

Chip NTC Thermistor Datasheet

Features

- Leadless , Size 0402
- SMD type suitable for high density mounting
- B constant tolerance $\pm 1\%$
- Excellent solder ability
- Operating temperature: -40°C to $+125^{\circ}\text{C}$
- RoHS compliant & Lead-Free & Halogen Free

Applications

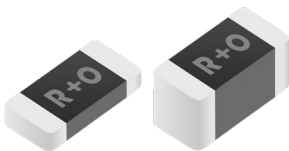
- Consumer Electronics, mobile phone, wearable device, TWS headphones, etc.
- Office automation such as printer , facsimile,word processor, etc.
- Industrial Power Supplies
- Medical Electronics
- IoT Sensor Nodes

Part Number Code

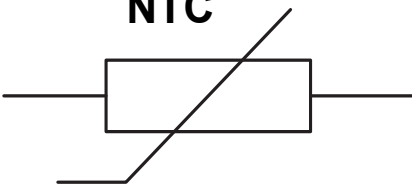
H NTC - F F B
① ② ③ ④ ⑤ ⑥ ⑦ ⑧

- ① “HJC” Brand Code
- ② Chip NTC Thermistor
- ③ Chip Size/package
- ④ Rated Zero-Power Resistance : 103=10000Ω, 503=50000Ω, 104=100000Ω
- ⑤ Resistance Tolerance F: 1% G: 2% H: 3% J:5%
- ⑥ B Constant
- ⑦ B Constant Tolerance F: 1% H: 3%
- ⑧ B Constant calculation method A: 25°C/85°C B: 25°C/50°C

HNTC0402 Series

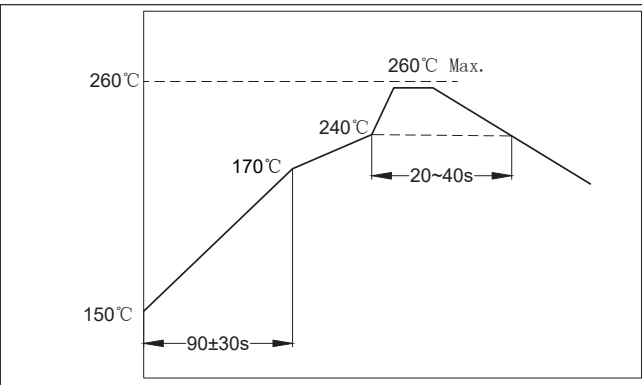


NTC



Recommended Soldering Conditions

Reflow Soldering Recommendation



Profile Feature		Condition
Pre-heat	Temperature Min	+150°C
	Temperature Max	+170°C
	Pre-heat Time	90±30 secs.
ramp up rate		3°C /sec. Max
Time above 240°C		20~40 secs
Peak Temperature		+260°C, 10 secs. Max
Ramp-down Rate		6°C /sec. Max
Time 25°C to Peak Temp (T _p)		8 min. Max
Do not exceed		+260°C

Iron Soldering Recommendation

Item	Conditions
Temperature of Soldering Iron-tip	280°C Max
Soldering Time	3 secs. Max
Times for iron soldering	1 time Max
Note: Take care not to apply the tip of the soldering iron to the terminal electrodes.	

Electrical Characteristics (Ta=25°C Unless otherwise specified)

PARAMETER	CONDITION	VALUE	UNIT
Rated Zero-Power Resistance	T _a =25°C ±0.1°C	10±1%	KΩ
B Constant (Material Constant)	25°C /50°C	3950±1%	K
Permissible Operating Current	T _a =25°C ±0.1°C	0.31	mA
Thermal Dissipation Constant	T _a =25°C ±0.1°C	1.0	mW/°C
Thermal Time Constant	T _a =25°C ±0.1°C	< 3	sec
Rated Electric Power	T _a =25°C ±0.1°C	100	mW
Operating Temperature Range	/	-40 to + 125	°C

