

承 认 书

APPROVAL SHEET

客户名称:			
Customer Name			
产品名称:	片式负温度系数热敏电阻器		
Product Name	CHIP NTC THERMISTOR		
制造商料号:	CMFB103F3950FANT		
Manufacturer P/N			
客户料号:	/		
Customer P/N			
版本号:	15.01	标准类型:	<input checked="" type="checkbox"/> 标准品 Standard product
Version No.		Standard type	<input type="checkbox"/> 非标准品 Custom product

制造厂商		
Manufacturer		
拟制 Draft	审核 Check	
	品管部	技术部
林晓华	徐雪枫	岑权进
日期 Date	2016-2-19	2016-2-19

客户承认印章	
APPROVAL SIGNET	
日期 Date	

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Note: Please confirm and sign back, if not we will consider the acceptance as our standard.

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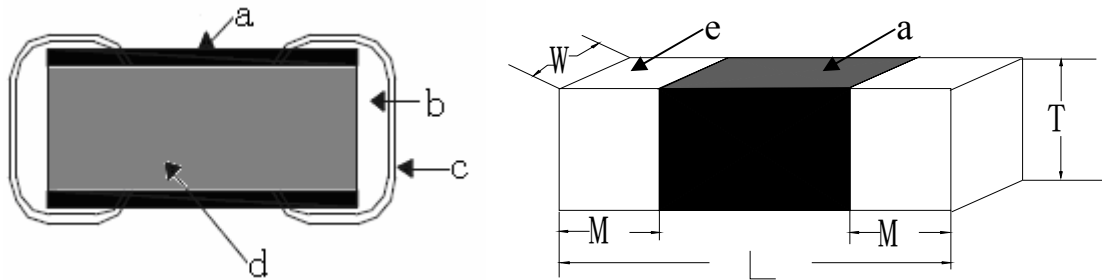


【 样单号 Sample No: 】

履 历 表 Resume

版本 Version No.	修改 明 细 Modify Details	日 期 Date
15.01	首次发行 Initial issue	2015-02-01

1 外形尺寸与内部结构 Dimension & Inner-configuration:



- a. 玻璃层: Gass layer
- b. 银层 Ag layer
- c. 镀层 Ni/Sn plating
- d. NTC 瓷体 NTC or ceramic
- e. 端电极 Terminal electrode

序号 No.	部位 Component		材料 Material
1	NTC瓷体 NTC or ceramic		锰钴镍 Mn-Co- Ni
2	玻璃层: Gass layer		硅铋系 Si-Bi
3	端电极	银层 Ag laye	银 Ag
	Terminal electrode	电镀层 Ni/Sn plating	镍层-锡层 Ni-Sn

单位 Unit: mm (inch)

型号 Size	L	W	T	M
0402	1.0 ± 0.15 (0.040 ± 0.006)	0.5 ± 0.10 (0.020 ± 0.004)	0.5Max. (0.020Max.)	0.10Min. (0.004Min.)
0603	1.6 ± 0.15 (0.063 ± 0.006)	0.8 ± 0.15 (0.031 ± 0.006)	0.95Max. (0.037Max.)	0.10Min. (0.004Min.)
0805	2.0 ± 0.20 (0.08 ± 0.008)	1.25 ± 0.20 (0.05 ± 0.008)	1.25Max. (0.05Max.)	0.15Min. (0.006Min.)
1206	3.2 ± 0.20 (0.126 ± 0.008)	1.6 ± 0.20 (0.063 ± 0.008)	1.50Max. (0.060Max.)	0.20Min. (0.008Min.)

2 产品品名构成 Product Spec. Model

CMF X XXX X XXXX X X X X
 ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨

① 产品代号：表示片式负温度系数热敏电阻

Product Code: Chip NTC Thermistor

② 尺寸规格代码

Size Code

代码/Code	D	A	B	C
尺寸 (英制) Size (Inches)	0402	0603	0805	1206

③ 标称电阻值 为 25℃时的零功率电阻，单位为 Ω ，
前二位为有效数字，第三位数字表示有效数字后“0”的个数。

Rated zero-power resistance(R_{25}) Unit: Ω

The first two are significant figure of resistance and the third one expresses number of following zeros.

④ 阻值公差代码 (%)

Tolerance of R_{25} (%)

代码/ Code	E	F	G	H	J	K	X
阻值公差 Tolerance of R_{25}	±0.5	±1.0	±2.0	±3.0	±5.0	±10.0	特殊公差

⑤ B 值常数,单位为 K

B value constant Unit:K

⑥ B 值精度代码(%)

Tolerance of B value(%)

代码/ Code	E	F	G	H	J	X
B 值公差 Tolerance of B value	±0.5	±1.0	±2.0	±3.0	±5.0	特殊公差

⑦ B 值温度代码 (°C/°C)

B value Temperature Code

代码/ Code	A	B	C	D	E	F	G	H	M	N
T_1/T_2	25/50	25/ 85	0/25	0/50	0/100	0/80	25/100	-18/25	-20/25	5/25

