





**REVISED RECORD SHEET**

REV. NO	REV. DATE	REVISED CONTENT



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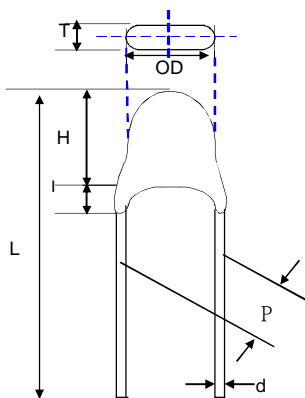
Part Number Code

Example :

**TTC**    **3**    **C**    **103**    **F**    **39H**    **1**    **W11**  
(1)    (2)    (3)    (4)    (5)    (6)    (7)    (8)

No.	Item	Digit	Specification
(1)	Product Type	TTC	Thinking NTC thermistor TTC type
(2)	Body Size	3	Φ4 mm x H 5.0 mm (max.)
(3)	Definition of B Value	C	Refer to "Optional Suffix"
(4)	Zero Power Resistance at 25°C	103	$10 \times 10^3 \Omega = 10K\Omega$
(5)	Tolerance of $R_{25^\circ C}$	F	± 1%
(6)	B Value	39H	Refer to "Optional Suffix"
(7)	Tolerance of B Value	1	Refer to "Optional Suffix"
(8)	Optional Suffix	W11	RoHS+HF compliance B25/100:3988K±1%

Structure and Dimensions



(unit:mm)

Item	D	d	P	H	L	T	I
Max	2.5	0.37	2.3	---	20.5	3	3
Min	----	0.33	1.3	2.3	19.5	1.5	----

Electrical Characteristics

Part No.	Zero Power Resistance at 25°C	Tolerance of $R_{25°C}$	$B_{25/100}$ Value	Tolerance of B Value	Max. Power Dissipation at 25°C	Dissipation Factor	Thermal Time Constant	Operating Temperature Range
	$R_{25°C}$ (K $\Omega$ )	( $\pm$ %)	(K)	( $\pm$ %)	$P_{max}$ (mW)	$\delta$ (mW/°C)	$\tau$ (sec.)	$T_L \sim T_U$ (°C)
TTC3C103F39H1W11	10	1	3988	1	150	$\geq 2.5$	$\leq 18$	-40 ~ +125

**Reliability**

Tests of TTC03 NTC thermistors are based on AEC-Q200 Rev-D.

Table of Test Methods

Item	Standard	Test conditions / Methods	Specifications
High Temperature Exposure (Storage)	MIL-STD-202 Method 108	Test temp.: 150 +3/-0°C Duration: 1000 h Unpowered Measurement at 24±2 hours after test conclusion.	No visible damage $ \Delta R_{25}/R_{25}  \leq 5\%$
Temperature Cycling	JESD22 Method JA-104	1000 Cycles (-55°C to +125°C) Measurement at 24±2 hours after test conclusion. 30min maximum dwell time at each temperature extreme. 1 min. maximum transition time.	No visible damage $ \Delta R_{25}/R_{25}  \leq 5\%$
Biased Humidity	MIL-STD-202 Method 103	1000 hours 85°C/85%RH. 1mW power. Measurement at 24±2 hours after test conclusion.	No visible damage $ \Delta R_{25}/R_{25}  \leq 5\%$
Operational Life	MIL-STD-202 Method 108	Test temp.: 150 +3/-0°C Duration: 1000 h. 1mW power. Measurement at 24±2 hours after test conclusion.	No visible damage $ \Delta R_{25}/R_{25}  \leq 5\%$
External Visual	MIL-STD-883 Method 2009	Inspect device construction, marking and workmanship. Electrical Test not required.	Within the specified values.
Dissipation Factor ( $\delta$ )	Specification	Dissipation factor is ration of thermistor's temperature change caused by its dissipation power under specific ambient temperature. which stands for dissipation power for thermistor's increase of 1°C. $\delta = V \cdot I / T_2 - T_1$ (mW/°C)	$\geq 2.5 \text{ mW/}^\circ\text{C}$
Thermal Time Constant ( $\tau$ )	Specification	The thermal time constant is a 63.2% change of thermistor's body temperature from its initial temperature (T0) to specific temperature (T1) under zero-power conditions.	$\leq 18 \text{ Sec}$

