

# DATA SHEET

## MULTILAYER CERAMIC CAPACITORS

CC Series  
X7R  
16 V TO 100 V



SCOPE

This specification describes Yageo CC X7R series chip capacitors.

ORDERING INFORMATION

Part number is identified by the series, size, tolerance, packing style, temperature coefficient, rated voltage and capacitance value.

**CC** XXXX X X **X7R** X **BB** XXX  
 (1) (2) (3) (4) (5)

**(1) SIZE – INCH BASED (METRIC)**

- 0402 (1005)
- 0603 (1608)
- 0805 (2012)
- 1206 (3216)
- 1210 (3225)
- 1812 (4532)

**(2) TOLERANCE**

- J = ±5%
- K = ±10%

**(3) PACKING STYLE**

- R = 7" paper tape
- K = 7" blister tape
- P = 13" paper tape
- F = 13" blister tape
- C = Bulk case

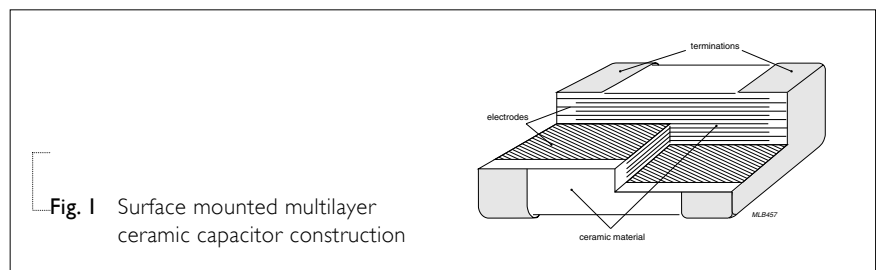
**(4) RATED VOLTAGE**

- 7 = 16 V
- 8 = 25 V
- 9 = 50 V
- 0 = 100 V

**(5) CAPACITANCE VALUE:**

- First two for significant figures and 3rd for number of zero
- Letter "R" for decimal point

CONSTRUCTION



DIMENSION

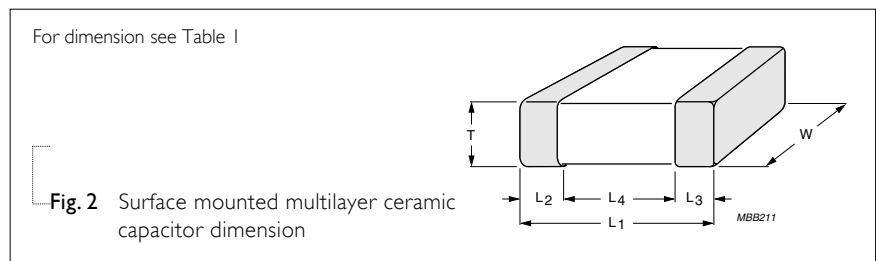


Table I

TYPE	CC0402	CC0603	CC0805	CC1206	CC1210	CC1812
<b>L<sub>1</sub> (mm)</b>	1.0±0.05	1.6±0.10	2.0±0.10	3.2±0.15	3.2±0.20	4.5±0.20
<b>W (mm)</b>	0.5±0.05	0.8±0.07	1.25±0.10	1.6±0.15	2.5±0.20	3.2±0.20
<b>T (mm)</b>	<b>min.</b> 0.45	0.73	0.50	0.50	0.50	0.50
	<b>max.</b> 0.55	0.87	1.35	1.35	1.80	1.80
<b>L<sub>2</sub>/L<sub>3</sub> (mm)</b>	<b>min.</b> 0.15	0.20	0.25	0.25	0.25	0.25
	<b>max.</b> 0.30	0.60	0.75	0.75	0.75	0.75
<b>L<sub>4</sub> (mm)</b>	<b>min.</b> 0.40	0.40	0.55	1.40	1.40	2.20