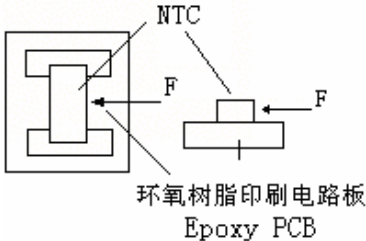
⑧ 端电极材料代号：N—三层电极

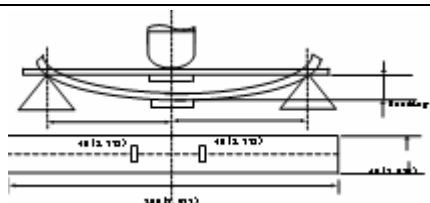
Termination Code: N—Nickel Barrier

⑨ 包装方式代码：T—编带包装、B—散包装

Packaging style Code: T—Tape & Reel、B—Bulk

4 可靠性试验项目 Reliability Testing Items

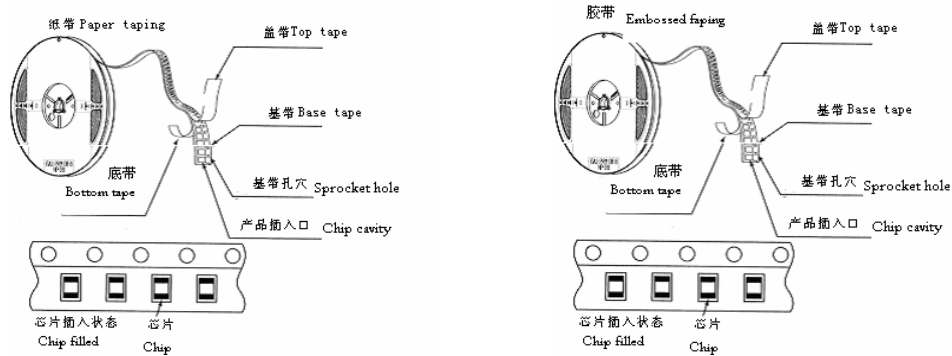
序号 No.	项目 Items	要求 Requirements	试验方法及备注 Test Methods and Remarks															
1	工作温度范围 Operating Temperature Range	-40℃~+120℃																
2	可焊 Solder ability	至少 95%端电极表面被焊锡覆盖。 At least 95% of terminal electrode should be covered with solder	预热温度:100℃~150℃ 预热时间:1~2Min. 焊锡温度: 245±5℃ 浸锡时间: 5±0.5s Preheating Temp. :100℃~150℃ Preheating Time: 1~2min. Soldering Temp. : 260±5℃ Immersion Time: 5±0.5s															
3	耐焊接热 Resistance to Soldering	至少 90%的焊锡覆盖在端电极表面, 无可见机械损伤。 R ₂₅ 变化率小于±5% B 值(B _{25/50}) 变化率小于±2% At least 90% of terminal electrode should be covered with solder. No mechanical damage. R ₂₅ change shall be less than±5%; B-constant(B _{25/50})change shall be less than ±2%.	预热温度:100℃~150℃ 预热时间:1~2Min. 焊锡温度: 260±5℃ 浸锡时间: 10±0.5s Preheating Temp. : 100℃~150℃ Preheating Time:1~2min. Soldering Temp. : 260±5℃ Immersion Time: 10±1s															
4	端电极强度 External Electrode Strength	瓷体及端头均不受破坏 Ceramic and termination shall not be damaged.	 <p>环氧树脂印刷电路板 Epoxy PCB</p> <table border="1"> <thead> <tr> <th>类型 Type</th> <th>推力(N) Force (N)</th> <th>时间(s) Time (s)</th> </tr> </thead> <tbody> <tr> <td>0402</td> <td>5</td> <td>5±1</td> </tr> <tr> <td>0603</td> <td>5</td> <td>5±1</td> </tr> <tr> <td>0805</td> <td>10</td> <td>5±1</td> </tr> <tr> <td>1206</td> <td>10</td> <td>5±1</td> </tr> </tbody> </table>	类型 Type	推力(N) Force (N)	时间(s) Time (s)	0402	5	5±1	0603	5	5±1	0805	10	5±1	1206	10	5±1
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0402	5	5±1																
0603	5	5±1																
0805	10	5±1																
1206	10	5±1																

序号 No.	项目 Items	要求 Requirements	试验方法及备注 Test Methods and Remarks						
5	振动 Vibration	无可见机械损伤; R_{25} 变化率小于 $\pm 5\%$; B 值 ($B_{25/50}$) 变化率小于 $\pm 2\%$. No visible mechanical damage ; R_{25} change shall be less than $\pm 5\%$; B-constant($B_{25/50}$)change shall be less than $\pm 2\%$.	振动频率范围:10Hz~55Hz~10Hz 全振幅: 1.52mm 时间:X\Y\Z 轴各 2hrs Frequency:10Hz~55Hz~10Hz Amplitude: 1.52mm Time: Vibrated for a period of 2hrs,in three directions perpendicularly intersecting each other.						
6	抗弯强度 Resistance to flexure	无可见机械损伤; R_{25} 变化率小于 $\pm 5\%$; B 值 ($B_{25/50}$) 变化率小于 $\pm 2\%$. No visible mechanical damage; R_{25} change shall be less than $\pm 5\%$; B-constant($B_{25/50}$)change shall be less than $\pm 2\%$.	 <table border="1" data-bbox="1005 884 1412 1008"> <thead> <tr> <th>规格 Size code</th> <th>弯曲度 h (mm) Camber (mm)</th> </tr> </thead> <tbody> <tr> <td>0402、0603</td> <td>0.7</td> </tr> <tr> <td>0805、1206</td> <td>1.0</td> </tr> </tbody> </table> 条件: 测试基板 (PCB) 施压速度:0.5mm/s Condition: print circuit board. Pressing speed: 0.5 mm/s	规格 Size code	弯曲度 h (mm) Camber (mm)	0402、0603	0.7	0805、1206	1.0
规格 Size code	弯曲度 h (mm) Camber (mm)								
0402、0603	0.7								
0805、1206	1.0								
7	跌落 Drop	无可见机械损伤; R_{25} 变化率小于 $\pm 5\%$; B 值 ($B_{25/50}$) 变化率小于 $\pm 2\%$. No visible mechanical damage; R_{25} change shall be less than $\pm 5\%$; B-constant($B_{25/50}$)change shall be less than $\pm 2\%$.	从高度为 1 米的空中自由落到混凝土地板, 重复 10 次 Drop 10 times on a concrete floor from a high of 1m.						
8	耐高温 Resistance to High Temperature	外观无可见损伤; R_{25} 变化率小于 $\pm 5\%$; B 值 ($B_{25/50}$) 变化率小于 $\pm 2\%$. No visible damage ; R_{25} change shall be less than $\pm 5\%$; B-constant($B_{25/50}$)change shall be less than $\pm 2\%$.	温度: $125 \pm 2^\circ\text{C}$ (无负荷) 试验时间: 500 ± 2 hrs Temp. : $125 \pm 2^\circ\text{C}$ (No Load) Time : 500 ± 2 hrs						

序号 No.	项目 Items	要求 Requirements	试验方法及备注 Test Methods and Remarks															
9	耐低温 Resistance to High Temperature	外观无可见机械损伤; R ₂₅ 变化率小于±5% B 值 (B _{25/50}) 变化率小于±2% No visible mechanical damage; R ₂₅ change shall be less than±5%; B-constant(B _{25/50})change shall be less than ±2%.	在-40±2℃的条件下放置 500±2hrs Temp. : -40±2℃ Time : 500±2hrs															
10	恒定湿热 Static Humidity	外观无可见机械损伤; R ₂₅ 变化率小于±5%; B 值 (B _{25/50}) 变化率小于±2%. No visible mechanical damage; R ₂₅ change shall be less than±5%; B-constant(B _{25/50})change shall be less than ±2%.	在下列条件下放置 500±2hrs 温度: 55±2℃ 湿度: 90~95%RH Temp. : 55±2℃ Humidity : 90~95%RH Time : 500±2hrs															
11	温度循环 Temperature cycling	外观无可见损伤; R ₂₅ 变化率小于±5%; B 值 (B _{25/50}) 变化率小于±2% No visible damage ; R ₂₅ change shall be less than ±5%; B-constant(B _{25/50})change shall be less than ±2%.	无负荷, 在下列条件循环 32 次 cycles without load <table border="1" data-bbox="932 1200 1433 1507"> <thead> <tr> <th>阶段 Step</th> <th>温度 Temp.</th> <th>时间 Time (Min.)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>-40℃</td> <td>30±3</td> </tr> <tr> <td>2</td> <td>室温/Room Temp</td> <td>10±2</td> </tr> <tr> <td>3</td> <td>+125℃</td> <td>30±3</td> </tr> <tr> <td>4</td> <td>室温/Room Temp</td> <td>10±2</td> </tr> </tbody> </table>	阶段 Step	温度 Temp.	时间 Time (Min.)	1	-40℃	30±3	2	室温/Room Temp	10±2	3	+125℃	30±3	4	室温/Room Temp	10±2
阶段 Step	温度 Temp.	时间 Time (Min.)																
1	-40℃	30±3																
2	室温/Room Temp	10±2																
3	+125℃	30±3																
4	室温/Room Temp	10±2																
<p>注: 以上要求测试电性能的项目, 应试验后在标准条件下放置 24 小时后测试。</p> <p>Note: When there are questions concerning, measurement shall be made after 24±2hrs of recovery under the standard condition.</p>																		

