

THINKING ELECTRONIC INDUSTRIAL CO., LTD.

HEAD OFFICE: 8F-1, No.93, Ta-Shun 1st Rd., Kaohsiung, Taiwan

TEL: 886-7-5577660 FAX: 886-7-5570560

MANUFACTURING SITE

- KAOHSIUNG FACTORY: No.51, Kaifa Road, Nantze Export Processing Zone,
Kaohsiung City 81170, Taiwan
TEL: 886-7-9616668 FAX: 886-7-9616698
- CHANGZHOU FACTORY: No.6 Longmen Road, Wujin National High&New-Tech
Industrial Development Zone Changzhou Jiangsu.
TEL:86-519-86578999 FAX:86-519-86558643
- DONG GUAN FACTORY: Chiao-Tou Tsun, Sha-Tao Hsiang, Chang-An Town,
Dong-Guan City 523863, Guangdong, China
TEL:86-769-85542016 FAX:86-769-85546890
- YICHANG FACTORY: No. 283 Xiaoting Avenue, Xiaoting Dist., Yichang
City 443007, Hubei, China
TEL:86-717-6510010 FAX:86-717-6511430

**SPECIFICATION FOR APPROVAL**

CUSTOMER

CERTIFIED
MODEL/TYPE

TTC-204

PART NO.

TTC05204JIE502(RoHS+HF)

APPLICATION

CUSTOMER P/N

ISSUE DATE

May.03.2017

REV. NO.

REV. DATE

FOR CUSTOMER APPROVAL	CHECKED BY
	<i>Haili Gong</i>
	APPROVED BY
	<i>Huaifang Zhang</i>





REVISED RECORD SHEET

REV. NO	REV. DATE	REVISED CONTENT



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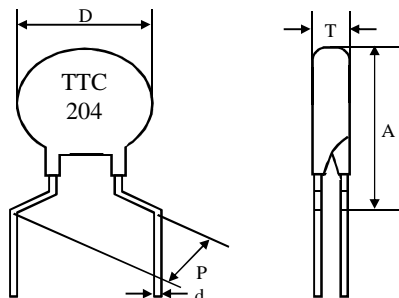
Part Number Code

Example :

TTC **05** **204** **J** **I** **E502**
 (1) (2) (3) (4) (5) (6)

No.	Item	Digit	Specification
(1)	Product Type	TTC	Thinking NTC thermistor TTC type
(2)	Body Size	05	φ 5 mm
(3)	Zero Power Resistance at 25°C (R ₂₅)	204	20 x 10 ⁴ = 200 KΩ
(4)	Tolerance of R ₂₅	J	±5%
(5)	Appearance	I	kink lead (K3)
(6)	Optional Suffix	E502	Tmax:3.2mm Taping 12.7mm&Box RoHS+HF compliance

Structure and Dimensions



(unit : mm)

Body Size	D max.	P	d	A max.	T max.
φ 5mm	6.5	5±0.5	0.5±0.02	10	3.2

Electrical Characteristics

Part No.	Zero Power Resistance at 25°C	Tolerance of R ₂₅	B _{25/50} Value	Max. Power Dissipation at 25°C	Dissipation Factor	Thermal Time Constant	Operating Temperature Range
	R ₂₅ (KΩ)	(± %)	(K)	P _{max} (mW)	δ (mW/°C)	τ (sec.)	T _L ~T _U (°C)
TTC05204JIE502	200	5	4600± 5%	450	Approx. 4.5	Approx. 20	-30 ~+125

