

# Radial Leaded PTC - Nickel Thin Film Linear Thermistors



## DESCRIPTION

These thermistors are based on a Nickel thin film resistor technology as thermal sensitive material. The device consists of a thin film ceramic chip with two tinned copper clad steel wire leads.

## FEATURES

- Nickel thin film PTC element
- High stability over the entire temperature range
- cUL recognized component: File E148885
- Epoxy coated UL 94 V-0 approved
- Compliant to RoHS Directive 2002/95/EC and in accordance to WEEE 2002/96/EC



**RoHS**  
COMPLIANT

## APPLICATIONS

Temperature measurement, sensing, compensation and control in industrial and consumer applications. For on-board or remote sensing.

## MARKING

The thermistors are laser marked with value and tolerance reference on an epoxy based coating.  
(Example: 102F = 10 x 10<sup>2</sup> = 1000 Ω 1 %)

## MOUNTING

By soldering or welding in any position.

QUICK REFERENCE DATA			
PARAMETER	VALUE		UNIT
DESCRIPTION	TFPTL10	TFPTL15	
Resistance value at 25 °C <sup>(2)</sup>	100 to 1K	100 to 5K	Ω
Tolerance on R <sub>25</sub> -value <sup>(2)</sup>	± 1; ± 5		%
TCR at 25 °C	4110		ppm/K
Tolerance on TCR at 25 °C <sup>(1)</sup>	± 400		ppm/K
Operating temperature range: at rated power at zero dissipation	- 55 to + 70 - 55 to + 150		°C
Response time (in oil)	≈ 1.1	≈ 1.6	s
Dissipation factor δ (for information only)	2.9	3.4	mW/K
Maximum rated power at 70 °C (P <sub>70</sub> )	75	100	mW
Maximum working voltage RCWV <sup>(3)</sup>	30	40	V
Climatic category (LCT/UCT/days)	55/150/56		-
Weight	0.12	0.14	g

STANDARD RESISTANCE VALUES at 25 °C in Ω <sup>(2)</sup>										
100	150	220	330	470	680	1K	1.5K	2.2K	3.3K	4.7K
120	180	270	390	560	820	1.2K	1.8K	2.7K	3.9K	5.0K

### Notes

- (1) Contact Vishay if closer TCR lot tolerance is desired
- (2) Other R<sub>25</sub>-values and tolerances are available upon request
- (3) Rated continuous working voltage is maximum working voltage or  $\sqrt{P_{70} \times R}$ , whichever is less

GLOBAL PART NUMBER INFORMATION															
Global Part Numbering: TFPTL10L1001FL2B															
T	F	P	T	L	1	0	L	1	0	0	1	F	L	2	B
PRODUCT TYPE	SIZE	CHARACTERISTIC		RESISTANCE VALUE			TOLERANCE	LEAD CONFIGURATION		PACKAGING					
TFPT Leaded	10 15	L = Linear		1000 = 100R 1001 = 1K 5001 = 5K			F = ± 1 % J = ± 5 %	L2 H5		B = Bulk (500 pieces) U = Ammopack (2500 pieces) T = T/R (4000 pieces)					

