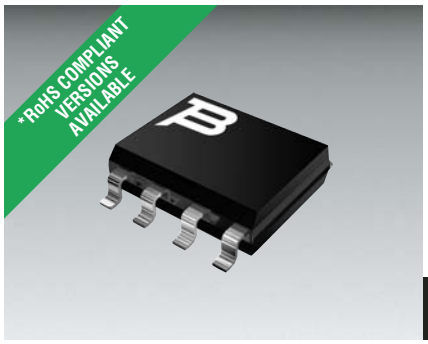


TRIPLE ELEMENT THYRISTOR OVERVOLTAGE PROTECTORS

TISP70xxL1 (VLV) OvervoltageProtectors

Three Terminal Very Low Voltage (VLV) Protection
Ion-Implanted Breakdown Region

Device	V_{DRM} V	$V_{(BO)}$ V
'7015L1	8	15
'7038L1	28	38

Protection for Signal, Data and Control Lines
- **ISDN**
- **T1/E1**
- **Ethernet**
- **RS232 & RS485**

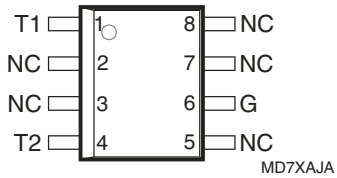
Low Capacitance
- **'7015L1 ..... 24 pF typ.**
- **'7038L1 ..... 17 pF typ.**

Rated for International Surge Wave Shapes

Voltage Waveshape	Standard	I_{PPSM} A
2/10	GR-1089-CORE	200
1.2/50	IEC 61000-4-5	100
10/700	TIA/EIA-IS-968 ITU-T K.20/45/21	50
10/1000	GR-1089-CORE	30

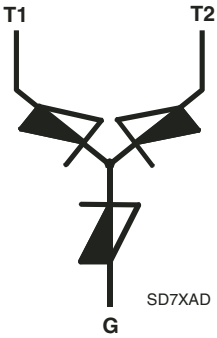
IEC 61000-4-2 Immunity Ratings
Contact ..... 6 kV
Air ..... 8 kV

D Package (Top View)



NC - No internal connection

Device Symbol



..... UL Recognized Components

Description

The TISP70xxL1 series are 3-point overvoltage protectors designed for protecting against metallic (transverse mode) and simultaneous longitudinal (common mode) impulses. Each terminal pair has the same voltage limiting values and surge current capability.

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 holding current will normally be higher than the available short circuit d.c. system current, causing the protector to switch off as the diverted current subsides.

How To Order

Device	Package	Carrier	For Standard Termination Finish Order As	For Lead Free Termination Finish Order As
TISP7015L1	D (8-pin, Small-outline)	R (Embossed Tape Reeled)	TISP7015L1DR	TISP7015L1DR-S
		Tube	TISP7015L1D	TISP7015L1D-S
TISP7038L1	D (8-pin, Small-outline)	R (Embossed Tape Reeled)	TISP7038L1DR	TISP7038L1DR-S
		Tube	TISP7038L1D	TISP7038L1D-S

*RoHS Directive 2002/95/EC Jan 27 2003 including Annex

JULY 2000 – REVISED FEBRUARY 2005

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

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 °C (Unless Otherwise Noted)

Rating		Symbol	Value	Unit
Repetitive peak off-state voltage	TISP7015L1	V_{DRM}	± 8	V
	TISP7038L1		± 28	
Non-repetitive peak on-state pulse current (see Notes 1 and 2)		I_{PPSM}		A
2/10 (Telcordia GR-1089-CORE, 2/10 voltage wave shape)			200	
1/20 (ITU-T K.22, 1.2/50 voltage wave shape, also VDE0878)			100	
8/20 (IEC 61000-4-5, Figure 12 generator, 1.2/50 voltage wave shape)			100	
10/160 (TIA/EIA-IS-968 (formally FCC Part 68), 10/160 voltage wave shape)			75	
5/310 (ITU-T k.20/21, 10/700 voltage wave shape, also IEC 61000-4-5 and VDE0433)			50	
10/560 (TIA/EIA-IS-968 (formally FCC Part 68), 10/560 voltage wave shape)			40	
10/1000 (Telcordia GR-1089-CORE, 10/1000 voltage wave shape)			30	
Non-repetitive peak on-state current (see Note 1)		I_{TSM}		A
16.7 ms (60 Hz) full sine wave			9	
20 ms (50 Hz) full sine wave			8	
0.2 s 50 Hz/60 Hz a.c.			3	
2.0 s 50 Hz/60 Hz a.c.			1.5	
Junction temperature		T_J	-40 to +150	°C
Storage temperature range		T_{stg}	-65 to +150	°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 °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		$V_{O/C}$		kV
	contact discharge		6	
	air discharge		8	

