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**SPECIFICATION FOR APPROVAL**

CUSTOMER	立創電子
CERTIFIED	TSM1A503
MODEL/TYPE	
PART NO.	TSM1A503J3953RZ (RoHS+HF)
APPLICATION	
CUSTOMER P/N	
ISSUE DATE	Dec. 29, 2020
REV. NO.	
REV. DATE	

FOR CUSTOMER APPROVAL	CHECKED BY
	<i>Shu Ling Fu</i>
	APPROVED BY
	<i>Chun Chu Tu</i>





NTC Thermistor TSM Type
Part No. :TSM1A503J3953RZ

REVISED RECORD SHEET

REV. NO	REV. DATE	REVISED CONTENT



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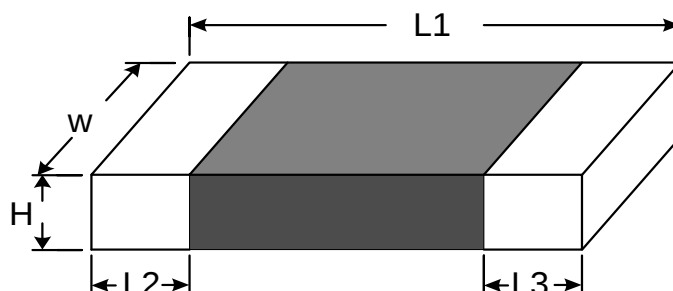
Part Number Code

Example :

TSM **1** **A** **503** **J** **395** **3** **R** **Z**
(1) (2) (3) (4) (5) (6) (7) (8) (9)

No.	Item	Digit	Specification
(1)	Product Type	TSM	Thinking NTC thermistor TSM type
(2)	Size (EIA)	1	0603
(3)	Definition of B Value	A	B _{25/85}
(4)	Zero Power Resistance at 25°C (R ₂₅)	503	50 x 10 ³ Ω = 50 KΩ
(5)	Tolerance of R ₂₅	J	± 5%
(6)	B Value	395	3950K
(7)	Tolerance of B Value	3	± 3%
(8)	Packaging	R	Reel
(9)	Optional Suffix	Z	RoHS+HF compliance

Structure and Dimensions



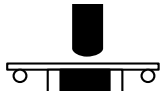
(unit : mm)

L1	W	H max.	L2 and L3
1.60±0.15	0.80±0.15	0.95	0.40±0.15

Electrical Characteristics

Part No.	Zero Power Resistance at 25°C	Tolerance of R ₂₅	B _{25/85} Value	Tolerance of B 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)
TSM1A503J3953RZ	50	5	3950	3	210	Approx. 2.1	Approx. 3.1	-40 ~ +125

