

## ■修订履历 Revision History

[illegible]

注：1.上述所提供之内容为产品规格说明。在产品未变更时，风华保有修改此内容不另行通知之所有权利，任何产品变更将会以 P C N 通知客户。

1.The content provided above is the produce specification, if the product is not changed, FENGHUA reserves all the right to modify this content without prior notice. any product change will be notified to the customer by PCN.

2.产品规格书中,同规格同容量同温度特性可交付的高电压型号规格,可以完全覆盖低压;同规格同容量同电压产品,温度特性 X7R 产品可覆盖 X7S,X7T,X6S,X5R (如 OP02B104K250NT 可以覆盖 OP02BS104K250NT,OP02BT104K250NT, OP02DS104K250NT, OP02X104K250NT)。规格书中就不再列出详细型号规格。

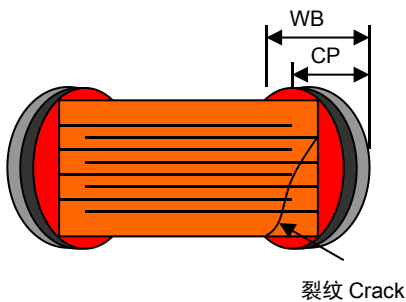
2. In the product specification, deliverable high-Voltage models with the same specifications, capacity, and temperature characteristics can fully cover the low-Voltage models. For products with the same specifications, capacity, and Voltage, X7R temperature characteristic products can cover X7S, X7T, X6S, and X5R (e.g., OP02B104K250NT can cover OP02BS104K250NT, OP02BT104K250NT, OP02DS104K250NT, OP02X104K250NT). Therefore, detailed model specifications will not be listed separately in the specification.

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## ■ 开路设计片式陶瓷电容器 Open-Mode Design MLCC

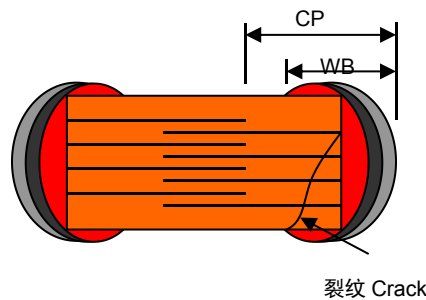
### ◆ 特征 Feature

- \* 叠层独石结构，具有高可靠性  
There is high reliability on monolithic structure of laminated layers.
- \* 具有优良的焊接与耐焊性能，适用于回流焊接与波峰焊接  
And its character of excellent soldering ability and soldering resistance ability is suitable for reflow soldering and peak soldering.
- \* 具有较高的容量且容量性能稳定  
It includes high and stable capacitance.
- \* 电路在电容器出现断裂失效时开放，可以对电路进行保护。  
Open circuit during capacitor cracking can protect the circuit.
- \* 此类型电容器的采用特殊的电极结构设计，如下图 2 和图 3 的内部结构。  
This type of capacitor adopts special inner electrode designs as picture2 and picture3 below
- \* 执行标准：GB/T 21041-2007 GB/T 21042-2007  
Executive Standard: GB/T 21041-2007 GB/T 21042-2007



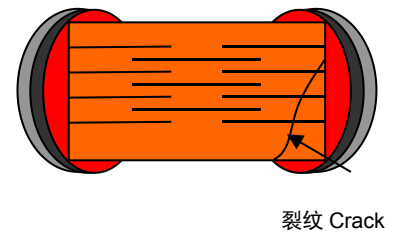
正常设计 (CP<WB), 开裂时电路泄漏电流  
Normal design (CP<WB), Circuit leakage current during cracking

图 1



开路设计 (CP>WB), 开裂时电路开放  
Open-mode design (CP>WB), the circuit is open when cracked

图 2



悬浮设计, 开裂时电路开放  
Suspension design, the circuit is open when cracked

图 3

## ◆ 型号表示法

### How To Order

OP	05	B	102	K	500	N	T			
OP: 开路设计 Open-Mode Design	介质种类 Dielectric Code		标称容量 Nominal Capacitance		额定电压 Rated Voltage 单位(unit): V		包装方式 Package Styles			
			表示方式 Express Method	实际值 Actual Value	表示方式 Express Method	实际值 Actual Value	表示方式 Express Method	包装方式 Package Styles		
			0R5	0.5	6R3	6.3		编带 7 寸 盘包装 Braided 7 inch disc packing		
			1R0	1.0	500	$50\times 10^0$	T			
尺寸规格 Size Code			102	$10\times 10^2$	201	$20\times 10^1$	D	编带 13 寸 盘包装 Braided 13 inch disc packing		
			注：头两位数字为有效数字，第三位数字为 0 的个数；R 为小数点。 Note: the first two digits are significant; third digit denotes number of zeros; R=decimal point.		注：头两位数字为有效数字，第三位数字为 0 的个数；R 为小数点。 Note: the first two digits are significant; third digit denotes number of zeros; R=decimal point.					
			代号 Code	尺寸规格 Size Code	EIA	长×宽 (L×W) mm				
			03	0603	0603	1.60×0.80				
			05	0805	0805	2.00×1.25				
			06	1206	1206	3.20×1.60				
			10	1210	1210	3.20×2.50				
			12	1812	1812	4.50×3.20				
			容量误差 Capacitance Tolerance					端头材料 Terminal Material Styles		
			代码 Code	误差 Tolerance		端头类别 Termination Styles		表示方式 Express Method		
			A	±0.05pF	A、B、C、D 级误差适用于容量 ≤ 10pF 的产品。 These Capacitance tolerance A, B, C, D are just applicable the capacitance that equals to or less than 10pF。	三层电镀端头 Nickel Barrier Termination		N		
			B	±0.10pF						
			C	±0.25pF						
			D	±0.50pF						
			F	±1%						
			G	±2%						
			J	±5%						
			K	±10%						
			M	±20%						

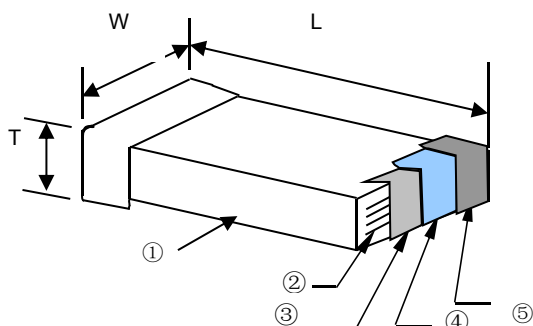
## ◆ 温度系数/特性

### Temperature Coefficient /Characteristics

介质种类 Dielectric	参考温度点 Reference Temperature Point	标称温度系数 Temperature Coefficient	工作温度范围 Operation Temperature Range
C0G	25°C	$0 \pm 30 \text{ ppm/}^\circ\text{C}$	-55°C ~ 125°C
X7R	25°C	$\pm 15\%$	-55°C ~ 125°C

◆ 产品结构

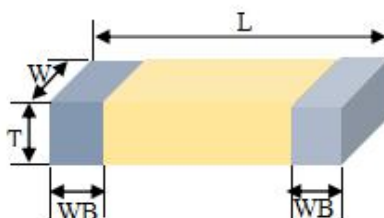
**Product Structure**



序号 NO	名称 Name
①	陶瓷介质 Ceramic dielectric
②	内电极 Inner electrode
③	外电极 Substrate electrode
④	镍层 Nickel Layer
⑤	锡层 Tin Layer

◆ 产品尺寸

**Product Dimensions**



型号 Type		尺寸 Dimensions (mm)				尺寸代码 Size code
英制表示 British expression	公制表示 Metric expression	L	W	T	WB	
0603	1608	1.60±0.10	0.80±0.10	0.80±0.10	0.35±0.20	DA
0805	2012	2.00±0.20	1.25±0.25	0.80±0.20	0.50±0.20	EA
				1.25±0.25		EB
1206	3216	3.20±0.30	1.60±0.30	0.80±0.20	0.60±0.30	FA
				1.25±0.25		FB
				1.60±0.30		FC
1210	3225	3.20±0.30	2.50±0.30	1.25±0.25	0.60±0.30	GA
				1.60±0.30		GB
				2.00±0.30		GC
1812	4532	4.50±0.40	3.20±0.30	1.25±0.25	0.60±0.30	IA
				1.60±0.30		IB
				2.00±0.30		IC

备注：1、产品具体厚度“T”查阅本承认书中“容量范围及其电压”。2、可根据客户的特殊要求设计符合客户需求的产品。

Note: 1、The specific thickness of the product can read "capacity range and Voltage" in this approval sheet.