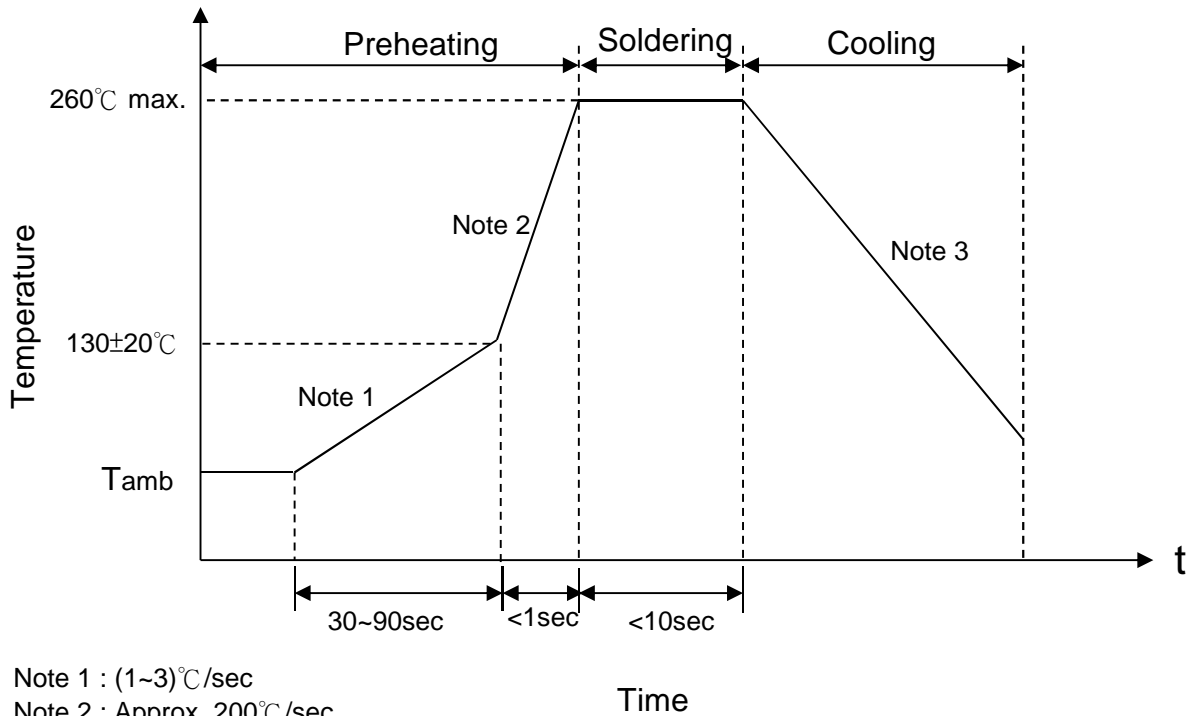
Reliability

Item	Standard	Test conditions / Methods	Specifications															
Tensile Strength of Terminals	IEC60068-2-21	Gradually applying the force specified and keeping the unit fixed for 10±1 sec. <table style="margin-left: auto; margin-right: auto;"> <tr> <td style="text-align: center;">Terminal diameter (mm)</td> <td style="text-align: center;">Force (Kg)</td> </tr> <tr> <td style="text-align: center;">$0.3 < d \leq 0.5$</td> <td style="text-align: center;">0.5</td> </tr> <tr> <td style="text-align: center;">$0.5 < d \leq 0.8$</td> <td style="text-align: center;">1.0</td> </tr> </table>	Terminal diameter (mm)	Force (Kg)	$0.3 < d \leq 0.5$	0.5	$0.5 < d \leq 0.8$	1.0	No visible damage									
Terminal diameter (mm)	Force (Kg)																	
$0.3 < d \leq 0.5$	0.5																	
$0.5 < d \leq 0.8$	1.0																	
Bending Strength of Terminals	IEC60068-2-21	Hold specimen and apply the force specified below to each lead. Bend the specimen to 90°, then return to the original position. Repeat the procedure in the opposite direction. <table style="margin-left: auto; margin-right: auto;"> <tr> <td style="text-align: center;">Terminal diameter (mm)</td> <td style="text-align: center;">Force (Kg)</td> </tr> <tr> <td style="text-align: center;">$0.3 < d \leq 0.5$</td> <td style="text-align: center;">0.25</td> </tr> <tr> <td style="text-align: center;">$0.5 < d \leq 0.8$</td> <td style="text-align: center;">0.50</td> </tr> </table>	Terminal diameter (mm)	Force (Kg)	$0.3 < d \leq 0.5$	0.25	$0.5 < d \leq 0.8$	0.50	No visible damage									
Terminal diameter (mm)	Force (Kg)																	
$0.3 < d \leq 0.5$	0.25																	
$0.5 < d \leq 0.8$	0.50																	
Solderability	IEC60068-2-20	245 ± 3 °C , 3 ± 0.3 sec	At least 95% of terminal electrode is covered by new solder															
Resistance to Soldering Heat	IEC60068-2-20	260 ± 3 °C , 10 ± 1 sec	No visible damage $\Delta R_{25}/R_{25}$ ≤ 3 %															
High Temperature Storage	IEC60068-2-2	125 ± 5 °C , 1000 ± 24 hrs	No visible damage $\Delta R_{25}/R_{25}$ ≤ 5 %															
Damp Heat, Steady State	IEC60068-2-78	40 ± 2°C , 90 ~ 95 % RH , 1000 ± 24 hrs	No visible damage $\Delta R_{25}/R_{25}$ ≤ 3 %															
Rapid Change of Temperature	IEC6008-2-14	The conditions shown below shall be repeated 5 cycles <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Step</th> <th>Temperature (°C)</th> <th>Period (minutes)</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">1</td> <td style="text-align: center;">-30 ± 5</td> <td style="text-align: center;">30 ± 3</td> </tr> <tr> <td style="text-align: center;">2</td> <td style="text-align: center;">Room temperature</td> <td style="text-align: center;">5 ± 3</td> </tr> <tr> <td style="text-align: center;">3</td> <td style="text-align: center;">125 ± 5</td> <td style="text-align: center;">30 ± 3</td> </tr> <tr> <td style="text-align: center;">4</td> <td style="text-align: center;">Room temperature</td> <td style="text-align: center;">5 ± 3</td> </tr> </tbody> </table>	Step	Temperature (°C)	Period (minutes)	1	-30 ± 5	30 ± 3	2	Room temperature	5 ± 3	3	125 ± 5	30 ± 3	4	Room temperature	5 ± 3	No visible damage $\Delta R_{25}/R_{25}$ ≤ 3 %
Step	Temperature (°C)	Period (minutes)																
1	-30 ± 5	30 ± 3																
2	Room temperature	5 ± 3																
3	125 ± 5	30 ± 3																
4	Room temperature	5 ± 3																
Max. Power Dissipation	IEC60539-1 4.26.3	25 ± 5 °C , Pmax. , 1000 ± 24 hrs	No visible damage $\Delta R_{25}/R_{25}$ ≤ 5 %															
Insulation test	MIL-STD-202F- Method 302	1000 V _{DC} 1 min	No visible damage ≥ 500 MΩ															

Products have been tested at Thinking Electronic Industrial Co.,Ltd. Laboratory recognized by UL (Underwriters Laboratories Inc.) under CTRDP (Client Test Data Program).

