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SPECIFICATION FOR APPROVAL

CUSTOMER	立創電子
CERTIFIED MODEL/TYPE	TSM1A682
PART NO.	TSM1A682J3952RZ (RoHS+HF)
APPLICATION	
CUSTOMER P/N	
ISSUE DATE	Jul. 22, 2022
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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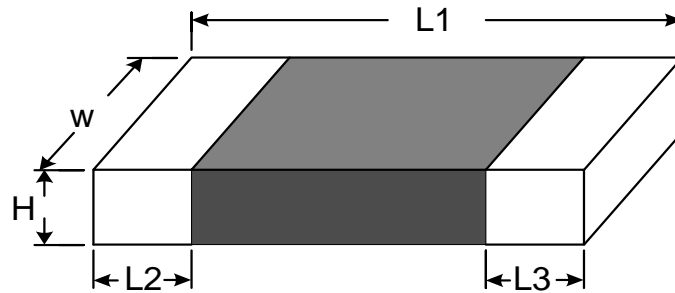
Part Number Code

Example :

TSM **1** **A** **682** **J** **395** **2** **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)	682	68 x 10 ² Ω = 6.8 KΩ
(5)	Tolerance of R ₂₅	J	± 5%
(6)	B Value	395	3950K
(7)	Tolerance of B Value	2	± 2%
(8)	Packaging	R	Reel
(9)	Optional Suffix	Z	RoHS+HF compliance

Structure and Dimensions



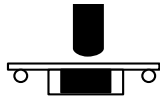
(unit : mm)

L1	W	H	L2 and L3
1.60±0.15	0.80±0.15	0.80±0.15	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)
TSM1A682J3952RZ	6.8	5	3950	2	210	Approx. 2.1	Approx. 3.1	-40 ~ +125

Reliability

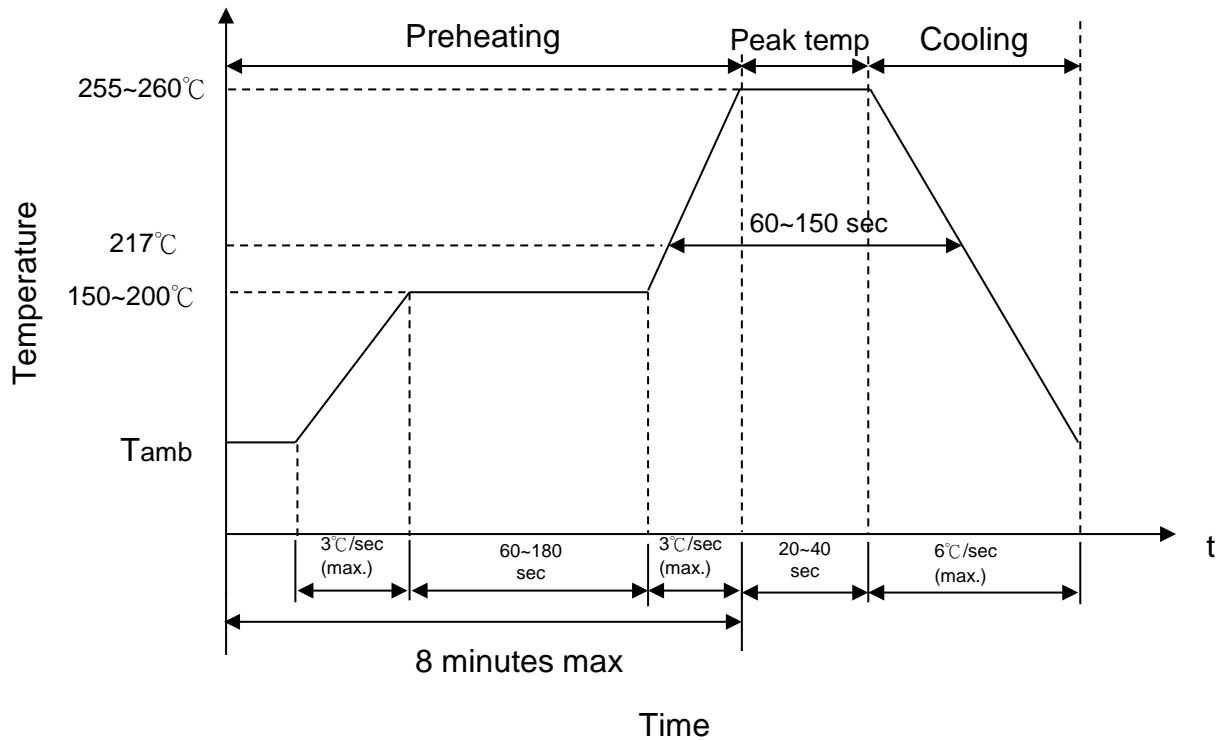
Item	Standard	Test conditions / Methods	Specifications															
Bending Strength	IEC 60068-2-21	Warp : 2mm ; Speed < 0.5mm/sec. Duration : 10 sec on PCB. 	No visible damage $ \Delta R_{25}/R_{25} \leq 5\%$															
Solderability	IEC60068-2-58	245 ± 5°C , 3 ± 0.3 sec	At least 95% of terminal 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 1223 1166 1532"> <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