2、We can design according to customer special requirements

**◆ 容量范围及电压**
**Capacitance Range and Voltage**

\*I 类电容器具体电压对应容量及厚度情况列表

A list of the specific Voltage-specific capacitors of Class I capacitors

材料 Dielectric	COG											
尺寸 Dimension	03 (1.6mm*0.8mm)					05 (2.0mm*1.25mm)						
容量/电压 Capacity/ Voltage	≤25V	50V	100V	200V	250V	≤25V	50V	100V	200V	250V	500V	1000V
0.1pF		DA										
0.3pF		DA					EA					
0.47pF		DA					EA					
1pF		DA					EA					
1.2pF		DA					EA					
1.5pF		DA					EA					
1.8pF		DA					EA					
2.0pF		DA					EA					
2.2pF		DA					EA					
2.7pF		DA					EA					
3.0pF		DA					EA					
3.3pF		DA					EA					
3.6pF		DA					EA					
3.9pF		DA					EA					
4.7pF		DA					EA					
5.0pF		DA					EA					
5.6pF		DA					EA					
6.8pF		DA					EA					EA
8.0pF		DA					EA					EA
8.2pF		DA					EA					EA
10pF		DA					EA	EA				EB
12pF		DA					EA	EA			EA	EB
15pF		DA					EA	EA			EA	EB
18pF		DA					EA	EA			EA	EB
22pF		DA	DA				EA	EA			EA	EB
27pF		DA	DA				EA	EA			EA	EB
33pF		DA	DA				EA	EA			EA	EB
39pF		DA	DA				EA	EA			EA	EB
47pF		DA	DA				EA	EA			EA	EB
56pF		DA	DA				EA	EA			EA	EB
68pF		DA	DA				EA	EA			EA	EB
100pF		DA	DA	DA			EA	EA	EA	EA	EA	EB
120pF		DA	DA	DA			EA	EA	EA	EA	EA	EB
150pF		DA	DA	DA			EA	EA	EA	EA	EA	EB
180pF		DA	DA	DA	DA		EA	EA	EA	EA	EB	EB
220pF		DA	DA	DA	DA		EA	EA	EA	EA	EB	
270pF		DA	DA	DA	DA		EA	EA	EA	EA	EB	
330pF		DA	DA	DA	DA		EA	EA	EA	EA	EB	
390pF		DA	DA	DA			EA	EA	EA	EA	EB	
470pF		DA	DA	DA			EA	EA	EA	EA	EB	
560pF		DA	DA				EA	EA	EA	EA		
680pF		DA	DA				EA	EA	EA	EA		
820pF		DA	DA				EA	EA	EA	EA		
1nF		DA	DA				EA	EA	EA	EA		
1.5nF							EA	EA				
1.8nF							EA	EA				
2.2nF							EA	EA				
3.3nF												
4.7nF												
6.8nF												
10nF												

代码 Code	DA	EA	EB
T	0.80±0.10	0.80±0.20	1.25±0.25

材料 Dielectric	C0G								
尺寸 Dimension	06 (3.2mm*1.6mm)								
容量/电压 Capacity/ Voltage	≤25V	50V	100V	200V	250V	500V	630V	1000V	2000V
0.3pF		FA				FA	FB	FB	
0.47pF		FA				FA	FB	FB	
1pF		FA				FA	FB	FB	
1.2pF		FA				FA	FB	FB	
1.5pF		FA				FA	FB	FB	
1.8pF		FA				FA	FB	FB	
2.0pF		FA				FA	FB	FB	FB
2.2pF		FA				FA	FB	FB	FB
2.7pF		FA				FA	FB	FB	FB
3.0pF		FA				FA	FB	FB	FB
3.3pF		FA				FA	FB	FB	FB
3.6pF		FA				FA	FB	FB	FB
3.9pF		FA				FA	FB	FB	FB
4.7pF		FA				FA	FB	FB	FB
5.0pF		FA				FA	FB	FB	FB
5.6pF		FA				FA	FB	FB	FB
6.8pF		FA				FB	FB	FB	FB
8.0pF		FA				FB	FB	FB	FB
8.2pF		FA				FB	FB	FB	FB
10pF		FA				FA	FB	FB	FB
12pF		FA				FA/FB*	FB	FB	FB
15pF		FA				FB	FB	FB	FB
18pF		FA				FB	FB	FB	FB
22pF		FA				FB	FB	FB	FB
27pF		FA		FA		FB	FB	FB	FB
33pF		FA		FA		FB	FB	FB	FB
39pF		FA		FA		FA	FB	FB	FB
47pF		FA		FA		FA/FB*	FB	FB	FB
56pF		FA		FA		FB	FB	FB	FB
68pF		FA		FA	FA	FB	FB	FB	FC
82pF		FA		FA	FA	FB	FB	FB	FC
100pF		FA		FA	FA	FA	FB	FB	FC
120pF		FA		FA	FA	FA	FB	FB	FC
150pF		FA		FA	FA	FA/FB*	FB	FB	FC
180pF		FA		FA	FA	FA/FB*	FB	FB	FC
220pF		FA		FA	FA	FA/FB*	FB	FB	FC
270pF		FA		FA	FA	FB	FB	FB	
330pF		FA	FA	FA	FA	FB	FB	FB	
390pF		FA	FA	FA	FA	FB	FB	FB	
470pF		FA	FA	FA	FA	FB	FB	FB	
560pF		FA	FA	FA	FA	FB	FB	FC	
680pF		FA	FA	FA	FA	FB/FC*	FB	FC	
820pF		FA	FA	FA	FA	FC	FB		
1nF		FA	FA	FA	FA	FC	FC		
1.2nF		FA	FA			FC			
1.5nF		FA	FA			FC			
1.8nF		FA	FA						
2.2nF		FA	FA						
2.7nF		FA							
3.3nF		FA							
4.7nF									
6.8nF									
10nF									

代码 Code	FA	FB	FC	备注 Note
T	0.80±0.20	1.25±0.25	1.60±0.30	加“*”为特殊品 Add “*” as special product.

材料 Dielectric	C0G												
尺寸 Dimension	10 (3.2mm*2.5mm)									12 (4.5mm*3.2mm)			
容量/电压 Capacity/ Voltage	≤25V	50V	100V	200V	250V	500V	630V	1000V	2000V	50V	100V	200V	250V
0.1pF													
0.3pF													
0.47pF													
1pF													
1.2pF													
1.5pF													
1.8pF													
2.0pF													
2.2pF													
2.7pF													
3.0pF													
3.3pF													
3.6pF													
3.9pF													
4.7pF													
5.0pF													
5.6pF													
6.8pF													
8.2pF													
10pF		GA		GA	GA	GA				IA			
12pF		GA		GA	GA	GA				IA			
15pF		GA		GA	GA	GA				IA			
18pF		GA		GA	GA	GA				IA			
22pF		GA		GA	GA	GA				IA			
27pF		GA		GA	GA	GA				IA			
33pF		GA		GA	GA	GA				IA			
39pF		GA		GA	GA	GA			GA	IA			
47pF		GA		GA	GA	GA			GA*/GB	IA			
56pF		GA		GA	GA	GA			GA*/GB	IA	IA		
68pF		GA		GA	GA	GA			GA*/GB	IA	IA		
82pF		GA		GA	GA	GA			GA*/GB	IA	IA		
100pF		GA	GA	GA	GA	GA	GA	GA*/GB	GB	IA	IA		
120pF		GA	GA	GA	GA	GA	GB	GC	GB	IA	IA		
150pF		GA	GA	GA	GA	GA	GB	GC	GB	IA	IA		
180pF		GA	GA	GA	GA	GA	GB	GC	GB	IA	IA		
220pF		GA	GA	GA	GA	GA	GB	GC	GB	IA	IA		IA
270pF		GA	GA	GA	GA	GA	GB	GC	GB	IA	IA		IA
330pF		GA	GA	GA	GA	GA	GB	GC	GC	IA	IA		IA
390pF		GA	GA	GA	GA	GA	GB	GC		IA	IA		IA
470pF		GA	GA	GA	GA	GA	GB	GB*/GC		IA	IA		IA
560pF		GA	GA	GA	GA	GA	GB	GB		IA	IA		IA
680pF		GA	GA	GA	GA	GA	GB	GB		IA	IA		IA
820pF		GA	GA	GA	GA	GA	GB	GB*/GC		IA	IA		IA
1nF		GA	GA	GA	GA	GB	GC	GB*/GC		IA	IA		IA
1.5nF		GA	GA	GA	GA	GB				IA	IA*/IB		IB
1.8nF		GA	GA	GA	GA	GB				IA	IA*/IB		IB
2.2nF		GA	GA							IA	IA*/IB		IB
2.7nF		GA	GA							IA	IA*/IB		IB
3.3nF		GA	GA							IA	IA*/IB		IB
3.9nF		GA	GA							IA	IA*/IB	IB	IB
4.7nF										IA	IA*/IB	IB	IB
5.6nF										IA			
6.8nF										IA			
8.2nF										IA			
10nF										IA			

代码 Code	GA	GB	GC	IA	IB	备注 Note
T	1.25±0.25	1.60±0.30	2.00±0.30	1.25±0.25	1.60±0.30	加“*”为特殊品 Add “*” as special product.



