

# SPECIFICATION

SPEC. No. C-SoftC-c

D A T E : 2016 Nov.

To

**Non-Controlled Copy**

CUSTOMER'S PRODUCT NAME

TDK'S PRODUCT NAME

Multilayer Ceramic Chip Capacitors  
C series/ Commercial grade  
Soft Termination

Please return this specification to TDK representatives with your signature.  
If orders are placed without returned specification, please allow us to judge that specification is accepted by your side.

## RECEIPT CONFIRMATION

DATE: \_\_\_\_\_ YEAR \_\_\_\_\_ MONTH \_\_\_\_\_ DAY \_\_\_\_\_

TDK Corporation  
Sales  
Electronic Components  
Sales & Marketing Group

Engineering  
Electronic Components Business Company  
Ceramic Capacitors Business Group

APPROVED	Person in charge

APPROVED	CHECKED	Person in charge

## 1. SCOPE

This specification is applicable to chip type multilayer ceramic capacitors with a priority over the other relevant specifications.

Production places defined in this specification shall be TDK Corporation Japan, TDK(Suzhou)Co.,Ltd and TDK Components U.S.A. Inc.

### EXPLANATORY NOTE:

This specification warrant the quality of the ceramic chip capacitor. The chips should be evaluated or confirmed a state of mounted on your product.

If the use of the chips go beyond the bounds of this specification, we can not afford to guarantee.

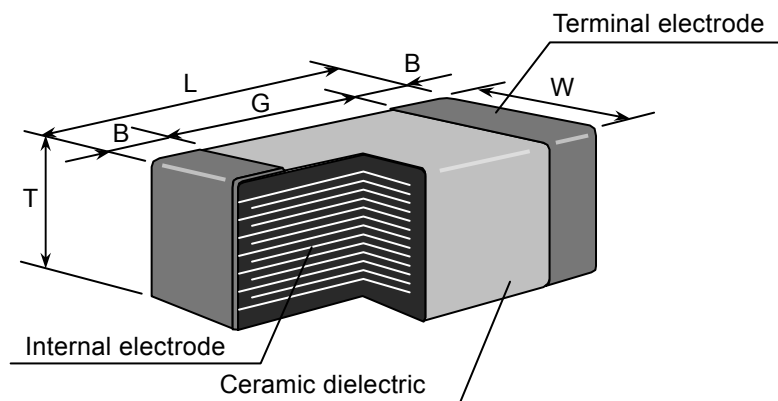
## 2. CODE CONSTRUCTION

(Example)

Catalog Number: C7563 X7S 1C 107 M 280 L E  
 (Web) (1) (2) (3) (4) (5) (6) (7) (8)

Item Description: C7563 X7S 1C 107 M T xxxS  
 (1) (2) (3) (4) (5) (9) (10)

### (1) Type



Symbol	Type (EIA style)	Symbol	Type (EIA style)
C1005	CC0402	C4520	CC1808
C1608	CC0603	C4532	CC1812
C2012	CC0805	C5750	CC2220
C3216	CC1206	C7563	CC3025
C3225	CC1210		

\*As for dimensions of each product, please refer to detailed information on TDK web.

### (2) Temperature Characteristics

(Details are shown in table 1 No.6 and No.7 at 8.PERFORMANCE.)

### (3) Rated Voltage

Symbol	Rated Voltage	Symbol	Rated Voltage
1 A	DC 10 V	2 E	DC 250 V
1 C	DC 16 V	2 W	DC 450 V
1 E	DC 25 V	2 J	DC 630 V
1 V	DC 35 V	3 A	DC 1000 V
1 H	DC 50 V	3 D	DC 2000 V
2 A	DC 100 V	3 F	DC 3000 V

(4) Rated Capacitance

Stated in three digits and in units of pico farads (pF).  
The first and Second digits identify the first and second significant figures of the capacitance, the third digit identifies the multiplier.

Symbol	Rated Capacitance
101	100pF
225	2,200,000pF (=2.2μF)

(5) Capacitance tolerance

\*M tolerance shall be TDK standard for  
Over 10μF parts.

Symbol	Tolerance
J	± 5 %
K	± 10 %
M*	± 20 %

(6) Thickness code (Only catalog number)

(7) Package code (Only catalog number)

(8) Special code (Only catalog number)

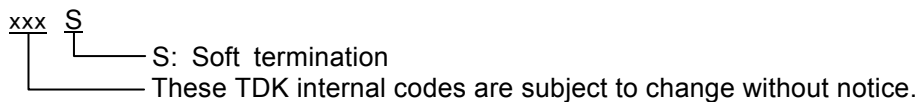
Symbol	Description
E	Soft termination

(9) Packaging (Only item description)

(Bulk is not applicable for C1005 [CC0402] type.)

Symbol	Packaging
B	Bulk
T	Taping

(10) TDK internal code (Only item description)



### 3. RATED CAPACITANCE AND TOLERANCE

#### 3.1 Standard combination of rated capacitance and tolerances

Class	Temperature Characteristics	Capacitance tolerance		Rated capacitance
1	C0G	J (± 5 %) K (± 10 %)		E – 6 series
2	X7R X7S X7T X8R	Cap ≤ 10μF	K (± 10 %) M (± 20 %)	E – 6 series
		Cap > 10μF	M (± 20 %)	E – 3 series

#### 3.2 Capacitance Step in E series

E series	Capacitance Step					
E- 3	1.0		2.2		4.7	
E- 6	1.0	1.5	2.2	3.3	4.7	6.8

#### 4. OPERATING TEMPERATURE RANGE

T.C.	Min. operating Temperature	Max. operating Temperature	Reference Temperature
C0G, X7R,X7S,X7T	-55°C	125°C	25°C
X8R	-55°C	150°C	25°C

#### 5. STORING CONDITION AND TERM

5 to 40°C at 20 to 70%RH  
6 months Max.

#### 6. P.C. BOARD

When mounting on an aluminum substrate, large case size such as C3225 [CC1210]~  
C7563 [CC3025] types are more likely to be affected by heat stress from the substrate.  
Please inquire separate specification for the large case sizes when mounted on the substrate.

#### 7. INDUSTRIAL WASTE DISPOSAL

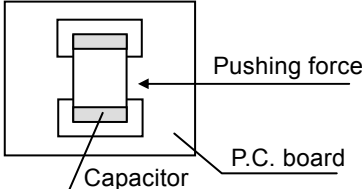
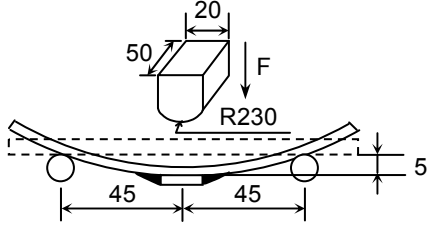
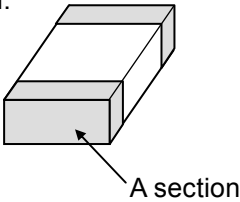
Dispose this product as industrial waste in accordance with the Industrial Waste Law.

8. PERFORMANCE

table 1

No.	Item	Performance	Test or inspection method																					
1	External Appearance	No defects which may affect performance.	Inspect with magnifying glass (3×)																					
2	Insulation Resistance	10,000MΩ or 500MΩ·μF min. (As for the capacitors of rated voltage 16V DC and, 10,000 MΩ or 100MΩ·μF min.,) whichever smaller.	Apply rated voltage for 60s. As for the capacitor of rated voltage 630V DC and above, apply 500V DC.																					
3	Voltage Proof	Withstand test voltage without insulation breakdown or other damage.	<table border="1"> <thead> <tr> <th>Class</th> <th>Rated voltage (RV)</th> <th>Apply voltage</th> </tr> </thead> <tbody> <tr> <td rowspan="4">1</td> <td><math>RV \leq 100V</math></td> <td>3 × rated voltage</td> </tr> <tr> <td><math>100V &lt; RV \leq 500V</math></td> <td>1.5 × rated voltage</td> </tr> <tr> <td>630V</td> <td>1.3 × rated voltage</td> </tr> <tr> <td><math>630V &lt; RV</math></td> <td>1.2 × rated voltage</td> </tr> <tr> <td rowspan="4">2</td> <td><math>RV \leq 100V</math></td> <td>2.5 × rated voltage</td> </tr> <tr> <td><math>100V &lt; RV \leq 500V</math></td> <td>1.5 × rated voltage</td> </tr> <tr> <td>630V</td> <td>1.3 × rated voltage</td> </tr> <tr> <td><math>630V &lt; RV</math></td> <td>1.2 × rated voltage</td> </tr> </tbody> </table> <p>Above DC voltage shall be applied for 1s. Charge/ discharge current shall not exceed 50mA.</p>	Class	Rated voltage (RV)	Apply voltage	1	$RV \leq 100V$	3 × rated voltage	$100V < RV \leq 500V$	1.5 × rated voltage	630V	1.3 × rated voltage	$630V < RV$	1.2 × rated voltage	2	$RV \leq 100V$	2.5 × rated voltage	$100V < RV \leq 500V$	1.5 × rated voltage	630V	1.3 × rated voltage	$630V < RV$	1.2 × rated voltage
Class	Rated voltage (RV)	Apply voltage																						
1	$RV \leq 100V$	3 × rated voltage																						
	$100V < RV \leq 500V$	1.5 × rated voltage																						
	630V	1.3 × rated voltage																						
	$630V < RV$	1.2 × rated voltage																						
2	$RV \leq 100V$	2.5 × rated voltage																						
	$100V < RV \leq 500V$	1.5 × rated voltage																						
	630V	1.3 × rated voltage																						
	$630V < RV$	1.2 × rated voltage																						
4	Capacitance	Within the specified tolerance.	<table border="1"> <thead> <tr> <th>Class</th> <th>Capacitance</th> <th>Measuring frequency</th> <th>Measuring voltage</th> </tr> </thead> <tbody> <tr> <td rowspan="2">1</td> <td><math>Cap \leq 1000pF</math></td> <td>1MHz±10%</td> <td rowspan="2">0.5-5Vrms.</td> </tr> <tr> <td><math>Cap &gt; 1000pF</math></td> <td>1kHz±10%</td> </tr> <tr> <td rowspan="2">2</td> <td><math>Cap \leq 10\mu F</math></td> <td>1kHz±10%</td> <td>1.0±0.2Vrms</td> </tr> <tr> <td><math>Cap &gt; 10\mu F</math></td> <td>120Hz±20%</td> <td>0.5±0.2Vrms</td> </tr> </tbody> </table> <p>For information which product has which measuring voltage, please contact with our sales representative.</p>	Class	Capacitance	Measuring frequency	Measuring voltage	1	$Cap \leq 1000pF$	1MHz±10%	0.5-5Vrms.	$Cap > 1000pF$	1kHz±10%	2	$Cap \leq 10\mu F$	1kHz±10%	1.0±0.2Vrms	$Cap > 10\mu F$	120Hz±20%	0.5±0.2Vrms				
Class	Capacitance	Measuring frequency	Measuring voltage																					
1	$Cap \leq 1000pF$	1MHz±10%	0.5-5Vrms.																					
	$Cap > 1000pF$	1kHz±10%																						
2	$Cap \leq 10\mu F$	1kHz±10%	1.0±0.2Vrms																					
	$Cap > 10\mu F$	120Hz±20%	0.5±0.2Vrms																					
5	Q (Class1) Dissipation Factor (Class2)	As for spec of each product, please refer to detailed information on TDK web.	See No.4 in this table for measuring condition.																					
6	Temperature Characteristics of Capacitance (Class1)	<table border="1"> <thead> <tr> <th>T. C.</th> <th>Temperature Coefficient</th> </tr> </thead> <tbody> <tr> <td>COG</td> <td><math>0 \pm 30</math> (ppm/°C)</td> </tr> </tbody> </table> <p>Capacitance drift within ± 0.2% or ± 0.05pF, whichever larger.</p>	T. C.	Temperature Coefficient	COG	$0 \pm 30$ (ppm/°C)	<p>Temperature coefficient shall be calculated based on values at 25°C and 85°C temperature.</p> <p>Measuring temperature below 20°C shall be -10°C and -25°C.</p>																	
T. C.	Temperature Coefficient																							
COG	$0 \pm 30$ (ppm/°C)																							

