

## PTF FAMILY

### Platinum Thin Film (PTF) Temperature Elements

#### 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.

#### Features

- Conforms to DIN EN 60751
- Wide operating temperature range: -50°C to +600°C (Ni/Au wire and Class F 0.3, Ag-Wire versions are limited to 300°C)
- Standard nominal resistances values: R0: 100 and 1000Ω (others available upon request) Class F 0.1 (T = AA), F 0.15 (A), F 0.3 (B) and F 0.6 (C) accuracy
- Very low drift over lifetime
- 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

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# PTF TEMPERATURE ELEMENTS

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\*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 operating temperature range.

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Nominal Resistance at 0 °C	R <sub>0</sub>	Class B (F0.3) Pt100 Class B (F0.3) Pt1000	99.88 998.8	100.00 1000.0	100.12 1001.2	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*		Class C (F 0.6) Class B (F 0.3) Class A (F 0.15) Class T (F 0.1) Class B/Cryo (F 0.3)	-50 -50 -30 -30 -200		600 600 300 200 200	°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	τ <sub>W,0.9</sub>	PTFC outline PTFD outline PTFF outline PTFM outline		0.2 0.35 0.2 0.2		s
Response Time Air Flow: 1 m/s	τ <sub>A,0.9</sub>	PTFC outline PTFD outline PTFF outline PTFM outline		10 17 10 10		s
Measuring Current R <sub>0</sub> : 100 Ω		PTFC outline (Class B) PTFD outline (Class B) PTFF outline (Class B) PTFM outline (Class B)			1.4 1.7 1.4 1.4	mA
Measuring Current R <sub>0</sub> : 1000 Ω		PTFC outline (Class B) PTFD outline (Class B) PTFF outline (Class B) PTFM outline (Class B)			0.4 0.5 0.4 0.4	mA

## Calculation Formulas

The calculation formulas of this Pt-RTD are defined in DIN EN 60751 as following:

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:

$$\begin{aligned} a &= 3.9083\text{E-}03 \\ b &= -5.775\text{E-}07 \\ c &= -4.183\text{E-}12 \end{aligned}$$

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)

