NTC Thermistors, 2-Point Radial Leaded, Automotive Grade

LINKS TO ADDITIONAL RESOURCES

Design Tools | SPICE Models | Related Documents | 3D Models

QUICK REFERENCE DATA		
PARAMETER	VALUE	UNIT
Resistance value at 25 °C	2.06K to 30K	Ω
Tolerance on R_{25}-value	± 1.93 to ± 2.20	%
$B_{25/85}$-value	3528 to 4090	K
Tolerance on $B_{25/85}$-value	± 0.5 to ± 0.75	%
Operating temperature range	-55 to +150	°C
Temperature accuracy between 25 °C and 85 °C	± 0.5	°C
Maximum dissipation	100	mW
Response time (in stirred air)	7	s
Min. dielectric withstanding voltage between terminals and body	500	V_{RMS}
Weight	0.1	g

AGENCY APPROVALS

- cUL certificate
- ULus certificate

Note
- Agency approval documents, please see: www.vishay.com/ppg?29118&documents

FEATURES

- High accuracy over a wide temperature range
- High stability over a long life
- Exceptional thermal shock withstanding performance
- AEC-Q200 qualified
- Mounting: radial
- Fulfills the ELV 2000/53/EC
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

RoHS COMPLIANT

APPLICATIONS

- Temperature measurement, sensing and control, temperature compensation in Automotive and Industrial applications
- Applications as EGR, ECT, IAT, and TMAP sensors

DESCRIPTION

These thermistors consist of a NTC ceramic chip with two solid tin plated nickel leads. The thermistor body is coated with a blue insulating lacquer.

PACKAGING

The thermistors are packed in bulk (quantity = 500 pieces). Tape and reel available on request.

DESIGN-IN SUPPORT

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

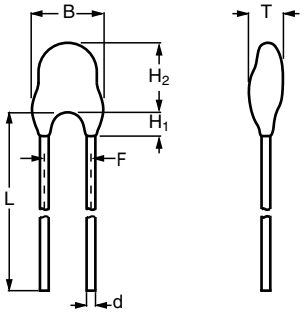
MOUNTING

Important mounting and handling instructions: see www.vishay.com/doc?29222

By soldering or welding in any position. The thermistors are fully suitable to be potted in epoxy or silicon resins.

ELECTRICAL DATA AND ORDERING INFORMATION					
R_{25} (Ω)	R_{25}-TOL. (± %)	$B_{25/85}$ (K)	$B_{25/85}$-TOL. (± %)	UL RECOGNIZED (Y / N)	SAP MATERIAL AND ORDERING NUMBER
2060	1.93	3528	0.50	N	NTCLE203E3202SB0
2252	2.20	3984	0.50	N	NTCLE203E3222SB0
2780	2.20	4090	0.75	N	NTCLE203E3272SB0
3000	2.20	3984	0.50	N	NTCLE203E3302SB0
5000	2.20	3984	0.50	N	NTCLE203E3502SB0
10 000	2.20	3984	0.50	Y	NTCLE203E3103SB0
30 000	2.20	3935	0.75	N	NTCLE203E3303SB0

