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SPECIFICATION FOR APPROVAL

CUSTOMER	
CERTIFIED MODEL/TYPE	TTC03-474
PART NO.	TTC3C474F4571W01 (RoHS+HF)
APPLICATION	
CUSTOMER P/N	
ISSUE DATE	Mar.05,2018
REV. NO.	
REV. DATE	

FOR CUSTOMER APPROVAL	CHECKED BY
	Haili Gong
	APPROVED BY
	Huaifang Zhang

REVISED RECORD SHEET

REV. NO	REV. DATE	REVISED CONTENT

INDEX

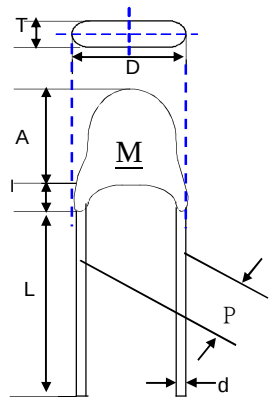
Part Number Code

Example :

TTC 3 C 474 F 457 1 W01
(1) (2) (3) (4) (5) (6) (7) (8)

No.	Item	Digit	Specification
(1)	Product Type	TTC	Thinking NTC thermistor TTC type
(2)	Body Size	3	Φ4 mm x H 5.0 mm (max.)
(3)	Definition of B Value	C	Automobile; $B_{25/85}$
(4)	Zero Power Resistance at 25℃	474	47 x 10^4 Ω = 470 KΩ
(5)	Tolerance of $R_{25℃}$	F	± 1%
(6)	B Value	457	4570K
(7)	Tolerance of B Value	1	± 1%
(8)	Optional Suffix	W01	RoHS+HF compliance 0.5mm Cu Wires

Structure and Dimensions



(unit:mm)

Item	D	d	P	A	I	L	T
Max	4	0.52	3.04	5	3	40	3
Min	2.5	0.48	2.04	2.5	---	30	1.5

Electrical Characteristics

Part No.	Zero Power Resistance at 25℃	Tolerance of $R_{25℃}$	$B_{25/85}$ Value	Tolerance of B Value	Max. Power Dissipation at 25℃	Dissipation Factor	Thermal Time Constant	Operating Temperature Range
	$R_{25℃}$ (KΩ)	(± %)	(K)	(± %)	P_{max} (mW)	δ(mW/℃)	τ (sec.)	T_L~T_U (℃)
TTC3C474F4571W01	470	1	4570	1	150	≧2.5	≦18	-55 ~+150

Reliability

Tests of TTC03 NTC thermistors are based on AEC-Q200 Rev-D.
Table of Test Methods

Item	Standard	Test conditions / Methods	Specifications
High Temperature Exposure (Storage)	MIL-STD-202 Method 108	Test temp.: 150 +3/-0℃ Duration: 1000 h Unpowered Measurement at 24±2 hours after test conclusion.	No visible damage $\lvert \triangle R_{25}/R_{25} \rvert \leqq 5\ \%$
Temperature Cycling	JESD22 Method JA-104	1000 Cycles (-55℃ to +125℃) Measurement at 24±2 hours after test conclusion. 30min maximum dwell time at each temperature extreme. 1 min. maximum transition time.	No visible damage $\lvert \triangle R_{25}/R_{25} \rvert \leqq 5\ \%$
Biased Humidity	MIL-STD-202 Method 103	1000 hours 85℃/85%RH.1mW power. Measurement at 24±2 hours after test conclusion.	No visible damage $\lvert \triangle R_{25}/R_{25} \rvert \leqq 5\ \%$
Operational Life	MIL-STD-202 Method 108	Test temp.: 150 +3/-0℃ Duration: 1000 h. 1mW power. Measurement at 24±2 hours after test conclusion.	No visible damage $\lvert \triangle R_{25}/R_{25} \rvert \leqq 5\ \%$
External Visual	MIL-STD-883 Method 2009	Inspect device construction, marking and workmanship. Electrical Test not required.	Within the specified values.

