

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) : QN0402X473F4050FB

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**

[illegible]

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

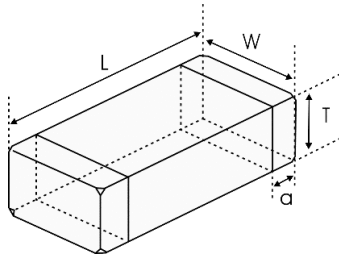


图 1 Fig.1

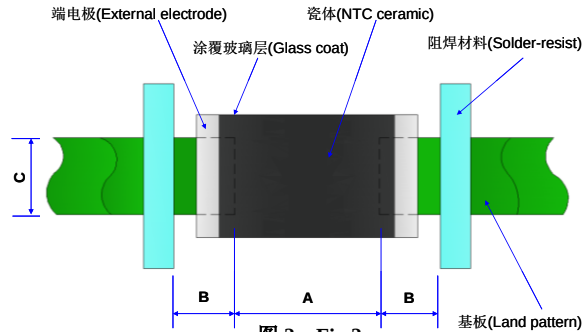


图 2 Fig.2

表 1 (Table 1)

单位 unit: inch[mm]

类别 Type	L	W	T	a	A	B	C
0402 [1005]	0.039±0.006 [1.0±0.15]	0.020±0.006 [0.5±0.15]	0.020±0.006 [0.5±0.15]	0.010±0.004 [0.25±0.1]	[0.45-0.55]	[0.4-0.5]	[0.45-0.55]

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

QN 0402 X 473 F 4050 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

③ 分隔符 Delimiter	
	X

④ 25℃的零功率电阻 Nominal Zero-Power Resistance	
222	2.2kΩ
473	47kΩ
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	
3450	3450K
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 (℃)
QN0402X473F4050FB	47±1%	4050±1%	4108 ref.	0.14	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:

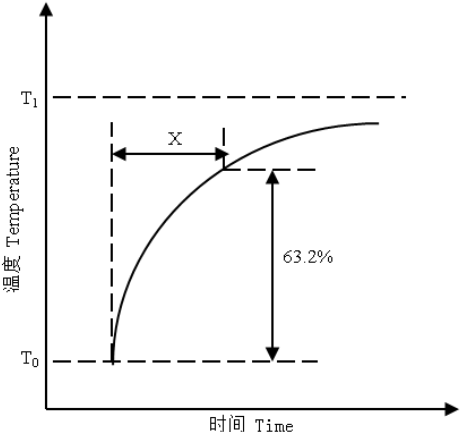
- a. Ambient Temperature: 25±2℃
- b. Relative Humidity: 65±5%
- c. Air Pressure: 86kPa to 106kPa

▪ Inspection Equipment

Visual Examination: 20× magnifier

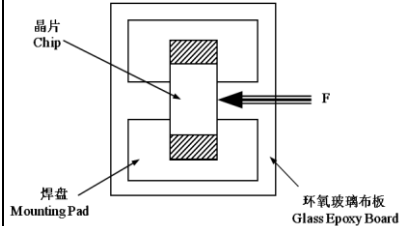
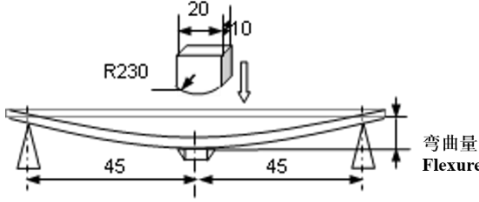
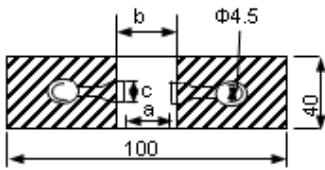
Resistance value test: Thermistor resistance tester

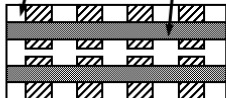
5 电性测试 Electrical Test

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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0603	1.0	3.0	1.2																														
0805	1.2	4.0	1.65																														

