

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

恭成料号 (QAMCN Part Number) : QN0603X104F4250FB

客户规格(Customer's Part Number):

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

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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

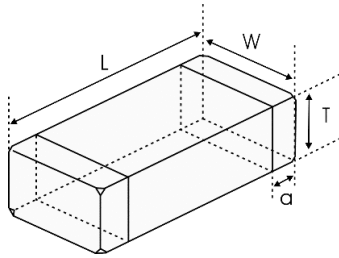


图 1 Fig.1

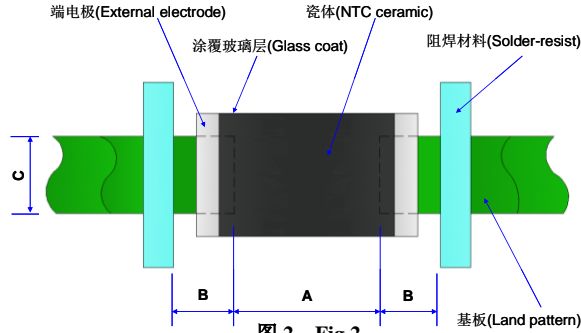


图 2 Fig.2

表 1 (Table 1)

单位 unit: inch[mm]

| 类别 Type | L | W | T | a | A | B | C |
|----------------|---------------------------|---------------------------|---------------------------|--------------------------|-----------|-----------|-----------|
| 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 104 F 4250 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°C 的零功率电阻 Nominal Zero-Power Resistance | |
| 472 | 4.7kΩ |
| 683 | 68kΩ |
| 104 | 100kΩ |
| ⑤ 电阻值公差 Tolerance of Resistance | |
| F | ±1% |
| G | ±2% |
| H | ±3% |
| J | ±5% |

| | |
|--|-------------|
| ⑥ B 值常数 B Constant | |
| 3600 | 3600K |
| 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°C & 85°C |
| B | 25°C & 50°C |

3 电气特性 Electrical Characteristics

| 型号 Part No | 电阻值 Resistance (25°C) (kΩ) | B 常数 B Constant (25/50°C) (K) | B 常数 B Constant (25/85°C) (K) | 允许工作电流 Permissible Operating Current (25°C) (mA) | 耗散系数 Dissipation Factor (mW/°C) | 热时间常数 Thermal Time Constant (s) | 额定功率 Rated Electric Power(25°C) (mW) | 工作温度 Operating ambient temperature (°C) |
|-------------------|-------------------------------------|--|--|--|--|---|---|---|
| QN0603X104F4250FB | 100±1% | 4250±1% | 4310 | 0.10 | 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

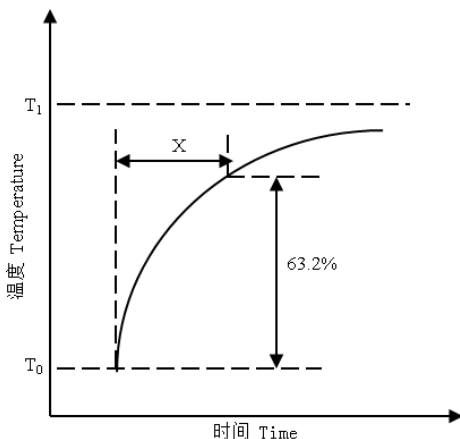
If any doubt on the results, measurements/tests should be made within the following limits:

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

Inspection Equipment

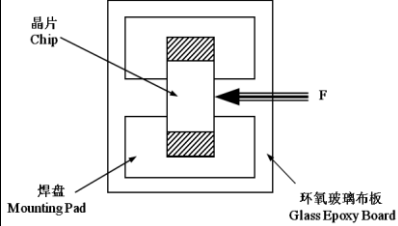
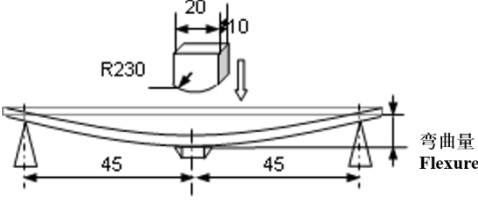
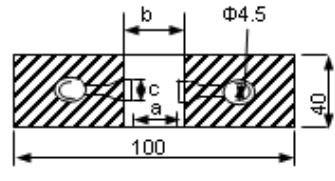
Visual Examination: 20× magnifier
Resistance value test: Thermistor resistance tester