**\*II 类电容器具体电压对应容量及厚度情况列表**

A list of the specific Voltage-specific capacitors of Class I capacitors

材料 Dielectric	X7R							
尺寸 Dimension	03 (1.6mm*0.8mm)							
容量/电压 Capacity/ Voltage	≤6.3V	10V	16V	25V	50V	100V	200V	250V
100pF	DA	DA	DA	DA	DA	DA	DA	
120pF	DA	DA	DA	DA	DA	DA	DA	
150pF	DA	DA	DA	DA	DA	DA	DA	
180pF	DA	DA	DA	DA	DA	DA	DA	
220pF	DA	DA	DA	DA	DA	DA	DA	
270pF	DA	DA	DA	DA	DA	DA	DA	
330pF	DA	DA	DA	DA	DA	DA	DA	
390pF	DA	DA	DA	DA	DA	DA	DA	
470pF	DA	DA	DA	DA	DA	DA	DA	
560pF	DA	DA	DA	DA	DA	DA	DA	
680pF	DA	DA	DA	DA	DA	DA	DA	
820pF	DA	DA	DA	DA	DA	DA	DA	
1nF	DA	DA	DA	DA	DA	DA	DA	
1.2nF	DA	DA	DA	DA	DA	DA	DA	
1.5nF	DA	DA	DA	DA	DA	DA	DA	
1.8nF	DA	DA	DA	DA	DA	DA	DA	
2.2nF	DA	DA	DA	DA	DA	DA	DA	
2.7nF	DA	DA	DA	DA	DA	DA	DA	
3.3nF	DA	DA	DA	DA	DA	DA	DA	DA
3.9nF	DA	DA	DA	DA	DA	DA	DA	DA
4.7nF	DA	DA	DA	DA	DA	DA	DA	DA
5.6nF	DA	DA	DA	DA	DA	DA	DA	DA
6.8nF	DA	DA	DA	DA	DA	DA	DA	DA
8.2nF	DA	DA	DA	DA	DA	DA	DA	DA
10nF	DA	DA	DA	DA	DA	DA	DA	DA
12nF	DA	DA	DA	DA	DA	DA		
15nF	DA	DA	DA	DA	DA	DA		
18nF	DA	DA	DA	DA	DA			
22nF	DA	DA	DA	DA	DA			
27nF	DA	DA	DA	DA	DA			
33nF	DA	DA	DA	DA	DA			
39nF	DA	DA	DA	DA	DA			
47nF	DA	DA	DA	DA	DA			
56nF	DA	DA	DA	DA	DA			
68nF	DA	DA	DA	DA	DA			
82nF	DA	DA	DA	DA	DA			
100nF	DA	DA	DA	DA	DA			
120nF	DA							
150nF	DA							
180nF	DA							
220nF	DA							
270nF	DA							
330nF	DA							
390nF	DA							
470nF	DA							

代码 Code	DA
T	0.80±0.20

材料 Dielectric	X7R								
尺寸 Dimension	05 (2.0mm*1.25mm)								
容量/电压 Capacity/ Voltage	≤6.3V	10V	16V	25V	50V	100V	200V	250V	500V
200pF	EA	EA	EA	EA	EA	EA	EA	EB	EA
220pF	EA	EA	EA	EA	EA	EA	EA	EB	EA
270pF	EA	EA	EA	EA	EA	EA	EA	EB	EA
330pF	EA	EA	EA	EA	EA	EA	EA	EB	EA
390pF	EA	EA	EA	EA	EA	EA	EA	EB	EA
470pF	EA	EA	EA	EA	EA	EA	EA	EB	EA
560pF	EA	EA	EA	EA	EA	EA	EA	EB	EA
680pF	EA	EA	EA	EA	EA	EA	EA	EB	EA
820pF	EA	EA	EA	EA	EA	EA	EA	EB	EA
1nF	EA	EA	EA	EA	EA	EA	EA	EB	EB
1.2nF	EA	EA	EA	EA	EA	EA	EA	EB	EB
1.5nF	EA	EA	EA	EA	EA	EA	EA	EB	EB
1.8nF	EA	EA	EA	EA	EA	EA	EA	EB	EB
2.2nF	EA	EA	EA	EA	EA	EA	EA	EB	EB
2.7nF	EA	EA	EA	EA	EA	EA	EA	EB	EB
3.3nF	EA	EA	EA	EA	EA	EA	EA	EB	EB
3.9nF	EA	EA	EA	EA	EA	EA	EA	EB	EB
4.7nF	EA	EA	EA	EA	EA	EA	EA	EB	EB
5.6nF	EA	EA	EA	EA	EA	EA	EA	EB	EB
6.8nF	EA	EA	EA	EA	EA	EA	EA	EB	EB
8.2nF	EA	EA	EA	EA	EA	EA	EA	EB	EB
10nF	EA	EA	EA	EA	EA	EA	EB	EB	EB
12nF	EA	EA	EA	EA	EA	EA	EB	EB	
15nF	EA	EA	EA	EA	EA	EA	EB	EB	
18nF	EA	EA	EA	EA	EA	EA	EB	EB	
22nF	EA	EA	EA	EA	EA	EA	EB	EB	
27nF	EA	EA	EA	EA	EA	EA	EB	EB	
33nF	EA	EA	EA	EA	EA	EB	EB	EB	
39nF	EA	EA	EA	EA	EA	EB			
47nF	EA	EA	EA	EA	EA	EB			
56nF	EA	EA	EA	EA	EA	EB			
68nF	EA	EA	EA	EA	EA	EB			
82nF	EA	EA	EA	EA	EA	EB			
100nF	EA	EA	EA	EA	EA	EB			
220nF	EA	EA	EA						
270nF	EA	EA							
330nF	EA	EA							
390nF	EA	EA							
470nF	EB	EB							
560nF	EB								
680nF	EB								
820nF	EB								
1μF	EB								

代码 Code	EA	EB
T	0.80±0.20	1.25±0.25

材料 Dielectric	X7R										
尺寸 Dimension	06 (3.2mm*1.6mm)										
容量/电压 Capacity/ Voltage	≤10V	16V	25V	50V	100V	200V	250V	500V	630V	1000V	2000V
200pF	FA	FA	FA	FA	FA	FA	FA	FA	FA	FB	FB
220pF	FA	FA	FA	FA	FA	FA	FA	FA	FA	FA*/FB	FB
270pF	FA	FA	FA	FA	FA	FA	FA	FA	FA	FB	FB
330pF	FA	FA	FA	FA	FA	FA	FA	FA	FA	FA*/FB	FB
390pF	FA	FA	FA	FA	FA	FA	FA	FA	FA	FB	FB
470pF	FA	FA	FA	FA	FA	FA	FA	FA	FA	FA*/FB	FB
560pF	FA	FA	FA	FA	FA	FA	FA	FA	FA	FB	FB
680pF	FA	FA	FA	FA	FA	FA	FA	FA	FA	FA*/FB	FB
820pF	FA	FA	FA	FA	FA	FA	FA	FA	FA	FB	FB
1nF	FA	FA	FA	FA	FA	FA	FA	FA	FA	FA*/FB	FB
1.2nF	FA	FA	FA	FA	FA	FA	FA	FA	FA	FB	FB
1.5nF	FA	FA	FA	FA	FA	FA	FA	FA	FA	FB	FB
1.8nF	FA	FA	FA	FA	FA	FA	FA	FA	FA	FB	FB
2.2nF	FA	FA	FA	FA	FA	FA	FA	FA	FA	FB	FB
2.7nF	FA	FA	FA	FA	FA	FA	FA	FA*/FB	FA*/FB	FB	FB
3.3nF	FA	FA	FA	FA	FA	FA	FA	FA*/FB	FA*/FB	FB	FB
4.7nF	FA	FA	FA	FA	FA	FA	FA	FB	FB	FB	
5.6nF	FA	FA	FA	FA	FA	FA	FA	FB	FB	FB	
6.8nF	FA	FA	FA	FA	FA	FA	FA	FB	FB	FB*/FC	
8.2nF	FA	FA	FA	FA	FA	FA	FA	FB	FB	FB	
10nF	FA	FA	FA	FA	FA	FA	FA	FB	FB	FB	
12nF	FA	FA	FA	FA	FA	FA	FA	FB	FB		
15nF	FA	FA	FA	FA	FA	FA	FA	FB	FB		
18nF	FA	FA	FA	FA	FA	FA	FA	FB	FB		
22nF	FA	FA	FA	FA	FA	FA/FB*	FA/FB*	FB	FB		
33nF	FA	FA	FA	FA	FA/FB*	FB	FB				
47nF	FA	FA	FA	FA	FA/FB*	FB	FB				
56nF	FA	FA	FA	FA							
68nF	FA	FA	FA	FA							
82nF	FA	FA	FA	FA							
100nF	FA	FA	FA	FA							
220nF	FA	FA	FA	FA							
330nF	FB	FB	FB	FB							
470nF	FB	FB	FB	FB							
680nF	FB	FB	FB	FB							
820nF	FB	FB	FB	FB							
1μF	FC	FC	FC	FC							
1.2μ	FC										
1.5μ	FC										
1.8μ	FC										
2.2μF	FC										
3.3μF	FC										
4.7μF	FC										
5.6μF	FC										
6.8μF	FC										
8.2μF	FC										
10μF	FC										
12μF	FC										
15 μF	FC										
18 μF	FC										
22 μF	FC										

代码 Code	FA	FB	FC	备注 Note
T	0.80±0.20	1.25±0.25	1.60±0.30	加“*”为特殊品 Add “*” as special product.