**CAPACITANCE RANGE & THICKNESS FOR 16V & 25V**

Table 2

CAPACITANCE (nF)	16 V 0402	0603	0805	1206	25 V 0402	0603	0805	1206	1210
3.3					0.5 ±0.05				
3.9									
4.7									
5.6									
6.8	0.5 ±0.05								
8.2									
10						0.8 ±0.07	0.6 ±0.1		
12									
15									
18									
22									
27									
33		0.8 ±0.07							
39									
47			0.6 ±0.1				0.85 ±0.1		
56									
68									
82			0.85 ±0.1						
100								0.85 ±0.1	
120									
150									
180									
220				0.85 ±0.1					0.85 ±0.1
270								1.15 ±0.1	
330			1.25 ±0.1						
390				1.15 ±0.1					
470									
560									
680									
820									
1,000									

CAPACITANCE RANGE & THICKNESS FOR 50V & 100V

Table 3

CAPACITANCE (nF)	50 V 0402	0603	0805	1206	1210	1812	100 V 0805	1206	1210	1812
0.10	0.5 ±0.05	0.8 ±0.07								
0.12										
0.15										
0.18										
0.22			0.6 ±0.1	0.85 ±0.1			0.6 ±0.1	0.85 ±0.1		
0.27										
0.33										
0.39										
0.47										
0.56										
0.68										
0.82										
1.0										
1.2										
1.5										
1.8										
2.2										
2.7										
3.3										
3.9										
4.7										
5.6										
6.8										
8.2										
10					0.85 ±0.1					
12							0.85 ±0.1			
15										
18										
22										
27			0.85 ±0.1							
33										
39										
47									0.85 ±0.1	

**CAPACITANCE RANGE & THICKNESS FOR 50V & 100V (CONTINUED)**

Table 4

CAPACITANCE (nF)	50 V					100 V				
	0402	0603	0805	1206	1210	1812	0805	1206	1210	1812
56			0.85 ±0.1	0.85 ±0.1	0.85 ±0.1			1.15 ±0.1	0.85 ±0.1	
68										
82										
100		0.8 ±0.07				1.15 ±0.1				1.15 ±0.1
120					1.15 ±0.1				1.15 ±0.1	
150				1.15 ±0.1						
180										
220										
270										
330										
390										1.6 ±0.2
470										
560						1.6 ±0.2				
680										
820										
1,000										

**THICKNESS CLASSES AND PACKING QUANTITY**

Table 5

THICKNESS CLASSIFICATION (mm)	8mm TAPE WIDTH / AMOUNT PER REEL				12mm TAPE WIDTH / AMOUNT PER REEL	AMOUNT PER BULK CASE			
	Ø180mm, 7"		Ø330mm, 13"		Ø180mm, 7" Blister	1812	0402	0603	0805
	Paper	Blister	Paper	Blister					
0.5 ±0.05	10,000	---	50,000	---	---	50,000	---	---	---
0.6 ±0.10	4,000	---	20,000	---	---	---	---	---	10,000
0.8 ±0.07	4,000	---	15,000	---	---	---	15,000	---	---
0.85 ±0.10	4,000	---	15,000	---	---	---	---	---	8,000
1.15 ±0.10	---	3,000	---	10,000	---	---	---	---	---
1.25 ±0.10	---	3,000	---	10,000	---	---	---	---	5,000
1.6 ±0.20	---	---	---	---	1,000	---	---	---	---

