

Surface Mount, NTC Thermistors



FEATURES

- High sensitivity
- High accuracy over a wide temperature range
- AgPd terminations
- Suitable for wave or reflow soldering
- Old part number was 2322 615 1...
- Component in accordance to RoHS 2002/95/EC and WEEE 2002/96/EC

APPLICATIONS

- Temperature compensation, sensing and protection in, for example:
 - Battery chargers
 - Consumer equipment
 - Office equipment

DESCRIPTION

Size 0805 chip thermistors with a negative temperature coefficient. The device has no marking.

PACKAGING

Available in 8 mm punched paper tape on reel package of 4000 units.

QUICK REFERENCE DATA

PARAMETER	VALUE
Resistance value at 25 °C	2 to 470 kOhm
Tolerance on R ₂₅ -value; note1	±5%; ±10%
Tolerance on B _{25/85} -value	see Electrical Data and Ordering Information
Maximum dissipation at 25 °C	210 mW
Thermal time constant τ	≈10 s
Operating temperature range	–55 to +150 °C
R/T values	see tables
Climatic category	40/125/56
Mass	≈0.0155 g

Note

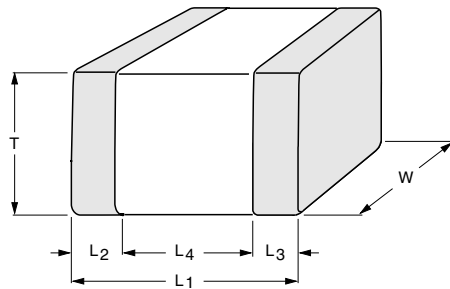
1. Tighter tolerances are available upon request.

SOLDERABILITY AND RESISTANCE TO SOLDERING HEAT

IEC 60068-2-20	TEST METHOD	TEST	PROCEDURE	REQUIREMENTS
6	T _c	solderability	3 s at 215 °C; 2 s at 235 °C	$\Delta R/R < 5\%$
		resistance to soldering heat	10 s at 260 °C	$\Delta R/R < 5\%$

ELECTRICAL DATA AND ORDERING INFORMATION

R ₂₅ (Ω)	B _{25/85} -VALUE (K)	TOLERANCE ON B _{25/85} (%)	CATALOG NUMBER 2381 615 1....	
			±5% TOL. ON R ₂₅	±10% TOL. ON R ₂₅
2000	3680	±3	3202	2202
2200	3680	±3	3222	2222
4700	3560	±1	3472	2472
10000	3620	±1	3103	2103
15000	3528	±1	3153	2153
22000	3930	±1.5	3223	2223
33000	3960	±3	3333	2333
47000	4090	±1.5	3473	2473
68000	3740	±3	3683	2683
100000	3650	±1	3104	2104
330000	4015	±3	3334	2334
470000	4130	±3	3474	2474

DIMENSIONS in millimeters


L ₁	W	T MAX.	L ₂ and L ₃ MIN.	L ₄ MIN.
2.0 ±0.2	1.25 ±0.2	1.25	0.5 ±0.25	0.5

RESISTANCE VALUES AT INTERMEDIATE TEMPERATURES WITH R₂₅ AT 2000 Ω							
T _{oper} (°C)	CATALOG NUMBER 2381 615 1.202						
	R _T /R ₂₅	TC (%/K)	R _T (Ω)	5%TOL. ΔR/R (%)	5%TOL. ΔT (K)	10%TOL. ΔR/R (%)	10%TOL. ΔT (K)
-40	27.23	-6.21	54462.6	15.94	2.57	21.46	3.46
-35	20.06	-6.02	40118.4	14.88	2.47	20.35	3.38
-30	14.92	-5.83	29834.5	13.87	2.38	19.29	3.31
-25	11.20	-5.65	22393.8	12.89	2.28	18.27	3.24
-20	8.481	-5.47	16961.6	11.95	2.19	17.29	3.16
-15	6.480	-5.29	12960.5	11.05	2.09	16.34	3.09
-10	4.994	-5.13	9987.9	10.19	1.99	15.44	3.01
-5	3.880	-4.97	7760.8	9.36	1.89	14.57	2.93
0	3.393	-4.81	6078.6	8.56	1.78	13.73	2.86
5	2.399	-4.66	4797.7	7.79	1.67	12.93	2.78
10	1.908	-4.51	3815.0	7.05	1.56	12.15	2.69
15	1.528	-4.37	3055.3	6.34	1.45	11.41	2.61
20	1.232	-4.24	2463.8	5.66	1.34	10.69	2.52
25	1.000	-4.11	2000.0	5.00	1.22	10.00	2.44
30	0.8170	-3.98	1633.9	5.64	1.42	10.67	2.68
35	0.6715	-3.86	1343.1	6.26	1.62	11.32	2.93
40	0.5553	-3.74	1110.5	6.87	1.83	11.96	3.19
45	0.4618	-3.63	923.5	7.46	2.05	12.58	3.46
50	0.3861	-3.53	772.2	8.04	2.28	13.19	3.74
55	0.3245	-3.42	649.0	8.61	2.51	13.78	4.03
60	0.2742	-3.32	548.3	9.16	2.76	14.35	4.32
65	0.2327	-3.23	465.5	9.69	3.00	14.92	4.62
70	0.1985	-3.14	397.0	10.22	3.26	15.47	4.93
75	0.1701	-3.05	340.2	10.73	3.52	16.00	5.25
80	0.1464	-2.96	292.7	11.23	3.79	16.53	5.58
85	0.1265	-2.88	252.9	11.72	4.07	17.04	5.92
90	0.1097	-2.80	219.4	12.20	4.35	17.54	6.26
95	0.0956	-2.73	191.1	12.66	4.65	18.03	6.61
100	0.0835	-2.65	167.1	13.12	4.95	18.50	6.98
105	0.0733	-2.58	146.6	13.56	5.25	18.97	7.35
110	0.0645	-2.51	129.1	14.00	5.57	19.43	7.73
115	0.0570	-2.45	114.0	14.42	5.89	19.87	8.12
120	0.0505	-2.38	101.0	14.84	6.22	20.31	8.52
125	0.0449	-2.32	89.8	15.24	6.56	20.73	8.92
130	0.0400	-2.26	80.1	15.64	6.91	21.15	9.34
135	0.0358	-2.21	71.6	16.03	7.26	21.55	9.76
140	0.0321	-2.15	64.2	16.41	7.62	21.95	10.20
145	0.0289	-2.10	57.7	16.78	7.99	22.34	10.64
150	0.0260	-2.05	52.1	17.15	8.37	22.72	11.09



