FOSAN TECHNOLOGY 富捷科技

Product Datasheet
产品规格说明书

FRE Series

Anti Electric Static Discharge Thick Film Chip Resistor

抗静电厚膜片式电阻器

安徽省富捷电子科技有限公司
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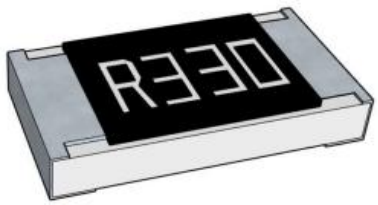


■ 特点 (Features)

- 体积小，重量轻 - Small size and light weight
- 可靠性，高质量 - Reliability, high quality
- 抗静电 - Anti-Electric Static Discharge
- 无卤，无铅 - Halogen free and lead free
- 符合 RoHS - RoHS compliant

■ 应用 (Application)

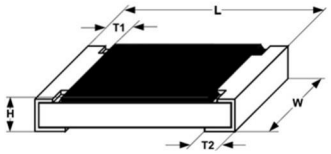
- 医疗器械 - Medical equipment
- 电源适配器 - Ac adapter
- 工业控制 - Industrial control

■ 产品料号 (Parts Number Explanation)

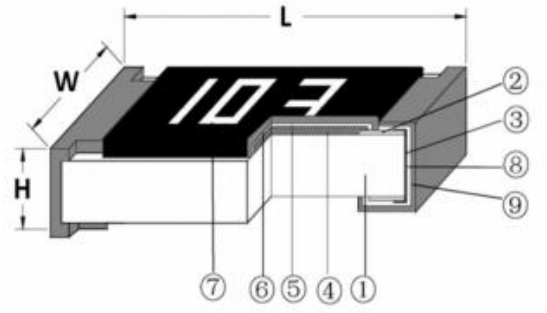
示例(Example)：FRE1206F2000TS

F 公司	R 产品别	E 功能别	1206 尺寸	F 公差	2000 字码	T 包装别	S 端电极	特殊
FOJAN	R:Resistor C:Capacitor L: Inductor D:Diode A:Audion	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 E: :Anti-Electric	0201 0402 0603 0805 1206 1210	B:±0.1% C:±0.25 % D:±0.5% F:±1% J:±5%	±5%:E24 3-digits+blank 102=1KΩ 1R0=1Ω ±1%&Below： E24+E96： 4-digits 1001=1KΩ 2000=200Ω 1R00=1Ω	T: 7 inch reel Q:10 inch reel R:13 inch reel B:Bulk	S：Sn C：Cu A：Au	Blank：none
Company	Type	Functional	Size	Tolerance	Resistance	Packaging	Termination	Special

▪ 尺寸(Dimension):

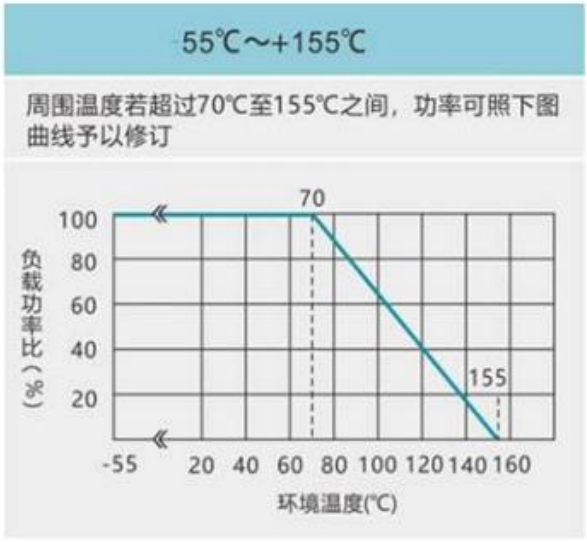
尺寸 dimension	 单位（unit）：mm				
型别 （Type）	L	W	H	T1	T2
0201	0.60 ±0.03	0.30 ±0.03	0.23±0.03	0.10±0.05	0.15±0.05
0402	1.00 ±0.05	0.50 ±0.05	0.35±0.05	0.20±0.10	0.25±0.10
0603	1.60 ±0.10	0.80 ±0.10	0.45 ±0.10	0.25 ±0.15	0.25±0.15
0805	2.00 ±0.10	1.25 ±0.10	0.50 ±0.10	0.35 ±0.20	0.40±0.20
1206	3.10 ±0.10	1.60 ±0.10	0.55 ±0.10	0.45 ±0.20	0.45 ±0.20
1210	3.10 ±0.10	2.50±0.15	0.55 ±0.10	0.45±0.15	0.50±0.20

