



**TISP4072F3LM THRU TISP4082F3LM,  
TISP4125F3LM THRU TISP4180F3LM,  
TISP4240F3LM THRU TISP4380F3LM**

**BIDIRECTIONAL THYRISTOR OVERVOLTAGE PROTECTORS**

**TISP4xxxF3LM Overvoltage Protector Series**

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

| Device | V <sub>DRM</sub><br>V | V <sub>(BO)</sub><br>V |
|--------|-----------------------|------------------------|
| '4072  | 58                    | 72                     |
| '4082  | 66                    | 82                     |
| '4125  | 100                   | 125                    |
| '4150  | 120                   | 150                    |
| '4180  | 145                   | 180                    |
| '4240  | 180                   | 240                    |
| '4260  | 200                   | 260                    |
| '4290  | 220                   | 290                    |
| '4320  | 240                   | 320                    |
| '4380  | 270                   | 380                    |

**Rated for International Surge Wave Shapes**

| Waveshape  | Standard      | I <sub>TSP</sub><br>A |
|------------|---------------|-----------------------|
| 10/160 μs  | FCC Part 68   | 60                    |
| 0.5/700 μs | I3124         | 38                    |
| 10/700 μs  | ITU-T K.20/21 | 50                    |
| 10/560 μs  | FCC Part 68   | 45                    |
| 10/1000 μs | REA PE-60     | 35                    |

**UL Recognized Component**

**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 to 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.

**How To Order**

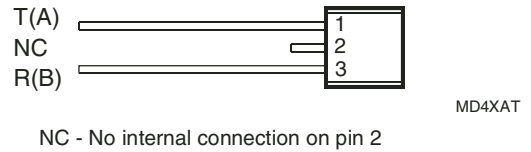
| Device       | Package                  | Carrier         | For Standard Termination Finish Order As | For Lead Free Termination Finish Order As |
|--------------|--------------------------|-----------------|--|---|
| TISP4xxxF3LM | Straight Lead DO-92 (LM) | Bulk Pack       | TISP4xxxF3LM                             | TISP4xxxF3LM-S                            |
|              |                          | Tape and Reeled | TISP4xxxF3LMR                            | TISP4xxxF3LMR-S                           |
|              | Formed Lead DO-92 (LMF)  | Tape and Reeled | TISP4xxxF3LMFR                           | TISP4xxxF3LMFRS                           |

Insert xxx value corresponding to protection voltages of 072, 082, 125 etc.

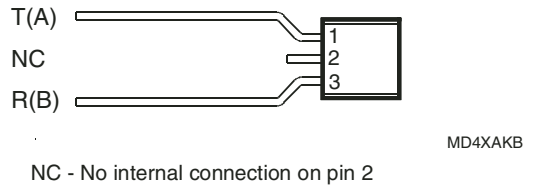
\*RoHS Directive 2002/95/EC Jan 27 2003 including Annex NOVEMBER 1997 - REVISED FEBRUARY 2005

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

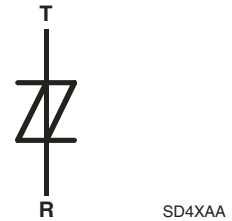
**LM Package (Top View)**



**LMF Package (LM Package with Formed Leads) (Top View)**



**Device Symbol**



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

# TISP4xxxF3LM Overvoltage Protector Series

**BOURNS®**

## Description (continued)

This TISP4xxxF3LM range consists of ten voltage variants to meet various maximum system voltage levels (58 V to 270 V). They are guaranteed to voltage limit and withstand the listed international lightning surges in both polarities. These protection devices are supplied in a DO-92 (LM) cylindrical plastic package. The TISP4xxxF3LM is a straight lead DO-92 supplied in bulk pack and on tape and reeled. The TISP4xxxF3LMF is a formed lead DO-92 supplied only on tape and reeled.

