

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) : QN0603X473J4050HB

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

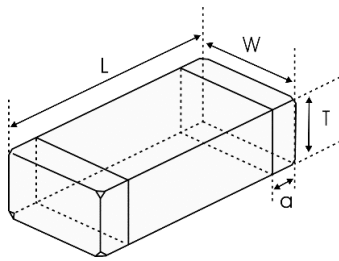


图 1 Fig.1

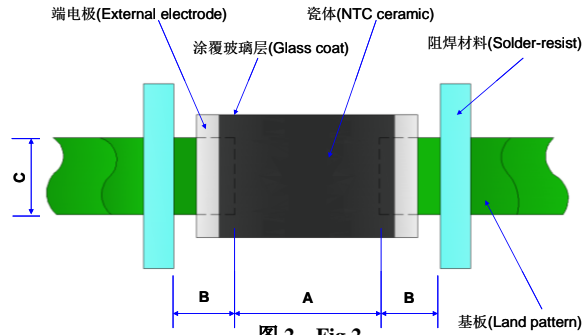


图 2 Fig.2

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 473 J 4050 H 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	
502	5kΩ
473	47kΩ
224	220kΩ

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
4050	4050K

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)
QN0603X473J4050HB	47±5%	4050±3%	4110	0.14	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

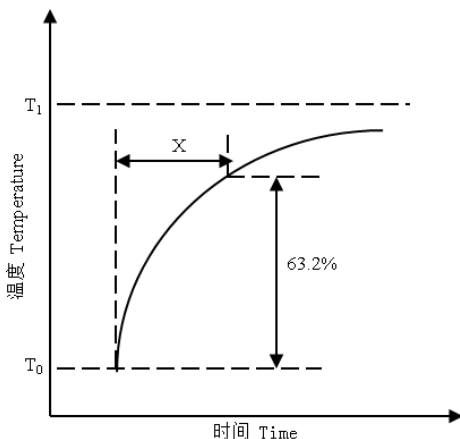
If any doubt on the results, measurements/tests should be made within the following limits:

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

▪ **Inspection Equipment**

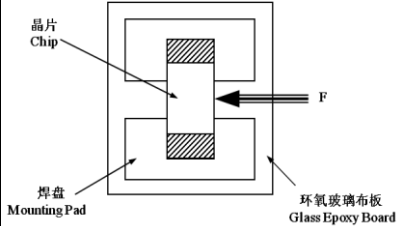
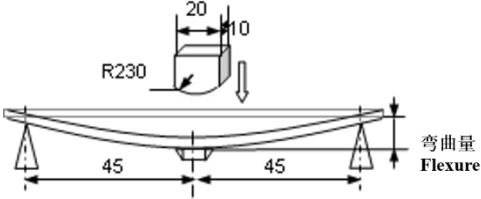
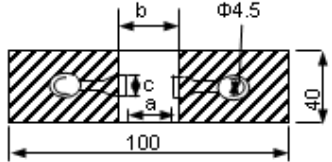
Visual Examination: 20× magnifier
Resistance value test: Thermistor resistance tester

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" data-bbox="497 1077 1034 1207"> <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 1980"> <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 $\Delta R_{25}/R_{25} \leq 2\%$</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
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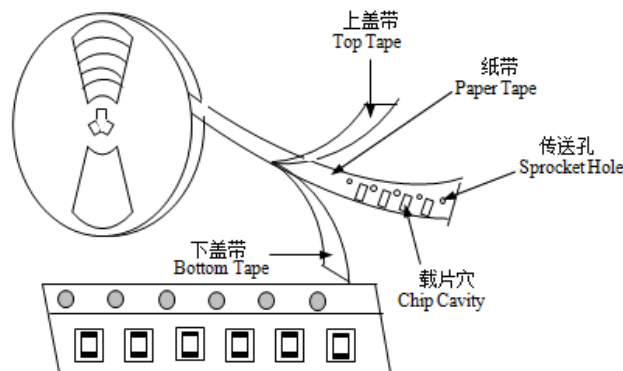
<p>振动 Vibration</p>	<p>IEC 60068-2-80</p>	<p>① 将晶片焊接在测试基板上（如右图所示的环氧玻璃布板）； Solder the chip to the testing jig (glass epoxy board shown in the left) using eutectic solder.</p> <p>② 晶片以全振幅为 1.5mm 进行振动，频率范围为 10Hz ~55 Hz； The chip shall be subjected to a simple harmonic motion having total amplitude of 1.5mm, 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: 96.5Sn/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: 96.5Sn/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 $\Delta R_{25}/R_{25} \leq 2\%$ ③ $\Delta B/B \leq 1\%$</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 $\Delta R_{25}/R_{25} \leq 2\%$ ③ $\Delta B/B \leq 1\%$</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 $\Delta R_{25}/R_{25} \leq 2\%$ ③ $\Delta B/B \leq 1\%$</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 2\%$ ③ $ \Delta B/B \leq 1\%$
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 2\%$ ③ $ \Delta B/B \leq 1\%$
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 2\%$ ③ $ \Delta B/B \leq 1\%$

