

## TELECOMMUNICATION SYSTEM SECONDARY PROTECTION

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

DEVICE	$V_{(Z)}$ V	$V_{(BO)}$ V
'4160LP	120	160
'4180LP	145	180

- **Planar Passivated Junctions**  
**Low Off-State Current < 10  $\mu$ A**
- **Rated for International Surge Wave Shapes**

WAVE SHAPE	STANDARD	$I_{TSP}$ A
8/20 $\mu$ s	ANSI C62.41	100
0.2/310 $\mu$ s	RLM 88	38
10/700 $\mu$ s	VDE 0433 CCITT IX K17	50 38

- **Package Options**

PACKAGE	PACKING	PART # SUFFIX
LP	Bulk	None
LP with formed leads	Tape and Reel	R

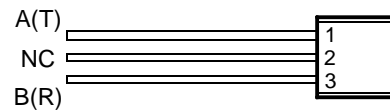
- **UL Recognized, E132482**

### description

The TISP4xxxLP series is designed specifically for telephone equipment protection against lightning and transients induced by a.c. power lines. These devices consist of a bidirectional suppressor element connecting the A and B terminals. They will suppress inter-wire voltage transients.

Transients are initially clipped by zener action until the voltage rises to the breakover level, which causes the device to crowbar. The high crowbar holding current prevents d.c. latchup as the transient subsides.

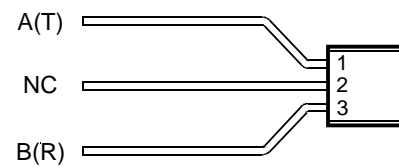
**LP PACKAGE**  
(TOP VIEW)



NC - No internal connection

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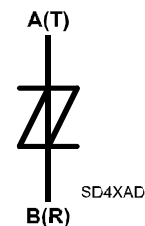
**LP PACKAGE**  
**WITH FORMED LEADS**  
(TOP VIEW)



NC - No internal connection

MD4XAF

### device symbol



These monolithic protection devices are fabricated in ion-implanted planar structures to ensure precise and matched breakover control and are virtually transparent to the system in normal operation.

## PRODUCT INFORMATION

Information is current as of publication date. Products conform to specifications in accordance with the terms of Power Innovations standard warranty. Production processing does not necessarily include testing of all parameters.

# TISP4160LP, TISP4180LP SYMMETRICAL TRANSIENT VOLTAGE SUPPRESSORS

APRIL 1987 - REVISED SEPTEMBER 1997

## absolute maximum ratings at 25°C case temperature (unless otherwise noted)

RATING	SYMBOL	VALUE	UNIT
Non-repetitive peak on-state pulse current (see Notes 1, 2 and 3) 8/20 $\mu$ s (ANSI C62.41, open-circuit voltage wave shape 1.2/50 $\mu$ s) 5/200 $\mu$ s (VDE 0433, open-circuit voltage wave shape 2 kV, 10/700 $\mu$ s) 0.2/310 $\mu$ s (RLM 88, open-circuit voltage wave shape 1.5 kV, 0.5/700 $\mu$ s) 5/310 $\mu$ s (CCITT IX K17, open-circuit voltage wave shape 1.5 kV, 10/700 $\mu$ s)	$I_{TSP}$	100 50 38 38	A
Non-repetitive peak on-state current, 50 Hz, 1 s (see Notes 1 and 2)	$I_{TSM}$	2.5	A rms
Initial rate of rise of on-state current, Linear current ramp, Maximum ramp value < 38 A	$di_T/dt$	250	A/ $\mu$ s
Junction temperature	$T_J$	150	°C
Operating free - air temperature range		0 to 70	°C
Storage temperature range	$T_{stg}$	-40 to +150	°C
Lead temperature 1.5 mm from case for 10 s	$T_{lead}$	260	°C

NOTES: 1. Above 70°C, derate linearly to zero at 150°C case temperature  
2. This value applies when the initial case temperature is at (or below) 70°C. The surge may be repeated after the device has returned to thermal equilibrium.  
3. Most PTT's quote an unloaded voltage waveform. In operation the TISP essentially shorts the generator output. The resulting loaded current waveform is specified.

