

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

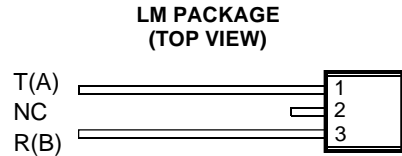
Copyright © 1999, Power Innovations Limited, UK

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



MD4XAT

NC - No internal connection on pin 2



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

device symbol



SD4XAA

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

- **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

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

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.



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

DECEMBER 1998 - REVISED APRIL 1999

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 ($0\text{ }^{\circ}\text{C} < T_J < 70\text{ }^{\circ}\text{C}$)	'4072	± 58	V	
	'4082	± 66		
	'4125	± 100		
	'4150	± 120		
	'4180	± 145		
	'4240	± 180		
	'4260	± 200		
	'4290	± 220		
	'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)	I_{TSM}	4	A	
50/60 Hz, 1 s				
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	$^{\circ}\text{C}$	
Storage temperature range	T_{stg}	-55 to +150	$^{\circ}\text{C}$	

- NOTES: 1. Initially the TISP must be in thermal equilibrium with $0\text{ }^{\circ}\text{C} < T_J < 70\text{ }^{\circ}\text{C}$.
2. The surge may be repeated after the TISP returns to its initial conditions.
3. Above $70\text{ }^{\circ}\text{C}$, derate linearly to zero at $150\text{ }^{\circ}\text{C}$ lead temperature.

PRODUCT INFORMATION

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

DECEMBER 1998 - REVISED APRIL 1999

electrical characteristics for the T and R terminals, $T_J = 25\text{ }^\circ\text{C}$ (unless otherwise noted)

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
I_{DRM} Repetitive peak off-state current	$V_D = \pm V_{DRM}$, $0\text{ }^\circ\text{C} < T_J < 70\text{ }^\circ\text{C}$			± 10	μA
$V_{(BO)}$ Breakover voltage	$dv/dt = \pm 250\text{ V/ms}$, $R_{SOURCE} = 300\ \Omega$	'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	$dv/dt = \pm 1000\text{ V}/\mu\text{s}$, $R_{SOURCE} = 50\ \Omega$, $di/dt < 20\text{ A}/\mu\text{s}$	'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	$dv/dt = \pm 250\text{ V/ms}$, $R_{SOURCE} = 300\ \Omega$	± 0.15		± 0.6	A
V_T On-state voltage	$I_T = \pm 5\text{ A}$, $t_W = 100\ \mu\text{s}$			± 3	V
I_H Holding current	$I_T = \pm 5\text{ A}$, $di/dt = +/- 30\text{ mA/ms}$	± 0.15			A
dv/dt Critical rate of rise of off-state voltage	Linear voltage ramp, Maximum ramp value $< 0.85V_{DRM}$	± 5			$\text{kV}/\mu\text{s}$
I_D Off-state current	$V_D = \pm 50\text{ V}$			± 10	μA
C_{off} Off-state capacitance	$f = 100\text{ kHz}$, $V_d = 1\text{ Vrms}$, $V_D = 0$,	'4072 - '4082	63	108	pF
		'4125 - '4180	43	74	
		'4240 - '4380	44	74	
	$f = 100\text{ kHz}$, $V_d = 1\text{ Vrms}$, $V_D = -50\text{ V}$	'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	$^\circ\text{C}/\text{W}$

TYPICAL CHARACTERISTICS

OFF-STATE CURRENT
 VS
 JUNCTION TEMPERATURE

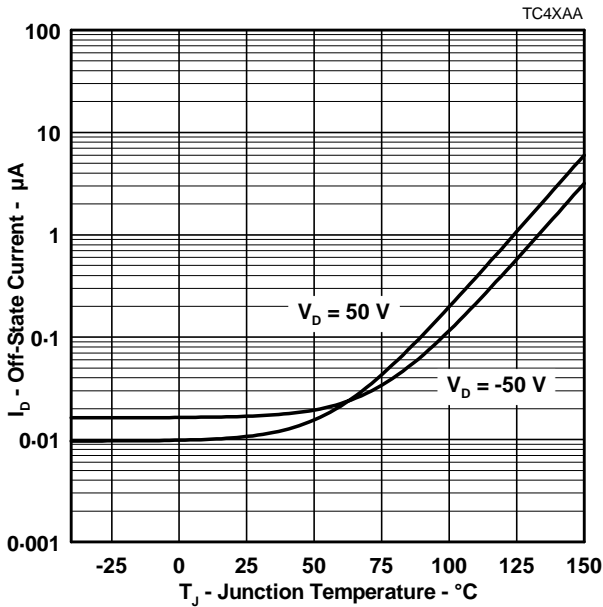


Figure 2.