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

| Rating  | Symbol    | Value       | Unit  |
|---|-----------|-------------|---|
| Repetitive peak off-state voltage ( $0\text{ °C} < T_J < 70\text{ °C}$ )                          | '4072     | ± 58        | V   |
|   | '4082     | ± 66        |   |
|   | '4125     | ± 100       |   |
|   | '4150     | ± 120       |   |
|   | '4180     | ± 145       |   |
|   | '4240     | ± 180       |   |
|   | '4260     | ± 200       |   |
|   | '4290     | ± 220       |   |
|   | '4320     | ± 240       |   |
|   | '4380     | ± 270       |   |
| Non-repetitive peak on-state pulse current (see Notes 1, 2 and 3)                                 | $I_{TSP}$ | A           | 2/10 $\mu\text{s}$ (FCC Part 68, 2/10 $\mu\text{s}$ voltage wave shape) excluding '4072 - '4082 |
| 8/20 $\mu\text{s}$ (ANSI C62.41, 1.2/50 $\mu\text{s}$ voltage wave shape) excluding '4072 - '4082 |           |             |   |
| 10/160 $\mu\text{s}$ (FCC Part 68, 10/160 $\mu\text{s}$ voltage wave shape)                       |           |             |   |
| 5/200 $\mu\text{s}$ (VDE 0433, 2 kV, 10/700 $\mu\text{s}$ voltage wave shape)                     |           |             |   |
| 0.2/310 $\mu\text{s}$ (I3124, 1.5 kV, 0.5/700 $\mu\text{s}$ voltage wave shape)                   |           |             |   |
| 5/310 $\mu\text{s}$ (ITU-T K.20/21, 1.5 kV, 10/700 $\mu\text{s}$ voltage wave shape)              |           |             |   |
| 5/310 $\mu\text{s}$ (FTZ R12, 2 kV, 10/700 $\mu\text{s}$ voltage wave shape)                      |           |             |   |
| 10/560 $\mu\text{s}$ (FCC Part 68, 10/560 $\mu\text{s}$ voltage wave shape)                       |           |             |   |
| 10/1000 $\mu\text{s}$ (REA PE-60, 10/1000 $\mu\text{s}$ voltage wave shape)                       |           |             |   |
| 2/10 $\mu\text{s}$ (FCC Part 68, 2/10 $\mu\text{s}$ voltage wave shape) '4072 - '4082 only        |           |             |   |
| 8/20 $\mu\text{s}$ (ANSI C62.41, 1.2/50 $\mu\text{s}$ voltage wave shape) '4072 - '4082 only      |           |             |   |
| Non-repetitive peak on-state current (see Notes 2 and 3)  | $I_{TSM}$ | 4           | A   |
| 50/60 Hz, 1 s   |           |             |   |
| Initial rate of rise of on-state current, Linear current ramp, Maximum ramp value < 38 A          | $di_T/dt$ | 250         | A/ $\mu\text{s}$  |
| Junction temperature  | $T_J$     | -40 to +150 | °C  |
| Storage temperature range   | $T_{stg}$ | -55 to +150 | °C  |

- NOTES: 1. Initially the TISP must be in thermal equilibrium with  $0\text{ °C} < T_J < 70\text{ °C}$ .  
 2. The surge may be repeated after the TISP returns to its initial conditions.  
 3. Above  $70\text{ °C}$ , derate linearly to zero at  $150\text{ °C}$  lead temperature.

# TISP4xxxF3LM Overvoltage Protector Series

**BOURNS®**

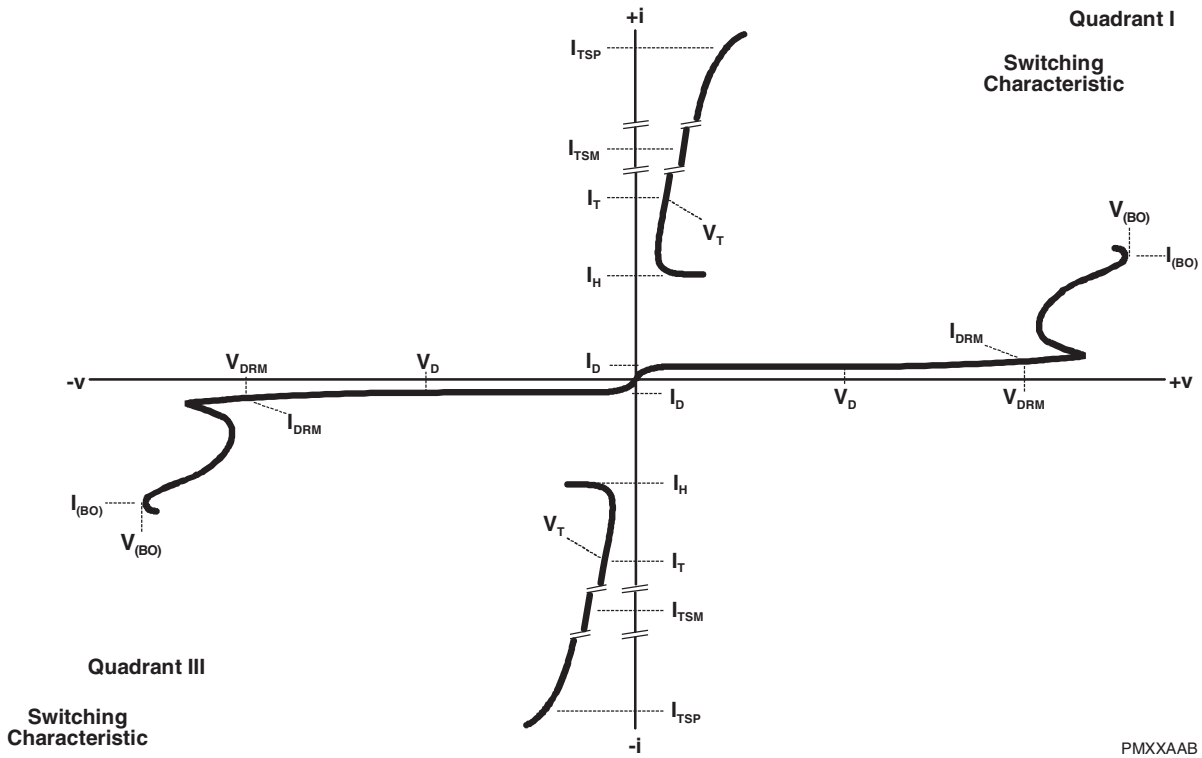
## Electrical Characteristics for R and T Terminals, T<sub>J</sub> = 25 °C (Unless Otherwise Noted)