Reliability

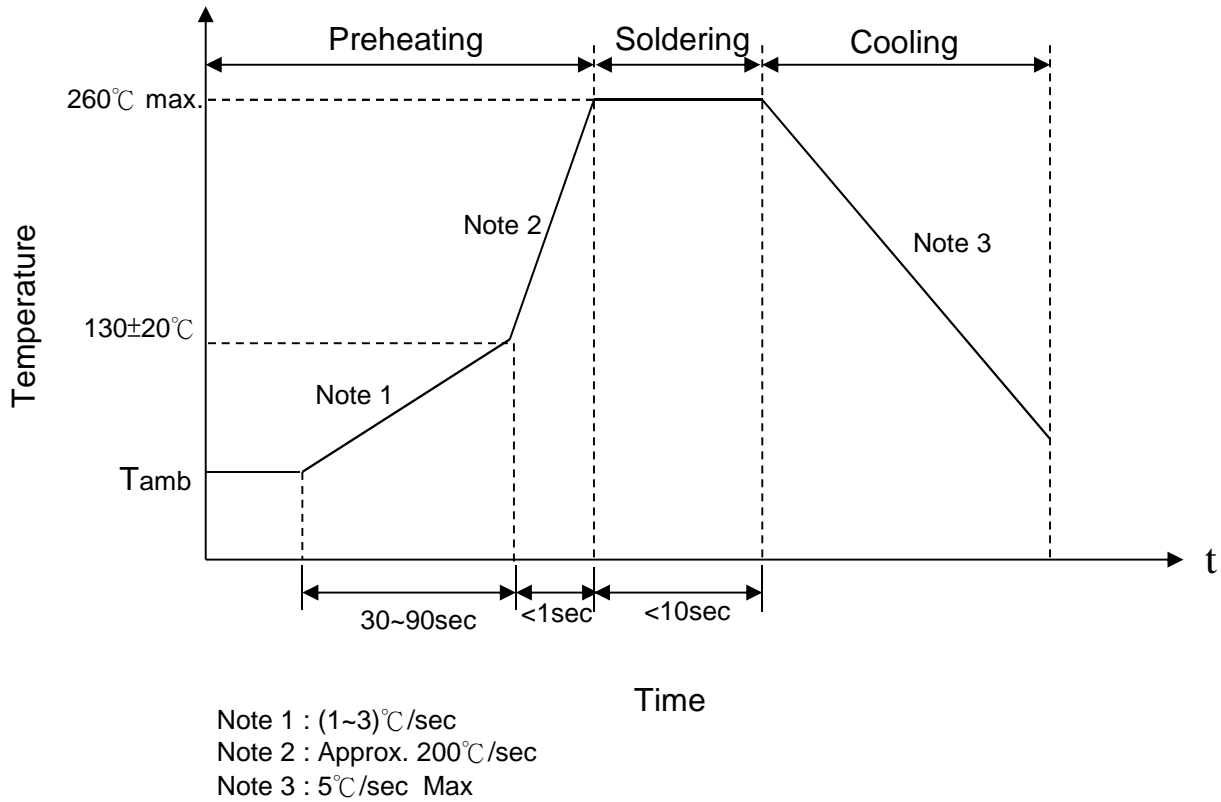
Tests of TTC03 NTC thermistors are based on AEC-Q200 Rev-D.

