FOSAN TECHNOLOGY 富捷科技

Product Datasheet
产品规格说明书

FQL Series

Automotive Low Resistance Low TCR Metal Film Chip Resistor

车规低阻低 TCL 金属膜片式电阻器

安徽省富捷电子科技有限公司
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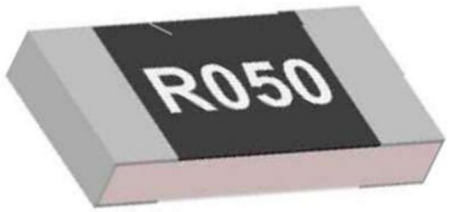


■ 特点（Features）

- 体积小，重量轻
- 可靠性，高质量
- 低阻值， 适合大电流通过
- 低温度系数
- 无卤，无铅
- 符合 RoHS
- 符合 AEC-Q200

- Small size and light weight
- Reliability, high quality
- Low Resistance & Suitable for Large Current Application
- Low TCR
- Halogen free and lead free
- RoHS compliant
- AEC-Q200 compliant

■ 应用（Application）

- 汽车电子
- 导航设备、胎压监测
- 暖气系统、通风系统,空调
- 室内照明、中央门锁、雨刮器模块

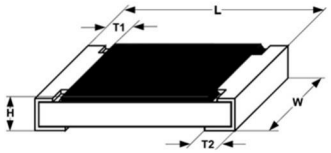
- Automotive electronics
- Navigation equipment TPMS
- Heating, Ventilating and Air conditioning
- Indoor lighting, Central door locking, Wiper module

■ 产品料号（Parts Number Explanation）

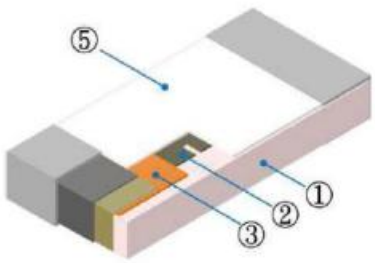
示例(Example)：FQL0805FR330TSW

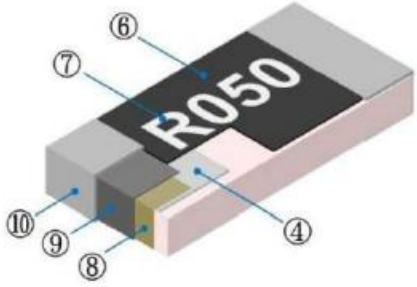
F 公司	Q 产品别	L 功能别	0805 尺寸	F 公差	R330 字码	T 包装别	S 端电极	V 特殊
FOJAN	R:Resistor C:Capacitor L: Inductor D:Diode A:Audion Q:Automotive	C:Normal P:Hi-Power L: Lowohmic A:Array S:Surge H:Hi-Precision V:Hi-Voltage Q:Auto-motive R:Anti-sulfur M:Metal D: LED	0402 0603 0805 1206 1210 2010 1812 2512	B:±0.1% C:±0.25 % D:±0.5% F:±1% J:±5%	E24+E96: 4-digits R330=0R33 R050=0R05	T: 7 inch reel Q:10 inch reel R:13 inch reel B:Bulk	S：Sn C：Cu A：Au	A：10ppm E：15ppm X：25ppm V：50ppm W:100ppm
Company	Type	Functional	Size	Tolerance	Resistance	Packaging	Termination	Special

▪ 尺寸(Dimension):

尺寸 dimension	 单位（unit）：mm				
型别 （Type）	L	W	H	T1	T2
0402	1.00±0.10	0.50±0.05	0.35±0.05	0.20±0.10	0.25±0.10
0603	1.60±0.10	0.80±0.10	0.45±0.10	0.25±0.15	0.20±0.15
0805	2.00±0.10	1.25±0.10	0.55±0.10	0.35±0.20	0.40±0.20
1206	3.10±0.10	1.60±0.10	0.55±0.10	0.40±0.20	0.45±0.20
1210	3.10±0.10	2.50±0.15	0.55±0.10	0.50±0.20	0.50±0.20
2010	5.00±0.20	2.50±0.15	0.55±0.10	0.60±0.25	0.60±0.25
2512	6.30±0.20	3.20±0.20	0.55±0.10	0.65±0.25	0.65±0.25

