

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

Datasheet

*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 ₀ | Class B (F0.3) Pt100 Class B (F0.3) Pt1000 | 99.88 999.8 | 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 _{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 | τ _{A,0.9} | PTFC outline PTFD outline PTFF outline PTFM outline | | 10 17 10 10 | | s |
| Measuring Current R ₀ : 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 ₀ : 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

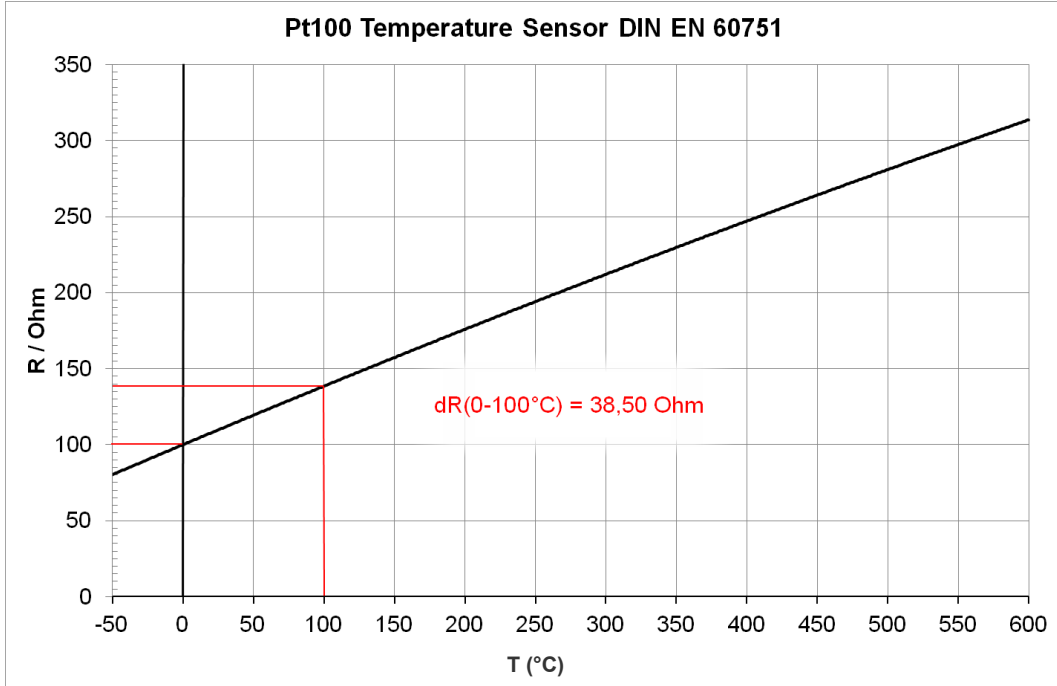


Figure 1: Resistance characteristics

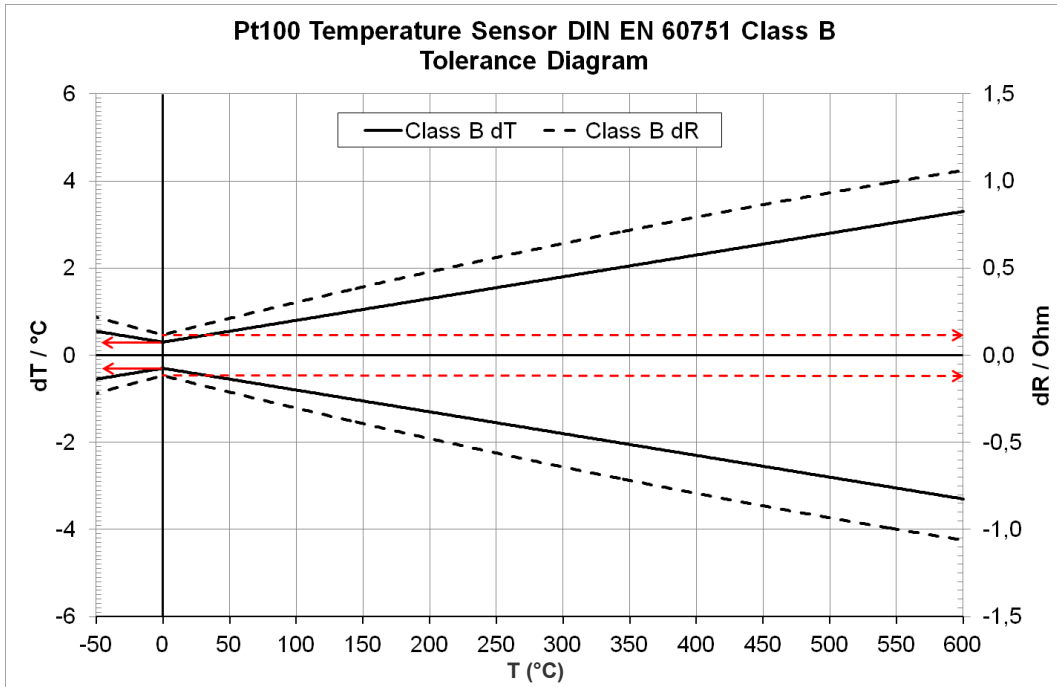


Figure 2: Tolerance chart

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Dimensional Drawing - PTFC Outline

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

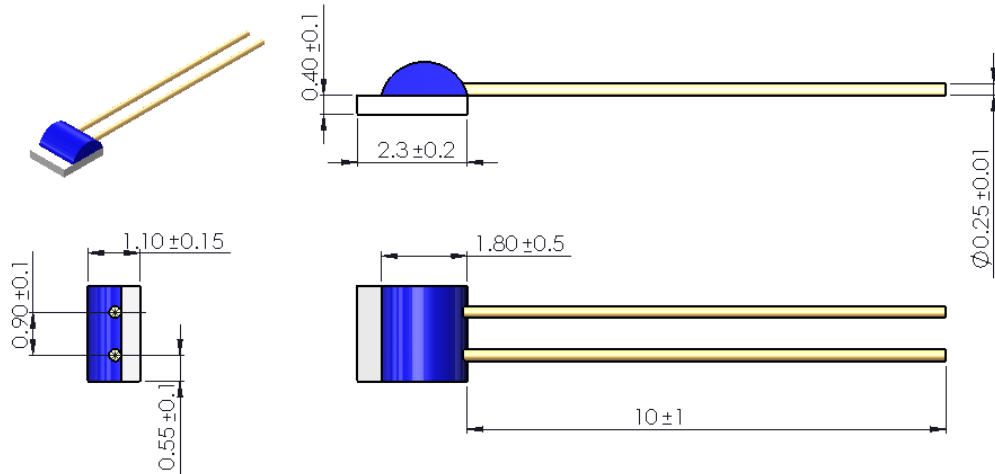


Figure 3: PTFC outline dimensions (mm)

Dimensional Drawing - PTFD Outline

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

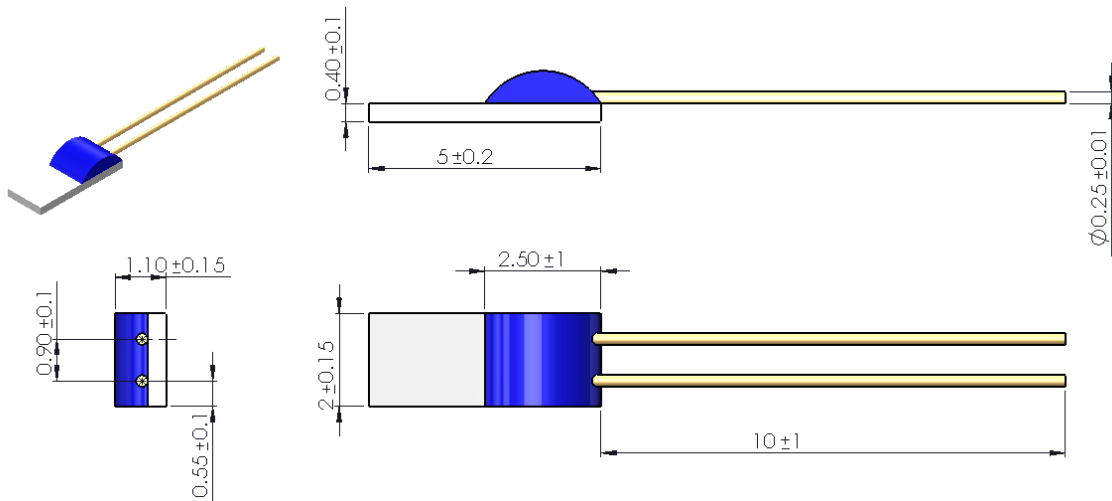


Figure 4: PTFD outline dimensions (mm)

