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**SPECIFICATION FOR APPROVAL**

CUSTOMER	Codico
CERTIFIED MODEL/TYPE	TSM1B104
PART NO.	TSM1B104H4252RZA (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



<b>INDEX</b>	<b>Page</b>
■ <b>Part Number Code</b>	<b>1</b>
■ <b>Structure and Dimensions</b>	<b>2</b>
■ <b>Electrical Characteristics</b>	<b>2</b>
■ <b>Reliability</b>	<b>3</b>
■ <b>Soldering Recommendation</b>	<b>4</b>
■ <b>Max. Power Dissipation Derating Curve</b>	<b>5</b>
■ <b>Recommended Soldering Pad Dimensions</b>	<b>6</b>
■ <b>RoHS Compliant Declaration</b>	<b>6</b>
■ <b>Warehouse Storage Conditions of Products</b>	<b>6</b>
■ <b>Packaging</b>	<b>7</b>
■ <b>Safety Approvals &amp; Certificates &amp; Test Report</b>	<b>8</b>
■ <b>R-T Table</b>	<b>9 ~ 13</b>

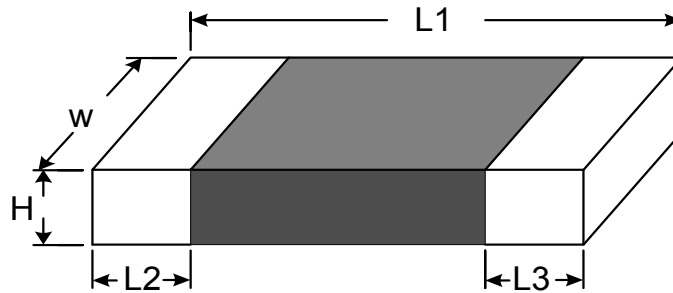
Part Number Code

Example :

**TSM**   **1**   **B**   **104**   **H**   **425**   **2**   **R**   **ZA**  
 (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	B	B <sub>25/50</sub>
(4)	Zero Power Resistance at 25°C (R <sub>25</sub> )	104	10 x 10 <sup>4</sup> Ω = 100 KΩ
(5)	Tolerance of R <sub>25</sub>	H	± 3%
(6)	B Value	425	4250K
(7)	Tolerance of B Value	2	± 2%
(8)	Packaging	R	Reel
(9)	Optional Suffix	ZA	RoHS+HF compliance

## Structure and Dimensions



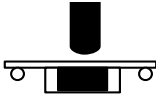
( unit : mm )

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 <sub>25</sub>	B <sub>25/50</sub> Value	Tolerance of B Value	Max. Power Dissipation at 25°C	Dissipation Factor	Thermal Time Constant	Operating Temperature Range
	R <sub>25</sub> (KΩ)	(± %)	(K)	(± %)	P <sub>max</sub> (mW)	δ (mW/°C)	τ (sec.)	T <sub>L</sub> ~T <sub>U</sub> (°C)
TSM1B104H4252RZA	100	3	4250	2	210	Approx. 2.1	Approx. 3.1	-40 ~ +125

