CCAH AEC-Q200

dielectric	COG/NPO CG/ N	X7R / B	X7S / K
temperature	-55℃--125℃	-55℃--125℃	-55℃--125℃
coefficient	±30ppm/℃	±15%	±22%

Use precautions

Please be sure to attach the purchase specification before using this product.

Safety precautions

When using this product, please pay attention to safety matters.

Application restrictions

Before using our products, please contact us with the following applications that require high reliability in particular to prevent defects that may directly cause damage to the life, body or property of a third party.

① Aircraft equipment ② Aerospace equipment ③ Underwater equipment ④ Power plant control equipmentt
⑤ Medical equipment ⑥ Transportation equipment (vehicles, trains, ships, etc.) ⑦ Traffic signal equipment
⑧ disaster prevention/crime prevention equipment ⑨ Data processing equipment
⑩ Complexity and/or reliability requirements similar to those of the above applications.

Transportation and storage methods

1. Transport

The packaging products are suitable for modern transportation, and should be protected from rain and acid and alkali corrosion during transportation. They shall not be thrown by gravity or squeezed violently.

2. Storage (Refer to IEC 61760-2, Clause 6 Storage conditions/IEC 60721-3-1: 2018, class 1K21)

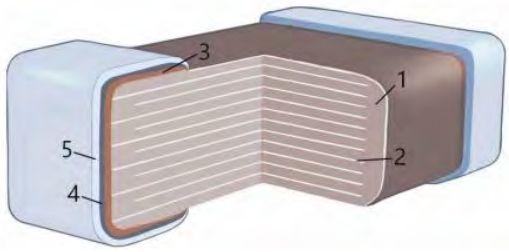
The storage period of the product with good weldability is: two years from the date of production. Do not open the tape before using the product (in the case of well packed and delivered), and the product should be used within three months after opening the tape.

Storage temperature: 5℃~40℃ Storage temperature: 5℃~40℃
Storage relative humidity: 10%~75% Storage relative humidity: 10%~75%
Environment: Harmless chemical environment Environment: Harmless chemical environment
Packaging: original packaging of core sound Packaging: original packaging of core sound
Solar radiation: 700 W/m², direct light should be avoided Solar radiation: 700 W/m², direct light should be avoided

Characteristic

- Complies with AEC-Q200 standard
- Complies with MSL 1 standard
- Complies with J-STD-020D standard
- High reliability and equipment reliability
- Passed 100% six-sided appearance inspection test

Structure diagram



Application

- Car audio and video
- Body electronics
- High reliability
- Industrial applications

No.	name
1	dielectric
2	Internal electrode (nickel)
3	External electrodes (copper)
4	nickel layer
5	The tin layer

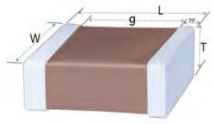
CCAH AEC-Q200

Part number example

CCAH	0603	B	104	K	1H	G	T
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)

No.	size code					
(1) Application	CCAH: General purpose for automobiles					
(2) size	code	inch	the metric system (mm)			
	00R4	008004	0201			
	01R5	01005	0402			
	0201	0201	0603			
	0402	0402	1005			
	0603	0603	1608			
	0805	0805	2012			
	1206	1206	3216			
	1210	1210	3225			
	1808	1808	4520			
	1812	1812	4532			
	2220	2220	5750			
(3) temperature characteristic	Class I：C0G Class II：X7R X7S					
(4) Capacitance value	The expression of capacitance value>= 10pF: First 2×10^3 104=10×10^4=100nF 123=12×10^3=12nF The expression of capacitance value <10pF: R30=0.3pF, 1R0=1pF					
(5) Capacitance tolerance	A：±0.05pF	B：±0.1pF	C：±0.25pF	D：±0.5pF	F：±1.0%	G：±2%
	J：±5%	K：±10%	M：±20%			
(6) Rated voltage (Vdc)	0E：2.5	0G：4.0	0J：6.3	1A：10	2C：16	2E：25
	1V：35	1H：50	1J：63	2A：100	2D：200	2E：250
	2W：450	2H：500	2J：630	3A：1000	3D：2000	3E：2500
	3U：3000	3G：4000				
(7) Product thickness (mm)	A：0.10	B：0.13	C：0.18	D：0.20	E：0.30	F：0.45
	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	S：2.30	R：2.50	
(8) Packaging method	T: Finished packaging (7"Reel)					

CCAH AEC-Q200



Size & packing specifications

In general, φ180mm (7") trays are used for packaging.
Five discs are packaged in one box and twelve boxes are a whole box.