RESISTANCE VALUES AT INTERMEDIATE TEMPERATURES WITH R₂₅ AT 2200 Ω							
T _{oper} (°C)	CATALOG NUMBER 2381 615 1.222						
	R _T /R ₂₅	TC (%/K)	R _T (Ω)	5%TOL. ΔR/R (%)	5%TOL. ΔT (K)	10%TOL. ΔR/R (%)	10%TOL. ΔT (K)
-40	27.23	-6.21	59909	15.94	2.57	21.46	3.46
-35	20.06	-6.02	44130	14.88	2.47	20.35	3.38
-30	14.92	-5.83	12818	13.87	2.38	19.29	3.31
-25	11.20	-5.65	24633	12.89	2.28	18.27	3.24
-20	8.481	-5.47	18658	11.95	2.19	17.29	3.16
-15	6.480	-5.29	14257	11.05	2.09	16.34	3.09
-10	4.994	-5.13	10987	10.19	1.99	15.44	3.01
-5	3.880	-4.97	8537	9.36	1.89	14.57	2.93
0	3.393	-4.81	6686	8.56	1.78	13.73	2.86
5	2.399	-4.66	5278	7.79	1.67	12.93	2.78
10	1.908	-4.51	4196	7.05	1.56	12.15	2.69
15	1.528	-4.37	3361	6.34	1.45	11.41	2.61
20	1.232	-4.24	2710	5.66	1.34	10.69	2.52
25	1.000	-4.11	2200	5.00	1.22	10.00	2.44
30	0.8170	-3.98	1797	5.64	1.42	10.67	2.68
35	0.6715	-3.86	1477	6.26	1.62	11.32	2.93
40	0.5553	-3.74	1222	6.87	1.83	11.96	3.19
45	0.4618	-3.63	1016	7.46	2.05	12.58	3.46
50	0.3861	-3.53	849.4	8.04	2.28	13.19	3.74
55	0.3245	-3.42	714.0	8.61	2.51	13.78	4.03
60	0.2742	-3.32	603.2	9.16	2.76	14.35	4.32
65	0.2327	-3.23	512.0	9.69	3.00	14.92	4.62
70	0.1985	-3.14	436.7	10.22	3.26	15.47	4.93
75	0.1701	-3.05	374.2	10.73	3.52	16.00	5.25
80	0.1464	-2.96	322.0	11.23	3.79	16.53	5.58
85	0.1265	-2.88	278.2	11.72	4.07	17.04	5.92
90	0.1097	-2.80	241.4	12.20	4.35	17.54	6.26
95	0.0956	-2.73	210.2	12.66	4.65	18.03	6.61
100	0.0835	-2.65	183.8	13.12	4.95	18.50	6.98
105	0.0733	-2.58	161.3	13.56	5.25	18.97	7.35
110	0.0645	-2.51	142.0	14.00	5.57	19.43	7.73
115	0.0570	-2.45	125.4	14.42	5.89	19.87	8.12
120	0.0505	-2.38	111.2	14.84	6.22	20.31	8.52
125	0.0449	-2.32	98.81	15.24	6.56	20.73	8.92
130	0.0400	-2.26	88.10	15.64	6.91	21.15	9.34
135	0.0358	-2.21	78.78	16.03	7.26	21.55	9.76
140	0.0321	-2.15	70.65	16.41	7.62	21.95	10.20
145	0.0289	-2.10	63.52	16.78	7.99	22.34	10.64
150	0.0260	-2.05	57.26	17.15	8.37	22.72	11.09

RESISTANCE VALUES AT INTERMEDIATE TEMPERATURES WITH R₂₅ AT 4700 Ω							
T _{oper} (°C)	CATALOG NUMBER 2381 615 1.472						
	R _T /R ₂₅	TC (%/K)	R _T (Ω)	5%TOL. ΔR/R (%)	5%TOL. ΔT (K)	10%TOL. ΔR/R (%)	10%TOL. ΔT (K)
-40	21.9261	-5.75	103053	8.50	1.48	13.66	2.38
-35	16.5224	-5.57	77655	8.16	1.46	13.31	2.39
-30	12.5583	-5.40	59024	7.84	1.45	12.97	2.40
-25	9.62492	-5.24	45237	7.53	1.44	12.65	2.41
-20	7.43618	-5.08	34950	7.23	1.42	12.33	2.43
-15	5.78976	-4.93	27212	6.94	1.41	12.04	2.44
-10	4.54158	-4.78	21345	6.67	1.39	11.75	2.46
-5	3.58813	-4.64	16864	6.40	1.38	11.47	2.47
0	2.85449	-4.51	13416	6.15	1.36	11.20	2.49
5	2.28599	-4.38	10744	5.90	1.35	10.94	2.50



