

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) : QN0201X474F4050FB

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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变更履历表 Version change history

版本号 Rev.	生效日期 Effective Date	变更内容 Changed Contents	变更原因 Change Reasons	批准 Approved By
01	/	新版发行 New release	/	潘士宾 Shibin Pan

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

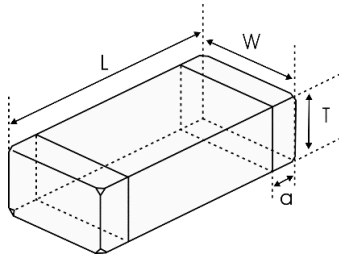


图 1 Fig.1

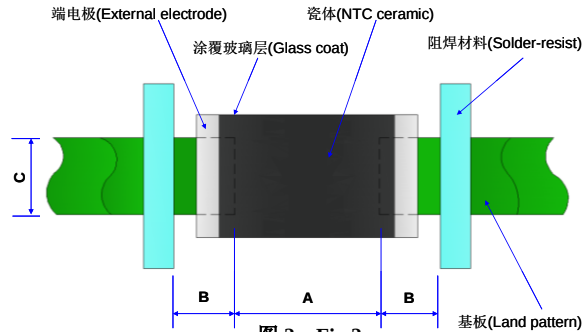


图 2 Fig.2

表 1 (Table 1)

单位 unit: inch[mm]

类别 Type	L	W	T	a	A	B	C
0201 [0603]	0.024±0.002 [0.6±0.05]	0.012±0.002 [0.3±0.05]	0.012±0.002 [0.3±0.05]	0.006±0.002 [0.15±0.05]	[0.2-0.3]	[0.25-0.35]	[0.25-0.35]

2 产品标识 (料号) Product Identification(Part Number)

QN 0201 X 474 F 4050 F B
① ② ③ ④ ⑤ ⑥ ⑦ ⑧

① 类别 Type	
QFZL	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

③ 分隔符 Delimiter	
	X

④ 25℃的零功率电阻 Nominal Zero-Power Resistance	
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	
3380	3380K
4050	4050K
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

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 (℃)
QN0201X474F4050FB	470±1%	4050±1%	4109 ref.	0.04	1.0	<3	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:

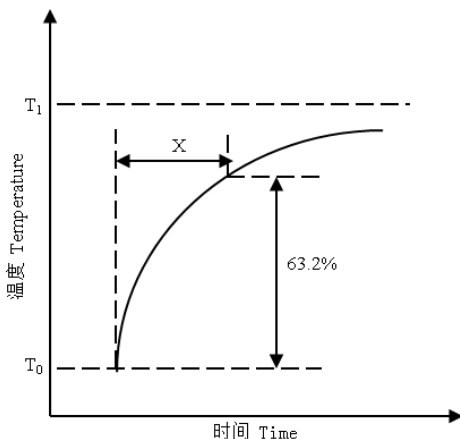
- a. Ambient Temperature: 25±2℃
- b. Relative Humidity: 65±5%
- c. Air Pressure: 86kPa to 106kPa

▪ Inspection Equipment

Visual Examination: 20× magnifier

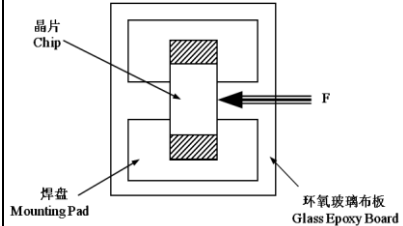
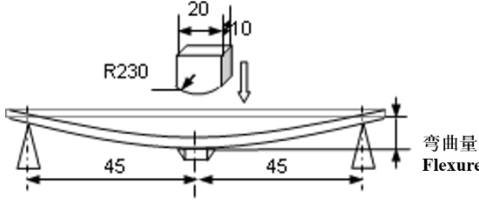
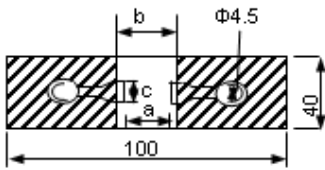
Resistance value test: Thermistor resistance tester