Test and Measurement Procedures

Unless otherwise specified, the standard atmospheric conditions for measurement/test as:

Items	Condition
Ambient Temperature:	20±15°C
Relative Humidity:	65±20%
Air Pressure:	86kPa to 106kPa

Inspection Equipment
1.Visual Examination: 20× magnifier
2.Resistance value test: Thermistor resistance tester

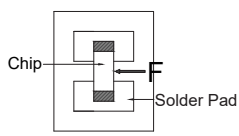
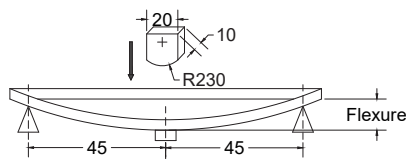
If any doubt on the results, measurements/tests should be made within the following limits:

Items	Condition
Ambient Temperature:	25±2°C
Relative Humidity:	65±5%
Air Pressure:	86kPa to 106kPa

Electrical Test

Items	Test Methods and Remarks
Nominal Zero-Power Resistance at 25°C	Ambient temperature: 25±0.05°C ; Measuring electric power: ≤ 0.1mW
Nominal B Constant	Measure the resistance at the ambient temperature of 25±0.05°C , 50±0.05°C or 85±0.05°C . $B(25/50^{\circ}C) = \frac{\ln R_{25} - \ln R_{50}}{1/T_{25} - 1/T_{50}} \quad B(25/85^{\circ}C) = \frac{\ln R_{25} - \ln R_{85}}{1/T_{25} - 1/T_{85}}$
Thermal Time Constant	The total time for the temperature of the thermistor to change by 63.2% of the difference from ambient temperature T0 (°C) to T1 (°C) by the drastic change of the power applied to thermistor from Non-zero Power to Zero-Power state, normally expressed in second(S)
Dissipation Factor	The required power which makes the NTC thermistor body temperature raise 1 °C through self-heated, normally expressed in milliwatts per degree Celsius (mW/°C). It can be calculated by the following formula:
Rated Power	The necessary electric power makes thermistor' s temperature rise 100°C by self-heating at ambient temperature 25°C .
Permissible operating current	The current that keep body temperature of chip NTC on the PC board in still air rising 1° C by self-heating.

