Cheng recognize Book

SPECIFICATION FOR APPROVAL

client's name:
CUSTOMER: _____

product name
PARTNAME: Multilayer Ceramic Chip Capacitors
Multilayer Chip Ceramic Capacitor

Product Specifications
General Series

SPECIFICATION: _____

Acknowledgement No.
APPROVAL SHEET NO.: DRAAW108F/0-2015

Issue Date
ISSUED DATE: _____

manufacture MANUFACTURER			client CUSTOMER		
approve **APPROVED**	**Audit CHECKED**	Handled by **PREPARED**	approve **APPROVED**	**Audit CHECKED**	Handled by **PREPARED**

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File No	DRAAW108F/0-2015	Pages	44
file name	Multilayer Ceramic Capacitors (Product Approval)	Date of establishment	2012.01

Edition	Date of establishment and revision	Pages	Formulate and revise content	Registrants
B/0	2012-01-11	38	The new formulation	Fang Qianjun
B/1	2012-08-11	36	Increase2225,1808Dimensions of carrier tape	Wang Binbin
C/0	2013-01-10	39	Change version	Wang Binbin
D/0	2014-01-06	39	renewSGSReport	Wang Binbin
E/0	2014-05-06	44	Change version	Zhang Guoxin
F/0	2015-02-10	44	Change version	Zhang Guoxin

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1.Capacitor and dielectric classificationTypes of Capacitor and Dielectric Material

※COG：Capacitors with this type of dielectric material are Class I capacitors, including conventional, medium and high voltageCOGThis kind of product has stable electrical performance and is almost

It changes with temperature, voltage and time. It is suitable for circuits with low loss and high stability requirements, such as filters, resonators and timing circuits.

※COG:The capacitor of this kind dielectric material is considered as Class Ⅰ capacitor, including general capacitor and high frequency COG capacitor.The electrical properties of COG capacitor are the most stable one and have little change with temperature, voltage and time. They are suited for applications where low-losses and high-stability are required, such as filters, oscillators, and timing circuits.

※X7R,X5R：Capacitors made of this type of dielectric material are Class II capacitors, which have a higher dielectric constant and a higher capacity than Class I capacitors, and are more stable.

The temperature characteristics are suitable for circuits with a wide capacity range and low stability requirements, such as DC isolation, coupling, bypass, frequency discrimination and other circuits.

※X7R,X5R:The material is a kind of material with high dielectric constant. The capacitor made of this kind of material is considered as Class II capacitor whose capacitance is higher than that of class Ⅰ.These capacitors are classified as having a semi-stable temperature characteristic and used over a wide temperature range, such as in these kinds of circuits, DC-blocking, decoupling, bypassing, frequency discriminating etc.

※Y5V：Capacitors made of this type of dielectric material are Class II capacitors, which have the largest dielectric constant among all capacitors, but their capacitance stability is poor.

It is sensitive to temperature, voltage and other conditions and is suitable for circuits that require large capacity and little temperature change.

※Y5V:The capacitor made of this kind of material is the highest dielectric constant of all ceramic capacitors. They are used over a moderate temperature range in application where high capacitance is required because of its unstable temperature coefficient, but where moderate losses and capacitance changes can be tolerated. Its capacitance and Dissipation factors are sensible to measuring conditions, such as temperature and voltage, etc.

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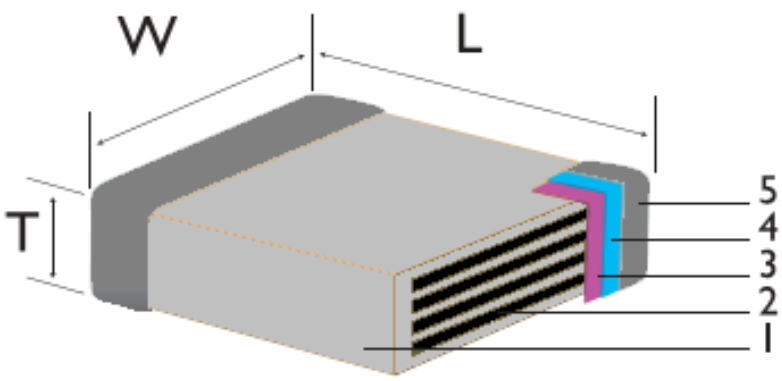
2.product structureProduct Frame



Serial number	name
1	Ceramic dielectric
2	Inner electrode
3	External electrode
4	Nickel layer
5	Tin layer

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3. Product specification and model naming rules

General Product Parts Numbering System

(example) (example)

TCC 0805 Y5V 105 M 500 D T

Ceramic capacitors
Device Code
Code of Ceramic Capacitor

size**Chip Size**
SpecificationType=L×W
0402=1.00×0.50mm
0603=1.60×0.80mm
0805=2.00×1.25mm
1206=3.20×1.60mm
1210=3.20×2.50mm
1808=4.50×2.00mm
1812=4.50×3.20mm
2220=5.70×5.00mm
2225=6.40×5.70 mm

Temperature characteristics
Dielectrics
COG, X7R,
X5R, Y5V

Capacitance Value
Capacitance
105=10×10$_5$
=1000,000pF
5express10$_5$
Two significant digits followed by no. of zero

Capacity tolerance
Capacitance Tolerance
A=±0.05pF
B=±0.1pF
C=±0.25pF
D=±0.5pF
F=±1.0%
G=±2.0%
J=±5.0%
K=±10%
M=±20%
Z=-20/+80%

Rated voltage
Rated Voltage
6R3=6.3V$_{DC}$
100=10V$_{DC}$
160=16V$_{DC}$
250=25V$_{DC}$
500=50V$_{DC}$
101=100V$_{DC}$
201=200V$_{DC}$
251=250V$_{DC}$
501=500V$_{DC}$
102=1000V$_{DC}$
202=2000V$_{DC}$

thickness
Thickness
A:0.5±0.05mm
B:0.60±0.10mm
C:0.80±0.10mm
D:0.85±0.10mm
E:1.00±0.10mm
F:1.25±0.20mm
H:1.6±0.20mm
G:2.0±0.20mm
M:2.5±0.30mm

Package**Packing**
B:Bag bulk
B: bulk packaging in a bag
T:Taping
T: tape carrier Packaging

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4.Product capacity rangeProduct Capacitance Range

0402（1005)size

	COGseries		X7Rseries					X5Rseries					Y5Vseries				
Cpdc	50	25	50	25	16	10	6.3	50	25	16	10	6.3	50	25	16	10	6.3
0R5	A	A															
1R0	A	A															
2R0	A	A															
3R0	A	A															
4R0	A	A															
5R0	A	A															
6R0	A	A															
7R0	A	A															
8R0	A	A															
9R0	A	A															
100	A	A															
120	A	A															
150	A	A															
180	A	A															
200	A	A															
220	A	A															
270	A	A															
300	A	A															
330	A	A															
390	A	A															
470	A	A															
560	A	A															
680	A	A															
820	A	A															
101	A	A	A	A	A	A	A	A	A	A	A	A					
121	A	A	A	A	A	A	A	A	A	A	A	A					
151	A	A	A	A	A	A	A	A	A	A	A	A					
181	A	A	A	A	A	A	A	A	A	A	A	A					
201	A	A	A	A	A	A	A	A	A	A	A	A					
221	A	A	A	A	A	A	A	A	A	A	A	A					
271	A	A	A	A	A	A	A	A	A	A	A	A					
331	A	A	A	A	A	A	A	A	A	A	A	A					
391	A	A	A	A	A	A	A	A	A	A	A	A					
471	A	A	A	A	A	A	A	A	A	A	A	A					
561	A	A	A	A	A	A	A	A	A	A	A	A					
681	A	A	A	A	A	A	A	A	A	A	A	A					
821	A	A	A	A	A	A	A	A	A	A	A	A					
102	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A

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	COGseries		X7Rseries					X5Rseries					Y5Vseries				
CpDC	50	25	50	25	16	10	6.3	50	25	16	10	6.3	50	25	16	10	6.3
152			A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
182			A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
222			A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
272			A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
332			A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
472			A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
562			A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
103			A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
153			A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
183				A	A	A	A		A	A	A	A	A	A	A	A	A
223				A	A	A	A		A	A	A	A	A	A	A	A	A
273				A	A	A	A		A	A	A	A	A	A	A	A	A
333				A	A	A	A		A	A	A	A	A	A	A	A	A
393				A	A	A	A		A	A	A	A	A	A	A	A	A
473				A	A	A	A		A	A	A	A	A	A	A	A	A
563				A	A	A	A		A	A	A	A		A	A	A	A
683				A	A	A	A		A	A	A	A		A	A	A	A
104					A	A	A			A	A	A		A	A	A	A
154					A	A	A			A	A	A			A	A	A
184						A	A				A	A			A	A	A
224						A	A				A	A			A	A	A
274							A					A				A	A
334							A					A				A	A
474							A					A				A	A
684							A					A					A
105							A					A					A

Capacity tolerance:COG(0.5pF~4.9pF): B/C;COG(5.0pF~9.9pF): D;COG(≥10pF): F(±1%), G(±2%), J(±5%),K(±10%)

X7R/X5R: J(±5.0%);K(±10%);M(±20%)

Y5V: M(±20%);Z(-20,+80%)

thickness:A:0.50±0.05mm;

The above capacity is for reference only, the specific capacity depends on the usage requirements.

Tolerance: COG(0.5pF~4.9pF): C COG(5.0pF~9.9pF): D;COG(≥10pF): F(±1%), G(±2%), J(±5%)

X7R/X5R: J(±5.0%);K(±10%);M(±20%)

Y5V: M(±20%);Z(-20,+80%)

Thickness: A:0.50±0.10mm;

Above capacitance for reference only, actual cap. Range depends on the standard products.

