te.com

-

EPOXY COATED NTC THERMISTORS

GENERAL DESCRIPTION

TE Connectivity offers a comprehensive range of epoxy coated NTC thermistors with tin plated or PTFE insulated leads. The sensors are available in different sizes from 2.4 to 2.8 mm bead diameters and 32 AWG to 28 AWG wire sizes. They offer a choice of precision temperature tolerance classifications for a wide variety of customer applications, such as temperature measurements, temperature indication, temperature control, and thermal compensation. Thermistor interchangeability is an important factor for cost efficiency as the need for expensive individual calibrations are not necessary as each device will match the published Resistance -Thermistor characteristics for a given thermistor and will be within the specified deviation limits at a single point or over a specific temperature range.

FEATURES

- Interchangeability
- Proven stability and reliability
- Temperature range -40°C to +125°C
- Rapid time response
- Thermally conductive epoxy coating
- Insulated or uninsulated leads

SPECIFICATION

- 0.1K to 1M Ohms Resistance @ +25ºC
- Available in custom tolerances
- Rapid Time Response
- Thermally conductive epoxy coating
- Choice from 32 AWG or 28 AWG leads available
- RoHS Compliant

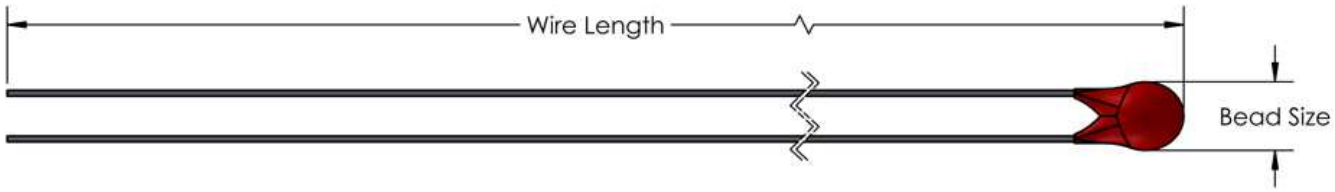
APPLICATIONS

- Temperature sensing, control and compensation
- Tight Tolerance Instrumentation
- Assembly into probes for a wide variety of applications
- General Instrumentation and medical applications
- Temperature sensing, control and compensation