V_{DRM} DERATING FACTOR
 VS
 MINIMUM AMBIENT TEMPERATURE

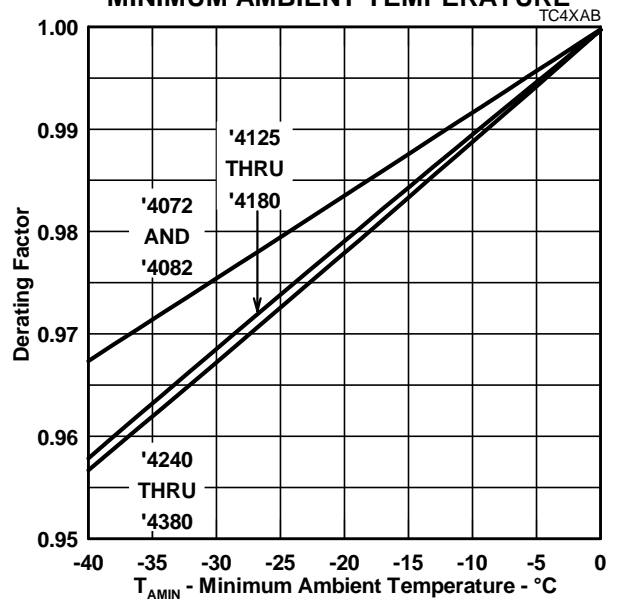


Figure 3.

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

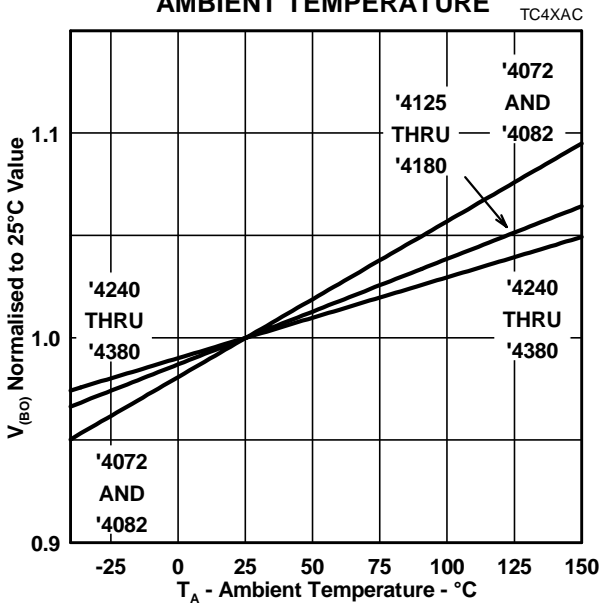


Figure 4.

NORMALISED HOLDING CURRENT
 VS
 JUNCTION TEMPERATURE

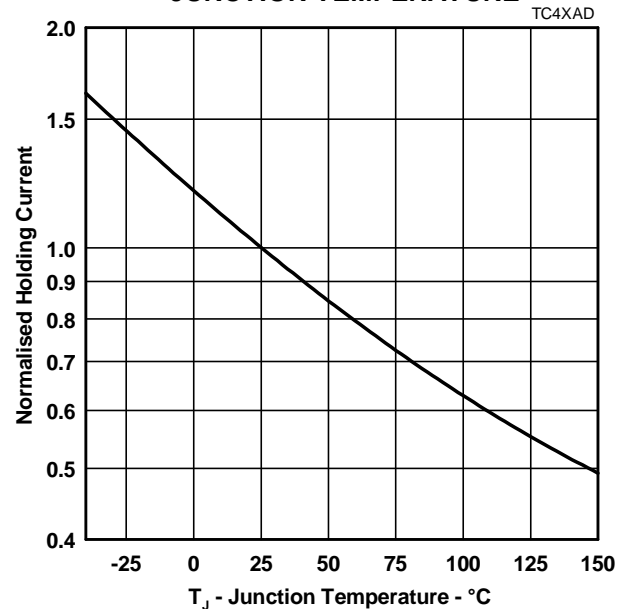


Figure 5.