(continued)

No.	Item	Performance	Test or inspection method										
7	Temperature Characteristics of Capacitance (Class2)	<p style="text-align: center;">Capacitance Change (%)</p> <hr/> <p style="text-align: center;">No voltage applied</p> <hr/> <p style="text-align: center;">X7R: ±15 X7S: ±22 X7T: +22,-33 X8R: ±15</p> <hr/>	<p>Capacitance shall be measured by the steps shown in the following table after thermal equilibrium is obtained for each step.</p> <p><math>\Delta C</math> be calculated ref. STEP3 reading</p> <table border="1" data-bbox="975 398 1442 674"> <thead> <tr> <th>Step</th> <th>Temperature(°C)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>25 ± 2</td> </tr> <tr> <td>2</td> <td>-55 ± 3</td> </tr> <tr> <td>3</td> <td>25 ± 2</td> </tr> <tr> <td>4*</td> <td>Max. operating Temp. ± 2</td> </tr> </tbody> </table> <p>*X7R, X7S, X7T: 125°C X8R: 150°C</p>	Step	Temperature(°C)	1	25 ± 2	2	-55 ± 3	3	25 ± 2	4*	Max. operating Temp. ± 2
Step	Temperature(°C)												
1	25 ± 2												
2	-55 ± 3												
3	25 ± 2												
4*	Max. operating Temp. ± 2												
8	Robustness of Terminations	No sign of termination coming off, breakage of ceramic, or other abnormal signs.	<p>Reflow solder the capacitors on a P.C. board shown in Appendix2 and apply a pushing force of 5N with 10±1s. (2N is applied for C1005 [CC0402] type)</p> 										
9	Bending	No mechanical damage.	<p>Reflow solder the capacitors on a P.C. board shown in Appendix1 and bend it for 5mm. (2mm is applied for C4520 [CC1808] ~ C5750 [CC2220] parts, 1mm is applied for C7563 [CC3025] parts)</p>  <p style="text-align: right;">(Unit : mm)</p>										
10	Solderability	<p>New solder to cover over 75% of termination. 25% may have pin holes or rough spots but not concentrated in one spot. Ceramic surface of A sections shall not be exposed due to melting or shifting of termination material.</p> 	<p>Completely soak both terminations in solder at the following conditions.</p> <p>Solder : Sn-3.0Ag-0.5Cu or Sn-37Pb Temperature: 245±5°C (Sn-3.0Ag-0.5Cu) 235±5°C (Sn-37Pb) Soaking time: 3±0.3s (Sn-3.0Ag-0.5Cu) 2±0.2s (Sn-37Pb)</p> <p>Flux: Isopropyl alcohol (JIS K 8839) Rosin (JIS K 5902) 25% solid solution.</p>										

(continued)

No.	Item		Performance	Test or inspection method
11	Resistance to solder heat	External appearance	No cracks are allowed and terminations shall be covered at least 60% with new solder.	<p>Completely soak both terminations in solder at the following conditions. 260±5°C for 10±1s.</p> <p>Preheating condition Temp.: 110 - 140°C Time : 30 - 60s.</p> <p>Solder : Sn-3.0Ag-0.5Cu or Sn-37Pb</p> <p>Flux : Isopropyl alcohol (JIS K 8839) Rosin (JIS K 5902) 25% solid solution.</p> <p>Leave the capacitors in ambient condition for 6 to 24h (Class1) or 24±2h (Class2) before measurement.</p>
Capacitance		Characteristics	Change from the value before test*	
Class1/ C0G			± 2.5 %	
Class2/ X7R, X7S, X7T, X8R			± 7.5 %	
Q (Class1)		Meet the initial spec.		
D.F. (Class2)	Meet the initial spec.			
Insulation Resistance	Meet the initial spec.			
Voltage proof	No insulation breakdown or other damage.			
12	Vibration	External appearance	No mechanical damage.	<p>Reflow solder the capacitors on a P.C. board shown in Appendix2 before testing.</p> <p>Vibrate the capacitors with amplitude of 1.5mm P-P changing the frequencies from 10Hz to 55Hz and back to 10Hz in about 1min. Repeat this for 2h each in 3 perpendicular directions.</p>
Capacitance		Characteristics	Change from the value before test*	
Class1/ C0G			± 2.5 %	
Class2/ X7R, X7S, X7T, X8R			± 7.5 %	
Q (Class1)	Meet the initial spec.			
D.F. (Class2)	Meet the initial spec.			

\*Typical SPEC.

(continued)

No.	Item		Performance	Test or inspection method															
13	Temperature cycle	External appearance	No mechanical damage.	<p>Reflow solder the capacitors on a P.C. board shown in Appendix2 before testing.</p> <p>Expose the capacitors in the condition step1 through step 4 and repeat 5 times consecutively.</p> <p>Leave the capacitors in ambient condition for 6 to 24h (Class1) or 24±2h (Class2) before measurement.</p> <table border="1"> <thead> <tr> <th>Step</th> <th>Temperature(°C)</th> <th>Time (min.)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>-55 ±3</td> <td>30 ± 3</td> </tr> <tr> <td>2</td> <td>25</td> <td>2 - 5</td> </tr> <tr> <td>3*</td> <td>Max. operating Temp. ±2</td> <td>30 ± 2</td> </tr> <tr> <td>4</td> <td>25</td> <td>2 - 5</td> </tr> </tbody> </table> <p>*C0G, X7R, X7S, X7T: 125°C X8R: 150°C</p>	Step	Temperature(°C)	Time (min.)	1	-55 ±3	30 ± 3	2	25	2 - 5	3*	Max. operating Temp. ±2	30 ± 2	4	25	2 - 5
		Step	Temperature(°C)		Time (min.)														
		1	-55 ±3		30 ± 3														
		2	25		2 - 5														
		3*	Max. operating Temp. ±2		30 ± 2														
		4	25		2 - 5														
		Capacitance	Characteristics		Change from the value before test*														
Class1/ C0G	± 2.5 %																		
Class2/ X7R, X7S, X7T, X8R	± 7.5 %																		
Q (Class1)	Meet the initial spec.																		
D.F. (Class2)	Meet the initial spec.																		
Insulation Resistance	Meet the initial spec.																		
Voltage proof	No insulation breakdown or other damage.																		
14	Moisture Resistance (Steady State)	External appearance	No mechanical damage.	<p>Reflow solder the capacitors on a P.C. board shown in Appendix2 before testing.</p> <p>Leave at temperature 40±2°C, 90 to 95%RH for 500 +24,0h.</p> <p>Leave the capacitors in ambient condition for 6 to 24h (Class1) or 24±2h (Class2) before measurement.</p>															
		Capacitance	Characteristics		Change from the value before test*														
			Class1/ C0G		± 5 %														
			Class2/ X7R, X7S, X7T, X8R		± 12.5 %														
		Q (Class1)	350 min.																
D.F. (Class2)	200% of initial spec. max.																		
Insulation Resistance	1,000MΩ or 50MΩ·μF min. (As for the capacitors of rated voltage 16V DC, 1,000 MΩ or 10MΩ·μF min.,) whichever smaller.																		

\*Typical SPEC.



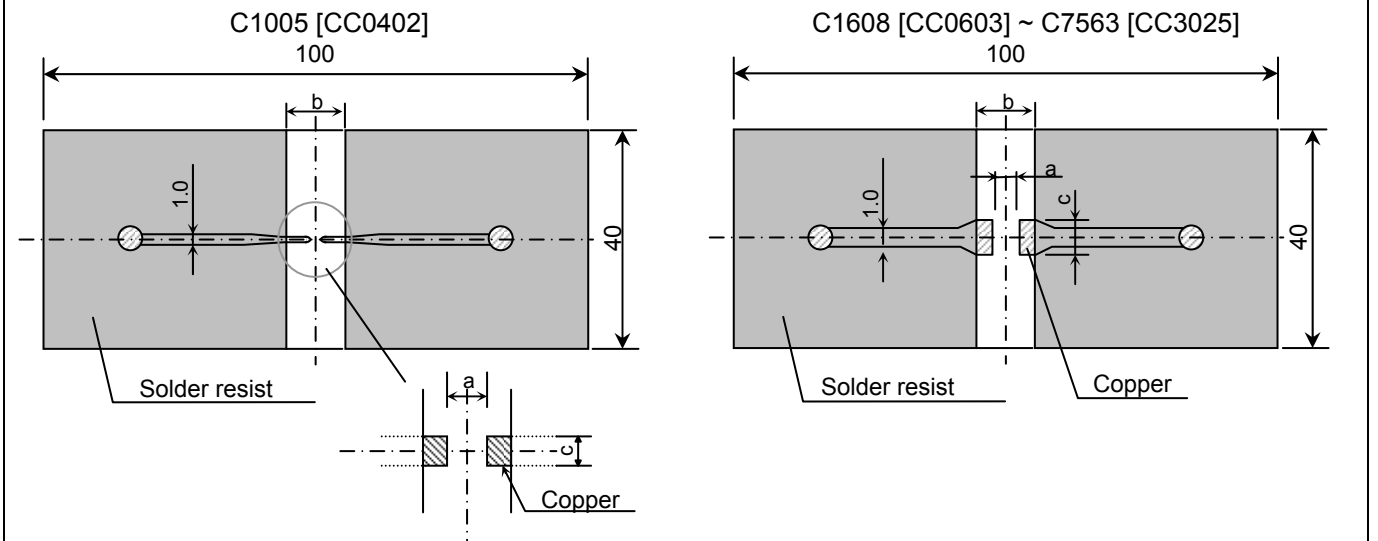
(continued)

No.	Item		Performance		Test or inspection method
15	Moisture Resistance	External appearance	No mechanical damage.		Reflow solder the capacitors on a P.C. board shown in Appendix2 before testing.
		Capacitance	Characteristics	Change from the value before test*	Apply the rated voltage at temperature 40±2°C and 90 to 95%RH for 500 +24,0h. Charge/ discharge current shall not exceed 50mA. Leave the capacitors in ambient condition for 6 to 24h (Class1) or 24±2h (Class2) before measurement. Voltage conditioning (only for Class2) Voltage treat the capacitors under testing temperature and voltage for 1 hour. Leave the capacitors in ambient condition for 24±2h before measurement. Use this measurement for initial value.
			Class1/ C0G	± 7.5 %	
			Class2/ X7R, X7S, X7T, X8R	± 12.5 %	
		Q (Class1)	200 min.		
		D.F. (Class2)	200% of initial spec. max.		
Insulation Resistance	500MΩ or 25MΩ·μF min. (As for the capacitors of rated voltage 16V DC, 500 MΩ or 5MΩ·μF min.), whichever smaller.				
16	Life	External appearance	No mechanical damage.		Reflow solder the capacitors on a P.C. board shown in Appendix2 before testing.
		Capacitance	Characteristics	Change from the value before test*	Below the voltage shall be applied at Max. operating Temp. ±2°C for 1,000 +48,0h. <u>Applied Voltage</u> <u>Rated voltage x2</u> <u>Rated voltage x1.5</u> <u>Rated voltage x1.2</u> <u>Rated voltage x1</u> As for applied voltage, please contact with TDK representative. Charge/ discharge current shall not exceed 50mA. Leave the capacitors in ambient condition for 6 to 24h (Class1) or 24±2h (Class2) before measurement. Voltage conditioning (only for Class2) Voltage treat the capacitors under testing temperature and voltage for 1 hour. Leave the capacitors in ambient condition for 24±2h before measurement. Use this measurement for initial value.
			Class1/ C0G	± 3 %	
			Class2/ X7R, X7S, X7T, X8R	± 15 %	
		Q (Class1)	350 min.		
		D.F. (Class2)	200% of initial spec. max.		
Insulation Resistance	1,000MΩ or 50MΩ·μF min. (As for the capacitors of rated voltage 16V DC, 1,000 MΩ or 10MΩ·μF min.), whichever smaller.				

