



TISP4SxxxL1BJ,  
TISP4SxxxM1BJ, TISP4SxxxM3BJ,  
TISP4SxxxT3BJ

## BIDIRECTIONAL THYRISTOR OVERVOLTAGE PROTECTORS

### TISP4SxxxBJ Overvoltage Protector Series

#### TISP4SxxxBJ Overview

These protection 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 onto 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 within rated limits through the device. The high crowbar holding current helps prevent d.c. latchup as the diverted current subsides.

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

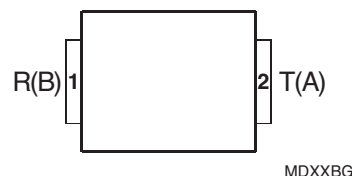
| Part Number      | $V_{\text{DRM}}$<br>(V) | Max. $V_{\text{BO}}$<br>@ 100 V/ $\mu\text{s}$<br>(V) | Min. $I_{\text{H}}$<br>$di/dt = 1 \text{ A/ms}$<br>(mA) | Max. $I_{\text{BO}}$<br>(mA) | Max. $I_{\text{T}}$<br>(A) | Off-State<br>Current<br>$I_{\text{D}}$ @ $V_{\text{DRM}}$<br>( $\mu\text{A}$ ) | On-State<br>Voltage<br>$V_{\text{T}}$ @ $I_{\text{T}} = 2.2 \text{ A}$<br>(V) | Typ. $C_j$<br>@ 1 V,<br>1 MHz<br>(pF) |
|------------------|-------------------------|-------------------------------------------------------|---------------------------------------------------------|------------------------------|----------------------------|--------------------------------------------------------------------------------|-------------------------------------------------------------------------------|---------------------------------------|
| TISP4S040L1BJR-S | $\pm 25$                | $\pm 40$                                              | 50                                                      | 800                          | 2.2                        | $\pm 5.0$                                                                      | $\pm 5.0$                                                                     | 100                                   |
| TISP4S040M1BJR-S | $\pm 25$                | $\pm 40$                                              | 50                                                      | 800                          | 2.2                        | $\pm 5.0$                                                                      | $\pm 5.0$                                                                     | 120                                   |
| TISP4S077M3BJR-S | $\pm 58$                | $\pm 77$                                              | 150                                                     | 800                          | 2.2                        | $\pm 5.0$                                                                      | $\pm 5.0$                                                                     | 75                                    |
| TISP4S088M3BJR-S | $\pm 65$                | $\pm 88$                                              | 150                                                     | 800                          | 2.2                        | $\pm 5.0$                                                                      | $\pm 5.0$                                                                     | 75                                    |
| TISP4S098M3BJR-S | $\pm 75$                | $\pm 98$                                              | 150                                                     | 800                          | 2.2                        | $\pm 5.0$                                                                      | $\pm 5.0$                                                                     | 75                                    |
| TISP4S160M3BJR-S | $\pm 120$               | $\pm 160$                                             | 150                                                     | 800                          | 2.2                        | $\pm 5.0$                                                                      | $\pm 5.0$                                                                     | 55                                    |
| TISP4S180M3BJR-S | $\pm 140$               | $\pm 180$                                             | 150                                                     | 800                          | 2.2                        | $\pm 5.0$                                                                      | $\pm 5.0$                                                                     | 55                                    |
| TISP4S240M3BJR-S | $\pm 180$               | $\pm 240$                                             | 150                                                     | 800                          | 2.2                        | $\pm 5.0$                                                                      | $\pm 5.0$                                                                     | 45                                    |
| TISP4S260M3BJR-S | $\pm 190$               | $\pm 260$                                             | 150                                                     | 800                          | 2.2                        | $\pm 5.0$                                                                      | $\pm 5.0$                                                                     | 45                                    |
| TISP4S300M3BJR-S | $\pm 220$               | $\pm 300$                                             | 150                                                     | 800                          | 2.2                        | $\pm 5.0$                                                                      | $\pm 5.0$                                                                     | 45                                    |
| TISP4S350M3BJR-S | $\pm 275$               | $\pm 350$                                             | 150                                                     | 800                          | 2.2                        | $\pm 5.0$                                                                      | $\pm 5.0$                                                                     | 45                                    |
| TISP4S350T3BJR-S | $\pm 275$               | $\pm 350$                                             | 150                                                     | 800                          | 2.2                        | $\pm 5.0$                                                                      | $\pm 5.0$                                                                     | 45                                    |
| TISP4S400M3BJR-S | $\pm 300$               | $\pm 400$                                             | 150                                                     | 800                          | 2.2                        | $\pm 5.0$                                                                      | $\pm 5.0$                                                                     | 45                                    |

