1. INTRODUCTION

JINPEI safety multilayer ceramic chip capacitor（SMD MLCC) are designed for surge or lightning immunity in modem facsimile and other equipments. The capacitors of CCAC series are class X1/Y2 compliant, and the capacitors of CCAD series are class X2 compliant respectively.

The green type capacitors in CCAC/CCAD series are manufactured by using environmentally friendly materials without lead or cadmium.

The terminations are composed of plated nickel and pure tin to feature the superior leaching resistance during soldering.

2. FEATURES

a. High reliability and stability.
b. Small size and high capacitance.
c. Safety standard :
EN 60384-14 : 2013/A1 : 2016
IEC 60384-14 : 2013/AMD1 : 2016
UL 60384-14 (Ed 2.0) UL 62368-1 (2nd Edition)

3. APPLICATIONS

a. Modem.
b. Facsimile.
c. Telephone.
d. Other electronic equipment for lighting or surge protection and isolation.

4. PART NUMBER

CCAC	1808	B	102	K	3H	T	F	Q
JINPEI Series	Size	Dielectric	Capacitance	Tolerance	Impulse Voltage	Packaging	Thickness	Customer Code
Table 1	Table 2	Table 3	Table 4	Table 5	Table 6	Table 7	Table 8	Table 9

Table 1	PDC Family
Code	Description
CCAC	Safety X1 & Y2
CCAD	Safety X2

Table 2	Size				
Code	Description	Code	Description	Code	Description
06	1206 (3216)	12	1812 (4532)	20	2220 (5750)
08	1808 (4520)	21	2211 (5728)		

Table 3	Dielectric Material Characteristics		
Code	Description	Code	Description
N	NPO/C0G	B	X7R

Table 4	Capacitance Rule Code		
Code	Description	Code	Description
0R5	0.5pF	104	104=10x104=100nF

Table 5	Tolerance				
Code	Description	Code	Description	Code	Description
D	±0.50pF	G	±2%	K	±10%
F	±1%	J	±5%	M	±20%

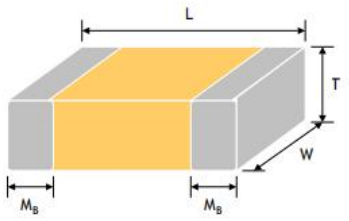
Table 6	Impulse Voltage				
Code	Description	Code	Description	Code	Description
2E	2.5KV	3000V 3U	2.5KV	3H	5KV
				3I	6KV

Table 7	Packaging Type		
Code	Description	Code	Description
B	Bulk	T	Embossed Tape

Table 8	Thickness Description				
Code	Description	Code	Description	Code	Description
C	1.25±0. 10 mm	E	1.60±0.20 mm	G	2.50±0.30 mm
D	1.40±0. 15 mm	F	2.00±0.20 mm	H	2.80±0.30 mm

Table 9	Customer Code				
Code	Description	Code	Description	Code	Description
G	RoHscompliant	Q	Anti-Arcing	E	Anti-Bending
H	High reliability	Z	Anti-Arcing+Anti-Bending		

5. EXTERNAL DIMENSIONS

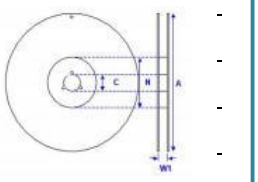
Size Inch (mm)	L (mm)	W (mm)	Code / T (mm)	MB (mm)	
1206（3216）	3.30±0.40	1.60±0.20	See No.4 Reference Table 8	0.50±0.25	
1808（4520）	4.50+0.6/-0.3	2.00±0.30		0.50±0.25	
1812（4532）	4.50+0.6/-0.3	3.20±0.40		0.50±0.25	
2211（5728）	5.70±0.50	2.80±0.40		0.60±0.30	
2220（5750）	5.70±0.50	5.00±0.50		0.60±0.30	Fig. 5.1 The outline of MLCC

