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）: QN0402X683F4150FB

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

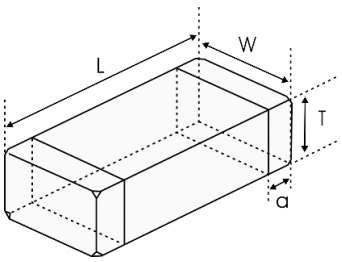


图 1 Fig.1

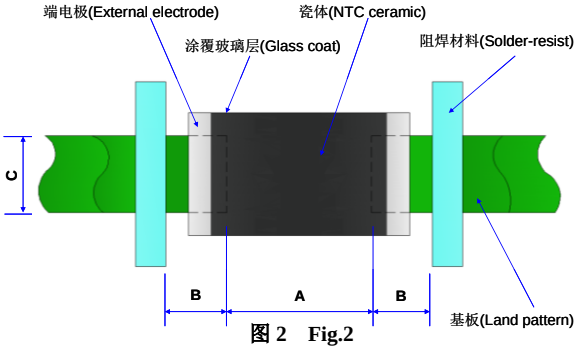


图 2 Fig.2

表 1（Table 1） 单位 unit: inch[mm]

类别 Type	L	W	T	a	A	B	C
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	683	F	4150	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
683	68kΩ
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	
3450	3450K
3950	3950K
4150	4150K

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 （℃）
QN0402X683F4150FB	68±1%	4150±1%	4209 ref.	0.12	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%

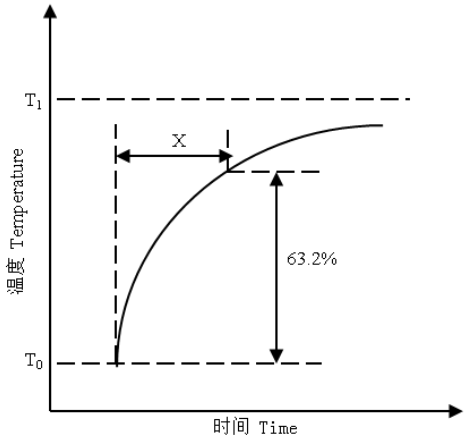
c. Air Pressure: 86kPa to 106kPa

▪ Inspection Equipment

Visual Examination: 20×magnifier

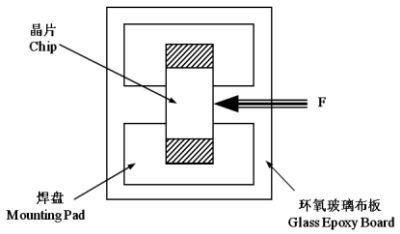
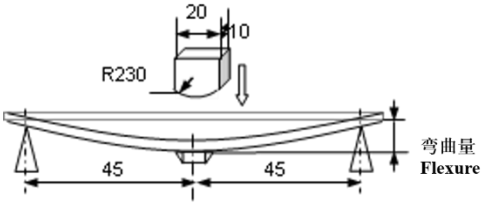
Resistance value test: Thermistor resistance tester

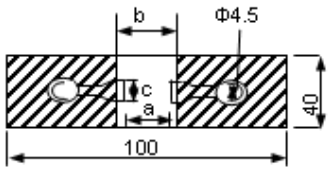
5 电性测试 Electrical Test

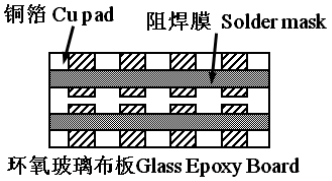
序号 No.	项目 Items	测试方法及备注 Test Methods and Remarks
1	25℃零功率电阻值 Nominal Zero-Power Resistance at 25℃(R25)	环境温度 Ambient temperature：25±0.05℃ 测试功率 Measuring electric power：≤0.1mW
2	B 值常数 Nominal B Constant	分别在环境温度 25±0.05℃， 50±0.05℃或 85±0.05℃下测量电阻值。 Measure the resistance at the ambient temperature of 25±0.05℃, 50±0.05℃ or 85±0.05℃. B(25-50℃)= $\frac{\ln R_{25}-\ln R_{50}}{1/T_{25}-1/T_{50}}$ B(25-85℃)= $\frac{\ln R_{25}-\ln R_{85}}{1/T_{25}-1/T_{85}}$ 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(℃) to T_1 (℃) 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

<table>
<tr><th>项目
Items</th><th>测试标准
Standard</th><th>测试方法及备注
Test Methods and Remarks</th><th>要求
Requirements</th></tr>
<tr><td>端头附着力
Terminal Strength</td><td>IEC 60068-2-21</td><td>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><th>尺寸 Size</th><th>F</th><th>保持时间 Duration</th></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></td><td>端电极无脱落且瓷体无损伤。
No removal or split of the termination or other defects shall occur.
 