DIMENSIONS in millimeters



B max.	4.2
T max.	4.0
H_1	2.0 ± 1.0
H_2 max.	6.0
L	41 ± 1
d	0.5 ± 0.05
F	2.54

RESISTANCE VALUES AT INTERMEDIATE TEMPERATURES WITH R_{25} AT 2060 Ω

PART NUMBER: NTCLE203E3202SB0

TEMP. (°C)	RESISTANCE (Ω)	R_T/R_{25}	R-TOL. (± %)	α (%/K)	T-TOL. (± °C)	$R_{MIN.}$ (Ω)	$R_{MAX.}$ (Ω)
-55.0	126 160	61.243	4.14	-6.82	0.61	120 931	131 389
-50.0	90 317	43.843	3.96	-6.55	0.60	86 740	93 893
-45.0	65 498	31.795	3.78	-6.30	0.60	63 020	67 976
-40.0	48 085	23.342	3.61	-6.06	0.60	46 347	49 823
-35.0	35 712	17.336	3.45	-5.84	0.59	34 479	36 945
-30.0	26 816	13.018	3.30	-5.62	0.59	25 932	27 700
-25.0	20 347	9.8772	3.15	-5.42	0.58	19 706	20 988
-20.0	15 592	7.5688	3.01	-5.23	0.57	15 123	16 060
-15.0	12 060	5.8546	2.87	-5.05	0.57	11 715	12 406
-10.0	9412.5	4.5692	2.74	-4.87	0.56	9155.1	9670.0
-5.0	7408.5	3.5963	2.61	-4.71	0.55	7215.3	7601.7
0.0	5878.3	2.8536	2.49	-4.55	0.55	5732.2	6024.4
5.0	4700.2	2.2816	2.37	-4.40	0.54	4588.9	4811.4
10.0	3785.7	1.8377	2.25	-4.26	0.53	3700.4	3871.0
15.0	3070.5	1.4905	2.14	-4.12	0.52	3004.7	3136.3
20.0	2507.0	1.2170	2.04	-3.99	0.51	2456.0	2558.1
25.0	2060.0	1.0000	1.93	-3.87	0.50	2020.2	2099.8
30.0	1702.9	0.82666	1.87	-3.75	0.50	1671.0	1734.8
35.0	1416.0	0.68736	1.82	-3.64	0.50	1390.2	1441.7
40.0	1183.7	0.57461	1.77	-3.53	0.50	1162.8	1204.6
45.0	994.40	0.48272	1.72	-3.44	0.50	977.30	1011.5
50.0	839.19	0.40737	1.68	-3.35	0.50	825.13	853.25
55.0	711.20	0.34524	1.63	-3.27	0.50	699.57	722.83
60.0	605.10	0.29374	1.60	-3.19	0.50	595.44	614.76
65.0	516.72	0.25083	1.56	-3.12	0.50	508.65	524.78
70.0	442.75	0.21493	1.53	-3.06	0.50	435.99	449.52
75.0	380.60	0.18476	1.50	-2.99	0.50	374.90	386.30
80.0	328.16	0.15930	1.47	-2.94	0.50	323.34	332.98
85.0	283.76	0.13775	1.44	-2.88	0.50	279.67	287.84
90.0	246.02	0.11943	1.44	-2.83	0.51	242.49	249.55
95.0	213.85	0.10381	1.50	-2.78	0.54	210.64	217.07
100.0	186.34	0.090458	1.57	-2.73	0.57	183.42	189.26
105.0	162.75	0.079005	1.63	-2.68	0.61	160.10	165.40
110.0	142.46	0.069155	1.69	-2.64	0.64	140.05	144.87
115.0	124.96	0.060662	1.75	-2.60	0.67	122.77	127.15
120.0	109.84	0.053321	1.81	-2.56	0.71	107.85	111.83
125.0	96.737	0.046960	1.87	-2.52	0.74	94.930	98.545
130.0	85.358	0.041436	1.92	-2.48	0.77	83.715	87.000
135.0	75.454	0.036628	1.98	-2.45	0.81	73.961	76.947
140.0	66.817	0.032436	2.03	-2.41	0.84	65.460	68.175
145.0	59.269	0.028772	2.08	-2.38	0.88	58.035	60.504
150.0	52.661	0.025564	2.13	-2.35	0.91	51.537	53.785