Table of Test Methods

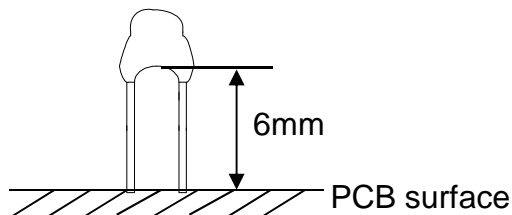
Item	Standard	Test conditions / Methods	Specifications
Physical Dimension	JESD22 Method JB-100	Verify physical dimensions to the applicable device specification.	Within the specified values.
Resistance to Solvents	MIL-STD-202 Method 215	Also aqueous wash chemical - OKEM Clean or equivalent. Do not use banned solvents.	No visible damage.
Mechanical Shock	MIL-STD-202 Method 213	Figure 1 of Method 213 LEADED:Condition C	No visible damage. $ \Delta R_{25}/R_{25}  \leq 5\%$
Vibration	MIL-STD-202 Method 204	5 g's for 20 minutes, 12 cycles each of 3 orientations. Note: Use 8"X5" PCB .031" thick with 7 secure points on one 8" side and 2 secure points on corners of opposite sides. Parts mounted within 2" from any secure point. Test from 10-2000 Hz.	No visible damage. $ \Delta R_{25}/R_{25}  \leq 5\%$
Resistance to Soldering Heat	MIL-STD-202 Method 210	260+/-5°C 10+/-1s,25mm/s+/-6mm/s, 1cycle.	No visible damage. $ \Delta R_{25}/R_{25}  \leq 5\%$
Flammability	UL-94	V-0 or V-1 are acceptable. Electrical test not required.	V-0 or V-1 are acceptable.
ESD	AEC-Q200 -002	Discharge capacitance : 150 pF Charging voltage: 6 kV ,Contact discharge 1 pulse in each polarity	No visible damage $ \Delta R_{25}/R_{25}  \leq 5\%$
Solderability	J-STD-002	Dipping Method Temperature : 235±5°C Time : 2±0.5sec	95% of termination wetted
Electrical Characterization	user spec	R(-40°C) / R(25°C) / R(125°C) B25/85 or B25/50	Within the specified values.
Terminal Strength	MIL-STD-202 Method 211	The terminal shall gradually be bent by 90° in one direction, then 90° in the opposite direction, and again back to the original position for three times.	No visible damage.

## Soldering Recommendation

### Wave Soldering Profile



Caution: It has been better to keep the minimum distance as 6mm between the bottom of the thermistor body and PCB surface to prevent component damage.

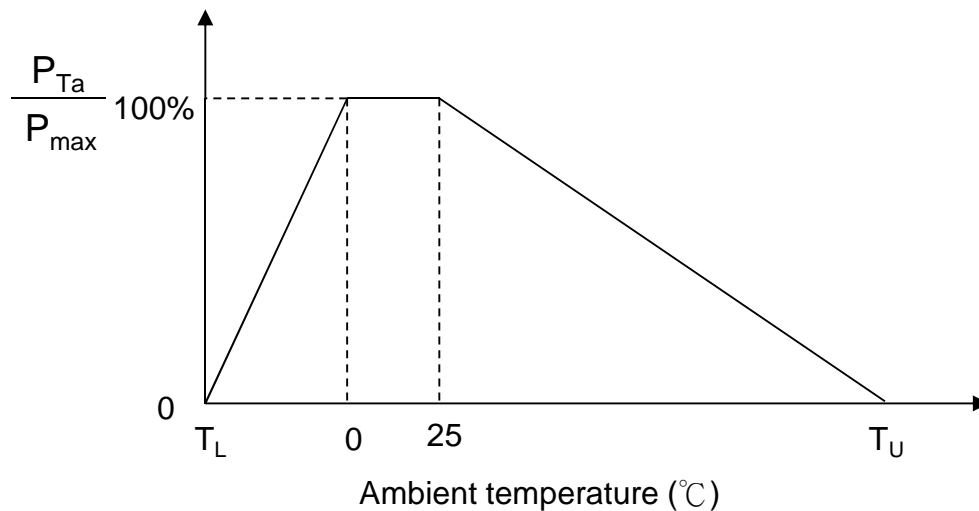


### Recommended Reworking Conditions with Soldering Iron

Item	Conditions
Temperature of Soldering Iron-tip	360°C (max.)
Soldering Time	3 sec (max.)
Distance from Thermistor	6 mm (min.)



### Max. Power Dissipation Derating Curve



Note:  $T_L$  = Minimum operating temperature (°C)

$T_U$  = Maximum operating temperature (°C)

For example :

Ambient temperature( $T_a$ ) = 55°C

Maximum operating temperature( $T_u$ ) = 125°C

$P_{Ta} = (T_u - T_a) / (T_u - 25) \times P_{max} = 70\% P_{max}$

### RoHS Compliant Declaration

We hereby declare that the components delivered to your company are compliant with RoHS directive 2015/863/EU.