▪ 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）

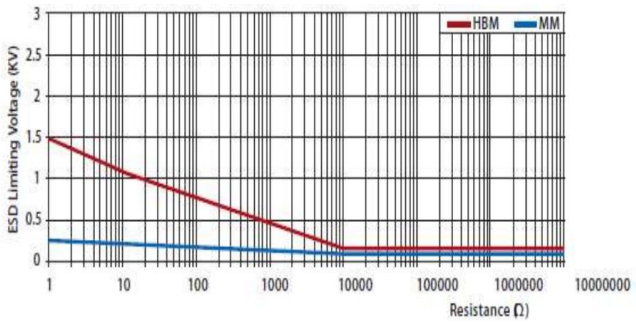


▪ 阻值范围（Resistance range）

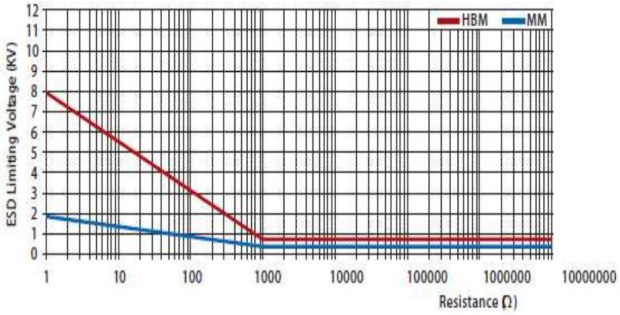
型别 Type	额定功率 (Power Rating at 70℃)	最高工作电压 Max. RCWV	最大过负荷电压 Max. Overload Voltage	绝缘耐压 Dielectronic withstanding Voltage	阻值范围 Resistance Range
0201	1/20W	25V	50V	--	1Ω~10MΩ
0402	1/16W	50V	100V	100V	
0603	1/4W	150V	200V	300V	
0805	2/5W	200V	400V	500V	
1206	2/3W	500V	1000V	500V	
1210	1/2W	800V	1500V	500V	

