承认书

APPROVAL SHEET

客户 CUSTOMER	立創
客户料号 CUSTOMER P/N	
规格描述 DESCRIPTION	ZNR-D(0603)系列贴片NTC
产品编码 PART NUMBER	
日期 DATE	2024-10-26

德尔创承认栏 APPROVED BY DERSONIC			客户承认栏 APPROVED BY CUSTOMER	
批　准 APPROVED BY	审核 CHECK BY	制订 FORMULATE BY	批　准 APPROVED BY	审核 CHECK BY
彭少雄	吴成愛	胡明康		

东莞市德尔创电子有限公司 样品承认章

东莞市德尔创电子有限公司

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PART NO 型号. ZNR0603（D) Series

1 Type Code Designation 类型代码名称

NS	1002	&	B	395	#	D	T	100
①	②	③	④	⑤	⑥	⑦	⑧	⑨

① NS: CHIP NTC THERMISTOR 贴片NTC热敏电阻

② 1002: Rated Zero-Power Resistance 额定零功率电阻值 abcd=abc×10^d

③ &:Accuracy Error 精度误差 F: 1% G: 2% H: 3% J: 5%

④ B:B constant calculation method B 值计算方式 A: 25℃&85℃ B: 25℃&50℃

⑤ 395:B Constant B 值常数

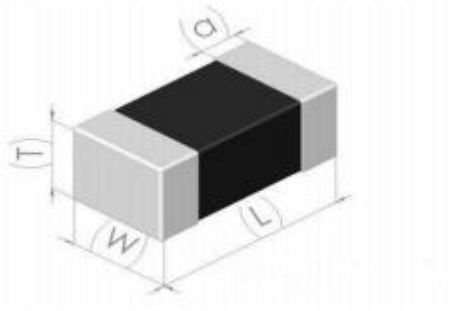
⑥ #:Accuracy Error 精度误差 F: 1% H: 3%

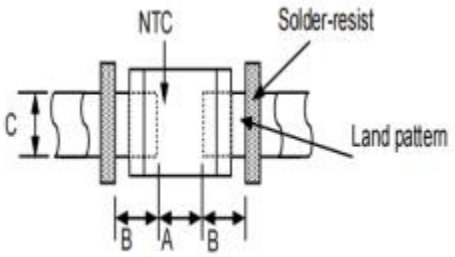
⑦ D:0603 Chip Size 尺寸

⑧ T:Reel packing 卷盘包装

⑨ 100:ZNR Inteer control code 内部控制码

3 Dimensional Drawings 尺寸图





类别Type	L	W	T	a	A	B	C
0603 [1608]	0.063±0.006 [1.6±0.15]	0.031±0.006 [0.8±0.15]	0.031±0.006 [0.8±0.15]	0.012±0.008 [0.3±0.2]	[0.6-0.8]	[0.6-0.7]	[0.6-0.8]

2 Electrical Characteristics 电气特性

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 (℃)
NS1000&B338#DT100	0.10	3380	3435	3.1	1.0	＜5	100	-40~+125
NS1500&B338#DT100	0.15	3380	3435	2.5				
NS2200&B345#DT100	0.22	3450	3500	2.1				
NS3300&B345#DT100	0.33	3450	3500	1.7				
NS4700&B345#DT100	0.47	3450	3500	1.4				
NS6800&B345#DT100	0.68	3450	3500	1.2				
NS1001&B320#DT100	1.0	3200	3250	1.0				
NS1001&B345#DT100	1.0	3450	3500	1.0				
NS1501&B345#DT100	1.5	3450	3500	0.81				
NS2201&B395#DT100	2.2	3950	3987	0.67				
NS3001&B395#DT100	3.0	3950	3987	0.55				
NS3301&B395#DT100	3.3	3950	3987	0.55				
NS4701&B350#DT100	4.7	3500	3545	0.44				
NS4701&B395#DT100	4.7	3950	3987	0.46				
NS5001&B395#DT100	5.0	3950	3987	0.44				
NS6801&B395#DT100	6.8	3950	3987	0.38				
NS1002&A343#DT100	10	3380	3435	0.31				
NS1002&B345#DT100	10	3450	3500	0.31				
NS1002&B395#DT100	10	3950	3987	0.33				
NS1502&B395#DT100	15	3950	3987	0.25				
NS2202&B395#DT100	22	3950	3987	0.21				
NS2202&B405#DT100	22	4050	4110	0.21				