## electrical characteristics, $T_J = 25^\circ\text{C}$

PARAMETER	TEST CONDITIONS	TISP4160			TISP4180			UNIT
		MIN	TYP	MAX	MIN	TYP	MAX	
$V_Z$ Reference zener voltage	$I_Z = \pm 1\text{mA}$	$\pm 120$			$\pm 145$			V
$\alpha V_Z$ Temperature coefficient of reference voltage			0.1			0.1		%/°C
$V_{(BO)}$ Breakover voltage	(see Notes 4 and 5)			$\pm 160$			$\pm 180$	V
$I_{(BO)}$ Breakover current	(see Note 4)	$\pm 0.15$		$\pm 0.6$	$\pm 0.15$		$\pm 0.6$	A
$V_{TM}$ Peak on-state voltage	$I_T = \pm 5\text{A}$ (see Notes 4 and 5)		$\pm 2.2$	$\pm 3$		$\pm 2.2$	$\pm 3$	V
$I_H$ Holding current	(see Note 4)	$\pm 150$			$\pm 150$			mA
$dv/dt$ Critical rate of rise of off-state voltage	(see Note 6)			$\pm 5$			$\pm 5$	kV/ $\mu$ s
$I_D$ Off-state leakage current	$V_D = \pm 50\text{V}$			$\pm 10$			$\pm 10$	$\mu$ A
$C_{off}$ Off-state capacitance	$V_D = 0$ $f = 1\text{kHz}$		70	150		70	150	pF

NOTES: 4. These parameters must be measured using pulse techniques,  $t_w = 100\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$ .  
5. These parameters are measured with voltage sensing contacts separate from the current carrying contacts located within 3.2 mm (0.125 inch) from the device body.  
6. Linear rate of rise, maximum voltage limited to 80 %  $V_Z$  (minimum).

## thermal characteristics

PARAMETER	MIN	TYP	MAX	UNIT
$R_{\theta JA}$ Junction to free air thermal resistance			156	°C/W

