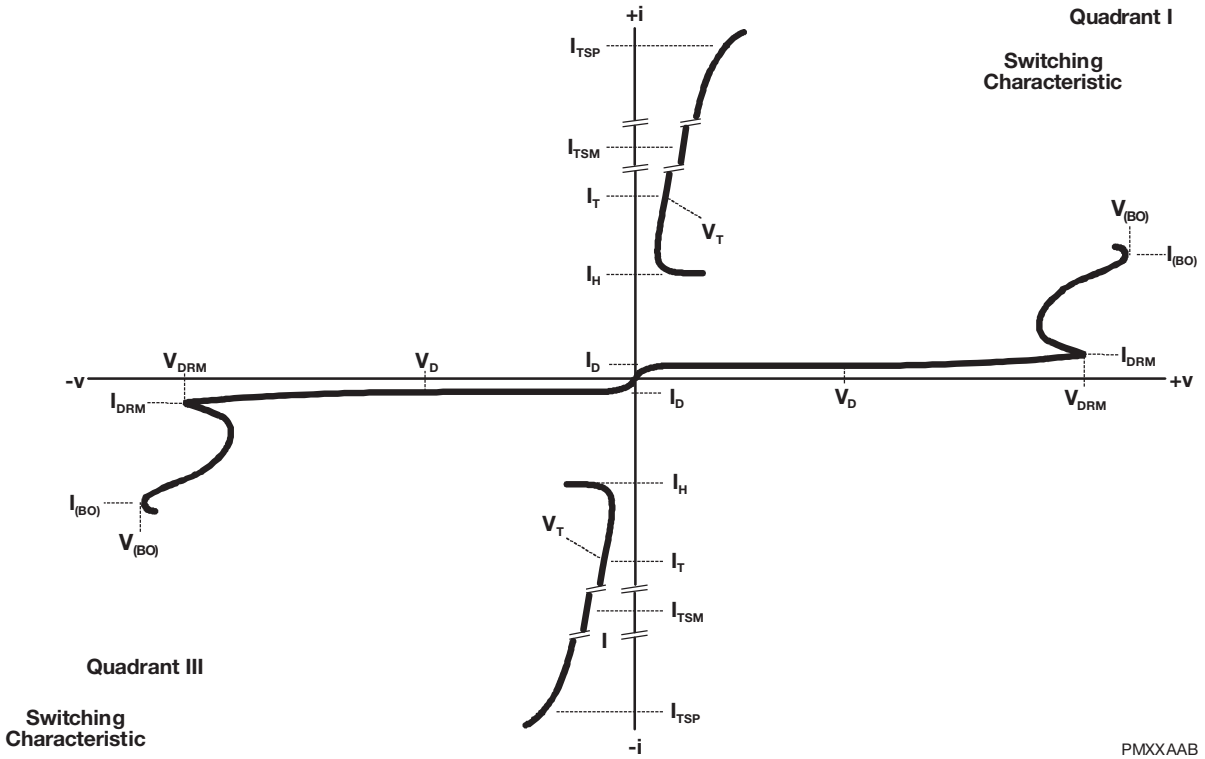


Figure 1. Voltage-Current Characteristic for T and R Terminals
All Measurements are Referenced to the R Terminal

PMXXAAB

Typical Characteristics

**OFF-STATE CURRENT
VS
JUNCTION TEMPERATURE**

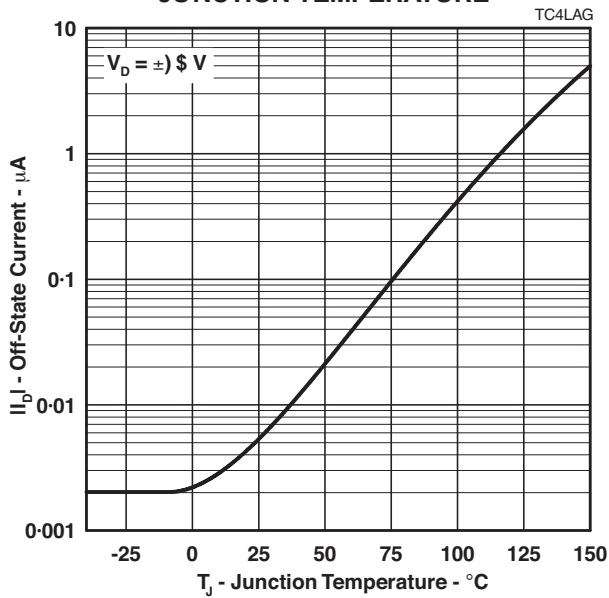


Figure 2.