**ELECTRICAL CHARACTERISTICS**

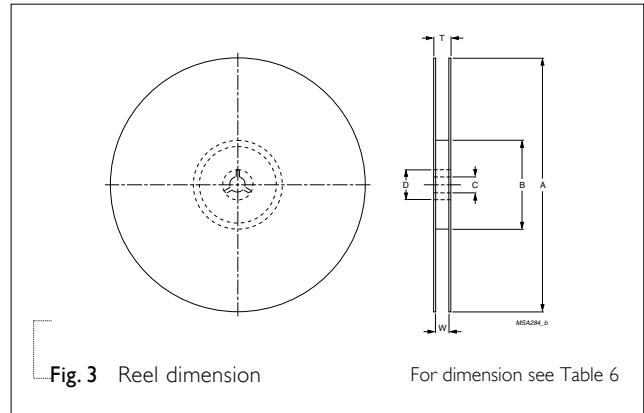
Table 5

CHARACTERISTICS	TEST CONDITIONS	REQUIREMENT
Operation temperature range	---	-55 °C to +125 °C
Temperature characteristic/coefficient (TC)	With respect to 20 °C within operation temperature range	±15%
Capacitance tolerance	1 Vrms/1 KHz at 20 °C	±5%, ±10%
Dissipation factor (Tan δ)	1 Vrms/1 KHz at 20 °C	25 V, 50 V & 100 V; ≤2.5% 16 V; ≤3.5%
Insulation resistance (IR)	At Ur (rated voltage) for 1 minute	C ≤ 10 nF; R <sub>ins</sub> ≥ 10 GΩ C > 10 nF; R <sub>ins</sub> × C ≥ 500 s
Dielectric withstanding Voltage	At 2.5 × Ur (for Ur ≤ 100V) 1.5 × Ur + 100 V for 5 sec	No breakdown

**TAPING REEL**

Table 6

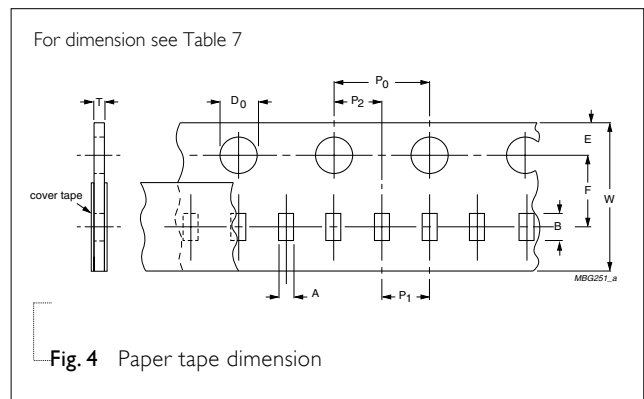
TAPE WIDE	8mm	8mm	12mm
ØA (mm)	180	330	180
ØB (mm)	62±1.5	62±1.5	62±1.5
ØD (mm)	20.5	20.5	20.5
ØC (mm)	12.75±0.15/-0	12.75±0.15/-0	12.75±0.15/-0
W (mm)	8.4+1.5/-0	8.4+1.5/-0	12.4+2/-0
T <sub>max</sub> (mm)	14.4	14.4	18.4



**PAPER TAPE SPECIFICATION**

Table 7

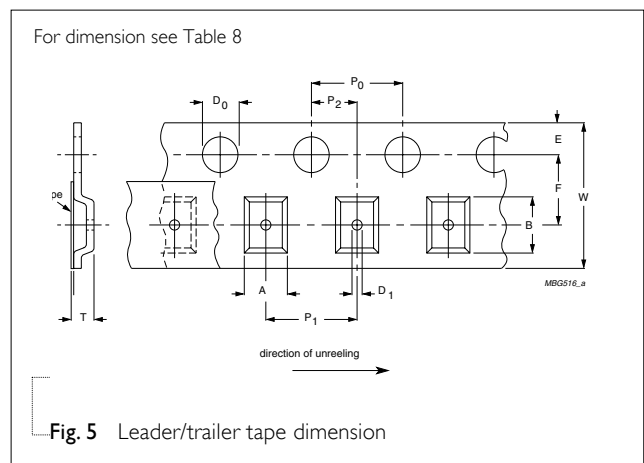
DIMENSION	0402	0603	0805	1206
A (mm)	0.62±0.05	1.10±0.05	1.65±0.05	2.0±0.1
B (mm)	1.12±0.05	1.90±0.05	2.4±0.05	3.5±0.1
W (mm)	8.0±0.2	8.0±0.2	8.0±0.2	8.0±0.2
E (mm)	1.75±0.1	1.75±0.1	1.75±0.1	1.75±0.1
F (mm)	3.5±0.05	3.5±0.05	3.5±0.05	3.5±0.05
P <sub>0</sub> (mm)	4±0.05	4±0.05	4±0.05	4±0.05
P <sub>1</sub> (mm)	2±0.05	4±0.1	4±0.1	4±0.1
P <sub>2</sub> (mm)	2±0.05	2±0.05	2±0.05	2±0.05
ØD <sub>0</sub> (mm)	1.5+0.1	1.5+0.1	1.5+0.1/-0	1.5+0.1/-0
T (mm)	0.6±0.05	0.95±0.05	0.95±0.05	0.95±0.05



