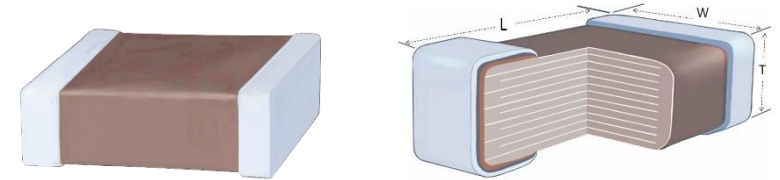


Multilayer Ceramic Chip Capacitors

江苏芯声微电子科技有限公司

Jiangsu Holy Ram Electronics
Technology Limited



CSA Series (Commerical Grade)

Material	X7R	X7S	X6S	X5R	C0G
Temp. Range	-55°C--125°C	-55°C--125°C	-55°C--105°C	-55°C--85°C	-55°C--125°C
Cap.Tolerance	±15%	±22%	±22%	±15%	±30ppm/°C





PRECAUTIONS FOR USE

Please attach the purchase specification before using this product.

SAFETY INFORMATION

Please pay attention to safety precautions when using this product.

Limitation of Applications

Please contact us before using our products for the applications listed below which require especially high reliability for the prevention of defects which might directly cause damage to the third party's life, body or property.

- | | | | |
|---|--|--|--------------------------------|
| ①Aircraft equipment | ②Aerospace equipment | ③Undersea equipment | ④Power plant control equipment |
| ⑤Medical equipment | ⑥Transportation equipment(vehicles, trains, ships, etc.) | ⑦Traffic signal equipment | |
| ⑧Disaster prevention / crime prevention equipment | ⑨Data-processing equipment | ⑩Application of similar complexity and/or reliability requirements to the applications listed in the above | |

Methods of transportation and storage

1. Transportation:

Packaged products suitable for modern transportation, in the process of transportation to prevent rain and acid and alkali corrosion, gravity throwing and force extrusion.

2. Storage:

The storage period to ensure good weldability of the product is one year from the date of production. Do not open the braid before use of the product (in the case of packaging and delivery). After the braid is opened, the product should be used within three months.

storage temperature: 0°C~35°C

Storage relative humidity: <70%



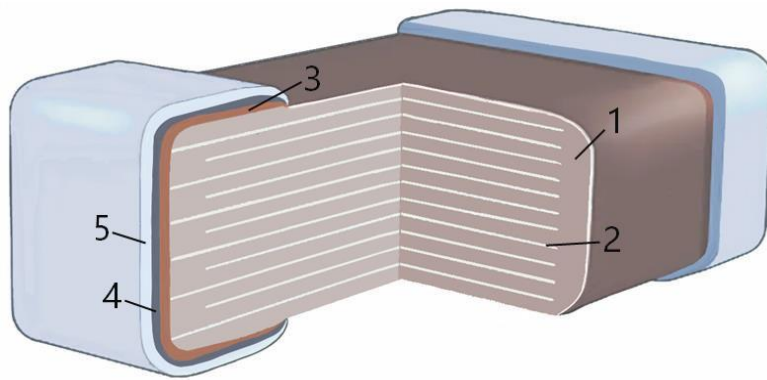
Characteristic

- Meets the IEC60384 standard
- Certified as lead-free
- halogen-free
- Non-polarity

Application

- General electronic equipment.
- Mobile devices
- Servers, computers, tablets

Product Structure Diagram



Serial number	Designation
1	Dielectric ceramics
2	Inner electrode (nickel)
3	Outer electrode (copper)
4	Nickel layer
5	Tin layer



Product model naming rules

EX: C SA 0402 X7R 104 K 500 G T

(1) (2) (3) (4) (5) (6) (7) (8) (9)

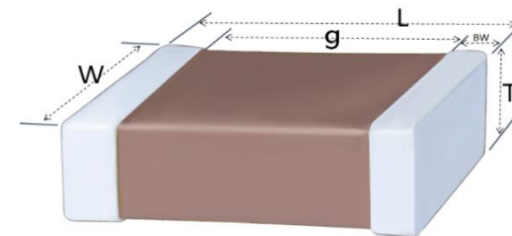
(1)	C:MLCC					(5) Capacitance Value	Cap. > =10pF:											
(2) Application	SA:Commerical						First Two×10^third											
(3) Product size (L*W)	Coding	inch		mm			104=10×10^4=100nF											
	00R4	008004		0201		123=12×10^3=12nF												
	01R5	01005		0402		Cap. < 10pF: R30=0.3pF, 1R0=1pF												
	0201	0201		0603		(6) Capacitance Tolerance	A: ±0.05pF		B: ±0.1pF		C: ±0.25pF		D: ±0.5pF		F: ±1.0%			
	0402	0402		1005			G: ±2%		J: ±5%		K: ±10%		M: ±20%		Z: 80/-20%			
	0603	0603		1608		(7) Rate Voltage Vdc	2R5:2.5		4R0:4.0		6R3:6.3		100:10		160:16		250:25	
	0805	0805		2012			350:35		500:50		630:63		800:80		101:100		201:200	
	1206	1206		3216			251:250		401:400		451:450		501:500		631:630		102:1000	
	1210	1210		3225			202:2000		252:2500		302:3000		402:4000					
	(8) Thickness (mm)	1808	1808		4520		A:0.10		B:0.13		C:0.18		D:0.20		E:0.30		F:0.45	
1812		1812	4532	G:0.50		H:0.60		J:0.80		K:0.85		L:1.15		M:1.25				
				N:1.60		P:1.90		Q:2.00		R:2.50								
(4) Temperature characteristic	X5R X6S X7R X7S C0G					(9) Packing	T: Finished product packaging (7" Reel)											



