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## Contact us

Tel: +86-755-8981 8866 Fax: +86-755-8427 6832

Email & Skype: [info@chipsmall.com](mailto:info@chipsmall.com) Web: [www.chipsmall.com](http://www.chipsmall.com)

Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China



# TRIPLE ELEMENT THYRISTOR OVERVOLTAGE PROTECTORS



## TISP7015 (VLV) Overvoltage Protector

### Three Terminal Very Low Voltage (VLV) Protection

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

DEVICE	V <sub>DRM</sub> V	V <sub>(BO)</sub> V
'7015	8	15

### Protection for Signal, Data and Control Lines

- ISDN  
- T1/E1  
- RS232 & RS485

Low Capacitance ..... 40 pF max.

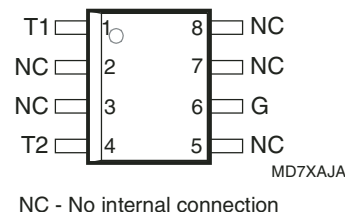
### Rated for International Surge Wave Shapes

Voltage Waveshape	Standard	I <sub>PPSM</sub> A
8/20	IEC 61000-4-5	150
10/700	ITU-T K.20/45/21	40
10/1000	GR-1089-CORE	30

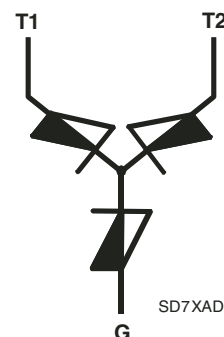


..... UL Recognized Components

### D Package (Top View)



### Device Symbol



### Description

The TISP7015 is a 3-point overvoltage protector designed for protecting against metallic (differential mode) and simultaneous longitudinal (common mode) impulses.

These devices are designed to limit overvoltages between signal, data and control port conductors, connected to terminals T1 and T2, and a protective ground, G. Each terminal pair has a symmetrical voltage-triggered bidirectional thyristor characteristic (Figure 1). 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 device switches off when the diverted current falls below the holding current value.

Terminals marked NC do not have any internal connections and may be left floating or tied to some circuit point.

### How To Order

Device	Package	Carrier	For Standard Termination Finish Order As	For Lead Free Termination Finish Order As
TISP7015	D, Small-outline	Embossed Tape Reeled	TISP7015DR	TISP7015DR-S
		Tube	TISP7015D	TISP7015D-S

# TISP7015 (VLV) Overvoltage Protector

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

Rating	Symbol	Value	Unit
Repetitive peak off-state voltage	$V_{\text{DRM}}$	$\pm 8$	V
Non-repetitive peak on-state pulse current (see Notes 1 and 2) 8/20 (IEC 61000-4-5, clause 7.2, R = 0, combination wave generator) 5/310 (ITU-T recommendation K.44, 10/700 generator used for K.20/45/21) 10/1000 (Telcordia GR-1089-CORE, 10/1000 voltage wave shape)	$I_{\text{PPSM}}$	150 40 30	A
Non-repetitive peak on-state current (see Notes 1, 2 and 3) 50/60 Hz, 1 s	$I_{\text{TSM}}$	4	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 TISP7015 must be in thermal equilibrium at the specified  $T_A$ . The surge may be repeated after the TISP7015 returns to its initial conditions.  
2. These non-repetitive rated currents are peak values of either polarity.  
3. Total return current,  $I_G$ , value.