| Parameter  | Test Conditions  | Min   | Typ | Max  | Unit  |
|--|--|-------|-----|------|-------|
| I <sub>DRM</sub> Repetitive peak off-state current | V <sub>D</sub> = ±V <sub>DRM</sub> , 0 °C < T <sub>J</sub> < 70 °C |       |     | ±10  | μA    |
| V <sub>(BO)</sub> Breakover voltage                | dv/dt = ±250 V/ms, R <sub>SOURCE</sub> = 300 Ω                     |       |     | ±72  | V     |
|  |  |       |     | ±82  |       |
|  |  |       |     | ±125 |       |
|  |  |       |     | ±150 |       |
|  |  |       |     | ±180 |       |
|  |  |       |     | ±240 |       |
|  |  |       |     | ±260 |       |
|  |  |       |     | ±290 |       |
|  |  |       |     | ±320 |       |
| V <sub>(BO)</sub> Impulse breakover voltage        | dv/dt = ±1000 V/μs, R <sub>SOURCE</sub> = 50 Ω<br>di/dt < 20 A/μs  |       |     | ±86  | V     |
|  |  |       |     | ±96  |       |
|  |  |       |     | ±143 |       |
|  |  |       |     | ±168 |       |
|  |  |       |     | ±198 |       |
|  |  |       |     | ±267 |       |
|  |  |       |     | ±287 |       |
|  |  |       |     | ±317 |       |
|  |  |       |     | ±347 |       |
|  |  | ±407  |     |      |       |
| I <sub>(BO)</sub> Breakover current                | dv/dt = ±250 V/ms, R <sub>SOURCE</sub> = 300 Ω                     | ±0.15 |     | ±0.6 | A     |
| V <sub>T</sub> On-state voltage                    | I <sub>T</sub> = ±5 A, t <sub>W</sub> = 100 μs                     |       |     | ±3   | V     |
| I <sub>H</sub> Holding current                     | I <sub>T</sub> = ±5 A, di/dt = -/+30 mA/ms                         | ±0.15 |     |      | A     |
| dv/dt Critical rate of rise of off-state voltage   | Linear voltage ramp, Maximum ramp value < 0.85V <sub>DRM</sub>     | ±5    |     |      | kV/μs |
| I <sub>D</sub> Off-state current                   | V <sub>D</sub> = ±50 V   |       |     | ±10  | μA    |
| C <sub>off</sub> Off-state capacitance             | f = 100 kHz, V <sub>d</sub> = 1 V r.m.s., V <sub>D</sub> = 0,      |       | 63  | 108  | pF    |
|  |  |       | 43  | 74   |       |
|  |  |       | 44  | 74   |       |
|  | f = 100 kHz, V <sub>d</sub> = 1 V r.m.s., V <sub>D</sub> = -50 V   |       | 25  | 40   |       |
|  |  |       | 15  | 25   |       |
|  |  |       | 11  | 20   |       |

## Thermal Characteristics

| Parameter  | Test Conditions                                       | Min | Typ | Max | Unit |
|--|---|-----|-----|-----|------|
| R <sub>θJA</sub> Junction to free air thermal resistance | EIA/JESD51-3 PCB mounted in an EIA/JESD51-2 enclosure |     |     | 120 | °C/W |

Parameter Measurement Information



PMXXAAB

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

## Typical Characteristics

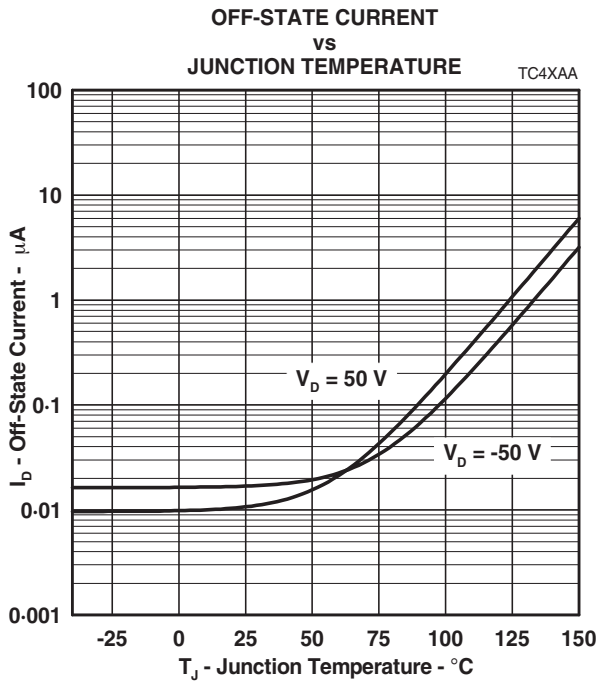


Figure 2.

