南京时恒电子科技有限公司

规格承认书

APPROVAL SHEET

客户名称：

CUSTOMER _____

产品名称：

PART NAME 片式 NTC 热敏电阻规格书

产品规格：

PART NUMBER CMFA 503F3950

日期：

DATE 2021 年 08 月 21 日

确 认

CONFIRM

客户	供货商/制造商
品保部：_____	规格书制作：鞠晓丽
制造部：_____	业务员审核：_____
工程部：_____	技术部审核：程鹏
	品质部审核：李竹媛

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1 外形尺寸 Shape and Dimensions

- 尺寸：见图 1 和表 1
- PCB 焊盘：见图 2 和表 1
- Dimensions: See Fig.1 and Table 1.
- Recommended PCB pattern for reflow soldering: See Fig.2 and Table 1

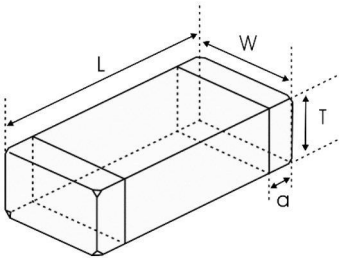


图 1 Fig.1

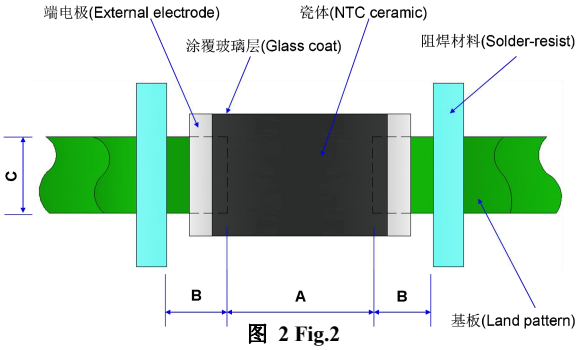


图 2 Fig.2

表 1（Table 1） 单位 unit: inch[mm]

类别 Type	L	W	T	a	A	B	C
A [0603]	0.063±0.006 [1.6±0.15]	0.031±0.006 [0.8±0.15]	0.031±0.006 [0.8±0.15]	0.012±0.008 [0.3±0.2]	[0.6-0.8]	[0.6-0.7]	[0.6-0.8]

2 产品标识（料号） Product Identification(Part Number)

CMF A 503 F 3950

① ② ③ ④ ⑤

① 类别 Type	
CMF	片式 NTC 热敏电阻器 Chip NTC Thermistor

② 外形尺寸(mm) External Dimensions (L×W)	
0201[A]	0.60×0.30×0.30
X[0402]	1.00×0.50×0.50
B[0805]	1.60×0.80×0.80
A[0603]	2.00×1.25×0.85
1206[3216]	3.20×1.60×0.85

③ 25℃的零功率电阻 Nominal Zero-Power Resistance	
222	2.2kΩ
503	50kΩ
204	200kΩ

④ 电阻值公差 Tolerance of Resistance	
F	±1%
G	±2%
H	±3%
J	±5%

⑤B 值常数 B Constant	
3470	3470K
3950	3950K
4150	4150K

3 电气特性 Electrical Characteristics

型号 Part No	电阻值 Resistance (25℃) (kΩ)	B 常数B Constant (25/50℃) （K）	B 常 数 B Constant (25/85℃) （K）	允许工作电流 Permissible Operating Current (25℃) （mA）	耗散系数 Dissipation Factor (mW/℃)	热时间常数 Thermal Time Constant (s)	额定功率 Rated Electric Power(25℃) (mW)	工作温度 Operating ambient temperature (℃)
CMFA 503F3950	50	3950	3987	0.13	1.0	＜5	100	-40～+125

4 检验和测试程序

测试条件

如无特别规定，检验和测试的标准大气环境条件如下：

a. 环境温度：20±15℃；

b. 相对湿度：65±20%；

c. 气压：86 kPa~106 kPa

如果对测试结果有异议，则在下述条件下测试：

a. 环境温度：25±2℃；

b. 相对湿度：65±5%

c. 气压：86kPa ~ 106kPa

检查设备

外观检查：20 倍放大镜；

阻值检查：热敏电阻测试仪

4 Test and Measurement Procedures

Test Conditions

Unless otherwise specified, the standard atmospheric conditions for measurement/test as:

a. Ambient Temperature: 20±15℃

b. Relative Humidity: 65±20%

c. Air Pressure: 86kPa to 106kPa

If any doubt on the results, measurements/tests should be made within the following limits:

