

Features

- Conforms to DIN EN 60751
- Wide operating temperature range:
-200°C to +600°C (Au-coated Nickel wire and Class F 0.3, Ag-Wire versions are limited to +300°C)
- Standard nominal resistances values:
R0: 100Ω and 1000Ω (others available upon request)
- Standardized Tolerance Classes:
Class F 0.1 (T = AA), F 0.15 (A), F 0.3 (B) and F 0.6 (C) accuracy with defined tolerance temperature ranges
- Excellent long-term stability
- Fast response time due to low thermal mass
- Variety of outline dimensions available to fit a wide range of space requirements
- Global interchangeability

Applications

- Temperature feedback control
- White goods
- Industrial applications
- Automotive
- Medical
- Sensing element for plug-in probes

PTF -FAMILY

Platinum Thinfilmm (PTF) Temperature Elements (PT-RTD's)

Product Description

The PTF family combines a group of resistance temperature detectors (RTD) using a Platinum resistor element utilizing the latest in thin film technology. It consists of a structured platinum film on a ceramic substrate, passivated by a glass coating. The connection wires are protected with glass on the welding area.

The characteristic curve of this Platinum RTD complies with DIN EN 60751. The usage of Platinum as the resistive material provides excellent long-term stability.

Due to small size and low mass, this RTD has a fast response time and low time constant; therefore, it is an optimal solution for fast and precise feedback control systems.

- Platinum Temperature Sensor (Pt-RTD)
- Conformal to DIN EN 60751
- Global interchangeability
- Wide operating temperature range
- Fast response time
- Other Geometries, Nominal Resistance values and specific Characteristics (TCR) on request
- Unprotected use of the elements in dry and clean environment only
- Resistance drift typically <0.03% after 1000h at 300°C
- Tests according to AEC-Q200 passed

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PTF TEMPERATURE ELEMENTS (PT-RTD'S)

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Sensor properties

* Operating temperature range is, -200°C to +600°C for elements with Au-coated Ni wire. Max temperature for elements with Ag wire is 300°C. Accuracy is not guaranteed if the sensor is exposed to temperatures outside the specified tolerance temperature range.

** The response times given are for comparison of several element geometries, will change on the later assemblies.

*** The limitations of measuring current values for narrower tolerance classes is made due to the self-heating effects affecting accuracy.

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Nominal Resistance at 0 °C	R ₀	Class B (F0.3) Pt100 Class A (F0.15) Pt100 Class AA or T (F0.1) Pt100 Class B (F0.3) Pt1000 Class A (F0.15) Pt1000 Class AA or T (F0.1) Pt1000	99.88 99.94 99.96 998.8 999.4 999.6	100.00 100.00 100.00 1000.0 1000.0 1000.0	100.12 100.06 100.04 1001.2 1001.6 1001.4	Ω
Tolerance at 25°C		Room temperature calibration	-0.43	0	0.43	°C
Temperature Coefficient of Resistance	TCR	0 °C, 100 °C		3850		ppm/°C
Tolerance Temperature Range (*see remarks above)		Class C (F 0.6) Class B (F 0.3) Class A (F 0.15) Class AA or T (F 0.1) Class B/Cryo (F 0.3)	-50 -50 -30 -30 -200		600(Ag-wire 300) 600(Ag-wire 300) 300 200 200	°C
Self-Heating Coefficient in Air Flow: 1 m/s		PTFC outline PTFD outline PTFF outline PTFM outline		0.5 0.33 0.5 0.5		°C/mW
Response Time Water Flow: 0.4 m/s (**see remarks above)	τ _{W,0.9}	PTFC outline PTFD outline PTFF outline PTFM outline		0.2 0.35 0.2 0.2		s
Response Time Air Flow: 1 m/s (**see remarks above)	τ _{A,0.9}	PTFC outline PTFD outline PTFF outline PTFM outline		10 17 10 10		s
Measuring Current R ₀ : 100 Ω (***see remarks above)		PTFC outline (Class C/B/A/T) PTFD outline (Class C/B/A/T) PTFF outline (Class C/B/A/T) PTFM outline (Class C/B/A/T)			1.4 / 1.4 / 1.0 / 0.8 1.7 / 1.7 / 1.2 / 1.0 1.4 / 1.4 / 1.0 / 0.8 1.4 / 1.4 / 1.0 / 0.8	mA
Measuring Current R ₀ : 1000 Ω (***see remarks above)		PTFC outline (Class C/B/A/T) PTFD outline (Class C/B/A/T) PTFF outline (Class C/B/A/T) PTFM outline (Class C/B/A/T)			0.4 / 0.4 / 0.3 / 0.2 0.5 / 0.5 / 0.3 / 0.3 0.4 / 0.4 / 0.3 / 0.2 0.4 / 0.4 / 0.3 / 0.2	mA