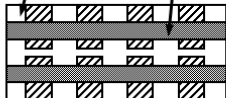
5 电性测试 Electrical Test

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 T₀ (°C) to T₁ (°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	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><td>尺寸 Size</td><td>F</td><td>保持时间 Duration</td></tr><tr><td>0201</td><td>2N</td><td rowspan="3">10±1s</td></tr><tr><td>0402, 0603</td><td>5N</td></tr><tr><td>0805</td><td>10N</td></tr></table>	尺寸 Size	F	保持时间 Duration	0201	2N	10±1s	0402, 0603	5N	0805	10N	端电极无脱落且瓷体无损伤。 No removal or split of the termination or other defects shall occur. 																				
尺寸 Size	F	保持时间 Duration																															
0201	2N	10±1s																															
0402, 0603	5N																																
0805	10N																																
抗弯强度 Resistance to Flexure	IEC 60068-2-21	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><td>尺寸 Size</td><td>弯曲变形量 Flexure</td><td>施压速度 Pressurizing Speed</td><td>保持时间 Duration</td></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	① 无外观损伤。 No visible damage. ② $\Delta R_{25}/R_{25} \leq 2\%$ 单位 unit: mm <table><tr><td>类型 Type</td><td>a</td><td>b</td><td>c</td></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																																
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0805	1.2	4.0	1.65																														

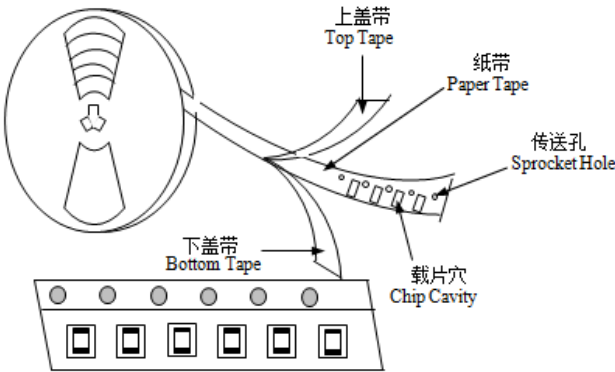
振动 Vibration	IEC 60068-2-80	① 将晶片焊接在测试基板上（如右图所示的环氧玻璃布板）； Solder the chip to the testing jig (glass epoxy board shown in the left) using eutectic solder. ② 晶片以全振幅为 1.5mm 进行振动，频率范围为 10Hz ~55 Hz； The chip shall be subjected to a simple harmonic motion having total amplitude of 1.5mm, the frequency being 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).	无外观损伤。 No visible damage. 铜箔 Cupad 阻焊膜 Solder mask  环氧玻璃布板Glass Epoxy Board															
坠落 Dropping	IEC 60068-2-32	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.	无外观损伤。 No visible damage.															
可焊性 Solderability	IEC 60068-2-58	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.	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.															
耐焊性 Resistance to Soldering Heat	IEC 60068-2-58	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.	① 无外观损伤； No visible damage. ② ΔR25/R25 ≤2% ③ ΔB/B ≤1%															
温度周期 Temperature cycling	IEC 60068-2-14	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.	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	① 无外观损伤； No visible damage. ② ΔR25/R25 ≤2% ③ ΔB/B ≤1%
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																
高温存放 Resistance to dry heat	IEC 60068-2-2	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.	① 无外观损伤； No visible damage. ② ΔR25/R25 ≤2% ③ ΔB/B ≤1%															

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 ΔR25/R25 ≤2% ③ ΔB/B ≤1%
湿热存放 Resistance to damp heat	IEC 60068-2-78	① 在 60±2℃，相对湿度 90~95%空气中，无负载放置 1000±24 小时。 60±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 ΔR25/R25 ≤2% ③ ΔB/B ≤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 ΔR25/R25 ≤2% ③ ΔB/B ≤1%