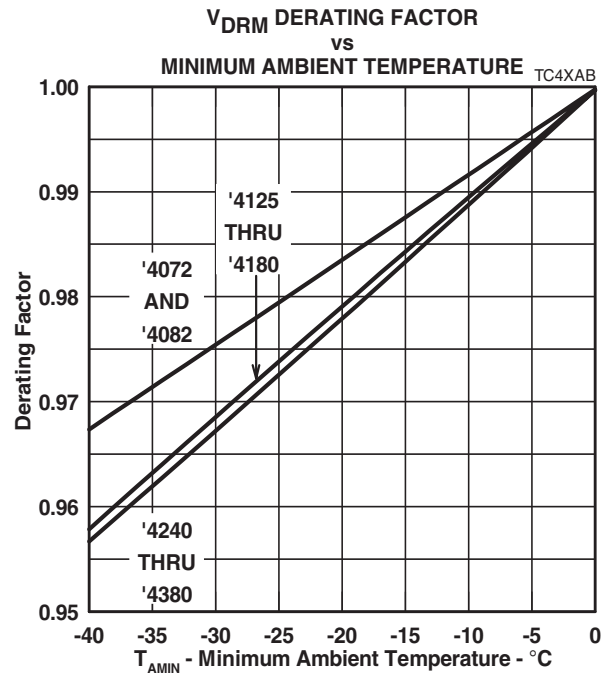


Figure 3.

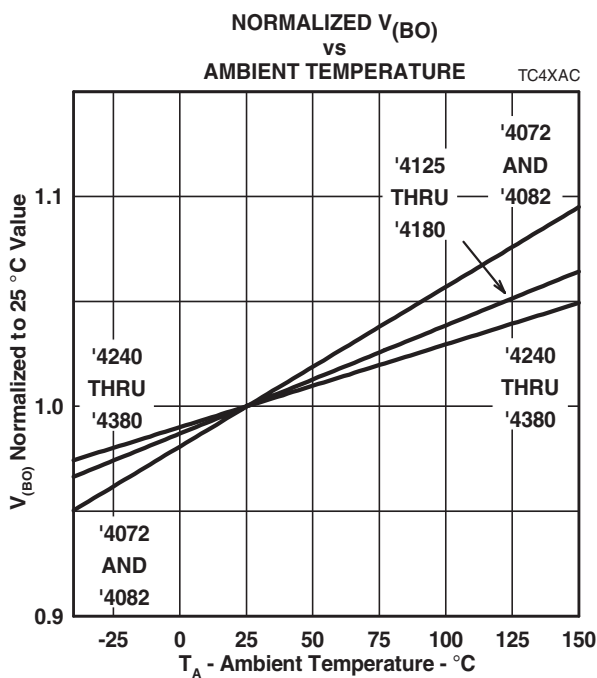


Figure 4.

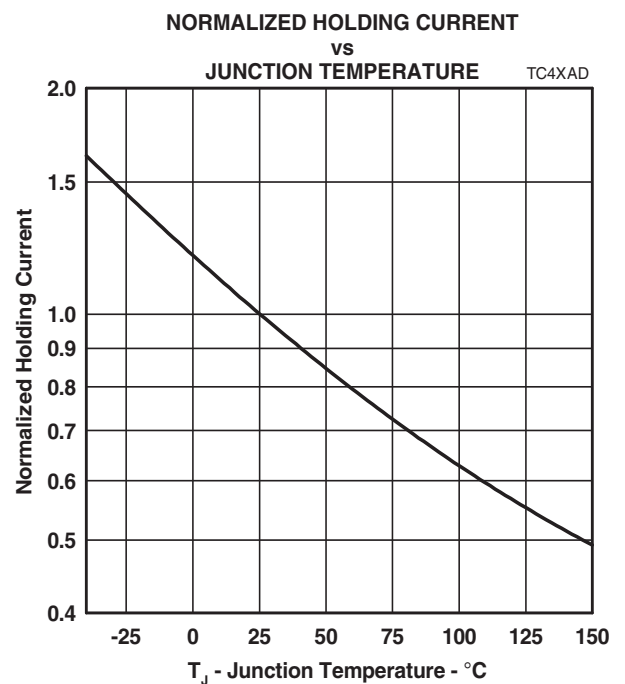


Figure 5.

## Typical Characteristics

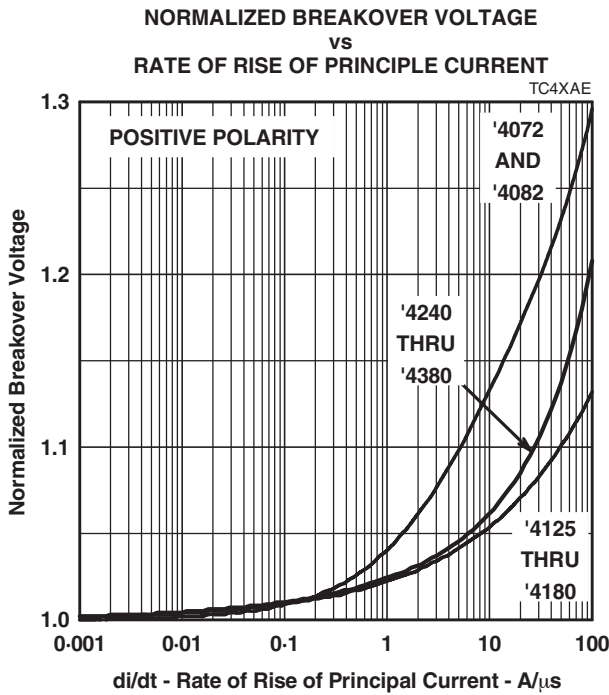


Figure 6.

