TISP4072F3LM, TISP4082F3LM, TISP4125F3LM, TISP4150F3LM, TISP4180F3LM TISP4240F3LM, TISP4260F3LM, TISP4290F3LM, TISP4320F3LM, TISP4380F3LM BIDIRECTIONAL THYRISTOR OVERVOLTAGE PROTECTORS

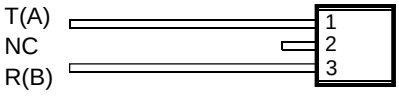
DECEMBER 1998 - REVISED APRIL 1999

TELECOMMUNICATION SYSTEM SECONDARY PROTECTION

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

DEVICE	V_{DRM} V	$V_{(BO)}$ 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

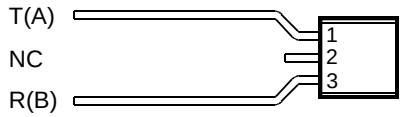
LM PACKAGE
(TOP VIEW)



MD4XAT

NC - No internal connection on pin 2

LMF PACKAGE
(LM PACKAGE WITH FORMED LEADS)
(TOP VIEW)



MD4XAKB

NC - No internal connection on pin 2

- **Rated for International Surge Wave Shapes**

WAVE SHAPE	STANDARD	I_{TSP} A
10/160 µs	FCC Part 68	60
0.5/700 µs	I3124	38
10/700 µs	ITU-T K20/21	50
10/560 µs	FCC Part 68	45
10/1000 µs	REA PE-60	35

- **Ordering Information**

DEVICE TYPE	PACKAGE TYPE
TISP4xxxF3LM	Straight Lead DO-92 Bulk Pack
TISP4xxxF3LMR	Straight Lead DO-92 Tape and Reeled
TISP4xxxF3LMFR	Formed Lead DO-92 Tape and Reeled

device symbol

SD4XAA

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

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.

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

description (continued)

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

RATING		SYMBOL	VALUE	UNIT
Repetitive peak off-state voltage (0 °C < T_J < 70 °C)	'4072	V_{DRM}	± 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 µs (FCC Part 68, 2/10 µs voltage wave shape) excluding '4072 - '4082			175	
8/20 µs (ANSI C62.41, 1.2/50 µs voltage wave shape) excluding '4072 - '4082			120	
10/160 µs (FCC Part 68, 10/160 µs voltage wave shape)			60	
5/200 µs (VDE 0433, 2 kV, 10/700 µs voltage wave shape)			50	
0.2/310 µs (I3124, 1.5 kV, 0.5/700 µs voltage wave shape)			38	
5/310 µs (ITU-T K20/21, 1.5 kV, 10/700 µs voltage wave shape)			38	
5/310 µs (FTZ R12, 2 kV, 10/700 µs voltage wave shape)			50	
10/560 µs (FCC Part 68, 10/560 µs voltage wave shape)			45	
10/1000 µs (REA PE-60, 10/1000 µs voltage wave shape)			35	
2/10 µs (FCC Part 68, 2/10 µs voltage wave shape) '4072 - '4082 only			80	
8/20 µs (ANSI C62.41, 1.2/50 µs voltage wave shape) '4072 - '4082 only			70	
Non-repetitive peak on-state current (see Notes 2 and 3) 50/60 Hz, 1 s		I_{TSM}	4	A
Initial rate of rise of on-state current, Linear current ramp, Maximum ramp value < 38 A		di_T/dt	250	A/µs
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 °C < T_J < 70 °C.
2. The surge may be repeated after the TISP returns to its initial conditions.
3. Above 70 °C, derate linearly to zero at 150 °C lead temperature.

electrical characteristics for the T and R terminals, T_J = 25 °C (unless otherwise noted)

PARAMETER		TEST CONDITIONS		MIN	TYP	MAX	UNIT
I_{DRM}	Repetitive peak off-state current	$V_D = \pm V_{DRM}$, 0 °C < T_J < 70 °C				±10	µA
$V_{(BO)}$	Breakover voltage	dv/dt = ±250 V/ms, R_{SOURCE} = 300 Ω	'4072			±72	V
			'4082			±82	
			'4125			±125	
			'4150			±150	
			'4180			±180	
			'4240			±240	
			'4260			±260	
			'4290			±290	
			'4320			±320	
			'4380			±380	
$V_{(BO)}$	Impulse breakover voltage	dv/dt = ±1000 V/µs, R_{SOURCE} = 50 Ω, di/dt < 20 A/µs	'4072			±86	V
			'4082			±96	
			'4125			±143	
			'4150			±168	
			'4180			±198	
			'4240			±267	
			'4260			±287	
			'4290			±317	
			'4320			±347	
			'4380			±407	
$I_{(BO)}$	Breakover current	dv/dt = ±250 V/ms, R_{SOURCE} = 300 Ω		±0.15		±0.6	A
V_T	On-state voltage	I_T = ±5 A, t_W = 100 µs				±3	V
I_H	Holding current	I_T = ±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_{DRM}		±5			kV/µs
I_D	Off-state current	V_D = ±50 V				±10	µA
C_{off}	Off-state capacitance	f = 100 kHz, V_d = 1 Vrms, V_D = 0,	'4072 - '4082		63	108	pF
			'4125 - '4180		43	74	
			'4240 - '4380		44	74	
		f = 100 kHz, V_d = 1 Vrms, V_D = -50 V	'4072 - '4082		25	40	
			'4125 - '4180		15	25	
			'4240 - '4380		11	20	