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 (℃)
NS3302&B395#DT100	33	3950	3987	0.17				
NS3302&B405#DT100	33	4050	4100	0.17				
NS4702&B395#DT100	47	3950	3987	0.14				
NS4702&B405#DT100	47	4050	4100	0.14				
NS4702&B415#DT100	47	4150	4210	0.14				
NS5002&B415#DT100	50	4150	4210	0.13				
NS6802&B415#DT100	68	4150	4210	0.12				
NS1003&B395#DT100	100	3950	3987	0.10				
NS1003&B415#DT100	100	4150	4210	0.10				
NS1003&B425#DT100	100	4250	4310	0.10				
NS1503&B395#DT100	150	3950	3987	0.08	1.0	＜5	100	-40~+125
NS1503&B430#DT100	150	4300	4350	0.08				
NS2203&B395#DT100	220	3950	3987	0.06				
NS2203&B430#DT100	220	4300	4350	0.06				
NS3303&B395#DT100	330	3950	3987	0.05				
NS3303&B430#DT100	330	4400	4456	0.05				
NS4703&B425#DT100	470	4250	4310	0.04				
NS4703&B450#DT100	470	4500	4567	0.04				
NS6803&B450#DT100	680	4500	4567	0.03				
NS1304&B470#DT100	1300	4700	4760	0.02				

4 Storage & Warnings 储存与注意事项

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

The 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 t thermistors is fragile, no excessive pressure or impact shall be exerted on it. The thermistors shall not be operated beyond the specified “Operating Temperature Range” in the catalog.

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

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

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。
热敏电阻不可在超过目录规定的温度范围情况下工作。

5 Test and Measurement Procedures 检验和测试程序

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

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℃

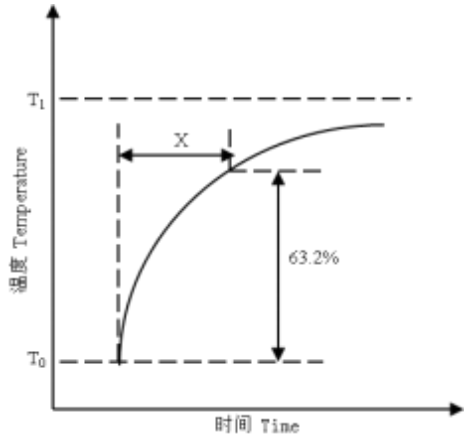
b. 相对湿度：65±5%

c. 气压：86kPa ~ 106kPa

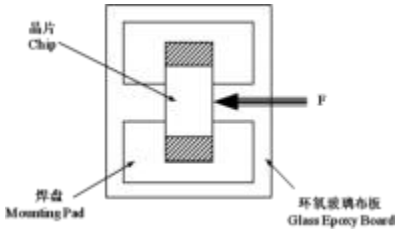
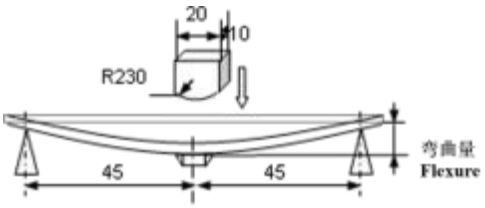
检查设备

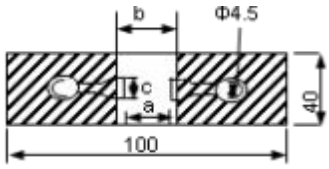
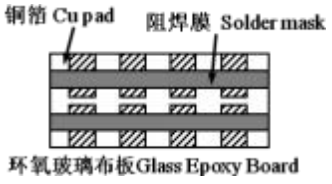
外观检查：20 倍放大镜
阻值检查：热敏电阻测试仪

6 Electrical Test电性测试

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℃. $B(25\text{-}50℃)=\frac{\ln R_{25}-\ln R_{50}}{1/T_{25}-1/T_{50}}$ $B(25\text{-}85℃)=\frac{\ln R_{25}-\ln R_{85}}{1/T_{25}-1/T_{85}}$ 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 T0 (℃) to T1 (℃) 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° C by self-heating.