## PRODUCT INFORMATION

# PARAMETER MEASUREMENT INFORMATION

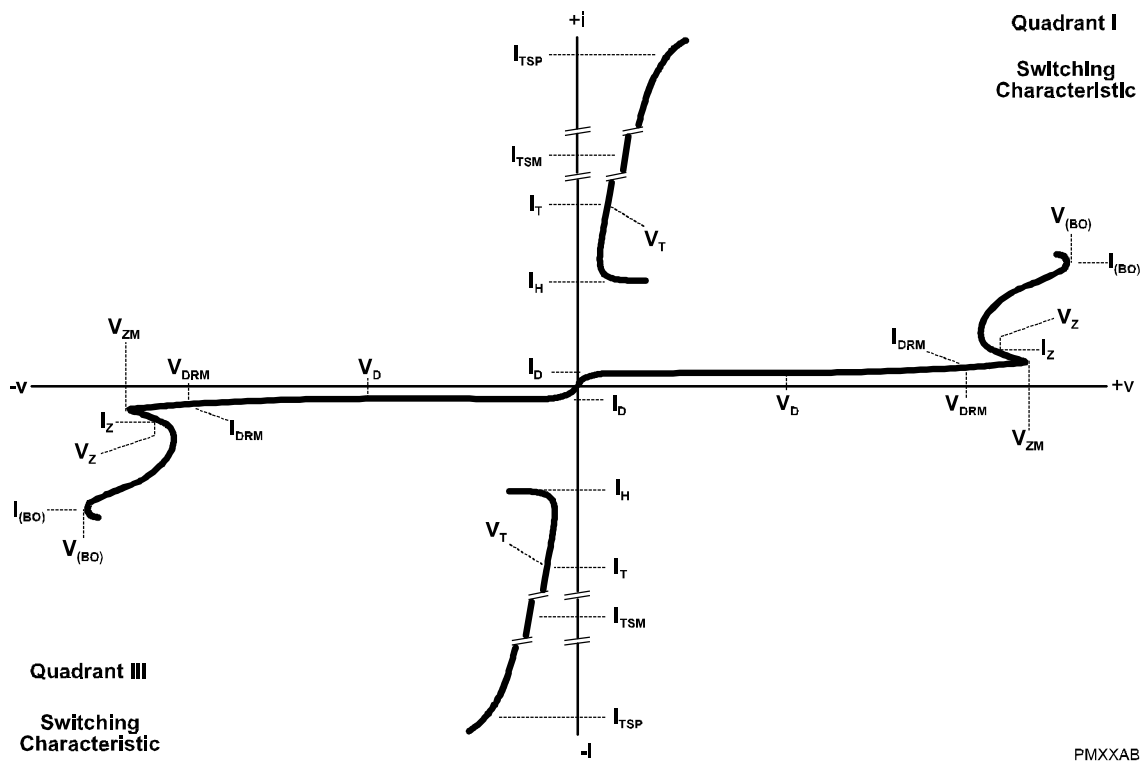


Figure 1. VOLTAGE-CURRENT CHARACTERISTICS FOR TERMINALS A AND B

# TISP4160LP, TISP4180LP SYMMETRICAL TRANSIENT VOLTAGE SUPPRESSORS

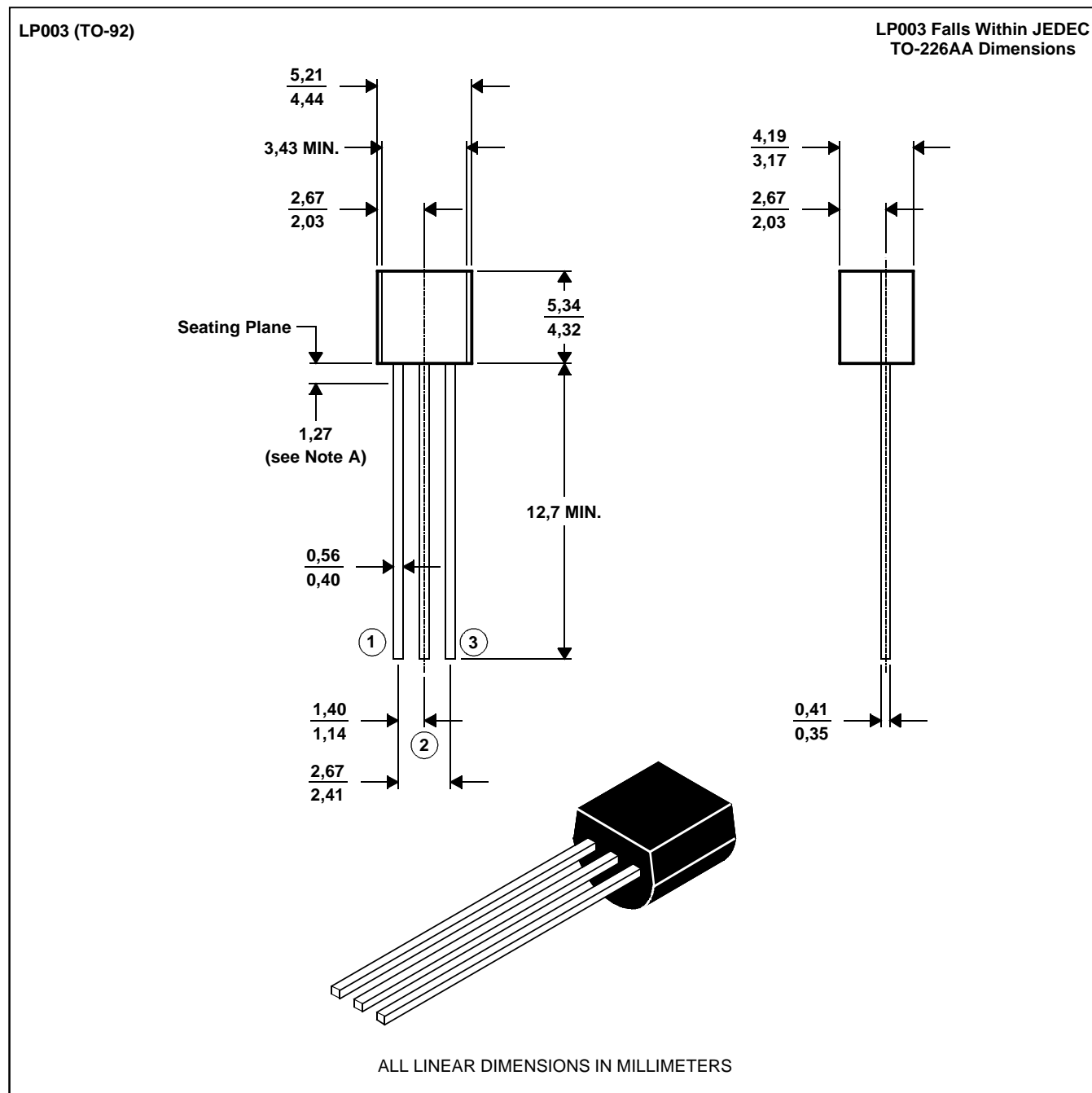
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## MECHANICAL DATA

### LP003 (TO-92)

#### 3-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.



NOTE A: Lead dimensions are not controlled in this area.

