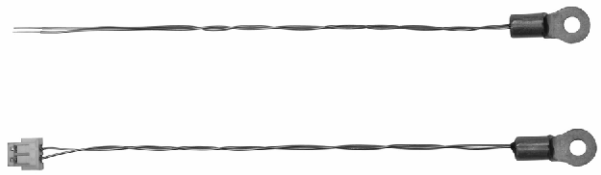
NTC Thermistors, Mini Lug Sensors



FEATURES

- Fast time response for surface applications compared to industry standard NTC lug sensors
- Reduced thermal gradient, due to the use of small dimensions and nickel conductor, allowing for an accurate surface temperature measurement
- The sensor is not suitable for being permanently in contact with water or liquids
- Small size connector and small lug ring tongue terminal, allowing for temperature sensing at locations where only limited space is available
- Connector ZHR-2 (optional)
- Compliant to RoHS directive 2002/95/EC

RoHS COMPLIANT

APPLICATIONS

Thermistors used for surface temperature sensing and control in:

- Computer equipment
- MOSFETS, IC's, Power Electronics, heatsink temperature control
- Consumer appliances
- Industrial equipment
- Automotive equipment

DESCRIPTION

Miniature insulated chip thermistor with a negative temperature coefficient in accordance with IEC 60539. The device has no marking.

MOUNTING

- The sensor can be mounted by means of a screw. For stud size, metric 2 mm M2/american stud #1 or #2
- The end wire can be soldered, welded or crimped to a connector
- Optional connector for Wire-to-Wire or Wire-to-Board connections

QUICK REFERENCE DATA

PARAMETER	VALUE
Resistance value at 25 °C	10 kΩ to 47 kΩ
Tolerance on R_{25} - value	± 2 % to ± 3 %
$B_{25/85}$ value	3740K to 3984K
Tolerance on $B_{25/85}$ - value	± 0.5 % to ± 1.5 %
Maximum dissipation at 25 °C	100 mW
Thermal time constant τ	≈ 5 s
Dissipation factor	10 mW/K
Operating temperature range at zero power	- 40 °C to 125 °C
Min. dielectric withstanding voltage between terminals and lug	1000 V_{AC}
R/T values	See table
Climatic category (IEC 60539)	40/125/56
Weight (without connector)	0.5 g
Weight (with connector)	0.6 g

Note

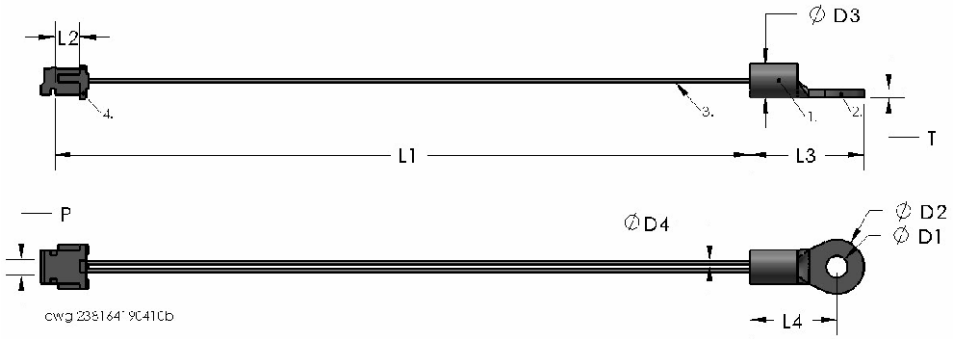
- Other R_{25} values and tolerances available upon request

