



- **Platinum Temperature Sensor**
- **Conformal to DIN EN 60751**
- **Global interchangeability**
- **Wide temperature range**
- **Fast response time**
- **Different tolerances**
- **Different outline dimensions**
- **Low drift over lifetime**
- **Blister box packing**

## PTF- FAMILY

### Platinum Temperature Sensors

#### Product Description

The PTF-sensor family combines a group of resistance temperature detectors (RTD) using a Platinum resistor in thin film technology as sensing element.

The characteristic curve of this Platinum RTD's are complying with DIN EN 60751. The usage of Platinum as resistive material guarantees high long term stability

A platinum RTD consists of a structured platinum film on a ceramics substrate, passivated by glass coating. The connection wires are protected with glass on the welding area.

The connection wires are gold coated nickel wire or silver wire. Gold coated Ni-wire is preferred for welding applications with need of higher application temperature but can be soldered as well, whereas silver wires preferably used for solder applications with lower temperatures.

Due to small outline and low mass this RTD has a low time constant; therefore it is a suitable solution for fast and precise feedback control systems.

Sensors are packed as bulk goods in blister box.

#### Features

- $R_0$ : 100  $\Omega$ , 1000  $\Omega$  values available
- TCR 3850ppm/K
- Application temperature up to -50...600°C (Class B)
- Various resistance tolerances  $\pm 0.24\%$ ,  $\pm 0.12\%$ ,  $\pm 0.06\%$ ,  $\pm 0.04\%$  available
- Size 2 x 2.3 x 1.1 mm<sup>3</sup> (width/length/height) FC-geometry
- Size 2 x 5.0 x 1.1 mm<sup>3</sup> (width/length/height) FD-geometry
- Size 2 x 4.0 x 1.1 mm<sup>3</sup> (width/length/height) FF-geometry
- Size 1.2 x 4.0 x 1.1 mm<sup>3</sup> (width/length/height) FM-geometry
- Gold coated nickel lead wire or silver lead wire

#### Applications

- Specific temperature feedback control
- Medical
- HVAC
- White goods
- Automotive
- Industrial applications
- Sensing element for plug-in probes

## PTF FAMILY

Platinum Temperature Sensor

### Sensor properties

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Nominal Resistance at 0 °C	R <sub>0</sub>	Class B (F0.3)	99.88 999.81	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
Temperature Range <small>for Au-coated Ni-wire Ag wire limited to 300°C</small>		Class C (F0.6) Class B (F 0.3) Class A (F 0.15) Class T (F 0.1)	-50 -50 -30 -30		600 600 300 200	°C
Selfheating 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 R0: 100 Ω Class B (F0.3)		PTFC outline PTFD outline PTFF outline PTFM outline			1.4 1.7 1.4 1.4	mA
Measuring Current R0: 1000 Ω Class B (F0.3)		PTFC outline PTFD outline PTFF outline PTFM outline			0.4 0.5 0.4 0.4	mA
Lead wire Au- coated Ni-wire		Diameter PTFC outline Diameter PTFD outline Diameter PTFF outline Diameter PTFM outline length		0.25 0.25 0.25 0.2 10		mm
Lead wire Ag-wire		Diameter PTFC outline Diameter PTFD outline Diameter PTFF outline Diameter PTFM outline length		0.3 0.3 0.3 0.25 10		mm

### Calculation Formulas

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

$$\text{For } T \geq 0 \text{ °C: } R_{(T)} = R_{(0)} \cdot (1 + a \cdot T + b \cdot T^2)$$

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

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

$$\text{Tolerances: class F0.1 (T=AA): } \pm (0.1 + 0.0017 \cdot |T/\text{°C}|) \text{ °C} \quad (-30 \dots +200 \text{ °C})$$

$$\text{Tolerances: class F0.15 (A): } \pm (0.15 + 0.002 \cdot |T/\text{°C}|) \text{ °C} \quad (-30 \dots +300 \text{ °C})$$

$$\text{Tolerances: class F0.3 (B): } \pm (0.3 + 0.005 \cdot |T/\text{°C}|) \text{ °C} \quad (-50 \dots +600 \text{ °C})$$

$$\text{Tolerances: class F0.6 (C=2B): } \pm (0.6 + 0.007 \cdot |T/\text{°C}|) \text{ °C} \quad (-50 \dots +600 \text{ °C})$$