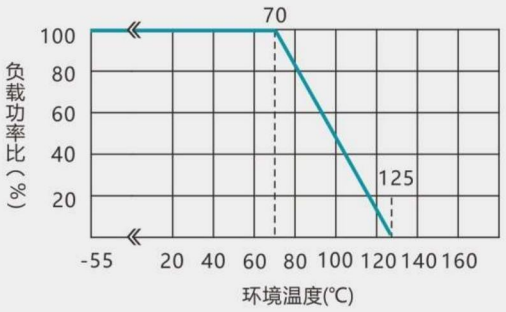
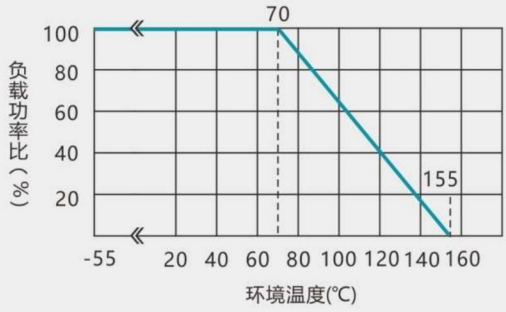
▪ 电阻结构 (Construction)





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	阻体层 Resistive layer	金属膜层 Metal film
3	铜电极 Cu plating layer	铜 Cu
4	银电极 Conductive layer	银 Ag
5	内保护层 （White≥39m Ω） (Green<39mΩ) Inner protective layer	玻璃/环氧树脂 Glass /Epoxy
6	外保护层 Outer Protective layer	环氧树脂 Epoxy
7	文字 Marking	环氧树脂 Epoxy
8	侧电极 Side conductive layer	镍铬合金 NiCr
8	镍电极 Ni plating layer	镍 Ni
9	锡电极 Sn plating layer	锡 Matte Tin

▪ 功率衰减曲线（Derating Curve）

使用温度范围	-55℃~+125℃ (0201)	-55℃~+155℃ (其他)
说明	周围温度若超过70℃至125℃之间，功率可照下图曲线予以修订	周围温度若超过70℃至155℃之间，功率可照下图曲线予以修订
功率衰减曲线图		

▪ 阻值范围（Resistance range）

型别 Type	阻值范围 Resistance Range	
	C（0.25%）	D（0.5%）；F（1%）；J 5%
0402	-	R05~10R
0603	-	R05~10R
0805	-	R039~10R
1206	-	R039~10R
1210	R470~10R	R10~10R
2010	R470~10R	R10~10R
2512	R470~10R	R10~10R

▪ 电性规格（Standard Electrical Specifications）

型别 Type	额定功率 (Power Rating at 70℃)	最高工作电流 Max Rated Current	最大过负荷电流 Max. Overload Current	T.C.R. (PPM/℃)	阻值范围 Resistance Range
0402	1/16W	1.12A	2.80A	±100	50mΩ≦R≦100mΩ
	1/8W	1.58A	3.54A		
	1/4W	2.24A	5.00A	± 50	100mΩ<R<10Ω
0603	1/10W	1.41A	3.54A	±100	50mΩ≦R≦100mΩ

