

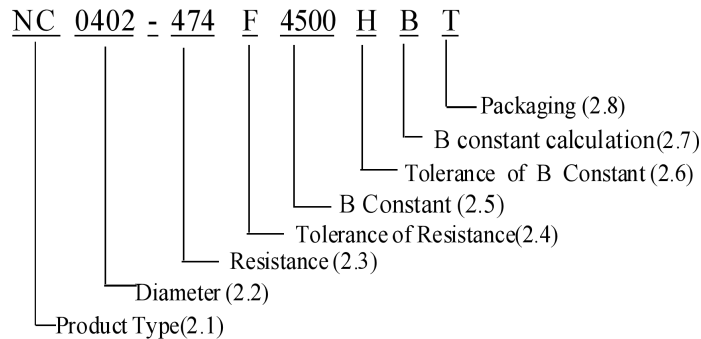
ALTERNATION HISTORY RECORDS 变更记录

Date 日期	Version 版本	Mark 标记	Page 页码	Description 描述	Drafter 制定者	Approver 审批者
2024-04-22	B	/		First release 首次发行	Robin Xiong	/

1. Application

This specification applies to negative temperature coefficient thermistor used in electronic equipment.

2. Part Number System



2.1 Product Type

Code	NC
Product Type	Negative Temperature Coefficient

2.2 Dimensions code

Code	0201	0402	0603	0805	1206
Dimensions(L×W×T)	0.60×0.30×0.30mm	1.00×0.50×0.50mm	1.60×0.80×0.80mm	2.00×1.25×0.85mm	3.20×1.60×0.85mm

2.3 Nominal Zero-Power Resistance code

Code	100	101	102	103	474
Resistance (Ω)	10	100	1000	10000	470000

2.4 Tolerance of Resistance

Code	F	G	H
Tolerance Range	±1%	±2%	±3%

2.5 B Constant

Code	2600	3000	4500
B Constant	2600K	3000K	4500K

2.6 Tolerance of B Constant

Code	F	H	J	K
Tolerance Range	±1%	±3%	±5%	±10%

2.7 B constant calculation method

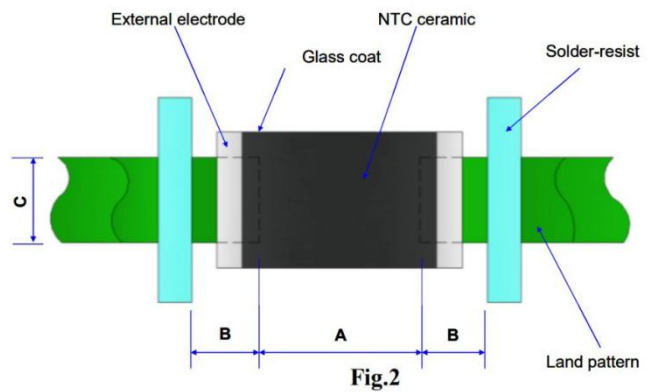
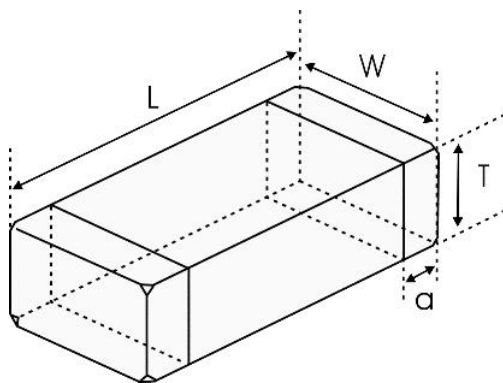
Code	A	B
B constant calculation method	25℃&85℃	25℃&50℃

2.9 Packaging

Code	T	B
Packaging	braided packing	loose packing

3. Outline Dimension:

unit: mm



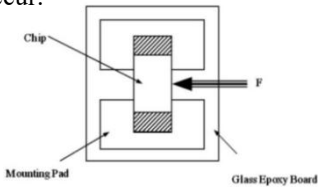
L	W	T	a	A	B	C
1.0±0.15	0.5±0.15	0.5±0.15	0.25±0.1	0.45~0.55	0.4~0.5	0.45~0.55