Size & Packing Specifications

Generally, a $\Phi 180\text{mm}$ (7") tray is used for packing.

Each 5 disks is packed into a box, and each 12 boxes is a whole box.



Specification	Size (mm)				Packing (7")	
	Length	Width	Thickness	g	Number(piece)	Method
0201	0.60±0.03	0.30±0.03	0.30±0.03	0.20	15,000	Paper tape
	0.60+0.10/-0.03	0.30+0.10/-0.03	0.30+0.10/-0.03			
0402	1.00±0.10	0.50±0.10	0.50±0.10	0.30	10,000	Paper tape
	1.00+0.20/-0.05	0.50+0.20/-0.05	0.50+0.20/-0.05			
0603	1.60±0.10	0.80±0.10	0.80±0.10	0.60	4,000	Paper tape
	1.60±0.20	0.80±0.20	0.80±0.20			
0805	2.00±0.10	1.25±0.10	0.60±0.10	0.70	4,000	Paper tape
			0.85±0.10			
	2.00±0.20	1.25±0.20	1.25±0.20		3,000/2,000	Plastic tape
1206	3.20±0.20	1.60±0.20	0.85±0.10	1.50	4,000	Paper tape
			1.25±0.20		3,000/2,000	Plastic tape
			1.60±0.20		2,000	Plastic tape
	3.20±0.30	1.60±0.30	1.60±0.30		2,000	Plastic tape
1210	3.20±0.30	2.50±0.20	0.85±0.10	1.50	2,000	Plastic tape
			1.25±0.20		2,000	Plastic tape
			1.60±0.20		2,000	Plastic tape
			2.00±0.20		2,000/1,000	Plastic tape
	3.20±0.40	2.50±0.30	2.50±0.30		2,000/1,000	Plastic tape

* Please refer to individual specification for details



Capacitance Range 【C0G】 0201~0805

Size (inch)	Thick (code)	RV (Vdc)	0.2pF			1pF			10pF						100pF						1nF					10nF
			R20	R30	R47	1R0	2R2	4R7	100	150	220	330	470	680	101	151	221	331	471	681	102	152	222	332	472	103
01005 (01R5)	0.20 (D)	16 25																								
0201	0.30 (E)	25 50																								
0402	0.50 (G)	16																								
		25																								
		50																								
		100																								
0603	0.80 (J)	25																								
		50																								
		100																								
		250																								
0805	0.60 (H)	50																								
		100																								
		250																								
		500																								
	0.85 (K)	50 250																								



【C0G】 1206~1210

Size (inch)	Thick (code)	RV (Vdc)	2.2pF		10pF						100pF					1nF					10nF			100nF
			2R2	4R7	100	150	220	330	470	680	101	221	331	471	681	102	152	222	332	472	103	223	473	104
1206	0.85 (K)	50																						
		100																						
		500																						
		630																						
		1000																						
	1.25 (M)	50																						
		2000																						
1210	0.85 (K)	250																						
		500																						
		2000																						
	1.25 (M)	50																						
		2000																						



【X7R/X7S】 0201~0805

Size (inch)	Thick (Code)	RV (Vdc)	100pF						1nF						10nF				100nF			1uF			10uF
			101	151	221	331	471	681	102	152	222	332	472	682	103	223	473	683	104	224	474	105	225	475	106
0201	0.30 (E)	6.3																							
		10																							
		16																							
		25																							
		50																							
0402	0.5 (G)	6.3																							
		10																							
		16																							
		25																							
		50																							
0603	0.80 (J)	6.3																							
		10																							
		16																							
		25																							
		50																							
0805	0.85 (K)	100																							
		250																							
		500																							
		10																							
		16																							
0805	1.25 (M)	25																							
		50																							
		100																							
		250																							
		500																							
0805	1.25 (M)	1000																							
		6.3																							
		10																							
		16																							
		25																							