Electrical Characteristics, T_J = 25 °C (Unless Otherwise Noted)

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

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

Electrical Characteristics, T_J = 25 °C (Unless Otherwise Noted) (Continued)

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

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 W, T_A = 25 °C, 5 cm^2, FR4 PCB			170	°C/W

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

Parameter Measurement Information

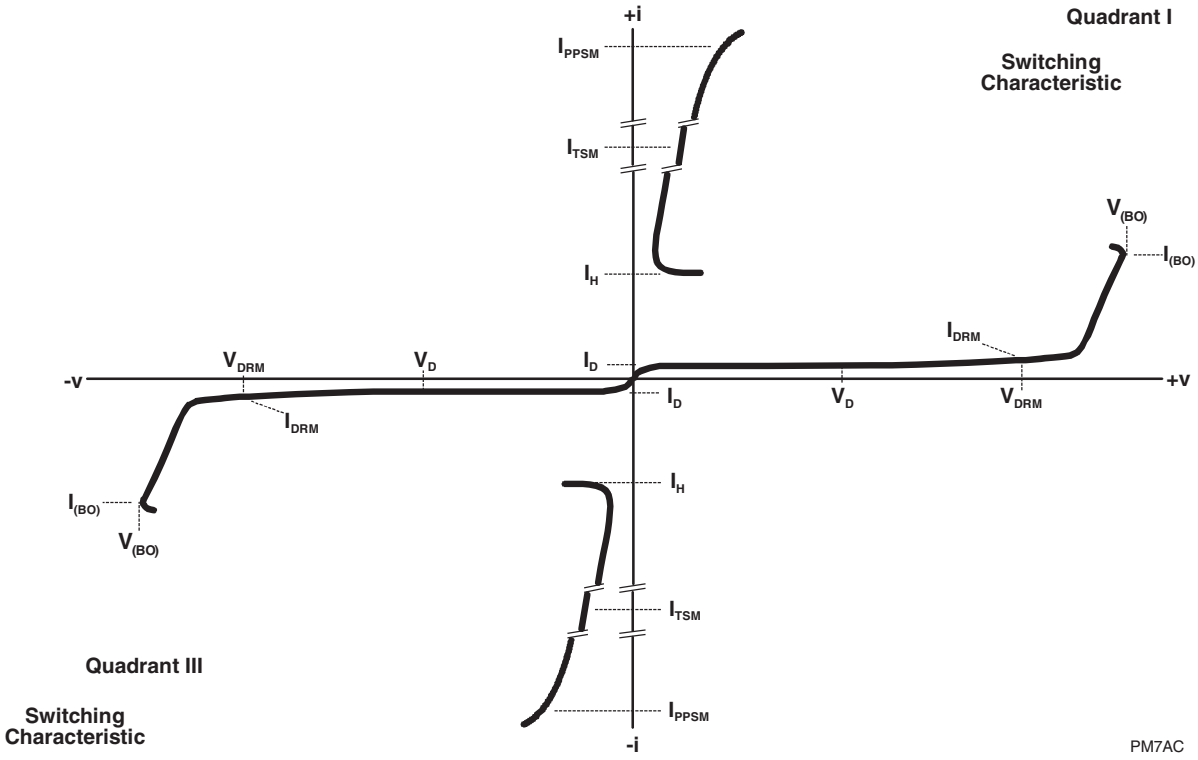


Figure 1. Voltage-Current Characteristic for any Terminal Pair

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

Typical Characteristics

OFF-STATE CURRENT vs JUNCTION TEMPERATURE

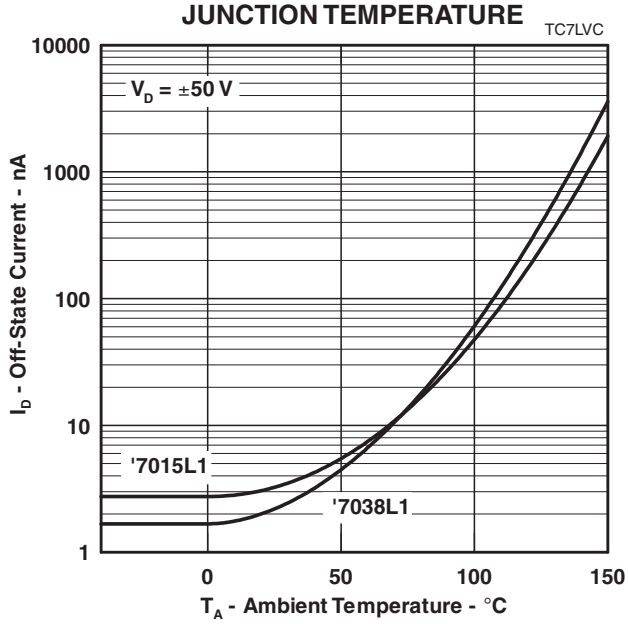


Figure 2.

NORMALIZED BREAKOVER VOLTAGE vs JUNCTION TEMPERATURE

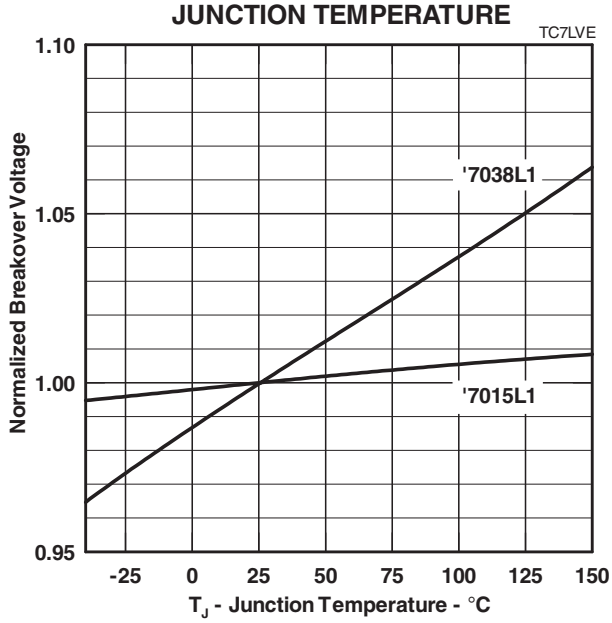


Figure 3.

ON-STATE CURRENT vs ON-STATE VOLTAGE

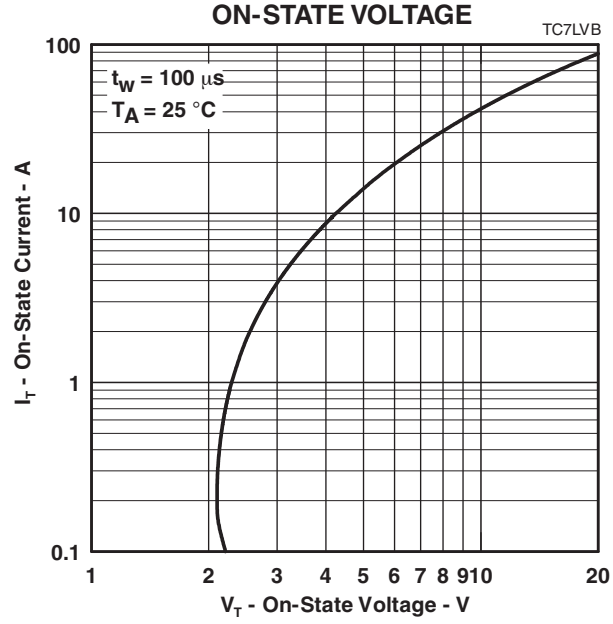


Figure 4.