	1/5W	2.00A	4.47A		
	2/5W	2.83A	6.32A	± 50	100mΩ<R<10Ω
0603	1/10W	1.41A	3.54A	±100	50mΩ≦R≦100mΩ
	1/5W	2.00A	4.47A		
	2/5W	2.83A	6.32A	± 50	100mΩ<R<10Ω
0805	1/8W	1.79A	4.48A	±150	39mΩ≦R<50mΩ
	1/4W	2.53A	5.66A	±100	50mΩ≦R≦100mΩ
	1/2W	3.58A	8.00A	±50	100mΩ<R≦10Ω
1206	1/4W	2.53A	6.33A	±150	39mΩ≦R<50mΩ
	1/2W	3.58A	8.00A		
	3/4W	4.39A	9.81A	±100	50mΩ≦R≦100mΩ
	1W	5.06A	11.32A	±50	100mΩ<R≦10Ω
1210	1/2W	3.58A	8.95A	±150	39mΩ≦R<50mΩ
	1W	5.06A	11.32A	±100	50mΩ≦R≦100mΩ
				±50	100mΩ<R≦10Ω
2010	3/4W	2.74A	6.85A	±150	39mΩ≦R<50mΩ
				±100	50mΩ≦R≦100mΩ
	1.5W	3.87A	8.66A	±50	100mΩ<R≦10Ω
2512	1W	3.16A	7.91A	±150	39mΩ≦R<50mΩ
	2W	4.47A	10.00A	±100	50mΩ≦R≦100mΩ
	3W	5.48A	12.25A	±50	100mΩ<R≦10Ω

▪ 性能 (Performance Specifications)

内容 Item	测试方法 Test Methods	测试条件 Test Conditions	规格 Specification
短时间过负荷 Short-time overload	JIS C 5201 4.13	加载 6.25 倍的额定功率，时间 5 秒后测量试验前后的阻值变化率。 Applied 6.25 times of rated power for 5 second. Measure the variation of resistance.	±(1.0% +0.05Ω)

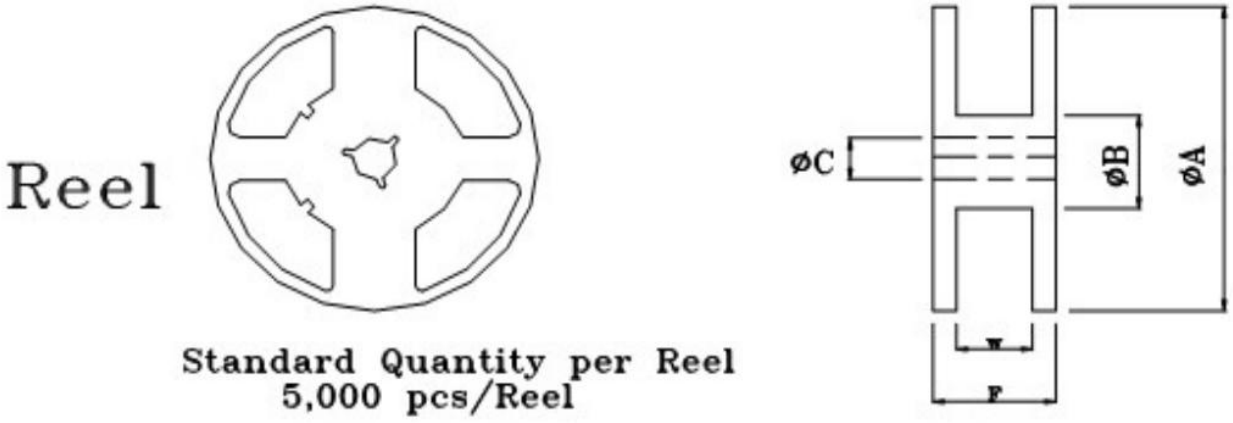
内容 Item	测试方法 Test Methods	测试条件 Test Conditions	规格 Specification
温度系数 Temperature Coefficient	JIS C 5201 4.8	TCR=（R-R0 ）/（t-t0）R0 ×10⁶（ppm） R0 电阻在室温下的阻值(resistance at room temperature) R 电阻在 125℃或-55℃下的阻值(resistance at 125℃ or -55℃) t0 室温(room temperature) t 测试温度（test temperature 125℃ or -55℃）	As Spec
焊锡性 Solderability	JIS C 5201 4.17	沾助焊剂后浸入锡炉，锡炉温度 245±5℃， 时间 3±0.5 秒。 Dip the terminal in a flux and then dip into a soldering bath at 245±5℃ for 3±0.5sec.	> 95%面积上锡 (>95% coverage)
抗焊锡热 Resist to soldering heat	MIL-STD-202 METHOD 210	沾助焊剂后浸入锡炉，锡炉温度 260±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 260±5℃ for 10±0.5sec. Measure the variation of resistance.	±(1.0% +0.05Ω)
绝缘电阻 Insulation resistance	JIS C 5201 4.6	电阻本体上加载绝缘耐压 60±5 秒后，测量绝缘阻抗。 Applied the dielectric withstanding voltage on the center of body for 60±5seconds. Then measure insulation resistance.	>10GΩ
绝缘耐压 Dielectric withstanding voltage	JIS C 5201 4.7	电阻本体上加载绝缘耐压 60±5 秒。 Applied the dielectric withstanding voltage on the center of body for60±5seconds.	无击穿、飞弧及可见机械性损伤 No evidence of flashover, mechanical damage arcing or insulation breakdown
端子弯曲 Terminal bending	AEC-Q200-005	电阻焊接在测试板上进行弯折,弯折保持时间 20±1 秒，1206(含) 以下的尺寸弯曲 5+0.2/0 mm; 1210 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 20±1s. the distance of bending is 5+0.2/0 mm for resistors which size no larger than 1206 or 2+0.2/0 mm which size larger than 1206. Measure the variation of resistance.	±(1.00% +0.05Ω)

