

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): QN0402X493F3937FB

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

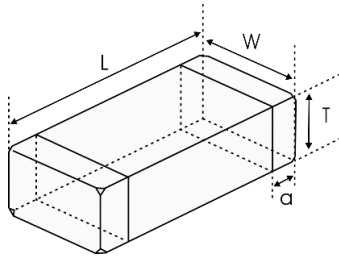


图 1 Fig.1

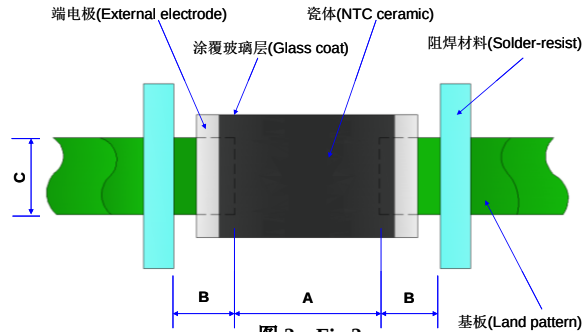


图 2 Fig.2

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 493 F 3937 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	
502	5kΩ
493	49.12kΩ
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
3937	3937K
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 (℃)
QN0402X493F3937FB	49.12±1%	3937±1%	3978 ref.	0.13	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：

- 环境温度：20±15℃；
- 相对湿度：65±20%；
- 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：

- 环境温度：25±2℃；
- 相对湿度：65±5%
- 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:

- Ambient Temperature: 20±15℃
- Relative Humidity: 65±20%
- Air Pressure: 86kPa to 106kPa

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

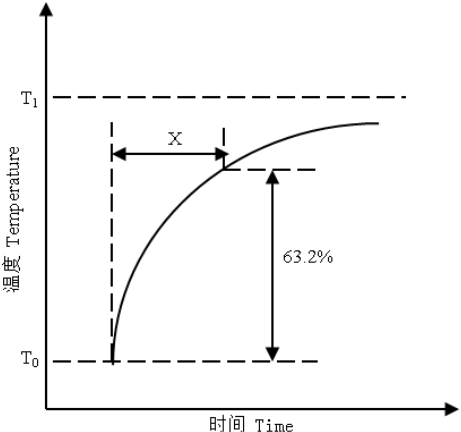
- Ambient Temperature: 25±2℃
- Relative Humidity: 65±5%
- Air Pressure: 86kPa to 106kPa

▪ Inspection Equipment

Visual Examination: 20× magnifier

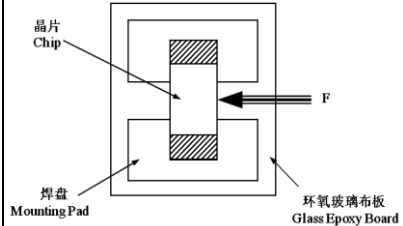
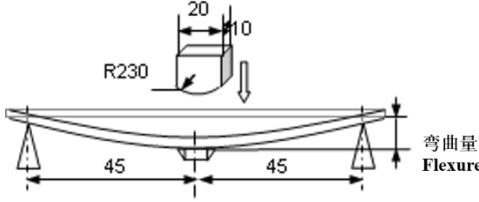
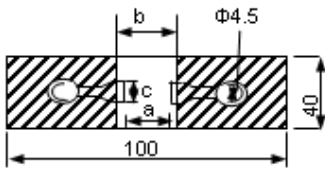
Resistance value test: Thermistor resistance tester

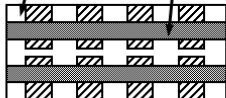
5 电性测试 Electrical Test

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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0805	1.2	4.0	1.65																														

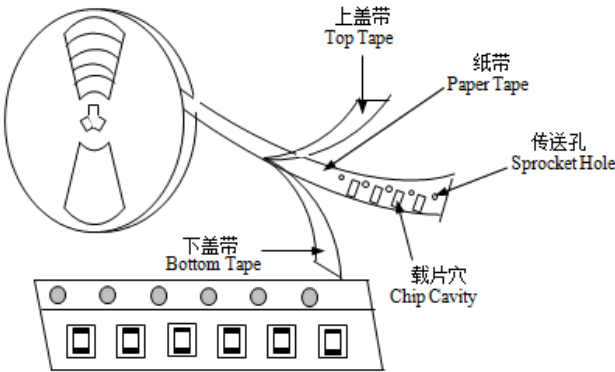
振动 Vibration	IEC 60068-2-80	① 将晶片焊接在测试基板上（如右图所示的环氧玻璃布板）； Solder the chip to the testing jig (glass epoxy board shown in the left) using eutectic solder. ② 晶片以全振幅为 1.5mm 进行振动，频率范围为 10Hz ~55 Hz； The chip shall be subjected to a simple harmonic motion having total amplitude of 1.5mm, the frequency being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

