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SPECIFICATION FOR APPROVAL

CUSTOMER	立創電子
CERTIFIED MODEL/TYPE	TSM1A333
PART NO.	TSM1A333H39H3RZ (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>





NTC Thermistor TSM Type
Part No. :TSM1A333H39H3RZ

REVISED RECORD SHEET

REV. NO	REV. DATE	REVISED CONTENT



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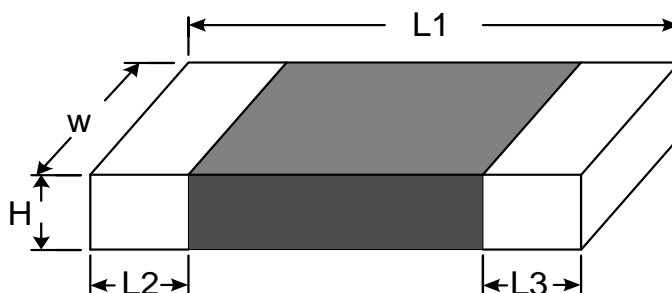
Part Number Code

Example :

TSM **1** **A** **333** **H** **39H** **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)	1	0603
(3)	Definition of B Value	A	$B_{25/85}$
(4)	Zero Power Resistance at 25°C (R_{25})	333	$33 \times 10^3 \Omega = 33 \text{ K}\Omega$
(5)	Tolerance of R_{25}	H	$\pm 3\%$
(6)	B Value	39H	3975K
(7)	Tolerance of B Value	3	$\pm 3\%$
(8)	Packaging	R	Reel
(9)	Optional Suffix	Z	RoHS+HF compliance

Structure and Dimensions



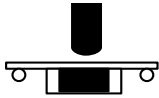
(unit : mm)

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)
TSM1A333H39H3RZ	33	3	3975	3	210	Approx. 2.1	Approx. 3.1	-40 ~ +125

Reliability

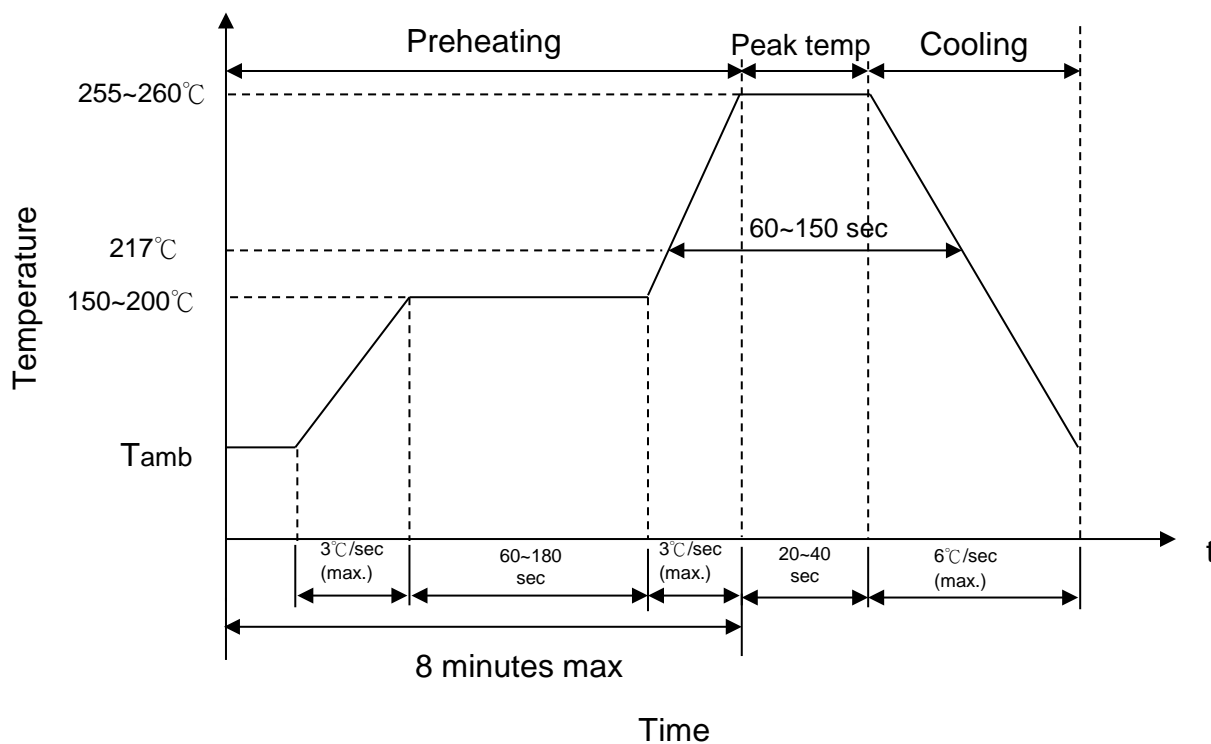
Item	Standard	Test conditions / Methods	Specifications															
Bending Strength	IEC 60068-2-21	Warp : 2mm ; Speed < 0.5mm/sec. Duration : 10 sec on PCB. 	No visible damage $ \Delta R_{25}/R_{25} \leq 5\%$															
Solderability	IEC60068-2-58	245 ± 5°C , 3 ± 0.3 sec	At least 95% of terminal 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="555 1249 1201 1563"> <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 CTDP (Client Test Data Program).