thermal characteristics

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
$R_{\theta JA}$	Junction to free air thermal resistance	EIA/JESD51-3 PCB mounted in an EIA/JESD51-2 enclosure			120	°C/W

PARAMETER MEASUREMENT INFORMATION

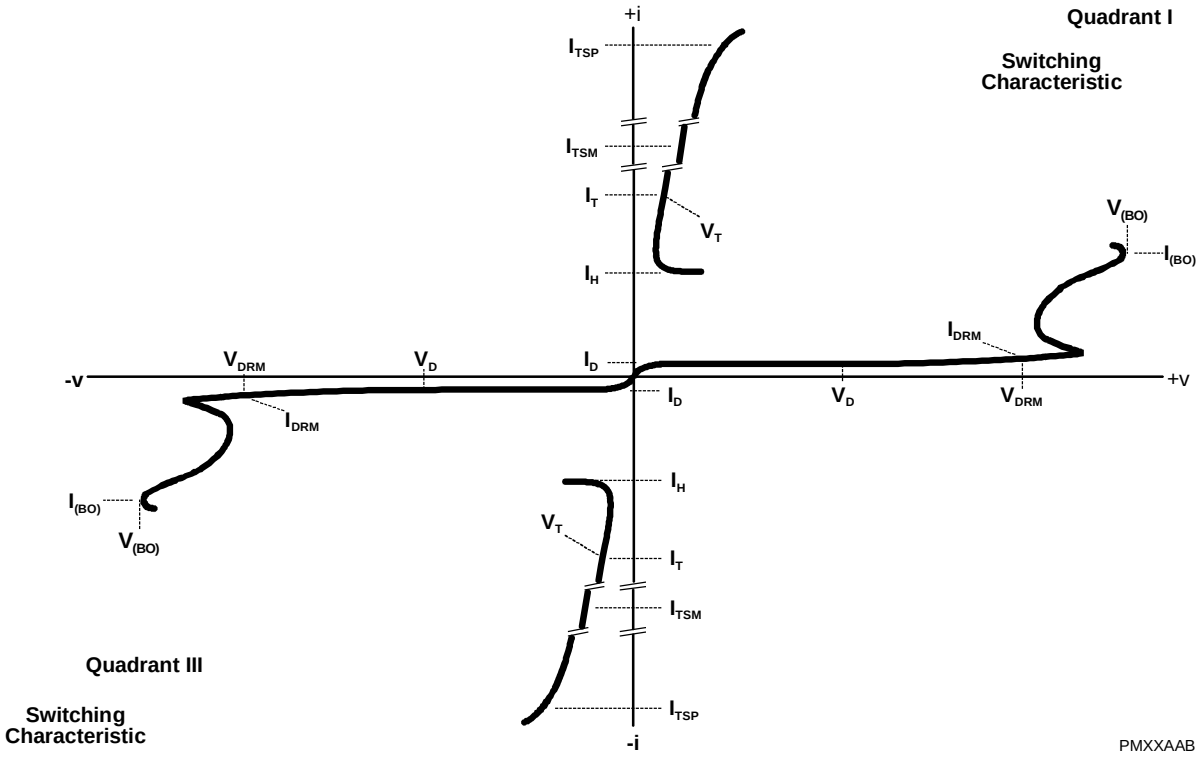


Figure 1. VOLTAGE-CURRENT CHARACTERISTIC FOR R AND T TERMINALS
ALL MEASUREMENTS ARE REFERENCED TO THE T TERMINAL

TYPICAL CHARACTERISTICS

OFF-STATE CURRENT vs JUNCTION TEMPERATURE

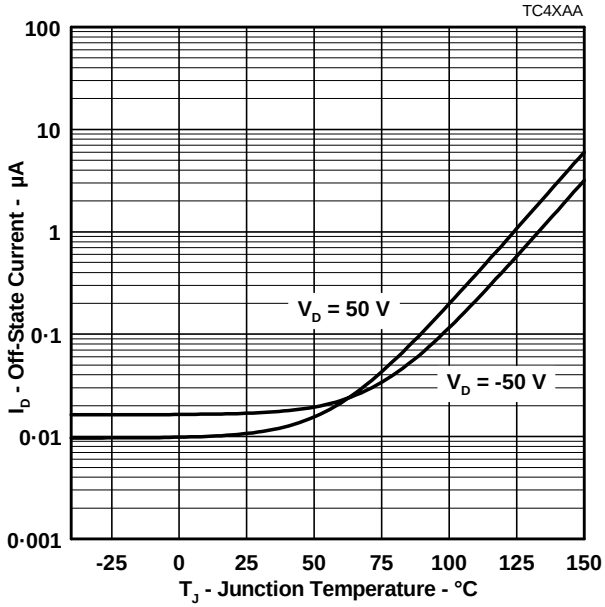


Figure 2.

