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## SPECIFICATION FOR APPROVAL

CUSTOMER	立創電子
CERTIFIED MODEL/TYPE	TSM2A334
PART NO.	TSM2A334F4151RZ (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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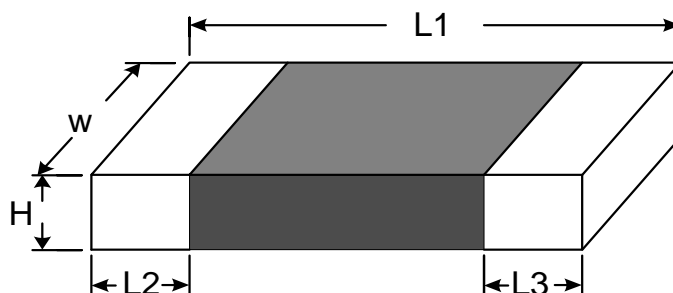
Part Number Code

Example :

**TSM**   **2**   **A**   **334**   **F**   **415**   **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 <sub>25/85</sub>
(4)	Zero Power Resistance at 25°C (R <sub>25</sub> )	334	33 x 10 <sup>4</sup> Ω = 330 KΩ
(5)	Tolerance of R <sub>25</sub>	F	± 1%
(6)	B Value	415	4150K
(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 <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)
TSM2A334F4151RZ	330	1	4150	1	240	Approx. 2.4	Approx. 5.4	-40 ~ +125

## Reliability

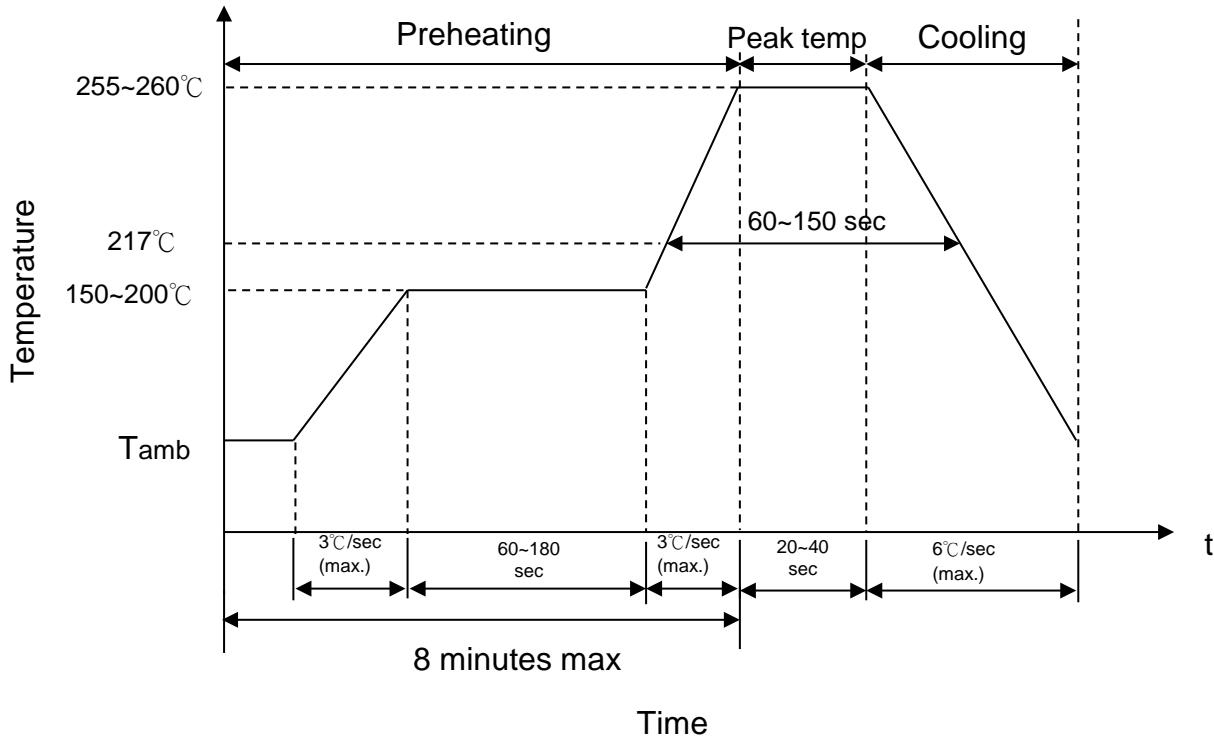
Item	Standard	Test conditions / Methods	Specifications															
Bending Strength	IEC 60068-2-21	Warp : 2mm ; Speed < 0.5mm/sec. Duration : 10 sec on PCB. 	No visible damage $ \Delta R_{25}/R_{25}  \leq 5\%$															
Solderability	IEC60068-2-58	245 ± 5°C , 3 ± 0.3 sec	At least 95% of terminal 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 1220 1166 1529"> <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 CTRDP (Client Test Data Program).

