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**SPECIFICATION FOR APPROVAL**

CUSTOMER	Blume-Benning
CERTIFIED	
MODEL/TYPE	TSM3A103
PART NO.	TSM3A103J3513RY (RoHS+HF)
APPLICATION	
CUSTOMER P/N	
ISSUE DATE	Dec. 26, 2024
REV. NO.	
REV. DATE	

FOR CUSTOMER APPROVAL	CHECKED BY
	<i>Mei Rong Chen</i>
	APPROVED BY
	<i>Kun Lin Lin</i>





NTC Thermistor TSM Type
Part No. :TSM3A103J3513RY

REVISED RECORD SHEET

REV. NO	REV. DATE	REVISED CONTENT



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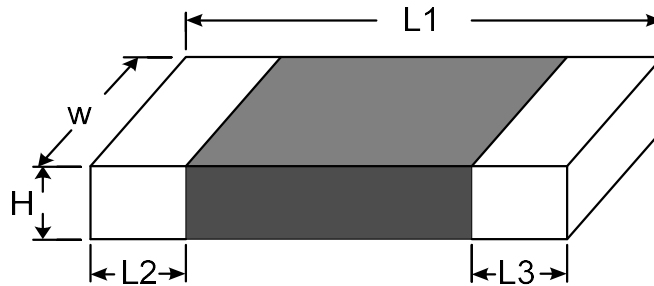
Part Number Code

Example :

TSM **3** **A** **103** **J** **351** **3** **R** **Y**
(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)	3	1206
(3)	Definition of B Value	A	B _{25/85}
(4)	Zero Power Resistance at 25°C (R ₂₅)	103	10 x 10 ³ Ω = 10 KΩ
(5)	Tolerance of R ₂₅	J	± 5%
(6)	B Value	351	3510K
(7)	Tolerance of B Value	3	± 3%
(8)	Packaging	R	Reel
(9)	Optional Suffix	Y	RoHS+HF compliance

Structure and Dimensions



(unit : mm)

L1	W	H max.	L2 and L3
3.20±0.30	1.60±0.20	1.50	0.50±0.20

Electrical Characteristics

Part No.	Zero Power Resistance at 25℃	Tolerance of R ₂₅	B _{25/85} Value	Tolerance of B Value	Max. Power Dissipation at 25℃	Dissipation Factor (Approx.)	Thermal Time Constant (Approx.)	Maximum Operating Current at 25℃	Operating Temperature Range
	R ₂₅ (KΩ)	(± %)	(K)	(± %)	P _{max} (mW)	δ (mW/℃)	τ (sec.)	I _{max} (mA)	T _L ~T _U (℃)
TSM3A103J3513RY	10	5	3510	3	320	3.2	6.7	0.57	-40 ~ +125

Note: Maximum operating current(I_{max}) is defined at which self-heating becomes 1℃ when operating current flows through the NTC thermistor. It is calculated from the following equation:

Maximum operating current(mA)=√(Dissipation factor (mW/℃)/ Resistance(KΩ))