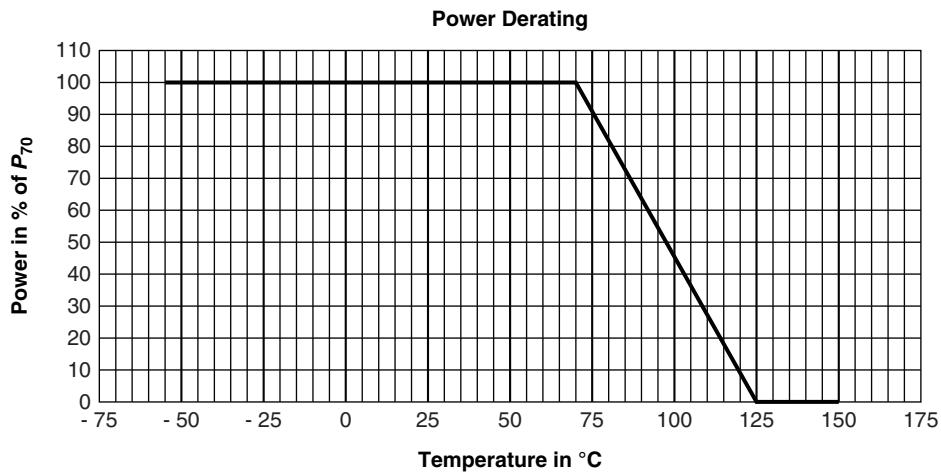
**DIMENSIONS**



TFPTL DIMENSIONS in millimeters				
	SIZE L10		SIZE L15	
	L2	H5	L2	H5
Wb <sub>max.</sub>	3.6		4.0	
H <sub>max.</sub>	3.5		3.8	
SH <sub>max.</sub> (seating height)	5.0	6.2	5.2	6.5
d	0.5 ± 10 %			
L	25 min.			
F	2.5 ± 0.8	5.0 ± 0.8	2.5 ± 0.8	5.0 ± 0.8
T <sub>max.</sub>	2.2		2.4	

**Notes**

- Bulk packed types have a standard lead length L = 25 mm minimum
- Thickness is defined as “T”



**Note**

- Zero power is considered as measuring power max. 1 % of rated power P<sub>70</sub>



PERFORMANCE	
TEST	MAXIMUM $\Delta R_{25}/R_{25}$ (1)
Storage dry heat (5000 h at 125 °C)	± 0.25 %
High temperature exposure (1000 h at 150 °C)	± 0.3 %
Damp heat steady state, unloaded (1344 h at 40 °C/95 % RH)	± 0.2 %
Thermal cycling (15 min at - 55 °C, 15 min at 150 °C, 100 cycles)	± 0.2 %
Thermal cycling (15 min at - 55 °C, 15 min at 125 °C, 1000 cycles)	± 0.2 %
Short time overload (2.5 x $P_{70}$ for 60s at 70 °C)	± 0.2 %
Long term dissipation (1000 h rated power at 70 °C)	± 0.2 %
Resistance to soldering heat (10 s at 260 °C)	± 0.25 %

Note

(1) TFPTs are ESD sensitive

AVERAGE RATIO $R/R_{25}$ TFPTL ALL SIZES AND VALUES									
TEMP.	$R/R_{25}$	TEMP.	$R/R_{25}$	TEMP.	$R/R_{25}$	TEMP.	$R/R_{25}$	TEMP.	$R/R_{25}$
- 20	0.825	20	0.980	60	1.150	100	1.337	140	1.541
- 19	0.828	21	0.984	61	1.155	101	1.342	141	1.547
- 18	0.832	22	0.988	62	1.159	102	1.347	142	1.552
- 17	0.836	23	0.992	63	1.164	103	1.352	143	1.557
- 16	0.839	24	0.996	64	1.168	104	1.357	144	1.563
- 55	0.702	- 15	0.843	<b>25</b>	<b>1.000</b>	65	1.173	105	1.362
- 54	0.705	- 14	0.847	26	1.004	66	1.177	106	1.367
- 53	0.708	- 13	0.851	27	1.008	67	1.182	107	1.372
- 52	0.712	- 12	0.854	28	1.012	68	1.186	108	1.377
- 51	0.715	- 11	0.858	29	1.017	69	1.191	109	1.382
- 50	0.719	- 10	0.862	30	1.021	70	1.196	110	1.387
- 49	0.722	- 9	0.866	31	1.025	71	1.200	111	1.392
- 48	0.725	- 8	0.869	32	1.029	72	1.205	112	1.397
- 47	0.729	- 7	0.873	33	1.033	73	1.209	113	1.402
- 46	0.732	- 6	0.877	34	1.037	74	1.214	114	1.407
- 45	0.736	- 5	0.881	35	1.042	75	1.219	115	1.412
- 44	0.739	- 4	0.885	36	1.046	76	1.223	116	1.417
- 43	0.743	- 3	0.889	37	1.050	77	1.228	117	1.422
- 42	0.746	- 2	0.892	38	1.054	78	1.232	118	1.427
- 41	0.749	- 1	0.896	39	1.059	79	1.237	119	1.432
- 40	0.753	0	0.900	40	1.063	80	1.242	120	1.437
- 39	0.756	1	0.904	41	1.067	81	1.246	121	1.442
- 38	0.760	2	0.908	42	1.071	82	1.251	122	1.448
- 37	0.763	3	0.912	43	1.076	83	1.256	123	1.453
- 36	0.767	4	0.916	44	1.080	84	1.261	124	1.458
- 35	0.771	5	0.920	45	1.084	85	1.265	125	1.463
- 34	0.774	6	0.924	46	1.089	86	1.270	126	1.468
- 33	0.778	7	0.927	47	1.093	87	1.275	127	1.473
- 32	0.781	8	0.931	48	1.097	88	1.280	128	1.478
- 31	0.785	9	0.935	49	1.102	89	1.284	129	1.484
- 30	0.788	10	0.939	50	1.106	90	1.289	130	1.489
- 29	0.792	11	0.943	51	1.110	91	1.294	131	1.494
- 28	0.796	12	0.947	52	1.115	92	1.299	132	1.499
- 27	0.799	13	0.951	53	1.119	93	1.303	133	1.505
- 26	0.803	14	0.955	54	1.124	94	1.308	134	1.510
- 25	0.806	15	0.959	55	1.128	95	1.313	135	1.515
- 24	0.810	16	0.963	56	1.133	96	1.318	136	1.520
- 23	0.814	17	0.967	57	1.137	97	1.323	137	1.526
- 22	0.817	18	0.971	58	1.141	98	1.328	138	1.531
- 21	0.821	19	0.975	59	1.146	99	1.333	139	1.536