## Soldering Recommendation

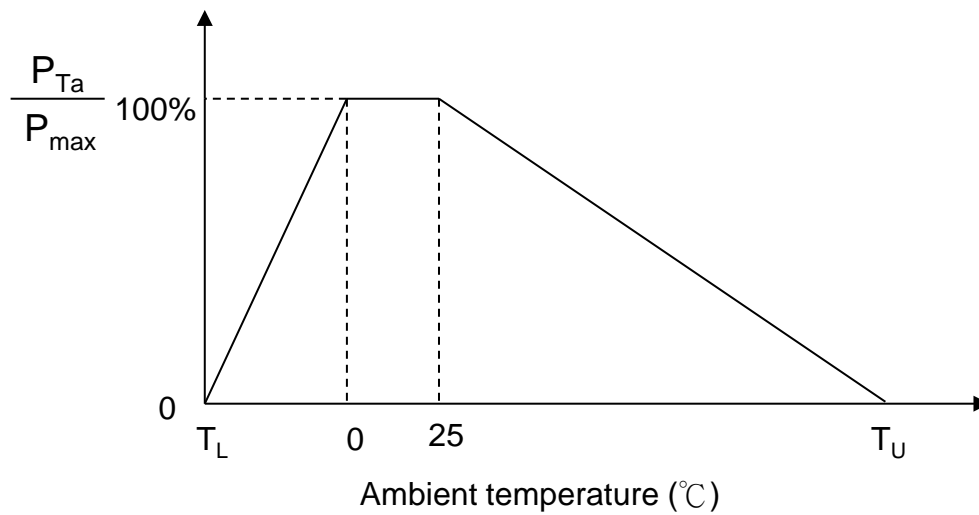
### ■ IR-Reflow Soldering Profile



### ■ 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 :

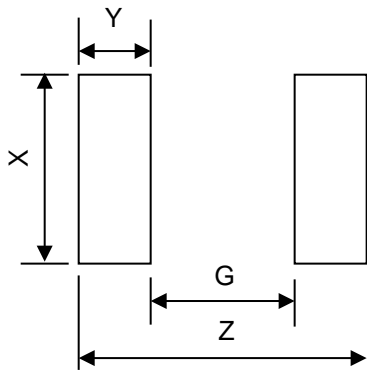
Ambient temperature( $T_a$ )=55°C

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)	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 2015/863/EU.

Warehouse Storage Conditions of Products

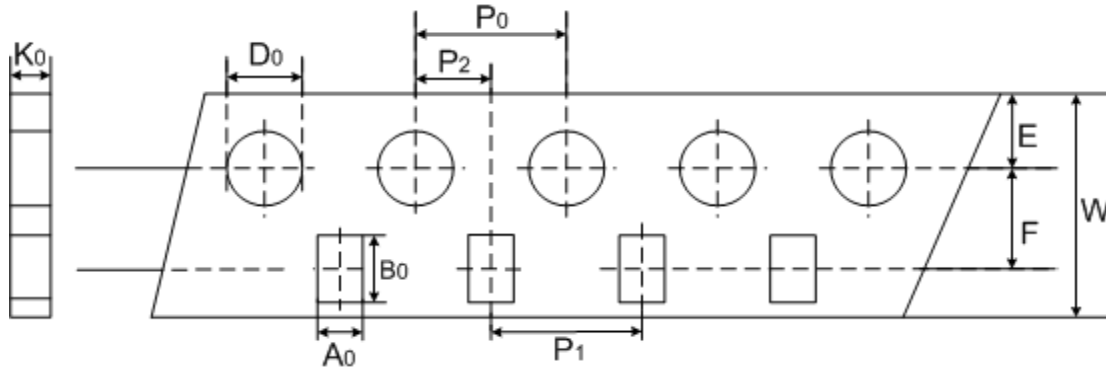
(I) Storage Conditions :