RESISTANCE VALUES AT INTERMEDIATE TEMPERATURES WITH R_{25} AT 2252 Ω, 3 kΩ, 5 kΩ AND 10 kΩ								
TEMP. (°C)	PART NUMBER NTCLE203E3222SB0	PART NUMBER NTCLE203E3302SB	PART NUMBER NTCLE203E3502SB0	PART NUMBER NTCLE203E3103SB0	R_T/R_{25}	*R*-TOL. (± %)	α (%/K)	T-TOL. (± °C)
	RESISTANCE (Ω)	RESISTANCE (Ω)	RESISTANCE (Ω)	RESISTANCE (Ω)				
-55.0	214 790	286 132	476 887	953 774	95.377	4.70	-7.37	0.64
-50.0	149 571	199 251	332 085	664 169	66.417	4.49	-7.11	0.63
-45.0	105 475	140 509	234 182	468 363	46.836	4.29	-6.86	0.62
-40.0	75 279	100 282	167 137	334 274	33.427	4.10	-6.63	0.62
-35.0	54 346	72 397	120 661	241 323	24.132	3.91	-6.41	0.61
-30.0	39 665	52 840	88 066	176 133	17.613	3.74	-6.19	0.60
-25.0	29 253	38 970	64 950	129 900	12.9900	3.57	-5.99	0.60
-20.0	21 791	29 028	48 381	96 761	9.6761	3.41	-5.79	0.59
-15.0	16 387	21 829	36 382	72 765	7.2765	3.25	-5.61	0.58
-10.0	12 435	16 565	27 609	55 218	5.5218	3.10	-5.43	0.57
-5.0	9518.7	12 680	21 134	42 268	4.2268	2.96	-5.26	0.56
0.0	7347.0	9787.3	16 312	32 624	3.2624	2.82	-5.10	0.55
5.0	5715.9	7614.4	12 691	25 381	2.5381	2.68	-4.94	0.54
10.0	4480.8	5969.1	9948.4	19 897	1.9897	2.55	-4.80	0.53
15.0	3538.2	4713.4	7855.6	15 711	1.5711	2.43	-4.65	0.52
20.0	2813.4	3747.8	6246.4	12 493	1.2493	2.31	-4.52	0.51
25.0	2252.0	3000.0	5000.0	10 000	1.0000	2.19	-4.39	0.50
30.0	1814.2	2416.8	4028.0	8056.0	0.80560	2.13	-4.26	0.50
35.0	1470.5	1958.9	3264.9	6529.7	0.65297	2.07	-4.14	0.50
40.0	1198.9	1597.2	2661.9	5323.9	0.53239	2.01	-4.03	0.50
45.0	983.06	1309.6	2182.6	4365.3	0.43653	1.96	-3.92	0.50
50.0	810.43	1079.6	1799.4	3598.7	0.35987	1.90	-3.81	0.50
55.0	671.61	894.68	1491.1	2982.3	0.29823	1.85	-3.71	0.50
60.0	559.36	745.14	1241.9	2483.8	0.24838	1.80	-3.61	0.50
65.0	468.11	623.60	1039.3	2078.7	0.20787	1.76	-3.51	0.50
70.0	393.57	524.30	873.83	1747.7	0.17477	1.71	-3.42	0.50
75.0	332.38	442.78	737.96	1475.9	0.14759	1.67	-3.34	0.50
80.0	281.91	375.54	625.90	1251.8	0.12518	1.63	-3.25	0.50
85.0	240.09	319.83	533.05	1066.1	0.10661	1.59	-3.17	0.50
90.0	205.29	273.48	455.79	911.59	0.091159	1.66	-3.09	0.54
95.0	176.21	234.74	391.23	782.46	0.078246	1.74	-3.02	0.58
100.0	151.81	202.23	337.06	674.11	0.067411	1.81	-2.94	0.62
105.0	131.26	174.85	291.42	582.84	0.058284	1.88	-2.87	0.66
110.0	113.88	151.70	252.84	505.68	0.050568	1.95	-2.81	0.70
115.0	99.130	132.06	220.09	440.19	0.044019	2.02	-2.74	0.74
120.0	86.569	115.32	192.21	384.41	0.038441	2.09	-2.68	0.78
125.0	75.836	101.02	168.37	336.748	0.033675	2.15	-2.62	0.82
130.0	66.632	88.764	147.94	295.881	0.029588	2.22	-2.56	0.87
135.0	58.716	78.219	130.36	260.729	0.026073	2.28	-2.50	0.91
140.0	51.886	69.120	115.20	230.400	0.023040	2.34	-2.45	0.96
145.0	45.975	61.246	102.08	204.152	0.020415	2.40	-2.39	1.00
150.0	40.845	54.411	90.685	181.370	0.018137	2.45	-2.34	1.05