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

DECEMBER 1998 - REVISED APRIL 1999

TYPICAL CHARACTERISTICS

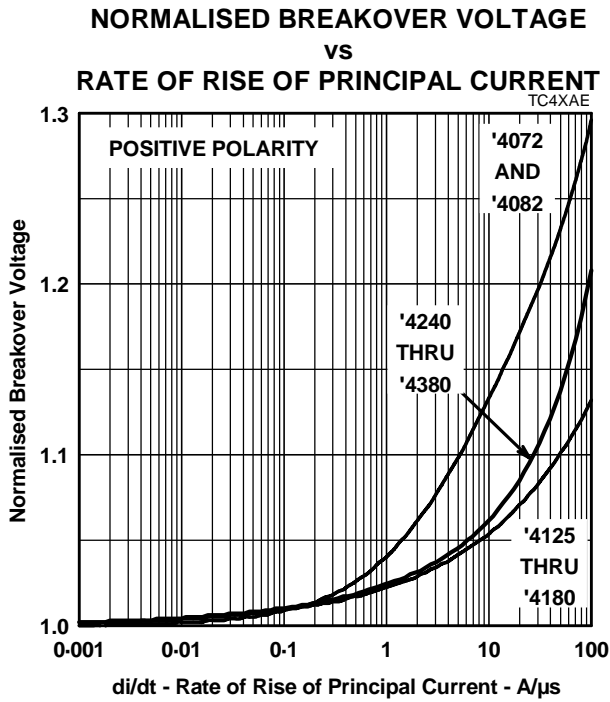


Figure 6.

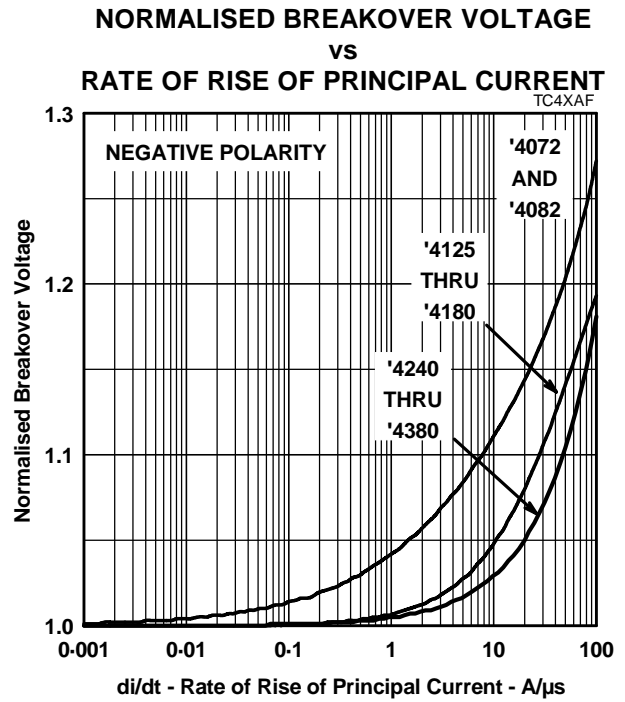


Figure 7.

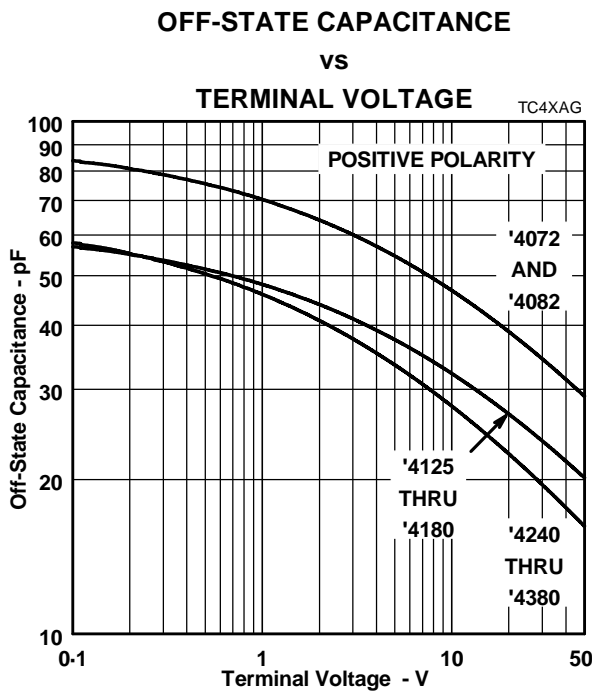


Figure 8.