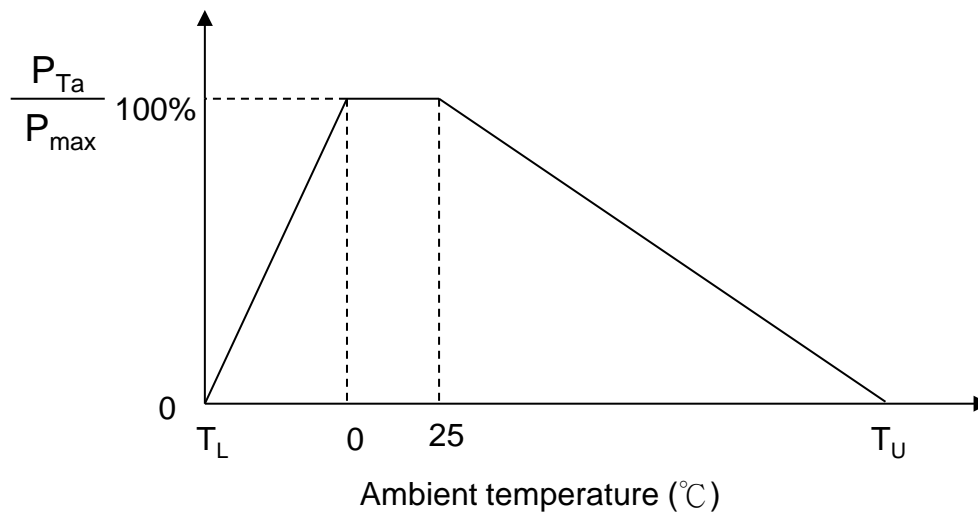
■ IR-Reflow Soldering Profile



■ 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 (°C)

T_U = Maximum operating temperature (°C)

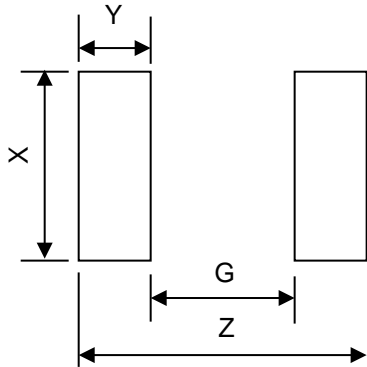
For example :

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

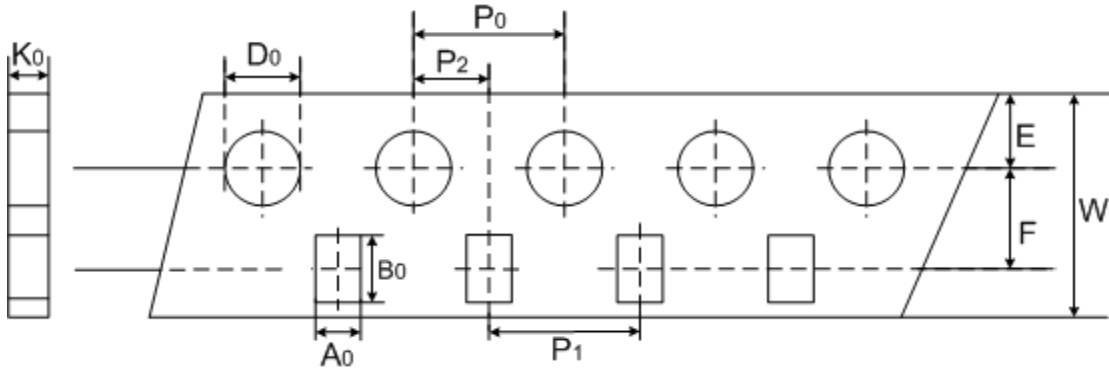
(I) Storage Conditions :