T _{oper} (°C)	CATALOG NUMBER 2381 615 1.472						
	R _T /R ₂₅	TC (%/K)	R _T (Ω)	5%TOL. ΔR/R (%)	5%TOL. ΔT (K)	10%TOL. ΔR/R (%)	10%TOL. ΔT (K)
10	1.84245	-4.25	8659.5	5.66	1.33	10.70	2.52
15	1.49414	-4.13	7022.5	5.44	1.32	10.46	2.53
20	1.21887	-4.01	5728.7	5.21	1.30	10.22	2.55
25	1.00	-3.90	4700.0	5.00	1.28	10.00	2.56
30	0.82494	-3.80	3877.2	5.21	1.37	10.22	2.69
35	0.68413	-3.69	3215.4	5.41	1.46	10.43	2.82
40	0.57025	-3.59	2680.2	5.60	1.56	10.63	2.96
45	0.47765	-3.50	2245.0	5.79	1.66	10.83	3.10
50	0.40198	-3.40	1889.3	5.97	1.75	11.02	3.24
55	0.33984	-3.31	1597.2	6.15	1.85	11.20	3.38
60	0.28856	-3.23	1356.2	6.32	1.96	11.38	3.52
65	0.24606	-3.15	1156.5	6.48	2.06	11.55	3.67
70	0.21067	-3.07	990.1	6.64	2.17	11.72	3.82
75	0.18108	-2.99	851.06	6.80	2.28	11.89	3.98
80	0.15623	-2.91	734.29	6.95	2.39	12.05	4.13
85	0.13529	-2.84	635.86	7.10	2.50	12.20	4.29
90	0.11757	-2.77	552.56	7.24	2.61	12.35	4.45
95	0.10251	-2.71	481.81	7.38	2.73	12.50	4.62
100	0.08968	-2.64	421.50	7.52	2.85	12.64	4.78
105	0.07871	-2.58	369.91	7.65	2.97	12.78	4.95
110	0.06928	-2.52	325.64	7.78	3.09	12.91	5.12
115	0.06117	-2.46	287.51	7.91	3.21	13.05	5.30
120	0.05416	-2.41	254.57	8.03	3.34	13.17	5.48
125	0.04809	-2.35	226.03	8.15	3.47	13.30	5.66
130	0.04282	-2.30	201.23	8.27	3.60	13.42	5.84
135	0.03822	-2.25	179.62	8.38	3.73	13.54	6.03
140	0.0342	-2.20	160.73	8.49	3.86	13.66	6.21
145	0.03068	-2.15	144.17	8.60	4.00	13.77	6.40
150	0.02758	-2.10	129.63	8.70	4.14	13.88	6.60

RESISTANCE VALUES AT INTERMEDIATE TEMPERATURES WITH R ₂₅ AT 10000 Ω							
T _{oper} (°C)	CATALOG NUMBER 2381 615 1.103						
	R _T /R ₂₅	TC (%/K)	R _T (Ω)	5%TOL. ΔR/R (%)	5%TOL. ΔT (K)	10%TOL. ΔR/R (%)	10%TOL. ΔT (K)
-40	23.0973	-5.84	230973	8.50	1.45	13.72	2.34
-35	17.3222	-5.67	173222	8.16	1.44	13.36	2.35
-30	13.1054	-5.49	131054	7.84	1.43	13.02	2.36
-25	9.99934	-5.33	99993	7.53	1.41	12.69	2.38
-20	7.69193	-5.17	76919	7.23	1.40	12.37	2.39
-15	5.96369	-5.01	59637	6.94	1.38	12.07	2.40
-10	4.6589	-4.86	46589	6.67	1.37	11.78	2.42
-5	3.66623	-4.72	36662	6.40	1.36	11.49	2.43
0	2.9054	-4.58	29054	6.15	1.34	11.22	2.44
5	2.31806	-4.45	23181	5.90	1.33	10.96	2.46
10	1.86153	-4.32	18615.3	5.66	1.31	10.71	2.47
15	1.50429	-4.20	15042.9	5.44	1.29	10.46	2.49
20	1.22295	-4.08	12229.5	5.21	1.28	10.23	2.50
25	1.00	-3.97	10000.0	5.00	1.26	10.00	2.52
30	0.82227	-3.86	8222.7	5.21	1.35	10.22	2.65
35	0.67977	-3.75	6797.7	5.41	1.44	10.43	2.78
40	0.56487	-3.65	5648.7	5.60	1.53	10.64	2.91
45	0.47174	-3.55	4717.4	5.79	1.63	10.84	3.05
50	0.39585	-3.46	3958.5	5.97	1.72	11.03	3.19
55	0.33371	-3.37	3337.1	6.15	1.82	11.22	3.33



T_{oper} (°C)	CATALOG NUMBER 2381 615 1.103						
	R_T/R_{25}	TC (%/K)	R_T (Ω)	5%TOL. $\Delta R/R$ (%)	5%TOL. ΔT (K)	10%TOL. $\Delta R/R$ (%)	10%TOL. ΔT (K)
60	0.28258	-3.28	2825.8	6.32	1.92	11.40	3.47
65	0.24031	-3.20	2403.1	6.48	2.03	11.58	3.62
70	0.20521	-3.12	2052.1	6.64	2.13	11.75	3.77
75	0.17594	-3.04	1759.37	6.80	2.24	11.92	3.92
80	0.15142	-2.96	1514.20	6.95	2.35	12.08	4.08
85	0.1308	-2.89	1308.04	7.10	2.46	12.24	4.24
90	0.1134	-2.82	1134.00	7.24	2.57	12.39	4.40
95	0.09865	-2.75	986.53	7.38	2.68	12.54	4.56
100	0.08611	-2.69	861.10	7.52	2.80	12.68	4.72
105	0.0754	-2.62	754.04	7.65	2.92	12.83	4.89
110	0.06624	-2.56	662.36	7.78	3.04	12.96	5.06
115	0.05836	-2.50	583.58	7.91	3.16	13.10	5.24
120	0.05157	-2.45	515.67	8.03	3.28	13.23	5.41
125	0.4569	-2.39	456.94	8.15	3.41	13.35	5.59
130	0.0406	-2.34	406.01	8.27	3.54	13.48	5.77
135	0.03617	-2.29	361.71	8.38	3.67	13.60	5.96
140	0.03231	-2.23	323.06	8.49	3.80	13.72	6.15
145	0.02893	-2.19	289.26	8.60	3.93	13.83	6.34
150	0.02596	-2.14	259.61	8.70	4.07	13.95	6.53