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℃. $B(25-50^{\circ}\text{C}) = \frac{\ln R_{25} - \ln R_{50}}{1/T_{25} - 1/T_{50}} \quad B(25-85^{\circ}\text{C}) = \frac{\ln R_{25} - \ln R_{85}}{1/T_{25} - 1/T_{85}}$ 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 (°C) to T ₁ (°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℃ 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℃ 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"> <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 rowspan="2">10±1s</td> </tr> <tr> <td>0805</td> <td>10N</td> </tr> </table> | 尺寸 Size | F | 保持时间 Duration | 0201, 0402, 0603 | 5N | 10±1s | 0805 | 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, 0402, 0603 | 5N | 10±1s | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0805 | 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"> <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 rowspan="2"><0.5mm/s</td> <td rowspan="2">10±1s</td> </tr> <tr> <td>0402, 0603, 0805</td> <td>2mm</td> </tr> </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 | 0402, 0603, 0805 | 2mm | <p>① 无外观损伤。 No visible damage. ② ΔR25/R25 ≤ 5%</p> <p>单位 unit: mm</p> <table border="1"> <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>  | 类型 Type | a | b | c | 0201 | 0.25 | 0.3 | 0.3 | 0402 | 0.4 | 1.5 | 0.5 | 0603 | 1.0 | 3.0 | 1.2 | 0805 | 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 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0201, | 1mm | <0.5mm/s | 10±1s | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0402, 0603, 0805 | 2mm | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 类型 Type | a | b | c | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0201 | 0.25 | 0.3 | 0.3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0402 | 0.4 | 1.5 | 0.5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0603 | 1.0 | 3.0 | 1.2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0805 | 1.2 | 4.0 | 1.65 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

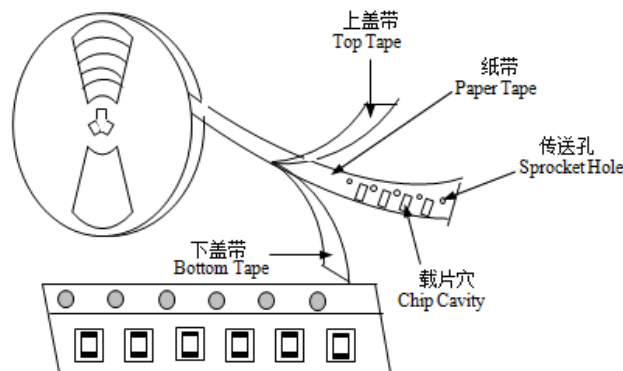
| <p>振动 Vibration</p> | <p>IEC 60068-2-80</p> | <p>① 将晶片焊接在测试基板上（如右图所示的环氧玻璃布板）； Solder the chip to the testing jig (glass epoxy board shown in the left) using eutectic solder.</p> <p>② 晶片以全振幅为 1.5mm 进行振动，频率范围为 10Hz ~55 Hz； The chip shall be subjected to a simple harmonic motion having total amplitude 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>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 ΔR25/R25 ≤5% ③ ΔB/B ≤2%</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 1624"> <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 ΔR25/R25 ≤3% ③ ΔB/B ≤2%</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 ΔR25/R25 ≤5% ③ ΔB/B ≤2%</p> | | | | | | | | | | | | | | | |

| | | | |
|---|--------------------|---|--|
| 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 $ \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±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 $ \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±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 $ \Delta R25/R25 \leq 5\%$ ③ $ \Delta B/B \leq 2\%$ |