4. Electrical parameter

Items	Symbol	Test condition	unit	performance requirement
Nominal Zero-Power Resistance	R25°C	$A_{t=25\pm 0.05^{\circ}\text{C}} \leq 0.1\text{mW}$	K Ω	470k $\Omega \pm 1\%$
B Constant	B25/50	B value between $25\pm 0.05^{\circ}\text{C}$ and $50\pm 0.05^{\circ}\text{C}$ $B = \ln(R_i/R_2) / (1/T_i - 1/T_2)$; $T_1 = (273.15 + 25)\text{K}$, $T_2 = (273.15 + 50)\text{K}$ Note: 273.15 is the absolute temperature.	K	4500 $\pm 3\%$
B Constant	B25/75	B value between $25\pm 0.05^{\circ}\text{C}$ and $75\pm 0.05^{\circ}\text{C}$ $B = \ln(R_i/R_2) / (1/T_i - 1/T_2)$; $T_1 = (273.15 + 25)\text{K}$, $T_2 = (273.15 + 75)\text{K}$ Note: 273.15 is the absolute temperature.	K	4509 $\pm 3\%$
B Constant	B25/85	B value between $25\pm 0.05^{\circ}\text{C}$ and $85\pm 0.05^{\circ}\text{C}$ $B = \ln(R_i/R_2) / (1/T_i - 1/T_2)$; $T_1 = (273.15 + 25)\text{K}$, $T_2 = (273.15 + 85)\text{K}$ Note: 273.15 is the absolute temperature.	K	4512 $\pm 3\%$
B Constant	B25/100	B value between $25\pm 0.05^{\circ}\text{C}$ and $100\pm 0.05^{\circ}\text{C}$ $B = \ln(R_i/R_2) / (1/T_i - 1/T_2)$; $T_1 = (273.15 + 25)\text{K}$, $T_2 = (273.15 + 100)\text{K}$ Note: 273.15 is the absolute temperature.	K	4514 $\pm 3\%$
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 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).	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 install air rising 1°C by self-heating.	mA	0.04
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.

5. Reliability

Item	Standard	Test Method and Remarks	Requirements
Terminal Strength	IEC 60068-2-21	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.	No removal or split of the termination or other defects shall occur. 
		Size	
		F	
		Duration	
		0201	2N
		0402, 0603	5N
		0805, 1206	10N

Issued-date: 2024-04-22

Name

Specification Sheet –SMD NTC Thermistor

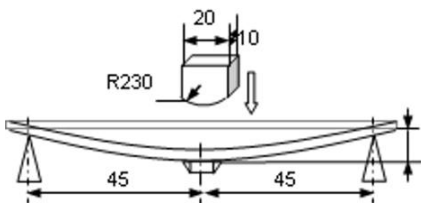
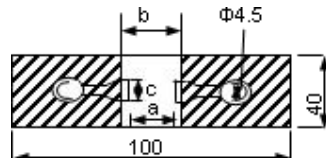
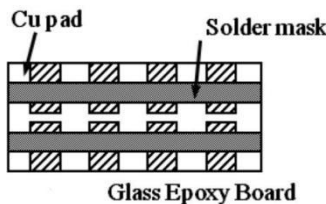
Revision