RESISTANCE VALUES AT INTERMEDIATE TEMPERATURES WITH R_{25} AT 15000 Ω

T_{oper} (°C)	CATALOG NUMBER 2381 615 1.153						
	R_T/R_{25}	TC (%/K)	R_T (Ω)	5%TOL. $\Delta R/R$ (%)	5%TOL. ΔT (K)	10%TOL. $\Delta R/R$ (%)	10%TOL. ΔT (K)
-40	23.3421	-6.06	350131	8.46	1.40	13.63	2.25
-35	17.336	-5.84	260040	8.13	1.39	13.28	2.27
-30	13.0176	-5.62	195263	7.81	1.39	12.94	2.30
-25	9.87717	-5.42	148158	7.50	1.38	12.62	2.33
-20	7.56881	-5.23	113532	7.21	1.38	12.31	2.36
-15	5.8546	-5.05	87819	6.93	1.37	12.02	2.38
-10	4.56918	-4.87	68538	6.65	1.37	11.73	2.41
-5	3.59635	-4.71	53945	6.39	1.36	11.46	2.43
0	2.85356	-4.55	42803	6.14	1.35	11.19	2.46
5	2.28163	-4.40	34224	5.89	1.34	10.94	2.49
10	1.83772	-4.26	27566	5.66	1.33	10.69	2.51
15	1.49054	-4.12	22358	5.43	1.32	10.45	2.54
20	1.21701	-3.99	18255	5.21	1.31	10.22	2.56
25	1.00	-3.87	15000	5.00	1.29	10.00	2.59
30	0.83154	-3.75	12473	5.20	1.39	10.21	2.73
35	0.69408	-3.63	10411	5.40	1.49	10.42	2.87
40	0.58149	-3.53	8722.3	5.60	1.59	10.62	3.01
45	0.48893	-3.42	7334.0	5.78	1.69	10.82	3.16
50	0.41256	-3.32	6188.5	5.96	1.79	11.01	3.31
55	0.34933	-3.23	5240.0	6.14	1.90	11.19	3.47
60	0.2968	-3.14	4451.9	6.31	2.01	11.37	3.62
65	0.253	-3.05	3794.9	6.47	2.12	11.54	3.78
70	0.21635	-2.97	3245.3	6.63	2.24	11.71	3.95
75	0.1856	-2.89	2784.0	6.78	2.35	11.87	4.11
80	0.15971	-2.81	2395.7	6.94	2.47	12.03	4.28
85	0.13785	-2.73	2067.7	7.08	2.59	12.18	4.46
90	0.11932	-2.66	1789.8	7.22	2.71	12.33	4.63
95	0.10358	-2.59	1553.7	7.36	2.84	12.47	4.81
100	0.09016	-2.53	1352.4	7.50	2.97	12.62	4.99
105	0.0787	-2.46	1180.5	7.63	3.10	12.75	5.18
110	0.06887	-2.40	1033.1	7.76	3.23	12.89	5.36



T _{oper} (°C)	CATALOG NUMBER 2381 615 1.153						
	R _T /R ₂₅	TC (%/K)	R _T (Ω)	5%TOL. ΔR/R (%)	5%TOL. ΔT (K)	10%TOL. ΔR/R (%)	10%TOL. ΔT (K)
115	0.06043	-2.34	906.41	7.88	3.36	13.02	5.56
120	0.05315	-2.29	797.27	8.00	3.50	13.15	5.75
125	0.04687	-2.23	702.99	8.12	3.64	13.27	5.95
130	0.04142	-2.18	621.33	8.24	3.78	13.39	6.15
135	0.03669	-2.13	550.42	8.35	3.92	13.51	6.35
140	0.03258	-2.08	488.72	8.46	4.07	13.62	6.56
145	0.02899	-2.03	434.88	8.57	4.22	13.74	6.77
150	0.02585	-1.98	387.81	8.67	4.37	13.85	6.98

RESISTANCE VALUES AT INTERMEDIATE TEMPERATURES WITH R ₂₅ AT 22000 Ω							
T _{oper} (°C)	CATALOG NUMBER 2381 615 1.223						
	R _T /R ₂₅	TC (%/K)	R _T (Ω)	5%TOL. ΔR/R (%)	5%TOL. ΔT (K)	10%TOL. ΔR/R (%)	10%TOL. ΔT (K)
-40	30.7958	-6.42	677507.99	16.71	2.60	22.27	3.47
-35	22.4562	-6.21	494036.94	15.59	2.51	21.09	3.39
-30	16.5404	-6.02	363888.31	14.50	2.41	19.96	3.32
-25	12.3010	-5.83	270622.69	13.47	2.31	18.87	3.24
-20	9.2333	-5.65	203131.71	12.47	2.21	17.82	3.16
-15	6.9923	-5.47	153831.44	11.51	2.10	16.82	3.07
-10	5.3406	-5.31	117492.27	10.59	2.00	15.85	2.99
-5	4.1124	-5.15	90473.18	9.70	1.88	14.92	2.90
0	3.1916	-4.99	70215.46	8.85	1.77	14.03	2.81
5	2.4957	-4.85	54904.79	8.02	1.66	13.17	2.72
10	1.9656	-4.70	43243.49	7.23	1.54	12.33	2.62
15	1.5589	-4.57	34295.62	6.46	1.41	11.53	2.52
20	1.2446	-4.44	27380.67	5.72	1.29	10.75	2.42
25	1.0000	-4.31	22000.00	5.00	1.16	10.00	2.32
30	0.8084	-4.19	17785.47	5.69	1.36	10.73	2.56
35	0.6574	-4.08	14463.33	6.36	1.56	11.43	2.80
40	0.5377	-3.97	11828.57	7.01	1.77	12.11	3.05
45	0.4421	-3.86	9726.63	7.64	1.98	12.77	3.31
50	0.3655	-3.76	8040.24	8.25	2.20	13.41	3.57
55	0.3036	-3.66	6679.83	8.84	2.42	14.02	3.83
60	0.2535	-3.56	5576.61	9.41	2.64	14.62	4.10
65	0.2126	-3.47	4677.41	9.97	2.87	15.21	4.38
70	0.1791	-3.38	3940.90	10.51	3.11	15.77	4.66
75	0.1516	-3.30	3334.80	11.03	3.35	16.32	4.95
80	0.1288	-3.22	2833.74	11.54	3.59	16.86	5.24
85	0.1099	-3.14	2417.69	12.04	3.84	17.37	5.54
90	0.0941	-3.06	2070.77	12.52	4.09	17.88	5.84
95	0.0809	-2.99	1780.29	12.99	4.35	18.37	6.15
100	0.0698	-2.92	1536.11	13.45	4.61	18.85	6.47
105	0.0605	-2.85	1330.07	13.89	4.88	19.31	6.79
110	0.0525	-2.78	1155.56	14.32	5.15	19.77	7.11
115	0.0458	-2.72	1007.23	14.74	5.43	20.21	7.44
120	0.0400	-2.65	880.71	15.15	5.71	20.64	7.78
125	0.0351	-2.59	772.44	15.55	6.00	21.06	8.12
130	0.0309	-2.54	679.48	15.94	6.29	21.46	8.46
135	0.0272	-2.48	599.41	16.32	6.58	21.86	8.82
140	0.0241	-2.43	530.24	16.70	6.88	22.25	9.18
145	0.0214	-2.37	470.31	17.06	7.19	22.63	9.54
150	0.0190	-2.32	418.23	17.41	7.50	23.00	9.91