7 编带 Taping

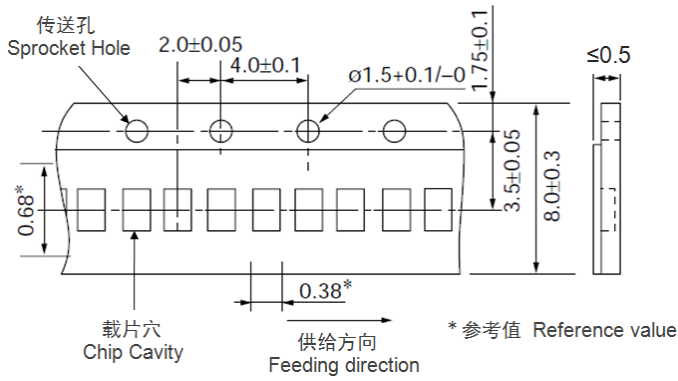
| 类型 Type | 0201 | 0402 | 0603 | 0805 |
|----------------------------|---------------|----------|----------|----------|
| 编带厚度 Tape thickness(mm) | 0.5±0.15 | 0.5±0.15 | 0.8±0.15 | 0.85±0.2 |
| 编带材质 Tape material | 纸带 Paper Tape | | | |
| 每盘数量 Quantity per Reel | 15K | 10K | 4K | 4K |

(1) 编带图 Taping Drawings

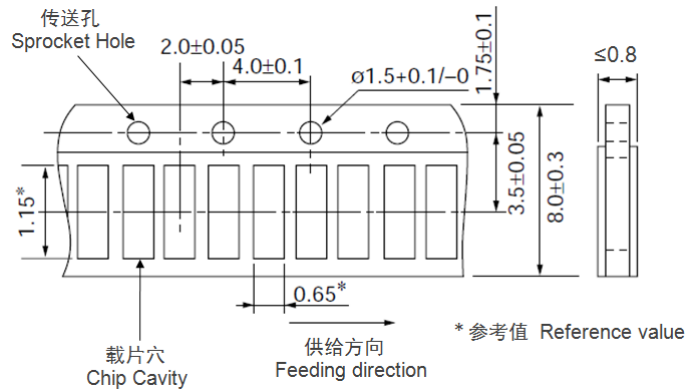


(2) 纸带尺寸 Paper Tape Dimensions (单位 Unit: mm)

