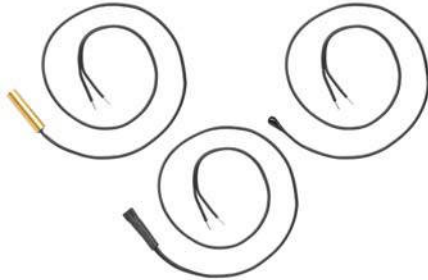


NTC Thermistors, Special Long Lead Sensors



FEATURES

- Accurate over wide temperature range
- High stability
- Excellent price / performance ratio
- High adhesive strength between PVC wire and the encapsulating laquer
- Material categorization:
for definitions of compliance please see www.vishay.com/doc?99912


RoHS
COMPLIANT

QUICK REFERENCE DATA		
PARAMETER	VALUE	UNIT
Resistance value at 25 °C (R_{25})	2.2K to 100K	Ω
Tolerance on R_{25} -value ⁽²⁾	± 3	%
$B_{25/85}$ -value	3977 to 4190	K
Tolerance on $B_{25/85}$ -value	± 0.75 to ± 1.5	%
Operating temperature range at zero dissipation	-40 to +85	°C
Maximum power dissipation at 55 °C	250	mW
Min. dielectric withstanding voltage between terminals and sensor body	1500	V_{AC}
Dissipation factor:		
NTCLE400...	6.0	mW/K
NTCLS100...	8.0	
NTCLP100...	6.0	
Response time ⁽¹⁾ :		
NTCLE400...	≈ 7	s
NTCLS100...	≈ 15	
NTCLP100...	≈ 10	
Weight		
NTCLE400...	≈ 4	g
NTCLS100...	≈ 6	
NTCLP100...	≈ 6	

Notes

- ⁽¹⁾ Response time in silicone oil MS 200/50. This is the time needed for the sensor to reach 63.2 % of the total temperature difference when subjected to a temperature change from 25 °C in air to 85 °C in oil
- ⁽²⁾ Tighter tolerances on R_{25} are available upon request

APPLICATIONS

Temperature measurement, sensing and control in remote locations and for various environmental conditions.

DESCRIPTION

These sensors exist of a small NTC chip reflow soldered between two AWG #24 UL-2468 wires. They are lacquered and insulated with black epoxy (NTCLE400 type), sleeved (NTCLS100 type) or potted into a brass pipe (NTCLP100 type).

MARKING

UL mark on wire, no mark on body.

PACKAGING

The thermistors are packed in cardboard boxes; each box containing 500 pieces.

DESIGN-IN SUPPORT

Other wire length and wire type (UL-2651 PVC 105 °C) are available on request. The products can be provided with a connector on request.

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

MOUNTING

By soldering or clamping the wire ends, in any position. Body can be inserted or taped attached. Not intended for fluid immersed applications.

ELECTRICAL DATA AND ORDERING INFORMATION						
R_{25} (Ω)	R_{25} -TOL. (\pm %)	$B_{25/85}$ (K)	$B_{25/85}$ -TOL. (\pm %)	SAP MATERIAL AND ORDERING NUMBER ⁽¹⁾⁽²⁾		
				EPOXY TYPE	SLEEVED TYPE	PIPE TYPE
2200	3	3977	0.75	NTCLE400E3222H	NTCLS100E3222H	NTCLP100E3222H
4700	3	3977	0.75	NTCLE400E3472H	NTCLS100E3472H	NTCLP100E3472H
5000	3	3977	0.75	NTCLE400E3502H	NTCLS100E3502H	NTCLP100E3502H
10 000	3	3977	0.75	NTCLE400E3103H	NTCLS100E3103H	NTCLP100E3103H
47 000	3	4090	1.5	NTCLE400E3473H	NTCLS100E3473H	NTCLP100E3473H
100 000	3	4190	1.5	NTCLE400E3104H	NTCLS100E3104H	NTCLP100E3104H

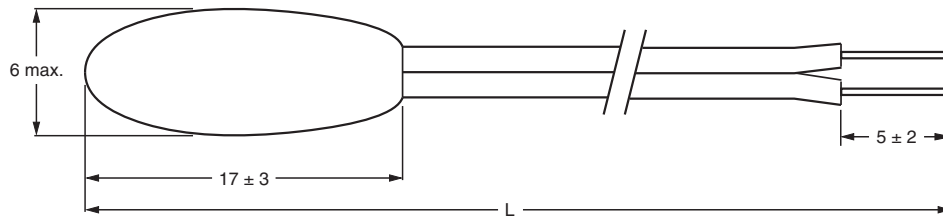
Notes

- ⁽¹⁾ Other values and tolerances based on the NTCC100E4 series are available on request. (www.vishay.com/doc?29058)
- ⁽²⁾ The specified catalog numbers refer to products with L = 400 mm, without connector and adopt UL-2468.AWG24 wire