【X7R/X7S】 1206

Size (inch)	Thick (Code)	RV (Vdc)	100pF				1nF			10nF			100nF			1uF			10uF	
			101	221	331	471	102	222	472	103	223	473	104	224	474	105	225	475	106	226
1206	0.85 (K)	25																		
		50																		
		100																		
		250																		
		500																		
		630																		
		1000																		
		2000																		
	1.25 (M)	16																		
		25																		
		50																		
		100																		
		250																		
		500																		
		630																		
		1000																		
		2000																		
	1.6 (N)	10																		
		16																		
		25																		
		50																		
		100																		
		250																		
		500																		
		630																		



【X7R/X7S】 1210

Size (inch)	Thick (Code)	RV (Vdc)	220pF			1nF			10nF			100nF			1uF			10uF		
			221	331	471	102	222	472	103	223	473	104	224	474	105	225	475	106	226	476
1210	1.25 (M)	50																		
		250																		
		500																		
		630																		
		1000																		
		2000																		
	1.60 (N)	16																		
		25																		
		50																		
		100																		
		500																		
		630																		
	2.00 (Q)	25																		
		50																		
		100																		
		250																		
		500																		
		630																		
	2.50 (R)	6.3																		
		10																		
		16																		
		25																		
		50																		
		100																		



【X5R】 01005~1210

Size (inch)	Thick (Code)	RV (Vdc)	15nF			100nF			1uF			10uF			100uF
			153	223	473	104	224	474	105	225	475	106	226	476	107
01005 (01R5)	0.20 (D)	6.3 10													
0201	0.30 (E)	6.3													
		10													
		16													
		25													
0402	0.50 (G)	6.3													
		10													
		16													
		25													
		50													
0603	0.80 (J)	6.3													
		10													
		16													
		25													
		50													
0805	0.85 (K)	10													
		6.3													
	1.25 (M)	10													
		16													
		25													
1206	1.25 (M)	25													
		6.3													
	1.60 (N)	10													
		16													
		25													
1210	2.00 (Q)	25													
		6.3													
	2.50 (R)	10													
		16													
		25													
		50													

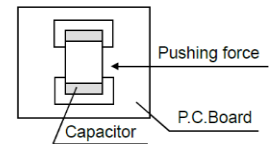


Specifications and Test Methods

No	Item	Specification	Test Method(Ref. Standard:JIS C 5101, IEC60384)			
1	Appearance	No defects or abnormalities.	Visual inspection			
2	Dimension	Shown in Dimension.	Using Measuring instrument of dimension.			
3	Voltage proof	Withstand the test voltage No defects or abnormalities.	Material	Rate voltage(RV)		Test voltage
			C0G	RV≤50V		300% RV
				50V < RV≤250V		200% RV
				250V < RV≤500V		150% RV
				500V < RV≤1000V		130% RV
			X7R/X5R/X6S	RV≤50V		250% RV
				50V < RV≤250V		200% RV
				250V < RV≤630V		150% RV
				630V < RV≤1000V		120% RV
Applied Time			1s to 5s			
Charge/discharge current			50mA max			
4	Insulation Resistance (I.R.)	Please refer to the single specification	Test Temperature		25℃	
			Test Point		Between the terminations	
			Test Voltage		Rate Voltage	
			Charging Time		1 min	
			Charge/discharge current		50mA max	
5	Capacitance	Within the specified tolerance	Measurement Temperature		25℃	
			Material	Capacitance	Frequency	Voltage
			C0G	C≤1000pF	1.0±0.1MHz	1.0±0.2Vrms
1000pF < C	1.0±0.1KHz	1.0±0.2Vrms				
6	Q or Dissipation Factor (D.F.)	Please refer to the single specification	X7R/X7S	C > 10uF	120Hz±24Hz	0.5V±0.1Vrms
			X5R/X6S	< C≤10uF	1.0±0.1KHz	1.0±0.2Vrms

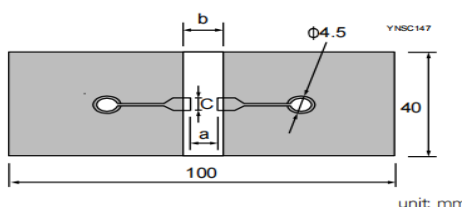
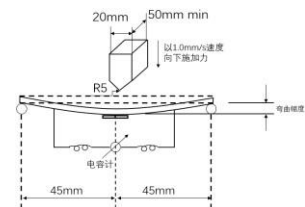