- 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

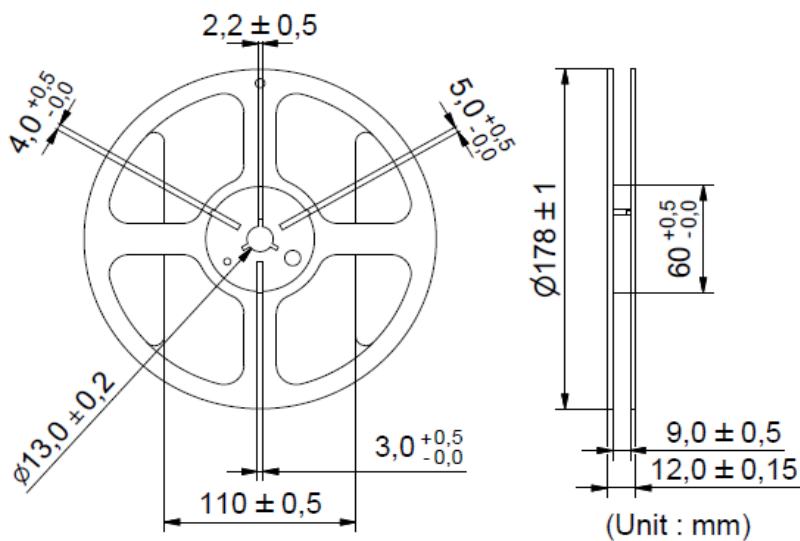
■ Taping Specification ( 0805 Series)



(Unit : mm)

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

■ Quantity ( 3500 pcs / reel )



(Unit : mm)

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Safety Approvals (Certified Model/Type : TSM2A334)



\* UL 1434 / cUL recognized (File # E138827)



\* TÜV 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. : TSM2A334F4151RZ

R25 = 330 KΩ ± 1%

B25/85 = 4150 K ± 1%

Temperature (°C)	Rmax. (KΩ)	Rnor. (KΩ)	Rmin. (KΩ)	Temperature Tol.		Resistance Tol.	
				(°C)		(%)	
-40	12,350	11,798	11,270	-0.65	0.68	4.7%	-4.5%
-39	11,526	11,019	10,532	-0.65	0.68	4.6%	-4.4%
-38	10,767	10,300	9,852.0	-0.65	0.68	4.5%	-4.3%
-37	10,067	9,636.7	9,223.8	-0.65	0.67	4.5%	-4.3%
-36	9,420.7	9,023.9	8,642.9	-0.65	0.67	4.4%	-4.2%
-35	8,822.7	8,456.6	8,104.8	-0.65	0.67	4.3%	-4.2%
-34	8,268.6	7,930.6	7,605.6	-0.64	0.67	4.3%	-4.1%
-33	7,754.2	7,441.9	7,141.5	-0.64	0.66	4.2%	-4.0%
-32	7,275.9	6,987.3	6,709.4	-0.63	0.66	4.1%	-4.0%
-31	6,830.4	6,563.6	6,306.5	-0.63	0.65	4.1%	-3.9%
-30	6,415.0	6,168.2	5,930.3	-0.62	0.64	4.0%	-3.9%
-29	6,027.0	5,798.7	5,578.5	-0.62	0.64	3.9%	-3.8%
-28	5,664.4	5,453.2	5,249.4	-0.61	0.63	3.9%	-3.7%
-27	5,325.3	5,129.8	4,941.1	-0.60	0.62	3.8%	-3.7%
-26	5,007.8	4,827.0	4,652.2	-0.60	0.62	3.7%	-3.6%
-25	4,710.6	4,543.2	4,381.4	-0.59	0.61	3.7%	-3.6%
-24	4,432.1	4,277.3	4,127.4	-0.58	0.60	3.6%	-3.5%
-23	4,171.3	4,027.9	3,889.1	-0.57	0.59	3.6%	-3.4%
-22	3,926.8	3,794.1	3,665.6	-0.57	0.59	3.5%	-3.4%
-21	3,697.7	3,574.9	3,455.8	-0.56	0.58	3.4%	-3.3%
-20	3,483.0	3,369.3	3,259.0	-0.55	0.57	3.4%	-3.3%
-19	3,281.8	3,176.5	3,074.4	-0.55	0.57	3.3%	-3.2%
-18	3,093.2	2,995.7	2,901.1	-0.54	0.56	3.3%	-3.2%
-17	2,916.4	2,826.1	2,738.4	-0.53	0.55	3.2%	-3.1%
-16	2,750.6	2,667.0	2,585.8	-0.53	0.54	3.1%	-3.0%
-15	2,595.2	2,517.8	2,442.5	-0.52	0.54	3.1%	-3.0%
-14	2,449.4	2,377.8	2,308.0	-0.51	0.53	3.0%	-2.9%
-13	2,312.8	2,246.4	2,181.7	-0.51	0.52	3.0%	-2.9%
-12	2,184.5	2,123.0	2,063.0	-0.50	0.52	2.9%	-2.8%
-11	2,064.2	2,007.2	1,951.6	-0.49	0.51	2.8%	-2.8%
-10	1,951.3	1,898.4	1,846.8	-0.49	0.50	2.8%	-2.7%
-9	1,845.2	1,796.2	1,748.4	-0.48	0.50	2.7%	-2.7%
-8	1,745.6	1,700.2	1,655.8	-0.47	0.49	2.7%	-2.6%
-7	1,651.9	1,609.9	1,568.7	-0.47	0.48	2.6%	-2.6%
-6	1,563.9	1,524.9	1,486.7	-0.46	0.48	2.6%	-2.5%
-5	1,481.2	1,445.0	1,409.6	-0.45	0.47	2.5%	-2.5%
-4	1,403.3	1,369.7	1,336.9	-0.45	0.46	2.4%	-2.4%
-3	1,330.0	1,298.9	1,268.4	-0.44	0.46	2.4%	-2.3%
-2	1,260.9	1,232.1	1,203.8	-0.43	0.45	2.3%	-2.3%
-1	1,195.9	1,169.1	1,142.9	-0.42	0.44	2.3%	-2.2%