B

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STANDARD MANUAL

Resistane 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  Flexure:Pressurizing Speed : <0.5mm/s, Duration : 10s±1	1.No visible damage. 2. ΔR25/R25 ≤2% <table><tr><th>Size</th><th>a</th><th>b</th><th>c</th></tr><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><tr><td>1206</td><td>2.0</td><td>5.8</td><td>1.9</td></tr></table> 	Size	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	1206	2.0	5.8	1.9
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1206	2.0	5.8	1.9																								
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 aheight of 1 meter.	No visible damage.																								
Solder ability	IEC 60068-2-58	1.Solder temperature: 245±5°C. 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.																								
Resistane 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.Flux(weight ratio):25% Rosin and 75% ethanol inweight. 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><tr><th>Step</th><th>Temperature</th><th>ime</th></tr><tr><td>1</td><td>-40±5°C</td><td>30±3min</td></tr><tr><td>2</td><td>25±2°C</td><td>5±3min</td></tr><tr><td>3</td><td>125±5°C</td><td>30±3min</td></tr><tr><td>4</td><td>25±2°C</td><td>5±3min</td></tr></table> 2.The chip shall be stabilized at normal condition for1~2 hours before measuring.	Step	Temperature	ime	1	-40±5°C	30±3min	2	25±2°C	5±3min	3	125±5°C	30±3min	4	25±2°C	5±3min	1 No visible damage; 2. ΔR25/R25 ≤2% 3. ΔB/B ≤1%									
Step	Temperature	ime																									
1	-40±5°C	30±3min																									
2	25±2°C	5±3min																									
3	125±5°C	30±3min																									
4	25±2°C	5±3min																									
Resistance todry 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 for1~2 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°C in air, for 1000±24 hours without loading. 2.2.The chip shall be stabilized at normal condition for1~2 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°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.	1 No visible damage; 2. ΔR25/R25 ≤2% 3. ΔB/B ≤1%																								

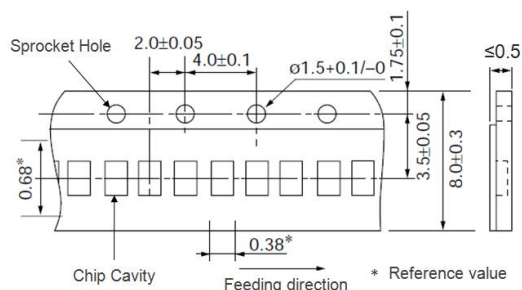
Resistane to high temperature load	IEC 60539-15.25.4	1.85±2°Cin air with permissive operating current for1000±48 hours 2.The chip shall be stabilized at normal condition for 1~2 hours before measuring.	1 No visible damage; 2. $\Delta R_{25}/R_{25}$ ≤2% 3. $\Delta B/B$ ≤1%
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6.Taping

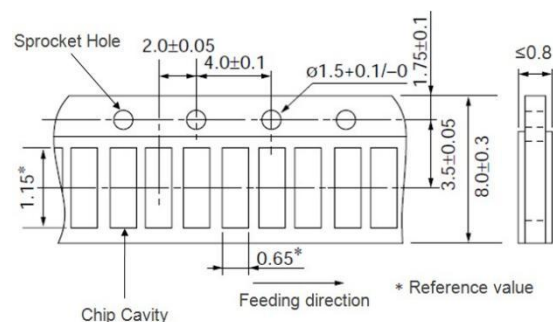
Type	0201	0402	0603	0805
Tape thickness(mm)	0.5±0.15	0.5±0.15	0.8±0.15	0.85±0.2
Tape material	Paper Tape			
Quantity per Reel	15K	10K	4K	4K

