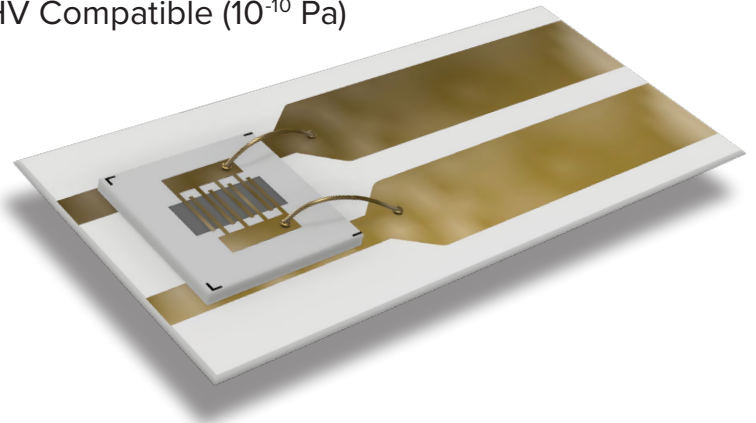


Zirnox is a thin film resistive temperature sensor that can operate over a wide temperature range (0.02K to 450K) and exhibits negligible calibration shifts when exposed to magnetic fields and ionizing radiation environments. Comprised of zirconium oxynitride, the material and physical properties of the sensor provide fast thermal response and exceptional heat transfer. Zirnox packaging is highly customizable and can be tailored to fit your application needs.

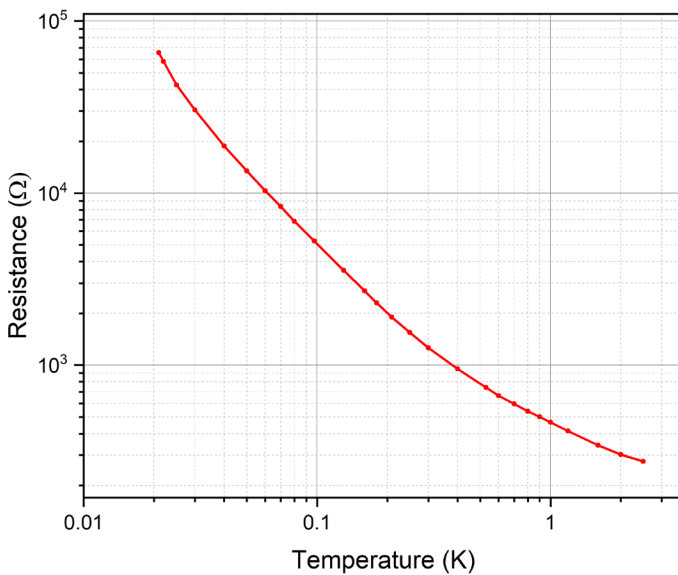
*Radiation ULT data subject to change and available upon release

Key Features

- High Sensitivity
- Fast Thermal Response
- Excellent Short-Term and Long-Term Stability
- Reliable and Wide-Ranging
- UHV Compatible (10^{-10} Pa)



Zirnox down to 20 mK



Thermal Response Time

0.093" Copper Canister, 300K → 4K : 3.931 Secs (62.5%)
 0.093" Copper Canister, 77K → 4K : 0.412 Secs (62.5%)

Zr2 (20Ω)

0.066%, 2 T
 0.31%, 5 T
 0.38%, 10 T
 1.5%, 15 T

Zr4 (40Ω)

0.12%, 2 T
 0.000%, 5 T
 0.18%, 10 T
 1.05%, 15 T

*Typical errors $\Delta T(H)/T_o$ @ 4K due to the magnetic field for Zr2 & Zr4

Available Configurations

Calibrated "NN"

(Range 1.4K to 450K)

- +/- 0.01K from 1.5K to 25K
- +/- 0.03K from 25K to 100K
- +/- 0.05K from 100K to 450K

Calibrated "E"

(Range 0.02K to 450K)