#### Device Symbol



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

#### SMBJ Package (Top View)



UL Pending

# TISP4SxxxBJ Overvoltage Protector Series

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## How to Order

| Device       | Package                  | Carrier              | Order As        |
|--------------|--------------------------|----------------------|-----------------|
| TISP4SxxxzBJ | BJ (J-Bend DO-214AA/SMB) | Embossed Tape Reeled | TISP4SxxxzBJR-S |

Insert xxx value corresponding to protection voltages.

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

| Parameter                                                                                                                    | Symbol           | Value                                                                                                                                                                                                                                                                                                                                                                                         | Unit             |
|------------------------------------------------------------------------------------------------------------------------------|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|
| Repetitive peak off-state voltage                                                                                            | $V_{\text{DRM}}$ | TISP4S040L1BJR-S $\pm 25$<br>TISP4S040M1BJR-S $\pm 25$<br>TISP4S077M3BJR-S $\pm 58$<br>TISP4S088M3BJR-S $\pm 65$<br>TISP4S098M3BJR-S $\pm 75$<br>TISP4S160M3BJR-S $\pm 120$<br>TISP4S180M3BJR-S $\pm 140$<br>TISP4S240M3BJR-S $\pm 180$<br>TISP4S260M3BJR-S $\pm 190$<br>TISP4S300M3BJR-S $\pm 220$<br>TISP4S350M3BJR-S $\pm 275$<br>TISP4S350T3BJR-S $\pm 275$<br>TISP4S400M3BJR-S $\pm 300$ | V                |
| Non-repetitive peak on-state pulse current<br>10/1000 $\mu\text{s}$ (GR-1089-CORE, 10/1000 $\mu\text{s}$ voltage wave shape) | $I_{\text{TSP}}$ | TISP4SxxxLyBJR-S 30<br>TISP4SxxxMyBJR-S 50<br>TISP4SxxxT3BJR-S 80                                                                                                                                                                                                                                                                                                                             | A                |
| Operating Temperature                                                                                                        | $T_J$            | -40 to +150                                                                                                                                                                                                                                                                                                                                                                                   | $^\circ\text{C}$ |
| Storage Temperature                                                                                                          | $T_{\text{STG}}$ | -55 to +150                                                                                                                                                                                                                                                                                                                                                                                   | $^\circ\text{C}$ |