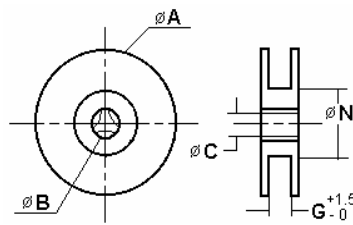
5 产品包装 Packaging

1) 编带图 Taping drawings

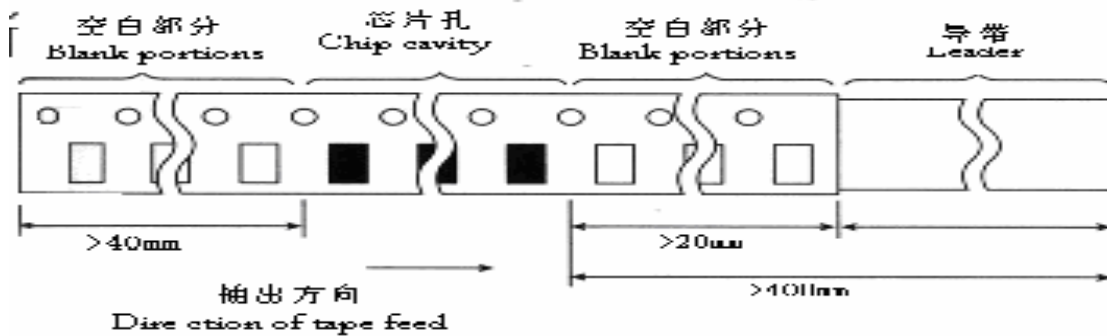


2) 卷盘尺寸 Reel dimensions (Unit:mm)

	A	B	C	N	G
CF-8	178 ±2.0	22.0 ±2.0	12.5 ±1.5	57 ±2.0	8

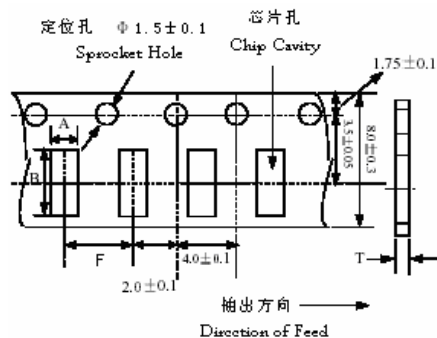


3) 导带及空格部分 Leader and blank portion



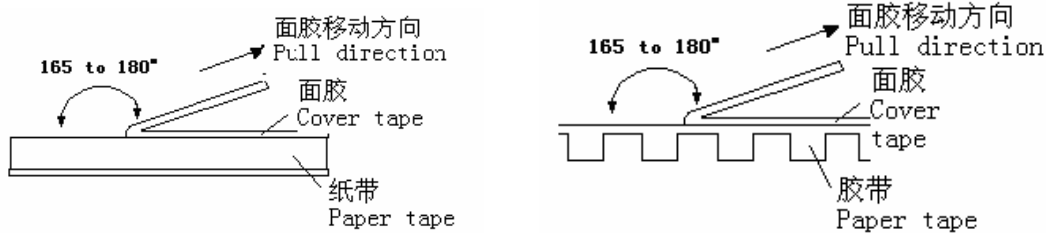
4) 编带尺寸 Taping dimensions (Unit: mm)

纸带 Paper tape



Part NO.	A	B	F	T
0402	0.65±0.1	1.15±0.1	2.0±0.05	0.8max
0603	1.1±0.2	1.9±0.2	4.0±0.2	1.1max
0805	1.5±0.2	2.3±0.2	4.0±0.2	1.1max
1206	1.9±0.2	3.5±0.2	4.0±0.2	1.1max

5) 剥离力检验 Peeling off force



(1) 盖带的剥离力：沿面胶移动方向拉时要求剥离力为 0.1N~0.7N。

Peeling force should be 0.1~0.7N pulling in the direction of arrow.

(2) 剥离速度：300mm/min

Speed of peeling off: 300mm/min.

(在胶带、纸带剥落时，面胶不能有破损，不能粘纸带。

The cover bond should not be damaged and bond the tape when it peeled off.

6) 包装数量 (单位：粒) Packaging number (Unit: Pcs)

类型 SIZE	1206	0805	0603	0402
每卷数量 REEL	4000	4000	4000	10000
每盒数量 BOX	40000	40000	40000	100000
每箱数量 CASE	240000	240000	240000	600000

7) 标签粘贴位置 Label stick station

卷盘标签	纸盒标签	纸盒标签	外箱标签
			

6 推荐焊接条件 Recommend Soldering Conditions

6.1 焊接要求 Soldering conditions

(1) 预热时，产品表温与焊料温度的温差最大不允许超出 150℃，焊接完冷却时，产品表温与溶剂温度之间的温差最大不超过 100℃。预热不足有可能引发产品表面裂纹，从而导致产品品质下降。

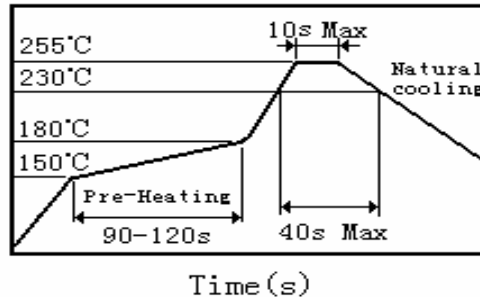
Pre-heating should be in such a way that the temperature difference between solder and ferrite surface is limited to 150℃ max. Also cooling into solvent after soldering should be in such way that the temperature difference is limited to 100℃ max. Un-enough pre-heating may cause cracks on the ferrite, resulting in the deterioration of product quality.