ELECTRICAL DATA AND ORDERING INFORMATION

R_{25} - VALUE (kΩ)	R_{25} - TOL.	$B_{25/85}$ - VALUE (K)	$B_{25/85}$ - TOL.	SAP MATERIAL NO.	DESCRIPTION	R/T TABLE
10	± 3 %	3984	± 0.5 %	NTCALUG03A103H	NTC Mini Lug 10K 3 % 3984 K 0.5 %	Table 1
10	± 3 %	3984	± 0.5 %	NTCALUG03A103HC	NTC Mini Lug 10K 3 % 3984 K 0.5 % with connector	Table 1
10	± 2 %	3984	± 0.5 %	NTCALUG03A103G	NTC Mini Lug 10K 2 % 3984 K 0.5 %	Table 2
10	± 2 %	3984	± 0.5 %	NTCALUG03A103GC	NTC Mini Lug 10K 2 % 3984 K 0.5 % with connector	Table 2
12	± 3 %	3740	± 1.5 %	NTCALUG03A123H	NTC Mini Lug 12K 3 %	Table 3
12	± 3 %	3740	± 1.5 %	NTCALUG03A123HC	NTC Mini Lug 12K 3 % with connector	Table 3
47	± 3 %	3740	± 1.5 %	NTCALUG03A473H	NTC Mini Lug 47K 3 %	Table 4
47	± 3 %	3740	± 1.5 %	NTCALUG03A473HC	NTC Mini Lug 47 kΩ 3 % with connector	Table 4

Ordering information can be found on: www.vishay.com/doc?33036

DIMENSIONS in millimeters



L_1	L_2	L_3	L_4	$L_1 + L_3$ (item without connector)	Ø D_1	Ø D_2	Ø D_3	Ø D_4	T	Pitch P
70 ± 5	4 ± 1	11.5 ± 0.3	8.8 ± 0.3	81.5 ± 5	2.2 ± 0.3	5.5 ± 0.3	3.4 ± 0.3	0.35 ± 0.1	0.8 ± 0.1	1.5 ± 0.3

Notes

(1) Vishay Thermistor chip NTC, with epoxy coating and middle buffer layer

(2) Metal ring lug, tin plated

(3) Insulated leads: AWG#32, monostranded, diam 0.20 mm, silver plated Nickel, PEI insulation, diameter 0.35 mm

(4) End wire stripped or 2-poles connector crimped (optional)

MOUNTING

- With screw size metric M2, or American stud 1-2
- For the type without connector ('103'), the electrical connection can be made by soldering or crimping or welding.
- For the type with connector ('103C'), the connector can mate with following counter-connectors (5):

A) One of the PCB Board connector - Through Hole:
- JST B 2B-ZR (top entry)
- JST S 2B-ZR (side entry)
- JST B 2B-ZR-3.4 (top entry, for 1.6 mm board)
- JST S 2B-ZR-3.4 (side entry, for 1.6 mm board)

B) One of the PCB Board connector - SMT Surface Mount:
- JST S 2B-ZR-SM2-TF (SM2 side entry)
- JST B 2B-ZR-SM3-TF (SM3 top entry)
- JST S 2B-ZR-SM3A-TF (SM3 side entry)
- JST B 2B-ZR-SM4-TF (SM4 top entry)
- JST S 2B-ZR-SM4A-TF (SM4 side entry)

C) The Wire-to-wire connector:
- JST ZMR-02 housing (x 1) + JST SMM-033T-P0.5 terminals (x 2)

Note

(5) Additional details and dimensions can be found in JST ZH and JST ZM datasheets.

PACKAGING

Available in plastic bags of 250 pieces. SPQ = 2000 pieces

DESIGN-IN SUPPORT

- Other resistance curves and tolerances are available on request
- Consult Vishay for other lead length, other connector crimping or other features
- Other applicable screw size are available, for example stud size metric 3 mm/American 3 to 4
- 3D Solid models: www.vishay.com/doc?29106
- NTC curve computation: www.vishay.com/thermistors/curve-computation-list/

For complete curve computation, visit: www.vishay.com/thermistors/curve-computation-list/

TABLE 1

NTCALUG03A103H	NTC Mini Lug 10K 3 % 3984 K 0.5 %
NTCALUG03A103HC	NTC Mini Lug 10K 3 % 3984 K 0.5 % with connector