7 编带 Taping

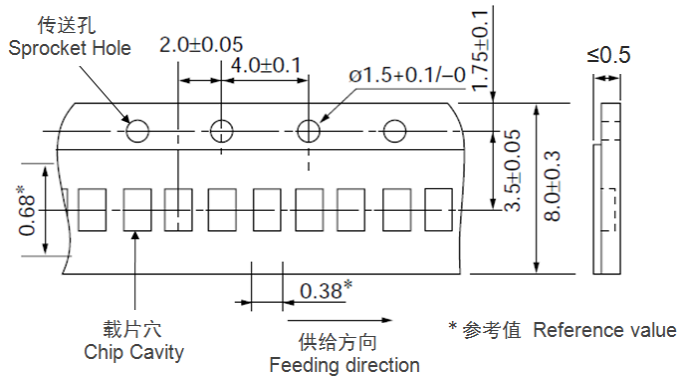
类型 Type	0201	0402	0603	0805
编带厚度 Tape thickness(mm)	0.5±0.15	0.5±0.15	0.8±0.15	0.85±0.2
编带材质 Tape material	纸带 Paper Tape			
每盘数量 Quantity per Reel	15K	10K	4K	4K

(1) 编带图 Taping Drawings

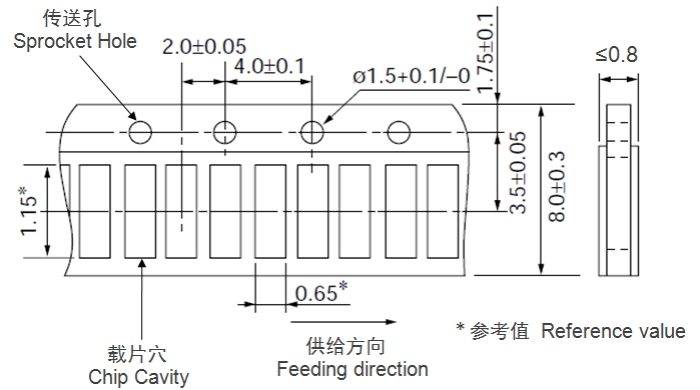


(2) 纸带尺寸 Paper Tape Dimensions (单位 Unit: mm)

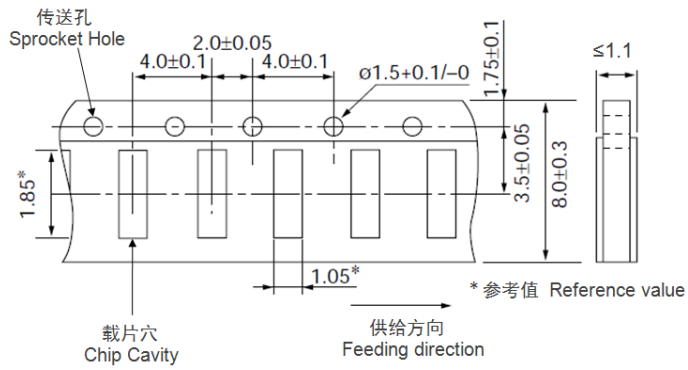
QN0201 系列 QN0201 series



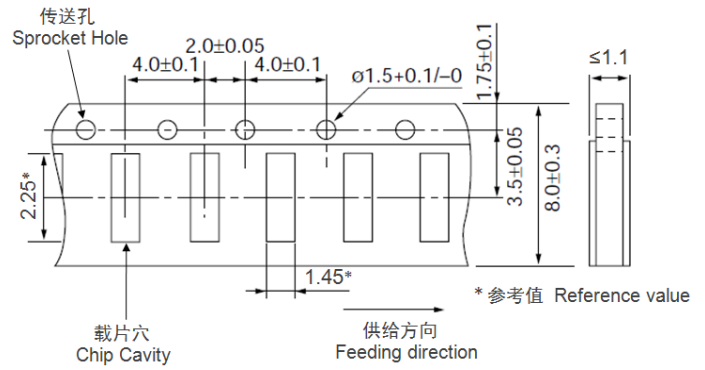
QN0402 系列 QN0402 series



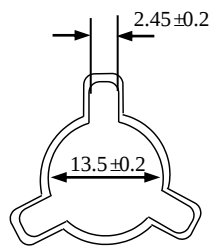
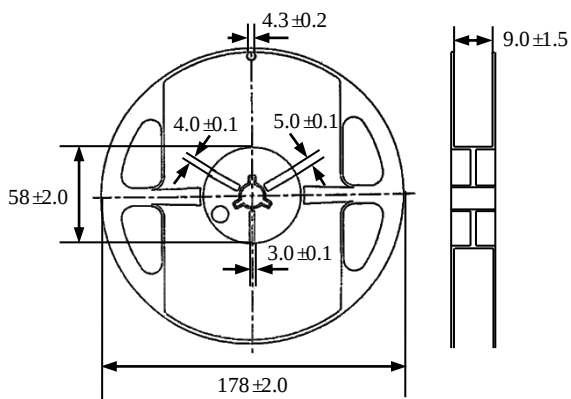
QN0603 系列 QN0603 series



