

NTC Thermistors, Radial Leaded, Automotive Grade



FEATURES

- High accuracy over a wide temperature range
- High stability over a long life
- Exceptional thermal shock withstanding performance
- AEC-Q200 qualified
- Compliant to RoHS Directive 2002/95/EC and in accordance to WEEE 2002/96/EC
- Fulfils the ELV 2000/53/EC


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 (qty = 500 p). Tape and reel available on request.

DESIGN-IN SUPPORT

$R_{(T)}$ table spreadsheet available on request at nlr@vishay.com.

MOUNTING

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

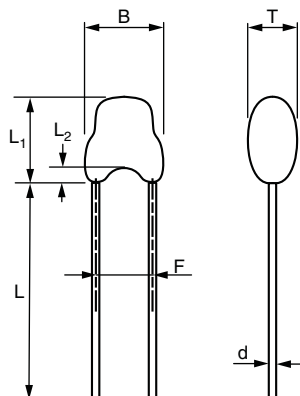
QUICK REFERENCE DATA		
PARAMETER	VALUE	UNIT
Resistance value at 25 °C	2.06 to 30	k Ω
Temperature accuracy between 25 °C and 85 °C measurement	± 0.5	°C
B _{25/85} value	3528 to 4090	K
Tolerance on B _{25/85}	± 0.5 to ± 0.75	%
Maximum dissipation	100	mW
Response time (in stirred air)	7	s
Operating temperature range	- 55 to 150	°C
Climatic category acc IEC 60068-1	55/150/56	
Minimum dielectric withstanding voltage (tested according to IEC 539 §4.7.2 method 1)	500	V _{RMS}
Weight	0.1	g

ELECTRICAL DATA AND ORDERING INFORMATION									
SAP PART NUMBER	12NC	R _{at 25 °C} (Ω)	α at 25 °C (%/K)	R ₂₅ Tol. (\pm %)	B _{25/85} (K)	B _{25/85} Tol. (\pm %)	ΔT max. ⁽¹⁾ 25 °C to 85 °C (\pm °C)	ΔT max. ⁽¹⁾ - 40 °C to 125 °C (\pm °C)	ΔT max. ⁽¹⁾ 125 °C to 150 °C (\pm °C)
NTCLE203E3202SB0	2381 640 20202	2060	3.86	1.93	3528	0.50	0.5	1	2
NTCLE203E3222SB0	2381 640 20222	2252	4.39	2.20	3984	0.50	0.5	1	1
NTCLE203E3272SB0	2381 640 20272	2780	4.51	2.20	4090	0.75	0.5	1	1
NTCLE203E3302SB0	2381 640 20302	3000	4.39	2.20	3984	0.50	0.5	1	1
NTCLE203E3502SB0	2381 640 20502	5000	4.39	2.20	3984	0.50	0.5	1	1
NTCLE203E3103SB0	2381 640 20103	10 000	4.39	2.20	3984	0.50	0.5	1	1
NTCLE203E3303SB0	2381 640 20303	30 000	4.30	2.20	3935	0.75	0.5	1	1

Note

⁽¹⁾ ΔT is the temperature measurement accuracy in the defined temperature range

DIMENSIONS in millimeters



B	4.2 max.
d	0.5 ± 0.05
L	41 ± 1
L ₁	6.0 max.
L ₂	2.0 ± 1.0
F	2.54
T	4.0 max.