Reliability

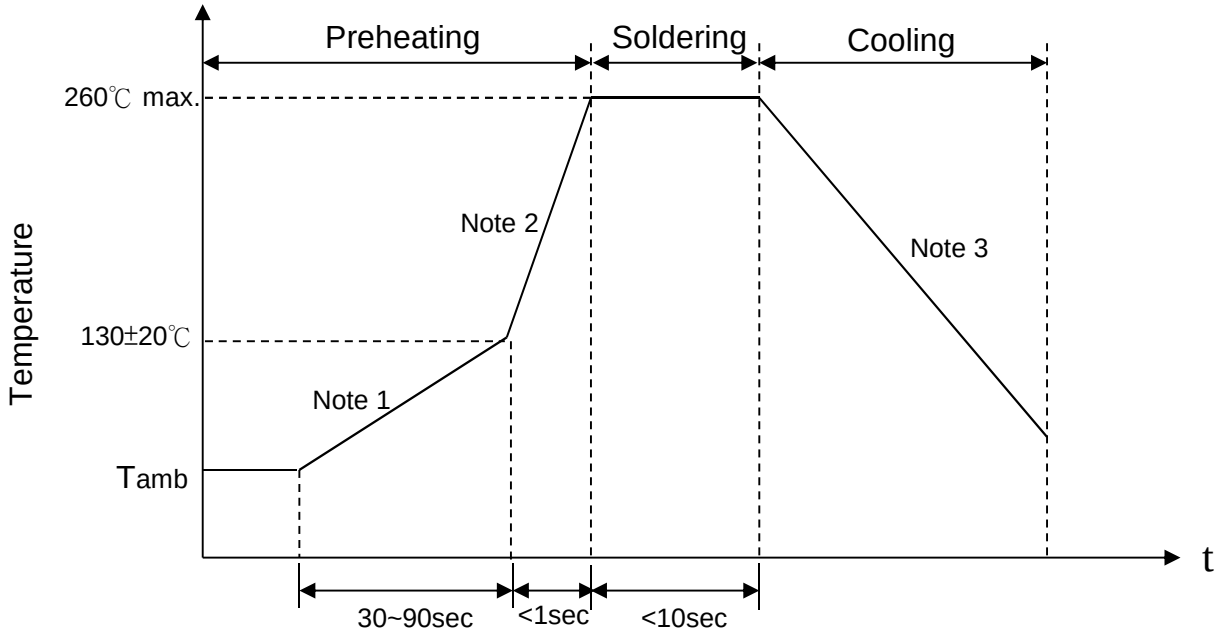
Tests of TTC03 NTC thermistors are based on AEC-Q200 Rev-D.

Table of Test Methods

Item	Standard	Test conditions / Methods	Specifications
Physical Dimension	JESD22 Method JB-100	Verify physical dimensions to the applicable device specification.	Within the specified values.
Resistance to Solvents	MIL-STD-202 Method 215	Also aqueous wash chemical - OKEM Clean or equivalent. Do not use banned solvents.	No visible damage.
Mechanical Shock	MIL-STD-202 Method 213	Figure 1 of Method 213 LEADED:Condition C	No visible damage. $\lvert \triangle R_{25}/R_{25} \rvert \leqq 5\ \%$
Vibration	MIL-STD-202 Method 204	5 g's for 20 minutes, 12 cycles each of 3 orientations. Note: Use 8"X5" PCB .031" thick with 7 secure points on one 8" side and 2 secure points on corners of opposite sides. Parts mounted within 2" from any secure point. Test from 10-2000 Hz.	No visible damage. $\lvert \triangle R_{25}/R_{25} \rvert \leqq 5\ \%$
Resistance to Soldering Heat	MIL-STD-202 Method 210	260+/-5℃ 10+/-1s,25mm/s+/-6mm/s, 1cycle.	No visible damage. $\lvert \triangle R_{25}/R_{25} \rvert \leqq 5\ \%$
Flammability	UL-94	V-0 or V-1 are acceptable. Electrical test not required.	V-0 or V-1 are acceptable.
ESD	AEC-Q200 -002	Discharge capacitance：150 pF Charging voltage: 6 kV ,Contact discharge 1 pulse in each polarity	No visible damage $\lvert \triangle R_{25}/R_{25} \rvert \leqq 5\ \%$
Solderability	J-STD-002	Dipping Method Temperature：235±5℃ Time：2±0.5sec	95% of termination wetted
Electrical Characterization	user spec	R(-40℃) / R(25℃) / R(150℃) B25/85 or B25/50	Within the specified values.
Terminal Strength	MIL-STD-202 Method 211	The terminal shall gradually be bent by 90° in one direction, then 90° in the opposite direction, and again back to the orginal position，for three times.	No visible damage.