内容 Item	测试方法 Test Methods	测试条件 Test Conditions	规格 Specification
温度循环 Temperature Cycling	JESD22 METHOD JA-104	-55℃~+ 155℃， 循环 1000 次，在每一个极限温度持续时间不超过 30 分钟，且温度转换时间不超过 1 分钟，试验结束 24±4 小时后进行测试. 1000 Cycles (-55℃ to +155℃) Measurement at 24±4 hours after test conclusion. 30min maximum dwell time at each temperature extreme. 1min. maximum transition time.	±(1.0% +0.10Ω)
耐湿特性 Humidity	MIL-STD-202 METHOD 103	加载 10%额定功率，85℃/85%RH, 持续通电 1000H,试验结束 24±4 小时后进行测试 1000 hours 85℃/85%RH. Note: Specified conditions: 10% of operating power. Measurement at 24±4 hours after test conclusion.	±(0.5% +0.05Ω)
负荷寿命 Load life	MIL-STD-202 METHOD 108	电阻放入恒温箱中，温度 125±2℃， ON TIME:1.5H， OFF TIME:0.5H，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 125±2℃ temperature, ON TIME:1.5H , OFF TIME:0.5H , and applied rated voltage for 1000 $^{+24}$/-0H. Measure the variation of resistance.	±(1.0% +0.10Ω)
温湿循环 Moisture resistance	MIL-STD-202 METHOD 106	25°C~65°C,90~100%RH, 2.5 小时; 65°C 90~100%RH, 3 小时 ; 65°C~25°C,80~100%RH,2.5 小时,10 个循环，试验结束 24±4 小时后进行测试. 25°C~65°C,90~100%RH, 2.5H; 65°C 90~100%RH, 3H; 65°C~25°C 80~100%RH, 2.5H, 10 cycles, Measurement at 24±4 hours after test conclusion.	±(1.0% +0.10Ω)
高温储存 High Temperature Exposure(Storage)	MIL-STD-202 METHOD 108	155℃下放置 1000h,不加载功率，试验结束 24±4 小时后进行测试. 1000 hrs. @ T=155℃. Unpowered. Measurement at 24±4 hours after test conclusion	±(1.0% +0.10Ω)