RESISTANCE (TEMPERATURE) CHARACTERISTICS

PART NUMBER	NTCLE203E3202SB0/2381 640 20202						
TEMP. (°C)	R _{(T)/R₂₅}	RESISTANCE (Ω)	ΔR/R (%)	α (%/K)	ΔT _{max.} (± °C)	R _{min.} (Ω)	R _{max.} (Ω)
-55	61.2426	126 160	6.82	- 6.82	1	117 557	134 762
-50	43.8430	90 317	6.55	- 6.55	1	84 398	96 235
-45	31.7953	65 498	6.3	- 6.3	1	61 371	69 626
-40	23.3421	48 085	6.06	- 6.06	1	45 169	51 000
-35	17.3360	35 712	5.84	- 5.84	1	33 627	37 797
-30	13.0176	26 816	5.62	- 5.62	1	25 308	28 324
-25	9.87717	20 347	5.42	- 5.42	1	19 244	21 450
-20	7.56881	15 592	5.23	- 5.23	1	14 777	16 407
-15	5.85460	12 060	5.05	- 5.05	1	11 452	12 669
-10	4.56918	9412.5	4.87	- 4.87	1	8954.0	9871.1
-5	3.59635	7408.5	4.71	- 4.71	1	7059.8	7757.1
0	2.85356	5878.3	4.55	- 4.55	1	5610.9	6145.7
5	2.28163	4700.2	4.4	- 4.4	1	4493.4	4906.9
10	1.83772	3785.7	4.26	- 4.26	1	3624.6	3946.8
15	1.49054	3070.5	4.12	- 4.12	1	2944.0	3197.0
20	1.21701	2507.0	3.99	- 3.99	1	2407.0	2607.1
25	1.00000	2060.0	1.93	- 3.87	0.5	2020.2	2099.8
30	0.826620	1702.8	1.87	- 3.75	0.5	1671.0	1734.7
35	0.687330	1415.9	1.81	- 3.63	0.5	1390.2	1441.6
40	0.574577	1183.6	1.76	- 3.53	0.5	1162.8	1204.5
45	0.482694	994.35	1.71	- 3.42	0.5	977.36	1011.3
50	0.407353	839.15	1.66	- 3.32	0.5	825.23	853.07
55	0.345226	711.17	1.61	- 3.23	0.5	699.71	722.63
60	0.293724	605.07	1.57	- 3.14	0.5	595.60	614.55
65	0.250821	516.69	1.52	- 3.05	0.5	508.82	524.56
70	0.214918	442.73	1.48	- 2.97	0.5	436.18	449.29
75	0.184748	380.58	1.44	- 2.89	0.5	375.10	386.06
80	0.159294	328.15	1.4	- 2.81	0.5	323.55	332.75
85	0.137738	283.74	1.36	- 2.73	0.5	279.87	287.61
90	0.119422	246.01	2.66	- 2.66	1	239.46	252.56
95	0.103807	213.84	2.59	- 2.59	1	208.30	219.39
100	0.0904534	186.33	2.53	- 2.53	1	181.62	191.04
105	0.0790010	162.74	2.46	- 2.46	1	158.73	166.75
110	0.0691519	142.45	2.4	- 2.4	1	139.03	145.88
115	0.0606592	124.96	2.34	- 2.34	1	122.03	127.89
120	0.0533184	109.84	2.29	- 2.29	1	107.32	112.35
125	0.0469578	96.733	2.23	- 2.23	1	94.574	98.891
130	0.0414340	85.354	4.36	- 2.18	2	81.635	89.073
135	0.0366267	75.451	4.25	- 2.13	2	72.240	78.661
140	0.0324340	66.814	4.16	- 2.08	2	64.037	69.590
145	0.0287704	59.267	4.06	- 2.03	2	56.860	61.673
150	0.0255626	52.659	3.97	- 1.98	2	50.569	54.748



NTCLE203E3...SB0/2381 640 20...