Reliability

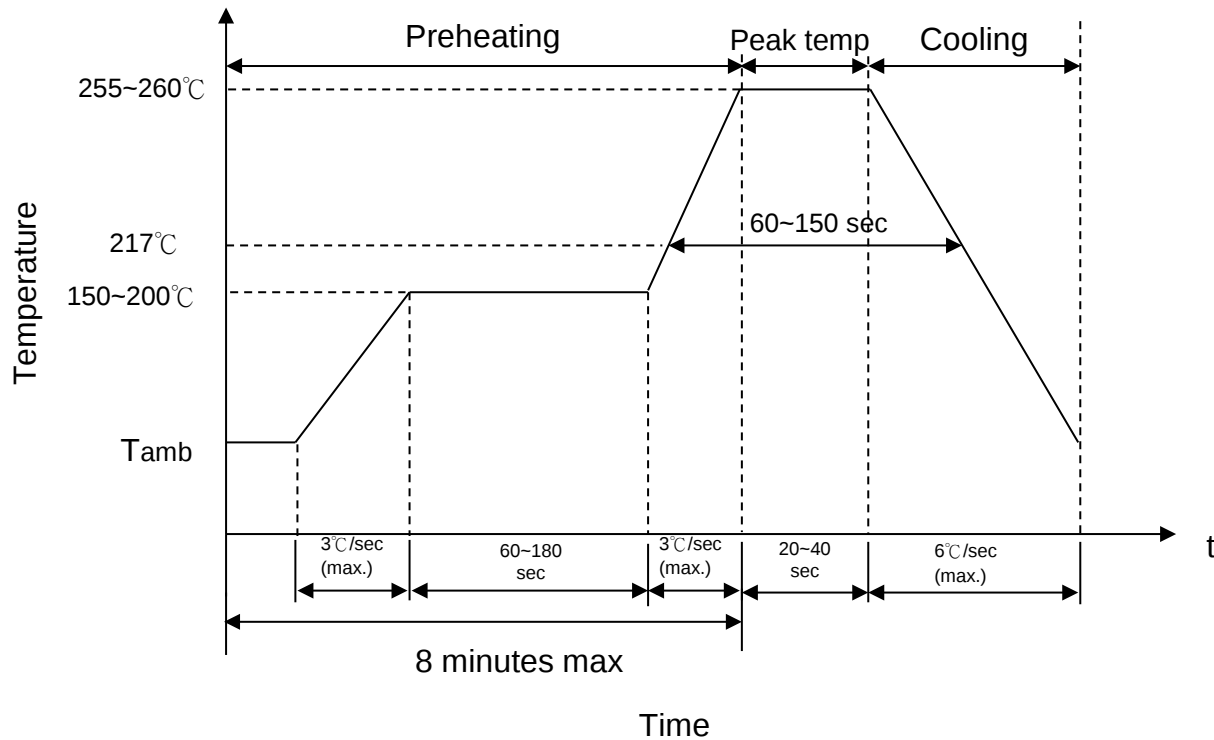
Item	Standard	Test conditions / Methods	Specifications															
Bending Strength	IEC 60068-2-21	Warp : 2mm ; Speed < 0.5mm/sec. Duration : 10 sec on PCB. 	No visible damage ΔR ₂₅ /R ₂₅ ≤ 5 %															
Solderability	IEC60068-2-58	245 ± 5℃ , 3 ± 0.3 sec	At least 95% of terminal electrode is covered by new solder															
Resistance to Soldering Heat	IEC60068-2-58	260 ± 5℃ , 10 ±1 sec	No visible damage ΔR ₂₅ /R ₂₅ ≤ 3 %															
High Temperature Storage	IEC60068-2-2	125 ± 5℃ , 1000 ± 24 hrs	No visible damage ΔR ₂₅ /R ₂₅ ≤ 5 %															
Damp Heat, Steady State	IEC60068-2-78	40 ± 2℃ , 9 0 ~ 95 % RH , 1000 ± 24 hrs	No visible damage ΔR ₂₅ /R ₂₅ ≤ 3 %															
Rapid Change of Temperature	IEC60068-2-14	The conditions shown below shall be repeated 5 cycles on PCB <table><tr><td>Step</td><td>Temperature (℃)</td><td>Period (minutes)</td></tr><tr><td>1</td><td>-40 ± 5</td><td>30 ± 3</td></tr><tr><td>2</td><td>Room temperature</td><td>5 ± 3</td></tr><tr><td>3</td><td>125 ± 5</td><td>30 ± 3</td></tr><tr><td>4</td><td>Room temperature</td><td>5 ± 3</td></tr></table>	Step	Temperature (℃)	Period (minutes)	1	-40 ± 5	30 ± 3	2	Room temperature	5 ± 3	3	125 ± 5	30 ± 3	4	Room temperature	5 ± 3	No visible damage ΔR ₂₅ /R ₂₅ ≤ 3 %
Step	Temperature (℃)	Period (minutes)																
1	-40 ± 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℃ , P _{max.} , 1000 ± 24 hrs	No visible damage ΔR ₂₅ /R ₂₅ ≤ 5 %															

Products have been tested at Thinking Electronic

Industrial Co.,Ltd. Laboratory recognized by UL (Underwriters Laboratories Inc.) under CTRP (Client Test Data Program).

