

ALTERNATION HISTORY RECORDS 变更记录

Date 日期	Version 版本	Mark 标记	Page 页码	Description 描述	Drafter 制定者	Approver 审批者
2023-10-04	B		/	First release 首次发行	Doris Chang	/
2025-02-24	B-1	△	P2	Renewal Permissible Operating Current	Doris Chang	Emily Peng

1、产品标识（料号） Product Identification(Part Number)

NC 0603 - 103 F 3380 F B
① ② ③ ④ ⑤ ⑥ ⑦ ⑧

① 类别 Type	
NC	片式 NTC 热敏电阻器 Chip NTC Thermistor

② 外形尺寸(mm) External Dimensions (L×W×T)	
0201[0603]	0.60×0.30×0.30
0402[1005]	1.00×0.50×0.50
0603[1608]	1.60×0.80×0.80
0805[2012]	2.00×1.25×0.85

③ 分隔符 Delimiter
-

④ 25℃的零功率电阻 Nominal Zero-Power Resistance	
222	2.2kΩ
103	10kΩ
105	1000kΩ

⑤ 电阻值公差 Tolerance of Resistance	
F	±1%
G	±2%
H	±3%
J	±5%

⑥ B 值常数 B Constant	
3380	3380K
3950	3950K
4100	4100K
4750	4750K

⑦ B 值公差 Tolerance of B Constant	
F	±1%
H	±3%

⑧ B 值计算方式 B constant calculation method	
A	25℃&85℃
B	25℃&50℃

2、Overall dimensions (unit: (mm))

Dimensions: See Fig.1 and Table 1.

Recommended PCB pattern for reflow soldering: See Fig.2 and Table 1

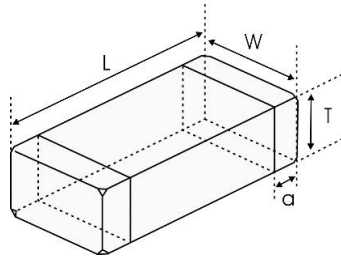


Fig.1

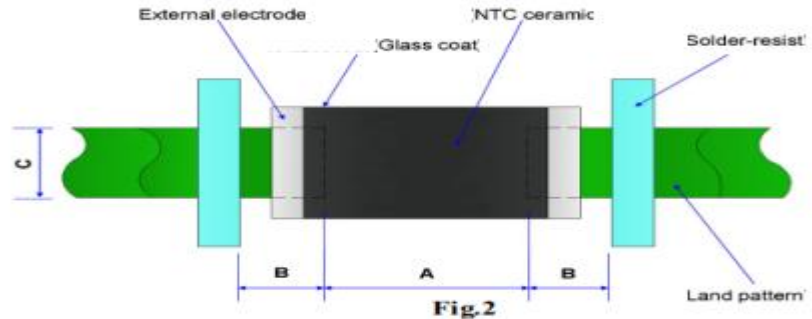


Fig.2

Table 1 unit: inch[mm]

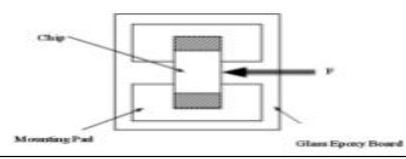
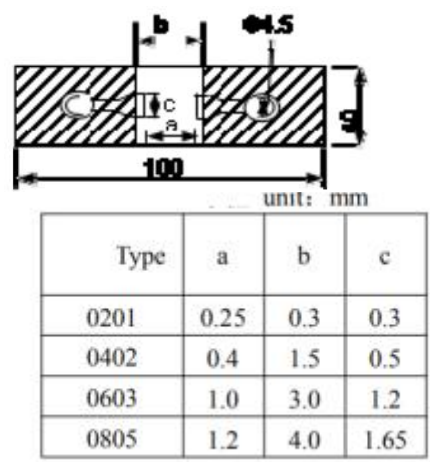
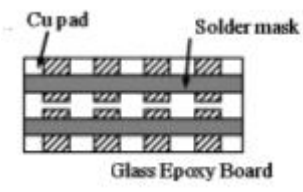
Type	L	W	T	a	A	B	C
0402	0.039±0.006	0.020±0.006	0.020±0.006	0.010±0.004	[0.45-0.55]	[0.4-0.5]	[0.45-0.55]
[1005]	[1.0±0.15]	[0.5±0.15]	[0.5±0.15]	[0.25±0.1]			

