丽智电子
LIZ Electronics

厚膜晶片电阻器规格书-RT 系列

Specification for Thick Film Chip Resistors - Type *RT*

规格书

SPECIFICATION

丽智电子（南通）有限公司

地址: 江苏省南通市通州区康富路 789 号

Address: No. 789, Kang Fu Road Tongzhou District Nantong city Jiangsu province

Tel: 0086-0513-68856666

Fax: 0086-0513-68383688

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Specification for Thick Film Chip Resistors - Type *RT*

1. 范围（scope）：

1.1 适用于本公司所生产的无铅、无卤之厚膜晶片电阻器 RT 系列

This specification applies to thick film chip resistors which meet requirements of Pb free and halogen free.

1.2 本公司的无铅产品指的晶片电阻端电极无铅，而存在于电阻层的玻璃中的符合 RoHS 豁免条款。

There no lead exists in terminal of resistor, and lead which exist in glass of resistor layer meets RoHS exemption.

2. 产品料号（part number）：

0603 1/10W 1% 70Ω

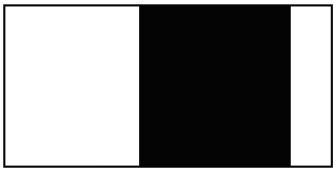
RT0603FA70R0S

RT	0603	F	A	70R0	S
类型(Type) RT: 厚膜晶片电阻器(thick film chip resistors)	尺寸(Size) 0603	公差 Tolerance F=±1%	额定功率 Rated Power A= 1/10W	阻值 Resistance value ±1%： 49R9=49.9Ω 70R0=70Ω	包装代码 Packing Code G= reel （卷装） V= bulk （散料） S= Double Standard Quantity (两倍卷盘标准包装量)

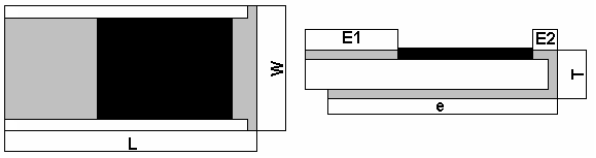
3. 电阻本体字码标示(Marking on the Resistor's Body)：