ESD 极限电压曲线（ESD Limiting Voltage Curve）

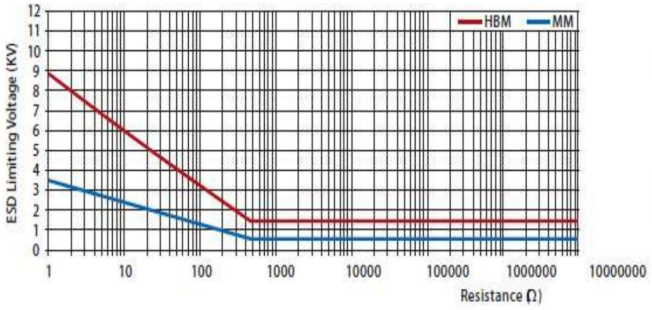
0201 ESD Limiting Voltage Curve



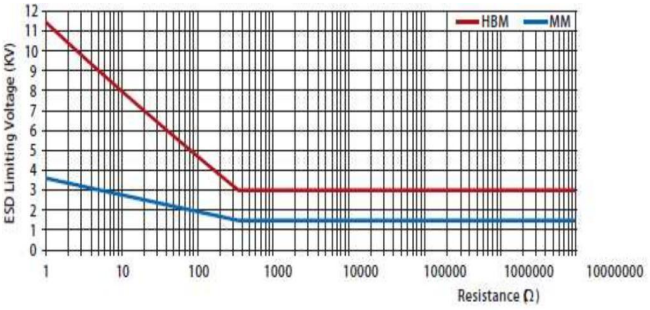
0402 ESD Limiting Voltage Curve



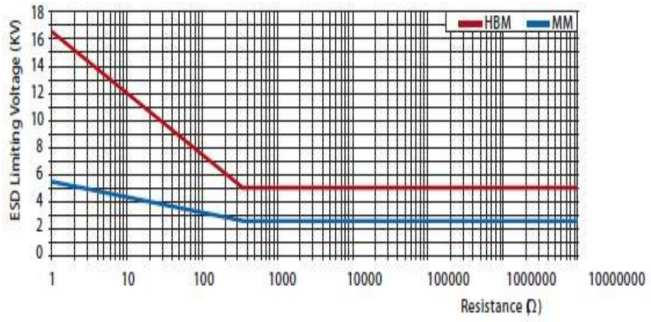
0603 ESD Limiting Voltage Curve



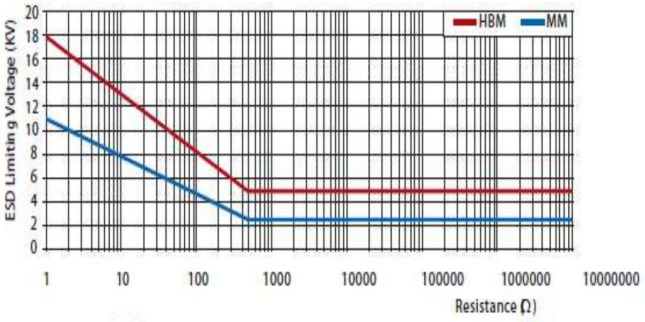
0805 ESD Limiting Voltage Curve



1206 ESD Limiting Voltage Curve

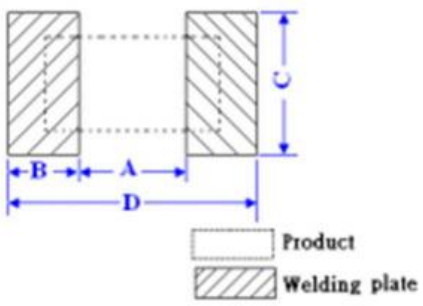


1210 ESD Limiting Voltage Curve



阻值量测点（Resistance measurement point）

型别 (Type)	A	B	C	D
0201	0.3±0.05	0.35±0.05	0.4±0.05	1.0±0.05
0402	0.5±0.05	0.5±0.05	0.6±0.05	1.5±0.05
0603	0.8±0.05	0.8±0.05	0.9±0.05	2.4±0.05
0805	1.0±0.1	1.0±0.1	1.4±0.1	3.0±0.1
1206	2.0±0.1	1.1±0.1	1.8±0.1	4.2±0.1
1210	2.0±0.1	1.1±0.1	2.9±0.1	4.2±0.1



Dimension:mm

▪ 性能 (Performance Specifications)

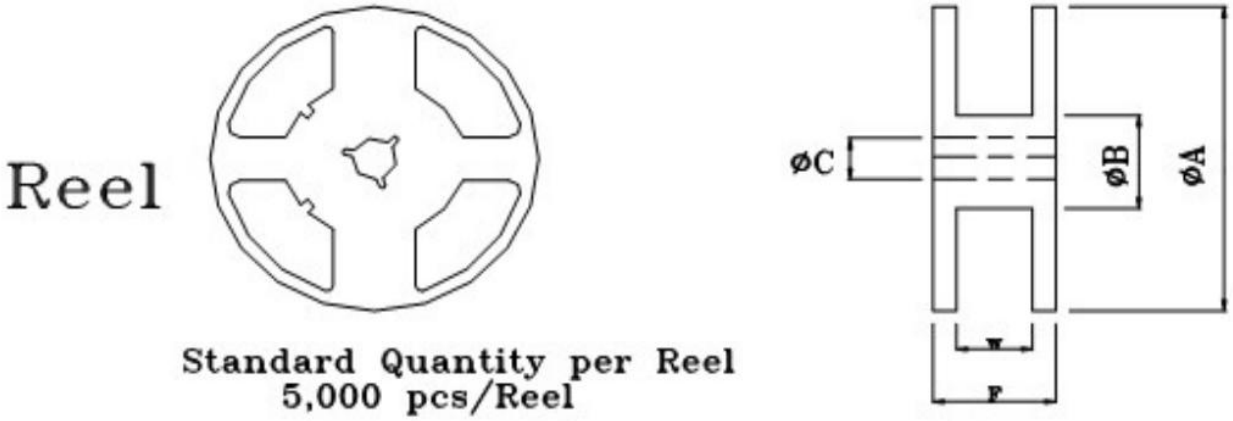
内容 Item	测试方法 Test Methods	测试条件 Test Conditions	规格 Specification
温度系数 Temperature Coefficient	JIS C 5201 4.8	TCR=（R-R0 ）/（t-t0）R0 ×10⁶（ppm） R0 电阻在室温下的阻值(resistance at room temperature) R 电阻在 125℃或-55℃下的阻值(resistance at 125℃ or -55℃) t0 室温(room temperature) t 测试温度（test temperature 125℃ or -55℃)	As Spec
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	JIS C 5201 4.33	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
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)
温度快速变化 Rapid temperature changes	JIS C 5201 4.19	电阻放入温度循环机中，T1 温度：-55 ± 3℃； T2 温度： 155 ±3℃./125 ±3℃， 放置 30 分钟，共 300 个循环。量测试验前后阻值变化率. Put specimen in a chamber which temperature can be T1： -55 ±3℃; T2： 155 ±3℃/125±3℃, 30min， repeated 300 cycles. Measure the variation of resistance.	±(1.00% +0.05Ω)
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 $^{+24}/_{-0}$H. 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)