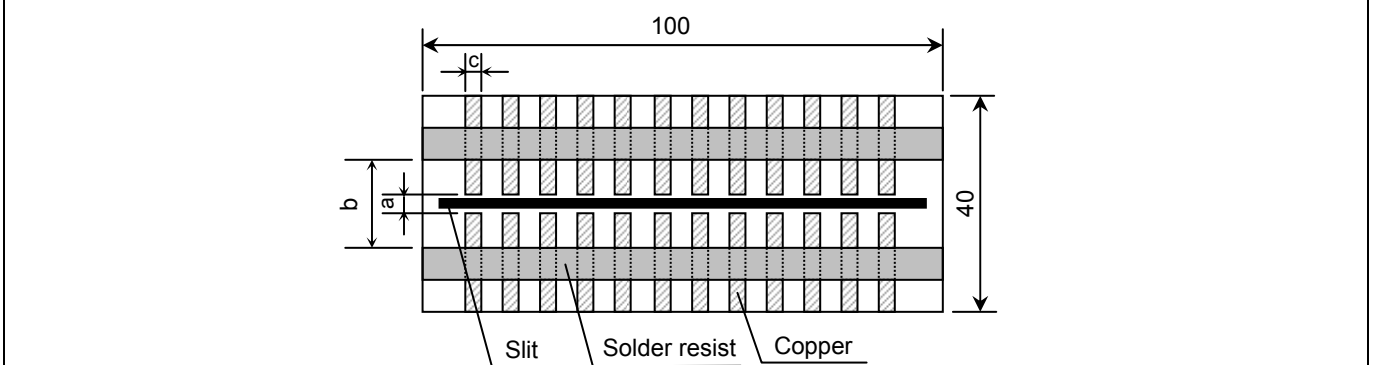
\*Typical SPEC.

\*\*As for the initial measurement of capacitors (Class2) on number 7,11,12,13 and 14 leave capacitors at 150 –10,0°C for 1 hour and measure the value after leaving capacitors for 24±2h in ambient condition.

## Appendix1 P.C. board for bending test



## Appendix2 P.C. Board for reliability test



(It is recommended to provide a slit on P.C. board for C3225 [CC1210] ~ C7563 [CC3025].)

(Unit : mm)

Type	Dimensions		
	a	b	c
TDK(EIA style)			
C1005 [CC0402]	0.4	1.5	0.5
C1608 [CC0603]	1.0	3.0	1.2
C2012 [CC0805]	1.2	4.0	1.65
C3216 [CC1206]	2.2	5.0	2.0
C3225 [CC1210]	2.2	5.0	2.9
C4520 [CC1808]	3.5	7.0	2.5
C4532 [CC1812]	3.5	7.0	3.7
C5750 [CC2220]	4.5	8.0	5.6
C7563 [CC3025]	5.5	9.1	6.9

1. Material : Glass Epoxy(As per JIS C6484 GE4)

■ Copper (Thickness:0.035mm)

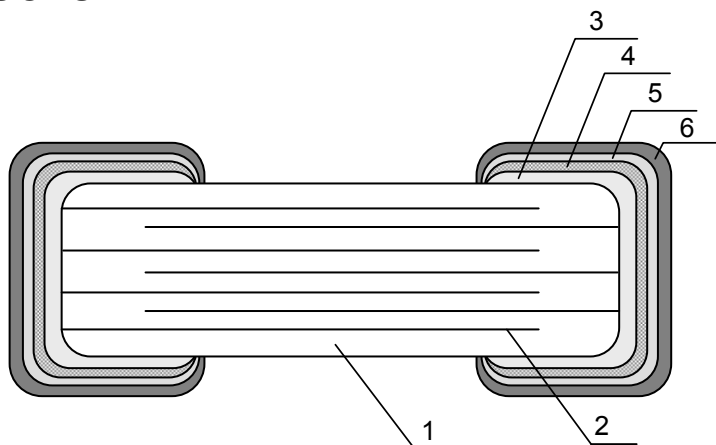
▨ Solder resist

2. Thickness : Appendix 1 — 0.8mm (C1005 [CC0402])

— 1.6mm (C1608 [CC0603] ~ C7563 [CC3025])

: Appendix 2 — 1.6mm

## 9. INSIDE STRUCTURE AND MATERIAL



No.	NAME	MATERIAL	
		Class1	Class2
1	Dielectric	CaZrO <sub>3</sub>	BaTiO <sub>3</sub>
2	Electrode	Nickel (Ni)	
3	Termination	Copper (Cu)	
4		Conductive resin (Filler: Ag)	
5		Nickel (Ni)	
6		Tin (Sn)	

## 10. PACKAGING

Packaging shall be done to protect the components from the damage during transportation and storing, and a label which has the following information shall be attached.

- 1) Total number of components in a plastic bag for bulk packaging : 1000pcs
- 2) Tape packaging is as per 14. TAPE PACKAGING SPECIFICATION.  
(C1005 [CC0402] types are applicable only to tape packaging.)

- 1) Inspection No.
- 2) TDK P/N
- 3) Customer's P/N
- 4) Quantity

\*Composition of Inspection No.

Example     F 6 A - OO - OOO  
                  (a) (b) (c)     (d)     (e)

- a) Line code
- b) Last digit of the year
- c) Month and A for January and B for February and so on. (Skip I)
- d) Inspection Date of the month.
- e) Serial No. of the day

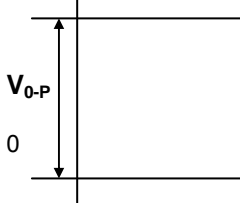
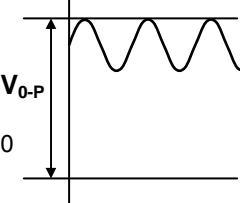
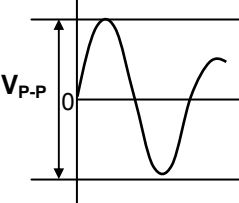
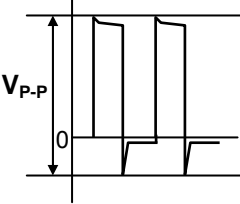
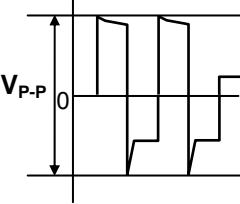
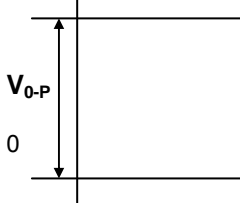
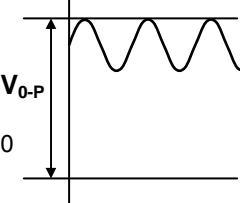
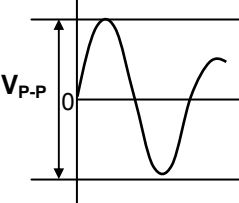
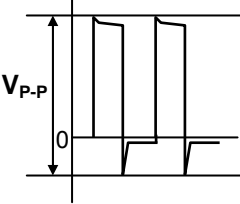
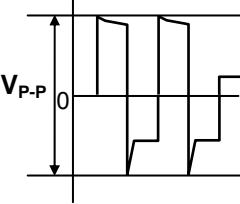
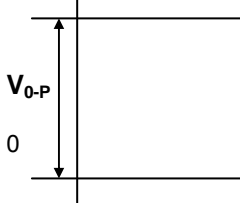
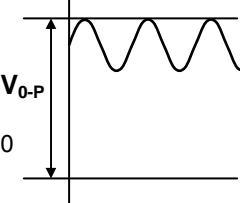
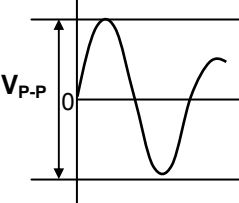
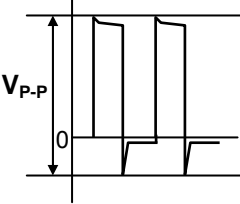
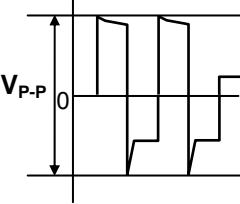
## 11. RECOMMENDATION

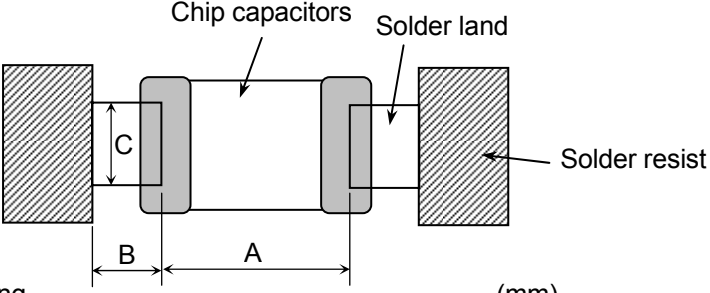
As for C3225 [CC1210] and larger, it is recommended to provide a slit (about 1mm width) in the board under the components to improve washing Flux. And please make sure to dry detergent up completely before.

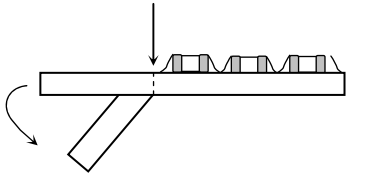
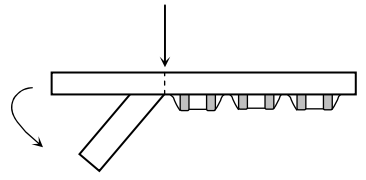
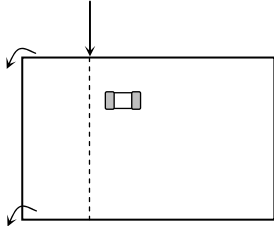
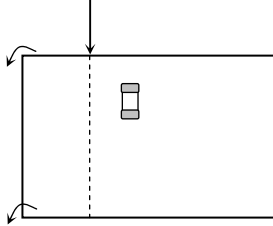
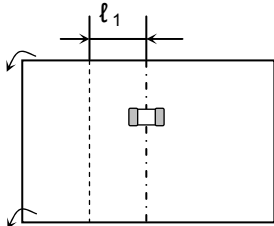
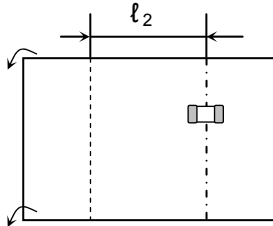
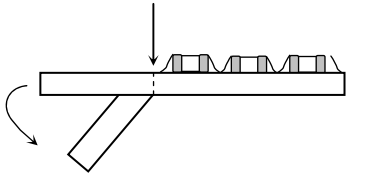
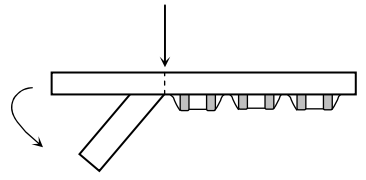
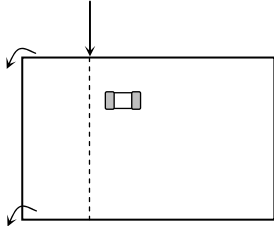
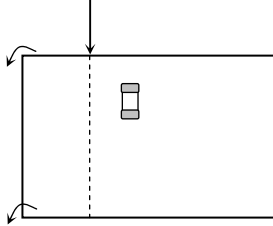
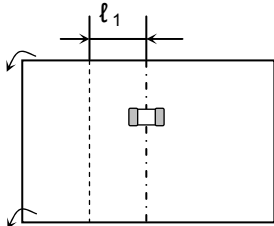
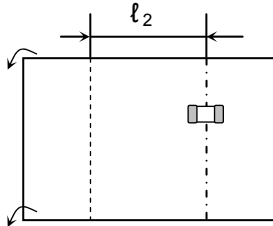
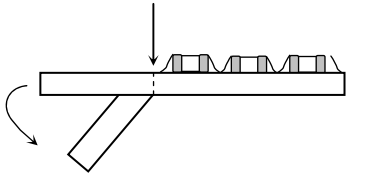
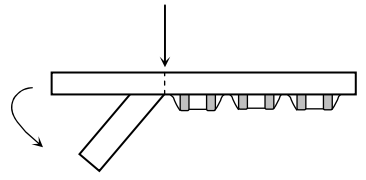
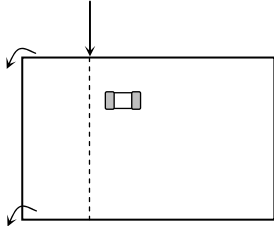
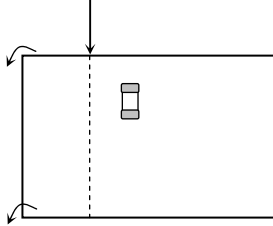
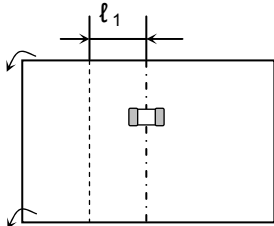
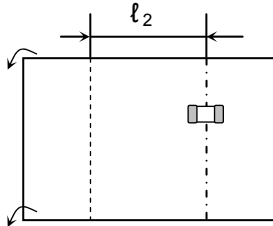
## 12. SOLDERING CONDITION

As for C1005 [CC0402], C3225 [CC1210] and larger, reflow soldering only.