**BLISTER TAPE SPECIFICATION**

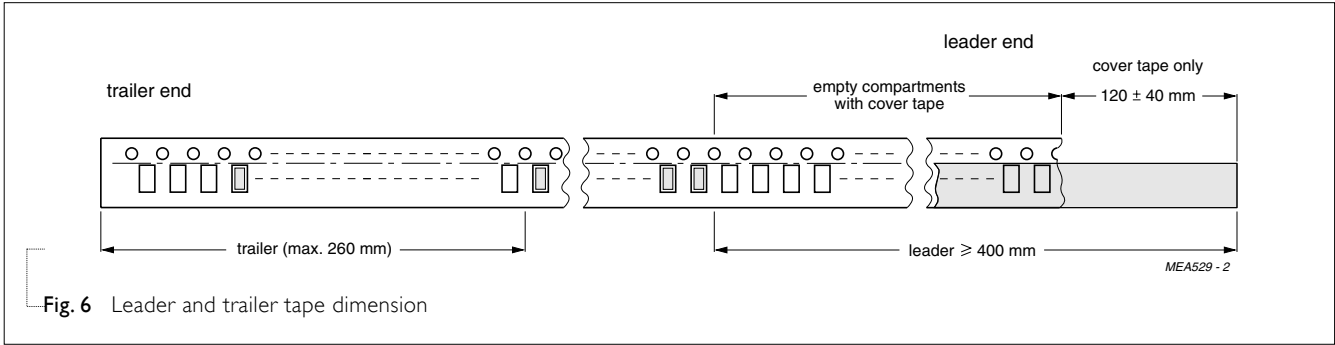
Table 8

DIMENSION	0805	1206	1210	1812
A (mm)	0.20	0.30	0.30	0.40
B (mm)	0.20	0.30	0.30	0.40
W (mm)	8.1±0.2	8.1±0.2	8.1±0.2	12.0±0.2
E (mm)	1.75±0.1	1.75±0.1	1.75±0.1	1.75±0.1
F (mm)	3.5±0.05	3.5±0.05	3.5±0.05	5.5±0.05
P <sub>0</sub> (mm)	4±0.1	4±0.1	4±0.1	4±0.1
P <sub>1</sub> (mm)	4±0.1	4±0.1	4±0.1	8±0.1
P <sub>2</sub> (mm)	2±0.05	2±0.05	2±0.05	2±0.05
ØD <sub>0</sub> (mm)	1.5+0.1/-0	1.5+0.1/-0	1.5+0.1/-0	1.5+0.1/-0
T <sub>max</sub> (mm)	3.5	3.5	3.5	3.5



