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**SPECIFICATION FOR APPROVAL**

CUSTOMER	Codico
CERTIFIED MODEL/TYPE	TSM3A103
PART NO.	TSM3A103J3513RY (RoHS+HF)
APPLICATION	
CUSTOMER P/N	
ISSUE DATE	Mar. 11, 2016
REV. NO.	
REV. DATE	

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





REVISED RECORD SHEET

REV. NO	REV. DATE	REVISED CONTENT



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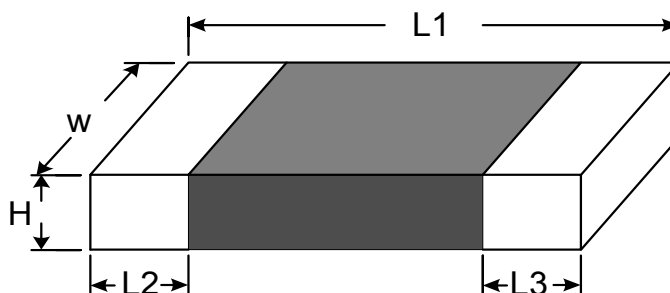
Part Number Code

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



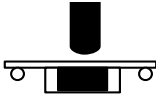
(unit : mm)

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°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)
TSM3A103J3513RY	10	5	3510	3	320	Approx. 3.2	Approx. 6.7	-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 $ \Delta R_{25}/R_{25} \leq 5\%$															
Solderability	IEC60068-2-58	245 ± 5°C , 3 ± 0.3 sec	At least 95% of terminal electrode is covered by new solder															
Resistance to Soldering Heat	IEC60068-2-58	260 ± 5°C , 10 ± 1 sec	No visible damage $ \Delta R_{25}/R_{25} \leq 3\%$															
High Temperature Storage	IEC60068-2-2	125 ± 5°C , 1000 ± 24 hrs	No visible damage $ \Delta R_{25}/R_{25} \leq 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} \leq 3\%$															
Rapid Change of Temperature	IEC60068-2-14	The conditions shown below shall be repeated 5 cycles on PCB <table border="1" data-bbox="523 1220 1168 1534"> <thead> <tr> <th>Step</th> <th>Temperature (°C)</th> <th>Period (minutes)</th> </tr> </thead> <tbody> <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> </tbody> </table>	Step	Temperature (°C)	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 $ \Delta R_{25}/R_{25} \leq 3\%$
Step	Temperature (°C)	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°C , P _{max.} , 1000 ± 24 hrs	No visible damage $ \Delta R_{25}/R_{25} \leq 5\%$															

