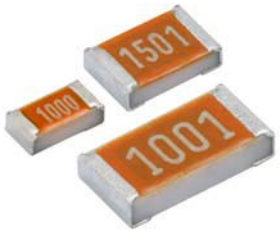
SMD PTC - Nickel Thin Film Linear Thermistors



FEATURES

- Alumina substrate base with nickel based PTC thin film element
- 0603, 0805 and 1206 sizes available
- Available in tape and reel packaging
- Standard R_{25} tolerances: ± 0.5 %, ± 1 %, ± 5 %
- Operation range - 55 °C to + 150 °C
- High stability over the entire temperature range
- cUL recognized component: File E148885
- Compliant to RoHS Directive 2002/95/EC
- Halogen-free according to IEC 61249-2-21 definition

e3 RoHS COMPLIANT HALOGEN FREE

QUICK REFERENCE DATA

PARAMETER DESCRIPTION	VALUE TFPT0603	VALUE TFPT0805	VALUE TFPT1206	UNIT
Resistance value at 25 °C (2)	100 to 1K	100 to 5K	100 to 10K	Ω
Tolerance on R_{25}-value (2)	± 0.5; ± 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	- 55 to + 70			°C
at zero dissipation (4)	- 55 to + 150			°C
Dissipation factor δ (for information only)	1.8	2.3	4	mW/K
Maximum rated power at 70 °C (P_{70})	75	100	125	mW
Maximum working voltage RCWV (3)	30	40	50	V
Climatic category (LCT/UCT/days)	55/150/56			-
Weight	2	5.5	10	mg

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
(4) Zero power or zero dissipation is considered as measuring power max. 1 % of rated power P_{70}

STANDARD RESISTANCE VALUES at 25 °C in Ω

100	180	330	560	1.0K	1.8K	3.3K	5.0K	8.2K
120	220	390	680	1.2K	2.2K	3.9K	5.6K	10.0K
150	270	470	820	1.5K	2.7K	4.7K	6.8K	

Note
- Rated continuous working voltage is maximum working voltage or $\sqrt{P_{70} \times R}$, whichever is less

GLOBAL PART NUMBER INFORMATION

Global Part Numbering: TFPT1206L1002FM (preferred part number format)

T F P T 1 2 0 6 L 1 0 0 2 F M

GLOBAL MODEL	CHARACTERISTIC	RESISTANCE VALUE	TOLERANCE CODE	PACKAGING
TFPT0603 **TFPT0805** **TFPT1206**	**L** = Linear	**1002** = 10K	**D** = ± 0.5 % **F** = ± 1 % **J** = ± 5 %	**M** = Lead (Pb)-free, T/R (5000 pieces) **V** = Lead (Pb)-free, T/R (1000 pieces) **Z** = Tin/lead, T/R (5000 pieces) **Y** = Tin/lead, T/R (1000 pieces)

For technical questions, contact: nlr@vishay.com
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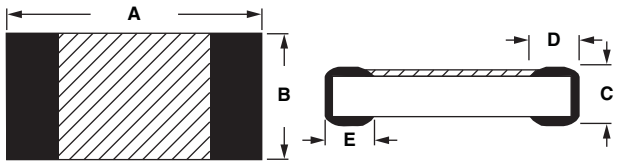
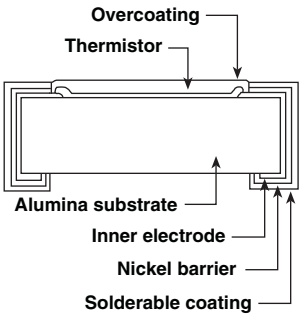
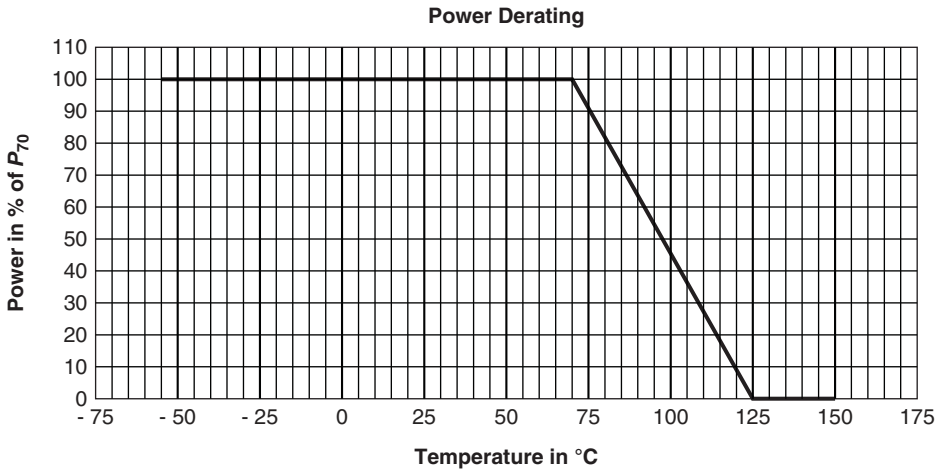
DIMENSIONS in millimeters