a. Ambient Temperature: 25±2℃

b. Relative Humidity: 65±5%

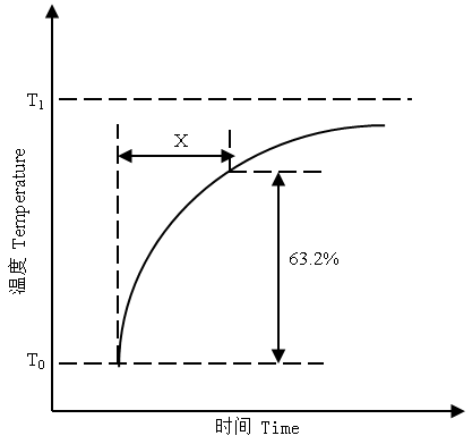
c. Air Pressure: 86kPa to 106kPa

Inspection Equipment

Visual Examination: 20×magnifier

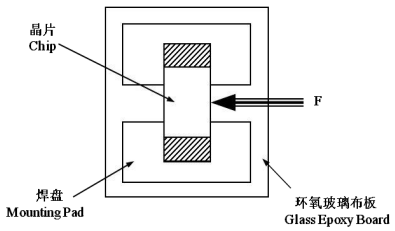
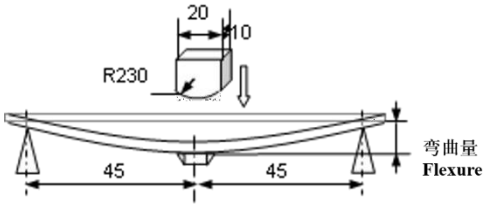
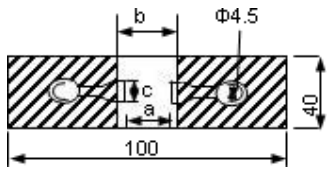
Resistance value test: Thermistor resistance tester

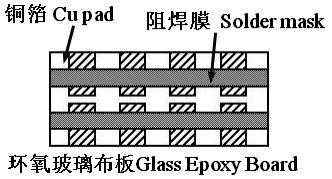
5 电性测试 Electrical Test

序号 No.	项目 Items	测试方法及备注 Test Methods and Remarks
1	25℃零功率电阻值 Nominal Zero-Power Resistance at 25℃(R25)	环境温度 Ambient temperature：25±0.05℃ 测试功率 Measuring electric power：≤0.1mW
2	B 值常数 Nominal B Constant	分别在环境温度 25±0.05℃， 50±0.05℃或 85±0.05℃下测量电阻值。 Measure the resistance at the ambient temperature of 25±0.05℃, 50±0.05℃ or 85±0.05℃. B(25-50℃)= $\frac{\ln R25-\ln R50}{\frac{1}{T_{25}}-\frac{1}{T_{50}}}$ B(25-85℃)= $\frac{\ln R25-\ln R85}{\frac{1}{T_{25}}-\frac{1}{T_{85}}}$ T：绝对温度（K）Absolute temperature (K)
3	热时间常数 Thermal Time Constant	在零功率条件下，当热敏电阻的环境温度发生急剧变化时，热敏电阻元件产生最初温度 T0 与最终温度 T1 两者温度差的 63.2%的温度变化所需要的时间，通常以秒(S)表示。 The total time for the temperature of the thermistor to change by 63.2% of the difference from ambient temperature T_0 (℃) to T_1 (℃) by the drastic change of the power applied to thermistor from Non-zero Power to Zero-Power state, normally expressed in second(S). 

4	耗散系数 Dissipation Factor	在一定环境温度下，NTC 热敏电阻通过自身发热使其温度升高 1℃时所需要的功率，通常以 mW/℃表示。可由下面公式计算： The required power which makes the NTC thermistor body temperature raise 1 ℃ through self-heated, normally expressed in milliwatts per degree Celsius (mW/℃). It can be calculated by the following formula: $\delta = \frac{W}{T-T_0}$
5	额定功率 Rated Power	在环境温度 25℃下因自身发热使表面温度升高 100℃所需要的功率。 The necessary electric power makes thermistor's temperature rise 100℃ by self-heating at ambient temperature 25℃.
6	允许工作电流 Permissible operating current	在静止空气中通过自身发热使其升温为 1℃的电流。 The current that keep body temperature of chip NTC on the PC board in still air rising 1°C by self-heating.