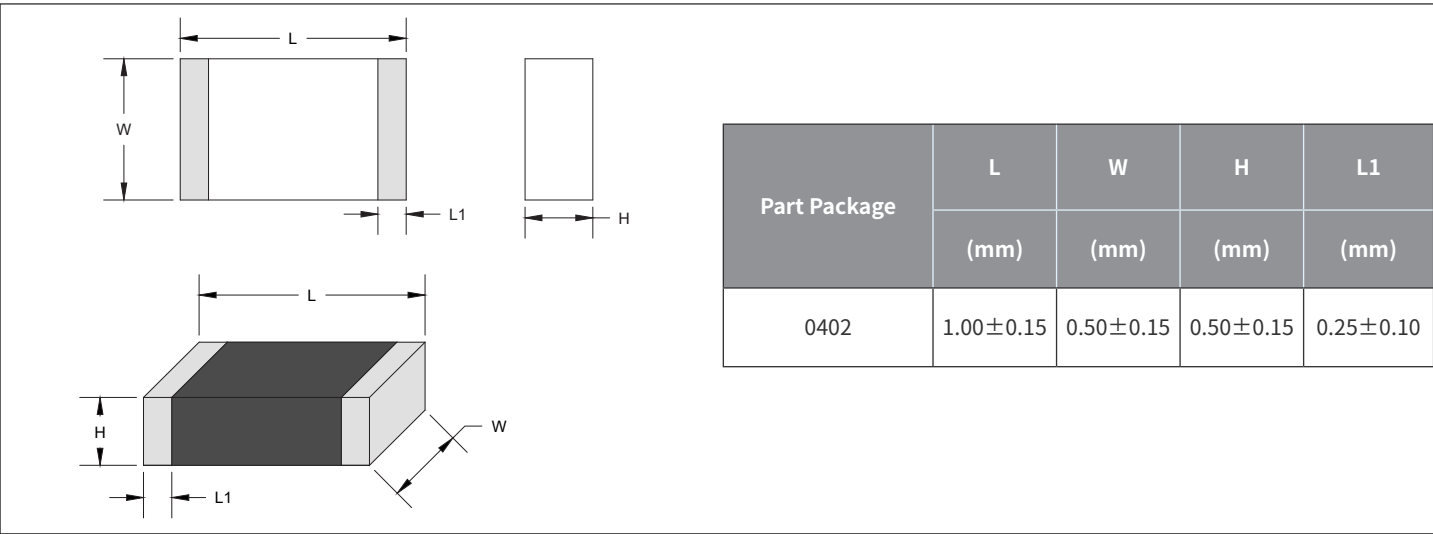
● Reliability Test

Items	Standard	Test Methods and Remarks	Requirements															
Terminal Strength	IEC 60068-2-21	Solder the chip to the testing jig using eutectic solder. Then apply a force in the direction of the arrow. <table><tr><th>Size</th><th>F</th><th>Duration</th></tr><tr><td>0402, 0603</td><td>5N</td><td>10±1s</td></tr><tr><td>0805</td><td>10N</td><td>10±1s</td></tr></table>	Size	F	Duration	0402, 0603	5N	10±1s	0805	10N	10±1s	No removal or split of the termination or other defects shall occur. 						
Size	F	Duration																
0402, 0603	5N	10±1s																
0805	10N	10±1s																
Resistance to Flexure	IEC 60068-2-21	Solder the chip to the test jig (glass epoxy board shown in the right) using a eutectic solder. Then apply a force in the direction shown as follow;  <table><tr><th>Size</th><th>Flexure</th><th>Speed</th><th>Duration</th></tr><tr><td>0402, 0603</td><td>1mm</td><td>< 0.5mm/s</td><td>10±1s</td></tr><tr><td>0805</td><td>2mm</td><td>< 0.5mm/s</td><td>10±1s</td></tr></table>	Size	Flexure	Speed	Duration	0402, 0603	1mm	< 0.5mm/s	10±1s	0805	2mm	< 0.5mm/s	10±1s	No visible damage. Δ R25/R25 ≤ 5%			
Size	Flexure	Speed	Duration															
0402, 0603	1mm	< 0.5mm/s	10±1s															
0805	2mm	< 0.5mm/s	10±1s															
Dropping	IEC 60068-2-32	Drop a chip 10 times on a concrete floor from a height of 1 meter.	No visible damage.															
Solderability	IEC 60068-2-58	1. Solder temperature: 245±5°C 2. Duration: 3±0.3s 3. Solder: Sn/3.0Ag/0.5Cu 4. 25% Resin and 75% ethanol in weight	No visible damage Wetting shall exceed 95% coverage.															
Resistance to Soldering Heat	IEC 60068-2-58	1. Solder temperature: 260±5°C 2. Duration: 10±1s 3. Solder: Sn/3.0Ag/0.5Cu 4. 25% Resin and 75% ethanol in weight 5. The chip shall be stabilized at normal condition for 1~2 hours before measuring	No visible damage. Δ R25/R25 ≤ 5% Δ B/B ≤ 2%															
