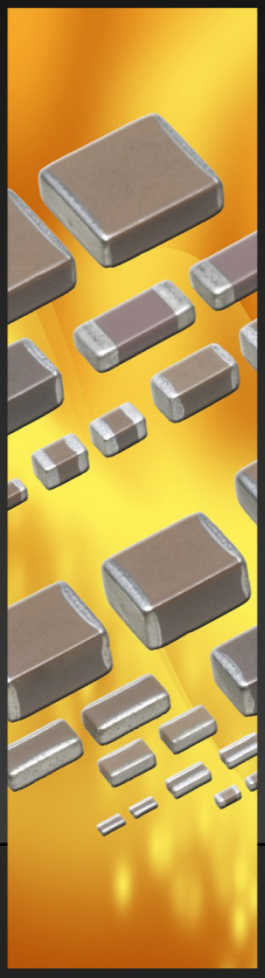
TDK

MULTILAYER CERAMIC CHIP CAPACITORS



C Series
Tight Tolerance Capacitors

Type: C1005 [EIA CC0402]
C1608 [EIA CC0603]

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

Tight Tolerance Capacitors

Type: C1005, C1608

Available Through Distribution Only*

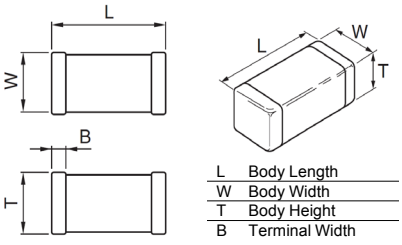
Features

- Available in 1% and 2% capacitance tolerance
- Suitable for high frequency applications
- A monolithic structure ensures superior mechanical strength and reliability
- High-accuracy automatic mounting is facilitated through the maintenance of very precise dimensional tolerances
- Composed of only ceramics and metals, these capacitors provide extremely dependable performance, exhibiting virtually no degradation even when subjected to temperature extremes
- Low stray capacitance ensures high conformity with nominal values, thereby simplifying the circuit design process
- Low residual inductance assures superior frequency characteristics
- Owing to their low ESR and excellent frequency characteristics, these products are optimally suited for high frequency and high-density type power supplies

Applications

- Electronics equipment
- Mobile communications equipment
- LTE/WiMAX base stations
- High frequency RF modules
- Test and measurement equipment
- Matching/Coupling circuits
- Tuning circuits

Shape & Dimensions



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

Dimensions in mm

Part Number Construction

C 1608 C0G 2A 102 F T XXXX

Series Name

Dimensions L x W (mm)

Case Code	Length	Width
C1005	1.00 ± 0.05	0.50 ± 0.05
C1608	1.60 ± 0.10	0.80 ± 0.10

Temperature Characteristic

Temperature Characteristics	Capacitance Change	Temperature Range
C0G	0±30 ppm/°C	-55 to +125°C

Rated Voltage (DC)

Voltage Code	Voltage (DC)
1H	50V
2A	100V

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 Tolerance

Tolerance Code	Tolerance
F	± 1%
G	± 2%

Packaging Style

Packaging Code	Style
T	Tape & Reel

Internal Codes

* This series is available through the distribution channel only. Please see www.tdk.com/distributor.php for a list of authorized distributors.

Capacitance Range Chart

C1005 [EIA CC0402]

Capacitance Range Chart

Temperature Characteristics: C0G (0 ± 30ppm/ºC)

Rated Voltage: 50V(1H)

Capacitance (pF)	Cap Code	Temperature Characteristics	Tolerance F (±1%)	Tolerance G (±2%)
15	150	-55 to 125ºC, 0±30 ppm/ºC		
22	220			
33	330			
47	470			
68	680			
100	101			
150	151			
220	221			
330	331			
470	471			
680	681			
1,000	102			

Standard Thickness

0.50 mm

Capacitance Range Table

C1005 [EIA CC0402]

Class 1 (Temperature Compensating)