Soldering Recommendation

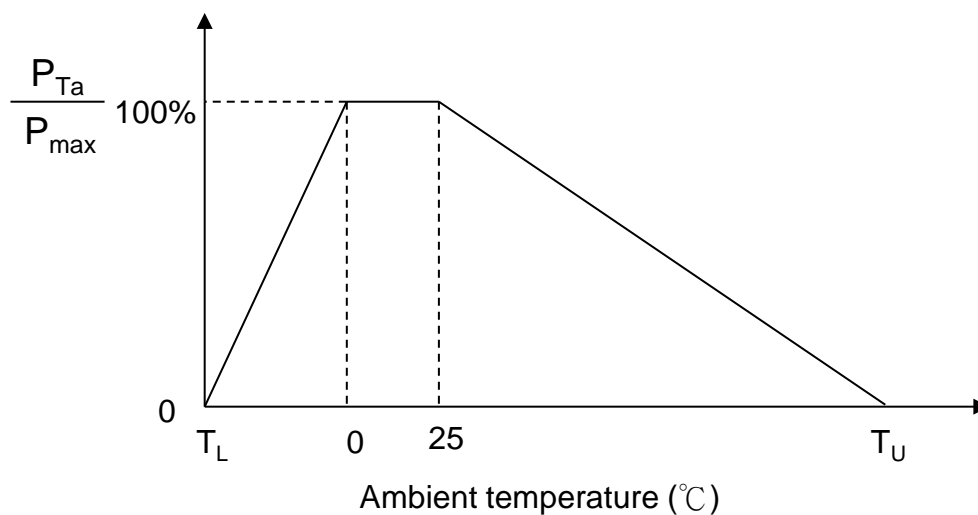
■ IR-Reflow Soldering Profile



■ Recommended Reworking Conditions with Soldering Iron

Item	Conditions
Temperature of Soldering Iron-tip	360°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)

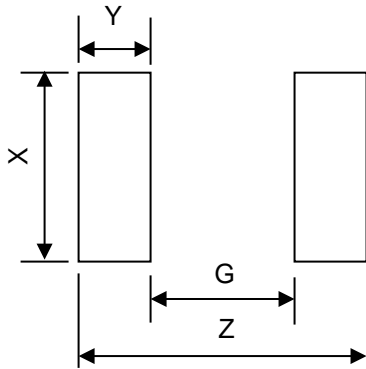
For example :

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

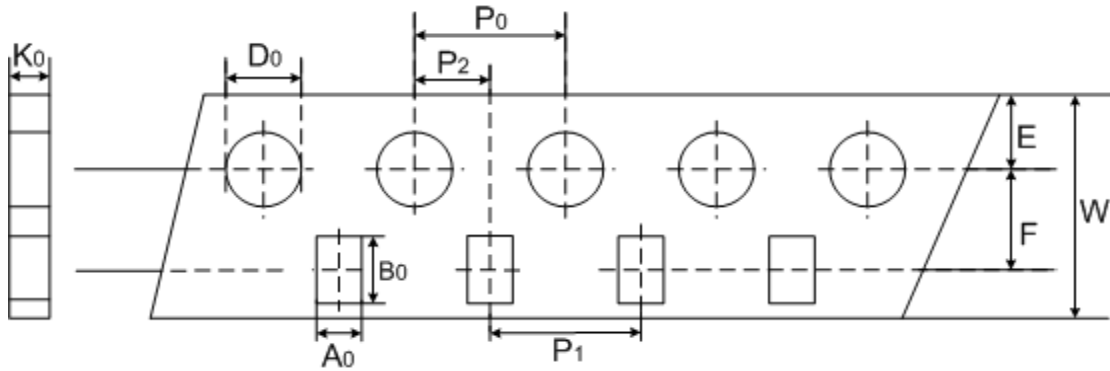
(I) Storage Conditions :