NORMALIZED HOLDING CURRENT vs JUNCTION TEMPERATURE

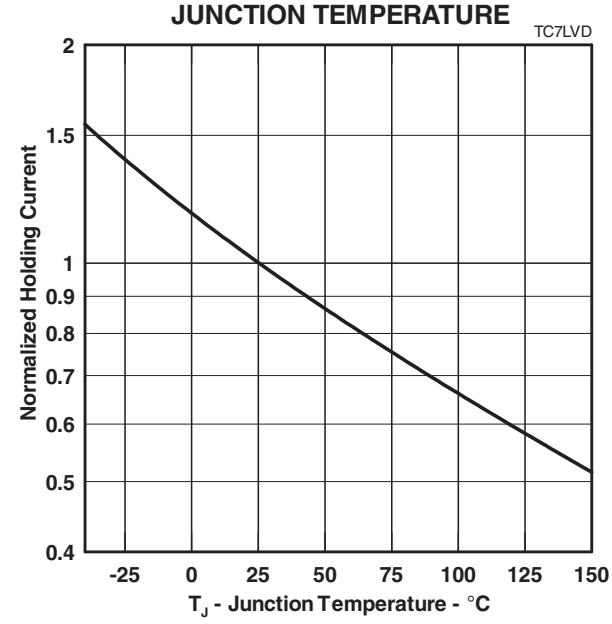


Figure 5.

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

Typical Characteristics

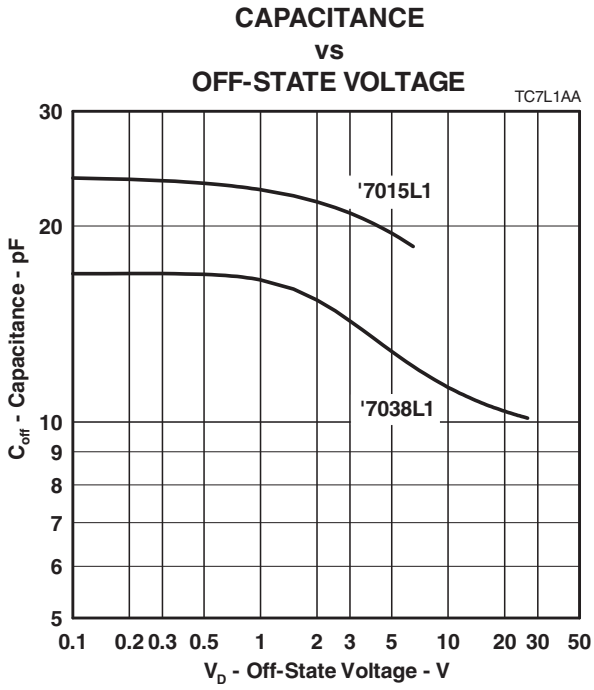


Figure 6.

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

Rating and Thermal Information

NON-REPETITIVE PEAK ON-STATE CURRENT vs CURRENT DURATION

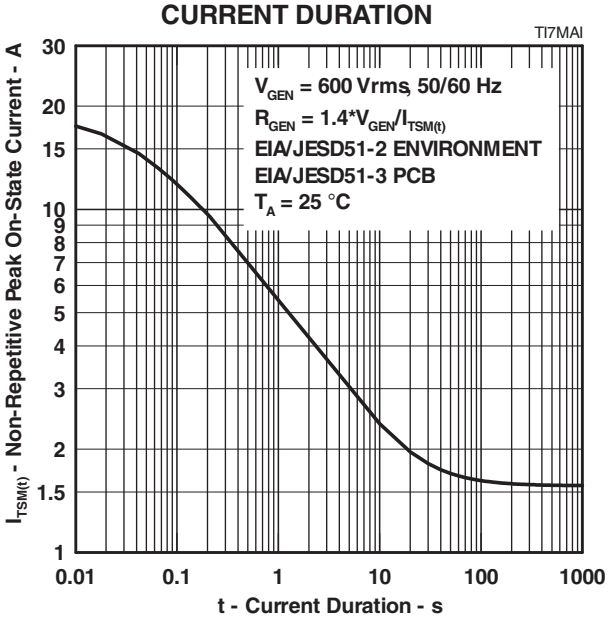


Figure 7.