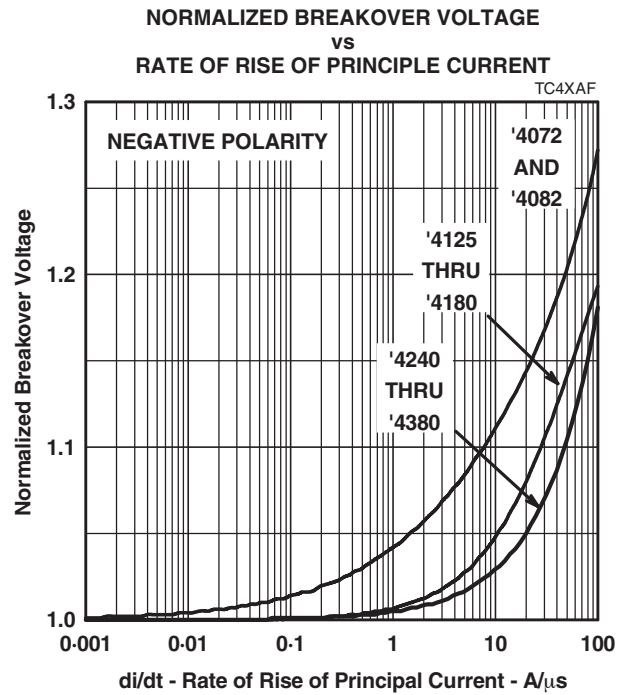


Figure 7.

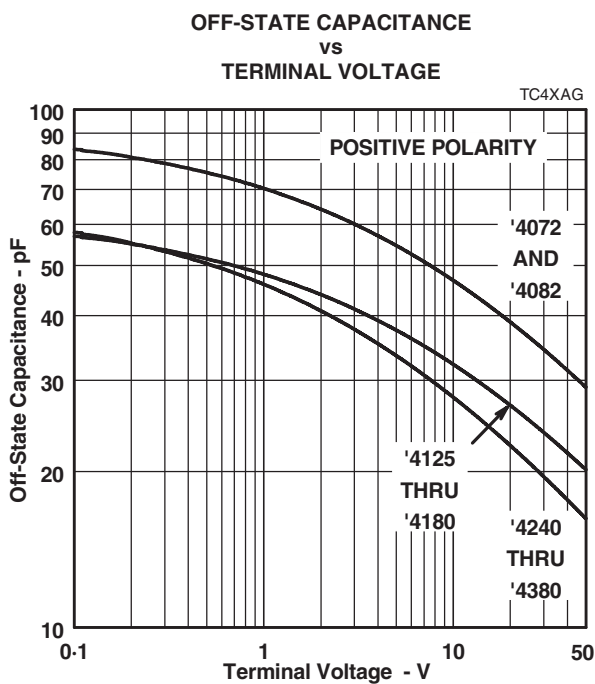


Figure 8.

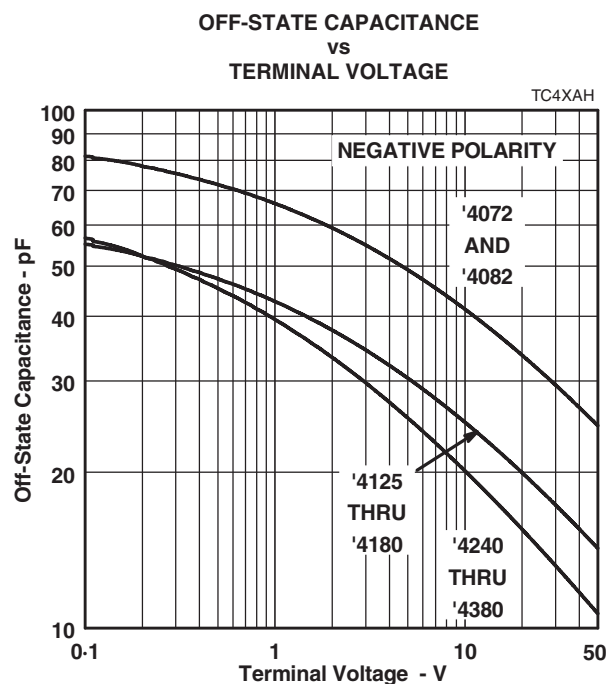


Figure 9.