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0603(1608)size

	0603(1608)															
	COGseries		X7Rseries					X5Rseries					Y5Vseries			
Cp DC	50	25	50	25	16	10	6.3	50	25	16	10	6.3	50	25	16	10
0R5	c	c														
1R0	c	c														
2R0	c	c														
3R0	c	c														
4R0	c	c														
5R0	c	c														
6R0	c	c														
7R0	c	c														
8R0	c	c														
9R0	c	c														
100	c	c														
120	c	c														
150	c	c														
180	c	c														
200	c	c														
220	c	c														
270	c	c														
300	c	c														
330	c	c														
390	c	c														
470	c	c														
560	c	c														
680	c	c														
820	c	c														
101	c	c														
121	c	c														
151	c	c														
181	c	c														
201	c	c														
221	c	c	c	c	c	c	c	c	c	c	c	c				
271	c	c	c	c	c	c	c	c	c	c	c	c				
331	c	c	c	c	c	c	c	c	c	c	c	c				
391	c	c	c	c	c	c	c	c	c	c	c	c				
471	c	c	c	c	c	c	c	c	c	c	c	c				
561	c	c	c	c	c	c	c	c	c	c	c	c				
681	c	c	c	c	c	c	c	c	c	c	c	c				
821	c	c	c	c	c	c	c	c	c	c	c	c				
102	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c

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	0603(1608)															
	COGseries		X7Rseries					X5Rseries					Y5Vseries			
CpDC	50	25	50	25	16	10	6.3	50	25	16	10	6.3	50	25	16	10
152	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
182		c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
222		c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
272			c	c	c	c	c	c	c	c	c	c	c	c	c	c
332			c	c	c	c	c	c	c	c	c	c	c	c	c	c
472			c	c	c	c	c	c	c	c	c	c	c	c	c	c
562			c	c	c	c	c	c	c	c	c	c	c	c	c	c
682			c	c	c	c	c	c	c	c	c	c	c	c	c	c
103			c	c	c	c	c	c	c	c	c	c	c	c	c	c
153			c	c	c	c	c	c	c	c	c	c	c	c	c	c
183			c	c	c	c	c	c	c	c	c	c	c	c	c	c
223			c	c	c	c	c	c	c	c	c	c	c	c	c	c
273			c	c	c	c	c	c	c	c	c	c	c	c	c	c
333			c	c	c	c	c	c	c	c	c	c	c	c	c	c
393			c	c	c	c	c	c	c	c	c	c	c	c	c	c
473			c	c	c	c	c	c	c	c	c	c	c	c	c	c
563			c	c	c	c	c	c	c	c	c	c	c	c	c	c
683			c	c	c	c	c	c	c	c	c	c	c	c	c	c
104			c	c	c	c	c	c	c	c	c	c	c	c	c	c
154			c	c	c	c	c	c	c	c	c	c	c	c	c	c
184			c	c	c	c	c	c	c	c	c	c	c	c	c	c
224			c	c	c	c	c	c	c	c	c	c	c	c	c	c
274			c	c	c	c	c	c	c	c	c	c	c	c	c	c
334			c	c	c	c	c	c	c	c	c	c	c	c	c	c
474			c	c	c	c	c	c	c	c	c	c	c	c	c	c
684				c	c	c	c		c	c	c	c		c	c	c
105				c	c	c	c		c	c	c	c		c	c	c
225					c	c	c			c	c	c			c	c
475						c	c				c	c				c
106							c					c				

Capacity tolerance:COG(0.5pF~4.9pF): B/C;COG(5.0pF~9.9pF): D;COG(≥10pF): F(±1%), G(±2%), J(±5%),K(±10%)

X7R/X5R: J(±5.0%);K(±10%);M(±20%);Y5V: M(±20%);Z(-20,+80%)

thickness:C:0.80±0.1mm; The above capacity is for reference only, the specific capacity depends on the usage requirements.

Tolerance: COG(0.5pF~4.9pF): C COG(5.0pF~9.9pF): D;COG(≥10pF): F(±1%), G(±2%), J(±5%)

X7R/X5R: J(±5.0%);K(±10%);M(±20%);Y5V: M(±20%);Z(-20,+80%)

Thickness: C:0.80±0.1mm;Above capacitance for reference only, actual cap. Range depends on the standard products.

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0805(2012)size

	0805（2012）																	
	COGseries			X7Rseries					X5Rseries					Y5Vseries				
Cp_{DC}	50	25	16	50	25	16	10	6.3	50	25	16	10	6.3	50	25	16	10	6.3
0R5	B	B	B															
1R0	B	B	B															
2R0	B	B	B															
3R0	B	B	B															
4R0	B	B	B															
5R0	B	B	B															
6R0	B	B	B															
7R0	B	B	B															
8R0	B	B	B															
9R0	B	B	B															
100	B	B	B															
120	B	B	B															
150	B	B	B															
180	B	B	B															
200	B	B	B															
220	B	B	B															
270	B	B	B															
300	B	B	B															
330	B	B	B															
390	B	B	B															
470	B	B	B															
560	B	B	B															
680	B	B	B															
820	B	B	B															
101	B	B	B															
121	B	B	B															
151	B	B	B															
181	B	B	B															
201	B	B	B															
221	B	B	B	B	B	B	B	B	B	B	B	B	B					
271	B	B	B	B	B	B	B	B	B	B	B	B	B					
331	B	B	B	B/D	B/D	B/D	B/D	B/D	B/D	B/D	B/D	B/D	B/D					
391	B	B	B	B/D	B/D	B/D	B/D	B/D	B/D	B/D	B/D	B/D	B/D					
471	B	B	B	B/D	B/D	B/D	B/D	B/D	B/D	B/D	B/D	B/D	B/D					
561	B	B	B	B/D	B/D	B/D	B/D	B/D	B/D	B/D	B/D	B/D	B/D					
681	B	B	B	B/D	B/D	B/D	B/D	B/D	B/D	B/D	B/D	B/D	B/D					
821	B	B	B	B/D	B/D	B/D	B/D	B/D	B/D	B/D	B/D	B/D	B/D					
102	B	B	B	B/D	B/D	B/D	B/D	B/D	B/D	B/D	B/D	B/D	B/D	D	D	D	D	D

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	0805（2012）																	
	COGseries			X7Rseries					X5Rseries					Y5Vseries				
Cp_{DC}	50	25	16	50	25	16	10	6.3	50	25	16	10	6.3	50	25	16	10	6.3
152	B	B	B	B/D	B/D	B/D	B/D	B/D	B/D	B/D	B/D	B/D	B/D	D	D	D	D	D
182	B	B	B	B/D	B/D	B/D	B/D	B/D	B/D	B/D	B/D	B/D	B/D	D	D	D	D	D
222	B	B	B	B/D	B/D	B/D	B/D	B/D	B/D	B/D	B/D	B/D	B/D	D	D	D	D	D
272	B	B	B	B/D	B/D	B/D	B/D	B/D	B/D	B/D	B/D	B/D	B/D	D	D	D	D	D
332		D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
472		D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
562		D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
682			D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
103				D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
153				D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
183				D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
223				D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
273				D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
333				D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
393				D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
473				D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
563				D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
683				D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
104				D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
154				D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
184				D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
224				D/F	D	D	D	D	D/F	D	D	D	D	D/F	D	D	D	D
274				D/F	D	D	D	D	D/F	D	D	D	D	D/F	D	D	D	D
334				D/F	D	D	D	D	D/F	D	D	D	D	D/F	D	D	D	D
474				D/F	D/F	D/F	D	D	D/F	D/F	D/F	D	D	D/F	D/F	D/F	D	D
684				D	D/F	D/F	D	D	D	D/F	D/F	D	D	D	D/F	D/F	D	D
105				D	D/F	D/F	D	D	D	D/F	D/F	D	D	D	D/F	D/F	D	D
225					F	F	F	F		F	F	F	F		F	F	F	F
475					F	F	F	F		F	F	F	F			F	F	F
106						F	F	F			F	F	F				F	F
226							F	F				F	F					F
476								F					F					

Capacity tolerance:COG(0.5pF~4.9pF): B/C;COG(5.0pF~9.9pF): D;COG(≥10pF): F(±1%), G(±2%), J(±5%),K(±10%)

X7R/X5R: J(±5.0%);K(±10%);M(±20%);Y5V: M(±20%);Z(-20,+80%)

thickness:B:0.60±0.1mm,D:0.85±0.1mm,F:1.25±0.2mm; The above capacity is for reference only, the specific capacity depends on the usage requirements.

Tolerance: COG(0.5pF~4.9pF): C COG(5.0pF~9.9pF): D;COG(≥10pF): F(±1%), G(±2%), J(±5%)

X7R/X5R: J(±5.0%);K(±10%);M(±20%);Y5V: M(±20%);Z(-20,+80%)

Thickness: B:0.60±0.1mm,D:0.85±0.1mm,F:1.25±0.2mm;Above capacitance for reference only, actual cap.

Range depends on the standard products.