PART NUMBER	A	B	C	D	E
TFPT 0603	1.60 ± 0.10	0.85 ± 0.10	0.45 ± 0.10	0.30 ± 0.20	0.30 ± 0.20
TFPT 0805	2.00 ± 0.15	1.25 ± 0.15	0.45 ± 0.10	0.40 ± 0.20	0.40 ± 0.20
TFPT 1206	3.20 ± 0.15	1.60 ± 0.15	0.55 ± 0.10	0.50 ± 0.25	0.50 ± 0.25

CONSTRUCTION





Note

- Zero power is considered as measuring power max. 1 % of rated power P_{70}

PERFORMANCE (1)	
TEST	**MAXIMUM $\Delta R/R_{25}$** (2)
High temperature exposure (100 h at 125 °C)	0.25 %
Effects of bonding (10 s solder dip at 260 °C)	0.25 %
Thermal shock (30 min at - 55 °C, 30 min at 125 °C, 5 cycles)	0.25 %
Low temperature operation (maximum rated power for 2 h at - 55 °C)	0.25 %
Short time overload (2.5 x RCWV for 5 s)	0.25 %
Load life (1000 h 70 °C, maximum rated power 1.5 h “ON”, 0.5 h “OFF”	0.25 %
Solderability (95 % coverage P/F)	P
Leaching (physical damage P/F)	P

Notes

(1) Environmental performance specifications use test procedures as outlined in MIL-R-23648D and MIL-STD-202

(2) TFPTs are ESD sensitive

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AVERAGE RATIO R/R_{25} TFPT 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

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

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

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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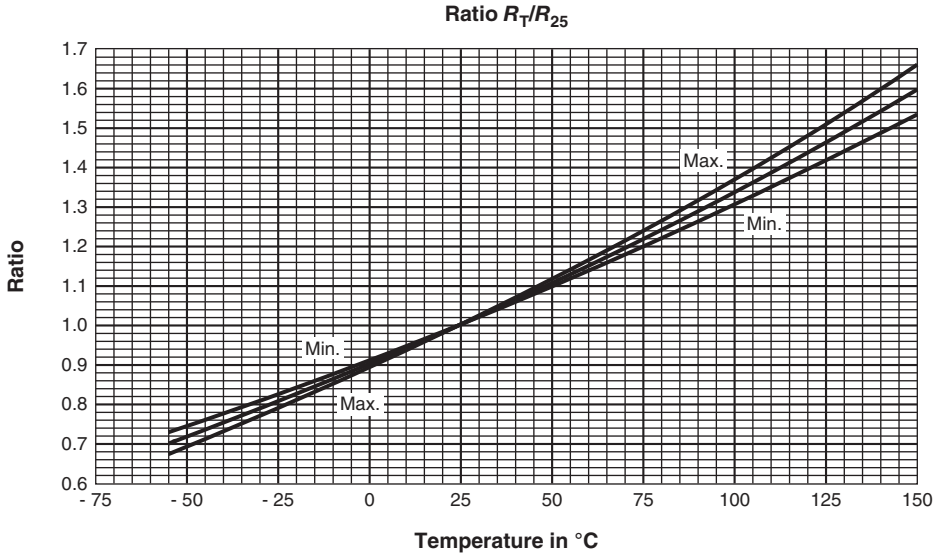

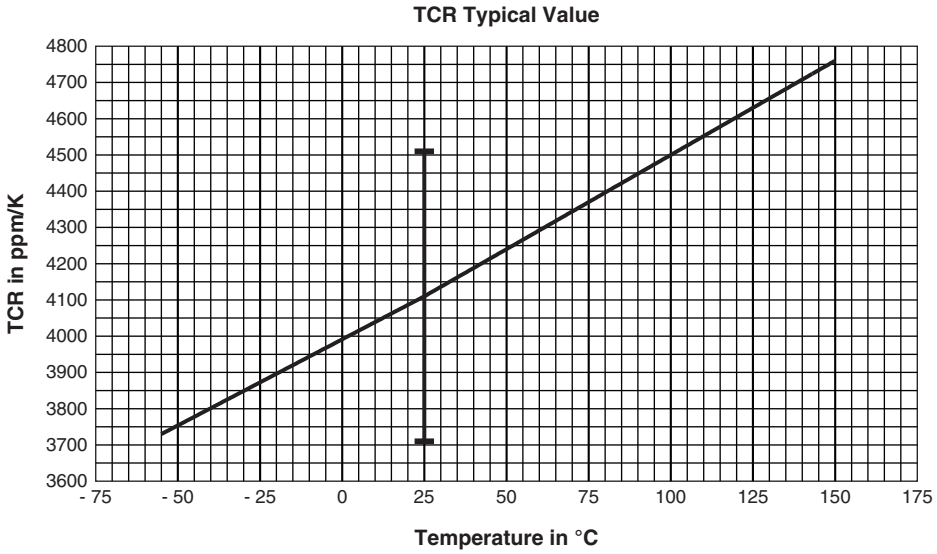

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