Temperature Characteristics: C0G (-55 to 125ºC, 0±30 ppm/ºC)

TDK Part Number (Ordering Code)	Temperature Characteristics	Rated Voltage	Capacitance (pF)	Capacitance Tolerance	Thickness (mm)
C1005C0G1H150F	C0G	50V	15	± 1%	0.50 ± 0.05
C1005C0G1H150G	C0G	50V	15	± 2%	0.50 ± 0.05
C1005C0G1H220F	C0G	50V	22	± 1%	0.50 ± 0.05
C1005C0G1H220G	C0G	50V	22	± 2%	0.50 ± 0.05
C1005C0G1H330F	C0G	50V	33	± 1%	0.50 ± 0.05
C1005C0G1H330G	C0G	50V	33	± 2%	0.50 ± 0.05
C1005C0G1H470F	C0G	50V	47	± 1%	0.50 ± 0.05
C1005C0G1H470G	C0G	50V	47	± 2%	0.50 ± 0.05
C1005C0G1H680F	C0G	50V	68	± 1%	0.50 ± 0.05
C1005C0G1H680G	C0G	50V	68	± 2%	0.50 ± 0.05
C1005C0G1H101F	C0G	50V	100	± 1%	0.50 ± 0.05
C1005C0G1H101G	C0G	50V	100	± 2%	0.50 ± 0.05
C1005C0G1H151F	C0G	50V	150	± 1%	0.50 ± 0.05
C1005C0G1H151G	C0G	50V	150	± 2%	0.50 ± 0.05
C1005C0G1H221F	C0G	50V	220	± 1%	0.50 ± 0.05
C1005C0G1H221G	C0G	50V	220	± 2%	0.50 ± 0.05
C1005C0G1H331F	C0G	50V	330	± 1%	0.50 ± 0.05
C1005C0G1H331G	C0G	50V	330	± 2%	0.50 ± 0.05
C1005C0G1H471F	C0G	50V	470	± 1%	0.50 ± 0.05
C1005C0G1H471G	C0G	50V	470	± 2%	0.50 ± 0.05
C1005C0G1H681F	C0G	50V	680	± 1%	0.50 ± 0.05
C1005C0G1H681G	C0G	50V	680	± 2%	0.50 ± 0.05
C1005C0G1H102F	C0G	50V	1,000	± 1%	0.50 ± 0.05
C1005C0G1H102G	C0G	50V	1,000	± 2%	0.50 ± 0.05

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Capacitance Range Chart

C1608 [EIA CC0603]

Capacitance Range Chart

Temperature Characteristics: C0G (0 ± 30ppm/ºC)

Rated Voltage: 100V (2A), 50V(1H)

Capacitance (pF)	Cap Code	Temperature Characteristics	100V		50V	
			F (±1%)	G (±2%)	F (±1%)	G (±2%)
15	150	-55 to 125ºC, 0±30 ppm/ºC				
22	220					
33	330					
47	470					
68	680					
100	101					
150	151					
220	221					
330	331					
470	471					
680	681					
1,000	102					

Standard Thickness

0.80 mm

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Capacitance Range Table

C1608 [EIA CC0603]

Class 1 (Temperature Compensating)

Temperature Characteristics: C0G (-55 to 125ºC, 0±30 ppm/ºC)