6.1 Paper Tape Dimensions (Unit : mm)

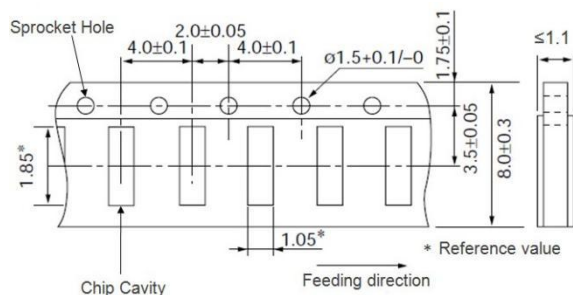
0201 series



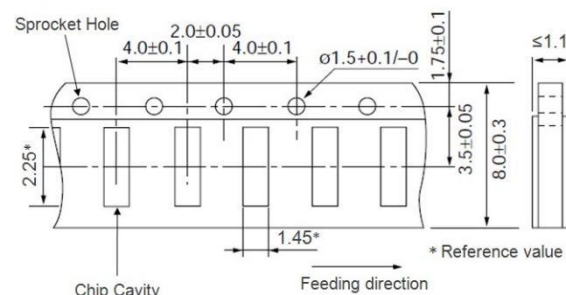
0402 series



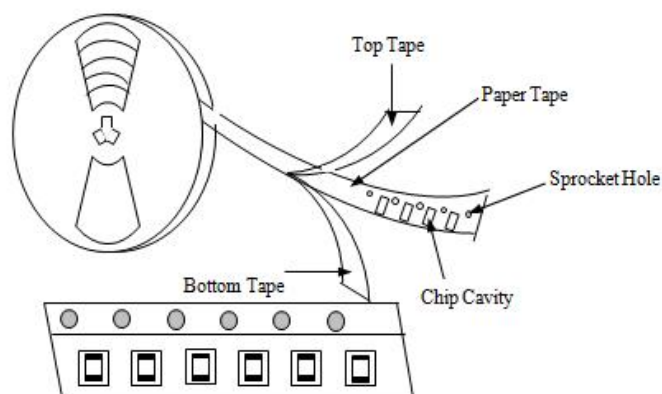
0603 series



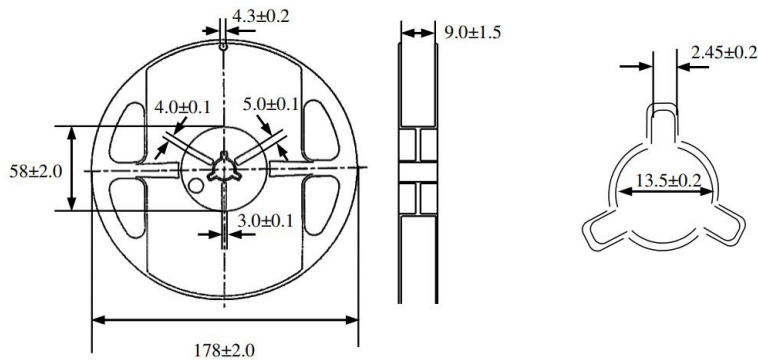
0805 series



6.2 Taping Drawings



6.3 Reel Dimensions(Unit : mm)



7. Storage

• Storage Conditions

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

• Period of Storage: 6 Months after delivery

8. Notes & Warnings

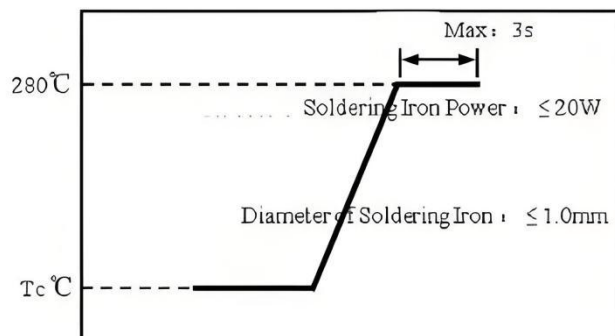
- The thermistors shall not be operated and stored under the following environmental condition:

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

9. Recommended Soldering Technologies

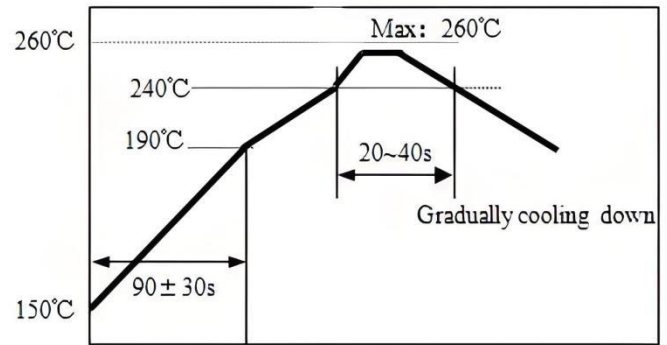
9.1 Re-flowing Profile

- $1 \sim 2^{\circ}\text{C}/\text{sec.}$ Ramp.
- Pre-heating: $150 \sim 190^{\circ}\text{C}/90 \pm 30 \text{ sec.}$
- Time above 240°C : $20 \sim 40 \text{ sec}$
- Peak temperature: 260°C Max./10 sec.
- Solder paste : $96.5\text{Sn}/3.0\text{Ag}/0.5\text{Cu}$
- Max.2 times for re-flowing.