Reliability

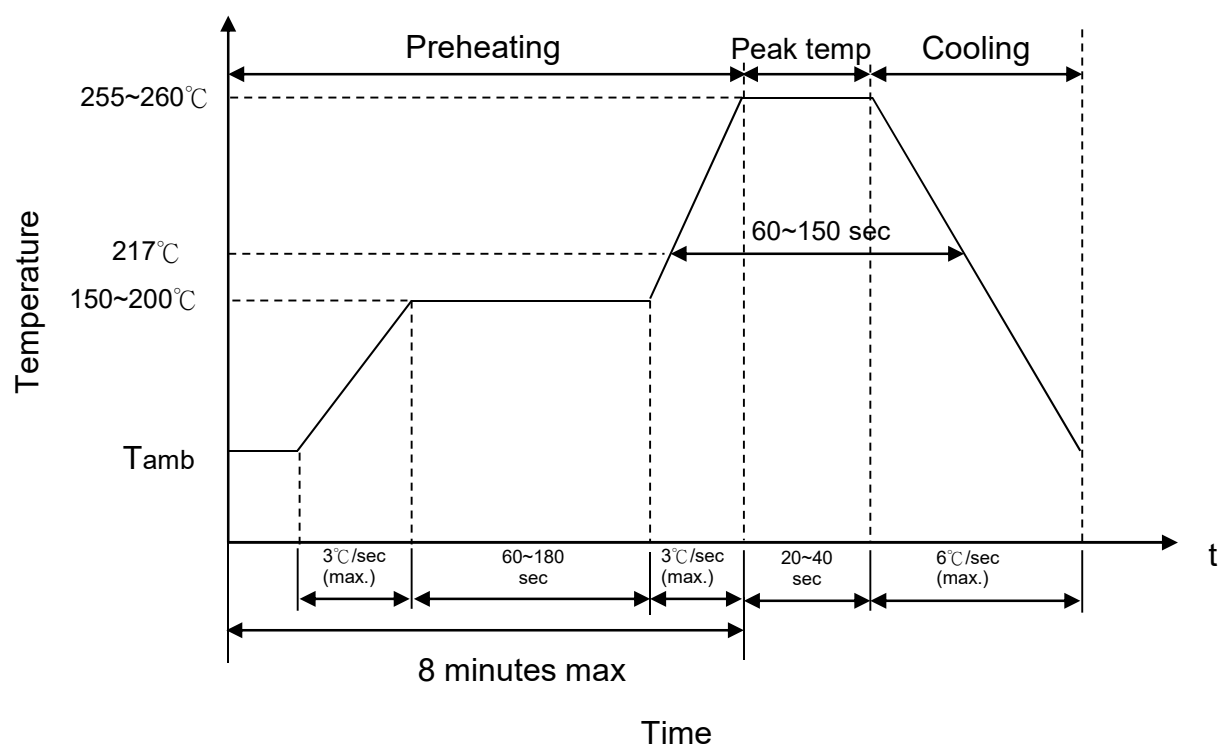
Item	Standard	Test conditions / Methods	Specifications															
Bending Strength	IEC 60068-2-21	Warp : 2mm ; Speed < 0.5mm/sec. Duration : 10 sec on PCB. 	No visible damage ΔR ₂₅ /R ₂₅ ≤ 5 %															
Solderability	IEC60068-2-58	245 ± 5℃ , 3 ± 0.3 sec	At least 95% of terminal electrode is 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 ± 2℃ , 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><th>Step</th><th>Temperature (℃)</th><th>Period (minutes)</th></tr><tr><td>1</td><td>-40 ± 3</td><td>30 ± 3</td></tr><tr><td>2</td><td>Room temperature</td><td>≤3</td></tr><tr><td>3</td><td>125 ± 2</td><td>30 ± 3</td></tr><tr><td>4</td><td>Room temperature</td><td>≤3</td></tr></table>	Step	Temperature (℃)	Period (minutes)	1	-40 ± 3	30 ± 3	2	Room temperature	≤3	3	125 ± 2	30 ± 3	4	Room temperature	≤3	No visible damage ΔR ₂₅ /R ₂₅ ≤ 3 %
Step	Temperature (℃)	Period (minutes)																
1	-40 ± 3	30 ± 3																
2	Room temperature	≤3																
3	125 ± 2	30 ± 3																
4	Room temperature	≤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

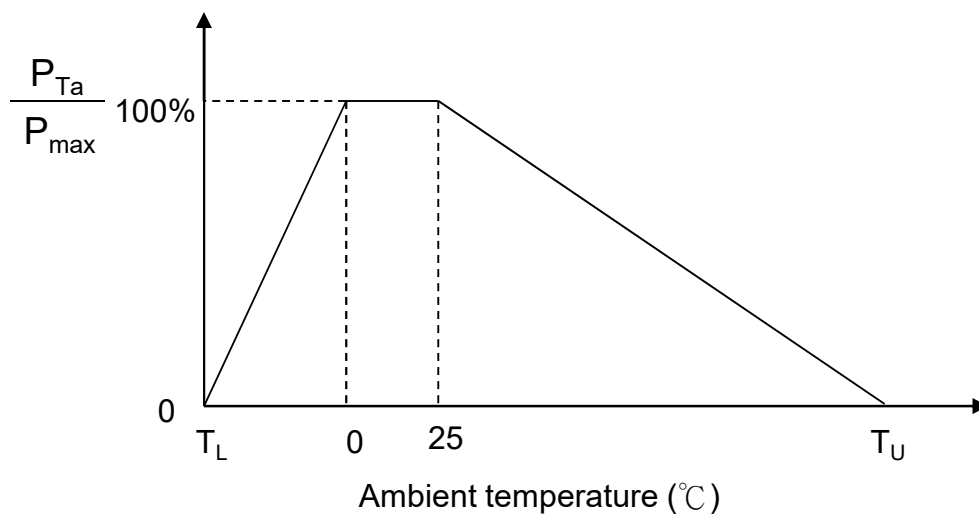
■ IR-Reflow Soldering Profile



■ 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)

