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## SPECIFICATION FOR APPROVAL

CUSTOMER	立創電子
CERTIFIED MODEL/TYPE	TSM0A473
PART NO.	TSM0A473J4053RZ (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>





**REVISED RECORD SHEET**

REV. NO	REV. DATE	REVISED CONTENT



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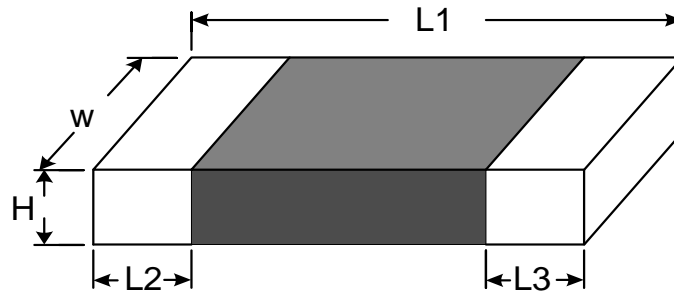
Part Number Code

Example :

**TSM** **0** **A** **473** **J** **405** **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)	0	0402
(3)	Definition of B Value	A	B <sub>25/85</sub>
(4)	Zero Power Resistance at 25°C (R <sub>25</sub> )	473	47 x 10 <sup>3</sup> Ω = 47 KΩ
(5)	Tolerance of R <sub>25</sub>	J	± 5%
(6)	B Value	405	4050K
(7)	Tolerance of B Value	3	± 3%
(8)	Packaging	R	Reel
(9)	Optional Suffix	Z	RoHS+HF compliance

## Structure and Dimensions



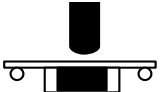
( unit : mm )

L1	W	H max.	L2 and L3
1.00±0.15	0.50±0.10	0.60	0.20±0.10

## Electrical Characteristics

Part No.	Zero Power Resistance at 25°C	Tolerance of R <sub>25</sub>	B <sub>25/85</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)
TSM0A473J4053RZ	47	5	4050	3	170	Approx. 1.7	Approx. 2.0	-40 ~ +125

Reliability

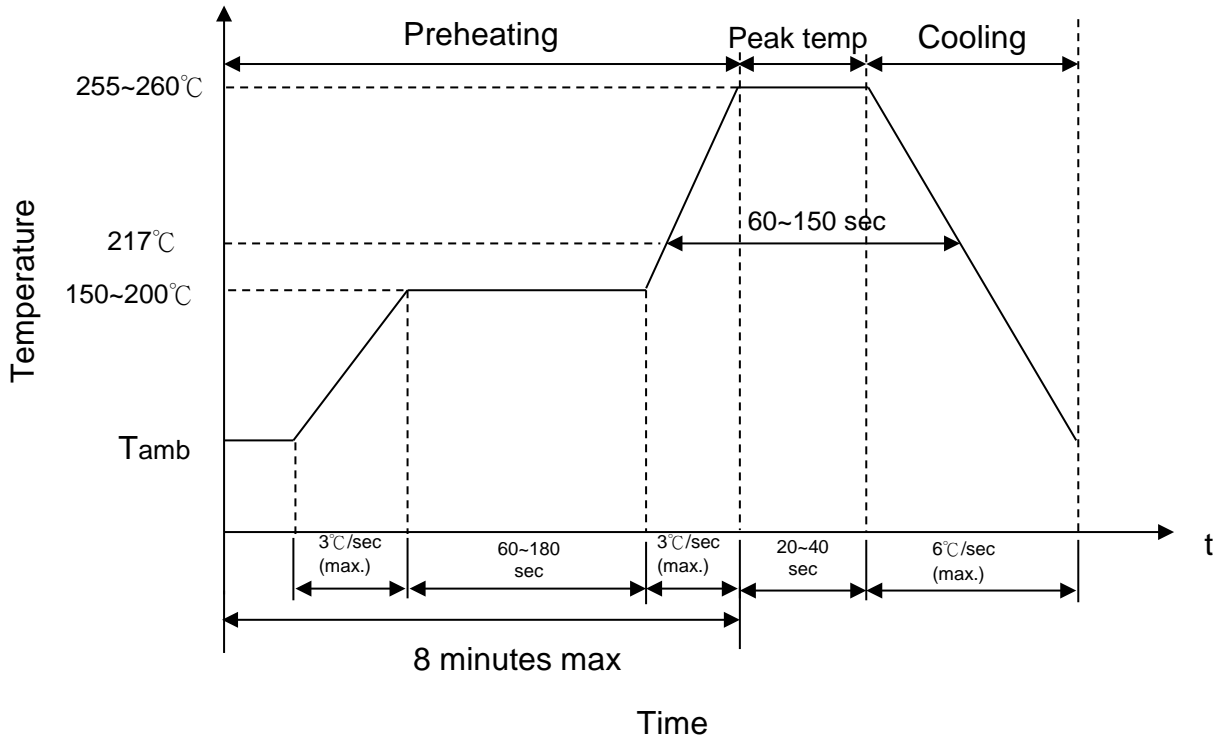
Item	Standard	Test conditions / Methods	Specifications															
Bending Strength	IEC 60068-2-21	Warp : 2mm ; Speed < 0.5mm/sec. Duration : 10 sec on PCB. 	No visible damage $ \Delta R_{25}/R_{25}  \leq 5\%$															
Solderability	IEC60068-2-58	245 ± 5°C , 3 ± 0.3 sec	At least 95% of terminal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

