

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) : QN0603X104F3950FB

客户规格(Customer's Part Number):

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

恭成科技有限公司

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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

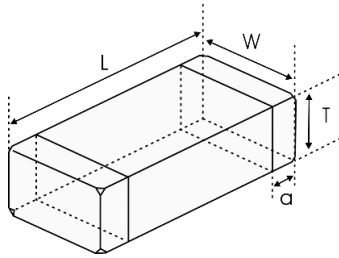


图 1 Fig.1

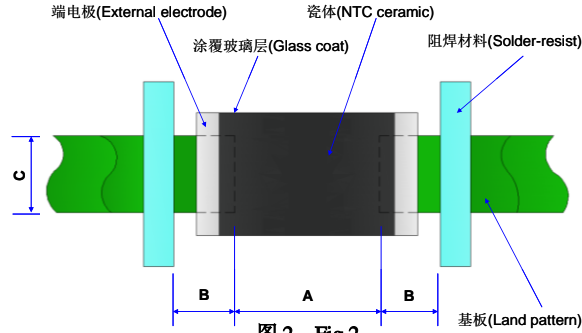


图 2 Fig.2

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 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°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
4500	4500K
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)
QN0603X104F3950FB	100±1%	3950±1%	3987	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

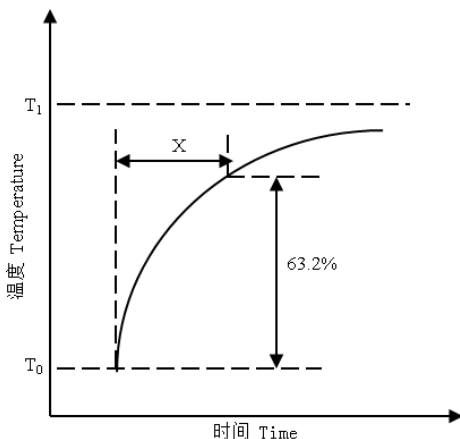
If any doubt on the results, measurements/tests should be made within the following limits:

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

▪ **Inspection Equipment**

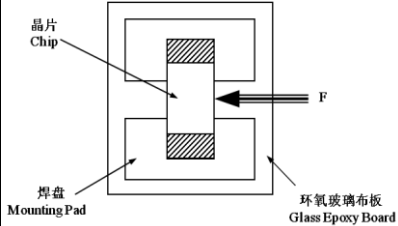
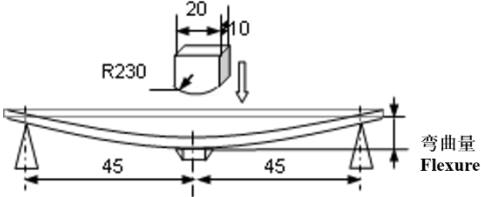
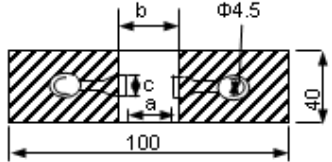
Visual Examination: 20× magnifier
Resistance value test: Thermistor resistance tester

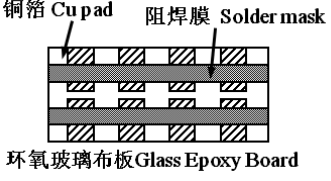
5 电性测试 Electrical Test

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℃. $B(25-50^{\circ}\text{C}) = \frac{\ln R_{25} - \ln R_{50}}{1/T_{25} - 1/T_{50}}$ $B(25-85^{\circ}\text{C}) = \frac{\ln R_{25} - \ln R_{85}}{1/T_{25} - 1/T_{85}}$ 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" data-bbox="496 1077 1034 1205"> <thead> <tr> <th>尺寸 Size</th> <th>F</th> <th>保持时间 Duration</th> </tr> </thead> <tbody> <tr> <td>0201, 0402, 0603</td> <td>5N</td> <td rowspan="2">10±1s</td> </tr> <tr> <td>0805</td> <td>10N</td> </tr> </tbody> </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" data-bbox="448 1760 1086 1977"> <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"><0.5mm/s</td> <td rowspan="2">10±1s</td> </tr> <tr> <td>0402, 0603, 0805</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	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" data-bbox="1155 1514 1517 1722"> <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>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> </tbody> </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																														
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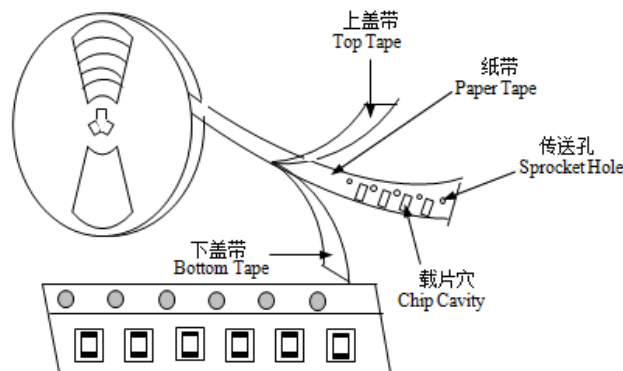
<p>振动 Vibration</p>	<p>IEC 60068-2-80</p>	<p>① 将晶片焊接在测试基板上（如右图所示的环氧玻璃布板）； Solder the chip to the testing jig (glass epoxy board shown in the left) using eutectic solder.</p> <p>② 晶片以全振幅为 1.5mm 进行振动，频率范围为 10Hz ~55 Hz； The chip shall be subjected to a simple harmonic motion having total amplitude of 1.5mm, 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>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 $\Delta R_{25}/R_{25} \leq 5\%$ ③ $\Delta B/B \leq 2\%$</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 $\Delta R_{25}/R_{25} \leq 3\%$ ③ $\Delta B/B \leq 2\%$</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 $\Delta R_{25}/R_{25} \leq 5\%$ ③ $\Delta B/B \leq 2\%$</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