6 信赖性试验 Reliability Test

<table>
<tr><th>项目
Items</th><th>测试标准
Standard</th><th>测试方法及备注
Test Methods and Remarks</th><th>要求
Requirements</th></tr>
<tr><td>端头附着力
Terminal Strength</td><td>IEC 60068-2-21</td><td>将晶片焊接在测试基板上（如右图所示的环氧玻璃布板），按箭头所示方向施加作用力；
Solder the chip to the testing jig (glass epoxy board shown in the right) using eutectic solder. Then apply a force in the direction of the arrow.
<table><tr><td>尺寸 Size</td><td>F</td><td>保持时间 Duration</td></tr><tr><td>0201, X, A</td><td>5N</td><td rowspan="2">10±1s</td></tr><tr><td>A</td><td>10N</td></tr></table></td><td>端电极无脱落且瓷体无损伤。
No removal or split of the termination or other defects shall occur.
  </td></tr>
<tr><td>抗弯强度
Resistance to Flexure</td><td>IEC 60068-2-21</td><td>将晶片焊接在测试基板上（如右图所示的环氧玻璃布板），按下图箭头所示方向施加作用力；
Solder the chip to the test jig (glass epoxy board shown in the right) using a eutectic solder. Then apply a force in the direction shown as follow;
 
<table><tr><td>尺寸
Size</td><td>弯曲变形量
Flexure</td><td>施压速度
Pressurizing Speed</td><td>保持时间
Duration</td></tr><tr><td>0201,</td><td>1mm</td><td rowspan="2">＜0.5mm/s</td><td rowspan="2">10±1s</td></tr><tr><td>X, A, A</td><td>2mm</td></tr></table></td><td>① 无外观损伤。
No visible damage.
② ｜ΔR25/R25｜≤5%
单位 unit：mm
<table><tr><td>类型Type</td><td>a</td><td>b</td><td>c</td></tr><tr><td>0201</td><td>0.25</td><td>0.3</td><td>0.3</td></tr><tr><td>X</td><td>0.4</td><td>1.5</td><td>0.5</td></tr><tr><td>A</td><td>1.0</td><td>3.0</td><td>1.2</td></tr><tr><td>A</td><td>1.2</td><td>4.0</td><td>1.65</td></tr></table>  </td></tr>
</table>

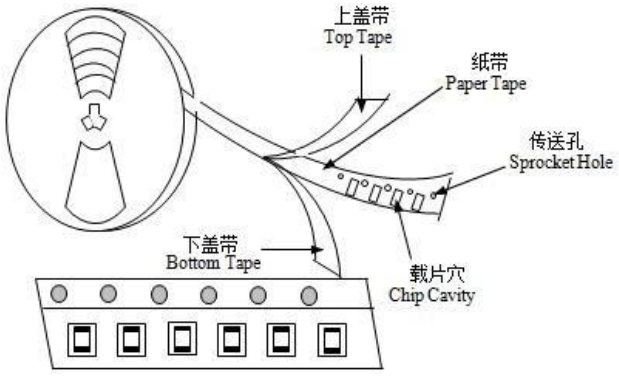
<table>
<tr>
<td>振动
Vibration</td>
<td>IEC 60068-2-80</td>
<td>① 将晶片焊接在测试基板上（如右图所示的环氧玻璃布板）；
Solder the chip to the testing jig (glass epoxy board shown in the left) using eutectic solder.
② 晶片以全振幅为 1.5mm 进行振动，频率范围为 10Hz ～55 Hz；
The chip shall be subjected to a simple harmonic motion having total amplitude of 1.5mm, the frequency being varied uniformly between the approximate limits of 10 and 55 Hz.
③ 振动频率按 10Hz→55Hz→10Hz 循环，周期为 1 分钟，在空间三个互相垂直的方向上各振动 2 小时（共 6 小时）。
The frequency ranges from 10 to 55 Hz and return to 10 Hz shall be traversed in approximately 1 minute. This motion shall be applied for a period of 2 hours in each 3mutually perpendicular directions (total of 6 hours).</td>
<td>无外观损伤。
No visible damage.
 