Reliability

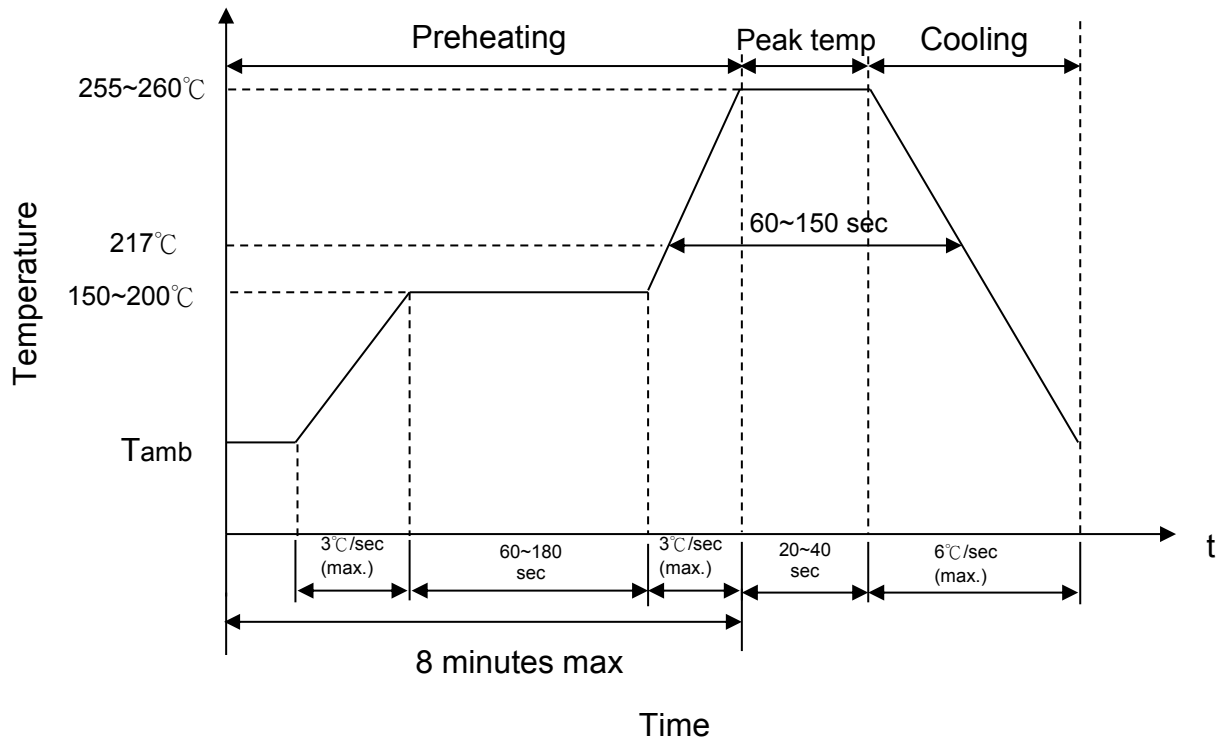
Item	Standard	Test conditions / Methods	Specifications															
Bending Strength	IEC 60068-2-21	Warp : 2mm ; Speed < 0.5mm/sec. Duration : 10 sec on PCB. 	No visible damage $ \Delta R_{25}/R_{25}  \leq 5\%$															
Solderability	IEC60068-2-58	245 ± 5°C , 3 ± 0.3 sec	At least 95% of terminal 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 <sub>max.</sub> , 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 CTDP (Client Test Data Program).