Soldering Recommendation

Wave Soldering Profile



Note 1 : (1~3) $^{\circ}\text{C/sec}$

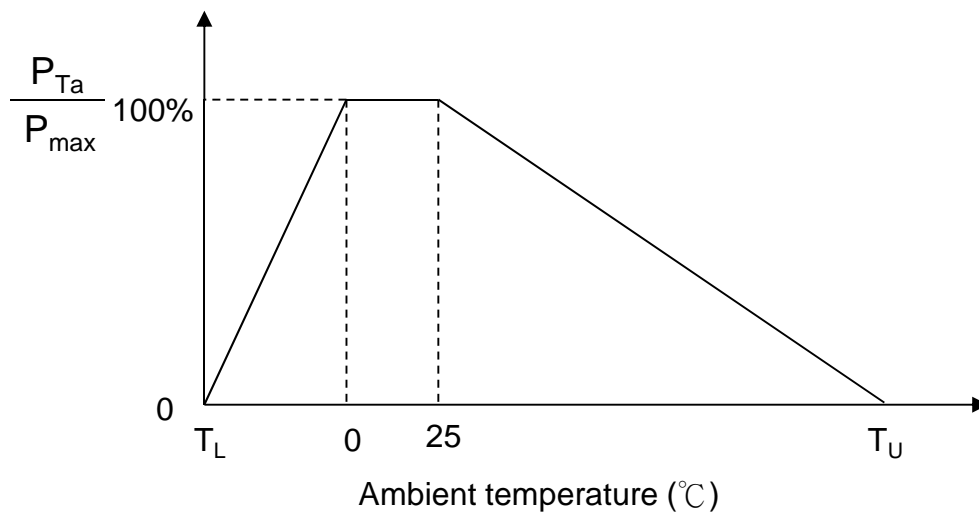
Note 2 : Approx. 200°C/sec

Note 3 : $5^{\circ}\text{C/sec max}$

Recommended Reworking Conditions with Soldering Iron

Item	Conditions
Temperature of Soldering Iron-tip	$360^{\circ}\text{C (max.)}$
Soldering Time	3 sec (max.)
Distance From Thermistor	2 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 2011/65/EU.

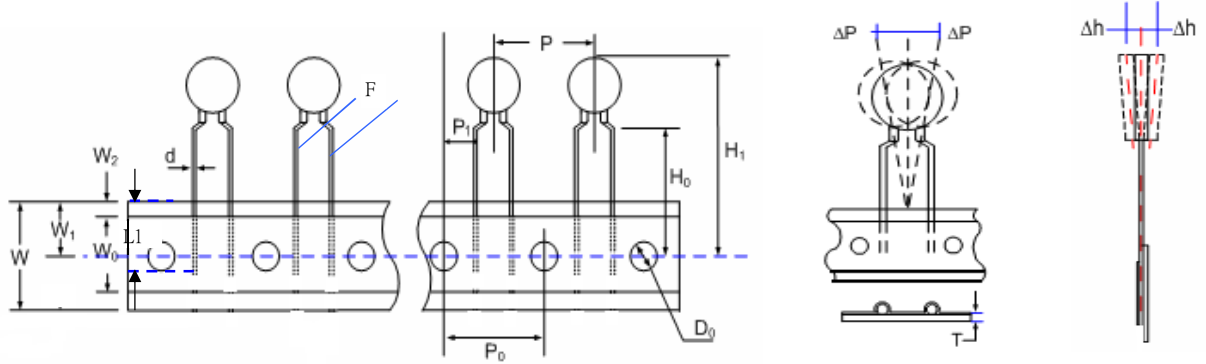
Warehouse Storage Conditions of Products

(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

Taping and Dimensions

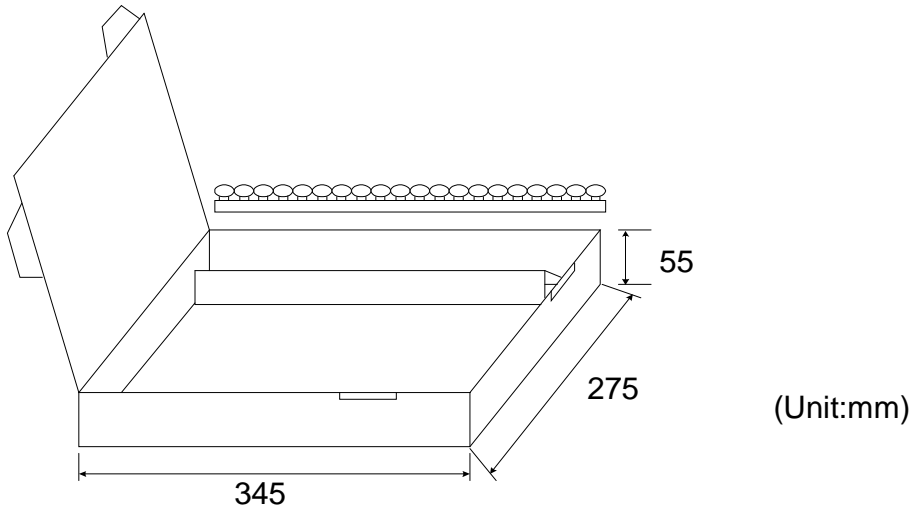


(Unit : mm)