Calculation Formulas

The temperature dependencies of resistance of this Pt-RTD's are defined in DIN EN 60751 as:

For T ≥ 0 °C:

$$R_{(T)} = R_{(0)} \cdot (1 + a \cdot T + b \cdot T^2)$$

For T < 0 °C:

$$R_{(T)} = R_{(0)} \cdot [1 + a \cdot T + b \cdot T^2 + c \cdot (T - 100^\circ\text{C}) \cdot T^3]$$

Coefficients:

$$a = 3.9083\text{E-}03 \quad b = -5.775\text{E-}07 \quad c = -4.183\text{E-}12$$

Tolerances:

Class F 0.1 (T = AA):	± (0.10+0.0017* T/°C) °C	(-30...+200 °C)
Class F 0.15 (A)	± (0.15+0.002* T/°C) °C	(-30...+300 °C)
Class F 0.3 (B):	± (0.30+0.005* T/°C) °C	(-50...+600 °C)
Class F 0.6 (C):	± (0.60+0.06* T/°C) °C	(-50...+600 °C)
Class F 0.3 B (Cryo)	± (0.30+0.005* T/°C) °C	(-200...+200 °C)

Typical Performance Curves

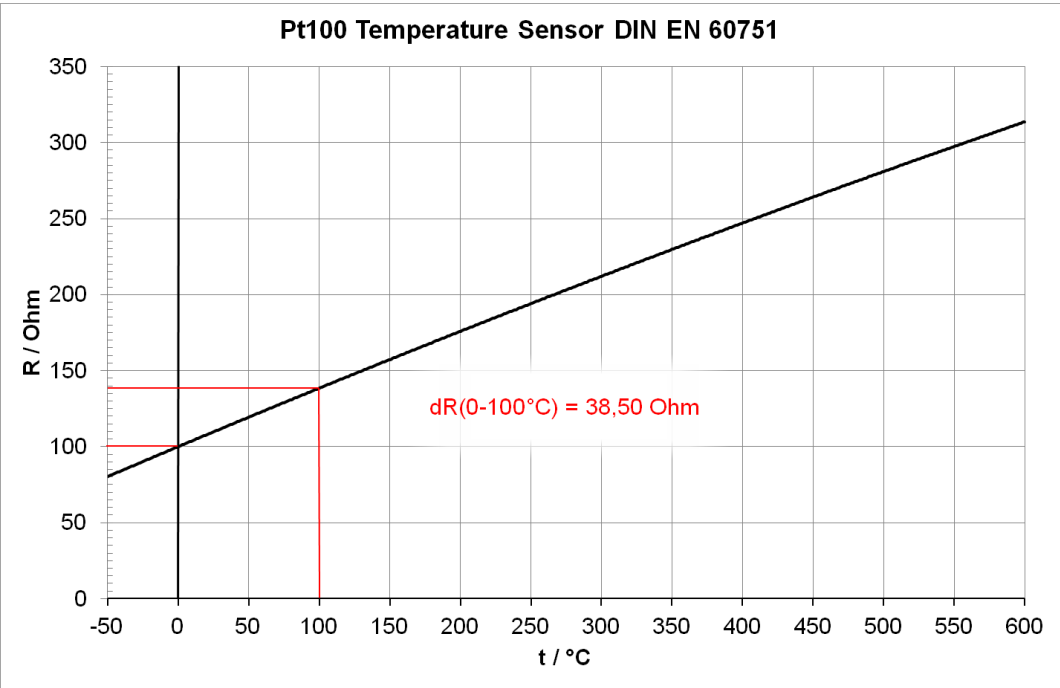


Figure 1: Resistance characteristics
(For Pt1000 use for Resistance Values Scale a Nominal Resistance Factor 10)

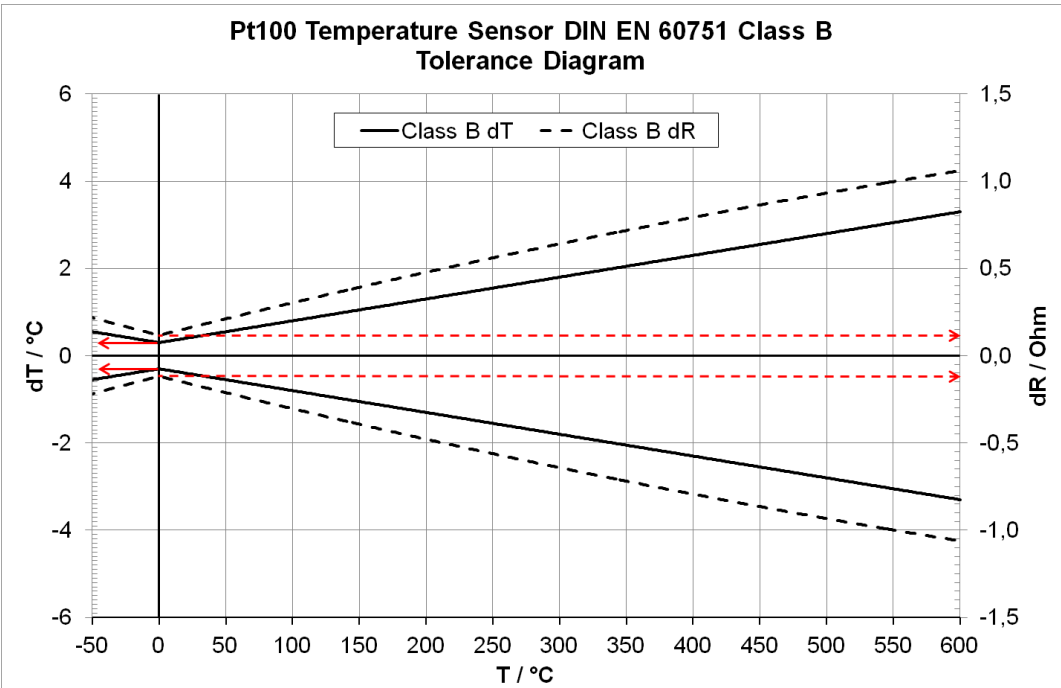


Figure 2: Tolerance chart
(For Pt1000 use for Resistance Values Scale a Nominal Resistance Factor 10,
Temperature Tolerance scale is equal to Pt100)

Dimensional Drawing - PTFC Outline

Wire diameter depends on wire material, drawings are for Au-coated Ni-wire ($\varnothing$ Ag-wire is 0.3mm)

