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**SPECIFICATION FOR APPROVAL**

CUSTOMER	TRG (TESE003)_Enerpoint
CERTIFIED MODEL/TYPE	TSM2A123
PART NO.	TSM2A123F3741RZ (RoHS+HF)
APPLICATION	
CUSTOMER P/N	
ISSUE DATE	Dec. 05, 2014
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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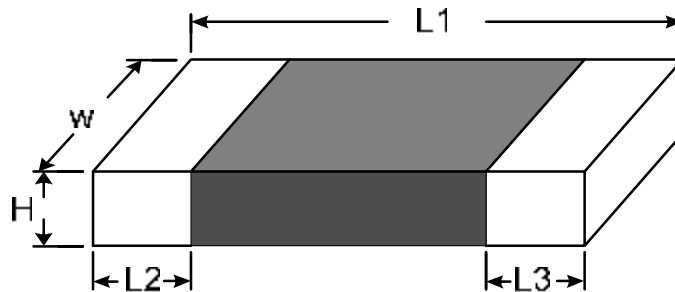
Part Number Code

Example :

TSM **2** **A** **123** **F** **374** **1** **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)	2	0805
(3)	Definition of B Value	A	B _{25/85}
(4)	Zero Power Resistance at 25°C (R ₂₅)	123	12 x 10 ³ Ω = 12 KΩ
(5)	Tolerance of R ₂₅	F	± 1%
(6)	B Value	374	3740K
(7)	Tolerance of B Value	1	± 1%
(8)	Packaging	R	Reel
(9)	Optional Suffix	Z	RoHS+HF compliance

Structure and Dimensions



(unit : mm)

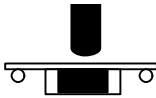
L1	W	H max.	L2 and L3
2.00±0.20	1.25±0.20	1.00	0.40±0.20

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)
TSM2A123F3741RZ	12	1	3740	1	240	Approx. 2.4	Approx. 5.4	-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 1218 1168 1527"> <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\%$															

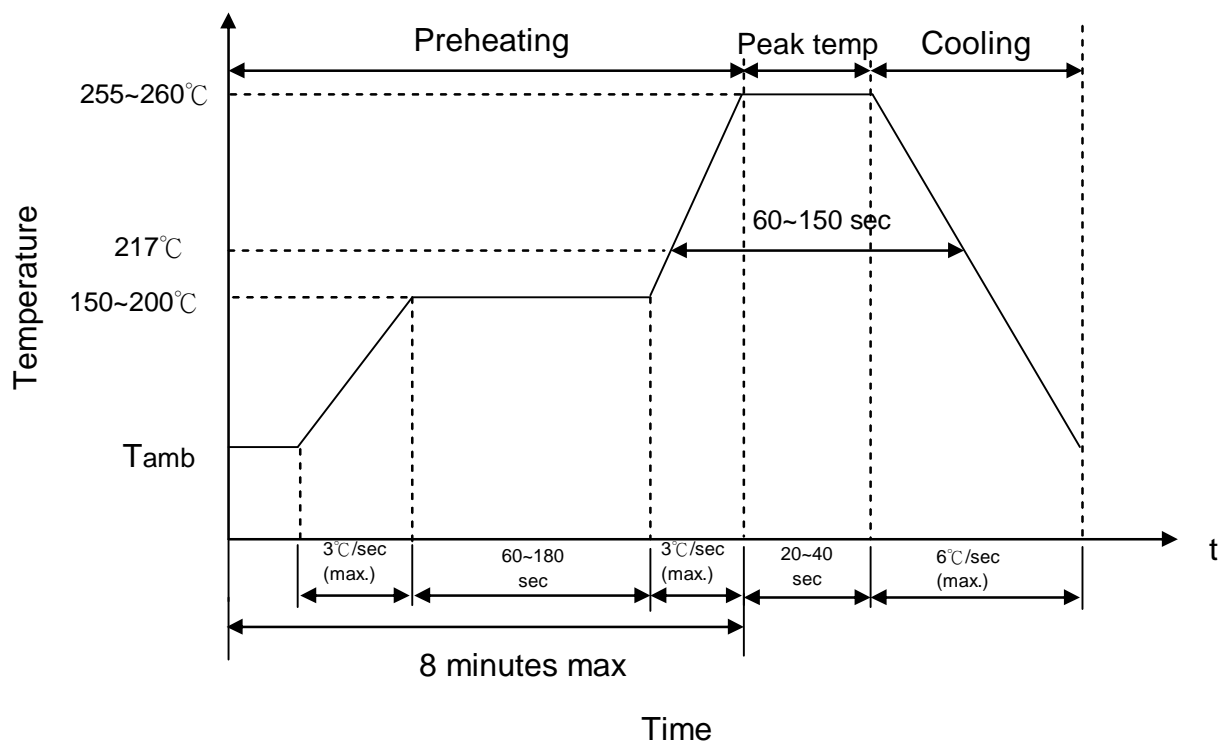
Products have been tested at Thinking Electronic

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

(Client Test Data Program).