Specifications and Test Methods

No	Item	Specification		Test Method(Ref. Standard:JIS C 5101, IEC60384)	
7	Temperature Characteristics of Capacitance	Material	Cap. Change	The capacitance change should be measured after 5 min at each specified temp. stage. After reaching thermal equilibrium at each step, measure capacitance as shown in the following table.	
		C0G	Within $\pm 30\text{ppm}/^{\circ}\text{C}$		
				Step	Temperature($^{\circ}\text{C}$)
		X5R	$\pm 15\%$	1	Reference Temp.: $25 \pm 2^{\circ}\text{C}$
		X6S	$\pm 22\%$	2	Min.Operating Temp.: $\pm 3^{\circ}\text{C}$
		X7S	$\pm 22\%$	3	Reference Temp: $25 \pm 2^{\circ}\text{C}$
				4	Max.Operating Temp.: $\pm 2^{\circ}\text{C}$
		X7R	$\pm 15\%$	5	Reference Temp: $25 \pm 2^{\circ}\text{C}$
8	Adhesive Strength of Termination	No removal of the terminations or other defect should occur.		Mounting method	Solder the capacitor on the test substrate
				Applied Force	5N (0402:2.5N / 0201:1N)
				Holding Time	10 $\pm$ 1s
				Applied Direction	Thrust is gradually applied in the center of the specimen along the horizontal direction of the P.C. plate. 



Specifications and Test Methods

No	Item	Specification		Test Method(Ref. Standard:JIS C 5101, IEC60384)		
9	Substrate Bending test	Appearance:No defects or abnormalities.		Mounting method	Reflow solder the capacitor on the test substrate and bend 1mm	
		$\Delta C/C$ < Universal series > X7R/X7S/X5R: $\pm 10\%$ C0G: $\pm 1\%$ or 0.5 pF <High capacitance> (Whichever is larger) X7R/X7S/X5R: $\pm 12.5\%$		 		
10	Solderability	95% of the terminations is to be soldered evenly and continuously.		Kind of Solder:Sn-3.0Ag-0.5Cu(Lead Free Solder)		
				scaling powder :Isopropyl alcohol Rosin 25% solid solution.		
				Test Temperature:245 $\pm$ 5°C		
				Test Time :2 $\pm$ 0.5s.		
				Solder position: Until both ends are completely wet		
11	Resistance to Soldering Heat	Appearance	No defects or abnormalities.		Pre-treatment	Heat treatment:Perform a heat treatment at 150+0/-10°C for 1hour and then let sit for 24+/-2hours at room temperature, then measure.
		Capacitance	Material	Cap.Change	Test Method	Solder bath method
			C0G	Please refer to the single specification	Kind of Solder	Sn-3.0Ag-0.5Cu(Lead Free Solder)
			X7R/X7S X5R/X6S		Test Temperature	260 $\pm$ 5°C
		Q or D.F.	Within the specified initial value.		Test Time	10 $\pm$ 1s
		I.R.	Within the specified initial value.		Preheat Temperature	110°C to 140°C
		Voltage proof	No defects or abnormalities.		Preheat Time	1 min
					Post-treatment	Non treatment:Let sit for 24+/-2hours at room temperature, then measure.



Specifications and Test Methods

No	Item	Specification			Test Method(Ref. Standard:JIS C 5101, IEC60384)			
12	Temperature Cycle	Appearance	No defects or abnormalities.		Mounting	Solder the capacitor on the test substrate		
					Pre-treatment	Heat treatment:Perform a heat treatment at 150+0/-10°C for 1hour and then let sit for 24+/-2hours at room temperature, then measure.		
		Capacitance	Material	Cap. Change	Temperature Cycles		5cycles	
			COG	Please refer to the single specification	Step	Temperature(°C)	Time(min)	
			X7R/X7S X5R/X6S		1	Min Operating Temp.:±3°C	30±3min	
		Q or D.F.	Within the specified initial value.		2	Room Temp.	2~5min	
					3	Max Operating Temp.:±3°C	30±3min	
		I.R.	Within the specified initial value.		4	Room Temp.	2~5min	
					Post-treatment	Non treatment:Let sit for 24+/-2hours at room temperature, then measure.		
		13	High Temperature High Humidity	Appearance	No defects or abnormalities.		Mounting method	
Capacitance	Material			Cap. Change	Pre-treatment		Heat treatment:Perform a heat treatment at 150+0/-10°C for 1hour and then let sit for 24+/-2hours at room temperature, then measure.	
				Please refer to the single specification	Test Temperature		40±2°C	
				Test Humidity		90%RH to 95%RH		
Q or D.F. (COG)	Capacitance			Q	Test Time		500±24h	
	C≥30pF			Please refer to the single specification	Test Voltage		Rate Voltage (Not more than 630V)	
	10pF < C < 30pF				Charge/discharge current		50mA max	
	< 10pF							
Q or D.F. (X7R/X7S X5R/X6S)	Please refer to the single specification			Voltage regulation "After voltage treatment of the capacitor at test temperature and voltage for 1 hour", place the electrical vessel under ambient conditions for 24±2 hours prior to measurement, using this measurement as the initial value.				
I.R.	Please refer to the single specification							