Soldering Recommendation

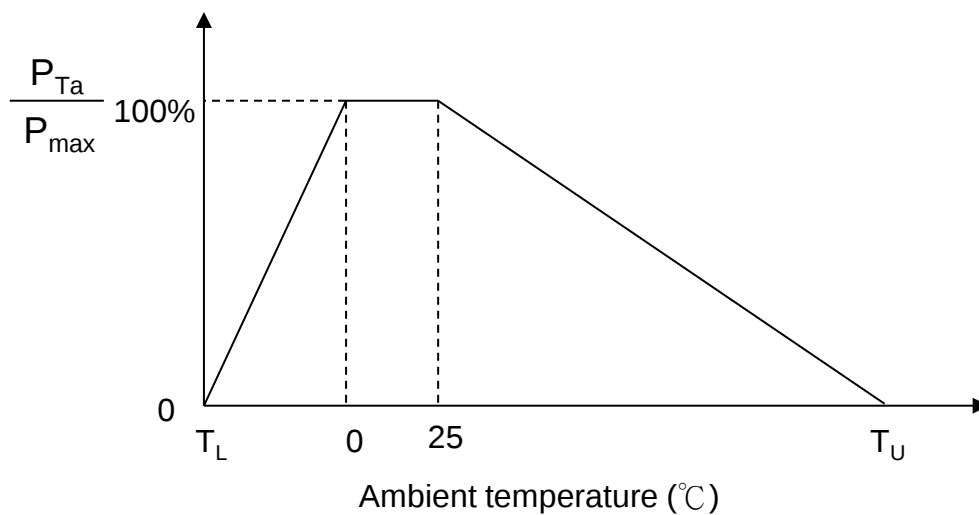
■ IR-Reflow Soldering Profile



■ Recommended Reworking Conditions with Soldering Iron

Item	Conditions
Temperature of Soldering Iron-tip	360°C (max.)
Soldering Time	3 sec (max.)
Diameter of Soldering Iron-tip	φ 3mm (max.)
Caution: Not to touch the component surface with soldering iron directly to prevent component damage.	

Max. Power Dissipation Derating Curve



Note: T_L = Minimum operating temperature (°C)

T_U = Maximum operating temperature (°C)

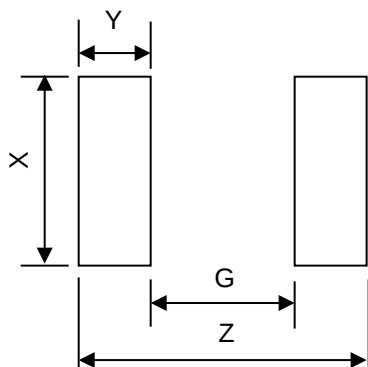
For example :

Ambient temperature(T_a)=55°C

Maximum operating temperature(T_u)=125°C

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

Recommended Soldering Pad Dimensions



Size (EIA)	0603
Z	2.8 mm
G	0.8 mm
X	1.0 mm
Y	1.0 mm

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

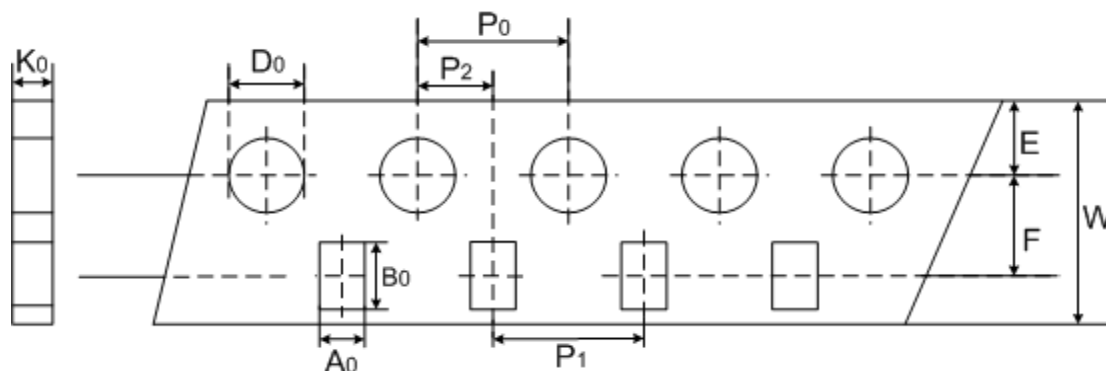
(I) Storage Conditions :