6. GENERAL ELECTRICAL DATA

Dielectric	C0G	X7R	
Size	1808, 1812, 2211	1808, 1812, 2211, 2220	1206
Rated voltage	250Vac		2.5KVdc
Capacitance range	X1/Y2 Class (Impulse 6KV) : 4pF ~ 100pF X1/Y2 Class (Impulse 5KV) : 3pF ~ 720pF X2 Class : 3pF ~ 1000pF	X1/Y2 Class : 100pF ~ 4700pF X2 Class : 100pF ~ 56000pF	100pF ~ 1000pF
Capacitance tolerance	Cap. Rang: Cap.<10pF — D (±0.5pF); 10pF≤Cap. — F (±1%), G (±2%), J (±5%), K (±10%), M (±20%)	J (±5%) K (±10%) M (±20%)	
Tan δ	Cap. Range: Cap.<30pF — Q≥400+20C; Cap.≥30pF — Q≥1000	≤2.5%	
Capacitance & Tan δ Test condition	Measured at the condition of 30~70% related humidity		
	For 25°C at ambient temperature	Preconditioning for Class II MLCC : Perform a heat treatment at 150±10°C for 1 hour, then leave in ambient condition for 24±2 hours before measurement	
	Cap. Rang: Cap.≤1000pF — 1.0±0.2Vrms, 1.0MHz±10%; Cap.>1000pF — 1.0±0.2Vrms, 1.0KHz±10%	1.0±0.2Vrms, 1.0KHz±10%, at 25°C ambient temperature	
Insulation resistance	≥100GΩ or RxC≥1000Ω-F, whichever is smaller	≥10GΩ or RxC≥500Ω-F, whichever is smaller	
Operating temperature	-55°C to +125°C		
Temperature coefficient	±30ppm /°C	±15%	
Termination	Cu or Ag/Ni/Sn (lead-free termination)		

7. PACKAGE DIMENSION AND QUANTITY

Size	Thickness (mm)	Plastic tape	
		7" reel	13" reel
1206(3216)	1.25±0. 10	3k	10k
1808(4520)	1.25±0. 10	2k	10k
	1.40±0. 15	2k	10k
	1.60±0.20	2k	8k
	2.00±0.20	1k	6k
1812(4532)	1.25±0. 10	1k	-
	1.60±0.20	1k	-
	2.00±0.20	1k	-
	2.50±0.30	0.5k	3k
2211(5728)	1.60±0.20	1k	-
	2.00±0.20	1k	-
	2.50±0.30	0.5k	-
	2.80±0.30	0.5k	-
2220(5750)	2.00±0.20	1k	-
	2.50±0.30	0.5k	2k

REEL DIMENSIONS			
Size	1206	1808, 1812, 2211, 2220	
Reel size	7"	7"	
C	13.0 +0.5/-0.2	13.0 +0.5/-0.2	
W1	8.4 +1.5/-0	12.4 +2.0/-0	
A	178.0 ±0. 1	178.0 ±0. 1	
N	60.0 +1.0/-0	60.0 +1.0/-0	Fig. 7.1 The dimension of reel