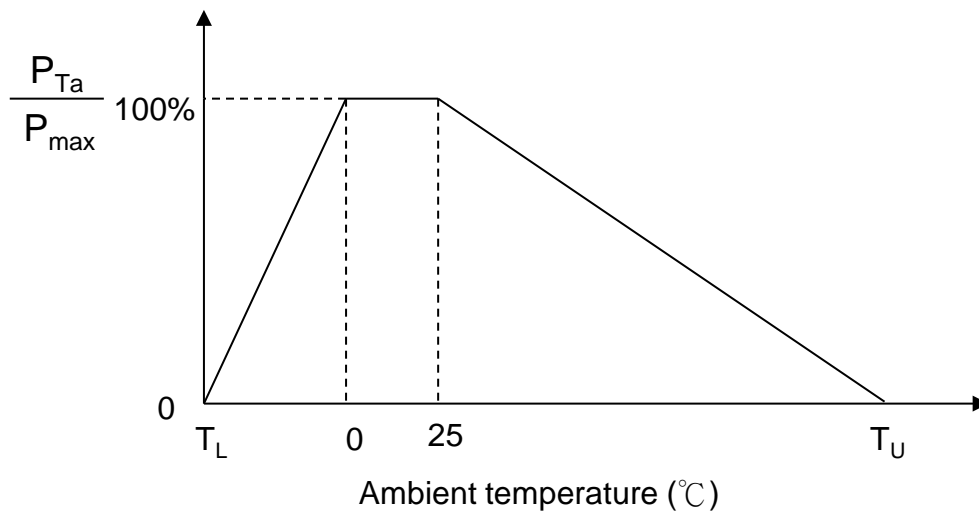
### ■ IR-Reflow Soldering Profile



### ■ 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 :

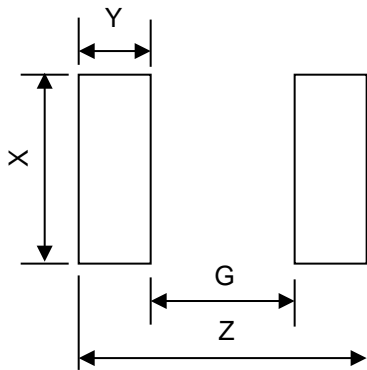
Ambient temperature( $T_a$ )=55°C

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)	0402
Z	1.7 mm
G	0.5 mm
X	0.6 mm
Y	0.6 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