</td></tr>
<tr><td>抗弯强度
Resistance to Flexure</td><td>IEC 60068-2-21</td><td>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><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></td><td>① 无外观损伤。
No visible damage.
② ｜ΔR25/R25｜≤2%
单位 unit：mm
<table>
<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> 
</td></tr>
</table>

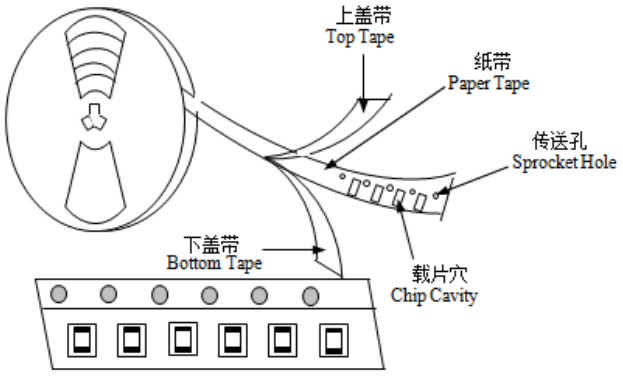
<table>
<tr>
<td>振动
Vibration</td>
<td>IEC 60068-2-80</td>
<td>① 将晶片焊接在测试基板上（如右图所示的环氧玻璃布板）；
Solder the chip to the testing jig (glass epoxy board shown in the left) using eutectic solder.
② 晶片以全振幅为 1.5mm 进行振动，频率范围为 10Hz ～55 Hz；
The chip shall be subjected to a simple harmonic motion having total amplitude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

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

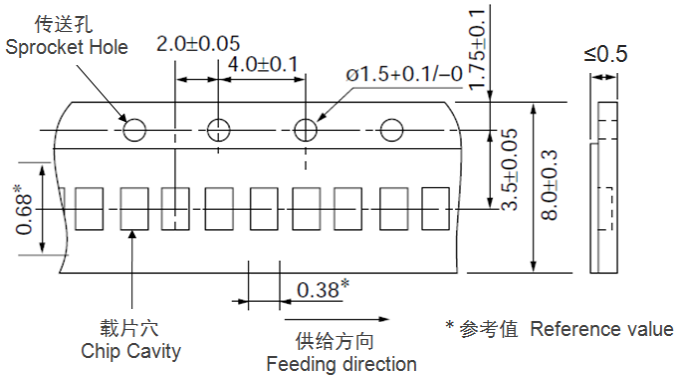
类型 Type	0201	0402	0603	0805
编带厚度 Tape thickness(mm)	0.5±0.15	0.5±0.15	0.8±0.15	0.85±0.2
编带材质 Tape material	纸带 Paper Tape			
每盘数量 Quantity per Reel	15K	10K	4K	4K

(1) 编带图 Taping Drawings

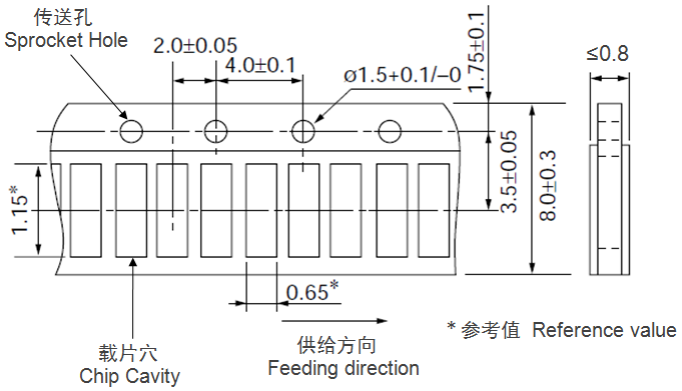


(2) 纸带尺寸 Paper Tape Dimensions (单位 Unit：mm)

