

Metal Film Resistors, Precision, Ultra-high Stability



FEATURES

- Extremely low temperature coefficient of resistance
- Very low noise and voltage coefficient
- Very good high frequency characteristics
- Can replace wirewound bobbins
- Proprietary epoxy coating provides superior moisture protection
- Lead (Pb)-Free Version is RoHS Compliant



RoHS*
COMPLIANT

STANDARD ELECTRICAL SPECIFICATIONS

GLOBAL MODEL	HISTORICAL MODEL	POWER RATING $P_{85^{\circ}\text{C}}$ W	LIMITING ELEMENT VOLTAGE MAX. V_{\cong}	TEMPERATURE COEFFICIENT ppm/ $^{\circ}\text{C}$	TOLERANCE %	RESISTANCE RANGE Ω
PTF51	PTF-51	0.05	200	5, 10, 15	0.02, 0.05, 0.1, 0.25, 0.5, 1	15R - 100K
PTF56	PTF-56	0.125	300	5, 10, 15	0.01, 0.02, 0.05, 0.1, 0.25, 0.5, 1	15R - 500K
PTF65	PTF-65	0.25	500	5, 10, 15	0.05, 0.1, 0.25, 0.5, 1	15R - 1M0

• Marking: Print-marked-model, Value, Tolerance, TC, Date code

TEMPERATURE COEFFICIENT CODES

GLOBAL TC CODE	HISTORICAL TC CODE	TEMPERATURE COEFFICIENT
Z	T-16	5 ppm/ $^{\circ}\text{C}$
Y	T-13	10 ppm/ $^{\circ}\text{C}$
X	T-10	15 ppm/ $^{\circ}\text{C}$

TECHNICAL SPECIFICATIONS

PARAMETER	UNIT	PTF51	PTF56	PTF65
Rated Dissipation at 85 $^{\circ}\text{C}$	W	0.05	0.125	0.25
Limiting Element Voltage	V_{\cong}	200	300	500
Insulation Voltage (1 min)	V_{eff}	> 500	> 500	> 500
Thermal Resistance	K/W	< 1300	< 520	260
Terminal Strength, axial	N	> 150	> 50	> 50
Insulation Resistance	Ω	$\geq 10^{11}$	$\geq 10^{11}$	$\geq 10^{11}$
Category Temperature Range	$^{\circ}\text{C}$	- 55/+ 150	- 55/+ 150	- 55/+ 150
Failure Rate	$10^{-9}/\text{h}$	< 1	< 1	< 1
Weight (max)	g	0.11	0.35	0.75

GLOBAL PART NUMBER INFORMATION

New Global Part Numbering: PTF5620K500BYRE (preferred part numbering format)

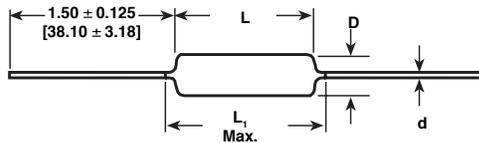
GLOBAL MODEL	RESISTANCE VALUE	TOLERANCE CODE	TEMP. COEFFICIENT	PACKAGING	SPECIAL
PTF51 PTF56 PTF65	R = Decimal K = Thousand M = Million G = Billion 15R000 = 15 Ω 500K00 = 500K Ω 1M0000 = 1.0M Ω	T = $\pm 0.01\%$ ** Q = $\pm 0.02\%$ ** A = $\pm 0.05\%$ B = $\pm 0.1\%$ C = $\pm 0.25\%$ D = $\pm 0.5\%$ F = $\pm 1\%$	Z = 5ppm Y = 10ppm X = 15ppm 0 = Special	EK = Lead Free, Bulk EA = Lead Free, T/R (Full) EB = Lead Free, T/R (1000pcs) BF = Tin/Lead, Bulk RE = Tin/Lead, T/R (Full) R6 = Tin/Lead, T/R (1000pcs)	Blank = Standard (Dash Number) (up to 3 digits) From 1-999 as applicable

Historical Part Number example: PTF-5620K5BT-13R36 (will continue to be accepted)

PTF-56	20K5	B	T-13	R36
HISTORICAL MODEL	RESISTANCE VALUE	TOLERANCE CODE	TEMP. COEFFICIENT	PACKAGING

* Pb containing terminations are not RoHS compliant, exemptions may apply.