7.1. EMBOSSED TAPE DIMENSIONS

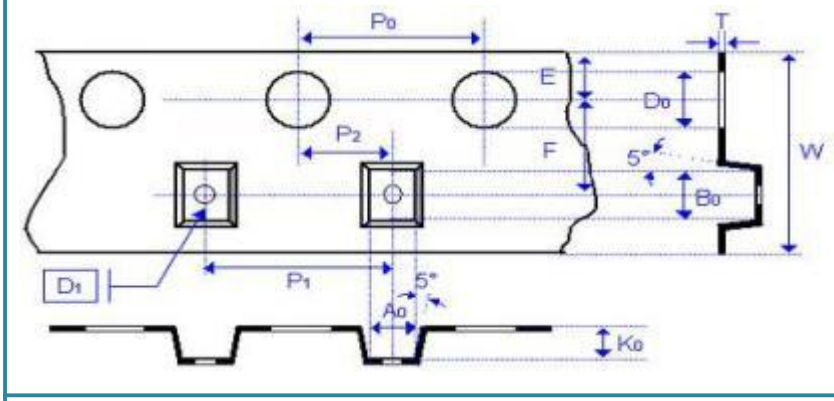


Fig. 7.2 The dimension of plastic tape

Size	1206	1808		1812		2211		2220	
Chip Thickness	1.25±0.10	1.25±0.10 1.40±0.15 1.60±0.20	2.00±0.20	1.25±0.10 1.60±0.20 2.00±0.20	2.50±0.30	1.60±0.20 2.00±0.20	2.50±0.30 2.80±0.30	2.00±0.20	2.50±0.30 2.80±0.30
A_0	<2.00	<2.50	<2.50	<3.90	<3.90	<3.30	<3.30	<5.80	<5.80
B_0	<3.60	<5.30	<5.30	<5.30	<5.30	<6.50	<6.50	<6.50	<6.50
T	0.23±0.05	0.25±0.05	0.25±0.05	0.25±0.05	0.25±0.05	0.30±0.10	0.30±0.10	0.30±0.10	0.30±0.10
K_0	<2.50	<2.50	<2.50	<2.50	<3.00	<2.50	<3.10	<2.50	<3.10
W	8.00±0.10	12.00±0.20	12.00±0.20	12.00±0.20	12.00±0.20	12.00±0.20	12.00±0.20	12.00±0.20	12.00±0.20
P0	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10
10xP0	40.00±0.20	40.00±0.20	40.00±0.20	40.00±0.20	40.00±0.20	40.00±0.20	40.00±0.20	40.00±0.20	40.00±0.20
P1	4.00±0.10	4.00±0.10	4.00±0.10	8.00±0.10	8.00±0.10	8.00±0.10	8.00±0.10	8.00±0.10	8.00±0.10
P2	2.00±0.05	2.00±0.05	2.00±0.05	2.00±0.05	2.00±0.05	2.00±0.05	2.00±0.05	2.00±0.05	2.00±0.05
D0	1.50+0.10/-0	1.50+0.10/-0	1.50+0.10/-0	1.50+0.10/-0	1.50+0.10/-0	1.50+0.10/-0	1.50+0.10/-0	1.50+0.10/-0	.50+0.10/-0
D1	1.00±0.10	1.50±0.10	1.50±0.10	1.50±0.10	1.50±0.10	1.50±0.10	1.50±0.10	1.50±0.10	1.50±0.10
E	1.75±0.10	1.75±0.10	1.75±0.10	1.75±0.10	1.75±0.10	1.75±0.10	1.75±0.10	1.75±0.10	1.75±0.10
F	3.50±0.05	5.50±0.05	5.50±0.05	5.50±0.05	5.50±0.05	5.50±0.05	5.50±0.05	5.50±0.05	5.50±0.05
Unit :	mm	mm	mm	mm	mm	mm	mm	mm	mm

8. APPLICATION NOTES

STORAGE

To prevent the damage of solderability of terminations, the following storage conditions are recommended :
Indoors under 5 ~ 40°C and 20% ~ 70% RH.
No harmful gases containing sulfuric acid, ammonia, hydrogen sulfide or chlorine.
Packaging should not be opened until the capacitors are required for use. If opened, the pack should be re-sealed as soon as is practicable. Taped product should be stored out of direct sunlight, which might promote deterioration in tape or adhesion performance. The product is recommended to be used within 12 months after shipment and checked the solderability before use.

HANDLING

Chip capacitors are dense, hard, brittle, and abrasive materials. They are liable to suffer mechanical damage, in the form of cracks or chips. Chip Capacitors should be handled with care to avoid contamination or damage. To use vacuum or plastic tweezers to pick up or plastic tweezers is recommended for manual placement. Tape and reeled packages are suitable for automatic pick and placement machine.

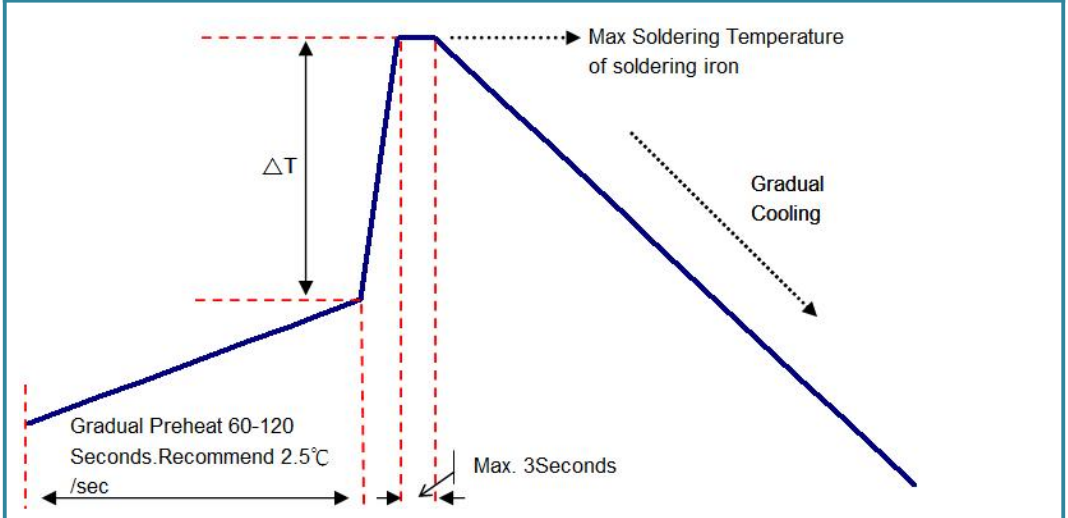
PREHEAT

In order to minimize the risk of thermal shock during soldering, a carefully controlled preheat is required. The rate of preheat should not exceed 3°C per second.