材料 Dielectric	X7R									
尺寸 Dimension	10 (3.2mm*2.5mm)									
容量/电压 Capacity/ Voltage	≤16V	25V	50V	100V	200V	250V	500V	630V	1000V	2000V
220pF	GA	GA	GA						GA	GA
270pF	GA	GA	GA						GA	GB
330pF	GA	GA	GA						GA	GB
390pF	GA	GA	GA						GA	GB
470pF	GA	GA	GA						GA	GB
560pF	GA	GA	GA						GA	GB
680pF	GA	GA	GA					GA	GA	GB
820pF	GA	GA	GA					GA	GA	GB
1nF	GA	GA	GA			GA		GA	GA	GB
1.2nF	GA	GA	GA			GA		GA	GA	GB
1.5nF	GA	GA	GA			GA		GA	GA	GB
1.8nF	GA	GA	GA			GA		GA	GA	GB
2.2nF	GA	GA	GA			GA		GA	GA	GB
2.7nF	GA	GA	GA			GA		GA	GA	GB
3.3nF	GA	GA	GA			GA	GA	GA	GA	GA
3.9nF	GA	GA	GA			GA	GA	GA	GA	GA
4.7nF	GA	GA	GA	GA		GA	GA	GA	GA/GB*	GB
5.6nF	GA	GA	GA	GA		GA	GA	GA	GA/GB*	GB
6.8nF	GA	GA	GA	GA		GA	GA	GA	GA*/GB	GB
8.2nF	GA	GA	GA	GA		GA	GA	GA	GA*/GB	GB
10nF	GA	GA	GA	GA		GA	GA	GA	GA*/GB	GB
12nF	GA	GA	GA	GA		GA	GA	GA	GB	
15nF	GA	GA	GA	GA		GA	GA	GA	GB	
18nF	GA	GA	GA	GA		GA	GA	GA	GB	
22nF	GA	GA	GA	GA		GA	GA	GA	GB	
27nF	GA	GA	GA	GA		GA	GA	GA		
33nF	GA	GA	GA	GA		GA	GA/GB*	GA/GB		
39nF	GA	GA	GA	GA		GA	GA/GB*	GA/GB*		
47nF	GA	GA	GA	GA	GA	GA				
56nF	GA	GA	GA	GA						
68nF	GA	GA	GA	GA						
82nF	GA	GA	GA	GA						
100nF	GA	GA	GA	GA						
120nF	GA	GA	GA	GA						
150nF	GA	GA	GA	GA						
180nF	GA	GA	GA	GA						
220nF	GB	GB	GB	GB						
270nF	GC	GC	GC							
330nF	GC	GC	GC							
390nF	GC	GC	GC							
470nF	GC	GC	GC							
560nF	GC	GC	GC							
680nF	GC	GC	GC							
820nF	GC	GC	GC							
1μF	GC	GC	GC							
1.2μF	GC	GC	GC							
1.5μF	GC	GC	GC							
1.8μF	GC	GC	GC							
2.2μF	GC	GC	GC							
3.3μF	GC	GC	GC							
4.7μF	GC	GC	GC							

代码 Code	GA	GB	GC	备注 Note
T	1.25±0.25	1.60±0.30	2.00±0.30	加“*”为特殊品 Add “*” as special product.

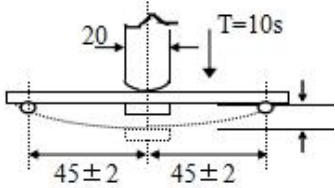
材料 Dielectric	X7R									
尺寸 Dimension	12 (4.5mm*3.2mm)									
容量/电压 Capacity/ Voltage	100V	200V	250V	500V	630V	1000V	2000V	3000V	4000V	5000V
470pF						IB	IB	IB	IB	
560pF						IB	IB	IB	IB	
680pF			IB			IB	IB	IB	IB	
820pF			IB			IB	IB	IB	IB	
1nF		IB	IB			IB	IB	IB	IB	
1.2nF		IB	IB			IB	IB	IB	IB	
1.5nF		IB	IB			IB	IB	IB	IB	
1.8nF		IB	IB	IB		IB	IB	IB	IB	
2.2nF		IB	IB	IB		IB	IB	IB/IC*	IB	IB/IC*
2.7nF		IB	IB	IB		IB	IB	IB	IB	
3.3nF		IB	IB	IB		IB	IB	IB	IB	
4.7nF		IB	IB	IB		IB	IB	IB		
5.6nF		IB	IB	IB		IB	IB	IB/ID*		
6.8nF		IB	IB	IB		IB	IB	IB/ID*		
8.2nF		IB	IB	IB		IB	IB	IB/ID*		
10nF	IA	IB	IB	IB		IB	IB	ID		
12nF	IA	IB	IB	IB		IB	IB			
15nF	IA	IB	IB	IB		IB	IB			
18nF	IA	IB	IB	IB		IB	ID			
22nF	IA	IB	IB	IB	IB	IB				
27nF	IA	IB	IB	IA	IB	IB				
33nF	IA	IB	IB	IA	IB	IB				
47nF	IA	IB	IB	IB	IB	IB				
56nF	IA	IB	IB	IB	IB	ID				
68nF	IA	IB	IB	IB	IB					
82nF	IA	IB	IB	IB	IB					
100nF	IA	IB	IB	IB	IB					
120nF	IA	IB	IB	IB	IC					
150nF	IA	IB	IB	IC	IC					
180nF	IA	IB	IB	IC	IC					
220nF	IA	IB/IC*	IB/IC*							
270nF	IA	IB/IC*	IB/IC*							
330nF	IA	IC	IC							
390nF	IA	IC	ID							
470nF	IA	IC*/ID	IC*/ID							
560nF	IA									
680nF	IC									
820nF	IC									
1μF	IC									

代码 Code	I	IB	IC	ID	备注 Note
T	1.25±0.25	1.60±0.30	2.00±0.30	2.50±0.30	加“*”为特殊品 Add "*" as special product.

## ◆ 可靠性测试方法 Reliability Test Methods

二类介质规格测量前需去老化处理：测试温度：25℃±3℃，测试湿度：<70%RH。电容器在150℃热处理1小时，放置48h后进行测量。  
The second type of medium specification needs to be aged before measuring the capacity: test temperature: 25℃±3℃, test humidity: <70%RH. The capacitors were heat treated at 150℃ for 1 hour and measured after 48 hours of placement.

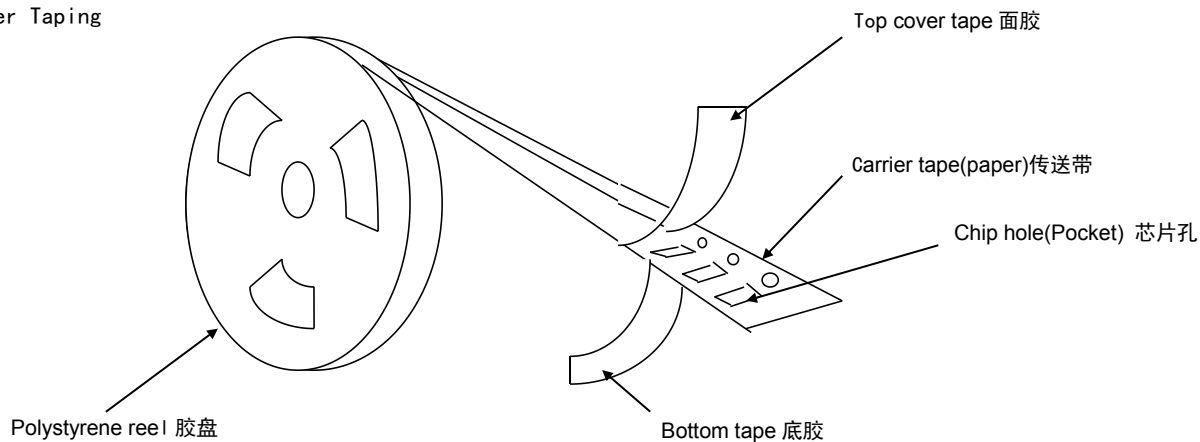
项目 Item	技术规格 Technical Specification			测试方法 Test Method and Remarks																
容量 Capacitance	C0G		应符合指定的误差级别 Should be within the specified tolerance.	标称容量 Capacitance	测试频率 Measuring Frequency	测试电压 Measuring Voltage														
				≤1000pF	1MHZ±10%	1.0±0.2Vrms														
	> 1000pF	测试温度： 25℃±3℃                      测试频率： 1KHZ±10% 测试电压： 1.0±0.2Vrms Test Temperature: 25℃±3℃                      est Frequency: 1KHZ±10% Test Voltage: 1.0±0.2Vrms																		
	X7R		应符合指定的误差级别 Should be within the specified tolerance.																	
绝缘电阻 (IR) Insulation Resistance	C0G		C≤10 nF, Ri≥50000MΩ C>10 nF, Ri•CR≥500S	测试电压：额定电压（最高 500V）      测试时间： 60±5 秒 测试湿度： ≤75%                      测试温度： 25℃±3℃ 测试充放电电流： ≤50mA Measuring Voltage: Rated Voltage（Max 500V） Duration: 60±5s                      Test Humidity: ≤75% Test Temperature: 25℃±3℃                      Test Current: ≤50mA																
	X7R		C≤25 nF, Ri≥10000MΩ C>25 nF, Ri•CR>100S																	
损耗角正切 (DF, tanδ) Dissipation Factor	C0G		DF	标称容量 Capacitance	测试频率 Measuring Frequency	测试电压 Measuring Voltage														
			≤1/（400+20C）	C<30pF	1MHZ±10%	1.0±0.2Vrms														
			≤0.1%	C≥30pF																
	X7R	<50V	≤5%	测试频率： 1KHZ±10%                      测试电压： 1.0±0.2Vrms Test Frequency: 1KHZ±10%Test Voltage: 1.0±0.2Vrms																
		≥50V	≤2.5%																	
温度循环 Temperature Cycle	ΔC/C		C0G	初始测量 Initial Measurement 循环次数： 5 次，一个循环分以下 4 步： Cycling Times: 5 times, 1 cycle, 4 steps:																
				<table><tr><td>阶段 Step</td><td>温度（Temperature）（℃）</td><td>时间（Time）</td></tr><tr><td>1</td><td>下限温度(Low- category temp.): -55</td><td>30min</td></tr><tr><td>2</td><td>常温 (Normal temp.): +20℃</td><td>2~3min</td></tr><tr><td>3</td><td>上限温度 (Up- category temp.): +125</td><td>30min</td></tr><tr><td>4</td><td>常温 (Normal temp.): +20℃</td><td>2~3min</td></tr></table>			阶段 Step	温度（Temperature）（℃）	时间（Time）	1	下限温度(Low- category temp.): -55	30min	2	常温 (Normal temp.): +20℃	2~3min	3	上限温度 (Up- category temp.): +125	30min	4	常温 (Normal temp.): +20℃
			阶段 Step	温度（Temperature）（℃）	时间（Time）															
	1	下限温度(Low- category temp.): -55	30min																	
	2	常温 (Normal temp.): +20℃	2~3min																	
3	上限温度 (Up- category temp.): +125	30min																		
4	常温 (Normal temp.): +20℃	2~3min																		
X7R	-15% ~+15%																			
外观：无可见损伤 Appearance: No visible damage			试验后放置（恢复）时间： 24±2h Recovery time after test: 24±2h																	
耐焊接热 Resistance to Soldering Heat	ΔC/C		C0G	将电容在 100~200℃的温度下预热 60~120 秒。 浸锡温度： 265±5℃ 浸锡时间： 10±1s 然后取出溶剂清洗干净，在 10 倍以上的显微镜底下观察。 放置时间： 24±2 小时 放置条件：室温 Preheating conditions: 100 to 200℃; 60~120S. Solder Temperature: 265±5℃ Duration: 10±1s Clean the capacitor with solvent and examine it with a 10X(min.) microscope. Recovery Time: 24±2h Recovery condition: Room temperature																
				X7R	±15%															
	DF	同初始标准 Same to initial value.																		
	IR	同初始标准 Same to initial value.																		
	外观：无可见损伤 上锡率： ≥95% Appearance: No visible damage.At least 95% of the terminal electrode is covered by new solder.																			
可焊性 Solderability	上锡率应大于 95% 外观：无可见损伤。 At least 95% of the terminal electrode is covered by new solder. Visual Appearance: No visible damage.			将电容在 80~120℃的温度下预热 10~30 秒。 Preheating conditions:80 to 120℃; 10~30s.																
				无铅焊料： 浸锡温度： 245±5℃ 浸锡时间： 2±0.5s Lead-free soldering Solder Temperature: 245±5℃ Duration: 2±0.5s																