specifications	size (mm)				Packaging (7")	
	Length	Width	Thickness	g	Packaging quantity (pieces)	manner of packing
01R5	0.40±0.02	0.20±0.02	0.20±0.02	0.13	20,000	paper tape
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±0.05	0.50±0.05	0.50±0.05	0.30	10,000	paper tape
	1.00±0.07	0.50±0.07	0.50±0.07			
	1.00±0.10	0.50±0.10	0.50±0.10			
	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			
specifications	size (mm)				Packaging (7")	
	Length	Width	Thickness	g	Packaging quantity (pieces)	manner of packing
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 strips
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 strips
			1.60±0.20		2,000	Plastic strips
	3.20±0.30	1.60±0.30	1.60±0.30		2,000	Plastic strips
1210	3.20±0.30	2.50±0.20	0.85±0.10	1.50	2,000	Plastic strips
			1.25±0.20		2,000	Plastic strips
			1.60±0.20		2,000	Plastic strips
			2.00±0.20		2,000/1,000	Plastic strips
	3.20±0.40	2.50±0.30	2.50±0.30		2,000/1,000	Plastic strips
1808	4.50±0.40	2.00±0.30	1.25±0.20		2,000	Plastic strips
			1.60±0.20		2,000	Plastic strips
			2.00±0.20		1,000	Plastic strips
1812	4.50±0.30	3.2±0.30	1.25±0.20	2.50	1,000	Plastic strips
			1.60±0.20		1,000	Plastic strips
	4.50±0.40	3.2±0.40	2.00±0.20		1,000	Plastic strips
			2.50±0.30		500/1,000	Plastic strips
2220	5.70±0.40	5.0±0.40	1.25±0.2	3.50	1,000	Plastic strips
			1.60±0.20		700	Plastic strips
			2.00±0.20		700	Plastic strips
			2.50±0.3		700	Plastic strips

* Please refer to the specification of a single particle for details

CCAH AEC-Q200

Capacitance range 【C0G】0402~0805

Size (inch)	thickness (Code)	RV	COG																											
			R20	R30	1R0	2R2	4R7	100	150	220	330	470	680	101	151	221	331	471	681	102	152	222	332	472	682	103	333
0402	0.50 (G)	25			■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■							
		50	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■							
0603	0.80 (J)	25			■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
		50			■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
		100						■	■	■	■	■	■	■	■	■	■	■	■	■							
0805	0.60 (H)	25												■	■	■	■	■	■	■							
		50												■	■	■	■	■	■	■							
	1.25 (M)	25																				■	■	■	■	■	
		50																				■	■	■	■	■	
1206	1.60(N)	630																								■	
1210	2.50 (R)	500																									■
		630																									■

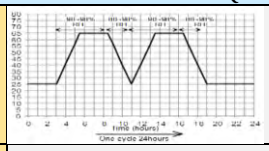
【X7R/X7S】0201~1210

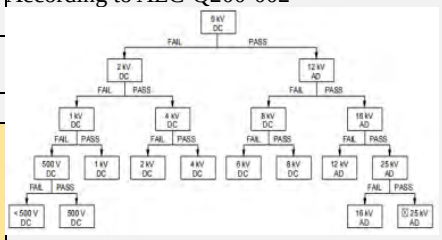
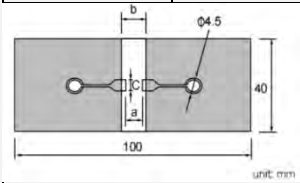
Size (inch)	thickness (Code)	RV (Vdc)	X7R/X7S/X7T																			
			151	221	471	102	152	222	472	103	223	473	104	224	474	105	225	475	106	226
0201	0.30 (E)	16				■	■	■	■	■										
		25				■	■	■	■	■										
0402	0.50(G)	6.3														X7S				
		10										■				X7S				
		16	■	■	■	■	■	■	■	■	■	■	■	■						
		25	■	■	■	■	■	■	■	■	■	■	■	■						
		50	■	■	■	■	■	■	■	■	■	■	■							
		100	■	■	■	■	■	■	■	■										
0603	0.80 (J)	6.3																	X7T	
		10														■				
		16				■	■	■	■	■	■	■	■	■	■	■				
		25				■	■	■	■	■	■	■	■	■	■	■				
		50		■	■	■	■	■	■	■	■	■	■	■		■				
		100		■	■	■	■	■	■	■	■	■	■							
0805	0.85 (K)	16										■	■	■						
		25										■	■	■						
		50			■	■	■	■	■	■	■	■	■							
		100				■	■	■	■	■	■	■								
		250				■	■	■	■											
	1.25 (M)	6.3																	■	
		10															■	■	■	
		16													■	■	■	■	X7S	
		25													■	■	■	X7S	X7S	

Size (inch)	Thick (Code)	RV (Vdc)	X7R/X7S/X7T																	
			151	221	471	102	152	222	472	103	223	473	104	224	474	105	225	475	106	226
0805	1.25 (M)	50																X7S		
		100														X7S				
		250																		
1206	0.85	50																		
	1.25 (M)	100																		
		500																		
		630																		
	1.60 (N)	10																		
		16																		X7S
		25																		
		50																	X7S	
		100															X7S			
		250																		
1210	2.00 (Q)	50																		
		100																		
	2.50 (R)	16																		
		25																		
		50																		
2220	2.30(S)	100																	X7S	

