规格承认书
SPECIFICATION

编号(No):
日期(Date):

客户 **(**Customer**):**

品名(Product Name**):** **片式NTC热敏电阻** Chip NTC thermistor

料号（ Part Number）: QN0603系列 QN0603 Series

客户规格(Customer’s Part Number**):**

QN0603系列规格书

Specification for QN0603 Series

客户承认 CUSTOMER CONFIRM			
承认章 STAMP	核准 APPROVE	审核 CHECK	经办人 SIGNATURE

东莞市瑞迈电子科技有限公司

Dongguan REOMAX Electronics Co., Ltd.

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

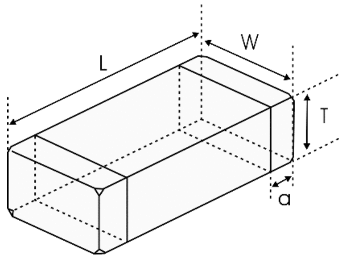


图 1 Fig.1

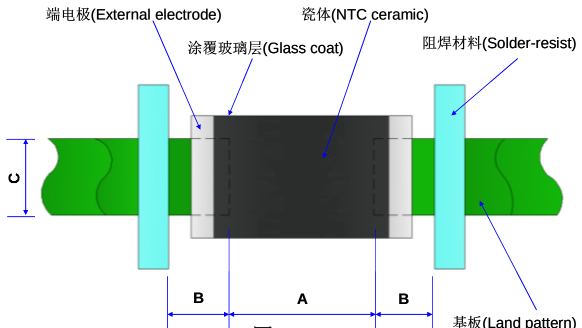


图 2 Fig.2

表 1（Table 1） 单位 unit: inch[mm]

类别 Type	L	W	T	a	A	B	C
0603 [1608]	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)

QN	0603	X	103	F	3950	F	B
①	②	③	④	⑤	⑥	⑦	⑧

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

② 外形尺寸(mm) External Dimensions (L×W×T)	
0201[0603]	0.60×0.30×0.30
0402[1005]	1.00×0.50×0.50
0603[1608]	1.60×0.80×0.80
0805[2012]	2.00×1.25×0.85
1206[3216]	3.20×1.60×0.85

③ 分隔符 Delimiter
X

④ 25℃的零功率电阻 Nominal Zero-Power Resistance at 25℃	
222	2.2kΩ
103	10kΩ
474	470kΩ

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

⑥ B 值常数 B Constant	
3435	3435K
3950	3950K
4250	4250K

⑦ B 值公差 Tolerance of B Constant	
F	±1%
H	±3%

⑧ B 值计算方式 B constant calculation method	
A	25℃&85℃
B	25℃&50℃

3 电气特性 Electrical Characteristics

1) F 档 F Series

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（℃）
QN0603X103F3435FA	10±1%	3380±1%	3435±1%	0.31	1.0	＜5	100	-40～+125
QN0603X103F3450FB	10±1%	3450±1%	3500	0.31				
QN0603X103F3950FB	10±1%	3950±1%	3987	0.31				
QN0603X223F3950FB	22±1%	3950±1%	3987	0.21				
QN0603X333F4050FB	33±1%	4050±1%	4100	0.17				
QN0603X473F4050FB	47±1%	4050±1%	4100	0.14				
QN0603X683F4150FB	68±1%	4150±1%	4210	0.12				
QN0603X104F3950FB	100±1%	3950±1%	3987	0.10				
QN0603X104F4250FB	100±1%	4250±1%	4310	0.10				

2) H 档 H Series

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（℃）
QN0603X103H3435FA	10±3%	3380±1%	3435±1%	0.31	1.0	＜5	100	-40～+125
QN0603X103H3450FB	10±3%	3450±1%	3500	0.31				
QN0603X103H3950FB	10±3%	3950±1%	3987	0.31				
QN0603X223H3950FB	22±3%	3950±1%	3987	0.21				
QN0603X333H4050FB	33±3%	4050±1%	4100	0.17				
QN0603X473H4050FB	47±3%	4050±1%	4100	0.14				
QN0603X683H4150FB	68±3%	4150±1%	4210	0.12				
QN0603X104H3950FB	100±3%	3950±1%	3987	0.10				
QN0603X104H4250FB	100±3%	4250±1%	4310	0.10				

3) J 档 J Series

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 （℃）
QN0603X103J3435FA	10±5%	3380±1%	3435±1%	0.31	1.0	＜5	100	-40～+125
QN0603X103J3450FB	10±5%	3450±1%	3500	0.31				
QN0603X103J3950FB	10±5%	3950±1%	3987	0.31				
QN0603X223J3950FB	22±5%	3950±1%	3987	0.21				
QN0603X333J4050FB	33±5%	4050±1%	4100	0.17				
QN0603X473J4050FB	47±5%	4050±1%	4100	0.14				
QN0603X683J4150FB	68±5%	4150±1%	4210	0.12				
QN0603X104J3950FB	100±5%	3950±1%	3987	0.10				
QN0603X104J4250FB	100±5%	4250±1%	4310	0.10				