9.2 Iron Soldering Profile

- Iron soldering power: Max.20 W
- Pre-heating: 150°C/60sec.
- Soldering Tip temperature: 280°CMax
- Soldering time: 3 sec Max.
- Solder paste: 96.5wt%Sn/3.0wt%Ag/0.5wt%Cu
- Max.1 times for iron soldering



Appendix : R-T table

R25 =470 KOhm $\pm$ 1% B25/50 = 4500K $\pm$ 3%

Temp. (°C)	R_Min (Kohm)	R_Cent (Kohm)	R_Max (Kohm)	Res TOL.	Temp. TOL.(°C)
-40	24,493.366	27,967.255	31,930.651	14.17%	1.76
-39	22,724.655	25,887.608	29,487.851	13.91%	1.74
-38	21,094.289	23,975.052	27,246.504	13.65%	1.72
-37	19,590.700	22,215.258	25,188.908	13.39%	1.70
-36	18,203.341	20,595.197	23,299.005	13.13%	1.69
-35	16,922.597	19,103.016	21,562.218	12.87%	1.67
-34	15,739.694	17,727.924	19,965.310	12.62%	1.65
-33	14,646.625	16,460.097	18,496.255	12.37%	1.63
-32	13,636.077	15,290.583	17,144.120	12.12%	1.60
-31	12,701.369	14,211.220	15,898.960	11.88%	1.58
-30	11,836.395	13,214.566	14,751.729	11.63%	1.56
-29	11,035.570	12,293.831	13,694.188	11.39%	1.54
-28	10,293.784	11,442.816	12,718.835	11.15%	1.52
-27	9,606.361	10,655.858	11,818.831	10.91%	1.50
-26	8,969.018	9,927.785	10,987.942	10.68%	1.48
-25	8,377.832	9,253.866	10,220.481	10.45%	1.46
-24	7,829.205	8,629.776	9,511.257	10.21%	1.44
-23	7,319.839	8,051.556	8,855.532	9.99%	1.42
-22	6,846.709	7,515.582	8,248.974	9.76%	1.39
-21	6,407.037	7,018.535	7,687.627	9.53%	1.37
-20	5,998.272	6,557.373	7,167.872	9.31%	1.35
-19	5,618.071	6,129.308	6,686.398	9.09%	1.33
-18	5,264.281	5,731.781	6,240.175	8.87%	1.31
-17	4,934.921	5,362.446	5,826.427	8.65%	1.28
-16	4,628.169	5,019.148	5,442.612	8.44%	1.26
-15	4,342.349	4,699.907	5,086.399	8.22%	1.24
-14	4,075.917	4,402.906	4,755.651	8.01%	1.21
-13	3,827.450	4,126.471	4,448.408	7.80%	1.19
-12	3,595.639	3,869.066	4,162.869	7.59%	1.17
-11	3,379.274	3,629.275	3,897.381	7.39%	1.14
-10	3,177.242	3,405.796	3,650.427	7.18%	1.12
-9	2,988.513	3,197.430	3,420.610	6.98%	1.10
-8	2,812.139	3,003.071	3,206.646	6.78%	1.07
-7	2,647.242	2,821.700	3,007.354	6.58%	1.05
-6	2,493.013	2,652.378	2,821.648	6.38%	1.02
-5	2,348.702	2,494.238	2,648.528	6.19%	1.00
-4	2,213.617	2,346.481	2,487.069	5.99%	0.98
-3	2,087.119	2,208.366	2,336.424	5.80%	0.95