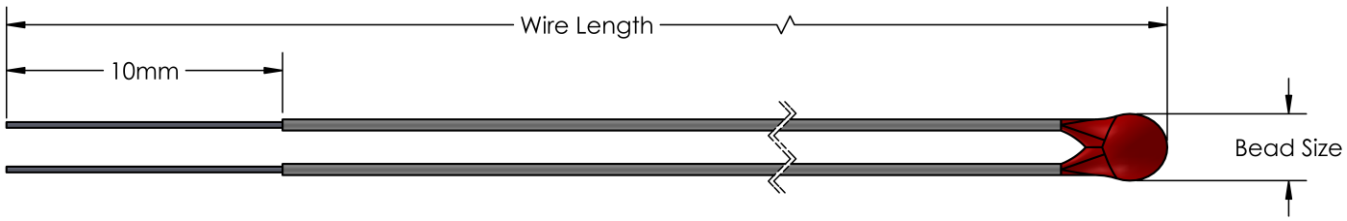
CLICK HERE ›
CONNECT WITH A SPECIALIST

PRODUCT OVERVIEW

Bare Lead NTC Thermistor



Insulated Lead NTC Thermistor



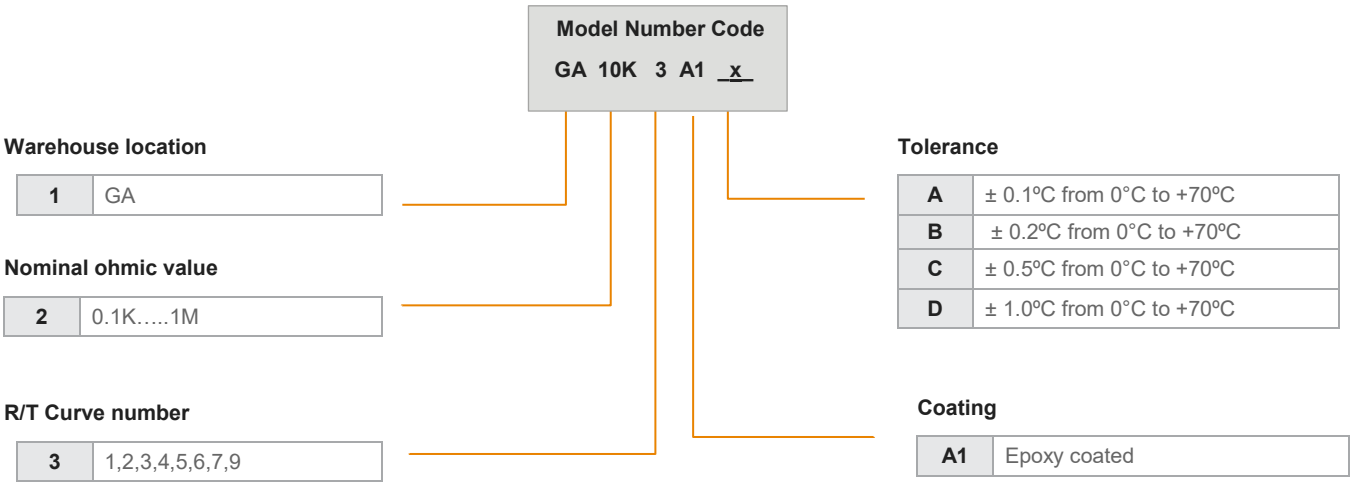
Product Overview Table

Part Description	Wire Gauge	Wire length (mm)	Bead size (mm	Resistance Range (Ω)	Tolerance Range	Dissipation Constant in Still Air @ +25ºC	Time Response (Stirred Oil)
Bare tin-plated copper alloy lead NTC (Uninsulated type)	32 AWG	76	2.4	2.2K → 100K	±0.2ºC from 0 to +70ºC	0.75 mW/°C	<1.0 s
Insulated silver-plated copper lead NTC (PTFE)	30 AWG	76	2.4	2.2K → 100K	±0.2ºC from 0 to +70ºC	0.85 mW/°C	<1.0 s
Bare tin-plated copper lead NTC 2 mW DC type	30 AWG	46	2.4	2.2K → 100K	±0.2ºC from 0 to +70ºC	2.0 mW/°C	<1.3 s
Bare tin-plated copper lead NTC 3 mW DC type	28 AWG	46	2.8	2.2K → 100K	±0.2ºC from 0 to +70ºC	3.0 mW/°C	<1.5 s
Bare tin-plated copper alloy lead NTC Low ohmic <1KΩ	32 AWG	76	2.4	0.1K → 1K	±0.2ºC from 0 to +25ºC	0.75 mW/°C	<1.0 s
Bare tin-plated copper alloy lead NTC Medical Tolerance	32 AWG	76	2.4	2.2K → 10K	±0.05ºC from 32 to +44ºC	0.75 mW/°C	<1.0 s
Bare tin-plated copper alloy- lead NTC Single point tolerance	32 AWG	76	2.4	0.1K → 1M	±1% at +25ºC	0.75 mW/°C	<1.0 s

Ordering Information

1. From the Product Overview Table above, select the Thermistor design required. Each Thermistor design is color coded.
2. Select the resistance value required from table below in the corresponding color-coded column.
3. Replace “x” in the selected Model Number with the required tolerance band (A, B, C or D). Refer to Part Number Code diagram below.
4. Please see Cross-reference table on page 7 for ordering part number.