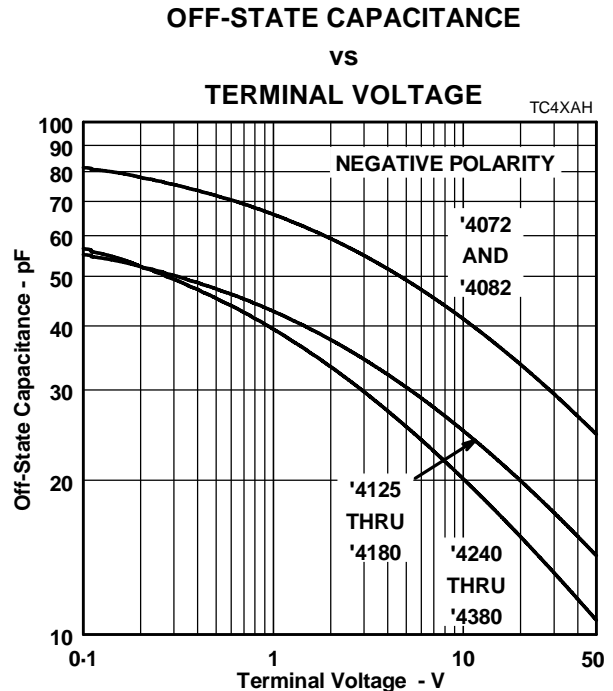


Figure 9.

PRODUCT INFORMATION

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

DECEMBER 1998 - REVISED APRIL 1999

THERMAL INFORMATION

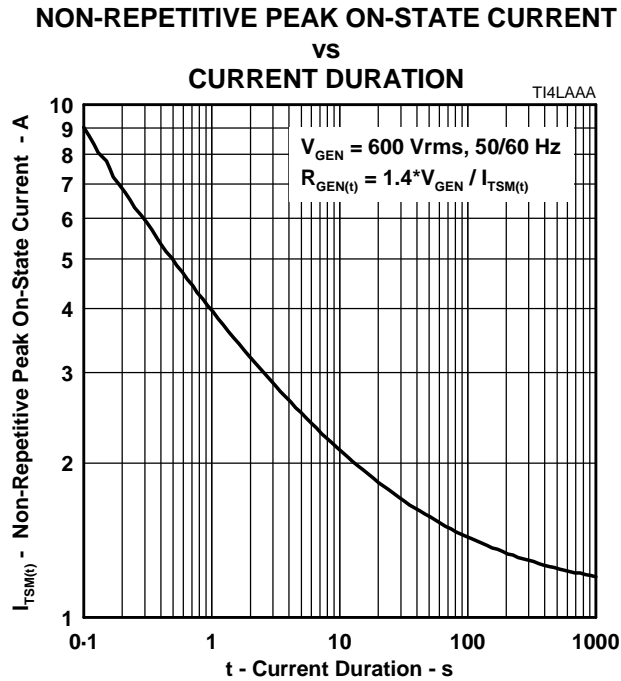


Figure 10.