RT0603 本体上无字码标示

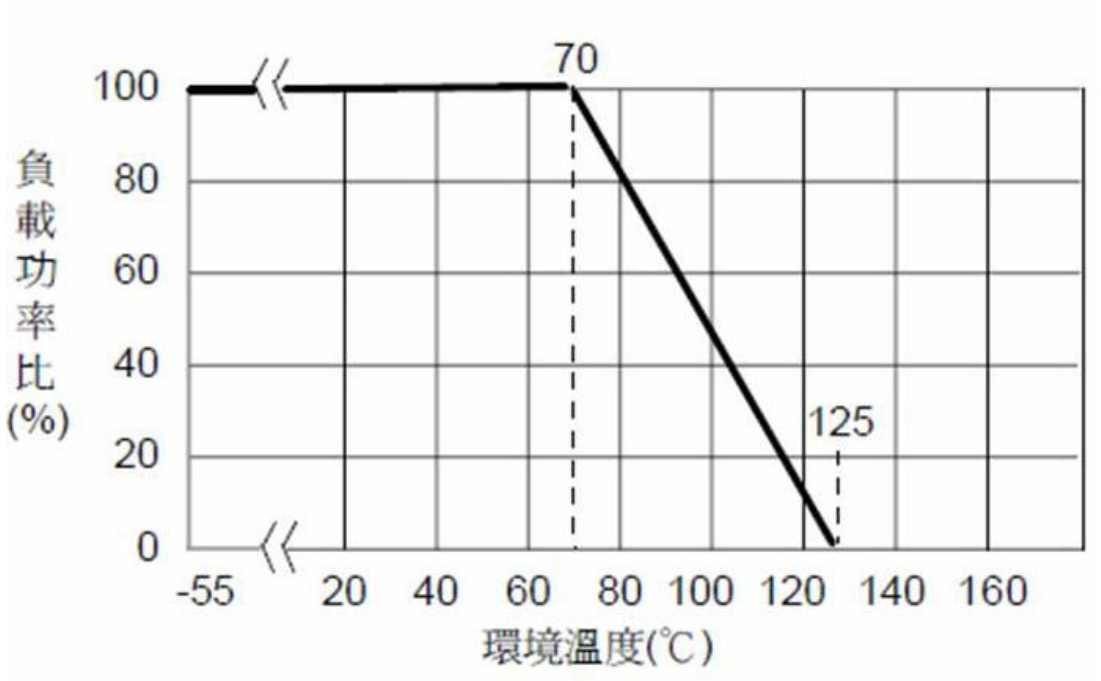
For RT0603 size, no marking on the body



4. 尺寸（dimension）：

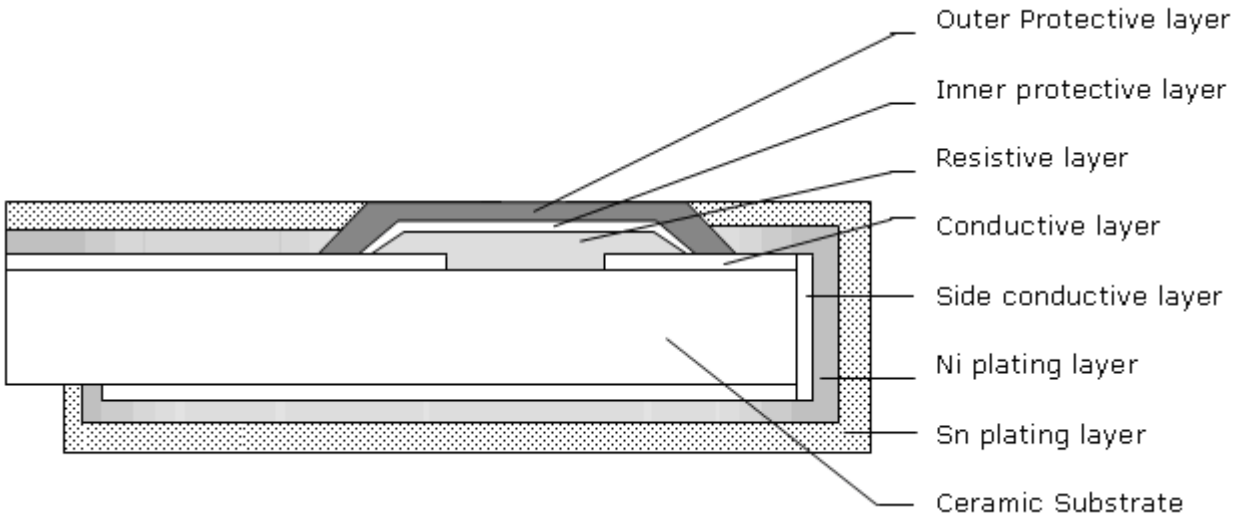
尺寸 dimension	 单位（unit）: mm					
型别（Type）	L	W	T	E1	E2	e
RT0603	1.60±0.10	0.80±0.10	0.45±0.10	0.60±0.10	0.20±0.10	1.30±0.10

5. 功率衰减曲线（ Derating Curve）：



工作温度范围（Operating Temperature Range）： -55℃~+125℃;
储存条件（storage condition ）： 5～30℃, 30～75%RH.

6.电阻结构（Construction ）：



No.	结构 construction	主要材料 Major material
1	陶瓷基板 Ceramic substrate	三氧化二铝 Al_2O_3
2	银电极 Conductive layer	银/鈀 Ag/Pd
3	侧电极 Side conductive layer	镍铬合金 NiCr
4	阻体层 Resistive layer	氧化钌+玻璃 RuO_2 + Glass
5	内保护层 Inner protective layer	玻璃 Glass
6	外保护层 Outer Protective layer	环氧树脂 Epoxy
7	镍电极 Ni plating layer	镍 Ni
8	锡电极 Sn plating layer	锡 Sn

7. 阻值范围（resistance range）：

型别 Type	阻值范围 Resistance Range
	1%
RT0603	1Ω~10MΩ

8. 电气特性（electrical characteristics）：

型别 Type	RT0603
额定功率 Rated power	1/10W
最大工作电压 Max Working Voltage	50V
最大过负荷电压 Max Overload Voltage	100V