### Warehouse Storage Conditions of Products

(I) Storage Conditions :

1. Storage Temperature : -10°C ~ +40°C
2. Relative Humidity :  $\leq 75\%RH$
3. Keep away from corrosive atmosphere and sunlight

(II) Period of Storage : 1 year

Safety Approvals (Certified Model/Type : TTC03-103)

\* UL 1434 / cUL recognized (File # E138827)



\* CQC GB/T 6663.1-2007 recognized (File# CQC04001011945)

\* CQC GB6663-86 recognized (File# CQC04001011966)



\* TÜV recognized (File # R 50050155)

Note: Application temperature of Safety Regulation : (-40 ~ 125°C)

Certificates

- (1) IATF 16949 certificate
- (2) ISO 9001 certificate

Test Report

- (1) RoHS test report
- (2) Halogen-free test report



R - T Table

Part No. : TTC3C103F39H1W11

R25=10KOhm ±1%

B25/100 = 3988 K ± 1%

Temperature (°C)	Rmax. (KΩ)	Rnor. (KΩ)	Rmin. (KΩ)	Temperature Tol. (°C)		Resistance Tol. (%)	
-40	338.310	323.515	309.336	-0.68	0.70	4.6%	-4.4%
-39	316.907	303.244	290.141	-0.67	0.69	4.5%	-4.3%
-38	296.977	284.356	272.245	-0.67	0.69	4.4%	-4.3%
-37	278.405	266.744	255.546	-0.66	0.68	4.4%	-4.2%
-36	261.089	250.312	239.957	-0.66	0.68	4.3%	-4.1%
-35	244.938	234.976	225.397	-0.65	0.67	4.2%	-4.1%
-34	229.869	220.659	211.797	-0.64	0.66	4.2%	-4.0%
-33	215.807	207.290	199.089	-0.64	0.66	4.1%	-4.0%
-32	202.683	194.805	187.214	-0.63	0.65	4.0%	-3.9%
-31	190.431	183.142	176.115	-0.62	0.64	4.0%	-3.8%
-30	178.992	172.247	165.739	-0.62	0.64	3.9%	-3.8%
-29	168.310	162.066	156.038	-0.61	0.63	3.9%	-3.7%
-28	158.330	152.549	146.964	-0.61	0.63	3.8%	-3.7%
-27	149.005	143.650	138.474	-0.60	0.62	3.7%	-3.6%
-26	140.286	135.326	130.527	-0.60	0.62	3.7%	-3.5%
-25	132.132	127.536	123.087	-0.59	0.61	3.6%	-3.5%
-24	124.502	120.242	116.116	-0.58	0.60	3.5%	-3.4%
-23	117.359	113.409	109.582	-0.58	0.60	3.5%	-3.4%
-22	110.668	107.006	103.454	-0.57	0.59	3.4%	-3.3%
-21	104.397	101.000	97.7045	-0.57	0.58	3.4%	-3.3%
-20	98.5162	95.3658	92.3068	-0.56	0.58	3.3%	-3.2%
-19	92.9990	90.0763	87.2368	-0.55	0.57	3.2%	-3.2%
-18	87.8200	85.1084	82.4722	-0.55	0.56	3.2%	-3.1%
-17	82.9562	80.4401	77.9926	-0.54	0.56	3.1%	-3.0%
-16	78.3864	76.0516	73.7790	-0.53	0.55	3.1%	-3.0%
-15	74.0911	71.9244	69.8140	-0.52	0.54	3.0%	-2.9%
-14	70.0522	68.0413	66.0816	-0.52	0.54	3.0%	-2.9%
-13	66.2532	64.3869	62.5669	-0.51	0.53	2.9%	-2.8%
-12	62.6786	60.9465	59.2563	-0.50	0.52	2.8%	-2.8%
-11	59.3143	57.7067	56.1370	-0.50	0.51	2.8%	-2.7%
-10	56.1472	54.6551	53.1973	-0.49	0.51	2.7%	-2.7%
-9	53.1650	51.7801	50.4262	-0.48	0.50	2.7%	-2.6%
-8	50.3563	49.0709	47.8136	-0.47	0.49	2.6%	-2.6%
-7	47.7105	46.5175	45.3498	-0.47	0.49	2.6%	-2.5%
-6	45.2178	44.1106	43.0262	-0.46	0.48	2.5%	-2.5%
-5	42.8688	41.8412	40.8342	-0.45	0.47	2.5%	-2.4%
-4	40.6550	39.7013	38.7660	-0.45	0.46	2.4%	-2.4%
-3	38.5680	37.6829	36.8145	-0.44	0.46	2.3%	-2.3%
-2	36.6004	35.7790	34.9725	-0.43	0.45	2.3%	-2.3%
-1	34.7449	33.9826	33.2338	-0.42	0.44	2.2%	-2.2%