V_{DRM} DERATING FACTOR vs MINIMUM AMBIENT TEMPERATURE

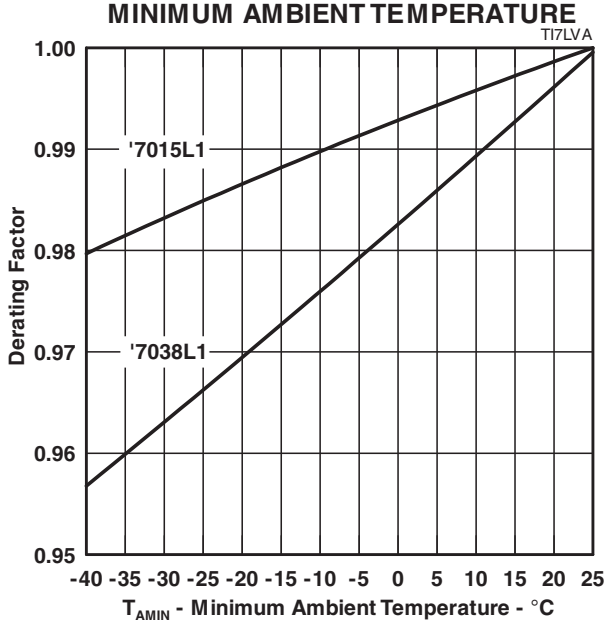


Figure 8.

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

MECHANICAL DATA

Device Symbolization Code

Devices will be coded as below.