Specifications and Test Methods

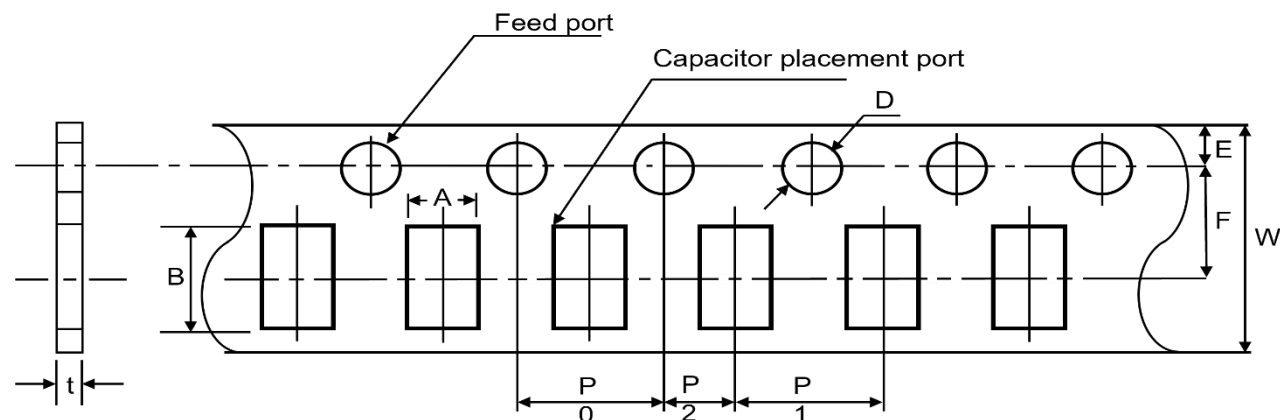
No	Item	Specification			Test Method(Ref. Standard:JIS C 5101, IEC60384)	
14	Life	Appearance	No defects or abnormalities.		Mounting method	Solder the capacitor on the test substrate
		Capacitance	Material	Cap.Change	Pre-treatment	Voltage treatment:Apply the test voltage at the test temperature for 1hour and then let sit for 24+/-2hours at room temperature, then measure.
				Please refer to the single specification	Test Temperature	Max. Operating Temp.:±3℃
					Test Time	1000±12 h
		Q or D.F. (C0G)	Capacitance	Q	Test Voltage (life)	Please refer to the single specification
			C≥30pF	Please refer to the single specification	Charge/discharge current	50mA max
			10pF < C < 30pF		Voltage regulation "After voltage treatment of the capacitor at test temperature and voltage for 1 hour", place the electrical vessel under ambient conditions for 24±2 hours prior to measurement, using this measurement as the initial value.	
			< 10pF			
		Q or D.F. (X7R/X7S X5R/X6S)	Please refer to the single specification			
		I.R.	Please refer to the single specification			



Product Packaging

At present, the most common way of packaging is to carry coil packaging. A coil with a diameter of 180mm (7") can contain 1000~20000 capacitors, or coil packaging can be carried out according to customer requirements.