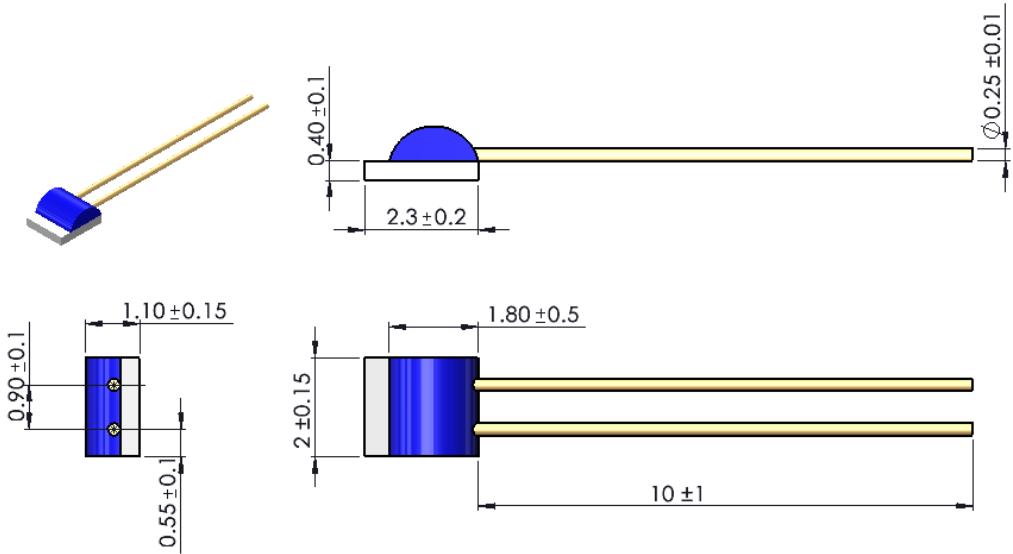


Figure 3: PTFC outline dimensions (mm)

Dimensional Drawing - PTFD Outline

Wire diameter depends on wire material, drawings are for Au-coated Ni-wire ($\varnothing$ Ag-wire is 0.3mm)

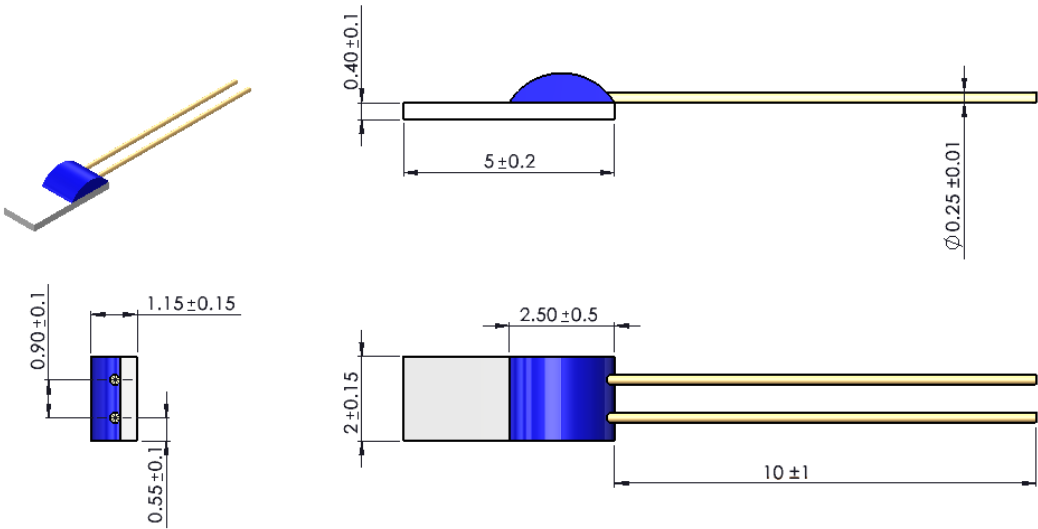


Figure 4: PTFD outline dimensions (mm)

PTF TEMPERATURE ELEMENTS (PT-RTD'S)

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Mechanical Dimensions PTFF Outline

Wire diameter depends on wire material, drawings are for Au-coated Ni-wire (Ø Ag-wire is 0.3mm)