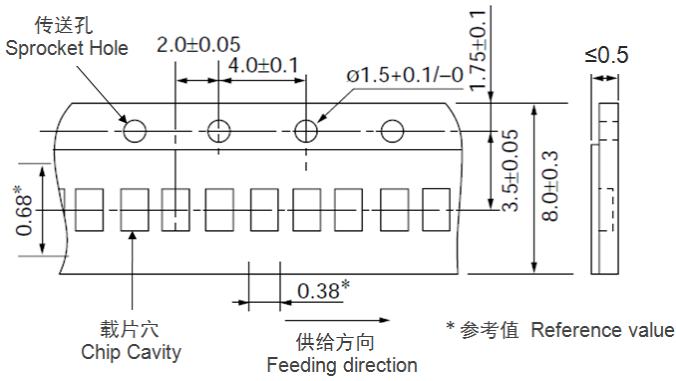
类型 Type	0201	0402	0603	0805
编带厚度 Tape thickness(mm)	0.5±0.15	0.5±0.15	0.8±0.15	0.85±0.2
编带材质 Tape material	纸带 Paper Tape			
每盘数量 Quantity per Reel	15K	10K	4K	4K

(1) 编带图 Taping Drawings

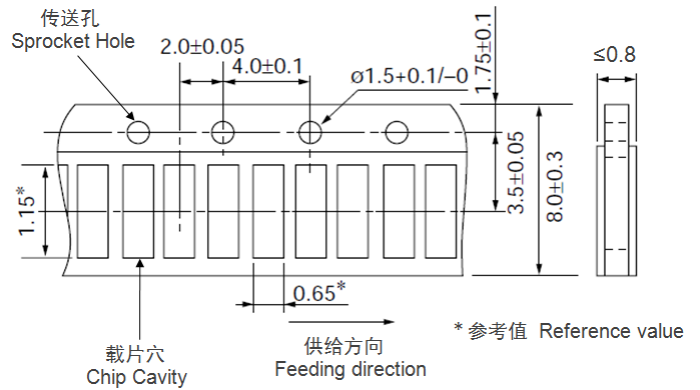


(2) 纸带尺寸 Paper Tape Dimensions (单位 Unit: mm)

