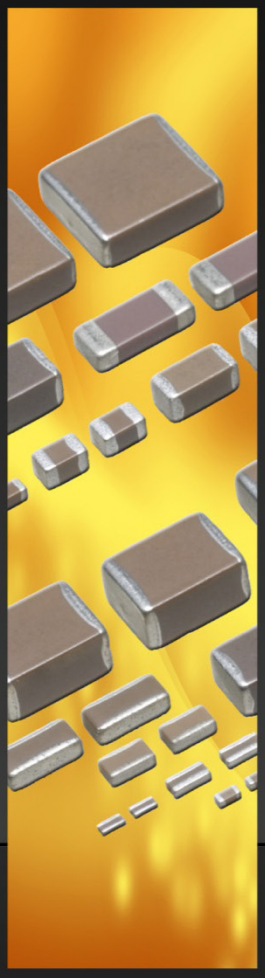
TDK

MULTILAYER CERAMIC CHIP CAPACITORS



C Series
Soft Termination Type

Type: C2012 [EIA CC0805]
C3216 [EIA CC1206]
C3225 [EIA CC1210]
C4532 [EIA CC1812]
C5750 [EIA CC2220]

Issue date: April 2011

TDK MLCC
US Catalog

Version B11

REMINDERS

Please read before using this product

SAFETY REMINDERS

REMINDERS

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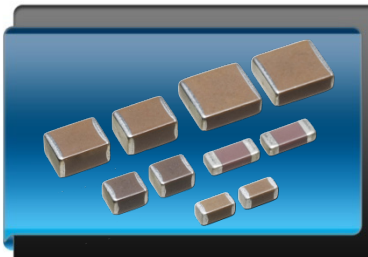


C Series

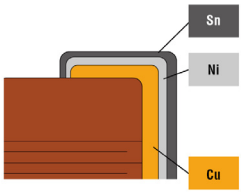
Soft Termination Type

Type: C2012, C3216, C3225, C4532, C5750

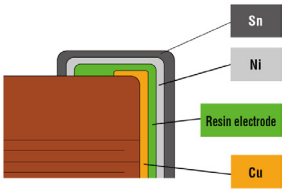
Features

- Conductive resin layer inside the terminal electrode absorbs external stress from thermal or mechanical sources.
- Improved board bending resistance and drop resistance prevents crack occurrence within the ceramic component.
- Reduce risk of solder cracks due to thermal shock and temperature cycling as well as improved board adherences.

Standard Product



Soft Termination

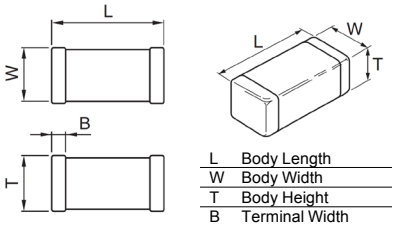


➢ A resin electrode layer between the copper base and the nickel plating of the terminal electrode absorbs bending stress from the board and suppresses the forming of solder cracks. Conductive resin is made of epoxy mixed with a filler of conductive particles.

Applications

- ECU / Sensor module / ABS units / HID and other automotive electronic equipment
- Switching power supply
- Telecom base station
- Electronic circuits mounted on alumina substrate
- SMT application which requires bending robustness
- Pb-free solder application in which solder joint reliability is problematic

Shape & Dimensions



L	Body Length
W	Body Width
T	Body Height
B	Terminal Width

Dimensions in mm

Part Number Construction

C 3225 X7S 1H 106 M /SOFT

Series Name

Dimensions L x W (mm)

Case Code	Length	Width
C2012	2.00 ± 0.20	1.25 ± 0.20
C3216	3.20 ± 0.20	1.60 ± 0.20
C3225	3.20 ± 0.40	2.50 ± 0.30
C4532	4.50 ± 0.40	3.20 ± 0.40
C5750	5.70 ± 0.40	5.00 ± 0.40

Temperature Characteristic

Temperature Characteristics	Capacitance Change	Temperature Range
X7R	± 15%	-55 to +125ºC
X7S	± 22%	-55 to +125ºC
X7T	+22/-33%	-55 to +125ºC

Rated Voltage (DC)

Voltage Code	Voltage (DC)
1C	16V
1E	25V
1V	35V
1H	50V
2A	100V
2E	250V
2W	450V
2J	630V

Termination Type

Termination Code	Style
/SOFT	Epoxy Termination

Capacitance Tolerance

Tolerance Code	Tolerance
M	± 20%

Nominal Capacitance (pF)

The capacitance is expressed in three digit codes 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. R designates a decimal point.