TDK Part Number (Ordering Code)	Temperature Characteristics	Rated Voltage	Capacitance (pF)	Capacitance Tolerance	Thickness (mm)
C1608C0G1H150F	C0G	50V	15	± 1%	0.80 ± 0.10
C1608C0G1H150G	C0G	50V	15	± 2%	0.80 ± 0.10
C1608C0G1H220F	C0G	50V	22	± 1%	0.80 ± 0.10
C1608C0G1H220G	C0G	50V	22	± 2%	0.80 ± 0.10
C1608C0G1H330F	C0G	50V	33	± 1%	0.80 ± 0.10
C1608C0G1H330G	C0G	50V	33	± 2%	0.80 ± 0.10
C1608C0G1H470F	C0G	50V	47	± 1%	0.80 ± 0.10
C1608C0G1H470G	C0G	50V	47	± 2%	0.80 ± 0.10
C1608C0G1H680F	C0G	50V	68	± 1%	0.80 ± 0.10
C1608C0G1H680G	C0G	50V	68	± 2%	0.80 ± 0.10
C1608C0G1H101F	C0G	50V	100	± 1%	0.80 ± 0.10
C1608C0G1H101G	C0G	50V	100	± 2%	0.80 ± 0.10
C1608C0G1H151F	C0G	50V	150	± 1%	0.80 ± 0.10
C1608C0G1H151G	C0G	50V	150	± 2%	0.80 ± 0.10
C1608C0G1H221F	C0G	50V	220	± 1%	0.80 ± 0.10
C1608C0G1H221G	C0G	50V	220	± 2%	0.80 ± 0.10
C1608C0G1H331F	C0G	50V	330	± 1%	0.80 ± 0.10
C1608C0G1H331G	C0G	50V	330	± 2%	0.80 ± 0.10
C1608C0G1H471F	C0G	50V	470	± 1%	0.80 ± 0.10
C1608C0G1H471G	C0G	50V	470	± 2%	0.80 ± 0.10
C1608C0G1H681F	C0G	50V	680	± 1%	0.80 ± 0.10
C1608C0G1H681G	C0G	50V	680	± 2%	0.80 ± 0.10
C1608C0G1H102F	C0G	50V	1,000	± 1%	0.80 ± 0.10
C1608C0G1H102G	C0G	50V	1,000	± 2%	0.80 ± 0.10
C1608C0G2A101F	C0G	100V	100	± 1%	0.80 ± 0.10
C1608C0G2A101G	C0G	100V	100	± 2%	0.80 ± 0.10
C1608C0G2A102F	C0G	100V	1,000	± 1%	0.80 ± 0.10
C1608C0G2A102G	C0G	100V	1,000	± 2%	0.80 ± 0.10

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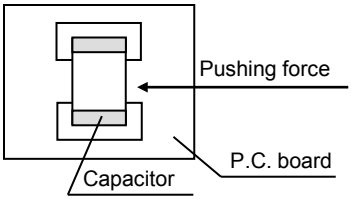
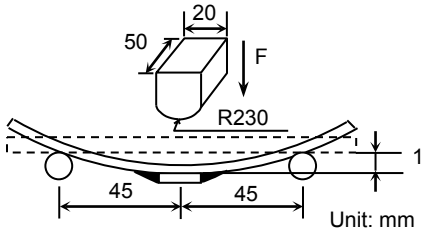
General Specifications

C Series – Tight Tolerance Capacitors

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 min.	Apply rated voltage for 60s.
3	**Voltage Proof**	Withstand test voltage without insulation breakdown or other damage.	**Class** / **Apply voltage**: Class 1 / 3 × 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 1 / 1000pF and under / 1MHz±10% / 0.5 - 5 V_{rms}; Class 1 / Over 1000pF / 1kHz±10% / 0.5 - 5 V_{rms}
5	**Q (Class 1)**	**Rated Capacitance** / **Q**: C ≥ 30pF / 1,000 min.; C < 30pF / 400+20×C min. C : Rated capacitance (pF)	See No.4 in this table for measuring condition.
6	**Temperature Characteristics of Capacitance (Class 1)**	**T.C.** / **Temperature Coefficient**: C0G / 0 ± 30 ppm/ºC Capacitance drift Within ± 0.2% or ±0.05pF, whichever larger.	Temperature coefficient shall be calculated based on values at 25ºC and 85ºC temperature. Measuring temperature below 20ºC shall be -10ºC and -25ºC.
7	**Robustness of Terminations**	No sign of termination coming off, breakage of ceramic, or other abnormal signs.	Reflow solder the capacitor on P.C. board (shown in Appendix 1) and apply a pushing force of 2N (C1005) or 5N (C1608) for 10±1s. 
8	**Bending**	No mechanical damage.	Reflow solder the capacitor on P.C. board (shown in Appendix 2a or Appendix 2b) and bend it for 1mm. 