</td>
</tr>
<tr>
<td>坠落
Dropping</td>
<td>IEC 60068-2-32</td>
<td>从 1m 的高度让晶片自由坠落至水泥地面 10 次。
Drop a chip 10 times on a concrete floor from a height of 1 meter.</td>
<td>无外观损伤。
No visible damage.</td>
</tr>
<tr>
<td>可焊性
Solderability</td>
<td>IEC 60068-2-58</td>
<td>① 焊接温度 Solder temperature: 245±5℃.
② 浸渍时间 Duration: 3±0.3s.
③ 焊锡成分 Solder: Sn/3.0Ag/0.5Cu.
④ 助焊剂 Flux: （重量比）25%松香和 75%酒精
25% Resin and 75% ethanol in weight.</td>
<td>① 无外观损伤；
No visible damage.
② 元件端电极的焊锡覆盖率不小于 95%。
Wetting shall exceed 95% coverage.</td>
</tr>
<tr>
<td>耐焊性
Resistance to Soldering Heat</td>
<td>IEC 60068-2-58</td>
<td>① 焊接温度 Solder temperature: 260±5℃.
② 浸渍时间 Duration: 10±1s.
③ 焊锡成分 Solder: Sn/3.0Ag/0.5Cu.
④ 助焊剂 Flux: （重量比）25%松香和 75%酒精
25% Resin and 75% ethanol in weight.
⑤ 试验后标准条件下放置 1~2 小时后测量。
The chip shall be stabilized at normal condition for 1~2 hours before measuring.</td>
<td>① 无外观损伤；
No visible damage.
② ｜ΔR25/R25｜≤5%
③ ｜ΔB/B｜≤2%</td>
</tr>
<tr>
<td>温度周期
Temperature cycling</td>
<td>IEC 60068-2-14</td>
<td>① 无负载于下表所示的环境条件下重复 5 次。
5 cycles of following sequence without loading.
<table>
<tr><th>步骤 Step</th><th>温度Temperature</th><th>时间Time</th></tr>
<tr><td>1</td><td>-40±5℃</td><td>30±3min</td></tr>
<tr><td>2</td><td>25±2℃</td><td>5±3min</td></tr>
<tr><td>3</td><td>125±2℃</td><td>30±3min</td></tr>
<tr><td>4</td><td>25±2℃</td><td>5±3min</td></tr>
</table>
② 试验后标准条件下放置 1~2 小时后测量。
The chip shall be stabilized at normal condition for 1~2 hours before measuring.</td>
<td>① 无外观损伤；
No visible damage.
② ｜ΔR25/R25｜≤3%
③ ｜ΔB/B｜≤2%</td>
</tr>
<tr>
<td>高温存放
Resistance to dry heat</td>
<td>IEC 60068-2-2</td>
<td>① 在 125±5℃空气中，无负载放置 1000±24 小时。
125±5℃ in air, for 1000±24 hours without loading.
② 试验后标准条件下放置 1~2 小时后测量。
The chip shall be stabilized at normal condition for 1~2 hours before measuring.</td>
<td>① 无外观损伤；
No visible damage.
② ｜ΔR25/R25｜≤5%
③ ｜ΔB/B｜≤2%</td>
</tr>
</table>

低温存放 Resistance to cold	IEC 60068-2-1	① 在-40±3℃空气中，无负载放置 1000±24 小时。 -40±3℃ in air, for 1000±24 hours without loading. ② 试验后标准条件下放置 1~2 小时后测量。 The chip shall be stabilized at normal condition for 1~2 hours before measuring.	① 无外观损伤； No visible damage. ② ｜ΔR25/R25｜≤5% ③ ｜ΔB/B｜≤2%
湿热存放 Resistance to damp heat	IEC 60068-2-78	① 在 40±2℃，相对湿度 90~95%空气中，无负载放置 1000±24 小时。 40±2℃, 90~95%RH in air, for 1000±24 hours without loading. ② 试验后标准条件下放置 1~2 小时后测量。 The chip shall be stabilized at normal condition for 1~2 hours before measuring.	① 无外观损伤； No visible damage. ② ｜ΔR25/R25｜≤3% ③ ｜ΔB/B｜≤2%
高温负荷 Resistance to high temperature load	IEC 60539-1 5.25.4	① 在 85±2℃空气中，施加允许工作电流 1000±48 小时。 85±2℃in air with permissive operating current for 1000±48 hours ② 试验后标准条件下放置 1~2 小时后测量。 The chip shall be stabilized at normal condition for 1~2 hours before measuring.	① 无外观损伤； No visible damage. ② ｜ΔR25/R25｜≤5% ③ ｜ΔB/B｜≤2%

7 编带 Taping

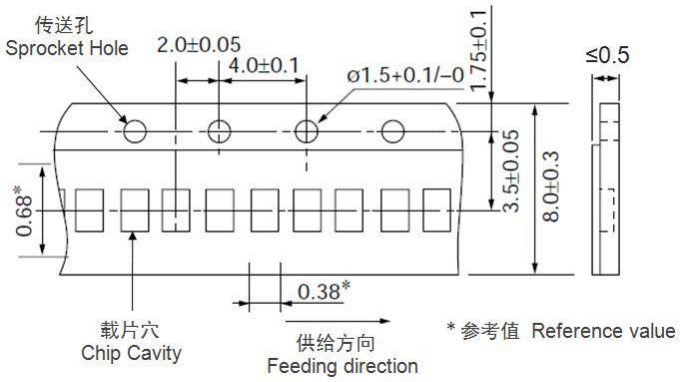
类型 Type	0201	X	A	A
编带厚度 Tape thickness(mm)	0.5±0.15	0.5±0.15	0.8±0.15	0.85±0.2
编带材质 Tape material	纸 带 Paper Tape			
每盘数量 Quantity per Reel	15K	10K	4K	4K