Specifications and test methods

No	item	Test specifications		Test method (Reference standard: AEC-Q200-Rev E)	
1	Pre-and-Post-Stress Electrical Test	--		--	
2	High Temperature Exposure(Storage)	surface	No defects or anomalies.	method of erection	Weld the capacitor to the test substrate
		Capacitance changes	C0G: ±2.5% or ±0.25pF (whichever is greater) X7R/X7S：±10%	Test temperature	150+/-3℃
		Q or D.F.	Same as the initial specification value	testing time	1000 +/-12 hours
		I.R.	Same as the initial specification value	reprocessing	Leave at room temperature for 24 +/-2 hours, then measure
3	Temperature Cycling	surface	No defects or anomalies	method of erection	Weld the capacitor to the test substrate
		Capacitance changes	C0G: ±2.5% or ±0.25pF (whichever is greater) X7R/X7S：±10%	pretreatment	Heat treatment for 1 hour at 150+/-0/-10℃, then leave at room temperature for 24+/-2 hours before measurement
		Q or D.F.	Same as initial specification value	period:	15 minutes
		I.R.	Same as initial specification value	temperature cycle	step 1: Minimum operating temperature +0/-3, 15+/-32 minutes step 2: room temperature, 1 step 3: Maximum operating temperature +3/-0, 15+/-3 step 4: room temperature, 1
				reprocessing	Leave at room temperature for 24 +/-2 hours before measuring
4	(DPA)	surface	No defects or anomalies	No defects or anomalies	
5	Moisture Resistance	surface	No defects or anomalies	method of erection	Weld the capacitor to the test substrate
		Capacitance changes	C0G: ±3% or ±0.3pF (whichever is greater) X7R/X7S：±15%	Test temperature	+25℃ to +65℃
				Test humidity	80% to 98% R.H.
		Q or D.F.	Same as initial specification value	testing time	Test 10 times for 24 hours (see figure below)

No	item	Test specifications		Test method (Reference standard: AEC-Q200-Rev E)	
5	Moisture Resistance	I.R.	Same as initial specification value	Temperature and humidity cycles	
				reprocessing:	Leave at room temperature for 24 +/-2 hours before measuring
6	Biased Humidity	surface	No defects or anomalies	method of erection	Weld the capacitor to the test substrate
		Capacitance changes	C0G: ±2% or ±1pF (the larger value is taken as the standard) X7R/X7S: ±15%	Test temperature	85+/-3℃
				Test humidity	80% to 85% R.H.
		Q or D.F.	Please refer to the specification sheet for a single particle	testing time	1000 +/-12 hours
		I.R.	Please refer to the specification sheet for a single particle	test voltage	Connect 100KΩ resistor and apply 150% R.V. Rated voltage (not exceeding 630V)
				Charging/discharge current	Maximum 50mA
				reprocessing	Leave at room temperature for 24 +/-2 hours, then measure
7	Operational Life	surface	No defects or anomalies	method of erection	Weld the capacitor to the test substrate
		Capacitance changes	C0G: ±2% or ±1pF (whichever is greater) X7R/X7S：±15%	Test temperature	Maximum operating temperature +/-3℃
				testing time	1000+/-12h
		Q or D.F.	Please refer to the specification sheet for a single particle	test voltage	Please refer to the specification sheet for a single particle
		I.R.	Please refer to the specification sheet for a single particle	Charging/discharge current	Maximum 50mA
				reprocessing:	Leave at room temperature for 24 +/-2 hours, then measure
8	Appearance	No defects or anomalies		Visual (microscopic) examination	
9	Size Dimension	In terms of size		Use a size measuring instrument	
10	Resistance to Solvents	surface	No defects or anomalies	According to MIL-STD-202 Method 215	
		Capacitance changes	Same as the initial specification value		
		Q or D.F.	Same as the initial specification value		
		I.R.	Same as the initial specification value		
11	Mechanical Shock	surface	No defects or anomalies	method of erection	Weld the capacitor to the test substrate
		Capacitance changes	Same as the initial specification value	wave form	Half sine
		Q or D.F.	Same as the initial specification value	peak value	1500g
		I.R.	Same as the initial specification value	holding time	0.5ms
				velocity change	4.7m/s
				Direction and time of impact	Each direction should be impacted three times (18 impacts) along the three mutually perpendicular axes of the specimen
12	Mechanical Vibration	surface	No defects or anomalies	method of erection	Weld the capacitor to the test substrate
		Capacitance changes	Same as the initial specification value	Vibration type	A 10Hz~2000Hz~10Hz
		Q or D.F.	Same as the initial specification value	Vibration time	20 minutes
		I.R.	Same as the initial specification value	total amplitude	1.5mm
				Direction and time of vibration	Do 12 items (36 times in total) for every 3 mutually perpendicular directions
13	Resistance to Soldering Heat	surface	No defects or anomalies	test method	Solder bath method
		Capacitance changes	Same as initial specification value	Welding material type	Sn-3.0Ag-0.5Cu（Lead Free Solder）
		Q or D.F.	Same as initial specification value	Test temperature	260+/-5℃
		I.R.	Same as the initial specification value	testing time	10+/-1s
				reprocessing	Leave at room temperature for 24 +/-2 hours, then measure