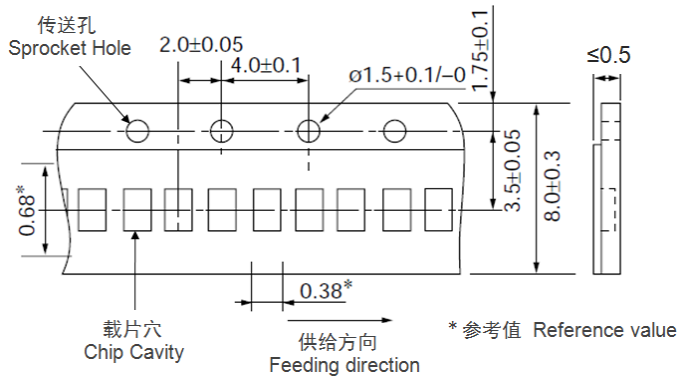
类型 Type	0201	0402	0603	0805
编带厚度 Tape thickness(mm)	0.5±0.15	0.5±0.15	0.8±0.15	0.85±0.2
编带材质 Tape material	纸带 Paper Tape			
每盘数量 Quantity per Reel	15K	10K	4K	4K

(1) 编带图 Taping Drawings

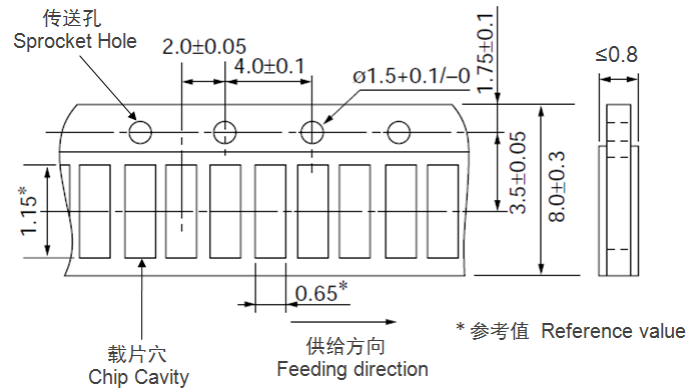


(2) 纸带尺寸 Paper Tape Dimensions (单位 Unit: mm)