Resistance (Ohms)	0/50°C Beta Value (K) (±0.5%)	Epoxy Color	Operating Temperature (°C)	Bare tin-plated copper alloy lead NTC (Uninsulated type)	Insulated silver-plated copper lead NTC (PTFE)	Bare tin-plated copper lead NTC 2 mW DC type	Bare tin-plated copper lead NTC 3 mW DC type
2252	3892	Brown	-40 to +125	GA2.2K3A1x	GA2.2K3A1Ix	GA2.2K3A1W2	GA2.2K3A1W3
3000	3892	Red	-40 to +125	GA3K3A1x	GA3K3A1Ix	GA3K3A1W2	GA3K3A1W3
5000	3892	Orange	-40 to +125	GA5K3A1x	GA5K3A1Ix	GA5K3A1W2	GA5K3A1W3
10000	3892	Yellow	-40 to +125	GA10K3A1x	GA10K3A1Ix	GA10K3A1W2	GA10K3A1W3
10000	3575	Black	-40 to +125	GA10K4A1x	GA10K4A1Ix	GA10K4A1W2	GA10K4A1W3
30000	3811	White	-40 to +125	GA30K5A1x	GA30K5A1Ix	GA30K5A1W2	GA30K5A1W3
30000	4143	Green	-40 to +125	GA30K6A1x	GA30K6A1Ix	GA30K6A1W2	GA30K6A1W3
50000	4143	Blue	-40 to +125	GA50K6A1x	GA50K6A1Ix	GA50K6A1W2	GA50K6A1W3
100000	4143	Violet	-40 to +125	GA100K6Ax	GA100K6A1Ix	GA100K6A1W2	GA100K6A1W3



Ordering Information

1. From the Product Overview Table above, select the Thermistor design required. Each Thermistor design is color coded.
2. Select the resistance value required from table below in the corresponding color-coded column.
3. Please see Cross-reference table on page 7 for ordering part number.

Resistance (Ohms)	0/50°C Beta Value (K) (±0.5%)	Epoxy Color	Operating Temperature (°C)	Bare tin-plated copper alloy lead NTC Low ohmic <1KΩ	Bare tin-plated copper alloy lead NTC Medical Tolerance	Bare tin-plated copper alloy- lead NTC Single point tolerance
100	3108	Black	-40 to +100	GA0.1K1A1	-	GA0.1K1A1-25
300	3108	Black	-40 to +100	GA0.3K1A1	-	GA0.3K1A1-25
1000	3263	Black	-40 to +100	GA1K2A1	-	GA1K2A1-25
1000	3422	Black	-40 to +100	GA1K7A1	-	GA1K7A1-25
2000	3892	Black	-40 to +125	-	-	GA2K3A1-25
2252	3892	Brown	-40 to +125	-	GA2.2K3A1AM	GA2.2K3A1-25
3000	3892	Red	-40 to +125	-	-	GA3K3A1-25
5000	3892	Orange	-40 to +125	-	-	GA5K3A1-25
10000	3892	Yellow	-40 to +125	-	GA10K3A1AM	GA10K3A1-25
10000	3575	Black	-40 to +125	-	GA10K4A1AM	GA10K4A1-25
30000	3811	White	-40 to +125	-	-	GA30K5A1-25
30000	4143	Green	-40 to +125	-	-	GA30K6A1-25
50000	4143	Blue	-40 to +125	-	-	GA50K6A1-25
100000	4143	Violet	-40 to +125	-	-	GA100K6A1-25
1000000	4582	Black	-40 to +125	-	-	GA1M9A1-25

RELIABILITY DATA

Test	Standard	Test conditions	ΔR25/R25	Remarks
Storage in Dry Heat	IEC 60068-2-2	High Temperature Storage @+100°C Duration: 1000 h	<0.5%	No mechanical damage
Storage in Dry Heat	IEC 60068-2-2	High Temperature Storage @+125°C Duration: 1000 h	<1%	No mechanical damage
Storage in Damp Heat, Steady State	IEC60068-2-78	Ambient Conditions: Temperature: +40°C Relative Humidity 93% Duration: 56 days	<1%	No mechanical damage
Rapid Temperature Cycling	IEC60068-2-14	Lower Test Temperature: -40°C Upper Test Temperature: +125°C Number of Cycles: 1000	<1%	No mechanical damage
Endurance		Pmax: 60mW Duration: 1000 h	<2%	No mechanical damage