(1) 编带图 Taping Drawings

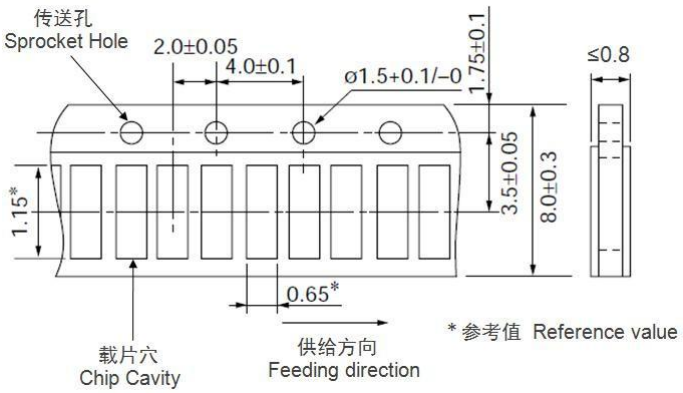


(2) 纸带尺寸 Paper Tape Dimensions (单位 Unit：mm)

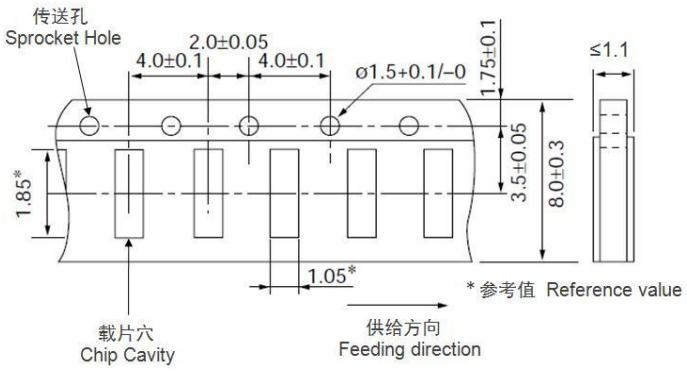
CMF0201 系列 CMF0201 series



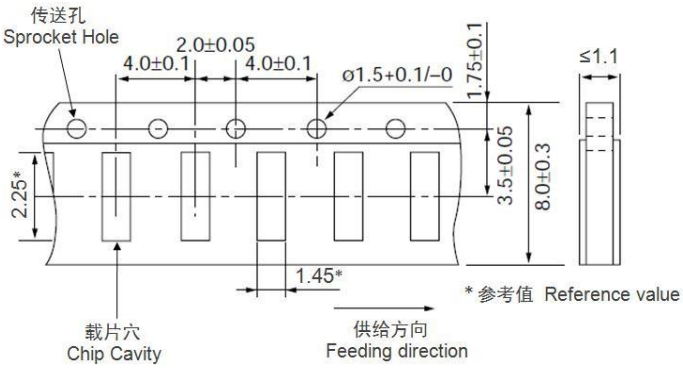
CMFX 系列 CMFX series



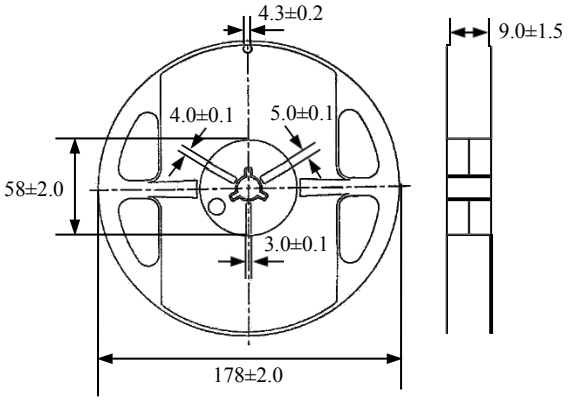
CMFA 系列 CMFA series

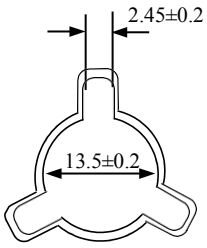


CMFA 系列 CMFA series



(3) 卷盘尺寸 Reel Dimensions(单位 Unit：mm)





8 储存

- **储存条件**

  a. 储存温度：-10℃～40℃

  b. 相对湿度：≤75%RH

  c. 避免接触粉尘、腐蚀性气氛和阳光

- **储存期限：6 个月**

8 Storage

- **Storage Conditions**

  a. Storage Temperature: -10℃～40℃

  b. Relative Humidity: ≦75%RH

  c. Keep away from corrosive atmosphere and sunlight.