**NORMALIZED BREAKOVER VOLTAGE
VS
JUNCTION TEMPERATURE**

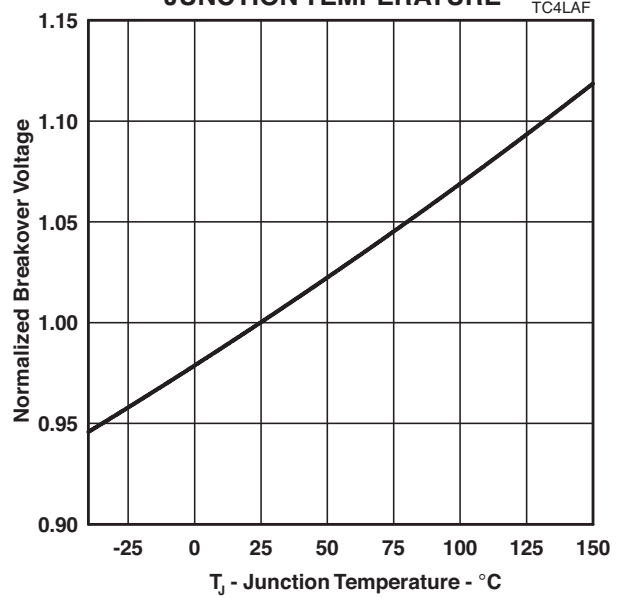


Figure 3.

**ON-STATE CURRENT
VS
ON-STATE VOLTAGE**

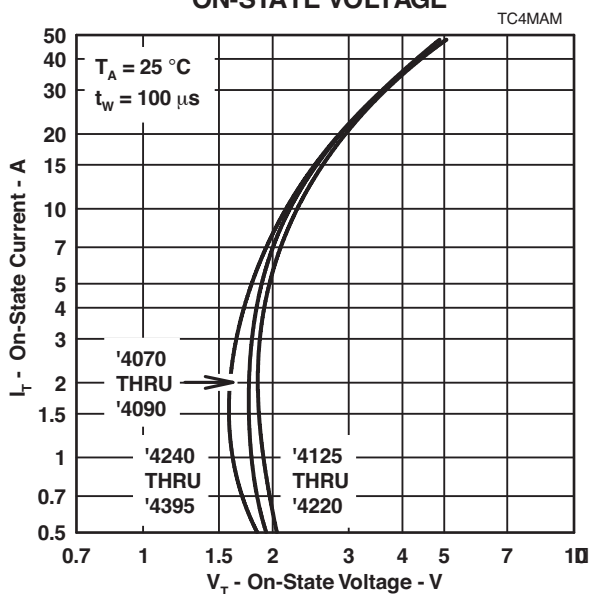


Figure 4.