R - T Table

Part No. : TSM2A334F4151RZ

R25 =330 KOhm  $\pm$  1%B25/85 = 4150 K  $\pm$  1%

Temperature (°C)	Rmax. (K $\Omega$ )	Rnor. (K $\Omega$ )	Rmin. (K $\Omega$ )	Temperature Tol. (°C)		Resistance Tol. (%)	
0	1,134.5	1,109.8	1,085.4	-0.42	0.43	2.2%	-2.2%
1	1,076.7	1,053.7	1,031.2	-0.41	0.43	2.2%	-2.1%
2	1,022.1	1,000.8	979.91	-0.40	0.42	2.1%	-2.1%
3	970.64	950.91	931.49	-0.40	0.41	2.1%	-2.0%
4	922.01	903.73	885.73	-0.39	0.40	2.0%	-2.0%
5	876.08	859.14	842.45	-0.38	0.40	2.0%	-1.9%
6	832.67	816.99	801.52	-0.37	0.39	1.9%	-1.9%
7	791.64	777.12	762.78	-0.36	0.38	1.9%	-1.8%
8	752.83	739.39	726.12	-0.36	0.37	1.8%	-1.8%
9	716.13	703.69	691.39	-0.35	0.36	1.8%	-1.7%
10	681.39	669.88	658.51	-0.34	0.36	1.7%	-1.7%
11	648.51	637.87	627.34	-0.33	0.35	1.7%	-1.7%
12	617.38	607.55	597.81	-0.32	0.34	1.6%	-1.6%
13	587.89	578.81	569.81	-0.32	0.33	1.6%	-1.6%
14	559.96	551.57	543.26	-0.31	0.32	1.5%	-1.5%
15	533.49	525.75	518.07	-0.30	0.31	1.5%	-1.5%
16	508.39	501.26	494.18	-0.29	0.30	1.4%	-1.4%
17	484.61	478.03	471.50	-0.28	0.30	1.4%	-1.4%
18	462.05	456.00	449.98	-0.27	0.29	1.3%	-1.3%
19	440.65	435.08	429.54	-0.27	0.28	1.3%	-1.3%
20	420.35	415.23	410.14	-0.26	0.27	1.2%	-1.2%
21	401.08	396.39	391.70	-0.25	0.26	1.2%	-1.2%
22	382.80	378.49	374.19	-0.24	0.25	1.1%	-1.1%
23	365.44	361.49	357.55	-0.23	0.24	1.1%	-1.1%
24	348.96	345.34	341.74	-0.22	0.24	1.0%	-1.0%
25	333.30	330.00	326.70	-0.22	0.23	1.0%	-1.0%
26	318.71	315.42	312.12	-0.23	0.24	1.0%	-1.0%
27	304.84	301.55	298.27	-0.24	0.25	1.1%	-1.1%
28	291.65	288.37	285.10	-0.25	0.26	1.1%	-1.1%
29	279.09	275.83	272.59	-0.26	0.27	1.2%	-1.2%
30	267.14	263.91	260.69	-0.27	0.28	1.2%	-1.2%
31	255.77	252.56	249.37	-0.28	0.30	1.3%	-1.3%
32	244.94	241.76	238.60	-0.29	0.31	1.3%	-1.3%
33	234.63	231.48	228.36	-0.31	0.32	1.4%	-1.4%
34	224.80	221.69	218.60	-0.32	0.33	1.4%	-1.4%
35	215.44	212.37	209.32	-0.33	0.34	1.4%	-1.4%
36	206.52	203.49	200.48	-0.34	0.36	1.5%	-1.5%
37	198.01	195.02	192.06	-0.35	0.37	1.5%	-1.5%
38	189.90	186.96	184.04	-0.37	0.38	1.6%	-1.6%
39	182.17	179.27	176.40	-0.38	0.39	1.6%	-1.6%