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

(II) Period of Storage : 1 year

Packaging

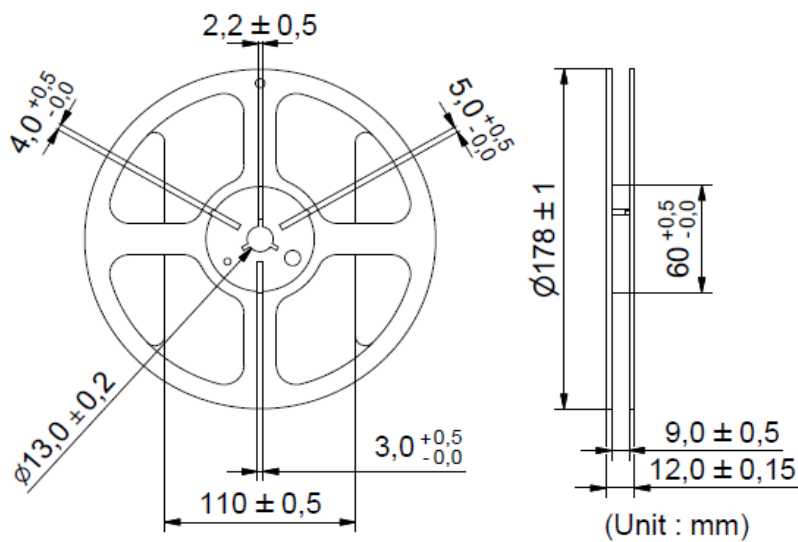
■ Taping Specification (0603 Series)



(Unit : mm)

Index	A 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 : TSM1A333)

* 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. : TSM1A333H39H3RZ

R25 =33 KOhm ± 3%
B25/85 = 3975 K ± 3%

Temperature (°C)	Rmax. (KΩ)	Rnor. (KΩ)	Rmin. (KΩ)	Temperature Tol.		Resistance Tol.	
				(°C)		(%)	
-40	1,248.3	1,091.2	952.98	-2.33	2.09	14.4%	-12.7%
-39	1,170.6	1,025.2	897.03	-2.20	2.02	14.2%	-12.5%
-38	1,096.2	961.84	843.21	-2.12	1.97	14.0%	-12.3%
-37	1,025.7	901.74	792.06	-2.06	1.94	13.7%	-12.2%
-36	959.53	845.21	743.85	-2.02	1.92	13.5%	-12.0%
-35	897.74	792.32	698.65	-1.99	1.90	13.3%	-11.8%
-34	840.22	742.99	656.42	-1.97	1.89	13.1%	-11.7%
-33	786.80	697.08	617.04	-1.95	1.87	12.9%	-11.5%
-32	737.20	654.38	580.34	-1.94	1.86	12.7%	-11.3%
-31	691.16	614.67	546.14	-1.93	1.85	12.4%	-11.1%
-30	648.41	577.72	514.27	-1.91	1.84	12.2%	-11.0%
-29	608.67	543.31	484.54	-1.90	1.83	12.0%	-10.8%
-28	571.71	511.25	456.77	-1.89	1.82	11.8%	-10.7%
-27	537.28	481.33	430.82	-1.87	1.81	11.6%	-10.5%
-26	505.17	453.38	406.54	-1.85	1.79	11.4%	-10.3%
-25	475.21	427.25	383.79	-1.84	1.78	11.2%	-10.2%
-24	447.22	402.79	362.46	-1.82	1.76	11.0%	-10.0%
-23	421.04	379.88	342.44	-1.80	1.74	10.8%	-9.9%
-22	396.54	358.40	323.64	-1.78	1.72	10.6%	-9.7%
-21	373.59	338.25	305.97	-1.75	1.71	10.4%	-9.5%
-20	352.08	319.33	289.36	-1.73	1.69	10.3%	-9.4%
-19	331.92	301.56	273.72	-1.71	1.67	10.1%	-9.2%
-18	313.00	284.86	259.01	-1.69	1.65	9.9%	-9.1%
-17	295.25	269.16	245.15	-1.66	1.63	9.7%	-8.9%
-16	278.59	254.40	232.10	-1.64	1.61	9.5%	-8.8%
-15	262.95	240.52	219.81	-1.62	1.59	9.3%	-8.6%
-14	248.25	227.46	208.22	-1.59	1.57	9.1%	-8.5%
-13	234.45	215.17	197.30	-1.57	1.55	9.0%	-8.3%
-12	221.49	203.61	187.01	-1.55	1.53	8.8%	-8.2%
-11	209.30	192.73	177.30	-1.52	1.51	8.6%	-8.0%
-10	197.85	182.48	168.15	-1.50	1.49	8.4%	-7.9%
-9	187.09	172.83	159.53	-1.48	1.47	8.2%	-7.7%
-8	176.97	163.75	151.39	-1.45	1.45	8.1%	-7.6%
-7	167.45	155.19	143.71	-1.43	1.43	7.9%	-7.4%
-6	158.50	147.13	136.46	-1.41	1.41	7.7%	-7.3%
-5	150.08	139.54	129.62	-1.39	1.39	7.6%	-7.1%
-4	142.15	132.38	123.17	-1.37	1.37	7.4%	-7.0%
-3	134.70	125.63	117.07	-1.34	1.35	7.2%	-6.8%
-2	127.67	119.27	111.32	-1.32	1.32	7.0%	-6.7%
-1	121.06	113.27	105.88	-1.30	1.30	6.9%	-6.5%