**NORMALIZED HOLDING CURRENT
VS
JUNCTION TEMPERATURE**

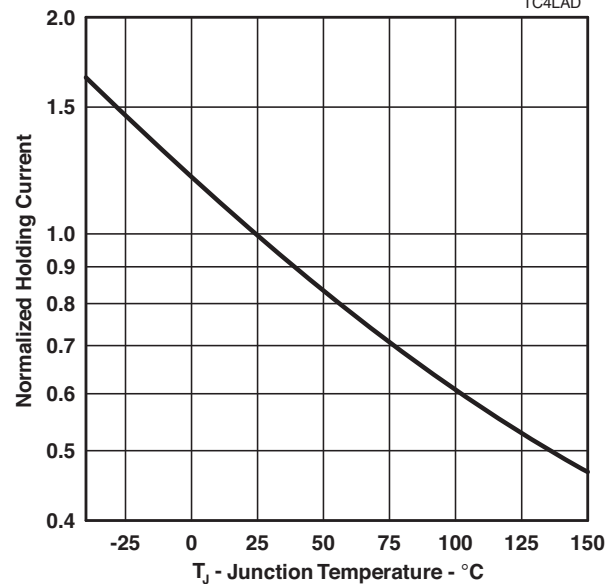
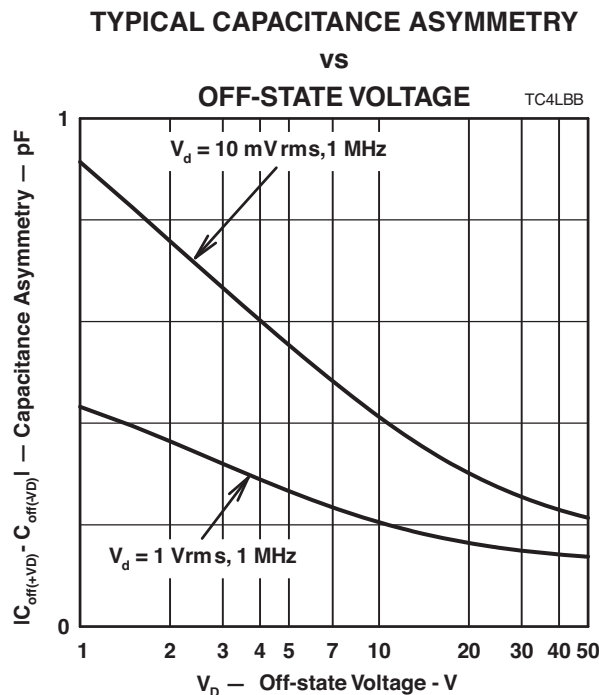
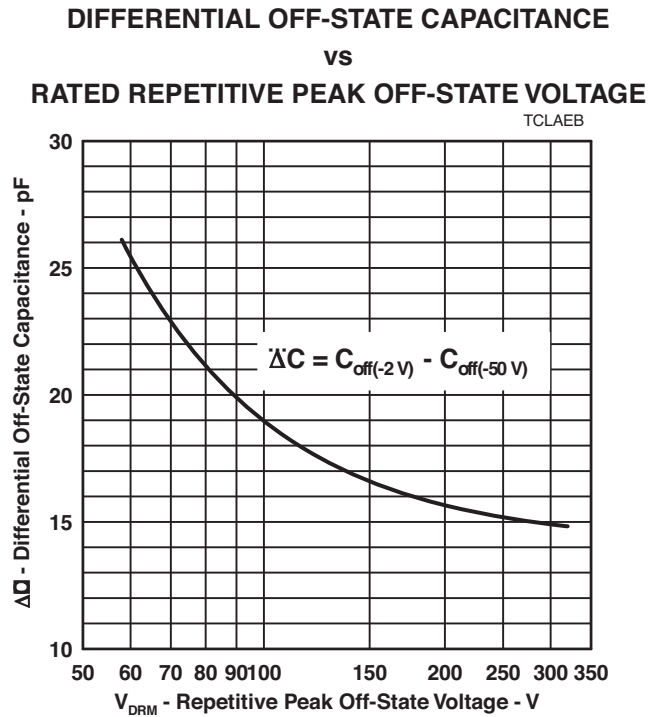
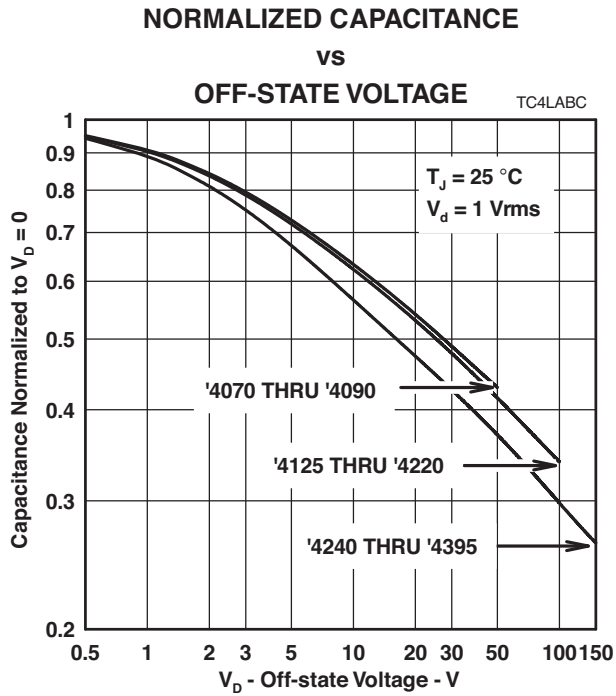


Figure 5.

Typical Characteristics



Rating and Thermal Information

NON-REPETITIVE PEAK ON-STATE CURRENT VS CURRENT DURATION

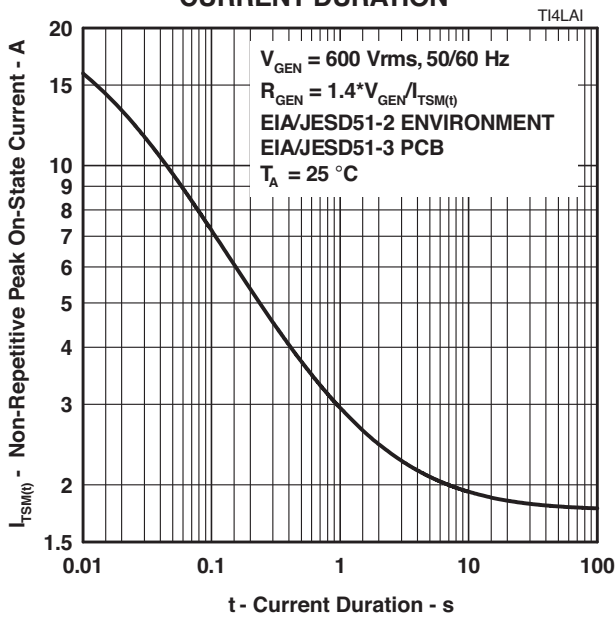


Figure 9.