RESISTANCE TEMPERATURE CHARACTERISTICS

TEMP. (°C)	$R_{(T)}/R_{25}$	RESISTANCE (Ω)	$\Delta R/R$ (%)	α (%/K)	ΔT (K)	$R_{min.}$ (Ω)	$R_{max.}$ (Ω)
- 40	33.427	334 274	4.92	- 6.63	0.74	317 833	350 716
- 35	24.132	241 323	4.73	- 6.41	0.74	229 899	252 747
- 30	17.613	176 133	4.56	- 6.19	0.74	168 107	184 158
- 25	12.990	129 900	4.39	- 5.99	0.73	124 202	135 598
- 20	9.676	96 761	4.22	- 5.79	0.73	92 675	100 848
- 15	7.276	72 765	4.07	- 5.61	0.73	69 806	75 723
- 10	5.522	55 218	3.92	- 5.43	0.72	53 056	57 380
- 5	4.227	42 268	3.77	- 5.26	0.72	40 674	43 861
0	3.262	32 624	3.63	- 5.10	0.71	31 440	33 808
5	2.538	25 381	3.49	- 4.94	0.71	24 494	26 268
10	1.990	19 897	3.36	- 4.80	0.70	19 227	20 566
15	1.571	15 711	3.24	- 4.65	0.70	15 202	16 220
20	1.249	12 493	3.12	- 4.52	0.69	12 103	12 882
25	1.000	10 000	3.00	- 4.39	0.68	9700.0	10 300
30	0.806	8056.0	3.11	- 4.26	0.73	7805.1	8306.8
35	0.653	6529.7	3.22	- 4.14	0.78	6319.3	6740.2
40	0.532	5323.9	3.33	- 4.03	0.83	5146.6	5501.1
45	0.437	4365.3	3.43	- 3.92	0.88	4215.4	4515.1
50	0.360	3598.7	3.53	- 3.81	0.93	3471.6	3725.8
55	0.298	2982.3	3.63	- 3.71	0.98	2874.0	3090.5
60	0.248	2483.8	3.72	- 3.61	1.03	2391.3	2576.3
65	0.208	2078.7	3.81	- 3.51	1.09	1999.4	2157.9
70	0.175	1747.7	3.90	- 3.42	1.14	1679.5	1815.9
75	0.148	1475.9	3.99	- 3.34	1.20	1417.1	1534.8
80	0.125	1251.8	4.07	- 3.25	1.25	1200.8	1302.8
85	0.107	1066.1	4.15	- 3.17	1.31	1021.8	1110.4
90	0.091	911.59	4.23	- 3.09	1.37	873.01	950.16
95	0.078	782.46	4.31	- 3.02	1.43	748.75	816.17
100	0.067	674.11	4.38	- 2.94	1.49	644.56	703.66
105	0.058	582.84	4.46	- 2.87	1.55	556.87	608.82
110	0.051	505.68	4.53	- 2.81	1.61	482.79	528.57
115	0.044	440.19	4.60	- 2.74	1.68	419.96	460.42
120	0.038	384.41	4.66	- 2.68	1.74	366.49	402.34
125	0.034	336.75	4.73	- 2.62	1.81	320.83	352.67

For complete curve computation, visit: www.vishay.com/thermistors/curve-computation-list/

TABLE 2

NTCALUG03A103G	NTC Mini Lug 10K 2 % 3984 K 0.5 %
NTCALUG03A103GC	NTC Mini Lug 10K 2 % 3984 K 0.5 % with connector