Capacitance Code	Capacitance
0R5	0.5pF
010	1pF
102	1,000pF (1nF)
105	1,000,000pF (1µF)

Capacitance Range Chart

C2012 [EIA CC0805]

Capacitance Range Chart

Temperature Characteristics: X7R (± 15%), X7S (± 22%), X7T (+22/-33%)

Rated Voltage: 450V (2W), 250V (2E), 100V (2A), 50V (1H), 35V (1V), 16V (1C)

Capacitance (pF)	Cap Code	Tolerance	X7R				X7S	X7T	
			2E (250V)	1H (50V)	1V (35V)	1C (16V)	2A (100V)	2W (450V)	2E (250V)
10,000	103	M: ± 20%							
22,000	223								
47,000	473								
100,000	104								
220,000	224								
470,000	474								
1,000,000	105								
2,200,000	225								
4,700,000	475								

Standard Thickness

0.85 mm 1.25 mm

Capacitance Range Table

C2012 [EIA CC0805]

Class 2 (Temperature Stable)

Temperature Characteristics: X7R (-55 to +125ºC, ±15%), X7S (-55 to +125ºC, ±22%), X7T (-55 to +125ºC, +22/-33%)

TDK Part Number (Ordering Code)	Temperature Characteristics	Rated Voltage	Capacitance (pF)	Capacitance Tolerance	Thickness (mm)
C2012X7R1C475M/SOFT	X7R	16V	4,700,000	± 20%	1.25 ± 0.25
C2012X7R1V225M/SOFT	X7R	35V	2,200,000	± 20%	1.25 ± 0.25
C2012X7R1H474M/SOFT	X7R	50V	470,000	± 20%	1.25 ± 0.20
C2012X7R1H105M/SOFT	X7R	50V	1,000,000	± 20%	1.25 ± 0.20
C2012X7S2A224M/SOFT	X7S	100V	220,000	± 20%	0.85 ± 0.10
C2012X7S2A474M/SOFT	X7S	100V	470,000	± 20%	1.25 ± 0.20
C2012X7S2A105M/SOFT	X7S	100V	1,000,000	± 20%	1.25 ± 0.25
C2012X7R2E103M/SOFT	X7R	250V	10,000	± 20%	1.25 ± 0.20
C2012X7R2E223M/SOFT	X7R	250V	22,000	± 20%	1.25 ± 0.20
C2012X7T2E473M/SOFT	X7T	250V	47,000	± 20%	1.25 ± 0.20
C2012X7T2E104M/SOFT	X7T	250V	100,000	± 20%	1.25 ± 0.20
C2012X7T2W103M/SOFT	X7T	450V	10,000	± 20%	0.85 ± 0.10
C2012X7T2W223M/SOFT	X7T	450V	22,000	± 20%	1.25 ± 0.20
C2012X7T2W473M/SOFT	X7T	450V	47,000	± 20%	1.25 ± 0.20

Capacitance Range Chart

C3216 [EIA CC1206]

Capacitance Range Chart

Temperature Characteristics: X7R (± 15%), X7S (± 22%), X7T (+22/-33%)

Rated Voltage: 630V (2J), 450V (2W), 250V (2E), 100V (2A), 50V (1H), 35V (1V), 25V (1E)

Capacitance (pF)	Cap Code	Tolerance	X7R						X7S	X7T		
			2J (630V)	2E (250V)	2A (100V)	1H (50V)	1V (35V)	1E (25V)	2A (100V)	2J (630V)	2W (450V)	2E (250V)
10,000	103	M: ± 20%										
22,000	223											
47,000	473											
100,000	104											
220,000	224											
470,000	474											
1,000,000	105											
2,200,000	225											
4,700,000	475											
10,000,000	106											

Standard Thickness

1.15 mm 1.30 mm 1.60 mm

Capacitance Range Table

C3216 [EIA CC1206]

Class 2 (Temperature Stable)

Temperature Characteristics X7R (-55 to +125ºC, ±15%), X7S (-55 to +125ºC, ±22%), X7T (-55 to +125ºC, +22/-33%)

TDK Part Number (Ordering Code)	Temperature Characteristics	Rated Voltage	Capacitance (pF)	Capacitance Tolerance	Thickness (mm)
C3216X7R1E106M/SOFT	X7R	25V	10,000,000	± 20%	1.60 ± 0.30
C3216X7R1V475M/SOFT	X7R	35V	4,700,000	± 20%	1.60 ± 0.30
C3216X7R1H105M/SOFT	X7R	50V	1,000,000	± 20%	1.60 ± 0.30
C3216X7R1H225M/SOFT	X7R	50V	2,200,000	± 20%	1.60 ± 0.30
C3216X7R2A474M/SOFT	X7R	100V	470,000	± 20%	1.60 ± 0.30
C3216X7R2A105M/SOFT	X7R	100V	1,000,000	± 20%	1.60 ± 0.30
C3216X7S2A225M/SOFT	X7S	100V	2,200,000	± 20%	1.60 ± 0.30
C3216X7R2E104M/SOFT	X7R	250V	100,000	± 20%	1.60 ± 0.30
C3216X7T2E224M/SOFT	X7T	250V	220,000	± 20%	1.60 ± 0.30
C3216X7T2W104M/SOFT	X7T	450V	100,000	± 20%	1.60 ± 0.30
C3216X7R2J103M/SOFT	X7R	630V	10,000	± 20%	1.15 ± 0.15
C3216X7R2J223M/SOFT	X7R	630V	22,000	± 20%	1.30 ± 0.15
C3216X7T2J473M/SOFT	X7T	630V	47,000	± 20%	1.60 ± 0.30