▪包装规格（Tapping Specification）

-卷盘尺寸（Reel dimension）

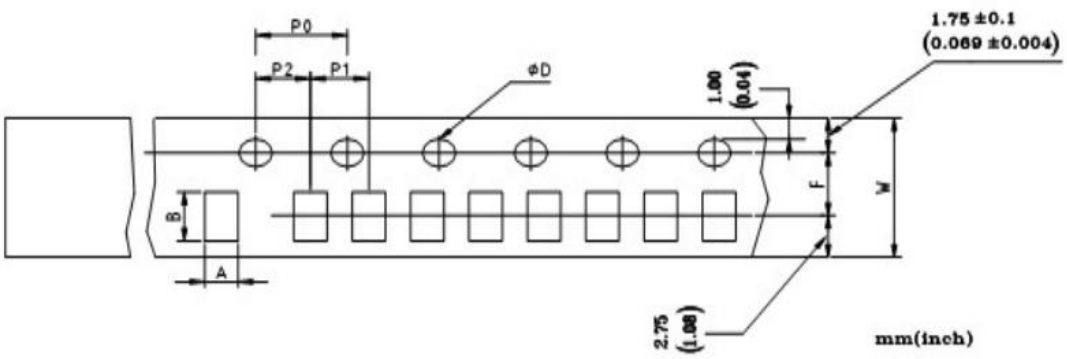
Type	Size		Unit	A	B	C	F	W
0201/0402	7”	10K/Reel	mm	178±2.0	60.0±1.0	13.5±0.5	11.4±0.1	9.00±0.3
0603/0805/1206/1210	7”	5K/Reel	mm	178±2.0	60.0±1.0	13.5±0.5	11.4±0.1	9.00±0.3
0603/0805/1206	10”	10K/Reel	mm	254±2.0	100.0±1.0	13.5±0.5	11.4±0.1	9.00±0.3
0603/0805/1206	13”	20K/Reel	mm	330±2.0	100.0±1.0	13.5±0.5	11.4±0.1	9.00±0.3



Standard Quantity per Reel
5,000 pcs/Reel

-包装尺寸（packing dimension）

-Tapping Specifications



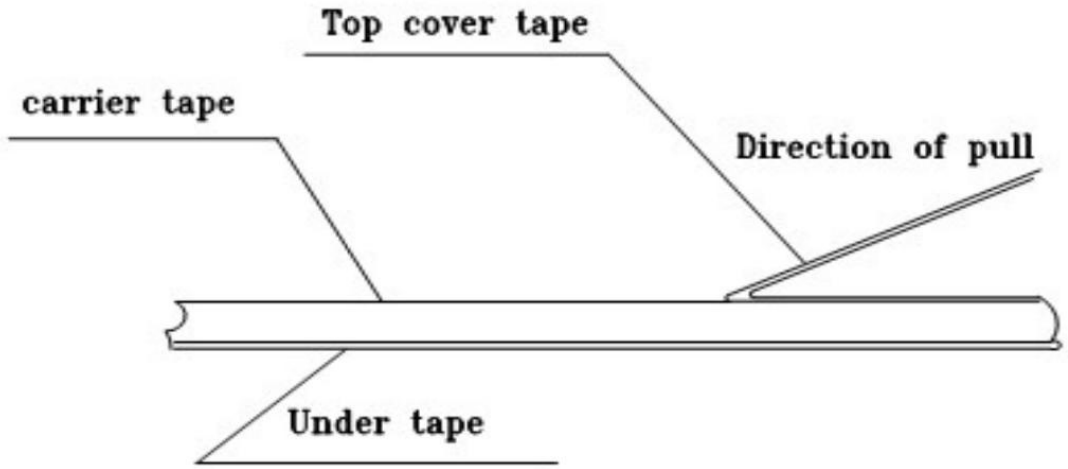
Unit: mm

Dimensions	A	B	D	F	P0	P1	P2	W
0201	0.40±0.05	0.70±0.05	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
0402	0.65±0.10	1.20±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