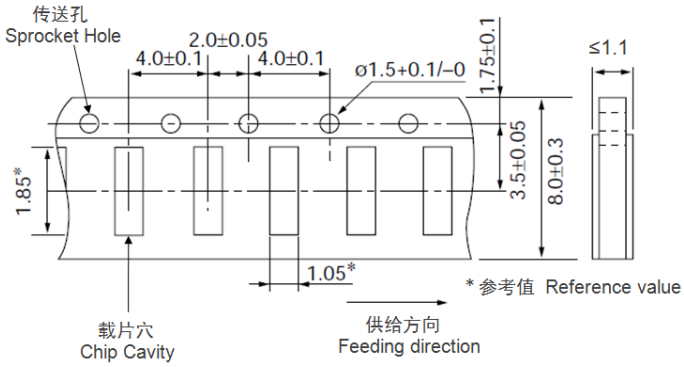
QN0201 系列 QN0201 series



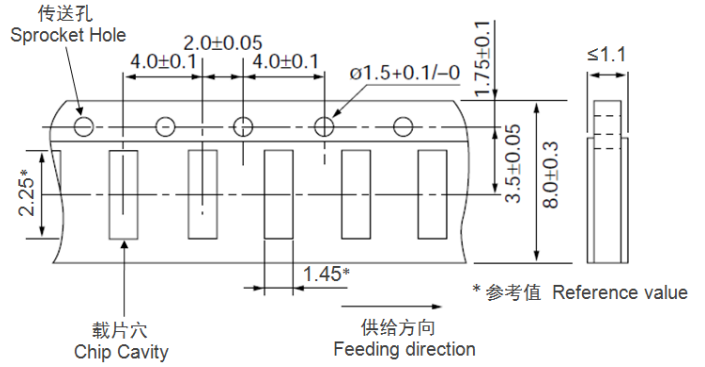
QN0402 系列 QN0402 series



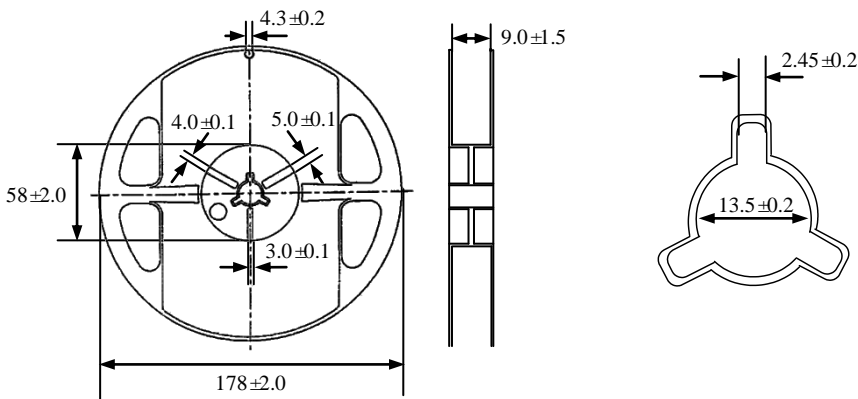
QN0603 系列 QN0603 series



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

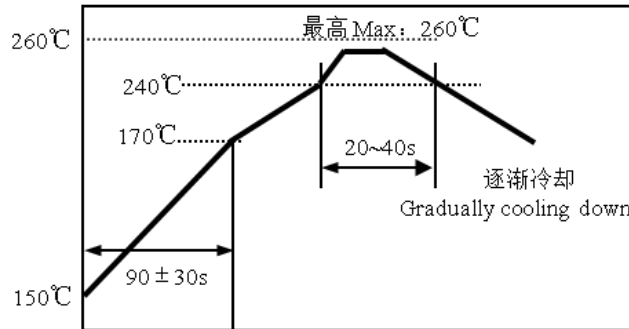
• **回流焊**

- 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**

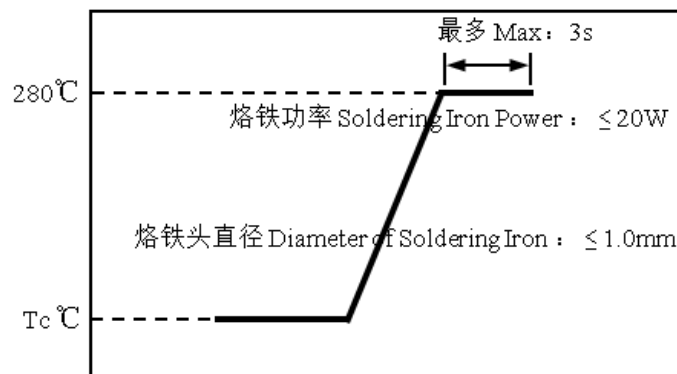
- 烙铁功率: 最大 20W
- 预热: 150°C/60sec.
- 烙铁头温度: 最高 280°C
- 焊接时间: 最多 3sec.
- 焊锡: Sn/3.0Ag/0.5Cu
- 手工焊: 最多 1 次