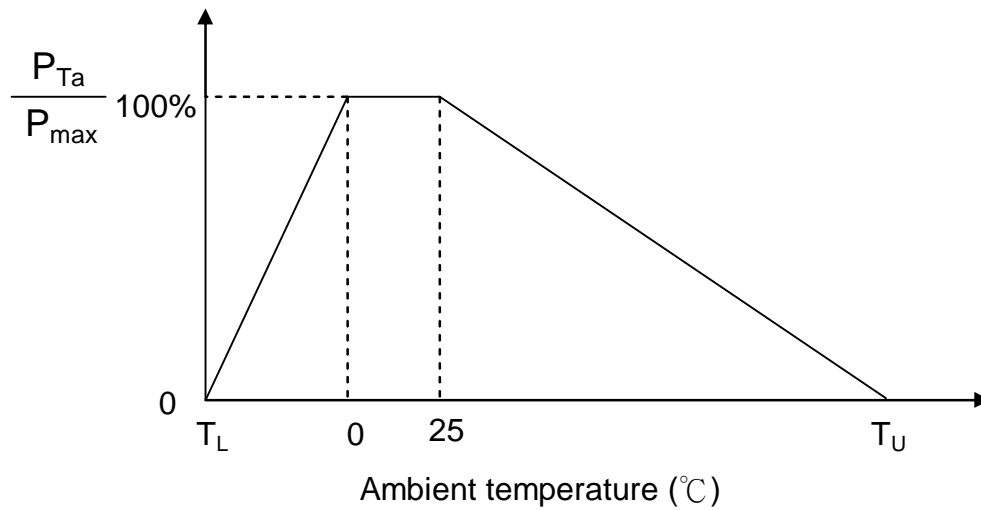
Soldering Recommendation

■ 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)

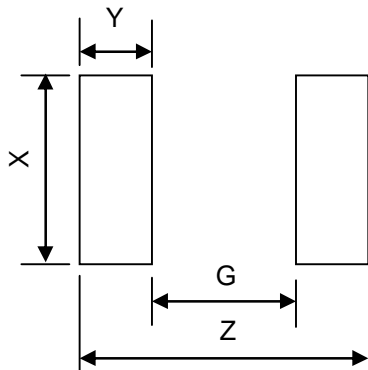
For example :

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)	0805
Z	3.4 mm
G	1.0 mm
X	1.4 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

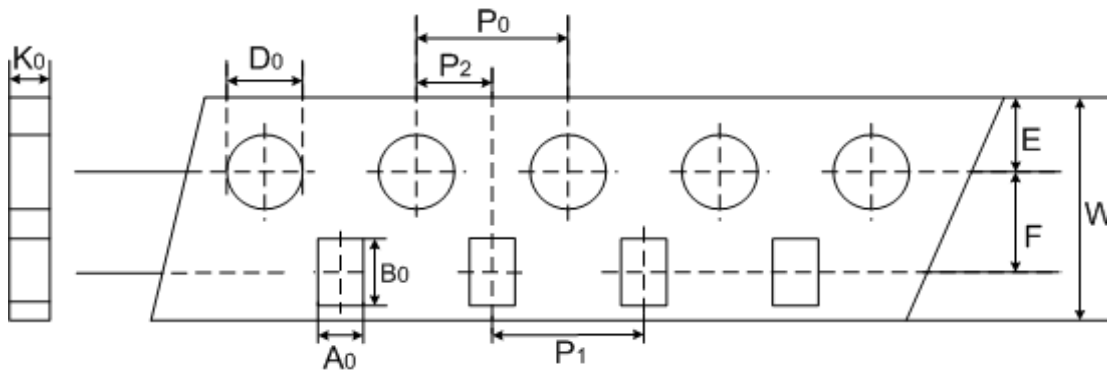
(I) Storage Conditions :