Device	Symbolization Code
TISP7015L1	7015L1
TISP7038L1	7038L1

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

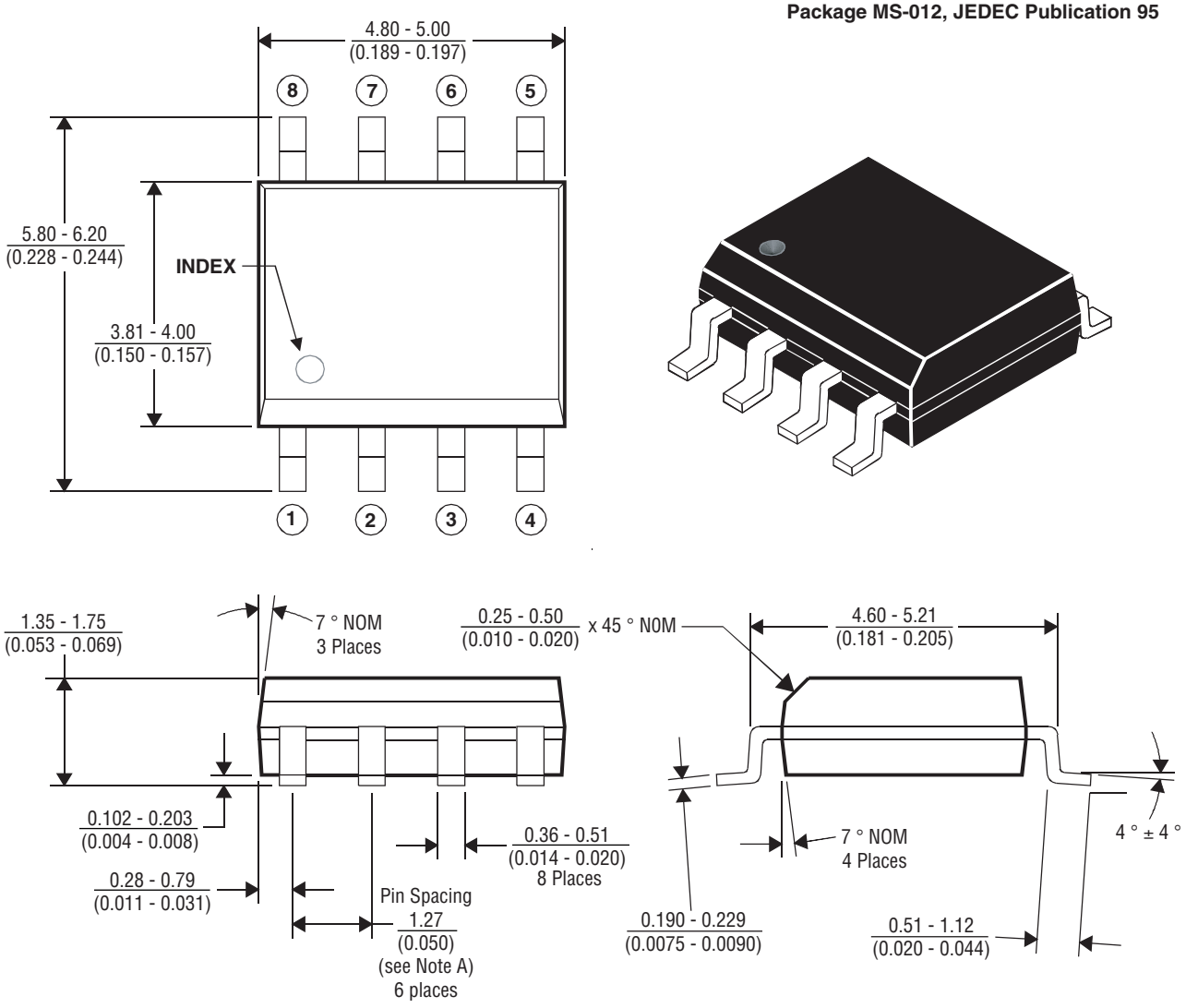
MECHANICAL DATA

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



MDXXAAE

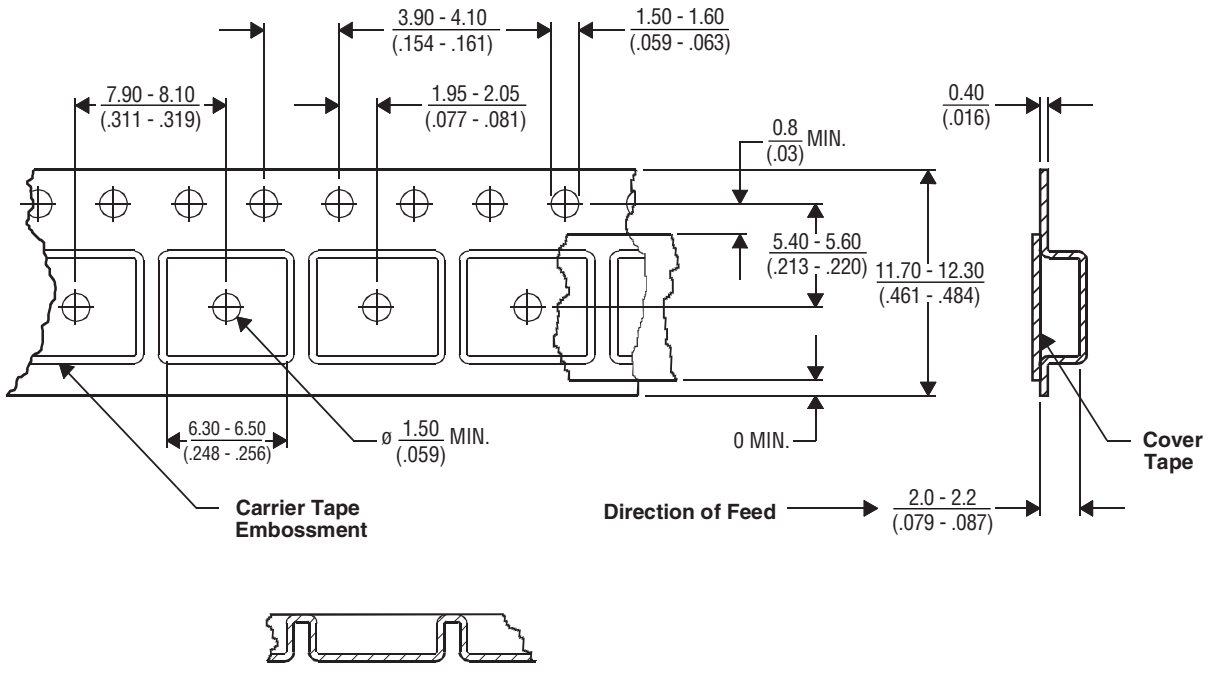
NOTES: A. Leads are within 0.25 (0.010) radius of true position at maximum material condition.
B. Body dimensions do not include mold flash or protrusion.
C. Mold flash or protrusion shall not exceed 0.15 (0.006).
D. Lead tips to be planar within ±0.051 (0.002).

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

MECHANICAL DATA

D008 Tape DImensions

D008 Package (8-pin Small Outline) Single-Sprocket Tape



DIMENSIONS ARE: MILLIMETERS / (INCHES)

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

Reel diameter:	330 +0.0/-4.0 (12.99 +0.0/-.157)
Reel hub diameter:	100 ± 2.0 (3.937 ± .079)
Reel axial hole:	13.0 ± 0.2 (.512 ± .008)

B. 2500 devices are on a reel.

"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.

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