(2) 产品要在以下画出的曲线允许的范围进行焊接。其它焊接条件可能引起产品电极的腐蚀。当焊接重复时，允许的时间为第一次做的累计时间。

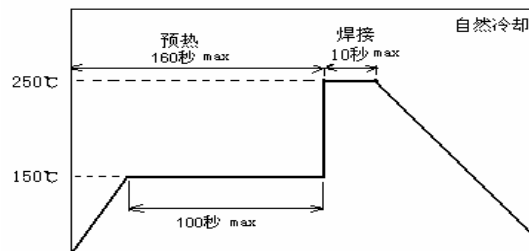
Products should be soldered within the following allowable range indicated by the slanted line. The excessive

soldering conditions may cause the corrosion of the electrode. When soldering is repeated, allowable time is the accumulated time.

6.2 回流焊曲线 Reflow soldering profile



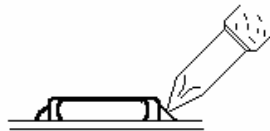
6.3 波峰焊曲线 Flow soldering profile



6.4 手工焊接 Iron soldering

烙铁温度: 350°C Perform soldering at 350°C on 30W max
 功率: 最大为 30W Time: < 5S
 烙铁停留时间: < 5S

注意: 烙铁头不得与瓷体直接接触 Caution: Do not allow the iron-tip to directly touch the ceramic body.



6.5 清洗条件 Cleaning Conditions

清洗温度: 60°C (最高) Cleaning temperature: 60°C max
 清洗时间: 1 分钟 (最少) Cleaning time: 1 minute min.

超声波功率: 最大为 200W Ultrasonic output power: 200W max

6.6 PC 板的设计 PCB design

(1) 当片式 NTCR 被安装在 PC 板上后, 所使用的焊料的量 (焊盘的大小) 会直接影响到片式 NTCR 的性能, 因此在设计基板时, 必须慎重考虑焊盘的大小和配置, 这些对组成基板的焊料的量有着决定的作用, 过量的焊料会影响到芯片耐机械应力的能力。

When chip thermistors are mounted on a PCB, the amount of solder used(size of fillet) can directly affect thermistor performance Therefore, when design land- patterns it is necessary to consider the appropriate size and configuration of the solder pads, which determines the amount of solder necessary to form the fillets. Excess solder can affect the ability of chips to withstand mechanical stress.

②基板配置: 将片式 NTCR 安装在板上之后, 芯片将承受在下一加工过程中产生的机械应力, 出于这个原因, 在设计焊盘和片式 NTCR 的位置时, 应注意考虑将应力减少到最低点。

Pattern configurations: After chip thermistor have been mounted on the board, chips can be subject to mechanical stresses in subsequent manufacturing process, for this reason, planning pattern configurations and the position of SMD thermistors should be carefully performed to minimize stress.

6.7 自动安装应考虑到的问题 Considerations for automatic placement.

①在将片式 NTCR 安装在 PC 板上时，不能让其承受过量的冲击力。

Excessive impact load should not be imposed on the thermistor when mounting on the PCB.

②应定期对安装机器进行维护和检查。

The maintenance and inspection of the mounting devices should be conducted periodically.

③当 PC 板沿着接缝孔切割开时，片式 NTCR 所受机械应力的的大小因使用的方法不同而不同。以下方法按应力从小到大进行排列：推板、割裂、V 形凹槽、接缝孔。因此。任何理想的片式 NTCR 的布局必须考虑到 PC 板的分割方法。

When beating PCB along their perforations, the amount of mechanical stress on the thermistor can vary according to the method used. The following methods are listed in order from least stressful to most stressful: push-back, slit, v-grooving, and perforation. Thus, any ideal SMD thermistor layout must also consider the PCB splitting procedure.

6.8 焊膏的印刷 printing solder paste

①焊膏的印刷厚度建议在 $150\mu\text{m}\sim 200\mu\text{m}$ 。

Recommendable thickness of solder paste printing should from $150\mu\text{m}$ to $200\mu\text{m}$.

②焊接后，爬锡高度为 0.2mm 至本产品的厚度。

After soldering, the solder fillet shall be a height from 0.2mm to the thickness of chip thermistor.

③过多的焊料将给本产品过大的机械应力，这些应力将导致断裂或机械损伤，也可能破坏产品的电性能。

Too much solder gives too strong mechanical stress to chip thermistor, such stress may cause cracking or any mechanical damage. And also, it can destroy the electrical performance of this product.

6.9 粘合剂作用和处理 Adhesive Application and curing

①在流体焊过程中，如果黏性不好或粘合剂不够坚硬，可能会导致产品和底板松散连接。

If insufficient adhesive is applied or if the adhesive is not sufficiently hardened this product may have a loose contact with the land, during flow soldering.

②黏胶的黏性太低将导致焊接后产品在板上滑动。

Too low viscosity of adhesive causes chip thermistor to slip on board, after mounting.

7 存储要求 Storage Requirements

1) 存储期限 Storage period

距电感公司出厂检验时间 6 个月内，产品可以使用检验时间可以通过包装外侧标记的检验号确认。若时间超过 6 个月，应检查焊接性能后方可使用。

Products which inspected in INDUCTOR COMPANY over 6 months ago should be examined and used, which can be Confirmed with inspection No. marked on the container. Solder ability should be checked if this period is exceeded.

2) 存储条件 Storage conditions

(1) 存放货物的库房应满足以下条件：温度： $-10\sim +40^{\circ}\text{C}$ ，相对湿度： $30\sim 70\%$ 。

Products should be storage in the warehouse on the following conditions:

Temperature : $-10\sim +40^{\circ}\text{C}$ Humidity: $30\sim 70\%$ relative humidity

(2) 禁止将产品保管在腐蚀性物质中，如硫磺、氯气或酸，否则将引起端头氧化，导致降低焊接性。

Don't keep products in corrosive gases such as sulfur, chlorine gas or acid , or it may case oxidization of Electrodes resulting in poor solder ability.

(3) 为了避免受潮气、灰尘等物质的影响，产品应保管于货架上。

Products should be stored on the palette for the prevention of the influence from humidity, dust and so on.

(4) 产品保管在库房中，应避免热冲击、振动以及直接光照等等。

Products should be stored in the warehouse without heat shock, vibration, direct sunlight and so on.

(5) 产品应密封包装。

Products should be stored under the airtight packaged condition.

8 ODS（消耗臭氧层物质）的使用情况 Usage Of ODS

1) 对于以下所列物质，我公司在生产过程中绝不使用。

ODS: CCl₄（四氯化碳）、HCFC 等。

For ODS listed below , we don't use in process。

ODS: CCl₄, HCFC, etc.

9 注意事项 Notes

(1) 若本次承认的为“整体无铅”产品，则表明该产品符合RoHS指令的要求。

If the parcel label on product is "Unitary lead free" that indicate the products in accord with ROHS appointed requests.