项目 Item	技术规格 Technical Specification			测试方法 Test Method and Remarks		
端头结合强度 Termination Adhesion	外观无可见损伤 No visible damage.			施加的力: 5N Applied Force: 5N	时间: 10±1S Duration: 10±1S	
抗弯曲强度 Resistance to Flexure of Substrate (Bending Strength)	外观: 无可见损伤. Appearance: No visible damage.  ΔC/C: I 类: ≤±5%或±0. 5pF , 取两者中最大者 II 类: ≤±10%  Class I : ≤±5%或±0. 5pF, whichever is larger. Class II : ≤±10%			试验基板: PCB      弯曲深度: 1mm 施压速度: 1mm/sec.      单位: mm 应在弯曲状态下进行测量。  Test Board: PCB      Warp: 1mm Speed: 1mm/sec.      Unit: mm The measurement should be made with the board in the bending position. 		
介质耐电强度 (DWV) Dielectric Withstanding Voltage	不应有介质被击穿或损伤 No breakdown or damage.			Ur<100V 测量电压: , I 类: 300% Ur      II 类: 250% Ur 时间: 1~5 秒    充/放电电流: 不应超过 50mA Measuring Voltage: I class:300% Ur    II class :250% Ur Duration: 1~5s    Charge/ Discharge Current: 50mA max.		
				100V≤Ur <500V 施加额定电压的 200%, 5 秒, 最大电流不超过 50mA Force 200% Rated Voltage for 5 second. Max.current should not exceed 50 mA.		
				500V≤Ur ≤1000V 施加额定电压的 150%, 5 秒, 最大电流不超过 50mA Force 150% Rated Voltage for 5 second. Max.current should not exceed 50 mA.		
				1000V < Ur ≤2000V 施加额定电压的 120%, 5 秒, 最大电流不超过 50mA Force 120% Rated Voltage for 5 seconds. Max.current should not exceed 50 mA.		
				2000V < Ur ≤5000V 施加额定电压的 120%, 5 秒, 最大电流不超过 10mA Force 120% Rated Voltage for 5 seconds. Max.current should not exceed 10 mA.		
耐湿负荷 Humidity load	ΔC/C	C0G	±7.5%或±0.75pF,取两者之中较大者 ±7.5% or ±0.75pF, whichever is larger.			温度: 40±2℃      湿度: 90~95%RH 电压: 额定电压      时间: 500 小时 放置条件: 室温 放置时间: 24±2h 小时 ※ Pretreatment (Class II) : After preheating at 140℃~150℃ for 1h±10min, place at room temperature for 24±2h. Temperature: 40±2℃ Humidity: 90~95%RH Voltage: Rated Voltage Duration: 500h Recovery conditions: Room temperature Recovery Time: :24h±2h
		X7R	≤±12.5%			
	DF	≤2 倍初始标准 Not more than twice of initial value.				
	IR	C0G	Ri≥2500MΩ或 Ri•Cr≥25S 取两者之中较小者. Ri≥2500MΩ or Ri•Cr≥25S whichever is smaller.			
		X7R	Ri≥1000MΩ或 Ri•Cr≥10S 取两者之中较小者. Ri≥1000MΩ or Ri•Cr≥10S whichever is smaller.			
外观: 无损伤 Appearance: No visible damage.						
寿命试验 Life Test	ΔC/ C	C0G	≤±3%或±0. 3pF, 取两者之中较大者 ≤±3%或±0.3pF, whichever is larger.			温度: 125℃ (C0G、X7R)、时间: 1000 小时 充电电流: 不应超过 50mA. 电压: 一、低压产品 (<100V) 2 倍额定工作电压。 二、中高压产品: 100V≤额定电压≤200V: 1.5 倍工作电压 200V<额定电压≤500V: 1.3 倍工作电压 500V<额定电压: 1.2 倍工作电压 放置条件: 室温    放置时间: 24±2h 小时 Temperature:125℃ (C0G、X7R) 、Time:1000h Charge/Discharge:Current:50mA max. Applied Voltage:1.Low Voltage products (< 100V) 2 times rated operating Voltage 2. Medium and high pressure products: 100V≤Rated Voltage≤200V: 1.5 Multiple 200V<Rated Voltages≤500V: 1.3 Multiple 500V<Rated Voltage: 1.2 Multiple Recovery Conditions: Room Temperature Recovery Time: :24h±2h
		X7R	-20% ~ +20%			
	DF	≤2 倍初始标准 Not more than twice of initial value.				
	IR	C0G	Ri≥4000MΩ或 Ri•Cr≥40S 取两者之中较小者. Ri≥4000MΩ or Ri•Cr≥40S whichever is smaller.			
		X7R	Ri≥2000MΩ或 Ri•Cr≥50S 取两者之中较小者. Ri≥2000MΩ or Ri•Cr≥50S whichever is smaller.			
外观: 无损伤 Appearance: No visible damage.						

◆ 包装 Package

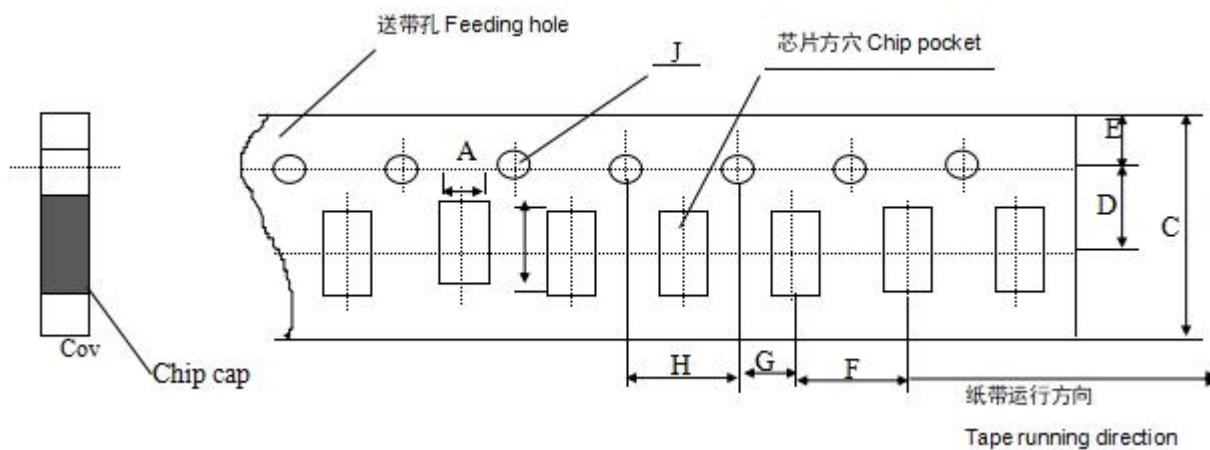
\* 纸带卷盘结构

Paper Taping



\* 适合 'OP03, OP05, OP06' 常规尺寸产品的纸带尺寸

Dimensions of paper taping for OP03, OP05, OP06 types.



