

# 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:  $\pm 0.5\%$ ,  $\pm 1\%$ ,  $\pm 5\%$
- Operation range  $-55\text{ }^{\circ}\text{C}$  to  $+150\text{ }^{\circ}\text{C}$
- High stability over the entire temperature range
- cUL recognized component: File E148885
- AEC-Q200 qualified (grade 1)
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**

QUICK REFERENCE DATA				
PARAMETER	VALUE			UNIT
DESCRIPTION	TFPT0603	TFPT0805	TFPT1206	
Resistance value at $25\text{ }^{\circ}\text{C}$ <sup>(2)</sup>	100 to 1K	100 to 5K	100 to 10K	$\Omega$
Tolerance on $R_{25}$ -value <sup>(2)</sup>	$\pm 0.5$ ; $\pm 1$ ; $\pm 5$			%
TCR at $25\text{ }^{\circ}\text{C}$	4110			ppm/K
Tolerance on TCR at $25\text{ }^{\circ}\text{C}$ <sup>(1)</sup>	$\pm 400$			
Operating temperature range: at rated power at zero dissipation <sup>(4)</sup>	$-55$ to $+70$ $-55$ to $+150$			$^{\circ}\text{C}$
Dissipation factor $\delta$ (for information only)	1.8	2.3	4	mW/K
Maximum rated power at $70\text{ }^{\circ}\text{C}$ ( $P_{70}$ )	75	100	125	mW
Maximum working voltage RCWV <sup>(3)</sup>	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 $25\text{ }^{\circ}\text{C}$ in $\Omega$									
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 = $\pm 0.5\%$ F = $\pm 1\%$ J = $\pm 5\%$			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)			

**DIMENSIONS** in millimeters


PART NUMBER	A	B	C	D	E
TFPT 0603	1.55 ± 0.10	0.80 ± 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	3.05 ± 0.15	1.50 ± 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  $P_{70}$ .

<b>TESTS AND REQUIREMENTS</b>		
TEST	CONDITIONS <sup>(1)</sup>	REQUIREMENTS MAX $ \Delta R_{25}/R_{25} $
High temperature exposure (storage)	AEC-Q200, 1000 h at 150 °C	0.25 %
Temperature cycling	AEC-Q200, 1000 cycles -55 °C / +125 °C	0.25 %
Biased humidity	1000 h, 1 mA biased at 85 °C / 85 % RH	0.25 %
	1000 h, 1 mA biased at 40 °C / 95 % RH	0.25 %
Operational life	1000 h, $P_{70}$ max biased at 85 °C	0.25 %
Mechanical shock and vibration	MIL-STD 202, method 213 - 204	0.50 %
Resistance to soldering heat	MIL-STD 202, method 210, solderbath dipping 10 s at 260°C	0.25 %
ESD <sup>(2)</sup>	AEC-Q200-002, HBM (CD) 0.5 kV (0603), 1.0 kV (0805), 1.0 kV (1206)	0.25 %
Board flex	AEC-Q200-005, 2 mm during 60 s	0.25 %
Terminal strength	AEC-Q200-006, shear test 17.7 N during 60 s	0.25 %

**Notes**

- <sup>(1)</sup> Environmental performance specifications use test procedures as outlined in MIL-R23648D, MIL-STD 202 and AEC-Q200.  
<sup>(2)</sup> TFPTs are ESD sensitive.



AVERAGE RATIO R/R25 TFPT ALL SIZES AND VALUES. Table with columns for TEMP. and R/R25 values ranging from -55 to 150 degrees Celsius.

RATIO FORMULA

RT = R25 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 (RT/R25)^3 - 158.5 x (RT/R25)^2 + 474.8 x (RT/R25) - 319.85

RATIO TOLERANCES table with columns for LOW TEMP., HIGH TEMP., and TOL. showing tolerance ranges for various temperatures.

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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