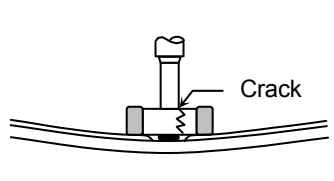
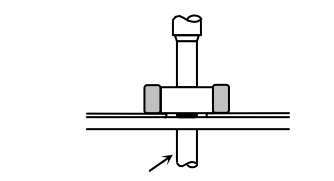
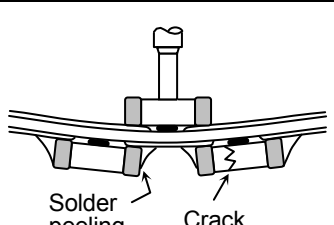
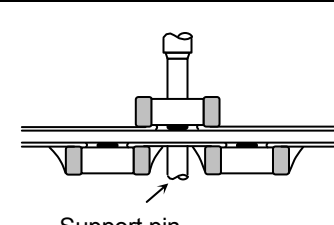
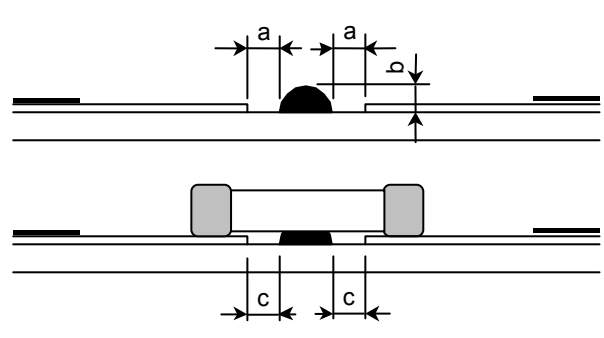
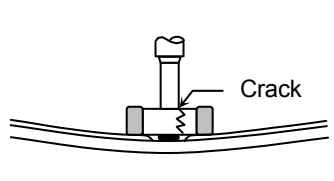
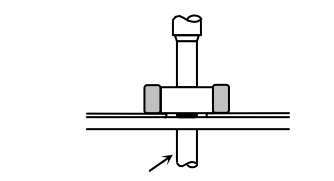
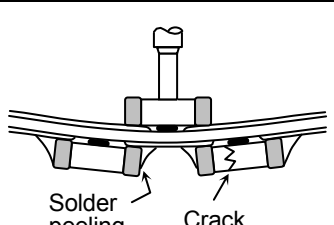
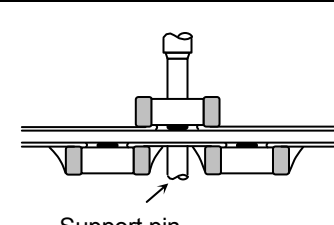
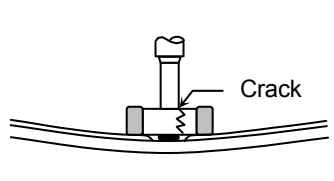
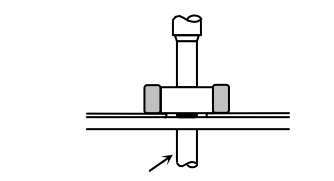
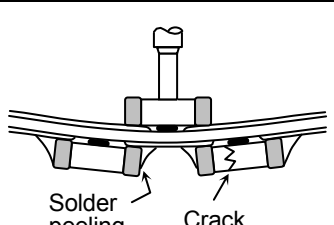
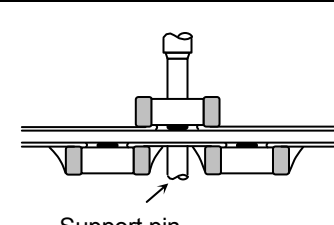
### 13. Caution