R - T Table

Part No. : TSM2A334F4151RZ

R25 =330 KOhm ± 1%

B25/85 = 4150 K ± 1%

Temperature (°C)	Rmax. (KΩ)	Rnor. (KΩ)	Rmin. (KΩ)	Temperature Tol. (°C)		Resistance Tol. (%)	
40	174.79	171.93	169.11	-0.39	0.40	1.7%	-1.6%
41	167.75	164.94	162.16	-0.40	0.42	1.7%	-1.7%
42	161.03	158.27	155.54	-0.41	0.43	1.7%	-1.7%
43	154.61	151.90	149.21	-0.43	0.44	1.8%	-1.8%
44	148.48	145.81	143.18	-0.44	0.45	1.8%	-1.8%
45	142.63	140.01	137.42	-0.45	0.47	1.9%	-1.8%
46	137.03	134.46	131.93	-0.46	0.48	1.9%	-1.9%
47	131.69	129.16	126.68	-0.48	0.49	2.0%	-1.9%
48	126.57	124.10	121.66	-0.49	0.50	2.0%	-2.0%
49	121.69	119.26	116.87	-0.50	0.52	2.0%	-2.0%
50	117.01	114.63	112.29	-0.51	0.53	2.1%	-2.0%
51	112.54	110.21	107.92	-0.53	0.54	2.1%	-2.1%
52	108.26	105.97	103.73	-0.54	0.55	2.2%	-2.1%
53	104.16	101.92	99.725	-0.55	0.57	2.2%	-2.2%
54	100.24	98.046	95.895	-0.56	0.58	2.2%	-2.2%
55	96.478	94.334	92.229	-0.58	0.59	2.3%	-2.2%
56	92.879	90.780	88.720	-0.59	0.61	2.3%	-2.3%
57	89.430	87.376	85.360	-0.60	0.62	2.4%	-2.3%
58	86.125	84.115	82.143	-0.62	0.63	2.4%	-2.3%
59	82.957	80.990	79.062	-0.63	0.64	2.4%	-2.4%
60	79.920	77.995	76.109	-0.64	0.66	2.5%	-2.4%
61	77.007	75.124	73.280	-0.66	0.67	2.5%	-2.5%
62	74.212	72.371	70.569	-0.67	0.68	2.5%	-2.5%
63	71.532	69.731	67.969	-0.68	0.70	2.6%	-2.5%
64	68.959	67.198	65.476	-0.70	0.71	2.6%	-2.6%
65	66.490	64.769	63.085	-0.71	0.72	2.7%	-2.6%
66	64.120	62.437	60.792	-0.72	0.74	2.7%	-2.6%
67	61.844	60.199	58.592	-0.74	0.75	2.7%	-2.7%
68	59.659	58.051	56.480	-0.75	0.76	2.8%	-2.7%
69	57.560	55.988	54.453	-0.76	0.77	2.8%	-2.7%
70	55.543	54.007	52.508	-0.78	0.79	2.8%	-2.8%
71	53.606	52.104	50.640	-0.79	0.80	2.9%	-2.8%
72	51.744	50.277	48.846	-0.80	0.81	2.9%	-2.8%
73	49.954	48.521	47.123	-0.82	0.83	3.0%	-2.9%
74	48.234	46.833	45.468	-0.83	0.84	3.0%	-2.9%
75	46.580	45.211	43.878	-0.84	0.86	3.0%	-2.9%
76	44.990	43.652	42.350	-0.86	0.87	3.1%	-3.0%
77	43.460	42.153	40.882	-0.87	0.88	3.1%	-3.0%
78	41.989	40.712	39.470	-0.89	0.90	3.1%	-3.1%
79	40.573	39.326	38.113	-0.90	0.91	3.2%	-3.1%

