



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

品保部: \_\_\_\_\_

制造部: \_\_\_\_\_

工程部: \_\_\_\_\_

供货商/制造商

规格书制作: 鞠晓丽

业务员审核: \_\_\_\_\_

技术部审核: 程鹏

品质部审核: 李昕媛

南京时恒电子科技有限公司

地址: 南京市江宁区湖熟镇金阳路 18 号

TEL: 025-52121868

Http:// [www.shiheng.com.cn](http://www.shiheng.com.cn)

邮编: 211121

FAX: 025-52122373

[E-MAILsales@shiheng.com.cn](mailto:sales@shiheng.com.cn)



## 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

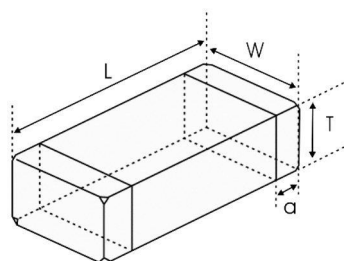


图 1 Fig.1

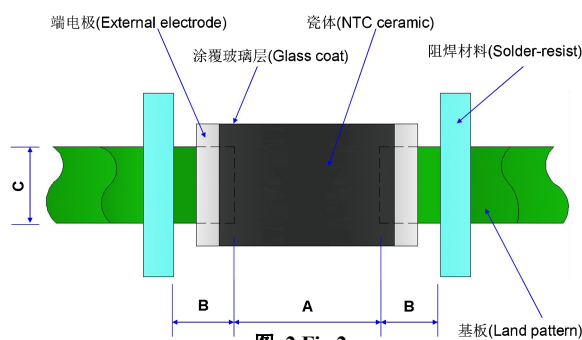


图 2 Fig.2

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

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

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

## 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：

- 环境温度：20±15℃；
- 相对湿度：65±20%；
- 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：

- 环境温度：25±2℃；
- 相对湿度：65±5%
- 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:

- Ambient Temperature: 20±15℃
- Relative Humidity: 65±20%
- Air Pressure: 86kPa to 106kPa

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

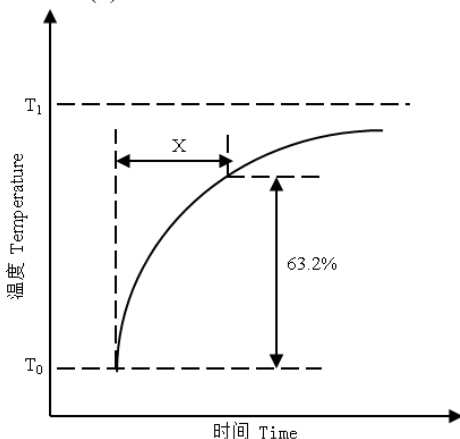
- Ambient Temperature: 25±2℃
- Relative Humidity: 65±5%
- Air Pressure: 86kPa to 106kPa

##### Inspection Equipment

Visual Examination: 20× magnifier

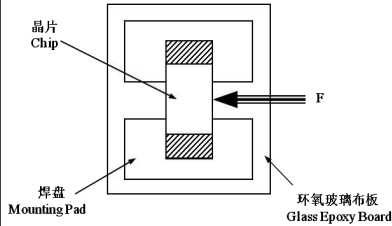
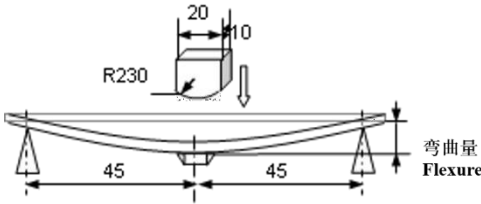
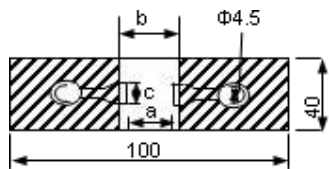
Resistance value test: Thermistor resistance tester

