

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) : QN0402X474F3950FB

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
			

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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

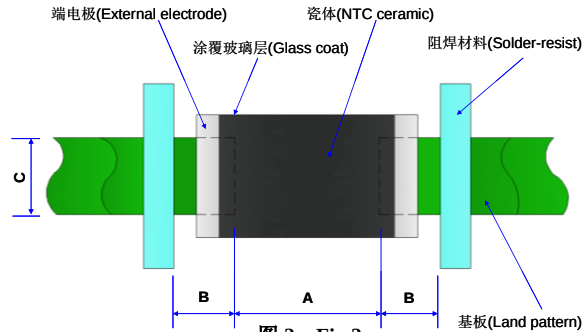


图 2 Fig.2

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 474 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

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	
3450	3450K
3950	3950K
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 (℃)
QN0402X474F3950FB	470±1%	3950±1%	4010 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:

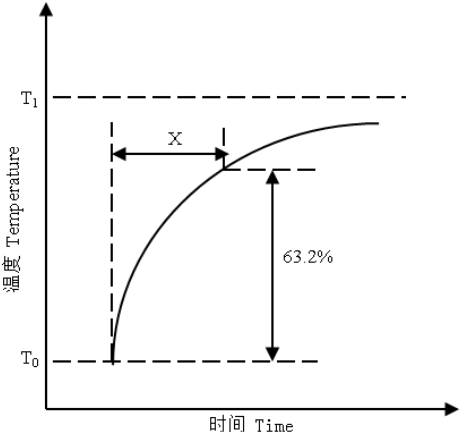
- a. Ambient Temperature: 25±2℃
- b. Relative Humidity: 65±5%
- c. Air Pressure: 86kPa to 106kPa

▪ Inspection Equipment

Visual Examination: 20× magnifier

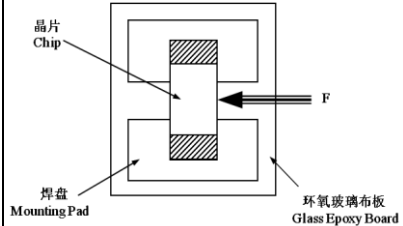
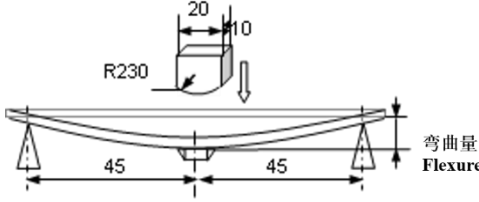
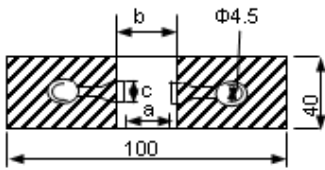
Resistance value test: Thermistor resistance tester

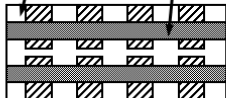
5 电性测试 Electrical Test

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><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>	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><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>	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><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> 	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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0201	0.25	0.3	0.3																														
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0603	1.0	3.0	1.2																														
0805	1.2	4.0	1.65																														

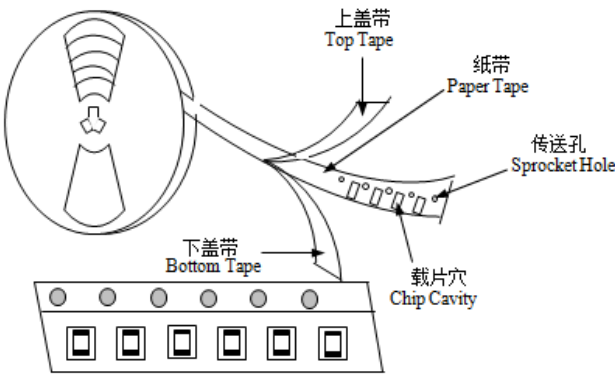
振动 Vibration	IEC 60068-2-80	① 将晶片焊接在测试基板上（如右图所示的环氧玻璃布板）； Solder the chip to the testing jig (glass epoxy board shown in the left) using eutectic solder. ② 晶片以全振幅为 1.5mm 进行振动，频率范围为 10Hz ~55 Hz； The chip shall be subjected to a simple harmonic motion having total amplitude of 1.5mm, the frequency being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