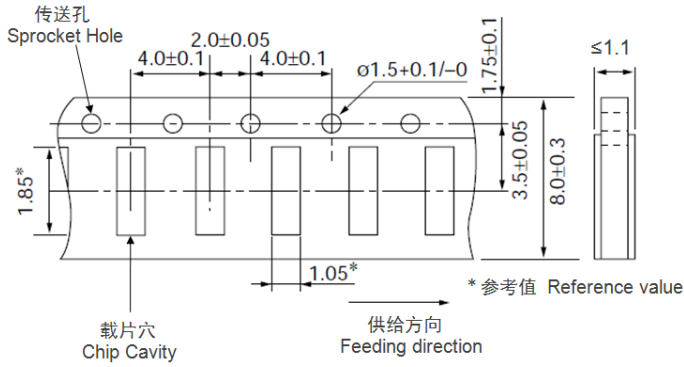
QN0201 系列 QN0201 series



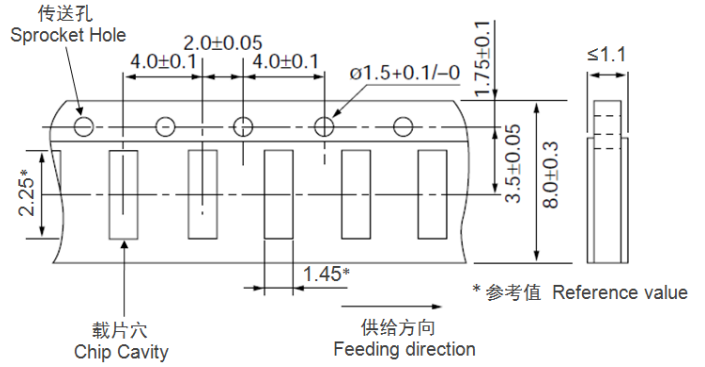
QN0402 系列 QN0402 series



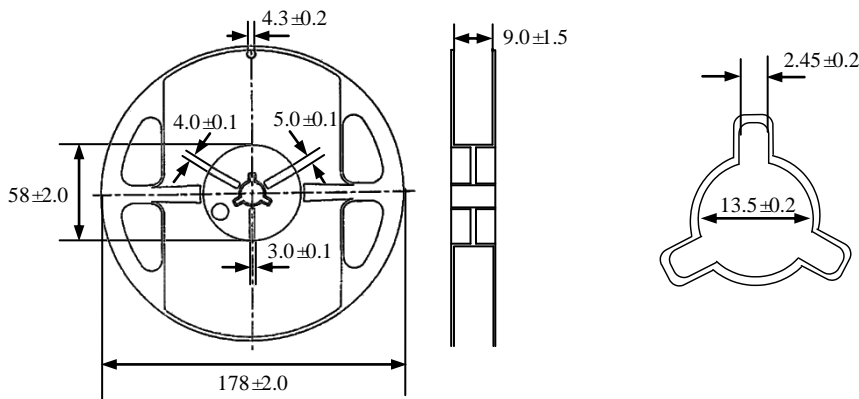
QN0603 系列 QN0603 series



QN0805 系列 QN0805 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: 产品交付后 6 个月**

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。

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 after delivery**

9 Notes & Warnings

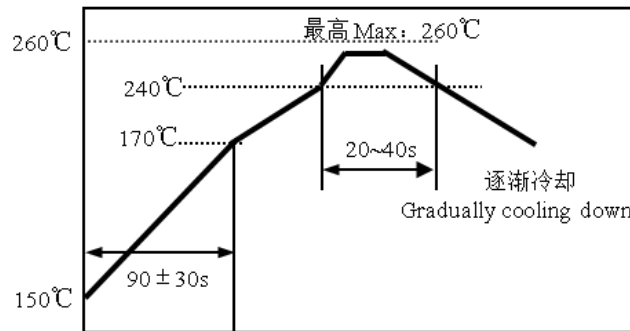
- The QN series thermistors shall not be operated and stored under the following environmental condition:
 - (1) Corrosive or deoxidized atmospheres
(such as chlorine, sulfurated hydrogen, ammonia, sulfuric acid, nitric oxide and so on)
 - (2) Volatile or inflammable atmospheres
 - (3) Dusty condition
 - (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°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°C Max./10 sec.
 - Solder paste: Sn/3.0Ag/0.5Cu
 - Max.2 times for re-flowing



• 手工焊

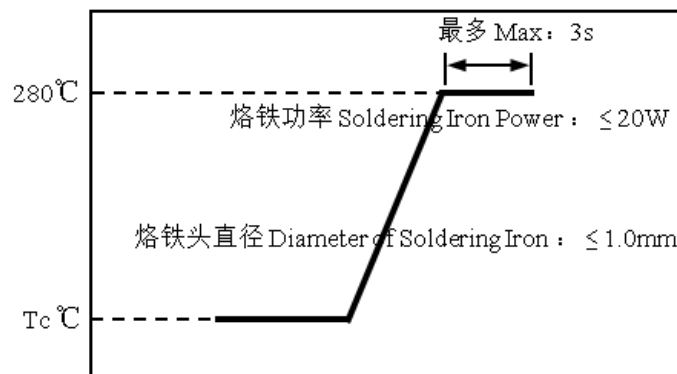
- 烙铁功率：最大 20W
- 预热：150°C/60sec.
- 烙铁头温度：最高 280°C
- 焊接时间：最多 3sec.
- 焊锡：Sn/3.0Ag/0.5Cu
- 手工焊：最多 1 次