#### 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℃. $B(25-50^{\circ}\text{C}) = \frac{\ln R_{25} - \ln R_{50}}{\frac{1}{T_{25}} - \frac{1}{T_{50}}}$ $B(25-85^{\circ}\text{C}) = \frac{\ln R_{25} - \ln R_{85}}{\frac{1}{T_{25}} - \frac{1}{T_{85}}}$ 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 T <sub>0</sub> 与最终温度 T <sub>1</sub> 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 <sub>0</sub> (°C) to T <sub>1</sub> (°C) 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 °C through self-heated, normally expressed in milliwatts per degree Celsius (mW/°C). 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°C by self-heating at ambient temperature 25°C.
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

项目 Items	测试标准 Standard	测试方法及备注 Test Methods and Remarks	要求 Requirements																														
端头附着力 Terminal Strength	IEC 60068-2-21	<p>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.</p> <table border="1"> <thead> <tr> <th>尺寸 Size</th> <th>F</th> <th>保持时间 Duration</th> </tr> </thead> <tbody> <tr> <td>0201, X, A</td> <td>5N</td> <td rowspan="2">10±1s</td> </tr> <tr> <td>A</td> <td>10N</td> </tr> </tbody> </table>	尺寸 Size	F	保持时间 Duration	0201, X, A	5N	10±1s	A	10N	<p>端电极无脱落且瓷体无损伤。 No removal or split of the termination or other defects shall occur.</p> 																						
尺寸 Size	F	保持时间 Duration																															
0201, X, A	5N	10±1s																															
A	10N																																
抗弯强度 Resistance to Flexure	IEC 60068-2-21	<p>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;</p>  <table border="1"> <thead> <tr> <th>尺寸 Size</th> <th>弯曲变形量 Flexure</th> <th>施压速度 Pressurizing Speed</th> <th>保持时间 Duration</th> </tr> </thead> <tbody> <tr> <td>0201,</td> <td>1mm</td> <td rowspan="2">&lt;0.5mm/s</td> <td rowspan="2">10±1s</td> </tr> <tr> <td>X, A, A</td> <td>2mm</td> </tr> </tbody> </table>	尺寸 Size	弯曲变形量 Flexure	施压速度 Pressurizing Speed	保持时间 Duration	0201,	1mm	<0.5mm/s	10±1s	X, A, A	2mm	<p>① 无外观损伤。 No visible damage. ② <math> \Delta R_{25}/R_{25}  \leq 5\%</math></p> <p>单位 unit: mm</p> <table border="1"> <thead> <tr> <th>类型 Type</th> <th>a</th> <th>b</th> <th>c</th> </tr> </thead> <tbody> <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> </tbody> </table> 	类型 Type	a	b	c	0201	0.25	0.3	0.3	X	0.4	1.5	0.5	A	1.0	3.0	1.2	A	1.2	4.0	1.65
尺寸 Size	弯曲变形量 Flexure	施压速度 Pressurizing Speed	保持时间 Duration																														
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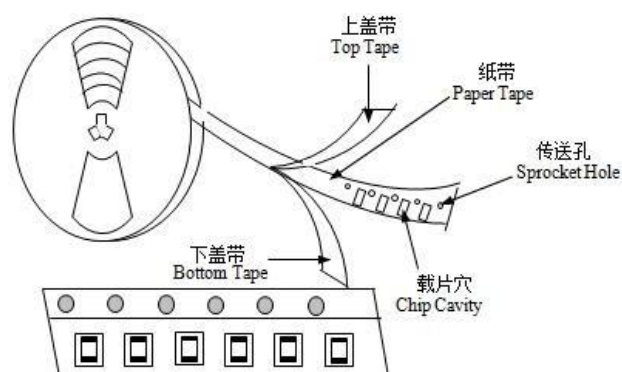
<p>振动 Vibration</p>	<p>IEC 60068-2-80</p>	<p>① 将晶片焊接在测试基板上（如右图所示的环氧玻璃布板）； Solder the chip to the testing jig (glass epoxy board shown in the left) using eutectic solder.</p> <p>② 晶片以全振幅为 1.5mm 进行振动，频率范围为 10Hz ~55 Hz； The chip shall be subjected to a simple harmonic motion having total amplitude of 1.5mm, the frequency being varied uniformly between the approximate limits of 10 and 55 Hz.</p> <p>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 3 mutually perpendicular directions (total of 6 hours).</p>	<p>无外观损伤。 No visible damage.</p>  <p>铜箔 Cu pad 阻焊膜 Solder mask 环氧玻璃布板 Glass Epoxy Board</p>															
<p>坠落 Dropping</p>	<p>IEC 60068-2-32</p>	<p>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.</p>	<p>无外观损伤。 No visible damage.</p>															
<p>可焊性 Solderability</p>	<p>IEC 60068-2-58</p>	<p>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.</p>	<p>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.</p>															
<p>耐焊性 Resistance to Soldering Heat</p>	<p>IEC 60068-2-58</p>	<p>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.</p>	<p>① 无外观损伤； No visible damage. ② <math> \Delta R_{25}/R_{25}  \leq 5\%</math> ③ <math> \Delta B/B  \leq 2\%</math></p>															
<p>温度周期 Temperature cycling</p>	<p>IEC 60068-2-14</p>	<p>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.</p> <table border="1" data-bbox="491 1429 1040 1621"> <thead> <tr> <th>步骤 Step</th> <th>温度 Temperature</th> <th>时间 Time</th> </tr> </thead> <tbody> <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> </tbody> </table> <p>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.</p>	步骤 Step	温度 Temperature	时间 Time	1	-40±5℃	30±3min	2	25±2℃	5±3min	3	125±2℃	30±3min	4	25±2℃	5±3min	<p>① 无外观损伤； No visible damage. ② <math> \Delta R_{25}/R_{25}  \leq 3\%</math> ③ <math> \Delta B/B  \leq 2\%</math></p>
步骤 Step	温度 Temperature	时间 Time																
1	-40±5℃	30±3min																
2	25±2℃	5±3min																
3	125±2℃	30±3min																
4	25±2℃	5±3min																
<p>高温存放 Resistance to dry heat</p>	<p>IEC 60068-2-2</p>	<p>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.</p>	<p>① 无外观损伤； No visible damage. ② <math> \Delta R_{25}/R_{25}  \leq 5\%</math> ③ <math> \Delta B/B  \leq 2\%</math></p>															