(2) 本承认书保证我司产品作为一个单体时的质量情况，当我司产品被安装到贵司产品上时请保证贵司的产品已根据贵司的规范进行了有效评价和确认。

This product specification guarantees the quality of our product as a single unit, Please make sure that your product has been evaluated and confirmed against your specifications when our product is mounted to your product.

(3) 如果贵司对我司产品的试用已超过了本测试规范所界定的产品功能，对于此所引发的失效我司将不予保证。

We can't warrant against failure caused by any use of our product that deviates from the intended use as described in this product specification.

附表 1

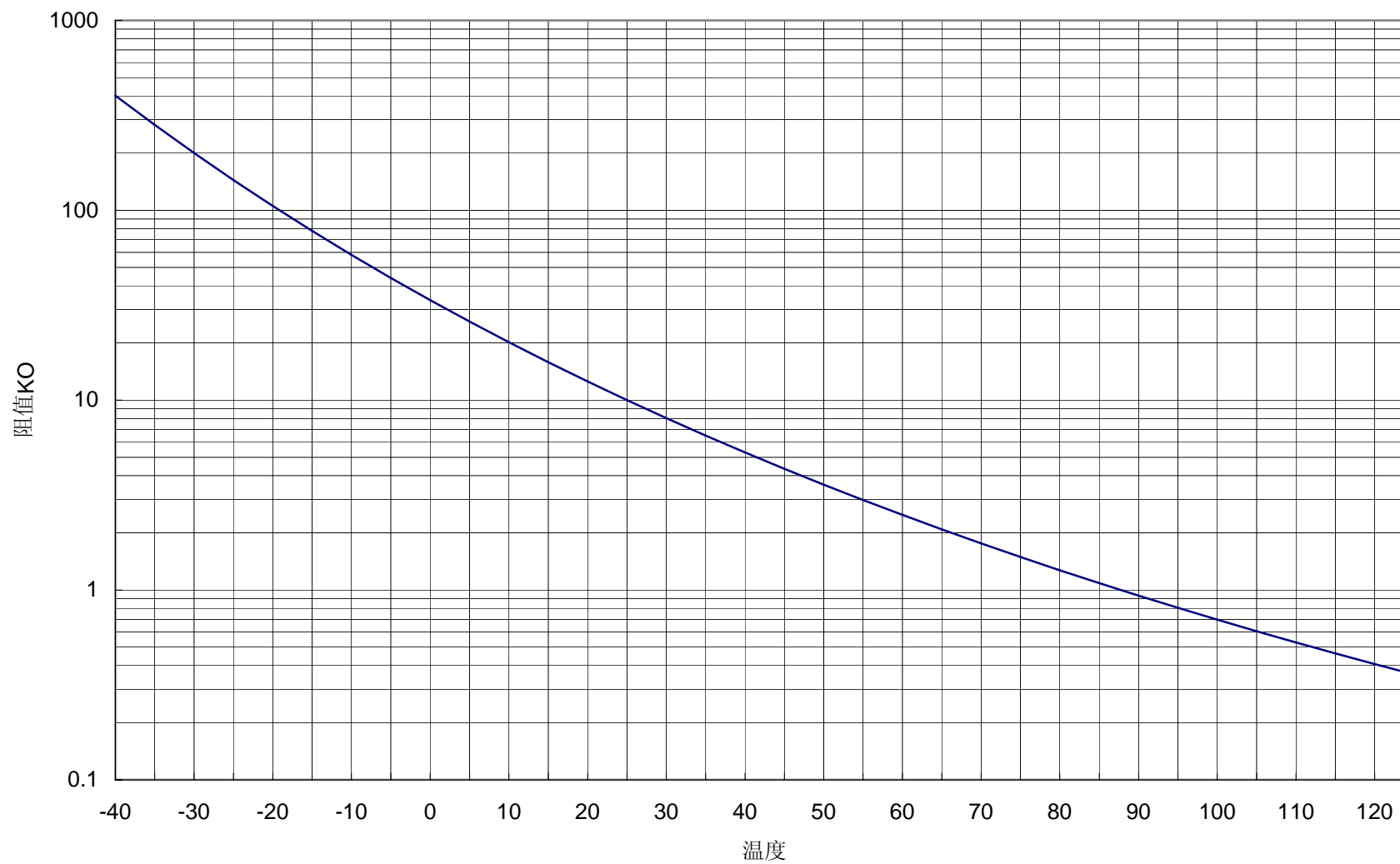
阻温特性表

R25=10K Ω 精度:±1% B25/50=3950K B25/85=4021K 精度:±1%(P163-6)

温度(°C)	电阻(K Ω)			电阻精度(%)		温度精度(°C)	
	最小值	中心值	最大值	ΔR	$-\Delta R$	ΔT	$-\Delta T$
-55	554.685	583.542	613.839	5.191	-4.945	0.747	-0.711
-54	527.487	554.647	583.148	5.138	-4.896	0.743	-0.708
-53	501.420	526.968	553.762	5.084	-4.848	0.738	-0.704
-52	476.462	500.480	525.656	5.030	-4.799	0.734	-0.700
-51	452.590	475.159	498.802	4.975	-4.749	0.729	-0.696
-50	429.779	450.974	473.167	4.921	-4.699	0.725	-0.692
-49	408.000	427.897	448.718	4.866	-4.649	0.720	-0.688
-48	387.224	405.892	425.419	4.810	-4.599	0.716	-0.684
-47	367.418	384.927	403.231	4.755	-4.548	0.711	-0.680
-46	348.551	364.967	382.118	4.699	-4.497	0.706	-0.676
-45	330.589	345.975	362.039	4.643	-4.446	0.701	-0.672
-44	313.501	327.915	342.957	4.587	-4.395	0.697	-0.667
-43	297.251	310.751	324.831	4.531	-4.344	0.692	-0.663
-42	281.808	294.448	307.623	4.474	-4.292	0.687	-0.659
-41	267.138	278.969	291.294	4.418	-4.240	0.682	-0.654
-40	253.208	264.279	275.806	4.361	-4.189	0.677	-0.650
-39	239.986	250.344	261.122	4.305	-4.137	0.671	-0.645
-38	227.442	237.130	247.205	4.248	-4.085	0.666	-0.641
-37	215.545	224.603	234.019	4.192	-4.033	0.661	-0.636
-36	204.264	212.733	221.531	4.135	-3.981	0.656	-0.631
-35	193.571	201.487	209.706	4.079	-3.928	0.650	-0.626
-34	183.437	190.836	198.512	4.022	-3.876	0.645	-0.622
-33	173.837	180.750	187.919	3.966	-3.824	0.640	-0.617
-32	164.743	171.201	177.895	3.909	-3.772	0.634	-0.612
-31	156.131	162.163	168.412	3.853	-3.720	0.629	-0.607
-30	147.976	153.610	159.443	3.797	-3.667	0.623	-0.602
-29	140.255	145.516	150.960	3.741	-3.615	0.617	-0.597
-28	132.946	137.858	142.938	3.684	-3.563	0.612	-0.591
-27	126.027	130.614	135.354	3.628	-3.511	0.606	-0.586
-26	119.480	123.761	128.184	3.573	-3.459	0.600	-0.581
-25	113.283	117.280	121.405	3.517	-3.407	0.594	-0.575
-24	107.419	111.149	114.997	3.461	-3.355	0.588	-0.570
-23	101.870	105.351	108.939	3.406	-3.303	0.582	-0.565
-22	96.619	99.867	103.214	3.351	-3.252	0.576	-0.559
-21	91.650	94.681	97.801	3.296	-3.200	0.570	-0.553
-20	86.949	89.776	92.686	3.241	-3.149	0.564	-0.548
-19	82.500	85.137	87.850	3.186	-3.097	0.558	-0.542
-18	78.290	80.750	83.279	3.131	-3.046	0.551	-0.536
-17	74.306	76.600	78.958	3.077	-2.995	0.545	-0.530