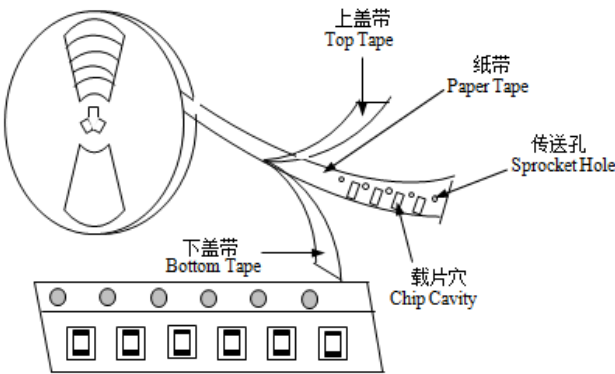
振动 Vibration	IEC 60068-2-80	① 将晶片焊接在测试基板上（如右图所示的环氧玻璃布板）； Solder the chip to the testing jig (glass epoxy board shown in the left) using eutectic solder. ② 晶片以全振幅为 1.5mm 进行振动，频率范围为 10Hz ~55 Hz； The chip shall be subjected to a simple harmonic motion having total amplitude of 1.5mm, the frequency being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

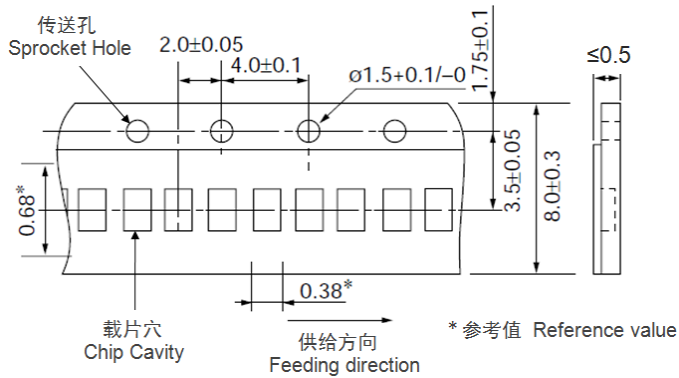
类型 Type	0201	0402	0603	0805
编带厚度 Tape thickness(mm)	0.5±0.15	0.5±0.15	0.8±0.15	0.85±0.2
编带材质 Tape material	纸带 Paper Tape			
每盘数量 Quantity per Reel	15K	10K	4K	4K

(1) 编带图 Taping Drawings

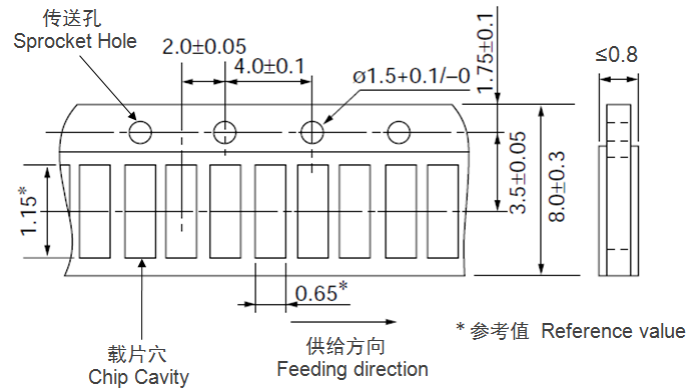


(2) 纸带尺寸 Paper Tape Dimensions (单位 Unit: mm)