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

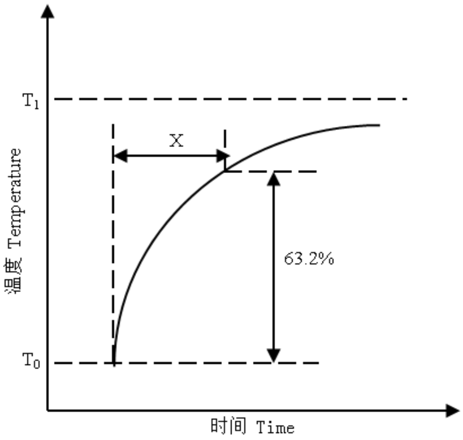
If any doubt on the results, measurements/tests should be made within the following limits:

a. Ambient Temperature: 25±2℃
b. Relative Humidity: 65±5%
c. Air Pressure: 86kPa to 106kPa

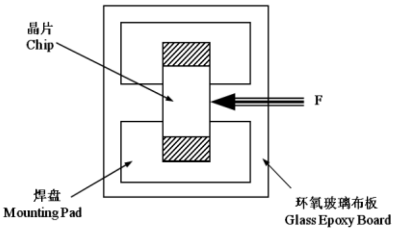
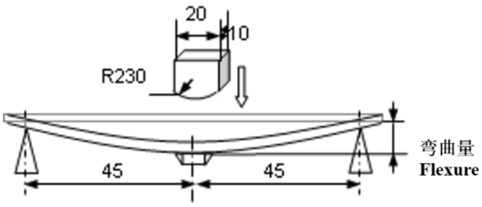
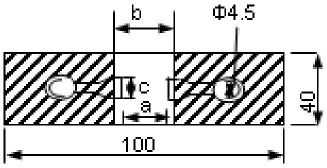
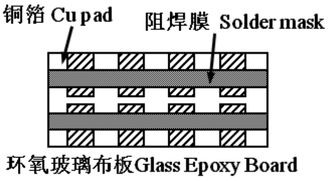
- **Inspection Equipment**

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℃)= $\frac{\ln R_{25}-\ln R_{50}}{1/T_{25}-1/T_{50}}$ B(25-85℃)= $\frac{\ln R_{25}-\ln R_{85}}{1/T_{25}-1/T_{85}}$ 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

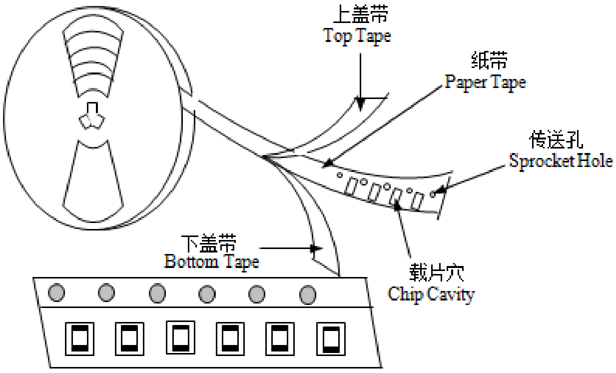
<table>
<tr><th>项目
Items</th><th>测试标准
Standard</th><th>测试方法及备注
Test Methods and Remarks</th><th>要求
Requirements</th></tr>
<tr><td>端头附着力
Terminal Strength</td><td>IEC 60068-2-21</td><td>将晶片焊接在测试基板上（如右图所示的环氧玻璃布板），按箭头所示方向施加作用力；
Solder the chip to the testing jig (glass epoxy board shown in the right) using eutectic solder. Then apply a force in the direction of the arrow.
<table>
<tr><th>尺寸 Size</th><th>F</th><th>保持时间 Duration</th></tr>
<tr><td>0201, 0402, 0603</td><td>5N</td><td>10±1s</td></tr>
<tr><td>0805</td><td>10N</td><td></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><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>
<tr><td>0201,</td><td>1mm</td><td>＜0.5mm/s</td><td>10±1s</td></tr>
<tr><td>0402, 0603, 0805</td><td>2mm</td><td></td><td></td></tr>
</table></td><td>① 无外观损伤。
No visible damage.
② ｜ΔR25/R25｜≤5%
单位 unit：mm
<table>
<tr><th>类型 Type</th><th>a</th><th>b</th><th>c</th></tr>
<tr><td>0201</td><td>0.25</td><td>0.3</td><td>0.3</td></tr>
<tr><td>0402</td><td>0.4</td><td>1.5</td><td>0.5</td></tr>
<tr><td>0603</td><td>1.0</td><td>3.0</td><td>1.2</td></tr>
<tr><td>0805</td><td>1.2</td><td>4.0</td><td>1.65</td></tr>
</table>
 </td></tr>
<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>
</table>