R - T Table

Part No. : TTC3C103F39H1W11

R25=10KOhm ±1%

B25/100 = 3988 K ± 1%

Temperature (°C)	Rmax. (KΩ)	Rnor. (KΩ)	Rmin. (KΩ)	Temperature Tol. (°C)		Resistance Tol. (%)	
0	32.9948	32.2874	31.5921	-0.42	0.43	2.2%	-2.2%
1	31.3436	30.6873	30.0417	-0.41	0.43	2.1%	-2.1%
2	29.7855	29.1765	28.5771	-0.40	0.42	2.1%	-2.1%
3	28.3149	27.7498	27.1934	-0.40	0.41	2.0%	-2.0%
4	26.9263	26.4022	25.8856	-0.39	0.41	2.0%	-2.0%
5	25.6149	25.1287	24.6492	-0.38	0.40	1.9%	-1.9%
6	24.3760	23.9250	23.4801	-0.37	0.39	1.9%	-1.9%
7	23.2052	22.7870	22.3741	-0.37	0.38	1.8%	-1.8%
8	22.0983	21.7105	21.3274	-0.36	0.38	1.8%	-1.8%
9	21.0515	20.6920	20.3367	-0.35	0.37	1.7%	-1.7%
10	20.0611	19.7280	19.3984	-0.35	0.36	1.7%	-1.7%
11	19.1237	18.8151	18.5096	-0.34	0.35	1.6%	-1.6%
12	18.2362	17.9503	17.6672	-0.33	0.35	1.6%	-1.6%
13	17.3955	17.1308	16.8685	-0.32	0.34	1.5%	-1.5%
14	16.5989	16.3539	16.1109	-0.32	0.33	1.5%	-1.5%
15	15.8436	15.6170	15.3920	-0.31	0.32	1.5%	-1.4%
16	15.1273	14.9178	14.7096	-0.30	0.31	1.4%	-1.4%
17	14.4477	14.2540	14.0616	-0.29	0.31	1.4%	-1.4%
18	13.8026	13.6237	13.4458	-0.28	0.30	1.3%	-1.3%
19	13.1899	13.0249	12.8606	-0.28	0.29	1.3%	-1.3%
20	12.6080	12.4557	12.3041	-0.27	0.28	1.2%	-1.2%
21	12.0548	11.9146	11.7748	-0.26	0.27	1.2%	-1.2%
22	11.5290	11.3999	11.2711	-0.25	0.26	1.1%	-1.1%
23	11.0288	10.9101	10.7916	-0.24	0.25	1.1%	-1.1%
24	10.5529	10.4439	10.3350	-0.23	0.25	1.0%	-1.0%
25	10.1000	10.0000	9.90000	-0.23	0.24	1.0%	-1.0%
26	9.67711	9.57716	9.47729	-0.24	0.25	1.0%	-1.0%
27	9.27400	9.17426	9.07470	-0.25	0.26	1.1%	-1.1%
28	8.88961	8.79026	8.69114	-0.26	0.27	1.1%	-1.1%
29	8.52299	8.42414	8.32561	-0.27	0.28	1.2%	-1.2%
30	8.17320	8.07499	7.97717	-0.28	0.29	1.2%	-1.2%
31	7.83939	7.74193	7.64492	-0.29	0.31	1.3%	-1.3%
32	7.52075	7.42415	7.32804	-0.30	0.32	1.3%	-1.3%
33	7.21653	7.12086	7.02575	-0.32	0.33	1.3%	-1.3%
34	6.92600	6.83134	6.73730	-0.33	0.34	1.4%	-1.4%
35	6.64848	6.55491	6.46201	-0.34	0.35	1.4%	-1.4%
36	6.38336	6.29093	6.19922	-0.35	0.36	1.5%	-1.5%
37	6.13002	6.03879	5.94832	-0.36	0.38	1.5%	-1.5%
38	5.88789	5.79791	5.70873	-0.37	0.39	1.6%	-1.5%
39	5.65645	5.56775	5.47988	-0.39	0.40	1.6%	-1.6%