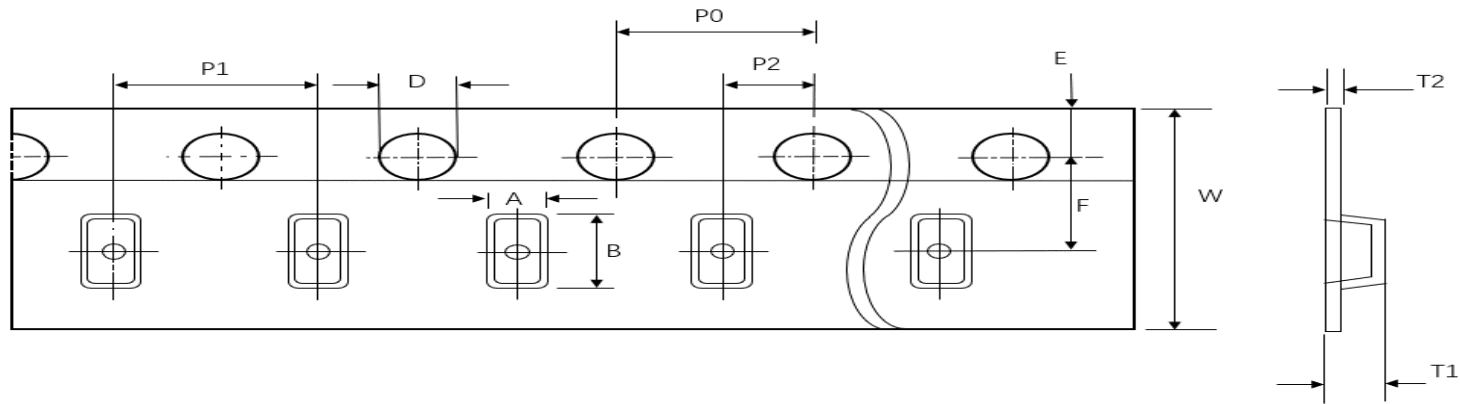
1. Tape Size



	01005 (0402)	0201 (0603)	0402 (1005)	0603 (1608)	0805 (2012)	1206 (3216)
P1	2.00±0.05(1.0 ±0.05)			4.00±0.10		
P0	4.00±0.10			4.00±0.10		
P2	2.00±0.05			2.00±0.05		
A	0.25±0.02	0.38±0.03	0.62±0.05	1.00±0.01	1.55±0.10	2.05±0.10
B	0.46±0.02	0.68±0.03	1.12±0.05	1.90±0.10	2.30±0.10	3.60±0.10
W	8.00±0.30			8.00±0.30		
E	1.75±0.10			1.75±0.10		
F	3.50±0.05			3.50±0.05		
D	φ1.50+0.10/-0.03			φ1.50+0.10/-0		
t	0.25±0.02	0.35±0.03	0.60±0.05	1.1Below		



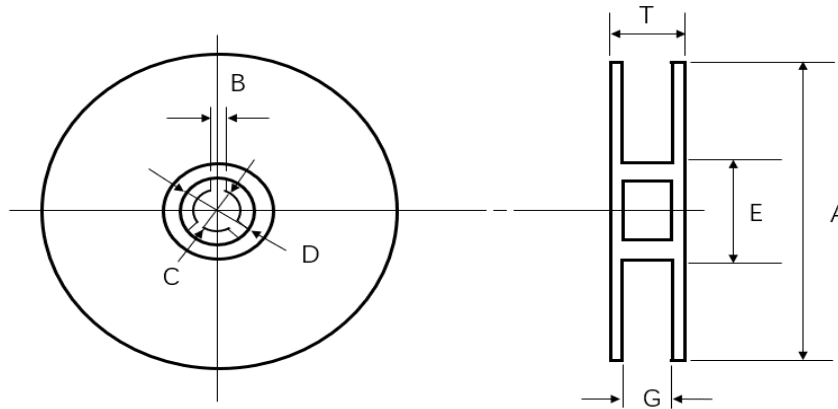
2. Plastic Size



	0603 (1608)	0805 (2012)	1206 (3216)	1210 (3225)
P1	4±0.1	4±0.1	4±0.1	4±0.1
P0	4±0.1	4±0.1	4±0.1	4±0.1
P2	2±0.05	2±0.05	2±0.05	2±0.05
A	1.2±0.2	1.45±0.2	1.9±0.2	2.8±0.2
B	2.0±0.2	2.3±0.2	3.5±0.2	3.6±0.2
W	8±0.3	8±0.2	8±0.2	8±0.2
E	1.75±0.1	1.75±0.1	1.75±0.1	1.75±0.1
F	3.5±0.05	3.5±0.05	3.5±0.05	3.5±0.05
D	1.5 (+0.1/-0.0)	1.5 (+0.1/-0.0)	1.5 (+0.1/-0.0)	1.5 (+0.1/-0.0)
T1	1.4 max	2.5 max.	2.5 max.	2.5 max.
T2	0.25±0.1	0.305±0.1	0.30±0.1	0.30±0.1



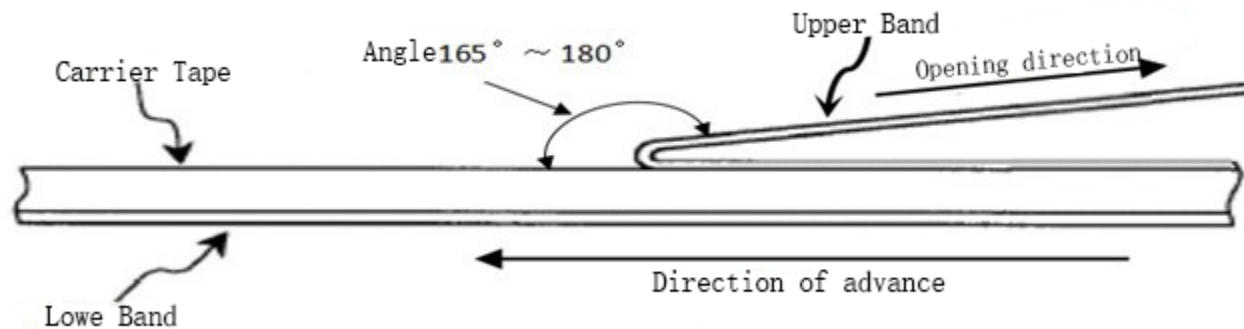
3. Disk Size



Disk Size	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	G (mm)	T (mm)
7"Reel	$\Phi 178 \pm 2.0$	2.0 ± 0.5	$\Phi 13 \pm 1.0$	$\Phi 21 \pm 0.8$	$\Phi 50$ or More	10 ± 1.0	13 ± 1.0

4. Instructions for use of reel tape

When the finished product is in use, the upper band (film) is at a speed of $300 \pm 10 \text{ mm/min}$, an Angle of $165^\circ \sim 180^\circ$ (as shown below), and the peeling strength is $0.1 \text{ N} \sim 0.7 \text{ N}$ ($10 \text{ g.f.} \leq \text{peeling force} \leq 70 \text{ g.f.}$).