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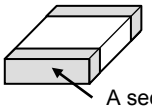
General Specifications

C Series – Tight Tolerance Capacitors

<table>
<tr><th>No.</th><th>Item</th><th>Performance</th><th>Test or Inspection Method</th></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.

 
A section</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 1</td><td>C0G</td><td>Capacitance drift within ±2.5% or ±0.25pF, whichever larger.</td></tr></table>
Q (Class 1):<table><tr><th>Rated Capacitance</th><th>Q</th></tr><tr><td>C ≥ 30pF</td><td>1,000 min.</td></tr><tr><td>C < 30pF</td><td>400 + 20×C min.</td></tr></table>C : Rated capacitance (pF)

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 1</td><td>C0G</td><td>Capacitance drift within ±2.5% or ±0.25pF, whichever larger.</td></tr></table>
Q (Class 1):<table><tr><th>Rated Capacitance</th><th>Q</th></tr><tr><td>C ≥ 30pF</td><td>1,000 min.</td></tr><tr><td>C < 30pF</td><td>400+20×C min.</td></tr></table>C : Rated capacitance (pF)</td><td>Reflow solder the capacitor on P.C. board (shown in Appendix 1) 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>

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General Specifications

C Series – Tight Tolerance Capacitors

<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 1) 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 6 to 24h 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>Class 1</td><td>C0G</td><td>Capacitance drift within ±2.5% or ±0.25pF, whichever larger.</td></tr></table></td></tr>
<tr><td></td><td>Q (Class 1)</td><td><table><tr><th>Rated Capacitance</th><th>Q</th></tr><tr><td>C ≥ 30pF</td><td>1,000 min.</td></tr><tr><td>C < 30pF</td><td>400 + 20×C min.</td></tr></table>C : Rated capacitance (pF)</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><td></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 1) before testing.

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

Leave the capacitor in ambient condition for 6 to 24h 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>Class 1</td><td>C0G</td><td>Capacitance drift within ±5% or ±0.5pF, whichever larger.</td></tr></table></td></tr>
<tr><td></td><td>Q (Class 1)</td><td><table><tr><th>Rated Capacitance</th><th>Q</th></tr><tr><td>C ≥ 30pF</td><td>350 min.</td></tr><tr><td>10pF ≤ C < 30pF</td><td>275 + 5/2×C min.</td></tr><tr><td>C < 10pF</td><td>200 + 10×C min.</td></tr></table>C : Rated capacitance (pF)</td></tr>
<tr><td></td><td>Insulation Resistance</td><td>1,000MΩ min.</td></tr>
</table>

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General Specifications

C Series – Tight Tolerance Capacitors

<table>
<tr><th>No.</th><th>Item</th><th>Performance</th><th>Test or Inspection Method</th></tr>
<tr><td>14</td><td>Moisture Resistance</td><td></td><td rowspan="4">Reflow solder the capacitors on P.C. board (shown in Appendix 1) 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 6 to 24h before measurement.
Use this measurement for initial value.</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>Class 1</td><td>C0G</td><td>Capacitance drift within ±7.5% or ±0.75pF, whichever larger.</td></tr></table></td></tr>
<tr><td></td><td>Q (Class 1)</td><td><table><tr><th>Rated Capacitance</th><th>Q</th></tr><tr><td>C ≥ 30pF</td><td>200 min.</td></tr><tr><td>C < 30pF</td><td>100 + 10/3×C min.</td></tr></table>C : Rated capacitance (pF)</td></tr>
<tr><td></td><td>Insulation Resistance</td><td>500MΩ min.</td><td></td></tr>
<tr><td>15</td><td>Life</td><td></td><td rowspan="4">Reflow solder the capacitor on P.C. board (shown in Appendix 1) before testing.
Apply 2x rated voltage at 125±2ºC for 1,000 +48, 0h.
Charge/discharge current shall not exceed 50mA.
Leave the capacitors in ambient condition for 6 to 24h before measurement.
Use this measurement for initial value.</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>Class 1</td><td>C0G</td><td>Capacitance drift within ±3% or ±0.3pF, whichever larger.</td></tr></table></td></tr>
<tr><td></td><td>Q (Class 1)</td><td><table><tr><th>Rated Capacitance</th><th>Q</th></tr><tr><td>C ≥ 30pF</td><td>350 min.</td></tr><tr><td>10pF ≤ C < 30pF</td><td>275 + 5/2×C min.</td></tr><tr><td>C < 10pF</td><td>200 + 10×C min.</td></tr></table>C : Rated capacitance (pF)</td></tr>
<tr><td></td><td>Insulation Resistance</td><td>1,000MΩ min.</td><td></td></tr>
</table>