3. Electrical Characteristics

Items	Symbol	Test condition	unit	performance requirement
Nominal Zero-Power Resistance	R _{25°C}	At=25±0.05°C P≤0.1mW	K Ω	1000±3%
B Constant	B _{25/85}	B value between 25±0.05°C and 85±0.05°C B=Ln (R _i /R ₂)/(1/T _i -1/T ₂); T ₁ =(273.15+25)K, T ₂ =(273.15+85) K Note:273.15 is the absolute temperature.	K	4750±3%
Dissipation Factor	δ	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).	mW/°C	≈1.0
Thermal Time Constant	τ	The total time for the temperature of the thermistor to change by 63.2% of the difference from ambient temperature T ₀ (°C) to T ₁ (°C) by the drastic change of the power applied to thermistor from Non-zero Power to Zero-Power state, normally expressed in second(S).	sec	<3S
Rated Electric Power	P	The necessary electric power makes thermistor's temperature rise 100°C by self-heating at ambient temperature 25°C.	mW	100
Permissible Operating Current	I	The current that keep body temperature of chip NTC on the PC board in still air rising 1°C by self-heating.	mA	0.03 △
Operating ambient temperature	/	Temperature range under specified conditions of use	°C	-40°C ~+125°C

Notes: When measured at 25°C in still air, as a single unit without mounting.

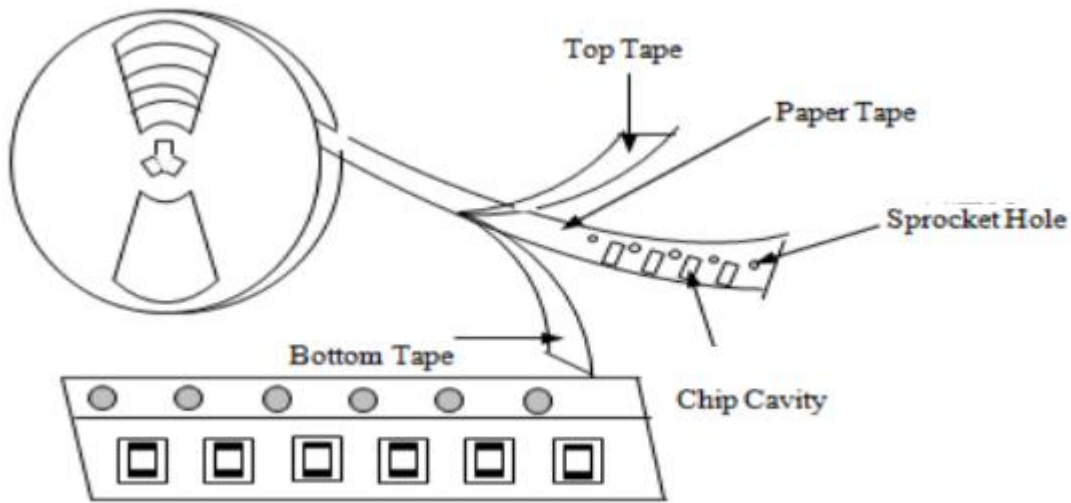
4. Reliability Test (一)

Item	Standard	Test Method and Remarks	Requirements																				
Terminal Strength	IEC 60068-2-21	1.Solder the chip to the testing jig (glass epoxy board shown in the right) using eutectic solder. Then apply a force in the direction of the arrow. 2.Apply a force of 5N 3 .Duration: 10±1S	No removal or split of the termination or other defects shall occur. 																				
Resistance to Flexur	IEC 60068-2-21	1.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; 2 Flexure:Pressurizing Speed : <0.5mm/s, 3.Duration: 10s	1.No visible damage. 2. $ \Delta R25/R25 \leq 2\%$  <table border="1"> <thead> <tr> <th>Type</th><th>a</th><th>b</th><th>c</th></tr> </thead> <tbody> <tr> <td>0201</td><td>0.25</td><td>0.3</td><td>0.3</td></tr> <tr> <td>0402</td><td>0.4</td><td>1.5</td><td>0.5</td></tr> <tr> <td>0603</td><td>1.0</td><td>3.0</td><td>1.2</td></tr> <tr> <td>0805</td><td>1.2</td><td>4.0</td><td>1.65</td></tr> </tbody> </table> unit: mm	Type	a	b	c	0201	0.25	0.3	0.3	0402	0.4	1.5	0.5	0603	1.0	3.0	1.2	0805	1.2	4.0	1.65
Type	a	b	c																				
0201	0.25	0.3	0.3																				
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0805	1.2	4.0	1.65																				
Vibration	IEC 60068-2-80	1.Solder the chip to the testing jig (glass epoxy board shown in the left) using eutectic solder. 2.The chip shall be subjected to a simple harmonic motion having total amplitude of 1.5mm, the frequency being varied uniformly between the approximate limits of 10 and 55 Hz. 3.The frequency ranges from 10 to 55 Hz and return to 10 Hz shall be traversed in approximately 1 minute. This motion shall be applied for a period of 2 hours in each 3mutually perpendicular directions (total of 6 hours).。	No visible damage. 																				
Dropping	IEC 60068-2-32	Drop a chip 10 times on a concrete floor from a height of 1 meter.。	No visible damage.																				