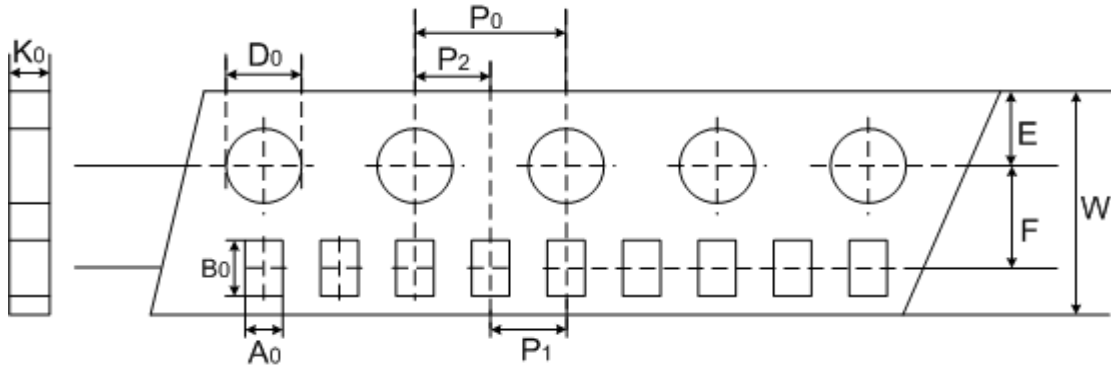
(I) Storage Conditions :

- 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

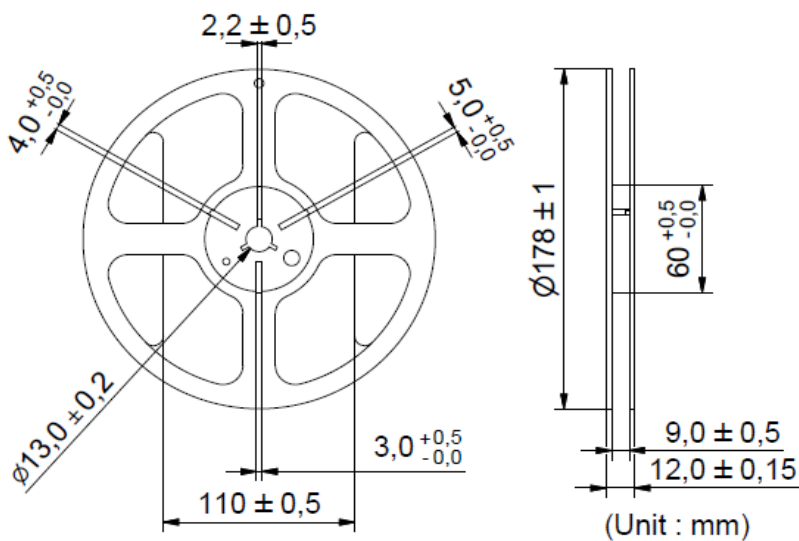
### ■ Taping Specification ( 0402 Series)



(Unit : mm)

Index	$A_0$	$B_0$	$W$	$E$	$F$	$P_1$	$P_2$	$P_0$	$D_0$	$K_0$
Size	$\pm 0.05$	$\pm 0.12$	$\pm 0.2$	$\pm 0.1$	$\pm 0.05$	$\pm 0.1$	$\pm 0.05$	$\pm 0.1$	$\pm 0.1$	$\pm 0.1$
0402	0.62	1.12	8	1.75	3.5	2	2	4	1.55	0.60

### ■ Quantity ( 10000 pcs / reel )



(Unit : mm)

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Safety Approvals (Certified Model/Type : TSM0A473)