R - T Table

Part No. : TSM1A333H39H3RZ

R25 =33 KOhm ± 3%
B25/85 = 3975 K ± 3%

Temperature (°C)	Rmax. (KΩ)	Rnor. (KΩ)	Rmin. (KΩ)	Temperature Tol. (°C)		Resistance Tol. (%)	
0	114.83	107.60	100.74	-1.28	1.28	6.7%	-6.4%
1	108.96	102.26	95.880	-1.25	1.26	6.6%	-6.2%
2	103.42	97.209	91.286	-1.23	1.24	6.4%	-6.1%
3	98.204	92.442	86.940	-1.21	1.22	6.2%	-6.0%
4	93.279	87.938	82.829	-1.19	1.20	6.1%	-5.8%
5	88.632	83.682	78.937	-1.16	1.18	5.9%	-5.7%
6	84.245	79.657	75.251	-1.14	1.16	5.8%	-5.5%
7	80.101	75.850	71.761	-1.12	1.14	5.6%	-5.4%
8	76.186	72.248	68.453	-1.09	1.11	5.5%	-5.3%
9	72.485	68.839	65.317	-1.07	1.09	5.3%	-5.1%
10	68.986	65.610	62.343	-1.05	1.07	5.1%	-5.0%
11	65.677	62.552	59.523	-1.02	1.05	5.0%	-4.8%
12	62.545	59.654	56.846	-1.00	1.02	4.8%	-4.7%
13	59.580	56.907	54.305	-0.97	1.00	4.7%	-4.6%
14	56.772	54.302	51.891	-0.95	0.98	4.6%	-4.4%
15	54.113	51.830	49.599	-0.92	0.95	4.4%	-4.3%
16	51.592	49.484	47.420	-0.90	0.93	4.3%	-4.2%
17	49.203	47.258	45.349	-0.87	0.90	4.1%	-4.0%
18	46.937	45.143	43.379	-0.85	0.88	4.0%	-3.9%
19	44.787	43.135	41.506	-0.82	0.85	3.8%	-3.8%
20	42.747	41.226	39.723	-0.80	0.83	3.7%	-3.6%
21	40.811	39.412	38.026	-0.77	0.80	3.6%	-3.5%
22	38.972	37.687	36.411	-0.75	0.78	3.4%	-3.4%
23	37.226	36.046	34.872	-0.72	0.75	3.3%	-3.3%
24	35.567	34.485	33.407	-0.69	0.73	3.1%	-3.1%
25	33.990	33.000	32.010	-0.67	0.70	3.0%	-3.0%
26	32.576	31.586	30.598	-0.70	0.73	3.1%	-3.1%
27	31.229	30.240	29.256	-0.73	0.77	3.3%	-3.3%
28	29.944	28.958	27.979	-0.77	0.80	3.4%	-3.4%
29	28.718	27.737	26.765	-0.80	0.84	3.5%	-3.5%
30	27.549	26.573	25.609	-0.84	0.87	3.7%	-3.6%
31	26.433	25.464	24.509	-0.87	0.90	3.8%	-3.8%
32	25.368	24.407	23.462	-0.91	0.94	3.9%	-3.9%
33	24.351	23.399	22.464	-0.94	0.97	4.1%	-4.0%
34	23.380	22.438	21.514	-0.98	1.01	4.2%	-4.1%
35	22.453	21.521	20.610	-1.02	1.04	4.3%	-4.2%
36	21.567	20.647	19.747	-1.05	1.08	4.5%	-4.4%
37	20.721	19.812	18.926	-1.09	1.11	4.6%	-4.5%
38	19.913	19.016	18.143	-1.13	1.15	4.7%	-4.6%
39	19.140	18.255	17.396	-1.16	1.18	4.8%	-4.7%