Typical Performance Curves

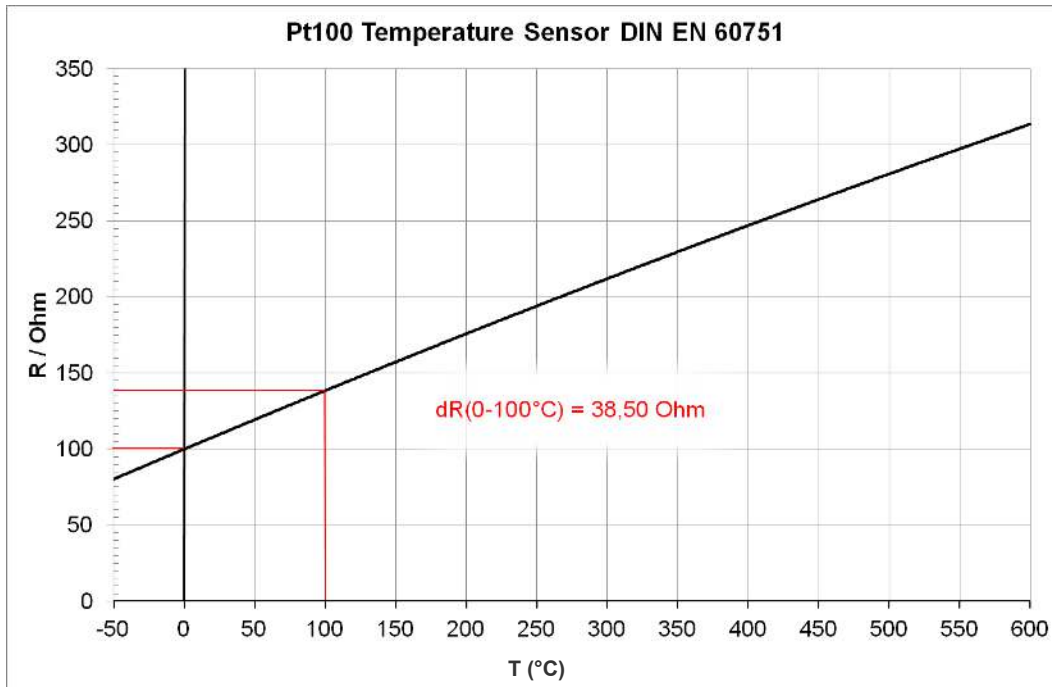


Figure 1: Resistance characteristics

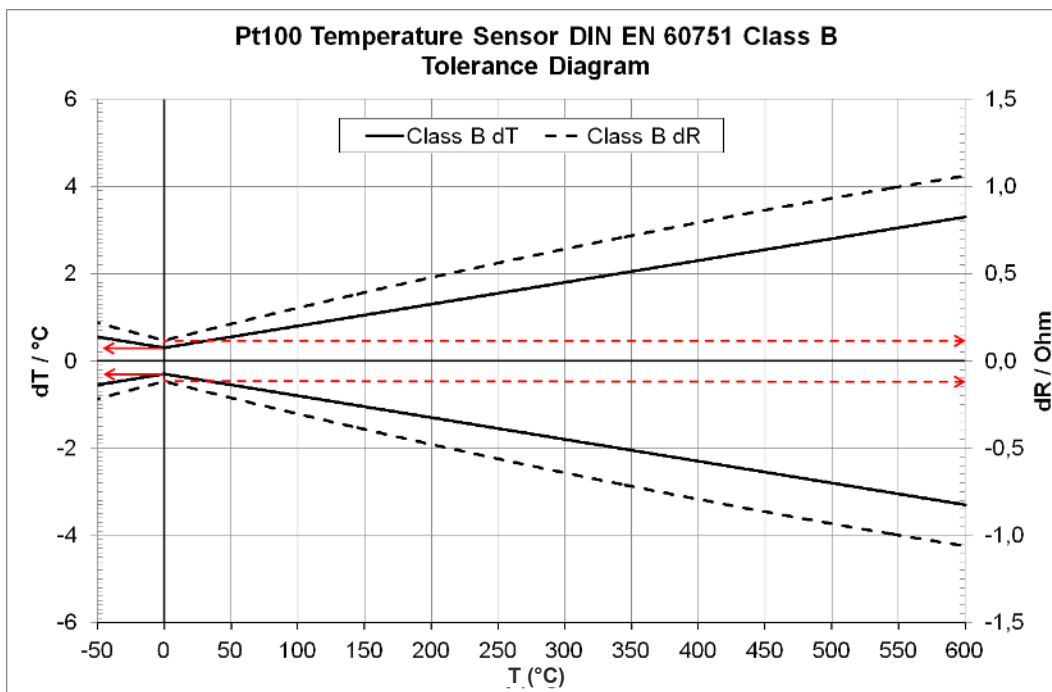


Figure 2: Tolerance chart

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## Dimensional Drawing - PTFC Outline