7 编带 Taping

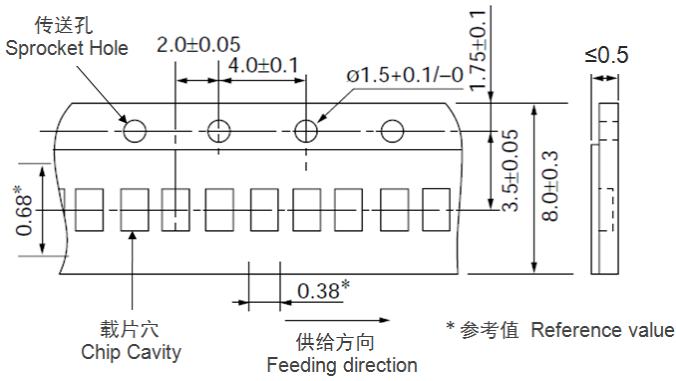
类型 Type	0201	0402	0603	0805
编带厚度 Tape thickness(mm)	0.5±0.15	0.5±0.15	0.8±0.15	0.85±0.2
编带材质 Tape material	纸带 Paper Tape			
每盘数量 Quantity per Reel	15K	10K	4K	4K

(1) 编带图 Taping Drawings

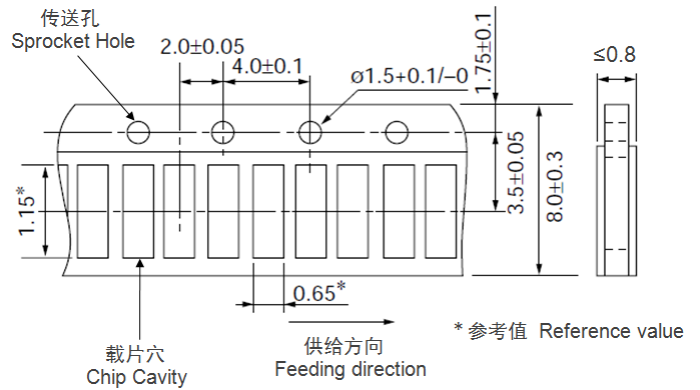


(2) 纸带尺寸 Paper Tape Dimensions (单位 Unit: mm)