7 Reliability Test 可靠性测试

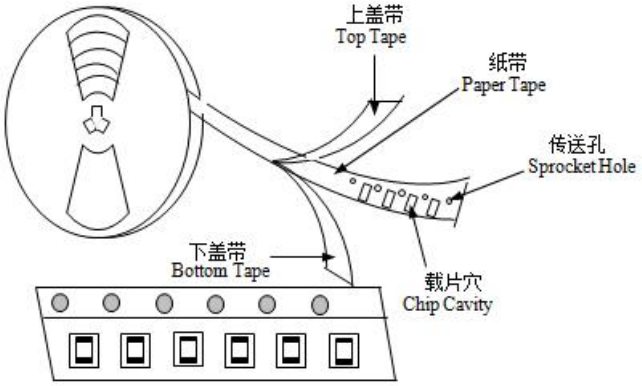
<table>
<tr><th>项目
Items</th><th>测试标准
Standard</th><th>测试方法及备注
Test Methods and Remarks</th><th>要求
Requirements</th></tr>
<tr><td>端头附着力
Terminal Strength</td><td>IEC 60068-2-21</td><td>将晶片焊接在测试基板上（如右图所示的环氧玻璃布板），按箭头所示方向施加作用力；
Solder the chip to the testing jig (glass epoxy board shown in the right) using 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, 0402, 0603</td><td>5N</td><td rowspan="2">10±1s</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｜≤5%
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>
<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>
</table>

<table>
<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: Sn/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: Sn/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 | ≤5%
③ | ΔB/B | ≤2%</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 | ≤3%
③ | ΔB/B | ≤2%</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 | ≤5%
③ | ΔB/B | ≤2%</td></tr>
<tr><td>低温存放
Resistance to cold</td><td>IEC 60068-2-1</td><td>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.</td><td>① 无外观损伤；
No visible damage.
② | ΔR25/R25 | ≤5%
③ | ΔB/B | ≤2%</td></tr>
<tr><td>湿热存放
Resistance to damp heat</td><td>IEC 60068-2-78</td><td>① 在 40±2℃, 相对湿度90~95%空气中，无负载放置1000±24小时。
40±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.</td><td>① 无外观损伤；
No visible damage.
② | ΔR25/R25 | ≤3%
③ | ΔB/B | ≤2%</td></tr>
<tr><td>高温负荷
Resistance to high temperature load</td><td>IEC 60539-1 5.25.4</td><td>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.</td><td>① 无外观损伤；
No visible damage.
② | ΔR25/R25 | ≤5%
③ | ΔB/B | ≤2%</td></tr>
</table>