Unit: mm

代号Code 纸带规格 paper size	A	B	C	D*	E	F	G*	H	J	T
OP03	1.10 ±0.10	1.90 ±0.10	8.00 ±0.10	3.50 ±0.05	1.75 ±0.10	4.00 ±0.10	2.00 ±0.10	4.00 ±0.10	1.55 -0/+0.05	1.10 Max
OP05	1.45 ±0.15	2.30 ±0.15	8.0 ±0.15	3.50 ±0.05	1.75 ±0.10	4.00 ±0.10	2.00 ±0.10	4.00 ±0.10	1.55 -0/+0.05	1.10 Max
OP06	1.80 ±0.20	3.40 ±0.20	8.00 ±0.20	3.50 ±0.05	1.75 ±0.10	4.00 ±0.10	2.00 ±0.10	4.00 ±0.10	1.55 -0/+0.05	1.10 Max

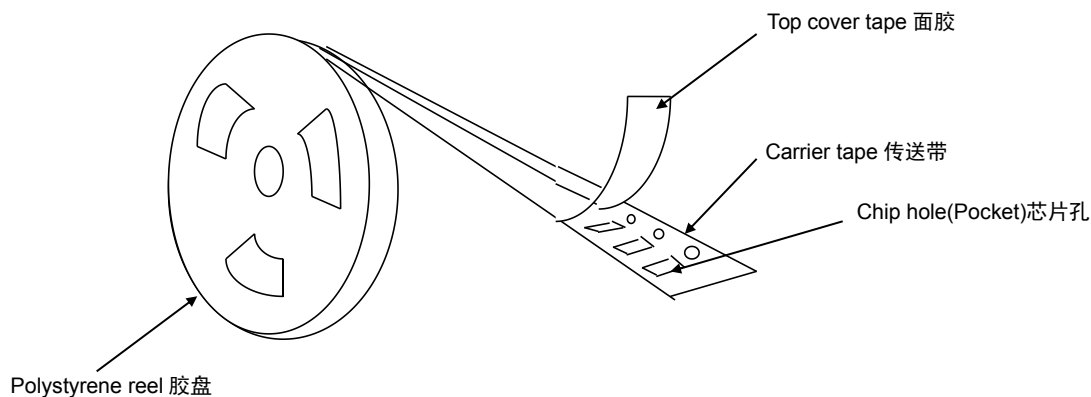
注意: \*表示此处对尺寸的要求非常精确。

Note: The place with "\*" means where needs exactly dimensions.



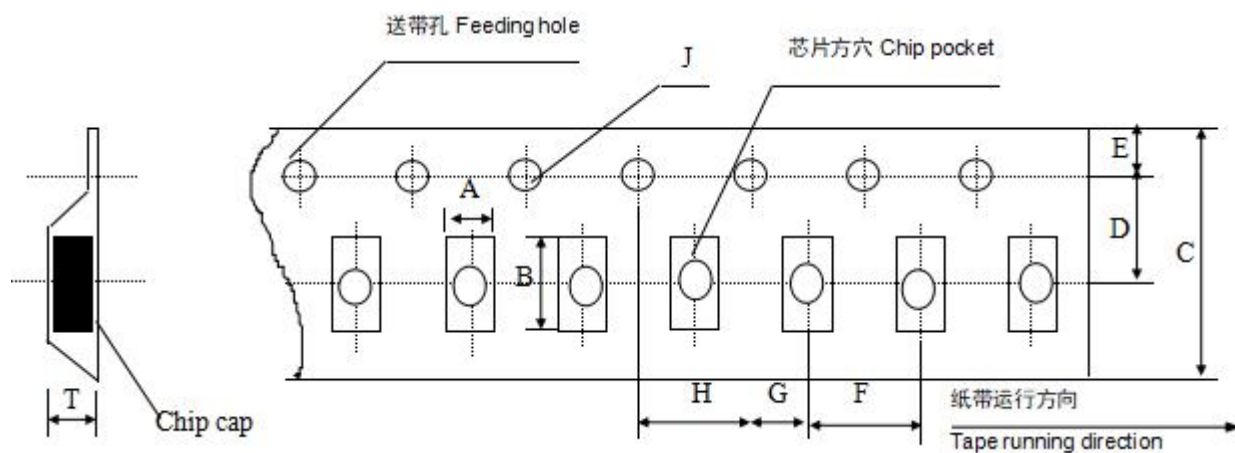
\* 塑胶卷盘结构

Embossed taping



\* 塑胶带尺寸结构(适合‘0805~1812’ 型产品)

Dimensions of embossed taping for 0805~1812 type



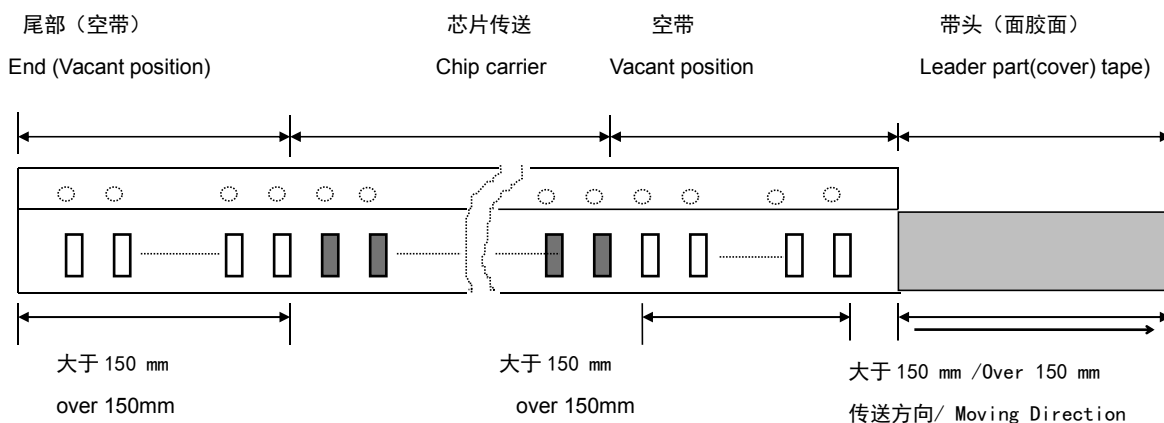
代号 Code 规格 Tape size	A	B	C	D*	E	F	G*	H	J	T
OP05	1.55 ± 0.20	2.35 ± 0.20	8.00 ± 0.20	3.50 ± 0.05	1.75 ± 0.10	4.00 ± 0.10	2.00 ± 0.10	4.00 ± 0.10	1.55 -0/+0.05	1.50 Max
OP06	1.95 ± 0.20	3.60 ± 0.20	8.00 ± 0.20	3.50 ± 0.05	1.75 ± 0.10	4.00 ± 0.10	2.00 ± 0.10	4.00 ± 0.1	1.55 -0/+0.05	1.85 Max
OP10	2.70 ± 0.10	3.42 ± 0.10	8.00 ± 0.10	3.50 ± 0.05	1.75 ± 0.10	4.00 ± 0.10	2.00 ± 0.05	4.00 ± 0.10	1.55 -0/+0.05	3.2 Max
OP12	3.66 ± 0.10	4.95 ± 0.10	12.00 ± 0.10	5.50 ± 0.05	1.75 ± 0.10	8.00 ± 0.10	2.00 ± 0.05	4.00 ± 0.10	1.55 -0/+0.05	4.0 Max

备注：\*表示此处对尺寸的要求非常精确。

Note: The place with “\*” means where needs exactly dimension

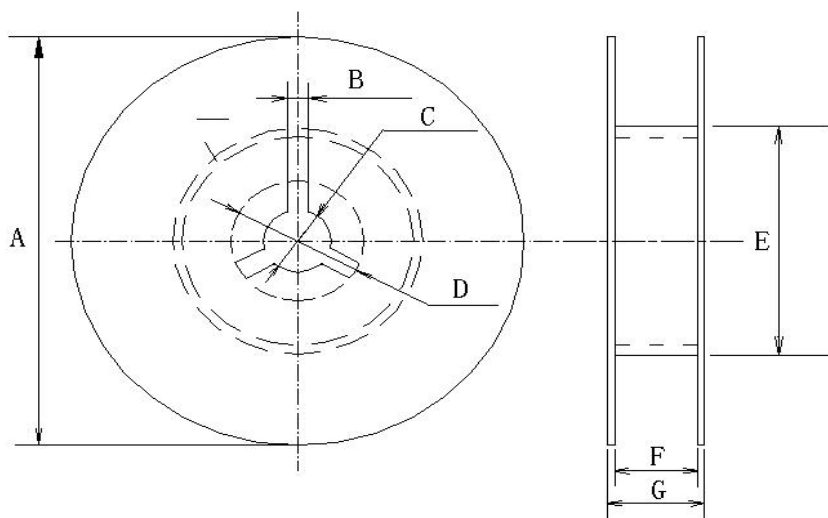
\* 传送带的前后结构

Structure of leader part and end part of the carrier paper



\* 卷盘尺寸

Reel dimensions (unit: mm)

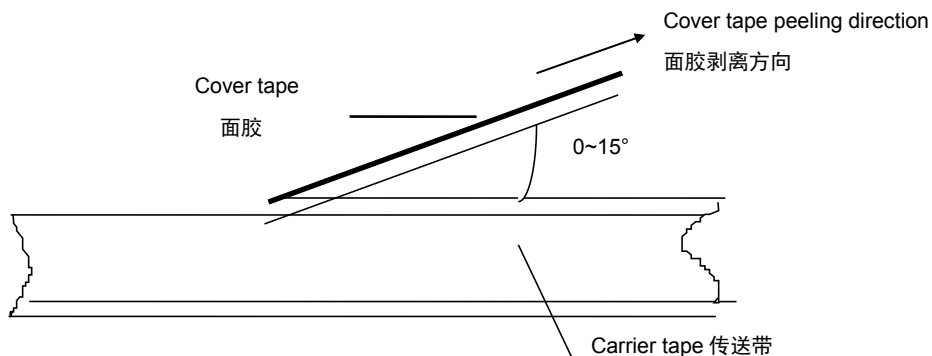


卷盘型号 Reel Code	A	B	C	D	E	F	G
7'REEL	$\phi 178 \pm 2.0$	3.0	$\phi 13 \pm 0.5$	$\phi 21 \pm 0.8$	$\phi 50$ 或更大 $\phi 50$ or more	$10.0 \pm 1.5$	12max