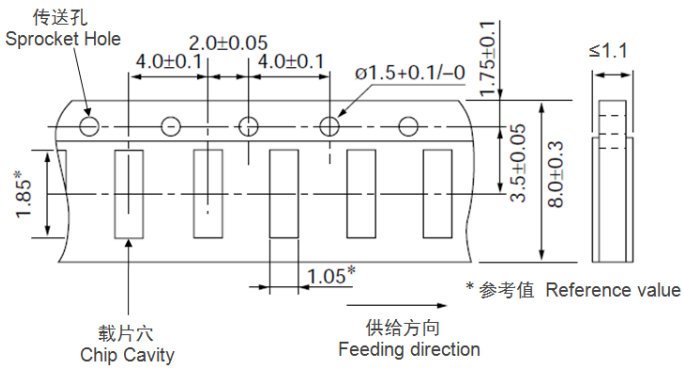
QN0201 系列 QN0201 series



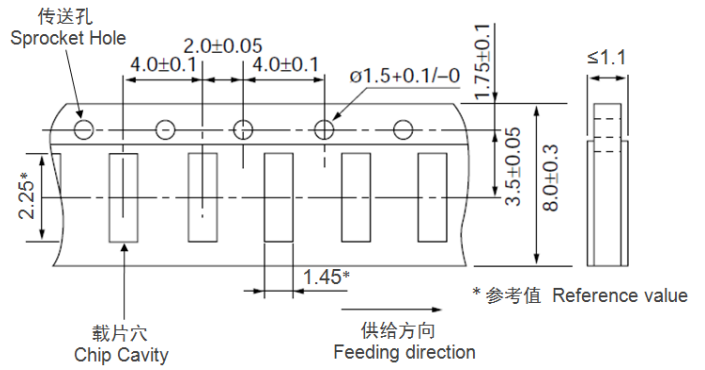
QN0402 系列 QN0402 series



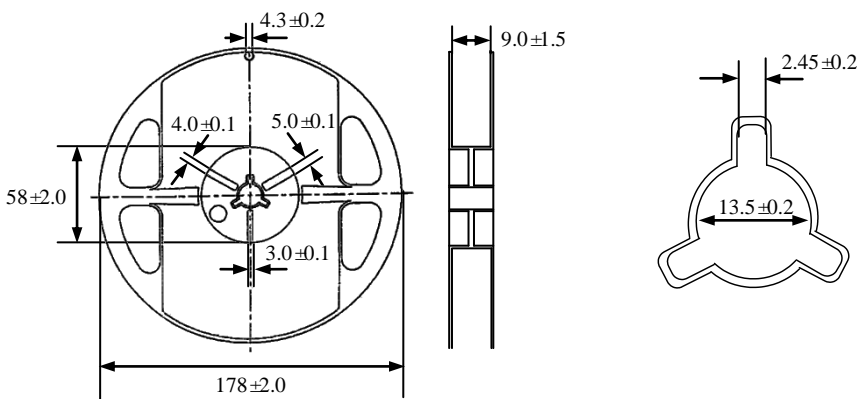
QN0603 系列 QN0603 series



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

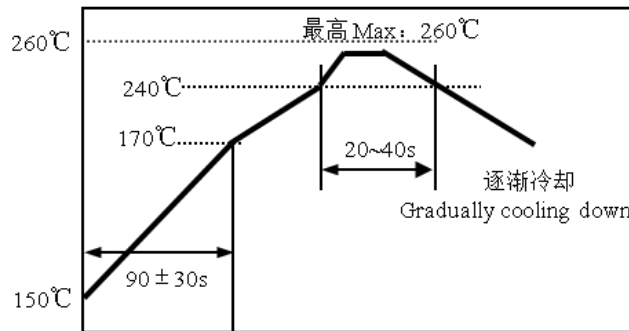
• 回流焊

- 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：96.5Sn/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: 96.5Sn/3.0Ag/0.5Cu
- Max.2 times for re-flowing



• 手工焊

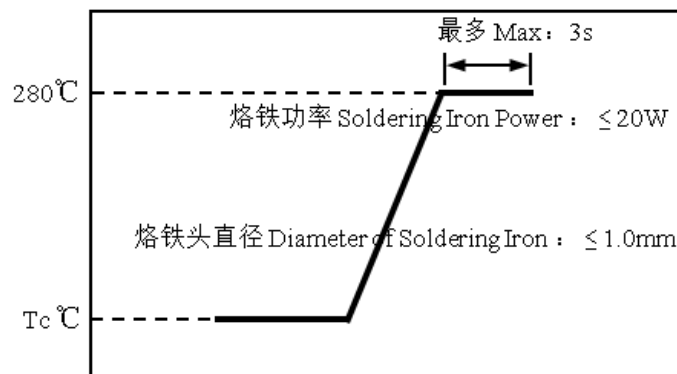
- 烙铁功率：最大 20W
- 预热：150°C/60sec.
- 烙铁头温度：最高 280°C
- 焊接时间：最多 3sec.
- 焊锡：96.5Sn/3.0Ag/0.5Cu
- 手工焊：最多 1 次

• 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: 96.5Sn/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