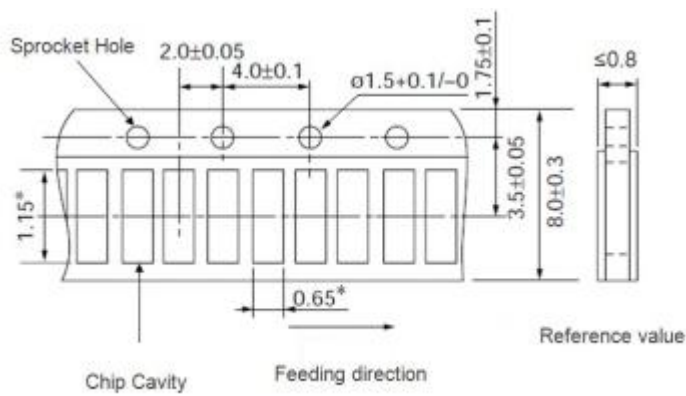
Solderability	IEC 60068-2-58	1.Solder temperature: 245±5℃. 2 Duration: 3±0.3s.. 3 Solder: Sn/3. 0Ag/0. 5Cu. 4.Flux(weight ratio):25% Rosin and 75% ethanol in weight.	1. No visible damage; 2 Wetting shall exceed 95% coverage.。															
Resistance to Soldering Heat	IEC 60068-2-58	1.Solder temperature: 260±5℃. 2 Duration: 10±1s.. 3 Solder: Sn/3. 0Ag/0. 5Cu. 4. Flux(weight ratio):25% Rosin and 75% ethanol in weight. 5. The chip shall be stabilized at normal condition for 1~2 hours before measuring.	1 No visible damage; 2 ΔR25/R25 ≤2% 3. ΔB/B ≤1%															
Temperature cycling	IEC 60068-2-14	1. 5 cycles of following sequence without loading. <table border="1"><tr><td>Step</td><td>Temperature</td><td>ime</td></tr><tr><td>1</td><td>-40±5℃</td><td>30±3min</td></tr><tr><td>2</td><td>25±2℃</td><td>5±3min</td></tr><tr><td>3</td><td>125±5℃</td><td>30±3min</td></tr><tr><td>4</td><td>25±2℃</td><td>5±3min</td></tr></table> 2. The chip shall be stabilized at normal condition for 1~2 hours before measuring.	Step	Temperature	ime	1	-40±5℃	30±3min	2	25±2℃	5±3min	3	125±5℃	30±3min	4	25±2℃	5±3min	1 No visible damage; 2 ΔR25/R25 ≤2% 3. ΔB/B ≤1%
Step	Temperature	ime																
1	-40±5℃	30±3min																
2	25±2℃	5±3min																
3	125±5℃	30±3min																
4	25±2℃	5±3min																
Resistance to dry heat	IEC 60068-2-2	1. 125±5℃ in air, for 1000±24 hours without loading. 2The chip shall be stabilized at normal condition for 1~2 hours before measuring.	1 No visible damage; 2 ΔR25/R25 ≤2% 3. ΔB/B ≤1%															
Resistance to cold	IEC 60068-2-1	1.-40±3℃ in air, for 1000±24 hours without loading. 2.The chip shall be stabilized at normal condition for 1~2 hours before measuring.	1 No visible damage; 2 ΔR25/R25 ≤2% 3. ΔB/B ≤1%															
Resistance to damp heat	IEC 60068-2-78	1. 60±2℃, 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.	1 No visible damage; 2 ΔR25/R25 ≤2% 3. ΔB/B ≤1%															
Resistance to high temperature load	IEC 60539-15. 25. 4	1. 85±2℃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.	1 No visible damage; 2 ΔR25/R25 ≤2% 3. ΔB/B ≤1%															