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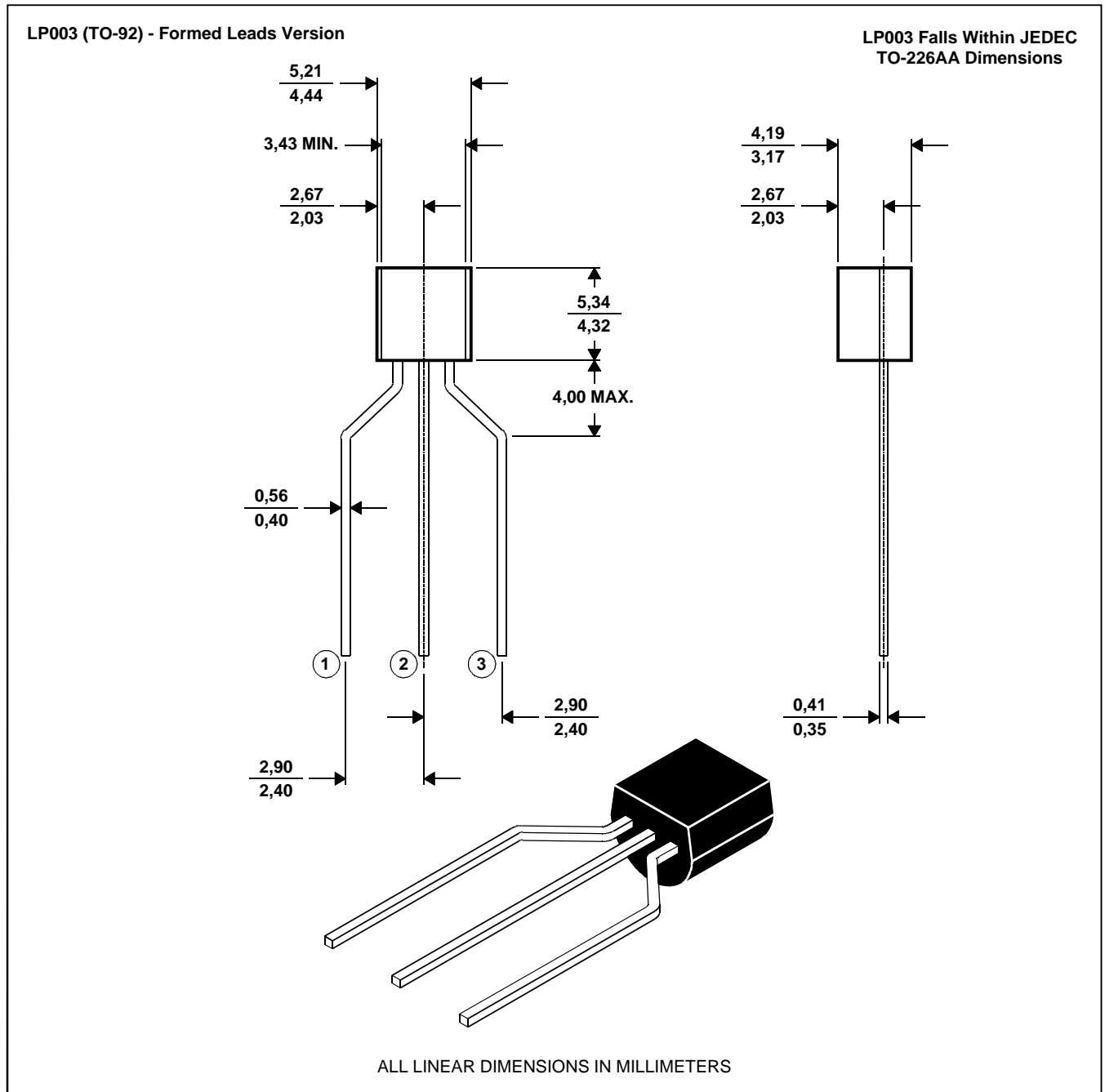
## PRODUCT INFORMATION