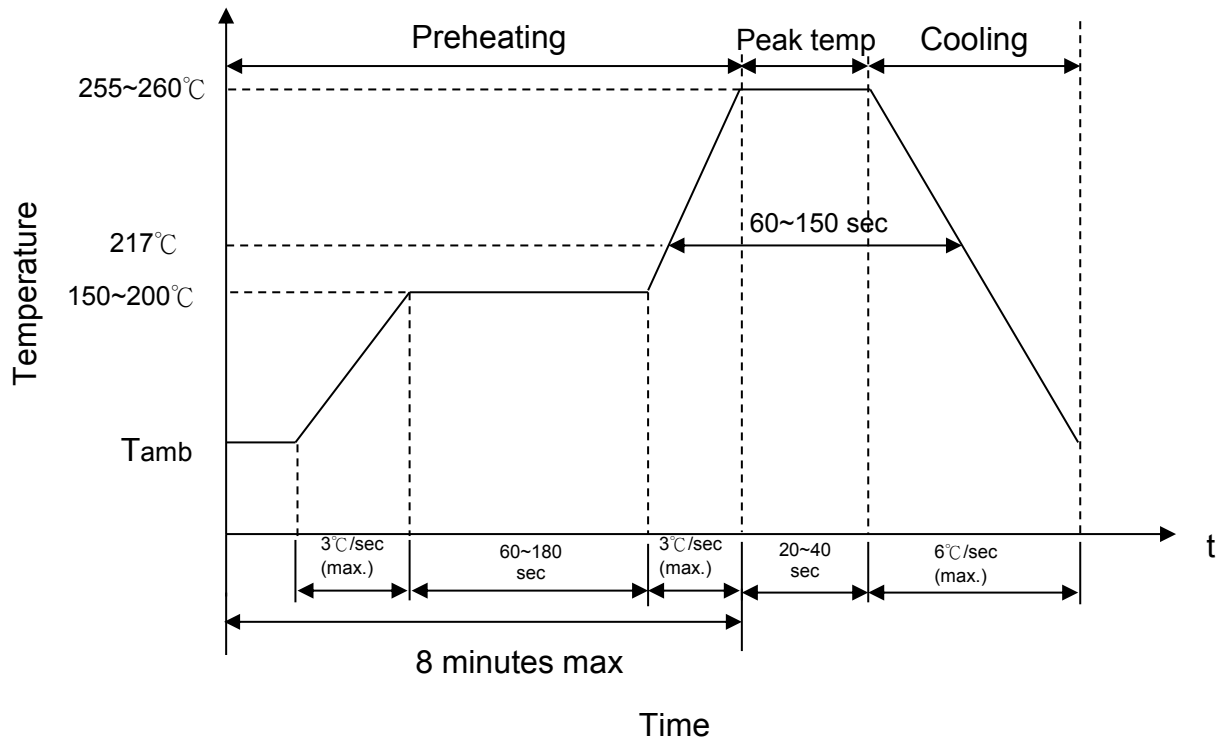
Products have been tested at Thinking Electronic

Industrial Co.,Ltd. Laboratory recognized by UL (Underwriters Laboratories Inc.) under CTRDP

(Client Test Data Program).

Soldering Recommendation

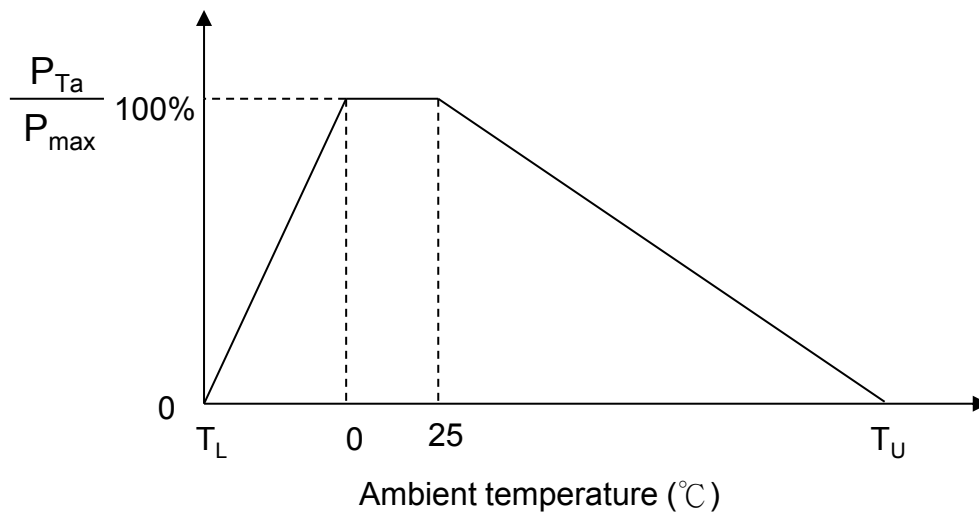
■ IR-Reflow Soldering Profile



■ 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 ($^{\circ}\text{C}$)

T_U = Maximum operating temperature ($^{\circ}\text{C}$)

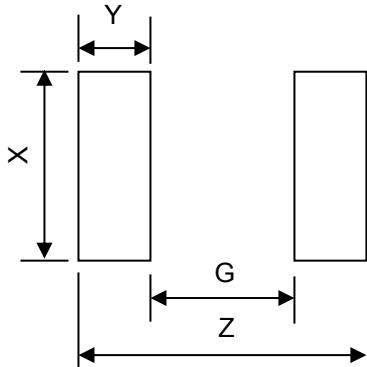
For example :