RESISTANCE V TEMPERATURE CHARACTERISTICS

Beta value 0/50 (K)	3108		3263	3422	3892				
Beta value 25/85 (K)	3187		3348	3499	3976				
Nominal Resistance at +25°C. (Ω)	100	300	1000	1000	2000	2252	3000	5000	10000
Temperature (°C)									
-40	1597.5	4814.7	18641.3	21681.1	67029.2	75491.0	100619.1	167861.6	336097.6
-35	1239.0	3730.1	14231.4	16307.9	35308.4	54489.3	72616.1	121113.9	242426.8
-30	968.5	2913.1	10959.8	12381.7	35308.4	39761.2	52982.3	88349.4	176802.7
-25	762.8	2292.7	8511.0	9485.3	26035.1	29317.3	39062.1	65126.8	130306.3
-20	605.2	1817.8	6662.1	7328.9	19388.7	21832.4	29087.3	48490.3	97006.1
-15	483.4	1451.6	5254.9	5709.2	14576.6	16413.5	21866.6	36449.5	72910.6
-10	388.8	1167.0	4175.2	4482.4	11058.7	12452.0	16588.4	27649.5	55303.6
-5	314.7	944.4	3340.7	3545.8	8462.8	9529.0	12694.1	21157.6	42316.5
0	256.3	769.0	2691.0	2825.0	6530.3	7353.0	9795.2	16325.4	32650.8
5	210.0	630.0	2181.6	2266.3	5079.3	5719.2	7618.7	12697.7	25395.0
10	173.0	519.1	1779.6	1830.1	3980.9	4482.4	5971.2	9951.8	19903.2
15	143.4	430.1	1460.3	1487.2	3142.9	3538.9	4714.3	7857.0	15713.6
20	119.4	358.3	1205.1	1216.0	2498.8	2813.6	3748.1	6246.7	12493.3
25	**100**	**300**	**1000**	**1000**	**2000**	**2252**	**3000**	**5000**	**10000**
30	84.1	252.4	834.2	827.0	1611.15	1814.2	2416.8	4028.0	8056.1
35	71.1	213.4	699.3	687.6	1305.96	1470.5	1959.0	3265.1	6530.3
40	60.4	181.3	589.2	574.7	1064.90	1199.1	1597.4	2662.4	5325.0
45	51.6	154.7	498.7	482.7	873.30	983.4	1310.0	2183.4	4367.0
50	44.2	132.5	424.0	407.4	720.13	810.9	1080.2	1800.5	3601.1
55	38.0	114.0	362.0	345.4	596.96	672.2	895.5	1492.5	2985.2
60	32.8	98.5	310.4	294.1	497.38	560.1	746.1	1243.5	2487.1
65	28.5	85.4	267.3	251.5	416.44	468.9	624.7	1041.2	2082.3
70	24.8	74.3	231.0	216.0	350.32	394.5	525.5	875.8	1751.6
75	21.6	64.9	200.4	186.2	296.04	333.3	444.1	740.1	1480.1
80	19.0	56.9	174.5	161.2	251.26	282.9	376.9	628.1	1256.1
85	16.7	50.0	152.4	140.0	214.15	241.1	321.2	535.3	1070.5
90	14.7	44.1	133.6	122.0	183.27	206.4	274.9	458.1	916.0
95	13.0	39.0	117.5	106.7	157.46	177.3	236.2	393.5	786.8
100	11.6	34.6	103.7	93.7	135.79	152.9	203.6	339.3	678.4
105	10.3	30.8	91.7	82.5	117.53	132.3	176.3	293.7	587.1
110	9.2	27.5	81.4	72.8	102.09	114.9	153.1	255.0	509.8
115	8.2	24.6	72.5	64.5	88.98	100.2	133.4	222.2	444.2
120	7.4	22.1	64.7	57.3	77.80	87.6	116.7	194.3	388.4
125	6.6	19.9	57.9	51.0	68.25	76.8	102.3	170.4	340.6