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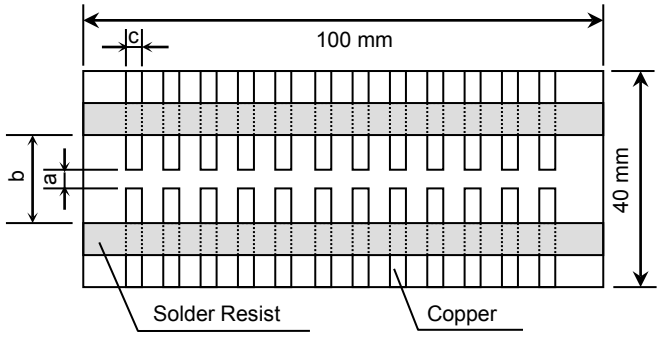
General Specifications

C Series – Tight Tolerance Capacitors

Appendix - 1

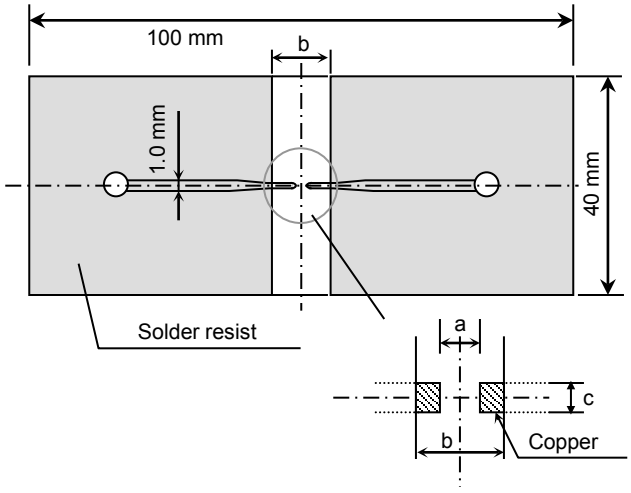
P.C. Board for reliability test



Appendix - 2a

P.C. Board for bending test

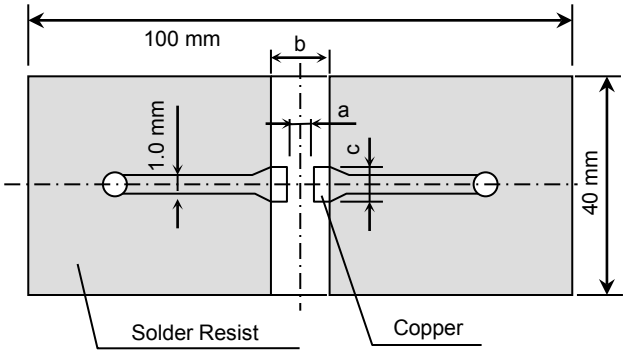
Applied for C1005



Appendix - 2b

P.C. Board for bending test

Applied for C1608



Material : Glass Epoxy (As per JIS C6484 GE4)

P.C. Board thickness : Appendix-2a 0.8mm

Appendix-1, 2b 1.6mm

Copper (thickness 0.035mm)