Soldering Recommendation

■ Wave Soldering Profile

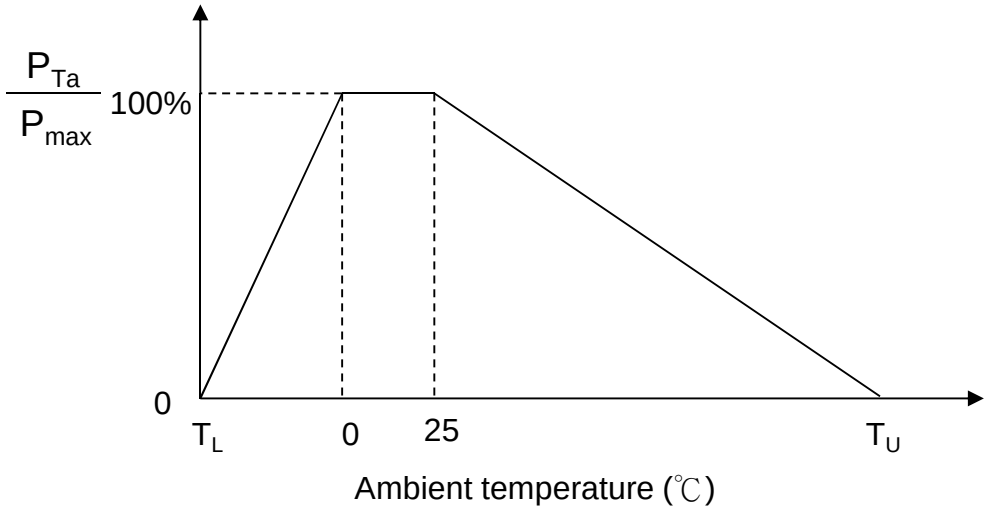


Note 1 : (1~3)℃/sec
Note 2 : Approx. 200℃/sec
Note 3 : 5℃/sec Max

■ Recommended Reworking Conditions with Soldering Iron

Item	Conditions
Temperature of Soldering Iron-tip	360℃ (max.)
Soldering Time	3 sec (max.)
Distance from Thermistor	2 mm (min.)

Max. Power Dissipation Derating Curve



Note: T_L = Minimum operating temperature (℃)

T_U = Maximum operating temperature (℃)