- **Period of Storage**: **6 Months**

9 注意事项

- CMF 系列热敏电阻不可在以下条件下工作或储存：

  (1) 腐蚀性气体或还原性气体

  (氯气、硫化氢气体、氨气、硫酸气体、一氧化氮等)。

  (2) 挥发性或易燃性气体

  (3) 多尘条件

  (4) 高压或低压条件

  (5) 潮湿场所

  (6) 存在盐水、油、化学液体或有机溶剂的场所

  (7) 强烈振动

  (8) 存在类似有害条件的其他场所

- CMF 系列热敏电阻的陶瓷属于易碎材料，使用时不可施加过大压力或冲击。

- CMF 系列热敏电阻不可在超过目录规定的温度范围情况下工作。

9 Notes ＆ Warnings

- The CMF series thermistors shall not be operated and stored under the following environmental condition:

  (1) Corrosive or deoxidized atmospheres

  (such as chlorine, sulfurated hydrogen, ammonia, sulfuric acid, nitric oxide and so on)

  (2) Volatile or inflammable atmospheres

  (3) Dusty condition

  (4) Excessively high or low pressure condition

  (5) Humid site

  (6) Places with brine, oil, chemical liquid or organic solvent

  (7) Intense vibration

  (8) Places with analogously deleterious conditions

- The ceramic body of the CMF series thermistors is fragile, no excessive pressure or impact shall be exerted on it.

- The CMF series thermistors shall not be operated beyond the specified “Operating Temperature Range” in the catalog.

10 建议焊接条件

- **回流焊**

温升 1~2℃/sec.

预热：150~170℃/90±30 sec.

大于 240℃时间：20~40sec

峰值温度：最高 260℃/10 sec.

焊锡：Sn/3.0Ag/0.5Cu

回流焊：最多 2 次

10 Recommended Soldering Technologies

- **Re-flowing Profile**

1~2℃/sec. Ramp

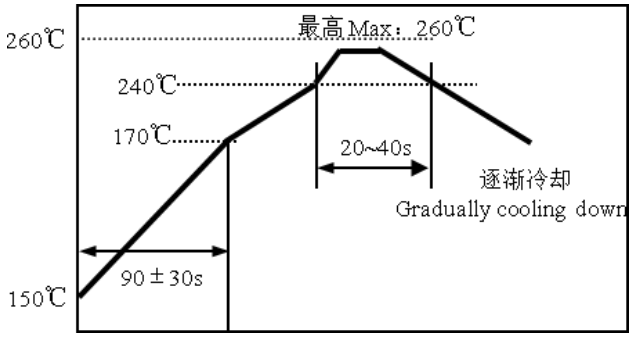
Pre-heating: 150~170℃/90±30 sec.

Time above 240℃: 20~40 sec.

Peak temperature: 260℃Max./10 sec.

Solder paste: Sn/3.0Ag/0.5Cu

Max.2 times for re-flowing



- **手工焊**

烙铁功率：最大 20W

预热：150℃/60sec.

烙铁头温度：最高 280℃

焊接时间：最多 3sec.

焊锡：Sn/3.0Ag/0.5Cu

手工焊：最多 1 次

[注：不要使烙铁头接触到端头]

- **Iron Soldering Profile**

Iron soldering power: Max.20W

Pre-heating: 150℃/60sec.

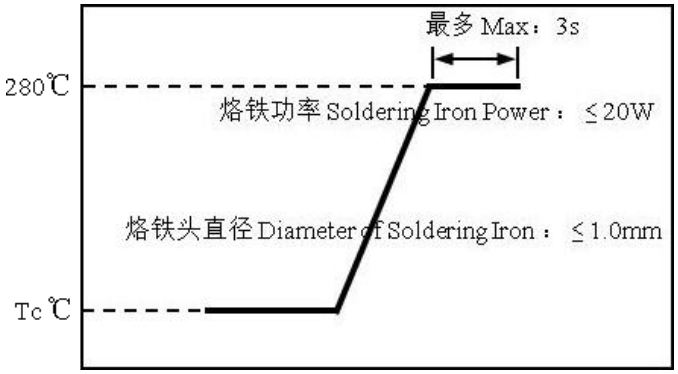
Soldering Tip temperature: 280℃Max.

Soldering time: 3 sec Max.

Solder paste: Sn/3.0Ag/0.5Cu

Max.1 times for iron soldering

[Note: Take care not to apply the tip of the soldering iron to the terminal electrodes.]