Precautions for use

Multi-layer Ceramic Chip Capacitors(MLCC) may have short circuit or open circuit under the harsh working environment beyond the use frequency described in this letter of admission or related instructions, or under the action of external mechanical force overpressure. Or it may smoke, burn or even explode, so when using, we should first consider to follow the relevant instructions in this acknowledgement, if there is anything unclear, please contact our technical department, Quality Control Department or production Department.

1. The amount of solder used in welding

A. Too much solder will cause capacitor damage due to excessive pressure at the capacitor end.

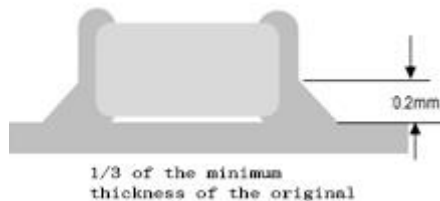


B. Too little solder fixed force is insufficient, may cause capacitor chip and line contact is poor.

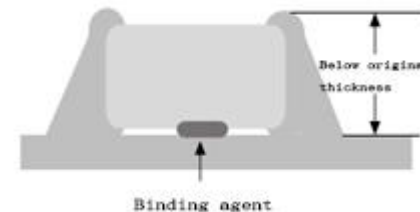


2. Recommended amount of solder:

A. Optimal amount of solder for reflow welding



B. Optimum amount of solder for wave soldering



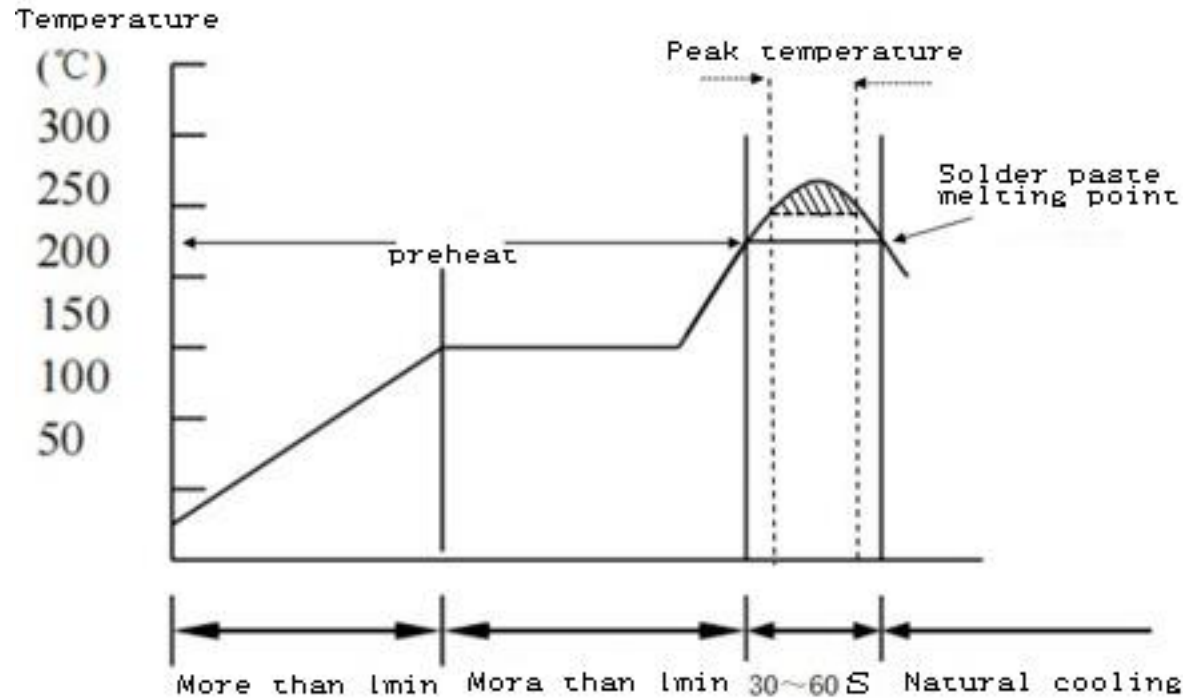
C. The optimal amount of solder used for repair with soldering iron





3.Recommended welding temperature curve:

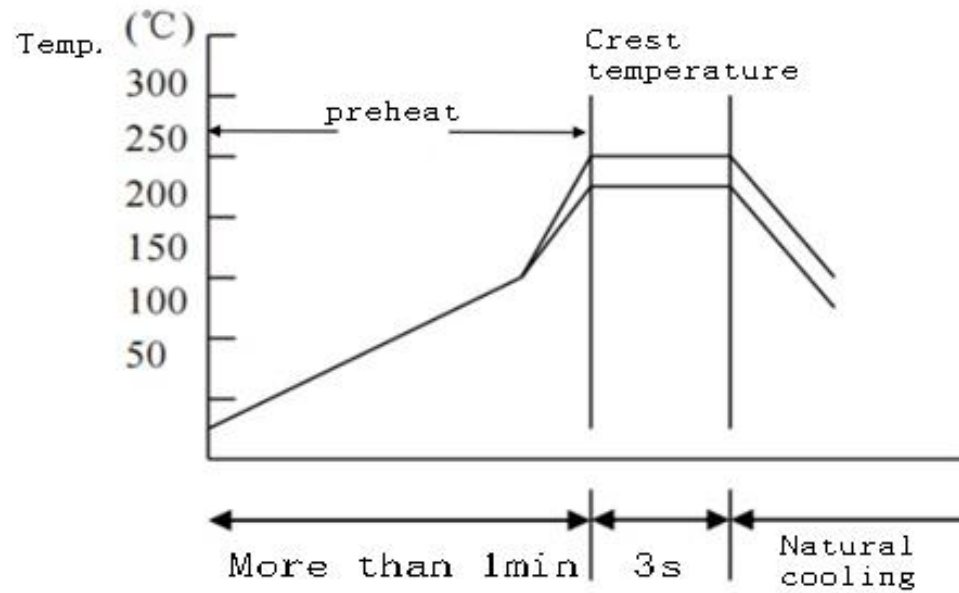
Reflow welding



Solder type	Pb-Sn welding	Lead-free welding
Peak temperature	230°C ~ 250°C	240°C ~ 260°C
Peak time	3s ~ 10s	3s ~ 10s



Wave soldering

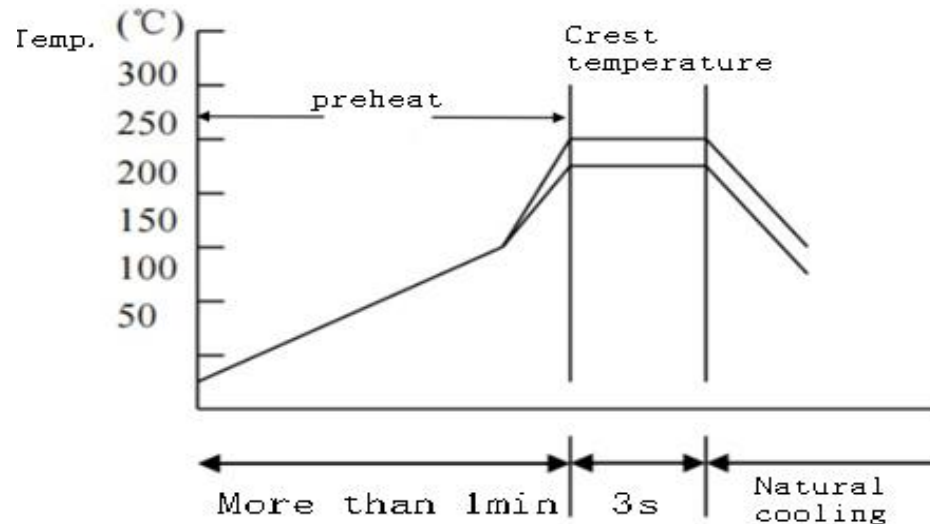


Solder type	Pb-Sn welding	Lead-free welding
Peak temperature	230°C ~ 260°C	240°C ~ 270°C
Peak time	Within 3s	Within 3s



Hand welding

Manual welding is easy to cause micro-cracking or partial cracking of porcelain because of uneven local heating of capacitor. Therefore, the use of electric iron manual welding should be carefully operated, and the choice of the tip of the electric branding iron and tip temperature control should be more careful.



Preheat	Temperature	Power	Diameter	Time	Tin paste	Notice
$\Delta \leq 130^{\circ}\text{C}$	$\leq 350^{\circ}\text{C}$	$\leq 20\text{W}$	Recommended 1mm	$\leq 3\text{s}$	$\leq 1/2$ Capacitance height	Do not contact the iron head directly with the ceramic body



Edition	Revision date	Revised content statement
CSA-S-2023-01	2023/2/24	Initial issue
CSA-S-2023-02	2023/6/09	1. Update the tolerance range 2. Update the packaging quantity