## Soldering Recommendation

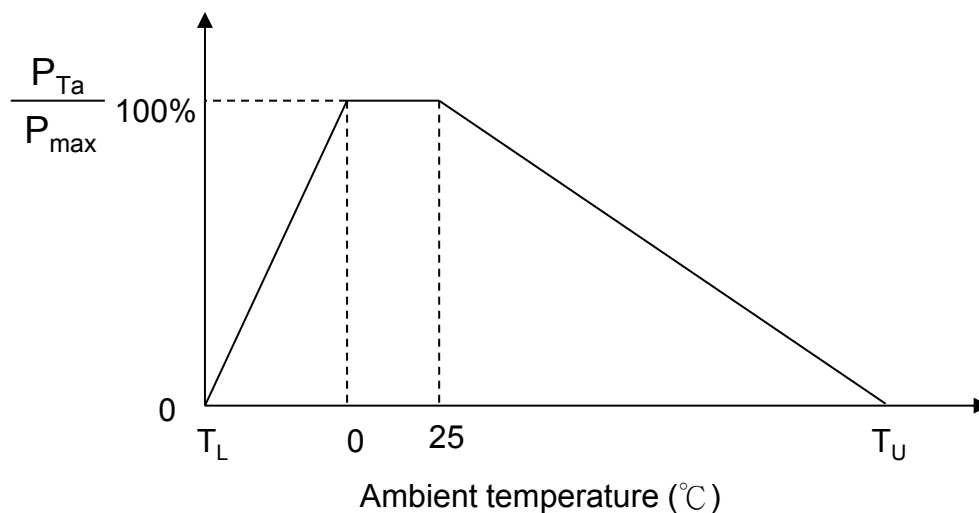
### ■ IR-Reflow Soldering Profile



### ■ Recommended Reworking Conditions with Soldering Iron

Item	Conditions
Temperature of Soldering Iron-tip	$360^{\circ}\text{C}$ (max.)
Soldering Time	3 sec (max.)
Diameter of Soldering Iron-tip	$\phi 3\text{mm}$ (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 :

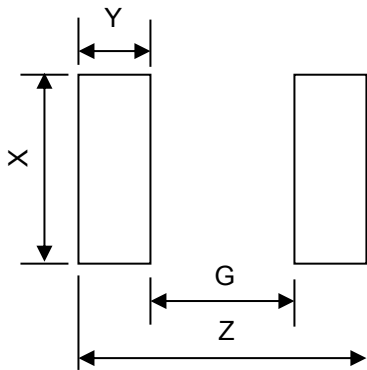
Ambient temperature( $T_a$ )=55°C

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	3.0 mm
G	1.0 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 2011/65/EU.

Warehouse Storage Conditions of Products

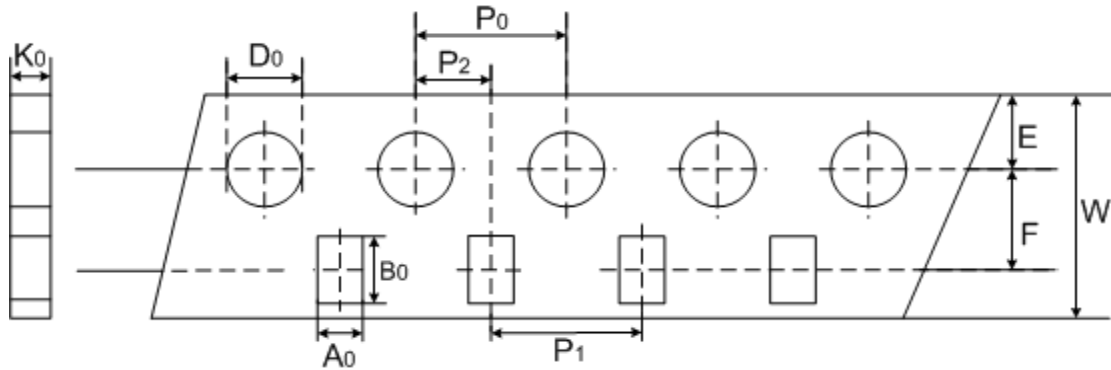
(I) Storage Conditions :

- 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

## Packaging

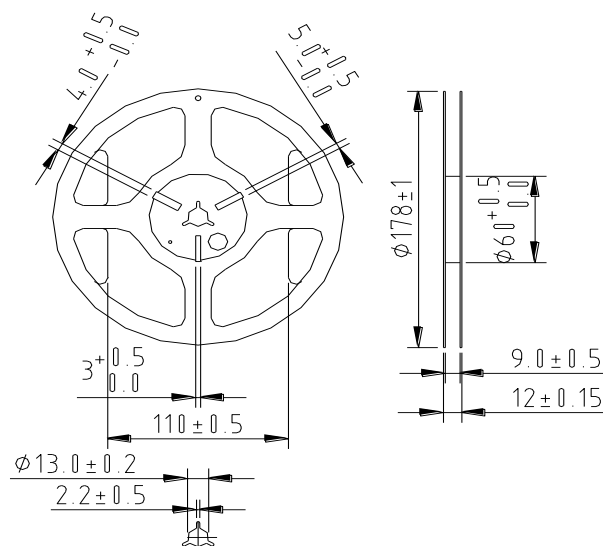
### ■ Taping Specification ( 0603 Series)



(Unit : mm)