Product Standards	serial number Document No.
SPECIFICATION FOR APPROVAL	DRAAW108F/0-2015

1206(3216)size

	1206（3216）																	
	COG Series			X7R Series					X5R Series					Y5V Series				
Cp_{DC}	50	25	16	50	25	16	10	6.3	50	25	16	10	6.3	50	25	16	10	6.3
0R5	D	D	D															
1R0	D	D	D															
2R0	D	D	D															
3R0	D	D	D															
4R0	D	D	D															
5R0	D	D	D															
6R0	D	D	D															
7R0	D	D	D															
8R0	D	D	D															
9R0	D	D	D															
100	D	D	D															
120	D	D	D															
150	D	D	D															
180	D	D	D															
200	D	D	D															
220	D	D	D															
270	D	D	D															
300	D	D	D															
330	D	D	D															
390	D	D	D															
470	D	D	D															
560	D	D	D															
680	D	D	D															
820	D	D	D															
101	D	D	D															
121	D	D	D															
151	D	D	D															
181	D	D	D															
201	D	D	D															
221	D	D	D	D	D	D	D	D	D	D	D	D	D					
271	D	D	D	D	D	D	D	D	D	D	D	D	D					
331	D	D	D	D	D	D	D	D	D	D	D	D	D					
391	D	D	D	D	D	D	D	D	D	D	D	D	D					
471	D	D	D	D	D	D	D	D	D	D	D	D	D					
561	D	D	D	D	D	D	D	D	D	D	D	D	D					
681	D	D	D	D	D	D	D	D	D	D	D	D	D					
821	D	D	D	D	D	D	D	D	D	D	D	D	D					
102	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D

Product Standards	serial number Document No.
SPECIFICATION FOR APPROVAL	DRAAW108F/0-2015

	1206（3216）																	
	COG Series			X7R Series					X5R Series					Y5V Series				
CpDC	50	25	16	50	25	16	10	6.3	50	25	16	10	6.3	50	25	16	10	6.3
152	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
182	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
222	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
272	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
332	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
472	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
562	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
682		D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
103		F	F	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
153				D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
183				D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
223				D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
273				D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
333				D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
393				D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
473				D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
563				D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
683				D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
104				D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
154				D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
184				D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
224				D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
274				D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
334				D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
474				F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
684				F/H	F	F	F	F	F/H	F	F	F	F	F	F	F	F	F
105				F/H/H*	F	F	F	F	F/H/H*	F	F	F	F	F	F	F	F	F
205					E	E	E			E	E	E		E	E	E	E	
225					F	F	F	F		F	F	F	F		F	F	F	F
475					H/H*	H/H*	H/H*	H/H*		H/H*	H/H*	H/H*	H/H*		F	F	F	F
106						H/H*	H/H*	H/H*			H/H*	H/H*	H/H*			F	F	F
226							H/H*	H/H*				H/H*	H/H*				H/H*	H/H*
476								H/H*					H/H*					

Capacity tolerance:COG(0.5pF~4.9pF): B/C;COG(5.0pF~9.9pF): D;COG(≥10pF): F(±1%), G(±2%), J(±5%),K(±10%)

X7R/X5R: J(±5.0%);K(±10%);M(±20%);Y5V: M(±20%);Z(-20,+80%)

thickness:D:0.85±0.1mm,E:1.00±0.1mm,F:1.25±0.2mm,H:1.60±0.2mm,1.60±0.3*mm; The above capacity is only for

For reference, the specific capacity depends on the usage requirements.

Tolerance: COG(0.5pF~4.9pF): C ;COG(5.0pF~9.9pF): D;COG(≥10pF): F(±1%), G(±2%), J(±5%)

X7R/X5R: J(±5.0%);K(±10%);M(±20%);Y5V: M(±20%);Z(-20,+80%)

Thickness: D:0.85±0.1mm,E:1.00±0.1mm,F:1.25±0.2mm,H:1.60±0.2mm,1.60±0.3*mm;Above capacitance for reference only, actual cap. Range depends on the standard products.

Product Standards	serial number Document No.
SPECIFICATION FOR APPROVAL	DRAAW108F/0-2015

1210(3225)size

	1210（3225）															
	COGseries	X7Rseries					X5Rseries					Y5Vseries				
Cpdc	50	50	25	16	10	6.3	50	25	16	10	6.3	50	25	16	10	6.3
101	D															
121	D															
151	D															
181	D															
201	D															
221	D															
271	D															
331	D															
391	D															
471	D															
561	D															
681	D															
821	D															
102	D															
152	D															
182	D															
222	D															
272	D															
332	D															
474		G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
684		H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
105		H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
225		H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
475			H/G	H	H	H		H/G	H	H	H		H/G	H	H	H
106			M	G	M	M		M	G	M	M		M	G	M	M
226				M	M	M			M	M	M			M	M	M
476					M	M				M	M				M	M
107						M					M					M

Capacity Tolerance:COG(≥10pF): F(±1%), G(±2%), J(±5%),K(±10%);X7R/X5R:J(±5.0%);K(±10%);M(±20%);

Y5V: M(±20%);Z(-20,+80%)

thickness:D:0.85±0.1mm,F:1.25±0.2mm,H:1.60±0.2mm,G:2.00±0.20mm,M:2.50±0.30mm;

The above capacity is for reference only, the specific capacity depends on the usage requirements.

Tolerance:COG(≥10pF): F(±1%), G(±2%), J(±5%);X7R/X5R: J(±5.0%);K(±10%);M(±20%);

Y5V: M(±20%);Z(-20,+80%)

Thickness: D:0.85±0.1mm,F:1.25±0.2mm,H:1.60±0.2mm,G:2.00±0.20mm M:2.50±0.30mm;

Above capacitance for reference only, actual cap. Range depends on the standard products.

Product Standards	serial number Document No.
SPECIFICATION FOR APPROVAL	DRAAW108F/0-2015

1808(4520)-1812（4532)size

	1808(4520)					1812(4532)									
	COGseries	Y5Vseries				COGseries	X7Rseries			X5Rseries			Y5Vseries		
C_{pDC}	50	50	25	16	C_{pDC}	50	50	25	16	50	25	16	50	25	16
101	F				101	D									
121	F				121	D									
151	F				151	D									
181	F				181	D									
201	F				201	D									
221	F				221	D									
271	F				271	D									
331	F				331	D									
391	F				391	D									
471	F				471	D									
561	F				561	D									
681	F				681	D									
821	F				821	D									
102	F				102	D									
222	F				474		F	F	F	F	F	F			
332	F				684		G/H	G/H	G/H	G/H	G/H	G/H			
104					105		G	G	G	G	G	G			
224					225		F/H	F/H	F/H	F/H	F/H	F/H	F/H	F/H	F/H
474					475		G	G	G	G	G	G	G	G	G
105					106			G	M		G	M		G	M
225		F	F	F	226				M			M			M
475			H	H	476										M
106				H	107										

Capacity Tolerance:COG(≥10pF): F(±1%), G(±2%), J(±5%),K(±10%);X7R:J(±5.0%);K(±10%);M(±20%);

Y5V: M(±20%);Z(-20,+80%)

thickness:D:0.85±0.1mm,F:1.25±0.2mm,H:1.60±0.2mm,G:2.00±0.20mm M:2.50±0.30mm;

The above capacity is for reference only, the specific capacity depends on the usage requirements.

Tolerance:COG(≥10pF): F(±1%), G(±2%), J(±5%);X7R: J(±5.0%);K(±10%);M(±20%);

Y5V: M(±20%);Z(-20,+80%)

Thickness: D:0.85±0.1mm,F:1.25±0.2mm,H:1.60±0.2mm,G:2.00±0.20mm M:2.50±0.30mm;

Above capacitance for reference only, actual cap. Range depends on the standard products.

Product Standards	serial number Document No.
SPECIFICATION FOR APPROVAL	DRAAW108F/0-2015

2220(5750)-2225(5764)size

	2220(5750)								2225(5764)			
	COGseries	X7Rseries		X5Rseries		Y5Vseries				COGseries	Y5Vseries	
CpDC	50	50	25	50	25	50	25	16	CpDC	50	50	25
101	E								101	E		
121	E								121	E		
151	E								151	E		
181	E								181	E		
201	E								201	E		
221	E								221	E		
271	E								271	E		
331	E								331	E		
391	E								391	E		
471	E								471	E		
561	E								561	E		
681	E								681	E		
821	E								821	E		
102	E								102	E		
222	E								222	E		
334									332	E		
474		F/H/G	F/H/G	F/H/G	F/H/G				472	E		
684		F/H/G	F/H/G	F/H/G	F/H/G				562	E		
105		M	M	M	M				103	E		
155		H	H	H	H				223	E		
225		M	M	M	M	G	G	G	333	E		
475		G	M	G	M	G	G	G	473	E		
106		G	M	G	M	G	G	G	563	E		
226						M	M	M	225		M	M
476							M	M	475		M	M
107								M	106			M

Capacity Tolerance:COG(≥10pF): F(±1%), G(±2%), J(±5%),K(±10%);X7R:J(±5.0%);K(±10%);M(±20%);

Y5V: M(±20%);Z(-20,+80%)

thickness:E:1.00±0.1mm,F:1.25±0.2mm,H:1.60±0.20mm,G:2.00±0.20mm,M:2.50±0.30mm;

The above capacity is for reference only, the specific capacity depends on the usage requirements.

Tolerance:COG(≥10pF): F(±1%), G(±2%), J(±5%);X7R: J(±5.0%);K(±10%);M(±20%);

Y5V: M(±20%);Z(-20,+80%)

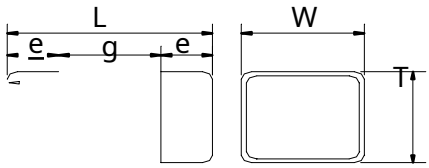
Thickness: E:1.00±0.1mm,F:1.25±0.2mm,H:1.60±0.20mm,G:2.00±0.20mm,M:2.50±0.30mm;

Above capacitance for reference only, actual cap. Range depends on the standard products.