Capacitance Range Chart

C3225 [EIA CC1210]

Capacitance Range Chart

Temperature Characteristics: X7R (± 15%), X7S (± 22%), X7T (+22/-33%)
Rated Voltage: 630V (2J), 450V (2W), 250V (2E), 100V (2A), 50V (1H)

Capacitance (pF)	Cap Code	Tolerance	X7R			X7S		X7T	
			2J (630V)	2E (250V)	2A (100V)	2A (100V)	1H (50V)	2J (630V)	2W (450V)
47,000	473	M: ± 20%							
100,000	104								
220,000	224								
470,000	474								
1,000,000	105								
2,200,000	225								
4,700,000	475								
10,000,000	106								

Standard Thickness

- 1.60 mm
- 2.00 mm
- 2.30 mm
- 2.50 mm

Capacitance Range Table

C3225 [EIA CC1210]

Class 2 (Temperature Stable)

Temperature Characteristics: X7R (-55 to +125ºC, ±15%), X7S (-55 to +125ºC, ±22%), X7T (-55 to +125ºC, +22/-33%)

TDK Part Number (Ordering Code)	Temperature Characteristics	Rated Voltage	Capacitance (pF)	Capacitance Tolerance	Thickness (mm)
C3225X7S1H475M/SOFT	X7S	50V	4,700,000	± 20%	2.30 ± 0.20
C3225X7S1H106M/SOFT	X7S	50V	10,000,000	± 20%	2.50 ± 0.30
C3225X7R2A225M/SOFT	X7R	100V	2,200,000	± 20%	2.30 ± 0.20
C3225X7S2A475M/SOFT	X7S	100V	4,700,000	± 20%	2.00 ± 0.30
C3225X7R2E104M/SOFT	X7R	250V	100,000	± 20%	2.00 ± 0.30
C3225X7R2E224M/SOFT	X7R	250V	220,000	± 20%	2.00 ± 0.30
C3225X7T2W224M/SOFT	X7T	450V	220,000	± 20%	2.00 ± 0.30
C3225X7R2J473M/SOFT	X7R	630V	47,000	± 20%	2.00 ± 0.30
C3225X7T2J104M/SOFT	X7T	630V	100,000	± 20%	1.60 ± 0.30

Capacitance Range Chart

C4532 [EIA CC1812]

Capacitance Range Chart

Temperature Characteristics: X7R (± 15%), X7T (+22/-33%)
Rated Voltage: 630V (2J), 450V (2W), 250V (2E)

Capacitance (pF)	Cap Code	Tolerance	X7R	X7T		
			2E (250V)	2J (630V)	2W (450V)	2E (250V)
100,000	104	M: ± 20%				
220,000	224					
470,000	474					
1,000,000	105					
2,200,000	225					
4,700,000	475					
10,000,000	106					

Standard Thickness

- 2.00 mm
- 2.30 mm
- 2.50 mm

Capacitance Range Table

C4532 [EIA CC1812]

Class 2 (Temperature Stable)

Temperature Characteristics: X7R (-55 to +125ºC, ±15%), X7T (-55 to +125ºC, +22/-33%)

TDK Part Number (Ordering Code)	Temperature Characteristics	Rated Voltage	Capacitance (pF)	Capacitance Tolerance	Thickness (mm)
C4532X7R2E474M/SOFT	X7R	250V	470,000	± 20%	2.30 ± 0.30
C4532X7T2E105M/SOFT	X7T	250V	1,000,000	± 20%	2.50 ± 0.30
C4532X7T2W474M/SOFT	X7T	450V	470,000	± 20%	2.30 ± 0.30
C4532X7T2J224M/SOFT	X7T	630V	220,000	± 20%	2.00 ± 0.30

Capacitance Range Chart

C5750 [EIA CC2220]

Capacitance Range Chart

Temperature Characteristics: X7R (± 15%), X7S (± 22%), X7T (+22/-33%)
Rated Voltage: 630V (2J), 450V (2W), 250V (2E), 100V (2A)

Capacitance (pF)	Cap Code	Tolerance	X7R	X7S	X7T		
			2E (250V)	2A (100V)	2J (630V)	2W (450V)	2E (250V)
100,000	104	M: ± 20%					
220,000	224						
470,000	474						
1,000,000	105						
2,200,000	225						
4,700,000	475						
10,000,000	106						

Standard Thickness

2.30 mm
2.50 mm

Capacitance Range Table

C5750 [EIA CC2220]

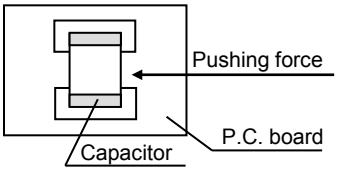
Class 2 (Temperature Stable)

Temperature Characteristics: X7R (-55 to +125ºC, ±15%), X7S (-55 to +125ºC, ±22%), X7T (-55 to +125ºC, +22/-33%)