备注（remark）：

※ 额定电压计算公式（The rated voltage is calculated by the following formula）：

$E=\sqrt{RP}$

E：额定电压（Rated Voltage） (V)

P：额定功率（Rated Power ） (W)

R：电阻阻值（Resistance ） (ohm)

※ 如果计算出的电压超过此型别的最大工作电压，则此型别的最大工作电压为此电阻的额定电压。
In case the value calculated by the formula exceed the maximum working voltage as above table 8, the maximum working voltage shall be regarded as rated voltage.

9. 性能(Performance Specifications)

内容 Item	规格 Specification Limits	测试方法 Test Methods
温度系数 Temperature Coefficient	≦10Ω产品（Product）: ±400 PPM/℃ >10Ω产品（Product）: ±150 PPM/℃	JIS C5201 4.8
焊锡性 Solderability	最少 95%面积上锡(Min 95% coverage)	JIS C5201 4.17
绝缘电阻 Insulation resistance	>10GΩ	JIS C5201 4.6
短时间过负荷 Short-time overload	±(1.0% +0.05Ω) Max (最大)	JIS C5201 4.13
端子弯曲 Terminal bending	±(1.0% +0.05Ω) Max (最大)	JIS C5201 4.33
推力测试 Pressurization	±(1.0% +0.05Ω) Max (最大)	JIS C5201 4.32.2
抗焊锡热 Resist to soldering heat	±(1.0% +0.05Ω) Max (最大)	依客户提供的条件 JIS C5201 4.18
负荷寿命 Load life	±(2.0% +0.05Ω) Max (最大)	JIS C5201 4.25.1
耐湿特性 Humidity	±(2.0% +0.05Ω) Max (最大)	JIS C5201 4.24
温度循环 Temperature cycling	±(2.0% +0.05Ω) Max (最大)	JIS C5201 4.19
温湿度敏感等级 Moisture sensitive level	Level 1	J-STD-020
冷热冲击 Thermal shock	±(1.0% +0.05Ω) Max (最大)	JIS C5201 4.21
耐溶剤性 Resistance to Solvent	表面無損傷	JIS C5201 4.29

10. 包装规格（Tapping Specification）

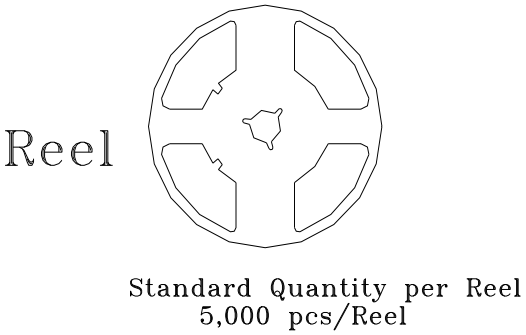
10.1 卷盘尺寸（reel dimension）

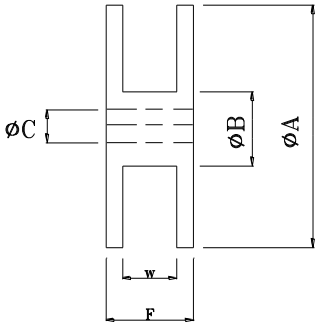
尺寸 Dimensions			A	B	C	F	W
RT0603	7"8	mm	178±2.0	60.0±1.0	13.5±0.5	11.4±0.1	9.00±0.3
		Inch	7.008±0.079	2.362±0.039	0.531±0.020	0.449±0.039	0.354±0.012
	13"8	mm	330±2.0	100±2.0	13.5±0.5	12.4±0.2	10.0±0.5
		Inch	12.992±0.079	3.937±0.079	0.531±0.020	0.488±0.0079	0.393±0.020