Temperature cycling	IEC 60068-2-14	1. 5 cycles of following sequence without loading. <table><tr><th>Step</th><th>Temperature</th><th>Period</th></tr><tr><td>1</td><td>-40±5°C</td><td>30±3min</td></tr><tr><td>2</td><td>Room Temperature</td><td>5±3min</td></tr><tr><td>3</td><td>125±2°C</td><td>30±3min</td></tr><tr><td>4</td><td>Room Temperature</td><td>5±3min</td></tr></table> 2. The chip shall be stabilized at normal condition for 1~2 hours before measuring.	Step	Temperature	Period	1	-40±5°C	30±3min	2	Room Temperature	5±3min	3	125±2°C	30±3min	4	Room Temperature	5±3min	No visible damage Δ R25/R25 ≤ 3% Δ B/B ≤ 2%
Step	Temperature	Period																
1	-40±5°C	30±3min																
2	Room Temperature	5±3min																
3	125±2°C	30±3min																
4	Room Temperature	5±3min																
Resistance to dry heat	IEC 60068-2-2	1. 125±5°C in air, for 1000±24 hours without loading 2. The chip shall be stabilized at normal condition for 1~2 hours before measuring	No visible damage. Δ R25/R25 ≤ 5% Δ B/B ≤ 2%															
Resistance to cold	IEC 60068-2- 1	1. -40±3°C in air, for 1000±24 hours without loading. 2. The chip shall be stabilized at normal condition for 1~2 hours before measuring.	No visible damage. Δ R25/R25 ≤ 5% Δ B/B ≤ 2%															
Resistance to damp heat	IEC 60068-2-78	1. 40±2°C , 90~95%RH in air, for 1000±24 hours without loading 2. The chip shall be stabilized at normal condition for 1~2 hours before measuring.	No visible damage. Δ R25/R25 ≤ 3% Δ B/B ≤ 2%															
Resistance to high temperature load	IEC 60539-1 5.25.4	1. 85±2°C in air with permissive operating current for 1000±48 hours 2. The chip shall be stabilized at normal condition for 1~2 hours before measuring	No visible damage. Δ R25/R25 ≤ 5% Δ B/B ≤ 2%															