TDK Part Number (Ordering Code)	Temperature Characteristics	Rated Voltage	Capacitance (pF)	Capacitance Tolerance	Thickness (mm)
C5750X7S2A106M/SOFT	X7S	100V	10,000,000	± 20%	2.30 ± 0.30
C5750X7R2E105M/SOFT	X7R	250V	1,000,000	± 20%	2.30 ± 0.30
C5750X7T2E225M/SOFT	X7T	250V	2,200,000	± 20%	2.50 ± 0.30
C5750X7T2W105M/SOFT	X7T	450V	1,000,000	± 20%	2.50 ± 0.30
C5750X7T2J474M/SOFT	X7T	630V	470,000	± 20%	2.50 ± 0.30

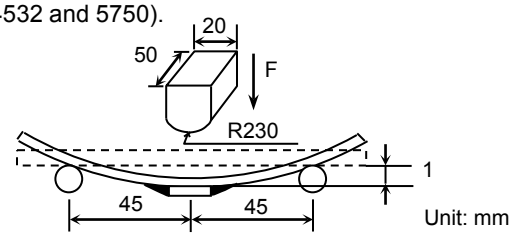
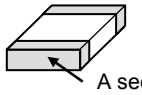
General Specifications

C Series – Soft Termination Type

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., whichever smaller. (As for the capacitors of rated voltage 16V DC, 10,000 MΩ or 100MΩ•μF min.,)	Apply rated voltage for 60s. As for the rated voltage 630V DC, apply 500V DC.
3	**Voltage Proof**	Withstand test voltage without insulation breakdown or other damage.	**Rated Voltage** / **Apply voltage** RV ≤ 100V: 2.5 ×rated voltage RV > 100V: 1.5 ×rated voltage Above DC voltage shall be applied for 1 to 5s. Charge / discharge current shall not exceed 50mA.
4	**Capacitance**	Within the specified tolerance.	**Class** / **Rated Capacitance** / **Measuring Frequency** / **Measuring voltage** Class 2: C ≤ 10uF: 1kHz±10%: 1.0±0.2V_{rms} Class 2: C > 10uF: 120Hz±20%: 0.5±0.2 V_{rms}
5	**Dissipation Factor (Class 2)**	**T.C.** / **D.F.** X7R: 3% max. / 5% max. / 7.5% max. X7S: 5% max. X7T: 2.5% max.	See No.4 in this table for measuring condition.
6	**Temperature Characteristics of Capacitance (Class 2)**	Capacitance Change (%) **No Voltage Applied** X7R: ± 15% X7S: ± 15% X7T: +22/-33%	Capacitance shall be measured by the steps shown in the following table after thermal equilibrium is obtained for each step. ΔC be calculated ref. STEP 3 reading **Step** / **Temperature (ºC)** 1: Reference temp. ± 2 2: Min. operating temp. ± 2 3: Reference temp. ± 2 4: Max. operating temp. ± 2
7	**Robustness of Terminations**	No sign of termination coming off, breakage of ceramic, or other abnormal signs.	Reflow solder the capacitors on P.C. board (shown in Appendix 1a or Appendix 1b) and apply a pushing force of 5N for 10±1s. 

General Specifications

C Series – Soft Termination Type

<table>
<tr><th>No.</th><th>Item</th><th>Performance</th><th>Test or Inspection Method</th></tr>
<tr><td>8</td><td>Bending</td><td>No mechanical damage.</td><td>Reflow solder the capacitor on P.C. board (shown in Appendix 2) and bend it for 5mm. (2mm is applied for C4532 and 5750).
 
</td></tr>
<tr><td>9</td><td>Solderability</td><td>New solder to cover over 75% of termination.
25% may have pinholes 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.
 
</td><td>Completely soak both terminations in solder at 235±5ºC for 2±0.5s.
Solder: H63A (JIS Z 3282)
Flux: Isopropyl alcohol (JIS K 8839)
Rosin (JIS K 5902) 25% solid solution.</td></tr>
<tr><td>10</td><td colspan="2">Resistance to solder heat
External appearance: No cracks are allowed and terminations shall be covered at least 60% with new solder.
Capacitance:<table><tr><th colspan="2">Characteristics</th><th>Change from the value before test</th></tr><tr><td>Class 2</td><td>X7R
X7S
X7T</td><td>± 7.5%</td></tr></table>D.F. (Class 2): Meet the initial spec.
Insulation Resistance: Meet the initial spec.
Voltage Proof: No insulation breakdown or other damage.</td><td>Completely soak both terminations in solder at 260±5ºC for 5±1s.
Preheating condition
Temp.: 150±10ºC
Time : 1 to 2min.
Flux: Isopropyl alcohol (JIS K 8839)
Rosin (JIS K 5902) 25% solid solution.
Solder: H63A (JIS Z 3282)
Leave the capacitor in ambient conditions for 6 to 24h before measurement.</td></tr>
<tr><td>11</td><td colspan="2">Vibration
External appearance: No mechanical damage.
Capacitance:<table><tr><th colspan="2">Characteristics</th><th>Change from the value before test</th></tr><tr><td>Class 2</td><td>X7R
X7S
X7T</td><td>± 7.5%</td></tr></table>D.F. (Class 2): Meet the initial spec.</td><td>Reflow solder the capacitor on P.C. board (shown in Appendix 1a or Appendix 1b) before testing.
Vibrate the capacitor with amplitude of 1.5mm P-P sweeping the frequencies from 10Hz to 55Hz and back to 10Hz after 1min.
Repeat this for 2h each in 3 perpendicular directions.</td></tr>
</table>

General Specifications

C Series – Soft Termination Type

<table>
<tr><th>No.</th><th>Item</th><th>Performance</th><th>Test or Inspection Method</th></tr>
<tr><td>12</td><td>Temperature cycle</td><td></td><td rowspan="5">Reflow solder the capacitors on a P.C. board (shown in Appendix 1a or Appendix 1b) before testing.