Index	A <sub>0</sub>	B <sub>0</sub>	W	E	F	P <sub>1</sub>	P <sub>2</sub>	P <sub>0</sub>	D <sub>0</sub>	K <sub>0</sub>
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 )



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**Safety Approvals** (Certified Model/Type : TSM1B104)

\* 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. : TSM1B104H4252RZA

R25 =100 KOhm ± 3%

B25/50 = 4250 K ± 2%

Temperature (°C)	Rmax. (KΩ)	Rnor. (KΩ)	Rmin. (KΩ)	Temperature Tol.		Resistance Tol.	
				(°C)		(%)	
-40	4,761.4	4,288.0	3,858.2	-1.52	1.49	11.0%	-10.0%
-39	4,434.5	3,999.1	3,603.3	-1.51	1.48	10.9%	-9.9%
-38	4,131.4	3,731.0	3,366.4	-1.49	1.47	10.7%	-9.8%
-37	3,850.7	3,482.3	3,146.3	-1.48	1.46	10.6%	-9.6%
-36	3,590.5	3,251.5	2,941.8	-1.47	1.45	10.4%	-9.5%
-35	3,349.5	3,037.4	2,751.8	-1.46	1.44	10.3%	-9.4%
-34	3,126.2	2,838.7	2,575.3	-1.45	1.43	10.1%	-9.3%
-33	2,919.2	2,654.2	2,411.2	-1.44	1.42	10.0%	-9.2%
-32	2,727.2	2,483.0	2,258.6	-1.43	1.41	9.8%	-9.0%
-31	2,549.0	2,323.9	2,116.7	-1.42	1.40	9.7%	-8.9%
-30	2,383.6	2,176.0	1,984.6	-1.40	1.39	9.5%	-8.8%
-29	2,230.0	2,038.4	1,861.5	-1.39	1.38	9.4%	-8.7%
-28	2,087.2	1,910.3	1,746.8	-1.38	1.37	9.3%	-8.6%
-27	1,954.4	1,791.1	1,639.9	-1.37	1.36	9.1%	-8.4%
-26	1,830.8	1,679.9	1,540.1	-1.36	1.35	9.0%	-8.3%
-25	1,715.7	1,576.3	1,447.0	-1.34	1.34	8.8%	-8.2%
-24	1,608.4	1,479.6	1,359.9	-1.33	1.33	8.7%	-8.1%
-23	1,508.4	1,389.4	1,278.6	-1.32	1.31	8.6%	-8.0%
-22	1,415.1	1,305.1	1,202.5	-1.31	1.30	8.4%	-7.9%
-21	1,328.1	1,226.3	1,131.4	-1.29	1.29	8.3%	-7.7%
-20	1,246.8	1,152.7	1,064.8	-1.28	1.28	8.2%	-7.6%
-19	1,170.9	1,083.9	1,002.4	-1.26	1.26	8.0%	-7.5%
-18	1,100.0	1,019.5	944.02	-1.25	1.25	7.9%	-7.4%
-17	1,033.7	959.21	889.30	-1.24	1.24	7.8%	-7.3%
-16	971.72	902.80	838.02	-1.22	1.23	7.6%	-7.2%
-15	913.76	849.98	789.94	-1.21	1.21	7.5%	-7.1%
-14	859.55	800.51	744.85	-1.19	1.20	7.4%	-7.0%
-13	808.81	754.16	702.56	-1.18	1.19	7.2%	-6.8%
-12	761.33	710.72	662.88	-1.17	1.18	7.1%	-6.7%
-11	716.87	670.01	625.65	-1.15	1.16	7.0%	-6.6%
-10	675.24	631.84	590.70	-1.14	1.15	6.9%	-6.5%
-9	636.24	596.04	557.88	-1.12	1.14	6.7%	-6.4%
-8	599.70	562.46	527.06	-1.11	1.12	6.6%	-6.3%
-7	565.45	530.96	498.11	-1.09	1.11	6.5%	-6.2%
-6	533.35	501.38	470.91	-1.08	1.10	6.4%	-6.1%
-5	503.24	473.62	445.34	-1.07	1.08	6.3%	-6.0%
-4	475.01	447.55	421.31	-1.05	1.07	6.1%	-5.9%
-3	448.51	423.06	398.70	-1.04	1.06	6.0%	-5.8%
-2	423.64	400.05	377.44	-1.03	1.05	5.9%	-5.7%
-1	400.29	378.43	357.43	-1.01	1.03	5.8%	-5.5%