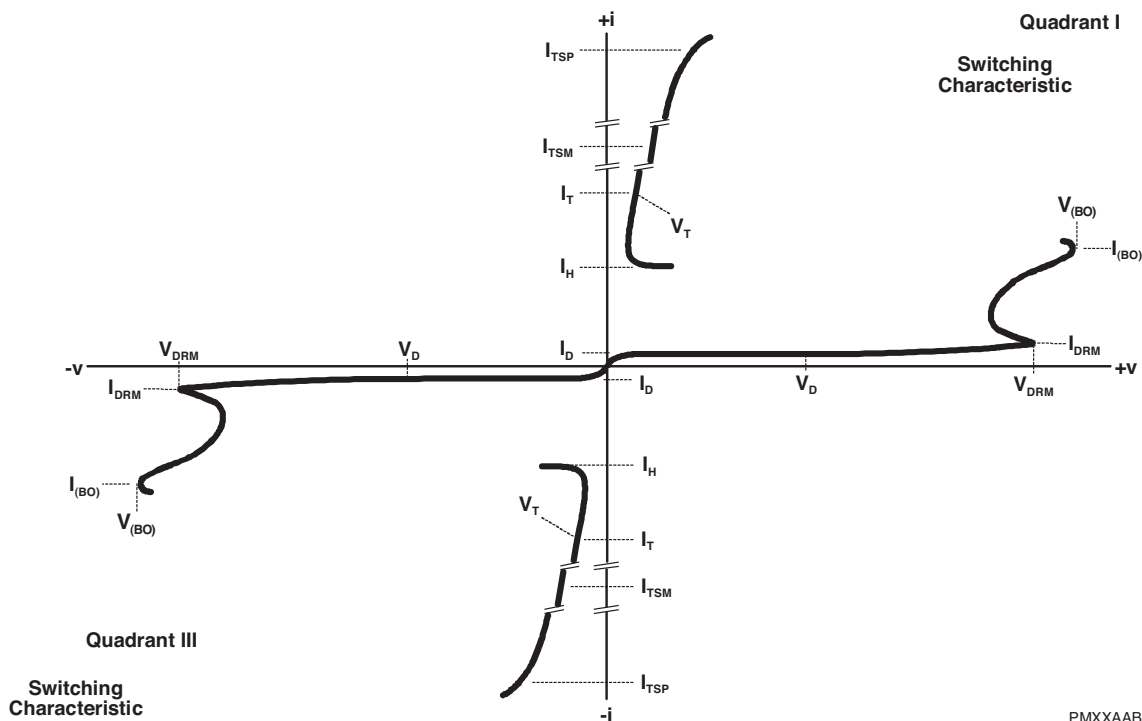
## Thermal Characteristics, $T_A = 25^\circ\text{C}$ (Unless Otherwise Noted)

| Parameter                                              | Test Conditions                                                              | Min. | Nom. | Max. | Unit               |
|--------------------------------------------------------|------------------------------------------------------------------------------|------|------|------|--------------------|
| $R\theta_{JA}$ Junction to free air thermal resistance | EIA/JESD51-3 PCB, $I_T = I_{\text{TSM}}(1000)$ ,<br>$T_A = 25^\circ\text{C}$ |      | 115  |      | $^\circ\text{C/W}$ |

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

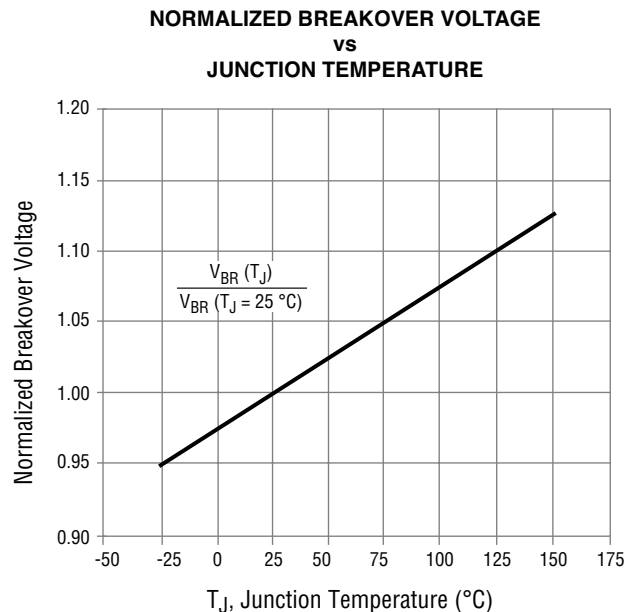
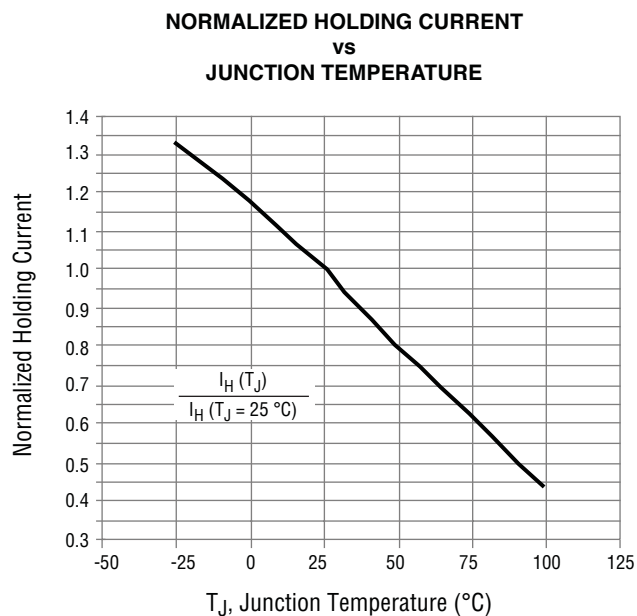
## Parameter Measurement Information