QN0603X473J4050HB

温度 Temp. (°C)	R 最小值 R_Min (Kohm)	R 中心值 R_Cent (Kohm)	R 最大值 R_Max (Kohm)	阻值公差 Res TOL.	温度公差 Temp. TOL.(°C)
-40	1,382.666	1,618.467	1,889.745	16.76%	2.41
-39	1,297.192	1,515.423	1,765.941	16.53%	2.39
-38	1,217.511	1,419.551	1,650.980	16.30%	2.38
-37	1,143.197	1,330.311	1,544.181	16.08%	2.36
-36	1,073.858	1,247.207	1,444.917	15.85%	2.35
-35	1,009.133	1,169.782	1,352.616	15.63%	2.33
-34	948.688	1,097.616	1,266.749	15.41%	2.31
-33	892.218	1,030.324	1,186.832	15.19%	2.30
-32	839.438	967.548	1,112.420	14.97%	2.28
-31	790.087	908.960	1,043.104	14.76%	2.27
-30	743.923	854.258	978.506	14.54%	2.25
-29	700.723	803.163	918.278	14.33%	2.23
-28	660.280	755.418	862.103	14.12%	2.22
-27	622.403	710.783	809.684	13.91%	2.20
-26	586.915	669.041	760.751	13.71%	2.18
-25	553.653	629.986	715.052	13.50%	2.16
-24	522.465	593.433	672.356	13.30%	2.15
-23	493.211	559.208	632.451	13.10%	2.13
-22	465.759	527.148	595.137	12.90%	2.11
-21	439.990	497.107	560.235	12.70%	2.09
-20	415.792	468.946	527.574	12.50%	2.08
-19	393.059	442.538	496.998	12.31%	2.06
-18	371.697	417.763	468.365	12.11%	2.04
-17	351.614	394.513	441.540	11.92%	2.02
-16	332.728	372.686	416.399	11.73%	2.00
-15	314.960	352.187	392.828	11.54%	1.98
-14	298.240	332.928	370.721	11.35%	1.97
-13	282.499	314.828	349.978	11.17%	1.95
-12	267.675	297.811	330.510	10.98%	1.93
-11	253.711	281.806	312.231	10.80%	1.91
-10	240.551	266.749	295.062	10.61%	1.89
-9	228.145	252.579	278.930	10.43%	1.87
-8	216.447	239.237	263.767	10.25%	1.85
-7	205.411	226.673	249.510	10.07%	1.83
-6	194.998	214.836	236.101	9.90%	1.81
-5	185.169	203.681	223.484	9.72%	1.79
-4	175.889	193.165	211.609	9.55%	1.77
-3	167.123	183.249	200.428	9.37%	1.75
-2	158.841	173.894	189.897	9.20%	1.73
-1	151.013	165.066	179.976	9.03%	1.71
0	143.614	156.734	170.626	8.86%	1.69
1	136.616	148.867	161.811	8.70%	1.66

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)
2	129.996	141.436	153.498	8.53%	1.64
3	123.732	134.415	145.656	8.36%	1.62
4	117.802	127.780	138.255	8.20%	1.60
5	112.189	121.507	131.270	8.03%	1.58
6	106.872	115.575	124.674	7.87%	1.56
7	101.835	109.963	118.444	7.71%	1.53
8	97.062	104.654	112.557	7.55%	1.51
9	92.537	99.628	106.994	7.39%	1.49
10	88.248	94.870	101.735	7.24%	1.47
11	84.179	90.364	96.761	7.08%	1.44
12	80.319	86.095	92.057	6.92%	1.42
13	76.656	82.051	87.605	6.77%	1.40
14	73.179	78.216	83.392	6.62%	1.38
15	69.878	74.581	79.403	6.46%	1.35
16	66.742	71.134	75.625	6.31%	1.33
17	63.764	67.864	72.046	6.16%	1.31
18	60.934	64.760	68.655	6.01%	1.28
19	58.243	61.815	65.441	5.87%	1.26
20	55.686	59.019	62.394	5.72%	1.23
21	53.254	56.363	59.504	5.57%	1.21
22	50.940	53.840	56.763	5.43%	1.19
23	48.739	51.443	54.162	5.28%	1.16
24	46.644	49.166	51.694	5.14%	1.14
25	44.650	47.000	49.350	5.00%	1.11
26	42.636	44.941	47.251	5.14%	1.15
27	40.724	42.982	45.253	5.28%	1.19
28	38.907	41.119	43.348	5.42%	1.23
29	37.180	39.346	41.534	5.56%	1.27
30	35.538	37.658	39.805	5.70%	1.31
31	33.977	36.051	38.156	5.84%	1.35
32	32.493	34.521	36.584	5.98%	1.39
33	31.081	33.064	35.085	6.11%	1.43
34	29.737	31.675	33.655	6.25%	1.47
35	28.458	30.352	32.290	6.39%	1.51
36	27.241	29.090	30.987	6.52%	1.55
37	26.081	27.887	29.744	6.66%	1.59
38	24.977	26.740	28.556	6.79%	1.63
39	23.925	25.646	27.422	6.93%	1.68
40	22.923	24.602	26.339	7.06%	1.72
41	21.967	23.606	25.304	7.19%	1.76
42	21.056	22.655	24.314	7.32%	1.80
43	20.188	21.747	23.369	7.46%	1.85
44	19.359	20.880	22.465	7.59%	1.89
45	18.569	20.052	21.600	7.72%	1.93