● Environmental Specification

Storage temperature:	-10°C to +40°C
Storage Conditions:	Light-proof, Hermetically Sealed, Moisture-proof; The components should be left in their original packing to avoid soldering problems due to oxidized contacts.
Relative humidity:	< 75 % RH
Storage period	The components should be employed within 6 months after delivery

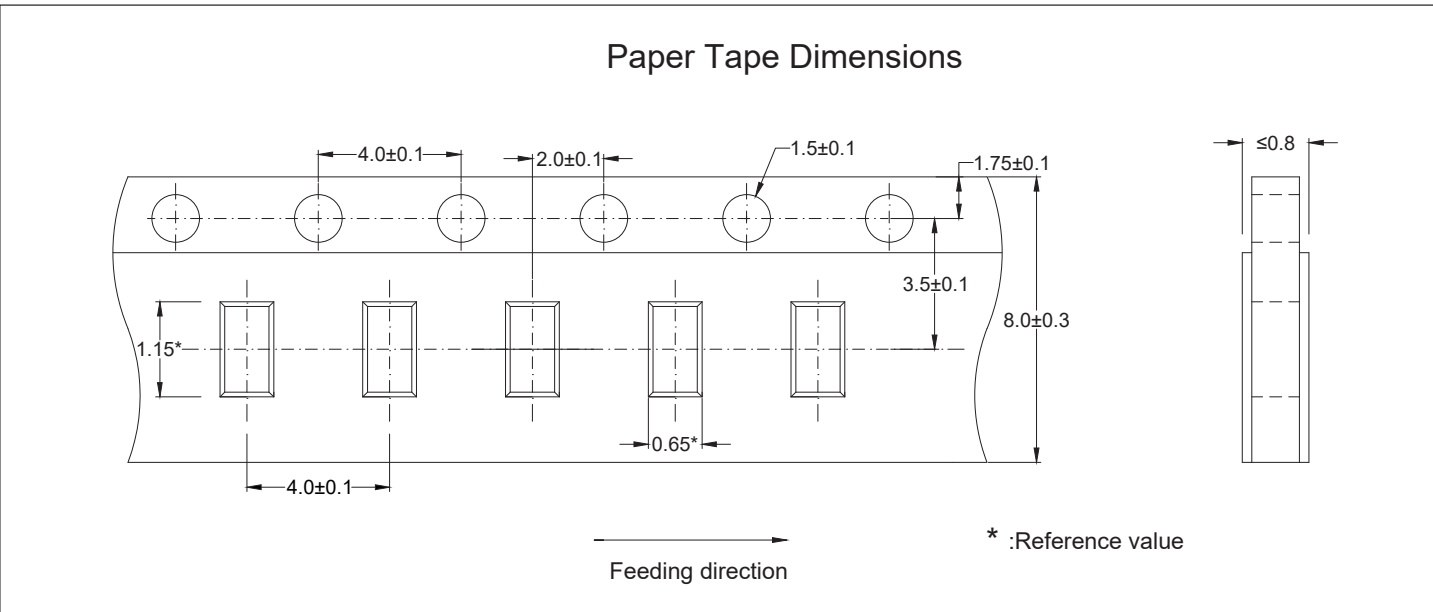
● Physical Dimensions



● Ordering Information

PACKAGE	Part Number	DELIVERY MODE	MPQ(PCS)
0402	HNTC0402-103F3950FB	7" REEL	10,000

● Packaging Information



● R-T Chart

Temp.(°C)	R_Min(KΩ)	R_Typ(KΩ)	R_Max(KΩ)	R_Tolerance	Temp._Tolerance(°C)
-40	329.927	345.275	361.300	4.64%	0.67
-39	308.651	322.791	337.545	4.57%	0.66
-38	288.892	301.925	315.514	4.50%	0.66
-37	270.532	282.549	295.071	4.43%	0.65
-36	253.464	264.549	276.091	4.36%	0.65
-35	237.587	247.816	258.459	4.29%	0.64
-34	222.812	232.254	242.072	4.23%	0.64
-33	209.055	217.774	226.833	4.16%	0.63
-32	196.239	204.292	212.655	4.09%	0.63
-31	184.293	191.735	199.457	4.03%	0.62
-30	173.153	180.032	187.165	3.96%	0.61
-29	162.760	169.120	175.711	3.90%	0.61
-28	153.059	158.941	165.033	3.83%	0.60
-27	144.000	149.441	155.073	3.77%	0.60
-26	135.535	140.571	145.779	3.71%	0.59
-25	127.622	132.284	137.102	3.64%	0.59
-24	120.207	124.522	128.979	3.58%	0.58
-23	113.270	117.266	121.391	3.52%	0.58
-22	106.779	110.480	114.298	3.46%	0.57
-21	100.701	104.130	107.664	3.39%	0.56
-20	95.008	98.185	101.459	3.33%	0.56
-19	89.674	92.618	95.650	3.27%	0.55
-18	84.672	87.402	90.211	3.21%	0.55
-17	79.982	82.513	85.115	3.15%	0.54
-16	75.580	77.927	80.339	3.10%	0.53
-15	71.449	73.626	75.861	3.04%	0.53
-14	67.569	69.588	71.661	2.98%	0.52
-13	63.924	65.797	67.719	2.92%	0.51
-12	60.498	62.237	64.019	2.86%	0.51
-11	57.277	58.890	60.543	2.81%	0.50
-10	54.247	55.744	57.278	2.75%	0.49
-9	51.396	52.786	54.208	2.69%	0.49
-8	48.712	50.002	51.322	2.64%	0.48
-7	46.184	47.382	48.606	2.58%	0.47
-6	43.803	44.916	46.051	2.53%	0.47
-5	41.559	42.592	43.646	2.47%	0.46
-4	39.441	40.400	41.377	2.42%	0.45
-3	37.443	38.333	39.240	2.37%	0.45
-2	35.559	36.385	37.227	2.31%	0.44
-1	33.781	34.548	35.328	2.26%	0.43
0	32.102	32.814	33.538	2.21%	0.43
1	30.518	31.179	31.851	2.16%	0.42
2	29.022	29.636	30.259	2.10%	0.41
3	27.608	28.178	28.756	2.05%	0.40
4	26.271	26.800	27.336	2.00%	0.40
5	25.007	25.497	25.994	1.95%	0.39
6	23.808	24.263	24.724	1.90%	0.38