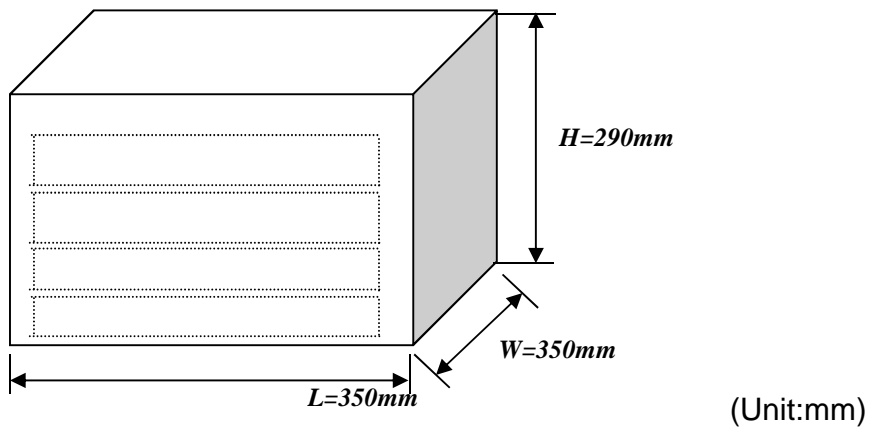
Item	P0	F	P	P1	H0	H1	d	W0	W1	W2	W	ΔP	Δh	L1	D0	T
	± 0.3	± 0.5	± 1	± 0.7	± 0.5	Max.	± 0.02	± 1	$+0.75$ -0.5	Max.	$+1/-0.5$	Max.	Max.	Min.	± 0.2	± 0.2
	12.7	5	12.7	3.85	16	28	0.5	12	9	3	18	1	2	9	4	0.6

Standard Packing

(1) Quantity (2000pcs / box)



(2) : Quantity (6 boxes /Carton)



Safety Approvals (Certified Model/Type : TTC-204)



* UL 1434 / cUL recognized (File # E138827)



* CSA recognized (File # 97495)



* TÜV recognized (File # R 50050155)



* CQC GB/T 6663.1-2007 recognized (File # CQC05001011994)

* CQC GB6663-86 recognized (File # CQC05001011991)