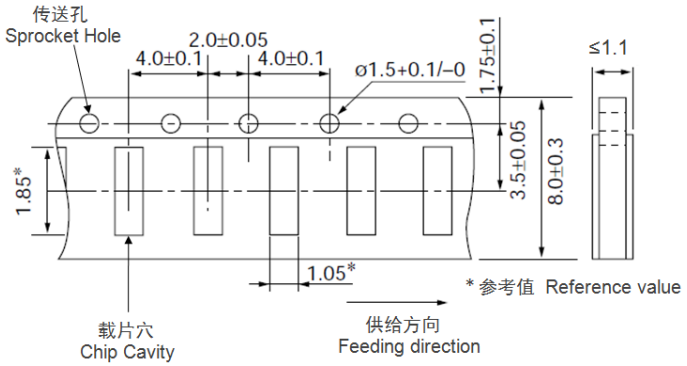
QN0201 系列 QN0201 series



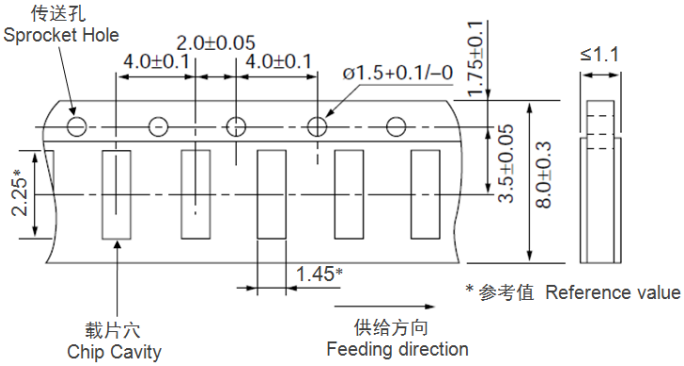
QN0402 系列 QN0402 series



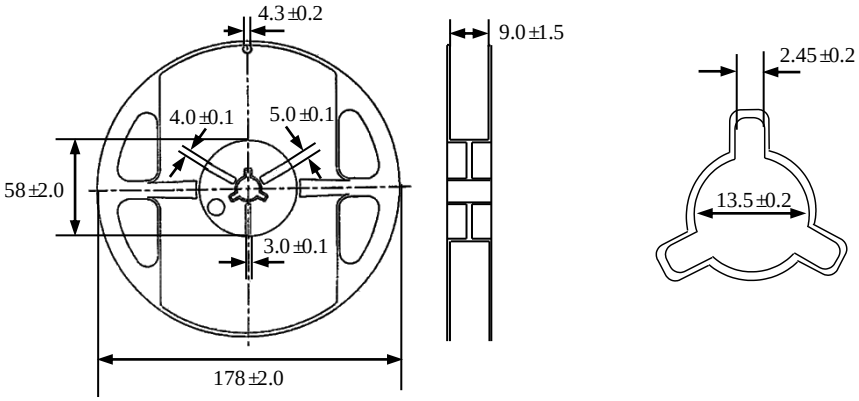
QN0603 系列 QN0603 series



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℃～40℃

  b. 相对湿度：≤75%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**

8 Storage

- **Storage Conditions**

  a. Storage Temperature: -10℃～40℃

  b. Relative Humidity: ≦75%RH

  c. Keep away from corrosive atmosphere and sunlight.

- **Period of Storage: 6 Months after delivery**

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。

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.

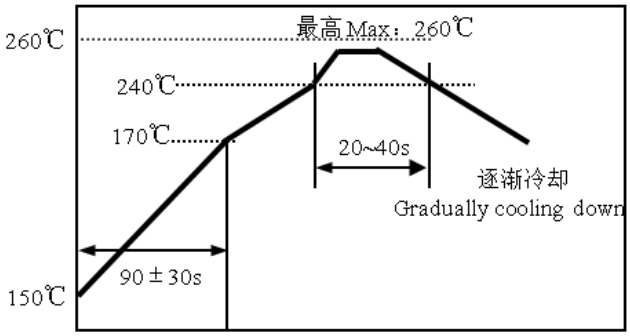
- The QN series thermistors shall not be operated beyond the specified “Operating Temperature Range” in the catalog.