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

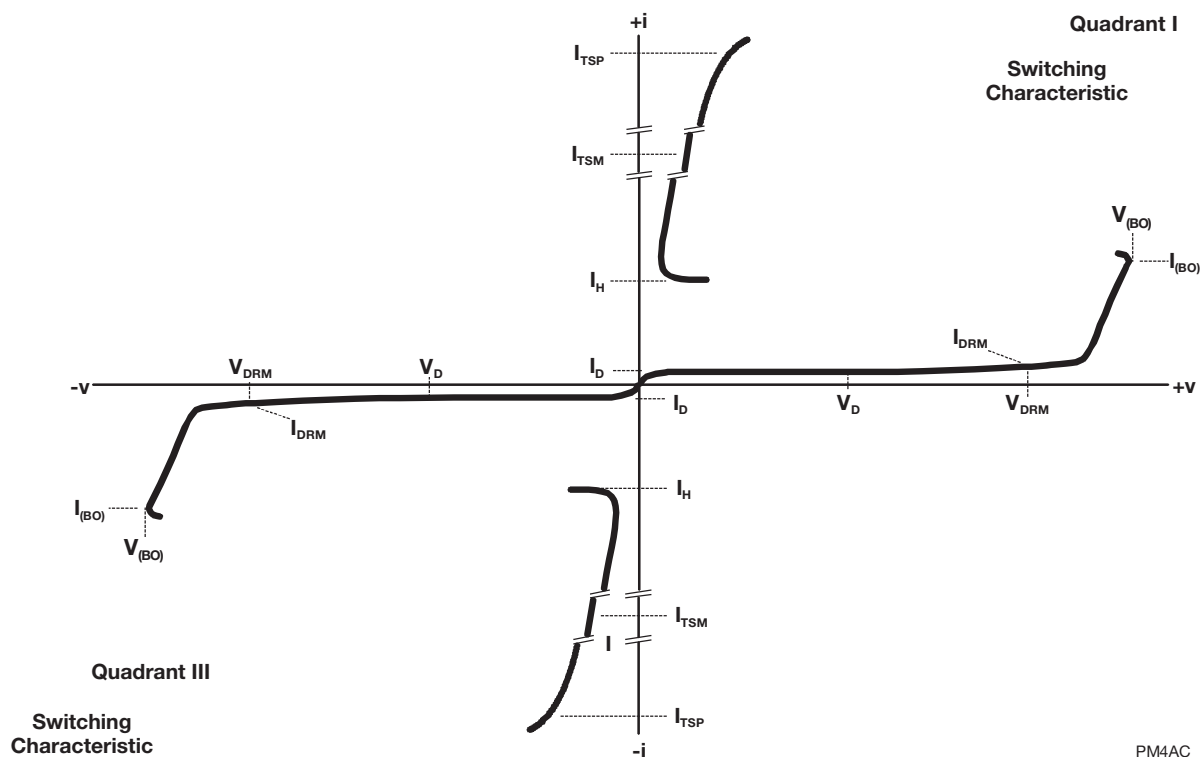
Parameter	Test Conditions	Min	Typ	Max	Unit
$I_{\text{DRM}}$ Repetitive peak off-state current	$V_D = \pm V_{\text{DRM}}$			$\pm 4$	$\mu\text{A}$
$V_{(\text{BO})}$ Breakover voltage	$dv/dt = \pm 250\text{ V/ms}$ , $R_{\text{SOURCE}} = 300\text{ }\Omega$			$\pm 15$	V
$I_{(\text{BO})}$ Breakover current	$dv/dt = \pm 250\text{ V/ms}$ , $R_{\text{SOURCE}} = 300\text{ }\Omega$			$\pm 100$	mA
$V_T$ On-state voltage	$I_T = \pm 5\text{ A}$ , $t_W = 100\text{ }\mu\text{s}$			$\pm 4$	V
$I_H$ Holding current	$I_T = \pm 5\text{ A}$ , $di/dt = \pm 30\text{ mA/ms}$	$\pm 30$			mA
$I_D$ Off-state current	$V_D = \pm 0.85V_{\text{DRM}}$ , $T_A = 85\text{ }^{\circ}\text{C}$			$\pm 10$	$\mu\text{A}$
$C_{\text{KA}}$ Off-state capacitance	$f = 1\text{ MHz}$ , $V_d = 30\text{ mV rms}$ , $V_D = 0$ (see Note 4)		32	40	pF

NOTE 4: Three-terminal guarded measurement, unmeasured terminal voltage bias is zero.

## Thermal Characteristics

Parameter	Test Conditions	Min	Typ	Max	Unit
$R_{\theta\text{JA}}$ Junction to free air thermal resistance	$P_{\text{tot}} = 0.8\text{ W}$ , $T_A = 25\text{ }^{\circ}\text{C}$ , $5\text{ cm}^2$ , FR4 PCB			160	$^{\circ}\text{C/W}$

## Parameter Measurement Information



PM4AC

Figure 1. Voltage-Current Characteristic for any Terminal Pair

# TISP7015 (VLV) Overvoltage Protector

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## MECHANICAL DATA

### Device Symbolization Code

Devices will be coded as below.