Certificates

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

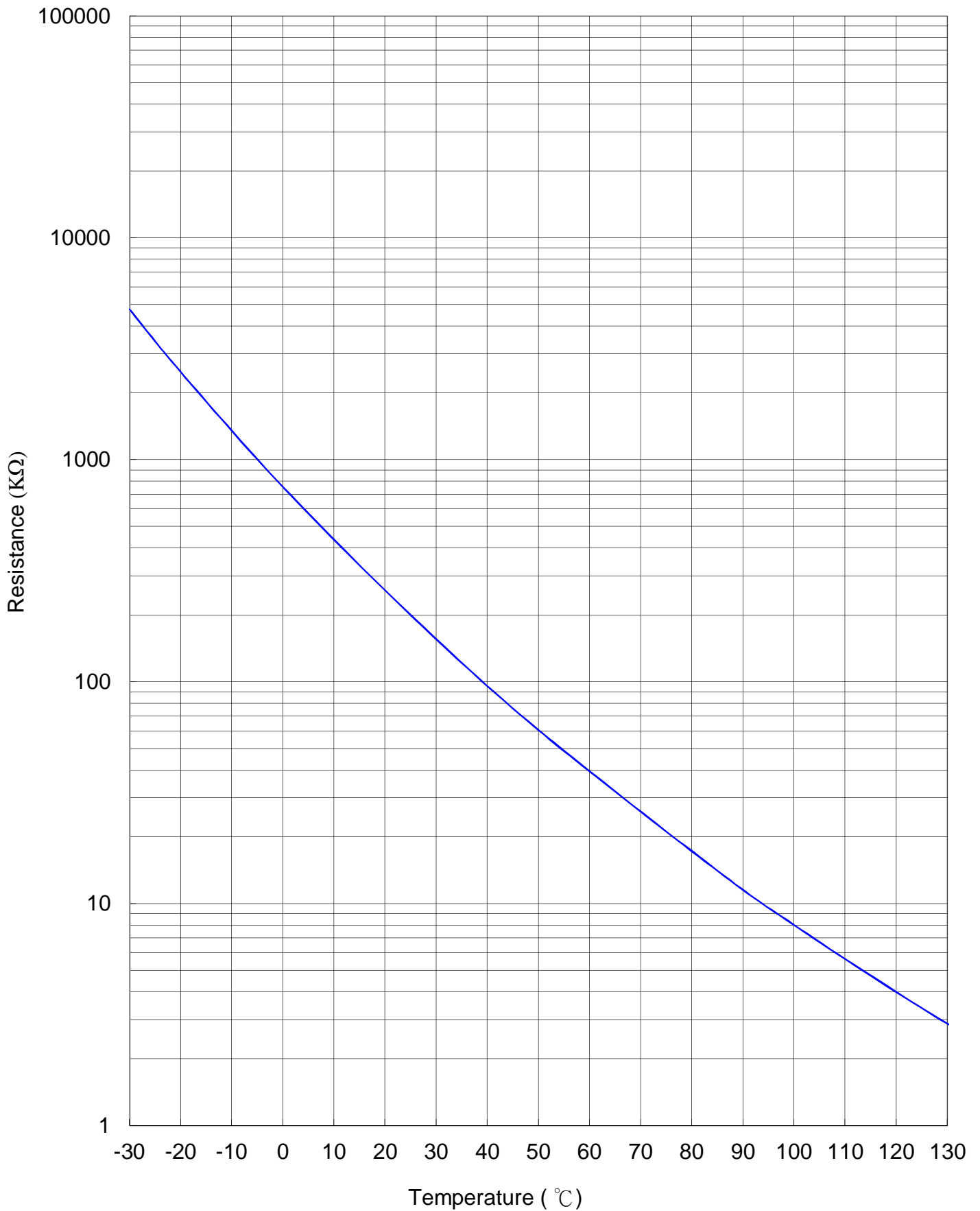
Test Report

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



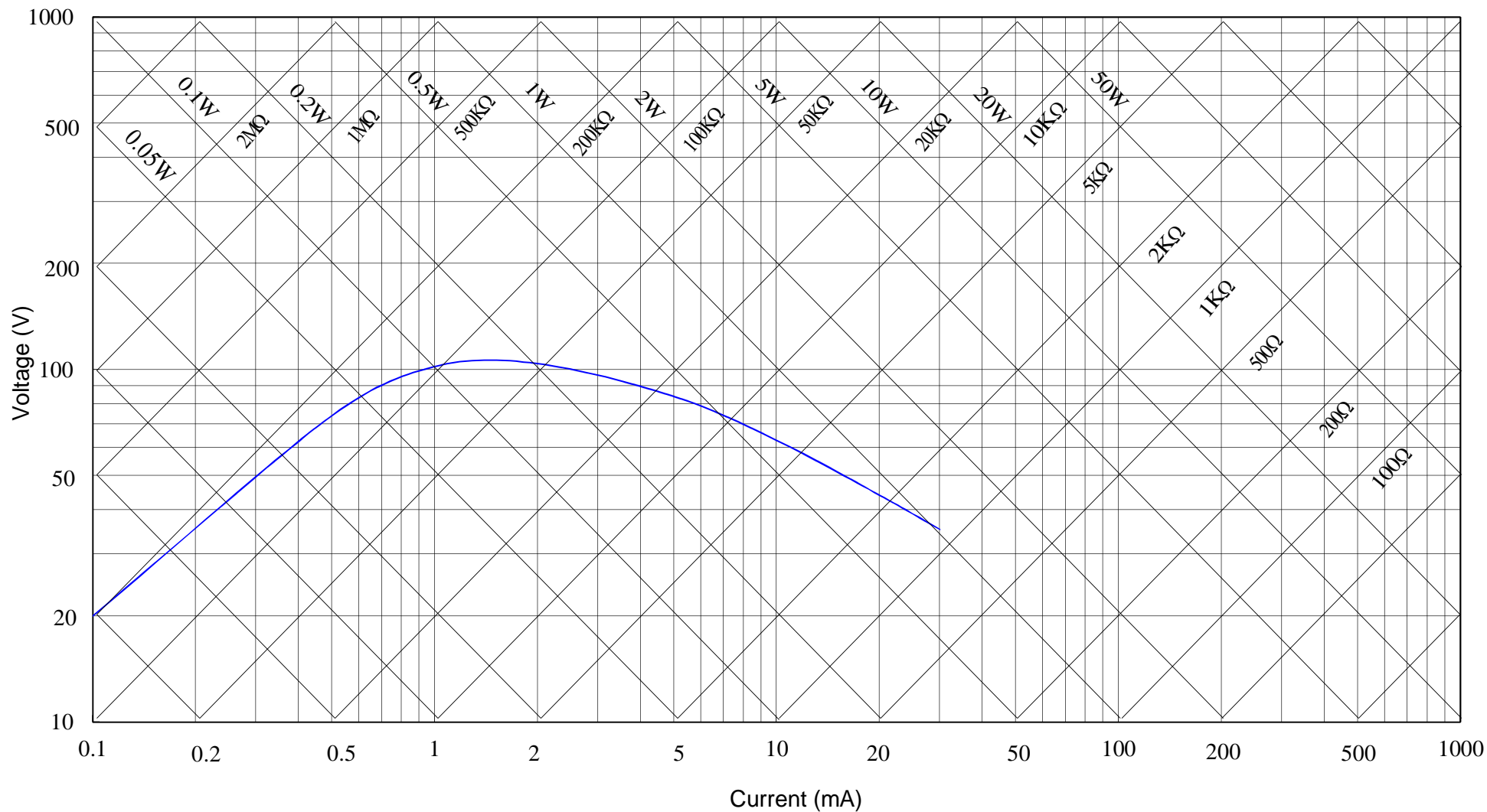
R-T Characteristic Curve

TTC05204JIE502



V-I Characteristic Curve (Ambient $T_a=25\text{ }^\circ\text{C}$)