5. Taping

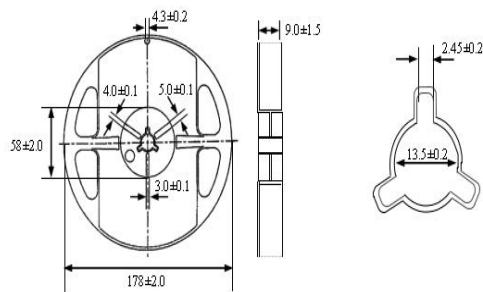
5.1 Taping Drawings



5.2 Paper Tape Dimensions (0402series) (Unit: mm)



5.3 Reel Dimensions (Unit: mm) /Quantity per Reel: (10K)



6. Storage

. Storage Conditions

- a. Storage Temperature: $-10^{\circ}\text{C} \sim 40^{\circ}\text{C}$
- b. Relative Humidity: $\leq 75\% \text{RH}$
- c. Keep away from corrosive atmosphere and sunlight.

. Period of Storage: 6 Months after delivery

7. Notes & Warnings

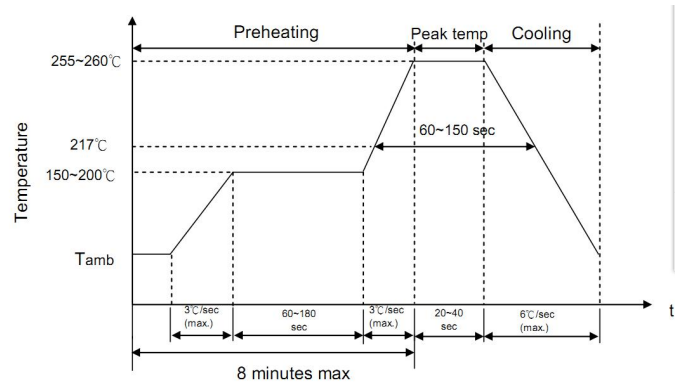
. The NC series thermistors shall not be operated and stored under the following environmental condition:

- (1) Corrosive or deoxidized atmospheres
(such as chlorine, sulfurated hydrogen, ammonia, sulfuric acid, nitric oxide and so on)
- (2) Volatile or inflammable atmospheres
- (3) Dusty condition
- (4) Excessively high or low pressure condition
- (5) Humid site
- (6) Places with brine, oil, chemical liquid or organic solvent
- (7) Intense vibration
- (8) Places with analogously deleterious conditions

8. Recommended Soldering Technologies

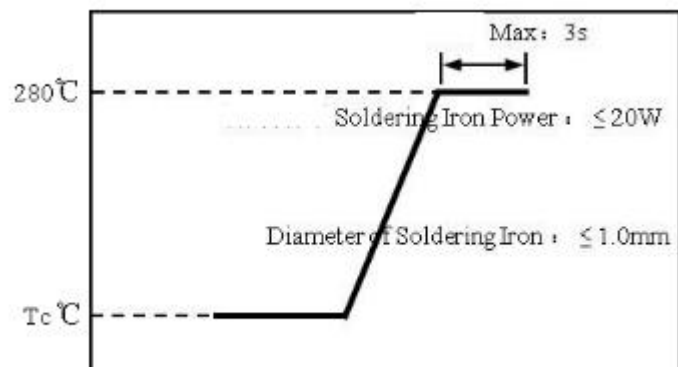
8.1 Re-flowing Profile

- $1 \sim 2^{\circ}\text{C}/\text{sec}$. Ramp.
- Pre-heating: $150 \sim 170^{\circ}\text{C}/90 \pm 30 \text{ sec}$.
- Time above 240°C : $20 \sim 40 \text{ sec}$
- Peak temperature: $260^{\circ}\text{C}_{\text{Max.}}/10 \text{ sec}$.
- Solder paste: 96.5Sn/3.0Ag/0.5Cu
- Max. 2 times for re-flowing.