Appendix : R-T table

R25 =470 KOhm ± 1% B25/50 = 4500K ± 3%

Temp. (°C)	R_Min (Kohm)	R_Cent (Kohm)	R_Max (Kohm)	Res TOL.	Temp. TOL.(°C)
-2	1,968.612	2,079.213	2,195.808	5.61%	0.93
-1	1,857.550	1,958.391	2,064.499	5.42%	0.90
0	1,753.423	1,845.315	1,941.830	5.23%	0.88
1	1,655.760	1,739.448	1,827.184	5.04%	0.85
2	1,564.124	1,640.290	1,719.993	4.86%	0.83
3	1,478.111	1,547.380	1,619.732	4.68%	0.80
4	1,397.345	1,460.288	1,525.915	4.49%	0.77
5	1,321.477	1,378.620	1,438.091	4.31%	0.75
6	1,250.183	1,302.008	1,355.847	4.14%	0.72
7	1,183.162	1,230.111	1,278.796	3.96%	0.70
8	1,120.135	1,162.613	1,206.582	3.78%	0.67
9	1,060.843	1,099.222	1,138.876	3.61%	0.64
10	1,005.043	1,039.665	1,075.371	3.43%	0.62
11	952.511	983.688	1,015.785	3.26%	0.59
12	903.038	931.059	959.853	3.09%	0.56
13	856.429	881.557	907.333	2.92%	0.54
14	812.502	834.982	857.997	2.76%	0.51
15	771.090	791.142	811.635	2.59%	0.48
16	732.034	749.864	768.052	2.43%	0.45
17	695.187	710.984	727.066	2.26%	0.43
18	660.414	674.349	688.509	2.10%	0.40
19	627.585	639.817	652.223	1.94%	0.37
20	596.582	607.257	618.063	1.78%	0.34
21	567.293	576.546	585.892	1.62%	0.31
22	539.614	547.568	555.584	1.46%	0.28
23	513.449	520.217	527.022	1.31%	0.26
24	488.706	494.392	500.094	1.15%	0.23
25	465.300	470.000	474.700	1.00%	0.20
26	441.818	446.954	452.105	1.15%	0.23
27	419.657	425.173	430.718	1.30%	0.26
28	398.737	404.579	410.467	1.46%	0.29
29	378.981	385.104	391.286	1.61%	0.33
30	360.318	366.678	373.114	1.75%	0.36
31	342.683	349.242	355.891	1.90%	0.39
32	326.012	332.735	339.563	2.05%	0.43
33	310.249	317.104	324.078	2.20%	0.46
34	295.339	302.298	309.390	2.35%	0.49
35	281.231	288.268	295.452	2.49%	0.53

Appendix : R-T table

R25 =470 KOhm $\pm$ 1% B25/50 = 4500K $\pm$ 3%

Temp. (°C)	R_Min (Kohm)	R_Cent (Kohm)	R_Max (Kohm)	Res TOL.	Temp. TOL.(°C)
36	267.878	274.970	282.222	2.64%	0.56
37	255.236	262.363	269.662	2.78%	0.60
38	243.262	250.405	257.732	2.93%	0.63
39	231.919	239.061	246.399	3.07%	0.67
40	221.170	228.296	235.629	3.21%	0.70
41	210.980	218.078	225.391	3.35%	0.74
42	201.318	208.375	215.657	3.49%	0.77
43	192.153	199.158	206.399	3.64%	0.81
44	183.457	190.402	197.591	3.78%	0.84
45	175.204	182.081	189.209	3.91%	0.88
46	167.370	174.171	181.230	4.05%	0.92
47	159.929	166.649	173.633	4.19%	0.95
48	152.862	159.494	166.397	4.33%	0.99
49	146.146	152.687	159.504	4.46%	1.03
50	139.764	146.209	152.936	4.60%	1.07
51	133.696	140.042	146.674	4.74%	1.11
52	127.925	134.170	140.705	4.87%	1.14
53	122.436	128.577	135.012	5.00%	1.18
54	117.213	123.248	129.581	5.14%	1.22
55	112.242	118.170	124.399	5.27%	1.26
56	107.509	113.330	119.453	5.40%	1.30
57	103.002	108.714	114.731	5.53%	1.34
58	98.710	104.313	110.223	5.67%	1.38
59	94.620	100.114	105.916	5.80%	1.42
60	90.722	96.107	101.802	5.93%	1.46
61	87.006	92.283	97.871	6.05%	1.50
62	83.462	88.632	94.113	6.18%	1.54
63	80.083	85.146	90.520	6.31%	1.58
64	76.859	81.816	87.084	6.44%	1.62
65	73.782	78.634	83.797	6.57%	1.67
66	70.846	75.594	80.652	6.69%	1.71
67	68.042	72.688	77.643	6.82%	1.75
68	65.365	69.909	74.762	6.94%	1.79
69	62.807	67.252	72.004	7.07%	1.84
70	60.364	64.710	69.363	7.19%	1.88
71	58.029	62.279	66.833	7.31%	1.92
72	55.796	59.951	64.409	7.44%	1.96
73	53.662	57.724	62.087	7.56%	2.01