No.	Process	Condition																
1	Operating Condition (Storage, Transportation)	<p>1-1. Storage</p> <ol style="list-style-type: none"> <li>1) The capacitors must be stored in an ambient temperature of 5 to 40°C with a relative humidity of 20 to 70%RH. The products should be used within 6 months upon receipt.</li> <li>2) The capacitors must be operated and stored in an environment free of dew condensation and these gases such as Hydrogen Sulphide, Hydrogen Sulphate, Chlorine, Ammonia and sulfur.</li> <li>3) Avoid storing in sun light and falling of dew.</li> <li>4) Do not use capacitors under high humidity and high and low atmospheric pressure which may affect capacitors reliability.</li> <li>5) Capacitors should be tested for the solderability when they are stored for long time.</li> </ol> <p>1-2. Handling in transportation</p> <p>In case of the transportation of the capacitors, the performance of the capacitors may be deteriorated depending on the transportation condition.            (Refer to JEITA RCR-2335C 9.2 Handling in transportation)</p>																
2	Circuit design ⚠ Caution	<p>2-1. Operating temperature</p> <p>Operating temperature should be followed strictly within this specification, especially be careful with maximum temperature.</p> <ol style="list-style-type: none"> <li>1) Do not use capacitors above the maximum allowable operating temperature.</li> <li>2) Surface temperature including self heating should be below maximum operating temperature.            (Due to dielectric loss, capacitors will heat itself when AC is applied. Especially at high frequencies around its SRF, the heat might be so extreme that it may damage itself or the product mounted on. Please design the circuit so that the maximum temperature of the capacitors including the self heating to be below the maximum allowable operating temperature. Temperature rise at capacitor surface shall be below 20°C)</li> <li>3) The electrical characteristics of the capacitors will vary depending on the temperature. The capacitors should be selected and designed in taking the temperature into consideration.</li> </ol> <p>2-2. Operating voltage</p> <ol style="list-style-type: none"> <li>1) Operating voltage across the terminals should be below the rated voltage.            When AC and DC are super imposed, <math>V_{0-P}</math> must be below the rated voltage.            — (1) and (2)</li> </ol> <p>AC or pulse with overshooting, <math>V_{P-P}</math> must be below the rated voltage.            — (3), (4) and (5)</p> <p>When the voltage is started to apply to the circuit or it is stopped applying, the irregular voltage may be generated for a transit period because of resonance or switching. Be sure to use the capacitors within rated voltage containing these Irregular voltage.</p> <table border="1" data-bbox="475 1480 1449 2056"> <thead> <tr> <th data-bbox="475 1480 660 1525">Voltage</th> <th data-bbox="660 1480 922 1525">(1) DC voltage</th> <th data-bbox="922 1480 1184 1525">(2) DC+AC voltage</th> <th data-bbox="1184 1480 1449 1525">(3) AC voltage</th> </tr> </thead> <tbody> <tr> <td data-bbox="475 1525 660 1753">Positional Measurement (Rated voltage)</td> <td data-bbox="660 1525 922 1753">  </td> <td data-bbox="922 1525 1184 1753">  </td> <td data-bbox="1184 1525 1449 1753">  </td> </tr> <tr> <th data-bbox="475 1783 660 1827">Voltage</th> <th data-bbox="660 1783 922 1827">(4) Pulse voltage (A)</th> <th data-bbox="922 1783 1184 1827">(5) Pulse voltage (B)</th> <th></th> </tr> <tr> <td data-bbox="475 1827 660 2056">Positional Measurement (Rated voltage)</td> <td data-bbox="660 1827 922 2056">  </td> <td data-bbox="922 1827 1184 2056">  </td> <td></td> </tr> </tbody> </table>	Voltage	(1) DC voltage	(2) DC+AC voltage	(3) AC voltage	Positional Measurement (Rated voltage)				Voltage	(4) Pulse voltage (A)	(5) Pulse voltage (B)		Positional Measurement (Rated voltage)			
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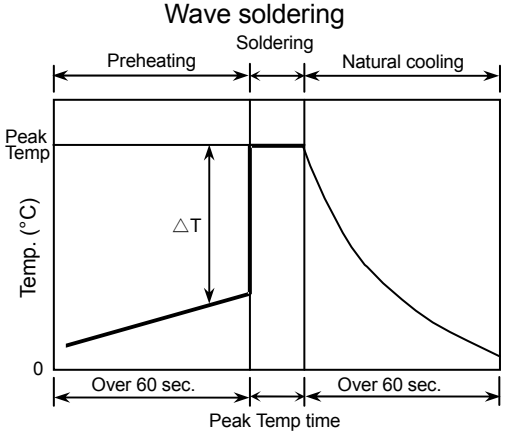
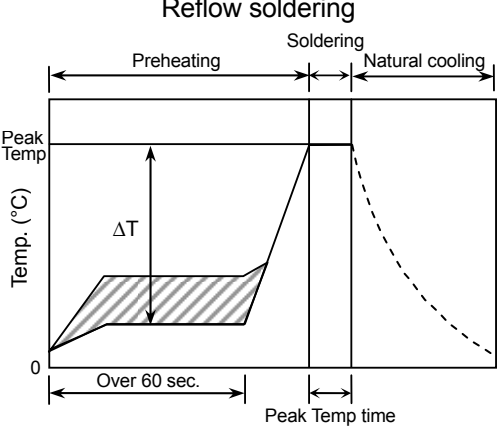
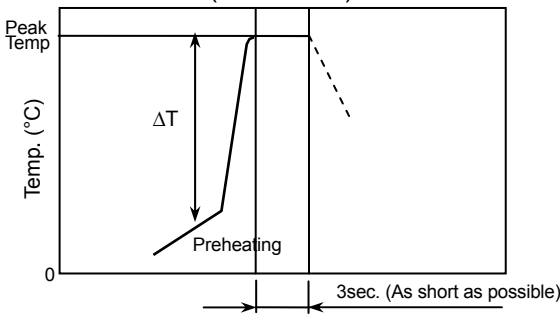
No.	Process	Condition																																																																																																												
2	Circuit design ⚠ Caution	<p>2) Even below the rated voltage, if repetitive high frequency AC or pulse is applied, the reliability of the capacitors may be reduced.</p> <p>3) The effective capacitance will vary depending on applied DC and AC voltages. The capacitors should be selected and designed in taking the voltages into consideration.</p> <p>2-3. Frequency When the capacitors (Class 2) are used in AC and/or pulse voltages, the capacitors may vibrate themselves and generate audible sound.</p>																																																																																																												
3	Designing P.C. board	<p>The amount of solder at the terminations has a direct effect on the reliability of the capacitors.</p> <p>1) The greater the amount of solder, the higher the stress on the chip capacitors, and the more likely that it will break. When designing a P.C. board, determine the shape and size of the solder lands to have proper amount of solder on the terminations.</p> <p>2) Avoid using common solder land for multiple terminations and provide individual solder land for each terminations.</p> <p>3) Size and recommended land dimensions.</p> <div style="text-align: center;">  </div> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <thead> <tr> <th colspan="4" style="text-align: left;">Flow soldering</th> <th colspan="3" style="text-align: right;">(mm)</th> </tr> <tr> <th style="text-align: left;">Type</th> <th>C1608</th> <th>C2012</th> <th>C3216</th> <th colspan="3"></th> </tr> <tr> <th style="text-align: left;">Symbol</th> <th>[CC0603]</th> <th>[CC0805]</th> <th>[CC1206]</th> <th colspan="3"></th> </tr> </thead> <tbody> <tr> <td>A</td> <td>0.7 - 1.0</td> <td>1.0 - 1.3</td> <td>2.1 - 2.5</td> <td colspan="3"></td> </tr> <tr> <td>B</td> <td>0.8 - 1.0</td> <td>1.0 - 1.2</td> <td>1.1 - 1.3</td> <td colspan="3"></td> </tr> <tr> <td>C</td> <td>0.6 - 0.8</td> <td>0.8 - 1.1</td> <td>1.0 - 1.3</td> <td colspan="3"></td> </tr> </tbody> </table> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <thead> <tr> <th colspan="5" style="text-align: left;">Reflow soldering</th> <th colspan="1" style="text-align: right;">(mm)</th> </tr> <tr> <th style="text-align: left;">Type</th> <th>C1005</th> <th>C1608</th> <th>C2012</th> <th>C3216</th> <th></th> </tr> <tr> <th style="text-align: left;">Symbol</th> <th>[CC0402]</th> <th>[CC0603]</th> <th>[CC0805]</th> <th>[CC1206]</th> <th></th> </tr> </thead> <tbody> <tr> <td>A</td> <td>0.3 - 0.5</td> <td>0.6 - 0.8</td> <td>0.9 - 1.2</td> <td>2.0 - 2.4</td> <td></td> </tr> <tr> <td>B</td> <td>0.35 - 0.45</td> <td>0.6 - 0.8</td> <td>0.7 - 0.9</td> <td>1.0 - 1.2</td> <td></td> </tr> <tr> <td>C</td> <td>0.4 - 0.6</td> <td>0.6 - 0.8</td> <td>0.9 - 1.2</td> <td>1.1 - 1.6</td> <td></td> </tr> </tbody> </table> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <thead> <tr> <th style="text-align: left;">Type</th> <th>C3225</th> <th>C4520</th> <th>C4532</th> <th>C5750</th> <th>C7563</th> </tr> <tr> <th style="text-align: left;">Symbol</th> <th>[CC1210]</th> <th>[CC1808]</th> <th>[CC1812]</th> <th>[CC2220]</th> <th>[CC3025]</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>2.0 - 2.4</td> <td>3.1 - 3.7</td> <td>3.1 - 3.7</td> <td>4.1 - 4.8</td> <td>5.2 - 5.8</td> </tr> <tr> <td>B</td> <td>1.0 - 1.2</td> <td>1.2 - 1.4</td> <td>1.2 - 1.4</td> <td>1.2 - 1.4</td> <td>1.7 - 1.9</td> </tr> <tr> <td>C</td> <td>1.9 - 2.5</td> <td>1.5 - 2.0</td> <td>2.4 - 3.2</td> <td>4.0 - 5.0</td> <td>6.4 - 7.4</td> </tr> </tbody> </table>	Flow soldering				(mm)			Type	C1608	C2012	C3216				Symbol	[CC0603]	[CC0805]	[CC1206]				A	0.7 - 1.0	1.0 - 1.3	2.1 - 2.5				B	0.8 - 1.0	1.0 - 1.2	1.1 - 1.3				C	0.6 - 0.8	0.8 - 1.1	1.0 - 1.3				Reflow soldering					(mm)	Type	C1005	C1608	C2012	C3216		Symbol	[CC0402]	[CC0603]	[CC0805]	[CC1206]		A	0.3 - 0.5	0.6 - 0.8	0.9 - 1.2	2.0 - 2.4		B	0.35 - 0.45	0.6 - 0.8	0.7 - 0.9	1.0 - 1.2		C	0.4 - 0.6	0.6 - 0.8	0.9 - 1.2	1.1 - 1.6		Type	C3225	C4520	C4532	C5750	C7563	Symbol	[CC1210]	[CC1808]	[CC1812]	[CC2220]	[CC3025]	A	2.0 - 2.4	3.1 - 3.7	3.1 - 3.7	4.1 - 4.8	5.2 - 5.8	B	1.0 - 1.2	1.2 - 1.4	1.2 - 1.4	1.2 - 1.4	1.7 - 1.9	C	1.9 - 2.5	1.5 - 2.0	2.4 - 3.2	4.0 - 5.0	6.4 - 7.4
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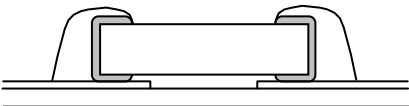
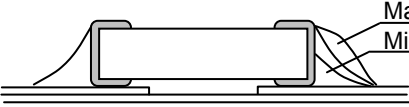
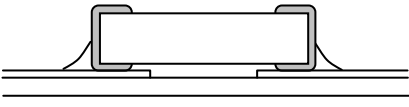
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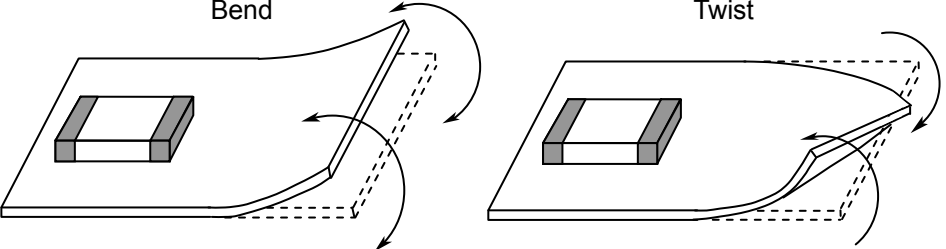
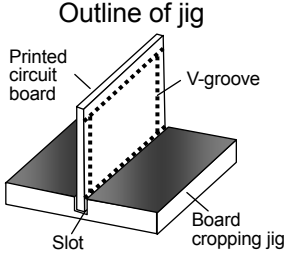
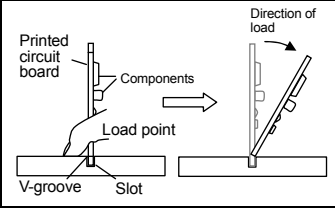
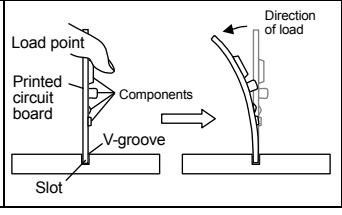
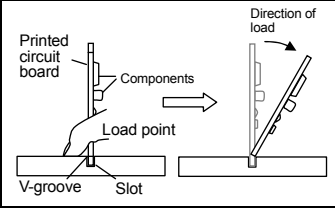
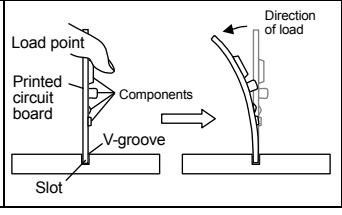
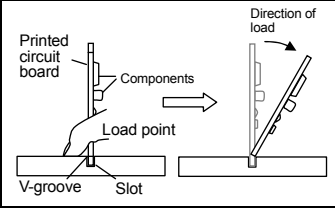
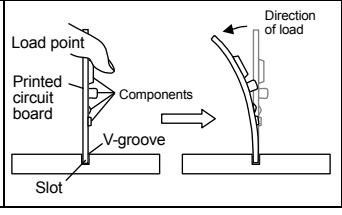
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4	Mounting	<p>4-1. Stress from mounting head            If the mounting head is adjusted too low, it may induce excessive stress in the chip capacitors to result in cracking. Please take following precautions.</p> <ol style="list-style-type: none"> <li>1) Adjust the bottom dead center of the mounting head to reach on the P.C. board surface and not press it.</li> <li>2) Adjust the mounting head pressure to be 1 to 3N of static weight.</li> <li>3) To minimize the impact energy from mounting head, it is important to provide support from the bottom side of the P.C. board.            See following examples.</li> </ol> <table border="1" data-bbox="478 593 1436 1153"> <thead> <tr> <th></th> <th>Not recommended</th> <th>Recommended</th> </tr> </thead> <tbody> <tr> <td>Single sided mounting</td> <td></td> <td></td> </tr> <tr> <td>Double-sides mounting</td> <td></td> <td></td> </tr> </tbody> </table> <p>When the centering jaw is worn out, it may give mechanical impact on the capacitors to cause crack. Please control the close up dimension of the centering jaw and provide sufficient preventive maintenance and replacement of it.</p> <p>4-2. Amount of adhesive</p>  <p>Example : C2012 [CC0805], C3216 [CC1206]</p> <table border="1" data-bbox="654 1769 1212 1948"> <tbody> <tr> <td>a</td> <td>0.2mm min.</td> </tr> <tr> <td>b</td> <td>70 - 100μm</td> </tr> <tr> <td>c</td> <td>Do not touch the solder land</td> </tr> </tbody> </table>		Not recommended	Recommended	Single sided mounting			Double-sides mounting			a	0.2mm min.	b	70 - 100μm	c	Do not touch the solder land
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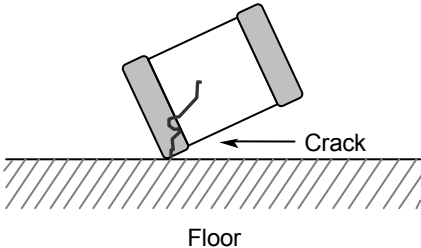
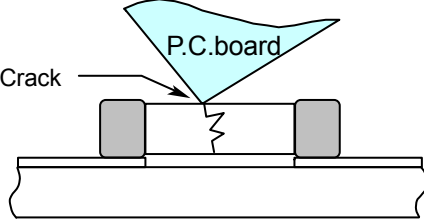
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5	Soldering	<p>5-1. Flux selection</p> <p>Although highly-activated flux gives better solderability, substances which increase activity may also degrade the insulation of the chip capacitors. To avoid such degradation, it is recommended following.</p> <ol style="list-style-type: none"> <li>1) It is recommended to use a mildly activated rosin flux (less than 0.1wt% chlorine). Strong flux is not recommended.</li> <li>2) Excessive flux must be avoided. Please provide proper amount of flux.</li> <li>3) When water-soluble flux is used, enough washing is necessary.</li> </ol> <p>5-2. Recommended soldering profile by various methods</p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p><b>Wave soldering</b></p>  </div> <div style="text-align: center;"> <p><b>Reflow soldering</b></p>  </div> </div> <div style="text-align: center; margin-top: 20px;"> <p><b>Manual soldering (Solder iron)</b></p>  </div> <div style="margin-top: 20px;"> <p><u>APPLICATION</u></p> <p>As for C1608 [CC0603] ~ C3216 [CC1206], applied to wave soldering and reflow soldering.</p> <p>As for C1005 [CC0402] and C3225 [CC1210] ~ C7563 [CC3025], applied only to reflow soldering.</p> </div> <p style="text-align: center; margin-top: 20px;">*As for peak temperature of manual soldering, please refer “5-6. Solder repair by solder iron”.</p> <p>5-3. Recommended soldering peak temp and peak temp duration</p> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th rowspan="2" style="text-align: left;">Temp./Duration</th> <th colspan="2">Wave soldering</th> <th colspan="2">Reflow soldering</th> </tr> <tr> <th>Peak temp(°C)</th> <th>Duration(sec.)</th> <th>Peak temp(°C)</th> <th>Duration(sec.)</th> </tr> </thead> <tbody> <tr> <td style="text-align: left;">Solder</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td style="text-align: left;">Sn-Pb Solder</td> <td>250 max.</td> <td>3 max.</td> <td>230 max.</td> <td>20 max.</td> </tr> <tr> <td style="text-align: left;">Lead Free Solder</td> <td>260 max.</td> <td>5 max.</td> <td>260 max.</td> <td>10 max.</td> </tr> </tbody> </table> <p>Recommended solder compositions</p> <p>Sn-37Pb (Sn-Pb solder)</p> <p>Sn-3.0Ag-0.5Cu (Lead Free Solder)</p>	Temp./Duration	Wave soldering		Reflow soldering		Peak temp(°C)	Duration(sec.)	Peak temp(°C)	Duration(sec.)	Solder					Sn-Pb Solder	250 max.	3 max.	230 max.	20 max.	Lead Free Solder	260 max.	5 max.	260 max.	10 max.
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5	Soldering	<p>2) Direct contact of the soldering iron with ceramic dielectric of chip capacitors may cause crack. Do not touch the ceramic dielectric and the terminations by solder iron.</p> <p>3) It is not recommended to reuse dismantled capacitors.</p> <p>5-7. Sn-Zn solder Sn-Zn solder affects product reliability. Please contact TDK in advance when utilize Sn-Zn solder.</p> <p>5-8. Countermeasure for tombstone The misalignment between the mounted positions of the capacitors and the land patterns should be minimized. The tombstone phenomenon may occur especially the capacitors are mounted (in longitudinal direction) in the same direction of the reflow soldering. (Refer to JEITA RCR-2335C Annex A (Informative) Recommendations to prevent the tombstone phenomenon)</p>
6	Cleaning	<p>1) If an unsuitable cleaning fluid is used, flux residue or some foreign articles may stick to chip capacitors surface to deteriorate especially the insulation resistance.</p> <p>2) If cleaning condition is not suitable, it may damage the chip capacitors.</p> <p>2)-1. Insufficient washing</p> <p>(1) Terminal electrodes may corrode by Halogen in the flux.</p> <p>(2) Halogen in the flux may adhere on the surface of capacitors, and lower the insulation resistance.</p> <p>(3) Water soluble flux has higher tendency to have above mentioned problems (1) and (2).</p> <p>2)-2. Excessive washing When ultrasonic cleaning is used, excessively high ultrasonic energy output can affect the connection between the ceramic chip capacitor's body and the terminal electrode. To avoid this, following is the recommended condition.</p> <p style="text-align: center;">Power : 20 W/ℓ max. Frequency : 40 kHz max. Washing time : 5 minutes max.</p> <p>2)-3. If the cleaning fluid is contaminated, density of Halogen increases, and it may bring the same result as insufficient cleaning.</p>