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

(II) Period of Storage : 1 year

Packaging

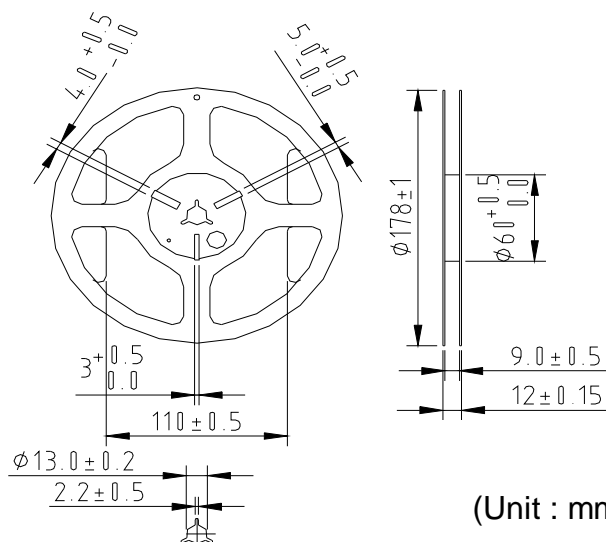
■ Taping Specification (0805 type)



(Unit : mm)

Index	A_0	B_0	W	E	F	P_1	P_2	P_0	D_0	K_0
Type	± 0.2	± 0.2	± 0.2	± 0.1	± 0.05	± 0.1	± 0.05	± 0.1	± 0.1	± 0.1
0805	1.5	2.3	8	1.75	3.5	4	2	4	1.55	1

■ Quantity (3500 pcs / reel)



(Unit : mm)

Safety Approvals (Certified Model/Type : TSM2A123)

* 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. : TSM2A123F3741RZ

R25 = 12 K Ω \pm 1%B25/85 = 3740 K \pm 1%

Temperature ($^{\circ}$ C)	Rmax. (K Ω)	Rnor. (K Ω)	Rmin. (K Ω)	Temperature Tol.		Resistance Tol.	
				($^{\circ}$ C)		(%)	
-40	343.93	329.43	315.51	-0.66	0.68	4.4%	-4.2%
-39	322.45	309.05	296.18	-0.66	0.68	4.3%	-4.2%
-38	302.60	290.21	278.30	-0.66	0.68	4.3%	-4.1%
-37	284.24	272.77	261.73	-0.66	0.68	4.2%	-4.0%
-36	267.21	256.59	246.36	-0.66	0.68	4.1%	-4.0%
-35	251.41	241.56	232.07	-0.66	0.68	4.1%	-3.9%
-34	236.70	227.56	218.75	-0.65	0.67	4.0%	-3.9%
-33	222.98	214.50	206.32	-0.65	0.67	4.0%	-3.8%
-32	210.17	202.29	194.69	-0.65	0.66	3.9%	-3.8%
-31	198.17	190.86	183.79	-0.64	0.66	3.8%	-3.7%
-30	186.93	180.13	173.57	-0.63	0.65	3.8%	-3.6%
-29	176.38	170.06	163.96	-0.63	0.65	3.7%	-3.6%
-28	166.47	160.60	154.92	-0.62	0.64	3.7%	-3.5%
-27	157.15	151.70	146.42	-0.61	0.63	3.6%	-3.5%
-26	148.39	143.32	138.41	-0.61	0.62	3.5%	-3.4%
-25	140.15	135.44	130.87	-0.60	0.62	3.5%	-3.4%
-24	132.39	128.02	123.77	-0.59	0.61	3.4%	-3.3%
-23	125.10	121.03	117.08	-0.58	0.60	3.4%	-3.3%
-22	118.23	114.45	110.78	-0.57	0.59	3.3%	-3.2%
-21	111.77	108.26	104.85	-0.57	0.59	3.2%	-3.2%
-20	105.70	102.43	99.257	-0.56	0.58	3.2%	-3.1%
-19	99.985	96.948	93.994	-0.55	0.57	3.1%	-3.0%
-18	94.611	91.787	89.039	-0.55	0.57	3.1%	-3.0%
-17	89.557	86.931	84.375	-0.54	0.56	3.0%	-2.9%
-16	84.804	82.362	79.983	-0.53	0.55	3.0%	-2.9%
-15	80.334	78.063	75.848	-0.53	0.55	2.9%	-2.8%
-14	76.129	74.016	71.955	-0.52	0.54	2.9%	-2.8%
-13	72.173	70.207	68.288	-0.52	0.54	2.8%	-2.7%
-12	68.451	66.622	64.834	-0.51	0.53	2.7%	-2.7%
-11	64.948	63.245	61.580	-0.50	0.52	2.7%	-2.6%
-10	61.649	60.063	58.513	-0.50	0.52	2.6%	-2.6%
-9	58.541	57.065	55.620	-0.49	0.51	2.6%	-2.5%
-8	55.613	54.238	52.892	-0.49	0.50	2.5%	-2.5%
-7	52.852	51.571	50.316	-0.48	0.50	2.5%	-2.4%
-6	50.248	49.055	47.885	-0.47	0.49	2.4%	-2.4%
-5	47.790	46.678	45.588	-0.47	0.49	2.4%	-2.3%
-4	45.469	44.433	43.417	-0.46	0.48	2.3%	-2.3%
-3	43.276	42.311	41.363	-0.45	0.47	2.3%	-2.2%
-2	41.203	40.304	39.421	-0.45	0.47	2.2%	-2.2%
-1	39.243	38.405	37.581	-0.44	0.46	2.2%	-2.1%