• **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

QN0603X104F3950FB

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	3,299.275	3,452.748	3,613.000	4.64%	0.67
-39	3,086.507	3,227.909	3,375.451	4.57%	0.66
-38	2,888.916	3,019.247	3,155.143	4.50%	0.66
-37	2,705.320	2,825.494	2,950.711	4.43%	0.65
-36	2,534.636	2,645.486	2,760.908	4.36%	0.65
-35	2,375.874	2,478.161	2,584.594	4.29%	0.64
-34	2,228.123	2,322.542	2,420.720	4.23%	0.64
-33	2,090.549	2,177.736	2,268.333	4.16%	0.63
-32	1,962.386	2,042.922	2,126.550	4.09%	0.63
-31	1,842.930	1,917.347	1,994.569	4.03%	0.62
-30	1,731.535	1,800.319	1,871.649	3.96%	0.61
-29	1,627.605	1,691.203	1,757.110	3.90%	0.61
-28	1,530.593	1,589.414	1,650.330	3.83%	0.60
-27	1,439.996	1,494.413	1,550.732	3.77%	0.60
-26	1,355.349	1,405.707	1,457.791	3.71%	0.59
-25	1,276.225	1,322.839	1,371.019	3.64%	0.59
-24	1,202.069	1,245.222	1,289.795	3.58%	0.58
-23	1,132.704	1,172.662	1,213.908	3.52%	0.58
-22	1,067.789	1,104.798	1,142.976	3.46%	0.57
-21	1,007.012	1,041.298	1,076.644	3.39%	0.56
-20	950.083	981.854	1,014.586	3.33%	0.56
-19	896.736	926.182	956.500	3.27%	0.55
-18	846.723	874.020	902.107	3.21%	0.55
-17	799.816	825.125	851.151	3.15%	0.54
-16	755.802	779.274	803.393	3.10%	0.53
-15	714.487	736.257	758.614	3.04%	0.53
-14	675.688	695.883	716.610	2.98%	0.52
-13	639.237	657.974	677.193	2.92%	0.51
-12	604.978	622.365	640.187	2.86%	0.51
-11	572.767	588.902	605.432	2.81%	0.50
-10	542.468	557.444	572.776	2.75%	0.49
-9	513.958	527.858	542.081	2.69%	0.49
-8	487.119	500.023	513.217	2.64%	0.48
-7	461.844	473.824	486.065	2.58%	0.47
-6	438.034	449.155	460.513	2.53%	0.47
-5	415.595	425.920	436.458	2.47%	0.46
-4	394.410	403.995	413.772	2.42%	0.45
-3	374.434	383.332	392.403	2.37%	0.45
-2	355.589	363.850	372.266	2.31%	0.44
-1	337.807	345.475	353.283	2.26%	0.43
0	321.020	328.139	335.382	2.21%	0.43
1	305.185	311.793	318.513	2.16%	0.42

2	290.224	296.357	302.590	2.10%	0.41
3	276.083	281.775	287.557	2.05%	0.40
4	262.713	267.995	273.357	2.00%	0.40
5	250.067	254.969	259.940	1.95%	0.39
6	238.082	242.628	247.236	1.90%	0.38
7	226.741	230.956	235.227	1.85%	0.37
8	216.007	219.915	223.872	1.80%	0.37
9	205.845	209.467	213.132	1.75%	0.36
10	196.220	199.576	202.969	1.70%	0.35
11	187.106	190.215	193.357	1.65%	0.34
12	178.469	181.348	184.255	1.60%	0.33
13	170.278	172.943	175.632	1.55%	0.33
14	162.511	164.976	167.462	1.51%	0.32
15	155.141	157.420	159.718	1.46%	0.31
16	148.144	150.250	152.372	1.41%	0.30
17	141.502	143.448	145.406	1.37%	0.29
18	135.195	136.991	138.797	1.32%	0.29
19	129.205	130.862	132.526	1.27%	0.28
20	123.514	125.041	126.574	1.23%	0.27
21	118.106	119.511	120.922	1.18%	0.26
22	112.964	114.257	115.554	1.13%	0.25
23	108.075	109.264	110.454	1.09%	0.24
24	103.425	104.515	105.607	1.04%	0.24
25	99.000	100.000	101.000	1.00%	0.23
26	94.705	95.704	96.704	1.04%	0.24
27	90.621	91.617	92.614	1.09%	0.25
28	86.735	87.726	88.719	1.13%	0.26
29	83.036	84.021	85.009	1.18%	0.27
30	79.516	80.493	81.475	1.22%	0.29
31	76.164	77.133	78.107	1.26%	0.30
32	72.972	73.932	74.897	1.31%	0.31
33	69.931	70.881	71.837	1.35%	0.32
34	67.034	67.973	68.918	1.39%	0.33
35	64.272	65.199	66.133	1.43%	0.35
36	61.638	62.554	63.476	1.47%	0.36
37	59.127	60.030	60.941	1.52%	0.37
38	56.732	57.621	58.519	1.56%	0.38
39	54.446	55.322	56.207	1.60%	0.40
40	52.264	53.127	53.999	1.64%	0.41
41	50.181	51.030	51.889	1.68%	0.42
42	48.193	49.028	49.873	1.72%	0.43
43	46.294	47.115	47.945	1.76%	0.45
44	44.479	45.285	46.102	1.80%	0.46
45	42.745	43.537	44.340	1.84%	0.47
46	41.089	41.867	42.656	1.88%	0.49
47	39.507	40.270	41.045	1.92%	0.50