RESISTANCE VALUES AT INTERMEDIATE TEMPERATURES WITH R₂₅ AT 33000 Ω							
T _{oper} (°C)	CATALOG NUMBER 2381 615 1.333						
	R _T /R ₂₅	TC (%/K)	R _T (Ω)	5%TOL. ΔR/R (%)	5%TOL. ΔT (K)	10%TOL. ΔR/R (%)	10%TOL. ΔT (K)
-40	32.68563	-6.59	1078626	16.66	2.53	22.22	3.37
-35	23.6478	-6.36	780377	15.54	2.44	21.04	3.31
-30	17.29545	-6.15	570750	14.46	2.35	19.91	3.24
-25	12.78101	-5.95	421773	13.43	2.26	18.83	3.17
-20	9.538645	-5.76	314775	12.44	2.16	17.79	3.09
-15	7.186265	-5.57	237147	11.48	2.06	16.79	3.01
-10	5.463007	-5.40	180279	10.56	1.96	15.83	2.93
-5	4.18889	-5.23	138233	9.68	1.85	14.90	2.85
0	3.238476	-5.07	106870	8.83	1.74	14.01	2.77
5	2.523488	-4.91	83275	8.01	1.63	13.15	2.68
10	1.9812223	-4.77	65380.4	7.22	1.51	12.32	2.59
15	1.566743	-4.62	51702.5	6.45	1.40	11.52	2.49
20	1.247561	-4.49	41169.5	5.71	1.27	10.75	2.39
25	1.00	-4.36	33000.0	5.00	1.15	10.00	2.29
30	0.806666	-4.24	26620.0	5.69	1.34	10.72	2.53
35	0.654682	-4.12	21604.5	6.36	1.54	11.42	2.78
40	0.534445	-4.00	17636.7	7.00	1.75	12.10	3.02
45	0.438742	-3.89	14478.5	7.63	1.96	12.76	3.28
50	0.362121	-3.79	11950.0	8.24	2.18	13.39	3.54
55	0.30043	-3.68	9914.2	8.82	2.39	14.01	3.80
60	0.250491	-3.59	8266.2	9.40	2.62	14.60	4.07
65	0.209854	-3.49	6925.2	9.95	2.85	15.18	4.35
70	0.17662	-3.40	5828.5	10.49	3.08	15.75	4.63
75	0.149308	-3.32	4927.18	11.01	3.32	16.29	4.91
80	0.126759	-3.23	4183.06	11.52	3.56	16.83	5.20
85	0.108058	-3.15	3565.93	12.01	3.81	17.34	5.50
90	0.092482	-3.07	3051.89	12.49	4.06	17.85	5.80
95	0.079453	-3.00	2621.93	12.96	4.32	18.33	6.11
100	0.068511	-2.93	2260.85	13.41	4.58	18.81	6.43
105	0.059286	-2.86	1956.42	13.85	4.85	19.27	6.74
110	0.051479	-2.79	1698.80	14.28	5.12	19.72	7.07
115	0.044848	-2.73	1479.98	14.70	5.39	20.16	7.40
120	0.039196	-2.66	1293.47	15.11	5.67	20.59	7.73
125	0.034363	-2.60	1133.96	15.51	5.96	21.01	8.07
130	0.030215	-2.54	997.09	15.90	6.25	21.42	8.42
135	0.026645	-2.49	879.28	16.28	6.55	21.81	8.77
140	0.023562	-2.43	777.55	16.65	6.84	22.20	9.13
145	0.020892	-2.38	689.45	17.01	7.15	22.58	9.49
150	0.018573	-2.33	612.93	17.36	7.46	22.95	9.86

RESISTANCE VALUES AT INTERMEDIATE TEMPERATURES WITH R₂₅ AT 47000 Ω							
T _{oper} (°C)	CATALOG NUMBER 2381 615 1.473						
	R _T /R ₂₅	TC (%/K)	R _T (Ω)	5%TOL. ΔR/R (%)	5%TOL. ΔT (K)	10%TOL. ΔR/R (%)	10%TOL. ΔT (K)
-40	37.156	-6.82	1746331	11.02	1.62	16.31	2.39
-35	26.5657	-6.60	1248589	10.44	1.58	15.70	2.38
-30	19.2065	-6.38	902705	9.89	1.55	15.12	2.37
-25	14.0347	-6.17	659632	9.35	1.52	14.56	2.36
-20	10.3608	-5.97	486956	8.84	1.48	14.02	2.35
-15	7.72365	-5.78	363012	8.35	1.44	13.51	2.34
-10	5.81188	-5.60	273158	7.87	1.41	13.01	2.32
-5	4.41266	-5.42	207395	7.42	1.37	12.53	2.31
0	3.37917	-5.25	158821	6.98	1.33	12.07	2.30