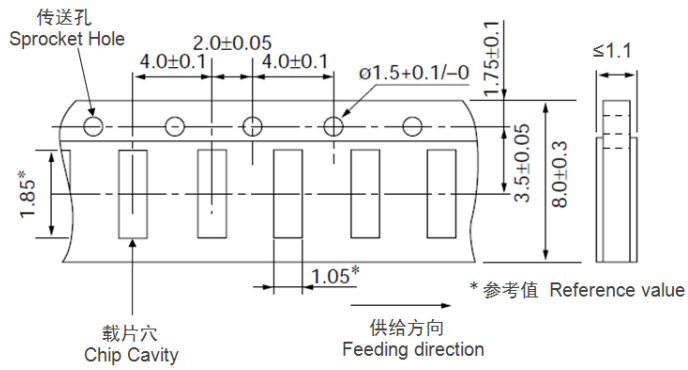
QN0201 系列 QN0201 series



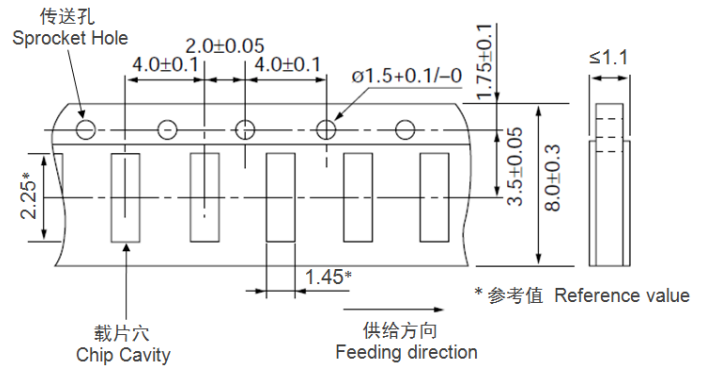
QN0402 系列 QN0402 series



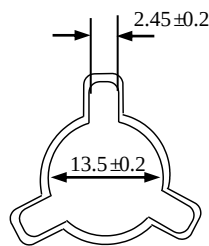
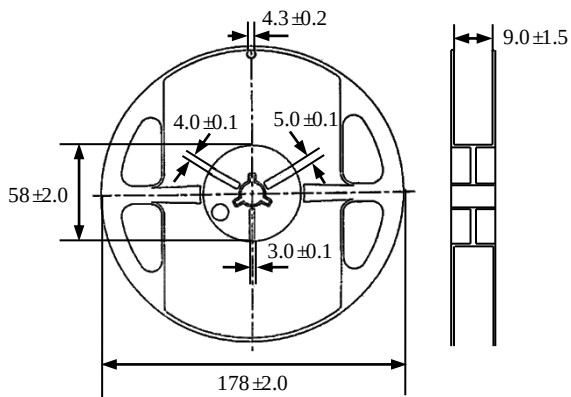
QN0603 系列 QN0603 series



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

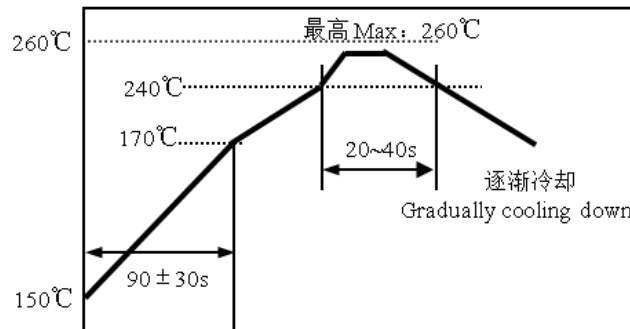
• 回流焊

- 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

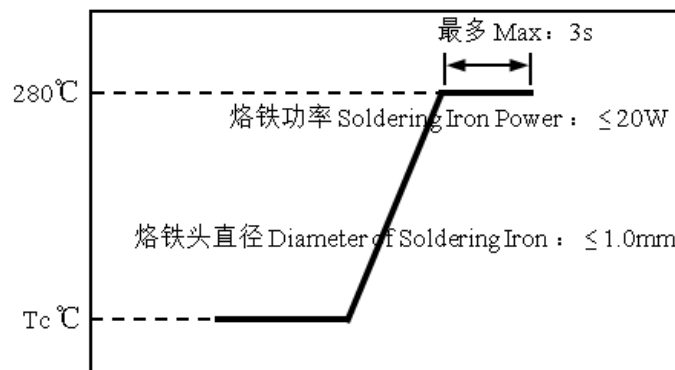
- 烙铁功率: 最大 20W
- 预热: 150°C/60sec.
- 烙铁头温度: 最高 280°C
- 焊接时间: 最多 3sec.
- 焊锡: 96.5Sn/3.0Ag/0.5Cu
- 手工焊: 最多 1 次