R - T Table

Part No. : TSM1B104H4252RZA

R25 =100 KOhm ± 3%

B25/50 = 4250 K ± 2%

Temperature (°C)	Rmax. (KΩ)	Rnor. (KΩ)	Rmin. (KΩ)	Temperature Tol. (°C)		Resistance Tol. (%)	
0	378.36	358.09	338.60	-1.00	1.02	5.7%	-5.4%
1	357.76	338.97	320.87	-0.98	1.01	5.5%	-5.3%
2	338.40	320.97	304.16	-0.97	0.99	5.4%	-5.2%
3	320.20	304.04	288.43	-0.95	0.98	5.3%	-5.1%
4	303.08	288.09	273.60	-0.94	0.97	5.2%	-5.0%
5	286.98	273.08	259.62	-0.93	0.95	5.1%	-4.9%
6	271.82	258.93	246.43	-0.91	0.94	5.0%	-4.8%
7	257.55	245.60	233.99	-0.90	0.92	4.9%	-4.7%
8	244.12	233.03	222.25	-0.88	0.91	4.8%	-4.6%
9	231.46	221.18	211.16	-0.87	0.90	4.6%	-4.5%
10	219.53	209.99	200.69	-0.85	0.88	4.5%	-4.4%
11	208.28	199.44	190.80	-0.84	0.87	4.4%	-4.3%
12	197.67	189.47	181.46	-0.82	0.85	4.3%	-4.2%
13	187.66	180.06	172.62	-0.81	0.84	4.2%	-4.1%
14	178.22	171.17	164.26	-0.79	0.82	4.1%	-4.0%
15	169.30	162.77	156.36	-0.78	0.81	4.0%	-3.9%
16	160.88	154.83	148.88	-0.76	0.79	3.9%	-3.8%
17	152.92	147.32	141.80	-0.75	0.78	3.8%	-3.7%
18	145.40	140.21	135.09	-0.73	0.76	3.7%	-3.7%
19	138.29	133.49	128.74	-0.71	0.75	3.6%	-3.6%
20	131.57	127.13	122.72	-0.70	0.73	3.5%	-3.5%
21	125.21	121.10	117.02	-0.68	0.72	3.4%	-3.4%
22	119.20	115.39	111.61	-0.67	0.70	3.3%	-3.3%
23	113.50	109.98	106.48	-0.65	0.68	3.2%	-3.2%
24	108.11	104.86	101.62	-0.63	0.67	3.1%	-3.1%
25	103.00	100.00	97.000	-0.62	0.65	3.0%	-3.0%
26	98.347	95.392	92.443	-0.64	0.67	3.1%	-3.1%
27	93.928	91.021	88.125	-0.67	0.70	3.2%	-3.2%
28	89.732	86.874	84.031	-0.69	0.72	3.3%	-3.3%
29	85.746	82.937	80.149	-0.71	0.75	3.4%	-3.4%
30	81.958	79.200	76.467	-0.74	0.77	3.5%	-3.5%
31	78.357	75.651	72.974	-0.76	0.79	3.6%	-3.5%
32	74.934	72.280	69.658	-0.79	0.82	3.7%	-3.6%
33	71.678	69.077	66.511	-0.81	0.84	3.8%	-3.7%
34	68.581	66.033	63.523	-0.84	0.87	3.9%	-3.8%
35	65.634	63.139	60.684	-0.86	0.89	4.0%	-3.9%
36	62.829	60.387	57.988	-0.89	0.92	4.0%	-4.0%
37	60.159	57.770	55.425	-0.91	0.94	4.1%	-4.1%
38	57.617	55.279	52.989	-0.94	0.97	4.2%	-4.1%
39	55.195	52.909	50.673	-0.96	0.99	4.3%	-4.2%