- 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

Packaging

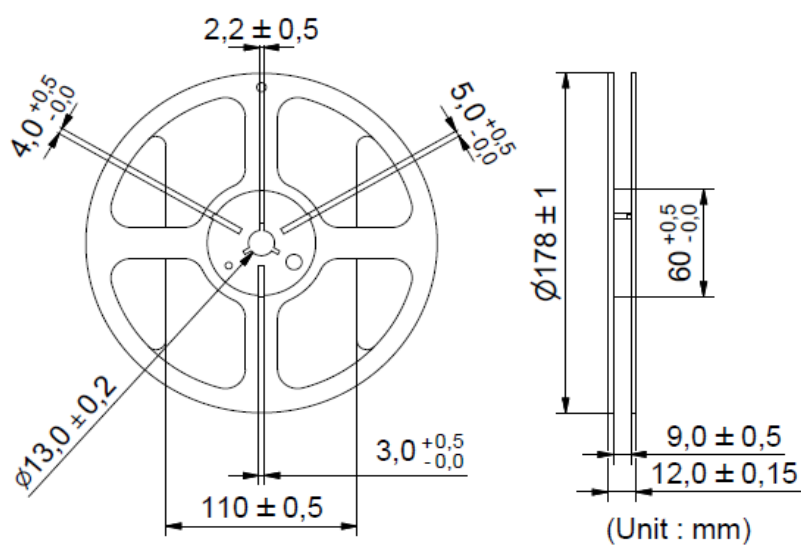
■ Taping Specification (0603 Series)



(Unit : mm)

Index	A_0	B_0	W	E	F	P_1	P_2	P_0	D_0	K_0
Size	± 0.2	± 0.2	± 0.2	± 0.1	± 0.05	± 0.1	± 0.05	± 0.1	± 0.1	± 0.1
0603	1.1	1.9	8	1.75	3.5	4	2	4	1.55	0.95

■ Quantity (4000 pcs / reel)



Safety Approvals (Certified Model/Type : TSM1A503)

* UL 1434 / cUL recognized (File # E138827)



* TUV recognized (File # R 50167657)



* CQC GB/T 6663.1-2007 recognized (File # CQC12001080962)

Certificates

- (1) IATF 16949 certificate
- (2) ISO 9001 certificate
- (3) QC 080000 certificate

Test Report

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

R - T Table

Part No. : TSM1A503J3953RZ

R25 =50 KOhm $\pm$ 5%B25/85 = 3950 K $\pm$ 3%

Temperature (°C)	Rmax. (K Ω)	Rnor. (K Ω)	Rmin. (K Ω)	Temperature Tol. (°C)		Resistance Tol. (%)	
-40	1,983.4	1,699.3	1,452.3	-2.45	2.28	16.7%	-14.5%
-39	1,853.4	1,591.1	1,362.5	-2.42	2.26	16.5%	-14.4%
-38	1,732.4	1,490.2	1,278.6	-2.40	2.25	16.3%	-14.2%
-37	1,619.8	1,396.1	1,200.2	-2.38	2.23	16.0%	-14.0%
-36	1,515.0	1,308.3	1,126.9	-2.35	2.21	15.8%	-13.9%
-35	1,417.4	1,226.4	1,058.4	-2.33	2.20	15.6%	-13.7%
-34	1,326.6	1,150.0	994.42	-2.31	2.18	15.4%	-13.5%
-33	1,242.0	1,078.8	934.61	-2.29	2.17	15.1%	-13.4%
-32	1,163.3	1,012.3	878.69	-2.27	2.15	14.9%	-13.2%
-31	1,089.9	950.25	826.41	-2.25	2.14	14.7%	-13.0%
-30	1,021.6	892.35	777.52	-2.23	2.12	14.5%	-12.9%
-29	957.89	838.29	731.79	-2.21	2.11	14.3%	-12.7%
-28	898.52	787.80	689.00	-2.19	2.10	14.1%	-12.5%
-27	843.17	740.64	648.95	-2.17	2.08	13.8%	-12.4%
-26	791.55	696.58	611.46	-2.16	2.07	13.6%	-12.2%
-25	743.39	655.39	576.37	-2.14	2.05	13.4%	-12.1%
-24	698.44	616.89	543.49	-2.12	2.04	13.2%	-11.9%
-23	656.49	580.88	512.69	-2.10	2.02	13.0%	-11.7%
-22	617.32	547.20	483.83	-2.08	2.01	12.8%	-11.6%
-21	580.73	515.68	456.77	-2.06	2.00	12.6%	-11.4%
-20	546.54	486.18	431.40	-2.05	1.98	12.4%	-11.3%
-19	514.58	458.55	407.61	-2.03	1.97	12.2%	-11.1%
-18	484.70	432.68	385.28	-2.01	1.95	12.0%	-11.0%
-17	456.74	408.43	364.32	-1.99	1.94	11.8%	-10.8%
-16	430.59	385.70	344.63	-1.97	1.93	11.6%	-10.6%
-15	406.10	364.39	326.15	-1.96	1.91	11.4%	-10.5%
-14	383.17	344.40	308.77	-1.94	1.90	11.3%	-10.3%
-13	361.68	325.63	292.44	-1.92	1.88	11.1%	-10.2%
-12	341.55	308.01	277.08	-1.90	1.87	10.9%	-10.0%
-11	322.66	291.47	262.63	-1.89	1.85	10.7%	-9.9%
-10	304.95	275.92	249.03	-1.87	1.84	10.5%	-9.7%
-9	288.32	261.30	236.22	-1.85	1.82	10.3%	-9.6%
-8	272.71	247.56	224.16	-1.83	1.81	10.2%	-9.5%
-7	258.05	234.63	212.79	-1.81	1.79	10.0%	-9.3%
-6	244.27	222.45	202.08	-1.79	1.78	9.8%	-9.2%
-5	231.32	210.99	191.97	-1.77	1.76	9.6%	-9.0%
-4	219.13	200.19	182.43	-1.75	1.75	9.5%	-8.9%
-3	207.67	190.01	173.43	-1.73	1.73	9.3%	-8.7%
-2	196.87	180.42	164.92	-1.71	1.71	9.1%	-8.6%
-1	186.71	171.37	156.89	-1.69	1.69	9.0%	-8.4%