Product Standards	serial number Document No.
SPECIFICATION FOR APPROVAL	DRAAW108F/0-2015

5.Product SizeDimensions

Specification:0402,0603,0805,1206,1210,1808,1812,2220,2225. Chip Size:0402,0603,0805,1206,1210,1808,1812 ,2220 and 2225



Specification Type	L (mm)	W (mm)	e (mm)	g min (mm)	T (mm)					
0402	1.00±0.05	0.50±0.05	0.15~0.3	0.4	0.50±0.05	— —	— —	— —	— —	— —
0603	1.60±0.10	0.80±0.10	0.2~0.5	0.5	0.80±0.10	— —	— —	— —	— —	— —
0805	2.00±0.10	1.25±0.10	0.2~0.7	0.7	0.60±0.10	0.85±0.10	1.25±0.20	— —	— —	— —
0805*1	2.00±0.20*1	1.25±0.20*1	0.2~0.7	0.7	0.60±0.10	0.85±0.10	1.25±0.20	— —	— —	— —
1206	3.20±0.20	1.60±0.20	0.3~0.8	1.6	0.85±0.10	1.00±0.10	1.25±0.20	1.60±0.20	— —	— —
1206*1	3.20±0.30*1	1.60±0.30*1	0.3~0.8	1.6	0.85±0.10	1.00±0.10	1.25±0.20	1.60±0.30*1	— —	— —
1210	3.20±0.30	2.5±0.20	0.3~0.8	1.6	0.85±0.10	1.25±0.20	1.60±0.20	2.00±0.20	2.50±0.30	— —
1210*1	3.20±0.40*1	2.5±0.30*1	0.3~0.8	1.6	0.85±0.10	1.25±0.20	1.60±0.20	2.00±0.20	2.50±0.30	— —
1808	4.50±0.30	2.0±0.20	0.3~1.5	2.5	1.25±0.20	1.60±0.20	— —	— —	— —	— —
1808*1	4.50±0.40*1	2.0±0.25*1	0.3~1.5	2.5	1.25±0.20	1.60±0.20	— —	— —	— —	— —
1812	4.50±0.30	3.2±0.30	0.3~1.5	2.5	0.85±0.10	1.00±0.10	1.25±0.20	1.60±0.20	2.00±0.20	2.50±0.30
1812*1	4.50±0.40*1	3.2±0.40*1	0.3~1.5	2.5	0.85±0.10	1.00±0.10	1.25±0.20	1.60±0.20	2.00±0.20	2.50±0.30
2220	5.70±0.40	5.0±0.40	0.3~1.1	3.5	1.00±0.10	1.25±0.20	1.60±0.20	2.00±0.20	2.50±0.30	
2225	5.70±0.40	6.4±0.40	0.3~1.1	3.5	1.00±0.10	2.00±0.20	2.50±0.30	— —	— —	

* 1Identify the specification model1uFThe above specifications are product dimensions.

Product Standards	serial number Document No.
SPECIFICATION FOR APPROVAL	DRAAW108F/0-2015

6.Technical requirements and test conditions **Specification and Test Condition**

6.1ExteriorAppearance

typeDielectrics	skills requirementSpecification	Test ConditionsTesting Condition
COG/X7R/X5R/Y5V	No damage or abnormality No defects or abnormalities	Visual inspection Visual inspection.

6.2sizeDimensions

typeDielectrics	skills requirementSpecification	Test ConditionsTesting Condition
COG/X7R/X5R/Y5V	Within the required range Within the specified dimensions	Use a micrometer Using calipers on micrometer

6.3capacityCapacitance

typeDielectrics	skills requirementSpecification	Test ConditionsTesting Condition
COG	Within the required capacitance tolerance Within the specified tolerance A: ±0.05pF;B:±0.1pF;C:±0.25pF; D: ±0.5pF;J: ±5%	1.0±0.2Vrms, 1MHz±10% (C>1000 pF, 1.0±0.2Vrms, 1KHz±10%,)
X7R/X5R	Within the required capacitance tolerance Within the specified tolerance J: ±5%;K: ±10%;M: ±20%	1.0±0.2Vrms, 1KHz±10% （Cp＞10uF, 0.5±0.1Vrms, 120±24Hz）
Y5V	Within the required capacitance tolerance Within the specified tolerance M: ±20%; Z: -20%, +80%	1.0±0.2Vrms, 1KHz±10% （Cp＞10uF, 0.5±0.1Vrms, 120±24Hz）
Note: Test temperature:25℃±3℃, test humidity: <70%RH.		

6.4lossDissipation Factor

typeDielectrics	skills requirementSpecification	Test ConditionsTesting Condition
COG	Cp<30pF, Q≥400+20Cp; Cp≥30pF, Q≥1000	1.0±0.2Vrms,1MHz±10%,25℃ (Cp>1000pF,1.0±0.2Vrms,1KHz±10%)
X7R/X5R	25V≤UR≤50V, DF≤3.5% ≤5.0%, (0402≥333, 0603≥224, 0805≥684, 1206＞225, 1210≥475） ≤7%（0603≥334,0805≥106,1206≥475） UR =16V, DF≤5.0% ≤7%, (0402≥104, 0603≥564, 0805≥105, 1206≥475, 1210≥106); ≤10.0%, (0402≥104, 0603≥684, 0805≥105, 1206≥475, 1210≥106); UR=10V, DF≤7.0% DF≤10%（0402≥1μF, 0603≥2.2μF, 0805≥4.7μF,1206≥10μF, 1210≥22μF） UR=6.3V, DF≤10%	1.0±0.2Vrms, 1KHz±10%, (Cp＞10uF,0.5±0.1Vrms, 120±24Hz)
Y5V	UR≥50V, DF≤7.0% UR=25V, DF≤7.0% (0402≥0.047μF, 0603≥0.1μF, 0805≥0.33μF,1206≥0.68μF, 1210≥1μF) DF≤9.0% (0402≥0.068μF, 0603≥0.47μF, 0805≥1μF,1206≥4.7μF, 1210≥10μF) UR=16V, DF≤9.0% ≤12.5%(0402≥224,0603≥225,0805≥335, 1206≥106,1210≥226,1812≥476） UR=10V, DF ≤12.5% UR=6.3V, DF ≤15.0%	1.0±0.2Vrms, 1KHz±10%, (Cp＞10uF,0.5±0.1Vrms, 120±24Hz) 25℃, after pretreatment48hrs. at 25℃,48 hours after annealing
Note: Test temperature:25℃±3℃, test humidity: <70%RH.		

6.5Insulation resistanceInsulation Resistance

typeDielectrics	skills requirementSpecification	Test ConditionsTesting Condition
COG/X7R/ X5R/Y5V	UR≤50V,more than the10 GΩor500Ω-F(is greater than the smaller value) UR≤50V,More than 10 GΩ or 500Ω·F, whichever is smaller.	UR≤50V $U_{Measurement}$=UR; Charging time:60±5Second temperature:25℃ Charge Time:60±5sec Temperture:25℃
Note: Test temperature:25℃±3℃, test humidity: <70%RH.		

Product Standards	serial number Document No.
SPECIFICATION FOR APPROVAL	DRAAW108F/0-2015

6.6Withstand voltageDielectric Strength

typeDielectrics	Rated voltage rangeRated voltage range	Voltage Withstand Performance Test MethodMeasuring Method
COG	$U_R \leqslant 50V$	Rated voltage applied300%,5seconds, the maximum current is not Exceed50mA Force 300%Rated voltage for 5second. Max..current should not exceed 50 mA.
X7R/X5R/Y5V	$U_R \leqslant 50V$	Rated voltage applied250%,5seconds, the maximum current is not Exceed50mA Force 250%Rated voltage for 5second. Max..current should not exceed 50 mA.

Product Standards	serial number Document No.
SPECIFICATION FOR APPROVAL	DRAAW108F/0-2015

6.7Capacitance Temperature CharacteristicsTemperature Coefficient of Capacitance

typeDielectrics	skills requirementSpecification	Test ConditionsTesting Condition
COG	Capacity changes in±30ppm/Within ℃ Capacity drift in±0.2%or±0.05pF Within Temperature coefficient within ±30ppm/℃; Cp drift within ±0.2% or ±0.05pF	Test the capacitance in series temperature order Measure capacitance under follow table list temperature: step STEP / COG, X7R / X5R / Y5V 1: 25 ±2 / 25 ±2 / 25 ±2 2: - 55±3 / - 55±3 / - 30±3 3: 25 ±2 / 25 ±2 / 25 ±2 4: 125±3 / 85±3 / 85±3 5: 25 ±2 / 25 ±2 / 25 ±2 1) COG The capacity drift is calculated by:3The measured capacitance is divided by the1,3and5The maximum error of the step measurement The difference between the maximum and minimum values. The temperature coefficient is calculated based on3Step 1: Measure the capacitance as a reference. The capacitance drift is calculated by dividing the differences between the maximum and minimum measured values in the step 1,3 and 5. The temperature coefficient is determined using the Capacitance measured in step 3 as a reference. 2) X7R,X5RandY5V X7R, X5R and Y5V and25Compared with the capacitance at ℃, the change of capacitance within the temperature range is within the required range. The ranges of capacitance change compared within the above 25℃value over the temperature ranges shall be within the specified ranges.
X7R/X5R	Capacity changes in±15%Within Capacitance change within ±15%	
Y5V	Capacity changes in +22%, -82%Within Capacitance change within +22%, - 82%	

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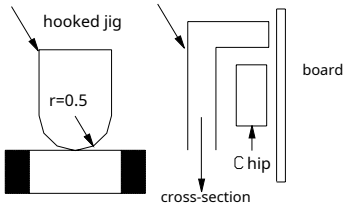
6.8AdhesionAdhesion

typeDielectrics	skills requirementSpecification	Test ConditionsTesting Condition
COG/X7R/X5R/ Y5V	The terminal electrodes are not loose, and there are no other defects. elephant No removal of the terminations or other defects shall occur.	Imposition6Npressure and maintain10±1Second The pressurizing force shall be 6N (=600g*f) and the duration of application shall be 10±1sec. 