V_{DRM} DERATING FACTOR vs MINIMUM AMBIENT TEMPERATURE

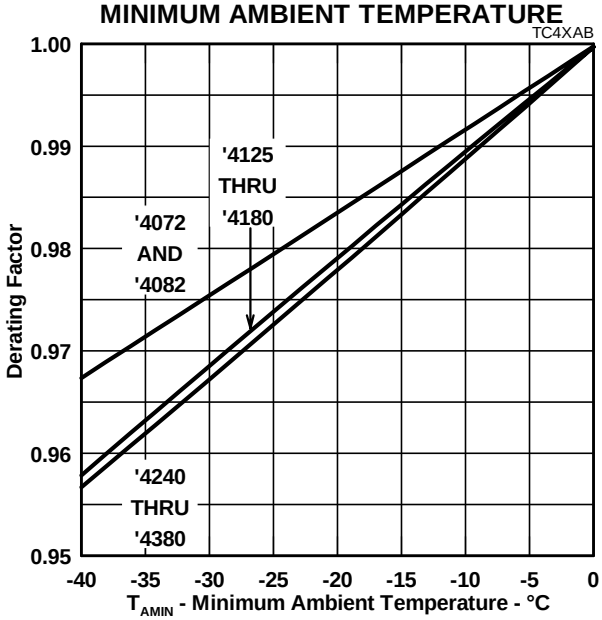


Figure 3.

NORMALISED $V_{(BO)}$ vs AMBIENT TEMPERATURE

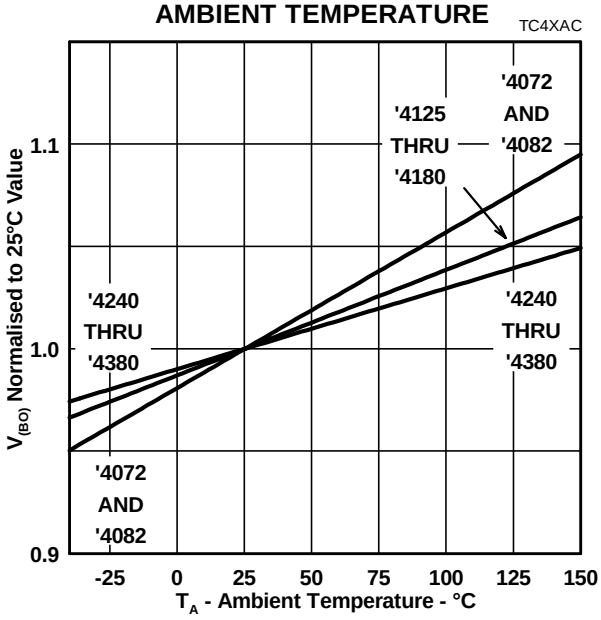


Figure 4.

NORMALISED HOLDING CURRENT vs JUNCTION TEMPERATURE

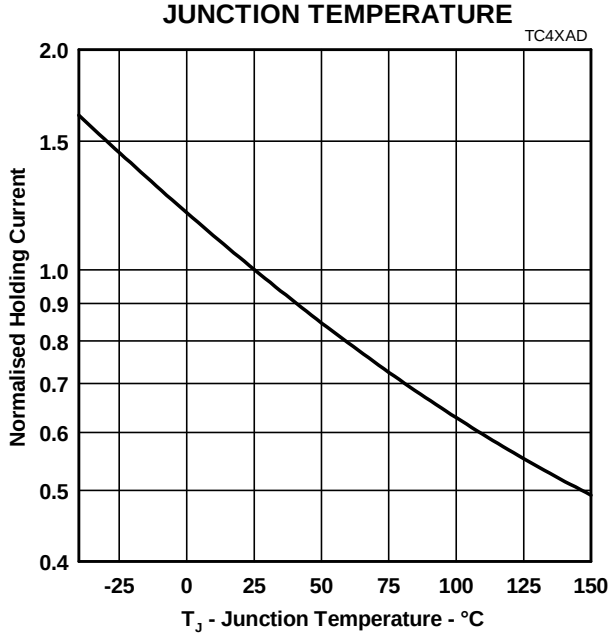


Figure 5.