RESISTANCE V TEMPERATURE CHARACTERISTICS

Beta value 0/50 (K)	3575	3811	4143			4582
Beta value 25/85 (K)	3694	3942	4261			4799
Nominal Resistance at +25°C. (Ω)	10000	30000	30000	50000	100000	1000000
Temperature (°C)						
-40	239828.4	884198.2	1219113	2033475	4071185.7	54553812
-35	179281.5	648789.9	866698.4	1445347	2892929.6	38043843
-30	135232.8	480620.2	622924.1	1038644	2078447.8	26800896
-25	102889.5	359305.5	452412.9	754239.9	1509065.2	19065025
-20	78930.1	270969.5	331870.6	553221.9	1106727.4	13689162
-15	61030.6	206068.7	245781.5	409682.0	819492.7	9917590.7
-10	47549.2	157975.0	183695.8	306177.6	612407.0	7247241.8
-5	37315.9	122041.2	138500.7	230839.4	461694.8	5339893.2
0	29490.0	94980.0	105305.0	175508.0	351017.0	3965970.0
5	23461.9	74445.3	80712.5	134518.9	269033.9	2968208.1
10	18786.5	58749.0	62342.6	103902.5	207800.6	2237922.5
15	15136.1	46666.8	48511.8	80851.7	161700.4	1699360.4
20	12267.8	37303.5	38018.9	63364.3	126727.2	1299288.0
25	**10000**	**30000**	**30000**	**50000**	**100000**	**1000000**
30	8196.4	24267.5	23828.5	39714.5	79430.1	774585.5
35	6753.9	19740.9	19046.5	31744.8	63491.2	603696.2
40	5593.7	16145.7	15317.0	25529.0	51059.9	473321.8
45	4655.6	13274.3	12390.1	20650.7	41303.3	373247.5
50	3893.3	10968.5	10079.0	16798.9	33599.4	295976.4
55	3270.7	9107.2	8243.6	13739.7	27480.8	235970.6
60	2759.9	7597.2	6777.8	11296.5	22594.0	189113.9
65	2338.7	6366.2	5600.7	9334.6	18669.8	152328.7
70	1990.0	5358.0	4650.6	7750.9	15502.0	123300.0
75	1700.0	4528.4	3879.8	6466.1	12932.0	100276.9
80	1457.9	3842.9	3251.4	5418.6	10836.7	81927.9
85	1254.8	3274.0	2736.7	4560.7	9120.5	67234.9
90	1084.0	2799.9	2313.2	3854.7	7708.4	55415.3
95	939.6	2403.3	1963.2	3271.3	6541.4	45865.0
100	817.2	2070.1	1672.7	2787.1	5572.8	38115.0
105	713.0	1789.3	1430.6	2383.6	4765.6	31799.5
110	624.1	1551.8	1228.1	2046.0	4090.3	26632.0
115	547.9	1350.1	1058.0	1762.4	3523.1	22387.1
120	482.5	1178.3	914.5	1523.4	3045.0	18886.8
125	426.0	1031.5	793.2	1321.1	2640.4	15989.6