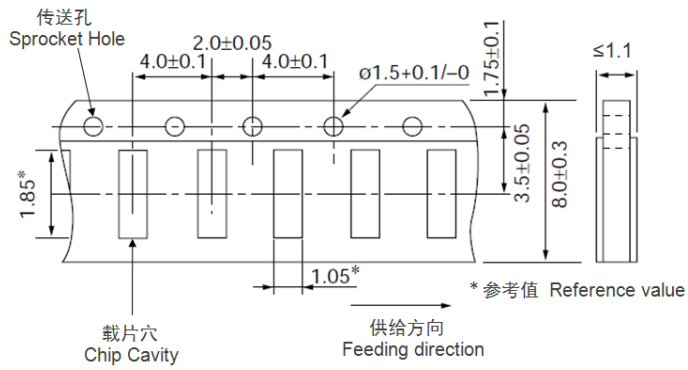
QN0201 系列 QN0201 series



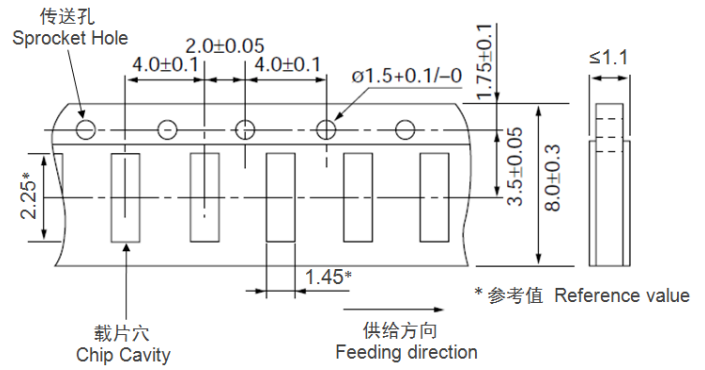
QN0402 系列 QN0402 series



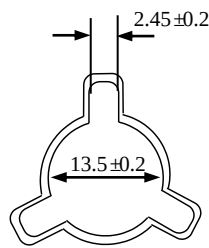
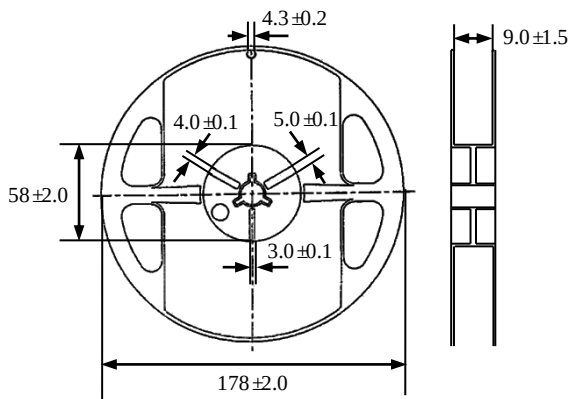
QN0603 系列 QN0603 series



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

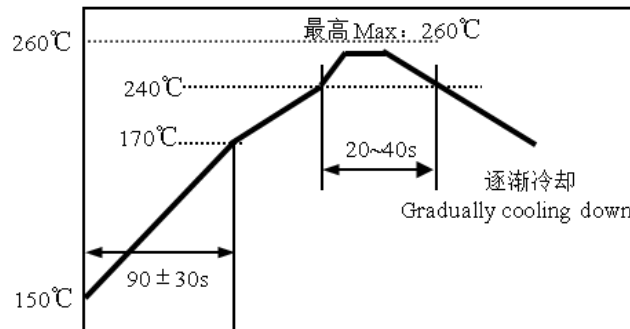
• 回流焊

- 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

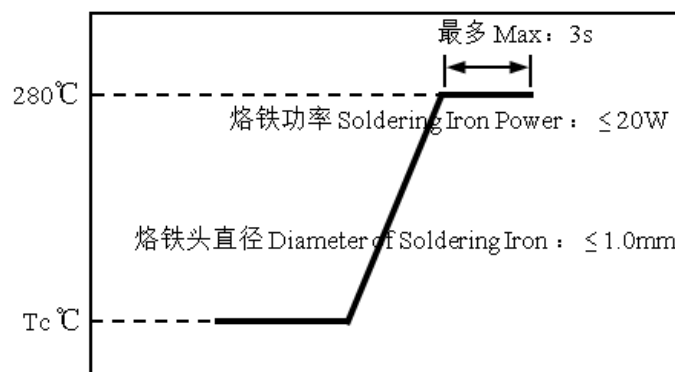
- 烙铁功率: 最大 20W
- 预热: 150°C/60sec.
- 烙铁头温度: 最高 280°C
- 焊接时间: 最多 3sec.
- 焊锡: 96.5Sn/3.0Ag/0.5Cu
- 手工焊: 最多 1 次