6.9SolderabilitySolderability of Termination

typeDielectrics	skills requirementSpecification	Test ConditionsTesting Condition
COG X7R/X5R Y5V	The terminal electrode tinning area is not less than95%, pinhole or Rough area is less than5% 95% min. coverage of both terminal electrodes and less than 5% have pin holes or rough spots.	Tin furnace temperature:245±5℃ Immersion time:2±1Second The electrodes on both sides are completely immersed in the soldering pot Solder temperature: 245±5℃ Dipping time: 2±1 seconds. Completely soak both terminal electrodes in solder

6.10Solder resistanceResistance to leaching

typeDielectrics	skills requirementSpecification	Test ConditionsTesting Condition
COG X7R/X5R Y5V	The terminal electrode tinning area is not less than95%, pinhole or Rough area is less than5%,No cracks on the surface 95% min. coverage of both terminal electrodes and less than 5% have pin holes or rough spots. No remarkable visual damage.	Preheat:120℃~150℃/60Second soldering furnace temperature:270±5℃ Immersion time:10±1Second The electrodes on both sides are completely immersed in the soldering pot Solder temperature: 270±5℃ preheated: 120 ℃~150℃/60sec Dipping time: 10±1 seconds. Completely soak both terminal electrodes in solder

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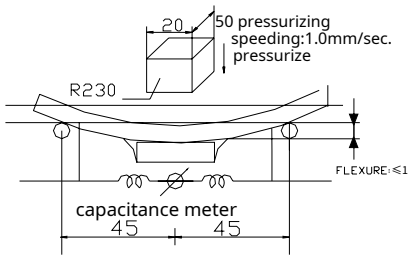
6.11Terminal electrode bonding strengthBending

typeDielectrics	skills requirementSpecification	Test ConditionsTesting Condition
COG	No visible damage; Capacity change is less than or equal to±5%or0.5 PF No remarkable visual damage Cp change ⩽ ±5% or ⩽ 0.5 pF	Install the chip capacitor on the test fixture as shown in the figure Direction1.0mm/sApply pressure at a rate that bends1mm. Solder the capacitor on testing substrate and put it on testing stand. The middle part of substrate shall successively be pressurized by pressuring rod at a rated of about 1.0mm/sec. Until the deflection becomes means of the 1.0mm. 
X7R/X5R	No visible damage; Capacity change is less than or equal to±10% No remarkable visual damage Cp change ⩽ ±10%	
Y5V	No visible damage; Capacity change is less than or equal to±30% No remarkable visual damage Cp change ⩽ ±30%	

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6.12Resistant to welding heatResistance to Soldering Heat

typeDielectrics	skills requirementSpecification	Test ConditionsTesting Condition
COG	No obvious visible damage Capacity changes in±2.5%or±0.25pF(whichever is greater) DFMeet the requirements of product initial value IRMeet the requirements of product initial value No remarkable visual damage Cp change within ±2.5% or ±0.25pF, whichever is larger. DF meets initial standard value. IR meets initial standard value.	Soldering Temperature:270±5℃ Preheat:120~150℃60Immersion time in seconds:10±1Second Place at room temperature24±2 (COG)or48±4(X7R, X5R,Y5V)Measure after hours After the test, recover under standard conditions * Initial value measurement of high dielectric constant capacitors exist140~150℃1After hours of heat treatment, place at room temperature48±4Hour Measuring initial value Soldering temperature: 270±5℃ Preheating: 120~150℃60sec. Dipping time: 10±1 seconds. Measurement to be made after being kept at room temperature for 24±2 (COG) or 48±4(X7R ,X5R, Y5V) hours. Recovery for the following period under the standard condition after test. * Initial measurement for high dielectric constant type Perform a heat treatment at 140~150℃for 1hr and let sit for 48±4hrs at room temperature. Perform the initial measurement.
X7R/X5R	No obvious visible damage Capacity changes in±7.5%Within DFMeet the requirements of product initial value IRMeet the requirements of product initial value No remarkable visual damage Cp change within ±7.5% DF meets initial standard value. IR meets initial standard value.	
Y5V	No obvious visible damage Capacity changes in±20%Within DFMeet the requirements of product initial value IRMeet the requirements of product initial value No remarkable visual damage Cp change within ±20% DF meets initial standard value. IR meets initial standard value.	

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6.13Rapid temperature cyclingTemperature Cycle

typeDielectrics	skills requirementSpecification	Test ConditionsTesting Condition
COG	No obvious visible damage Capacity changes in±2.5%or±0.25pF(whichever is greater) No remarkable visual damage Cp change within ±2.5% or ±0.25pF, whichever is larger.	Follow the steps below5Second cycle: To perform 5 cycles of the stated environment step Step / temperature Temperature / time Time 1 Lower category temperature +0/-3℃ Min.operating Temp.+0/-3℃ 30min 2 25℃ 2~3 min 3 Upper category temperature +3/-0℃ Max. operating Temp.+3/-0℃ 30 min 4 25℃ 2~3 min Place at room temperature24±2 (COG)or 48±4(X7R,X5R,Y5V)Measure after hours * Initial value measurement of high dielectric constant capacitors exist140~150℃1After hours of heat treatment, place at room temperature48±4Hour Measuring initial value Measurement to be made after being kept at room temperature for 24±2hrs (COG) or 48±4hrs (X7R, X5R, Y5V) at room temperature, then measure. * Initial measurement for high dielectric constant type Perform a heat treatment at 140~150 ℃for 1hr and let sit for 48±4hrs at room temperature. Perform the initial measurement.
X7R/X5R	No obvious visible damage Capacity changes in±7.5%Within No remarkable visual damage Cp change within ±7.5%	
Y5V	No obvious visible damage Capacity changes in±20%Within No remarkable visual damage Cp change within ±20%	

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6.14Steady-state moist heatMoisture Resistance, steady state

typeDielectrics	skills requirementSpecification	Test ConditionsTesting Condition
COG	No obvious visible damage Capacity changes in±5%or±0.5pF(whichever is greater) Cp<10pF, Q≥200+10Cp; 10≤Cp<30pF, Q≥275+2.5Cp Cp≥30pF, Q≥350 IR:more than the1000MΩor50Ω-F(Take the smaller value) No remarkable visual damage Cp change within ±5% or ±0.5pF, whichever is larger. Cp<10pF, Q≥200+10Cp; 10≤Cp<30pF, Q≥275+2.5Cp Cp≥30pF, Q≥350 R*C≥1000MΩ or 50Ω·F, whichever is smaller	test temperature:40±2℃ humidity:90~95% RH testing time:500 ±12hrs Place at room temperature24±2 (COG)or 48±4(X7R,X5R,Y5V)Measure after hours * Initial value measurement of high dielectric constant capacitors exist140~150℃1After hours of heat treatment, place at room temperature48±4Hour Measuring initial value Test temperature: 40±2℃ Humidity: 90~95% RH Testing time: 500 ±12hrs Measurement to be made after being kept at room temperature for 24±2hrs (COG) or 48±4hrs (X7R, X5R, Y5V) * Initial measurement for high dielectric constant type Perform a heat treatment at 140~150 ℃for 1hr and let sit for 48±4hrs at room temperature. Perform the initial measurement.
X7R/X5R	No obvious visible damage Capacity changes in±12.5%Within DFThe initial value2times or less IR:more than the1000MΩor50Ω-F(Take the smaller value) Cp change within ±12.5% DF: Not more than 2 times of initial value R*C≥1000MΩ or 50Ω·F, whichever is smaller	
Y5V	No obvious visible damage Capacity changes in±30%Within DFThe initial value1.5times or less IR:more than the1000MΩor50Ω-F(Take the smaller value) No remarkable visual damage Cp change within ±30% DF: Not more than 1.5 times of initial value R*C≥1000MΩ or 50Ω·F, whichever is smaller	

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6.15Moisture load resistanceDamp heat with load

typeDielectrics	skills requirementSpecification	Test ConditionsTesting Condition
COG	No obvious visible damage Capacity changes in±7.5%or±0.75pF(whichever is greater) Cp<30pF, Q≥100+10/3*Cp Cp≥30pF, Q≥200 IR:more than the500MΩor25Ω-F(Take the smaller value) No remarkable visual damage Cp change≤±7.5% or ±0.75pF, whichever is larger. Cp<30pF, Q≥100+10/3*Cp Cp≥30pF, Q≥200 R*C≥500MΩ or 25Ω·F, whichever is smaller	test temperature:40±2℃ humidity:90~95% RH Voltage: Rated voltage testing time:500 ±12hrs Place at room temperature24±2 (COG)or 48±4(X7R,X5R,Y5V)Measure after hours * exist40±2At ℃, add rated DC voltage to the capacitor1hrs. Remove the voltage and place the capacitor at room temperature. 48±4hrs Measure the initial capacitance value. Test temperature: 40±2℃ Humidity: 90~95% RH Voltage: 100% of the rated voltage Testing time: 500 ±12hrs Measurement to be made after being kept at room temperature for 24±2hrs (COG) or 48±4hrs (X7R, X5R, Y5V) * Apply the rated DC voltage for 1 hour at 40±2℃. Remove and let sit for 48±4hrs at room temperature. Perform the initial measurement.
X7R/X5R	No obvious visible damage Capacity changes in±12.5%Within DFThe initial value2times or less IR:more than the500MΩor25Ω-F(Take the smaller value) No remarkable visual damage Cp change ≤±12.5% DF: Not more than 2 times of initial value R*C≥500MΩ or 25Ω·F, whichever is smaller	
Y5V	No obvious visible damage Capacity changes in±30%Within DFThe initial value1.5times or less IR:more than the500MΩor25Ω-F(Take the smaller value) No remarkable visual damage Cp change ≤±30% DF: Not more than 1.5 times of initial value R*C≥500MΩ or 25Ω·F, whichever is smaller	

Note: This reliability test is only applicable to conventional products, not to medium and high voltage products.