NTC Thermistors, Radial Leaded, Vishay BCcomponents
Automotive Grade

RESISTANCE (TEMPERATURE) CHARACTERISTICS								
TEMP. (°C)	$R_{(T)}/R_{25}$	PART NUMBER NTCLE203E3222SB0 2381 640 20222	PART NUMBER NTCLE203E3302SB 2381 640 20302	PART NUMBER NTCLE203E3502SB0 2381 640 20502	PART NUMBER NTCLE203E3103SB0 2381 640 20103	$\Delta R/R$ (%)	α (%/K)	ΔT_{max} (± °C)
		RESISTANCE (Ω)	RESISTANCE (Ω)	RESISTANCE (Ω)	RESISTANCE (Ω)			
- 55	95.3774	214 790	286 132	476 887	953 774	7.37	- 7.37	1.0
- 50	66.4169	149 571	199 251	332 085	664 169	7.11	- 7.11	1.0
- 45	46.8363	105 475	140 509	234 182	468 363	6.86	- 6.86	1.0
- 40	33.4274	75 279	100 282	167 137	334 274	6.63	- 6.63	1.0
- 35	24.1323	54 346	72 397	120 661	241 323	6.41	- 6.41	1.0
- 30	17.6133	39 665	52 840	88 066	176 133	6.19	- 6.19	1.0
- 25	12.9900	29 253	38 970	64 950	129 900	5.99	- 5.99	1.0
- 20	9.67611	21 791	29 028	48 381	96 761	5.79	- 5.79	1.0
- 15	7.27646	16 387	21 829	36 382	72 765	5.61	- 5.61	1.0
- 10	5.52181	12 435	16 565	27 609	55 218	5.43	- 5.43	1.0
- 5	4.22678	9518.7	12 680	21 134	42 268	5.26	- 5.26	1.0
0	3.26242	7347.0	9787.3	16 312	32 624	5.1	- 5.1	1.0
5	2.53814	5715.9	7614.4	12 691	25 381	4.94	- 4.94	1.0
10	1.98969	4480.8	5969.1	9948.5	19897	4.8	- 4.8	1.0
15	1.57113	3538.2	4713.4	7855.6	15711	4.65	- 4.65	1.0
20	1.24927	2813.4	3747.8	6246.4	12493	4.52	- 4.52	1.0
25	1.00000	2252.0	3000.0	5000.0	10000	2.19	- 4.39	0.5
30	0.805596	1814.2	2416.8	4028.0	8056.0	2.13	- 4.26	0.5
35	0.652974	1470.5	1958.9	3264.9	6529.7	2.07	- 4.14	0.5
40	0.532388	1198.9	1597.2	2661.9	5323.9	2.01	- 4.03	0.5
45	0.436527	983.06	1309.6	2182.6	4365.3	1.95	- 3.92	0.5
50	0.359872	810.43	1079.6	1799.4	3598.7	1.9	- 3.81	0.5
55	0.298227	671.61	894.68	1491.1	2982.3	1.85	- 3.71	0.5
60	0.248382	559.36	745.15	1241.9	2483.8	1.8	- 3.61	0.5
65	0.207865	468.11	623.60	1039.3	2078.7	1.75	- 3.51	0.5
70	0.174765	393.57	524.30	873.83	1747.7	1.71	- 3.42	0.5
75	0.147592	332.38	442.78	737.96	1475.9	1.67	- 3.34	0.5
80	0.125180	281.91	375.54	625.90	1251.8	1.62	- 3.25	0.5
85	0.106611	240.09	319.83	533.06	1066.1	1.58	- 3.17	0.5
90	0.0911586	205.29	273.48	455.79	911.59	3.09	- 3.09	1.0
95	0.0782457	176.21	234.74	391.23	782.46	3.02	- 3.02	1.0
100	0.0674111	151.81	202.23	337.06	674.11	2.94	- 2.94	1.0
105	0.0582845	131.26	174.85	291.42	582.85	2.87	- 2.87	1.0
110	0.0505675	113.88	151.70	252.84	505.68	2.81	- 2.81	1.0
115	0.0440186	99.130	132.06	220.09	440.19	2.74	- 2.74	1.0
120	0.0384411	86.569	115.32	192.21	384.41	2.68	- 2.68	1.0
125	0.0336748	75.836	101.02	168.37	336.75	2.62	- 2.62	1.0
130	0.0295881	66.632	88.764	147.94	295.88	2.56	- 2.56	1.0
135	0.0260729	58.716	78.219	130.37	260.73	2.5	- 2.5	1.0
140	0.0230400	51.886	69.120	115.20	230.40	2.45	- 2.45	1.0
145	0.0204152	45.975	61.246	102.08	204.15	2.39	- 2.39	1.0
150	0.0181370	40.845	54.411	90.685	181.37	2.34	- 2.34	1.0

NTCLE203E3...SB0/2381 640 20...