• 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

QN0402X493F3937FB

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	1,433.656	1,498.490	1,566.098	4.51%	0.67
-39	1,346.816	1,406.834	1,469.380	4.45%	0.67
-38	1,265.747	1,321.323	1,379.202	4.38%	0.66
-37	1,189.978	1,241.454	1,295.027	4.32%	0.66
-36	1,124.761	1,172.748	1,222.659	4.26%	0.65
-35	1,052.840	1,097.025	1,142.951	4.19%	0.65
-34	990.906	1,031.860	1,074.400	4.12%	0.64
-33	932.871	970.834	1,010.242	4.06%	0.64
-32	878.584	913.785	950.301	4.00%	0.63
-31	827.764	860.410	894.255	3.93%	0.62
-30	780.155	810.438	841.814	3.87%	0.62
-29	735.539	763.637	792.729	3.81%	0.61
-28	693.720	719.795	746.775	3.75%	0.61
-27	654.509	678.710	703.736	3.69%	0.60
-26	617.734	640.202	663.420	3.63%	0.60
-25	583.226	604.088	625.633	3.57%	0.59
-24	550.834	570.208	590.204	3.51%	0.59
-23	520.415	538.410	556.971	3.45%	0.58
-22	491.846	508.564	525.796	3.39%	0.57
-21	465.006	480.538	496.539	3.33%	0.57
-20	439.778	454.212	469.073	3.27%	0.56
-19	416.051	429.465	443.268	3.21%	0.56
-18	393.747	406.216	419.038	3.16%	0.55
-17	372.754	384.345	396.258	3.10%	0.54
-16	352.995	363.771	374.840	3.04%	0.54
-15	334.393	344.414	354.699	2.99%	0.53
-14	316.864	326.182	335.740	2.93%	0.52
-13	300.370	309.036	317.920	2.87%	0.52
-12	284.806	292.865	301.122	2.82%	0.51
-11	270.142	277.639	285.314	2.76%	0.51
-10	256.314	263.287	270.422	2.71%	0.50
-9	243.263	249.749	256.382	2.66%	0.49
-8	232.885	238.988	245.228	2.61%	0.48
-7	219.331	224.943	230.676	2.55%	0.48
-6	208.355	213.575	218.905	2.50%	0.47
-5	197.984	202.840	207.795	2.44%	0.46
-4	188.191	192.708	197.314	2.39%	0.46
-3	178.936	183.138	187.420	2.34%	0.45
-2	170.183	174.090	178.070	2.29%	0.44
-1	161.910	165.545	169.244	2.23%	0.44
0	154.081	157.461	160.900	2.18%	0.43
1	146.667	149.810	153.005	2.13%	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	139.648	142.570	145.538	2.08%	0.41
3	133.015	135.731	138.489	2.03%	0.41
4	126.720	129.244	131.806	1.98%	0.40
5	120.763	123.108	125.487	1.93%	0.39
6	115.115	117.294	119.502	1.88%	0.38
7	109.756	111.780	113.830	1.83%	0.38
8	106.625	108.560	110.519	1.80%	0.36
9	99.862	101.607	103.371	1.74%	0.36
10	95.293	96.912	98.549	1.69%	0.35
11	90.956	92.457	93.974	1.64%	0.35
12	86.858	88.250	89.657	1.59%	0.34
13	82.929	84.219	85.521	1.55%	0.33
14	79.215	80.411	81.616	1.50%	0.32
15	75.687	76.794	77.909	1.45%	0.31
16	72.333	73.357	74.389	1.41%	0.31
17	69.145	70.092	71.045	1.36%	0.30
18	66.114	66.989	67.869	1.31%	0.29
19	63.231	64.039	64.851	1.27%	0.28
20	60.488	61.234	61.982	1.22%	0.27
21	57.878	58.565	59.255	1.18%	0.26
22	55.393	56.027	56.661	1.13%	0.26
23	53.028	53.610	54.194	1.09%	0.25
24	50.775	51.310	51.846	1.04%	0.24
25	48.629	49.120	49.611	1.00%	0.23
26	46.544	47.034	47.525	1.04%	0.24
27	44.558	45.047	45.537	1.09%	0.25
28	42.667	43.154	43.642	1.13%	0.26
29	40.865	41.349	41.834	1.17%	0.28
30	39.148	39.628	40.110	1.22%	0.29
31	37.511	37.987	38.466	1.26%	0.30
32	35.951	36.423	36.897	1.30%	0.31
33	34.463	34.930	35.399	1.34%	0.32
34	33.044	33.506	33.970	1.39%	0.34
35	31.689	32.146	32.605	1.43%	0.35
36	30.397	30.848	31.301	1.47%	0.36
37	29.164	29.608	30.056	1.51%	0.37
38	27.986	28.424	28.866	1.55%	0.39
39	26.861	27.292	27.728	1.60%	0.40
40	25.787	26.212	26.641	1.64%	0.41
41	24.761	25.178	25.601	1.68%	0.42
42	23.780	24.191	24.607	1.72%	0.44
43	22.843	23.247	23.656	1.76%	0.45
44	21.847	22.244	22.645	1.80%	0.46
45	21.090	21.480	21.875	1.84%	0.47
46	20.270	20.653	21.041	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	19.486	19.862	20.243	1.92%	0.50
48	18.736	19.105	19.479	1.96%	0.51
49	18.018	18.380	18.747	2.00%	0.53
50	17.331	17.686	18.046	2.04%	0.54
51	16.677	17.025	17.378	2.08%	0.55
52	16.053	16.394	16.740	2.11%	0.57
53	15.455	15.789	16.129	2.15%	0.58
54	14.883	15.210	15.544	2.19%	0.59
55	14.335	14.656	14.982	2.23%	0.61
56	13.810	14.124	14.444	2.27%	0.62
57	13.307	13.615	13.928	2.30%	0.64
58	12.824	13.126	13.433	2.34%	0.65
59	12.362	12.658	12.959	2.38%	0.66
60	11.919	12.208	12.503	2.42%	0.68
61	11.494	11.777	12.066	2.45%	0.69
62	11.086	11.364	11.646	2.49%	0.71
63	10.695	10.967	11.244	2.53%	0.72
64	10.320	10.585	10.857	2.56%	0.74
65	9.960	10.220	10.485	2.60%	0.75
66	9.614	9.868	10.128	2.63%	0.77
67	9.282	9.531	9.785	2.67%	0.78
68	8.963	9.207	9.456	2.71%	0.79
69	8.657	8.895	9.139	2.74%	0.81
70	8.363	8.596	8.834	2.78%	0.82
71	8.080	8.308	8.541	2.81%	0.84
72	7.808	8.031	8.260	2.85%	0.85
73	7.547	7.765	7.989	2.88%	0.87
74	7.296	7.509	7.728	2.91%	0.89
75	7.055	7.263	7.477	2.95%	0.90
76	6.822	7.026	7.236	2.98%	0.92
77	6.599	6.799	7.004	3.02%	0.93
78	6.384	6.579	6.780	3.05%	0.95
79	6.177	6.368	6.565	3.08%	0.96
80	5.978	6.165	6.357	3.12%	0.98
81	5.786	5.969	6.157	3.15%	0.99
82	5.602	5.781	5.965	3.18%	1.01
83	5.424	5.599	5.779	3.22%	1.03
84	5.253	5.424	5.600	3.25%	1.04
85	5.088	5.255	5.428	3.28%	1.06
86	4.929	5.093	5.262	3.32%	1.07
87	4.776	4.936	5.102	3.35%	1.09
88	4.628	4.785	4.947	3.38%	1.11
89	4.486	4.640	4.798	3.41%	1.12
90	4.349	4.499	4.654	3.44%	1.14
91	4.217	4.364	4.515	3.47%	1.16