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

(II) Period of Storage : 1 year

Packaging

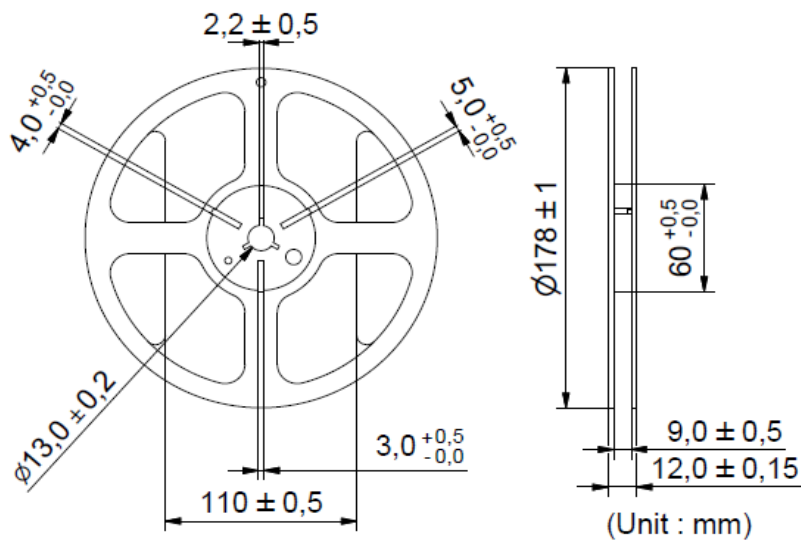
■ Taping Specification (0603 Series)



(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)



(Unit : mm)

Safety Approvals (Certified Model/Type : TSM1A682)



* 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. : TSM1A682J3952RZ

R25 = 6.8 KOhm ± 5%

B25/85 = 3950 K ± 2%

Temperature (°C)	Rmax. (KΩ)	Rnor. (KΩ)	Rmin. (KΩ)	Temperature Tol.		Resistance Tol.	
				(°C)		(%)	
-40	281.85	249.76	220.78	-1.81	1.77	12.8%	-11.6%
-39	262.98	233.36	206.55	-1.81	1.76	12.7%	-11.5%
-38	245.53	218.16	193.37	-1.80	1.76	12.5%	-11.4%
-37	229.36	204.07	181.12	-1.79	1.75	12.4%	-11.2%
-36	214.36	190.98	169.72	-1.79	1.75	12.2%	-11.1%
-35	200.43	178.80	159.11	-1.78	1.74	12.1%	-11.0%
-34	187.48	167.47	149.22	-1.77	1.73	11.9%	-10.9%
-33	175.42	156.90	139.99	-1.75	1.72	11.8%	-10.8%
-32	164.20	147.06	131.38	-1.74	1.71	11.7%	-10.7%
-31	153.75	137.88	123.33	-1.73	1.70	11.5%	-10.5%
-30	144.01	129.31	115.82	-1.72	1.69	11.4%	-10.4%
-29	134.93	121.31	108.79	-1.70	1.68	11.2%	-10.3%
-28	126.47	113.85	102.23	-1.69	1.67	11.1%	-10.2%
-27	118.58	106.88	96.095	-1.68	1.66	10.9%	-10.1%
-26	111.22	100.38	90.359	-1.67	1.65	10.8%	-10.0%
-25	104.36	94.300	84.996	-1.66	1.64	10.7%	-9.9%
-24	97.960	88.626	79.980	-1.64	1.63	10.5%	-9.8%
-23	91.988	83.325	75.289	-1.63	1.62	10.4%	-9.6%
-22	86.414	78.372	70.901	-1.62	1.61	10.3%	-9.5%
-21	81.211	73.743	66.795	-1.61	1.61	10.1%	-9.4%
-20	76.354	69.417	62.952	-1.60	1.60	10.0%	-9.3%
-19	71.819	65.372	59.355	-1.59	1.59	9.9%	-9.2%
-18	67.582	61.589	55.987	-1.58	1.58	9.7%	-9.1%
-17	63.624	58.050	52.833	-1.57	1.58	9.6%	-9.0%
-16	59.924	54.738	49.877	-1.57	1.57	9.5%	-8.9%
-15	56.464	51.638	47.107	-1.56	1.56	9.3%	-8.8%
-14	53.228	48.735	44.510	-1.55	1.55	9.2%	-8.7%
-13	50.199	46.015	42.074	-1.54	1.55	9.1%	-8.6%
-12	47.364	43.466	39.789	-1.53	1.54	9.0%	-8.5%
-11	44.709	41.075	37.643	-1.52	1.53	8.8%	-8.4%
-10	42.221	38.833	35.628	-1.51	1.52	8.7%	-8.3%
-9	39.888	36.729	33.735	-1.50	1.52	8.6%	-8.2%
-8	37.701	34.753	31.956	-1.49	1.51	8.5%	-8.0%
-7	35.648	32.897	30.282	-1.48	1.50	8.4%	-7.9%
-6	33.722	31.153	28.708	-1.47	1.49	8.2%	-7.8%
-5	31.912	29.513	27.226	-1.46	1.48	8.1%	-7.7%
-4	30.211	27.970	25.831	-1.45	1.47	8.0%	-7.6%
-3	28.612	26.518	24.516	-1.44	1.46	7.9%	-7.6%
-2	27.109	25.151	23.277	-1.43	1.46	7.8%	-7.5%
-1	25.693	23.863	22.108	-1.42	1.45	7.7%	-7.4%