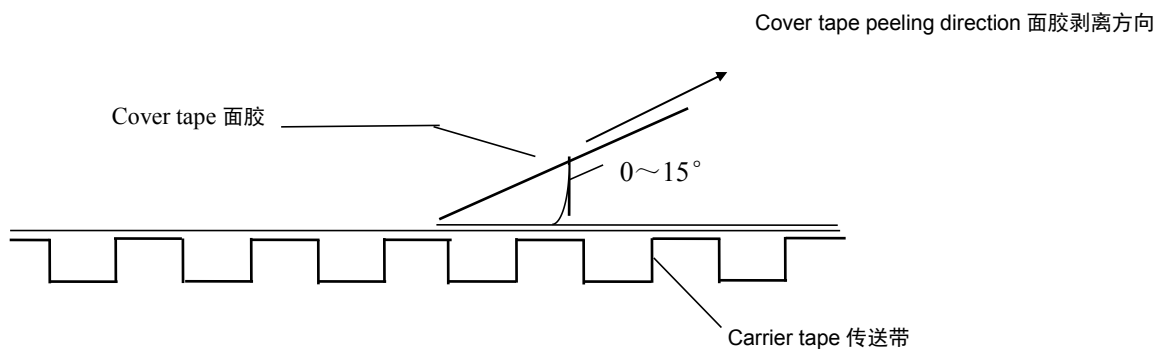
\* 关于卷带的说明：面胶剥离强度

Taping specification: top tape peeling strength

\* 纸带 Paper Taping



\* 塑料胶盘 Embossed Taping



标准: 0.1N<剥离强度<0.7N

Standard: 0.1N < peeling strength < 0.7N

在剥离时, 纸带不能有纸碎, 也不能粘在底、面胶上。

No paper dirty remains on the scotch when peeling, and sticks to top and bottom tape.

\* 包装数量 Packing Quantity

尺寸代码 SizeCode	厚度 (T) Thickness	7 寸纸带卷盘 (PT)	7 寸胶带卷盘 (ET)	13 寸纸带卷盘 (PT)	13 寸胶带卷盘 (ET)
0603	0.80±0.10	4000	-----	15000	-----
0805	0.80±0.20	4000	-----	15000	-----
	1.25±0.25	-----	T≤1.35mm 3000 T>1.35mm 2000	-----	10000
1206	0.80±0.20	4000	-----	15000	-----
	1.25±0.25	-----	T≤1.35mm 3000 T>1.35mm 2000	-----	10000
	1.60±0.30	-----	2000	-----	8000
1210	1.25±0.25	-----	2000	-----	8000
	1.60±0.30	-----	1000	-----	
	2.00±0.30	-----	1000	-----	
1812	1.25±0.25	-----	1000	-----	3000
	1.60±0.30	-----	500	-----	
	2.00±0.30	-----	500	-----	

注意: 包装的形式和数量可根据客户的要求来定。

Note: We can choose packing style and quantity can be according to the customer's requirement.

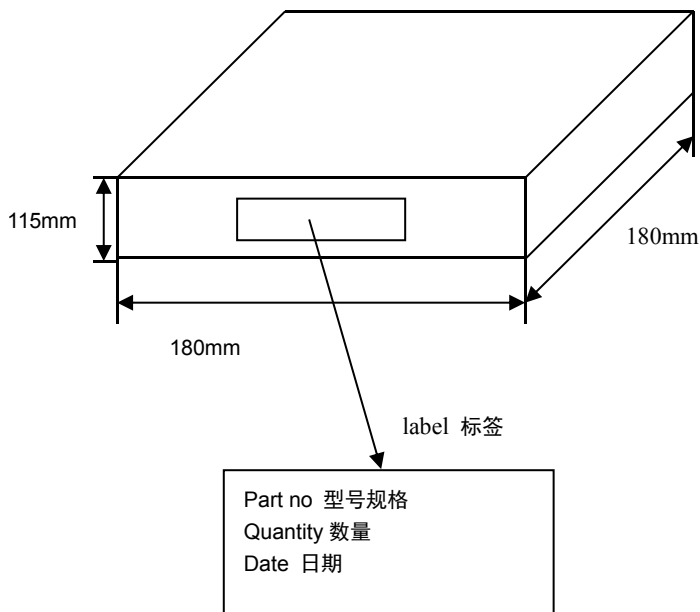
**\* 外包装**

**Outer packing**

小包装 The first package

Quantity: 10 reels

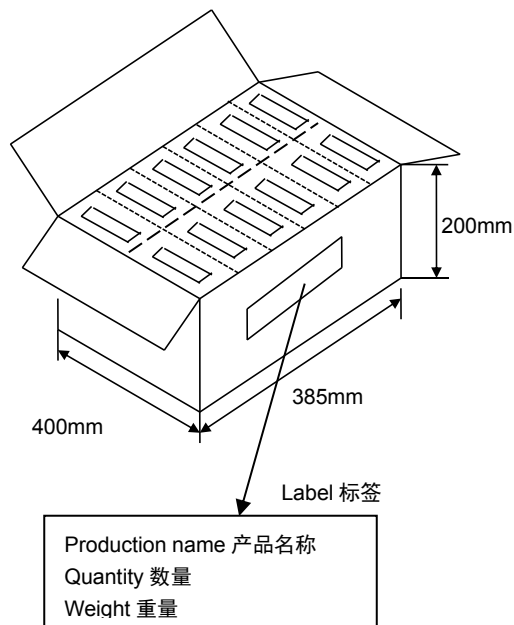
数量: 10 卷



大包装 The second package

Quantity: 6 cases

数量: 6 盒



**◆ 储存注意事项**

\*MLCC 的储存条件: 相对湿度为 20~70%, 储存温度为 5~40℃, 建议温度低于 30℃。

\*MLCC 的性能可能会受到储存条件的影响, 交货后请立即使用。高温高湿条件、长期储存可能会导致包装材料变质、产品端头电极氧化。如自交付后已超过六个月, 使用前检查包装、外观等。如果交付后超过一年, 在使用前要检查可焊性。

\* 不要将电容器存放在含有腐蚀性气体(例如硫化氢、二氧化硫、氯气、氨气等)的环境中。

\* 不要在阳光直射下或高湿度条件下储存电容器。

**◆ Storage Precautions**

\* Storage Conditions for MLCC: Relative humidity: 20~70%, storage temperature: 5~40℃, recommended temperature is below 30℃.

\* The performance of MLCCs may be affected by storage conditions. Please use immediately after delivery. High temperature and high humidity conditions, or long-term storage, may lead to packaging material deterioration and oxidation of the product's end electrodes. If it has been over six months since delivery, check the packaging and appearance before use. If it has been over a year, check the solderability before use.

\* Do not store capacitors in environments containing corrosive gases (e.g., hydrogen sulfide, sulfur dioxide, chlorine, ammonia, etc.).

\* Do not store capacitors under direct sunlight or in high humidity conditions.

**◆ 使用前注意事项**

\* 安装前的信息

- 1、不要重复使用从设备上拆下的电容器。
- 2、确认额定容量、额定电压等电气特性。
- 3、确认施加电压下的电容特性。
- 4、确认使用下的机械应力。
- 5、确认长期存放的电容器的可焊性。
- 6、在测量电容之前, 对长期存放的电容器进行热处理。

**◆ Precautions Before Use**

Pre-installation Information

- 1、Do not reuse capacitors removed from equipment.

- 2、Confirm electrical characteristics such as rated capacitance and rated Voltage.
- 3、Confirm the capacitor characteristics under applied Voltage.
- 4、Confirm the mechanical stress under use conditions.
- 5、Confirm the solderability of capacitors stored for long periods.
- 6、Perform heat treatment on capacitors that have been stored for a long time before measuring capacitance.

## ◆应用限制 Application Restrictions

- 1、我们的产品旨在用于一般消费电子设备(例如家用电器、办公设备、信息和通信设备, AV 设备、OA 设备、包括但不限于手机和 PC 等), 产品的设计基于正常操作和使用条件下的通用应用和标准用途。
- 2、不推荐用于下列高可靠性应用场景, 包括但不限于: 航天设备、医疗设备、航空设备、原子能设备、灾难预防设备、犯罪预防设备、电加热设备、燃烧设备、公共信息网络设备、数据处理设备、军事设备、发电控制设备、安全设备、车载设备、交通信号设备、运输设备和海底设备。

3、除非您事先获得风华的书面同意, 否则风华不对您或第三方因将我们的产品用于第 2 点设备而产生的任何损害承担任何责任。

1、Our products are intended for use in general consumer electronic devices (such as household appliances, office equipment, information and communication devices, AV equipment, OA equipment, including but not limited to mobile phones and PCs), based on general applications and standard uses under normal operating and usage conditions.

2、Our products are not recommended for the following high-reliability application scenarios, including but not limited to: aerospace equipment, medical devices, aviation equipment, atomic energy equipment, disaster prevention equipment, crime prevention equipment, electric heating equipment, combustion equipment, public information network devices, data processing equipment, military equipment, power generation control equipment, safety equipment, vehicle-mounted devices, traffic signal equipment, transportation equipment, and underwater equipment.

3、Unless you have prior written consent from Fenghua, Fenghua is not liable for any damages caused to you or third parties by using our products in the devices mentioned in point 2.