低温存放 Resistance to cold	IEC 60068-2-1	① 在 $-40\pm 3^{\circ}\text{C}$ 空气中, 无负载放置 $1000\pm 24$ 小时。 $-40\pm 3^{\circ}\text{C}$ in air, for $1000\pm 24$ 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 $ \Delta R25/R25  \leq 5\%$ ③ $ \Delta B/B  \leq 2\%$
湿热存放 Resistance to damp heat	IEC 60068-2-78	① 在 $40\pm 2^{\circ}\text{C}$ , 相对湿度 90~95%空气中, 无负载放置 $1000\pm 24$ 小时。 $40\pm 2^{\circ}\text{C}$ , 90~95%RH in air, for $1000\pm 24$ 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 $ \Delta R25/R25  \leq 3\%$ ③ $ \Delta B/B  \leq 2\%$
高温负荷 Resistance to high temperature load	IEC 60539-1 5.25.4	① 在 $85\pm 2^{\circ}\text{C}$ 空气中, 施加允许工作电流 $1000\pm 48$ 小时。 $85\pm 2^{\circ}\text{C}$ in air with permissive operating current for $1000\pm 48$ 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 $ \Delta R25/R25  \leq 5\%$ ③ $ \Delta B/B  \leq 2\%$

## 7 编带 Taping

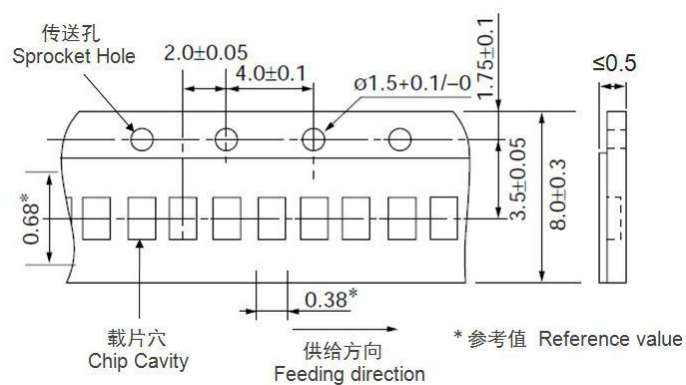
类型 Type	0201	X	A	A
编带厚度 Tape thickness(mm)	$0.5\pm 0.15$	$0.5\pm 0.15$	$0.8\pm 0.15$	$0.85\pm 0.2$
编带材质 Tape material	纸带 Paper Tape			
每盘数量 Quantity per Reel	15K	10K	4K	4K