No.	Process	Condition				
7	Coating and molding of the P.C. board	1) When the P.C. board is coated, please verify the quality influence on the product. 2) Please verify carefully that there is no harmful decomposing or reaction gas emission during curing which may damage the chip capacitors. 3) Please verify the curing temperature.				
8	Handling after chip mounted ⚠ Caution	1) Please pay attention not to bend or distort the P.C. board after soldering in handling otherwise the chip capacitors may crack. <div style="text-align: center;">  </div> 2) Printed circuit board cropping should not be carried out by hand, but by using the proper tooling. Printed circuit board cropping should be carried out using a board cropping jig as shown in the following figure or a board cropping apparatus to prevent inducing mechanical stress on the board. (1) Example of a board cropping jig Recommended example: The board should be pushed from the back side, close to the cropping jig so that the board is not bent and the stress applied to the capacitor is compressive. Unrecommended example: If the pushing point is far from the cropping jig and the pushing direction is from the front side of the board, large tensile stress is applied to the capacitor, which may cause cracks. <div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div data-bbox="475 1238 762 1496" style="text-align: center;"> <p>Outline of jig</p>  </div> <table border="1" data-bbox="778 1227 1457 1496"> <thead> <tr> <th data-bbox="778 1227 1114 1283">Recommended</th> <th data-bbox="1114 1227 1457 1283">Unrecommended</th> </tr> </thead> <tbody> <tr> <td data-bbox="778 1283 1114 1496">  </td> <td data-bbox="1114 1283 1457 1496">  </td> </tr> </tbody> </table> </div>	Recommended	Unrecommended		
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No.	Process	Condition																		
8	Handling after chip mounted ⚠ Caution	<p>(2) Example of a board cropping machine</p> <p>An outline of a printed circuit board cropping machine is shown below. The top and bottom blades are aligned with one another along the lines with the V-grooves on printed circuit board when cropping the board.</p> <p>Unrecommended example: Misalignment of blade position between top and bottom, right and left, or front and rear blades may cause a crack in the capacitor.</p> <div style="display: flex; justify-content: space-around;"> <div data-bbox="571 488 981 743"> <p>Outline of machine</p> </div> <div data-bbox="981 488 1423 728"> <p>Principle of operation</p> </div> </div> <div style="text-align: center; margin-top: 10px;"> <p>Cross-section diagram</p> </div> <table border="1" style="width: 100%; margin-top: 10px; border-collapse: collapse;"> <thead> <tr> <th data-bbox="655 965 836 1012">Recommended</th> <th colspan="3" data-bbox="836 965 1366 1012">Unrecommended</th> </tr> <tr> <td></td> <th data-bbox="836 1012 1011 1093">Top-bottom misalignment</th> <th data-bbox="1011 1012 1187 1093">Left-right misalignment</th> <th data-bbox="1187 1012 1366 1093">Front-rear misalignment</th> </tr> </thead> <tbody> <tr> <td data-bbox="655 1093 836 1391"> </td> <td data-bbox="836 1093 1011 1391"> </td> <td data-bbox="1011 1093 1187 1391"> </td> <td data-bbox="1187 1093 1366 1391"> </td> </tr> </tbody> </table> <p>3) When functional check of the P.C. board is performed, check pin pressure tends to be adjusted higher for fear of loose contact. But if the pressure is excessive and bend the P.C. board, it may crack the chip capacitors or peel the terminations off. Please adjust the check pins not to bend the P.C. board.</p> <table border="1" style="width: 100%; margin-top: 10px; border-collapse: collapse;"> <thead> <tr> <th data-bbox="491 1637 628 1697">Item</th> <th data-bbox="628 1637 1046 1697">Not recommended</th> <th data-bbox="1046 1637 1445 1697">Recommended</th> </tr> </thead> <tbody> <tr> <td data-bbox="491 1697 628 1935">Board bending</td> <td data-bbox="628 1697 1046 1935"> </td> <td data-bbox="1046 1697 1445 1935"> </td> </tr> </tbody> </table>	Recommended	Unrecommended				Top-bottom misalignment	Left-right misalignment	Front-rear misalignment					Item	Not recommended	Recommended	Board bending		
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9	Handling of loose chip capacitors	<p>1) If dropped the chip capacitors may crack. Once dropped do not use it. Especially, the large case sized chip capacitors are tendency to have cracks easily, so please handle with care.</p>  <p>2) Piling the P.C. board after mounting for storage or handling, the corner of the P.C. board may hit the chip capacitors of another board to cause crack.</p> 
10	Capacitance aging	The capacitors (Class 2) have aging in the capacitance. They may not be used in precision time constant circuit. In case of the time constant circuit, the evaluation should be done well.
11	Estimated life and estimated failure rate of capacitors	As per the estimated life and the estimated failure rate depend on the temperature and the voltage. This can be calculated by the equation described in JEITA RCR-2335C Annex F (Informative) Calculation of the estimated lifetime and the estimated failure rate ( Voltage acceleration coefficient : 3 multiplication rule, Temperature acceleration coefficient : 10°C rule) The failure rate can be decreased by reducing the temperature and the voltage but they will not be guaranteed.

No.	Process	Condition
12	Caution during operation of equipment	<p>1) A capacitor shall not be touched directly with bare hands during operation in order to avoid electric shock. Electric energy held by the capacitor may be discharged through the human body when touched with a bare hand. Even when the equipment is off, a capacitor may stay charged. The capacitor should be handled after being completely discharged using a resistor.</p> <p>2) The terminals of a capacitor shall not be short-circuited by any accidental contact with a conductive object. A capacitor shall not be exposed to a conductive liquid such as an acid or alkali solution. A conductive object or liquid, such as acid and alkali, between the terminals may lead to the breakdown of a capacitor due to short circuit</p> <p>3) Confirm that the environment to which the equipment will be exposed during transportation and operation meets the specified conditions. Do not to use the equipment in the following environments.</p> <p>(1) Environment where a capacitor is spattered with water or oil  (2) Environment where a capacitor is exposed to direct sunlight  (3) Environment where a capacitor is exposed to Ozone, ultraviolet rays or radiation  (4) Environment where a capacitor exposed to corrosive gas(e.g. hydrogen sulfide, sulfur dioxide, chlorine. ammonia gas etc.)  (5) Environment where a capacitor exposed to vibration or mechanical shock exceeding the specified limits.  (6) Atmosphere change with causes condensation</p>
13	Others  Caution	<p>The products listed on this specification sheet are intended for use in general electronic equipment (AV equipment, telecommunications equipment, home appliances, amusement equipment, computer equipment, personal equipment, office equipment, measurement equipment, industrial robots) and automotive application under a normal operation and use condition.</p> <p>The products are not designed or warranted to meet the requirements of the applications listed below, whose performance and/or quality require a more stringent level of safety or reliability, or whose failure, malfunction or trouble could cause serious damage to society, person or property. Please understand that we are not responsible for any damage or liability caused by use of the products in any of the applications below or for any other use exceeding the range or conditions set forth in this specification sheet. If you intend to use the products in the applications listed below or if you have special requirements exceeding the range or conditions set forth in this specification, please contact us.</p> <p>(1) Aerospace/Aviation equipment  (2) Transportation equipment (electric trains, ships, etc.)  (3) Medical equipment (Excepting Pharmaceutical Affairs Law classification Class1, 2)  (4) Power-generation control equipment  (5) Atomic energy-related equipment  (6) Seabed equipment  (7) Transportation control equipment  (8) Public information-processing equipment  (9) Military equipment  (10) Electric heating apparatus, burning equipment  (11) Disaster prevention/crime prevention equipment  (12) Safety equipment  (13) Other applications that are not considered general-purpose applications</p> <p>When designing your equipment even for general-purpose applications, you are kindly requested to take into consideration securing protection circuit/device or providing backup circuits in your equipment.</p>

# 14. TAPE PACKAGING SPECIFICATION

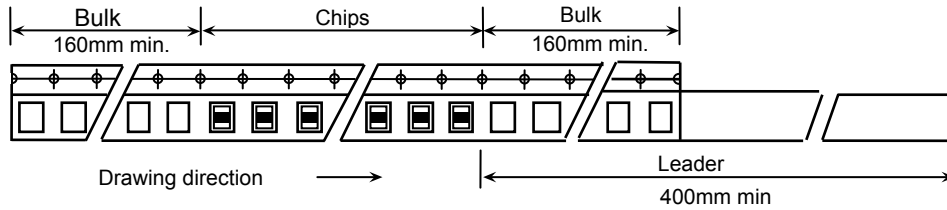
## 1. CONSTRUCTION AND DIMENSION OF TAPING

### 1-1. Dimensions of carrier tape

Dimensions of paper tape shall be according to Appendix 3, 4.

Dimensions of plastic tape shall be according to Appendix 5, 6, 7.

### 1-2. Bulk part and leader of taping



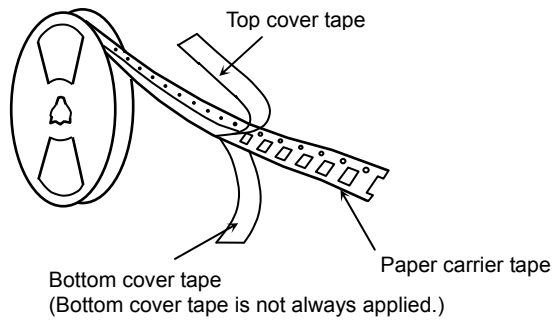
### 1-3. Dimensions of reel

Dimensions of Ø178 reel shall be according to Appendix 8, 9.

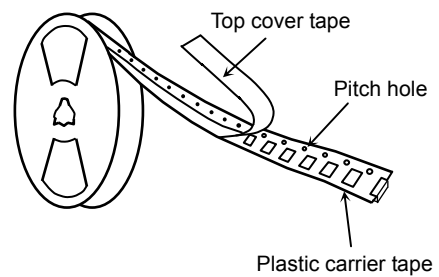
Dimensions of Ø330 reel shall be according to Appendix 10, 11, 12 .