**RATIO FORMULA**

$$R_T = R_{25} \times (9.0014 \times 10^{-1} + 3.87235 \times 10^{-3} (\text{°C})^{-1} \times T + 4.86825 \times 10^{-6} (\text{°C})^{-2} \times T^2 + 1.37559 \times 10^{-9} (\text{°C})^{-3} \times T^3)$$

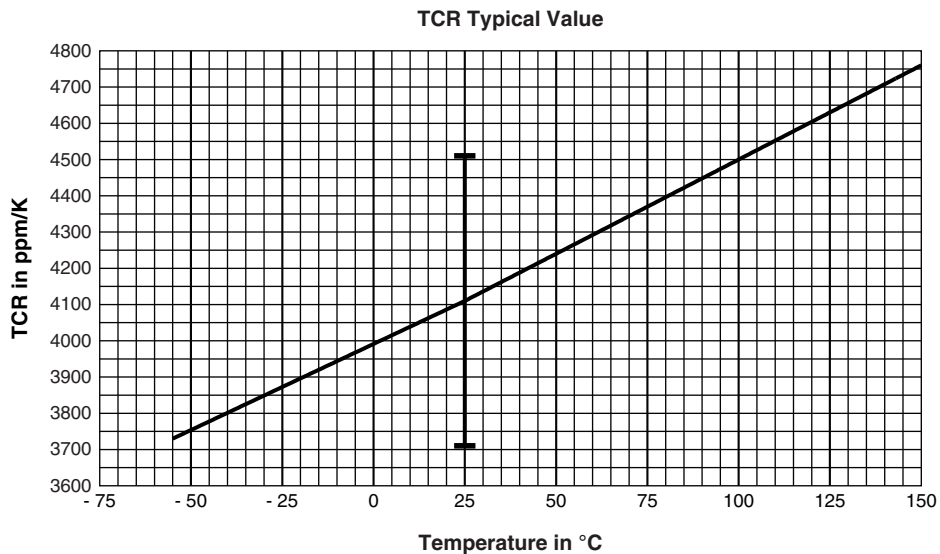
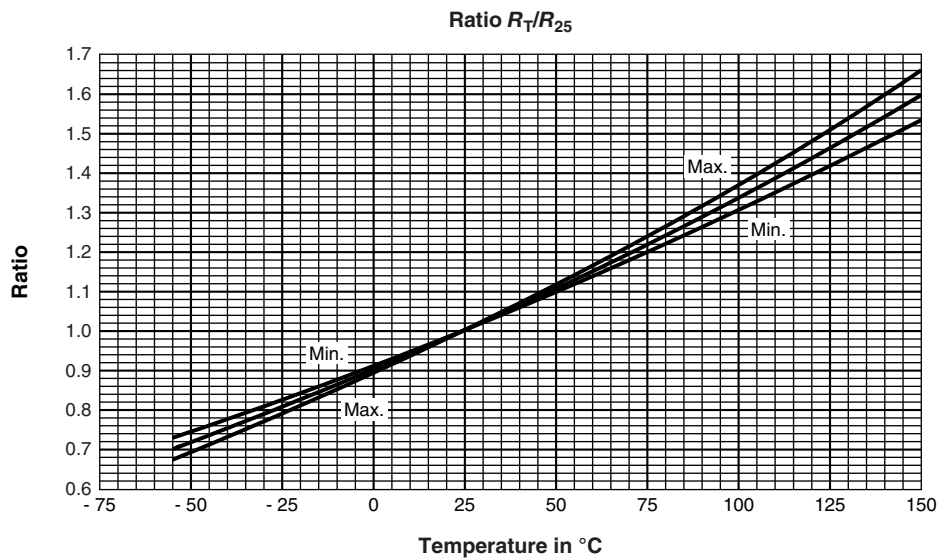
$$T(\text{°C}) = 28.54 \times (R_T/R_{25})^3 - 158.5 \times (R_T/R_{25})^2 + 474.8 \times (R_T/R_{25}) - 319.85$$