R - T Table

Part No. : TSM2A123F3741RZ

R25 =12 KOhm \pm 1%
B25/85 = 3740 K \pm 1%

Temperature (°C)	Rmax. (K Ω)	Rnor. (K Ω)	Rmin. (K Ω)	Temperature Tol. (°C)		Resistance Tol. (%)	
0	37.388	36.607	35.839	-0.43	0.45	2.1%	-2.1%
1	35.631	34.904	34.188	-0.43	0.44	2.1%	-2.1%
2	33.968	33.290	32.622	-0.42	0.44	2.0%	-2.0%
3	32.391	31.759	31.137	-0.41	0.43	2.0%	-2.0%
4	30.896	30.308	29.728	-0.41	0.42	1.9%	-1.9%
5	29.478	28.930	28.390	-0.40	0.41	1.9%	-1.9%
6	28.132	27.623	27.119	-0.39	0.41	1.8%	-1.8%
7	26.855	26.381	25.912	-0.38	0.40	1.8%	-1.8%
8	25.642	25.201	24.764	-0.37	0.39	1.8%	-1.7%
9	24.490	24.079	23.673	-0.37	0.38	1.7%	-1.7%
10	23.395	23.013	22.635	-0.36	0.37	1.7%	-1.6%
11	22.355	22.000	21.648	-0.35	0.36	1.6%	-1.6%
12	21.366	21.036	20.709	-0.34	0.36	1.6%	-1.6%
13	20.425	20.118	19.815	-0.33	0.35	1.5%	-1.5%
14	19.530	19.246	18.963	-0.33	0.34	1.5%	-1.5%
15	18.679	18.415	18.153	-0.32	0.33	1.4%	-1.4%
16	17.869	17.624	17.381	-0.31	0.32	1.4%	-1.4%
17	17.098	16.871	16.646	-0.30	0.31	1.3%	-1.3%
18	16.365	16.155	15.946	-0.29	0.31	1.3%	-1.3%
19	15.666	15.472	15.278	-0.28	0.30	1.3%	-1.3%
20	15.001	14.821	14.642	-0.28	0.29	1.2%	-1.2%
21	14.368	14.201	14.036	-0.27	0.28	1.2%	-1.2%
22	13.764	13.611	13.458	-0.26	0.27	1.1%	-1.1%
23	13.190	13.048	12.907	-0.25	0.26	1.1%	-1.1%
24	12.642	12.511	12.381	-0.24	0.25	1.0%	-1.0%
25	12.120	12.000	11.880	-0.23	0.25	1.0%	-1.0%
26	11.632	11.512	11.392	-0.25	0.26	1.0%	-1.0%
27	11.167	11.047	10.928	-0.26	0.27	1.1%	-1.1%
28	10.723	10.603	10.484	-0.27	0.28	1.1%	-1.1%
29	10.299	10.180	10.062	-0.28	0.29	1.2%	-1.2%
30	9.8942	9.7762	9.6586	-0.29	0.30	1.2%	-1.2%
31	9.5079	9.3907	9.2740	-0.30	0.32	1.2%	-1.2%
32	9.1389	9.0227	8.9070	-0.32	0.33	1.3%	-1.3%
33	8.7865	8.6713	8.5567	-0.33	0.34	1.3%	-1.3%
34	8.4498	8.3357	8.2223	-0.34	0.35	1.4%	-1.4%
35	8.1280	8.0151	7.9030	-0.35	0.37	1.4%	-1.4%
36	7.8204	7.7088	7.5980	-0.36	0.38	1.4%	-1.4%
37	7.5263	7.4160	7.3066	-0.38	0.39	1.5%	-1.5%
38	7.2450	7.1361	7.0281	-0.39	0.40	1.5%	-1.5%
39	6.9760	6.8685	6.7620	-0.40	0.42	1.6%	-1.6%