11 R-T 表 R-T table

CMFA 503F3950

温度 Temp. (℃)	R 最小值 R_Min (Kohm)	R 中心值 R_Cent (Kohm)	R 最大值 R_Max (Kohm)	阻值公差 Res TOL.	温度公差 Temp. TOL.(℃)
-40	1,649.637	1,726.374	1,806.500	4.64%	0.67
-39	1,543.253	1,613.954	1,687.726	4.57%	0.66
-38	1,444.458	1,509.624	1,577.571	4.50%	0.66
-37	1,352.660	1,412.747	1,475.355	4.43%	0.65
-36	1,267.318	1,322.743	1,380.454	4.36%	0.65
-35	1,187.937	1,239.081	1,292.297	4.29%	0.64
-34	1,114.062	1,161.271	1,210.360	4.23%	0.64
-33	1,045.275	1,088.868	1,134.166	4.16%	0.63
-32	981.193	1,021.461	1,063.275	4.09%	0.63
-31	921.465	958.673	997.284	4.03%	0.62
-30	865.767	900.160	935.824	3.96%	0.61
-29	813.802	845.601	878.555	3.90%	0.61
-28	765.297	794.707	825.165	3.83%	0.60
-27	719.998	747.207	775.366	3.77%	0.60
-26	677.674	702.854	728.895	3.71%	0.59
-25	638.112	661.420	685.509	3.64%	0.59
-24	601.035	622.611	644.897	3.58%	0.58
-23	566.352	586.331	606.954	3.52%	0.58
-22	533.894	552.399	571.488	3.46%	0.57
-21	503.506	520.649	538.322	3.39%	0.56
-20	475.042	490.927	507.293	3.33%	0.56
-19	448.368	463.091	478.250	3.27%	0.55
-18	423.361	437.010	451.053	3.21%	0.55
-17	399.908	412.563	425.575	3.15%	0.54
-16	377.901	389.637	401.697	3.10%	0.53
-15	357.243	368.128	379.307	3.04%	0.53
-14	337.844	347.942	358.305	2.98%	0.52
-13	319.618	328.987	338.596	2.92%	0.51
-12	302.489	311.183	320.094	2.86%	0.51
-11	286.384	294.451	302.716	2.81%	0.50
-10	271.234	278.722	286.388	2.75%	0.49
-9	256.979	263.929	271.040	2.69%	0.49
-8	243.559	250.011	256.608	2.64%	0.48
-7	230.922	236.912	243.032	2.58%	0.47
-6	219.017	224.578	230.257	2.53%	0.47
-5	207.797	212.960	218.229	2.47%	0.46
-4	197.205	201.998	206.886	2.42%	0.45
-3	187.217	191.666	196.202	2.37%	0.45
-2	177.795	181.925	186.133	2.31%	0.44
-1	168.903	172.738	176.642	2.26%	0.43
0	160.510	164.069	167.691	2.21%	0.43

1	152.592	155.897	159.256	2.16%	0.42
2	145.112	148.179	151.295	2.10%	0.41
3	138.041	140.888	143.778	2.05%	0.40
4	131.356	133.998	136.678	2.00%	0.40
5	125.034	127.484	129.970	1.95%	0.39
6	119.041	121.314	123.618	1.90%	0.38
7	113.370	115.478	117.613	1.85%	0.37
8	108.004	109.958	111.936	1.80%	0.37
9	102.922	104.733	106.566	1.75%	0.36
10	98.110	99.788	101.485	1.70%	0.35
11	93.553	95.108	96.678	1.65%	0.34
12	89.234	90.674	92.127	1.60%	0.33
13	85.139	86.472	87.816	1.55%	0.33
14	81.255	82.488	83.731	1.51%	0.32
15	77.570	78.710	79.859	1.46%	0.31
16	74.072	75.125	76.186	1.41%	0.30
17	70.751	71.724	72.703	1.37%	0.29
18	67.597	68.495	69.398	1.32%	0.29
19	64.603	65.431	66.263	1.27%	0.28
20	61.757	62.520	63.287	1.23%	0.27
21	59.053	59.756	60.461	1.18%	0.26
22	56.482	57.129	57.777	1.13%	0.25
23	54.038	54.632	55.227	1.09%	0.24
24	51.712	52.258	52.804	1.04%	0.24
25	49.500	50.000	50.500	1.00%	0.23
26	47.353	47.852	48.352	1.04%	0.24
27	45.311	45.808	46.307	1.09%	0.25
28	43.367	43.863	44.360	1.13%	0.26
29	41.518	42.011	42.505	1.18%	0.27
30	39.758	40.247	40.737	1.22%	0.29
31	38.082	38.567	39.054	1.26%	0.30
32	36.486	36.966	37.449	1.31%	0.31
33	34.966	35.441	35.918	1.35%	0.32
34	33.517	33.986	34.459	1.39%	0.33
35	32.136	32.600	33.067	1.43%	0.35
36	30.819	31.277	31.738	1.47%	0.36
37	29.564	30.015	30.470	1.52%	0.37
38	28.366	28.811	29.260	1.56%	0.38
39	27.223	27.661	28.104	1.60%	0.40
40	26.132	26.564	27.000	1.64%	0.41
41	25.091	25.515	25.944	1.68%	0.42
42	24.097	24.514	24.936	1.72%	0.43
43	23.147	23.557	23.973	1.76%	0.45
44	22.239	22.643	23.051	1.80%	0.46
45	21.372	21.769	22.170	1.84%	0.47
46	20.545	20.934	21.328	1.88%	0.49