※ 备注（Remark）： RT0603/每卷 5,000pcs

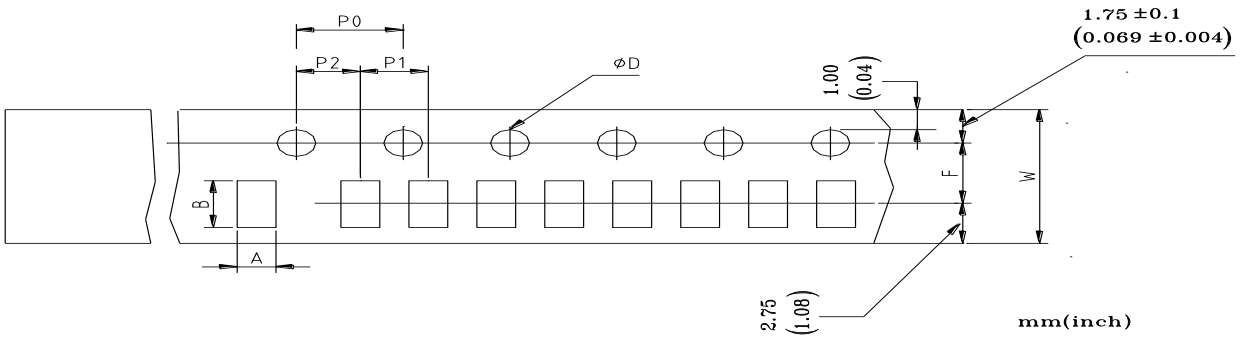
RT0603 Quantity per Reel 5,000 pcs/Reel

可按客戶需求: Quantity per Reel 20,000 pcs/Reel





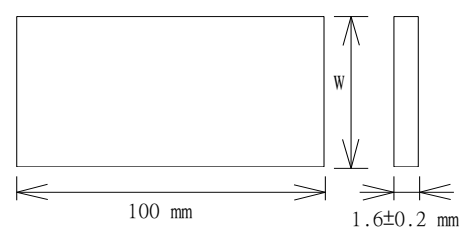
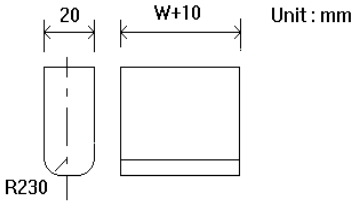
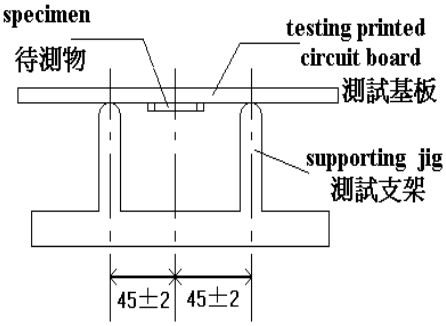
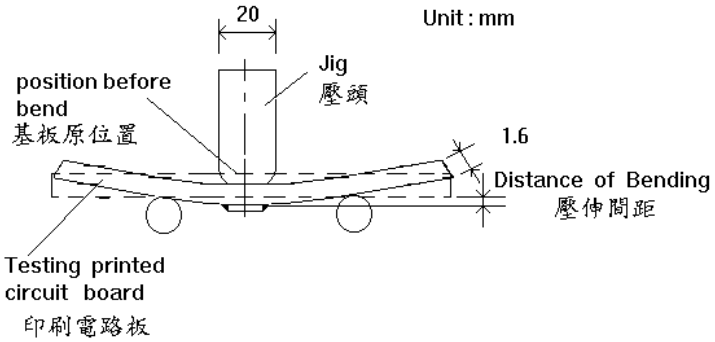
10.2 包装尺寸（packing dimension）



Dimensions		A	B	D	F	P0	P1	P2	W
RT0603	mm	1.10±0.10	1.90±0.10	1.50±0.10	3.50±0.05	4.00±0.10	4.00±0.10	2.00±0.05	8.00±0.20
	inch	0.043 ±0.004	0.075 ±0.004	0.059 ±0.004	0.138 ±0.002	0.157 ±0.004	0.157 ±0.004	0.079 ±0.002	0.315 ±0.008