● R-T Chart

Temp.(°C)	R_Min(KΩ)	R_Typ(KΩ)	R_Max(KΩ)	R_Tolerance	Temp._Tolerance(°C)
7	22.674	23.096	23.523	1.85%	0.37
8	21.601	21.992	22.387	1.80%	0.37
9	20.584	20.947	21.313	1.75%	0.36
10	19.622	19.958	20.297	1.70%	0.35
11	18.711	19.022	19.336	1.65%	0.34
12	17.847	18.135	18.425	1.60%	0.33
13	17.028	17.294	17.563	1.55%	0.33
14	16.251	16.498	16.746	1.51%	0.32
15	15.514	15.742	15.972	1.46%	0.31
16	14.814	15.025	15.237	1.41%	0.30
17	14.150	14.345	14.541	1.37%	0.29
18	13.519	13.699	13.880	1.32%	0.29
19	12.921	13.086	13.253	1.27%	0.28
20	12.351	12.504	12.657	1.23%	0.27
21	11.811	11.951	12.092	1.18%	0.26
22	11.296	11.426	11.555	1.13%	0.25
23	10.808	10.926	11.045	1.09%	0.24
24	10.342	10.452	10.561	1.04%	0.24
25	9.900	10.000	10.100	1.00%	0.23
26	9.471	9.570	9.670	1.04%	0.24
27	9.062	9.162	9.261	1.09%	0.25
28	8.673	8.773	8.872	1.13%	0.26
29	8.304	8.402	8.501	1.18%	0.27
30	7.952	8.049	8.147	1.22%	0.29
31	7.616	7.713	7.811	1.26%	0.30
32	7.297	7.393	7.490	1.31%	0.31
33	6.993	7.088	7.184	1.35%	0.32
34	6.703	6.797	6.892	1.39%	0.33
35	6.427	6.520	6.613	1.43%	0.35
36	6.164	6.255	6.348	1.47%	0.36
37	5.913	6.003	6.094	1.52%	0.37
38	5.673	5.762	5.852	1.56%	0.38
39	5.445	5.532	5.621	1.60%	0.40
40	5.226	5.313	5.400	1.64%	0.41
41	5.018	5.103	5.189	1.68%	0.42
42	4.819	4.903	4.987	1.72%	0.43
43	4.629	4.711	4.795	1.76%	0.45
44	4.448	4.529	4.610	1.80%	0.46
45	4.274	4.354	4.434	1.84%	0.47
46	4.109	4.187	4.266	1.88%	0.49
47	3.951	4.027	4.104	1.92%	0.50
48	3.799	3.874	3.950	1.96%	0.51
49	3.655	3.728	3.803	2.00%	0.53
50	3.516	3.588	3.661	2.04%	0.54
51	3.384	3.454	3.526	2.08%	0.55
52	3.257	3.326	3.396	2.12%	0.57
53	3.135	3.203	3.272	2.16%	0.58