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6.16DurabilityLife Test

typeDielectrics	skills requirementSpecification	Test ConditionsTesting Condition
COG	No obvious visible damage Capacity changes in±3%or±0.3pF(Take the larger value) Capacity30pFabove,Q≥350 Capacity10 pF More than and less than30 PF, Q≥275+(2.5* Cp) Capacity less than10pF,Q≥200+10*Cp IR:more than the1000MΩor50Ω-F(Take the smaller value) No remarkable visual damage Cp change≤±3% or ±0.3pF, whichever is larger. Q≥350 (Cp≥30 PF) Q≥275+(2.5* Cp) (10 pF≤Cp<30 PF) Q≥200+10*Cp (Cp<10 PF) R*C≥1000MΩ or 50Ω·F, whichever is smaller	Test temperature: upper category temperature±3℃ Voltage: UR＜100V 1.5Times rated voltage test time:1000Hour Place at room temperature24±2 (COG)or48±4(X7R, X5R,Y5V)Measure after hours * Initial value measurement of high dielectric constant capacitors At upper category temperature±3℃, add capacitor2Times rated DC voltage1Hour Remove the voltage and place the capacitor at room temperature.48±4hrs Measuring initial capacitance Test temperature: Max. Operating Temp. ±3℃ Voltage: UR＜100V 150% of the rated voltage Testing time: 1000 hrs Measurement to be made after being kept at room temperature for 24±2hrs (COG) or 48±4hrs (X7R, X5R,Y5V) * Initial measurement for high dielectric constant type Apply 150% of the rated DC voltage for one hour at the maximum operating temperature ±3 ℃. Remove and let sit for 48±4hrs at room temperature. Perform the initial measurement
X7R/X5R	No obvious visible damage Capacity changes in±12.5%Within DFThe initial value2times or less IR:more than the1000MΩor50Ω-F(Take the smaller value) No remarkable visual damage Cp change ≤±12.5% DF: Not more than 2 times of initial value R*C≥1000MΩ or 50Ω·F, whichever is smaller	
Y5V	No obvious visible damage Capacity changes in±30%Within DFThe initial value1.5times or less IR:more than the1000MΩor50Ω-F(Take the smaller value) No remarkable visual damage Cp change ≤±30% DF: Not more than 1.5 times of initial value R*C≥1000MΩ or 50Ω·F, whichever is smaller	
Note: This reliability test is only applicable to conventional products, not to medium and high voltage products.		

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7.Product packagingPacking

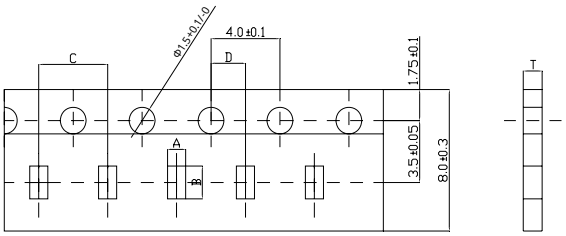
7.1Bag bulkBulk Packing

10000Pieces/bag or as per customer's requirement.Standard packing 10Kpcs/bag; others are according to customer request.

7.2Taping packagingTape Packing

Specification Type	sizeSize (mm)			Tape quantity (pcs/reel)pcs/reel)	
	lengthL	widthW	thicknessT	Paper tapePaper Tape	Plastic beltPlastic Tape
0402	1.0	0.5	0.5	10,000	N/A
0603	1.6	0.8	0.8	4,000	N/A
0805	2.0	1.25	＜0.85	4,000	N/A
			⩾0.85	N/A	2,000(or3000)
1206	3.2	1.6	⩽0.85	4,000	N/A
			＞0.85	N/A	2,000(or3000)
1210	3.2	2.5	⩽1.25	N/A	3,000
			＞1.25	N/A	2,000
1808	4.5	2.0	⩽1.25	N/A	1,000
1812	4.6	3.2	⩽1.25	N/A	1,000
			＞1.25	N/A	
2220	5.7	5.0	⩽1.25	N/A	1,000
			＞1.25	N/A	700
2225	5.7	6.4	＞1.25	N/A	700

7.2.1Tape sizeDimensions of Packing Paper

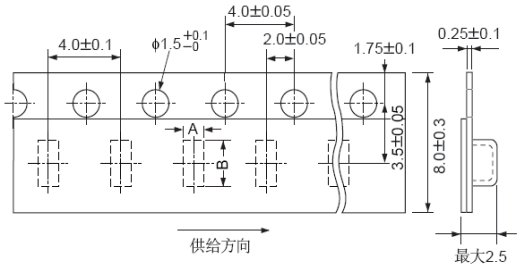


Type	A	B	C	D	T
0402	0.65±0.10	1.15±0.10	2.0±0.05	2.0±0.05	0.8max
0603	1.05±0.10	1.85±0.10	4.0±0.10	2.0±0.10	1.1max
0805	1.55±0.15	2.3±0.15	4.0±0.10	2.0±0.10	1.1max
1206	1.95±0.15	3.5±0.15	4.0±0.10	2.0±0.10	1.1max

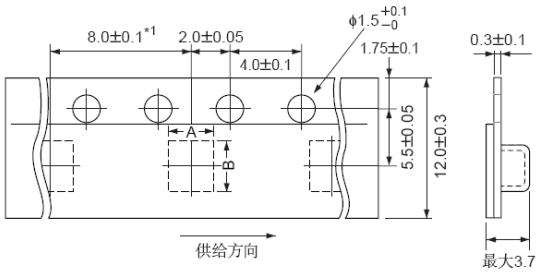
(unitunit:Millimetersmm)

7.2.2Plastic belt sizeDimensions of Embossed Packing

8mm宽，4mm间距编带



12mm宽，8mm/4mm间距编带

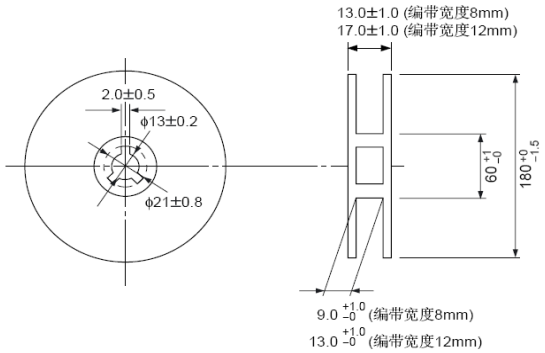


A:1.45±0.20 B:2.25±0.20（0805）A:1.95±0.20 B:3.60±0.20（1210）A:2.50±0.20 B:4.90±0.20（1812）A:5.40±0.20 B:6.80±0.20（2225）A:2.90±0.20 A:3.60±0.20 A:6.10±0.20

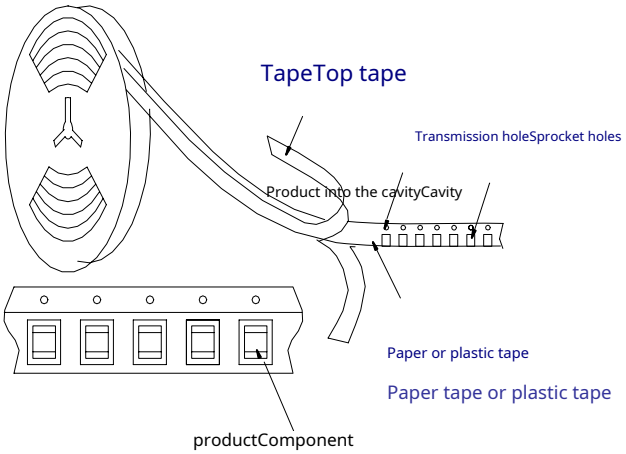
B:3.50±0.20（1206） B:4.90±0.20（1808） B:6.10±0.20（2220）

(unitunit:Millimetersmm)

7.2.3Tape reel sizeDimensions of Reel



7.2.4Taping methodTaping Figure



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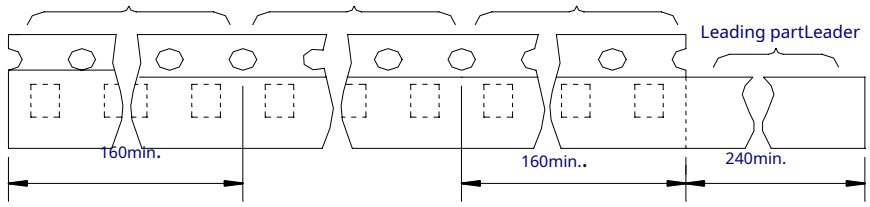
Blank partEmpty section Product loading sectionChip insertion sectionBlank partEmpty section



(unitunit: mmmm) Extraction directionFeeding direction

7.2.5Taping methodTaping Method

① The tape used to package the capacitor is wound clockwise. When the tape is pulled out from top to bottom, the transfer hole is on the right side of the tape.

② At the front end of the tape, leave at least5The lead-out strips are spaced apart.

③ When taping, you must leave a leader portion or blank portion as shown below.

④ The number of products mis-installed during the installation of the reel must be less than the indicated number per reel.0.1%or1The limit is , no continuous errors occur.

⑤ The upper and lower tapes should not extend beyond the edge of the tape and should not block the transfer holes.

⑥ The cumulative error of the transmission hole is10Pitch: ±0.3Within millimeters.

⑦ The peeling torque of the upper tape should be0.1to0.6Within Newton, its direction is shown in the figure below.

①Tapes for capacitors are wound clockwise. The sprocket holes are to the right as the tape is pulled toward the user.

②The top tape and base tape are not attached at the end of the tape for a minimum of 5 pitches.

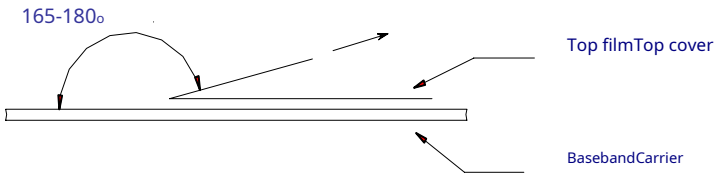
③Part of the leader and part of the empty tape shall be attached to the end of the tape as follows.

④Missing capacitors number within 0.1% of the number per reel or 1pc, whichever is greater, and are not continuous.