T _{oper} (°C)	CATALOG NUMBER 2381 615 1.473						
	R _T /R ₂₅	TC (%/K)	R _T (Ω)	5%TOL. ΔR/R (%)	5%TOL. ΔT (K)	10%TOL. ΔR/R (%)	10%TOL. ΔT (K)
5	2.60609	-5.09	122627	6.55	1.29	11.63	2.28
10	2.03042	-4.94	95430	6.14	1.24	11.20	2.27
15	1.59206	-4.79	74827	5.75	1.20	10.79	2.25
20	1.2574	-4.65	59098	5.37	1.15	10.39	2.23
25	1.00	-4.51	47000	5.00	1.11	10.00	2.22
30	0.8006	-4.38	37628	5.36	1.22	10.37	2.37
35	0.64506	-4.26	30318	5.70	1.34	10.73	2.52
40	0.52294	-4.14	24578	6.04	1.46	11.08	2.68
45	0.42644	-4.02	20043	6.36	1.58	11.42	2.84
50	0.34971	-3.91	16437	6.67	1.71	11.75	3.00
55	0.28836	-3.81	13553	6.98	1.83	12.07	3.17
60	0.23901	-3.70	11233	7.27	1.96	12.38	3.34
65	0.1991	-3.60	9358	7.56	2.10	12.68	3.52
70	0.16666	-3.51	7833	7.83	2.23	12.97	3.69
75	0.14016	-3.42	6587	8.10	2.37	13.25	3.88
80	0.1184	-3.33	5565	8.37	2.51	13.53	4.06
85	0.10045	-3.25	4721	8.62	2.66	13.79	4.25
90	0.08557	-3.16	4022	8.87	2.80	14.05	4.44
95	0.07319	-3.09	3440	9.11	2.95	14.30	4.64
100	0.06285	-3.01	2954	9.34	3.10	14.55	4.83
105	0.05416	-2.94	2546	9.57	3.26	14.79	5.04
110	0.04685	-2.87	2202	9.79	3.42	15.02	5.24
115	0.04066	-2.80	1911	10.01	3.58	15.25	5.45
120	0.03541	-2.73	1664	10.22	3.74	15.47	5.66
125	0.03094	-2.67	1454	10.43	3.91	15.69	5.88
130	0.02711	-2.61	1274	10.63	4.08	15.90	6.10
135	0.02383	-2.55	1120	10.82	4.25	16.10	6.32
140	0.02101	-2.49	987.6	11.02	4.42	16.30	6.54
145	0.01858	-2.44	873.2	11.20	4.60	16.50	6.77
150	0.01647	-2.38	774.1	11.38	4.78	16.69	7.01

RESISTANCE VALUES AT INTERMEDIATE TEMPERATURES WITH R ₂₅ AT 68000 Ω							
T _{oper} (°C)	CATALOG NUMBER 2381 615 1.683						
	R _T /R ₂₅	TC (%/K)	R _T (Ω)	5%TOL. ΔR/R (%)	5%TOL. ΔT (K)	10%TOL. ΔR/R (%)	10%TOL. ΔT (K)
-40	25.783	-6.07	1753245	16.02	2.64	21.54	3.55
-35	19.1253	-5.88	1300524	14.96	2.54	20.43	3.47
-30	14.32	-5.70	973759.8	13.94	2.45	19.36	3.40
-25	10.8187	-5.52	735674.7	12.96	2.35	18.34	3.32
-20	8.24438	-5.35	560618	12.02	2.25	17.36	3.24
-15	6.33489	-5.19	430772.3	11.12	2.14	16.41	3.16
-10	4.90655	-5.03	333645.6	10.26	2.04	15.51	3.08
-5	3.82943	-4.88	260401.1	9.42	1.93	14.63	3.00
0	3.01078	-4.74	204733.3	8.62	1.82	13.79	2.91
5	2.3839	-4.60	162105	7.84	1.70	12.98	2.82
10	1.90036	-4.47	129224.7	7.09	1.59	12.19	2.73
15	1.52479	-4.34	103686	6.37	1.47	11.44	2.63
20	1.23112	-4.22	83716.26	5.67	1.35	10.71	2.54
25	1.00	-4.10	68000	5.00	1.22	10.00	2.44
30	0.81697	-3.99	55554.14	5.65	1.42	10.68	2.68
35	0.67116	-3.88	45638.98	6.28	1.62	11.34	2.93
40	0.55433	-3.77	37694.27	6.89	1.83	11.98	3.18
45	0.46019	-3.67	31292.96	7.48	2.04	12.60	3.43
50	0.38393	-3.58	26107.56	8.06	2.25	13.20	3.69
55	0.32184	-3.48	21885.36	8.61	2.47	13.78	3.96

T _{oper} (°C)	CATALOG NUMBER 2381 615 1.683						
	R _T /R ₂₅	TC (%/K)	R _T (Ω)	5%TOL. ΔR/R (%)	5%TOL. ΔT (K)	10%TOL. ΔR/R (%)	10%TOL. ΔT (K)
60	0.27103	-3.39	18430.3	9.15	2.70	14.35	4.23
65	0.22926	-3.30	15589.41	9.67	2.93	14.90	4.51
70	0.19475	-3.22	13242.67	10.18	3.16	15.43	4.79
75	0.16611	-3.14	11295.44	10.67	3.40	15.95	5.08
80	0.14225	-3.06	9672.73	11.15	3.64	16.45	5.37
85	0.12228	-2.99	8314.81	11.62	3.89	16.93	5.67
90	0.1055	-2.92	7173.88	12.07	4.14	17.41	5.97
95	0.09135	-2.85	6211.55	12.51	4.40	17.87	6.28
100	0.07936	-2.78	5396.80	12.94	4.66	18.32	6.59
105	0.06918	-2.71	4704.48	13.36	4.92	18.76	6.91
110	0.0605	-2.65	4114.12	13.77	5.19	19.18	7.24
115	0.05307	-2.59	3609	14.16	5.47	19.60	7.57
120	0.0467	-2.53	3175.38	14.55	5.75	20.00	7.90
125	0.04121	-2.47	2801.96	14.92	6.03	20.40	8.24
130	0.03646	-2.42	2479.38	15.29	6.32	20.78	8.59
135	0.03235	-2.37	2199.88	15.65	6.62	21.16	8.94
140	0.02878	-2.31	1957.02	16.00	6.91	21.52	9.30
145	0.02567	-2.26	1745.39	16.34	7.22	21.88	9.66
150	0.02295	-2.22	1560.48	16.67	7.52	22.23	10.03