<table>
<tr><th>No</th><th>item</th><th colspan="2">Test specifications</th><th colspan="2">Test method (Reference standard: AEC-Q200-Rev E)</th></tr>
<tr><td rowspan="4">14</td><td rowspan="4">Electrical static testing (ESD)</td><td>surface</td><td>No defects or anomalies</td><td colspan="2" rowspan="4">According to AEC-Q200-002
 
Note: classified according to the highest electrostatic voltage level that can be withstand during electrostatic testing. Passive component HBM anti-static test flow chart (DC= direct contact discharge, AD= air discharge)</td></tr>
<tr><td>Capacitance changes</td><td>Same as initial specification value</td></tr>
<tr><td>Q or D.F.</td><td>Same as initial specification value</td></tr>
<tr><td>I.R.</td><td>Same as the initial specification value</td></tr>
<tr><td rowspan="5">15</td><td rowspan="5">solderability
Solderability（a）</td><td colspan="2" rowspan="5">Ninety-five percent of the terminals should be welded continuously and evenly</td><td>pretreatment</td><td>Heat treatment for 4 hours at 155℃</td></tr>
<tr><td>flux</td><td>Solution of rosin ethanol 25（mass）%</td></tr>
<tr><td>Type of solder</td><td>Sn-3.0Ag-0.5Cu（Lead Free Solder）</td></tr>
<tr><td>welding temperature</td><td>245+/-5℃</td></tr>
<tr><td>soak period</td><td>5+0/-0.5s</td></tr>
<tr><td rowspan="9">16</td><td rowspan="9">electrical character
Electrical Characterization</td><td>Capacity</td><td>Within the specified tolerance</td><td>Test temperature</td><td>25℃</td></tr>
<tr><td rowspan="2">D.F.</td><td rowspan="2">Please refer to the specification sheet for a single particle</td><td rowspan="2"></td><td rowspan="2"><table><tr><th>material quality</th><th></th><th>Capacity</th><th>frequency</th><th>voltage</th></tr><tr><td rowspan="2">Class I</td><td rowspan="2">C0G</td><td>C≤1000pF</td><td>1.0±0.1MHz</td><td>0.5-5.0Vrms</td></tr><tr><td>C>1000pF</td><td>1.0±0.1KHz</td><td>1.0±0.2Vrms</td></tr><tr><td rowspan="2">Class II</td><td rowspan="2">X7R/ X7S</td><td>C>10uF</td><td>120Hz±24Hz</td><td>0.5V±0.1Vrms</td></tr><tr><td>C≤10uF</td><td>1.0±0.1KHz</td><td>1.0±0.2Vrms</td></tr></table></td></tr>
<tr><td rowspan="4">I.R.</td><td rowspan="4">Please refer to the specification sheet for a single particle</td><td>Test temperature</td><td>25℃</td></tr>
<tr><td>test voltage</td><td>rated voltage</td></tr>
<tr><td>charging interval</td><td>Two minutes</td></tr>
<tr><td>Charging/discharge current</td><td>Maximum 50mA</td></tr>
<tr><td>withstand voltage</td><td>Can withstand the test voltage without defects or abnormalities</td><td>Charging/discharge current</td><td><table><tr><th>Rated voltage (R.V.)</th><th>test voltage</th></tr><tr><td>R.V.≤100V</td><td>250% RV</td></tr><tr><td>100V < R.V.≤200V</td><td>150% RV+100</td></tr><tr><td>200V < R.V.≤500V</td><td>130% RV+100</td></tr><tr><td>R.V. > 500V</td><td>130% RV</td></tr><tr><td>R.V.≥1000V</td><td>120% RV</td></tr></table>Maximum 50mA</td></tr>
<tr><td rowspan="5">17</td><td rowspan="5">Flat board test
Board Flex</td><td>surface</td><td>No defects or anomalies</td><td>method of erection</td><td>Weld the capacitor to the test substrate</td></tr>
<tr><td>Capacitance changes</td><td>C0G: ±1% or ±0.5pF (whichever is greater)
X7R/X7S：±10%</td><td>test method</td><td>The force is applied at a speed of 1mm/s to bend it, and the fixture radius is 340 mm</td></tr>
<tr><td>Q or D.F.</td><td>Same as initial specification value</td><td>The amplitude of bending</td><td>C0G：3mm
X7R/X7S：2mm</td></tr>
<tr><td rowspan="2">I.R.</td><td rowspan="2">Same as the initial specification value</td><td>duration</td><td>60s</td></tr>
<tr><td colspan="2"> 