▪包装规格（Tapping Specification）

-卷盘尺寸（Reel dimension）

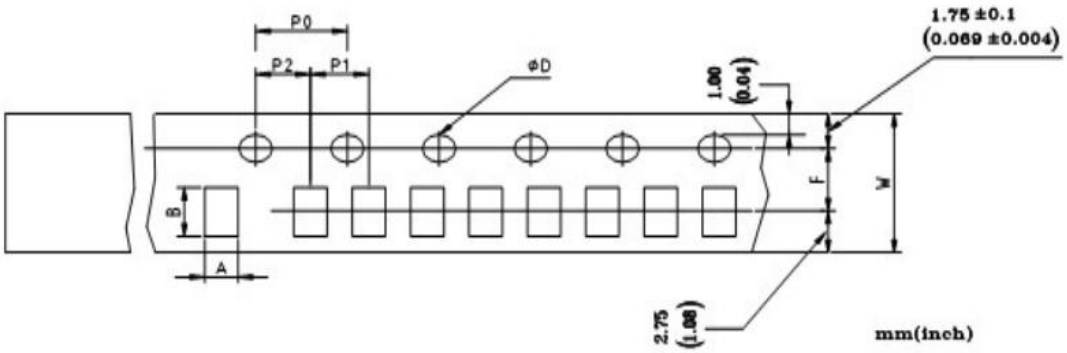
Type	Size		Unit	A	B	C	F	W
0402	7”	10K/Reel	mm	178±2.0	60.0±1.0	13.5±0.5	11.4±0.1	9.00±0.3
0402	13”	40K/50K Reel	mm	330±2.0	100.0±1.0	13.5±0.5	11.4±0.1	9.00±0.3
0603/0805/1206/1210	7”	5K/Reel	mm	178±2.0	60.0±1.0	13.5±0.5	11.4±0.1	9.00±0.3
0603/0805/1206	10”	10K/Reel	mm	254±2.0	100.0±1.0	13.5±0.5	11.4±0.1	9.00±0.3
0603/0805/1206	13”	20K/Reel	mm	330±2.0	100.0±1.0	13.5±0.5	11.4±0.1	9.00±0.3
2010/2512	7”	4K/Reel	mm	178±2.0	60.0±1.0	13.5±0.5	15.4±1.0	13.0±0.3