R - T Table

Part No. : TTC3C103F39H1W11

R25=10KOhm ±1%

B25/100 = 3988 K ± 1%

Temperature (°C)	Rmax. (KΩ)	Rnor. (KΩ)	Rmin. (KΩ)	Temperature Tol. (°C)		Resistance Tol. (%)	
40	5.43518	5.34779	5.26128	-0.40	0.41	1.6%	-1.6%
41	5.22361	5.13756	5.05242	-0.41	0.42	1.7%	-1.7%
42	5.02128	4.93659	4.85285	-0.42	0.44	1.7%	-1.7%
43	4.82775	4.74444	4.66210	-0.43	0.45	1.8%	-1.7%
44	4.64261	4.56070	4.47978	-0.45	0.46	1.8%	-1.8%
45	4.46549	4.38498	4.30548	-0.46	0.47	1.8%	-1.8%
46	4.29599	4.21689	4.13883	-0.47	0.49	1.9%	-1.9%
47	4.13379	4.05609	3.97946	-0.48	0.50	1.9%	-1.9%
48	3.97852	3.90224	3.82703	-0.50	0.51	2.0%	-1.9%
49	3.82989	3.75501	3.68122	-0.51	0.52	2.0%	-2.0%
50	3.68757	3.61409	3.54172	-0.52	0.54	2.0%	-2.0%
51	3.55129	3.47921	3.40824	-0.53	0.55	2.1%	-2.0%
52	3.42077	3.35006	3.28049	-0.55	0.56	2.1%	-2.1%
53	3.29574	3.22640	3.15821	-0.56	0.58	2.1%	-2.1%
54	3.17595	3.10797	3.04114	-0.57	0.59	2.2%	-2.2%
55	3.06116	2.99453	2.92905	-0.59	0.60	2.2%	-2.2%
56	2.95115	2.88584	2.82169	-0.60	0.62	2.3%	-2.2%
57	2.84569	2.78169	2.71886	-0.61	0.63	2.3%	-2.3%
58	2.74457	2.68187	2.62034	-0.63	0.64	2.3%	-2.3%
59	2.64761	2.58618	2.52593	-0.64	0.66	2.4%	-2.3%
60	2.55460	2.49443	2.43544	-0.66	0.67	2.4%	-2.4%
61	2.46538	2.40645	2.34869	-0.67	0.68	2.4%	-2.4%
62	2.37976	2.32205	2.26550	-0.68	0.70	2.5%	-2.4%
63	2.29759	2.24107	2.18572	-0.70	0.71	2.5%	-2.5%
64	2.21870	2.16336	2.10919	-0.71	0.73	2.6%	-2.5%
65	2.14295	2.08877	2.03575	-0.73	0.74	2.6%	-2.5%
66	2.07020	2.01715	1.96527	-0.74	0.75	2.6%	-2.6%
67	2.00031	1.94838	1.89760	-0.76	0.77	2.7%	-2.6%
68	1.93315	1.88231	1.83263	-0.77	0.78	2.7%	-2.6%
69	1.86861	1.81884	1.77022	-0.78	0.80	2.7%	-2.7%
70	1.80655	1.75784	1.71027	-0.80	0.81	2.8%	-2.7%
71	1.74688	1.69920	1.65266	-0.81	0.83	2.8%	-2.7%
72	1.68949	1.64282	1.59728	-0.83	0.84	2.8%	-2.8%
73	1.63427	1.58860	1.54404	-0.84	0.85	2.9%	-2.8%
74	1.58114	1.53643	1.49284	-0.86	0.87	2.9%	-2.8%
75	1.52999	1.48624	1.44359	-0.87	0.88	2.9%	-2.9%
76	1.48075	1.43793	1.39620	-0.89	0.90	3.0%	-2.9%
77	1.43332	1.39142	1.35060	-0.90	0.91	3.0%	-2.9%
78	1.38764	1.34663	1.30670	-0.92	0.93	3.0%	-3.0%
79	1.34363	1.30350	1.26444	-0.93	0.94	3.1%	-3.0%