Ambient temperature(T_a)=55 $^{\circ}\text{C}$

Maximum operating temperature(T_u)= 125 $^{\circ}\text{C}$

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

Recommended Soldering Pad Dimensions



Size (EIA)	1206
Z	4.5 mm
G	2.1 mm
X	1.8 mm
Y	1.2 mm

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

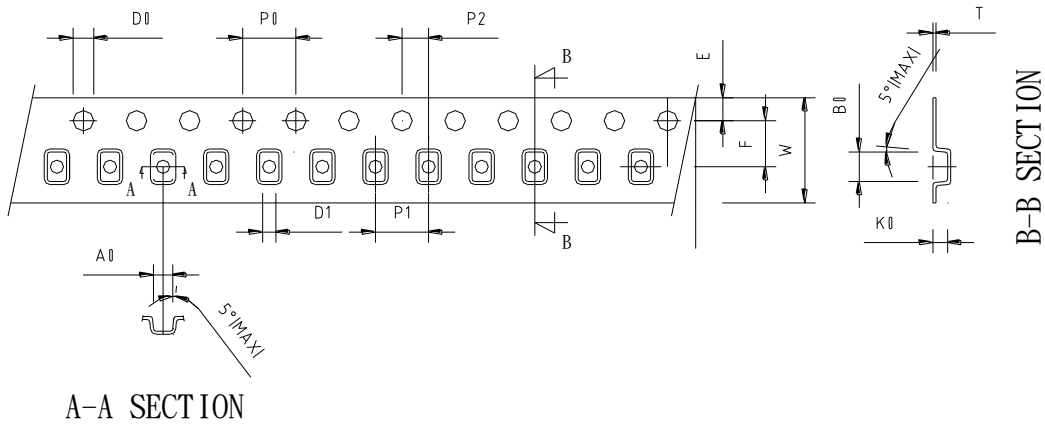
(I) Storage Conditions :

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

(II) Period of Storage : 1 year

Packaging

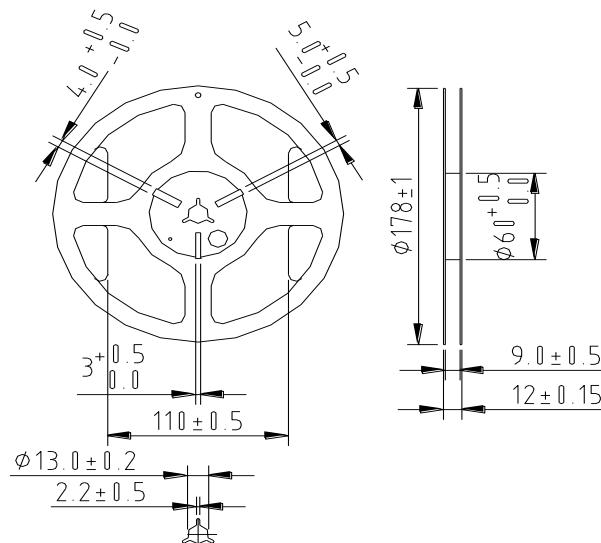
■ Taping Specification (1206 Series)



(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)



* TUV recognized (File # R 50167657)



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

Certificates

- (1) TS 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 K Ω \pm 5%
 B25/85 = 3510 K \pm 3%

Temperature ($^{\circ}$ C)	Rmax. (K Ω)	Rnor. (K Ω)	Rmin. (K Ω)	Temperature Tol.		Resistance Tol.	
				($^{\circ}$ C)		(%)	
-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 ± 5%
B25/85 = 3510 K ± 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 ± 5%
B25/85 = 3510 K ± 3%

Temperature (°C)	Rmax. (KΩ)	Rnor. (KΩ)	Rmin. (KΩ)	Temperature Tol. (°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 ± 5%
B25/85 = 3510 K ± 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%