Typical performance curves

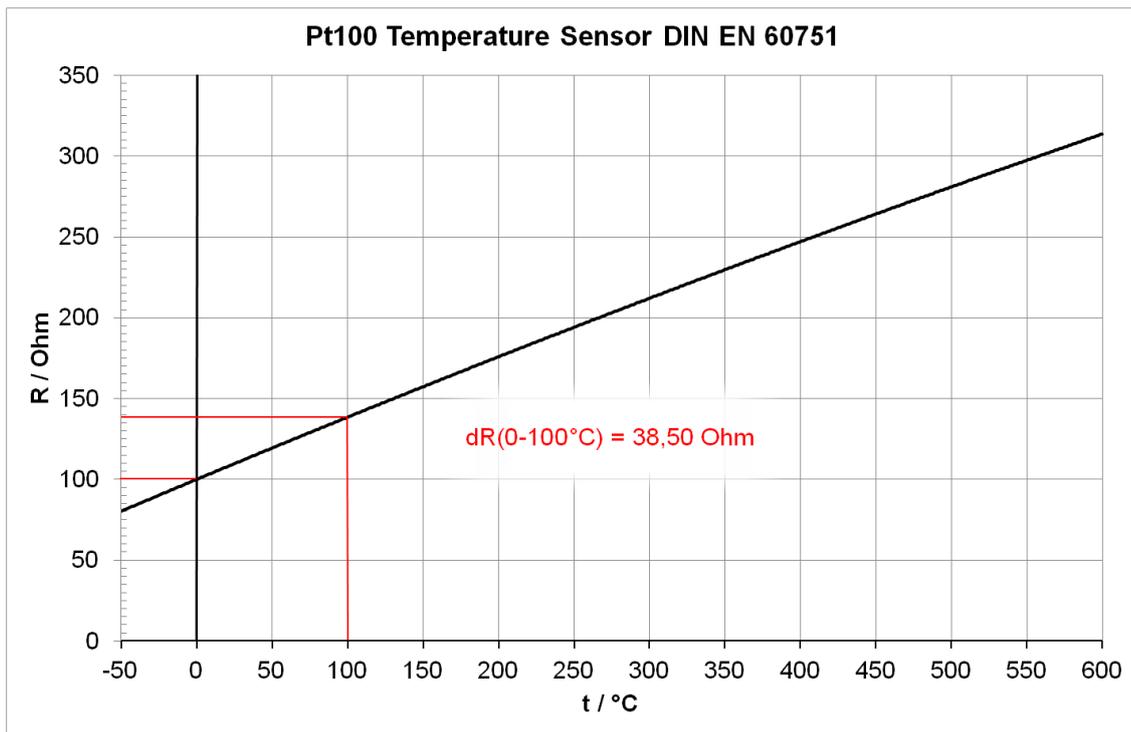


Figure 1: Resistance characteristics

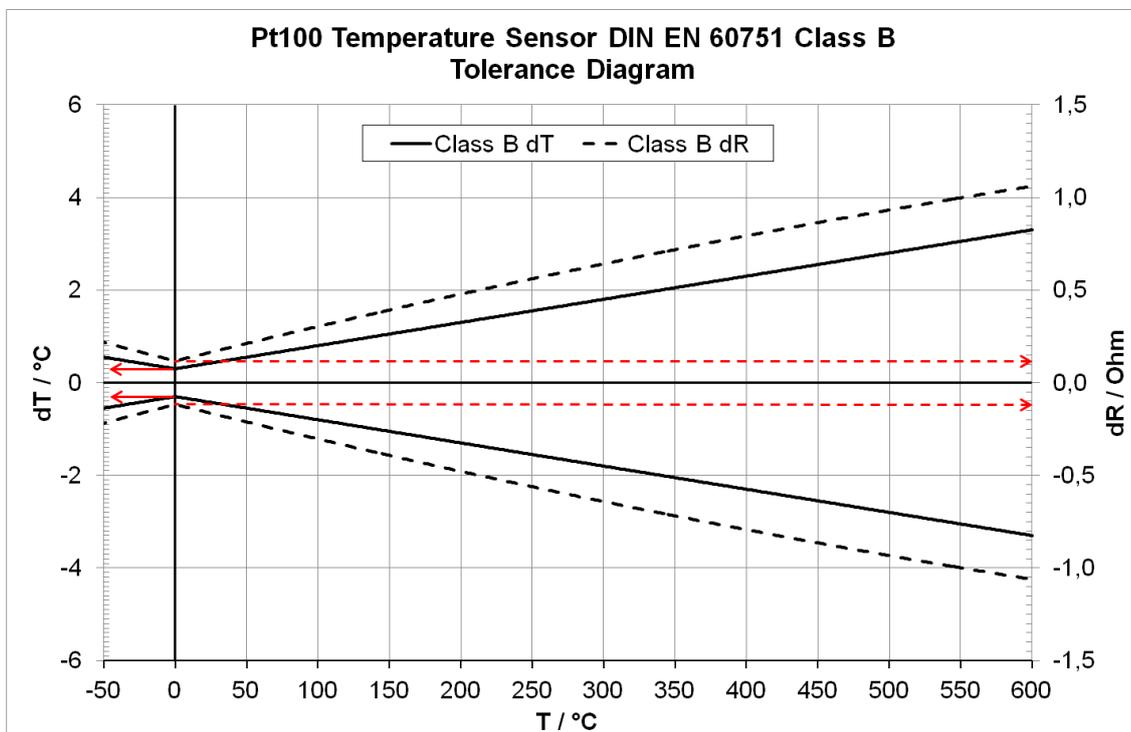


Figure 2: Tolerance chart

### Mechanical Dimensions PTFC Outline

Wire diameter depends on wire material, drawings are for Au-coated Ni-wire

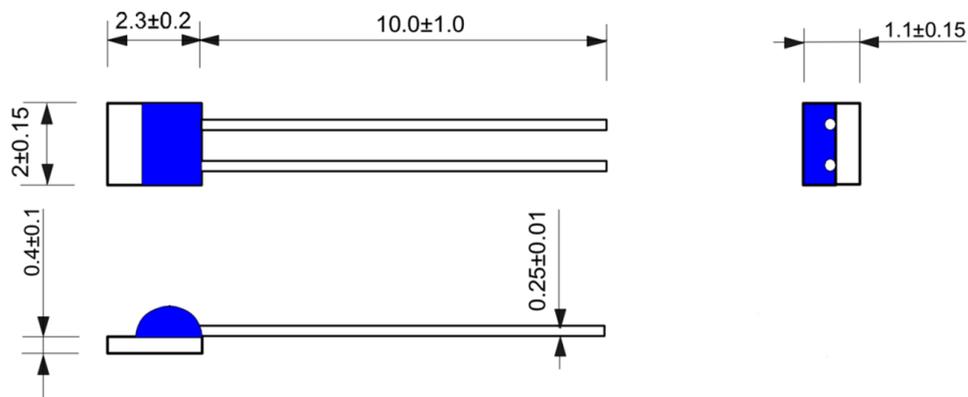


Figure 3: Mechanical dimensions PTFC outline

### Mechanical Dimensions PTFD Outline

Wire diameter depends on wire material, drawings are for Au-coated Ni-wire

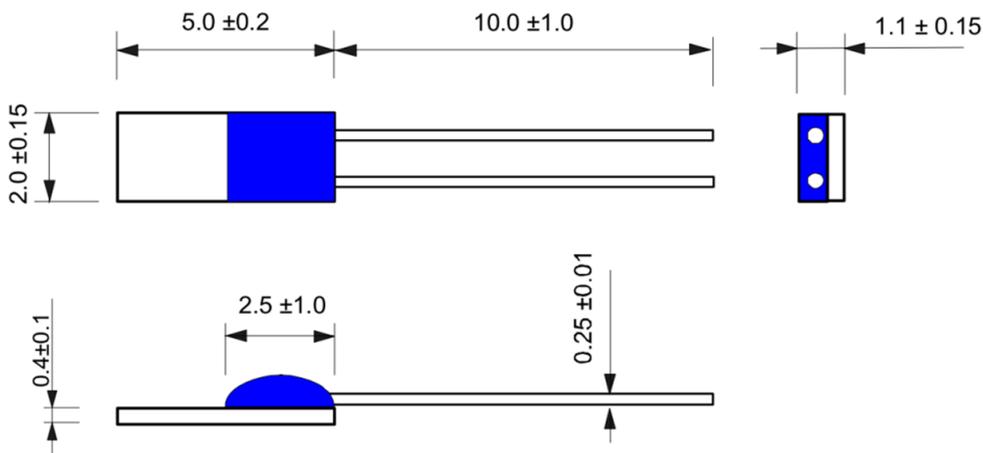


Figure 4: Mechanical dimensions PTFD outline

