

NTC thermistors, accuracy line
(low values)

2322 640 6....

T _{amb} (°C)	R _T /R ₂₅	ΔR DUE TO B-TOLERANCE (%)	TC (%/K)	R ₂₅ (kΩ)		
				2322 640; note 1		
				6.102	6.152	6.202
130	0.04143	1.54	2.18	41.44	62.15	82.9
135	0.03662	1.60	2.13	36.63	54.94	73.3
140	0.03243	1.65	2.08	32.43	48.65	64.9
145	0.02877	1.70	2.03	28.77	43.16	57.5
150	0.02556	1.75	1.98	25.56	38.34	51.1

Note

1. Replace dot in last 5 digits of catalogue number by a number according to the following details and depending on tolerance on required R₂₅-value: 4 for a tolerance of ±2%; 6 for a tolerance of ±3%; 3 for a tolerance of ±5%.

PACKAGING

The thermistors are packaged in cardboard boxes. Taped products are available on request.

Table 5 Packaging information

PARAMETER	PACKAGING		
	BULK	TAPE AND REEL ⁽¹⁾ 1E pitch	TAPE AND REEL ⁽¹⁾ 2E pitch
Code number	2322 640 6....	2322 640 4....	2322 640 3....
Drawing	Fig.1	Fig.3	Fig.4
Quantity	500	1 500 per reel, 2 reels per box	1500 per reel, 2 reels per box

Note

1. The maximum number of empty places per reel shall not exceed 0.5% of the total number of components per reel. No more than three consecutive positions may be vacant.

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R_T value and tolerance

These thermistors have a narrow tolerance on the B-value, the result of which provides a very small tolerance on the nominal resistance value over a wide temperature range. For this reason the usual graphs of $R = f(T)$ are replaced by Tables 3 and 4, together with a formula to calculate the characteristics with a high precision.

Formulae to determine nominal resistance values⁽¹⁾

The resistance values at intermediate temperatures, or the operating temperature values, can be calculated using the following interpolation laws (extended "Steinhart and Hart"):

$$R(T) = R_{\text{ref}} \times e^{A+B/T+C/T^2+D/T^3} \quad (1)$$

$$T(R) = \left(A_1 + B_1 \ln \frac{R}{R_{\text{ref}}} + C_1 \ln^2 \frac{R}{R_{\text{ref}}} + D_1 \ln^3 \frac{R}{R_{\text{ref}}} \right)^{-1} \quad (2)$$

where:

A, B, C, D, A₁, B₁, C₁ and D₁ are constant values depending on the material concerned; see Table 2.

R_{ref} is the resistance value at a reference temperature (in this event 25 °C).

T is the temperature in K.

Determination of the resistance/temperature deviation from nominal value

The total resistance deviation is obtained by combining the 'R₂₅-tolerance' and the 'resistance deviation due to B-tolerance'.

When:

X = R₂₅-tolerance

Y = resistance deviation due to B-tolerance

Z = complete resistance deviation,

$$\text{then: } Z = \left[\left(1 + \frac{X}{100} \right) \times \left(1 + \frac{Y}{100} \right) - 1 \right] \times 100\%$$

or $Z \approx X + Y$.

When:

TC = temperature coefficient

ΔT = temperature deviation,

$$\text{then: } \Delta T = \frac{Z}{TC}$$

(1) Formulae numbered (1) and (2) are interchangeable with an error of max. 0.005 °C in the range 25 °C to 125 °C and max. 0.015 °C in the range -40 °C to 25 °C.

Table 2 Parameters for determining nominal resistance values

B _{25/85} -VALUE (K)	A	B × 10 ⁻³ (K)	C × 10 ⁻⁵ (K ²)	D × 10 ⁻⁶ (K ³)	A ₁ × 10 ⁻³ (K ⁻¹)	B ₁ × 10 ⁻⁴ (K ⁻¹)	C ₁ × 10 ⁻⁶ (K ⁻¹)	D ₁ × 10 ⁻⁷ (K ⁻¹)
3528; note 1	-12.060	3.688	-0.076	-5.915	3.354016	2.909670	1.632136	0.719220
3528; note 2	-21.095	11.93	-25.139	248.12	3.354016	2.933908	3.494314	-7.71269

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Table 3 Resistance values at intermediate temperatures

T _{amb} (°C)	R _T /R ₂₅	ΔR DUE TO B-TOLERANCE (%)	TC (%/K)	R ₂₅ (kΩ)
				2322 640; see Table 4, note 1
				6.471
-40	21.926	2.50	5.75	10503
-35	16.522	2.26	5.57	7766
-30	12.558	2.03	5.40	5902
-25	9.6249	1.81	5.24	4524
-20	7.4362	1.59	5.08	3495
-15	5.7898	1.39	4.93	2721
-10	4.5416	1.19	4.78	2135
-5	3.5881	1.00	4.64	1686
0	2.8550	0.82	4.51	1342
5	2.2860	0.64	4.38	1074
10	1.8425	0.48	4.25	865.9
15	1.4941	0.31	4.13	702.2
20	1.2189	0.15	4.01	572.9
25	1.0000	0.00	3.90	470.0
30	0.8250	0.15	3.80	387.7
35	0.6841	0.29	3.69	321.5
40	0.5703	0.43	3.59	268.0
45	0.4777	0.56	3.50	224.5
50	0.4020	0.69	3.40	188.9
55	0.3398	0.82	3.31	159.7
60	0.2886	0.94	3.23	135.6
65	0.2461	1.06	3.15	115.6
70	0.2107	1.18	3.07	99.00
75	0.1811	1.29	2.99	85.11
80	0.1562	1.40	2.91	73.43
85	0.1353	1.50	2.84	63.59

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Table 4 Resistance values at intermediate temperatures

T _{amb} (°C)	R _T /R ₂₅	ΔR DUE TO B-TOLERANCE (%)	TC (%/K)	R ₂₅ (kΩ)		
				2322 640; note 1		
				6.102	6.152	6.202
-40	23.3402	1.65	6.06	23342	35013	46684
-35	17.3347	1.49	5.84	17336	26004	34672
-30	13.0166	1.34	5.62	13018	19526	26035
-25	9.8764	1.19	5.42	9877	14816	19754
-20	7.5682	1.05	5.23	7569	11353	15138
-15	5.8541	0.92	5.05	5855	8782	11709
-10	4.5688	0.79	4.87	4569	6854	9138
-5	3.5961	0.66	4.71	3596	5395	7193
0	2.8533	0.54	4.55	2854	4280	5707
5	2.2815	0.43	4.40	2282	3422	4563
10	1.8376	0.31	4.26	1838	2757	3675
15	1.4904	0.21	4.12	1491	2236	2981
20	1.2169	0.10	3.99	1217	1826	2434
25	1.000	0.00	3.87	1000	1500	2000
30	0.8266	0.10	3.75	826.7	1240	1653
35	0.6873	0.19	3.63	687.4	1031	1375
40	0.5746	0.28	3.53	574.6	861.9	1149
45	0.4827	0.37	3.42	482.7	724.1	965.0
50	0.4073	0.46	3.32	407.4	611.0	814.7
55	0.3452	0.54	3.23	345.2	517.8	690.5
60	0.2937	0.62	3.14	293.7	440.6	587.5
65	0.2508	0.70	3.05	250.8	376.2	501.7
70	0.2149	0.78	2.97	214.9	322.4	429.8
75	0.1847	0.85	2.89	184.8	277.1	369.5
80	0.1593	0.92	2.81	159.3	238.9	318.6