TYPICAL CHARACTERISTICS

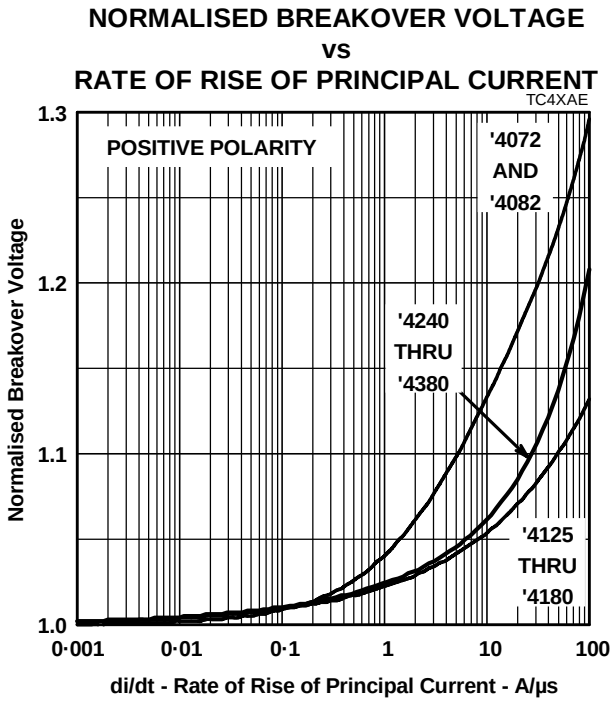


Figure 6.

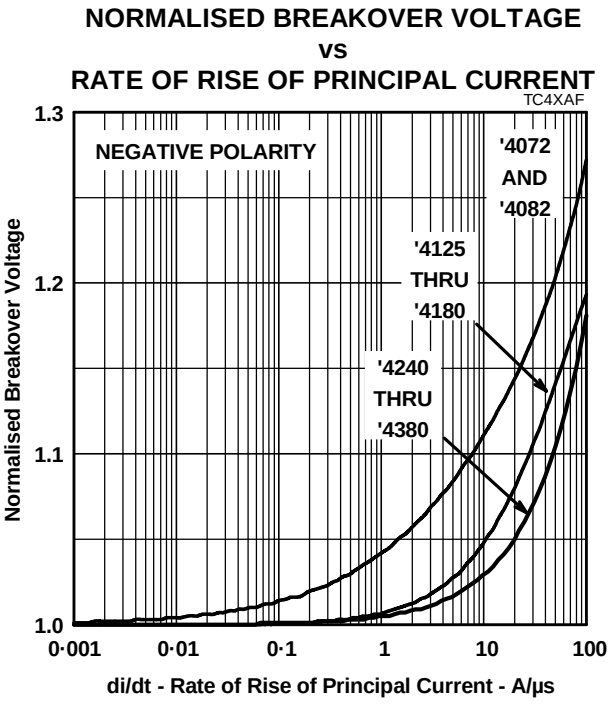


Figure 7.

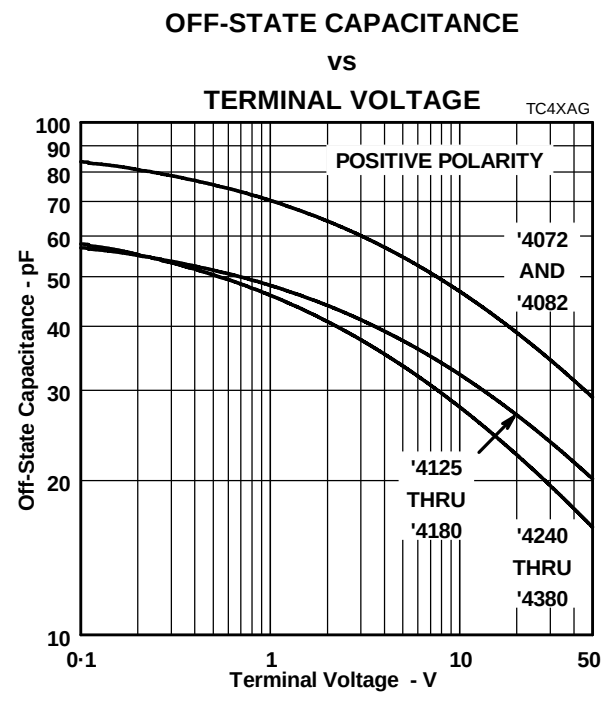


Figure 8.