R - T Table

Part No. : TSM1A333H39H3RZ

R25 =33 KOhm ± 3%

B25/85 = 3975 K ± 3%

Temperature (°C)	Rmax. (KΩ)	Rnor. (KΩ)	Rmin. (KΩ)	Temperature Tol. (°C)		Resistance Tol. (%)	
40	18.401	17.529	16.684	-1.20	1.22	5.0%	-4.8%
41	17.695	16.836	16.004	-1.24	1.26	5.1%	-4.9%
42	17.019	16.174	15.356	-1.28	1.29	5.2%	-5.1%
43	16.373	15.541	14.738	-1.32	1.33	5.4%	-5.2%
44	15.755	14.937	14.148	-1.35	1.37	5.5%	-5.3%
45	15.164	14.359	13.585	-1.39	1.40	5.6%	-5.4%
46	14.598	13.807	13.047	-1.43	1.44	5.7%	-5.5%
47	14.056	13.279	12.533	-1.47	1.48	5.9%	-5.6%
48	13.537	12.774	12.043	-1.51	1.51	6.0%	-5.7%
49	13.040	12.291	11.574	-1.55	1.55	6.1%	-5.8%
50	12.565	11.829	11.126	-1.59	1.59	6.2%	-5.9%
51	12.109	11.387	10.698	-1.63	1.63	6.3%	-6.0%
52	11.672	10.964	10.289	-1.67	1.67	6.5%	-6.2%
53	11.254	10.559	9.8981	-1.72	1.71	6.6%	-6.3%
54	10.853	10.171	9.5240	-1.76	1.74	6.7%	-6.4%
55	10.469	9.8002	9.1662	-1.80	1.78	6.8%	-6.5%
56	10.100	9.4447	8.8239	-1.84	1.82	6.9%	-6.6%
57	9.7465	9.1040	8.4962	-1.89	1.86	7.1%	-6.7%
58	9.4073	8.7776	8.1826	-1.93	1.90	7.2%	-6.8%
59	9.0819	8.4647	7.8824	-1.97	1.94	7.3%	-6.9%
60	8.7696	8.1648	7.5949	-2.02	1.98	7.4%	-7.0%
61	8.4698	7.8772	7.3195	-2.06	2.02	7.5%	-7.1%
62	8.1820	7.6014	7.0557	-2.11	2.06	7.6%	-7.2%
63	7.9056	7.3368	6.8028	-2.15	2.10	7.8%	-7.3%
64	7.6401	7.0829	6.5605	-2.19	2.14	7.9%	-7.4%
65	7.3850	6.8393	6.3282	-2.24	2.19	8.0%	-7.5%
66	7.1399	6.6054	6.1054	-2.29	2.23	8.1%	-7.6%
67	6.9043	6.3808	5.8917	-2.33	2.27	8.2%	-7.7%
68	6.6778	6.1651	5.6866	-2.38	2.31	8.3%	-7.8%
69	6.4600	5.9579	5.4898	-2.42	2.35	8.4%	-7.9%
70	6.2505	5.7588	5.3010	-2.47	2.39	8.5%	-7.9%
71	6.0489	5.5674	5.1196	-2.52	2.43	8.6%	-8.0%
72	5.8549	5.3835	4.9455	-2.56	2.48	8.8%	-8.1%
73	5.6682	5.2066	4.7782	-2.61	2.52	8.9%	-8.2%
74	5.4885	5.0365	4.6175	-2.66	2.56	9.0%	-8.3%
75	5.3154	4.8728	4.4630	-2.70	2.60	9.1%	-8.4%
76	5.1487	4.7153	4.3145	-2.75	2.64	9.2%	-8.5%
77	4.9881	4.5638	4.1718	-2.80	2.69	9.3%	-8.6%
78	4.8334	4.4179	4.0345	-2.85	2.73	9.4%	-8.7%
79	4.6842	4.2774	3.9024	-2.90	2.77	9.5%	-8.8%