Standard Quantity per Reel
5,000 pcs/Reel

-包装尺寸（packing dimension）

-Tapping Specifications



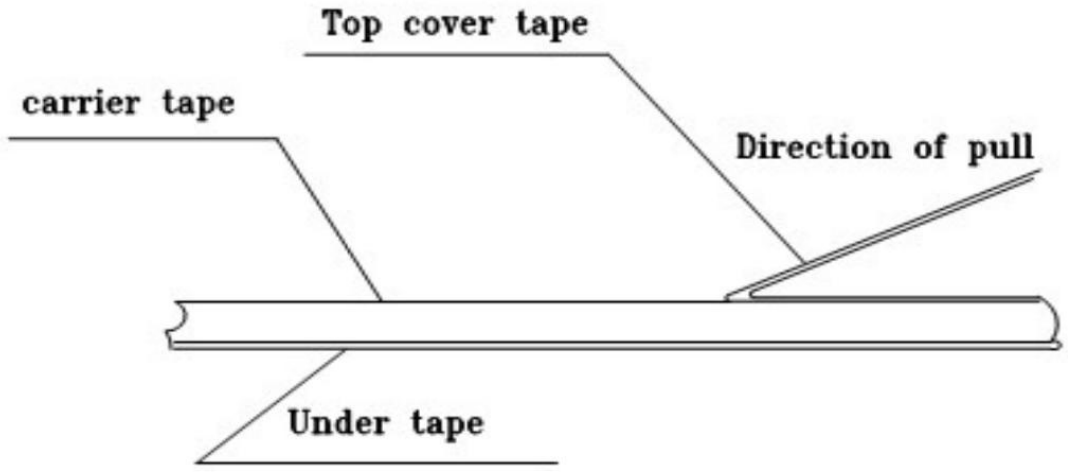
Unit: mm

Dimensions	A	B	D	F	P0	P1	P2	W
0402	0.65±0.10	1.15±0.10	1.50±0.1 0.0	3.50±0.05	4.00±0.10	2.00±0.10	2.00±0.05	8.00±0.20
0603	1.10±0.10	1.90±0.10	1.50±0.1 0.0	3.50±0.05	4.00±0.10	4.00±0.10	2.00±0.05	8.00±0.20
0805	1.65±0.20	2.40±0.20	1.50±0.1 0.0	3.50±0.05	4.00±0.10	4.00±0.10	2.00±0.05	8.00±0.20
1206	1.90±0.20	3.50±0.20	1.50±0.1 0.0	3.50±0.05	4.00±0.10	4.00±0.10	2.00±0.05	8.00±0.20
1210	2.80±0.20	3.50±0.20	1.50±0.1 0.0	3.50±0.05	4.00±0.10	4.00±0.10	2.00±0.05	8.00±0.20
2010	2.90±0.10	5.30±0.10	1.50±0.1 0.0	5.50±0.05	4.00±0.10	4.00±0.10	2.00±0.05	12.0±0.10
2512	3.40±0.10	6.60±0.10	1.50±0.1 0.0	5.50±0.05	4.00±0.10	4.00±0.10	2.00±0.05	12.0±0.10

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

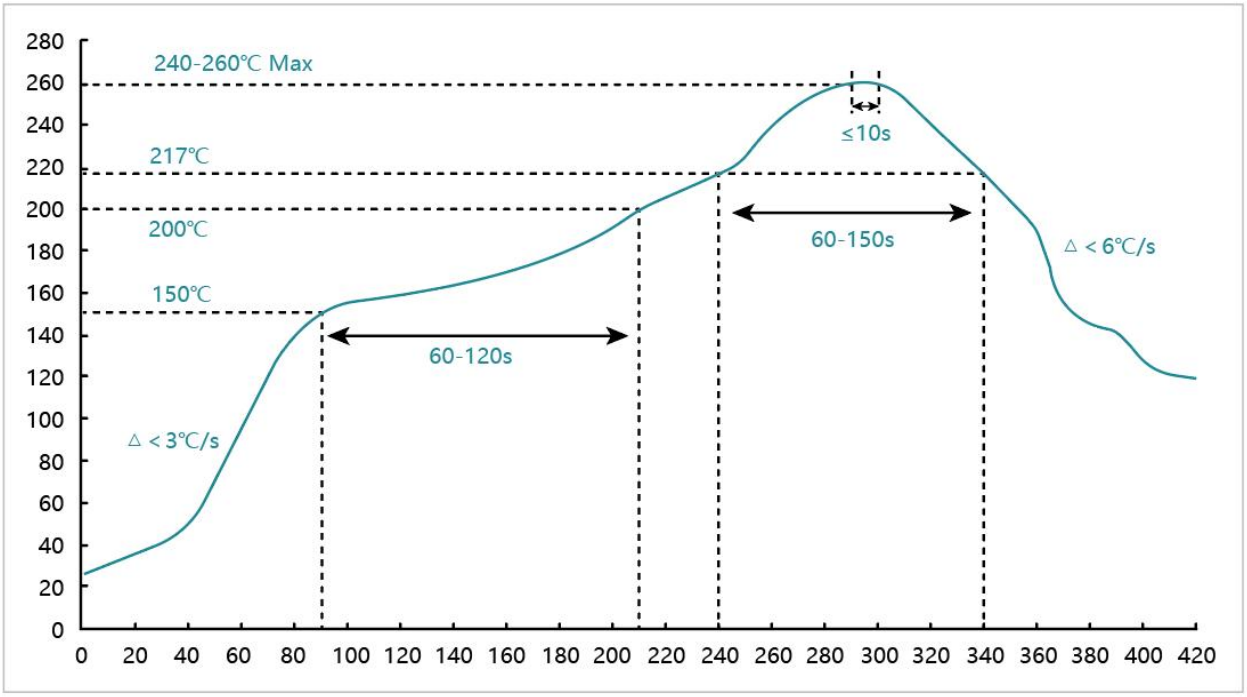
上胶带以 200mm/分钟的速度，沿 165∽180 度角的方向进行剥离，如下图所示。纸带的剥离力范围为 10g∽70g； 载带的剥离力范围为 30∽100g。

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)

