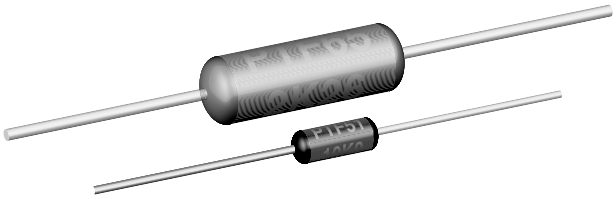
Metal Film Resistors, Precision, Ultra-High Stability



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

Pb-free Available

RoHS* COMPLIANT

STANDARD ELECTRICAL SPECIFICATIONS

GLOBAL MODEL	HISTORICAL MODEL	POWER RATING $P_{85\ °C}$ W	LIMITING ELEMENT VOLTAGE MAX. V≅	TEMPERATURE COEFFICIENT ppm/°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 to 100K
PTF56	PTF-56	0.125	300	5, 10, 15	0.01, 0.02, 0.05, 0.1, 0.25, 0.5, 1	15R to 500K
PTF65	PTF-65	0.25	500	5, 10, 15	0.05, 0.1, 0.25, 0.5, 1	15R to 1M0

Note:
• 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/°C
Y	T-13	10 ppm/°C
X	T-10	15 ppm/°C

TECHNICAL SPECIFICATIONS

PARAMETER	UNIT	PTF51	PTF56	PTF65
Rated Dissipation at 85 °C	W	0.05	0.125	0.25
Limiting Element Voltage	V≅	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	≥ 10^{11}	≥ 10^{11}	≥ 10^{11}
Category Temperature Range	°C	- 55 to + 150	- 55 to + 150	- 55 to + 150
Failure Rate	10^{-9}/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)

P	T	F	5	6	2	0	K	5	0	0	B	Y	R	E			

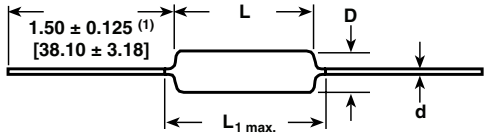
GLOBAL MODEL	RESISTANCE VALUE	TOLERANCE CODE	TEMP. COEFFICIENT	PACKAGING	SPECIAL
PTF51 **PTF56** **PTF65**	**R** = Decimal **K** = Thousand **M** = Million **15R000** = 15 Ω **500K00**= 500 kΩ **1M0000**= 1.0 MΩ	**T** = ± 0.01 % (1) **Q** = ± 0.02 % (1) **A** = ± 0.05 % **B** = ± 0.1 % **C** = ± 0.25 % **D** = ± 0.5 % **F** = ± 1 %	**Z** = 5 ppm **Y** = 10 ppm **X** = 15 ppm **0** = Special	**EK** = Lead (Pb)-free, Bulk **EA** = Lead (Pb)-free, T/R (Full) **EB** = Lead (Pb)-free, T/R (1000 pieces) **BF** = Tin/Lead, Bulk **RE** = Tin/Lead, T/R (Full) **R6** = Tin/Lead, T/R (1000 pieces)	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

Note:
(1) Historical tolerance codes were BB for 0.01 % and BC for 0.02 %
* Pb containing terminations are not RoHS compliant, exemptions may apply

DIMENSIONS

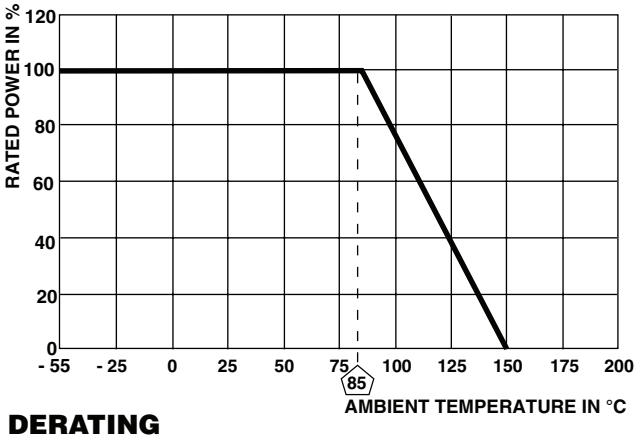


Note:
(1) 1.08 ± 0.125 [27.43 ± 3.18] if tape and reel

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
Life	MIL-PRF-55182 Paragraph 4.8.18 1000 h rated power at + 85 °C	≤ ± 0.04 %
Thermal Shock	MIL-STD-202, Method 107 - 55 °C to + 85 °C	≤ ± 0.02 %
Short Time Overload	MIL-R-10509, Paragraph 4.7.6	≤ ± 0.01 %
Low Temperature Operation	MIL-PRF-55182, Methods 4.8.10	≤ ± 0.02 %
Moisture	MIL-PRF-55182, Paragraph 4.8.15	≤ ± 0.08 %
Resistance to Soldering Heat	MIL-STD-202, Methods 210	≤ ± 0.02 %
Damp Heat IEC 60068-2-3	56 days at 40 °C and 92 % RH	≤ ± 0.08 %
Dielectric Withstanding Voltage	MIL-STD-202, Methods 301 and 105	≤ ± 0.01 %



DERATING

MATERIAL SPECIFICATIONS

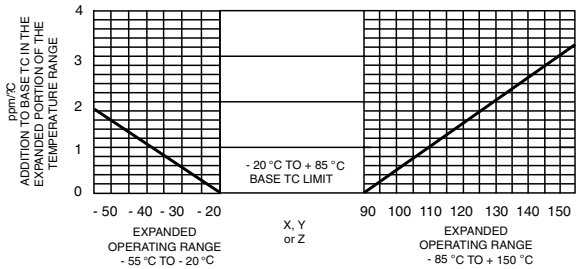
Element:	Precision deposited nickel chrome alloy with controlled annealing
Encapsulation:	Specially formulated epoxy compounds. Coated construction
Core:	Fire-cleanded high purity ceramic
Termination:	Standard lead material is solder-coated copper. Solderable and weldable per MIL-STD-1276, Type C.

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 of 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 unifom resistance temp. characteristic when measured over the operating range of - 20 °C to + 85 °C. The standard temperature coefficients available are
X = ± 15 ppm/°C, Y = ± 10 ppm/°C and Z = ± 5 ppm/°C.

Some applications of the PTF require operation beyond the specifications of - 20 °C to + 85 °C. The change in temperature coeffecient of resistance is very small (less than ± 0.05 ppm/°C) over the expanded temperature range of - 55 °C to ± 150 °C. Therefore, when operating outside the range - 20 °C to + 85 °C, the designer can plan for a worst case addition of ± 0.05 ppm/°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.



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 ± 0.05 ppm/°C times ± 40 °C or ± 2 ppm/°C. Therefore, a Z which is characterized by a base TC limit of ± 5 ppm/°C over the temperature range of - 20 °C to ± 85 °C will exhibit a maximum temperature coefficient of ± 7 ppm/°C over the expanded portion of the temperature range of - 55 °C to + 125 °C.

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