● R-T Chart

Temp.(°C)	R_Min(KΩ)	R_Typ(KΩ)	R_Max(KΩ)	R_Tolerance	Temp._Tolerance(°C)
54	3.019	3.086	3.153	2.19%	0.59
55	2.908	2.973	3.039	2.23%	0.61
56	2.801	2.865	2.930	2.27%	0.62
57	2.699	2.761	2.825	2.31%	0.64
58	2.601	2.662	2.724	2.35%	0.65
59	2.507	2.567	2.628	2.38%	0.66
60	2.417	2.476	2.535	2.42%	0.68
61	2.331	2.388	2.447	2.46%	0.69
62	2.248	2.304	2.362	2.49%	0.71
63	2.169	2.224	2.280	2.53%	0.72
64	2.092	2.146	2.201	2.57%	0.74
65	2.019	2.072	2.126	2.60%	0.75
66	1.949	2.001	2.053	2.64%	0.76
67	1.882	1.932	1.984	2.67%	0.78
68	1.817	1.866	1.917	2.71%	0.79
69	1.754	1.803	1.852	2.75%	0.81
70	1.695	1.742	1.790	2.78%	0.82
71	1.637	1.684	1.731	2.82%	0.84
72	1.582	1.628	1.674	2.85%	0.85
73	1.529	1.574	1.619	2.88%	0.87
74	1.479	1.522	1.566	2.92%	0.88
75	1.430	1.472	1.516	2.95%	0.90
76	1.383	1.424	1.467	2.99%	0.92
77	1.337	1.378	1.419	3.02%	0.93
78	1.294	1.333	1.374	3.06%	0.95
79	1.251	1.290	1.330	3.09%	0.96
80	1.211	1.249	1.288	3.12%	0.98
81	1.172	1.209	1.247	3.16%	0.99
82	1.135	1.171	1.208	3.19%	1.01
83	1.099	1.134	1.171	3.22%	1.03
84	1.064	1.099	1.135	3.26%	1.04
85	1.031	1.065	1.100	3.29%	1.06
86	0.998	1.032	1.066	3.32%	1.07
87	0.967	1.000	1.033	3.35%	1.09
88	0.937	0.969	1.002	3.38%	1.11
89	0.908	0.940	0.972	3.42%	1.12
90	0.881	0.911	0.943	3.45%	1.14
91	0.854	0.884	0.914	3.48%	1.16
92	0.828	0.857	0.887	3.51%	1.17
93	0.803	0.831	0.861	3.54%	1.19
94	0.779	0.807	0.835	3.57%	1.21
95	0.755	0.783	0.811	3.61%	1.22
96	0.733	0.760	0.787	3.64%	1.24
97	0.711	0.738	0.765	3.67%	1.26
98	0.691	0.716	0.743	3.70%	1.27
99	0.670	0.695	0.721	3.73%	1.29
100	0.651	0.675	0.701	3.76%	1.31

HNTC0402-103F3950FB

Chip NTC Thermistor

● R-T Chart

Temp.(°C)	R_Min(KΩ)	R_Typ(KΩ)	R_Max(KΩ)	R_Tolerance	Temp._Tolerance(°C)
101	0.632	0.656	0.681	3.79%	1.33
102	0.614	0.637	0.662	3.82%	1.34
103	0.596	0.619	0.643	3.85%	1.36
104	0.579	0.602	0.625	3.88%	1.38
105	0.563	0.585	0.608	3.91%	1.40
106	0.547	0.569	0.591	3.94%	1.41
107	0.532	0.553	0.575	3.97%	1.43
108	0.517	0.538	0.559	4.00%	1.45
109	0.502	0.523	0.544	4.03%	1.47
110	0.489	0.508	0.529	4.05%	1.49
111	0.475	0.495	0.515	4.08%	1.50
112	0.462	0.481	0.501	4.11%	1.52
113	0.449	0.468	0.487	4.14%	1.54
114	0.437	0.456	0.474	4.17%	1.56
115	0.425	0.443	0.462	4.20%	1.58
116	0.414	0.432	0.450	4.22%	1.60
117	0.403	0.420	0.438	4.25%	1.62
118	0.392	0.409	0.427	4.28%	1.63
119	0.382	0.399	0.416	4.31%	1.65
120	0.372	0.388	0.405	4.34%	1.67
121	0.362	0.378	0.395	4.36%	1.69
122	0.353	0.368	0.385	4.39%	1.71
123	0.344	0.359	0.375	4.42%	1.73
124	0.335	0.350	0.365	4.44%	1.75
125	0.326	0.341	0.356	4.47%	1.77