R - T Table

Part No. : TSM1A682J3952RZ

R25 =6.8 KOhm \pm 5%B25/85 = 3950 K \pm 2%

Temperature (°C)	Rmax. (K Ω)	Rnor. (K Ω)	Rmin. (K Ω)	Temperature Tol. (°C)		Resistance Tol. (%)	
0	24.361	22.649	21.005	-1.41	1.44	7.6%	-7.3%
1	23.106	21.505	19.965	-1.40	1.43	7.4%	-7.2%
2	21.924	20.426	18.982	-1.39	1.42	7.3%	-7.1%
3	20.809	19.407	18.054	-1.38	1.41	7.2%	-7.0%
4	19.758	18.445	17.177	-1.36	1.40	7.1%	-6.9%
5	18.766	17.537	16.347	-1.35	1.39	7.0%	-6.8%
6	17.830	16.679	15.563	-1.34	1.38	6.9%	-6.7%
7	16.946	15.868	14.821	-1.33	1.36	6.8%	-6.6%
8	16.111	15.101	14.118	-1.32	1.35	6.7%	-6.5%
9	15.321	14.375	13.453	-1.30	1.34	6.6%	-6.4%
10	14.575	13.688	12.823	-1.29	1.33	6.5%	-6.3%
11	13.870	13.039	12.226	-1.28	1.32	6.4%	-6.2%
12	13.203	12.423	11.661	-1.27	1.31	6.3%	-6.1%
13	12.571	11.840	11.124	-1.25	1.30	6.2%	-6.0%
14	11.973	11.288	10.616	-1.24	1.29	6.1%	-6.0%
15	11.407	10.765	10.133	-1.23	1.27	6.0%	-5.9%
16	10.871	10.269	9.6751	-1.21	1.26	5.9%	-5.8%
17	10.363	9.7981	9.2404	-1.20	1.25	5.8%	-5.7%
18	9.8820	9.3517	8.8277	-1.19	1.24	5.7%	-5.6%
19	9.4257	8.9281	8.4357	-1.17	1.23	5.6%	-5.5%
20	8.9930	8.5261	8.0633	-1.16	1.21	5.5%	-5.4%
21	8.5826	8.1445	7.7094	-1.15	1.20	5.4%	-5.3%
22	8.1933	7.7821	7.3731	-1.13	1.19	5.3%	-5.3%
23	7.8238	7.4379	7.0533	-1.12	1.18	5.2%	-5.2%
24	7.4730	7.1108	6.7492	-1.11	1.16	5.1%	-5.1%
25	7.1400	6.8000	6.4600	-1.09	1.15	5.0%	-5.0%
26	6.8359	6.5046	6.1738	-1.12	1.18	5.1%	-5.1%
27	6.5464	6.2237	5.9020	-1.15	1.20	5.2%	-5.2%
28	6.2709	5.9565	5.6437	-1.18	1.23	5.3%	-5.3%
29	6.0087	5.7024	5.3983	-1.21	1.26	5.4%	-5.3%
30	5.7589	5.4606	5.1649	-1.23	1.29	5.5%	-5.4%
31	5.5210	5.2305	4.9430	-1.26	1.31	5.6%	-5.5%
32	5.2943	5.0115	4.7320	-1.29	1.34	5.6%	-5.6%
33	5.0783	4.8029	4.5312	-1.32	1.37	5.7%	-5.7%
34	4.8724	4.6043	4.3401	-1.35	1.40	5.8%	-5.7%
35	4.6761	4.4151	4.1583	-1.38	1.42	5.9%	-5.8%
36	4.4889	4.2348	3.9852	-1.41	1.45	6.0%	-5.9%
37	4.3103	4.0630	3.8203	-1.44	1.48	6.1%	-6.0%
38	4.1400	3.8992	3.6633	-1.47	1.51	6.2%	-6.1%
39	3.9774	3.7430	3.5137	-1.50	1.54	6.3%	-6.1%