R - T Table

Part No. : TSM2A334F4151RZ

R25 =330 KOhm ± 1%

B25/85 = 4150 K ± 1%

Temperature (°C)	Rmax. (KΩ)	Rnor. (KΩ)	Rmin. (KΩ)	Temperature Tol.		Resistance Tol.	
				(°C)		(%)	
80	39.212	37.993	36.809	-0.91	0.92	3.2%	-3.1%
81	37.901	36.711	35.554	-0.93	0.94	3.2%	-3.2%
82	36.640	35.477	34.348	-0.94	0.95	3.3%	-3.2%
83	35.426	34.290	33.187	-0.96	0.97	3.3%	-3.2%
84	34.258	33.148	32.071	-0.97	0.98	3.3%	-3.2%
85	33.133	32.048	30.997	-0.99	0.99	3.4%	-3.3%
86	32.049	30.990	29.963	-1.00	1.01	3.4%	-3.3%
87	31.006	29.971	28.968	-1.02	1.02	3.5%	-3.3%
88	30.001	28.990	28.011	-1.03	1.04	3.5%	-3.4%
89	29.033	28.046	27.089	-1.05	1.05	3.5%	-3.4%
90	28.100	27.136	26.202	-1.06	1.07	3.6%	-3.4%
91	27.202	26.259	25.347	-1.08	1.08	3.6%	-3.5%
92	26.336	25.415	24.524	-1.09	1.10	3.6%	-3.5%
93	25.501	24.602	23.731	-1.11	1.11	3.7%	-3.5%
94	24.697	23.818	22.968	-1.12	1.13	3.7%	-3.6%
95	23.921	23.062	22.232	-1.14	1.14	3.7%	-3.6%
96	23.173	22.334	21.523	-1.15	1.16	3.8%	-3.6%
97	22.452	21.632	20.840	-1.17	1.17	3.8%	-3.7%
98	21.757	20.956	20.182	-1.18	1.19	3.8%	-3.7%
99	21.086	20.303	19.547	-1.20	1.20	3.9%	-3.7%
100	20.439	19.674	18.936	-1.22	1.22	3.9%	-3.8%
101	19.815	19.067	18.346	-1.23	1.23	3.9%	-3.8%
102	19.212	18.481	17.777	-1.25	1.25	4.0%	-3.8%
103	18.631	17.917	17.228	-1.26	1.26	4.0%	-3.8%
104	18.069	17.371	16.699	-1.28	1.28	4.0%	-3.9%
105	17.528	16.845	16.188	-1.30	1.29	4.0%	-3.9%
106	17.005	16.338	15.695	-1.31	1.31	4.1%	-3.9%
107	16.499	15.848	15.220	-1.33	1.33	4.1%	-4.0%
108	16.012	15.374	14.761	-1.35	1.34	4.1%	-4.0%
109	15.540	14.917	14.318	-1.36	1.36	4.2%	-4.0%
110	15.085	14.476	13.890	-1.38	1.37	4.2%	-4.0%
111	14.645	14.050	13.477	-1.40	1.39	4.2%	-4.1%
112	14.220	13.638	13.078	-1.41	1.41	4.3%	-4.1%
113	13.809	13.240	12.693	-1.43	1.42	4.3%	-4.1%
114	13.412	12.855	12.320	-1.45	1.44	4.3%	-4.2%
115	13.028	12.484	11.961	-1.47	1.46	4.4%	-4.2%
116	12.657	12.124	11.613	-1.48	1.47	4.4%	-4.2%
117	12.298	11.777	11.277	-1.50	1.49	4.4%	-4.2%
118	11.950	11.441	10.952	-1.52	1.50	4.5%	-4.3%
119	11.614	11.116	10.638	-1.53	1.52	4.5%	-4.3%