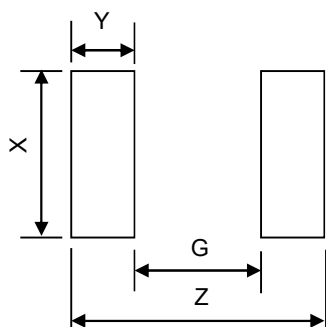
For example :

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)	1206
Z	4.5 mm
G	2.1 mm
X	1.8 mm
Y	1.2 mm

(I) Notice of Mounting on Flexible Printed Circuit (FPC) :

1. Before SMDs mounting, a support plate should be attached to the back of the SMDs mounting position on the FPC to avoid undue stress being imposed on the SMDs body during the placing process.
2. After SMDs mounting is completed, a protective frame should be attached around the outside of the SMDs mounting position to avoid inappropriate stress being directly applied to the SMDs body during the subsequent assembly process.

(II) Not suitable for mounting on Direct Bond Copper (DBC) ceramic substrate.

RoHS Compliant Declaration

We hereby declare that the components delivered to your company are compliant with RoHS directive 2015/863/EU.

Restriction of Weapon and Military End-Use

Thinking has established and implemented the fundamental policy on none of our product should be used or sold, through any channels, for use in the design, development, production, utilization, maintenance or operation of, or otherwise contribution to any weapons (Weapons of Mass Destruction [nuclear, chemical or biological weapons or missiles] or conventional weapons) or goods or systems specially designed or intended for military end-use or utilization by military end-users.

Warehouse Storage Conditions of Products

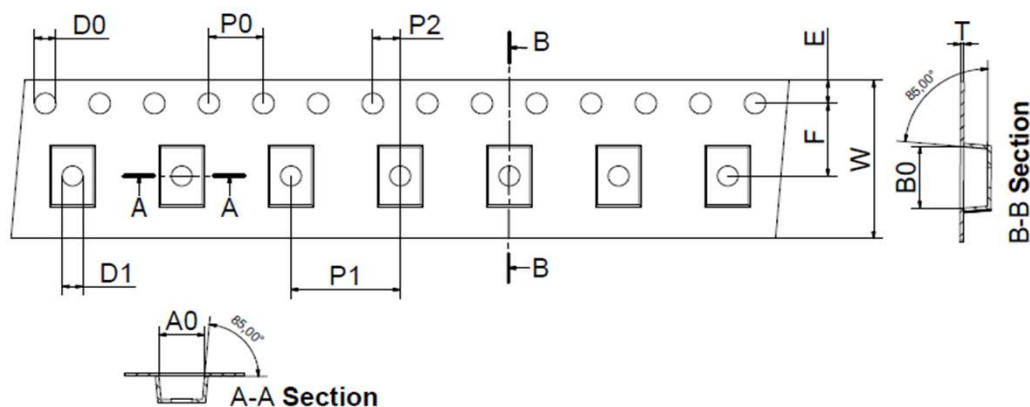
(I) Storage Conditions :

- 1.Storage Temperature : -10°C ~+40°C
- 2.Relative Humidity : ≤75%RH
- 3.Keep away from corrosive atmosphere and sunlight.