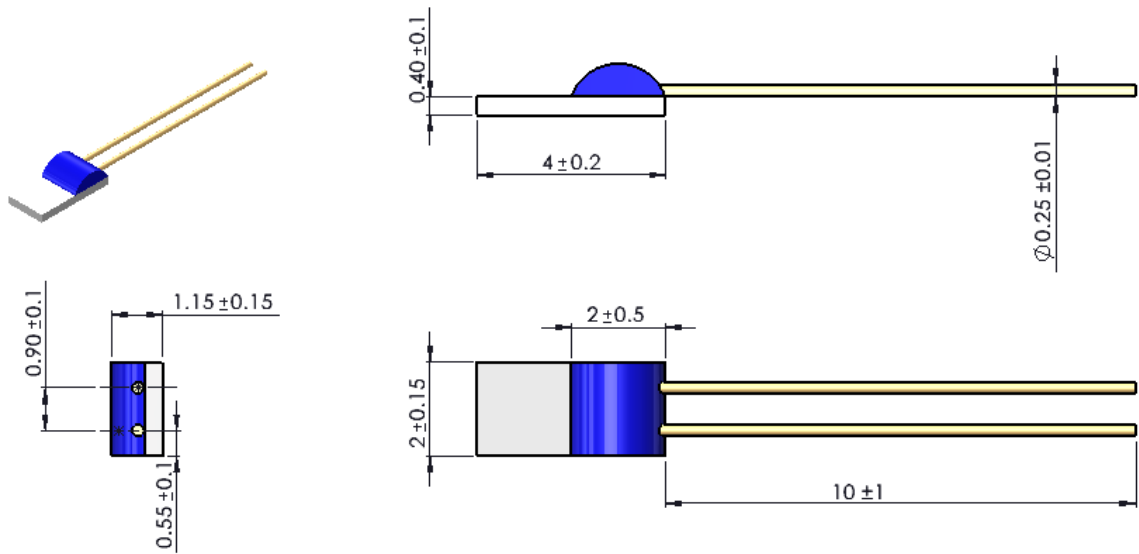


Figure 5: PTFF outline dimensions (mm)

Dimensional Drawing - PTFM Outline

Wire diameter depends on wire material, drawings are for Au-coated Ni-wire (Ø Ag-wire is 0.25mm)

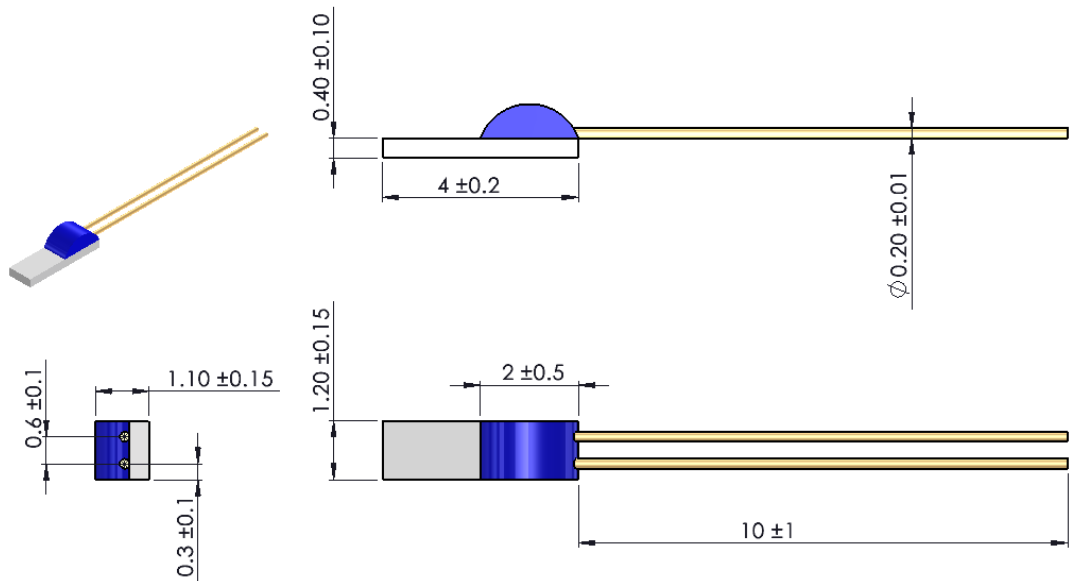


Figure 6: PTFM outline dimensions (mm)