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: $\leq 75\% \text{RH}$
 - 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

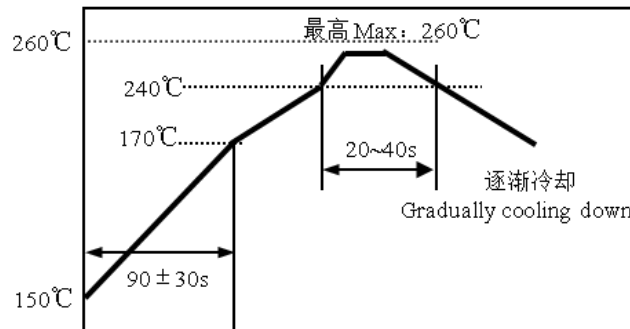
• 回流焊

- 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

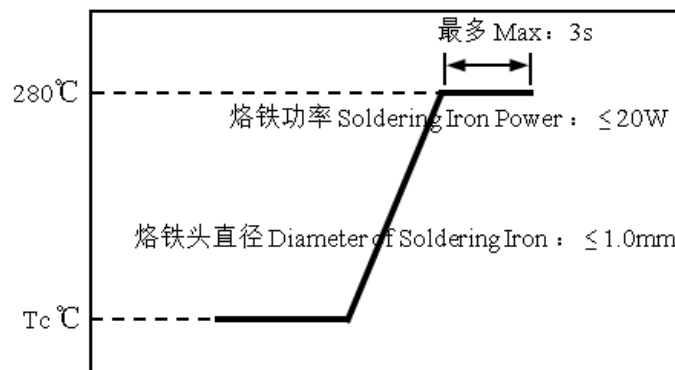
- 烙铁功率: 最大 20W
- 预热: 150°C/60sec.
- 烙铁头温度: 最高 280°C
- 焊接时间: 最多 3sec.
- 焊锡: 96.5Sn/3.0Ag/0.5Cu
- 手工焊: 最多 1 次

• 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

QN0201X474F4050FB

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	15,465.677	16,184.668	16,935.391	4.64%	0.67
-39	14,490.545	15,154.230	15,846.728	4.57%	0.66
-38	13,582.686	14,195.510	14,834.500	4.50%	0.66
-37	12,737.078	13,303.110	13,892.906	4.43%	0.65
-36	11,949.101	12,472.067	13,016.620	4.37%	0.65
-35	11,214.502	11,697.819	12,200.744	4.30%	0.64
-34	10,529.367	10,976.164	11,440.776	4.23%	0.64
-33	9,890.087	10,303.237	10,732.572	4.17%	0.63
-32	9,293.340	9,675.477	10,072.319	4.10%	0.63
-31	8,736.059	9,089.601	9,456.505	4.04%	0.62
-30	8,215.415	8,542.584	8,881.893	3.97%	0.61
-29	7,728.800	8,031.634	8,345.500	3.91%	0.61
-28	7,273.801	7,554.177	7,844.575	3.84%	0.60
-27	6,848.193	7,107.832	7,376.578	3.78%	0.60
-26	6,449.916	6,690.405	6,939.167	3.72%	0.59
-25	6,077.068	6,299.864	6,530.176	3.66%	0.59
-24	5,727.886	5,934.333	6,147.606	3.59%	0.58
-23	5,400.742	5,592.075	5,789.608	3.53%	0.57
-22	5,094.127	5,271.484	5,454.471	3.47%	0.57
-21	4,806.641	4,971.072	5,140.613	3.41%	0.56
-20	4,536.991	4,689.461	4,846.571	3.35%	0.56
-19	4,283.974	4,425.375	4,570.987	3.29%	0.55
-18	4,046.476	4,177.631	4,312.606	3.23%	0.54
-17	3,823.464	3,945.132	4,070.263	3.17%	0.54
-16	3,613.979	3,726.858	3,842.878	3.11%	0.53
-15	3,417.127	3,521.865	3,629.450	3.05%	0.53
-14	3,232.083	3,329.276	3,429.049	3.00%	0.52
-13	3,058.076	3,148.276	3,240.812	2.94%	0.51
-12	2,894.390	2,978.106	3,063.938	2.88%	0.51
-11	2,740.359	2,818.064	2,897.682	2.83%	0.50
-10	2,595.366	2,667.494	2,741.352	2.77%	0.49
-9	2,458.832	2,525.786	2,594.305	2.71%	0.49
-8	2,330.221	2,392.375	2,455.941	2.66%	0.48
-7	2,209.033	2,266.731	2,325.703	2.60%	0.47
-6	2,094.801	2,148.363	2,203.074	2.55%	0.47
-5	1,987.091	2,036.813	2,087.570	2.49%	0.46
-4	1,885.497	1,931.653	1,978.740	2.44%	0.45
-3	1,789.642	1,832.485	1,876.166	2.38%	0.44
-2	1,699.172	1,738.938	1,779.456	2.33%	0.44
-1	1,613.758	1,650.665	1,688.247	2.28%	0.43
0	1,533.092	1,567.342	1,602.196	2.22%	0.42
1	1,456.886	1,488.667	1,520.988	2.17%	0.42