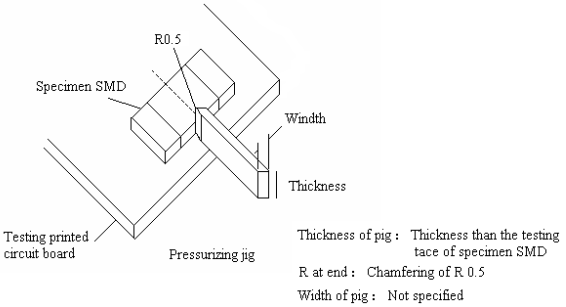
11.信赖性测试（Reliability Test Methods）

内容 Item	测试条件 Test Conditions
温度系数 Temperature Coefficient	TCR=（R-R_0）/（t-t_0）R_0 ×10^6（ppm） R_0 电阻在室温下的阻值(resistance at room temperature) R 电阻在 125℃或-55℃下的阻值(resistance at 125℃ or -55℃) t_0 室温(room temperature) t 测试温度（test temperature 125℃ or -55℃）
焊锡性 Solderability	沾助焊剂后浸入锡炉，锡炉温度 245±5℃，时间 2~3 秒 Dip the terminal in a flux and then dip into a soldering bath at 245±5℃ for 2~3sec.
绝缘电阻 Insulation resistance	电阻本体上加载最大的工作电压 60 秒后，测量绝缘阻抗 Applied the maximum DC working voltage on the center of body for 60±5seconds. Then measure insulation resistance
短时间过负荷 Short-time overload	加载 2.5 倍的额定电压，时间 5 秒后测量试验前后的阻值变化率。 Applied 2.5 times of rated voltage for 5 second. Measure the variation of resistance. $\Delta R\% = \frac{R_2-R_1}{R_1} * 100$------（%） R1＝试验前阻值(resistance before test) R2＝试验后阻值(resistance after test)
抗焊锡热 Resist to soldering heat	沾助焊剂后浸入锡炉，锡炉温度 290±5℃，时间 10±0.5 秒，测量试验前后的阻值变化率。 Dip the terminal in a flux and then dip into a soldering bath at 290±5℃ for 10±0.5sec. Measure the variation of resistance. $\Delta R\% = \frac{R_2-R_1}{R_1} * 100$------（%） R1＝试验前阻值(resistance before test) R2＝试验后阻值(resistance after test)

内容 Item	测试条件 Test Conditions
端子弯曲 Terminal bending	电阻焊接在测试板上进行弯折,弯折保持时间 5±1 秒，1206 以下的尺寸弯曲 $5^{+0.2}_{0}$mm; 1206 以上的尺寸弯曲 $2^{+0.2}_{0}$mm; 量测试验前后阻值变化率 Specimen shall be mounted on test board, then bend the board and maintained for 5±1s. the distance of bending is $5^{+0.2}_{0}$mm for resistors which size smaller than 1206 or $2^{+0.2}_{0}$mm which size larger than 1206. Measure the variation of resistance. 测试板（test board）　　压头（jig）     $\Delta R\% = \frac{R_2 - R_1}{R_1} * 100$------（%） R1＝试验前阻值(resistance before test) R2＝试验后阻值(resistance after test)

<table>
<tr><th>内容
Item</th><th>测试条件
Test Conditions</th></tr>
<tr><td>温度循环
Temperature cycling</td><td>
电阻放入恒温恒湿箱，加载额定电压，温湿度条件如下表; 循环测试 42 次，测试时间 1000 小时. 量测试验前后阻值变化率.
Put specimen in a chamber and applied rated voltage. Temperature and humidity conditions as following. There are 42 cycles and total test time is 1000H. Measure the variation of resistance.
表 1（table1）
<table>
<tr><td>测试条件
test condition</td><td>step1</td><td>step2</td><td>step3</td><td>step4</td><td>step5</td></tr>
<tr><td>湿度%
humidity</td><td>90～96%</td><td>90～96%</td><td>80～96%</td><td>90～96%</td><td>90～96%</td></tr>
<tr><td>温度
temperature</td><td>升温至 65℃
increase to 65℃</td><td>65℃</td><td>降温至 25℃
decrease to 25℃</td><td>升温至 65℃
increase to 65℃</td><td>65℃</td></tr>
<tr><td>时间
time</td><td>2.5H</td><td>3H</td><td>2.5H</td><td>2.5H</td><td>3H</td></tr>
</table>
<table>
<tr><td>测试条件
test condition</td><td>step6</td><td>step7</td><td>step8</td><td>step9</td><td>step10</td></tr>
<tr><td>湿度%
humidity</td><td>80～96%</td><td>90～96%</td><td>90～96%</td><td>90～96%</td><td>90～96%</td></tr>
<tr><td>温度
temperature</td><td>降温至 25℃
decrease to 25℃</td><td>25℃</td><td>降温至 -10℃
decrease to -10℃</td><td>-10℃</td><td>升温至 25℃
increase to 25℃</td></tr>
<tr><td>时间
time</td><td>2.5H</td><td>2H</td><td>0.5H</td><td>3H</td><td>0.5H</td></tr>
</table>
$$\Delta R\% = \frac{R_2 - R_1}{R_1} * 100 \text{------（\%）}$$
R1＝试验前阻值(resistance before test)
R2＝试验后阻值(resistance after test)
</td></tr>
</table>