TEMPERATU
RE(°C)

CMFB103F3950FANT



阻温特性表

R25=10K Ω 精度:±1% B25/50=3950K B25/85=4021K 精度:±1%(P163-6)

温度(°C)	电阻(K Ω)			电阻精度(%)		温度精度(°C)	
	最小值	中心值	最大值	ΔR	$-\Delta R$	ΔT	$-\Delta T$
-16	70.536	72.676	74.873	3.023	-2.944	0.539	-0.524
-15	66.968	68.963	71.011	2.969	-2.893	0.532	-0.518
-14	63.591	65.451	67.360	2.915	-2.842	0.526	-0.512
-13	60.394	62.129	63.907	2.861	-2.791	0.519	-0.506
-12	57.369	58.986	60.643	2.808	-2.741	0.512	-0.500
-11	54.504	56.012	57.555	2.755	-2.691	0.506	-0.494
-10	51.793	53.198	54.635	2.702	-2.640	0.499	-0.488
-9	49.225	50.534	51.873	2.649	-2.590	0.492	-0.481
-8	46.793	48.013	49.260	2.597	-2.541	0.485	-0.475
-7	44.490	45.627	46.788	2.544	-2.491	0.478	-0.468
-6	42.309	43.368	44.449	2.492	-2.441	0.471	-0.462
-5	40.243	41.229	42.235	2.440	-2.392	0.464	-0.455
-4	38.285	39.204	40.140	2.389	-2.343	0.457	-0.449
-3	36.430	37.285	38.157	2.337	-2.294	0.450	-0.442
-2	34.672	35.468	36.279	2.286	-2.245	0.443	-0.435
-1	33.005	33.747	34.501	2.235	-2.196	0.436	-0.428
0	31.426	32.116	32.817	2.185	-2.148	0.428	-0.421
1	29.928	30.570	31.222	2.134	-2.100	0.421	-0.414
2	28.507	29.105	29.711	2.084	-2.052	0.414	-0.407
3	27.160	27.716	28.280	2.034	-2.004	0.406	-0.400
4	25.882	26.399	26.923	1.985	-1.956	0.399	-0.393
5	24.670	25.150	25.637	1.935	-1.908	0.391	-0.386
6	23.519	23.965	24.418	1.886	-1.861	0.383	-0.378
7	22.427	22.842	23.262	1.837	-1.814	0.376	-0.371
8	21.391	21.776	22.165	1.789	-1.767	0.368	-0.364
9	20.407	20.764	21.125	1.740	-1.720	0.360	-0.356
10	19.452	19.783	20.117	1.691	-1.673	0.353	-0.349
11	18.584	18.892	19.203	1.644	-1.627	0.344	-0.341
12	17.741	18.026	18.314	1.596	-1.581	0.336	-0.333
13	16.940	17.204	17.471	1.549	-1.535	0.328	-0.325
14	16.178	16.423	16.670	1.502	-1.489	0.320	-0.318
15	15.455	15.681	15.909	1.455	-1.444	0.312	-0.310
16	14.766	14.976	15.187	1.408	-1.399	0.304	-0.302
17	14.112	14.306	14.501	1.362	-1.353	0.296	-0.294
18	13.490	13.669	13.849	1.316	-1.308	0.287	-0.286
19	12.898	13.063	13.229	1.270	-1.264	0.279	-0.278
20	12.335	12.487	12.640	1.224	-1.219	0.271	-0.269
21	11.799	11.939	12.080	1.179	-1.175	0.262	-0.261
22	11.288	11.418	11.547	1.134	-1.131	0.253	-0.253
23	10.803	10.921	11.040	1.089	-1.087	0.245	-0.244

阻温特性表

R25=10K Ω 精度:±1% B25/50=3950K B25/85=4021K 精度:±1%(P163-6)

温度(°C)	电阻(K Ω)			电阻精度(%)		温度精度(°C)	
	最小值	中心值	最大值	ΔR	$-\Delta R$	ΔT	$-\Delta T$
24	10.340	10.449	10.558	1.044	-1.043	0.236	-0.236
25	9.900	10.000	10.100	1.000	-1.000	0.228	-0.228
26	9.472	9.571	9.671	1.044	-1.043	0.239	-0.239
27	9.064	9.164	9.263	1.088	-1.086	0.251	-0.250
28	8.676	8.775	8.875	1.131	-1.129	0.262	-0.262
29	8.307	8.405	8.504	1.175	-1.171	0.274	-0.273
30	7.955	8.052	8.151	1.218	-1.214	0.286	-0.285
31	7.619	7.716	7.814	1.262	-1.256	0.298	-0.296
32	7.300	7.396	7.492	1.305	-1.298	0.309	-0.308
33	6.995	7.090	7.186	1.347	-1.339	0.322	-0.320
34	6.705	6.798	6.893	1.390	-1.381	0.334	-0.331
35	6.428	6.520	6.614	1.432	-1.422	0.346	-0.343
36	6.163	6.255	6.347	1.474	-1.463	0.358	-0.355
37	5.911	6.002	6.093	1.516	-1.504	0.370	-0.367
38	5.671	5.760	5.850	1.558	-1.544	0.383	-0.379
39	5.441	5.529	5.617	1.600	-1.584	0.395	-0.392
40	5.222	5.309	5.396	1.641	-1.624	0.408	-0.404
41	5.013	5.098	5.184	1.682	-1.664	0.421	-0.416
42	4.813	4.897	4.981	1.723	-1.704	0.433	-0.428
43	4.622	4.704	4.787	1.764	-1.743	0.446	-0.441
44	4.440	4.521	4.602	1.804	-1.782	0.459	-0.453
45	4.266	4.345	4.425	1.845	-1.821	0.472	-0.466
46	4.099	4.177	4.256	1.885	-1.860	0.485	-0.479
47	3.940	4.016	4.094	1.925	-1.898	0.498	-0.491
48	3.788	3.863	3.939	1.965	-1.937	0.511	-0.504
49	3.642	3.716	3.790	2.004	-1.975	0.525	-0.517
50	3.515	3.588	3.661	2.040	-2.009	0.539	-0.531
51	3.370	3.440	3.512	2.083	-2.050	0.551	-0.543
52	3.242	3.311	3.381	2.122	-2.088	0.565	-0.556
53	3.120	3.188	3.257	2.161	-2.125	0.579	-0.569
54	3.003	3.069	3.137	2.199	-2.162	0.592	-0.582
55	2.891	2.956	3.022	2.238	-2.199	0.606	-0.595
56	2.784	2.848	2.912	2.276	-2.235	0.620	-0.609
57	2.681	2.744	2.807	2.314	-2.271	0.634	-0.622
58	2.583	2.644	2.706	2.352	-2.308	0.648	-0.636
59	2.489	2.548	2.609	2.390	-2.344	0.662	-0.649
60	2.398	2.457	2.516	2.427	-2.379	0.676	-0.663
61	2.312	2.369	2.427	2.464	-2.415	0.690	-0.676
62	2.228	2.284	2.342	2.502	-2.450	0.704	-0.690