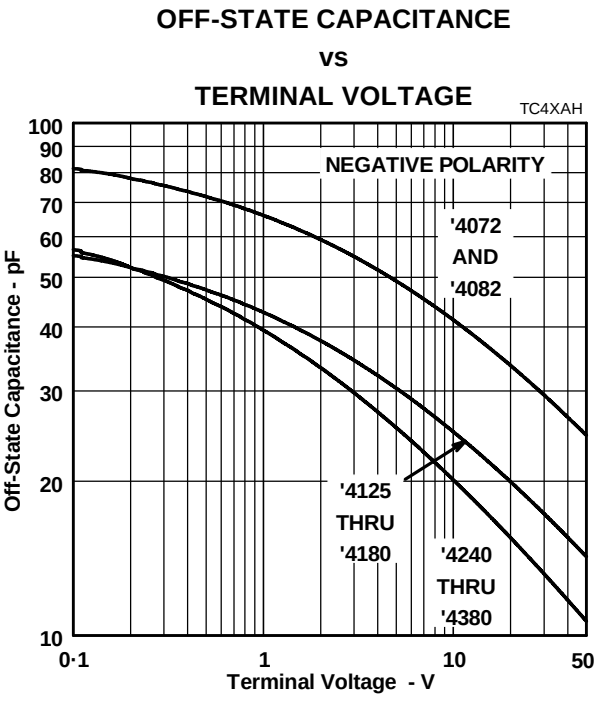


Figure 9.

THERMAL INFORMATION

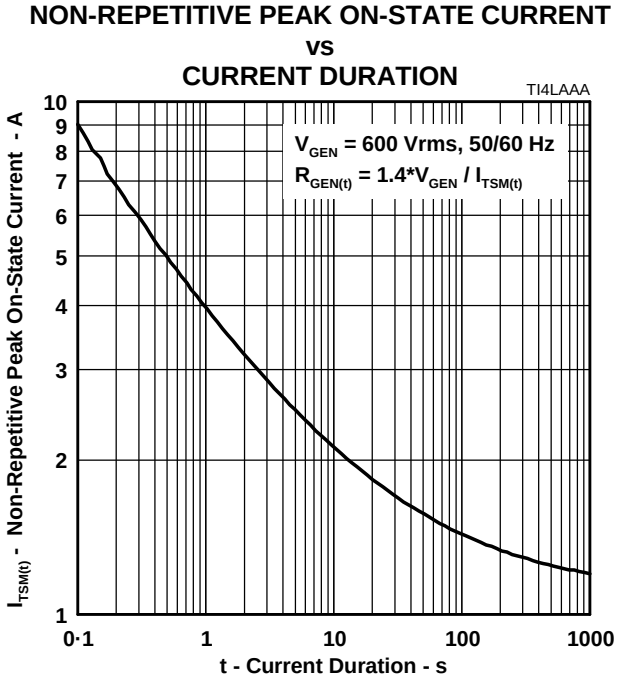


Figure 10.

MECHANICAL DATA

device symbolization code

Devices will be coded as below.

DEVICE	SYMOBLIZATION 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	ORDER #
Straight Lead DO-92	Bulk Pack	TISP4xxxF3LM
Straight Lead DO-92	Tape and Reeled	TISP4xxxF3LMR
Formed Lead DO-92	Tape and Reeled	TISP4xxxF3LMFR