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

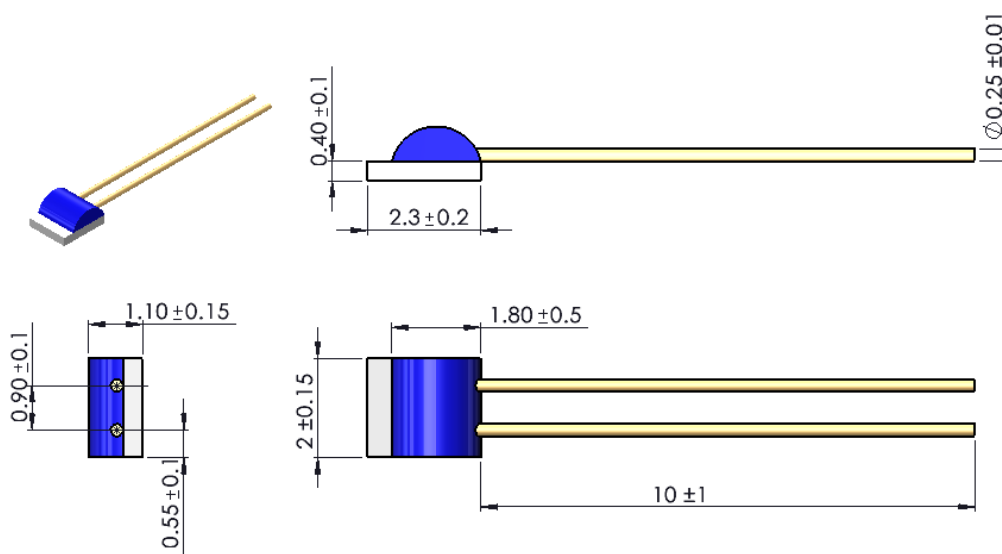


Figure 3: PTFC outline dimensions (mm)

## Dimensional Drawing - PTFD Outline

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

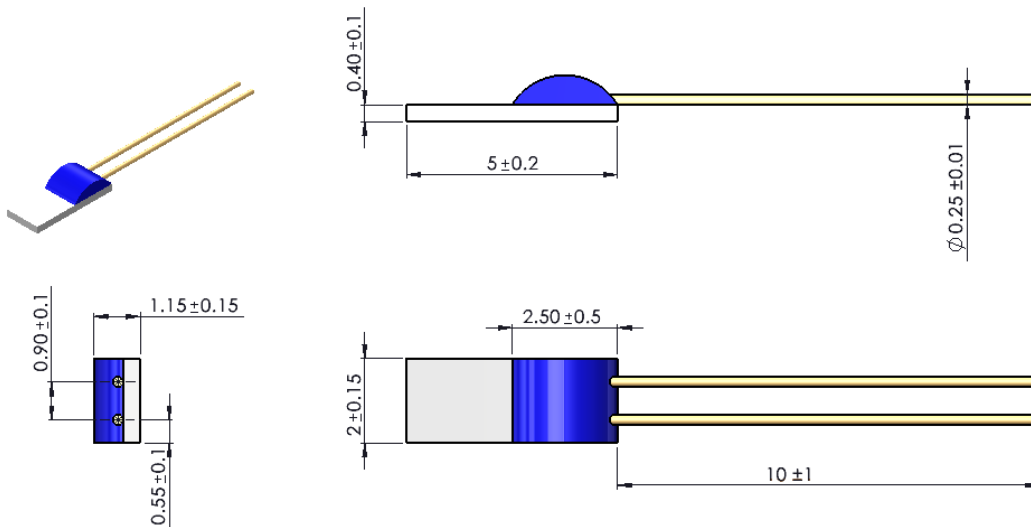


Figure 4: PTFD outline dimensions (mm)

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## Mechanical Dimensions PTFF Outline