Typical Characteristics

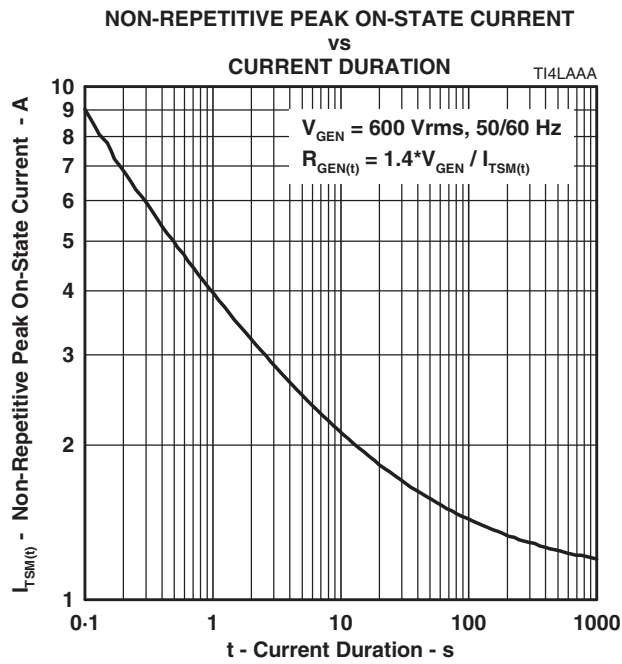


Figure 10.

# TISP4xxxF3LM Overvoltage Protector Series

**BOURNS®**

## MECHANICAL DATA

### Device Symbolization Code

Devices will be coded as below.

| Device     | Symbolization Code |
|------------|--------------------|
| TISP4072F3 | 4072F3             |
| TISP4082F3 | 4082F3             |
| TISP4125F3 | 4125F3             |
| TISP4150F3 | 4150F3             |
| TISP4180F3 | 4180F3             |
| TISP4240F3 | 4240F3             |
| TISP4260F3 | 4260F3             |
| TISP4290F3 | 4290F3             |
| TISP4320F3 | 4320F3             |
| TISP4380F3 | 4380F3             |

### Carrier Information

Devices are shipped in one of the carriers below. A reel contains 2,000 devices.

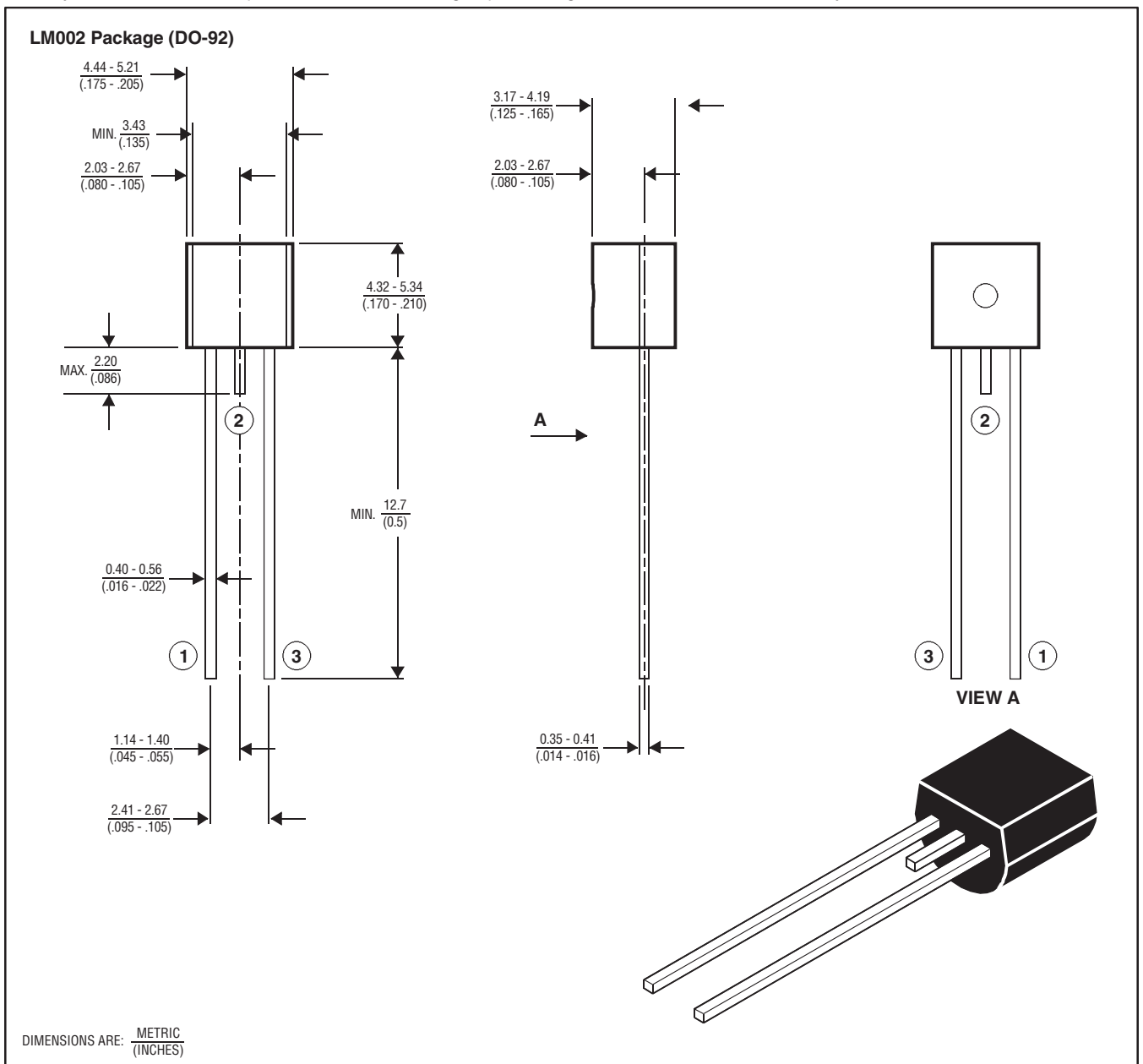
| Package Type        | Carrier         | For Standard Termination Finish Order As | For Lead Free Termination Finish Order As |
|---------------------|-----------------|--|---|
| Straight Lead DO-92 | Bulk Pack       | TISP4xxxF3LM                             | TISP4xxxF3LM-S                            |
| Straight Lead DO-92 | Tape and Reeled | TISP4xxxF3LMR                            | TISP4xxxF3LMR-S                           |
| Formed Lead DO-92   | Tape and Reeled | TISP4xxxF3LMFR                           | TISP4xxxF3LMFRS                           |



