High Temperature Thermistors

Glass Encapsulated, Up to 200°C (392°F)

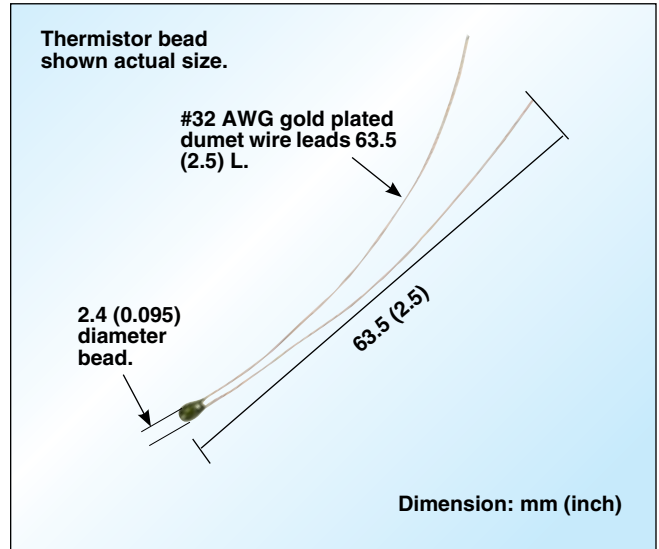**55000 Series**

RoHS

Thermistor bead shown actual size.

#32 AWG gold plated dumet wire leads 63.5 (2.5) L.

2.4 (0.095) diameter bead.

63.5 (2.5)

Dimension: mm (inch)

✔ **Maximum Continuous Use, 200°C (392°F) [Short Term Use to 250°C (482°F)]**

✔ **Excellent Long Term Stability**

✔ **Hermetically Sealed Glass Bead**

✔ **Available in 2252, 3000, 5000 and 10,000 Ω Resistances at 25°C (77°F)**

✔ **Tolerance: ±0.2°C From 0 to 70°C (32 to 158°F)**

✔ **2.4 mm (0.095") Max Diameter Bead**

✔ **#32 AWG, Gold Plated Dumet Leads 63.5 mm (2.5") L**

The OMEGA® 55000 Series glass encapsulated thermistors provide a higher temperature alternative to the OMEGA 44000 Series epoxy coated thermistors where needed. With a maximum continuous temperature rating of -80 to 200°C (-112 to 392°F), and intermittent operation to 250°C (482°F), the 55000 can be used in those applications previously out of reach.

With the same small size as our 44000 thermistor Series, and solderable #32 AWG gold plated Dumet leads, the 55000 thermistor can be used interchangeably wherever our 44000 Series thermistors are used.

Resistance Vs. Temperature Characteristics

The Steinhart-Hart Equation has become the generally accepted method for specifying the resistance vs. temperature relationship for thermistors. The Steinhart-Hart equation for temperature as a function of resistance is as follows:

$$\frac{1}{T} = A + B\,[Ln(R)] + C\,[Ln(R)]^3$$

where: A, B and C are constants derived from three temperature test points.

R = Thermistors resistance in Ω

T = Temperature in Kelvins K (°C + 273.15)

To determine the thermistor resistance at a specific temperature point, the following equation is used:

$$R = e^{\,(beta-(alpha/2))1/3 \,-\, ((beta+(alpha/2))1/3}$$

where:

alpha = ((A-(1/T))/C)

beta = SQRT(((B/(3C))³)+(alpha²/4))

The A, B and C constants for each of our thermistor selections can be found in Table 1. Using these constants with the above equations, you can determine the temperature of the thermistor based on its resistance, or determine a thermistors resistance at a particular temperature.