## MECHANICAL DATA

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# TISP4160LP, TISP4180LP SYMMETRICAL TRANSIENT VOLTAGE SUPPRESSORS

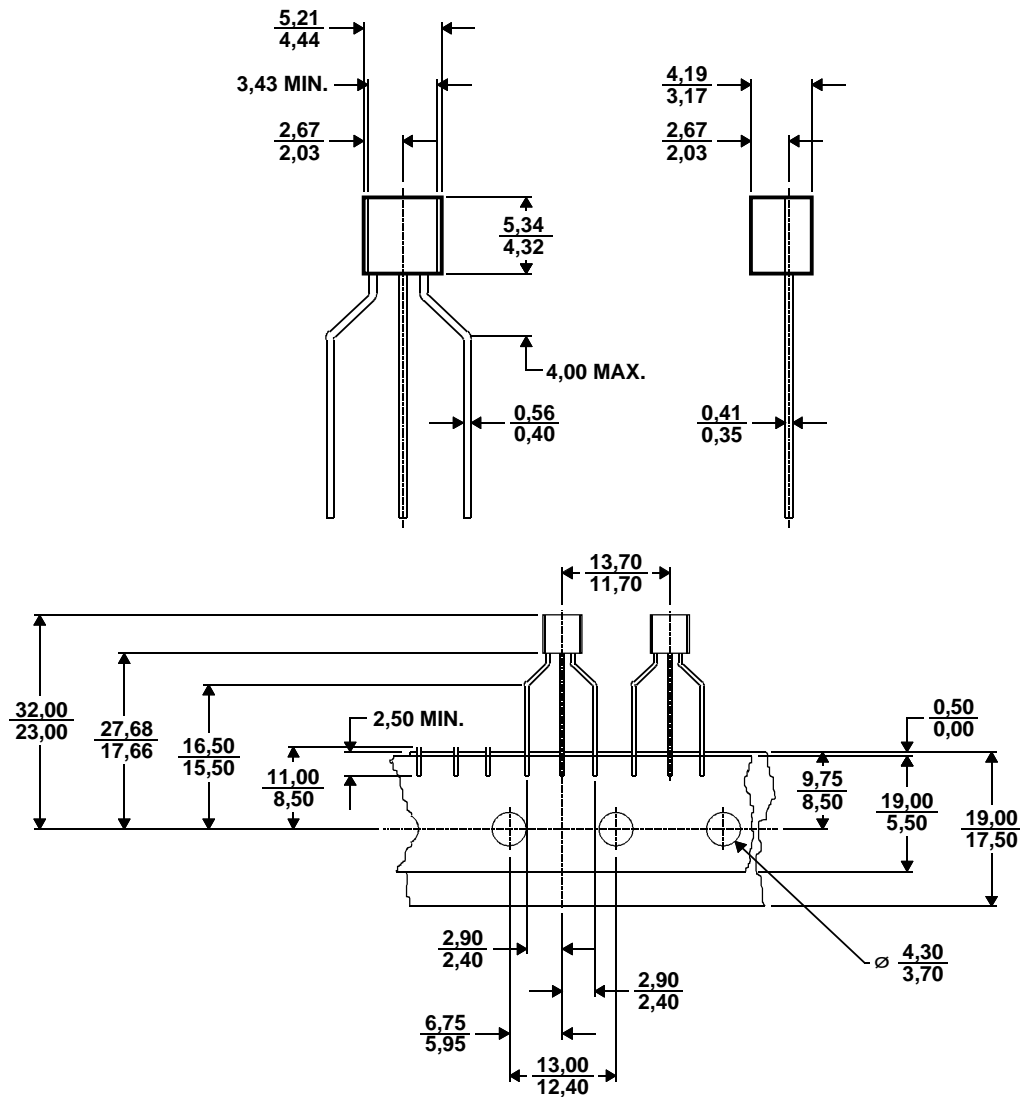
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## MECHANICAL DATA

### LPR

### tape dimensions

LP Package (TO-92) Tape (Formed Lead Version)



ALL LINEAR DIMENSIONS IN MILLIMETERS

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## PRODUCT INFORMATION

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