### (1) 编带图 Taping Drawings

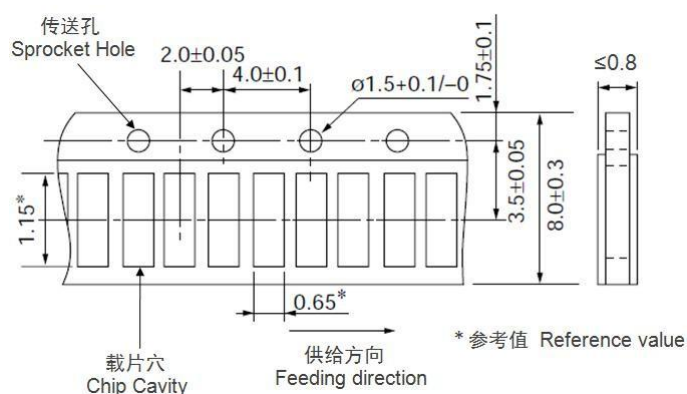


## (2) 纸带尺寸 Paper Tape Dimensions (单位 Unit: mm)

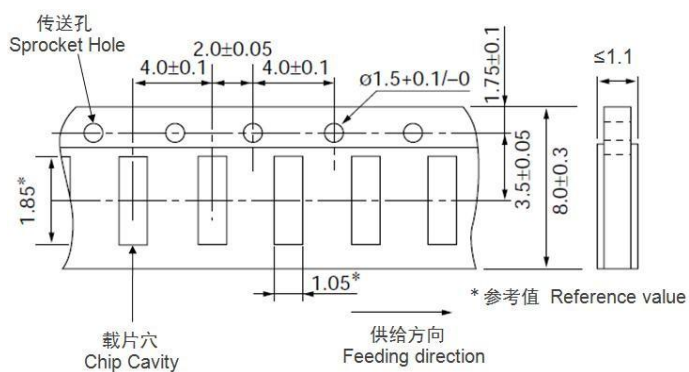
CMF0201 系列 CMF0201 series



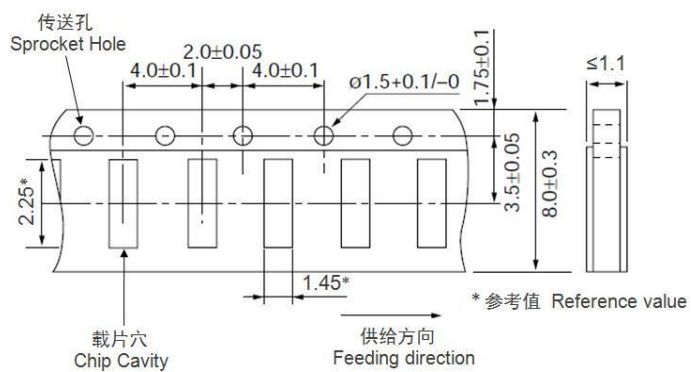
CMFX 系列 CMFX series



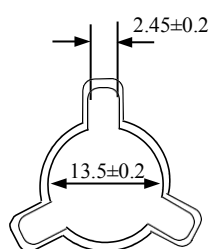
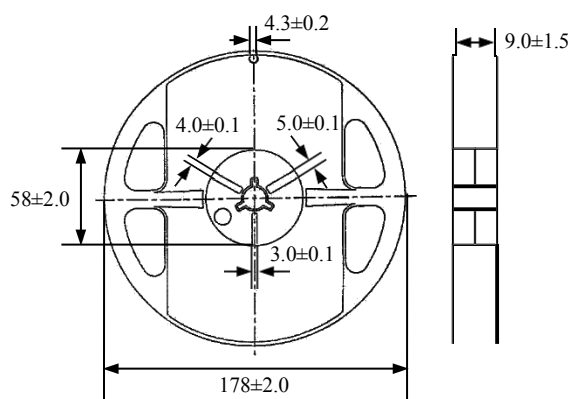
CMFA 系列 CMFA series



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:  $-10^{\circ}\text{C} \sim 40^{\circ}\text{C}$
  - b. 相对湿度:  $\leq 75\% \text{RH}$
  - c. 避免接触粉尘、腐蚀性气氛和阳光
- **储存期限: 6 个月**

## 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。

## 8 Storage

- **Storage Conditions**
  - a. Storage Temperature:  $-10^{\circ}\text{C} \sim 40^{\circ}\text{C}$
  - b. Relative Humidity:  $\cong 75\% \text{RH}$
  - c. Keep away from corrosive atmosphere and sunlight.
- **Period of Storage: 6 Months**