PMXXAAB

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

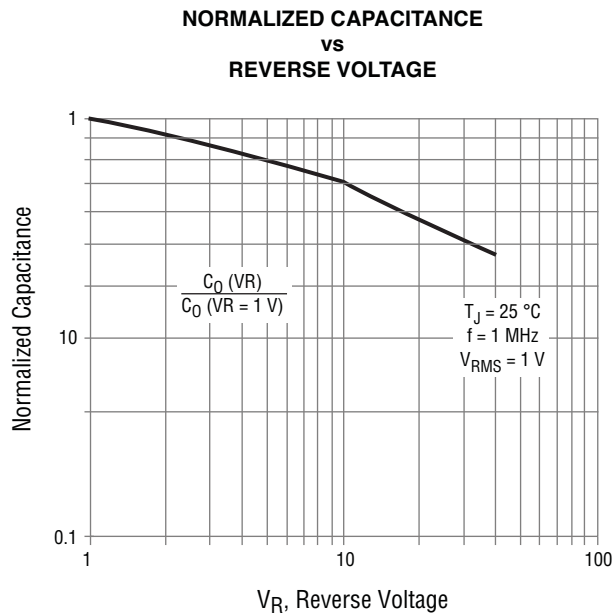
## Typical Characteristics



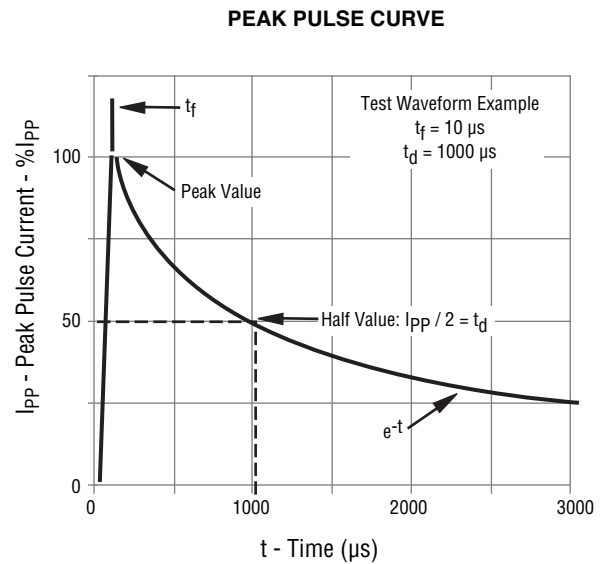
# TISP4SxxxBJ Overvoltage Protector Series

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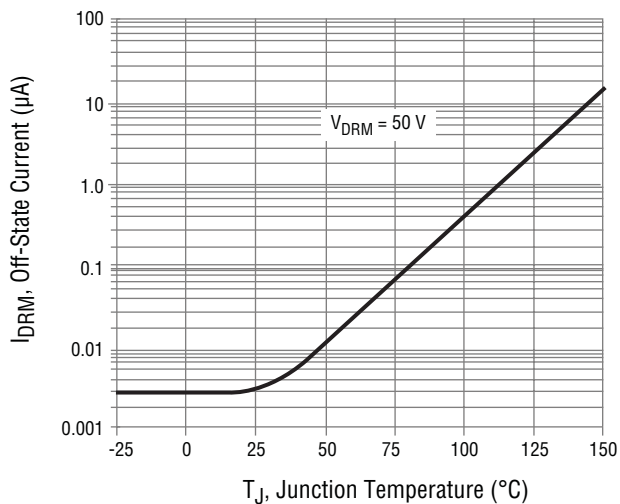
## Typical Characteristics



Excludes TISP4S040x1BJ devices as these are only rated up to 25 V.



## OFF-STATE CURRENT vs JUNCTION TEMPERATURE



Excludes TISP4S040x1BJ devices as these devices cannot be operated at 50 V.