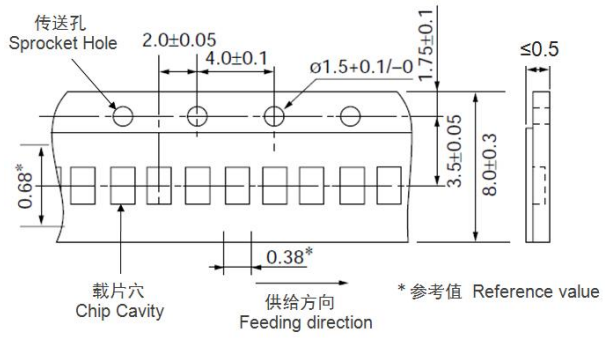
8 Taping 编带

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

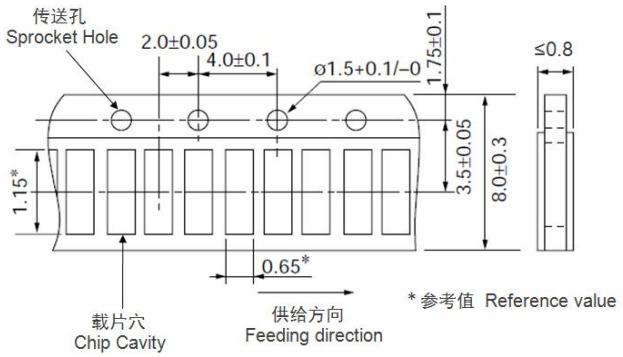


8.1 Paper Tape Dimensions 纸带尺寸

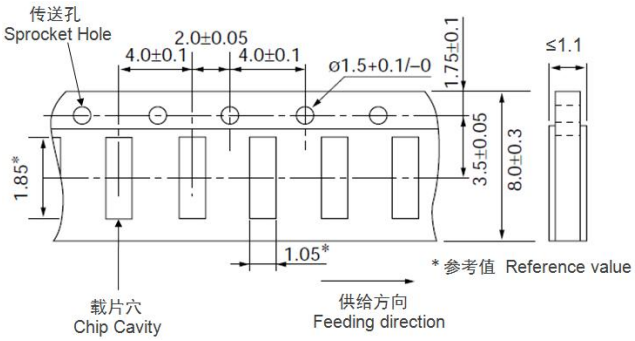
0201



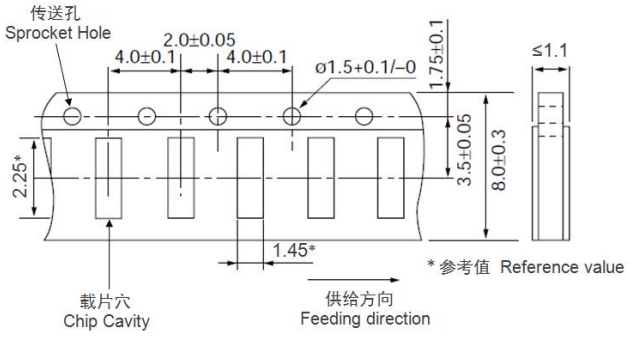
0402



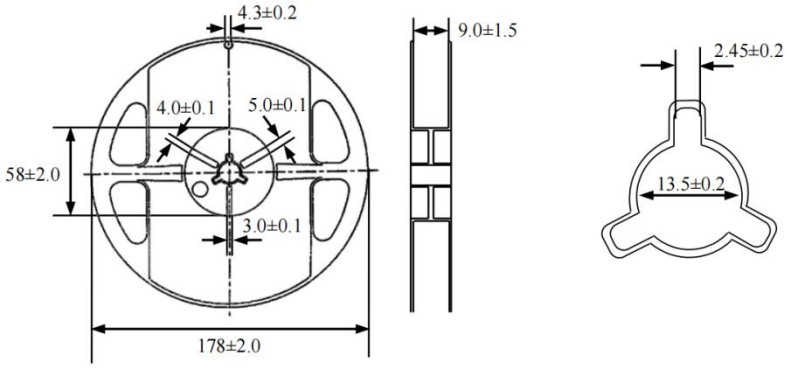
0603



0805



8.2 Reel Dimensions 卷盘尺寸 (单位 Unit：mm)



9 Recommended Soldering Technologies 建议焊接条件

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: Sn/3.0Ag/0.5Cu

Max.2 times for re-flowing

回流焊

温升 1~2℃/sec.

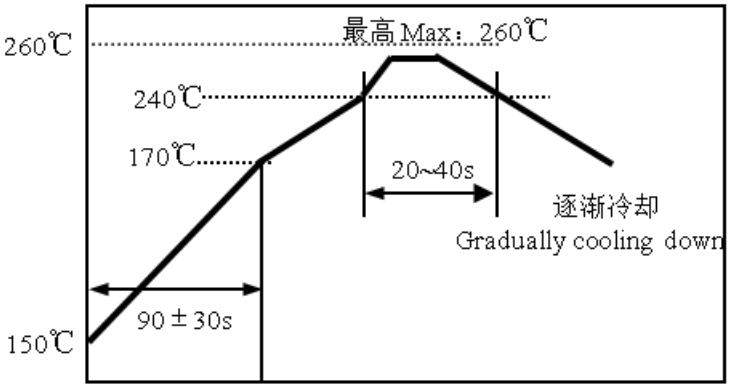
预热：150~170℃/90±30 sec.

