Radial Leaded PTC - Nickel Thin Film Linear Thermistors

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

e3

RoHS COMPLIANT

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.

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 10^2 = 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 (2)	100 to 1K	100 to 5K	Ω
Tolerance on R_{25}-value (2)	± 1; ± 5		%
TCR at 25 °C	4110		ppm/K
Tolerance on TCR at 25 °C (1)	± 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_{70})	75	100	mW
Maximum working voltage RCWV (3)	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 (2)

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_{25}-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

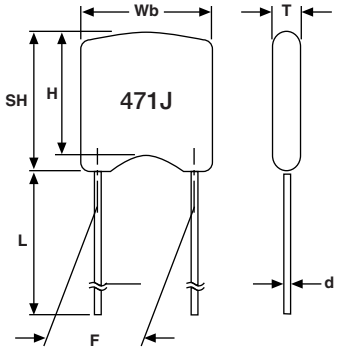
GLOBAL PART NUMBER INFORMATION

Global Part Numbering: TFPTL10L1001FL2B

T	F	P	T	L	1	0	L	1	0	0	1	F	L	2	B

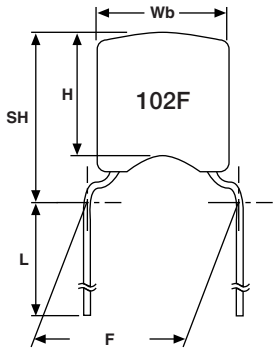
PRODUCT TYPE	SIZE	CHARACTERISTIC	RESISTANCE VALUE	TOLERANCE	LEAD CONFIGURATION	PACKAGING
TFPT Leaded	**10** **15**	**L** = Linear	**1000** = 100R **1001** = 1K **5001** = 5K	**F** = ± 1 % **J** = ± 5 %	**L2** **H5**	**B** = Bulk (500 pieces) **U** = Ammopack (2500 pieces) **T** = T/R (4000 pieces)

DIMENSIONS



L2

Component outline for
lead spacing 2.5 mm ± 0.8 mm
(straight leads)

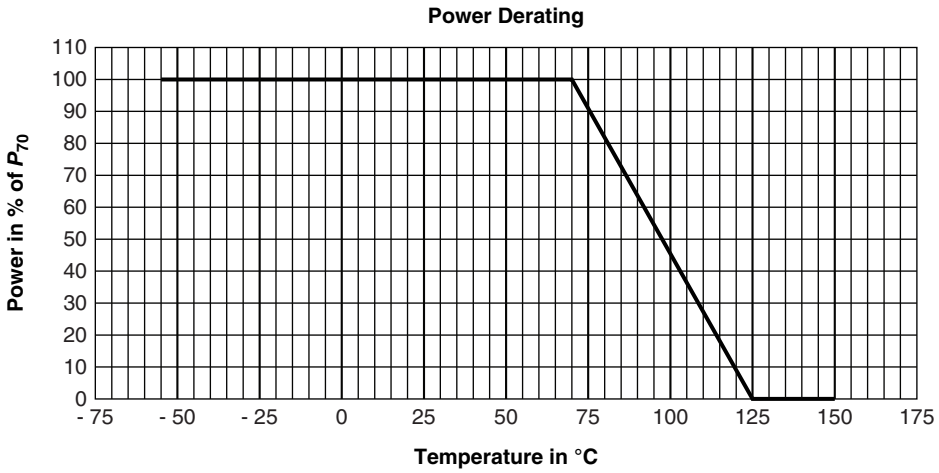


H5

Component outline for
lead spacing 5.0 mm ± 0.8 mm
(flat bent leads)

TFPTL DIMENSIONS in millimeters				
	SIZE L10		**SIZE L15**	
	L2	**H5**	**L2**	**H5**
$Wb_{max.}$	3.6		4.0	
$H_{max.}$	3.5		3.8	
$SH_{max.}$ (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
$T_{max.}$	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_{70}

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}	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	**25**	**1.000**	65	1.173	105	1.362	145	1.568
- 54	0.705	- 14	0.847	26	1.004	66	1.177	106	1.367	146	1.574
- 53	0.708	- 13	0.851	27	1.008	67	1.182	107	1.372	147	1.579
- 52	0.712	- 12	0.854	28	1.012	68	1.186	108	1.377	148	1.584
- 51	0.715	- 11	0.858	29	1.017	69	1.191	109	1.382	149	1.590
- 50	0.719	- 10	0.862	30	1.021	70	1.196	110	1.387	150	1.595
- 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