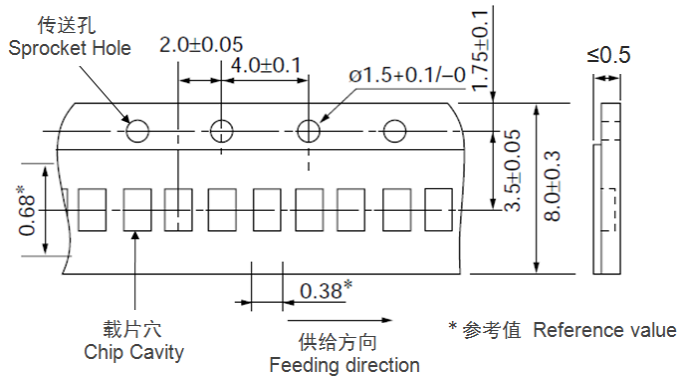
类型 Type	0201	0402	0603	0805
编带厚度 Tape thickness(mm)	0.5±0.15	0.5±0.15	0.8±0.15	0.85±0.2
编带材质 Tape material	纸带 Paper Tape			
每盘数量 Quantity per Reel	15K	10K	4K	4K

(1) 编带图 Taping Drawings

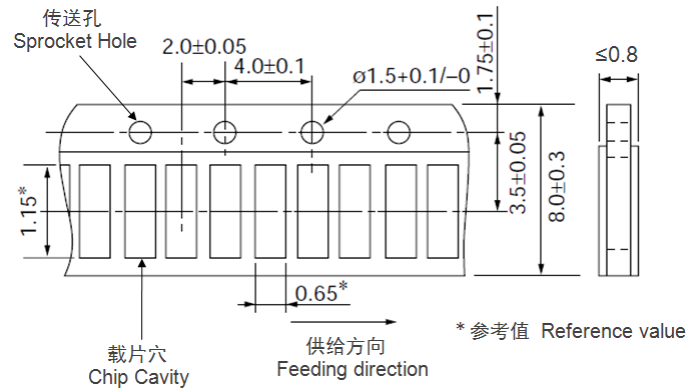


(2) 纸带尺寸 Paper Tape Dimensions (单位 Unit: mm)