RATIO TOLERANCES		
LOW TEMP.	HIGH TEMP.	TOL.
- 55 °C	+ 150 °C	± 4 %
- 40 °C	+ 125 °C	± 3 %
- 20 °C	+ 85 °C	± 2 %
0 °C	+ 55 °C	± 1 %
+ 12 °C	+ 40 °C	± 0.5 %

**Ratio Tolerance Examples:**

At 40 °C, ratio = 1.063 ± 0.5 % (0.005)  
so, ratio = 1.058 to 1.068

At 125 °C, ratio = 1.460 ± 3 % (0.044)  
so, ratio = 1.416 to 1.504





## Disclaimer

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "Vishay"), disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product.

Vishay makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Vishay disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Vishay's knowledge of typical requirements that are often placed on Vishay products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and/or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer's technical experts. Product specifications do not expand or otherwise modify Vishay's terms and conditions of purchase, including but not limited to the warranty expressed therein.

Except as expressly indicated in writing, Vishay products are not designed for use in medical, life-saving, or life-sustaining applications or for any other application in which the failure of the Vishay product could result in personal injury or death. Customers using or selling Vishay products not expressly indicated for use in such applications do so at their own risk. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay. Product names and markings noted herein may be trademarks of their respective owners.

## Material Category Policy

**Vishay Intertechnology, Inc. hereby certifies that all its products that are identified as RoHS-Compliant fulfill the definitions and restrictions defined under Directive 2011/65/EU of The European Parliament and of the Council of June 8, 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (EEE) - recast, unless otherwise specified as non-compliant.**

**Please note that some Vishay documentation may still make reference to RoHS Directive 2002/95/EC. We confirm that all the products identified as being compliant to Directive 2002/95/EC conform to Directive 2011/65/EU.**

**Vishay Intertechnology, Inc. hereby certifies that all its products that are identified as Halogen-Free follow Halogen-Free requirements as per JEDEC JS709A standards. Please note that some Vishay documentation may still make reference to the IEC 61249-2-21 definition. We confirm that all the products identified as being compliant to IEC 61249-2-21 conform to JEDEC JS709A standards.**



Компания «ЭлектроПласт» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов;
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Помимо этого, одним из направлений компании «ЭлектроПласт» является направление «Источники питания». Мы предлагаем Вам помощь Конструкторского отдела:

- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



#### Как с нами связаться

**Телефон:** 8 (812) 309 58 32 (многоканальный)

**Факс:** 8 (812) 320-02-42

**Электронная почта:** [org@eplast1.ru](mailto:org@eplast1.ru)

**Адрес:** 198099, г. Санкт-Петербург, ул. Калинина, дом 2, корпус 4, литера А.