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

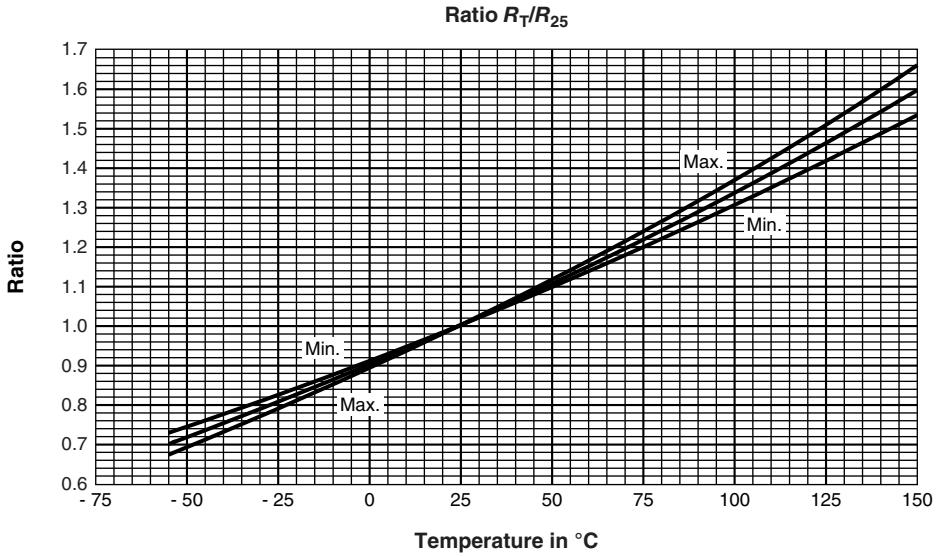
$T_{(°C)} = 28.54 \times (R_T/R_{25})^3 - 158.5 \times (R_T/R_{25})^2 + 474.8 \times (R_T/R_{25}) - 319.85)$

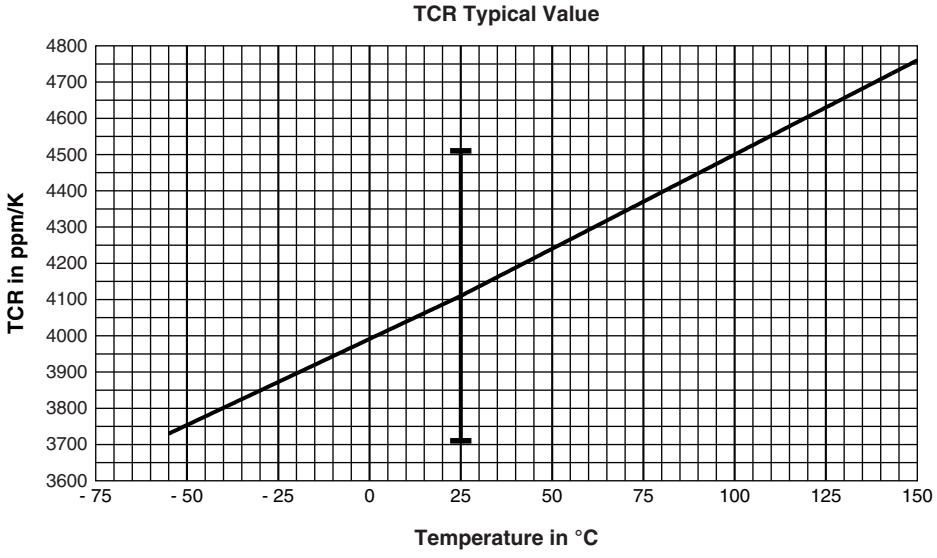
RATIO TOLERANCES		
LOW TEMP.	HIGH TEMP.	TOL.
- 55 °C	+ 150 °C	± 4 %
- 40 °C	+ 125 °C	± 3 %
- 20 °C	+ 85 °C	± 2 %
0 °C	+ 55 °C	± 1 %
+ 12 °C	+ 40 °C	± 0.5 %

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





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