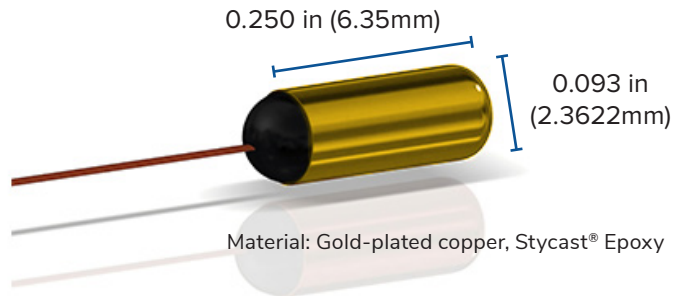
- +/- 0.005K from 0.02K to 0.15K
- +/- 0.01K from 0.15K to 1.5K
- +/- 0.025K from 1.5K to 4.2K
- +/- 0.05K from 4.2K to 450K

Uncalibrated Configurations

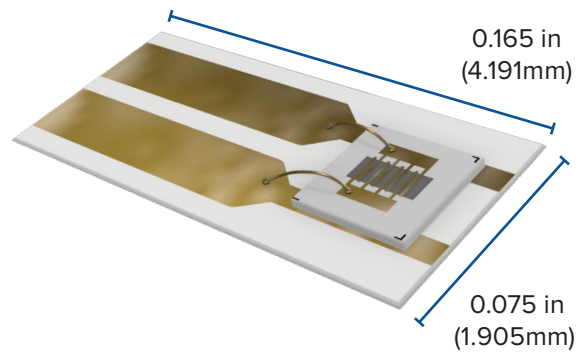
Available Upon Request

*Data is subject to change as a result of product improvement

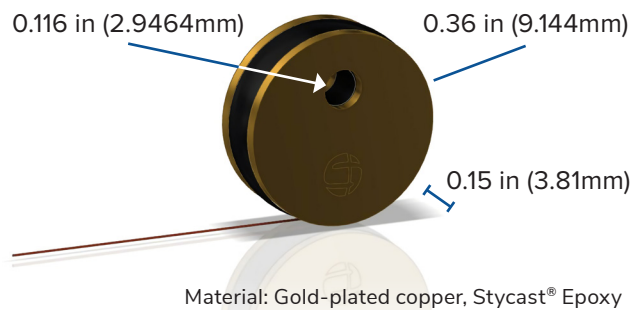
Canister Package



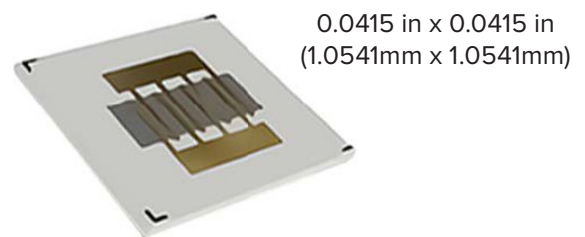
Exposed Substrate



Model 22 Bobbin



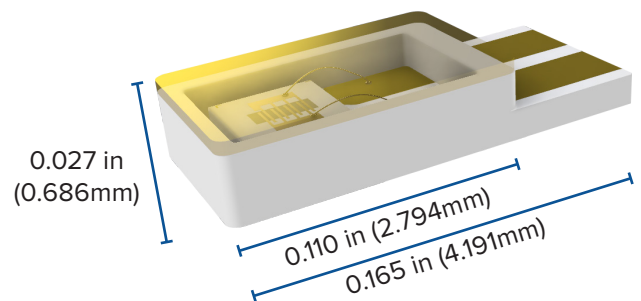
Bare Chip



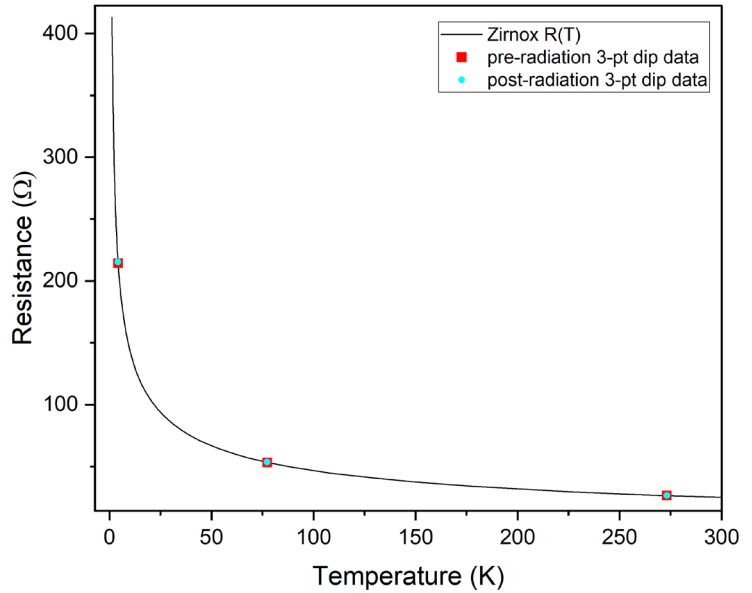
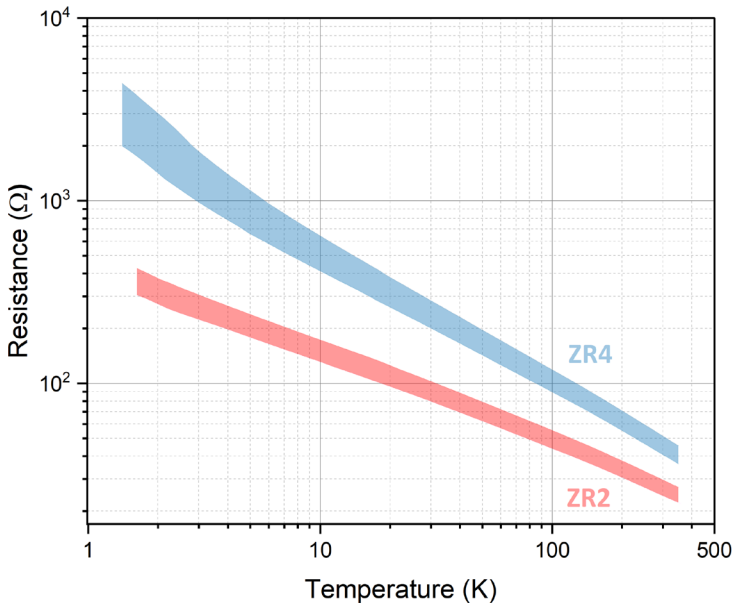
Four-Wire Options

- * 36 AWG Copper, Twisted: Teflon
 - * 36 AWG Phosphor-Bronze, Bonded Insulation: Polyimide
 - * 30 AWG Phosphor-Bronze, Bonded Insulation: Polyimide
 - * 30 AWG Copper, Twisted (Model 25 Only) Insulation: Teflon
 - * 32 AWG Phosphor-Bronze, Bonded Insulation: Polyimide
- *Two-Wire Configurations Available Upon Request

ZrNO Assembly 2



Zirnox Resistance Bands



Zirnox Magnetic Field-Dependent Temperature Deviations

T(K)	2T (%)	5T (%)	10T (%)	14T (%)
0.6	-14.28	-30.43	-50	
1	-1.01	-10.98	-25	
2	-0.150	-0.479	-2.103	-4.697
4	0.066	-0.310	0.380	1.500
9	-0.020	0.249	0.614	1.165
19	0.030	0.108	0.550	1.057
30	0.040	0.132	0.621	0.980
80	-0.091	-0.122	-0.122	-0.150
200	0.046	-0.118	-0.214	-0.254
280	0.021	-0.027	-0.100	-0.186

Zirnox temperature shift due to neutron and gamma irradiation, taken at ~4.2 K, ~77 K and ~273 K. The thermal neutron fluence was ~6.6E12, the fast neutron fluence (1 MeV eq. in Si) was ~1.0E12, and the total dose including gamma-rays was ~110 Gy.

Percent Error Equation Used In Table:

$$100\% \times \frac{T_B - T_0}{T_0}$$

where T_0 is the temperature at zero applied field, and T_B is the temperature at the given applied field