<table><tr><th>size</th><th>a</th><th>b</th><th>c</th></tr><tr><td>0201</td><td>0.3</td><td>0.9</td><td>0.3</td></tr><tr><td>0402</td><td>0.5</td><td>1.5</td><td>0.6</td></tr><tr><td>0603</td><td>0.6</td><td>2.2</td><td>0.9</td></tr><tr><td>0805</td><td>0.8</td><td>3.0</td><td>1.3</td></tr><tr><td>1206</td><td>2.0</td><td>4.4</td><td>1.7</td></tr><tr><td>1210</td><td>2.0</td><td>4.4</td><td>2.6</td></tr></table>unit:mm</td></tr>
<tr><td rowspan="4">18</td><td rowspan="4">Thrust test
Terminal Strength</td><td>surface</td><td>No defects or anomalies</td><td>method of erection</td><td>Weld the capacitor to the test substrate</td></tr>
<tr><td>Capacitance changes</td><td>Same as initial specification value</td><td rowspan="3">acting force</td><td rowspan="3">Apply a continuous force of 17.7N (1.8Kg)
*0402 Apply a force of 2N
*0201 Apply a force of 1N
Note: Apply force gradually to avoid impact on the measuring part</td></tr>
<tr><td>Q or D.F.</td><td>Same as initial specification value</td></tr>
<tr><td>I.R.</td><td>Same as the initial specification value</td></tr>
<tr><td colspan="4"></td><td>duration</td><td>60+1s</td></tr>
</table>

<table>
<tr><th>No</th><th>item</th><th colspan="2">Test specifications</th><th colspan="3">Test method (Reference standard: AEC-Q200-Rev E)</th></tr>
<tr><td>19</td><td>Load testing
Beam Load Test</td><td>The allowable value should exceed the following values</td><td>Product L size is less than 2.5mm
Product T thickness> 0.5mm: 20N

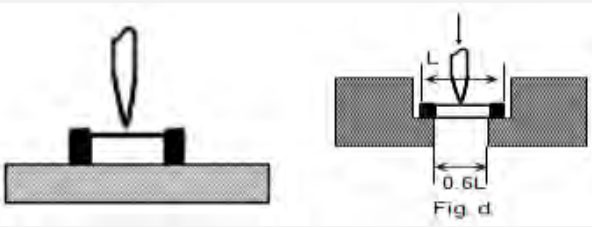
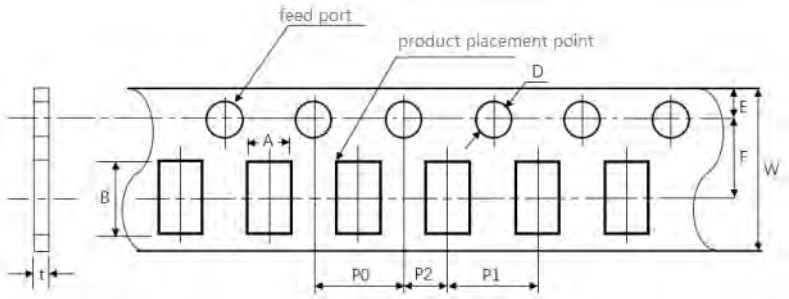
Product L size> = 3.2mm
Product T thickness> = 1.25mm: 54N</td><td colspan="3">The pressure load provides a speed of 0.1mm/s
Location diagram: [Product L size ≤ 2.5mm][Product L size ≥ 3.2mm]
 

Fig. d</td></tr>
<tr><td rowspan="4">20</td><td rowspan="4">Temperature characteristics
Temperature Characteristics of Capacitance</td><td rowspan="3">change in capacitance</td><td rowspan="3">The nominal value of the temperature coefficient is shown in the rated value. The change of capacitance at reference temperature is shown in Table A.</td><td colspan="3">The capacitance change should be measured after 5 minutes at each specified temperature stage.
The capacitance value is used as a reference value and is the step value marked with "*".</td></tr>
<tr><td>Capacitance changes</td><td colspan="2">The value of the change is calculated by dividing the difference between the maximum and minimum values</td></tr>
<tr><td>test voltage</td><td colspan="2">Less than 1.0Vrms</td></tr>
<tr><td>Capacitance changes</td><td>C0G：±30ppm/℃
X7R/X7S：±15%</td><td>Temperature step (A)</td><td colspan="2"><table><tr><th>step</th><th>temperature</th></tr><tr><td>1</td><td>Reference temperature +/-2</td></tr><tr><td>2</td><td>Minimum operating temperature +/-3</td></tr><tr><td>3*</td><td>Reference temperature +/-2</td></tr><tr><td>4</td><td>Maximum operating temperature +/-3</td></tr><tr><td>5</td><td>Reference temperature +/-2</td></tr></table></td></tr>
</table>

product packaging

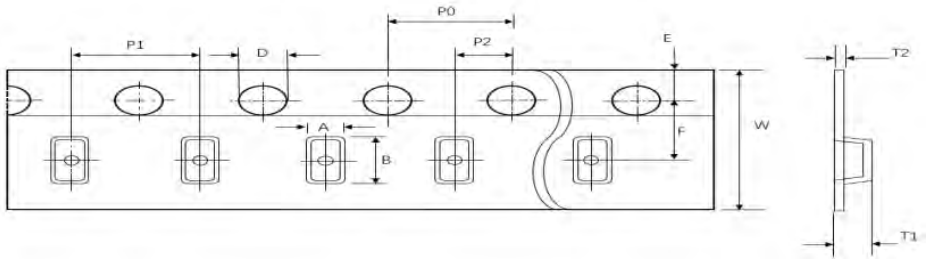
The tape reel packaging is the most common packaging method at present. A reel with a diameter of 180mm (7") can contain 1000~20000 capacitors, and can also be packaged according to customer requirements.