## MECHANICAL DATA

### LM002 (DO-92) 2-Pin Cylindrical Plastic Package

This single-in-line 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.



MD4XARA

# TISP4xxxF3LM Overvoltage Protector Series

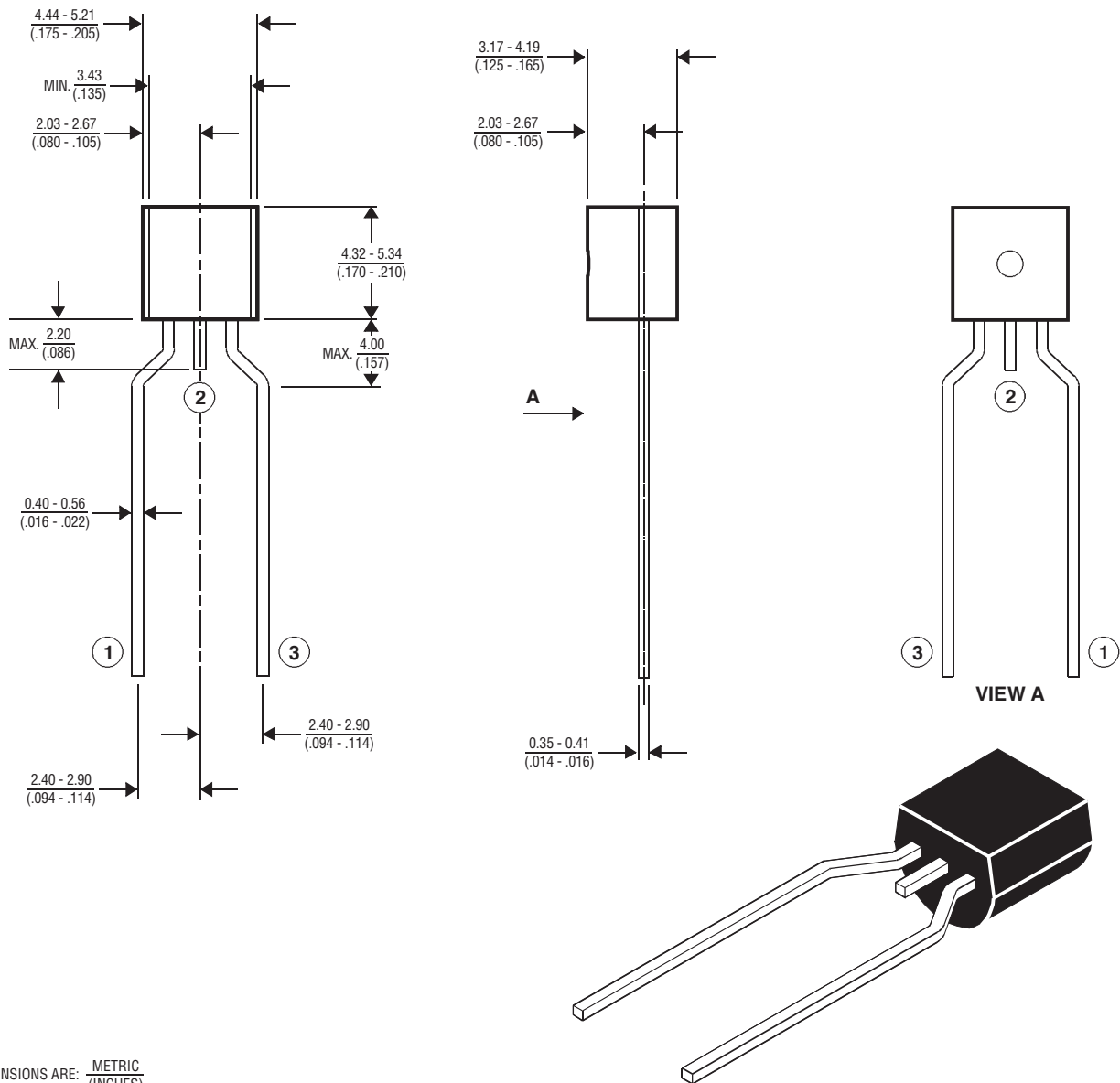
**BOURNS®**

## MECHANICAL DATA

### LM002 (DO-92) - Formed Leads Version - 2-Pin Cylindrical Plastic Package

This single-in-line 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.