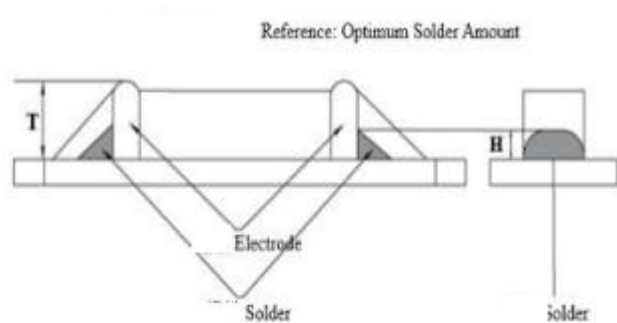
8.2 Iron Soldering Profile

- Iron soldering power: Max. 20W
- Pre-heating: $150^{\circ}\text{C}/60 \text{ sec}$.
- Soldering Tip temperature: $280^{\circ}\text{C}_{\text{Max.}}$
- Soldering time: 3 sec Max.
- Solder paste: 96.5wt%Sn/3.0wt%Ag/0.5wt%Cu
- Max. 1 times for iron soldering



8.3 Printing Conditions of Solder Paste

- The amount of solder is critical . Standard height of fillet is shown in the table below.
- Too much solder may cause mechanical stress , resulting in cracking , mechanical and / or electronic damage.



Type	Solder Paste Thickness	H
0201	100μm	$1/3T \leq H \leq T$
0402	150μm	$1/3T \leq H \leq T$
0603, QN0805	200μm	$0.2\text{mm} \leq H \leq T$

• After Soldering

- For removing the flux after soldering, observe the following points in order to avoid deterioration of the characteristics or any change of the external electrodes quality.
 - 1)Please keep mounted parts and a substrate from an occurrence of resonance in ultrasonic cleaning.
 - 2)Please do not clean the products in the case of using a non-wash-type flux

Appose: R-T table

R25 =1000 KOhm ± 3%

B25/85= 4750 K ± 3%

Temp. (°C)	R_Min (Kohm)	R_Cent (Kohm)	R_Max (Kohm)	Res TOL.	Temp. TOL.(°C)
-40	59,889.859	70,139.129	82,068.482	17.01%	2.03
-39	55,462.936	64,800.518	75,642.010	16.73%	2.02
-38	51,386.584	59,896.303	69,752.414	16.46%	2.00
-37	47,631.431	55,389.142	64,352.378	16.18%	1.98
-36	44,170.684	51,245.054	59,398.945	15.91%	1.96
-35	40,979.892	47,433.102	54,853.102	15.64%	1.94
-34	38,036.734	43,925.111	50,679.402	15.38%	1.92
-33	35,320.824	40,695.413	46,845.626	15.11%	1.91
-32	32,813.542	37,720.612	43,322.481	14.85%	1.89
-31	30,497.866	34,979.378	40,083.318	14.59%	1.87
-30	28,358.238	32,452.253	37,103.889	14.33%	1.85
-29	26,380.428	30,121.486	34,362.117	14.08%	1.83
-28	24,551.415	27,970.870	31,837.897	13.83%	1.81
-27	22,859.283	25,985.606	29,512.912	13.57%	1.79
-26	21,293.121	24,152.176	27,370.465	13.33%	1.77
-25	19,842.934	22,458.225	25,395.333	13.08%	1.75
-24	18,499.566	20,892.456	23,573.627	12.83%	1.73
-23	17,254.622	19,444.539	21,892.673	12.59%	1.71
-22	16,100.403	18,105.019	20,340.901	12.35%	1.69
-21	15,029.848	16,865.244	18,907.741	12.11%	1.67
-20	14,036.476	15,717.291	17,583.537	11.87%	1.65
-19	13,114.337	14,653.900	16,359.463	11.64%	1.63
-18	12,257.967	13,668.418	15,227.445	11.41%	1.61
-17	11,462.344	12,754.748	14,180.099	11.18%	1.58
-16	10,722.855	11,907.294	13,210.665	10.95%	1.56
-15	10,035.254	11,120.924	12,312.956	10.72%	1.54
-14	9,395.640	10,390.926	11,481.301	10.49%	1.52
-13	8,800.419	9,712.973	10,710.506	10.27%	1.50
-12	8,246.286	9,083.091	9,995.808	10.05%	1.48
-11	7,730.196	8,497.627	9,332.840	9.83%	1.45
-10	7,249.342	7,953.223	8,717.594	9.61%	1.43
-9	6,801.139	7,446.788	8,146.392	9.39%	1.41
-8	6,383.204	6,975.482	7,615.855	9.18%	1.39
-7	5,993.337	6,536.687	7,122.880	8.97%	1.36
-6	5,629.509	6,127.994	6,664.615	8.76%	1.34
-5	5,289.848	5,747.184	6,238.439	8.55%	1.32
-4	4,972.624	5,392.211	5,841.940	8.34%	1.30
-3	4,676.240	5,061.190	5,472.899	8.13%	1.27
-2	4,399.219	4,752.380	5,129.272	7.93%	1.25
-1	4,140.197	4,464.178	4,809.179	7.73%	1.23
0	3,897.911	4,195.101	4,510.886	7.53%	1.20
1	3,671.193	3,943.782	4,232.797	7.33%	1.18