• 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

QN0402X473F4050FB

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	1,668.985	1,747.920	1,830.405	4.72%	0.66
-39	1,559.059	1,631.671	1,707.495	4.65%	0.66
-38	1,457.126	1,523.950	1,593.679	4.58%	0.65
-37	1,362.554	1,424.076	1,488.225	4.50%	0.65
-36	1,274.763	1,331.424	1,390.465	4.43%	0.64
-35	1,193.223	1,245.428	1,299.787	4.36%	0.64
-34	1,117.447	1,165.564	1,215.631	4.30%	0.63
-33	1,046.992	1,091.357	1,137.488	4.23%	0.63
-32	981.450	1,022.370	1,064.889	4.16%	0.62
-31	920.446	958.202	997.406	4.09%	0.62
-30	863.639	898.485	934.645	4.02%	0.61
-29	810.711	842.884	876.246	3.96%	0.61
-28	761.375	791.088	821.878	3.89%	0.60
-27	715.364	742.813	771.239	3.83%	0.60
-26	672.432	697.798	724.048	3.76%	0.59
-25	632.356	655.802	680.050	3.70%	0.58
-24	594.926	616.605	639.009	3.63%	0.58
-23	559.952	580.001	600.708	3.57%	0.57
-22	527.258	545.805	564.948	3.51%	0.57
-21	496.681	513.842	531.543	3.44%	0.56
-20	468.071	483.954	500.325	3.38%	0.55
-19	441.290	455.992	471.137	3.32%	0.55
-18	416.209	429.822	443.835	3.26%	0.54
-17	392.711	405.317	418.286	3.20%	0.54
-16	370.686	382.362	394.367	3.14%	0.53
-15	350.033	360.850	371.963	3.08%	0.52
-14	330.659	340.680	350.971	3.02%	0.52
-13	312.476	321.762	331.292	2.96%	0.51
-12	295.404	304.011	312.837	2.90%	0.50
-11	279.369	287.347	295.522	2.85%	0.50
-10	264.302	271.697	279.271	2.79%	0.49
-9	250.139	256.995	264.012	2.73%	0.48
-8	236.820	243.176	249.678	2.67%	0.48
-7	224.290	230.184	236.208	2.62%	0.47
-6	212.498	217.963	223.546	2.56%	0.46
-5	201.396	206.463	211.637	2.51%	0.46
-4	190.926	195.624	200.418	2.45%	0.45
-3	181.063	185.419	189.862	2.40%	0.44
-2	171.768	175.808	179.924	2.34%	0.44
-1	163.006	166.751	170.565	2.29%	0.43
0	154.743	158.214	161.748	2.23%	0.42
1	146.947	150.165	153.439	2.18%	0.41