R - T Table

Part No. : TSM1B104H4252RZA

R25 =100 KOhm ± 3%

B25/50 = 4250 K ± 2%

Temperature (°C)	Rmax. (KΩ)	Rnor. (KΩ)	Rmin. (KΩ)	Temperature Tol. (°C)		Resistance Tol. (%)	
40	52.888	50.654	48.470	-0.99	1.02	4.4%	-4.3%
41	50.689	48.506	46.375	-1.02	1.04	4.5%	-4.4%
42	48.593	46.460	44.381	-1.04	1.07	4.6%	-4.5%
43	46.595	44.511	42.483	-1.07	1.09	4.7%	-4.6%
44	44.689	42.655	40.676	-1.10	1.12	4.8%	-4.6%
45	42.872	40.885	38.955	-1.12	1.14	4.9%	-4.7%
46	41.137	39.198	37.316	-1.15	1.17	4.9%	-4.8%
47	39.482	37.589	35.755	-1.18	1.20	5.0%	-4.9%
48	37.902	36.055	34.267	-1.20	1.22	5.1%	-5.0%
49	36.394	34.591	32.849	-1.23	1.25	5.2%	-5.0%
50	34.953	33.195	31.496	-1.26	1.27	5.3%	-5.1%
51	33.577	31.862	30.207	-1.29	1.30	5.4%	-5.2%
52	32.262	30.589	28.976	-1.31	1.33	5.5%	-5.3%
53	31.005	29.373	27.803	-1.34	1.35	5.6%	-5.3%
54	29.804	28.213	26.682	-1.37	1.38	5.6%	-5.4%
55	28.655	27.104	25.613	-1.40	1.41	5.7%	-5.5%
56	27.557	26.044	24.592	-1.43	1.43	5.8%	-5.6%
57	26.506	25.031	23.617	-1.46	1.46	5.9%	-5.7%
58	25.501	24.063	22.685	-1.49	1.49	6.0%	-5.7%
59	24.539	23.137	21.795	-1.51	1.51	6.1%	-5.8%
60	23.618	22.252	20.945	-1.54	1.54	6.1%	-5.9%
61	22.737	21.404	20.132	-1.57	1.57	6.2%	-5.9%
62	21.893	20.594	19.355	-1.60	1.60	6.3%	-6.0%
63	21.084	19.818	18.611	-1.63	1.63	6.4%	-6.1%
64	20.310	19.075	17.900	-1.66	1.65	6.5%	-6.2%
65	19.567	18.364	17.220	-1.69	1.68	6.6%	-6.2%
66	18.856	17.683	16.569	-1.72	1.71	6.6%	-6.3%
67	18.174	17.031	15.945	-1.75	1.74	6.7%	-6.4%
68	17.520	16.406	15.349	-1.78	1.77	6.8%	-6.4%
69	16.893	15.807	14.777	-1.81	1.79	6.9%	-6.5%
70	16.292	15.233	14.230	-1.84	1.82	7.0%	-6.6%
71	15.715	14.683	13.706	-1.88	1.85	7.0%	-6.7%
72	15.161	14.155	13.204	-1.91	1.88	7.1%	-6.7%
73	14.630	13.649	12.723	-1.94	1.91	7.2%	-6.8%
74	14.120	13.163	12.261	-1.97	1.94	7.3%	-6.9%
75	13.630	12.698	11.819	-2.00	1.97	7.3%	-6.9%
76	13.159	12.251	11.395	-2.03	2.00	7.4%	-7.0%
77	12.708	11.822	10.988	-2.06	2.03	7.5%	-7.1%
78	12.274	11.410	10.597	-2.10	2.05	7.6%	-7.1%
79	11.857	11.014	10.223	-2.13	2.08	7.6%	-7.2%