• **Iron Soldering Profile**

- Iron soldering power: Max.20W
- Pre-heating: 150°C/60sec.
- Soldering Tip temperature: 280°C Max.
- 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

QN0603X104F4250FB

| 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 | 4,191.522 | 4,397.119 | 4,612.340 | 4.89% | 0.66 |
| -39 | 3,904.301 | 4,092.874 | 4,290.126 | 4.82% | 0.65 |
| -38 | 3,638.686 | 3,811.717 | 3,992.576 | 4.74% | 0.65 |
| -37 | 3,392.915 | 3,551.749 | 3,717.646 | 4.67% | 0.64 |
| -36 | 3,165.377 | 3,311.236 | 3,463.470 | 4.60% | 0.64 |
| -35 | 2,954.603 | 3,088.599 | 3,228.349 | 4.52% | 0.63 |
| -34 | 2,759.251 | 2,882.396 | 3,010.735 | 4.45% | 0.63 |
| -33 | 2,578.097 | 2,691.310 | 2,809.213 | 4.38% | 0.62 |
| -32 | 2,410.018 | 2,514.137 | 2,622.492 | 4.31% | 0.62 |
| -31 | 2,253.988 | 2,349.778 | 2,449.393 | 4.24% | 0.61 |
| -30 | 2,109.070 | 2,197.225 | 2,288.836 | 4.17% | 0.61 |
| -29 | 1,974.402 | 2,055.558 | 2,139.835 | 4.10% | 0.60 |
| -28 | 1,849.196 | 1,923.932 | 2,001.488 | 4.03% | 0.59 |
| -27 | 1,732.729 | 1,801.573 | 1,872.966 | 3.96% | 0.59 |
| -26 | 1,624.337 | 1,687.773 | 1,753.511 | 3.89% | 0.58 |
| -25 | 1,523.411 | 1,581.881 | 1,642.430 | 3.83% | 0.58 |
| -24 | 1,429.203 | 1,483.100 | 1,538.875 | 3.76% | 0.57 |
| -23 | 1,341.418 | 1,391.113 | 1,442.505 | 3.69% | 0.57 |
| -22 | 1,259.579 | 1,305.413 | 1,352.779 | 3.63% | 0.56 |
| -21 | 1,183.249 | 1,225.531 | 1,269.196 | 3.56% | 0.55 |
| -20 | 1,112.022 | 1,151.037 | 1,191.301 | 3.50% | 0.55 |
| -19 | 1,045.527 | 1,081.535 | 1,118.671 | 3.43% | 0.54 |
| -18 | 983.422 | 1,016.661 | 1,050.919 | 3.37% | 0.53 |
| -17 | 925.389 | 956.080 | 987.689 | 3.31% | 0.53 |
| -16 | 871.138 | 899.481 | 928.652 | 3.24% | 0.52 |
| -15 | 820.400 | 846.579 | 873.505 | 3.18% | 0.52 |
| -14 | 772.928 | 797.111 | 821.969 | 3.12% | 0.51 |
| -13 | 728.490 | 750.834 | 773.786 | 3.06% | 0.50 |
| -12 | 686.877 | 707.524 | 728.718 | 3.00% | 0.50 |
| -11 | 647.891 | 666.972 | 686.547 | 2.93% | 0.49 |
| -10 | 611.352 | 628.988 | 647.069 | 2.87% | 0.48 |
| -9 | 577.042 | 593.342 | 610.042 | 2.81% | 0.48 |
| -8 | 544.864 | 559.931 | 575.357 | 2.75% | 0.47 |
| -7 | 514.674 | 528.602 | 542.852 | 2.70% | 0.46 |
| -6 | 486.337 | 499.212 | 512.377 | 2.64% | 0.46 |
| -5 | 459.730 | 471.632 | 483.794 | 2.58% | 0.45 |
| -4 | 434.767 | 445.772 | 457.009 | 2.52% | 0.44 |
| -3 | 411.305 | 421.480 | 431.863 | 2.46% | 0.43 |
| -2 | 389.245 | 398.652 | 408.245 | 2.41% | 0.43 |
| -1 | 368.496 | 377.193 | 386.056 | 2.35% | 0.42 |
| 0 | 348.972 | 357.012 | 365.200 | 2.29% | 0.41 |
| 1 | 330.575 | 338.006 | 345.569 | 2.24% | 0.41 |