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

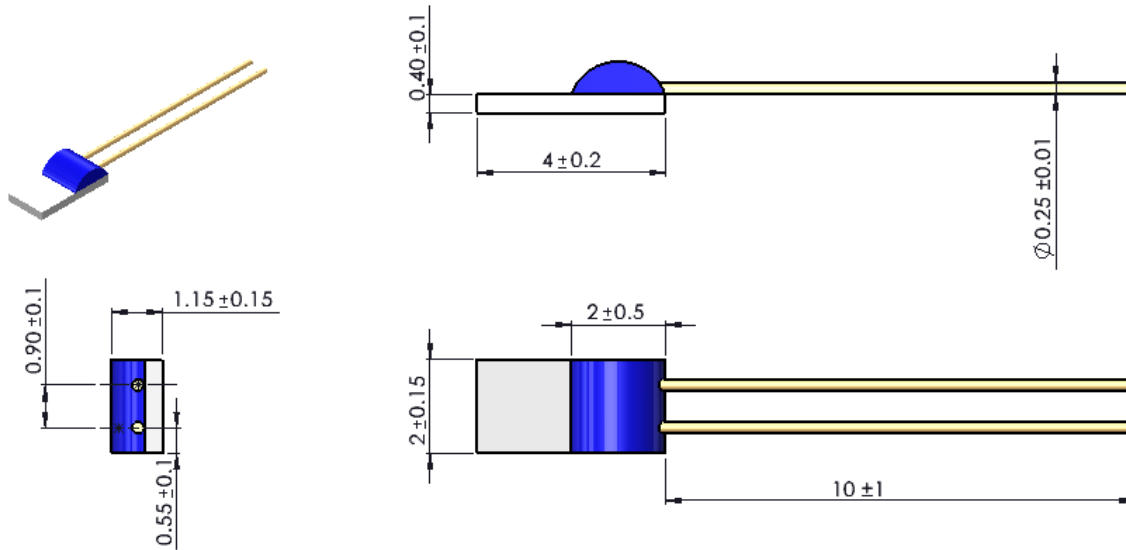


Figure 5: PTFF outline dimensions (mm)

## Dimensional Drawing - PTFM Outline

Wire diameter depends on wire material, drawings are for Au-coated Ni-wire ( $\varnothing$  Ag-wire 0.25mm)

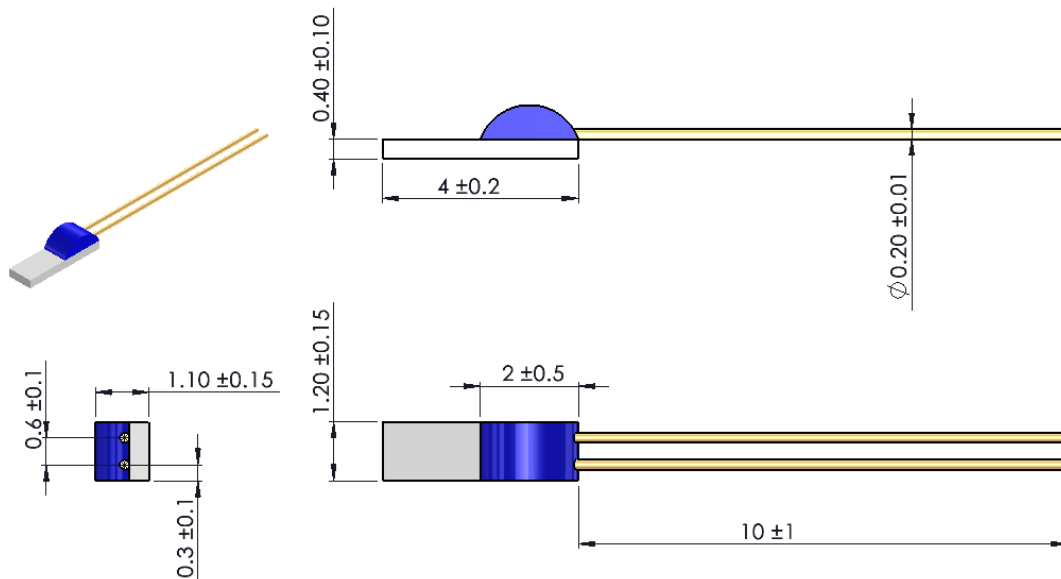


Figure 6: PTFM outline dimensions (mm)

## PTF TEMPERATURE ELEMENTS

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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	T	A	B	C	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

\*Separate datasheet available for the B/Cryo, connect with a specialist for more information

### 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 mm x 2.3 mm)

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

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### Ordering Information PTFD Outline (2 mm x 5 mm)

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

### Ordering Information PTFF Outline (2 mm x 4 mm)

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

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

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