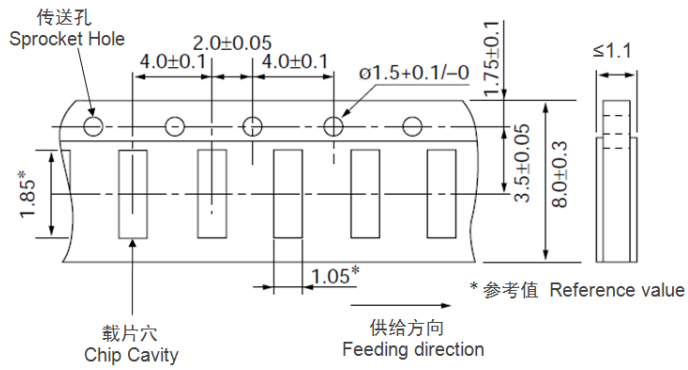
QN0201 系列 QN0201 series



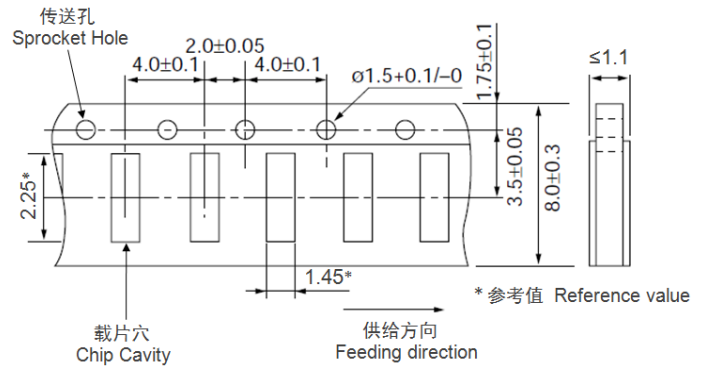
QN0402 系列 QN0402 series



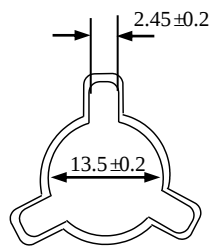
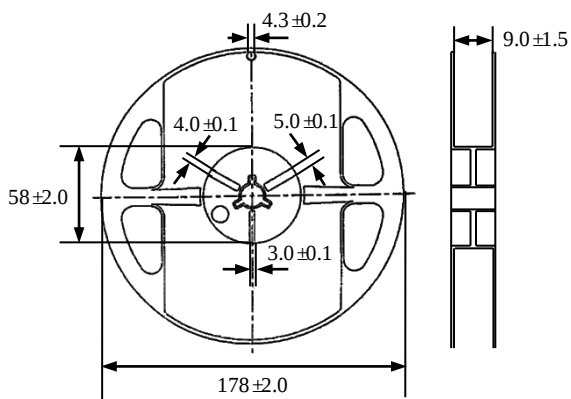
QN0603 系列 QN0603 series



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

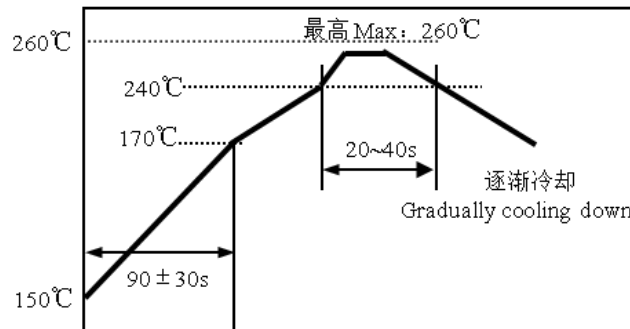
• 回流焊

- 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

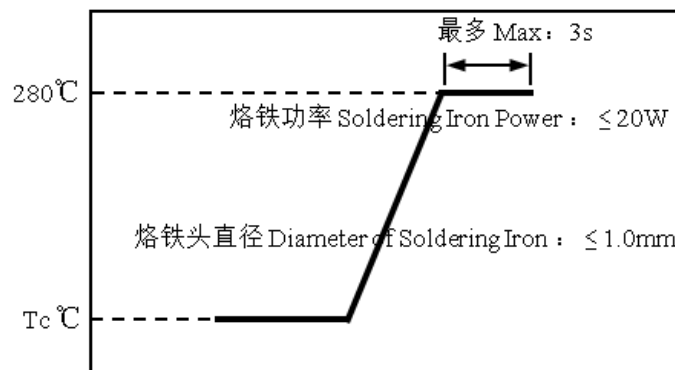
- 烙铁功率: 最大 20W
- 预热: 150°C/60sec.
- 烙铁头温度: 最高 280°C
- 焊接时间: 最多 3sec.
- 焊锡: 96.5Sn/3.0Ag/0.5Cu
- 手工焊: 最多 1 次