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	4.089	4.233	4.381	3.51%	1.17
93	3.966	4.107	4.252	3.54%	1.19
94	3.847	3.985	4.127	3.57%	1.21
95	3.733	3.868	4.007	3.60%	1.22
96	3.622	3.754	3.890	3.63%	1.24
97	3.516	3.645	3.778	3.66%	1.26
98	3.412	3.539	3.669	3.69%	1.28
99	3.313	3.437	3.565	3.72%	1.29
100	3.217	3.338	3.463	3.75%	1.31
101	3.124	3.243	3.365	3.78%	1.33
102	3.034	3.150	3.271	3.81%	1.34
103	2.948	3.061	3.179	3.84%	1.36
104	2.864	2.975	3.091	3.87%	1.38
105	2.783	2.892	3.005	3.90%	1.40
106	2.705	2.812	2.922	3.93%	1.42
107	2.629	2.734	2.842	3.96%	1.43
108	2.556	2.659	2.765	3.99%	1.45
109	2.486	2.586	2.690	4.02%	1.47
110	2.417	2.515	2.617	4.05%	1.49
111	2.351	2.447	2.547	4.08%	1.51
112	2.287	2.381	2.479	4.10%	1.52
113	2.225	2.317	2.413	4.13%	1.54
114	2.165	2.256	2.350	4.16%	1.56
115	2.107	2.196	2.288	4.19%	1.58
116	2.051	2.138	2.228	4.22%	1.60
117	1.997	2.082	2.170	4.24%	1.62
118	1.944	2.027	2.114	4.27%	1.63
119	1.893	1.975	2.060	4.30%	1.65
120	1.844	1.924	2.007	4.33%	1.67
121	1.796	1.874	1.956	4.35%	1.69
122	1.750	1.827	1.907	4.38%	1.71
123	1.705	1.780	1.859	4.41%	1.73
124	1.661	1.735	1.812	4.43%	1.75
125	1.619	1.692	1.767	4.46%	1.77