TTC05204JIE502





R - T Table

Part No. : TTC05204JIE502

R25=200KOhm ±5%

B25/50 = 4600 K ± 5%

Temperature (°C)	Rmax. (KΩ)	Rnor. (KΩ)	Rmin. (KΩ)	Temperature Tol. (°C)		Resistance Tol. (%)	
-30	5862.93	4765.11	3863.18	-3.36	2.96	23.0%	-18.9%
-29	5470.31	4460.71	3628.35	-3.32	2.93	22.6%	-18.7%
-28	5105.25	4176.74	3408.55	-3.27	2.90	22.2%	-18.4%
-27	4765.72	3911.76	3202.79	-3.22	2.87	21.8%	-18.1%
-26	4449.89	3664.47	3010.13	-3.18	2.84	21.4%	-17.9%
-25	4156.08	3433.66	2829.73	-3.13	2.80	21.0%	-17.6%
-24	3882.72	3218.24	2660.80	-3.08	2.77	20.6%	-17.3%
-23	3628.40	3017.16	2502.61	-3.04	2.74	20.3%	-17.1%
-22	3391.78	2829.47	2354.48	-3.00	2.71	19.9%	-16.8%
-21	3171.62	2654.28	2215.77	-2.95	2.68	19.5%	-16.5%
-20	2966.77	2490.74	2085.87	-2.91	2.65	19.1%	-16.3%
-19	2776.14	2338.08	1964.23	-2.87	2.62	18.7%	-16.0%
-18	2598.72	2195.56	1850.30	-2.83	2.59	18.4%	-15.7%
-17	2433.58	2062.48	1743.59	-2.79	2.57	18.0%	-15.5%
-16	2279.84	1938.19	1643.62	-2.75	2.54	17.6%	-15.2%
-15	2136.67	1822.09	1549.95	-2.71	2.51	17.3%	-14.9%
-14	2003.31	1713.62	1462.16	-2.67	2.48	16.9%	-14.7%
-13	1879.05	1612.24	1379.85	-2.63	2.45	16.5%	-14.4%
-12	1763.22	1517.45	1302.67	-2.59	2.42	16.2%	-14.2%
-11	1655.22	1428.80	1230.26	-2.55	2.39	15.8%	-13.9%
-10	1554.48	1345.85	1162.31	-2.52	2.36	15.5%	-13.6%
-9	1460.45	1268.21	1098.51	-2.48	2.33	15.2%	-13.4%
-8	1372.66	1195.50	1038.60	-2.44	2.30	14.8%	-13.1%
-7	1290.66	1127.38	982.294	-2.40	2.27	14.5%	-12.9%
-6	1214.02	1063.53	929.367	-2.36	2.24	14.1%	-12.6%
-5	1142.36	1003.65	879.590	-2.32	2.21	13.8%	-12.4%
-4	1075.32	947.479	832.753	-2.28	2.18	13.5%	-12.1%
-3	1012.57	894.750	788.664	-2.23	2.14	13.2%	-11.9%
-2	953.811	845.232	747.140	-2.19	2.11	12.8%	-11.6%
-1	898.762	798.707	708.017	-2.15	2.07	12.5%	-11.4%
0	847.164	754.976	671.137	-2.11	2.04	12.2%	-11.1%
1	798.776	713.850	636.358	-2.07	2.00	11.9%	-10.9%
2	753.380	675.159	603.546	-2.02	1.97	11.6%	-10.6%
3	710.771	638.742	572.577	-1.98	1.93	11.3%	-10.4%
4	670.761	604.452	543.337	-1.93	1.89	11.0%	-10.1%
5	633.177	572.152	515.717	-1.89	1.85	10.7%	-9.9%
6	597.858	541.716	489.619	-1.84	1.82	10.4%	-9.6%
7	564.655	513.025	464.950	-1.80	1.78	10.1%	-9.4%
8	533.430	485.969	441.625	-1.75	1.74	9.8%	-9.1%
9	504.055	460.448	419.563	-1.71	1.70	9.5%	-8.9%