大于 240℃时间：20~40sec

峰值温度：最高 260℃/10 sec.

焊锡：Sn/3.0Ag/0.5Cu

回流焊：最多 2 次



Iron Soldering Profile

Iron soldering power: Max.20W

Pre-heating: 150℃/60sec.

Soldering Tip temperature: 280℃Max.

Soldering time: 3 sec Max.

Solder paste: Sn/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.]

手工焊

烙铁功率：最大 20W

预热：150℃/60sec.

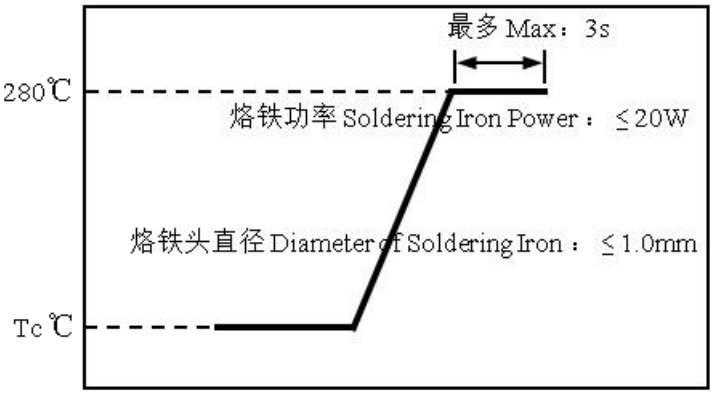
烙铁头温度：最高 280℃

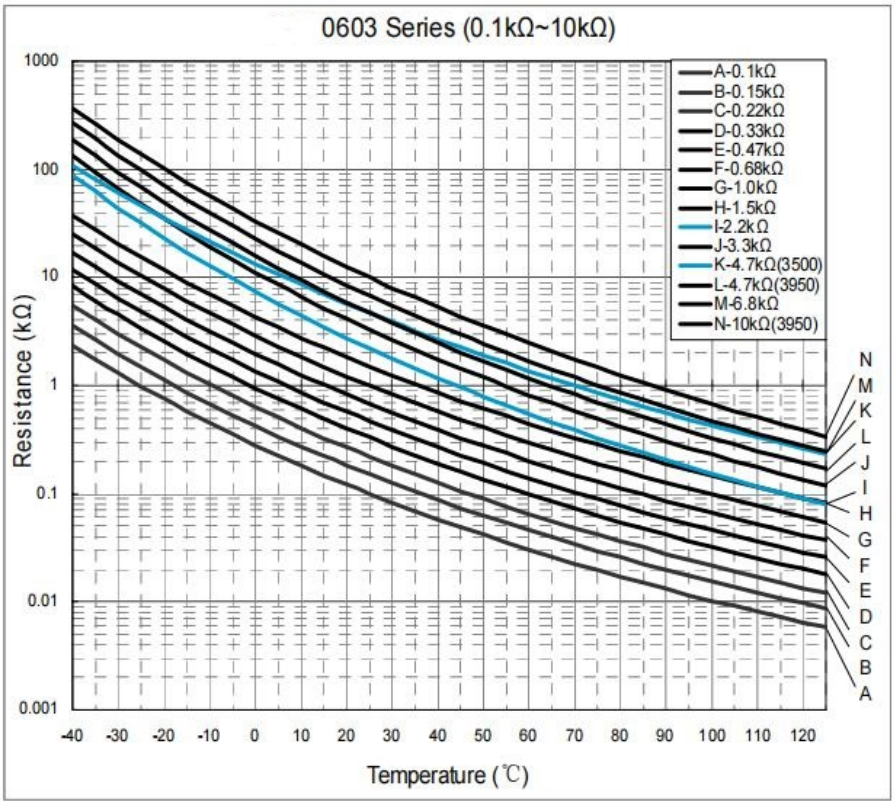
焊接时间：最多 3sec.