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)
46	17.815	19.261	20.773	7.85%	1.98
47	17.095	18.505	19.981	7.98%	2.02
48	16.408	17.782	19.224	8.11%	2.07
49	15.752	17.092	18.499	8.24%	2.11
50	15.125	16.431	17.805	8.36%	2.16
51	14.526	15.799	17.141	8.49%	2.20
52	13.954	15.195	16.504	8.62%	2.25
53	13.408	14.617	15.895	8.74%	2.29
54	12.885	14.063	15.311	8.87%	2.34
55	12.385	13.533	14.751	9.00%	2.39
56	11.908	13.026	14.214	9.12%	2.43
57	11.451	12.541	13.700	9.25%	2.48
58	11.013	12.076	13.207	9.37%	2.53
59	10.595	11.630	12.734	9.49%	2.57
60	10.195	11.203	12.280	9.62%	2.62
61	9.811	10.794	11.845	9.74%	2.67
62	9.444	10.402	11.427	9.86%	2.72
63	9.093	10.025	11.026	9.98%	2.77
64	8.756	9.665	10.641	10.10%	2.82
65	8.434	9.319	10.272	10.22%	2.87
66	8.124	8.987	9.917	10.34%	2.92
67	7.828	8.669	9.576	10.46%	2.97
68	7.544	8.363	9.248	10.58%	3.02
69	7.272	8.070	8.934	10.70%	3.07
70	7.011	7.789	8.631	10.82%	3.12
71	6.760	7.518	8.340	10.94%	3.17
72	6.520	7.259	8.061	11.05%	3.22
73	6.289	7.009	7.792	11.17%	3.27
74	6.068	6.770	7.534	11.28%	3.32
75	5.856	6.540	7.285	11.40%	3.37
76	5.652	6.318	7.046	11.52%	3.43
77	5.456	6.106	6.816	11.63%	3.48
78	5.268	5.901	6.594	11.74%	3.53
79	5.087	5.705	6.381	11.86%	3.59
80	4.913	5.515	6.176	11.97%	3.64
81	4.747	5.334	5.978	12.08%	3.69
82	4.586	5.159	5.788	12.20%	3.75
83	4.432	4.990	5.604	12.31%	3.80
84	4.284	4.828	5.428	12.42%	3.86
85	4.141	4.672	5.257	12.53%	3.91
86	4.004	4.522	5.093	12.64%	3.97
87	3.873	4.377	4.935	12.75%	4.02
88	3.746	4.238	4.783	12.86%	4.08
89	3.624	4.104	4.636	12.97%	4.13

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)
90	3.506	3.974	4.494	13.08%	4.19
91	3.393	3.850	4.358	13.18%	4.25
92	3.284	3.730	4.226	13.29%	4.30
93	3.179	3.614	4.099	13.40%	4.36
94	3.078	3.503	3.976	13.51%	4.42
95	2.981	3.395	3.857	13.61%	4.48
96	2.887	3.291	3.743	13.72%	4.54
97	2.797	3.191	3.633	13.82%	4.59
98	2.710	3.095	3.526	13.93%	4.65
99	2.626	3.002	3.423	14.03%	4.71
100	2.545	2.912	3.324	14.14%	4.77
101	2.467	2.825	3.228	14.24%	4.83
102	2.392	2.742	3.135	14.34%	4.89
103	2.319	2.661	3.045	14.45%	4.95
104	2.249	2.583	2.959	14.55%	5.01
105	2.182	2.508	2.875	14.65%	5.07
106	2.117	2.435	2.794	14.75%	5.13
107	2.054	2.365	2.716	14.85%	5.19
108	1.993	2.297	2.640	14.95%	5.26
109	1.934	2.231	2.567	15.05%	5.32
110	1.878	2.168	2.496	15.15%	5.38
111	1.823	2.106	2.428	15.25%	5.44
112	1.770	2.047	2.361	15.35%	5.51
113	1.719	1.990	2.297	15.45%	5.57
114	1.670	1.935	2.235	15.55%	5.63
115	1.622	1.881	2.175	15.64%	5.70
116	1.576	1.829	2.117	15.74%	5.76
117	1.532	1.779	2.061	15.84%	5.82
118	1.489	1.731	2.006	15.93%	5.89
119	1.447	1.684	1.954	16.03%	5.95
120	1.407	1.638	1.902	16.12%	6.02
121	1.368	1.594	1.853	16.22%	6.08
122	1.331	1.552	1.805	16.31%	6.15
123	1.294	1.511	1.758	16.41%	6.21
124	1.259	1.471	1.713	16.50%	6.28
125	1.225	1.432	1.670	16.59%	6.35

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