Vishay BCcomponents NTC Thermistors, Radial Leaded,
Automotive Grade

RESISTANCE (TEMPERATURE) CHARACTERISTICS							
PART NUMBER	NTCLE203E3272SB0/2381 640 20272						
TEMP. (°C)	R_T/R_{25}	RESISTANCE (Ω)	$\Delta R/R$ (%)	α (%/K)	ΔT_{max} (± °C)	R_{min} (Ω)	R_{max} (Ω)
- 55	109.223	303 640	7.57	- 7.57		280 661	326 619
- 50	75.3012	209 337	7.31	- 7.31	1.0	194 035	224 639
- 45	52.5754	146 159	7.06	- 7.06	1.0	135 838	156 481
- 40	37.1560	103 294	6.82	- 6.82	1.0	96 244	110 343
- 35	26.5657	73 853	6.6	- 6.6	1.0	68 981	78 725
- 30	19.2065	53 394	6.38	- 6.38	1.0	49 988	56 800
- 25	14.0347	39 017	6.17	- 6.17	1.0	36 609	41 424
- 20	10.3608	28 803	5.97	- 5.97	1.0	27 083	30 523
- 15	7.72365	21 472	5.78	- 5.78	1.0	20 231	22 713
- 10	5.81188	16 157	5.6	- 5.6	1.0	15 253	17 061
- 5	4.41266	12 267	5.42	- 5.42	1.0	11 602	12 932
0	3.37917	9394.1	5.25	- 5.25	1.0	8900.6	9887.6
5	2.60909	7253.3	5.09	- 5.09	1.0	6883.9	7622.7
10	2.03042	5644.6	4.94	- 4.94	1.0	5365.8	5923.3
15	1.59206	4425.9	4.79	- 4.79	1.0	4213.9	4638.0
20	1.25740	3495.6	4.65	- 4.65	1.0	3333.1	3658.1
25	1.00000	2780.0	2.25	- 4.51	0.5	2717.4	2842.6
30	0.800599	2225.7	2.19	- 4.38	0.5	2177.0	2274.4
35	0.645064	1793.3	2.13	- 4.26	0.5	1755.2	1831.4
40	0.522939	1453.8	2.07	- 4.14	0.5	1423.7	1483.8
45	0.426436	1185.5	2.01	- 4.02	0.5	1161.7	1209.3
50	0.349713	972.20	1.95	- 3.91	0.5	953.22	991.19
55	0.288355	801.63	1.9	- 3.81	0.5	786.40	816.86
60	0.239008	664.44	1.85	- 3.7	0.5	652.16	676.72
65	0.199102	553.50	1.8	- 3.6	0.5	543.54	563.46
70	0.166662	463.32	1.75	- 3.51	0.5	455.20	471.44
75	0.140158	389.64	1.71	- 3.42	0.5	382.99	396.29
80	0.118397	329.14	1.66	- 3.33	0.5	323.67	334.62
85	0.100446	279.24	1.62	- 3.25	0.5	274.72	283.77
90	0.0855723	237.89	3.16	- 3.16	1.0	230.36	245.42
95	0.0731928	203.48	3.09	- 3.09	1.0	197.20	209.76
100	0.0628464	174.71	3.01	- 3.01	1.0	169.45	179.97
105	0.0541637	150.58	2.94	- 2.94	1.0	146.15	155.00
110	0.0468486	130.24	2.87	- 2.87	1.0	126.51	133.97
115	0.0406622	113.04	2.8	- 2.8	1.0	109.88	116.20
120	0.0354108	98.442	2.73	- 2.73	1.0	95.752	101.133
125	0.0309378	86.007	2.67	- 2.67	1.0	83.711	88.303
130	0.0271140	75.377	2.61	- 2.61	1.0	73.411	77.343
135	0.0238349	66.261	2.55	- 2.55	1.0	64.572	67.950
140	0.0210137	58.418	2.49	- 2.49	1.0	56.962	59.873
145	0.0185784	51.648	2.44	- 2.44	1.0	50.390	52.906
150	0.0164705	45.788	2.38	- 2.38	1.0	44.697	46.879



NTCLE203E3...SB0/2381 640 20...