Solder resist

Case Code		Dimensions (mm)		
JIS	EIA	a	b	c
C1005	CC0402	0.4	1.5	0.5
C1608	CC0603	1.0	3.0	1.2

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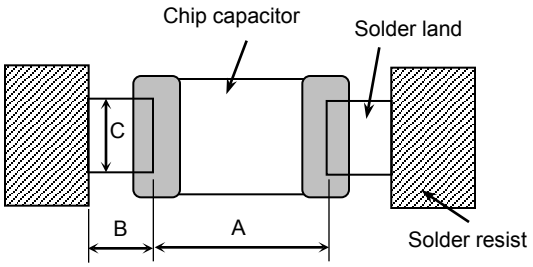
Soldering Information

C Series – Tight Tolerance Capacitors

• Recommended Soldering Land Pattern



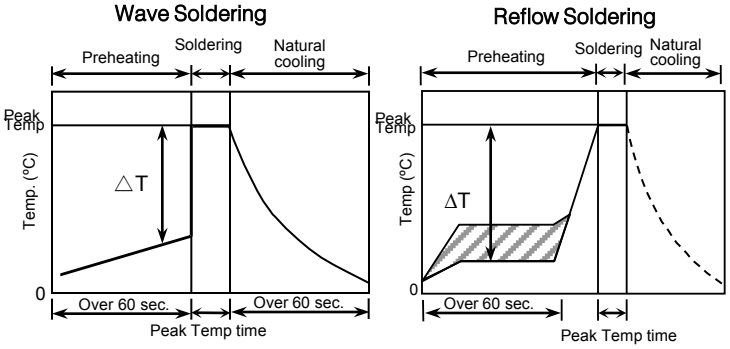
Wave Soldering Unit: mm

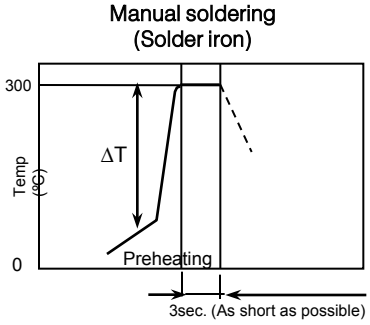
Symbol \ Type	C1608 [CC0603]
A	0.7 - 1.0
B	0.8 - 1.0
C	0.6 - 0.8

Reflow Soldering Unit: mm

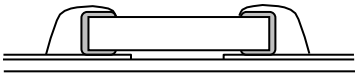
Symbol \ Type	C1005 [CC0402]	C1608 [CC0603]
A	0.3 - 0.5	0.6 - 0.8
B	0.35 - 0.45	0.6 - 0.8
C	0.4 - 0.6	0.6 - 0.8

• Recommended Soldering Profile



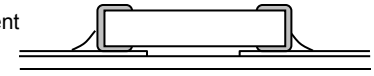


• Recommended Solder Amount



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 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

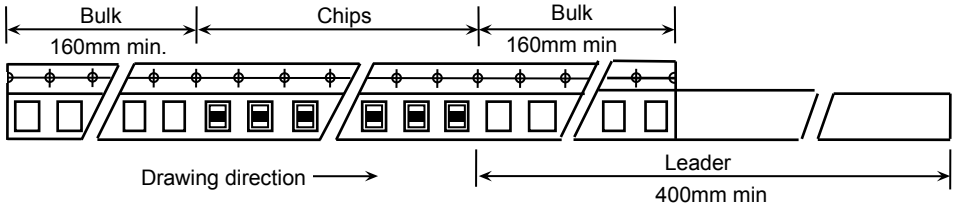
Soldering	Case Size - JIS (EIA)	Temp. (ºC)
Wave soldering	C1608(CC0603)	ΔT ≤ 150
Reflow soldering	C1005(CC0402), C1608(CC0603)	ΔT ≤ 150
Manual soldering	C1005(CC0402), C1608(CC0603)	ΔT ≤ 150

* This series is available through the distribution channel only. Please see www.tdk.com/distributor.php for a list of authorized distributors.