阻温特性表

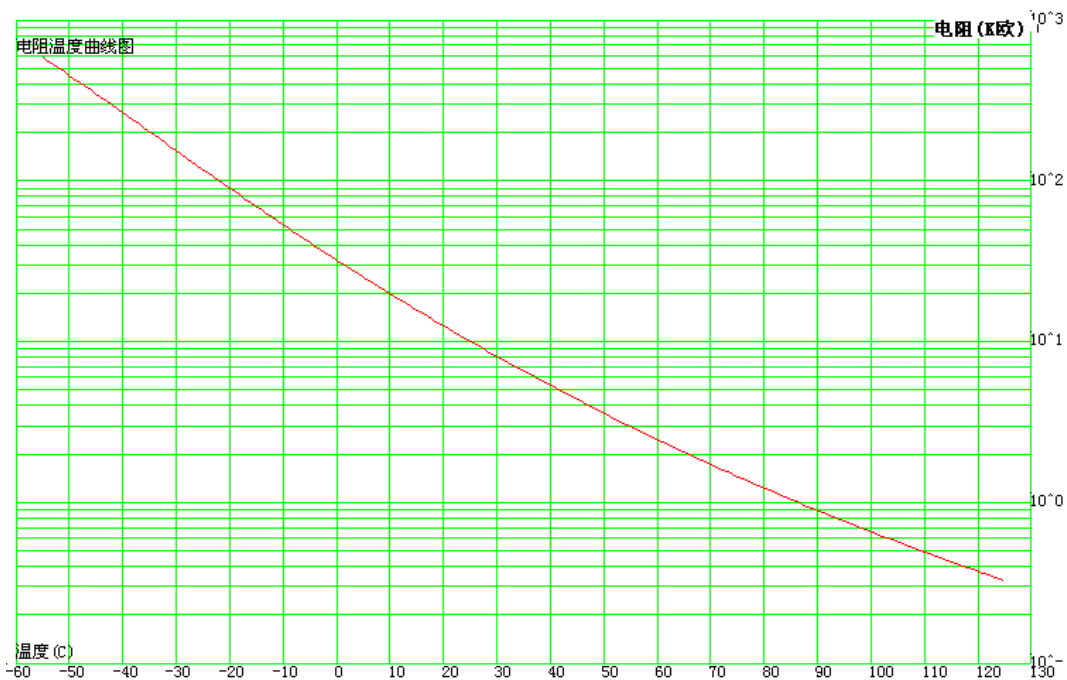
R25=10K Ω 精度:±1% B25/50=3950K B25/85=4021K 精度:±1%(P163-6)

温度(°C)	电阻(K Ω)			电阻精度(%)		温度精度(°C)	
	最小值	中心值	最大值	ΔR	$-\Delta R$	ΔT	$-\Delta T$
63	2.149	2.204	2.260	2.539	-2.485	0.719	-0.704
64	2.072	2.126	2.181	2.575	-2.520	0.733	-0.718
65	1.999	2.051	2.105	2.612	-2.555	0.748	-0.732
66	1.929	1.980	2.032	2.648	-2.590	0.762	-0.746
67	1.861	1.911	1.963	2.685	-2.624	0.777	-0.760
68	1.796	1.845	1.895	2.721	-2.658	0.792	-0.774
69	1.734	1.782	1.831	2.756	-2.692	0.807	-0.788
70	1.674	1.721	1.769	2.792	-2.726	0.822	-0.802
71	1.617	1.663	1.710	2.828	-2.760	0.837	-0.816
72	1.561	1.606	1.652	2.863	-2.793	0.852	-0.831
73	1.508	1.552	1.597	2.898	-2.826	0.867	-0.845
74	1.457	1.500	1.544	2.933	-2.859	0.882	-0.860
75	1.408	1.450	1.493	2.968	-2.892	0.897	-0.874
76	1.361	1.402	1.444	3.003	-2.925	0.913	-0.889
77	1.316	1.356	1.397	3.037	-2.958	0.928	-0.904
78	1.272	1.312	1.352	3.072	-2.990	0.944	-0.919
79	1.230	1.269	1.308	3.106	-3.022	0.959	-0.933
80	1.190	1.228	1.266	3.140	-3.054	0.975	-0.948
81	1.151	1.188	1.226	3.174	-3.086	0.991	-0.963
82	1.114	1.150	1.187	3.207	-3.117	1.007	-0.978
83	1.078	1.113	1.149	3.241	-3.149	1.023	-0.994
84	1.043	1.078	1.113	3.274	-3.180	1.039	-1.009
85	1.010	1.044	1.078	3.308	-3.211	1.055	-1.024
86	0.978	1.011	1.044	3.341	-3.242	1.071	-1.039
87	0.947	0.979	1.012	3.374	-3.273	1.087	-1.055
88	0.917	0.948	0.981	3.406	-3.304	1.103	-1.070
89	0.888	0.919	0.951	3.439	-3.334	1.120	-1.086
90	0.861	0.891	0.922	3.471	-3.364	1.136	-1.101
91	0.834	0.863	0.894	3.504	-3.395	1.153	-1.117
92	0.808	0.837	0.867	3.536	-3.425	1.169	-1.133
93	0.783	0.811	0.840	3.568	-3.454	1.186	-1.149
94	0.759	0.787	0.815	3.599	-3.484	1.203	-1.164
95	0.736	0.763	0.791	3.631	-3.513	1.220	-1.180
96	0.714	0.740	0.767	3.663	-3.543	1.237	-1.196
97	0.693	0.718	0.745	3.694	-3.572	1.254	-1.212
98	0.672	0.697	0.723	3.725	-3.601	1.271	-1.229
99	0.652	0.676	0.702	3.756	-3.630	1.288	-1.245
100	0.632	0.657	0.681	3.787	-3.659	1.305	-1.261
101	0.614	0.637	0.662	3.818	-3.687	1.323	-1.277
102	0.596	0.619	0.643	3.849	-3.716	1.340	-1.294