Appendix : R-T table

R25 =470 KOhm $\pm$ 1% B25/50 = 4500K $\pm$ 3%

Temp. (°C)	R_Min (Kohm)	R_Cent (Kohm)	R_Max (Kohm)	Res TOL.	Temp. TOL.(°C)
74	51.621	55.591	59.860	7.68%	2.05
75	49.669	53.548	57.726	7.80%	2.10
76	47.800	51.592	55.679	7.92%	2.14
77	46.013	49.717	53.715	8.04%	2.19
78	44.301	47.921	51.832	8.16%	2.23
79	42.663	46.199	50.024	8.28%	2.28
80	41.093	44.549	48.290	8.40%	2.32
81	39.590	42.966	46.624	8.52%	2.37
82	38.150	41.448	45.026	8.63%	2.41
83	36.770	39.991	43.490	8.75%	2.46
84	35.447	38.594	42.015	8.87%	2.51
85	34.179	37.252	40.598	8.98%	2.55
86	32.963	35.965	39.236	9.10%	2.60
87	31.796	34.728	37.927	9.21%	2.65
88	30.677	33.541	36.668	9.32%	2.70
89	29.603	32.401	35.458	9.44%	2.74
90	28.573	31.305	34.295	9.55%	2.79
91	27.583	30.252	33.175	9.66%	2.84
92	26.634	29.240	32.098	9.78%	2.89
93	25.721	28.267	31.062	9.89%	2.94
94	24.845	27.332	30.064	10.00%	2.99
95	24.003	26.432	29.104	10.11%	3.04
96	23.194	25.567	28.180	10.22%	3.09
97	22.417	24.735	27.289	10.33%	3.14
98	21.670	23.934	26.431	10.44%	3.19
99	20.951	23.163	25.605	10.55%	3.24
100	20.260	22.420	24.809	10.65%	3.29
101	19.595	21.706	24.042	10.76%	3.34
102	18.956	21.018	23.302	10.87%	3.39
103	18.340	20.355	22.589	10.97%	3.44
104	17.748	19.717	21.901	11.08%	3.49
105	17.178	19.101	21.238	11.19%	3.54
106	16.629	18.509	20.598	11.29%	3.60
107	16.100	17.937	19.981	11.40%	3.65
108	15.591	17.386	19.386	11.50%	3.70
109	15.101	16.855	18.811	11.60%	3.75
110	14.628	16.343	18.256	11.71%	3.81
111	14.173	15.849	17.721	11.81%	3.86

Appendix : R-T table

R25 =470 KOhm ± 1% B25/50 = 4500K ± 3%

Temp. (°C)	R_Min (Kohm)	R_Cent (Kohm)	R_Max (Kohm)	Res TOL.	Temp. TOL.(°C)
112	13.734	15.372	17.203	11.91%	3.91
113	13.311	14.912	16.704	12.02%	3.97
114	12.903	14.468	16.221	12.12%	4.02
115	12.510	14.040	15.755	12.22%	4.08
116	12.131	13.626	15.305	12.32%	4.13
117	11.765	13.227	14.870	12.42%	4.19
118	11.411	12.841	14.449	12.52%	4.24
119	11.071	12.469	14.042	12.62%	4.30
120	10.742	12.109	13.649	12.72%	4.35
121	10.424	11.761	13.269	12.82%	4.41
122	10.118	11.426	12.901	12.91%	4.47
123	9.822	11.101	12.545	13.01%	4.52
124	9.536	10.787	12.201	13.11%	4.58
125	9.260	10.484	11.868	13.21%	4.64