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

PRODUCT INFORMATION



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

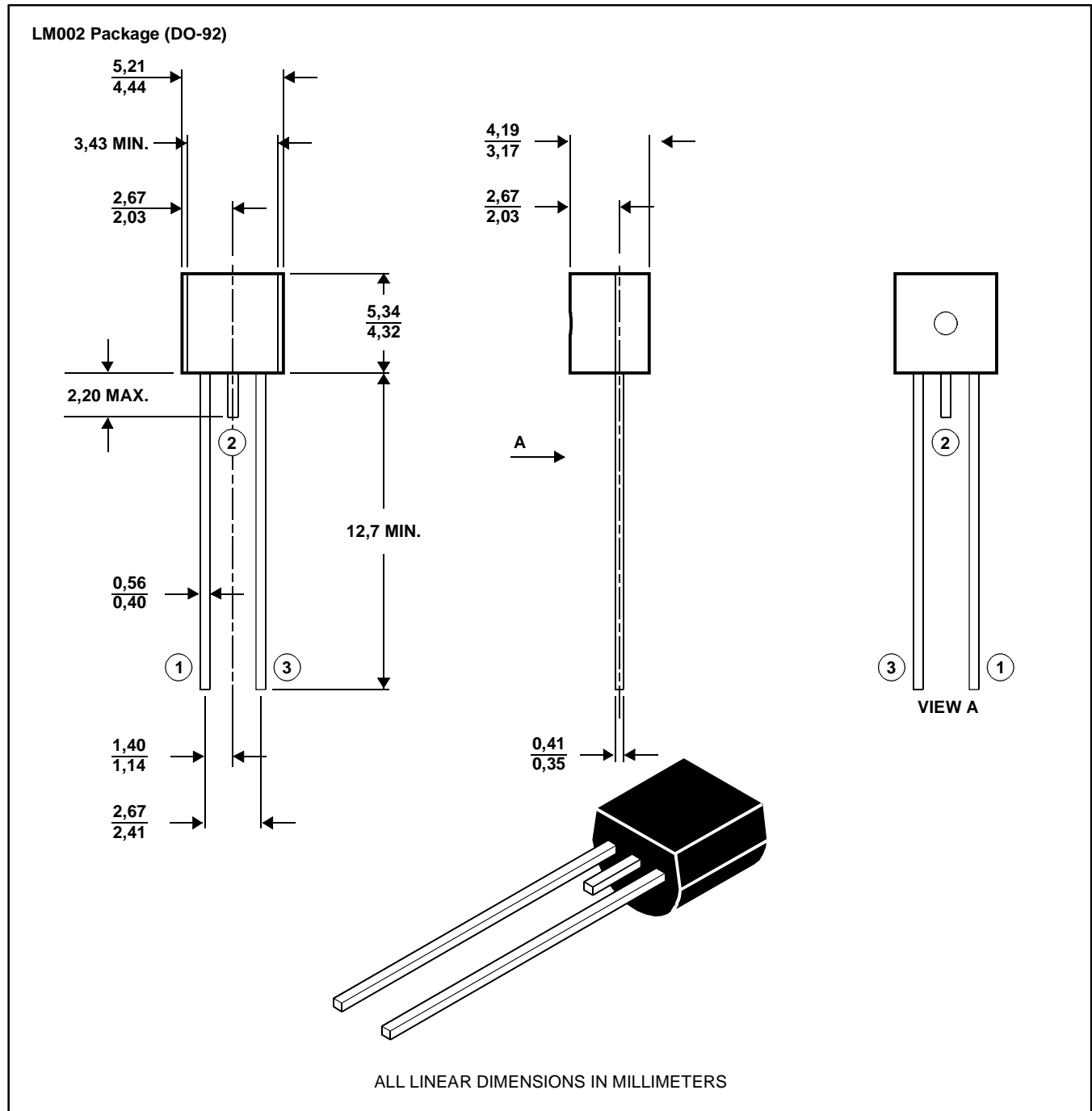
DECEMBER 1998 - REVISED APRIL 1999

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.



