

## 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)
- UL recognized, file E148885 (UL category XGPU2)
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



RoHS  
COMPLIANT

QUICK REFERENCE DATA		
PARAMETER	VALUE	UNIT
Resistance value at 25 °C	10K to 47K	Ω
Tolerance on $R_{25}$ -value	± 2 to ± 3	%
$B_{25/85}$ -value	3740 to 3984	K
Tolerance on $B_{25/85}$ -value	± 0.5 to ± 1.5	%
Operating temperature range: At zero dissipation	- 40 to + 125	°C
Response time	3.5	s
Thermal time constant $\tau$	≈ 5	s
Dissipation factor $\delta$	10	mW/K
Maximum power dissipation at 25 °C	100	mW
Min. dielectric withstanding voltage between terminals and lug	1000	V <sub>AC</sub>
Climatic category (LCT/UCT/days)	40/125/56	-
Weight		
without connector	0.5	g
with connector	0.6	g

#### Note

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

### APPLICATIONS

Thermistors used for surface temperature sensing and control in:

- Computer equipment
- MOSFETS, IC's, Power Electronics, heatsink temperature control, LED emitter heat-sink 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

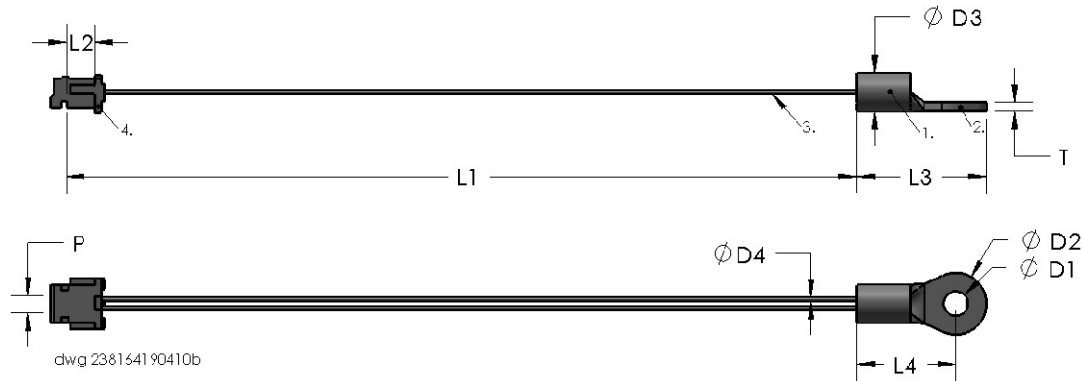
- The sensor can be mounted by means of a screw. For stud size, metric 2 mm M2/American stud #1 or #2
- The end wire can be soldered, welded or crimped to a connector
- Optional connector for Wire-to-Wire or Wire-to-Board connections

ELECTRICAL DATA AND ORDERING INFORMATION							
$R_{25}$ -VALUE (kΩ)	$R_{25}$ -TOL. (%)	$B_{25/85}$ -VALUE (K)	$B_{25/85}$ -TOL. (± %)	SAP MATERIAL NUMBER	DESCRIPTION	R/T TABLE	UL CERTIFICATION
10	± 2	3984	0.5	NTCALUG03A103G	NTC Mini Lug 10K 2 % 3984 K 0.5 %	Table 2	UL
10	± 2	3984	0.5	NTCALUG03A103GC	NTC Mini Lug 10K 2 % 3984 K 0.5 % with connector	Table 2	UL
10	± 3	3984	0.5	NTCALUG03A103H	NTC Mini Lug 10K 3 % 3984 K 0.5 %	Table 1	UL
10	± 3	3984	0.5	NTCALUG03A103HC	NTC Mini Lug 10K 3 % 3984 K 0.5 % with connector	Table 1	UL
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	-

#### Note

- Ordering information can be found on: [www.vishay.com/doc?33036](http://www.vishay.com/doc?33036)

## DIMENSIONS in millimeters



L <sub>1</sub>	L <sub>2</sub>	L <sub>3</sub>	L <sub>4</sub>	L <sub>1</sub> + L <sub>3</sub> (item without connector)	Ø D <sub>1</sub>	Ø D <sub>2</sub>	Ø D <sub>3</sub>	Ø D <sub>4</sub>	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, insulated, 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, the electrical connection can be made by soldering, crimping or welding.
- For the type with connector, the connector can mate with following counter-connectors <sup>(5)</sup>:
  - A. One of the PCB 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-003T-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](http://www.vishay.com/doc?29106)
- NTC curve computation: [www.vishay.com/resistors-non-linear/curve-computation-list/](http://www.vishay.com/resistors-non-linear/curve-computation-list/)
- For M3 screw size, use code number NTCALUG39



For complete Curve Computation, visit: [www.vishay.com/resistors-non-linear/curve-computation-list/](http://www.vishay.com/resistors-non-linear/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

<b>RESISTANCE TEMPERATURE CHARACTERISTICS</b>							
TEMP. (°C)	$R(T)/R_{25}$	RESISTANCE (Ω)	$\Delta R/R$ (%)	$\alpha$ (%/K)	$\Delta T$ (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/resistors-non-linear/curve-computation-list/](http://www.vishay.com/resistors-non-linear/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

<b>RESISTANCE TEMPERATURE CHARACTERISTICS</b>							
TEMP. (°C)	$R(T)/R_{25}$	RESISTANCE (Ω)	$\Delta R/R$ (%)	$\alpha$ (%/K)	$\Delta T$ (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/resistors-non-linear/curve-computation-list/](http://www.vishay.com/resistors-non-linear/curve-computation-list/)

**TABLE 3**

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

<b>RESISTANCE TEMPERATURE CHARACTERISTICS</b>							
TEMP. (°C)	$R_{(T)}/R_{25}$	RESISTANCE (Ω)	$\Delta R/R$ (%)	$\alpha$ (%/K)	$\Delta T$ (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/resistors-non-linear/curve-computation-list/](http://www.vishay.com/resistors-non-linear/curve-computation-list/)

**TABLE 4**

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

<b>RESISTANCE TEMPERATURE CHARACTERISTICS</b>							
TEMP. (°C)	$R_{(T)}/R_{25}$	RESISTANCE (Ω)	$\Delta R/R$ (%)	$\alpha$ (%/K)	$\Delta T$ (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



## **Disclaimer**

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "Vishay"), disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product.

Vishay makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Vishay disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Vishay's knowledge of typical requirements that are often placed on Vishay products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and / or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer's technical experts. Product specifications do not expand or otherwise modify Vishay's terms and conditions of purchase, including but not limited to the warranty expressed therein.

Except as expressly indicated in writing, Vishay products are not designed for use in medical, life-saving, or life-sustaining applications or for any other application in which the failure of the Vishay product could result in personal injury or death. Customers using or selling Vishay products not expressly indicated for use in such applications do so at their own risk. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay. Product names and markings noted herein may be trademarks of their respective owners.