R - T Table

Part No. : TTC3C103F39H1W11

R25=10KOhm ±1%

B25/100 = 3988 K ± 1%

Temperature (°C)	Rmax. (KΩ)	Rnor. (KΩ)	Rmin. (KΩ)	Temperature Tol. (°C)		Resistance Tol. (%)	
80	1.30122	1.26194	1.22373	-0.95	0.95	3.1%	-3.0%
81	1.26034	1.22190	1.18452	-0.96	0.97	3.1%	-3.1%
82	1.22092	1.18331	1.14674	-0.97	0.98	3.2%	-3.1%
83	1.18291	1.14610	1.11033	-0.99	1.00	3.2%	-3.1%
84	1.14625	1.11023	1.07523	-1.00	1.01	3.2%	-3.2%
85	1.11089	1.07563	1.04140	-1.02	1.03	3.3%	-3.2%
86	1.07676	1.04226	1.00877	-1.03	1.04	3.3%	-3.2%
87	1.04383	1.01007	0.97730	-1.05	1.05	3.3%	-3.2%
88	1.01203	0.97900	0.94695	-1.06	1.07	3.4%	-3.3%
89	0.98134	0.94901	0.91766	-1.08	1.08	3.4%	-3.3%
90	0.95171	0.92007	0.88940	-1.09	1.10	3.4%	-3.3%
91	0.92309	0.89213	0.86212	-1.11	1.11	3.5%	-3.4%
92	0.89545	0.86515	0.83579	-1.12	1.13	3.5%	-3.4%
93	0.86875	0.83909	0.81037	-1.14	1.14	3.5%	-3.4%
94	0.84295	0.81393	0.78583	-1.15	1.16	3.6%	-3.5%
95	0.81803	0.78962	0.76213	-1.17	1.17	3.6%	-3.5%
96	0.79394	0.76614	0.73924	-1.18	1.19	3.6%	-3.5%
97	0.77066	0.74345	0.71714	-1.20	1.20	3.7%	-3.5%
98	0.74816	0.72153	0.69578	-1.21	1.22	3.7%	-3.6%
99	0.72641	0.70035	0.67516	-1.23	1.23	3.7%	-3.6%
100	0.70539	0.67988	0.65523	-1.25	1.25	3.8%	-3.6%
101	0.68506	0.66009	0.63597	-1.26	1.26	3.8%	-3.7%
102	0.66541	0.64097	0.61736	-1.28	1.28	3.8%	-3.7%
103	0.64641	0.62248	0.59938	-1.29	1.29	3.8%	-3.7%
104	0.62803	0.60461	0.58200	-1.31	1.31	3.9%	-3.7%
105	0.61026	0.58733	0.56521	-1.33	1.32	3.9%	-3.8%
106	0.59308	0.57063	0.54897	-1.34	1.34	3.9%	-3.8%
107	0.57646	0.55448	0.53328	-1.36	1.36	4.0%	-3.8%
108	0.56038	0.53886	0.51812	-1.38	1.37	4.0%	-3.8%
109	0.54483	0.52376	0.50345	-1.40	1.39	4.0%	-3.9%
110	0.52979	0.50916	0.48928	-1.41	1.41	4.1%	-3.9%
111	0.51524	0.49504	0.47557	-1.43	1.42	4.1%	-3.9%
112	0.50117	0.48138	0.46232	-1.45	1.44	4.1%	-4.0%
113	0.48755	0.46817	0.44951	-1.47	1.46	4.1%	-4.0%
114	0.47437	0.45539	0.43712	-1.49	1.48	4.2%	-4.0%
115	0.46162	0.44303	0.42514	-1.50	1.50	4.2%	-4.0%
116	0.44928	0.43107	0.41355	-1.52	1.51	4.2%	-4.1%
117	0.43734	0.41950	0.40234	-1.54	1.53	4.3%	-4.1%
118	0.42579	0.40830	0.39150	-1.56	1.55	4.3%	-4.1%
119	0.41460	0.39747	0.38101	-1.58	1.57	4.3%	-4.1%