Device	Symbolization Code
TISP7015	7015



# TISP7015 (VLV) Overvoltage Protector

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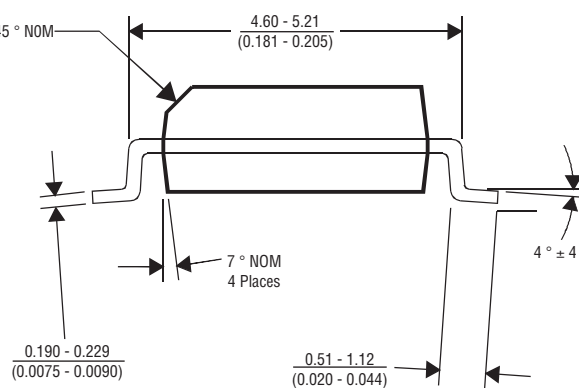
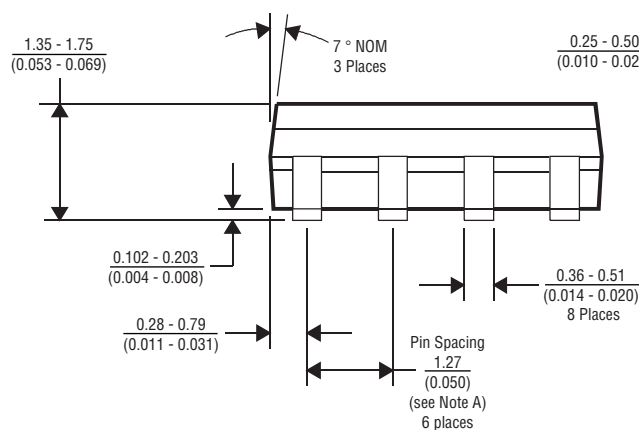
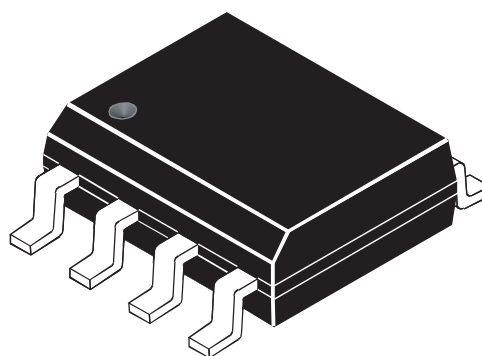
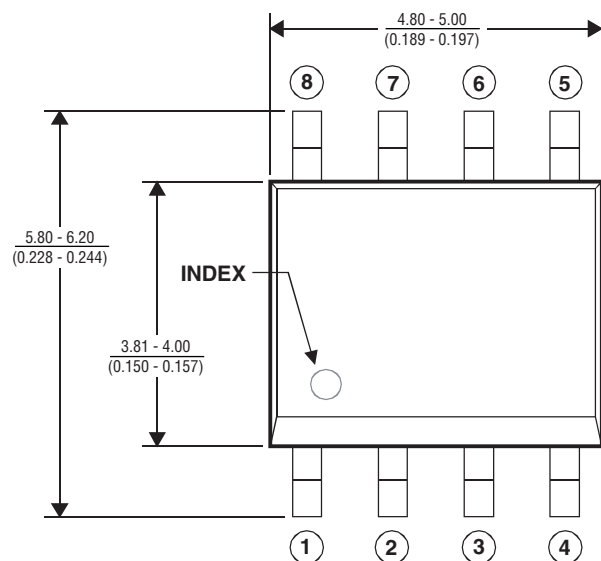
## MECHANICAL DATA

### D008 Plastic Small-outline Package

This small-outline 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.

D008

8-pin Small Outline Microelectronic Standard Package MS-012, JEDEC Publication 95



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

- NOTES: A. Leads are within 0.25 (0.010) radius of true position at maximum material condition.  
 B. Body dimensions do not include mold flash or protrusion.  
 C. Mold flash or protrusion shall not exceed 0.15 (0.006).  
 D. Lead tips to be planar within  $\pm 0.051$  (0.002).

MDXXAAE

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

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### D008 Tape Dimensions

Technical drawing of a carrier tape with dimensions in inches and millimeters. The drawing shows a top view and a side view. The top view includes dimensions for the overall length (11.70 - 12.30 / (.461 - .484)), the distance between the first and last holes (7.90 - 8.10 / (.311 - .319)), the distance between the first and last holes (3.90 - 4.10 / (.154 - .161)), the distance between the first and last holes (1.50 - 1.60 / (.059 - .063)), the distance between the first and last holes (1.95 - 2.05 / (.077 - .081)), the distance between the first and last holes (6.30 - 6.50 / (.248 - .256)), the distance between the first and last holes (5.40 - 5.60 / (.213 - .220)), the distance between the first and last holes (0.8 MIN. / (.03)), the distance between the first and last holes (0.40 / (.016)), the distance between the first and last holes (2.0 - 2.2 / (.079 - .087)), and the distance between the first and last holes (0 MIN.). The side view shows the carrier tape with a cover tape and a carrier tape embossment. The dimensions for the side view are 0.8 MIN. / (.03), 5.40 - 5.60 / (.213 - .220), 11.70 - 12.30 / (.461 - .484), 0 MIN., and 2.0 - 2.2 / (.079 - .087). The drawing also includes a cross-section view of the carrier tape and a detail view of the carrier tape embossment.

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

NOTES: A. Taped devices are supplied on a reel of the following dimensions:-

MDXXATC

Reel diameter:  $\frac{330 + 0.0 / -4.0}{(12.99 + 0.0 / -0.157)}$

Reel hub diameter:  $\frac{100 \pm 2.0}{(3.937 \pm .079)}$

Reel axial hole:  $\frac{13.0 \pm 0.2}{(.512 \pm .008)}$

B. 2500 devices are on a reel.

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