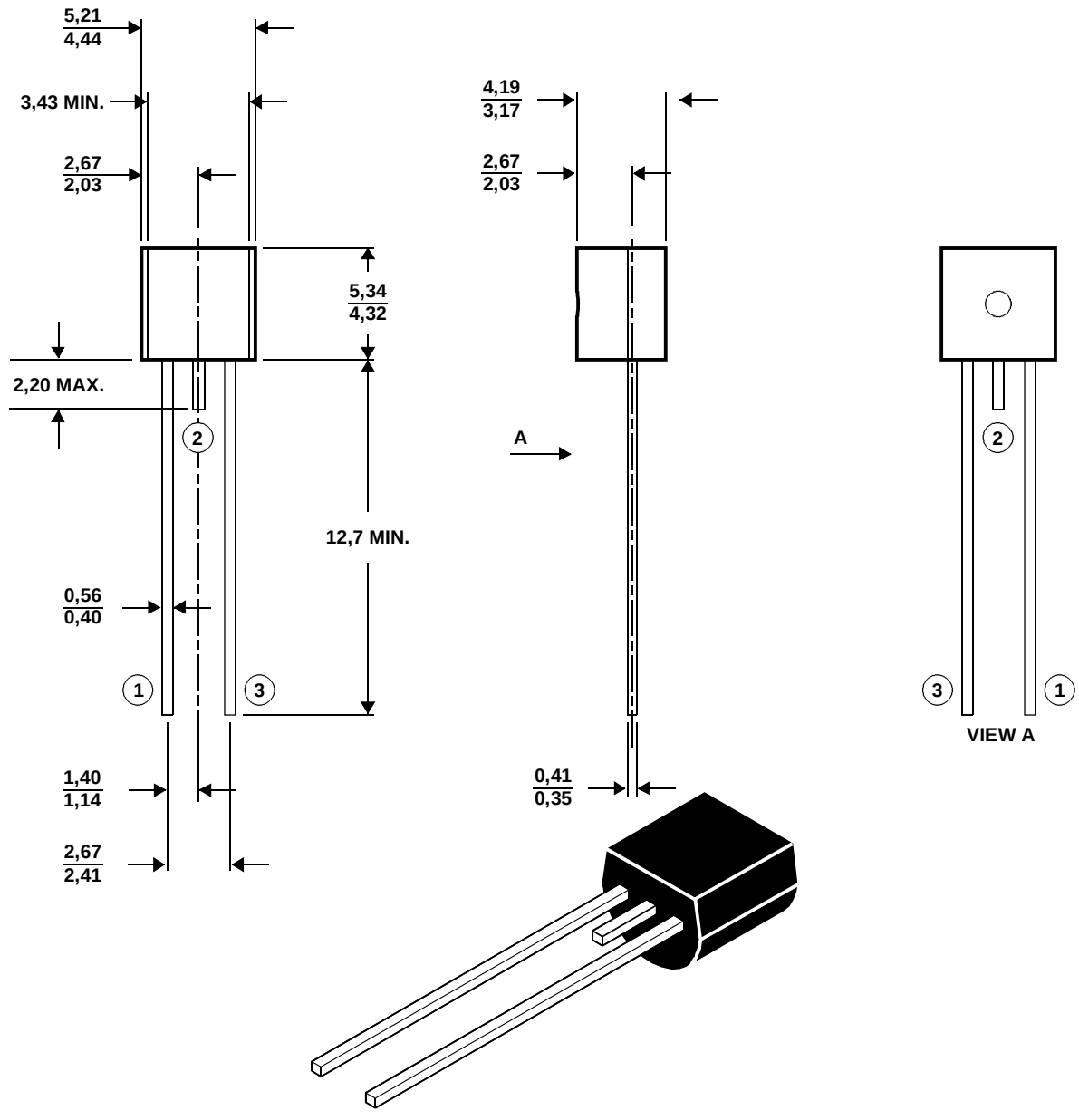
MECHANICAL DATA

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. .

LM002 Package (DO-92)