1. Tape size



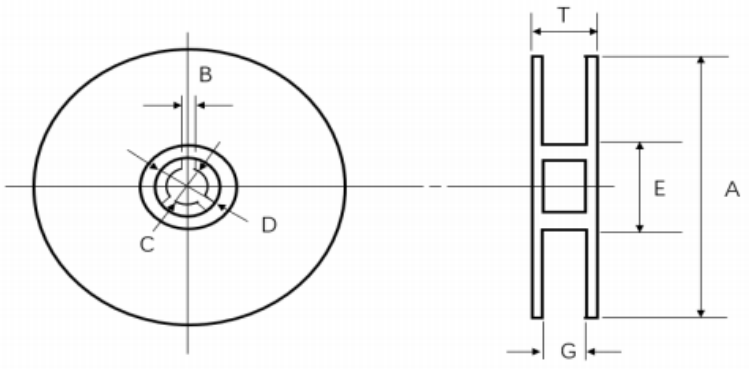
	01005（0402）	0201（0603）	0402（1005）	0603（1608）	0805（2012）	1206（3216）
P1	2.00±0.05（1.0±0.05）			4.00±0.10		
P0	4.00±0.10			4.00±0.10		
P2	2.00±0.05			2.00±0.05		
A	0.25±0.02	0.38±0.03	0.62±0.05	1.00±0.01	1.55±0.10	2.05±0.10
B	0.46±0.02	0.68±0.03	1.12±0.05	1.90±0.10	2.30±0.10	3.60±0.10
W	8.00±0.30			8.00±0.30		
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. Size of plastic bags



	0805（2012）	1206（3216）	1210（3225）	1808（4520）	1812（4532）	2220（5750）
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
P1	4.00±0.10	4.00±0.10	4.00±0.10	4.00±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
A	<1.80	<2.50	<3.20	<2.50	<3.90	<6.80
B	<2.70	<4.00	<4.00	<5.30	<5.30	<6.50
W	8.00±0.20	8.00±0.20	8.00±0.20	12.00±0.20	12.00±0.20	12.00±0.20
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
F	3.5±0.05	3.5±0.05/5.50±0.05	3.5±0.05/5.50±0.05	5.50±0.05	5.50±0.05	5.50±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）	1.5（+0.1/-0.0）	1.5（+0.1/-0.0）
T1	2.5max.	2.5max.	3.5max.	2.5max.	3.0max.	3.1max.
T2	0.23±0.05	0.23±0.05/0.95±0.05	0.23±0.05	0.30±0.1	0.30±0.1	0.30±0.1

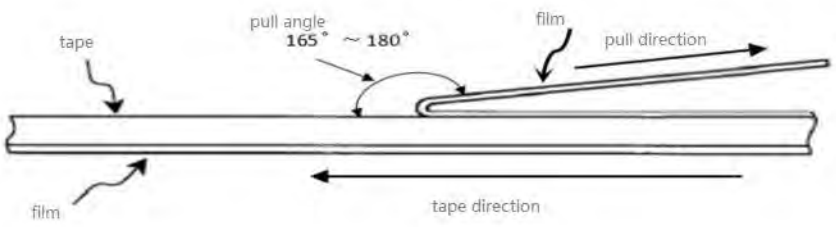
3. Disk size



Disc size	A（mm）	B（mm）	C（mm）	D（mm）	E（mm）	G（mm）	T（mm）
7"Reel	φ178±2.0	2.0±0.5	φ13±1.0	φ21±0.8	φ 50 or more	10±1.0	13±1.0

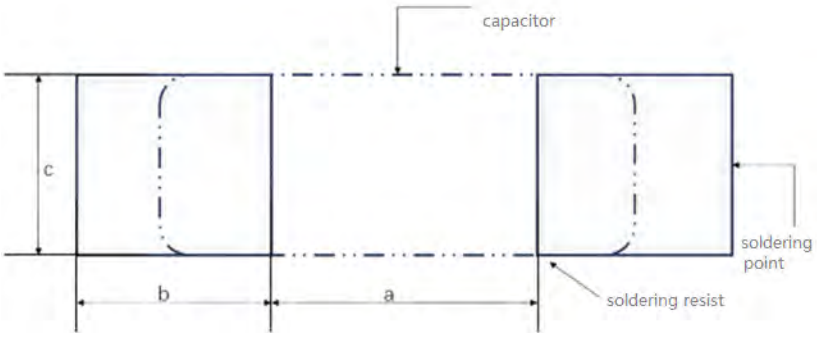
4. Instructions for use of roll tape

When the finished product is used, the upper belt (membrane) is peeled at a speed of 300±10mm/min and an Angle of 165°~180° (as shown in the figure below), with a peel strength of 0.1N~0.7N(10g.f≤peel force≤70g.f).