## Device Symbolization Code

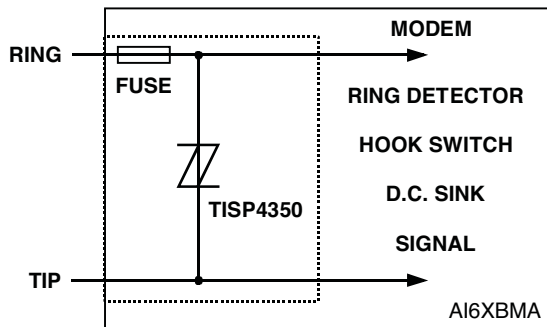
Devices will be coded as below. As the device parameters are symmetrical, terminal 1 is not identified.

| Device           | Symbolization Code |
|------------------|--------------------|
| TISP4S040L1BJR-S | KBL                |
| TISP4S040M1BJR-S | GBL                |
| TISP4S077M3BJR-S | GCL                |
| TISP4S088M3BJR-S | GDL                |
| TISP4S098M3BJR-S | GEL                |
| TISP4S160M3BJR-S | GGL                |
| TISP4S180M3BJR-S | GHL                |
| TISP4S240M3BJR-S | GIL                |
| TISP4S260M3BJR-S | GJL                |
| TISP4S300M3BJR-S | GKL                |
| TISP4S350M3BJR-S | GLL                |
| TISP4S350T3BJR-S | GYL                |
| TISP4S400M3BJR-S | GML                |

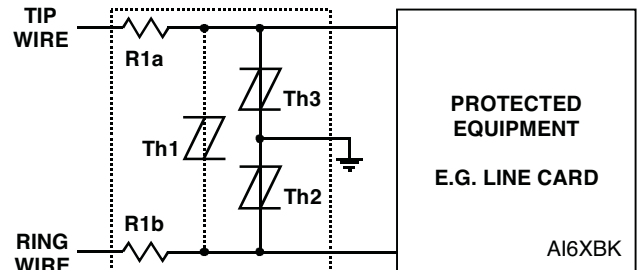
# TISP4SxxxBJ Overvoltage Protector Series

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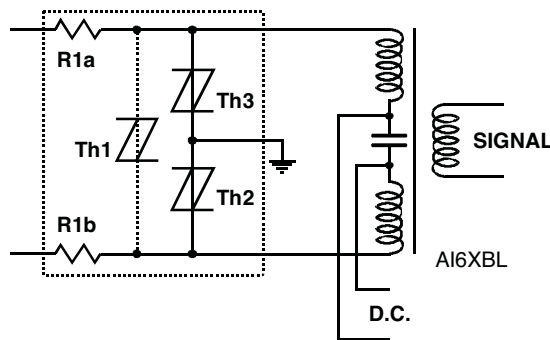
## Typical Applications