阻温特性表

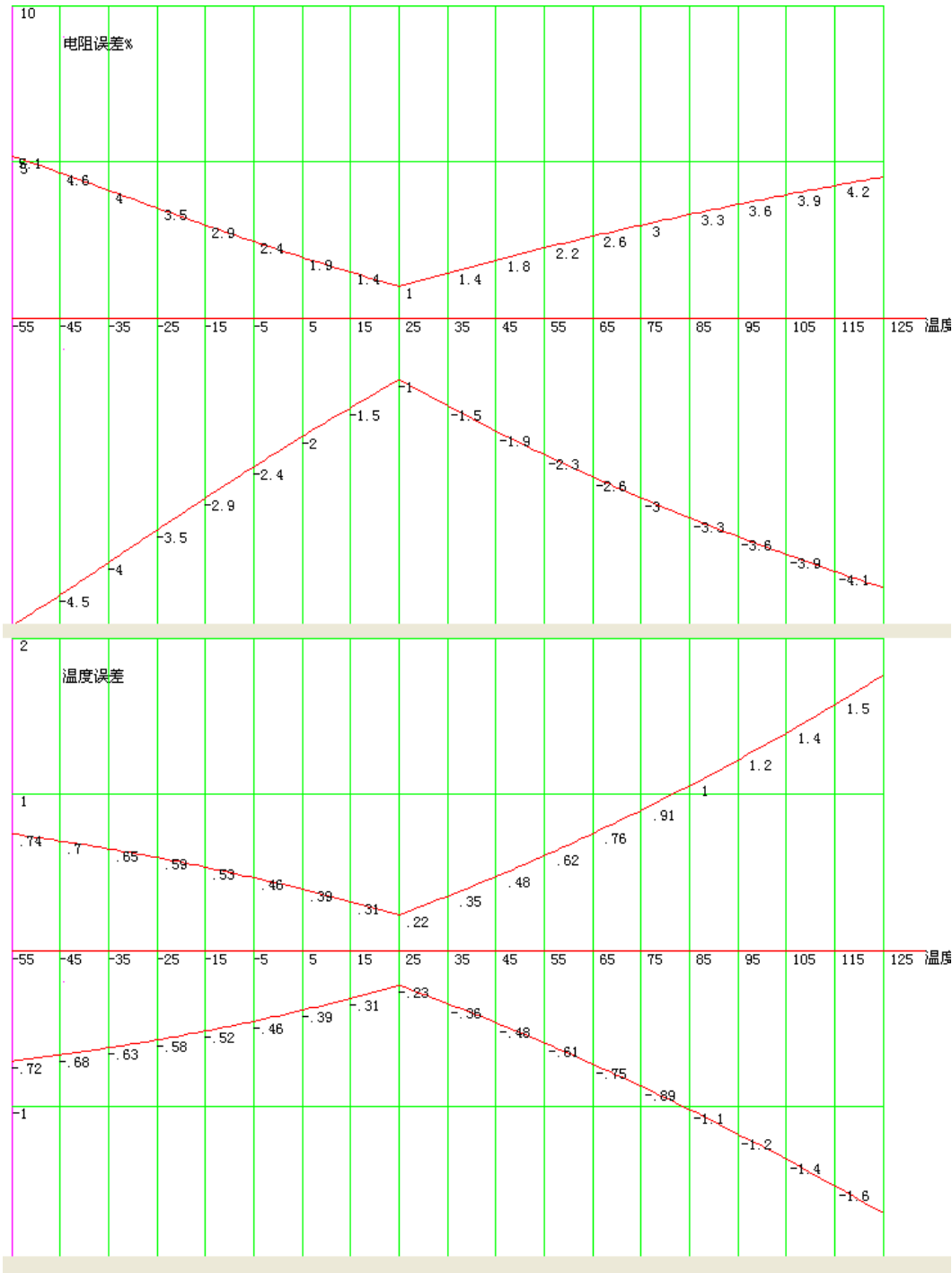
R25=10K Ω 精度: $\pm 1\%$ B25/50=3950K B25/85=4021K 精度: $\pm 1\%$ (P163-6)

温度($^{\circ}\text{C}$)	电阻(K Ω)			电阻精度(%)		温度精度($^{\circ}\text{C}$)	
	最小值	中心值	最大值	ΔR	$-\Delta R$	ΔT	$-\Delta T$
103	0.578	0.601	0.624	3.879	-3.744	1.358	-1.310
104	0.562	0.584	0.606	3.909	-3.772	1.375	-1.327
105	0.545	0.567	0.589	3.940	-3.800	1.393	-1.343
106	0.530	0.551	0.573	3.970	-3.828	1.410	-1.360
107	0.514	0.535	0.556	4.000	-3.855	1.428	-1.377
108	0.500	0.520	0.541	4.029	-3.883	1.446	-1.394
109	0.485	0.505	0.526	4.059	-3.910	1.464	-1.410
110	0.472	0.491	0.511	4.089	-3.938	1.482	-1.427
111	0.459	0.477	0.497	4.118	-3.965	1.500	-1.444
112	0.446	0.464	0.483	4.147	-3.992	1.518	-1.461
113	0.433	0.451	0.470	4.176	-4.018	1.537	-1.479
114	0.421	0.439	0.458	4.205	-4.045	1.555	-1.496
115	0.410	0.427	0.445	4.234	-4.072	1.573	-1.513
116	0.398	0.415	0.433	4.263	-4.098	1.592	-1.530
117	0.387	0.404	0.422	4.291	-4.124	1.610	-1.548
118	0.377	0.393	0.410	4.320	-4.150	1.629	-1.565
119	0.367	0.383	0.399	4.348	-4.176	1.648	-1.583
120	0.357	0.373	0.389	4.376	-4.202	1.667	-1.600
121	0.347	0.363	0.379	4.404	-4.228	1.686	-1.618
122	0.338	0.353	0.369	4.432	-4.254	1.705	-1.636
123	0.329	0.344	0.359	4.460	-4.279	1.724	-1.654
124	0.320	0.335	0.350	4.488	-4.305	1.743	-1.672
125	0.312	0.326	0.341	4.515	-4.330	1.762	-1.689



附表 2

阻值误差曲线图



TEMPERATU
RE(°C)

CMFB103F3950FANT