| | | | | | |
|----|---------|---------|---------|-------|------|
| 2 | 313.254 | 320.122 | 327.107 | 2.18% | 0.40 |
| 3 | 296.941 | 303.287 | 309.737 | 2.13% | 0.39 |
| 4 | 281.571 | 287.434 | 293.389 | 2.07% | 0.38 |
| 5 | 267.084 | 272.500 | 277.997 | 2.02% | 0.38 |
| 6 | 253.425 | 258.426 | 263.501 | 1.96% | 0.37 |
| 7 | 240.541 | 245.160 | 249.842 | 1.91% | 0.36 |
| 8 | 228.386 | 232.649 | 236.968 | 1.86% | 0.35 |
| 9 | 216.913 | 220.847 | 224.830 | 1.80% | 0.34 |
| 10 | 206.081 | 209.710 | 213.381 | 1.75% | 0.34 |
| 11 | 195.850 | 199.196 | 202.579 | 1.70% | 0.33 |
| 12 | 186.184 | 189.268 | 192.384 | 1.65% | 0.32 |
| 13 | 177.048 | 179.890 | 182.758 | 1.59% | 0.31 |
| 14 | 168.411 | 171.028 | 173.667 | 1.54% | 0.30 |
| 15 | 160.243 | 162.651 | 165.078 | 1.49% | 0.30 |
| 16 | 152.512 | 154.726 | 156.957 | 1.44% | 0.29 |
| 17 | 145.197 | 147.232 | 149.281 | 1.39% | 0.28 |
| 18 | 138.273 | 140.142 | 142.022 | 1.34% | 0.27 |
| 19 | 131.717 | 133.432 | 135.156 | 1.29% | 0.26 |
| 20 | 125.508 | 127.080 | 128.659 | 1.24% | 0.25 |
| 21 | 119.626 | 121.066 | 122.510 | 1.19% | 0.25 |
| 22 | 114.052 | 115.368 | 116.689 | 1.14% | 0.24 |
| 23 | 108.766 | 109.970 | 111.175 | 1.10% | 0.23 |
| 24 | 103.754 | 104.852 | 105.951 | 1.05% | 0.22 |
| 25 | 99.000 | 100.000 | 101.000 | 1.00% | 0.21 |
| 26 | 94.400 | 95.398 | 96.397 | 1.05% | 0.22 |
| 27 | 90.037 | 91.032 | 92.029 | 1.09% | 0.23 |
| 28 | 85.899 | 86.889 | 87.881 | 1.14% | 0.25 |
| 29 | 81.973 | 82.956 | 83.942 | 1.19% | 0.26 |
| 30 | 78.247 | 79.222 | 80.200 | 1.24% | 0.27 |
| 31 | 74.710 | 75.675 | 76.645 | 1.28% | 0.28 |
| 32 | 71.351 | 72.306 | 73.266 | 1.33% | 0.29 |
| 33 | 68.161 | 69.104 | 70.054 | 1.37% | 0.31 |
| 34 | 65.130 | 66.061 | 66.999 | 1.42% | 0.32 |
| 35 | 62.249 | 63.167 | 64.093 | 1.47% | 0.33 |
| 36 | 59.510 | 60.415 | 61.327 | 1.51% | 0.34 |
| 37 | 56.906 | 57.797 | 58.696 | 1.56% | 0.35 |
| 38 | 54.429 | 55.306 | 56.190 | 1.60% | 0.37 |
| 39 | 52.073 | 52.934 | 53.805 | 1.64% | 0.38 |
| 40 | 49.830 | 50.677 | 51.532 | 1.69% | 0.39 |
| 41 | 47.697 | 48.528 | 49.369 | 1.73% | 0.40 |
| 42 | 45.666 | 46.482 | 47.308 | 1.78% | 0.42 |
| 43 | 43.732 | 44.533 | 45.343 | 1.82% | 0.43 |
| 44 | 41.890 | 42.675 | 43.470 | 1.86% | 0.44 |
| 45 | 40.134 | 40.904 | 41.684 | 1.91% | 0.46 |
| 46 | 38.459 | 39.213 | 39.978 | 1.95% | 0.47 |
| 47 | 36.863 | 37.601 | 38.350 | 1.99% | 0.48 |