• 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

QN0402X474F3950FB

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	14,496.065	15,160.061	15,852.887	4.57%	0.67
-39	13,596.090	14,209.660	14,849.434	4.50%	0.66
-38	12,757.295	13,324.438	13,915.403	4.44%	0.66
-37	11,975.185	12,499.569	13,045.609	4.37%	0.65
-36	11,245.621	11,730.606	12,235.284	4.30%	0.65
-35	10,564.782	11,013.456	11,480.036	4.24%	0.64
-34	9,929.151	10,344.344	10,775.821	4.17%	0.64
-33	9,335.478	9,719.791	10,118.914	4.11%	0.63
-32	8,780.765	9,136.588	9,505.879	4.04%	0.63
-31	8,262.245	8,591.771	8,933.547	3.98%	0.62
-30	7,777.359	8,082.608	8,398.997	3.91%	0.62
-29	7,323.744	7,606.570	7,899.529	3.85%	0.61
-28	6,899.215	7,161.326	7,432.651	3.79%	0.61
-27	6,501.749	6,744.716	6,996.063	3.73%	0.60
-26	6,129.476	6,354.745	6,587.635	3.66%	0.59
-25	5,780.663	5,989.567	6,205.400	3.60%	0.59
-24	5,453.707	5,647.473	5,847.538	3.54%	0.58
-23	5,147.120	5,326.879	5,512.365	3.48%	0.58
-22	4,859.525	5,026.320	5,198.321	3.42%	0.57
-21	4,589.645	4,744.438	4,903.961	3.36%	0.57
-20	4,336.293	4,479.971	4,627.947	3.30%	0.56
-19	4,098.371	4,231.753	4,369.038	3.24%	0.55
-18	3,874.855	3,998.697	4,126.084	3.19%	0.55
-17	3,664.799	3,779.798	3,898.017	3.13%	0.54
-16	3,467.319	3,574.122	3,683.846	3.07%	0.54
-15	3,281.598	3,380.799	3,482.651	3.01%	0.53
-14	3,106.873	3,199.024	3,293.579	2.96%	0.52
-13	2,942.435	3,028.045	3,115.834	2.90%	0.52
-12	2,787.624	2,867.164	2,948.679	2.84%	0.51
-11	2,641.828	2,715.734	2,791.428	2.79%	0.50
-10	2,504.473	2,573.148	2,643.442	2.73%	0.50
-9	2,375.027	2,438.845	2,504.128	2.68%	0.49
-8	2,252.994	2,312.300	2,372.931	2.62%	0.48
-7	2,137.910	2,193.026	2,249.337	2.57%	0.48
-6	2,029.344	2,080.565	2,132.866	2.51%	0.47
-5	1,926.894	1,974.496	2,023.071	2.46%	0.46
-4	1,830.182	1,874.420	1,919.534	2.41%	0.46
-3	1,738.859	1,779.968	1,821.868	2.35%	0.45
-2	1,652.596	1,690.797	1,729.708	2.30%	0.44
-1	1,571.087	1,606.582	1,642.716	2.25%	0.43
0	1,494.045	1,527.024	1,560.576	2.20%	0.43
1	1,421.204	1,451.842	1,482.992	2.15%	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	1,352.312	1,380.772	1,409.689	2.09%	0.41
3	1,287.135	1,313.568	1,340.409	2.04%	0.41
4	1,225.455	1,250.001	1,274.911	1.99%	0.40
5	1,167.066	1,189.855	1,212.968	1.94%	0.39
6	1,111.775	1,132.929	1,154.370	1.89%	0.38
7	1,059.403	1,079.035	1,098.920	1.84%	0.38
8	1,009.781	1,027.995	1,046.433	1.79%	0.37
9	962.751	979.645	996.735	1.74%	0.36
10	918.164	933.828	949.664	1.70%	0.35
11	875.882	890.400	905.069	1.65%	0.34
12	835.773	849.224	862.806	1.60%	0.34
13	797.715	810.173	822.742	1.55%	0.33
14	761.594	773.125	784.752	1.50%	0.32
15	727.300	737.969	748.719	1.46%	0.31
16	694.733	704.598	714.531	1.41%	0.30
17	663.797	672.912	682.085	1.36%	0.30
18	634.402	642.820	651.284	1.32%	0.29
19	606.464	614.231	622.036	1.27%	0.28
20	579.903	587.065	594.256	1.22%	0.27
21	554.646	561.243	567.862	1.18%	0.26
22	530.621	536.693	542.779	1.13%	0.25
23	507.763	513.344	518.935	1.09%	0.25
24	486.009	491.134	496.263	1.04%	0.24
25	465.300	470.000	474.700	1.00%	0.23
26	445.192	449.886	454.583	1.04%	0.24
27	426.057	430.736	435.423	1.09%	0.25
28	407.844	412.501	417.170	1.13%	0.26
29	390.503	395.133	399.777	1.18%	0.27
30	373.989	378.585	383.199	1.22%	0.29
31	358.259	362.815	367.393	1.26%	0.30
32	343.270	347.784	352.321	1.30%	0.31
33	328.986	333.452	337.944	1.35%	0.32
34	315.369	319.784	324.228	1.39%	0.33
35	302.385	306.746	311.138	1.43%	0.35
36	290.002	294.306	298.644	1.47%	0.36
37	278.189	282.434	286.715	1.52%	0.37
38	266.917	271.101	275.323	1.56%	0.38
39	256.159	260.280	264.441	1.60%	0.40
40	245.889	249.946	254.045	1.64%	0.41
41	236.082	240.074	244.109	1.68%	0.42
42	226.716	230.642	234.613	1.72%	0.43
43	217.768	221.628	225.533	1.76%	0.45
44	209.218	213.011	216.850	1.80%	0.46
45	201.047	204.772	208.545	1.84%	0.47
46	193.236	196.893	200.600	1.88%	0.49