** Historical tolerance codes were BB for 0.01% and BC for 0.02%..

DIMENSIONS

 * 1.08 ± 0.125 [27.43 ± 3.18] IF TAPE AND REEL

GLOBAL MODEL	DIMENSIONS in inches [millimeters]			
	L	D	L ₁ max	d
PTF51	0.150 ± 0.020 [3.81 ± 0.51]	0.070 ± 0.010 [1.78 ± 0.25]	0.200 [5.08]	0.016 [0.41]
PTF56	0.250 ± 0.031 [6.35 ± 0.79]	0.091 ± 0.009 [2.31 ± 0.23]	0.300 [7.62]	0.025 [0.64]
PTF65	0.375 ± 0.062 [9.53 ± 1.57]	0.145 ± 0.016 [3.68 ± 0.41]	0.475 [12.07]	0.025 [0.64]

PERFORMANCE

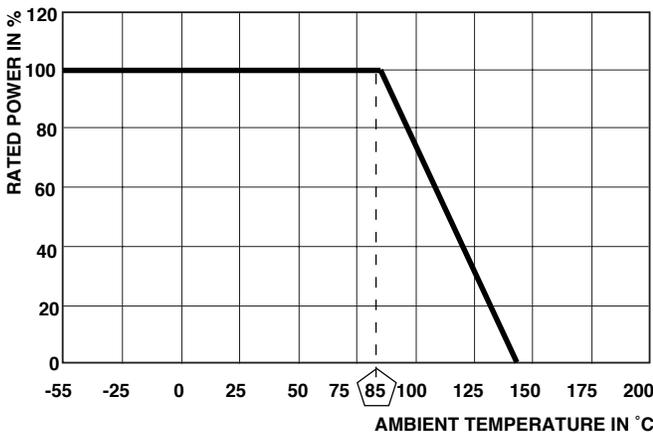
TEST	CONDITIONS OF TEST	TEST RESULTS
Endurance	MIL-PRF-55182 Para. 4.7.17 1000 hours rated power at + 85°C	$\leq \pm 0.04\%$
Thermal Shock	MIL-STD-202, Method 107 -55°C to + 85°C	$\leq \pm 0.02\%$
Short Time Overload	MIL-R-10509, Paragraph 4.6.6	$\leq \pm 0.01\%$
Low Temperature Operation	MIL-PRF-55182, Methods 4.7.9	$\leq \pm 0.02\%$
Moisture	MIL-STD-202 Method 106	$\leq \pm 0.08\%$
Resistance to Soldering Heat	MIL-STD-202, Methods 210	$\leq \pm 0.02\%$
Damp Heat IEC 60068-2.3	56 days at 40°C and 92% RH	$\leq \pm 0.08\%$
Dielectric Withstanding Voltage	MIL-STD-202, Methods 301 & 105	$\leq \pm 0.01\%$

TEMPERATURE COEFFICIENT OF RESISTANCE

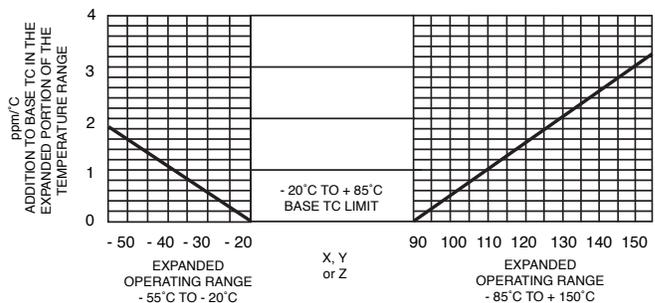
Temperature coefficient (TC) of resistance is normally stated as the maximum amount of resistance change from the original + 25°C value as the ambient temperature increases or decreases. This is most commonly expressed in parts per million per degree centigrade (ppm/°C).

The resistance curve over the operating temperature range is usually a non-linear curve within predictable maximum limits. PTF resistors have a very uniform resistance temperature characteristic when measured over the operating range of - 20°C to + 85°C. The standard temperature coefficients available are X = ± 15ppm/°C, Y = ± 10ppm/°C and Z = ± 5ppm/°C.

Some applications of the PTF require operation beyond the specifications of - 20°C to + 85°C. The change in temperature coefficient of resistance is very small (less than ± 0.05ppm/°C) over the expanded temperature range of -55°C to ± 150°C. Therefore, when operating outside the range of -20°C to + 85°C, the designer can plan for a worst case addition of ± 0.05ppm/°C for each degree centigrade beyond either - 20°C or + 85°C as indicated in the graph. This applies to all three temperature coefficient codes.


DERATING
MATERIAL SPECIFICATIONS

Element:	Precision deposited nickel chrome alloy with controlled annealing
Encapsulation:	Specially formulated epoxy compounds. Coated construction
Core:	Fire-cleaned high purity ceramic
Termination:	Standard lead material is solder-coated copper. Solderable and weldable per MIL-STD-1276, Type C.



Example: Assume the operating characteristics demand a temperature range from -55°C to + 125°C. This requires a ± 35°C Δ below - 20°C and a ± 40°C Δ above + 85°C. The extreme Δ being ± 40°C means that the worst case addition to the specified TC limit of ± 0.05ppm/°C times ± 40°C or ± 2ppm/°C. Therefore, a Z which is characterized by a base TC limit of ± 5ppm/°C over the temperature range of - 20°C to ± 85°C will exhibit a maximum temperature coefficient of ± 7ppm/°C over the expanded portion of the temperature range of - 55°C to + 125°C.



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