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Type Configuration Matrix

Sensor family	Type	Outline Dimensions	Nominal Resistance		Tolerance Class DIN EN 60751				Connection Wire	
			100 Ω	1000 Ω					Ag wire	Ni/Au wire
PTF	C	2.0 x 2.3	101	102	T	A	B	C	1A0	1G0
PTF	D	2.0 x 5.0	101	102	T	A	B	C	1A0	1G0
PTF	F	2.0 x 4.0	101	102	T	A	B	C	1A0	1G0
PTF	M	1.2 x 4.0	101	102	T	A	B	C	1A0	1G0

Packing and Minimum Order Quantity

Packing	PCS per Packing unit	MOQ
Transparent Blister Box 80(120)mm x 50(60)mm x 20mm	500 (bulk)	500 per Type

Ordering Information PTFC Outline (2.0 mm x 2.3mm)

Part Number	Type	Description
NB-PTCO-005	PTFC101C1G0	100 Ohms, 2.0 mm x 2.3 mm, F 0.6 (C), Au-coated Ni-wire
NB-PTCO-002	PTFC101B1G0	100 Ohms, 2.0 mm x 2.3 mm, F 0.3 (B), Au-coated Ni-wire
NB-PTCO-011	PTFC101A1G0	100 Ohms, 2.0 mm x 2.3 mm, F 0.15 (A), Au-coated Ni-wire
NB-PTCO-058	PTFC101T1G0	100 Ohms, 2.0 mm x 2.3 mm, F 0.1 (T = AA), Au-coated Ni-wire
NB-PTCO-159	PTFC101C1A0	100 Ohms, 2.0 mm x 2.3 mm, F 0.6 (C), Ag-wire
NB-PTCO-160	PTFC101B1A0	100 Ohms, 2.0 mm x 2.3 mm, F 0.3 (B), Ag-wire
NB-PTCO-161	PTFC101A1A0	100 Ohms, 2.0 mm x 2.3 mm, F 0.15 (A), Ag-wire
NB-PTCO-162	PTFC101T1A0	100 Ohms, 2.0 mm x 2.3 mm, F 0.1 (T = AA), Ag-wire
NB-PTCO-046	PTFC102C1G0	1000 Ohms, 2.0 mm x 2.3 mm, F 0.6 (C), Au-coated Ni-wire
NB-PTCO-006	PTFC102B1G0	1000 Ohms, 2.0 mm x 2.3 mm, F 0.3 (B), Au-coated Ni-wire
NB-PTCO-029	PTFC102A1G0	1000 Ohms, 2.0 mm x 2.3 mm, F 0.15 (A), Au-coated Ni-wire
NB-PTCO-154	PTFC102T1G0	1000 Ohms, 2.0 mm x 2.3 mm, F 0.1 (T = AA), Au-coated Ni-wire
NB-PTCO-163	PTFC102C1A0	1000 Ohms, 2.0 mm x 2.3 mm, F 0.6 (C), Ag-wire
NB-PTCO-157	PTFC102B1A0	1000 Ohms, 2.0 mm x 2.3 mm, F 0.3 (B), Ag-wire
NB-PTCO-164	PTFC102A1A0	1000 Ohms, 2.0 mm x 2.3 mm, F 0.15 (A), Ag-wire
NB-PTCO-165	PTFC102T1A0	1000 Ohms, 2.0 mm x 2.3 mm, F 0.1 (T = AA), Ag-wire
NB-PTCO-295	PTFC101BC1G0	1000 Ohms, 2.0 mm x 2.3 mm x 1.1 mm, F 0.3 (B) cryo, 10mm Au-coated Ni-wire
10213359-00	PTFC101BC1G0	100 Ohms, 2.0 mm x 2.3 mm x 1.1 mm, F 0.3 (B) cryo, 10mm Au-coated Ni-wire