Temp. (°C)	R_Min (Kohm)	R_Cent (Kohm)	R_Max (Kohm)	Res TOL.	Temp. TOL.(°C)
2	3,458.963	3,708.957	3,973.439	7.13%	1.15
3	3,260.221	3,489.458	3,731.453	6.94%	1.13
4	3,074.038	3,284.206	3,505.586	6.74%	1.11
5	2,899.557	3,092.203	3,294.680	6.55%	1.08
6	2,735.982	2,912.524	3,097.668	6.36%	1.06
7	2,582.574	2,744.315	2,913.562	6.17%	1.03
8	2,438.648	2,586.784	2,741.450	5.98%	1.01
9	2,303.570	2,439.199	2,580.488	5.79%	0.98
10	2,176.750	2,300.878	2,429.896	5.61%	0.96
11	2,057.640	2,171.194	2,288.953	5.42%	0.93
12	1,945.732	2,049.562	2,156.990	5.24%	0.91
13	1,840.552	1,935.440	2,033.389	5.06%	0.88
14	1,741.662	1,828.326	1,917.575	4.88%	0.86
15	1,648.652	1,727.753	1,809.020	4.70%	0.83
16	1,561.142	1,633.287	1,707.229	4.53%	0.81
17	1,478.780	1,544.527	1,611.746	4.35%	0.78
18	1,401.234	1,461.098	1,522.148	4.18%	0.75
19	1,328.199	1,382.652	1,438.042	4.01%	0.73
20	1,259.390	1,308.866	1,359.062	3.84%	0.70
21	1,194.538	1,239.439	1,284.870	3.67%	0.67
22	1,133.398	1,174.091	1,215.150	3.50%	0.65
23	1,075.736	1,112.560	1,149.610	3.33%	0.62
24	1,021.337	1,054.606	1,087.978	3.16%	0.59
25	970.000	1,000.000	1,030.000	3.00%	0.57
26	918.619	948.533	978.538	3.16%	0.60
27	870.252	900.007	929.942	3.33%	0.64
28	824.705	854.240	884.035	3.49%	0.67
29	781.801	811.060	840.656	3.65%	0.71
30	741.372	770.308	799.653	3.81%	0.74
31	703.262	731.835	760.883	3.97%	0.78
32	667.327	695.501	724.212	4.13%	0.81
33	633.431	661.177	689.518	4.29%	0.85
34	601.448	628.741	656.682	4.44%	0.89
35	571.260	598.080	625.596	4.60%	0.93
36	542.758	569.088	596.157	4.76%	0.96
37	515.838	541.664	568.271	4.91%	1.00
38	490.405	515.717	541.846	5.07%	1.04
39	466.369	491.159	516.800	5.22%	1.08
40	443.646	467.908	493.052	5.37%	1.11
41	422.158	445.889	470.530	5.53%	1.15
42	401.831	425.030	449.163	5.68%	1.19
43	382.597	405.263	428.887	5.83%	1.23
44	364.391	386.527	409.639	5.98%	1.27