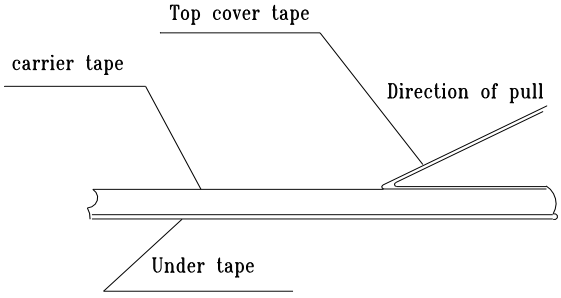
内容 Item	测试条件 Test Conditions
负荷寿命 Load life	电阻放入恒温箱中，温度 70±2℃，通电额定电压 1000 $^{+24}/_{-0}$ 小时，量测试验前后阻值变化率. Put the specimen in a chamber at 70±2℃ temperature, and applied rated voltage for 1000 $^{+24}/_{-0}$H. Measure the variation of resistance. $\Delta R\% = \frac{R_2-R_1}{R_1} * 100$------（%） R1＝试验前阻值(resistance before test) R2＝试验后阻值(resistance after test)
耐湿特性 Humidity	电阻放入恒温恒湿箱，温度 40±2℃，湿度 90~95 %RH;通电额定电压 1.5 小时，断电 0.5 小时；重复通断电至试验时间 1000 $^{+48}/_{-0}$ 小时.量测试验前后阻值变化率. Put the specimen in a chamber at 40±2℃ temperature and 90~95% relative humidity, then applied rated voltage for1.5H and rested for 0.5H repeatedly till total test time is 1000 $^{+48}/_{-0}$. Measure the variation of resistance. $\Delta R\% = \frac{R_2-R_1}{R_1} * 100$------（%） R1＝试验前阻值(resistance before test) R2＝试验后阻值(resistance after test)
温湿度敏感等级 Moisture sensitive level	电阻放入恒温恒湿箱，温度 85℃，湿度 90~95 %RH;时间 168 小时，再进行回流焊测试 Put the specimen in a chamber at 85℃ temperature and 85% relative humidity for 168H, then apply reflow test
冷热冲击 Thermal shock	电阻放入冷热冲击机中，温度 125±2℃至-55±3℃，共 5 个循环。量测试验前后阻值变化率. Put specimen in a chamber which temperature can be changed to 125±2℃ or -55±3℃, repeated 5 times. Measure the variation of resistance. $\Delta R\% = \frac{R_2-R_1}{R_1} * 100$------（%） R1＝试验前阻值(resistance before test) R2＝试验后阻值(resistance after test)

内容 Item	测试条件 Test Conditions
推力测试 Pressurization	电阻焊接在测试板上,加壓 5N,保持时间 10±1 秒，量测试验前后阻值变化率 Specimen shall be mounted on test board, pressure 5N and maintained for 10±1s, Measure the variation of resistance.  $\Delta R\% = \frac{R_2 - R_1}{R_1} * 100$------（%） R1＝试验前阻值(resistance before test) R2＝试验后阻值(resistance after test)
耐溶劑性 Resistance to Solvent	測試環境:23±5℃,電阻浸入乙丙醇, 5±1 分鐘 Test environment: 23±5℃, the resistance immersed in B, 5±1 minutes