47	19.753	20.135	20.522	1.92%	0.50
48	18.997	19.371	19.751	1.96%	0.51
49	18.273	18.640	19.014	2.00%	0.53
50	17.580	17.941	18.307	2.04%	0.54
51	16.918	17.271	17.630	2.08%	0.55
52	16.284	16.630	16.982	2.12%	0.57
53	15.676	16.016	16.362	2.16%	0.58
54	15.095	15.428	15.767	2.19%	0.59
55	14.538	14.864	15.196	2.23%	0.61
56	14.005	14.324	14.650	2.27%	0.62
57	13.494	13.807	14.125	2.31%	0.64
58	13.004	13.310	13.622	2.35%	0.65
59	12.534	12.834	13.140	2.38%	0.66
60	12.084	12.378	12.677	2.42%	0.68
61	11.653	11.940	12.234	2.46%	0.69
62	11.240	11.521	11.808	2.49%	0.71
63	10.843	11.118	11.400	2.53%	0.72
64	10.462	10.732	11.007	2.57%	0.74
65	10.097	10.361	10.630	2.60%	0.75
66	9.745	10.003	10.267	2.64%	0.76
67	9.408	9.660	9.919	2.67%	0.78
68	9.084	9.331	9.584	2.71%	0.79
69	8.772	9.014	9.261	2.75%	0.81
70	8.473	8.709	8.951	2.78%	0.82
71	8.187	8.418	8.655	2.82%	0.84
72	7.912	8.138	8.370	2.85%	0.85
73	7.647	7.869	8.096	2.88%	0.87
74	7.393	7.610	7.832	2.92%	0.88
75	7.149	7.361	7.578	2.95%	0.90
76	6.913	7.120	7.333	2.99%	0.92
77	6.686	6.889	7.097	3.02%	0.93
78	6.468	6.666	6.870	3.06%	0.95
79	6.257	6.451	6.651	3.09%	0.96
80	6.055	6.245	6.440	3.12%	0.98
81	5.861	6.047	6.237	3.16%	0.99
82	5.674	5.855	6.042	3.19%	1.01
83	5.494	5.671	5.854	3.22%	1.03
84	5.320	5.494	5.673	3.26%	1.04
85	5.153	5.323	5.498	3.29%	1.06
86	4.992	5.158	5.329	3.32%	1.07
87	4.837	4.999	5.167	3.35%	1.09
88	4.687	4.846	5.010	3.38%	1.11
89	4.542	4.698	4.859	3.42%	1.12
90	4.403	4.555	4.713	3.45%	1.14
91	4.269	4.418	4.572	3.48%	1.16
92	4.139	4.285	4.436	3.51%	1.17

93	4.014	4.157	4.304	3.54%	1.19
94	3.894	4.033	4.177	3.57%	1.21
95	3.777	3.914	4.055	3.61%	1.22
96	3.665	3.799	3.937	3.64%	1.24
97	3.557	3.688	3.823	3.67%	1.26
98	3.453	3.581	3.713	3.70%	1.27
99	3.352	3.477	3.607	3.73%	1.29
100	3.255	3.377	3.504	3.76%	1.31
101	3.161	3.281	3.405	3.79%	1.33
102	3.069	3.187	3.309	3.82%	1.34
103	2.982	3.097	3.216	3.85%	1.36
104	2.897	3.009	3.126	3.88%	1.38
105	2.815	2.925	3.039	3.91%	1.40
106	2.735	2.843	2.955	3.94%	1.41
107	2.658	2.764	2.874	3.97%	1.43
108	2.584	2.688	2.795	4.00%	1.45
109	2.512	2.614	2.719	4.03%	1.47
110	2.443	2.542	2.645	4.05%	1.49
111	2.375	2.473	2.573	4.08%	1.50
112	2.310	2.405	2.504	4.11%	1.52
113	2.247	2.340	2.437	4.14%	1.54
114	2.186	2.278	2.372	4.17%	1.56
115	2.127	2.217	2.310	4.20%	1.58
116	2.070	2.158	2.249	4.22%	1.60
117	2.015	2.101	2.190	4.25%	1.62
118	1.962	2.046	2.133	4.28%	1.63
119	1.910	1.993	2.078	4.31%	1.65
120	1.860	1.941	2.025	4.34%	1.67
121	1.811	1.890	1.973	4.36%	1.69
122	1.764	1.842	1.923	4.39%	1.71
123	1.718	1.795	1.874	4.42%	1.73
124	1.674	1.749	1.827	4.44%	1.75
125	1.631	1.705	1.781	4.47%	1.77

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