| | | | | | |
|----|--------|--------|--------|-------|------|
| 48 | 35.340 | 36.063 | 36.797 | 2.04% | 0.49 |
| 49 | 33.888 | 34.595 | 35.314 | 2.08% | 0.51 |
| 50 | 32.502 | 33.195 | 33.898 | 2.12% | 0.52 |
| 51 | 31.182 | 31.859 | 32.548 | 2.16% | 0.53 |
| 52 | 29.921 | 30.584 | 31.258 | 2.20% | 0.55 |
| 53 | 28.718 | 29.366 | 30.025 | 2.25% | 0.56 |
| 54 | 27.569 | 28.203 | 28.847 | 2.29% | 0.57 |
| 55 | 26.472 | 27.091 | 27.721 | 2.33% | 0.59 |
| 56 | 25.424 | 26.028 | 26.645 | 2.37% | 0.60 |
| 57 | 24.422 | 25.013 | 25.615 | 2.41% | 0.62 |
| 58 | 23.464 | 24.042 | 24.631 | 2.45% | 0.63 |
| 59 | 22.549 | 23.113 | 23.688 | 2.49% | 0.64 |
| 60 | 21.674 | 22.224 | 22.787 | 2.53% | 0.66 |
| 61 | 20.837 | 21.374 | 21.924 | 2.57% | 0.67 |
| 62 | 20.036 | 20.561 | 21.097 | 2.61% | 0.69 |
| 63 | 19.269 | 19.782 | 20.306 | 2.65% | 0.70 |
| 64 | 18.536 | 19.036 | 19.548 | 2.69% | 0.72 |
| 65 | 17.834 | 18.323 | 18.822 | 2.73% | 0.73 |
| 66 | 17.163 | 17.640 | 18.128 | 2.77% | 0.74 |
| 67 | 16.521 | 16.986 | 17.463 | 2.81% | 0.76 |
| 68 | 15.906 | 16.360 | 16.825 | 2.85% | 0.77 |
| 69 | 15.316 | 15.760 | 16.214 | 2.88% | 0.79 |
| 70 | 14.752 | 15.184 | 15.628 | 2.92% | 0.80 |
| 71 | 14.209 | 14.631 | 15.064 | 2.96% | 0.82 |
| 72 | 13.689 | 14.101 | 14.523 | 3.00% | 0.83 |
| 73 | 13.190 | 13.592 | 14.004 | 3.04% | 0.85 |
| 74 | 12.712 | 13.104 | 13.506 | 3.07% | 0.86 |
| 75 | 12.253 | 12.635 | 13.029 | 3.11% | 0.88 |
| 76 | 11.814 | 12.187 | 12.571 | 3.15% | 0.89 |
| 77 | 11.393 | 11.757 | 12.131 | 3.19% | 0.91 |
| 78 | 10.988 | 11.344 | 11.709 | 3.22% | 0.92 |
| 79 | 10.600 | 10.947 | 11.304 | 3.26% | 0.94 |
| 80 | 10.228 | 10.566 | 10.914 | 3.30% | 0.96 |
| 81 | 9.870 | 10.200 | 10.539 | 3.33% | 0.97 |
| 82 | 9.526 | 9.848 | 10.180 | 3.37% | 0.99 |
| 83 | 9.196 | 9.510 | 9.834 | 3.40% | 1.00 |
| 84 | 8.879 | 9.185 | 9.501 | 3.44% | 1.02 |
| 85 | 8.574 | 8.873 | 9.181 | 3.48% | 1.03 |
| 86 | 8.281 | 8.572 | 8.873 | 3.51% | 1.05 |
| 87 | 7.999 | 8.283 | 8.577 | 3.55% | 1.07 |
| 88 | 7.728 | 8.006 | 8.292 | 3.58% | 1.08 |
| 89 | 7.467 | 7.738 | 8.018 | 3.62% | 1.10 |
| 90 | 7.217 | 7.481 | 7.754 | 3.65% | 1.12 |
| 91 | 6.976 | 7.234 | 7.501 | 3.69% | 1.13 |
| 92 | 6.745 | 6.997 | 7.258 | 3.72% | 1.15 |
| 93 | 6.523 | 6.769 | 7.023 | 3.76% | 1.17 |