For example：

Ambient temperature(Ta)＝55℃

Maximum operating temperature(Tu)＝125℃

P_{Ta}=(Tu-Ta)/(Tu-25)×Pmax＝70% Pmax

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℃~+40℃

2.Relative Humidity : ≦75%RH

3.Keep away from corrosive atmosphere and sunlight

(II) Period of Storage : 1 year

Certificates

(1) IATF 16949 certificate
(2) ISO 9001 certificate

Test Report

(1) RoHS test report
(2) Halogen-free test report

R - T Table

Part No. : TTC3C474F4571W01

R25=470KOhm ±1%

B25/85 = 4570 K ± 1%

Temperature (℃)	Rmax. (KΩ)	Rnor. (KΩ)	Rmin. (KΩ)	Temperature Tol. (℃)		Resistance Tol. (%)	
-40	24964.3	23766.2	22623.3	-0.66	0.68	5.0%	-4.8%
-39	23191.3	22094.4	21047.2	-0.66	0.68	5.0%	-4.7%
-38	21559.5	20554.6	19594.6	-0.65	0.68	4.9%	-4.7%
-37	20055.0	19133.9	18253.4	-0.65	0.67	4.8%	-4.6%
-36	18665.7	17821.1	17013.0	-0.64	0.67	4.7%	-4.5%
-35	17381.2	16606.4	15864.6	-0.64	0.66	4.7%	-4.5%
-34	16192.4	15481.5	14800.3	-0.63	0.65	4.6%	-4.4%
-33	15091.4	14438.9	13813.2	-0.63	0.65	4.5%	-4.3%
-32	14071.0	13471.9	12897.1	-0.62	0.64	4.4%	-4.3%
-31	13124.7	12574.6	12046.4	-0.61	0.63	4.4%	-4.2%
-30	12246.8	11741.6	11256.0	-0.61	0.63	4.3%	-4.1%
-29	11432.0	10967.8	10521.4	-0.60	0.62	4.2%	-4.1%
-28	10675.4	10248.9	9838.45	-0.59	0.61	4.2%	-4.0%
-27	9972.67	9580.70	9203.21	-0.59	0.61	4.1%	-3.9%
-26	9319.72	8959.41	8612.18	-0.58	0.60	4.0%	-3.9%
-25	8712.83	8381.57	8062.10	-0.57	0.59	4.0%	-3.8%
-24	8148.56	7843.96	7549.98	-0.57	0.59	3.9%	-3.7%
-23	7623.76	7343.61	7073.05	-0.56	0.58	3.8%	-3.7%
-22	7135.49	6877.79	6628.74	-0.55	0.57	3.7%	-3.6%
-21	6681.07	6443.98	6214.68	-0.55	0.57	3.7%	-3.6%
-20	6258.00	6039.84	5828.69	-0.54	0.56	3.6%	-3.5%
-19	5863.99	5663.20	5468.75	-0.53	0.55	3.5%	-3.4%
-18	5496.91	5312.09	5132.97	-0.53	0.55	3.5%	-3.4%
-17	5154.79	4984.64	4819.63	-0.52	0.54	3.4%	-3.3%
-16	4835.82	4679.16	4527.13	-0.51	0.53	3.3%	-3.2%
-15	4538.33	4394.07	4253.97	-0.51	0.53	3.3%	-3.2%
-14	4260.76	4127.90	3998.79	-0.50	0.52	3.2%	-3.1%
-13	4001.69	3879.32	3760.31	-0.49	0.51	3.2%	-3.1%
-12	3759.79	3647.07	3537.37	-0.49	0.51	3.1%	-3.0%
-11	3533.84	3429.99	3328.87	-0.48	0.50	3.0%	-2.9%
-10	3322.70	3227.02	3133.79	-0.47	0.49	3.0%	-2.9%
-9	3125.33	3037.18	2951.22	-0.46	0.48	2.9%	-2.8%
-8	2940.76	2859.54	2780.28	-0.46	0.48	2.8%	-2.8%
-7	2768.09	2693.25	2620.18	-0.45	0.47	2.8%	-2.7%
-6	2606.50	2537.54	2470.16	-0.44	0.46	2.7%	-2.7%
-5	2455.22	2391.68	2329.55	-0.44	0.45	2.7%	-2.6%
-4	2313.54	2254.99	2197.70	-0.43	0.45	2.6%	-2.5%
-3	2180.79	2126.85	2074.03	-0.42	0.44	2.5%	-2.5%
-2	2056.38	2006.68	1957.98	-0.41	0.43	2.5%	-2.4%
-1	1939.72	1893.94	1849.05	-0.41	0.42	2.4%	-2.4%