SOLDERING

Use middy activated rosin RA and RMA fluxes do not use activated flux. The amount of solder in each solder joint should be controlled to prevent the damage of chip capacitors caused by the stress between solder, chips, and substrate.
a.) Hand soldering :

Fig. 8.1 Hand Soldering Profile

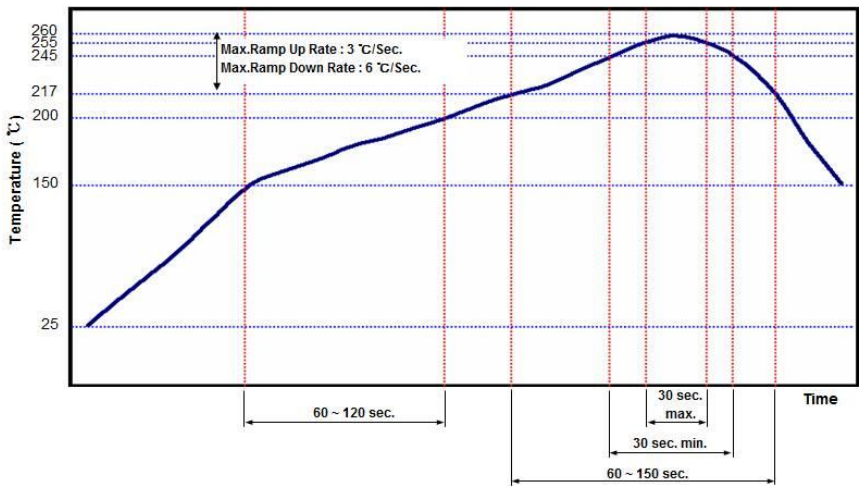


Chip Size	Pre-Heat temp.	△T	Max.soldering iron temp.
≤1206	≥150°C	≤150°C	≤350C
1210~2225	≥150°C	≤130°C	≤280°C

* Soldering iron tip diameter ≤1.0 mm and wattage max. 20W.
* The Capacitors shall be pre-heated and that the temperature gradient between the devices and the tip of the soldering iron.
* The required amount of solder shall be melted on the soldering tip.
* The tip of iron should not contact the ceramic body directly.
* The Capacitors shall be cooled gradually at room temperature after soldering.
* Forced air cooling is not allowed.

b.) Reflow soldering :

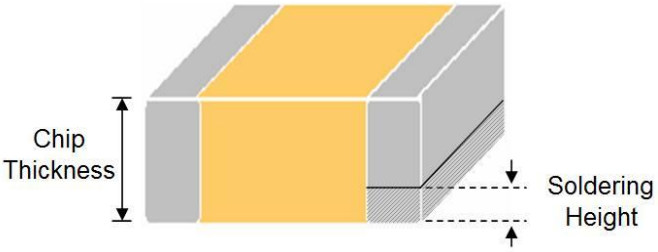
Fig. 8.2 Reflow soldering profile



For Sn/Ag/Cu Series solder paste (Pb-Free)

c.) Wave soldering :
Do not apply wave soldering for size >1206 products, the condition for FH06X series products please contactwith our sales representative.

Soldering height :

The solder climbing minimum height is suggesting to 25% of chip thickness or 500um whichever is less. (Reference from IPC-610E)	

COOLING

After soldering, cool the chips and the substrate gradually to room temperature. Natural cooling in air is recommended to minimize stress in the solder joint.

CLEANING

All flux residues must be removed by using suitable electronic-grade vapor-cleaning solvents to eliminate contamination that could cause electrolytic surface corrosion. Good results can be obtained by using ultrasonic cleaning of the solvent. The choice of the proper system is depends upon many factors such as component mix, flux, and solder paste and assembly method. The ability of the cleaning system to remove flux residues and contamination from under the chips is very important.