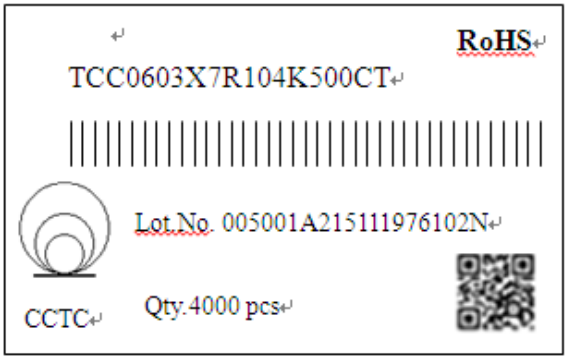
⑤The top tape and bottom tape shall not protrude beyond the edges of the tape and shall not cover sprocket holes.

⑥Cumulative tolerance of sprocket holes, 10 pitches:±0.3mm.

⑦Peeling off force: 0.1 to 0.6N in the direction shown down.



7.2.6product labelReel Label



Tagged contentThe Contents of Label

(1)TCC0603X7R104 K 500 C T

① ② ③ ④ ⑤ ⑥ ⑦ ⑧

① Ceramic capacitor codeCode of Ceramic Capacitor

② Sizechip size,③Temperature characteristicsdielectrics,④Capacitycapacitance,⑤Capacity tolerancetolerance,

⑥ Rated voltagerated voltage,⑦Thickness,⑧Packing

(2)Serial NumberLot. No.:005001A215111976102N

(3)quantityQty: 4000pcs

(4) RoHS:GREEN PARTSGreen Materials

7.2.7.Outer PackagingPackage

7.2.7.1Packing boxCarton

7.2.7.1.1Packing box sizeCarton Size

L	W	H
40cm	36cm	20cm

7.2.7.1.2quantity:240Kpcs /boxThe Quantity: 240Kpcs /one carton

1Inner box =40,000PCS 1 INNER BOX=40,000PCS

1Packing box =40,000PCS × 6Packing box =240,000PCS 1 CARTON=40,000PCS × 6BOX=240,000PCS

RoHSLogo (posted according to customer requirements) according to customer request

7.2.7.2Inner packaging boxInner Box

7.2.7.2.1Packing box sizeSize

L	W	H
18.5cm	6.5cm	19cm

7.2.7.2.2quantity:40Kpcs /box

1Plate =4000PCS 1 REEL=4,000PCS

1Packing box =4,000PCS × 10Plate =40,000PCS 1 INNER BOX = 4,000 PCS × 10 REEL = 40,000 PCS

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8.MLCCPrecautions for usePrecautions on the use of MLCC

8.1Circuit Board DesignPCB Design

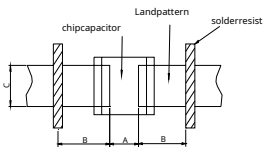
8.1.1Circuit board pattern designDesign of Land-patterns The following figure and table show some recommended design patterns to prevent excessive soldering during installation. Incorrect patterns are also shown.

The following diagrams and tables show some examples recommended patterns to prevent excessive solder amounts (larger fillets which above the component end terminations)

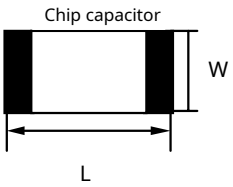
Examples of improper pattern designs are also shown. Recommended pattern size for circuit board design:

Recommended land dimensions for a typical chip capacitor land patterns for PCBs Recommended design dimensions for wave soldering (unit:mm): Recommended land dimensions for wave-soldering (unit: mm)

SpecificationSIZE		0603	0805	1206	1210
size	L	1.6	2.0	3.2	3.2
	W	0.8	1.25	1.6	1.6
A		0.8~1.0	1.0~1.4	1.8~2.5	1.8~2.5
B		0.5~0.8	0.8~1.5	0.8~1.7	0.8~1.7
C		0.6~0.8	0.9~1.2	1.2~1.6	1.8~2.5



Recommended design dimensions for reflow soldering (unit:mm)



Recommended land dimensions for reflow-soldering (unit: mm)

SpecificationSIZE		0402	0603	0805	1206	1210	1808	1812	2220	2225
size	L	1.0	1.6	2.00	3.2	3.2	4.5	4.5	5.7	5.7
	W	0.5	0.8	1.25	1.6	2.5	2.0	3.2	5.0	6.4
A		0.35~0.45	0.6~0.8	0.8~1.2	1.8~2.5	1.8~2.5	2.5~3.4	2.5~3.4	4.0~4.6	4.0~4.6
B		0.40~0.50	0.6~0.8	0.8~1.2	1.0~1.5	1.0~1.5	1.8~2.0	1.8~2.0	2.0~2.2	2.0~2.2
C		0.45~0.55	0.6~0.8	0.9~1.6	1.2~2.0	1.6~3.2	1.4~1.8	2.3~3.5	3.5~4.8	5.0~6.2

Excessive solder will affect the product's ability to resist mechanical stress, so attention should be paid when designing the pattern.

Excess solder can affect the ability of chips to withstand mechanical stresses. Therefore, please take proper precautions when designing land-patterns.

Some good and bad welding situations in application:

Examples of good and bad solder application

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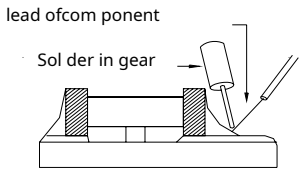
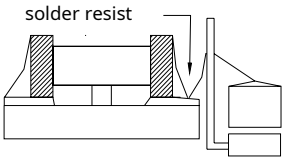
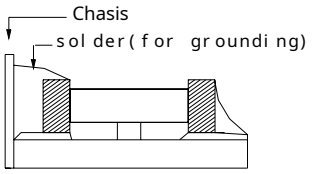
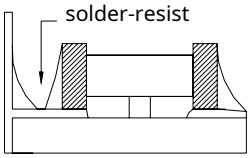
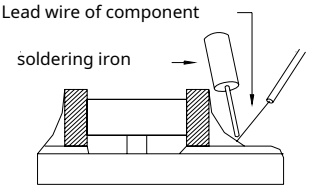
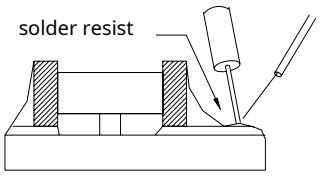
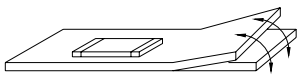
projectItem	Not recommended structureNot recommended	Recommended structureRecommended
Chip components and leaded Mixed welding of components Mixed mounting of SMD and leaded component		
Welding close to the base Component placement close to the chassis		
Near the chip Soldering of leaded components Hand-soldering of leaded components near mounted components		

8.1.2Pattern structurePattern configurations

Below are examples of good and bad capacitor mounting. The mounting position should be chosen to minimize the mechanical stress on the board when it is flexed.

The following are examples of good and bad capacitor layout, SMD capacitors should be located to minimize any possible mechanical stresses from board warp or deflection..

	Not recommended structureNot recommended	Recommended structureRecommended
Bending of circuit boards Deflection of the board		

For capacitors that are distributed on a circuit board, the amount of mechanical stress they are subjected to during distribution is related to the installation of the capacitor. Some good designs are recommended below.To

To layout the capacitors for the breakaway PC board, it should be noted that the amount of mechanical stresses given depending on capacitor layout. The example below shows recommendations for better design.

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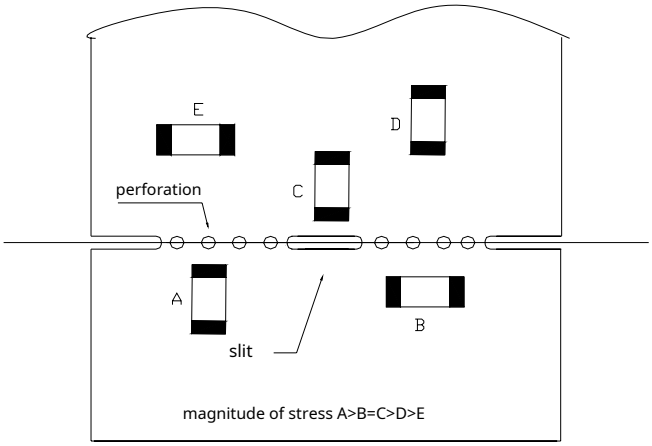


When separating circuit boards along the separation line, the mechanical stress applied to the product is closely related to the method used.

Fatigue increases in the following order: folding, shear,VTherefore, the sorting process of the circuit board should be considered during mounting.

When breaking PC boards along their performances, the amount lf mechanical stress on the capacitors can vary according to the method used. The following methods are listed in order from least stressful to most stressful: push-back, silt, -grooving, and perforation. Thus, any ideal SMD capacitor layout must also consider the PCB splitting procedure.

8.2Automatic placement precautions **Considerations for automatic placement**

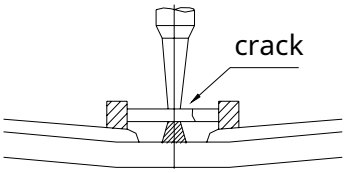
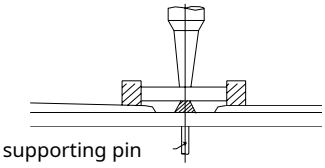
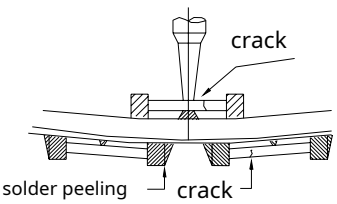
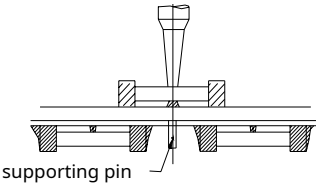
Adjustment of placement machine **Adjustment of mounting machine**

① . The product should not be subjected to excessive impact when it is mounted on the circuit board.