10 建议焊接条件

- **回流焊**
  - 温升 1~2℃/sec.
  - 预热：150~170℃/90±30 sec.
  - 大于 240℃时间：20~40sec
  - 峰值温度：最高 260℃/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℃/sec. Ramp
  - Pre-heating: 150~170℃/90±30 sec.
  - Time above 240℃: 20~40 sec.
  - Peak temperature: 260℃Max./10 sec.
  - Solder paste: 96.5Sn/3.0Ag/0.5Cu
  - Max.2 times for re-flowing

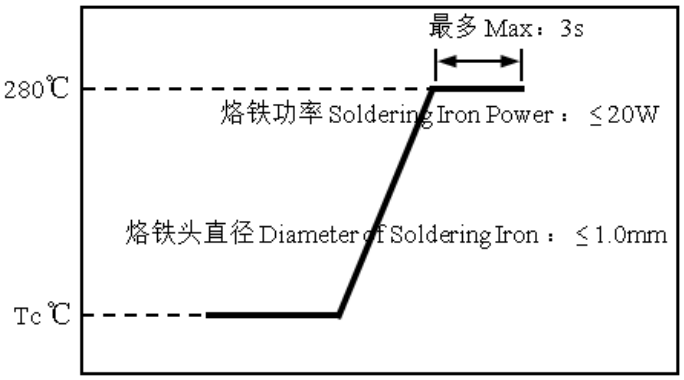


- **手工焊**
  - 烙铁功率：最大 20W
  - 预热：150℃/60sec.
  - 烙铁头温度：最高 280℃
  - 焊接时间：最多 3sec.
  - 焊锡：96.5Sn/3.0Ag/0.5Cu
  - 手工焊：最多 1 次

[注：不要使烙铁头接触到端头]

- **Iron Soldering Profile**
  - Iron soldering power: Max.20W
  - Pre-heating: 150℃/60sec.
  - Soldering Tip temperature: 280℃Max.
  - Soldering time: 3 sec Max.
  - Solder paste: 96.5Sn/3.0Ag/0.5Cu
  - Max.1 times for iron soldering

[Note: Take care not to apply the tip of the soldering iron to the terminal electrodes.]



11 R-T 表 R-T table

QN0402X683F4150FB

温度 Temp. (℃)	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.(℃)
-40	2,454.615	2,571.132	2,692.910	4.74%	0.66
-39	2,295.681	2,403.028	2,515.143	4.67%	0.66
-38	2,147.987	2,246.918	2,350.171	4.60%	0.65
-37	2,010.674	2,101.877	2,196.998	4.53%	0.65
-36	1,882.952	1,967.058	2,054.715	4.46%	0.64
-35	1,764.098	1,841.682	1,922.485	4.39%	0.64
-34	1,653.446	1,725.034	1,799.542	4.32%	0.63
-33	1,550.384	1,616.459	1,685.181	4.25%	0.63
-32	1,454.349	1,515.352	1,578.755	4.18%	0.62
-31	1,364.822	1,421.157	1,479.670	4.12%	0.62
-30	1,281.326	1,333.365	1,387.378	4.05%	0.61
-29	1,203.422	1,251.504	1,301.376	3.98%	0.61
-28	1,130.704	1,175.140	1,221.200	3.92%	0.60
-27	1,062.799	1,103.875	1,146.425	3.85%	0.59
-26	999.361	1,037.341	1,076.656	3.79%	0.59
-25	940.073	975.196	1,011.531	3.73%	0.58
-24	884.639	917.129	950.716	3.66%	0.58
-23	832.790	862.849	893.903	3.60%	0.57
-22	784.273	812.088	840.805	3.54%	0.56
-21	738.857	764.600	791.162	3.47%	0.56
-20	696.327	720.157	744.728	3.41%	0.55
-19	656.483	678.546	701.280	3.35%	0.55
-18	619.143	639.572	660.609	3.29%	0.54
-17	584.135	603.054	622.524	3.23%	0.53
-16	551.301	568.825	586.846	3.17%	0.53
-15	520.495	536.728	553.411	3.11%	0.52
-14	491.581	506.620	522.066	3.05%	0.51
-13	464.433	478.366	492.668	2.99%	0.51
-12	438.934	451.844	465.088	2.93%	0.50
-11	414.975	426.938	439.203	2.87%	0.49
-10	392.455	403.542	414.900	2.81%	0.49
-9	371.280	381.555	392.074	2.76%	0.48
-8	351.363	360.885	370.629	2.70%	0.47
-7	332.622	341.448	350.473	2.64%	0.47
-6	314.983	323.163	331.522	2.59%	0.46
-5	298.375	305.956	313.698	2.53%	0.45
-4	282.732	289.758	296.928	2.47%	0.45
-3	267.993	274.504	281.145	2.42%	0.44
-2	254.102	260.136	266.286	2.36%	0.43
-1	241.005	246.596	252.291	2.31%	0.43
0	228.653	233.833	239.107	2.26%	0.42
1	217.001	221.799	226.682	2.20%	0.41