Expose the capacitor in the conditions in step 1 through step 4, and repeat 5 times consecutively.

Leave the capacitor in ambient conditions for 24±2h before measurement.

<table><tr><th>Step</th><th>Temperature (ºC)</th><th>Time (min.)</th></tr><tr><td>1</td><td>Min. operating temp. ±3</td><td>30 ± 3</td></tr><tr><td>2</td><td>Reference Temp.</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>Reference Temp.</td><td>2 - 5</td></tr></table></td></tr>
<tr><td></td><td>External appearance</td><td>No mechanical damage.</td></tr>
<tr><td></td><td>Capacitance</td><td><table><tr><th colspan="2">Characteristics</th><th>Change from the value before test</th></tr><tr><td rowspan="3">Class 2</td><td>X7R
X7S
X7T</td><td>± 7.5%</td></tr></table></td></tr>
<tr><td></td><td>D.F. (Class 2)</td><td>Meet the initial spec.</td></tr>
<tr><td></td><td>Insulation Resistance</td><td>Meet the initial spec.</td></tr>
<tr><td></td><td>Voltage Proof</td><td>No insulation breakdown or other damage.</td></tr>
<tr><td>13</td><td>Moisture Resistance (Steady State)</td><td></td><td rowspan="5">Reflow solder the capacitor on P.C. board (shown in Appendix 1a or Appendix 1b) before testing.

Leave at temperature 40±2ºC, 90 to 95%RH for 500 +24,0h.

Leave the capacitor in ambient condition for 24±2h before measurement.</td></tr>
<tr><td></td><td>External appearance</td><td>No mechanical damage.</td></tr>
<tr><td></td><td>Capacitance</td><td><table><tr><th colspan="2">Characteristics</th><th>Change from the value before test</th></tr><tr><td rowspan="3">Class 2</td><td>X7R
X7S
X7T</td><td>± 12.5%</td></tr></table></td></tr>
<tr><td></td><td>D.F. (Class 2)</td><td>Characteristics
X7R: 200% of initial spec. max.
X7S: 200% of initial spec. max.
X7T: 200% of initial spec. max.</td></tr>
<tr><td></td><td>Insulation Resistance</td><td>1,000MΩ or 50MΩ•μF min., whichever smaller. (As for the capacitors of rated voltage 16V DC, 1,000 MΩ or 10MΩ•μF min.,)</td></tr>
</table>

General Specifications

C Series – Soft Termination Type

No.	Item	Performance	Test or Inspection Method
14	**Moisture Resistance**		Reflow solder the capacitors on P.C. board (shown in Appendix 1a or Appendix 1b) before testing. Apply the rated voltage at temperature 40±2ºC and 90 to 95%RH for 500 +24,0h. Charge/discharge current shall not exceed 50mA. Leave the capacitor in ambient conditions for 24±2h before measurement. Voltage conditioning: 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.
	External appearance	No mechanical damage.	
	Capacitance	**Characteristics**: Class 2 (X7R, X7S, X7T); **Change from the value before test**: ± 12.5%	
	D.F. (Class 2)	Characteristics X7R: 200% of initial spec. max. X7S: 200% of initial spec. max. X7T: 200% of initial spec. max.	
	Insulation Resistance	500MΩ or 25MΩ•μF min., whichever smaller. (As for the capacitors of rated voltage 16V DC, 500 MΩ or 5MΩ•μF min.,)	
15	**Life**		Reflow solder the capacitors on P.C. board (shown in Appendix 1a or Appendix 1b) before testing. Apply rated voltage at maximum operating temperature ±2ºC for 1,000 +48, 0h. Some items may be tested at higher voltage (1.2x, 1.5x or 2xRV). Charge/discharge current shall not exceed 50mA. Leave the capacitor in ambient conditions for 24±2h before measurement. Voltage conditioning: 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.
	External appearance	No mechanical damage.	
	Capacitance	**Characteristics**: Class 2 (X7R, X7S, X7T); **Change from the value before test**: ± 15%	
	D.F. (Class 2)	Characteristics X7R: 200% of initial spec. max. X7S: 200% of initial spec. max. X7T: 200% of initial spec. max.	
	Insulation Resistance	1,000MΩ or 50MΩ•μF min., whichever smaller. (As for the capacitors of rated voltage 16V DC, 1,000 MΩ or 10MΩ•μF min.,)	

*As for the initial measurement of capacitors on number 8,12,13,14 and 15 leave capacitor at 150 –10, 0°C for 1 hour and measure the value after leaving capacitor for 24±2h in ambient conditions.