MD4XARA

PRODUCT INFORMATION

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

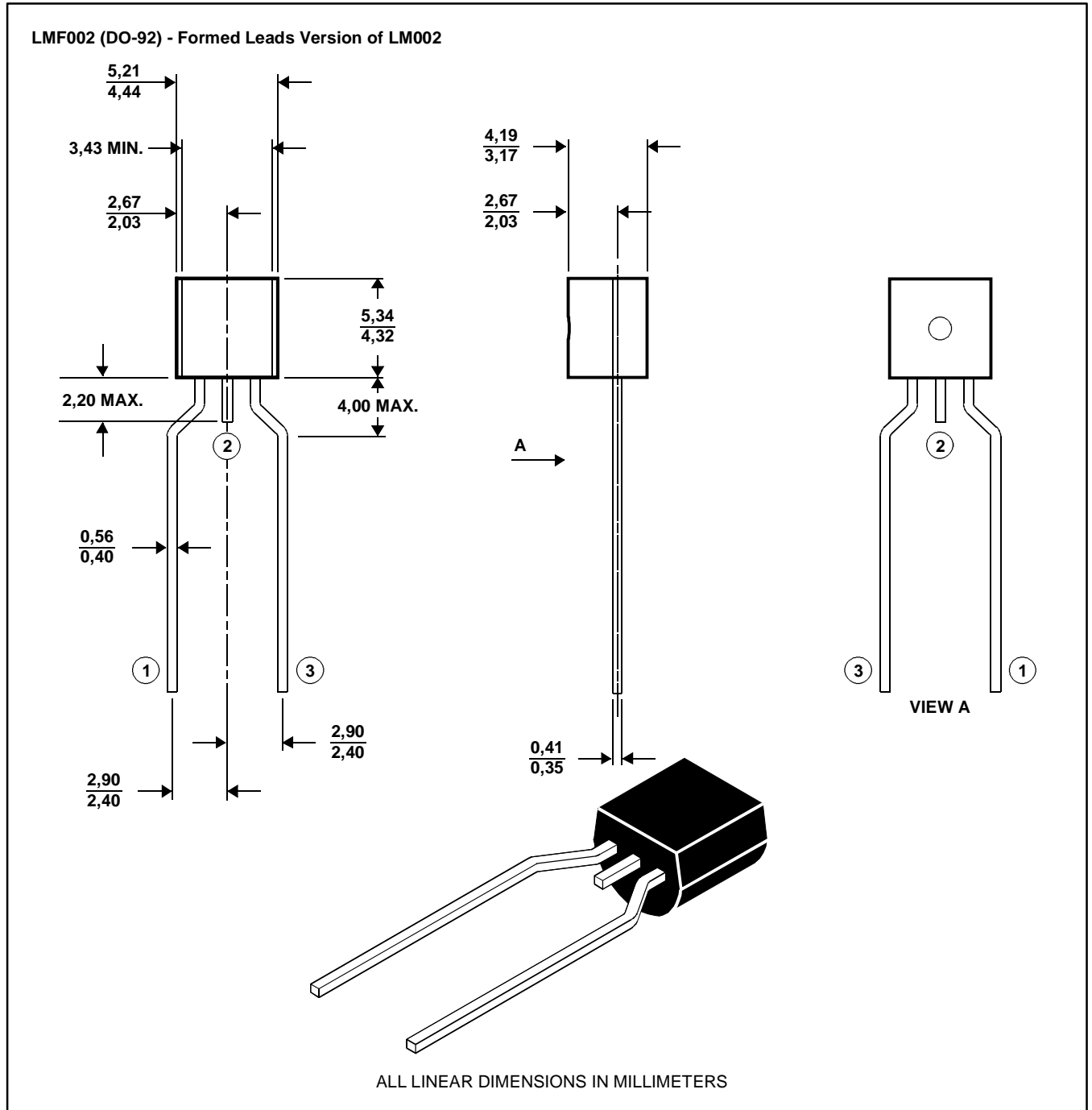
DECEMBER 1998 - REVISED APRIL 1999

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.