RESISTANCE VALUES AT INTERMEDIATE TEMPERATURES WITH R_{25} AT 2780 Ω

PART NUMBER: NTCLE203E3272SB0

TEMP. (°C)	RESISTANCE (Ω)	R_T/R_{25}	R-TOL. (± %)	α (%/K)	T-TOL. (± °C)	$R_{MIN.}$ (Ω)	$R_{MAX.}$ (Ω)
-55.0	303 640	109.22	6.11	-7.57	0.81	285 073	322 207
-50.0	209 337	75.301	5.79	-7.31	0.79	197 211	221 464
-45.0	146 159	52.575	5.48	-7.06	0.78	138 143	154 176
-40.0	103 294	37.156	5.19	-6.82	0.76	97 933	108 654
-35.0	73 853	26.566	4.91	-6.60	0.74	70 228	77 477
-30.0	53 394	19.206	4.64	-6.38	0.73	50 918	55 870
-25.0	39 017	14.035	4.38	-6.17	0.71	37 309	40 724
-20.0	28 803	10.361	4.13	-5.97	0.69	27 614	29 992
-15.0	21 472	7.7237	3.89	-5.78	0.67	20 637	22 306
-10.0	16 157	5.8119	3.66	-5.60	0.65	15 566	16 748
-5.0	12 267	4.4127	3.43	-5.42	0.63	11 846	12 688
0.0	9394.1	3.3792	3.22	-5.25	0.61	9091.6	9696.6
5.0	7253.3	2.6091	3.01	-5.09	0.59	7034.7	7471.8
10.0	5644.6	2.0304	2.81	-4.94	0.57	5485.7	5803.4
15.0	4425.9	1.5921	2.62	-4.79	0.55	4309.9	4542.0
20.0	3495.6	1.2574	2.44	-4.65	0.52	3410.4	3580.7
25.0	2780.0	1.0000	2.26	-4.51	0.50	2717.3	2842.7
30.0	2225.7	0.80060	2.19	-4.38	0.50	2176.9	2274.4
35.0	1793.3	0.64506	2.13	-4.26	0.50	1755.1	1831.5
40.0	1453.8	0.52294	2.07	-4.14	0.50	1423.7	1483.8
45.0	1185.5	0.42644	2.01	-4.02	0.50	1161.6	1209.3
50.0	972.20	0.34971	1.96	-3.91	0.50	953.19	991.22
55.0	801.63	0.28836	1.90	-3.81	0.50	786.38	816.88
60.0	664.44	0.23901	1.85	-3.70	0.50	652.14	676.74
65.0	553.50	0.19910	1.80	-3.60	0.50	543.53	563.48
70.0	463.32	0.16666	1.75	-3.51	0.50	455.19	471.45
75.0	389.64	0.14016	1.71	-3.42	0.50	382.98	396.30
80.0	329.14	0.11840	1.67	-3.33	0.50	323.66	334.62
85.0	279.24	0.10045	1.62	-3.25	0.50	274.71	283.77
90.0	237.89	0.08557	1.74	-3.16	0.55	233.74	242.04
95.0	203.48	0.07319	1.86	-3.09	0.60	199.69	207.26
100.0	174.71	0.062846	1.97	-3.01	0.66	171.27	178.16
105.0	150.58	0.054164	2.08	-2.94	0.71	147.44	153.71
110.0	130.24	0.046849	2.19	-2.87	0.76	127.39	133.09
115.0	113.04	0.040662	2.30	-2.80	0.82	110.45	115.64
120.0	98.44	0.035411	2.40	-2.73	0.88	96.082	100.80
125.0	86.007	0.030938	2.50	-2.67	0.94	83.859	88.155
130.0	75.377	0.027114	2.59	-2.61	0.99	73.421	77.333
135.0	66.261	0.023835	2.69	-2.55	1.06	64.479	68.043
140.0	58.418	0.021014	2.78	-2.49	1.12	56.792	60.043
145.0	51.648	0.018578	2.87	-2.44	1.18	50.165	53.132
150.0	45.788	0.016471	2.96	-2.38	1.24	44.433	47.144