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	1,384.872	1,414.357	1,444.325	2.12%	0.41
3	1,316.798	1,344.149	1,371.931	2.07%	0.40
4	1,252.429	1,277.796	1,303.547	2.02%	0.39
5	1,191.545	1,215.067	1,238.930	1.96%	0.39
6	1,133.941	1,155.747	1,177.855	1.91%	0.38
7	1,079.423	1,099.634	1,120.111	1.86%	0.37
8	1,027.812	1,046.538	1,065.499	1.81%	0.36
9	978.937	996.283	1,013.834	1.76%	0.36
10	932.642	948.702	964.943	1.71%	0.35
11	888.776	903.642	918.664	1.66%	0.34
12	847.201	860.955	874.844	1.61%	0.33
13	807.787	820.505	833.340	1.56%	0.32
14	770.409	782.165	794.021	1.52%	0.32
15	734.955	745.814	756.758	1.47%	0.31
16	701.314	711.340	721.437	1.42%	0.30
17	669.386	678.636	687.945	1.37%	0.29
18	639.076	647.604	656.180	1.32%	0.28
19	610.294	618.150	626.044	1.28%	0.27
20	582.955	590.186	597.446	1.23%	0.27
21	556.980	563.629	570.301	1.18%	0.26
22	532.296	538.403	544.527	1.14%	0.25
23	508.831	514.435	520.049	1.09%	0.24
24	486.520	491.655	496.796	1.05%	0.23
25	465.300	470.000	474.700	1.00%	0.22
26	444.715	449.408	454.106	1.05%	0.23
27	425.145	429.823	434.509	1.09%	0.25
28	406.534	411.190	415.858	1.14%	0.26
29	388.833	393.459	398.101	1.18%	0.27
30	371.991	376.582	381.192	1.22%	0.28
31	355.963	360.514	365.086	1.27%	0.29
32	340.707	345.212	349.742	1.31%	0.30
33	326.181	330.637	335.119	1.36%	0.32
34	312.347	316.750	321.182	1.40%	0.33
35	299.169	303.515	307.894	1.44%	0.34
36	286.613	290.901	295.223	1.49%	0.35
37	274.647	278.873	283.136	1.53%	0.37
38	263.240	267.403	271.604	1.57%	0.38
39	252.364	256.462	260.600	1.61%	0.39
40	241.991	246.023	250.097	1.66%	0.40
41	232.096	236.061	240.069	1.70%	0.42
42	222.655	226.552	230.493	1.74%	0.43
43	213.645	217.473	221.347	1.78%	0.44
44	205.045	208.803	212.609	1.82%	0.45
45	196.833	200.522	204.259	1.86%	0.47
46	188.991	192.610	196.279	1.91%	0.48