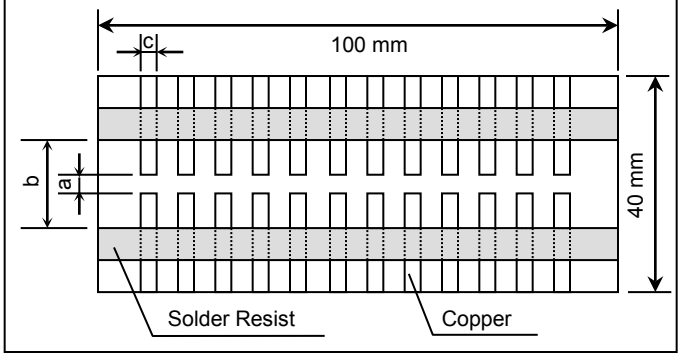
General Specifications

C Series – Soft Termination Type

Appendix - 1a

P.C. Board for reliability test

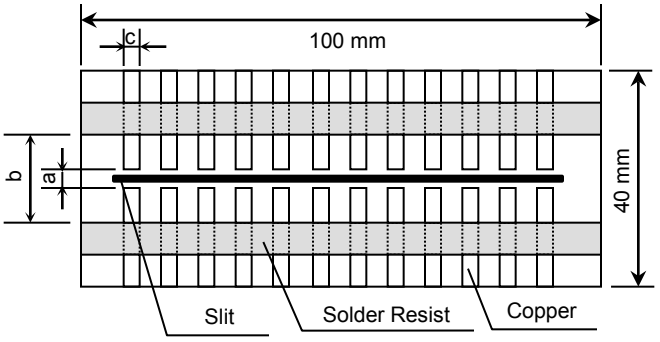
Applied for C2012, C3216



Appendix - 1b

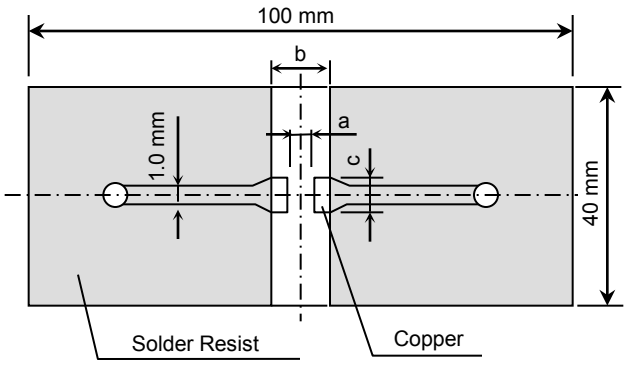
P.C. Board for reliability test

Applied for C3225, C4532, C5750



Appendix - 2

P.C. Board for bending test



Material : Glass Epoxy (As per JIS C6484 GE4)

P.C. Board thickness: 1.6mm

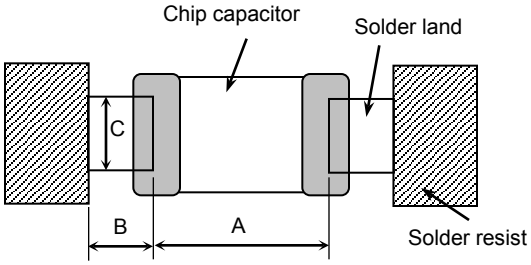
Copper (thickness 0.035mm)
Solder resist

Case Code		Dimensions (mm)		
JIS	EIA	a	b	c
C2012	CC0805	1.2	4.0	1.65
C3216	CC1206	2.2	5.0	2.0
C3225	CC1210	2.2	5.0	2.9
C4532	CC1812	3.5	7.0	3.7
C5750	CC2220	4.5	8.0	5.6

Soldering Information

C Series – Soft Termination Type

• Recommended Soldering Land Pattern



Wave Soldering Unit: mm

Symbol \ Type	C2012 [CC0805]	C3216 [CC1206]
A	1.0 - 1.3	2.1 - 2.5
B	1.0 - 1.2	1.1 - 1.3
C	0.8 - 1.1	1.0 - 1.3

Reflow Soldering Unit: mm

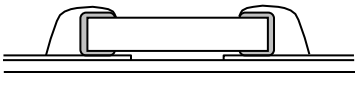
Symbol \ Type	C2012 [CC0805]	C3216 [CC1206]
A	0.9 - 1.2	2.0 - 2.4
B	0.7 - 0.9	1.0 - 1.2
C	0.9 - 1.2	1.1 - 1.6

Reflow Soldering Unit: mm

Symbol \ Type	C3225 [CC1210]	C4532 [CC1812]	C5750 [CC2220]
A	2.0 - 2.4	3.1 - 3.7	4.1 - 4.8
B	1.0 - 1.2	1.2 - 1.4	1.2 - 1.4
C	1.9 - 2.5	2.4 - 3.2	4.0 - 5.0

• Recommended Solder Amount

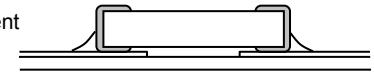
Excessive solder



Higher tensile force on the chip capacitor may cause cracking.