R - T Table

Part No. : TTC3C474F4571W01

R25=470KOhm ±1%

B25/85 = 4570 K ± 1%

Temperature (℃)	Rmax. (KΩ)	Rnor. (KΩ)	Rmin. (KΩ)	Temperature Tol. (℃)		Resistance Tol. (%)	
0	1830.31	1788.14	1746.76	-0.40	0.42	2.4%	-2.3%
1	1727.65	1688.81	1650.67	-0.39	0.41	2.3%	-2.3%
2	1631.30	1595.52	1560.38	-0.38	0.40	2.2%	-2.2%
3	1540.82	1507.89	1475.51	-0.38	0.39	2.2%	-2.1%
4	1455.84	1425.52	1395.70	-0.37	0.39	2.1%	-2.1%
5	1376.00	1348.09	1320.62	-0.36	0.38	2.1%	-2.0%
6	1300.95	1275.27	1249.98	-0.35	0.37	2.0%	-2.0%
7	1230.38	1206.77	1183.49	-0.34	0.36	2.0%	-1.9%
8	1164.01	1142.30	1120.88	-0.34	0.35	1.9%	-1.9%
9	1101.57	1081.61	1061.91	-0.33	0.34	1.8%	-1.8%
10	1042.80	1024.46	1006.34	-0.32	0.34	1.8%	-1.8%
11	987.462	970.621	953.971	-0.31	0.33	1.7%	-1.7%
12	935.349	919.890	904.596	-0.30	0.32	1.7%	-1.7%
13	886.254	872.072	858.031	-0.30	0.31	1.6%	-1.6%
14	839.988	826.985	814.102	-0.29	0.30	1.6%	-1.6%
15	796.373	784.459	772.646	-0.28	0.29	1.5%	-1.5%
16	755.245	744.337	733.514	-0.27	0.29	1.5%	-1.5%
17	716.450	706.471	696.562	-0.26	0.28	1.4%	-1.4%
18	679.845	670.724	661.660	-0.26	0.27	1.4%	-1.4%
19	645.296	636.967	628.684	-0.25	0.26	1.3%	-1.3%
20	612.677	605.080	597.518	-0.24	0.25	1.3%	-1.2%
21	581.871	574.950	568.055	-0.23	0.24	1.2%	-1.2%
22	552.770	546.473	540.193	-0.22	0.23	1.2%	-1.1%
23	525.270	519.549	513.838	-0.21	0.22	1.1%	-1.1%
24	499.277	494.087	488.901	-0.20	0.22	1.1%	-1.0%
25	474.700	470.000	465.300	-0.20	0.21	1.0%	-1.0%
26	451.905	447.208	442.516	-0.21	0.22	1.1%	-1.0%
27	430.318	425.636	420.962	-0.22	0.23	1.1%	-1.1%
28	409.871	405.211	400.565	-0.23	0.24	1.1%	-1.1%
29	390.497	385.869	381.258	-0.24	0.25	1.2%	-1.2%
30	372.135	367.546	362.977	-0.25	0.26	1.2%	-1.2%
31	354.729	350.184	345.664	-0.26	0.27	1.3%	-1.3%
32	338.222	333.729	329.262	-0.27	0.29	1.3%	-1.3%
33	322.566	318.128	313.720	-0.28	0.30	1.4%	-1.4%
34	307.712	303.334	298.988	-0.30	0.31	1.4%	-1.4%
35	293.615	289.301	285.021	-0.31	0.32	1.5%	-1.5%
36	280.234	275.986	271.775	-0.32	0.33	1.5%	-1.5%
37	267.528	263.349	259.210	-0.33	0.35	1.6%	-1.6%
38	255.461	251.354	247.288	-0.34	0.36	1.6%	-1.6%
39	243.998	239.963	235.972	-0.35	0.37	1.7%	-1.7%