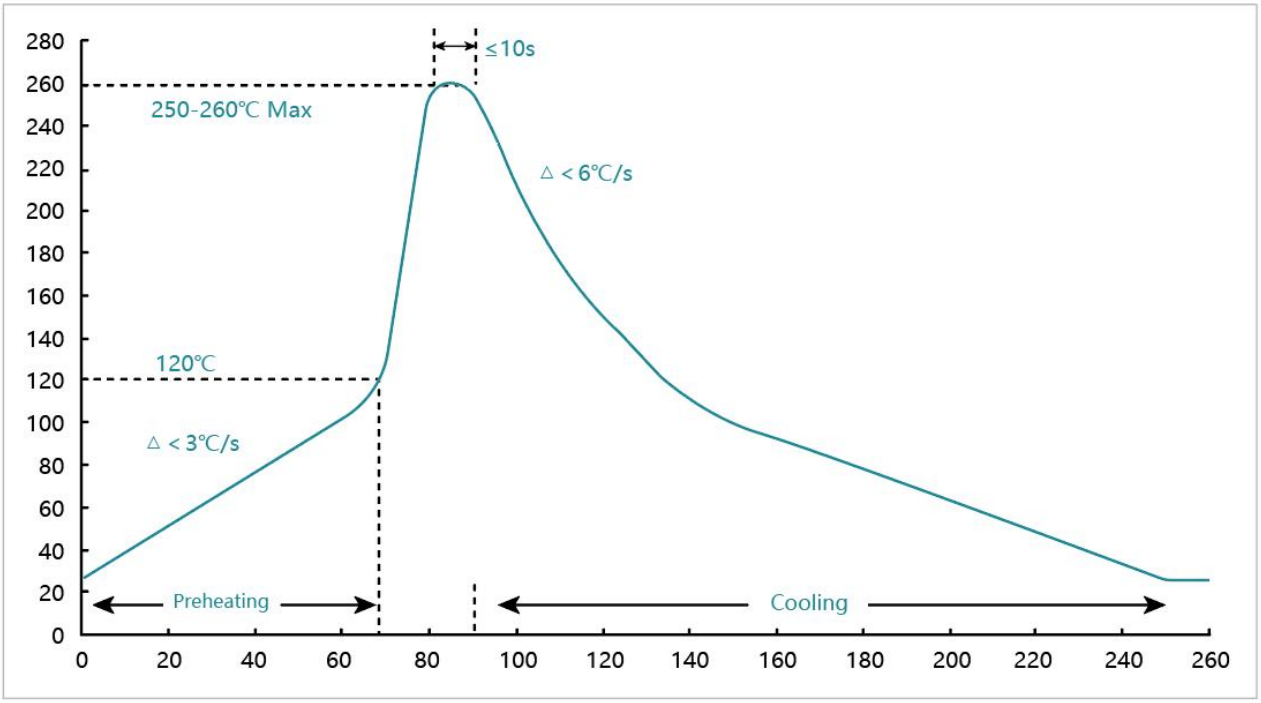


▪ 焊接（soldering）

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



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

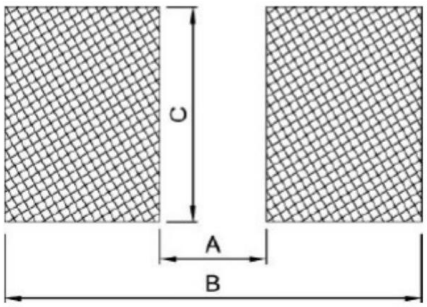


- 手工焊温度（hand soldering temperature)

烙铁温度 350±10℃ 3 秒之内，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

▪ 建议的焊盘尺寸 (Recommended pad dimensions)



单位： mm

Type	A	B	C
0402	0.50	1.60	0.70
0603	0.80	2.40	1.00
0805	1.30	2.90	1.45
1206	2.20	4.20	1.80
1210	2.00	4.40	2.70
2010	3.80	6.60	2.70
2512	4.90	8.10	3.40

修订履历 (Revision History)

版本 Version	修订日期 Revision Date	修订内容 Revision Description	版本确认 Version Checked
FJ-JS-3001-V1.0	2020.12.01	原版 The original version	魏效振 Xiaozhen Wei
FJ-JS-3001-V2.0	2025.12.11	版本及格式修订 Version and format revision	魏效振 Xiaozhen Wei