| | | | | | |
|-----|-------|-------|-------|-------|------|
| 94 | 6.309 | 6.548 | 6.797 | 3.79% | 1.18 |
| 95 | 6.102 | 6.337 | 6.579 | 3.83% | 1.20 |
| 96 | 5.903 | 6.132 | 6.368 | 3.86% | 1.22 |
| 97 | 5.711 | 5.934 | 6.165 | 3.89% | 1.23 |
| 98 | 5.526 | 5.744 | 5.969 | 3.93% | 1.25 |
| 99 | 5.348 | 5.561 | 5.781 | 3.96% | 1.27 |
| 100 | 5.177 | 5.384 | 5.599 | 3.99% | 1.28 |
| 101 | 5.012 | 5.214 | 5.424 | 4.03% | 1.30 |
| 102 | 4.853 | 5.051 | 5.256 | 4.06% | 1.32 |
| 103 | 4.700 | 4.893 | 5.093 | 4.09% | 1.34 |
| 104 | 4.553 | 4.741 | 4.937 | 4.13% | 1.35 |
| 105 | 4.410 | 4.594 | 4.785 | 4.16% | 1.37 |
| 106 | 4.273 | 4.453 | 4.639 | 4.19% | 1.39 |
| 107 | 4.141 | 4.316 | 4.498 | 4.22% | 1.41 |
| 108 | 4.013 | 4.184 | 4.362 | 4.26% | 1.42 |
| 109 | 3.890 | 4.057 | 4.231 | 4.29% | 1.44 |
| 110 | 3.771 | 3.934 | 4.104 | 4.32% | 1.46 |
| 111 | 3.656 | 3.816 | 3.982 | 4.35% | 1.48 |
| 112 | 3.545 | 3.701 | 3.863 | 4.38% | 1.49 |
| 113 | 3.438 | 3.591 | 3.749 | 4.42% | 1.51 |
| 114 | 3.335 | 3.484 | 3.639 | 4.45% | 1.53 |
| 115 | 3.235 | 3.380 | 3.532 | 4.48% | 1.55 |
| 116 | 3.139 | 3.281 | 3.429 | 4.51% | 1.57 |
| 117 | 3.047 | 3.185 | 3.330 | 4.54% | 1.59 |
| 118 | 2.957 | 3.093 | 3.234 | 4.57% | 1.60 |
| 119 | 2.871 | 3.003 | 3.141 | 4.60% | 1.62 |
| 120 | 2.787 | 2.916 | 3.052 | 4.63% | 1.64 |
| 121 | 2.706 | 2.832 | 2.964 | 4.66% | 1.66 |
| 122 | 2.627 | 2.751 | 2.880 | 4.70% | 1.68 |
| 123 | 2.551 | 2.672 | 2.798 | 4.73% | 1.70 |
| 124 | 2.478 | 2.596 | 2.719 | 4.76% | 1.72 |
| 125 | 2.407 | 2.522 | 2.643 | 4.79% | 1.74 |

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