(II) Period of Storage : 1 year

Packaging

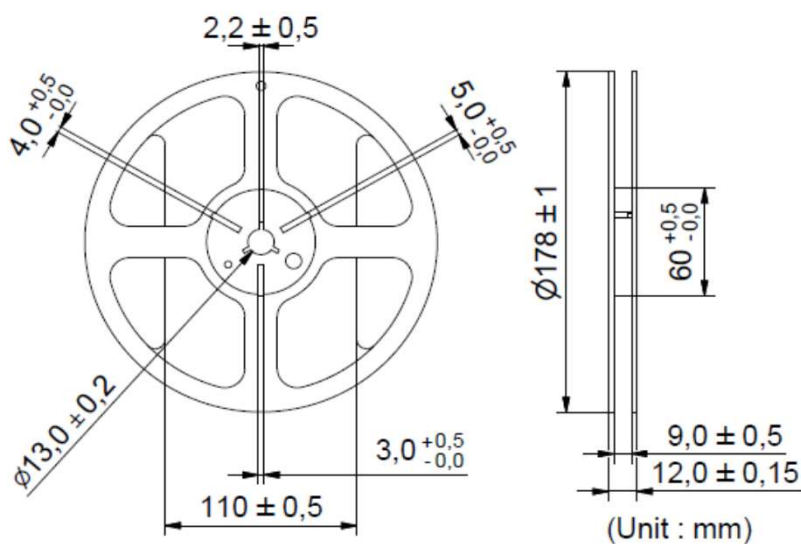
■ Taping Specification (1206 Series)



(Unit : mm)

Index	A_0	B_0	W	E	F	P_1	P_2	P_0	D_0	D_1	T
Size	± 0.2	± 0.2	± 0.2	± 0.1	± 0.05	± 0.1	± 0.05	± 0.1	± 0.1	± 0.1	± 0.1
1206	1.85	3.45	8	1.75	3.5	4	2	4	1.55	1	0.25

■ Quantity (2500 pcs / reel)



Safety Approvals (Certified Model/Type : TSM3A103)

* UL 1434 / cUL recognized (File # E138827)



* TÜV 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. : TSM3A103J3513RY

R25 =10 KOhm $\pm$ 5%B25/85 = 3510 K $\pm$ 3%

Temperature (°C)	Rmax. (KΩ)	Rnor. (KΩ)	Rmin. (KΩ)	Temperature Tol. (°C)		Resistance Tol. (%)	
-40	251.54	218.40	189.14	-2.53	2.39	15.2%	-13.4%
-39	237.05	206.17	178.87	-2.53	2.39	15.0%	-13.2%
-38	223.52	194.73	169.23	-2.52	2.38	14.8%	-13.1%
-37	210.86	184.01	160.19	-2.50	2.37	14.6%	-12.9%
-36	198.99	173.95	151.68	-2.49	2.36	14.4%	-12.8%
-35	187.86	164.50	143.68	-2.47	2.34	14.2%	-12.7%
-34	177.41	155.61	136.14	-2.45	2.33	14.0%	-12.5%
-33	167.59	147.24	129.04	-2.43	2.31	13.8%	-12.4%
-32	158.37	139.36	122.33	-2.41	2.30	13.6%	-12.2%
-31	149.69	131.94	116.01	-2.39	2.28	13.4%	-12.1%
-30	141.53	124.95	110.04	-2.37	2.26	13.3%	-11.9%
-29	133.85	118.37	104.41	-2.35	2.25	13.1%	-11.8%
-28	126.62	112.16	99.096	-2.33	2.23	12.9%	-11.6%
-27	119.82	106.30	94.076	-2.31	2.22	12.7%	-11.5%
-26	113.42	100.79	89.336	-2.29	2.20	12.5%	-11.4%
-25	107.40	95.584	84.859	-2.27	2.19	12.4%	-11.2%
-24	101.72	90.677	80.630	-2.25	2.17	12.2%	-11.1%
-23	96.379	86.050	76.636	-2.23	2.16	12.0%	-10.9%
-22	91.347	81.685	72.862	-2.21	2.14	11.8%	-10.8%
-21	86.608	77.567	69.296	-2.20	2.13	11.7%	-10.7%
-20	82.143	73.681	65.927	-2.18	2.11	11.5%	-10.5%
-19	77.935	70.014	62.741	-2.16	2.10	11.3%	-10.4%
-18	73.969	66.553	59.730	-2.14	2.09	11.1%	-10.3%
-17	70.230	63.284	56.882	-2.13	2.07	11.0%	-10.1%
-16	66.704	60.197	54.189	-2.11	2.06	10.8%	-10.0%
-15	63.377	57.280	51.640	-2.09	2.05	10.6%	-9.8%
-14	60.238	54.524	49.228	-2.07	2.03	10.5%	-9.7%
-13	57.276	51.918	46.944	-2.06	2.02	10.3%	-9.6%
-12	54.478	49.454	44.782	-2.04	2.00	10.2%	-9.4%
-11	51.835	47.123	42.733	-2.02	1.99	10.0%	-9.3%
-10	49.337	44.917	40.791	-2.00	1.98	9.8%	-9.2%
-9	46.976	42.829	38.950	-1.99	1.96	9.7%	-9.1%
-8	44.744	40.851	37.204	-1.97	1.95	9.5%	-8.9%
-7	42.631	38.978	35.548	-1.95	1.93	9.4%	-8.8%
-6	40.632	37.202	33.976	-1.93	1.92	9.2%	-8.7%
-5	38.739	35.518	32.483	-1.91	1.90	9.1%	-8.5%
-4	36.946	33.920	31.065	-1.89	1.88	8.9%	-8.4%
-3	35.247	32.405	29.718	-1.88	1.87	8.8%	-8.3%
-2	33.636	30.966	28.437	-1.86	1.85	8.6%	-8.2%
-1	32.108	29.600	27.219	-1.84	1.83	8.5%	-8.0%