<table>
<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><td>步骤 Step</td><td>温度 Temperature</td><td>时间 Time</td></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>
<tr>
<td>低温存放
Resistance to cold</td>
<td>IEC 60068-2-1</td>
<td>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.</td>
<td>① 无外观损伤；
No visible damage.
② ｜ΔR25/R25｜≤5%
③ ｜ΔB/B｜≤2%</td>
</tr>
<tr>
<td>湿热存放
Resistance to damp heat</td>
<td>IEC 60068-2-78</td>
<td>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.</td>
<td>① 无外观损伤；
No visible damage.
② ｜ΔR25/R25｜≤3%
③ ｜ΔB/B｜≤2%</td>
</tr>
<tr>
<td>高温负荷
Resistance to high temperature load</td>
<td>IEC 60539-1
5.25.4</td>
<td>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.</td>
<td>① 无外观损伤；
No visible damage.
② ｜ΔR25/R25｜≤5%
③ ｜ΔB/B｜≤2%</td>
</tr>
</table>

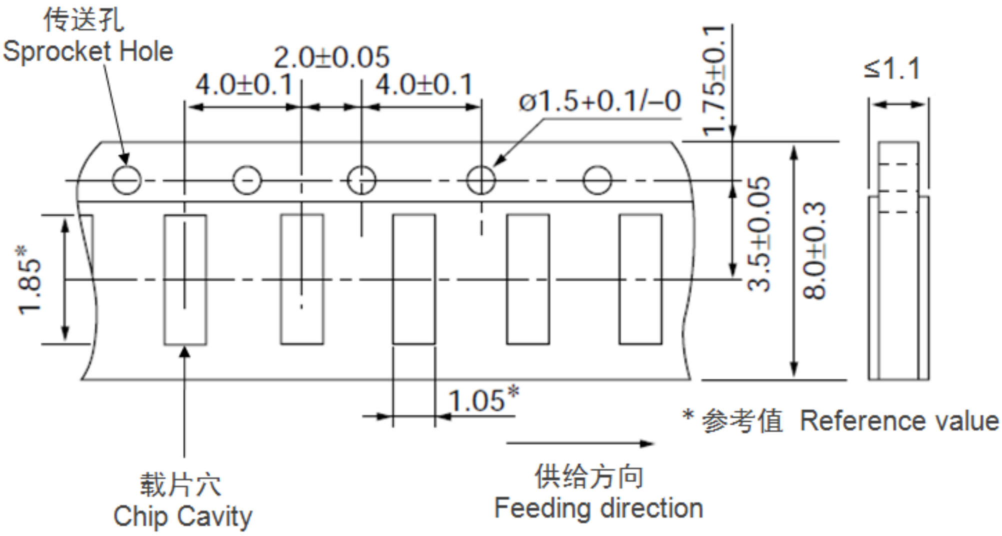
7 编带 Taping

类型 Type	0603
编带厚度 Tape thickness(mm)	0.8±0.15
编带材质 Tape material	纸带 Paper Tape
每盘数量 Quantity per Reel	4K

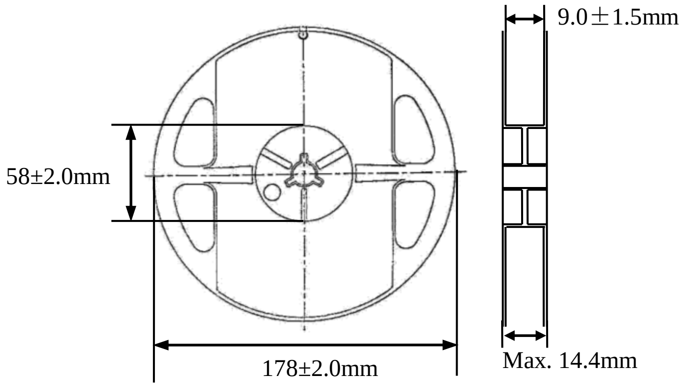
(1) 编带图 Taping Drawings

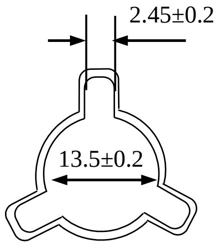


(2) 纸带尺寸 Paper Tape Dimensions (单位 Unit：mm)



(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

- QN 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

- QN 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。

- QN 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 QN 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 QN series thermistors is fragile, no excessive pressure or impact shall be exerted on it.

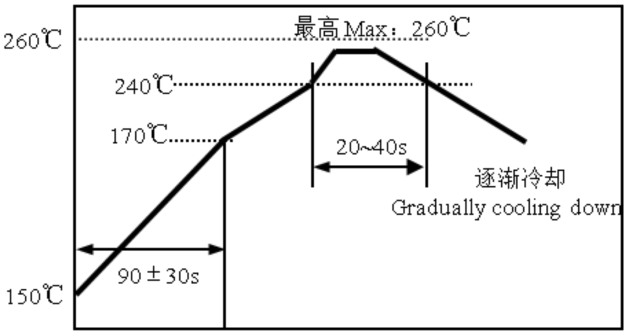
- The QN series thermistors shall not be operated beyond the specified “Operating Temperature Range” in the catalog.

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.]