\* 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. : TSM0A473J4053RZ

R25 =47 KOhm ± 5%

B25/85 = 4050 K ± 3%

Temperature (°C)	Rmax. (KΩ)	Rnor. (KΩ)	Rmin. (KΩ)	Temperature Tol.		Resistance Tol.	
				(°C)		(%)	
-40	2,068.6	1,767.0	1,505.6	-2.32	2.20	17.1%	-14.8%
-39	1,924.6	1,647.5	1,406.7	-2.32	2.20	16.8%	-14.6%
-38	1,792.7	1,537.7	1,315.7	-2.32	2.20	16.6%	-14.4%
-37	1,671.5	1,436.7	1,231.8	-2.32	2.20	16.3%	-14.3%
-36	1,560.0	1,343.6	1,154.2	-2.32	2.20	16.1%	-14.1%
-35	1,457.2	1,257.5	1,082.5	-2.32	2.20	15.9%	-13.9%
-34	1,362.2	1,177.8	1,015.8	-2.31	2.19	15.7%	-13.8%
-33	1,274.1	1,103.8	953.90	-2.30	2.18	15.4%	-13.6%
-32	1,192.4	1,035.0	896.18	-2.29	2.17	15.2%	-13.4%
-31	1,116.5	970.97	842.32	-2.27	2.15	15.0%	-13.2%
-30	1,045.8	911.23	792.00	-2.25	2.14	14.8%	-13.1%
-29	979.94	855.48	744.95	-2.23	2.12	14.5%	-12.9%
-28	918.55	803.40	700.92	-2.21	2.11	14.3%	-12.8%
-27	861.30	754.73	659.70	-2.19	2.09	14.1%	-12.6%
-26	807.87	709.24	621.09	-2.17	2.07	13.9%	-12.4%
-25	758.01	666.70	584.92	-2.15	2.06	13.7%	-12.3%
-24	711.47	626.92	551.04	-2.13	2.04	13.5%	-12.1%
-23	668.01	589.71	519.29	-2.10	2.02	13.3%	-11.9%
-22	627.44	554.90	489.53	-2.08	2.01	13.1%	-11.8%
-21	589.54	522.34	461.63	-2.06	1.99	12.9%	-11.6%
-20	554.15	491.86	435.49	-2.04	1.98	12.7%	-11.5%
-19	521.08	463.34	410.97	-2.02	1.96	12.5%	-11.3%
-18	490.17	436.63	387.97	-2.00	1.95	12.3%	-11.1%
-17	461.28	411.62	366.40	-1.99	1.93	12.1%	-11.0%
-16	434.26	388.19	346.15	-1.97	1.91	11.9%	-10.8%
-15	408.98	366.23	327.14	-1.95	1.90	11.7%	-10.7%
-14	385.32	345.65	309.28	-1.93	1.88	11.5%	-10.5%
-13	363.16	326.33	292.51	-1.91	1.87	11.3%	-10.4%
-12	342.40	308.21	276.74	-1.89	1.85	11.1%	-10.2%
-11	322.95	291.20	261.91	-1.87	1.83	10.9%	-10.1%
-10	304.71	275.22	247.95	-1.85	1.82	10.7%	-9.9%
-9	287.61	260.20	234.82	-1.82	1.80	10.5%	-9.8%
-8	271.55	246.09	222.46	-1.80	1.78	10.3%	-9.6%
-7	256.47	232.81	210.81	-1.78	1.76	10.2%	-9.5%
-6	242.32	220.33	199.83	-1.76	1.74	10.0%	-9.3%
-5	229.01	208.57	189.48	-1.74	1.73	9.8%	-9.2%
-4	216.51	197.51	179.72	-1.72	1.71	9.6%	-9.0%
-3	204.76	187.09	170.52	-1.70	1.69	9.4%	-8.9%
-2	193.70	177.28	161.84	-1.67	1.67	9.3%	-8.7%
-1	183.30	168.03	153.64	-1.65	1.65	9.1%	-8.6%