R - T Table

Part No. : TTC3C474F4571W01

R25=470KOhm ±1%
B25/85 = 4570 K ± 1%

Temperature (℃)	Rmax. (KΩ)	Rnor. (KΩ)	Rmin. (KΩ)	Temperature Tol. (℃)		Resistance Tol. (%)	
40	233.105	229.145	225.230	-0.37	0.38	1.7%	-1.7%
41	222.752	218.868	215.029	-0.38	0.39	1.8%	-1.8%
42	212.910	209.101	205.340	-0.39	0.41	1.8%	-1.8%
43	203.550	199.818	196.135	-0.40	0.42	1.9%	-1.8%
44	194.648	190.993	187.388	-0.41	0.43	1.9%	-1.9%
45	186.178	182.600	179.073	-0.43	0.44	2.0%	-1.9%
46	178.118	174.617	171.168	-0.44	0.45	2.0%	-2.0%
47	170.446	167.022	163.650	-0.45	0.47	2.1%	-2.0%
48	163.142	159.793	156.498	-0.46	0.48	2.1%	-2.1%
49	156.186	152.913	149.694	-0.48	0.49	2.1%	-2.1%
50	149.561	146.362	143.218	-0.49	0.50	2.2%	-2.1%
51	143.248	140.124	137.054	-0.50	0.52	2.2%	-2.2%
52	137.232	134.181	131.184	-0.51	0.53	2.3%	-2.2%
53	131.498	128.519	125.595	-0.53	0.54	2.3%	-2.3%
54	126.031	123.123	120.270	-0.54	0.55	2.4%	-2.3%
55	120.818	117.979	115.196	-0.55	0.57	2.4%	-2.4%
56	115.845	113.075	110.361	-0.56	0.58	2.4%	-2.4%
57	111.101	108.399	105.752	-0.58	0.59	2.5%	-2.4%
58	106.573	103.938	101.357	-0.59	0.61	2.5%	-2.5%
59	102.252	99.6815	97.1661	-0.60	0.62	2.6%	-2.5%
60	98.1261	95.6198	93.1682	-0.62	0.63	2.6%	-2.6%
61	94.1866	91.7429	89.3537	-0.63	0.65	2.7%	-2.6%
62	90.4239	88.0415	85.7134	-0.64	0.66	2.7%	-2.6%
63	86.8293	84.5070	82.2386	-0.66	0.67	2.7%	-2.7%
64	83.3945	81.1311	78.9211	-0.67	0.69	2.8%	-2.7%
65	80.1119	77.9059	75.7531	-0.68	0.70	2.8%	-2.8%
66	76.9739	74.8241	72.7270	-0.70	0.71	2.9%	-2.8%
67	73.9735	71.8786	69.8361	-0.71	0.73	2.9%	-2.8%
68	71.1041	69.0629	67.0736	-0.72	0.74	3.0%	-2.9%
69	68.3595	66.3707	64.4333	-0.74	0.75	3.0%	-2.9%
70	65.7336	63.7960	61.9092	-0.75	0.77	3.0%	-3.0%
71	63.2209	61.3331	59.4958	-0.77	0.78	3.1%	-3.0%
72	60.8158	58.9768	57.1876	-0.78	0.79	3.1%	-3.0%
73	58.5135	56.7219	54.9797	-0.79	0.81	3.2%	-3.1%
74	56.3089	54.5637	52.8673	-0.81	0.82	3.2%	-3.1%
75	54.1976	52.4976	50.8458	-0.82	0.83	3.2%	-3.1%
76	52.1752	50.5192	48.9108	-0.84	0.85	3.3%	-3.2%
77	50.2376	48.6245	47.0584	-0.85	0.86	3.3%	-3.2%
78	48.3808	46.8095	45.2847	-0.87	0.88	3.4%	-3.3%
79	46.6012	45.0706	43.5859	-0.88	0.89	3.4%	-3.3%