Adequate solder

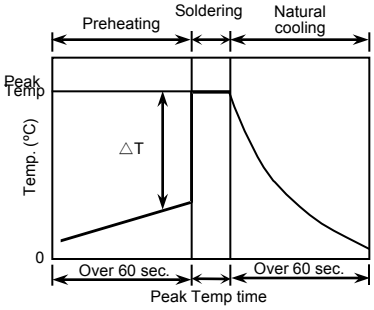
Insufficient solder



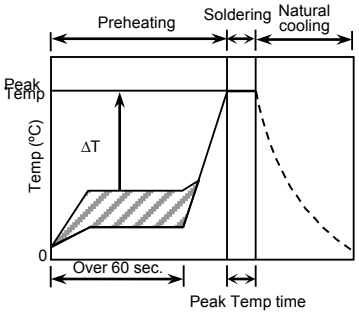
Small solder fillet may cause contact failure or failure to hold the chip capacitor to the P.C. board.

• Recommended Soldering Profile

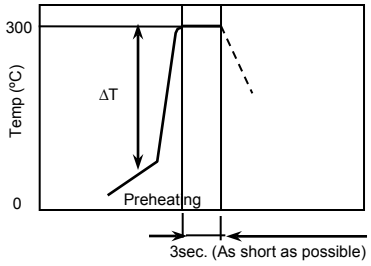
Wave Soldering



Reflow Soldering



Manual soldering (Solder iron)



APPLICATION

For C2012 (CC0805) and C3216 (CC1206), applied wave soldering and reflow soldering.

For C3225 (CC1210), C4532 (CC1812), C5750 (CC2220), applied only reflow soldering.

Recommended soldering duration

Solder \ Temp./ Dura.	Wave Soldering		Reflow Soldering	
	Peak temp (°C)	Duration (sec.)	Peak temp (°C)	Duration (sec.)
Sn-Pb Solder	250 max.	3 max.	230 max.	20 max.
Lead-Free Solder	260 max.	5 max.	260 max.	10 max.

Recommended solder compositions
Sn-37Pb (Sn-Pb solder)
Sn-3.0Ag-0.5Cu (Lead Free Solder)

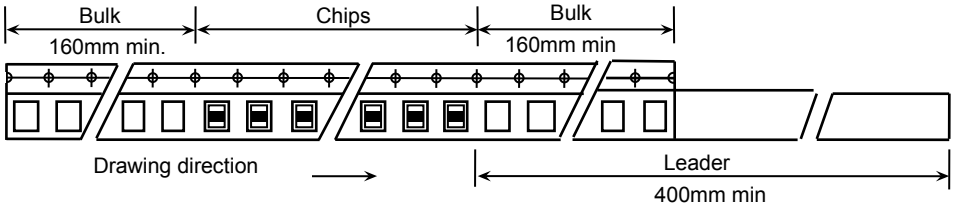
Preheating Condition

Soldering	Case Size - JIS (EIA)	Temp. (ºC)
Wave soldering	C2012(CC0805), C3216(CC1206)	ΔT ≤ 150
Reflow soldering	C2012(CC0805), C3216(CC1206)	ΔT ≤ 150
	C3225(CC1210), C4532(CC1812), C5750(CC2220)	ΔT ≤ 130
Manual soldering	C2012(CC0805), C3216(CC1206)	ΔT ≤ 150
	C3225(CC1210), C4532(CC1812), C5750(CC2220)	ΔT ≤ 130

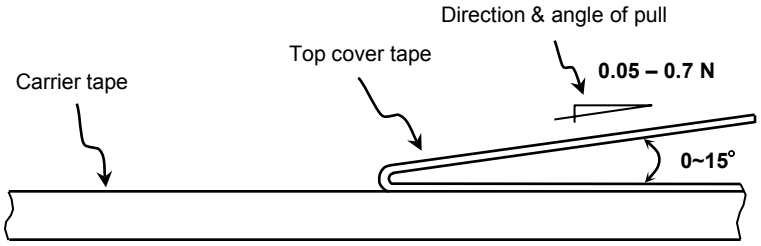
Packaging Information

C Series – Soft Termination Type

• Carrier Tape Configuration



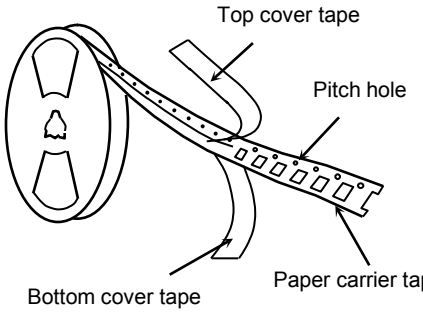
• Peel Back Force (Top Tape)



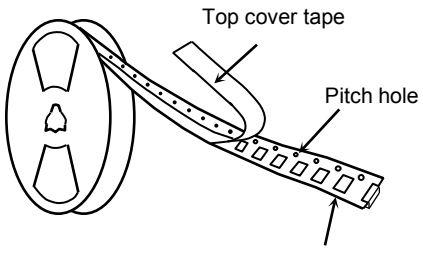
- Carrier tape shall be flexible enough to be wound around a minimum radius of 30mm with components in tape.
- The missing of components shall be less than 0.1%
- Components shall not stick to the cover tape.
- The cover tape shall not protrude beyond the edges of the carrier tape and shall not cover the sprocket holes.