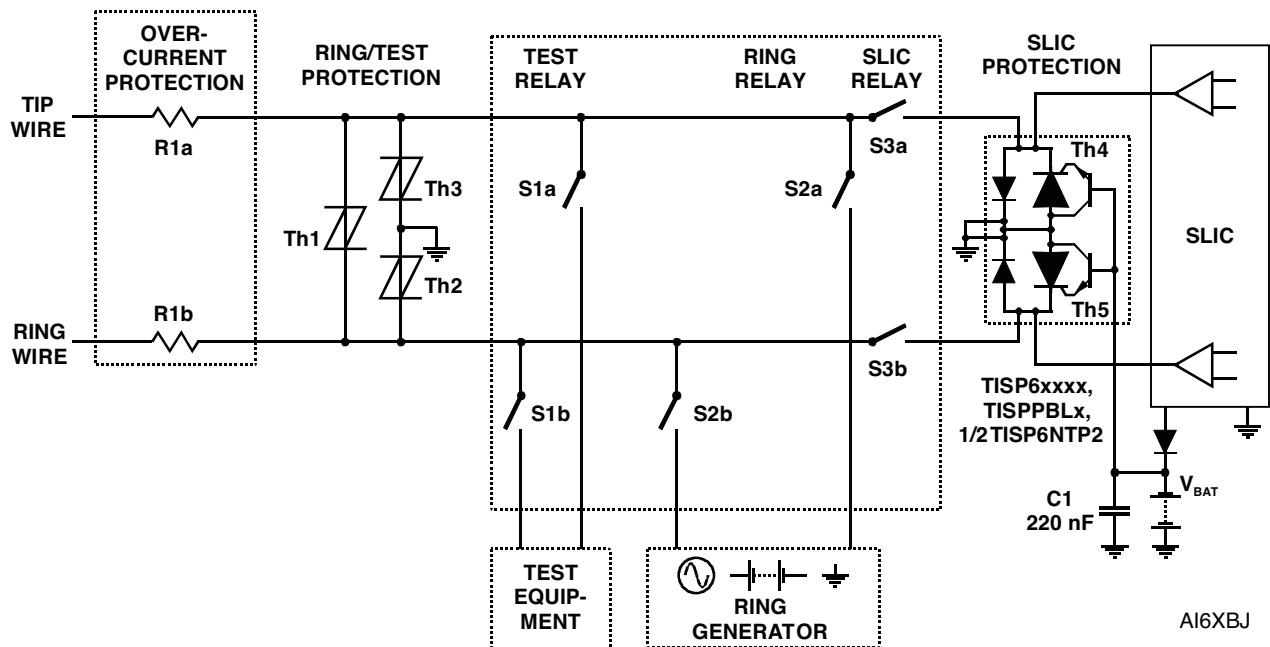
Modem Inter-wire Protection



Protection Module



ISDN Protection



Line Card Ring/Test Protection

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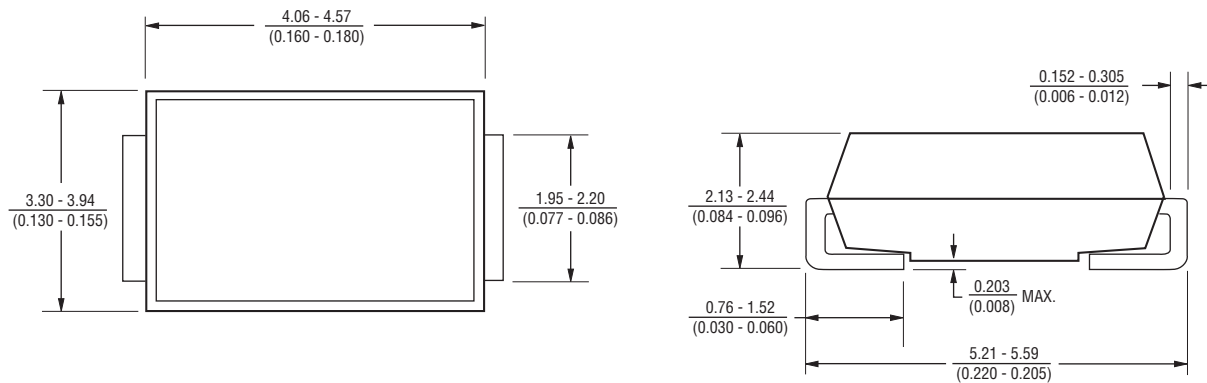
# TISP4SxxxBJ Overvoltage Protector Series

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## Package Outline Dimensions

This surface mount two terminal package consists of a circuit mounted on a lead frame and encapsulated within a plastic compound. The compound is designed to withstand normal soldering temperatures with no deformation and circuit performance characteristics will remain stable when operated in most high humidity conditions. Terminals require no additional cleaning or processing when used in soldered assembly.

