Rhodium-Iron RTDs

**Rhodium-iron features**
- Good long term stability: ±10 mK from 1.4 K to 325 K
- RF-800 offers a wide temperature range from 0.65 K to 500 K
- Linear response above 100 K
- Excellent resistance to ionizing radiation

Rhodium-iron temperature sensors offer a positive temperature coefficient, monotonic response over a wide temperature range, and high resistance to ionizing radiation.

The RF-800 rhodium-iron resistance sensor features monotonically decreasing resistivity from 500 K to 0.65 K, although sensitivity (dR/dT) falls off in the region of 30 K. From 100 K to 273 K the resistance changes linearly with temperature to within 1 K. RF-800-4 sensors also exhibit monotonic response at higher temperatures, hence their adaptability for use over the broad range from 1.4 K to 500 K.

**Packaging options**
- RF-800-4

**Typical rhodium-iron resistance**
- RF-800

**Typical rhodium-iron sensitivity**
- RF-800-4

**Typical rhodium-iron dimensionless sensitivity**
- RF-800-4

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Sensors

Rhodium-Iron RTDs

Specifications

Standard curve Not applicable
Recommended excitation 1 mA
Dissipation at recommended excitation 10 µW at 4.2 K, 250 µW at 273 K
Thermal response time 10 s at 273 K
Use in radiation Recommended for use in ionizing radiation environments—see Appendix B
Use in magnetic field Not recommended for use in magnetic fields below 77 K—see Appendix B
Reproducibility1 ±5 mK at 4.2 K.

Soldering standard J-STD-001 Class 2

1 Short-term reproducibility data is obtained by subjecting sensor to repeated thermal shocks from 305 K to 4.2 K

Range of use

Minimum limit | Maximum limit
---|---
RF-800-4 | 0.65 K | 500 K²

² Usable to 800 K, but large and erratic temperature shifts can occur at lower temperatures without proper thermal conditioning

Calibrated accuracy

<table>
<thead>
<tr>
<th>Temperature (K)</th>
<th>Uncalibrated accuracy</th>
<th>Long-term stability</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.4</td>
<td>±7 mK</td>
<td>±10 mK</td>
</tr>
<tr>
<td>4.2</td>
<td>±7 mK</td>
<td>±10 mK</td>
</tr>
<tr>
<td>10</td>
<td>±8 mK</td>
<td>±10 mK</td>
</tr>
<tr>
<td>77</td>
<td>±13 mK</td>
<td>±10 mK</td>
</tr>
<tr>
<td>305</td>
<td>±23 mK</td>
<td>±10 mK</td>
</tr>
<tr>
<td>400</td>
<td>±41 mK</td>
<td>—</td>
</tr>
<tr>
<td>500</td>
<td>±42 mK</td>
<td>—</td>
</tr>
</tbody>
</table>

¹ (Calibration uncertainty)² + (reproducibility)² for more information see Appendices B, D, and E
² Long-term stability data is obtained by subjecting sensor to 200 thermal shocks from 305 K to 77 K

Typical magnetic field-dependent temperature errorsΔT/T (%) at B (magnetic induction)

<table>
<thead>
<tr>
<th>Package parallel to field B</th>
<th>2.5 T</th>
<th>8 T</th>
<th>14 T</th>
<th>19 T</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.2 K</td>
<td>11</td>
<td>40</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>20 K</td>
<td>4</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>40 K</td>
<td>1.5</td>
<td>12</td>
<td>30</td>
<td>47</td>
</tr>
<tr>
<td>66 K</td>
<td>0.3</td>
<td>2.5</td>
<td>6</td>
<td>9</td>
</tr>
<tr>
<td>87 K</td>
<td>0.2</td>
<td>1.5</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>110 K</td>
<td>0.1</td>
<td>0.9</td>
<td>2.4</td>
<td>—</td>
</tr>
<tr>
<td>190 K</td>
<td>0.03</td>
<td>0.3</td>
<td>0.9</td>
<td>—</td>
</tr>
<tr>
<td>300 K</td>
<td>-0.01</td>
<td>0.1</td>
<td>0.4</td>
<td>—</td>
</tr>
</tbody>
</table>

Ordering information

Uncalibrated sensor—Specify the part number in the left column only, for example RF-800-4.
Calibrated sensor—Add the calibration range suffix code to the end of the model number, for example RF-800-4-1.4L.

Accessories suggested for installation—see Accessories section for full descriptions
Stycast® epoxy VGE-7031 varnish
CryoCable™ Indium solder
Apiezon® grease 90% Pb, 10% Sn solder
Manganin wire Phosphor bronze wire

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