V_{DRM} DERATING FACTOR VS MINIMUM AMBIENT TEMPERATURE

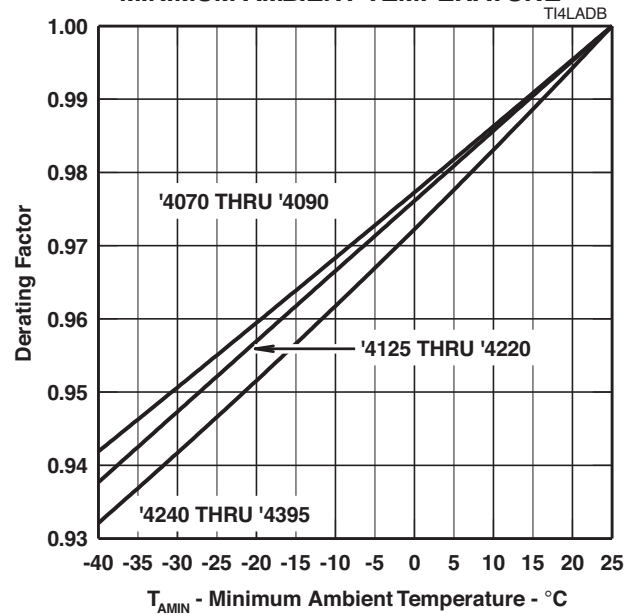


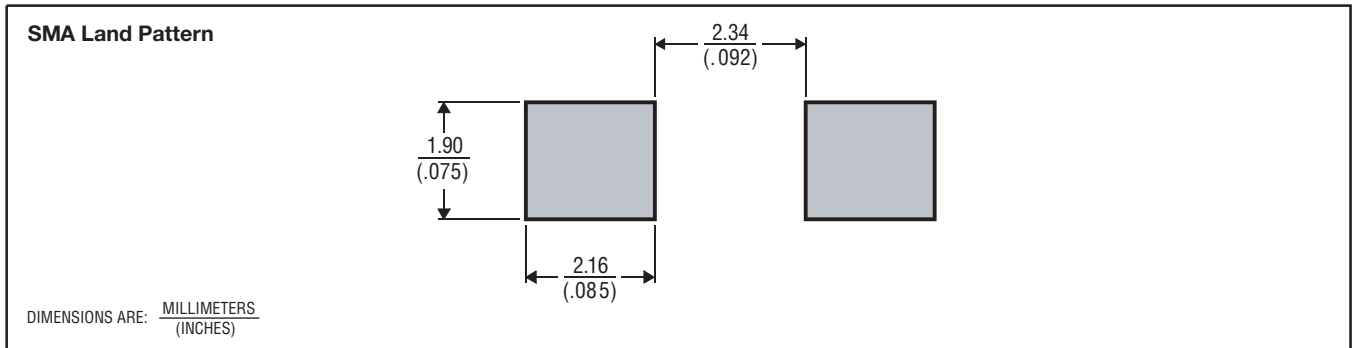
Figure 10.

TISP4xxxL3AJ Overvoltage Protector Series

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MECHANICAL DATA

Recommended Printed Wiring Land Pattern Dimensions



MDXXBIC

Device Symbolization Code

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

| Device | Symbolization Code |
|------------|--------------------|
| TISP4070L3 | 4070L |
| TISP4080L3 | 4080L |
| TISP4090L3 | 4090L |
| TISP4125L3 | 4125L |
| TISP4145L3 | 4145L |
| TISP4165L3 | 4165L |
| TISP4180L3 | 4180L |
| TISP4220L3 | 4220L |
| TISP4240L3 | 4240L |
| TISP4260L3 | 4260L |
| TISP4290L3 | 4290L |
| TISP4320L3 | 4320L |
| TISP4350L3 | 4350L |
| TISP4360L3 | 4360L |
| TISP4395L3 | 4395L |

Carrier Information

For production quantities, the carrier will be embossed tape reel pack. Evaluation quantities may be shipped in bulk pack or embossed tape.

| Carrier | Standard Quantity |
|-------------------------|-------------------|
| Embossed Tape Reel Pack | 5,000 |

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