R - T Table

Part No. : TTC05204JIE502

R25=200KOhm ±5%

B25/50 = 4600 K ± 5%

Temperature (°C)	Rmax. (KΩ)	Rnor. (KΩ)	Rmin. (KΩ)	Temperature Tol. (°C)		Resistance Tol. (%)	
10	476.412	436.367	398.690	-1.66	1.66	9.2%	-8.6%
11	450.391	413.639	378.935	-1.62	1.62	8.9%	-8.4%
12	425.890	392.180	360.235	-1.57	1.58	8.6%	-8.1%
13	402.813	371.915	342.528	-1.52	1.54	8.3%	-7.9%
14	381.072	352.772	325.758	-1.48	1.49	8.0%	-7.7%
15	360.584	334.686	309.871	-1.43	1.45	7.7%	-7.4%
16	341.274	317.593	294.817	-1.39	1.41	7.5%	-7.2%
17	323.067	301.436	280.550	-1.34	1.37	7.2%	-6.9%
18	305.899	286.161	267.027	-1.29	1.32	6.9%	-6.7%
19	289.706	271.716	254.205	-1.25	1.28	6.6%	-6.4%
20	274.430	258.053	242.046	-1.20	1.24	6.3%	-6.2%
21	260.016	245.128	230.514	-1.15	1.19	6.1%	-6.0%
22	246.412	232.898	219.575	-1.11	1.15	5.8%	-5.7%
23	233.571	221.325	209.196	-1.06	1.11	5.5%	-5.5%
24	221.448	210.370	199.347	-1.01	1.06	5.3%	-5.2%
25	210.000	200.000	190.000	-0.96	1.02	5.0%	-5.0%
26	200.193	190.181	180.218	-1.02	1.07	5.3%	-5.2%
27	190.882	180.882	170.977	-1.08	1.12	5.5%	-5.5%
28	182.042	172.074	162.246	-1.13	1.18	5.8%	-5.7%
29	173.645	163.730	153.995	-1.19	1.23	6.1%	-5.9%
30	165.670	155.824	146.197	-1.25	1.28	6.3%	-6.2%
31	158.093	148.332	138.825	-1.30	1.34	6.6%	-6.4%
32	150.894	141.231	131.855	-1.36	1.39	6.8%	-6.6%
33	144.053	134.498	125.264	-1.42	1.45	7.1%	-6.9%
34	137.550	128.115	119.029	-1.48	1.50	7.4%	-7.1%
35	131.368	122.061	113.130	-1.54	1.56	7.6%	-7.3%
36	125.490	116.319	107.549	-1.60	1.61	7.9%	-7.5%
37	119.900	110.871	102.266	-1.66	1.66	8.1%	-7.8%
38	114.583	105.702	97.2655	-1.72	1.72	8.4%	-8.0%
39	109.524	100.796	92.5308	-1.78	1.77	8.7%	-8.2%
40	104.711	96.1384	88.0469	-1.84	1.83	8.9%	-8.4%
41	100.130	91.7165	83.7996	-1.90	1.89	9.2%	-8.6%
42	95.7700	87.5172	79.7756	-1.97	1.94	9.4%	-8.8%
43	91.6185	83.5284	75.9623	-2.03	2.00	9.7%	-9.1%
44	87.6652	79.7389	72.3479	-2.09	2.05	9.9%	-9.3%
45	83.8999	76.1378	68.9212	-2.16	2.11	10.2%	-9.5%
46	80.3128	72.7152	65.6718	-2.22	2.16	10.4%	-9.7%
47	76.8948	69.4614	62.5897	-2.28	2.22	10.7%	-9.9%
48	73.6374	66.3675	59.6657	-2.35	2.28	11.0%	-10.1%
49	70.5322	63.4249	56.8911	-2.42	2.33	11.2%	-10.3%

R - T Table

Part No. : TTC05204JIE502

R25=200KOhm ±5%

B25/50 = 4600 K ± 5%

Temperature (°C)	Rmax. (KΩ)	Rnor. (KΩ)	Rmin. (KΩ)	Temperature Tol.		Resistance Tol.	
				(°C)		(%)	
50	67.5716	60.6256	54.2576	-2.48	2.39	11.5%	-10.5%
51	64.7482	57.9621	51.7575	-2.55	2.45	11.7%	-10.7%
52	62.0551	55.4272	49.3834	-2.61	2.50	12.0%	-10.9%
53	59.4857	53.0141	47.1285	-2.68	2.56	12.2%	-11.1%
54	57.0339	50.7166	44.9862	-2.75	2.62	12.5%	-11.3%
55	54.6938	48.5285	42.9505	-2.82	2.68	12.7%	-11.5%
56	52.4597	46.4442	41.0157	-2.89	2.73	13.0%	-11.7%
57	50.3264	44.4583	39.1763	-2.95	2.79	13.2%	-11.9%
58	48.2891	42.5658	37.4271	-3.02	2.85	13.4%	-12.1%
59	46.3428	40.7619	35.7634	-3.09	2.91	13.7%	-12.3%
60	44.4832	39.0420	34.1807	-3.16	2.96	13.9%	-12.5%
61	42.7060	37.4019	32.6746	-3.23	3.02	14.2%	-12.6%
62	41.0073	35.8375	31.2411	-3.30	3.08	14.4%	-12.8%
63	39.3832	34.3450	29.8764	-3.38	3.14	14.7%	-13.0%
64	37.8301	32.9208	28.5770	-3.45	3.20	14.9%	-13.2%
65	36.3447	31.5615	27.3394	-3.52	3.25	15.2%	-13.4%
66	34.9237	30.2639	26.1603	-3.59	3.31	15.4%	-13.6%
67	33.5639	29.0249	25.0369	-3.66	3.37	15.6%	-13.7%
68	32.2627	27.8416	23.9663	-3.74	3.43	15.9%	-13.9%
69	31.0171	26.7113	22.9457	-3.81	3.49	16.1%	-14.1%
70	29.8245	25.6314	21.9726	-3.88	3.55	16.4%	-14.3%
71	28.6826	24.5994	21.0447	-3.96	3.60	16.6%	-14.5%
72	27.5889	23.6130	20.1596	-4.03	3.66	16.8%	-14.6%
73	26.5412	22.6701	19.3151	-4.11	3.72	17.1%	-14.8%
74	25.5375	21.7685	18.5094	-4.18	3.78	17.3%	-15.0%
75	24.5756	20.9063	17.7404	-4.26	3.84	17.6%	-15.1%
76	23.6537	20.0816	17.0063	-4.33	3.90	17.8%	-15.3%
77	22.7699	19.2926	16.3054	-4.41	3.96	18.0%	-15.5%
78	21.9226	18.5376	15.6361	-4.48	4.02	18.3%	-15.7%
79	21.1101	17.8151	14.9968	-4.56	4.08	18.5%	-15.8%
80	20.3308	17.1235	14.3862	-4.64	4.13	18.7%	-16.0%
81	19.5833	16.4614	13.8027	-4.72	4.19	19.0%	-16.2%
82	18.8661	15.8275	13.2451	-4.79	4.25	19.2%	-16.3%
83	18.1780	15.2204	12.7121	-4.87	4.31	19.4%	-16.5%
84	17.5175	14.6389	12.2027	-4.95	4.37	19.7%	-16.6%
85	16.8836	14.0818	11.7156	-5.03	4.43	19.9%	-16.8%
86	16.2751	13.5481	11.2498	-5.11	4.49	20.1%	-17.0%
87	15.6908	13.0366	10.8042	-5.19	4.55	20.4%	-17.1%
88	15.1298	12.5464	10.3781	-5.27	4.61	20.6%	-17.3%
89	14.5910	12.0765	9.97032	-5.35	4.68	20.8%	-17.4%