R - T Table

Part No. : TSM3A103J3513RY

R25 =10 KOhm $\pm$ 5%B25/85 = 3510 K $\pm$ 3%

Temperature (°C)	Rmax. (KΩ)	Rnor. (KΩ)	Rmin. (KΩ)	Temperature Tol. (°C)		Resistance Tol. (%)	
0	30.659	28.302	26.061	-1.82	1.82	8.3%	-7.9%
1	29.284	27.069	24.958	-1.80	1.80	8.2%	-7.8%
2	27.978	25.896	23.909	-1.78	1.78	8.0%	-7.7%
3	26.738	24.781	22.910	-1.76	1.76	7.9%	-7.6%
4	25.560	23.720	21.958	-1.73	1.75	7.8%	-7.4%
5	24.440	22.710	21.051	-1.71	1.73	7.6%	-7.3%
6	23.375	21.749	20.186	-1.69	1.71	7.5%	-7.2%
7	22.363	20.834	19.362	-1.67	1.69	7.3%	-7.1%
8	21.400	19.963	18.575	-1.65	1.67	7.2%	-6.9%
9	20.483	19.132	17.825	-1.63	1.65	7.1%	-6.8%
10	19.611	18.340	17.109	-1.61	1.63	6.9%	-6.7%
11	18.780	17.586	16.426	-1.58	1.61	6.8%	-6.6%
12	17.989	16.866	15.773	-1.56	1.59	6.7%	-6.5%
13	17.235	16.179	15.150	-1.54	1.57	6.5%	-6.4%
14	16.517	15.525	14.555	-1.52	1.55	6.4%	-6.2%
15	15.833	14.899	13.986	-1.49	1.53	6.3%	-6.1%
16	15.180	14.303	13.443	-1.47	1.51	6.1%	-6.0%
17	14.558	13.733	12.923	-1.45	1.49	6.0%	-5.9%
18	13.964	13.189	12.426	-1.42	1.47	5.9%	-5.8%
19	13.398	12.669	11.951	-1.40	1.45	5.7%	-5.7%
20	12.857	12.173	11.496	-1.38	1.43	5.6%	-5.6%
21	12.341	11.698	11.061	-1.35	1.40	5.5%	-5.4%
22	11.849	11.245	10.645	-1.33	1.38	5.4%	-5.3%
23	11.378	10.811	10.247	-1.31	1.36	5.2%	-5.2%
24	10.929	10.397	9.8652	-1.28	1.34	5.1%	-5.1%
25	10.500	10.000	9.5000	-1.26	1.32	5.0%	-5.0%
26	10.113	9.6207	9.1291	-1.30	1.35	5.1%	-5.1%
27	9.7432	9.2578	8.7746	-1.34	1.39	5.2%	-5.2%
28	9.3884	8.9105	8.4357	-1.38	1.43	5.4%	-5.3%
29	9.0485	8.5781	8.1118	-1.42	1.47	5.5%	-5.4%
30	8.7227	8.2598	7.8020	-1.45	1.50	5.6%	-5.5%
31	8.4104	7.9551	7.5057	-1.49	1.54	5.7%	-5.6%
32	8.1110	7.6633	7.2223	-1.53	1.58	5.8%	-5.8%
33	7.8238	7.3838	6.9511	-1.57	1.62	6.0%	-5.9%
34	7.5484	7.1160	6.6915	-1.61	1.65	6.1%	-6.0%
35	7.2842	6.8594	6.4431	-1.66	1.69	6.2%	-6.1%
36	7.0307	6.6134	6.2053	-1.70	1.73	6.3%	-6.2%
37	6.7875	6.3776	5.9775	-1.74	1.77	6.4%	-6.3%
38	6.5539	6.1515	5.7594	-1.78	1.81	6.5%	-6.4%
39	6.3298	5.9347	5.5504	-1.82	1.85	6.7%	-6.5%