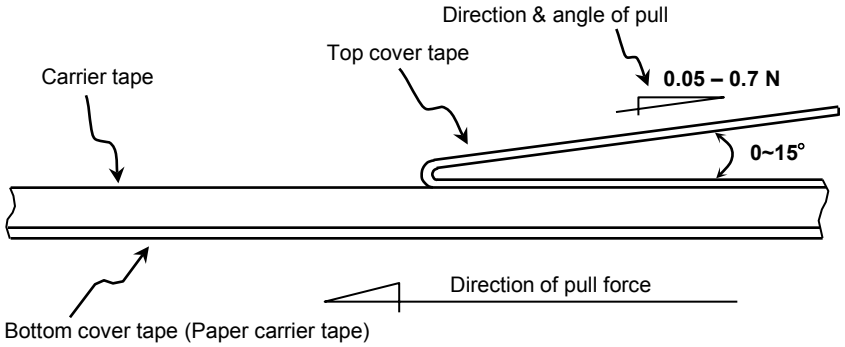
Packaging Information

C Series – Tight Tolerance Capacitors

• Carrier Tape Configuration

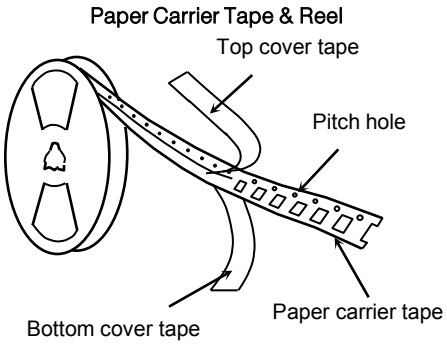


• Peel Back Force (Top Tape)



• 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



Case Code		Chip Thickness (mm)	Taping Material	Chip quantity (pcs.)	
JIS	EIA			φ178mm (7") reel	φ330mm (13") reel
C1005	CC0402	0.50	Paper	10,000	50,000
C1608	CC0603	0.80		4,000	10,000

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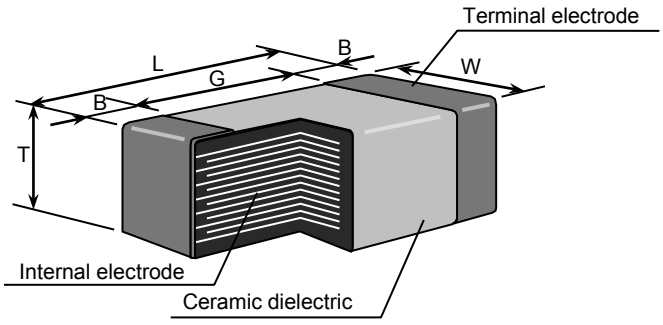
Additional Information

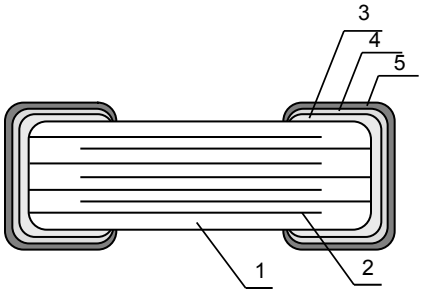
C Series – Tight Tolerance Capacitors

• Shape & Dimensions



Case Code		Dimensions (mm)				
JIS	EIA	L	W	T	B	G
C1005	CC0402	1.00	0.50	0.50	0.25	0.35 min.
C1608	CC0603	1.60	0.80	0.80	0.20 min.	0.50 min.

• Inside Structure & Material System



No.	NAME	MATERIAL
		Class 1
(1)	Ceramic Dielectric	$CaZrO_3$
(2)	Internal Electrode	Nickel (Ni)
(3)	Termination	Copper (Cu)
(4)		Nickel (Ni)
(5)		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.

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