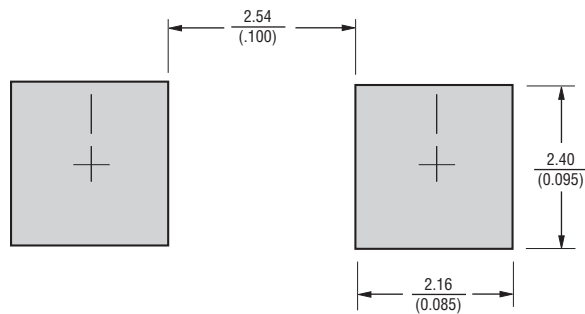
### SMB (DO-214AA) Package



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

## Recommended Printed Wiring Land Pattern Dimensions

### SMB (DO-214AA) Land Pattern

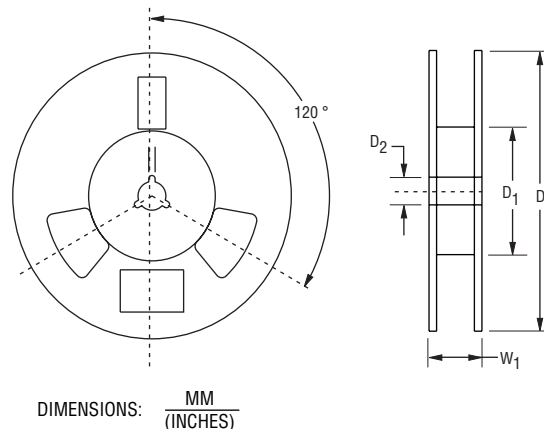
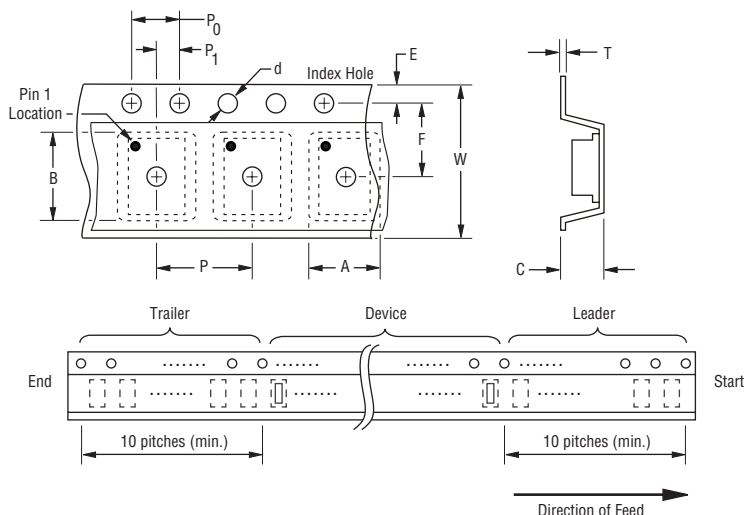


# TISP4SxxxBJ Overvoltage Protector Series

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## Tape & Reel Dimensions

The product will be dispensed in tape and reel format (see diagram below).



Devices are packed in accordance with EIA 481 standard specifications shown here.

| Item                   | Symbol         | SMB (DO-214AA)                      |
|------------------------|----------------|-------------------------------------|
| Carrier Width          | A              | $4.94 \pm 0.10$<br>(0.194 - 0.004)  |
| Carrier Length         | B              | $5.57 \pm 0.10$<br>(0.210 ± 0.004)  |
| Carrier Depth          | C              | $2.36 \pm 0.10$<br>(0.093 ± 0.004)  |
| Sprocket Hole          | d              | $1.55 \pm 0.05$<br>(0.061 ± 0.002)  |
| Reel Outside Diameter  | D              | $330$<br>(12.992)                   |
| Reel Inner Diameter    | D <sub>1</sub> | $50.0$<br>(1.969) MIN.              |
| Feed Hole Diameter     | D <sub>2</sub> | $13.0 \pm 0.20$<br>(0.512 ± 0.008)  |
| Sprocket Hole Position | E              | $1.75 \pm 0.10$<br>(0.069 ± 0.004)  |
| Punch Hole Position    | F              | $5.50 \pm 0.05$<br>(0.217 ± 0.002)  |
| Punch Hole Pitch       | P              | $4.00 \pm 0.10$<br>(0.157 ± 0.004)  |
| Sprocket Hole Pitch    | P <sub>0</sub> | $4.00 \pm 0.10$<br>(0.157 ± 0.004)  |
| Embossment Center      | P <sub>1</sub> | $2.00 \pm 0.05$<br>(0.079 ± 0.002)  |
| Overall Tape Thickness | T              | $0.30 \pm 0.10$<br>(0.012 ± 0.004)  |
| Tape Width             | W              | $12.00 \pm 0.20$<br>(0.472 ± 0.008) |
| Reel Width             | W <sub>1</sub> | $18.4$<br>(0.724) MAX.              |
| Quantity per Reel      | --             | 3,000                               |

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