### LMF002 (DO-92) - Formed Leads Version of LM002



DIMENSIONS ARE: METRIC  
(INCHES)

MD4XASA

# TISP4xxxF3LM Overvoltage Protector Series

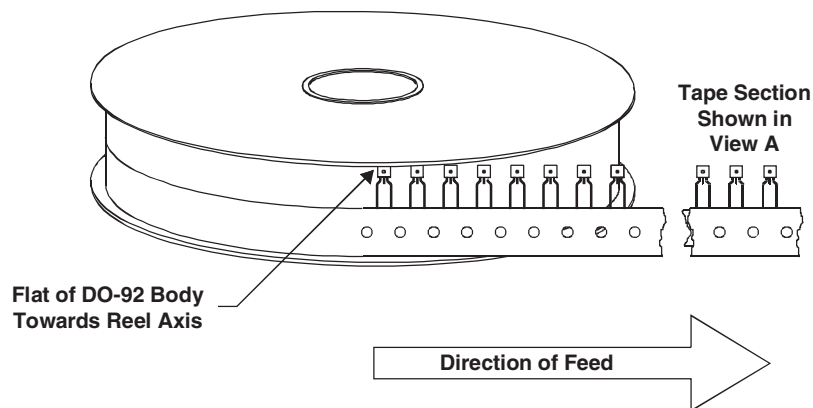
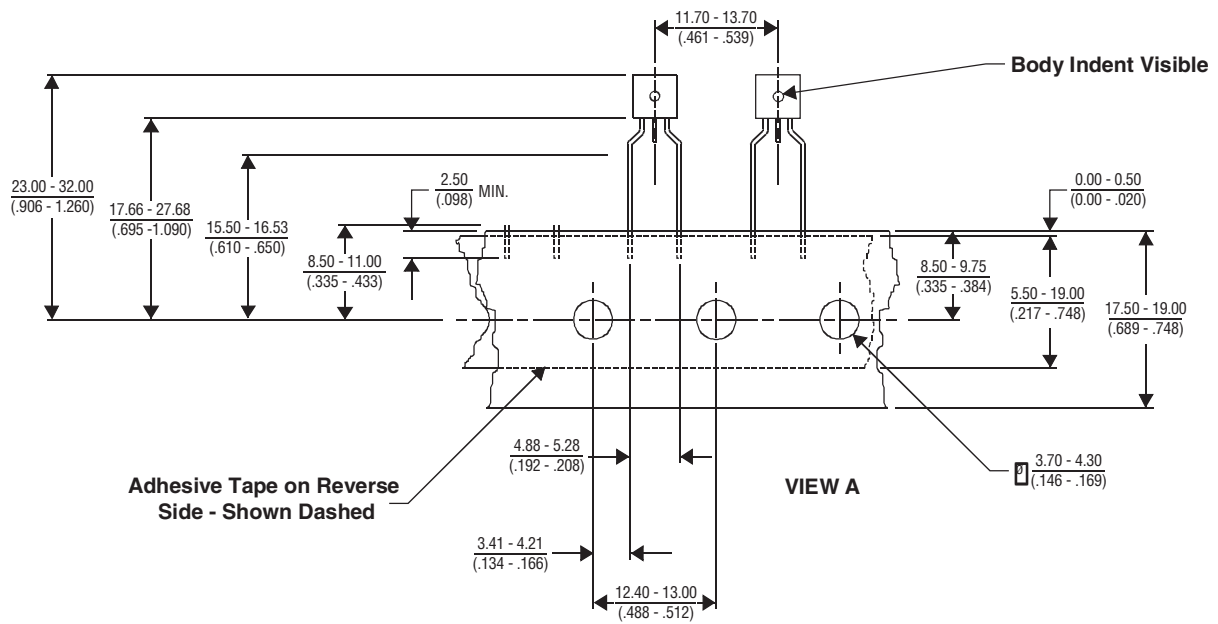
**BOURNS®**

## MECHANICAL DATA

### Tape Dimensions

LMF002 Package (Formed Lead DO-92) Tape

LMF002 Tape Dimensions Conform to the Requirements of EIA-468-B



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

MD4XAQC

"TISP" is a trademark of Bourns, Ltd., a Bourns Company, and is Registered in U.S. Patent and Trademark Office. "Bourns" is a registered trademark of Bourns, Inc. in the U.S. and other countries.

NOVEMBER 1997 - REVISED FEBRUARY 2005

Specifications are subject to change without notice.

Customers should verify actual device performance in their specific applications.