### 1-4. Structure of taping

#### (a) Paper



#### (b) Plastic



## 2. CHIP QUANTITY

As for chip quantity and taping material of each product, please refer to detailed information on TDK web.

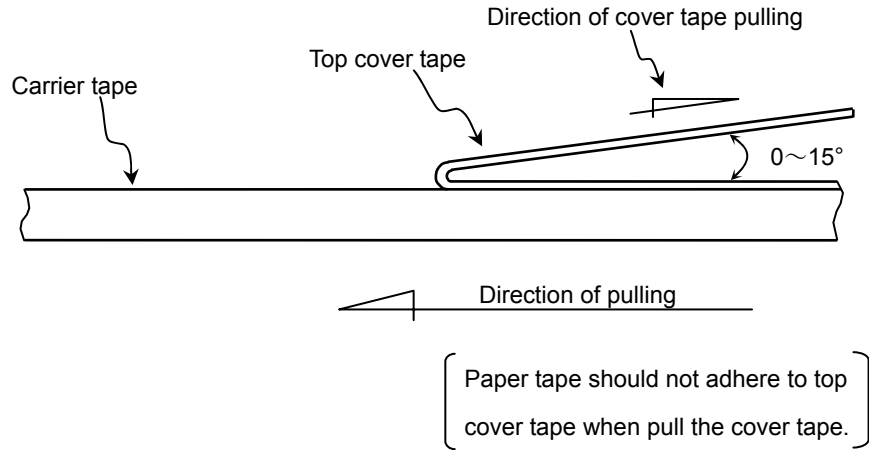


### 3. PERFORMANCE SPECIFICATIONS

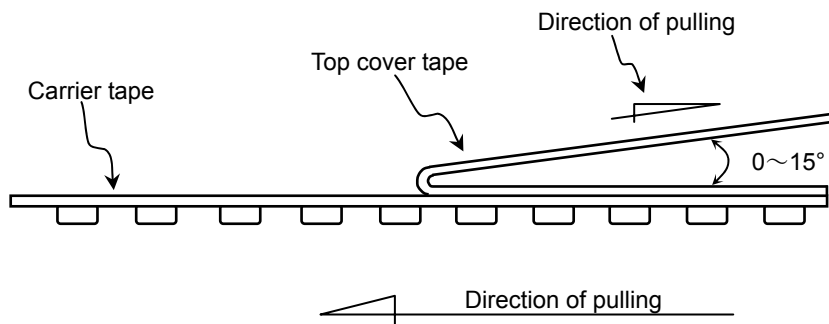
#### 3-1. Fixing peeling strength (top tape)

0.05 - 0.7N. (See the following figure.)

〈Paper〉



〈Plastic〉



3-2. Carrier tape shall be flexible enough to be wound around a minimum radius of 30mm with components in tape.

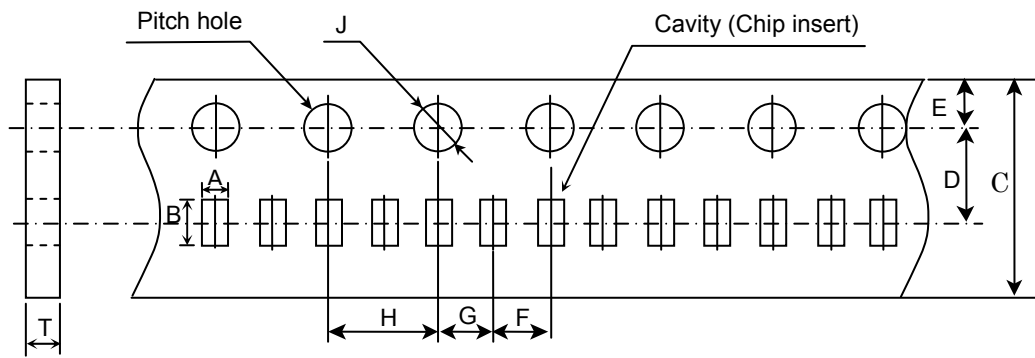
3-3. The missing of components shall be less than 0.1%

3-4. Components shall not stick to fixing tape.

3-5. The fixing tapes shall not protrude beyond the edges of the carrier tape not shall cover the sprocket holes.

# Appendix 3

## Paper Tape



(Unit : mm)

Symbol Type	A	B	C	D	E	F
C1005 [CC0402]	( 0.65 )	( 1.15 )	8.00 ± 0.30	3.50 ± 0.05	1.75 ± 0.10	2.00 ± 0.05

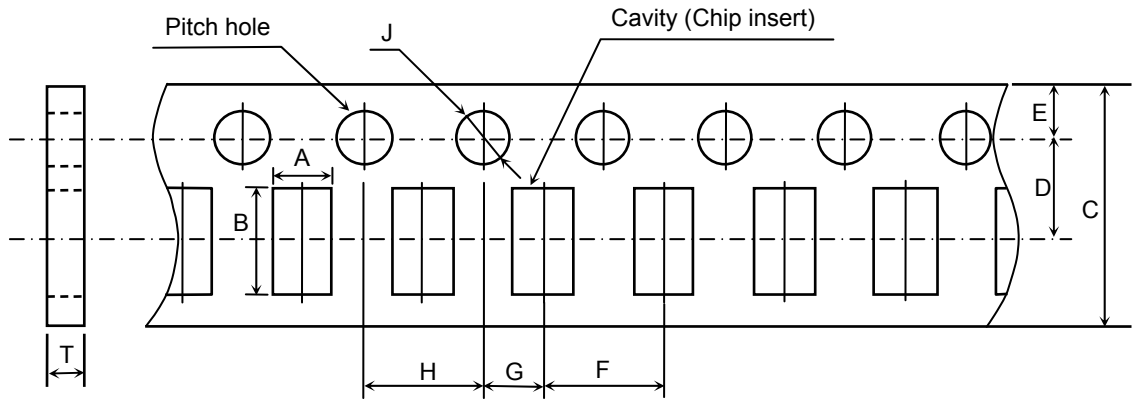
  

Symbol Type	G	H	J	T
C1005 [CC0402]	2.00 ± 0.05	4.00 ± 0.10	∅ 1.50 <sup>+0.10</sup> <sub>0</sub>	0.60 ± 0.15

( ) Reference value.

# Appendix 4

## Paper Tape



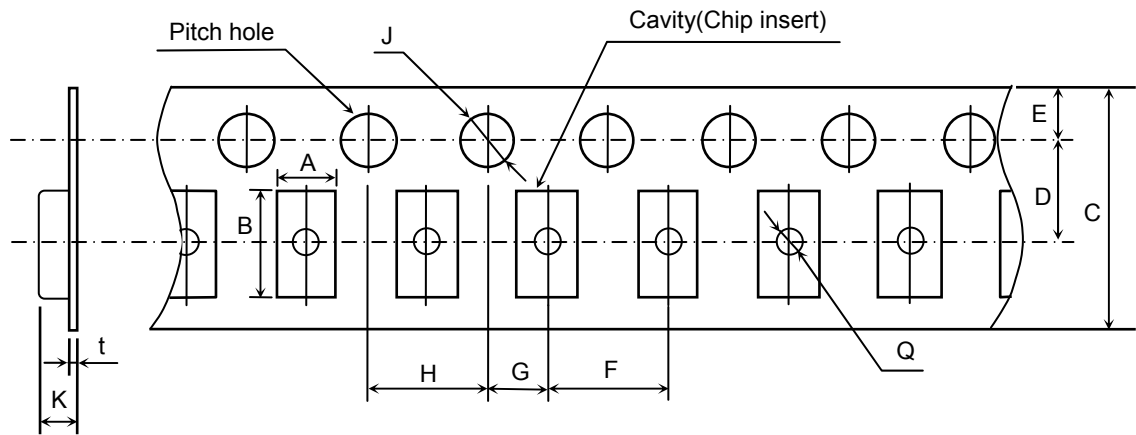
(Unit : mm)

Symbol Type	A	B	C	D	E	F
C1608 [CC0603]	( 1.10 )	( 1.90 )	8.00 ± 0.30	3.50 ± 0.05	1.75 ± 0.10	4.00 ± 0.10
C2012 [CC0805]	( 1.50 )	( 2.30 )				
C3216 [CC1206]	( 1.90 )	( 3.50 )				
Symbol Type	G	H	J	T		
C1608 [CC0603]	2.00 ± 0.05	4.00 ± 0.10	∅ 1.50 $\begin{matrix} +0.10 \\ 0 \end{matrix}$	1.20 max.		
C2012 [CC0805]						
C3216 [CC1206]						

( ) Reference value.

## Appendix 5

### Plastic Tape



(Unit : mm)

Symbol Type	A	B	C	D	E	F
C2012 [CC0805]	( 1.50 )	( 2.30 )	8.00 ± 0.30 * 12.00 ± 0.30	3.50 ± 0.05 * 5.50 ± 0.05	1.75 ± 0.10	4.00 ± 0.10
C3216 [CC1206]	( 1.90 )	( 3.50 )				
C3225 [CC1210]	( 2.90 )	( 3.60 )				
Symbol Type	G	H	J	K	t	Q
C2012 [CC0805]	2.00 ± 0.05	4.00 ± 0.10	∅ 1.50 <sup>+0.10</sup> <sub>0</sub>	2.50 max.	0.60 max.	∅ 0.50 min.
C3216 [CC1206]				3.40 max.		
C3225 [CC1210]						

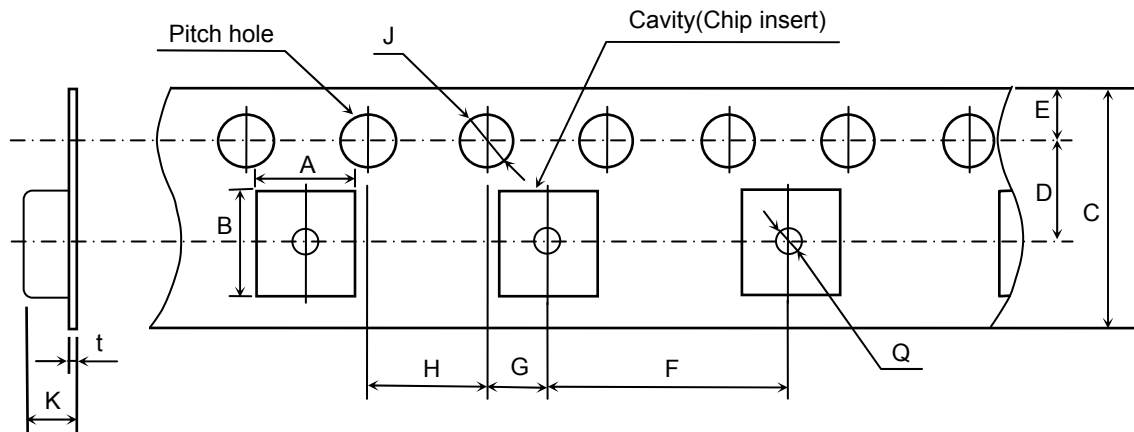
( ) Reference value.

Exceptionally no hole in the cavity is applied. Please inquire if hole in cavity is mandatory.

\* Applied to 2.5mm thickness products.