48	37.993	38.743	39.503	1.96%	0.51
49	36.546	37.281	38.027	2.00%	0.53
50	35.161	35.882	36.614	2.04%	0.54
51	33.836	34.543	35.261	2.08%	0.55
52	32.567	33.260	33.965	2.12%	0.57
53	31.353	32.032	32.723	2.16%	0.58
54	30.190	30.856	31.533	2.19%	0.59
55	29.076	29.729	30.392	2.23%	0.61
56	28.010	28.649	29.299	2.27%	0.62
57	26.988	27.613	28.251	2.31%	0.64
58	26.008	26.620	27.245	2.35%	0.65
59	25.069	25.669	26.280	2.38%	0.66
60	24.168	24.755	25.355	2.42%	0.68
61	23.306	23.881	24.468	2.46%	0.69
62	22.479	23.042	23.616	2.49%	0.71
63	21.686	22.237	22.799	2.53%	0.72
64	20.925	21.464	22.014	2.57%	0.74
65	20.194	20.721	21.261	2.60%	0.75
66	19.491	20.007	20.535	2.64%	0.76
67	18.816	19.321	19.838	2.67%	0.78
68	18.167	18.661	19.167	2.71%	0.79
69	17.544	18.028	18.523	2.75%	0.81
70	16.946	17.419	17.903	2.78%	0.82
71	16.374	16.836	17.310	2.82%	0.84
72	15.824	16.276	16.740	2.85%	0.85
73	15.295	15.738	16.192	2.88%	0.87
74	14.786	15.220	15.664	2.92%	0.88
75	14.298	14.721	15.156	2.95%	0.90
76	13.826	14.240	14.666	2.99%	0.92
77	13.372	13.777	14.194	3.02%	0.93
78	12.935	13.332	13.739	3.06%	0.95
79	12.515	12.903	13.301	3.09%	0.96
80	12.110	12.490	12.880	3.12%	0.98
81	11.722	12.093	12.475	3.16%	0.99
82	11.348	11.711	12.084	3.19%	1.01
83	10.988	11.343	11.708	3.22%	1.03
84	10.641	10.988	11.346	3.26%	1.04
85	10.306	10.646	10.996	3.29%	1.06
86	9.984	10.316	10.659	3.32%	1.07
87	9.673	9.999	10.334	3.35%	1.09
88	9.374	9.692	10.020	3.38%	1.11
89	9.085	9.396	9.717	3.42%	1.12
90	8.806	9.111	9.425	3.45%	1.14
91	8.538	8.836	9.143	3.48%	1.16
92	8.279	8.570	8.871	3.51%	1.17
93	8.029	8.314	8.609	3.54%	1.19

94	7.787	8.066	8.355	3.57%	1.21
95	7.555	7.828	8.110	3.61%	1.22
96	7.330	7.598	7.874	3.64%	1.24
97	7.114	7.376	7.646	3.67%	1.26
98	6.906	7.162	7.427	3.70%	1.27
99	6.704	6.955	7.214	3.73%	1.29
100	6.509	6.755	7.008	3.76%	1.31
101	6.321	6.561	6.810	3.79%	1.33
102	6.139	6.374	6.618	3.82%	1.34
103	5.963	6.194	6.432	3.85%	1.36
104	5.793	6.019	6.252	3.88%	1.38
105	5.629	5.850	6.079	3.91%	1.40
106	5.470	5.686	5.910	3.94%	1.41
107	5.317	5.528	5.747	3.97%	1.43
108	5.168	5.375	5.590	4.00%	1.45
109	5.025	5.227	5.438	4.03%	1.47
110	4.886	5.084	5.290	4.05%	1.49
111	4.751	4.945	5.147	4.08%	1.50
112	4.620	4.811	5.009	4.11%	1.52
113	4.494	4.681	4.875	4.14%	1.54
114	4.372	4.555	4.745	4.17%	1.56
115	4.254	4.433	4.619	4.20%	1.58
116	4.141	4.316	4.498	4.22%	1.60
117	4.030	4.202	4.381	4.25%	1.62
118	3.923	4.092	4.267	4.28%	1.63
119	3.820	3.985	4.157	4.31%	1.65
120	3.720	3.881	4.050	4.34%	1.67
121	3.622	3.781	3.946	4.36%	1.69
122	3.528	3.684	3.845	4.39%	1.71
123	3.437	3.589	3.748	4.42%	1.73
124	3.349	3.498	3.653	4.44%	1.75
125	3.263	3.409	3.562	4.47%	1.77

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