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
- Material categorization: For definitions of compliance please see www.vishay.com/doc?99912

e3

RoHS COMPLIANT

APPLICATIONS

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

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.

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

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

STANDARD RESISTANCE VALUES at 25 °C in Ω

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

Note

- Other R_{25}-values and tolerances are available upon request

GLOBAL PART NUMBER INFORMATION

Global Part Numbering: TFPTL10L1001FL2B

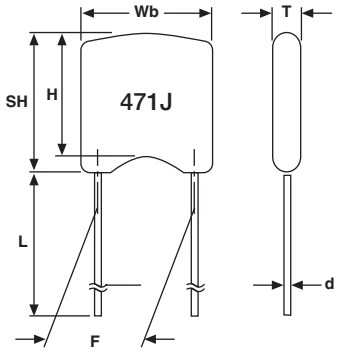
T	F	P	T	L	1	0	L	1	0	0	1	F	L	2	B

PRODUCT TYPE	SIZE	CHARACTERISTICS	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)

For technical questions, contact: nlr@vishay.com

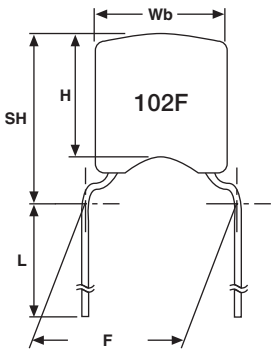
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DIMENSIONS



L2

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



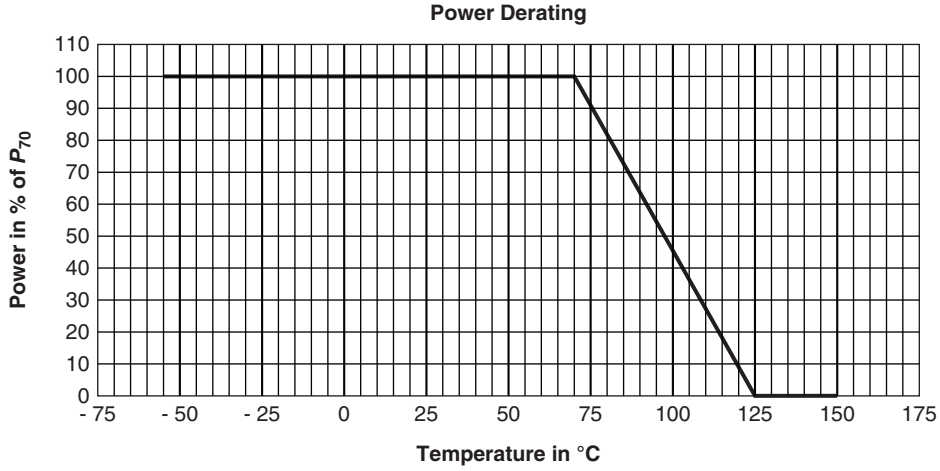
H5

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}

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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		

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RATIO FORMULA

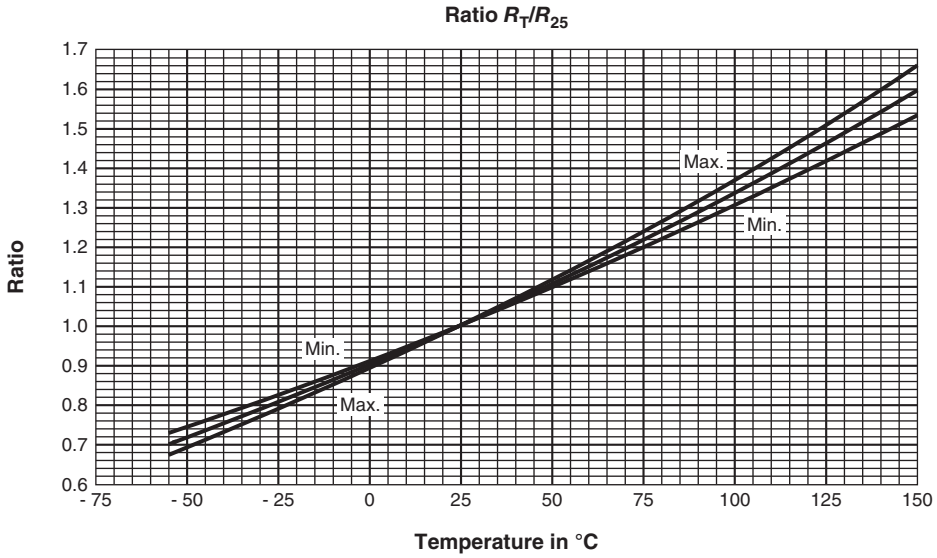
$R_T = R_{25}$ x (9.0014 x 10^{-1} + 3.87235 x 10^{-3} (°C)$^{-1}$ x T + 4.86825 x 10^{-6} (°C)$^{-2}$ x T^2 + 1.37559 x 10^{-9} (°C)$^{-3}$ x T^3)
$T_{(°C)}$ = 28.54 x $(R_T/R_{25})^3$ - 158.5 x $(R_T/R_{25})^2$ + 474.8 x (R_T/R_{25}) - 319.85)

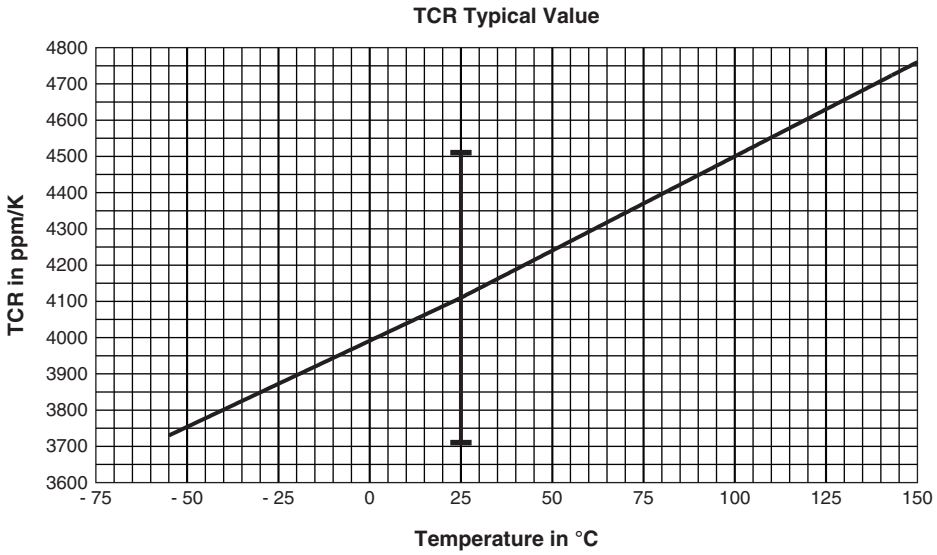
RATIO TOLERANCES		
LOW TEMP.	HIGH TEMP.	TOL.
-55 °C	+150 °C	± 4 %
-40 °C	+125 °C	± 3 %
-20 °C	+85 °C	± 2 %
0 °C	+55 °C	± 1 %
+12 °C	+40 °C	± 0.5 %

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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