## \* 焊接的条件与相关图表

### Soldering Condition and Profile

为避免因温度的突然变化而引起的芯片开裂或局部爆炸的现象发生, 请按有关温度曲线图表来进行。(请参考附页中的图表)

To avoid the crack problem by sudden temperature change, follow the temperature profile in the adjacent graph (refer to the graph in the enclosure page).

## \* 手工焊接 Manual Soldering

手工焊接很容易因为芯片局部受热不均而引起瓷体微裂或局部爆炸的现象, 在焊接时, 如果操作者不小心, 会使烙铁头直接同电容芯片的瓷体部分接触, 这样很容易使电容芯片因热冲击而受损或出现其他意外. 因此, 使用电烙铁手工焊接时应仔细操作, 并对电烙铁的尖端的选择和尖端温度控制应多加小心.

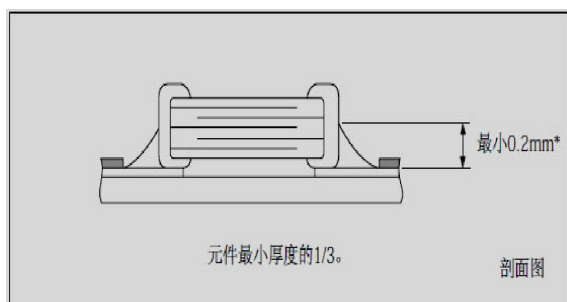
Manual soldering can pose a great risk of creating thermal cracks in capacitors. The hot soldering iron tip comes into direct contact with the end terminations, and operator's careless may cause the tip of the soldering iron to come into direct contact with the ceramic body of the capacitor. Therefore the soldering iron must be handled carefully, and pay much attention to the selection of the soldering iron tip and temperature contact of the tip.

## \* 推荐焊料用量

### Recommended Soldering amounts

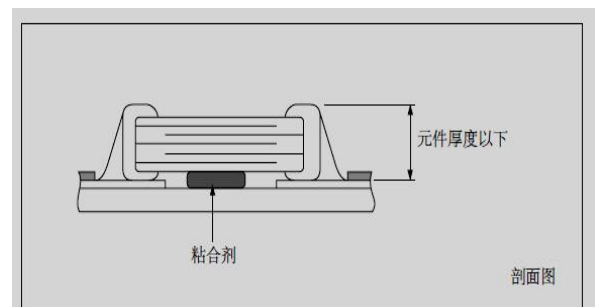
#### 回流焊接的最佳焊料用量

The optimal solder fillet amounts for re-flow soldering



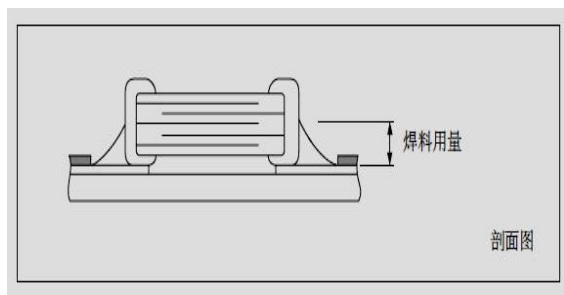
#### 波峰焊接的最佳焊料用量

The optimal solder fillet amounts for wave soldering



使用烙铁返修时的最佳焊料量

The optimal solder fillet amounts for reworking by using soldering iron



**\* 推荐焊接方式**

**Recommended Soldering Method**

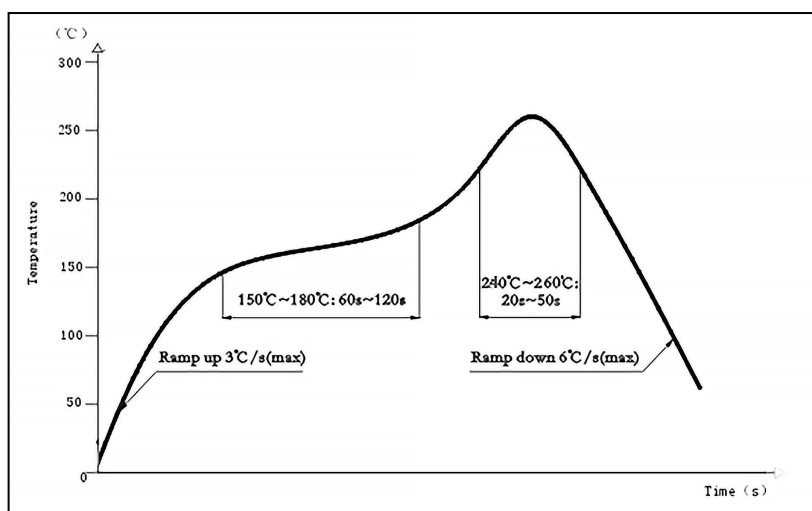
规格尺寸 Size	温度特性 Temperature Characteristics	容量范围 Capacitance	焊接方式 Soldering Method
0402	X7R	/	R
0603	C0G	/	R/W
	X7R	$C \geq 1\mu f$	R
0805	C0G	$C < 1\mu f$	R/W
		/	R/W
	X7R	$C \geq 4.7\mu f$	R
1206	C0G	$C < 4.7\mu f$	R/W
		/	R/W
	X7R	$C \geq 10\mu f$	R
$\geq 1210$	C0G	$C < 10\mu f$	R/W
		/	R
	X7R	/	R

焊接方式 Soldering method: R—回流焊 Reflow soldering W—波峰焊 Wave Soldering

**◆ 推荐焊接温度曲线图**

**The temperature profile for soldering**

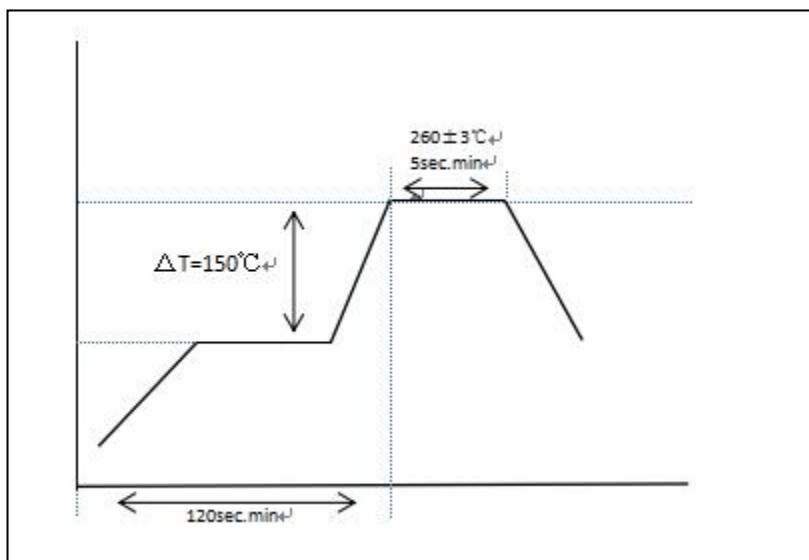
**\* 回流焊接 (Re-flow soldering)**



在预热时, 请将焊接温度与芯片表面温度之间的温差维持在  $T \leq 150^{\circ}\text{C}$ 。

While in preheating, please keep the temperature difference between soldering temperature and surface temperature of chips as:  $T \leq 150^{\circ}\text{C}$ .

\* 波峰焊接 (Wave soldering)

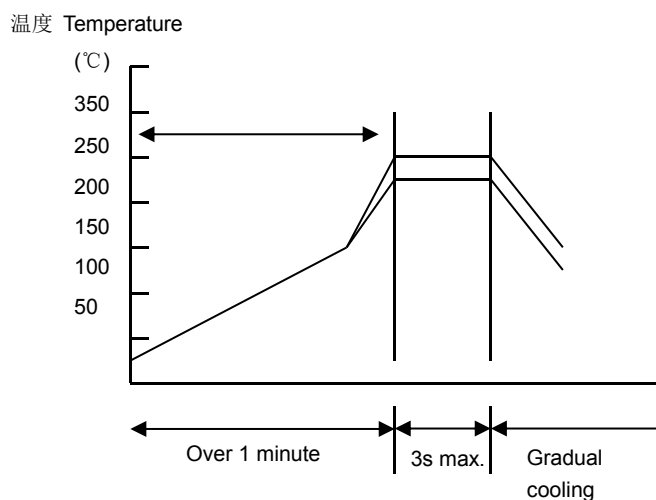


在预热时, 请将焊接温度与芯片表面温度之间的温差维持在  $T \leq 150^{\circ}\text{C}$ 。

While in preheating, please keep the temperature difference between soldering temperature and surface temperature of chips as:  $T \leq 150^{\circ}\text{C}$ .

\* 手工焊接

Hand soldering



条件 Conditions:

预热 Preheating	烙铁头温度 Temperature of soldering iron head	烙铁功率 Power of soldering iron	烙铁头直径 Diameter of soldering iron head	焊接时间 Soldering time	锡膏量 Solder paste amount	限制条件 Restricted conditions
$\Delta \leq 130^{\circ}\text{C}$	最高 350°C Highest temperature: 350°C	最大 20W 20W at the highest	建议 1mm 1mm recommended	最长 3s 3s at the longest	$\leq 1/2$ 芯片厚度 $\leq 1/2$ chip thickness	请勿使用烙铁头直接接触陶瓷元件 Please avoid the direct contact between soldering iron head and ceramic components

\* 备注: 产品规格书仅供设计选型参考用, 不作为交货依据。

Note: The product specification is for design and selection reference only and shall not serve as a basis for delivery.