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Ordering Information PTFD Outline (2.0 mm x 5.0mm)

Part Number	Type	Description
NB-PTCO-013	PTFD101C1G0	100 Ohms, 2.0 mm x 5.0 mm, F 0.6 (C), Au-coated Ni-wire
NB-PTCO-024	PTFD101B1G0	100 Ohms, 2.0 mm x 5.0 mm, F 0.3 (B), Au-coated Ni-wire
NB-PTCO-037	PTFD101A1G0	100 Ohms, 2.0 mm x 5.0 mm, F 0.15 (A), Au-coated Ni-wire
NB-PTCO-155	PTFD101T1G0	100 Ohms, 2.0 mm x 5.0 mm, F 0.1 (T = AA), Au-coated Ni-wire
NB-PTCO-166	PTFD101C1A0	100 Ohms, 2.0 mm x 5.0 mm, F 0.6 (C), Ag-wire
NB-PTCO-053	PTFD101B1A0	100 Ohms, 2.0 mm x 5.0 mm, F 0.3 (B), Ag-wire
NB-PTCO-158	PTFD101A1A0	100 Ohms, 2.0 mm x 5.0 mm, F 0.15 (A), Ag-wire
NB-PTCO-152	PTFD101T1A0	100 Ohms, 2.0 mm x 5.0 mm, F 0.1 (T = AA), Ag-wire
NB-PTCO-167	PTFD102C1G0	1000 Ohms, 2.0 mm x 5.0 mm, F 0.6 (C), Au-coated Ni-wire
NB-PTCO-126	PTFD102B1G0	1000 Ohms, 2.0 mm x 5.0 mm, F 0.3 (B), Au-coated Ni-wire
NB-PTCO-168	PTFD102A1G0	1000 Ohms, 2.0 mm x 5.0 mm, F 0.15 (A), Au-coated Ni-wire
NB-PTCO-150	PTFD102T1G0	1000 Ohms, 2.0 mm x 5.0 mm, F 0.1 (T = AA), Au-coated Ni-wire
NB-PTCO-169	PTFD102C1A0	1000 Ohms, 2.0 mm x 5.0 mm, F 0.6 (C), Ag-wire
NB-PTCO-035	PTFD102B1A0	1000 Ohms, 2.0 mm x 5.0 mm, F 0.3 (B), Ag-wire
NB-PTCO-170	PTFD102A1A0	1000 Ohms, 2.0 mm x 5.0 mm, F 0.15 (A), Ag-wire
NB-PTCO-151	PTFD102T1A0	1000 Ohms, 2.0 mm x 5.0 mm, F 0.1 (T = AA), Ag-wire

Ordering Information PTFF Outline (2.0 mm x 4.0mm)