Table 1: Steinhart-Hart Constants

Model No.	R25°C	A	B	C
55004	2252 Ω	1.4705 x 10⁻³	2.3780 x 10⁻⁴	1.0389 x 10⁻⁷
55005	3000 Ω	1.4052 x 10⁻³	2.3692 x 10⁻⁴	1.0125 x 10⁻⁷
55007	5000 Ω	1.2870 x 10⁻³	2.3585 x 10⁻⁴	9.4346 x 10⁻⁸
55016	10,000 Ω	1.1275 x 10⁻³	2.3441 x 10⁻⁴	8.6482 x 10⁻⁸

Stability and Drift

Thermistors are generally very accurate and stable devices, but conditions such as over-temperature exposure, thermal or mechanical shock, or subjecting them to over-current conditions can result in a change in resistance. The 55000 Series thermistors are chemically stable and not significantly affected by aging. The following shows typical stability data for the 55016 thermistor:

Typical Thermometric Drift (±0.2°C Elements)

Operating Temp	10 Months
0°C	<0.01°C
25°C	<0.01°C
100°C	0.12°C
150°C	0.15°C
200°C	0.20°C

Tolerance Curves

Accuracy tolerances for thermistor sensors are expressed as a percentage of temperature. This is also referred to as interchangeability. The 55000 Series thermistors have a tolerance of 0.2°C between 0 and 70°C.

Table 2: Interchangeability Tolerances

| Temp (°C)	Model No. 55004, ±0.20°C	
	±°C	±Ω
-80	1.00	142,000
-40	0.40	2018
0	0.20	75
40	0.20	10
70	0.20	2.7
100	0.30	1.3
150	1.00	0.9

Note: Temperature values (°C) are the same for each tolerance group (±0.10 or ±0.20), resistance tolerances will change based on resistance at 25°C (77°F).

Operating Current and Dissipation Constant

The suggested operating current for bead-style thermistors is approximately 10 to 15 micro-amps. thermistors can experience self-heating effects if they are exposed to operating currents that are high enough to create more heat than the thermistor can dissipate to its surroundings. The 55000 Series thermistors have a dissipation constant of 1.5 milliwatts/°C in air.

Time Constant

The time constant is the time required for a thermistor to react to a step change in temperature. For example, if exposed to a change from 0 to 100°C (32 to 212°F), the 63% time constant would be the time required for the thermistor to indicate a resistance to its value at 63°C (145°F). The time constant for the 55000 Series thermistor is less than 15 seconds in air.

Shown actual size.
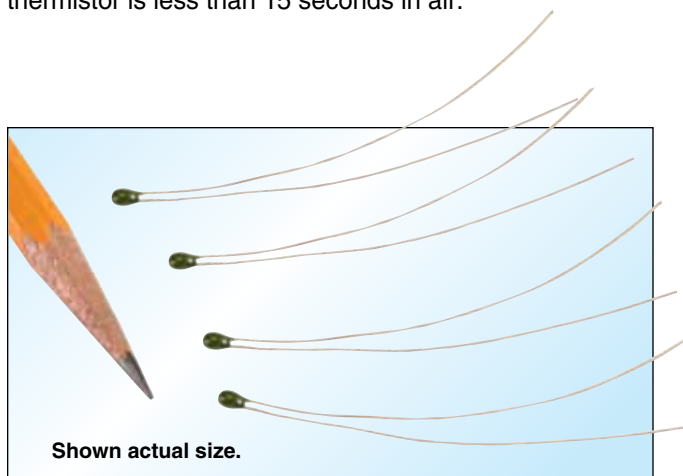
Discount Schedule

4 to 10	9%
11 to 24	12%
25 to 49	18%
50 to 99	20%
100 and over	25%

To Order *Visit omega.com/55000 for Pricing and Details*

Model Number	Resistance at 25°C	Tolerance (0 to 70°C)	Beta 0 to 50°C (K)	Ratio Ω 25/125°C	Best Working Temperature	Short Term Temperature
55004	2252	0.2°C	3891	29.26	-80 to 200°C (-112 to 392)	250°C (482°F)
55005	3000	0.2°C	3891	29.26	-80 to 200°C (-112 to 392)	250°C (482°F)
55007	5000	0.2°C	3891	29.26	-80 to 200°C (-112 to 392)	250°C (482°F)
55016	10000	0.2°C	3891	29.26	-80 to 200°C (-112 to 392)	250°C (482°F)

***Ordering Example: 55007**, thermistor, 5000 Ω at 25°C (77°F), 2.4 mm (0.095") maximum bead diameter with two 63.5 mm (2.5") L gold plated dumet lead wires.*