R - T Table

Part No. : TSM1A503J3953RZ

R25 =50 KOhm $\pm$ 5%B25/85 = 3950 K $\pm$ 3%

Temperature (°C)	Rmax. (KΩ)	Rnor. (KΩ)	Rmin. (KΩ)	Temperature Tol. (°C)		Resistance Tol. (%)	
0	177.13	162.83	149.30	-1.67	1.68	8.8%	-8.3%
1	168.10	154.76	142.12	-1.65	1.66	8.6%	-8.2%
2	159.59	147.15	135.34	-1.63	1.64	8.5%	-8.0%
3	151.56	139.95	128.91	-1.61	1.62	8.3%	-7.9%
4	143.98	133.15	122.83	-1.59	1.60	8.1%	-7.8%
5	136.82	126.72	117.07	-1.57	1.59	8.0%	-7.6%
6	130.06	120.64	111.62	-1.55	1.57	7.8%	-7.5%
7	123.68	114.88	106.45	-1.53	1.55	7.7%	-7.3%
8	117.64	109.44	101.55	-1.51	1.53	7.5%	-7.2%
9	111.93	104.28	96.903	-1.48	1.51	7.3%	-7.1%
10	106.53	99.391	92.495	-1.46	1.49	7.2%	-6.9%
11	101.43	94.761	88.313	-1.44	1.47	7.0%	-6.8%
12	96.591	90.372	84.343	-1.42	1.45	6.9%	-6.7%
13	92.013	86.211	80.573	-1.39	1.43	6.7%	-6.5%
14	87.677	82.264	76.992	-1.37	1.41	6.6%	-6.4%
15	83.570	78.520	73.590	-1.35	1.39	6.4%	-6.3%
16	79.676	74.966	70.357	-1.33	1.37	6.3%	-6.1%
17	75.986	71.592	67.284	-1.30	1.34	6.1%	-6.0%
18	72.486	68.388	64.361	-1.28	1.32	6.0%	-5.9%
19	69.166	65.345	61.582	-1.26	1.30	5.8%	-5.8%
20	66.016	62.454	58.937	-1.23	1.28	5.7%	-5.6%
21	63.026	59.706	56.420	-1.21	1.26	5.6%	-5.5%
22	60.188	57.094	54.024	-1.18	1.24	5.4%	-5.4%
23	57.493	54.610	51.743	-1.16	1.21	5.3%	-5.3%
24	54.932	52.248	49.570	-1.14	1.19	5.1%	-5.1%
25	52.500	50.000	47.500	-1.11	1.17	5.0%	-5.0%
26	50.320	47.861	45.408	-1.15	1.20	5.1%	-5.1%
27	48.243	45.825	43.420	-1.19	1.24	5.3%	-5.2%
28	46.262	43.887	41.530	-1.23	1.28	5.4%	-5.4%
29	44.373	42.041	39.732	-1.26	1.31	5.5%	-5.5%
30	42.572	40.283	38.021	-1.30	1.35	5.7%	-5.6%
31	40.854	38.608	36.394	-1.34	1.39	5.8%	-5.7%
32	39.214	37.011	34.845	-1.38	1.42	6.0%	-5.9%
33	37.649	35.490	33.370	-1.42	1.46	6.1%	-6.0%
34	36.155	34.039	31.966	-1.46	1.50	6.2%	-6.1%
35	34.729	32.655	30.629	-1.50	1.54	6.4%	-6.2%
36	33.367	31.336	29.354	-1.54	1.57	6.5%	-6.3%
37	32.066	30.077	28.140	-1.58	1.61	6.6%	-6.4%
38	30.822	28.875	26.983	-1.62	1.65	6.7%	-6.6%
39	29.634	27.728	25.880	-1.66	1.69	6.9%	-6.7%