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

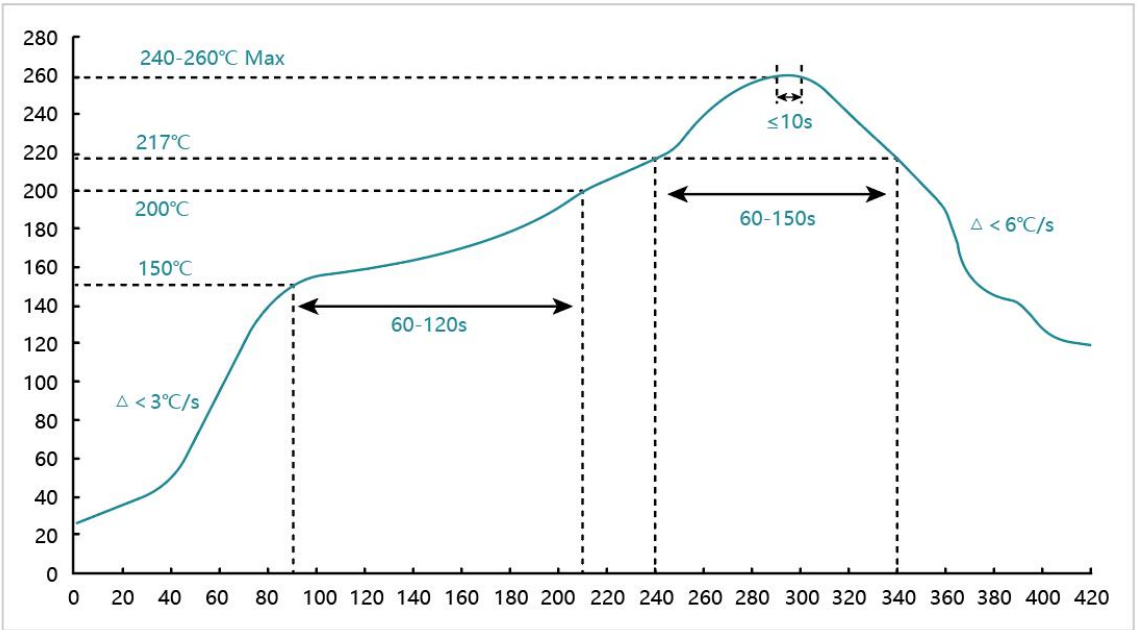
上胶带以 200mm/分钟的速度，沿 165∽180 度角的方向进行剥离，如下图所示。纸带的剥离力范围为 10g∽70g； 载带的剥离力范围为 30∽100g。

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)

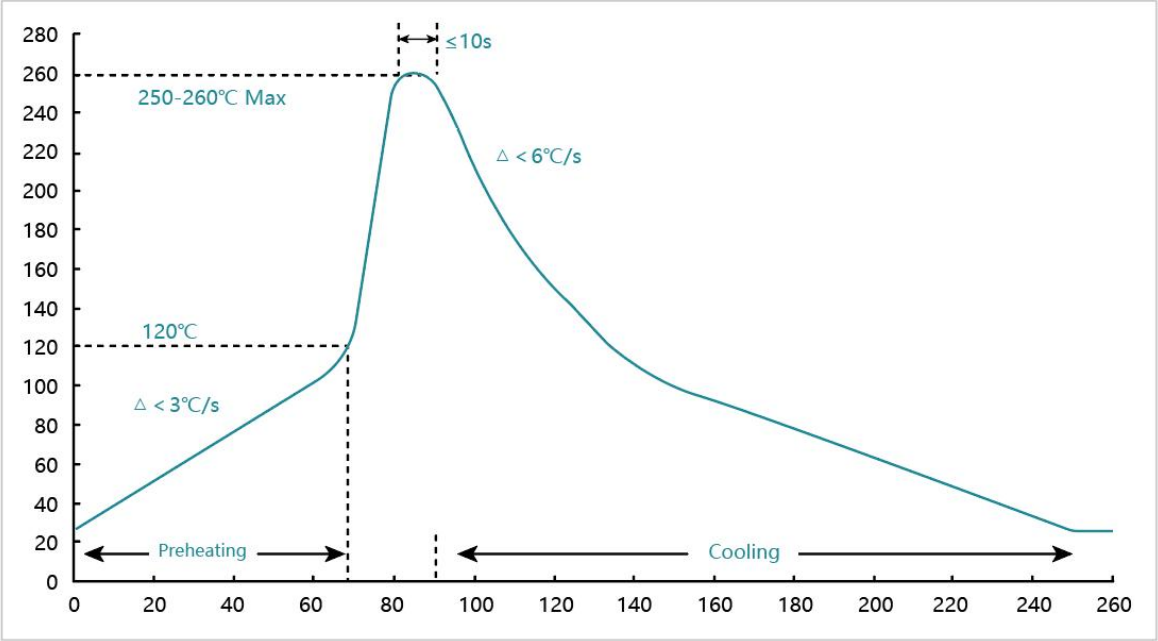


▪ 焊接 (soldering)

- 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

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	2025.12.30	版本及格式修订 Version and format revision	魏效振 Xiaozhen Wei