RESISTANCE TEMPERATURE CHARACTERISTICS

TEMP. (°C)	$R_{(T)}/R_{25}$	RESISTANCE (Ω)	$\Delta R/R$ (%)	α (%/K)	ΔT (K)	$R_{min.}$ (Ω)	$R_{max.}$ (Ω)
- 40	33.427	334 274	3.90	- 6.63	0.59	321 238	347 311
- 35	24.132	241 323	3.72	- 6.41	0.58	232 353	250 293
- 30	17.613	176 133	3.54	- 6.19	0.57	169 895	182 370
- 25	12.990	129 900	3.37	- 5.99	0.56	125 518	134 282
- 20	9.676	96 761	3.21	- 5.79	0.55	93 654	99 869
- 15	7.276	72 765	3.06	- 5.61	0.54	70 541	74 988
- 10	5.522	55 218	2.91	- 5.43	0.54	53 613	56 823
- 5	4.227	42 268	2.76	- 5.26	0.53	41 100	43 435
0	3.262	32 624	2.62	- 5.10	0.51	31 768	33 480
5	2.538	25 381	2.49	- 4.94	0.50	24 749	26 013
10	1.990	19 897	2.36	- 4.80	0.49	19 427	20 367
15	1.571	15 711	2.24	- 4.65	0.48	15 360	16 063
20	1.249	12 493	2.12	- 4.52	0.47	12 228	12 757
25	1.000	10 000	2.00	- 4.39	0.46	9800.0	10 200
30	0.806	8056.0	2.11	- 4.26	0.50	7885.8	8226.1
35	0.653	6529.7	2.22	- 4.14	0.54	6384.7	6674.8
40	0.532	5323.9	2.33	- 4.03	0.58	5200.0	5447.7
45	0.437	4365.3	2.43	- 3.92	0.62	4259.3	4471.3
50	0.360	3598.7	2.53	- 3.81	0.66	3507.8	3689.7
55	0.298	2982.3	2.62	- 3.71	0.71	2904.0	3060.5
60	0.248	2483.8	2.72	- 3.61	0.75	2416.4	2551.3
65	0.208	2078.7	2.81	- 3.51	0.80	2020.3	2137.0
70	0.175	1747.7	2.89	- 3.42	0.85	1697.1	1798.2
75	0.148	1475.9	2.98	- 3.34	0.89	1432.0	1519.9
80	0.125	1251.8	3.06	- 3.25	0.94	1213.5	1290.1
85	0.107	1066.1	3.14	- 3.17	0.99	1032.6	1099.6
90	0.091	911.59	3.22	- 3.09	1.04	882.23	940.94
95	0.078	782.46	3.30	- 3.02	1.09	756.67	808.25
100	0.067	674.11	3.37	- 2.94	1.14	651.40	696.83
105	0.058	582.84	3.44	- 2.87	1.20	562.79	602.90
110	0.051	505.68	3.51	- 2.81	1.25	487.92	523.43
115	0.044	440.19	3.58	- 2.74	1.31	424.43	455.95
120	0.038	384.41	3.65	- 2.68	1.36	370.39	398.43
125	0.034	336.75	3.71	- 2.62	1.42	324.25	349.25

For complete curve computation, visit: www.vishay.com/thermistors/curve-computation-list/

TABLE 3

NTCALUG03A123H	NTC Mini Lug 12K 3 %
NTCALUG03A123HC	NTC Mini Lug 12K 3 % with connector

RESISTANCE TEMPERATURE CHARACTERISTICS

TEMP. (°C)	$R_{(T)}/R_{25}$	RESISTANCE (Ω)	$\Delta R/R$ (%)	α (%/K)	ΔT (K)	$R_{min.}$ (Ω)	$R_{max.}$ (Ω)
- 40	25.783	309 396	8.40	- 6.07	1.38	283 397	335 395
- 35	19.125	229 504	7.88	- 5.88	1.34	211 413	247 595
- 30	14.320	171 840	7.38	- 5.70	1.30	159 152	184 528
- 25	10.819	129 825	6.90	- 5.52	1.25	120 861	138 789
- 20	8.244	98 933	6.45	- 5.35	1.20	92 556	105 309
- 15	6.335	76 019	6.00	- 5.19	1.16	71 455	80 582
- 10	4.907	58 879	5.58	- 5.03	1.11	55 595	62 163
- 5	3.829	45 953	5.17	- 4.88	1.06	43 578	48 328
0	3.011	36 129	4.77	- 4.74	1.01	34 405	37 854
5	2.384	28 607	4.39	- 4.60	0.95	27 350	29 864
10	1.900	22 804	4.03	- 4.47	0.90	21 886	23 723
15	1.525	18 298	3.67	- 4.34	0.85	17 626	18 970
20	1.231	14 773	3.33	- 4.22	0.79	14 281	15 265
25	1.000	12 000	3.00	- 4.10	0.73	11 640	12 360
30	0.817	9803.7	3.32	- 3.99	0.83	9478.2	10 129
35	0.671	8053.9	3.63	- 3.88	0.94	7761.7	8346.2
40	0.554	6651.9	3.93	- 3.77	1.04	6390.6	6913.2
45	0.460	5522.3	4.22	- 3.67	1.15	5289.3	5755.2
50	0.384	4607.2	4.50	- 3.58	1.26	4399.9	4814.5
55	0.322	3862.1	4.77	- 3.48	1.37	3677.8	4046.4
60	0.271	3252.4	5.04	- 3.39	1.48	3088.6	3416.2
65	0.229	2751.1	5.29	- 3.30	1.60	2605.5	2896.7
70	0.195	2336.9	5.54	- 3.22	1.72	2207.4	2466.4
75	0.166	1993.3	5.78	- 3.14	1.84	1878.0	2108.6
80	0.142	1707.0	6.02	- 3.06	1.96	1604.2	1809.7
85	0.122	1467.3	6.25	- 2.99	2.09	1375.7	1559.0
90	0.105	1266.0	6.47	- 2.92	2.22	1184.1	1347.9
95	0.091	1096.2	6.69	- 2.85	2.35	1022.9	1169.4
100	0.079	952.38	6.90	- 2.78	2.48	886.71	1018.0
105	0.069	830.20	7.10	- 2.71	2.62	771.26	889.15
110	0.061	726.02	7.30	- 2.65	2.75	673.03	779.02
115	0.053	636.88	7.49	- 2.59	2.89	589.16	684.61
120	0.047	560.36	7.68	- 2.53	3.04	517.31	603.41
125	0.041	494.46	7.87	- 2.47	3.18	455.56	533.37