R - T Table

Part No. : TSM1A503J3953RZ

R25 =50 KOhm $\pm$ 5%B25/85 = 3950 K $\pm$ 3%

Temperature (°C)	Rmax. (KΩ)	Rnor. (KΩ)	Rmin. (KΩ)	Temperature Tol. (°C)		Resistance Tol. (%)	
40	28.498	26.633	24.828	-1.70	1.73	7.0%	-6.8%
41	27.412	25.587	23.824	-1.75	1.77	7.1%	-6.9%
42	26.374	24.589	22.867	-1.79	1.80	7.3%	-7.0%
43	25.380	23.634	21.954	-1.83	1.84	7.4%	-7.1%
44	24.430	22.722	21.082	-1.87	1.88	7.5%	-7.2%
45	23.520	21.851	20.249	-1.92	1.92	7.6%	-7.3%
46	22.650	21.018	19.454	-1.96	1.96	7.8%	-7.4%
47	21.816	20.221	18.695	-2.00	2.00	7.9%	-7.5%
48	21.018	19.459	17.970	-2.05	2.04	8.0%	-7.7%
49	20.254	18.730	17.277	-2.09	2.08	8.1%	-7.8%
50	19.522	18.032	16.614	-2.14	2.12	8.3%	-7.9%
51	18.820	17.364	15.981	-2.18	2.16	8.4%	-8.0%
52	18.147	16.725	15.375	-2.23	2.20	8.5%	-8.1%
53	17.503	16.113	14.796	-2.27	2.25	8.6%	-8.2%
54	16.885	15.526	14.241	-2.32	2.29	8.7%	-8.3%
55	16.292	14.964	13.711	-2.36	2.33	8.9%	-8.4%
56	15.723	14.426	13.203	-2.41	2.37	9.0%	-8.5%
57	15.177	13.910	12.717	-2.46	2.41	9.1%	-8.6%
58	14.653	13.416	12.252	-2.50	2.45	9.2%	-8.7%
59	14.151	12.941	11.806	-2.55	2.50	9.3%	-8.8%
60	13.668	12.486	11.379	-2.60	2.54	9.5%	-8.9%
61	13.204	12.050	10.969	-2.65	2.58	9.6%	-9.0%
62	12.759	11.631	10.577	-2.69	2.62	9.7%	-9.1%
63	12.331	11.229	10.201	-2.74	2.67	9.8%	-9.2%
64	11.920	10.844	9.8398	-2.79	2.71	9.9%	-9.3%
65	11.525	10.473	9.4937	-2.84	2.75	10.0%	-9.4%
66	11.145	10.117	9.1617	-2.89	2.80	10.2%	-9.4%
67	10.779	9.7756	8.8431	-2.94	2.84	10.3%	-9.5%
68	10.428	9.4472	8.5372	-2.99	2.88	10.4%	-9.6%
69	10.090	9.1316	8.2436	-3.04	2.93	10.5%	-9.7%
70	9.7646	8.8282	7.9616	-3.09	2.97	10.6%	-9.8%
71	9.4515	8.5365	7.6908	-3.14	3.01	10.7%	-9.9%
72	9.1500	8.2559	7.4306	-3.19	3.06	10.8%	-10.0%
73	8.8598	7.9861	7.1806	-3.24	3.10	10.9%	-10.1%
74	8.5803	7.7265	6.9403	-3.29	3.15	11.1%	-10.2%
75	8.3110	7.4766	6.7092	-3.34	3.19	11.2%	-10.3%
76	8.0516	7.2362	6.4871	-3.39	3.24	11.3%	-10.4%
77	7.8016	7.0047	6.2734	-3.44	3.28	11.4%	-10.4%
78	7.5607	6.7817	6.0679	-3.49	3.33	11.5%	-10.5%
79	7.3284	6.5670	5.8701	-3.55	3.37	11.6%	-10.6%