温度 Temp. (℃)	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.(℃)
2	206.004	210.449	214.968	2.15%	0.40
3	195.622	199.739	203.922	2.09%	0.40
4	185.819	189.631	193.502	2.04%	0.39
5	176.559	180.088	183.669	1.99%	0.38
6	167.810	171.076	174.388	1.94%	0.37
7	159.540	162.562	165.625	1.88%	0.37
8	151.720	154.516	157.347	1.83%	0.36
9	144.326	146.911	149.527	1.78%	0.35
10	137.330	139.720	142.137	1.73%	0.34
11	130.710	132.918	135.150	1.68%	0.33
12	124.443	126.483	128.543	1.63%	0.33
13	118.510	120.393	122.293	1.58%	0.32
14	112.890	114.628	116.380	1.53%	0.31
15	107.566	109.168	110.783	1.48%	0.30
16	102.521	103.997	105.484	1.43%	0.29
17	97.738	99.098	100.466	1.38%	0.29
18	93.203	94.454	95.713	1.33%	0.28
19	88.902	90.053	91.209	1.28%	0.27
20	84.821	85.878	86.940	1.24%	0.26
21	80.949	81.919	82.893	1.19%	0.25
22	77.273	78.163	79.054	1.14%	0.24
23	73.783	74.598	75.413	1.09%	0.23
24	70.469	71.213	71.959	1.05%	0.23
25	67.320	68.000	68.680	1.00%	0.22
26	64.269	64.948	65.628	1.05%	0.23
27	61.372	62.048	62.726	1.09%	0.24
28	58.620	59.293	59.968	1.14%	0.25
29	56.005	56.674	57.345	1.18%	0.26
30	53.520	54.184	54.850	1.23%	0.28
31	51.158	51.815	52.476	1.27%	0.29
32	48.912	49.563	50.217	1.32%	0.30
33	46.776	47.419	48.066	1.36%	0.31
34	44.744	45.379	46.019	1.41%	0.32
35	42.811	43.438	44.069	1.45%	0.34
36	40.971	41.588	42.211	1.50%	0.35
37	39.219	39.827	40.441	1.54%	0.36
38	37.551	38.150	38.755	1.59%	0.37
39	35.962	36.551	37.147	1.63%	0.38
40	34.448	35.027	35.613	1.67%	0.40
41	33.005	33.575	34.151	1.72%	0.41
42	31.631	32.190	32.756	1.76%	0.42
43	30.320	30.869	31.425	1.80%	0.44
44	29.070	29.609	30.155	1.84%	0.45
45	27.878	28.406	28.942	1.89%	0.46
46	26.741	27.259	27.784	1.93%	0.47