R - T Table

Part No. : TSM3A103J3513RY

R25 =10 KOhm $\pm$ 5%B25/85 = 3510 K $\pm$ 3%

Temperature ($^{\circ}$ C)	Rmax. (K Ω)	Rnor. (K Ω)	Rmin. (K Ω)	Temperature Tol. ($^{\circ}$ C)		Resistance Tol. (%)	
40	6.1145	5.7267	5.3502	-1.86	1.89	6.8%	-6.6%
41	5.9077	5.5272	5.1583	-1.91	1.93	6.9%	-6.7%
42	5.7091	5.3358	4.9743	-1.95	1.97	7.0%	-6.8%
43	5.5183	5.1520	4.7980	-1.99	2.01	7.1%	-6.9%
44	5.3349	4.9756	4.6289	-2.04	2.05	7.2%	-7.0%
45	5.1587	4.8062	4.4666	-2.08	2.09	7.3%	-7.1%
46	4.9892	4.6435	4.3110	-2.12	2.13	7.4%	-7.2%
47	4.8263	4.4873	4.1616	-2.17	2.17	7.6%	-7.3%
48	4.6695	4.3371	4.0183	-2.21	2.21	7.7%	-7.4%
49	4.5188	4.1928	3.8807	-2.26	2.25	7.8%	-7.4%
50	4.3737	4.0541	3.7485	-2.30	2.29	7.9%	-7.5%
51	4.2341	3.9208	3.6216	-2.35	2.33	8.0%	-7.6%
52	4.0998	3.7926	3.4997	-2.40	2.38	8.1%	-7.7%
53	3.9704	3.6693	3.3825	-2.44	2.42	8.2%	-7.8%
54	3.8458	3.5506	3.2699	-2.49	2.46	8.3%	-7.9%
55	3.7258	3.4365	3.1617	-2.53	2.50	8.4%	-8.0%
56	3.6102	3.3266	3.0576	-2.58	2.54	8.5%	-8.1%
57	3.4988	3.2208	2.9575	-2.63	2.59	8.6%	-8.2%
58	3.3914	3.1190	2.8612	-2.67	2.63	8.7%	-8.3%
59	3.2879	3.0209	2.7686	-2.72	2.67	8.8%	-8.4%
60	3.1881	2.9264	2.6795	-2.77	2.71	8.9%	-8.4%
61	3.0919	2.8354	2.5936	-2.82	2.76	9.0%	-8.5%
62	2.9990	2.7476	2.5110	-2.87	2.80	9.1%	-8.6%
63	2.9094	2.6631	2.4315	-2.91	2.84	9.3%	-8.7%
64	2.8230	2.5815	2.3548	-2.96	2.88	9.4%	-8.8%
65	2.7396	2.5029	2.2810	-3.01	2.93	9.5%	-8.9%
66	2.6590	2.4271	2.2098	-3.06	2.97	9.6%	-9.0%
67	2.5812	2.3539	2.1413	-3.11	3.01	9.7%	-9.0%
68	2.5061	2.2833	2.0751	-3.16	3.06	9.8%	-9.1%
69	2.4335	2.2152	2.0114	-3.20	3.10	9.9%	-9.2%
70	2.3634	2.1494	1.9499	-3.25	3.14	10.0%	-9.3%
71	2.2957	2.0859	1.8906	-3.30	3.19	10.1%	-9.4%
72	2.2302	2.0246	1.8334	-3.35	3.23	10.2%	-9.4%
73	2.1669	1.9654	1.7782	-3.40	3.27	10.3%	-9.5%
74	2.1057	1.9082	1.7249	-3.45	3.32	10.3%	-9.6%
75	2.0465	1.8529	1.6735	-3.50	3.36	10.4%	-9.7%
76	1.9892	1.7995	1.6238	-3.55	3.40	10.5%	-9.8%
77	1.9338	1.7479	1.5758	-3.60	3.45	10.6%	-9.8%
78	1.8802	1.6979	1.5295	-3.65	3.49	10.7%	-9.9%
79	1.8284	1.6497	1.4847	-3.70	3.53	10.8%	-10.0%