ALL LINEAR DIMENSIONS IN MILLIMETERS

MD4XARA

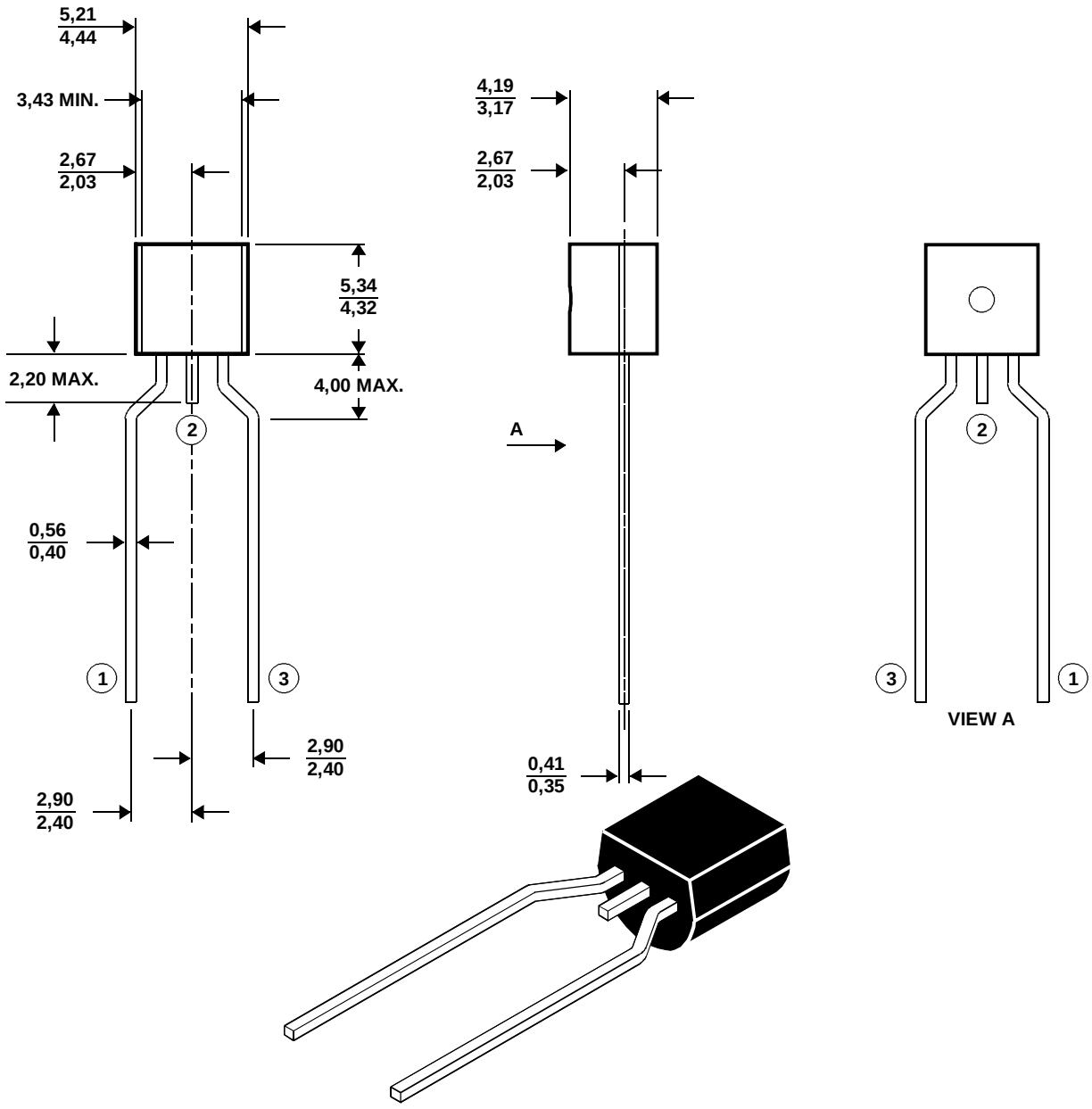
MECHANICAL DATA

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

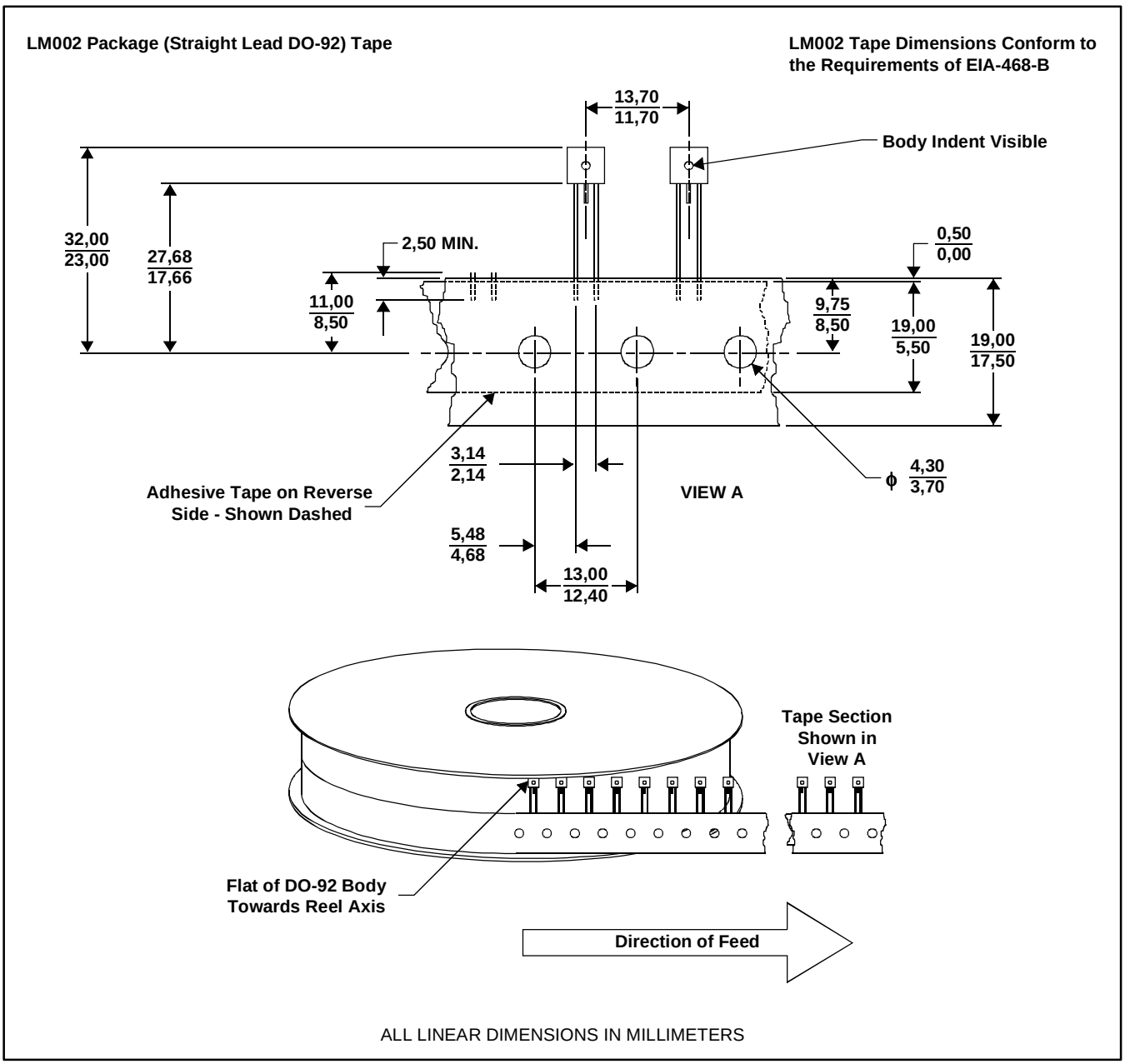


ALL LINEAR DIMENSIONS IN MILLIMETERS

MD4XASA

MECHANICAL DATA

tape dimensions