## 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°C/sec.

预热: 150~170°C/90±30 sec.

大于 240°C时间: 20~40sec

峰值温度: 最高 260°C/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°C/sec. Ramp

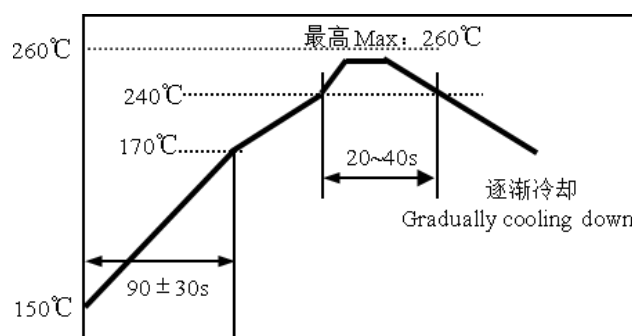
Pre-heating: 150~170°C/90±30 sec.

Time above 240°C: 20~40 sec.

Peak temperature: 260°CMax./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°C/60sec.

烙铁头温度: 最高 280°C

焊接时间: 最多 3sec.

焊锡: Sn/3.0Ag/0.5Cu

手工焊: 最多 1次

### • Iron Soldering Profile

Iron soldering power: Max.20W

Pre-heating: 150°C/60sec.

Soldering Tip temperature: 280°CMax.

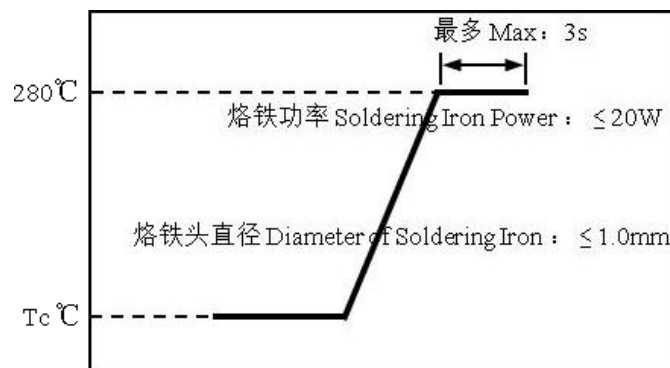
Soldering time: 3 sec Max.

Solder paste: Sn/3.0Ag/0.5Cu

Max.1 times for iron soldering

[注: 不要使烙铁头接触到端头]

[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. (°C)	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.(°C)
-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