R - T Table

Part No. : TTC3C474F4571W01

R25=470KOhm ±1%
B25/85 = 4570 K ± 1%

Temperature (℃)	Rmax. (KΩ)	Rnor. (KΩ)	Rmin. (KΩ)	Temperature Tol. (℃)		Resistance Tol. (%)	
80	44.8951	43.4042	41.9587	-0.89	0.91	3.4%	-3.3%
81	43.2593	41.8071	40.3996	-0.91	0.92	3.5%	-3.4%
82	41.6906	40.2760	38.9055	-0.92	0.93	3.5%	-3.4%
83	40.1859	38.8079	37.4735	-0.94	0.95	3.6%	-3.4%
84	38.7423	37.4000	36.1006	-0.95	0.96	3.6%	-3.5%
85	37.3571	36.0495	34.7843	-0.97	0.98	3.6%	-3.5%
86	36.0277	34.7539	33.5219	-0.98	0.99	3.7%	-3.5%
87	34.7516	33.5107	32.3110	-1.00	1.01	3.7%	-3.6%
88	33.5264	32.3176	31.1492	-1.01	1.02	3.7%	-3.6%
89	32.3499	31.1723	30.0345	-1.03	1.03	3.8%	-3.6%
90	31.2200	30.0727	28.9646	-1.04	1.05	3.8%	-3.7%
91	30.1345	29.0167	27.9376	-1.06	1.06	3.9%	-3.7%
92	29.0917	28.0026	26.9516	-1.07	1.08	3.9%	-3.8%
93	28.0896	27.0284	26.0048	-1.09	1.09	3.9%	-3.8%
94	27.1264	26.0925	25.0954	-1.10	1.11	4.0%	-3.8%
95	26.2005	25.1930	24.2219	-1.12	1.12	4.0%	-3.9%
96	25.3103	24.3286	23.3826	-1.14	1.14	4.0%	-3.9%
97	24.4543	23.4976	22.5761	-1.15	1.15	4.1%	-3.9%
98	23.6310	22.6987	21.8009	-1.17	1.17	4.1%	-4.0%
99	22.8391	21.9304	21.0558	-1.18	1.18	4.1%	-4.0%
100	22.0771	21.1915	20.3394	-1.20	1.20	4.2%	-4.0%
101	21.3439	20.4807	19.6504	-1.21	1.21	4.2%	-4.1%
102	20.6382	19.7968	18.9879	-1.23	1.23	4.3%	-4.1%
103	19.9590	19.1388	18.3505	-1.25	1.24	4.3%	-4.1%
104	19.3050	18.5055	17.7373	-1.26	1.26	4.3%	-4.2%
105	18.6753	17.8959	17.1472	-1.28	1.28	4.4%	-4.2%
106	18.0688	17.3089	16.5793	-1.29	1.29	4.4%	-4.2%
107	17.4847	16.7438	16.0327	-1.31	1.31	4.4%	-4.2%
108	16.9219	16.1996	15.5064	-1.33	1.32	4.5%	-4.3%
109	16.3797	15.6753	14.9997	-1.34	1.34	4.5%	-4.3%
110	15.8572	15.1703	14.5117	-1.36	1.35	4.5%	-4.3%
111	15.3536	14.6837	14.0417	-1.38	1.37	4.6%	-4.4%
112	14.8681	14.2148	13.5888	-1.39	1.39	4.6%	-4.4%
113	14.4000	13.7629	13.1525	-1.41	1.40	4.6%	-4.4%
114	13.9487	13.3272	12.7321	-1.43	1.42	4.7%	-4.5%
115	13.5134	12.9072	12.3269	-1.44	1.43	4.7%	-4.5%
116	13.0936	12.5022	11.9363	-1.46	1.45	4.7%	-4.5%
117	12.6885	12.1116	11.5597	-1.48	1.46	4.8%	-4.6%
118	12.2977	11.7348	11.1966	-1.49	1.48	4.8%	-4.6%
119	11.9206	11.3714	10.8464	-1.51	1.50	4.8%	-4.6%

R - T Table

Part No. : TTC3C474F4571W01

R25=470KOhm ±1%
B25/85 = 4570 K ± 1%

Temperature (℃)	Rmax. (KΩ)	Rnor. (KΩ)	Rmin. (KΩ)	Temperature Tol. (℃)		Resistance Tol. (%)	
120	11.5566	11.0207	10.5086	-1.53	1.51	4.9%	-4.6%
121	11.2052	10.6823	10.1828	-1.55	1.53	4.9%	-4.7%
122	10.8660	10.3557	9.86840	-1.56	1.55	4.9%	-4.7%
123	10.5385	10.0405	9.56504	-1.58	1.56	5.0%	-4.7%
124	10.2222	9.73616	9.27227	-1.60	1.58	5.0%	-4.8%
125	9.91677	9.44232	8.98967	-1.61	1.60	5.0%	-4.8%

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