Cross Reference – Model Number to TE Part Number

Model Number	Ordering TEPN	Legacy Series	Model Number	Ordering TEPN	Legacy Series
GA0.1K1A1	11024449-00	Series V	GA10K4A1IA	GA10K4A1IA	Series II
GA0.1K1A1-25	20033252-00	Series VII	GA10K4A1IB	GA10K4A1IB	Series II
GA0.3K1A1	11021046-00	Series V	GA10K4A1IC	GA10K4A1IC	Series II
GA0.3K1A1-25	11020953-00	Series VII	GA10K4A1ID	20033204-00	Series II
GA100K6A1-25	GA100K6A1-25	Series VII	GA10K4A1W2	20033218-00	Series III
GA100K6A1A	GA100K6A1A	Series I	GA10K4A1W3	GA10K4A1W3	Series IV
GA100K6A1B	GA100K6A1B	Series I	GA1K2A1	GA1K2A1	Series V
GA100K6A1C	GA100K6A1C	Series I	GA1K2A1-25	20033253-00	Series VII
GA100K6A1D	GA100K6A1D	Series I	GA1K7A1	GA1K7A1	Series V
GA100K6A1IA	GA100K6A1IA	Series II	GA1K7A1-25	20033254-00	Series VII
GA100K6A1IB	GA100K6A1IB	Series II	GA1M9A1-25	GA1M9A1-25	Series VII
GA100K6A1IC	20033212-00	Series II	GA2.2K3A1-25	11016574-00	Series VII
GA100K6A1ID	GA100K6A1ID	Series II	GA2.2K3A1A	11033270-00	Series I
GA100K6A1W2	20033228-00	Series III	GA2.2K3A1AM	11026046-00	Series VII
GA100K6A1W3	GA100K6A1W3	Series IV	GA2.2K3A1B	11025821-00	Series I
GA10K3A1-25	GA10K3A1-25	Series VII	GA2.2K3A1C	11024456-00	Series I
GA10K3A1A	GA10K3A1A	Series I	GA2.2K3A1D	11021160-00	Series I
GA10K3A1AM	GA10K3A1AM	Series VII	GA2.2K3A1IA	11028086-00	Series II
GA10K3A1B	GA10K3A1B	Series I	GA2.2K3A1IB	11033130-00	Series II
GA10K3A1C	GA10K3A1C	Series I	GA2.2K3A1IC	20033195-00	Series II
GA10K3A1D	GA10K3A1D	Series I	GA2.2K3A1ID	20033196-00	Series II
GA10K3A1IA	GA10K3A1IA	Series II	GA2.2K3A1W2	11026047-00	Series III
GA10K3A1IB	GA10K3A1IB	Series II	GA2.2K3A1W3	11021008-00	Series IV
GA10K3A1IC	GA10K3A1IC	Series II	GA2K3A1-25	20033256-00	Series VII
GA10K3A1ID	GA10K3A1ID	Series II	GA30K5A1-25	20033260-00	Series VII
GA10K3A1W2	GA10K3A1W2	Series III	GA30K5A1A	GA30K5A1A	Series I
GA10K3A1W3	GA10K3A1W3	Series IV	GA30K5A1B	GA30K5A1B	Series I
GA10K4A1-25	20033259-00	Series VII	GA30K5A1C	20033193-00	Series I
GA10K4A1A	GA10K4A1A	Series I	GA30K5A1D	GA30K5A1D	Series I
GA10K4A1AM	GA10K4A1AM	Series VII	GA30K5A1IA	GA30K5A1IA	Series II
GA10K4A1B	GA10K4A1B	Series I	GA30K5A1IB	GA30K5A1IB	Series II
GA10K4A1C	GA10K4A1C	Series I	GA30K5A1IC	GA30K5A1IC	Series II
GA10K4A1D	GA10K4A1D	Series I	GA30K5A1ID	20033205-00	Series II
GA30K6A1A	GA30K6A1A	Series I	GA30K5A1W2	20033220-00	Series III
GA30K6A1B	GA30K6A1B	Series I	GA30K5A1W3	GA30K5A1W3	Series IV
GA30K6A1C	GA30K6A1C	Series I	GA30K6A1-25	20033261-00	Series VII
GA30K6A1D	GA30K6A1D	Series I	GA50K6A1-25	20033262-00	Series VII
GA30K6A1IA	GA30K6A1IA	Series II	GA50K6A1A	GA50K6A1A	Series I
GA30K6A1IB	GA30K6A1IB	Series II	GA50K6A1B	GA50K6A1B	Series I
GA30K6A1IC	20033206-00	Series II	GA50K6A1C	GA50K6A1C	Series I
GA30K6A1ID	20033208-00	Series II	GA50K6A1D	20033194-00	Series I
GA30K6A1W2	GA30K6A1W2	Series III	GA50K6A1IA	GA50K6A1IA	Series II
GA30K6A1W3	20033229-00	Series IV	GA50K6A1IB	GA50K6A1IB	Series II
GA3K3A1-25	20033257-00	Series VII	GA50K6A1IC	20033211-00	Series II
GA3K3A1A	GA3K3A1A	Series I	GA50K6A1ID	GA50K6A1ID	Series II
GA3K3A1B	GA3K3A1B	Series I	GA50K6A1W2	20033227-00	Series III
GA3K3A1C	GA3K3A1C	Series I	GA50K6A1W3	20033230-00	Series IV
GA3K3A1D	GA3K3A1D	Series I	GA5K3A1-25	20033258-00	Series VII
GA3K3A1IA	GA3K3A1IA	Series II	GA5K3A1A	GA5K3A1A	Series I
GA3K3A1IB	GA3K3A1IB	Series II	GA5K3A1B	GA5K3A1B	Series I
GA3K3A1IC	20033198-00	Series II	GA5K3A1C	GA5K3A1C	Series I
GA3K3A1ID	GA3K3A1ID	Series II	GA5K3A1D	GA5K3A1D	Series I
GA3K3A1W2	20033216-00	Series III	GA5K3A1IA	GA5K3A1IA	Series II
GA3K3A1W3	GA3K3A1W3	Series IV	GA5K3A1IB	GA5K3A1IB	Series II
			GA5K3A1IC	20033202-00	Series II
			GA5K3A1ID	20033203-00	Series II
			GA5K3A1W2	20033217-00	Series III
			GA5K3A1W3	GA5K3A1W3	Series IV