# Appendix 6

## Plastic Tape



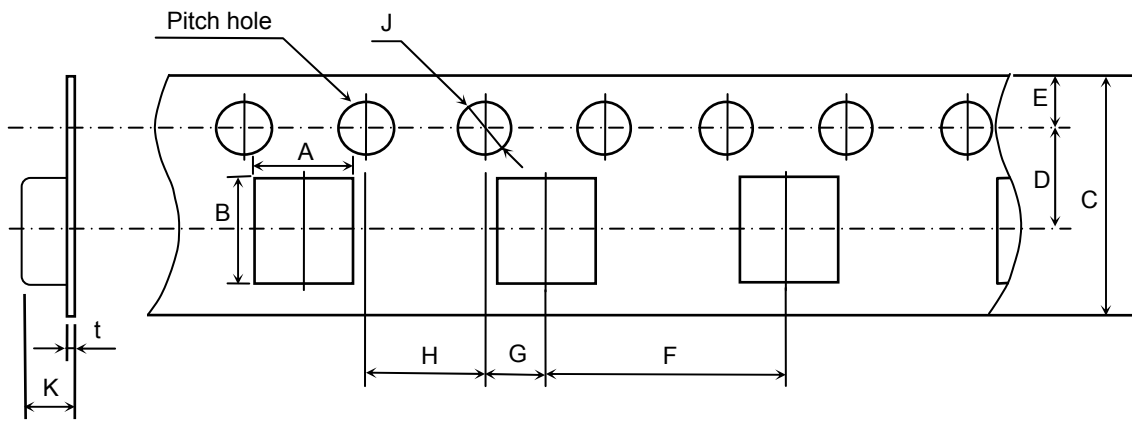
(Unit : mm)

Symbol Type	A	B	C	D	E	F
C4520 [CC1808]	(2.50)	(5.10)	12.00 ± 0.30	5.50 ± 0.05	1.75 ± 0.10	8.00 ± 0.10
C4532 [CC1812]	(3.60)	(4.90)				
C5750 [CC2220]	(5.40)	(6.10)				
Symbol Type	G	H	J	K	t	Q
C4520 [CC1808]	2.00 ± 0.05	4.00 ± 0.10	∅ 1.50 $\begin{matrix} +0.10 \\ 0 \end{matrix}$	6.50 max.	0.60 max.	∅ 1.50 min.
C4532 [CC1812]						
C5750 [CC2220]						

( ) Reference value.

# Appendix 7

## Plastic Tape



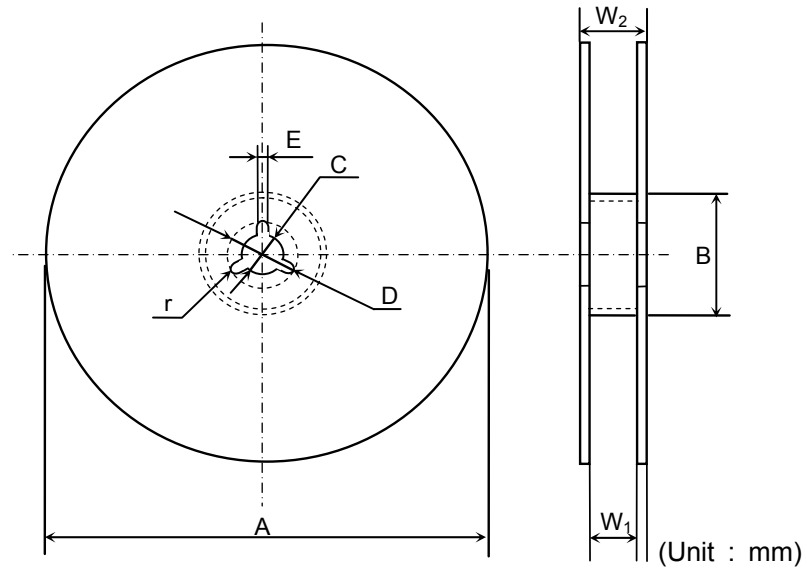
(Unit : mm)

Symbol Type	A	B	C	D	E	F
C7563 [CC3025]	( 6.9 )	( 8.0 )	16.0 ± 0.3	7.5 ± 0.1	1.75 ± 0.1	12.0 ± 0.1
Symbol Type	G	H	J	K	t	
C7563 [CC3025]	2.00 ± 0.05	4.00 ± 0.10	∅ 1.5 <sup>+0.10</sup> <sub>0</sub>	6.50 max.	0.60 max.	

( ) Reference value.

## Appendix 8

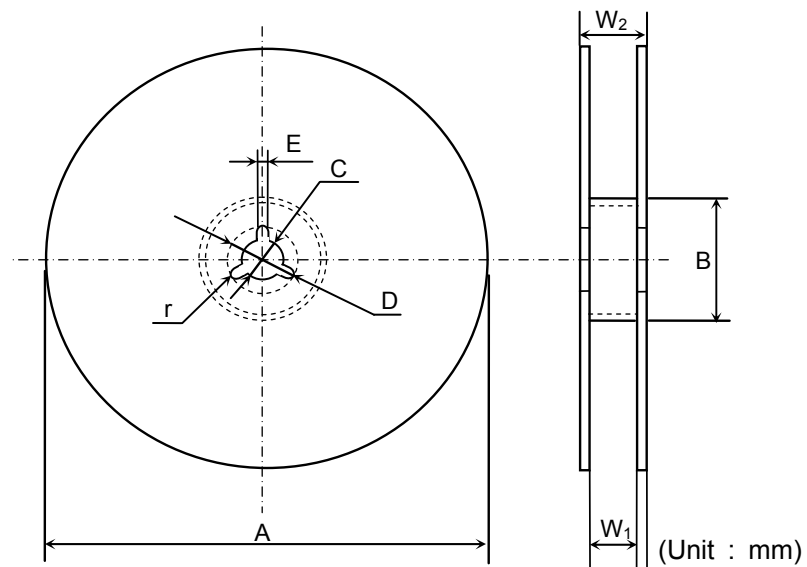
C1005 [CC0402] ~ C3225 [CC1210]  
 (As for C3225 type, any thickness of the item except 2.5mm)  
 (Material: Polystyrene)



Symbol	A	B	C	D	E	$W_1$
Dimension	$\text{Ø}178 \pm 2.0$	$\text{Ø}60 \pm 2.0$	$\text{Ø}13 \pm 0.5$	$\text{Ø}21 \pm 0.8$	$2.0 \pm 0.5$	$9.0 \pm 0.3$
Symbol	$W_2$	r				
Dimension	$13.0 \pm 1.4$	1.0				

## Appendix 9

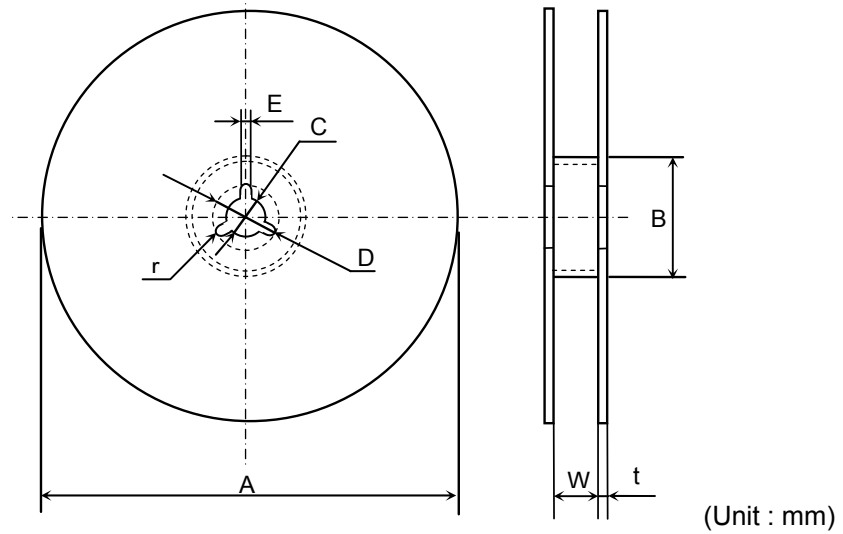
C3225 [CC1210] ~ C5750 [CC2220]  
 (As for CGA6 type, applied to 2.5mm thickness products)  
 (Material: Polystyrene)



Symbol	A	B	C	D	E	$W_1$
Dimension	$\text{Ø}178 \pm 2.0$	$\text{Ø}60 \pm 2.0$	$\text{Ø}13 \pm 0.5$	$\text{Ø}21 \pm 0.8$	$2.0 \pm 0.5$	$13.0 \pm 0.3$
Symbol	$W_2$	r				
Dimension	$17.0 \pm 1.4$	1.0				

## Appendix 10

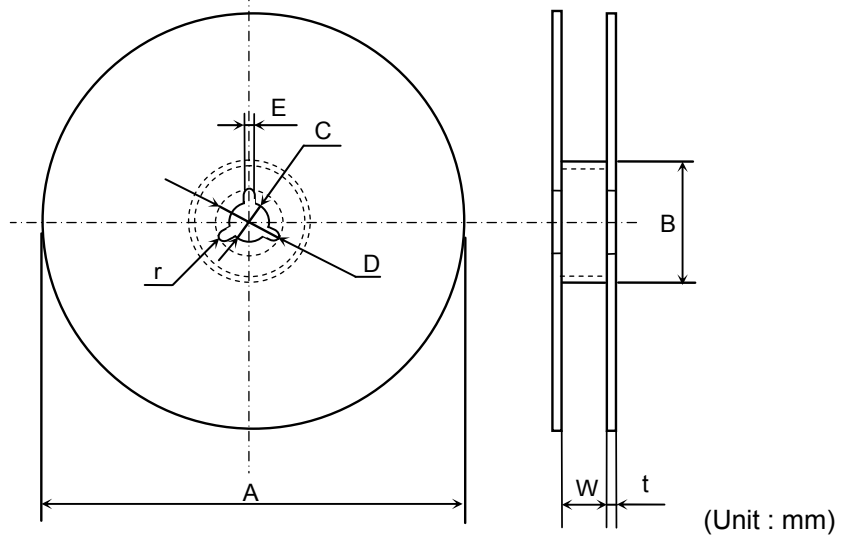
C1005 [CC0402] ~ C3225 [CC1210]  
 (As for CGA6 type, any thickness of the item except 2.5mm)  
 (Material: Polystyrene)



Symbol	A	B	C	D	E	W
Dimension	Ø382 max. (Nominal Ø330)	Ø50 min.	Ø13 ± 0.5	Ø21 ± 0.8	2.0 ± 0.5	10.0 ± 1.5
Symbol	t	r				
Dimension	2.0 ± 0.5	1.0				

## Appendix 11

C3225 [CC1210] ~ C5750 [CC2220]  
 (As for CGA6 type, applied to 2.5mm thickness products)  
 (Material: Polystyrene)



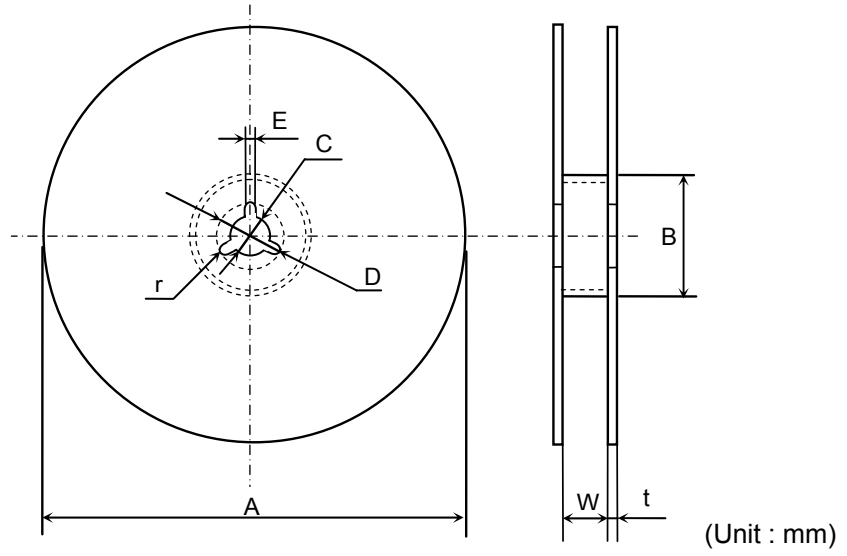
Symbol	A	B	C	D	E	W
Dimension	Ø382 max. (Nominal Ø330)	Ø50 min.	Ø13 ± 0.5	Ø21 ± 0.8	2.0 ± 0.5	14.0 ± 1.5
Symbol	t	r				
Dimension	2.0 ± 0.5	1.0				



# Appendix 12

C7563 [CC3025]

(Material : Polystyrene)



Symbol	A	B	C	D	E	W
Dimension	Ø382 max. (Nominal Ø330)	Ø50 min.	Ø13 ± 0.5	Ø21 ± 0.8	2.0 ± 0.5	17.5 ± 1.5
Symbol	t	r				
Dimension	2.0 ± 0.5	1.0				