温度 Temp. (℃)	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.(℃)
47	25.655	26.163	26.678	1.97%	0.49
48	24.619	25.117	25.622	2.01%	0.50
49	23.631	24.118	24.613	2.05%	0.51
50	22.686	23.164	23.649	2.09%	0.53
51	21.784	22.252	22.727	2.13%	0.54
52	20.923	21.380	21.845	2.18%	0.55
53	20.100	20.547	21.002	2.22%	0.57
54	19.313	19.751	20.196	2.26%	0.58
55	18.561	18.989	19.425	2.30%	0.59
56	17.842	18.261	18.687	2.34%	0.61
57	17.154	17.564	17.981	2.38%	0.62
58	16.496	16.897	17.305	2.42%	0.64
59	15.867	16.258	16.658	2.46%	0.65
60	15.265	15.647	16.038	2.49%	0.66
61	14.689	15.062	15.444	2.53%	0.68
62	14.137	14.502	14.875	2.57%	0.69
63	13.608	13.965	14.330	2.61%	0.71
64	13.102	13.451	13.808	2.65%	0.72
65	12.618	12.958	13.307	2.69%	0.74
66	12.153	12.486	12.826	2.73%	0.75
67	11.708	12.033	12.366	2.76%	0.76
68	11.282	11.599	11.924	2.80%	0.78
69	10.873	11.183	11.501	2.84%	0.79
70	10.481	10.784	11.094	2.88%	0.81
71	10.105	10.401	10.704	2.91%	0.82
72	9.744	10.033	10.329	2.95%	0.84
73	9.398	9.680	9.970	2.99%	0.85
74	9.066	9.342	9.624	3.02%	0.87
75	8.748	9.016	9.293	3.06%	0.88
76	8.442	8.704	8.974	3.10%	0.90
77	8.148	8.404	8.668	3.13%	0.92
78	7.866	8.116	8.374	3.17%	0.93
79	7.595	7.840	8.091	3.21%	0.95
80	7.335	7.574	7.819	3.24%	0.96
81	7.085	7.318	7.558	3.28%	0.98
82	6.845	7.072	7.306	3.31%	0.99
83	6.614	6.836	7.065	3.35%	1.01
84	6.392	6.609	6.832	3.38%	1.03
85	6.178	6.390	6.609	3.42%	1.04
86	5.973	6.180	6.393	3.45%	1.06
87	5.776	5.978	6.186	3.49%	1.07
88	5.586	5.783	5.987	3.52%	1.09
89	5.403	5.596	5.795	3.55%	1.11
90	5.227	5.415	5.610	3.59%	1.12
91	5.058	5.242	5.431	3.62%	1.14

温度 Temp. (℃)	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.(℃)
92	4.895	5.074	5.260	3.66%	1.16
93	4.738	4.913	5.095	3.69%	1.17
94	4.587	4.758	4.935	3.72%	1.19
95	4.441	4.609	4.782	3.76%	1.21
96	4.301	4.465	4.634	3.79%	1.22
97	4.166	4.326	4.491	3.82%	1.24
98	4.036	4.192	4.353	3.85%	1.26
99	3.911	4.063	4.221	3.89%	1.27
100	3.790	3.939	4.093	3.92%	1.29
101	3.673	3.819	3.969	3.95%	1.31
102	3.561	3.703	3.850	3.98%	1.33
103	3.452	3.591	3.735	4.01%	1.34
104	3.348	3.483	3.624	4.05%	1.36
105	3.247	3.379	3.517	4.08%	1.38
106	3.149	3.279	3.414	4.11%	1.40
107	3.055	3.182	3.314	4.14%	1.41
108	2.965	3.089	3.218	4.17%	1.43
109	2.877	2.999	3.125	4.20%	1.45
110	2.793	2.911	3.035	4.23%	1.47
111	2.711	2.827	2.948	4.26%	1.49
112	2.632	2.746	2.864	4.29%	1.50
113	2.556	2.667	2.782	4.32%	1.52
114	2.483	2.591	2.704	4.35%	1.54
115	2.412	2.518	2.628	4.38%	1.56
116	2.343	2.447	2.555	4.41%	1.58
117	2.277	2.378	2.484	4.44%	1.60
118	2.213	2.312	2.415	4.47%	1.61
119	2.151	2.248	2.349	4.50%	1.63
120	2.091	2.186	2.285	4.53%	1.65
121	2.033	2.126	2.223	4.56%	1.67
122	1.977	2.068	2.163	4.59%	1.69
123	1.922	2.011	2.104	4.62%	1.71
124	1.870	1.957	2.048	4.65%	1.73
125	1.819	1.905	1.994	4.68%	1.75