RESISTANCE VALUES AT INTERMEDIATE TEMPERATURES WITH R₂₅ AT 10000 Ω

T _{oper} (°C)	CATALOG NUMBER 2381 615 1.104						
	R _T /R ₂₅	TC (%/K)	R _T (Ω)	5%TOL. ΔR/R (%)	5%TOL. ΔT (K)	10%TOL. ΔR/R (%)	10%TOL. ΔT (K)
-40	23.8997	-5.92	2389969	8.58	1.45	13.72	2.32
-35	17.8586	-5.74	1785861	8.24	1.44	13.36	2.33
-30	13.465	-5.56	1346502	7.91	1.42	13.02	2.34
-25	10.2407	-5.39	1024071	7.59	1.41	12.69	2.35
-20	7.85378	-5.23	785378.1	7.28	1.39	12.37	2.37
-15	6.07181	-5.07	607181.2	6.99	1.38	12.07	2.38
-10	4.73061	-4.92	473061.1	6.71	1.36	11.78	2.40
-5	3.7132	-4.77	371319.7	6.44	1.35	11.49	2.41
0	2.93554	-4.63	293553.6	6.18	1.33	11.22	2.42
5	2.33677	-4.50	233677.1	5.92	1.32	10.96	2.44
10	1.87249	-4.37	187249.2	5.68	1.30	10.71	2.45
15	1.51004	-4.24	151003.9	5.45	1.28	10.46	2.47
20	1.22522	-4.12	122522.4	5.22	1.27	10.23	2.48
25	1.00	-4.01	100000	5.00	1.25	10.00	2.50
30	0.82081	-3.89	82081.36	5.21	1.34	10.22	2.62
35	0.67742	-3.79	67741.67	5.42	1.43	10.43	2.76
40	0.56201	-3.68	56201.1	5.62	1.52	10.64	2.89
45	0.46863	-3.59	46862.56	5.81	1.62	10.84	3.02
50	0.39266	-3.49	39266.09	5.99	1.72	11.03	3.16
55	0.33055	-3.40	33055.34	6.18	1.82	11.22	3.30
60	0.27953	-3.31	27952.66	6.35	1.92	11.40	3.45
65	0.23741	-3.22	23740.56	6.52	2.02	11.58	3.59
70	0.20248	-3.14	20247.74	6.69	2.13	11.75	3.74
75	0.17339	-3.06	17338.63	6.85	2.24	11.92	3.89
80	0.14905	-2.99	14905.37	7.00	2.34	12.08	4.05
85	0.12862	-2.91	12861.77	7.15	2.46	12.24	4.20
90	0.11139	-2.84	11138.64	7.30	2.57	12.39	4.36
95	0.0968	-2.77	9680.13	7.44	2.68	12.54	4.52
100	0.08441	-2.71	8441.05	7.58	2.80	12.68	4.69
105	0.07385	-2.64	7384.60	7.72	2.92	12.83	4.85
110	0.06481	-2.58	6480.76	7.85	3.04	12.96	5.02



T _{oper} (°C)	CATALOG NUMBER 2381 615 1.104						
	R _T /R ₂₅	TC (%/K)	R _T (Ω)	5%TOL. ΔR/R (%)	5%TOL. ΔT (K)	10%TOL. ΔR/R (%)	10%TOL. ΔT (K)
115	0.05705	-2.52	5704.87	7.98	3.17	13.10	5.20
120	0.05037	-2.46	5036.67	8.11	3.29	13.23	5.37
125	0.04459	-2.41	4459.40	8.23	3.42	13.35	5.55
130	0.03959	-2.35	3959.18	8.35	3.55	13.48	5.73
135	0.03524	-2.30	3524.43	8.46	3.68	13.60	5.91
140	0.03146	-2.25	3145.52	8.58	3.81	13.72	6.10
145	0.02814	-2.20	2814.35	8.69	3.95	13.83	6.29
150	0.02524	-2.15	2524.15	8.80	4.09	13.95	6.48