R - T Table

Part No. : TSM0A473J4053RZ

R25 =47 KOhm  $\pm$  5%B25/85 = 4050 K  $\pm$  3%

Temperature (°C)	Rmax. (K $\Omega$ )	Rnor. (K $\Omega$ )	Rmin. (K $\Omega$ )	Temperature Tol. (°C)		Resistance Tol. (%)	
0	173.52	159.31	145.91	-1.63	1.63	8.9%	-8.4%
1	164.31	151.10	138.60	-1.61	1.61	8.7%	-8.3%
2	155.64	143.35	131.70	-1.59	1.59	8.6%	-8.1%
3	147.48	136.05	125.19	-1.56	1.58	8.4%	-8.0%
4	139.79	129.16	119.03	-1.54	1.56	8.2%	-7.8%
5	132.55	122.66	113.22	-1.52	1.54	8.1%	-7.7%
6	125.73	116.52	107.72	-1.50	1.52	7.9%	-7.6%
7	119.30	110.73	102.53	-1.48	1.50	7.7%	-7.4%
8	113.24	105.27	97.613	-1.46	1.48	7.6%	-7.3%
9	107.52	100.11	92.967	-1.44	1.46	7.4%	-7.1%
10	102.13	95.231	88.573	-1.42	1.45	7.2%	-7.0%
11	97.050	90.626	84.415	-1.40	1.43	7.1%	-6.9%
12	92.254	86.275	80.481	-1.37	1.41	6.9%	-6.7%
13	87.728	82.162	76.757	-1.35	1.39	6.8%	-6.6%
14	83.455	78.274	73.231	-1.33	1.37	6.6%	-6.4%
15	79.419	74.596	69.891	-1.31	1.35	6.5%	-6.3%
16	75.606	71.117	66.727	-1.29	1.33	6.3%	-6.2%
17	72.004	67.825	63.728	-1.27	1.31	6.2%	-6.0%
18	68.598	64.707	60.885	-1.25	1.29	6.0%	-5.9%
19	65.377	61.755	58.189	-1.23	1.28	5.9%	-5.8%
20	62.329	58.959	55.631	-1.21	1.26	5.7%	-5.6%
21	59.445	56.308	53.203	-1.18	1.24	5.6%	-5.5%
22	56.713	53.794	50.898	-1.16	1.21	5.4%	-5.4%
23	54.126	51.410	48.709	-1.14	1.19	5.3%	-5.3%
24	51.675	49.148	46.628	-1.12	1.17	5.1%	-5.1%
25	49.350	47.000	44.650	-1.09	1.15	5.0%	-5.0%
26	47.271	44.960	42.655	-1.13	1.19	5.1%	-5.1%
27	45.293	43.022	40.762	-1.17	1.23	5.3%	-5.3%
28	43.410	41.179	38.965	-1.21	1.26	5.4%	-5.4%
29	41.617	39.426	37.258	-1.25	1.30	5.6%	-5.5%
30	39.908	37.759	35.636	-1.29	1.34	5.7%	-5.6%
31	38.280	36.172	34.095	-1.33	1.37	5.8%	-5.7%
32	36.728	34.661	32.629	-1.37	1.41	6.0%	-5.9%
33	35.248	33.222	31.234	-1.41	1.45	6.1%	-6.0%
34	33.835	31.850	29.906	-1.45	1.49	6.2%	-6.1%
35	32.487	30.542	28.642	-1.49	1.52	6.4%	-6.2%
36	31.199	29.295	27.438	-1.53	1.56	6.5%	-6.3%
37	29.969	28.105	26.291	-1.57	1.60	6.6%	-6.5%
38	28.794	26.969	25.198	-1.61	1.63	6.8%	-6.6%
39	27.670	25.885	24.155	-1.65	1.67	6.9%	-6.7%