DIMENSIONS in millimeters

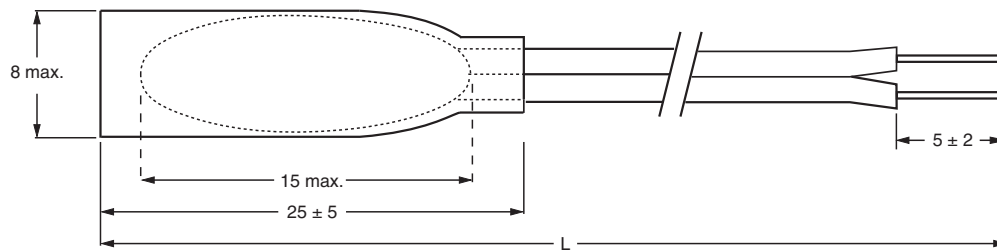
Epoxy-coated type NTCLE400E....



$L = 400 \text{ mm} + 15/- 0$

Other wire lengths or connector attached available on request.

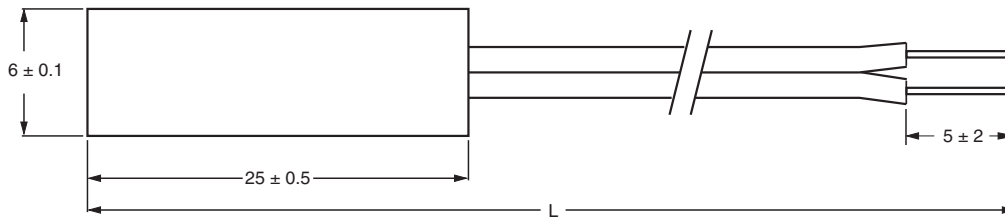
Sleeved type NTCLS100E....



$L = 400 \text{ mm} + 15/- 0$

Other wire lengths or connector attached available on request.

Brass-pipe type NTCLP100E....

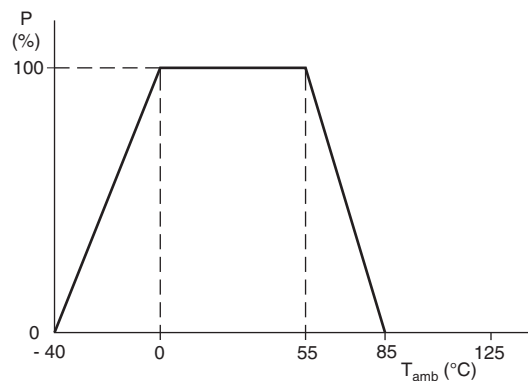


$L = 400 \text{ mm} + 15/- 0$

Other wire lengths or connector attached available on request.

DERATING

Power derating curve.



Note

- Zero power is considered as measuring power max. 1 % of max. power



RESISTANCE VALUES AT INTERMEDIATE TEMPERATURES WITH R_{25} AT 2.2 k Ω , 4.7 k Ω , 5.0 k Ω , AND 10 k Ω							
T_{OPER} (°C)	PART NR. NTCL**00E3222H	PART NR. NTCL**00E3472H	PART NR. NTCL**00E3502H	PART NR. NTCL**00E3103H	R -TOL. (± %)	α (%/K)	T-TOL. (± °C)
	R_T (Ω)	R_T (Ω)	R_T (Ω)	R_T (Ω)			
-40	73 061	156 084	166 047	332 094	5.87	-6.62	0.89
-35	52 778	112 753	119 950	239 900	5.60	-6.39	0.88
-30	38 544	82 344	87 600	175 200	5.33	-6.18	0.86
-25	28 443	60 765	64 643	129 287	5.08	-5.98	0.85
-20	21 199	45 288	48 179	96 358	4.83	-5.78	0.84
-15	15 950	34 075	36 250	72 500	4.60	-5.60	0.82
-10	12 110	25 872	27 523	55 046	4.37	-5.42	0.81
-5	9275	19 814	21 078	42 157	4.15	-5.25	0.79
0	7162	15 300	16 277	32 554	3.94	-5.09	0.77
5	5574	11 909	12 669	25 339	3.74	-4.93	0.76
10	4372	9340	9936	19 872	3.55	-4.79	0.74
15	3454	7378	7849	15 698	3.36	-4.64	0.72
20	2747	5869	6244	12 488	3.18	-4.51	0.70
25	2200	4700	5000	10 000	3.00	-4.38	0.69
30	1773	3788	4030	8059	3.17	-4.25	0.75
35	1438	3071	3267	6535	3.33	-4.13	0.81
40	1173	2505	2665	5330	3.49	-4.02	0.87
45	961.8	2055	2186	4372	3.65	-3.91	0.93
50	793.2	1694	1803	3605	3.80	-3.80	1.00
55	657.5	1405	1494	2989	3.94	-3.70	1.07
60	547.8	1170	1245	2490	4.08	-3.60	1.13
65	458.6	979.7	1042	2084	4.22	-3.51	1.20
70	385.7	823.9	876.5	1753	4.35	-3.42	1.27
75	325.8	696.0	740.5	1481	4.48	-3.33	1.35
80	276.4	590.5	628.2	1256	4.60	-3.25	1.42
85	235.5	503.0	585.2	1070	4.73	-3.17	1.49