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Mechanical Dimensions PTFF Outline

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

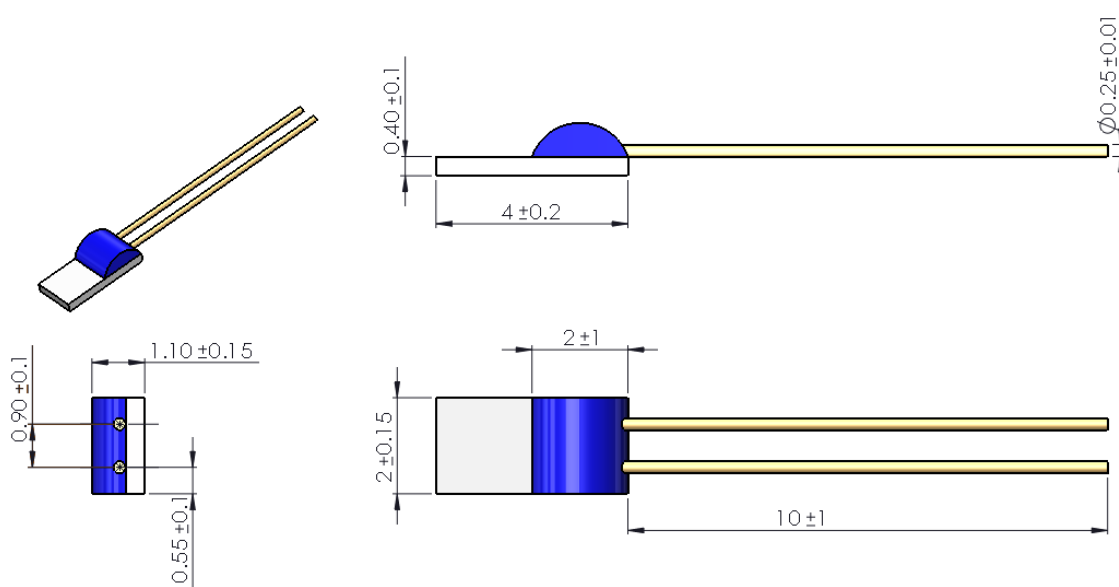


Figure 5: PTFF outline dimensions (mm)

Dimensional Drawing - PTFM Outline

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

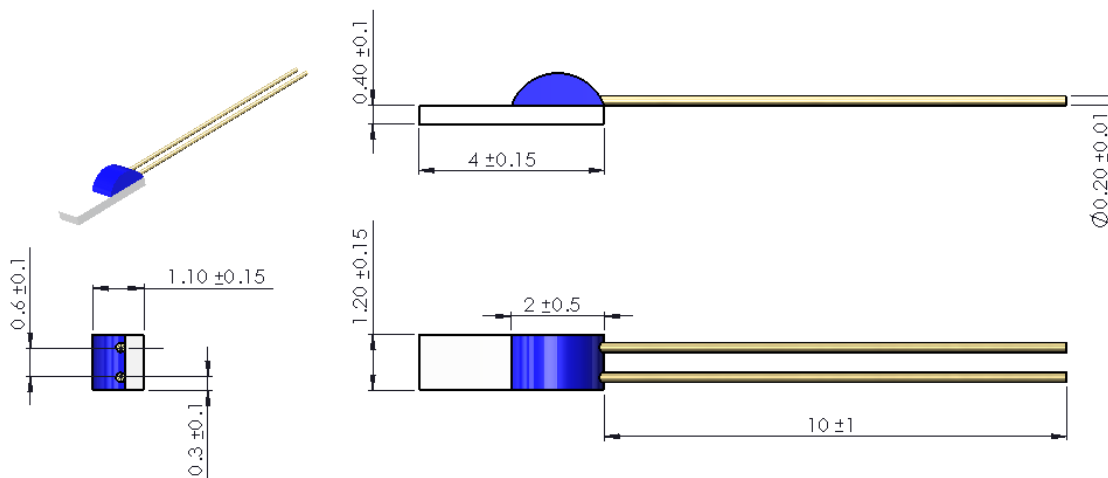


Figure 6: PTFM outline dimensions (mm)

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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 | 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 | 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 PTFE Outline (2 mm x 4 mm)

| 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 |