RESISTANCE VALUES AT INTERMEDIATE TEMPERATURES WITH R_{25} AT 30 kΩ

PART NUMBER: NTCLE203E3303SB0

TEMP. (°C)	RESISTANCE (Ω)	R_T/R_{25}	R-TOL. (± %)	α (%/K)	T-TOL. (± °C)	$R_{MIN.}$ (Ω)	$R_{MAX.}$ (Ω)
-55.0	2 557 277	85.243	5.87	-7.10	0.83	2 407 214	2 707 340
-50.0	1 803 830	60.128	5.56	-6.87	0.81	1 703 566	1 904 094
-45.0	1 286 911	42.897	5.26	-6.64	0.79	1 219 190	1 354 632
-40.0	928 204	30.940	4.98	-6.43	0.77	881 990	974 418
-35.0	676 539	22.551	4.71	-6.22	0.76	644 692	708 387
-30.0	498 097	16.603	4.45	-6.03	0.74	475 947	520 248
-25.0	370 280	12.343	4.20	-5.84	0.72	354 739	385 821
-20.0	277 825	9.2608	3.96	-5.66	0.70	266 831	288 819
-15.0	210 316	7.0105	3.73	-5.48	0.68	202 478	218 154
-10.0	160 574	5.3525	3.50	-5.31	0.66	154 947	166 202
-5.0	123 604	4.1201	3.29	-5.15	0.64	119 536	127 672
0.0	95 895	3.1965	3.09	-5.00	0.62	92 937	98 854
5.0	74 960	2.4987	2.89	-4.85	0.59	72 797	77 124
10.0	59 021	1.9674	2.70	-4.71	0.57	57 430	60 612
15.0	46 794	1.5598	2.51	-4.58	0.55	45 619	47 969
20.0	37 348	1.2449	2.33	-4.44	0.52	36 477	38 219
25.0	30 000	1.0000	2.16	-4.32	0.50	29 352	30 648
30.0	24 246	0.80821	2.10	-4.20	0.50	23 737	24 755
35.0	19 712	0.65707	2.04	-4.08	0.50	19 310	20 114
40.0	16 117	0.53723	1.99	-3.97	0.50	15 797	16 437
45.0	13 250	0.44165	1.93	-3.86	0.50	12 994	13 506
50.0	10 950	0.36499	1.88	-3.76	0.50	10 744	11 156
55.0	9094.9	0.30316	1.83	-3.66	0.50	8928.3	9261.5
60.0	7591.1	0.25304	1.78	-3.57	0.50	7455.7	7726.5
65.0	6365.6	0.21219	1.74	-3.48	0.50	6255.0	6476.3
70.0	5362.2	0.17874	1.69	-3.39	0.50	5271.3	5453.0
75.0	4536.5	0.15122	1.65	-3.30	0.50	4461.6	4611.4
80.0	3854.1	0.12847	1.61	-3.22	0.50	3792.1	3916.2
85.0	3287.6	0.10959	1.57	-3.14	0.50	3236.0	3339.2
90.0	2815.3	0.09384	1.69	-3.06	0.55	2767.9	2862.8
95.0	2419.9	0.08066	1.80	-2.99	0.60	2376.4	2463.4
100.0	2087.7	0.069588	1.91	-2.92	0.65	2047.8	2127.5
105.0	1807.3	0.060244	2.01	-2.85	0.71	1770.9	1843.7
110.0	1569.9	0.052330	2.12	-2.78	0.76	1536.7	1603.1
115.0	1368.2	0.045605	2.22	-2.72	0.82	1337.8	1398.5
120.0	1196.1	0.039870	2.32	-2.66	0.87	1168.4	1223.8
125.0	1048.9	0.034963	2.41	-2.60	0.93	1023.6	1074.2
130.0	922.52	0.030751	2.50	-2.54	0.99	899.42	945.62
135.0	813.69	0.027123	2.60	-2.48	1.05	792.57	834.81
140.0	719.69	0.023990	2.68	-2.43	1.11	700.37	739.01
145.0	638.25	0.021275	2.77	-2.38	1.17	620.56	655.94
150.0	567.50	0.018917	2.86	-2.32	1.23	551.29	583.70

RELIABILITY DATA BASED ON AEC-Q200 COMPLIANCE		
TEST DENOMINATION	**METHOD**	$\Delta R_{25}/R_{25\ max.}$ (1)
High temperature storage	MIL-STD-202 method 108	± 1 %
Thermal cycling	JESD22 method JA-104	± 2 %
Operational life	MIL-STD-202 method 108	± 1 %
Soldering heat	MIL-STD-202 method 204	± 3 %
Moisture resistance	MIL-STD-202 method 106	± 1 %
Vibration	MIL-STD-202 method 204	± 1 %
Biased humidity (85 °C, 85 % RH)	MIL-STD-202 method 108	± 2 %
Thermal shock	MIL-STD-202 method 107	± 2 %
Mechanical shocks	MIL-STD-202-213	± 1 %

Note

- Valid for NTCLE203E3103SB0

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