RESISTANCE VALUES AT INTERMEDIATE TEMPERATURES WITH R_{25} AT 47 kΩ				
T_{OPER} (°C)	PART NR. NTCL**00E3473H	R -TOL. (± %)	α (%/K)	T-TOL. (± °C)
	R_T (Ω)			
-40	1 589 068	8.91	-6.54	1.36
-35	1 151 627	8.34	-6.34	1.32
-30	842 790	7.79	-6.15	1.27
-25	622 597	7.27	-5.96	1.22
-20	464 110	6.77	-5.79	1.17
-15	348 989	6.28	-5.62	1.12
-10	264 628	5.82	-5.45	1.07
-5	202 280	5.37	-5.30	1.01
0	155 823	4.94	-5.14	0.96
5	120 932	4.52	-5.00	0.91
10	94 528	4.12	-4.86	0.85
15	74 399	3.74	-4.72	0.79
20	58 945	3.36	-4.59	0.73
25	47 000	3.00	-4.47	0.67
30	37 706	3.35	-4.35	0.77
35	30 429	3.69	-4.23	0.87
40	24 696	4.02	-4.12	0.97
45	20 154	4.33	-4.01	1.08
50	16 534	4.64	-3.91	1.19
55	13 633	4.94	-3.81	1.30
60	11 296	5.23	-3.71	1.41
65	9404	5.51	-3.62	1.52
70	7865	5.78	-3.53	1.64
75	6607	6.04	-3.44	1.75
80	5573	6.30	-3.36	1.87
85	4721	6.55	-3.28	2.00



RESISTANCE VALUES AT INTERMEDIATE TEMPERATURES WITH R_{25} AT 100 k Ω				
T_{OPER} (°C)	PART NR. NTCL**00E3104H	$R-TOL.$ (± %)	α (%/K)	T-TOL. (± °C)
	R_T (Ω)			
-40	3 666 299	9.05	-6.69	1.35
-35	2 637 588	8.47	-6.49	1.31
-30	1 916 576	7.91	-6.29	1.26
-25	1 406 111	7.37	-6.10	1.21
-20	1 041 184	6.86	-5.92	1.16
-15	777 846	6.36	-5.75	1.11
-10	586 097	5.89	-5.58	1.06
-5	445 257	5.43	-5.42	1.00
0	340 942	4.99	-5.26	0.95
5	263 054	4.56	-5.11	0.89
10	204 446	4.15	-4.97	0.84
15	160 014	3.75	-4.83	0.78
20	126 087	3.37	-4.70	0.72
25	100 000	3.00	-4.57	0.66
30	79 808	3.36	-4.45	0.75
35	64 077	3.70	-4.33	0.86
40	51 745	4.04	-4.22	0.96
45	42 021	4.36	-4.11	1.06
50	34 308	4.68	-4.00	1.17
55	28 156	4.98	-3.90	1.28
60	23 222	5.28	-3.80	1.39
65	19 246	5.57	-3.71	1.50
70	16 025	5.85	-3.62	1.62
75	13 402	6.12	-3.53	1.73
80	11 258	6.38	-3.45	1.85
85	9496	6.64	-3.36	1.97

TESTS AND REQUIREMENTS

STABILITY TESTS			
IEC	TEST	PROCEDURE	DRIFT REQUIREMENT
60068-2-2	Endurance dry heat	85 °C; 1000 h	$\Delta R/R < 5 \%$
60068-2-1	Endurance cold	-40 °C; 1000 h	$\Delta R/R < 5 \%$
60539	Endurance max. dissipation	250 mW; 55 °C; 1000 h	$\Delta R/R < 5 \%$
60068-2-3	Damp heat, steady state	56 days at 40 °C; 90 % to 95 % RH	$\Delta R/R < 7 \%$
60068-20-14	-40 °C to +85 °C; 50 cycles	Rapid change of temperature	$\Delta R/R < 5 \%$



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.