R - T Table

Part No. : TSM1A503J3953RZ

R25 =50 KOhm $\pm$ 5%B25/85 = 3950 K $\pm$ 3%

Temperature (°C)	Rmax. (KΩ)	Rnor. (KΩ)	Rmin. (KΩ)	Temperature Tol. (°C)		Resistance Tol. (%)	
80	7.1044	6.3602	5.6798	-3.60	3.41	11.7%	-10.7%
81	6.8884	6.1610	5.4966	-3.65	3.46	11.8%	-10.8%
82	6.6800	5.9689	5.3202	-3.70	3.50	11.9%	-10.9%
83	6.4790	5.7838	5.1504	-3.76	3.55	12.0%	-11.0%
84	6.2850	5.6054	4.9868	-3.81	3.60	12.1%	-11.0%
85	6.0978	5.4334	4.8292	-3.86	3.64	12.2%	-11.1%
86	5.9171	5.2674	4.6774	-3.92	3.69	12.3%	-11.2%
87	5.7426	5.1074	4.5310	-3.97	3.73	12.4%	-11.3%
88	5.5741	4.9530	4.3900	-4.02	3.78	12.5%	-11.4%
89	5.4114	4.8040	4.2540	-4.08	3.82	12.6%	-11.4%
90	5.2542	4.6602	4.1229	-4.13	3.87	12.7%	-11.5%
91	5.1023	4.5213	3.9965	-4.19	3.92	12.8%	-11.6%
92	4.9556	4.3873	3.8746	-4.24	3.96	13.0%	-11.7%
93	4.8137	4.2579	3.7569	-4.30	4.01	13.1%	-11.8%
94	4.6766	4.1330	3.6434	-4.35	4.06	13.2%	-11.8%
95	4.5441	4.0123	3.5338	-4.41	4.10	13.3%	-11.9%
96	4.4159	3.8957	3.4281	-4.46	4.15	13.4%	-12.0%
97	4.2920	3.7830	3.3260	-4.52	4.20	13.5%	-12.1%
98	4.1722	3.6741	3.2275	-4.57	4.24	13.6%	-12.2%
99	4.0562	3.5689	3.1323	-4.63	4.29	13.7%	-12.2%
100	3.9440	3.4672	3.0404	-4.69	4.34	13.8%	-12.3%
101	3.8355	3.3689	2.9517	-4.75	4.39	13.9%	-12.4%
102	3.7305	3.2738	2.8659	-4.80	4.44	13.9%	-12.5%
103	3.6288	3.1819	2.7830	-4.86	4.49	14.0%	-12.5%
104	3.5304	3.0930	2.7030	-4.92	4.53	14.1%	-12.6%
105	3.4351	3.0070	2.6256	-4.98	4.58	14.2%	-12.7%
106	3.3429	2.9238	2.5508	-5.04	4.63	14.3%	-12.8%
107	3.2536	2.8433	2.4785	-5.10	4.68	14.4%	-12.8%
108	3.1671	2.7654	2.4086	-5.16	4.73	14.5%	-12.9%
109	3.0833	2.6900	2.3410	-5.22	4.78	14.6%	-13.0%
110	3.0022	2.6171	2.2756	-5.28	4.84	14.7%	-13.0%
111	2.9236	2.5464	2.2124	-5.34	4.89	14.8%	-13.1%
112	2.8474	2.4781	2.1513	-5.40	4.94	14.9%	-13.2%
113	2.7736	2.4119	2.0921	-5.47	4.99	15.0%	-13.3%
114	2.7021	2.3478	2.0349	-5.53	5.04	15.1%	-13.3%
115	2.6328	2.2858	1.9795	-5.59	5.10	15.2%	-13.4%
116	2.5656	2.2257	1.9259	-5.66	5.15	15.3%	-13.5%
117	2.5005	2.1675	1.8741	-5.72	5.20	15.4%	-13.5%
118	2.4374	2.1111	1.8239	-5.79	5.26	15.5%	-13.6%
119	2.3763	2.0565	1.7753	-5.86	5.31	15.5%	-13.7%

R - T Table

Part No. : TSM1A503J3953RZ

R25 =50 KOhm $\pm$ 5%

$$B_{25/85} = 3950 \text{ K} \pm 3\%$$
[illegible]