② . The suction head and positioning claws must be inspected, repaired and replaced regularly

① .Excessive impact load should not be imposed on the capacitors when mounting the PC boards.

② .The maintenance and inspection of the mounters should be conducted periodically.

	Not recommended structureNot recommended	Recommended structureRecommended
Single-sided mounting Single-sided mounting		
Double-sided mounting Double-sided mounting		

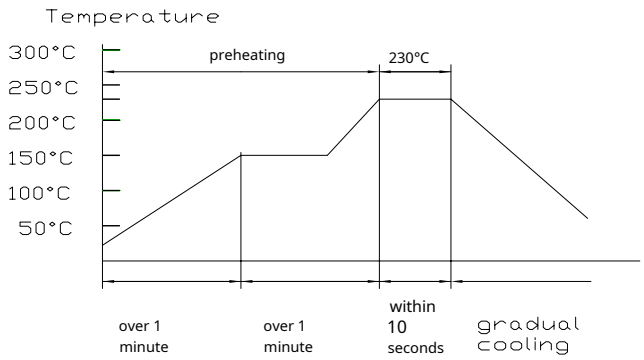
8.3Recommended welding curveRecommended soldering profile

8.3.1illustrate:① The product is recommended to use reflow soldering process; ② Large size products suitable for reflow soldering process

Re:①flow Soldering is recommended;②Flow soldering is suitable for bigger size MLCCs

8.3.2Tin-lead soldering curveRecommended Sn&Pb soldering profile

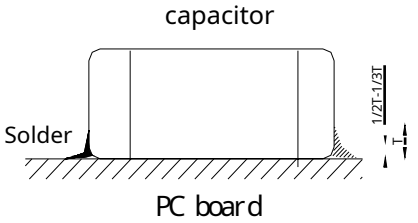
ReflowReflow soldering



NoticeCaution

①. The ideal solder height is 1/100 of the capacitor thickness.1/2 ~1/3,As shown below:

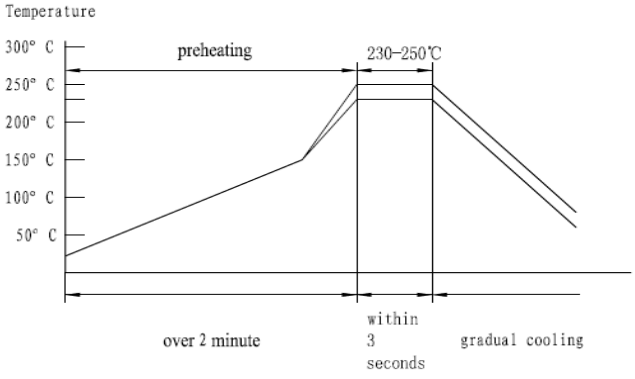
① The ideal condition is to have solder mass (fillet) controlled to 1/2 to 1/3of the thickness of the capacitor, as shown below:



②. Too long welding time will affect the weldability of the terminal. The welding time should be kept consistent with the recommended time as much as possible.

② .Because excessive dwell times can detrimentally affect solderability, soldering duration s recommended times as possible.

Wave SolderingWave solder profile



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NoticeCaution

①. Make sure the capacitor is fully preheated.

②. The temperature difference between product preheating and welding should not exceed100~130℃.

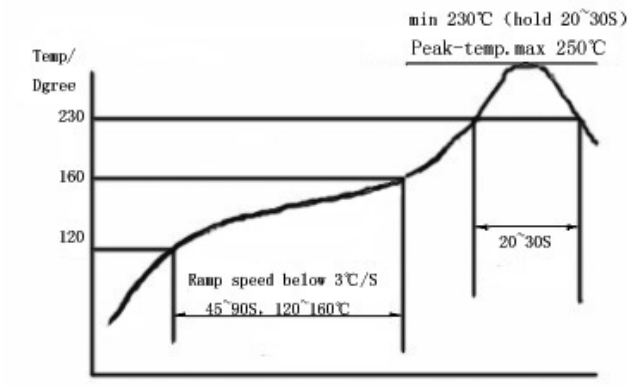
③. Cool as slowly as possible after welding.

① Make sure the capacitors are preheated sufficiently.

② The temperature difference between the capacitor and melted solder should not be greater than 100 to 130℃.

③ .Cooling after soldering should be gradual as possible.

manual weldingHand soldering



NoticeCaution

①. Maximum diameter of the tip1.0mmpower20WSoldering iron.

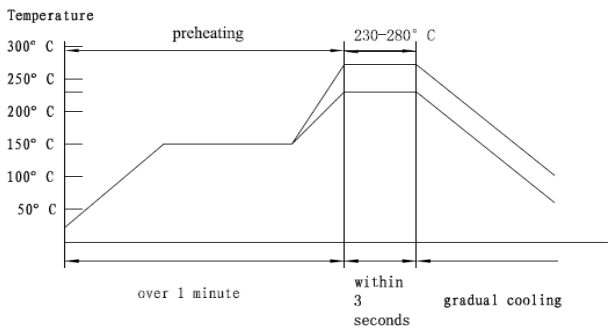
②. Do not allow the soldering iron to directly contact the product.

① Use a 20w soldering iron with a maximum tip diameter of 1.0mm.

② The soldering iron should not directly touch the capacitor.

8.3.3Lead-free soldering curveRecommended Pb-Free soldering profile

Reflow SolderingReflow solder



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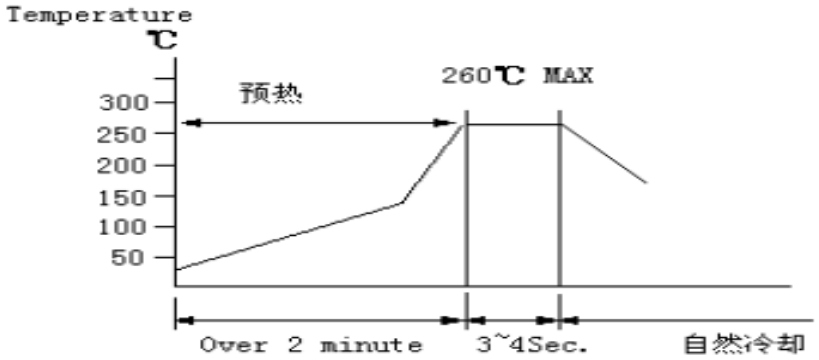
Wave SolderingWave solder profile



8.4Distribution circuit boardHandling

Breakaway PC boards (splitting along perforations)

(1). After capacitors or other mounting, attention must be paid to the stress caused by bending or deformation of the circuit board.

(2). When separating circuit boards, you must use a special clamp and do not break them by hand.

(1).When splitting the PC board after mounting capacitors and other components, care is required so as not to give any stresses of deflection or twisting to the board.

(2).Board separation should not be done manually, but by using the appropriate devices.

8.5saveStorage

(1). Store the product in the following environment: Temperature5~40℃; humidity≤70% RH

(2). The shelf life of the product is one year from the date of production. Please do not remove the tape before using the product.

(3).After the braiding is removed, the product should be used within three months.

(4). High dielectric constant capacitors (X7R, X5R, Y5V)The capacitance of the capacitor will gradually decrease over time, so this phenomenon should be fully considered when designing the circuit.

The reduced capacitor150℃Heat treatment1After hours, the capacitance will return to the initial test value.

(1).Keep the storage environment conditions as following: Temperature: 5~40℃;Humidity: ≤70% RH

(2).Don't open the tape until the parts are to be used, and store them within one year since the date printed on the reel.

(3).Use the chips within 3 months after the tape is opened.

(4).The capacitance value of high dielectric constant capacitors (X7R,X5R,Y5V) will gradually decrease with the passage of time, so this should be taken into consideration in the circuit design. If such a capacitance reduction occurs, a Heat treatment of 150℃for 1 hour will return the capacitance to its initial level.

8.6 MLCCProduct voltage and temperature precautions

8.6.1Working temperature

It is necessary to select a product with a rated temperature higher than the operating temperature. In addition, the temperature distribution within the machine and seasonal temperature changes must also be considered.

Problems that may occur when the rated operating temperature is exceeded If a capacitor is used under conditions above the upper operating temperature limit, the insulation resistance of the capacitor may decrease.

A problem where the current suddenly increases sharply or there is a short circuit.

Capacitors use ceramic dielectrics whose dielectric constant changes with temperature, so their electrostatic capacitance may change greatly over a wide temperature range.

Therefore, in order to ensure the electrostatic capacitance, we recommend the following methods:

(1)In actual use, the operating temperature range is controlled to suppress the change rate of electrostatic capacitance due to temperature.

(2)The so-called temperature characteristics refer to the fact that the capacitance may change with the change of temperature even if the ambient temperature is below the rated temperature.

When using in a circuit with a small effective capacitance range, such as a fixed circuit, please also consider the DC voltage characteristics and capacitance discharge in addition to the above.

Select capacitor after setting characteristics

8.6.1Rated voltage

(1)Please control the voltage applied to the capacitor to be below the rated voltage specified in the specification. (It is recommended to use the capacitor at the rated voltage.70%Used below)

If DC voltage and AC voltage are used in combination, please keep the sum of the peak voltages (Zero-to-peakvoltage) is below the rated voltage.

When used for AC or pulse voltage, the sum of the peak voltages (Peak-to-peakvoltage) should be lower than the rated voltage.

If the capacitor is used at a voltage exceeding the rated voltage specified in the catalog or specification, an electrical short circuit may occur due to insulation breakdown of the ceramic dielectric.

In addition, the time at which a failure occurs varies depending on the applied voltage and the ambient temperature.

(2)Even if used below the rated voltage, the reliability of the capacitor may be reduced if used under high-speed pulse voltage or high-frequency AC voltage.

8.7If the product is used at a higher temperature, its life span will be greatly reduced. Please conduct relevant life tests before use.