5. Welded plate size

Please confirm the appropriate size by evaluating the actual SET/PCB.



wave-soldering

Size (Unit: mm)		a	b	c
0603	1.60*0.80mm	0.6~1.0	0.8~0.9	0.6~0.8
0805	2.00*1.25mm	1.0~1.2	0.9~1.0	0.8~1.1
1206	3.20*1.60mm	2.2~2.6	1.0~1.1	1.0~1.4

reflow soldering

Size (Unit: mm)		a	b	c
0201	0.60*0.30mm	0.2~0.3	0.2~0.35	0.25~0.4
0402	1.00*0.50mm	0.3~0.6	0.35~0.5	0.4~0.7
0603	1.60*0.80mm	0.6~0.9	0.6~0.8	0.6~1.0
0805	2.00*1.25mm	1.0~1.4	0.6~0.8	1.2~1.4
1206	3.20*1.60mm	1.8~2.1	1.9~1.3	1.5~1.9
1210	3.20*2.50mm	2.0~2.4	1.0~1.2	1.8~2.3

Use precautions

Multilayer ceramic chip capacitors (MLCCs) may experience short circuits, open circuits, or even smoke, burn, or explode under harsh working conditions exceeding the usage frequency specified in this acceptance document or related manuals, or when subjected to excessive external mechanical forces. Therefore, when using them, please first refer to the relevant instructions in this acceptance document. If you have any questions, please contact our Technical Department, Quality Control Department, or Production Department.

1. The amount of solder used in welding

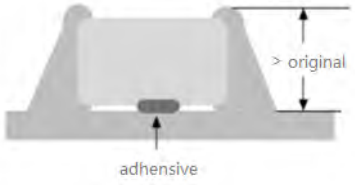
A. Too much solder can cause damage to the capacitor due to excessive pressure at the end of the capacitor.

B. Too little solder and insufficient fixing force may cause poor contact between the capacitor chip and the line.

2. Recommended solder usage:

A. Optimal solder quantity for reflow welding

B. Optimal solder usage for peak welding



C. The best amount of solder to use when using a soldering iron for repair

3. Precautions for printing PCB board

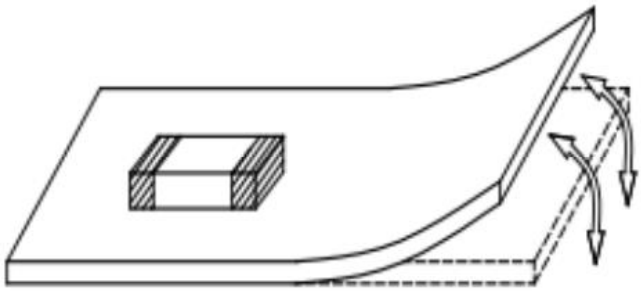
After the MLCC is installed on the PCB, do not apply any stress to the MLCC, such as bending or twisting the board.

· Stress as shown in the figure may cause cracks in MLCC when cutting the board.

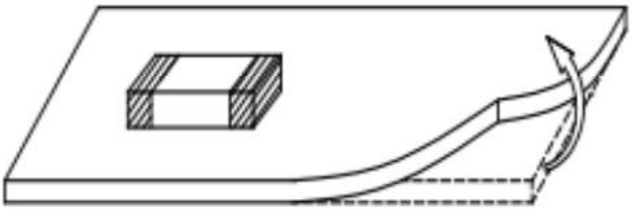
· MLCC cracking may lead to a decrease in insulation resistance, resulting in a short circuit.

· Avoid applying these types of stress to MLCC.

[Curving] [Twisting]



[Curving] [Twisting]



3.1 Precautions for cutting PCB board

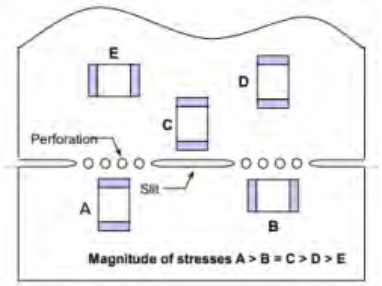
Check the PCB cutting method in advance.

The high density board is divided into many separate boards after welding. If the board bends or deforms during separation, the MLCC may break.

Carefully select a separation method to minimize PCB deformation

3.2 Product layout and chip PCB

When breaking a PCB, the layout should pay attention to mechanical stress depending on the position of the capacitor. The following example shows suggestions for better design.