Temp. (°C)	R_Min (Kohm)	R_Cent (Kohm)	R_Max (Kohm)	Res TOL.	Temp. TOL.(°C)
45	347.152	368.762	391.364	6.13%	1.31
46	330.826	351.913	374.007	6.28%	1.35
47	315.359	335.928	357.516	6.43%	1.39
48	300.701	320.758	341.845	6.57%	1.43
49	286.805	306.358	326.948	6.72%	1.47
50	273.629	292.684	312.784	6.87%	1.51
51	261.132	279.697	299.312	7.01%	1.56
52	249.275	267.358	286.495	7.16%	1.60
53	238.021	255.632	274.299	7.30%	1.64
54	227.338	244.486	262.690	7.45%	1.68
55	217.194	233.887	251.636	7.59%	1.72
56	207.558	223.806	241.109	7.73%	1.77
57	198.403	214.215	231.080	7.87%	1.81
58	189.702	205.089	221.524	8.01%	1.85
59	181.430	196.401	212.416	8.15%	1.90
60	173.565	188.129	203.732	8.29%	1.94
61	166.084	180.251	195.452	8.43%	1.99
62	158.966	172.747	187.553	8.57%	2.03
63	152.192	165.595	180.017	8.71%	2.07
64	145.744	158.779	172.825	8.85%	2.12
65	139.604	152.281	165.960	8.98%	2.17
66	133.756	146.084	159.405	9.12%	2.21
67	128.185	140.174	153.145	9.25%	2.26
68	122.877	134.534	147.165	9.39%	2.30
69	117.817	129.152	141.451	9.52%	2.35
70	112.993	124.015	135.990	9.66%	2.40
71	108.392	119.110	130.769	9.79%	2.44
72	104.004	114.425	125.777	9.92%	2.49
73	99.817	109.950	121.003	10.05%	2.54
74	95.821	105.674	116.436	10.18%	2.59
75	92.006	101.588	112.066	10.31%	2.63
76	88.364	97.681	107.883	10.44%	2.68
77	84.886	93.946	103.879	10.57%	2.73
78	81.563	90.374	100.046	10.70%	2.78
79	78.388	86.956	96.374	10.83%	2.83
80	75.354	83.686	92.857	10.96%	2.88
81	72.453	80.557	89.486	11.08%	2.93
82	69.680	77.561	86.257	11.21%	2.98
83	67.027	74.693	83.161	11.34%	3.03
84	64.489	71.946	80.192	11.46%	3.08
85	62.061	69.315	77.346	11.59%	3.13
86	59.738	66.793	74.616	11.71%	3.18
87	57.513	64.377	71.996	11.83%	3.23

Temp. (°C)	R_Min (Kohm)	R_Cent (Kohm)	R_Max (Kohm)	Res TOL.	Temp. TOL.(°C)
88	55.383	62.061	69.482	11.96%	3.28
89	53.343	59.841	67.070	12.08%	3.33
90	51.390	57.712	64.754	12.20%	3.39
91	49.517	55.670	62.530	12.32%	3.44
92	47.723	53.710	60.394	12.44%	3.49
93	46.004	51.830	58.342	12.56%	3.54
94	44.355	50.026	56.371	12.68%	3.60
95	42.774	48.294	54.477	12.80%	3.65
96	41.258	46.631	52.656	12.92%	3.71
97	39.803	45.034	50.906	13.04%	3.76
98	38.407	43.500	49.223	13.16%	3.81
99	37.067	42.026	47.604	13.27%	3.87
100	35.781	40.609	46.047	13.39%	3.92
101	34.547	39.248	44.550	13.51%	3.98
102	33.361	37.940	43.108	13.62%	4.03
103	32.222	36.682	41.721	13.74%	4.09
104	31.128	35.472	40.385	13.85%	4.15
105	30.076	34.308	39.099	13.97%	4.20
106	29.066	33.188	37.861	14.08%	4.26
107	28.095	32.111	36.668	14.19%	4.32
108	27.161	31.074	35.519	14.31%	4.37
109	26.263	30.076	34.412	14.42%	4.43
110	25.399	29.115	33.345	14.53%	4.49
111	24.568	28.190	32.317	14.64%	4.55
112	23.768	27.299	31.325	14.75%	4.60
113	22.999	26.440	30.369	14.86%	4.66
114	22.258	25.613	29.447	14.97%	4.72
115	21.545	24.816	28.558	15.08%	4.78
116	20.858	24.048	27.700	15.19%	4.84
117	20.197	23.307	26.872	15.30%	4.90
118	19.560	22.593	26.073	15.40%	4.96
119	18.946	21.905	25.302	15.51%	5.02
120	18.355	21.241	24.558	15.62%	5.08
121	17.785	20.600	23.839	15.72%	5.14
122	17.236	19.982	23.145	15.83%	5.20
123	16.706	19.385	22.474	15.93%	5.26
124	16.195	18.810	21.827	16.04%	5.32
125	15.703	18.254	21.201	16.14%	5.39