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)
47	181.500	185.050	188.651	1.95%	0.49
48	174.343	177.824	181.356	1.99%	0.51
49	167.503	170.915	174.380	2.03%	0.52
50	160.966	164.310	167.706	2.07%	0.53
51	154.716	157.992	161.321	2.11%	0.55
52	148.740	151.948	155.211	2.15%	0.56
53	143.024	146.166	149.362	2.19%	0.57
54	137.556	140.632	143.762	2.23%	0.59
55	132.324	135.335	138.400	2.27%	0.60
56	127.316	130.263	133.265	2.30%	0.61
57	122.523	125.407	128.345	2.34%	0.63
58	117.934	120.755	123.632	2.38%	0.64
59	113.539	116.299	119.114	2.42%	0.66
60	109.330	112.029	114.784	2.46%	0.67
61	105.298	107.937	110.633	2.50%	0.68
62	101.434	104.015	106.652	2.53%	0.70
63	97.730	100.255	102.834	2.57%	0.71
64	94.181	96.648	99.171	2.61%	0.73
65	90.777	93.190	95.657	2.65%	0.74
66	87.513	89.872	92.285	2.68%	0.76
67	84.383	86.688	89.048	2.72%	0.77
68	81.380	83.633	85.941	2.76%	0.79
69	78.499	80.701	82.957	2.80%	0.80
70	75.733	77.886	80.091	2.83%	0.82
71	73.079	75.183	77.339	2.87%	0.83
72	70.531	72.587	74.695	2.90%	0.85
73	68.084	70.093	72.154	2.94%	0.86
74	65.734	67.697	69.712	2.98%	0.88
75	63.477	65.395	67.365	3.01%	0.89
76	61.308	63.183	65.108	3.05%	0.91
77	59.224	61.056	62.938	3.08%	0.92
78	57.222	59.011	60.851	3.12%	0.94
79	55.296	57.045	58.844	3.15%	0.95
80	53.445	55.154	56.912	3.19%	0.97
81	51.665	53.335	55.054	3.22%	0.98
82	49.953	51.585	53.265	3.26%	1.00
83	48.307	49.901	51.543	3.29%	1.02
84	46.722	48.280	49.886	3.32%	1.03
85	45.198	46.720	48.290	3.36%	1.05
86	43.730	45.218	46.752	3.39%	1.06
87	42.318	43.772	45.272	3.43%	1.08
88	40.958	42.379	43.845	3.46%	1.10
89	39.648	41.037	42.471	3.49%	1.11
90	38.387	39.745	41.146	3.53%	1.13
91	37.173	38.499	39.870	3.56%	1.15

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)
92	36.002	37.299	38.639	3.59%	1.16
93	34.875	36.142	37.452	3.62%	1.18
94	33.788	35.027	36.308	3.66%	1.20
95	32.740	33.951	35.204	3.69%	1.21
96	31.730	32.914	34.139	3.72%	1.23
97	30.757	31.914	33.112	3.75%	1.25
98	29.818	30.949	32.121	3.79%	1.26
99	28.912	30.019	31.164	3.82%	1.28
100	28.038	29.120	30.241	3.85%	1.30
101	27.196	28.253	29.350	3.88%	1.32
102	26.382	27.417	28.489	3.91%	1.33
103	25.597	26.609	27.658	3.94%	1.35
104	24.840	25.829	26.855	3.97%	1.37
105	24.108	25.076	26.080	4.00%	1.39
106	23.402	24.348	25.331	4.03%	1.40
107	22.720	23.646	24.607	4.07%	1.42
108	22.061	22.967	23.907	4.10%	1.44
109	21.425	22.311	23.231	4.13%	1.46
110	20.810	21.677	22.578	4.16%	1.48
111	20.216	21.064	21.946	4.19%	1.49
112	19.642	20.472	21.335	4.22%	1.51
113	19.087	19.899	20.744	4.24%	1.53
114	18.550	19.345	20.172	4.27%	1.55
115	18.032	18.810	19.619	4.30%	1.57
116	17.530	18.292	19.084	4.33%	1.59
117	17.045	17.791	18.567	4.36%	1.60
118	16.576	17.306	18.066	4.39%	1.62
119	16.122	16.837	17.581	4.42%	1.64
120	15.683	16.383	17.111	4.45%	1.66
121	15.259	15.943	16.657	4.48%	1.68
122	14.847	15.518	16.217	4.50%	1.70
123	14.449	15.106	15.790	4.53%	1.72
124	14.064	14.707	15.378	4.56%	1.74
125	13.691	14.321	14.978	4.59%	1.76