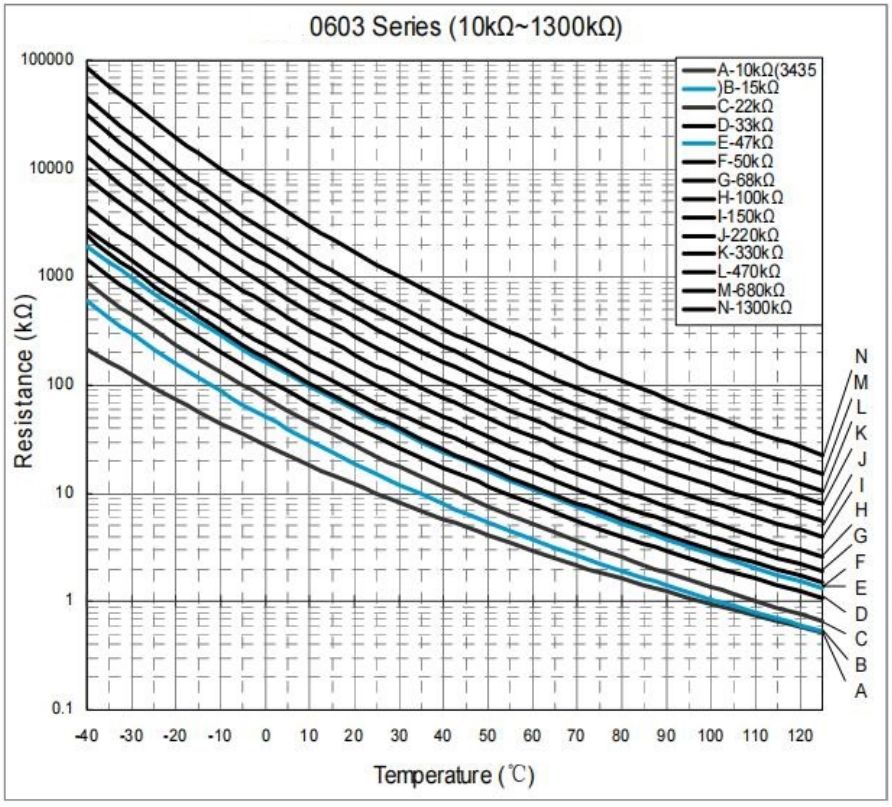
焊锡：Sn/3.0Ag/0.5Cu

手工焊：最多 1 次

[注：不要使烙铁头接触到端头]




0603 Series (0.1kΩ~10kΩ)
Resistance (kΩ)
1000
100
10
1
0.1
0.01
0.001
-40 -30 -20 -10 0 10 20 30 40 50 60 70 80 90 100 110 120
Temperature (℃)
A-0.1kΩ
B-0.15kΩ
C-0.22kΩ
D-0.33kΩ
E-0.47kΩ
F-0.68kΩ
G-1.0kΩ
H-1.5kΩ
I-2.2kΩ
J-3.3kΩ
K-4.7kΩ(3500)
L-4.7kΩ(3950)
M-6.8kΩ
N-10kΩ(3950)
N M K L J I H G F E D C B A


0603 Series (10kΩ~1300kΩ)
Resistance (kΩ)
100000
10000
1000
100
10
1
0.1
-40 -30 -20 -10 0 10 20 30 40 50 60 70 80 90 100 110 120
Temperature (℃)
A-10kΩ(3435
)B-15kΩ
C-22kΩ
D-33kΩ
E-47kΩ
F-50kΩ
G-68kΩ
H-100kΩ
I-150kΩ
J-220kΩ
K-330kΩ
L-470kΩ
M-680kΩ
N-1300kΩ
N M L K J I H G F E D C B A