### Mechanical Dimensions PTFF Outline

Wire diameter depends on wire material, drawings are for Au-coated Ni-wire

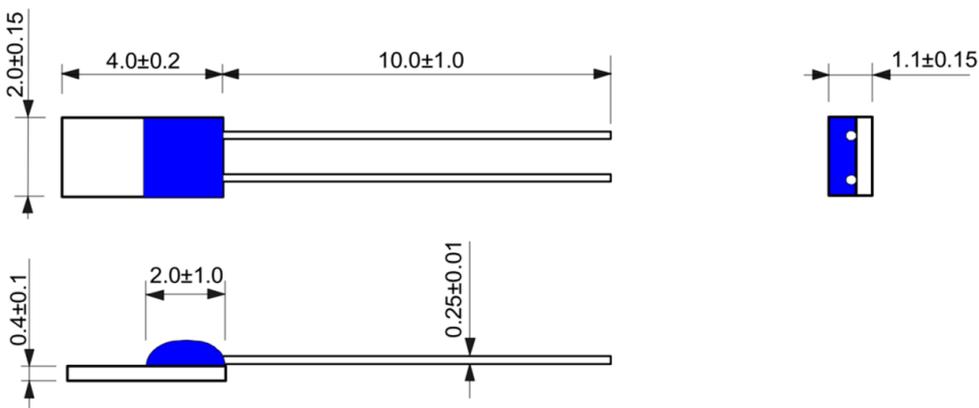


Figure 5: Mechanical dimensions PTFF outline

## PTF FAMILY

Platinum Temperature Sensor

### Mechanical Dimensions PTFM Outline

Wire diameter depends on wire material, drawings are for Au-coated Ni-wire

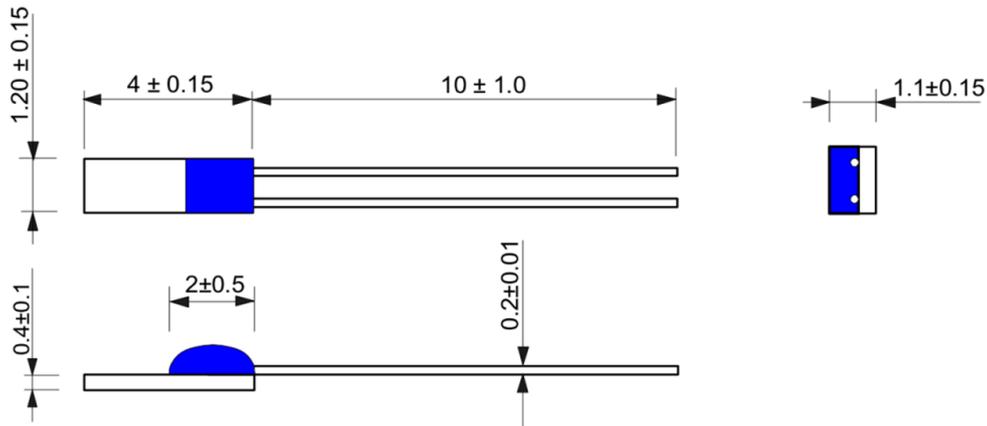


Figure 6: Mechanical dimensions PTFM outline

### Type configuration Matrix

Sensor family	Type	Outline dimensions	Nominal resistance		Tolerance class			Connection wire		
			100 Ω	1000 Ω	DIN EN 60751			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

### Ordering Information PTFC outline (2 mm x 2.3 mm)

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

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

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

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

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

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### Ordering Information PTFM outline (1.2 mm x 4 mm)

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

### Packing and Minimum Order Quantity

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