R - T Table

Part No. : TSM3A103J3513RY

R25 =10 KOhm $\pm$ 5%B25/85 = 3510 K $\pm$ 3%

Temperature (°C)	Rmax. (KΩ)	Rnor. (KΩ)	Rmin. (KΩ)	Temperature Tol. (°C)		Resistance Tol. (%)	
80	1.7782	1.6030	1.4415	-3.75	3.58	10.9%	-10.1%
81	1.7296	1.5578	1.3997	-3.80	3.62	11.0%	-10.2%
82	1.6825	1.5142	1.3593	-3.85	3.67	11.1%	-10.2%
83	1.6370	1.4719	1.3202	-3.91	3.71	11.2%	-10.3%
84	1.5928	1.4310	1.2825	-3.96	3.75	11.3%	-10.4%
85	1.5501	1.3915	1.2459	-4.01	3.80	11.4%	-10.5%
86	1.5087	1.3532	1.2106	-4.06	3.84	11.5%	-10.5%
87	1.4686	1.3161	1.1765	-4.11	3.89	11.6%	-10.6%
88	1.4297	1.2802	1.1434	-4.16	3.93	11.7%	-10.7%
89	1.3920	1.2454	1.1115	-4.22	3.98	11.8%	-10.8%
90	1.3555	1.2117	1.0805	-4.27	4.02	11.9%	-10.8%
91	1.3201	1.1791	1.0506	-4.32	4.07	12.0%	-10.9%
92	1.2858	1.1475	1.0216	-4.38	4.12	12.0%	-11.0%
93	1.2525	1.1169	0.99355	-4.43	4.16	12.1%	-11.0%
94	1.2202	1.0873	0.96640	-4.48	4.21	12.2%	-11.1%
95	1.1889	1.0586	0.94010	-4.54	4.25	12.3%	-11.2%
96	1.1586	1.0307	0.91465	-4.59	4.30	12.4%	-11.3%
97	1.1292	1.0037	0.88999	-4.65	4.35	12.5%	-11.3%
98	1.1006	0.97757	0.86612	-4.70	4.40	12.6%	-11.4%
99	1.0729	0.95222	0.84299	-4.76	4.44	12.7%	-11.5%
100	1.0460	0.92764	0.82059	-4.82	4.49	12.8%	-11.5%
101	1.0200	0.90382	0.79889	-4.88	4.54	12.9%	-11.6%
102	0.99468	0.88072	0.77787	-4.93	4.59	12.9%	-11.7%
103	0.97013	0.85832	0.75750	-4.99	4.64	13.0%	-11.7%
104	0.94631	0.83661	0.73777	-5.05	4.69	13.1%	-11.8%
105	0.92320	0.81555	0.71865	-5.11	4.74	13.2%	-11.9%
106	0.90076	0.79512	0.70012	-5.17	4.80	13.3%	-11.9%
107	0.87899	0.77532	0.68216	-5.23	4.85	13.4%	-12.0%
108	0.85786	0.75611	0.66476	-5.30	4.90	13.5%	-12.1%
109	0.83735	0.73748	0.64790	-5.36	4.96	13.5%	-12.1%
110	0.81744	0.71941	0.63155	-5.43	5.01	13.6%	-12.2%
111	0.79811	0.70188	0.61571	-5.49	5.07	13.7%	-12.3%
112	0.77936	0.68488	0.60035	-5.56	5.13	13.8%	-12.3%
113	0.76115	0.66839	0.58547	-5.62	5.18	13.9%	-12.4%
114	0.74347	0.65240	0.57104	-5.69	5.24	14.0%	-12.5%
115	0.72631	0.63688	0.55706	-5.76	5.30	14.0%	-12.5%
116	0.70966	0.62183	0.54351	-5.84	5.36	14.1%	-12.6%
117	0.69349	0.60723	0.53037	-5.91	5.43	14.2%	-12.7%
118	0.67780	0.59306	0.51763	-5.98	5.49	14.3%	-12.7%
119	0.66256	0.57933	0.50528	-6.06	5.56	14.4%	-12.8%

R - T Table

Part No. : TSM3A103J3513RY

R25 =10 KOhm $\pm$ 5%

$$B_{25/85} = 3510 \text{ K} \pm 3\%$$
[illegible]