ALL LINEAR DIMENSIONS IN MILLIMETERS

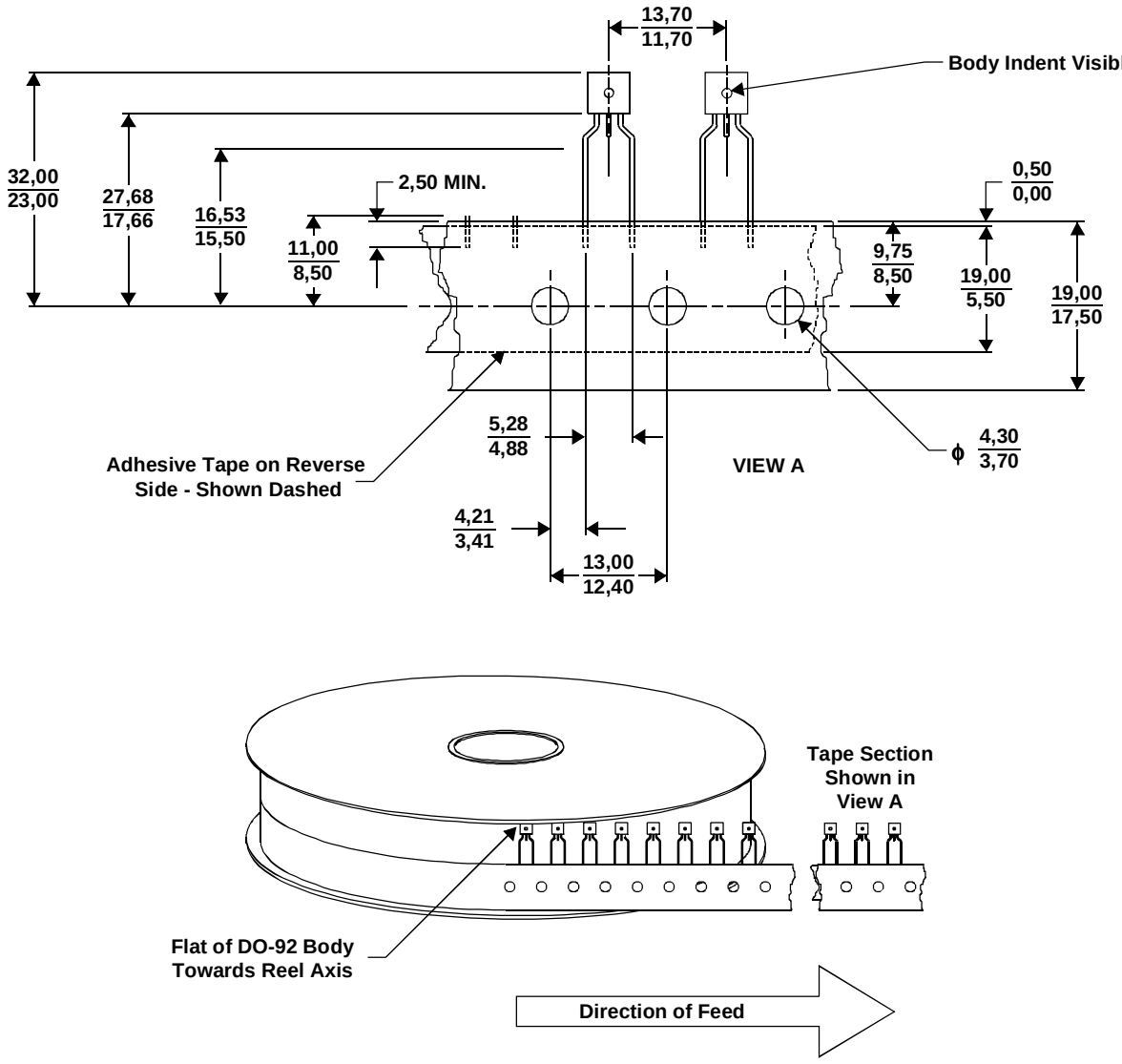
MD4XAPC

MECHANICAL DATA

tape dimensions

LMF002 Package (Formed Lead DO-92) Tape

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



ALL LINEAR DIMENSIONS IN MILLIMETERS

MD4XAQC

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