MD4XASA

PRODUCT INFORMATION

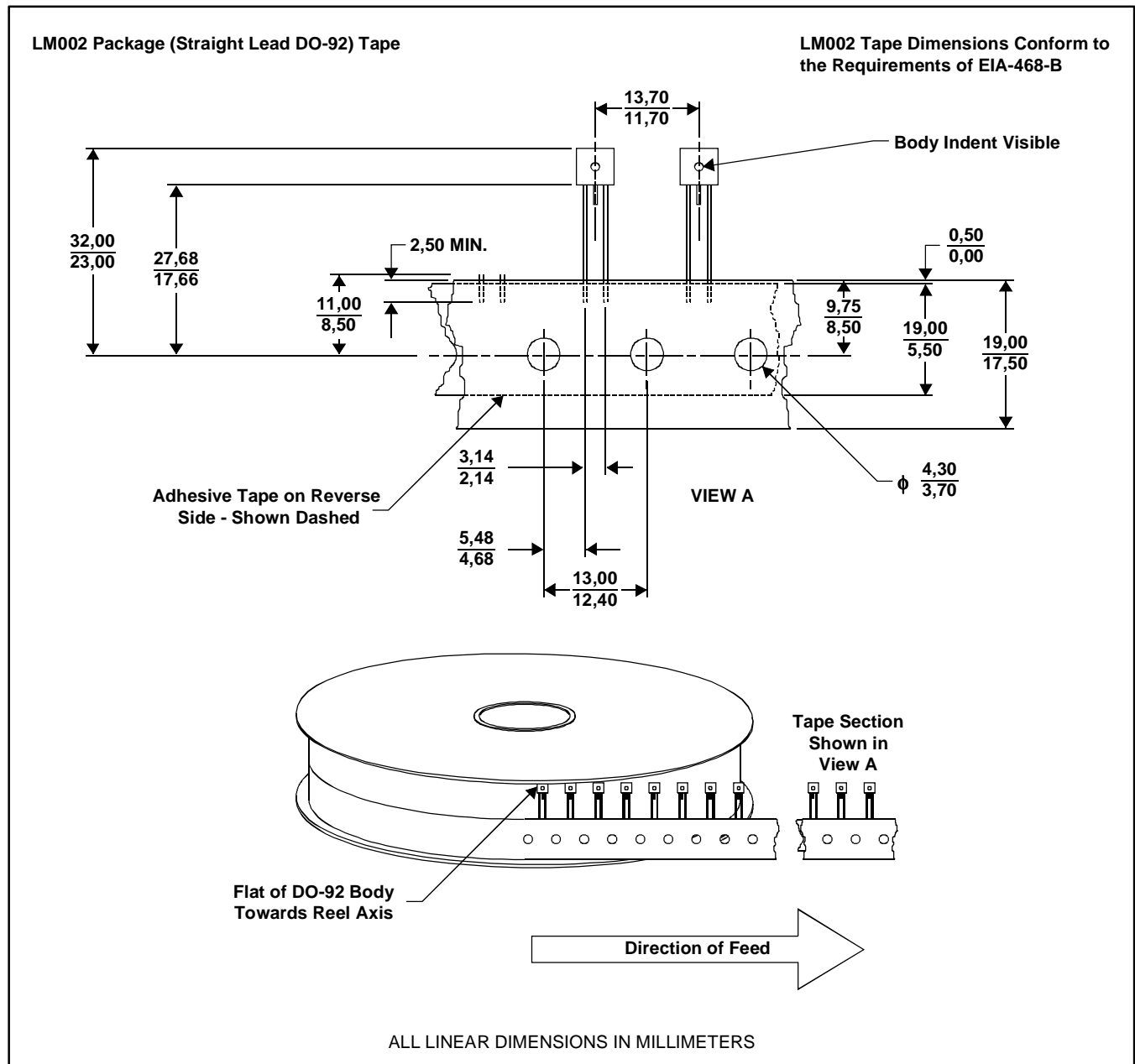


**TISP4072F3LM, TISP4082F3LM, TISP4125F3LM, TISP4150F3LM, TISP4180F3LM
TISP4240F3LM, TISP4260F3LM, TISP4290F3LM, TISP4320F3LM, TISP4380F3LM
BIDIRECTIONAL THYRISTOR OVERVOLTAGE PROTECTORS**

DECEMBER 1998 - REVISED APRIL 1999

MECHANICAL DATA

tape dimensions



MD4XAPC

PRODUCT INFORMATION

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

DECEMBER 1998 - REVISED APRIL 1999

IMPORTANT NOTICE

Power Innovations Limited (PI) reserves the right to make changes to its products or to discontinue any semiconductor product or service without notice, and advises its customers to verify, before placing orders, that the information being relied on is current.

PI warrants performance of its semiconductor products to the specifications applicable at the time of sale in accordance with PI's standard warranty. Testing and other quality control techniques are utilized to the extent PI deems necessary to support this warranty. Specific testing of all parameters of each device is not necessarily performed, except those mandated by government requirements.

PI assumes no liability for applications assistance, customer product design, software performance, or infringement of patents or services described herein. Nor is any license, either express or implied, granted under any patent right, copyright, design right, or other intellectual property right of PI covering or relating to any combination, machine, or process in which such semiconductor products or services might be or are used.

PI SEMICONDUCTOR PRODUCTS ARE NOT DESIGNED, INTENDED, AUTHORISED, OR WARRANTED TO BE SUITABLE FOR USE IN LIFE-SUPPORT APPLICATIONS, DEVICES OR SYSTEMS.

Copyright © 1999, Power Innovations Limited

PRODUCT INFORMATION