RESISTANCE VALUES AT INTERMEDIATE TEMPERATURES WITH R ₂₅ AT 33000 Ω							
T _{oper} (°C)	CATALOG NUMBER 2381 615 1.334						
	R _T /R ₂₅	TC (%/K)	R _T (kΩ)	5%TOL. ΔR/R (%)	5%TOL. ΔT (K)	10%TOL. ΔR/R (%)	10%TOL. ΔT (K)
-40	33.3434	-6.58	11003.3	16.83	2.56	22.39	3.40
-35	24.1285	-6.36	7962.4	15.69	2.46	21.20	3.33
-30	17.6422	-6.16	5821.9	14.60	2.37	21.05	3.25
-25	13.0283	-5.97	4299.4	13.55	2.27	18.95	3.18
-20	9.7132	-5.78	3205.4	12.54	2.17	17.90	3.10
-15	7.3081	-5.60	2411.7	11.57	2.07	16.89	3.01
-10	5.5470	-5.43	1830.5	10.64	1.96	15.91	2.93
-5	4.2457	-5.27	1401.1	9.75	1.85	14.97	2.84
0	3.2760	-5.11	1081.1	8.88	1.74	14.07	2.75
5	2.5474	-4.96	840.63	8.05	1.62	13.20	2.66
10	1.9955	-4.81	658.52	7.25	1.51	12.35	2.57
15	1.5744	-4.67	519.55	6.47	1.39	11.54	2.47
20	1.2506	-4.54	412.71	5.72	1.26	10.76	2.37
25	1.0000	-4.41	330.00	5.00	1.13	10.00	2.27
30	0.8046	-4.29	265.53	5.70	1.33	10.73	2.50
35	0.6514	-4.17	214.95	6.38	1.53	11.44	2.75
40	0.5304	-4.05	175.02	7.03	1.73	12.13	2.99
45	0.4343	-3.94	143.31	7.67	1.94	12.79	3.24
50	0.3575	-3.84	117.97	8.28	2.16	13.44	3.50
55	0.2958	-3.74	97.62	8.88	2.36	14.06	3.76
60	0.2460	-3.64	81.18	9.46	2.60	14.67	4.03
65	0.2056	-3.55	67.83	10.02	2.83	15.26	4.30
70	0.1726	-3.45	56.94	10.56	3.06	15.83	4.58
75	0.1455	-3.37	48.02	11.09	3.29	16.38	4.86
80	0.1232	-3.28	40.66	11.61	3.53	16.92	5.15
85	0.1048	-3.20	34.57	12.11	3.78	17.44	5.45
90	0.0894	-3.12	29.52	12.59	4.03	17.95	5.75
95	0.0767	-3.05	25.30	13.07	4.29	18.45	6.05
100	0.0659	-2.98	21.76	13.53	4.54	18.93	6.36
105	0.0569	-2.91	18.78	13.97	4.81	19.40	6.68
110	0.0493	-2.84	16.27	14.41	5.08	19.86	7.00
115	0.0429	-2.77	14.14	14.84	5.35	20.30	7.32
120	0.0374	-2.71	12.33	15.25	5.63	20.74	7.66
125	0.0327	-2.65	10.79	15.65	5.91	21.16	7.99
130	0.0287	-2.59	9.463	16.05	6.20	21.57	8.34
135	0.0252	-2.53	8.326	16.43	6.49	21.98	8.68
140	0.0223	-2.48	7.347	16.81	6.79	22.37	9.04
145	0.0197	-2.42	6.500	17.17	7.09	22.75	9.40
150	0.0175	-2.37	5.767	17.53	7.40	22.13	9.76

RESISTANCE VALUES AT INTERMEDIATE TEMPERATURES WITH R₂₅ AT 470000 Ω

T _{oper} (°C)	CATALOG NUMBER 2381 615 1.474						
	R _T /R ₂₅	TC (%/K)	R _T (kΩ)	5%TOL. ΔR/R (%)	5%TOL. ΔT (K)	10%TOL. ΔR/R (%)	10%TOL. ΔT (K)
-40	37.1288	-6.79	17450.5	17.16	2.53	22.74	3.35
-35	26.5910	-6.57	12497.8	15.99	2.44	21.52	3.28
-30	19.2505	-6.36	9047.8	14.87	2.34	20.34	3.20
-25	14.0812	-6.15	6618.2	13.79	2.24	19.21	3.12
-20	10.4026	-5.96	4889.2	12.76	2.14	18.13	3.04
-15	7.7582	-5.77	3646.4	11.76	2.04	17.08	2.96
-10	5.8389	-5.60	2744.3	10.80	1.93	16.08	2.87
-5	4.4329	-5.43	2083.5	9.88	1.82	15.11	2.79
0	3.3937	-5.26	1595.0	8.99	1.71	14.18	2.70
5	2.6190	-5.10	1230.93	8.14	1.59	13.29	2.60
10	2.0367	-4.95	957.26	7.31	1.48	12.42	2.51
15	1.5956	-4.81	749.94	6.51	1.35	11.59	2.41
20	1.2589	-4.67	591.68	5.74	1.23	10.78	2.31
25	1.0000	-4.54	470.00	5.00	1.10	10.00	2.20
30	0.7995	-4.41	375.78	5.72	1.30	10.75	2.44
35	0.6433	-4.29	302.34	6.42	1.50	11.48	2.68
40	0.5207	-4.17	244.71	7.09	1.70	12.19	2.92
45	0.4239	-4.06	199.22	7.74	1.91	12.87	3.17
50	0.3470	-3.95	163.08	8.38	2.12	13.54	3.43
55	0.2856	-3.84	134.22	8.99	2.34	14.18	3.69
60	0.2362	-3.74	111.03	9.58	2.56	14.80	3.95
65	0.1964	-3.65	92.30	10.16	2.79	15.41	4.23
70	0.1640	-3.55	77.10	10.72	3.02	15.99	4.50
75	0.1377	-3.46	64.70	11.27	3.25	16.56	4.78
80	0.1160	-3.38	54.53	11.80	3.49	17.12	5.07
85	0.0982	-3.29	46.16	12.31	3.74	17.66	5.36
90	0.0835	-3.21	39.23	12.81	3.99	18.18	5.66
95	0.0712	-3.13	33.48	13.30	4.24	18.69	5.96
100	0.0610	-3.06	28.68	13.77	4.50	19.19	6.27
105	0.0525	-2.99	24.66	14.23	4.77	19.67	6.59
110	0.0453	-2.92	21.27	14.68	5.03	20.14	6.91
115	0.0392	-2.85	18.42	15.12	5.31	20.60	7.23
120	0.0340	-2.78	16.00	15.54	5.58	21.05	7.56
125	0.0297	-2.72	13.94	15.96	5.87	21.48	7.90
130	0.0259	-2.66	12.189	16.36	6.15	21.91	8.24
135	0.0227	-2.60	10.688	16.76	6.45	22.32	8.59
140	0.0200	-2.54	9.398	17.15	6.74	22.72	8.94
145	0.0176	-2.49	8.288	17.52	7.05	23.12	9.30
150	0.0156	-2.43	7.329	17.89	7.35	23.50	9.66



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