R - T Table

Part No. : TSM1A333H39H3RZ

R25 =33 KOhm ± 3%

B25/85 = 3975 K ± 3%

Temperature (°C)	Rmax. (KΩ)	Rnor. (KΩ)	Rmin. (KΩ)	Temperature Tol. (°C)		Resistance Tol. (%)	
80	4.5404	4.1421	3.7753	-2.94	2.81	9.6%	-8.9%
81	4.4018	4.0118	3.6530	-2.99	2.86	9.7%	-8.9%
82	4.2680	3.8862	3.5353	-3.04	2.90	9.8%	-9.0%
83	4.1391	3.7651	3.4219	-3.09	2.94	9.9%	-9.1%
84	4.0146	3.6485	3.3128	-3.14	2.98	10.0%	-9.2%
85	3.8945	3.5360	3.2076	-3.19	3.03	10.1%	-9.3%
86	3.7785	3.4275	3.1063	-3.24	3.07	10.2%	-9.4%
87	3.6666	3.3229	3.0087	-3.28	3.11	10.3%	-9.5%
88	3.5585	3.2219	2.9146	-3.33	3.16	10.4%	-9.5%
89	3.4541	3.1245	2.8239	-3.38	3.20	10.5%	-9.6%
90	3.3533	3.0305	2.7364	-3.43	3.24	10.6%	-9.7%
91	3.2558	2.9398	2.6521	-3.48	3.28	10.7%	-9.8%
92	3.1617	2.8522	2.5707	-3.53	3.33	10.9%	-9.9%
93	3.0707	2.7676	2.4922	-3.58	3.37	11.0%	-10.0%
94	2.9827	2.6859	2.4164	-3.63	3.41	11.1%	-10.0%
95	2.8976	2.6069	2.3433	-3.68	3.46	11.1%	-10.1%
96	2.8154	2.5307	2.2728	-3.73	3.50	11.2%	-10.2%
97	2.7358	2.4570	2.2046	-3.78	3.54	11.3%	-10.3%
98	2.6589	2.3858	2.1389	-3.83	3.59	11.4%	-10.4%
99	2.5844	2.3170	2.0753	-3.89	3.63	11.5%	-10.4%
100	2.5124	2.2504	2.0140	-3.94	3.68	11.6%	-10.5%
101	2.4427	2.1861	1.9547	-3.99	3.72	11.7%	-10.6%
102	2.3753	2.1239	1.8974	-4.04	3.77	11.8%	-10.7%
103	2.3100	2.0638	1.8421	-4.09	3.81	11.9%	-10.7%
104	2.2468	2.0056	1.7887	-4.15	3.86	12.0%	-10.8%
105	2.1857	1.9493	1.7370	-4.20	3.90	12.1%	-10.9%
106	2.1264	1.8949	1.6871	-4.25	3.95	12.2%	-11.0%
107	2.0691	1.8423	1.6388	-4.31	3.99	12.3%	-11.0%
108	2.0136	1.7913	1.5921	-4.36	4.04	12.4%	-11.1%
109	1.9598	1.7420	1.5470	-4.42	4.09	12.5%	-11.2%
110	1.9077	1.6943	1.5034	-4.47	4.14	12.6%	-11.3%
111	1.8573	1.6481	1.4612	-4.53	4.18	12.7%	-11.3%
112	1.8084	1.6035	1.4205	-4.59	4.23	12.8%	-11.4%
113	1.7611	1.5602	1.3810	-4.65	4.28	12.9%	-11.5%
114	1.7153	1.5184	1.3429	-4.70	4.33	13.0%	-11.6%
115	1.6709	1.4779	1.3060	-4.76	4.38	13.1%	-11.6%
116	1.6278	1.4387	1.2703	-4.82	4.44	13.1%	-11.7%
117	1.5862	1.4007	1.2358	-4.89	4.49	13.2%	-11.8%
118	1.5458	1.3640	1.2024	-4.95	4.54	13.3%	-11.8%
119	1.5067	1.3284	1.1702	-5.01	4.60	13.4%	-11.9%

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