R - T Table

Part No. : TSM1B104H4252RZA

R25 =100 KOhm ± 3%

B25/50 = 4250 K ± 2%

Temperature (°C)	Rmax. (KΩ)	Rnor. (KΩ)	Rmin. (KΩ)	Temperature Tol. (°C)		Resistance Tol. (%)	
80	11.456	10.635	9.8634	-2.16	2.11	7.7%	-7.3%
81	11.071	10.270	9.5185	-2.19	2.14	7.8%	-7.3%
82	10.700	9.9194	9.1872	-2.23	2.17	7.9%	-7.4%
83	10.344	9.5826	8.8692	-2.26	2.20	7.9%	-7.4%
84	10.002	9.2589	8.5637	-2.29	2.23	8.0%	-7.5%
85	9.6720	8.9478	8.2703	-2.33	2.26	8.1%	-7.6%
86	9.3551	8.6486	7.9884	-2.36	2.30	8.2%	-7.6%
87	9.0500	8.3610	7.7175	-2.40	2.33	8.2%	-7.7%
88	8.7565	8.0843	7.4571	-2.43	2.36	8.3%	-7.8%
89	8.4739	7.8182	7.2068	-2.46	2.39	8.4%	-7.8%
90	8.2018	7.5622	6.9661	-2.50	2.42	8.5%	-7.9%
91	7.9398	7.3158	6.7347	-2.53	2.45	8.5%	-7.9%
92	7.6875	7.0786	6.5121	-2.57	2.48	8.6%	-8.0%
93	7.4445	6.8503	6.2979	-2.60	2.51	8.7%	-8.1%
94	7.2103	6.6305	6.0919	-2.64	2.54	8.7%	-8.1%
95	6.9847	6.4189	5.8936	-2.67	2.58	8.8%	-8.2%
96	6.7672	6.2150	5.7027	-2.71	2.61	8.9%	-8.2%
97	6.5576	6.0187	5.5190	-2.74	2.64	9.0%	-8.3%
98	6.3556	5.8295	5.3421	-2.78	2.67	9.0%	-8.4%
99	6.1607	5.6472	5.1718	-2.82	2.71	9.1%	-8.4%
100	5.9728	5.4714	5.0077	-2.85	2.74	9.2%	-8.5%
101	5.7915	5.3021	4.8496	-2.89	2.77	9.2%	-8.5%
102	5.6167	5.1388	4.6973	-2.93	2.80	9.3%	-8.6%
103	5.4480	4.9813	4.5505	-2.96	2.84	9.4%	-8.6%
104	5.2851	4.8294	4.4091	-3.00	2.87	9.4%	-8.7%
105	5.1280	4.6830	4.2727	-3.04	2.90	9.5%	-8.8%
106	4.9763	4.5416	4.1412	-3.08	2.94	9.6%	-8.8%
107	4.8298	4.4053	4.0144	-3.11	2.97	9.6%	-8.9%
108	4.6884	4.2737	3.8922	-3.15	3.00	9.7%	-8.9%
109	4.5518	4.1467	3.7742	-3.19	3.04	9.8%	-9.0%
110	4.4198	4.0240	3.6604	-3.23	3.07	9.8%	-9.0%
111	4.2924	3.9057	3.5506	-3.27	3.11	9.9%	-9.1%
112	4.1692	3.7913	3.4446	-3.31	3.14	10.0%	-9.1%
113	4.0502	3.6809	3.3423	-3.34	3.17	10.0%	-9.2%
114	3.9351	3.5742	3.2435	-3.38	3.21	10.1%	-9.3%
115	3.8239	3.4712	3.1482	-3.42	3.24	10.2%	-9.3%
116	3.7163	3.3716	3.0561	-3.46	3.28	10.2%	-9.4%
117	3.6124	3.2754	2.9671	-3.50	3.31	10.3%	-9.4%
118	3.5118	3.1823	2.8812	-3.54	3.35	10.4%	-9.5%
119	3.4145	3.0924	2.7982	-3.58	3.38	10.4%	-9.5%