12.上胶带剥离力测试（Peel force of top cover tape）

上胶带以 200mm/分钟的速度，沿 165～180 度角的方向进行剥离，如下图所示。纸带的剥离力范围为 10g～70g; 载带的剥离力范围为 30～100g

The top cover tape is pulled at a speed of 200 mm/min with the angle between the tape during peel and the direction of unreeling maintained at 165 to 180 degree as following picture. The peel force of paper carrier tape shall be 0.1N to 0.7N(10 to 70 g), the peel force of plastic carrier tape shall be 0.3N to 1N (30 to 100 g)



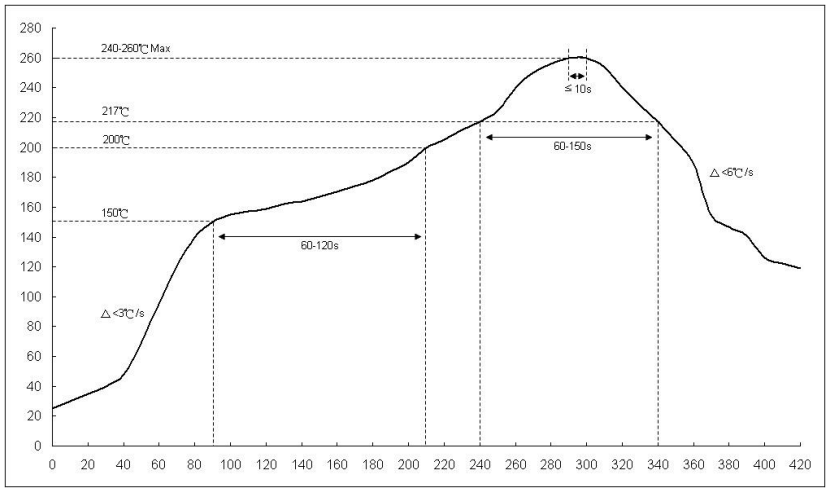
13. 鍍膜厚度 （Plated film thickness）

13.1 Plated Ni : 4~8 um

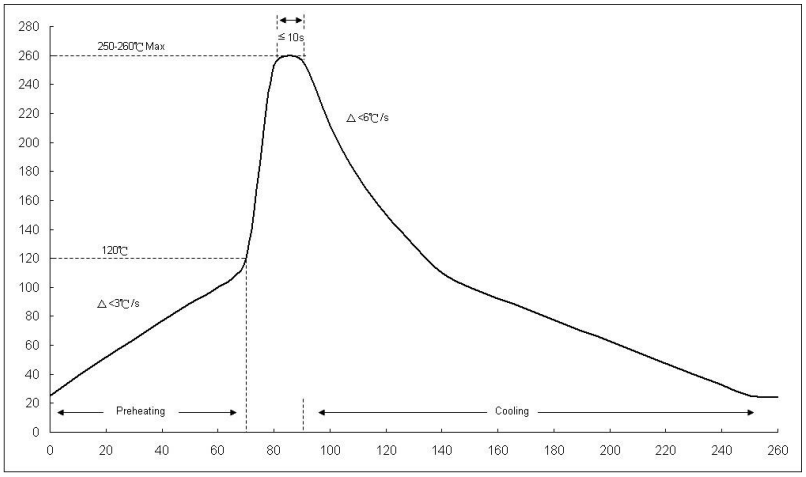
13.2 Plated Sn : 4~8 um

14. 焊接 （soldering）

14.1 建议回流焊曲线（Recommend reflow soldering profile）



14.2 建议波峰焊曲线（Recommend wave soldering profile）



14.3 手工焊温度（hand soldering temperature）

烙鐵温度 350±10℃ 3 秒之內，避免烙铁接触电阻本体

The iron temperature is 350± 10℃, hand soldering time less than 3S. Avoid solder iron tip direct touch the components body