• Chip Quantity Per Reel and Structure of Reel (Paper & Plastic)

Paper Carrier Tape & Reel



Plastic Carrier Tape & Reel

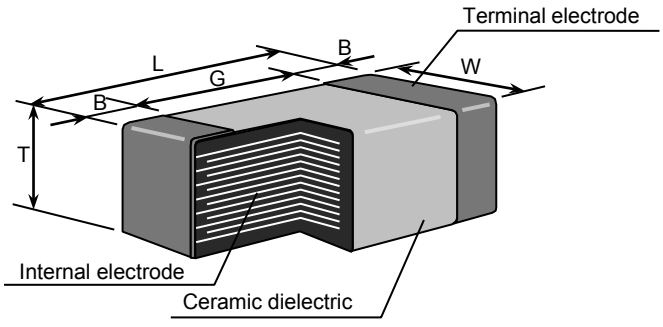


Case Code		Chip Thickness	Taping Material	Chip quantity (pcs.)	
JIS	EIA			φ178mm (7") reel	φ330mm (13") reel
C2012	CC0805	0.85 mm	Paper/Plastic	4,000	10,000
		1.25 mm	Plastic	2,000	
C3216	CC1206	1.15 mm	Plastic	2,000	10,000
		1.30 mm			
		1.60 mm			8,000
C3225	CC1210	1.60 mm	Plastic	2,000	8,000
		2.00 mm		1,000	5,000
		2.30 mm			
		2.50 mm			
C4532	CC1812	2.00 mm	Plastic	1,000	3,000
		2.30 mm		500	
		2.50 mm			
C5750	CC2220	2.30 mm	Plastic	500	3,000
		2.50 mm			

Additional Information

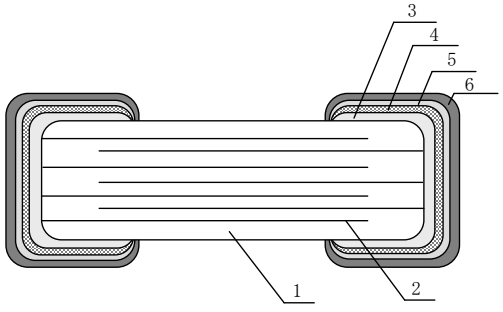
C Series – Soft Termination Type

• Shape & Dimensions



Case Code		Dimensions (mm)				
JIS	EIA	L	W	T	B	G
C2012	CC0805	2.00	1.25	0.85 1.25	0.45 min.	0.50 min.
C3216	CC1206	3.20	1.60	1.15 1.30 1.60	0.50 min.	1.00 min.
C3225	CC1210	3.20	2.50	1.60 2.00 2.30 2.50	0.50 min.	1.00 min.
C4532	CC1812	4.50	3.20	2.00 2.30 2.50	0.70 min.	2.00 min.
C5750	CC2220	5.70	5.00	2.30 2.50	0.70 min.	2.00 min.

• Inside Structure & Material System



No.	NAME	MATERIAL
		Class 2
(1)	Ceramic Dielectric	$BaTiO_3$
(2)	Internal Electrode	Nickel (Ni)
(3)	Termination	Copper (Cu)
(4)		Conductive Resin (Filler: Ag)
(5)		Nickel (Ni)
(6)		Tin (Sn)

• Environmental Information

TDK Corporation established internal product environmental assurance standards that include the six hazardous substances banned by the EU RoHS Directive[1] enforced on July 1, 2006 along with additional substances independently banned by TDK and has successfully completed making general purpose electronic components conform to the RoHS Directive[2].

1. · Abbreviation for Restriction on Hazardous Substances, which refers to the regulation EU Directive 2002/95/EC on hazardous substances by the European Union (EU) effective from July 1, 2006. The Directive bans the use of six specific hazardous substances in electric and electronic devices and products handled within the EU. The six substances are lead, mercury, cadmium, hexavalent chromium, PBB (polybrominated biphenyls), and PBDE (polybrominated diphenyl ethers).

2. This means that, in conformity with the EU Directive 2002/95/EC, lead, cadmium, mercury, hexavalent chromium, and specific bromine-based flame retardants, PBB and PBDE, have not been used, except for exempted applications.

For REACH (SVHC : 15 substances according to ECHA / October 2008) : All TDK MLCC do not contain these 15 substances.
For European Directive 2000/53/CE and 2005/673/CE : Cadmium, Hexavalent Chromium, Mercury, Lead are not contained in all TDK MLCC.
For European Directive 2003/11/CE : Pentabromodiphenyl-ether, Octabromodiphenyl-ether are not contained in all TDK MLCC.