R - T Table

Part No. : TSM2A123F3741RZ

R25 =12 KOhm \pm 1%
B25/85 = 3740 K \pm 1%

Temperature (°C)	Rmax. (K Ω)	Rnor. (K Ω)	Rmin. (K Ω)	Temperature Tol. (°C)		Resistance Tol. (%)	
40	6.7186	6.6126	6.5075	-0.41	0.43	1.6%	-1.6%
41	6.4722	6.3677	6.2642	-0.43	0.44	1.6%	-1.6%
42	6.2364	6.1333	6.0314	-0.44	0.45	1.7%	-1.7%
43	6.0105	5.9090	5.8086	-0.45	0.47	1.7%	-1.7%
44	5.7942	5.6942	5.5954	-0.47	0.48	1.8%	-1.7%
45	5.5869	5.4884	5.3912	-0.48	0.49	1.8%	-1.8%
46	5.3882	5.2913	5.1957	-0.49	0.51	1.8%	-1.8%
47	5.1977	5.1025	5.0084	-0.50	0.52	1.9%	-1.8%
48	5.0151	4.9214	4.8289	-0.52	0.53	1.9%	-1.9%
49	4.8399	4.7478	4.6569	-0.53	0.55	1.9%	-1.9%
50	4.6718	4.5813	4.4920	-0.54	0.56	2.0%	-1.9%
51	4.5105	4.4215	4.3338	-0.56	0.57	2.0%	-2.0%
52	4.3557	4.2682	4.1820	-0.57	0.59	2.0%	-2.0%
53	4.2069	4.1210	4.0364	-0.58	0.60	2.1%	-2.1%
54	4.0641	3.9797	3.8967	-0.60	0.61	2.1%	-2.1%
55	3.9269	3.8440	3.7625	-0.61	0.63	2.2%	-2.1%
56	3.7950	3.7136	3.6336	-0.62	0.64	2.2%	-2.2%
57	3.6682	3.5883	3.5098	-0.64	0.65	2.2%	-2.2%
58	3.5463	3.4679	3.3908	-0.65	0.67	2.3%	-2.2%
59	3.4291	3.3521	3.2765	-0.66	0.68	2.3%	-2.3%
60	3.3163	3.2407	3.1666	-0.68	0.69	2.3%	-2.3%
61	3.2078	3.1336	3.0609	-0.69	0.71	2.4%	-2.3%
62	3.1033	3.0306	2.9593	-0.71	0.72	2.4%	-2.4%
63	3.0028	2.9315	2.8615	-0.72	0.73	2.4%	-2.4%
64	2.9060	2.8360	2.7675	-0.73	0.75	2.5%	-2.4%
65	2.8128	2.7442	2.6769	-0.75	0.76	2.5%	-2.4%
66	2.7230	2.6557	2.5898	-0.76	0.77	2.5%	-2.5%
67	2.6365	2.5705	2.5059	-0.77	0.79	2.6%	-2.5%
68	2.5532	2.4884	2.4251	-0.79	0.80	2.6%	-2.5%
69	2.4728	2.4094	2.3473	-0.80	0.81	2.6%	-2.6%
70	2.3954	2.3332	2.2723	-0.82	0.83	2.7%	-2.6%
71	2.3208	2.2597	2.2001	-0.83	0.84	2.7%	-2.6%
72	2.2488	2.1890	2.1305	-0.85	0.86	2.7%	-2.7%
73	2.1794	2.1207	2.0634	-0.86	0.87	2.8%	-2.7%
74	2.1124	2.0549	1.9988	-0.87	0.88	2.8%	-2.7%
75	2.0478	1.9915	1.9365	-0.89	0.90	2.8%	-2.8%
76	1.9855	1.9303	1.8764	-0.90	0.91	2.9%	-2.8%
77	1.9254	1.8712	1.8184	-0.92	0.93	2.9%	-2.8%
78	1.8673	1.8142	1.7625	-0.93	0.94	2.9%	-2.9%
79	1.8113	1.7593	1.7086	-0.95	0.96	3.0%	-2.9%