R - T Table

Part No. : TSM1A682J3952RZ

R25 =6.8 KOhm ± 5%

B25/85 = 3950 K ± 2%

Temperature (°C)	Rmax. (KΩ)	Rnor. (KΩ)	Rmin. (KΩ)	Temperature Tol. (°C)		Resistance Tol. (%)	
40	3.8222	3.5940	3.3711	-1.53	1.57	6.3%	-6.2%
41	3.6740	3.4519	3.2352	-1.56	1.60	6.4%	-6.3%
42	3.5325	3.3163	3.1056	-1.59	1.63	6.5%	-6.4%
43	3.3973	3.1869	2.9820	-1.63	1.66	6.6%	-6.4%
44	3.2682	3.0633	2.8641	-1.66	1.69	6.7%	-6.5%
45	3.1447	2.9453	2.7516	-1.69	1.72	6.8%	-6.6%
46	3.0267	2.8326	2.6442	-1.72	1.75	6.9%	-6.6%
47	2.9139	2.7249	2.5417	-1.76	1.78	6.9%	-6.7%
48	2.8060	2.6219	2.4438	-1.79	1.81	7.0%	-6.8%
49	2.7027	2.5235	2.3503	-1.82	1.84	7.1%	-6.9%
50	2.6040	2.4294	2.2609	-1.85	1.87	7.2%	-6.9%
51	2.5094	2.3394	2.1755	-1.89	1.90	7.3%	-7.0%
52	2.4188	2.2533	2.0939	-1.92	1.94	7.3%	-7.1%
53	2.3321	2.1709	2.0158	-1.96	1.97	7.4%	-7.1%
54	2.2491	2.0921	1.9412	-1.99	2.00	7.5%	-7.2%
55	2.1695	2.0166	1.8697	-2.03	2.03	7.6%	-7.3%
56	2.0932	1.9442	1.8013	-2.06	2.06	7.7%	-7.3%
57	2.0201	1.8749	1.7359	-2.09	2.09	7.7%	-7.4%
58	1.9500	1.8086	1.6732	-2.13	2.13	7.8%	-7.5%
59	1.8827	1.7449	1.6132	-2.17	2.16	7.9%	-7.5%
60	1.8182	1.6839	1.5557	-2.20	2.19	8.0%	-7.6%
61	1.7562	1.6254	1.5006	-2.24	2.22	8.0%	-7.7%
62	1.6968	1.5693	1.4477	-2.27	2.26	8.1%	-7.7%
63	1.6397	1.5154	1.3971	-2.31	2.29	8.2%	-7.8%
64	1.5849	1.4637	1.3485	-2.34	2.32	8.3%	-7.9%
65	1.5322	1.4141	1.3019	-2.38	2.36	8.4%	-7.9%
66	1.4816	1.3664	1.2571	-2.42	2.39	8.4%	-8.0%
67	1.4329	1.3207	1.2142	-2.45	2.42	8.5%	-8.1%
68	1.3861	1.2767	1.1730	-2.49	2.45	8.6%	-8.1%
69	1.3412	1.2344	1.1334	-2.53	2.49	8.6%	-8.2%
70	1.2979	1.1938	1.0953	-2.56	2.52	8.7%	-8.2%
71	1.2563	1.1548	1.0588	-2.60	2.55	8.8%	-8.3%
72	1.2162	1.1172	1.0237	-2.64	2.59	8.9%	-8.4%
73	1.1776	1.0811	0.98993	-2.67	2.62	8.9%	-8.4%
74	1.1405	1.0463	0.95746	-2.71	2.65	9.0%	-8.5%
75	1.1048	1.0128	0.92624	-2.75	2.69	9.1%	-8.5%
76	1.0703	0.98063	0.89620	-2.78	2.72	9.1%	-8.6%
77	1.0371	0.94961	0.86730	-2.82	2.76	9.2%	-8.7%
78	1.0052	0.91974	0.83949	-2.86	2.79	9.3%	-8.7%
79	0.97433	0.89097	0.81271	-2.90	2.82	9.4%	-8.8%