For complete curve computation, visit: www.vishay.com/thermistors/curve-computation-list/

TABLE 4

NTCALUG03A473H	NTC Mini Lug 47K 3 %
NTCALUG03A473HC	NTC Mini Lug 47K 3 % with connector

RESISTANCE TEMPERATURE CHARACTERISTICS

TEMP. (°C)	$R_{(T)}/R_{25}$	RESISTANCE (Ω)	$\Delta R/R$ (%)	α (%/K)	ΔT (K)	$R_{min.}$ (Ω)	$R_{max.}$ (Ω)
- 40	25.783	1 211 802	8.40	- 6.07	1.38	1 109 973	1 313 631
- 35	19.125	898 891	7.88	- 5.88	1.34	828 034	969 749
- 30	14.320	673 040	7.38	- 5.70	1.30	623 344	722 736
- 25	10.819	508 481	6.90	- 5.52	1.25	473 370	543 592
- 20	8.244	387 486	6.45	- 5.35	1.20	362 512	412 460
- 15	6.335	297 740	6.00	- 5.19	1.16	279 866	315 613
- 10	4.907	230 608	5.58	- 5.03	1.11	217 745	243 471
- 5	3.829	179 983	5.17	- 4.88	1.06	170 681	189 285
0	3.011	141 507	4.77	- 4.74	1.01	134 752	148 262
5	2.384	112 043	4.39	- 4.60	0.95	107 121	116 966
10	1.900	89 317	4.03	- 4.47	0.90	85 721	92 914
15	1.525	71 665	3.67	- 4.34	0.85	69 033	74 297
20	1.231	57 863	3.33	- 4.22	0.79	55 936	59 790
25	1.000	47 000	3.00	- 4.10	0.73	45 590	48 410
30	0.817	38 398	3.32	- 3.99	0.83	37 123	39 672
35	0.671	31 545	3.63	- 3.88	0.94	30 400	32 689
40	0.554	26 053	3.93	- 3.77	1.04	25 030	27 077
45	0.460	21 629	4.22	- 3.67	1.15	20 717	22 541
50	0.384	18 045	4.50	- 3.58	1.26	17 233	18 857
55	0.322	15 127	4.77	- 3.48	1.37	14 405	15 848
60	0.271	12 739	5.04	- 3.39	1.48	12 097	13 380
65	0.229	10 775	5.29	- 3.30	1.60	10 205	11 345
70	0.195	9153.0	5.54	- 3.22	1.72	8645.8	9660.2
75	0.166	7807.1	5.78	- 3.14	1.84	7355.6	8258.7
80	0.142	6685.6	6.02	- 3.06	1.96	6283.2	7087.9
85	0.122	5747.0	6.25	- 2.99	2.09	5388.0	6106.0
90	0.105	4958.4	6.47	- 2.92	2.22	4637.7	5279.2
95	0.091	4293.3	6.69	- 2.85	2.35	4006.3	4580.3
100	0.079	3730.1	6.90	- 2.78	2.48	3472.9	3987.3
105	0.069	3251.6	7.10	- 2.71	2.62	3020.8	3482.5
110	0.061	2843.6	7.30	- 2.65	2.75	2636.0	3051.2
115	0.053	2494.5	7.49	- 2.59	2.89	2307.5	2681.4
120	0.047	2194.7	7.68	- 2.53	3.04	2026.1	2363.4
125	0.041	1936.6	7.87	- 2.47	3.18	1784.3	2089.0

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