R - T Table

Part No. : TSM2A123F3741RZ

R25 =12 KOhm \pm 1%
B25/85 = 3740 K \pm 1%

Temperature (°C)	Rmax. (K Ω)	Rnor. (K Ω)	Rmin. (K Ω)	Temperature Tol. (°C)		Resistance Tol. (%)	
80	1.7572	1.7062	1.6565	-0.96	0.97	3.0%	-2.9%
81	1.7050	1.6550	1.6063	-0.98	0.99	3.0%	-2.9%
82	1.6546	1.6056	1.5579	-0.99	1.00	3.1%	-3.0%
83	1.6059	1.5579	1.5111	-1.01	1.01	3.1%	-3.0%
84	1.5589	1.5118	1.4660	-1.02	1.03	3.1%	-3.0%
85	1.5135	1.4673	1.4224	-1.04	1.04	3.1%	-3.1%
86	1.4696	1.4244	1.3804	-1.05	1.06	3.2%	-3.1%
87	1.4272	1.3828	1.3398	-1.07	1.07	3.2%	-3.1%
88	1.3862	1.3428	1.3005	-1.08	1.09	3.2%	-3.1%
89	1.3466	1.3040	1.2626	-1.10	1.11	3.3%	-3.2%
90	1.3083	1.2666	1.2260	-1.12	1.12	3.3%	-3.2%
91	1.2714	1.2304	1.1907	-1.13	1.14	3.3%	-3.2%
92	1.2356	1.1955	1.1565	-1.15	1.15	3.4%	-3.3%
93	1.2010	1.1617	1.1235	-1.16	1.17	3.4%	-3.3%
94	1.1676	1.1290	1.0916	-1.18	1.18	3.4%	-3.3%
95	1.1352	1.0974	1.0608	-1.20	1.20	3.4%	-3.3%
96	1.1040	1.0669	1.0310	-1.21	1.22	3.5%	-3.4%
97	1.0737	1.0374	1.00215	-1.23	1.23	3.5%	-3.4%
98	1.0444	1.0088	0.97428	-1.25	1.25	3.5%	-3.4%
99	1.0161	0.98116	0.94733	-1.26	1.27	3.6%	-3.4%
100	0.98869	0.95443	0.92127	-1.28	1.28	3.6%	-3.5%
101	0.96216	0.92856	0.89605	-1.30	1.30	3.6%	-3.5%
102	0.93648	0.90353	0.87166	-1.32	1.32	3.6%	-3.5%
103	0.91162	0.87931	0.84806	-1.33	1.33	3.7%	-3.6%
104	0.88754	0.85585	0.82522	-1.35	1.35	3.7%	-3.6%
105	0.86423	0.83315	0.80311	-1.37	1.37	3.7%	-3.6%
106	0.84165	0.81117	0.78171	-1.39	1.38	3.8%	-3.6%
107	0.81978	0.78988	0.76099	-1.40	1.40	3.8%	-3.7%
108	0.79859	0.76925	0.74092	-1.42	1.42	3.8%	-3.7%
109	0.77805	0.74928	0.72149	-1.44	1.44	3.8%	-3.7%
110	0.75816	0.72992	0.70267	-1.46	1.45	3.9%	-3.7%
111	0.73887	0.71117	0.68444	-1.48	1.47	3.9%	-3.8%
112	0.72017	0.69299	0.66678	-1.50	1.49	3.9%	-3.8%
113	0.70204	0.67537	0.64966	-1.51	1.51	3.9%	-3.8%
114	0.68446	0.65829	0.63306	-1.53	1.52	4.0%	-3.8%
115	0.66741	0.64173	0.61698	-1.55	1.54	4.0%	-3.9%
116	0.65087	0.62567	0.60138	-1.57	1.56	4.0%	-3.9%
117	0.63482	0.61009	0.58626	-1.59	1.58	4.1%	-3.9%
118	0.61925	0.59497	0.57159	-1.61	1.59	4.1%	-3.9%
119	0.60414	0.58031	0.55736	-1.62	1.61	4.1%	-4.0%