R - T Table

Part No. : TSM1A682J3952RZ

R25 =6.8 KOhm ± 5%

B25/85 = 3950 K ± 2%

Temperature (°C)	Rmax. (KΩ)	Rnor. (KΩ)	Rmin. (KΩ)	Temperature Tol. (°C)		Resistance Tol. (%)	
80	0.94461	0.86325	0.78692	-2.93	2.86	9.4%	-8.8%
81	0.91596	0.83654	0.76209	-2.97	2.89	9.5%	-8.9%
82	0.88832	0.81079	0.73817	-3.01	2.93	9.6%	-9.0%
83	0.86165	0.78596	0.71513	-3.05	2.96	9.6%	-9.0%
84	0.83593	0.76202	0.69292	-3.09	2.99	9.7%	-9.1%
85	0.81110	0.73894	0.67151	-3.13	3.03	9.8%	-9.1%
86	0.78714	0.71667	0.65087	-3.16	3.06	9.8%	-9.2%
87	0.76400	0.69518	0.63097	-3.20	3.10	9.9%	-9.2%
88	0.74166	0.67444	0.61179	-3.24	3.13	10.0%	-9.3%
89	0.72009	0.65443	0.59328	-3.28	3.17	10.0%	-9.3%
90	0.69926	0.63512	0.57542	-3.32	3.20	10.1%	-9.4%
91	0.67913	0.61647	0.55819	-3.36	3.24	10.2%	-9.5%
92	0.65968	0.59846	0.54156	-3.40	3.27	10.2%	-9.5%
93	0.64089	0.58107	0.52551	-3.44	3.31	10.3%	-9.6%
94	0.62273	0.56427	0.51002	-3.48	3.34	10.4%	-9.6%
95	0.60517	0.54804	0.49507	-3.52	3.38	10.4%	-9.7%
96	0.58820	0.53237	0.48063	-3.56	3.42	10.5%	-9.7%
97	0.57179	0.51722	0.46668	-3.60	3.45	10.6%	-9.8%
98	0.55593	0.50258	0.45321	-3.64	3.49	10.6%	-9.8%
99	0.54058	0.48843	0.44020	-3.69	3.53	10.7%	-9.9%
100	0.52575	0.47475	0.42763	-3.73	3.56	10.7%	-9.9%
101	0.51139	0.46153	0.41549	-3.77	3.60	10.8%	-10.0%
102	0.49751	0.44875	0.40375	-3.81	3.64	10.9%	-10.0%
103	0.48408	0.43639	0.39241	-3.86	3.68	10.9%	-10.1%
104	0.47108	0.42443	0.38145	-3.90	3.72	11.0%	-10.1%
105	0.45850	0.41288	0.37086	-3.95	3.76	11.1%	-10.2%
106	0.44633	0.40170	0.36062	-3.99	3.80	11.1%	-10.2%
107	0.43456	0.39089	0.35072	-4.04	3.84	11.2%	-10.3%
108	0.42316	0.38043	0.34115	-4.09	3.88	11.2%	-10.3%
109	0.41213	0.37031	0.33190	-4.13	3.92	11.3%	-10.4%
110	0.40145	0.36052	0.32296	-4.18	3.97	11.4%	-10.4%
111	0.39112	0.35105	0.31431	-4.23	4.01	11.4%	-10.5%
112	0.38111	0.34189	0.30594	-4.28	4.06	11.5%	-10.5%
113	0.37143	0.33303	0.29786	-4.33	4.10	11.5%	-10.6%
114	0.36205	0.32445	0.29003	-4.38	4.15	11.6%	-10.6%
115	0.35297	0.31616	0.28247	-4.44	4.19	11.6%	-10.7%
116	0.34419	0.30813	0.27515	-4.49	4.24	11.7%	-10.7%
117	0.33568	0.30035	0.26808	-4.55	4.29	11.8%	-10.7%
118	0.32744	0.29284	0.26123	-4.60	4.34	11.8%	-10.8%
119	0.31946	0.28556	0.25461	-4.66	4.39	11.9%	-10.8%