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	139.589	142.573	145.605	2.13%	0.41
3	132.643	135.408	138.217	2.07%	0.40
4	126.083	128.645	131.247	2.02%	0.39
5	119.885	122.259	124.668	1.97%	0.38
6	114.028	116.227	118.457	1.92%	0.38
7	108.491	110.528	112.591	1.87%	0.37
8	103.254	105.140	107.050	1.82%	0.36
9	98.300	100.045	101.812	1.77%	0.35
10	93.611	95.227	96.861	1.72%	0.35
11	89.173	90.667	92.178	1.67%	0.34
12	84.970	86.352	87.748	1.62%	0.33
13	80.989	82.266	83.555	1.57%	0.32
14	77.216	78.396	79.586	1.52%	0.31
15	73.641	74.730	75.828	1.47%	0.31
16	70.250	71.256	72.268	1.42%	0.30
17	67.035	67.962	68.895	1.37%	0.29
18	63.984	64.839	65.698	1.33%	0.28
19	61.089	61.876	62.667	1.28%	0.27
20	58.341	59.065	59.792	1.23%	0.26
21	55.730	56.396	57.064	1.18%	0.26
22	53.252	53.863	54.476	1.14%	0.25
23	50.896	51.457	52.019	1.09%	0.24
24	48.658	49.172	49.686	1.05%	0.23
25	46.530	47.000	47.470	1.00%	0.22
26	44.467	44.936	45.406	1.05%	0.23
27	42.506	42.974	43.442	1.09%	0.25
28	40.642	41.108	41.574	1.14%	0.26
29	38.870	39.332	39.796	1.18%	0.27
30	37.184	37.643	38.104	1.22%	0.28
31	35.580	36.035	36.492	1.27%	0.29
32	34.054	34.504	34.957	1.31%	0.30
33	32.601	33.046	33.494	1.36%	0.32
34	31.217	31.657	32.100	1.40%	0.33
35	29.899	30.334	30.772	1.44%	0.34
36	28.645	29.073	29.506	1.49%	0.35
37	27.449	27.872	28.298	1.53%	0.37
38	26.310	26.726	27.146	1.57%	0.38
39	25.223	25.633	26.047	1.61%	0.39
40	24.188	24.591	24.998	1.66%	0.40
41	23.200	23.596	23.997	1.70%	0.42
42	22.257	22.647	23.041	1.74%	0.43
43	21.357	21.740	22.127	1.78%	0.44
44	20.499	20.875	21.255	1.82%	0.45
45	19.679	20.048	20.422	1.86%	0.47
46	18.896	19.258	19.625	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	18.148	18.503	18.863	1.95%	0.49
48	17.434	17.782	18.135	1.99%	0.51
49	16.751	17.092	17.439	2.03%	0.52
50	16.098	16.433	16.772	2.07%	0.53
51	15.474	15.802	16.135	2.11%	0.55
52	14.877	15.198	15.524	2.15%	0.56
53	14.306	14.621	14.940	2.19%	0.57
54	13.760	14.068	14.381	2.23%	0.59
55	13.237	13.539	13.845	2.26%	0.60
56	12.737	13.032	13.332	2.30%	0.61
57	12.258	12.547	12.840	2.34%	0.63
58	11.799	12.082	12.369	2.38%	0.64
59	11.360	11.636	11.918	2.42%	0.66
60	10.939	11.209	11.485	2.46%	0.67
61	10.537	10.801	11.070	2.50%	0.68
62	10.151	10.409	10.673	2.53%	0.70
63	9.781	10.034	10.292	2.57%	0.71
64	9.426	9.673	9.926	2.61%	0.73
65	9.086	9.328	9.575	2.65%	0.74
66	8.760	8.996	9.238	2.68%	0.76
67	8.447	8.678	8.914	2.72%	0.77
68	8.147	8.373	8.604	2.76%	0.79
69	7.859	8.080	8.305	2.79%	0.80
70	7.582	7.798	8.019	2.83%	0.82
71	7.316	7.527	7.743	2.87%	0.83
72	7.061	7.266	7.477	2.90%	0.85
73	6.815	7.016	7.222	2.94%	0.86
74	6.579	6.776	6.977	2.98%	0.88
75	6.352	6.544	6.741	3.01%	0.89
76	6.135	6.323	6.515	3.05%	0.91
77	5.926	6.110	6.298	3.08%	0.92
78	5.726	5.905	6.089	3.12%	0.94
79	5.533	5.708	5.887	3.15%	0.95
80	5.347	5.518	5.694	3.19%	0.97
81	5.169	5.336	5.508	3.22%	0.98
82	4.997	5.161	5.329	3.26%	1.00
83	4.833	4.992	5.156	3.29%	1.02
84	4.674	4.830	4.990	3.32%	1.03
85	4.521	4.674	4.831	3.36%	1.05
86	4.374	4.523	4.676	3.39%	1.06
87	4.232	4.377	4.527	3.43%	1.08
88	4.095	4.237	4.383	3.46%	1.10
89	3.963	4.102	4.245	3.49%	1.11
90	3.836	3.972	4.112	3.53%	1.13
91	3.714	3.846	3.983	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	3.596	3.725	3.859	3.59%	1.16
93	3.482	3.609	3.740	3.63%	1.18
94	3.373	3.496	3.624	3.66%	1.20
95	3.267	3.388	3.513	3.69%	1.21
96	3.165	3.284	3.406	3.72%	1.23
97	3.067	3.183	3.303	3.76%	1.25
98	2.973	3.086	3.203	3.79%	1.26
99	2.882	2.992	3.107	3.82%	1.28
100	2.794	2.902	3.014	3.85%	1.30
101	2.709	2.815	2.924	3.88%	1.32
102	2.627	2.730	2.837	3.92%	1.33
103	2.548	2.649	2.753	3.95%	1.35
104	2.472	2.570	2.673	3.98%	1.37
105	2.398	2.494	2.594	4.01%	1.39
106	2.326	2.421	2.518	4.04%	1.40
107	2.257	2.349	2.445	4.07%	1.42
108	2.190	2.281	2.374	4.10%	1.44
109	2.126	2.214	2.305	4.13%	1.46
110	2.063	2.150	2.239	4.16%	1.47
111	2.003	2.088	2.175	4.19%	1.49
112	1.945	2.028	2.113	4.23%	1.51
113	1.889	1.970	2.054	4.26%	1.53
114	1.835	1.914	1.996	4.29%	1.55
115	1.783	1.860	1.940	4.32%	1.57
116	1.732	1.808	1.886	4.34%	1.58
117	1.683	1.757	1.834	4.37%	1.60
118	1.636	1.708	1.784	4.40%	1.62
119	1.590	1.661	1.735	4.43%	1.64
120	1.546	1.615	1.687	4.46%	1.66
121	1.503	1.571	1.641	4.49%	1.68
122	1.461	1.528	1.597	4.52%	1.70
123	1.421	1.486	1.553	4.55%	1.72
124	1.382	1.445	1.511	4.58%	1.73
125	1.344	1.406	1.471	4.61%	1.75