R - T Table

Part No. : TSM0A473J4053RZ

R25 =47 KOhm ± 5%  
B25/85 = 4050 K ± 3%

Temperature (°C)	Rmax. (KΩ)	Rnor. (KΩ)	Rmin. (KΩ)	Temperature Tol. (°C)		Resistance Tol. (%)	
40	26.596	24.850	23.160	-1.69	1.71	7.0%	-6.8%
41	25.569	23.861	22.211	-1.73	1.75	7.2%	-6.9%
42	24.586	22.916	21.306	-1.77	1.78	7.3%	-7.0%
43	23.645	22.012	20.441	-1.81	1.82	7.4%	-7.1%
44	22.745	21.149	19.616	-1.85	1.86	7.5%	-7.2%
45	21.882	20.323	18.827	-1.89	1.89	7.7%	-7.4%
46	21.057	19.533	18.074	-1.93	1.93	7.8%	-7.5%
47	20.266	18.777	17.354	-1.97	1.97	7.9%	-7.6%
48	19.508	18.054	16.666	-2.01	2.00	8.1%	-7.7%
49	18.782	17.361	16.008	-2.05	2.04	8.2%	-7.8%
50	18.086	16.699	15.379	-2.09	2.08	8.3%	-7.9%
51	17.419	16.064	14.777	-2.14	2.12	8.4%	-8.0%
52	16.780	15.457	14.202	-2.18	2.16	8.6%	-8.1%
53	16.167	14.875	13.651	-2.22	2.19	8.7%	-8.2%
54	15.579	14.317	13.125	-2.26	2.23	8.8%	-8.3%
55	15.015	13.783	12.621	-2.31	2.27	8.9%	-8.4%
56	14.474	13.271	12.139	-2.35	2.31	9.1%	-8.5%
57	13.955	12.781	11.677	-2.39	2.35	9.2%	-8.6%
58	13.457	12.311	11.235	-2.44	2.39	9.3%	-8.7%
59	12.979	11.861	10.812	-2.48	2.43	9.4%	-8.8%
60	12.521	11.429	10.407	-2.53	2.47	9.5%	-8.9%
61	12.080	11.015	10.019	-2.57	2.51	9.7%	-9.0%
62	11.658	10.618	9.6470	-2.62	2.55	9.8%	-9.1%
63	11.252	10.238	9.2910	-2.67	2.59	9.9%	-9.2%
64	10.863	9.8725	8.9500	-2.71	2.63	10.0%	-9.3%
65	10.489	9.5224	8.6232	-2.76	2.68	10.2%	-9.4%
66	10.130	9.1865	8.3101	-2.81	2.72	10.3%	-9.5%
67	9.7851	8.8642	8.0100	-2.86	2.76	10.4%	-9.6%
68	9.4538	8.5550	7.7223	-2.91	2.81	10.5%	-9.7%
69	9.1355	8.2583	7.4466	-2.96	2.85	10.6%	-9.8%
70	8.8298	7.9734	7.1822	-3.01	2.89	10.7%	-9.9%
71	8.5359	7.7000	6.9286	-3.06	2.94	10.9%	-10.0%
72	8.2535	7.4375	6.6855	-3.11	2.98	11.0%	-10.1%
73	7.9820	7.1855	6.4522	-3.16	3.03	11.1%	-10.2%
74	7.7211	6.9434	6.2284	-3.21	3.07	11.2%	-10.3%
75	7.4701	6.7109	6.0137	-3.27	3.12	11.3%	-10.4%
76	7.2288	6.4875	5.8076	-3.32	3.17	11.4%	-10.5%
77	6.9967	6.2729	5.6098	-3.37	3.21	11.5%	-10.6%
78	6.7734	6.0666	5.4199	-3.43	3.26	11.7%	-10.7%
79	6.5586	5.8683	5.2376	-3.48	3.31	11.8%	-10.7%