Part Number	Type	Description
NB-PTCO-171	PTFF101C1G0	100 Ohms, 2.0 mm x 4.0 mm, F 0.6 (C), Au-coated Ni-wire
NB-PTCO-172	PTFF101B1G0	100 Ohms, 2.0 mm x 4.0 mm, F 0.3 (B), Au-coated Ni-wire
NB-PTCO-173	PTFF101A1G0	100 Ohms, 2.0 mm x 4.0 mm, F 0.15 (A), Au-coated Ni-wire
NB-PTCO-174	PTFF101T1G0	100 Ohms, 2.0 mm x 4.0 mm, F 0.1 (T = AA), Au-coated Ni-wire
NB-PTCO-175	PTFF101C1A0	100 Ohms, 2.0 mm x 4.0 mm, F 0.6 (C), Ag-wire
NB-PTCO-176	PTFF101B1A0	100 Ohms, 2.0 mm x 4.0 mm, F 0.3 (B), Ag-wire
NB-PTCO-177	PTFF101A1A0	100 Ohms, 2.0 mm x 4.0 mm, F 0.15 (A), Ag-wire
NB-PTCO-178	PTFF101T1A0	100 Ohms, 2.0 mm x 4.0 mm, F 0.1 (T = AA), Ag-wire
NB-PTCO-149	PTFF102C1G0	1000 Ohms, 2.0 mm x 4.0 mm, F 0.6 (C), Au-coated Ni-wire
NB-PTCO-101	PTFF102B1G0	1000 Ohms, 2.0 mm x 4.0 mm, F 0.3 (B), Au-coated Ni-wire
NB-PTCO-179	PTFF102A1G0	1000 Ohms, 2.0 mm x 4.0 mm, F 0.15 (A), Au-coated Ni-wire
NB-PTCO-180	PTFF102T1G0	1000 Ohms, 2.0 mm x 4.0 mm, F 0.1 (T = AA), Au-coated Ni-wire
NB-PTCO-181	PTFF102C1A0	1000 Ohms, 2.0 mm x 4.0 mm, F 0.6 (C), Ag-wire
NB-PTCO-182	PTFF102B1A0	1000 Ohms, 2.0 mm x 4.0 mm, F 0.3 (B), Ag-wire
NB-PTCO-183	PTFF102A1A0	1000 Ohms, 2.0 mm x 4.0 mm, F 0.15 (A), Ag-wire
NB-PTCO-184	PTFF102T1A0	1000 Ohms, 2.0 mm x 4.0 mm, F 0.1 (T = AA), Ag-wire

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Ordering Information PTFM Outline (1.2 mm x 4.0mm)

Part Number	Type	Description
NB-PTCO-148	PTFM101C1G0	100 Ohms, 1.2 mm x 4.0 mm, F 0.6 (C), Au-coated Ni-wire
NB-PTCO-032	PTFM101B1G0	100 Ohms, 1.2 mm x 4.0 mm, F 0.3 (B), Au-coated Ni-wire
NB-PTCO-142	PTFM101A1G0	100 Ohms, 1.2 mm x 4.0 mm, F 0.15 (A), Au-coated Ni-wire
NB-PTCO-156	PTFM101T1G0	100 Ohms, 1.2 mm x 4.0 mm, F 0.1 (T = AA), Au-coated Ni-wire
NB-PTCO-185	PTFM101C1A0	100 Ohms, 1.2 mm x 4.0 mm, F 0.6 (C), Ag-wire
NB-PTCO-186	PTFM101B1A0	100 Ohms, 1.2 mm x 4.0 mm, F 0.3 (B), Ag-wire
NB-PTCO-187	PTFM101A1A0	100 Ohms, 1.2 mm x 4.0 mm, F 0.15 (A), Ag-wire
NB-PTCO-188	PTFM101T1A0	100 Ohms, 1.2 mm x 4.0 mm, F 0.1 (T = AA), Ag-wire
NB-PTCO-189	PTFM102C1G0	1000 Ohms, 1.2 mm x 4.0 mm, F 0.6 (C), Au-coated Ni-wire
NB-PTCO-012	PTFM102B1G0	1000 Ohms, 1.2 mm x 4.0 mm, F 0.3 (B), Au-coated Ni-wire
NB-PTCO-050	PTFM102A1G0	1000 Ohms, 1.2 mm x 4.0 mm, F 0.15 (A), Au-coated Ni-wire
NB-PTCO-153	PTFM102T1G0	1000 Ohms, 1.2 mm x 4.0 mm, F 0.1 (T = AA), Au-coated Ni-wire
NB-PTCO-190	PTFM102C1A0	1000 Ohms, 1.2 mm x 4.0 mm, F 0.6 (C), Ag-wire
NB-PTCO-191	PTFM102B1A0	1000 Ohms, 1.2 mm x 4.0 mm, F 0.3 (B), Ag-wire
NB-PTCO-192	PTFM102A1A0	1000 Ohms, 1.2 mm x 4.0 mm, F 0.15 (A), Ag-wire
NB-PTCO-193	PTFM102T1A0	1000 Ohms, 1.2 mm x 4.0 mm, F 0.1 (T = AA), Ag-wire

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