R - T Table

Part No. : TTC05204JIE502

R25=200KOhm ±5%

B25/50 = 4600 K ± 5%

Temperature (°C)	Rmax. (KΩ)	Rnor. (KΩ)	Rmin. (KΩ)	Temperature Tol. (°C)		Resistance Tol. (%)	
90	14.0734	11.6260	9.58015	-5.43	4.74	21.1%	-17.6%
91	13.5761	11.1940	9.20675	-5.51	4.80	21.3%	-17.8%
92	13.0984	10.7797	8.84933	-5.60	4.86	21.5%	-17.9%
93	12.6393	10.3824	8.50716	-5.68	4.92	21.7%	-18.1%
94	12.1981	10.0012	8.17954	-5.76	4.98	22.0%	-18.2%
95	11.7740	9.63556	7.86580	-5.85	5.04	22.2%	-18.4%
96	11.3663	9.28467	7.56531	-5.93	5.11	22.4%	-18.5%
97	10.9743	8.94793	7.27747	-6.02	5.17	22.6%	-18.7%
98	10.5974	8.62471	7.00171	-6.10	5.23	22.9%	-18.8%
99	10.2349	8.31444	6.73747	-6.19	5.29	23.1%	-19.0%
100	9.88619	8.01655	6.48424	-6.28	5.36	23.3%	-19.1%
101	9.55078	7.73052	6.24153	-6.36	5.42	23.5%	-19.3%
102	9.22809	7.45582	6.00887	-6.45	5.48	23.8%	-19.4%
103	8.91758	7.19198	5.78580	-6.54	5.55	24.0%	-19.6%
104	8.61877	6.93853	5.57190	-6.63	5.61	24.2%	-19.7%
105	8.33117	6.69503	5.36676	-6.72	5.68	24.4%	-19.8%
106	8.05433	6.46106	5.17001	-6.81	5.74	24.7%	-20.0%
107	7.78781	6.23621	4.98125	-6.90	5.81	24.9%	-20.1%
108	7.53119	6.02009	4.80016	-6.99	5.87	25.1%	-20.3%
109	7.28408	5.81235	4.62638	-7.08	5.94	25.3%	-20.4%
110	7.04609	5.61262	4.45960	-7.18	6.00	25.5%	-20.5%
111	6.81684	5.42057	4.29951	-7.27	6.07	25.8%	-20.7%
112	6.59600	5.23588	4.14583	-7.36	6.14	26.0%	-20.8%
113	6.38322	5.05824	3.99826	-7.46	6.20	26.2%	-21.0%
114	6.17819	4.88736	3.85656	-7.55	6.27	26.4%	-21.1%
115	5.98059	4.72296	3.72046	-7.65	6.34	26.6%	-21.2%
116	5.79013	4.56476	3.58973	-7.75	6.40	26.8%	-21.4%
117	5.60652	4.41252	3.46412	-7.84	6.47	27.1%	-21.5%
118	5.42950	4.26599	3.34344	-7.94	6.54	27.3%	-21.6%
119	5.25880	4.12493	3.22745	-8.04	6.61	27.5%	-21.8%
120	5.09417	3.98912	3.11597	-8.14	6.68	27.7%	-21.9%
121	4.93538	3.85834	3.00879	-8.24	6.74	27.9%	-22.0%
122	4.78220	3.73238	2.90574	-8.33	6.81	28.1%	-22.1%
123	4.63440	3.61106	2.80665	-8.43	6.88	28.3%	-22.3%
124	4.49178	3.49418	2.71134	-8.54	6.95	28.6%	-22.4%
125	4.35413	3.38155	2.61966	-8.64	7.02	28.8%	-22.5%