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	185.767	189.357	192.997	1.92%	0.50
48	178.623	182.146	185.720	1.96%	0.51
49	171.790	175.246	178.753	2.00%	0.53
50	165.252	168.641	172.082	2.04%	0.54
51	158.996	162.318	165.694	2.08%	0.55
52	153.006	156.263	159.574	2.12%	0.57
53	147.272	150.464	153.710	2.16%	0.58
54	141.781	144.909	148.090	2.20%	0.59
55	136.522	139.585	142.703	2.23%	0.61
56	131.483	134.484	137.539	2.27%	0.62
57	126.655	129.594	132.587	2.31%	0.64
58	122.028	124.905	127.837	2.35%	0.65
59	117.592	120.409	123.280	2.38%	0.66
60	113.339	116.096	118.908	2.42%	0.68
61	109.261	111.959	114.712	2.46%	0.69
62	105.348	107.989	110.685	2.50%	0.71
63	101.595	104.179	106.818	2.53%	0.72
64	97.994	100.522	103.105	2.57%	0.73
65	94.537	97.011	99.539	2.61%	0.75
66	91.219	93.639	96.114	2.64%	0.76
67	88.033	90.401	92.822	2.68%	0.78
68	84.974	87.290	89.659	2.71%	0.79
69	82.036	84.300	86.619	2.75%	0.81
70	79.213	81.428	83.697	2.79%	0.82
71	76.500	78.667	80.887	2.82%	0.84
72	73.894	76.012	78.184	2.86%	0.85
73	71.388	73.460	75.585	2.89%	0.87
74	68.979	71.006	73.084	2.93%	0.88
75	66.663	68.645	70.678	2.96%	0.90
76	64.436	66.373	68.362	3.00%	0.91
77	62.293	64.188	66.133	3.03%	0.93
78	60.232	62.084	63.987	3.07%	0.95
79	58.248	60.060	61.921	3.10%	0.96
80	56.339	58.110	59.931	3.13%	0.98
81	54.502	56.233	58.015	3.17%	0.99
82	52.732	54.426	56.168	3.20%	1.01
83	51.029	52.685	54.389	3.23%	1.02
84	49.388	51.007	52.674	3.27%	1.04
85	47.808	49.391	51.022	3.30%	1.06
86	46.285	47.834	49.429	3.33%	1.07
87	44.818	46.332	47.892	3.37%	1.09
88	43.405	44.885	46.411	3.40%	1.10
89	42.042	43.489	44.982	3.43%	1.12
90	40.728	42.144	43.604	3.47%	1.14
91	39.461	40.846	42.274	3.50%	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	38.240	39.594	40.991	3.53%	1.17
93	37.062	38.386	39.753	3.56%	1.19
94	35.925	37.220	38.558	3.59%	1.20
95	34.828	36.095	37.404	3.63%	1.22
96	33.770	35.009	36.289	3.66%	1.24
97	32.749	33.961	35.213	3.69%	1.25
98	31.763	32.948	34.174	3.72%	1.27
99	30.812	31.971	33.170	3.75%	1.29
100	29.893	31.026	32.200	3.78%	1.31
101	29.005	30.114	31.263	3.81%	1.32
102	28.148	29.233	30.357	3.84%	1.34
103	27.320	28.382	29.482	3.88%	1.36
104	26.520	27.559	28.635	3.91%	1.38
105	25.747	26.763	27.817	3.94%	1.39
106	25.000	25.994	27.025	3.97%	1.41
107	24.278	25.251	26.260	4.00%	1.43
108	23.580	24.532	25.520	4.03%	1.45
109	22.905	23.837	24.804	4.06%	1.46
110	22.252	23.164	24.111	4.09%	1.48
111	21.621	22.513	23.440	4.12%	1.50
112	21.011	21.884	22.791	4.15%	1.52
113	20.420	21.275	22.163	4.18%	1.54
114	19.849	20.685	21.555	4.20%	1.56
115	19.296	20.115	20.966	4.23%	1.57
116	18.761	19.562	20.396	4.26%	1.59
117	18.243	19.027	19.844	4.29%	1.61
118	17.741	18.509	19.309	4.32%	1.63
119	17.256	18.008	18.791	4.35%	1.65
120	16.785	17.522	18.289	4.38%	1.67
121	16.330	17.051	17.802	4.41%	1.69
122	15.889	16.595	17.331	4.43%	1.70
123	15.462	16.153	16.874	4.46%	1.72
124	15.048	15.725	16.431	4.49%	1.74
125	14.647	15.310	16.002	4.52%	1.76