Steinhart-Hart equation for modelling Resistance vs. Temperature characteristics of thermistors:

The equation is derived from mathematical curve-fitting techniques and examination of the Resistance versus Temperature characteristic of thermistor devices. In particular, using the plot of the natural log of resistance value, **ln(R)** versus **(1/T)** for a thermistor component to consider **(1/T)** to be a polynomial in **ln(R)**, an equation of the following form is developed:
$1/T = A_0 + A_1(\ln(R)) + \ldots\ldots + A_N(\ln(R))_N$ (where T is the temperature in Kelvin, and $A_0 \ldots A_N$ are polynomial coefficients that are mathematical constants.) The order of the polynomial to be used to model the relationship between R and T depends on the accuracy of the model that is required and on the non-linearity of the relationship for a particular thermistor. It is generally accepted that use of a third order polynomial gives a very good correlation with measured data, and that the "squared" term is not significant. The equation then is reduced to a simpler form, and it is generally written as:
$1/T = A + B(\ln(R)) + C(\ln(R))_3$ where: **A, B,** and **C** are constant factors for the thermistor that is being modelled.

(In the listings below **A, B**, and **C** are constant factors for the thermistor, **R** is resistance in ohms, T is temperature in Kelvin.)

Steinhart-Hart Equation with temperature as main variable*:*
1/T = A + B(ln(R)) + C(ln(R))3

Steinhart-Hart Equation in terms of Resistance, suitable for programmable computation.
Steinhart Coefficients, A, B and C constants for Standard Part Numbers.

Resistance	Beta 0/50	"A" Constant	"B" Constant	"C" Constant	Temperature reference points °C
100	3108	1.942952×10^{-3}	2.989769×10^{-4}	3.504383×10^{-7}	-20ºC, +25ºC and +50ºC
300	3108	1.627660×10^{-3}	2.933316×10^{-4}	2.870016×10^{-7}	-20ºC, +25ºC and +50ºC
1000	3263	1.373168×10^{-3}	2.772261×10^{-4}	1.997412×10^{-7}	-20ºC, +25ºC and +50ºC
1000	3422	1.446059×10^{-3}	2.683626×10^{-4}	1.643561×10^{-7}	20ºC, +25ºC and +50ºC
2000	3892	1.498872×10^{-3}	2.379047×10^{-4}	1.066953×10^{-7}	0ºC, +25ºC and +70ºC
2252	3892	1.471388×10^{-3}	2.376138×10^{-4}	1.051058×10^{-7}	0ºC, +25ºC and +70ºC
3000	3892	1.405027×10^{-3}	2.369386×10^{-4}	1.012660×10^{-7}	0ºC, +25ºC and +70ºC
5000	3892	1.287450×10^{-3}	2.357394×10^{-4}	9.505200×10^{-8}	0ºC, +25ºC and +70ºC
10000	3892	1.129241×10^{-3}	2.341077×10^{-4}	8.775468×10^{-8}	0ºC, +25ºC and +70ºC
10000	3575	1.028444×10^{-3}	2.392435×10^{-4}	1.562216×10^{-7}	0ºC, +25ºC and +70ºC
30000	3811	9.331754×10^{-4}	2.213978×10^{-4}	1.263817×10^{-7}	0ºC, +25ºC and +70ºC
30000	4143	1.068981×10^{-3}	2.120700×10^{-4}	9.019537×10^{-8}	0ºC, +25ºC and +70ºC
50000	4143	9.657154×10^{-4}	2.106840×10^{-4}	8.585481×10^{-8}	0ºC, +25ºC and +70ºC
100000	4143	8.271111×10^{-4}	2.088020×10^{-4}	8.059200×10^{-8}	0ºC, +25ºC and +70ºC
1000000	4582	7.402387×10^{-4}	1.760865×10^{-4}	6.865999×10^{-8}	25ºC, +100ºC and +150ºC

NORTH AMERICA
Tel +1 800 522 6752

EUROPE
Tel +31 73 624 6999

ASIA
Tel +86 0400 820 6015

te.com/sensors

Version 11/2024