R - T Table

Part No. : TSM0A473J4053RZ

R25 =47 KOhm ± 5%  
B25/85 = 4050 K ± 3%

Temperature (°C)	Rmax. (KΩ)	Rnor. (KΩ)	Rmin. (KΩ)	Temperature Tol. (°C)		Resistance Tol. (%)	
80	6.3518	5.6777	5.0624	-3.54	3.36	11.9%	-10.8%
81	6.1528	5.4944	4.8942	-3.59	3.40	12.0%	-10.9%
82	5.9612	5.3181	4.7325	-3.65	3.45	12.1%	-11.0%
83	5.7767	5.1485	4.5771	-3.70	3.50	12.2%	-11.1%
84	5.5991	4.9853	4.4278	-3.76	3.55	12.3%	-11.2%
85	5.4279	4.8283	4.2842	-3.82	3.60	12.4%	-11.3%
86	5.2630	4.6771	4.1461	-3.88	3.65	12.5%	-11.4%
87	5.1040	4.5316	4.0133	-3.93	3.70	12.6%	-11.4%
88	4.9508	4.3914	3.8855	-3.99	3.75	12.7%	-11.5%
89	4.8031	4.2564	3.7625	-4.05	3.80	12.8%	-11.6%
90	4.6606	4.1263	3.6441	-4.11	3.85	12.9%	-11.7%
91	4.5232	4.0009	3.5301	-4.17	3.90	13.1%	-11.8%
92	4.3906	3.8801	3.4203	-4.22	3.95	13.2%	-11.8%
93	4.2627	3.7636	3.3146	-4.28	4.00	13.3%	-11.9%
94	4.1392	3.6512	3.2127	-4.34	4.05	13.4%	-12.0%
95	4.0199	3.5428	3.1145	-4.40	4.10	13.5%	-12.1%
96	3.9048	3.4382	3.0198	-4.46	4.15	13.6%	-12.2%
97	3.7935	3.3373	2.9286	-4.52	4.19	13.7%	-12.2%
98	3.6860	3.2398	2.8405	-4.58	4.24	13.8%	-12.3%
99	3.5822	3.1458	2.7556	-4.64	4.29	13.9%	-12.4%
100	3.4818	3.0549	2.6737	-4.70	4.34	14.0%	-12.5%
101	3.3847	2.9671	2.5946	-4.76	4.39	14.1%	-12.6%
102	3.2908	2.8823	2.5182	-4.82	4.44	14.2%	-12.6%
103	3.2000	2.8004	2.4445	-4.88	4.49	14.3%	-12.7%
104	3.1122	2.7212	2.3733	-4.94	4.54	14.4%	-12.8%
105	3.0272	2.6446	2.3046	-5.00	4.59	14.5%	-12.9%
106	2.9449	2.5705	2.2381	-5.05	4.64	14.6%	-12.9%
107	2.8653	2.4989	2.1739	-5.11	4.69	14.7%	-13.0%
108	2.7881	2.4296	2.1118	-5.17	4.74	14.8%	-13.1%
109	2.7135	2.3625	2.0518	-5.23	4.79	14.9%	-13.2%
110	2.6411	2.2976	1.9938	-5.29	4.84	15.0%	-13.2%
111	2.5710	2.2348	1.9376	-5.35	4.89	15.0%	-13.3%
112	2.5031	2.1739	1.8833	-5.41	4.93	15.1%	-13.4%
113	2.4373	2.1150	1.8308	-5.47	4.98	15.2%	-13.4%
114	2.3735	2.0580	1.7800	-5.53	5.03	15.3%	-13.5%
115	2.3117	2.0027	1.7308	-5.59	5.08	15.4%	-13.6%
116	2.2517	1.9492	1.6831	-5.65	5.13	15.5%	-13.7%
117	2.1936	1.8974	1.6370	-5.71	5.18	15.6%	-13.7%
118	2.1372	1.8471	1.5924	-5.77	5.23	15.7%	-13.8%
119	2.0825	1.7984	1.5492	-5.83	5.28	15.8%	-13.9%