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RESISTANCE (TEMPERATURE) CHARACTERISTICS							
PART NUMBER	NTCLE203E3303SB0/2381 640 20303						
TEMP. (°C)	R_{T1}/R_{25}	RESISTANCE (Ω)	$\Delta R/R$ (%)	α (%/K)	$\Delta T_{max.}$ (± °C)	$R_{min.}$ (Ω)	$R_{max.}$ (Ω)
- 55.0	85.2426	2 557 277.190	7.10	- 7.10	1.00	2 375 781.069	2 738 773.311
- 50.0	60.1277	1 803 830.235	6.87	- 6.87	1.00	1 679 988.374	1 927 672.096
- 45.0	42.8970	1 286 910.597	6.64	- 6.64	1.00	1 201 425.011	1 372 396.183
- 40.0	30.9401	928 204.065	6.43	- 6.43	1.00	868 532.882	987 875.248
- 35.0	22.5513	676 539.148	6.22	- 6.22	1.00	634 436.876	718 641.419
- 30.0	16.6032	498 097.217	6.03	- 6.03	1.00	468 082.003	528 112.431
- 25.0	12.3427	370 280.018	5.84	- 5.84	1.00	348 667.649	391 892.386
- 20.0	9.2608	277 824.765	5.66	- 5.66	1.00	262 113.071	293 536.459
- 15.0	7.0105	210 315.939	5.48	- 5.48	1.00	198 788.221	221 843.656
- 10.0	5.3525	160 574.497	5.31	- 5.31	1.00	152 041.360	169 107.634
- 5.0	4.1201	123 604.210	5.15	- 5.15	1.00	117 233.757	129 974.664
0.0	3.1965	95 895.429	5.00	- 5.00	1.00	91 100.468	100 690.390
5.0	2.4987	74 960.499	4.85	- 4.85	1.00	71 322.895	78 598.104
10.0	1.9674	59 020.802	4.71	- 4.71	1.00	56 240.259	61 801.346
15.0	1.5598	46 793.975	4.58	- 4.58	1.00	44 653.049	48 934.901
20.0	1.2449	37 347.957	4.44	- 4.44	1.00	35 687.948	39 007.966
25.0	1.0000	30 000.000	2.16	- 4.32	0.50	29 353.158	30 646.842
30.0	0.8082	24 246.211	2.10	- 4.20	0.50	23 738.006	24 754.416
35.0	0.6571	19 711.993	2.04	- 4.08	0.50	19 310.216	20 113.770
40.0	0.5372	16 116.913	1.98	- 3.97	0.50	15 797.366	16 436.461
45.0	0.4417	13 249.611	1.93	- 3.86	0.50	12 993.992	13 505.230
50.0	0.3650	10 949.745	1.88	- 3.76	0.50	10 744.124	11 155.366
55.0	0.3032	9094.908	1.83	- 3.66	0.50	8928.617	9261.199
60.0	0.2530	7591.086	1.78	- 3.57	0.50	7455.906	7726.267
65.0	0.2122	6365.645	1.73	- 3.48	0.50	6255.206	6476.084
70.0	0.1787	5362.150	1.69	- 3.39	0.50	5271.491	5452.810
75.0	0.1512	4536.514	1.65	- 3.30	0.50	4461.745	4611.283
80.0	0.1285	3854.110	1.61	- 3.22	0.50	3792.170	3916.050
85.0	0.1096	3287.603	1.57	- 3.14	0.50	3236.069	3339.138
90.0	0.0938	2815.308	3.06	- 3.06	1.00	2729.055	2901.562
95.0	0.0807	2419.939	2.99	- 2.99	1.00	2347.586	2492.293
100.0	0.0696	2087.652	2.92	- 2.92	1.00	2026.721	2148.583
105.0	0.0602	1807.309	2.85	- 2.85	1.00	1755.805	1858.814
110.0	0.0523	1569.914	2.78	- 2.78	1.00	1526.218	1613.609
115.0	0.0456	1368.165	2.72	- 2.72	1.00	1330.963	1405.366
120.0	0.0399	1196.114	2.66	- 2.66	1.00	1164.334	1227.894
125.0	0.0350	1048.898	2.60	- 2.60	1.00	1021.659	1076.136
130.0	0.0308	922.521	2.54	- 2.54	1.00	899.100	945.942
135.0	0.0271	813.692	2.48	- 2.48	1.00	793.491	833.893
140.0	0.0240	719.689	2.43	- 2.43	1.00	702.213	737.164
145.0	0.0213	638.251	2.38	- 2.38	1.00	623.089	653.413
150.0	0.0189	567.498	2.32	- 2.32	1.00	554.306	580.690



RELIABILITY DATA		
TEST DENOMINATION	METHOD	$\Delta R_{25/R25}$ 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

⁽¹⁾ Valid for 2381 640 20103



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