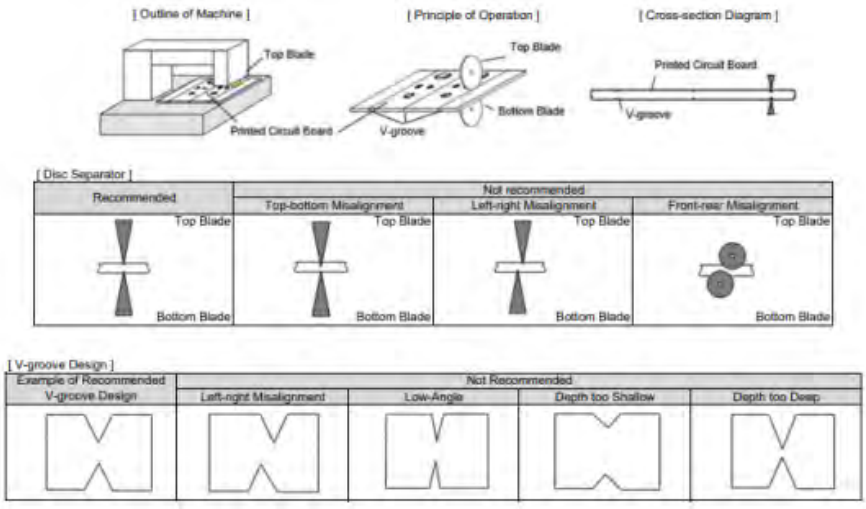
3.3 An example of a disk separator

The contour of the disc separator is shown below. As shown in the working principle, the upper and lower blades align with the ν-shaped groove on the printed circuit board to separate it. In the following cases, bending stress will be applied to the board surface and cause cracks in the capacitor.

(1) The upper and lower blades are misaligned, such as the upper and lower, left and right, front and back directions

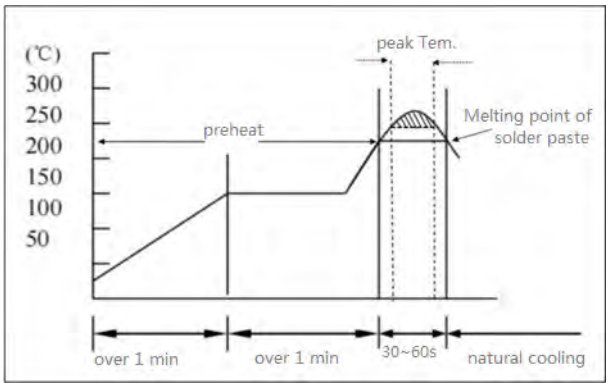
(2) The Angle of the V-shaped groove is too low, the depth of the V-shaped groove is too shallow, or the V-shaped groove is misaligned

If the V slot is too deep, it may brake during handling. Take into account the strength of the PCB material and carefully design the depth of the V slot.



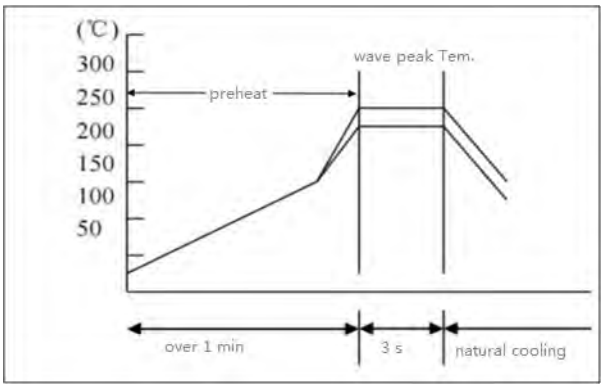
4. Recommended welding temperature curve:

Welding mode	≤0402	0603	0805	1206	≥1210
reflow soldering	All specifications	>1.0μF	>2.2μF	>4.7μF	All specifications
Return/wave soldering		≤1.0μF	≤2.2μF	≤4.7μF	



Type of solder	Pb-Sn weld	lead-free soldering
Peak temperatures	230℃~250℃	240℃~260℃
Peak time	3s~10s	3s~10s

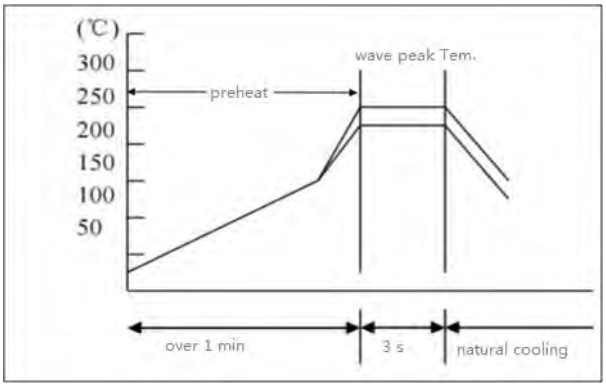
Boltzman distribution law



Type of solder	Pb-Sn weld	lead-free soldering
Peak temperatures	230℃~260℃	240℃~270℃
Peak time	Within 3 seconds	Within 3 seconds

manual welding

Manual welding is easy to cause micro-cracking or local bursting of porcelain body because of uneven heating of the capacitor. Therefore, when using soldering iron for manual welding, it should be carefully operated, and more care should be taken in the selection of the tip of the soldering iron and the control of the tip temperature.



preheat	The temperature of the soldering iron	Wattage of the soldering iron	Diameter of the soldering iron head	weld period	The amount of ointment	matters need attention
△≤ 130℃	≤350℃	≤20W	Suggest 1mm	≤3s	Less than 1/2 capacitance height	Do not touch the ceramic body directly with the iron head