**PACKING METHOD**

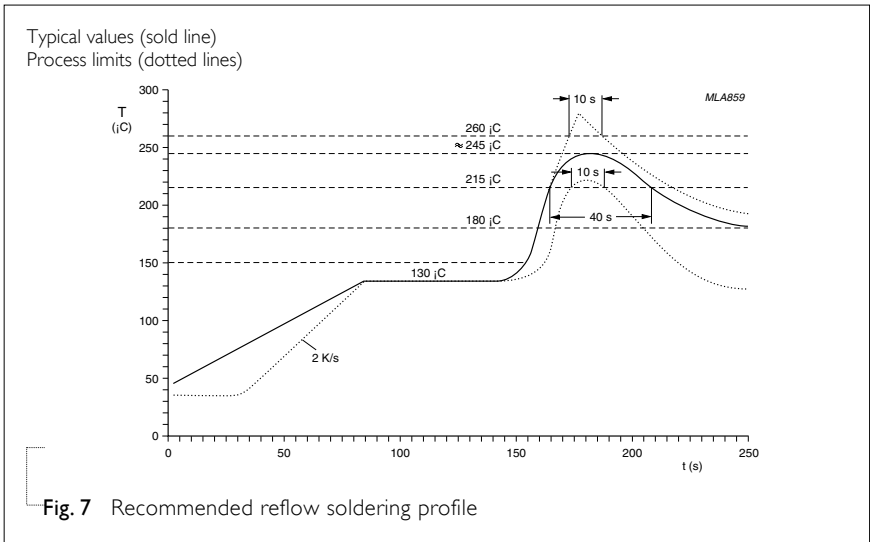
**LEADER/TRAILER TAPE SPECIFICATION**



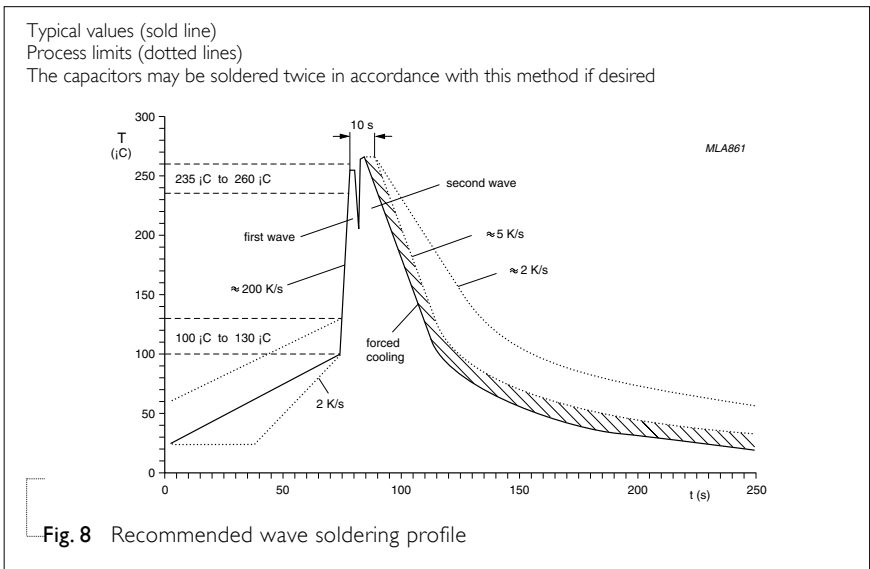
**Fig. 6** Leader and trailer tape dimension

**METHOD OF MOUNTING**

For normal use the capacitors may be mounted on printed-circuit boards or ceramic substrates by applying wave soldering, reflow soldering (including vapor phase soldering) or conductive adhesive in accordance with CECC 00802 classification A.



**Fig. 7** Recommended reflow soldering profile



**Fig. 8** Recommended wave soldering profile



**TEST AND REQUIREMENT**

Table 9

IEC384-10	TEST ITEMS	CONDITIONS	REQUIREMENTS
4.9	Bending	Bending rate 1mm/s, jig. radius 340mm	$\Delta C/C \leq 10\%$
4.10	Resistance to soldering heat	260±5°C for 10±0.5s in static solder bath	$-5\% \leq \Delta C/C \leq 10\%$
4.11	Solderability	235±5°C for 2±0.5s in a static solder bath	75% minimum coverage of metallic area
4.12	Rapid change of temperature	Preconditioning -55°C to +125°C, 5cycles	$\Delta C/C$ within 15%
4.14	Damp heat	Preconditioning At 40°C, 90 to 95% RH and Ur applied (max. 500V) for 500 hours	$\Delta C/C$ within 15% Tan $\delta \leq 7\%$ $IR \geq 500M\Omega$ or $RxC \geq 25s$ whichever is less
4.15	Endurance	Preconditioning 2xUr applied for 1,000 hours, at upper category temperature	$\Delta C/C$ within 20% Tan $\delta \leq 7\%$ $IR \geq 1,000M\Omega$ or $RxC \geq 50s$ whichever is less

REVISION HISTORY

REVISION	DATE	CHANGE NOTIFICATION	DESCRIPTION
Version 9	Aug 17, 2005	-	- 0603 50V capacitance range extended to 100 nF
Version 8	Jan 21, 2005	-	- Capacitance range extended
Version 7	Feb. 24, 2004	-	- upgrade the thickness on page 3-4
Version 6	Aug. 13, 2003	-	- Taping drawing amended
Version 5	Jun. 19, 2003	-	- Thickness of 1206/470 nF revised into "1.15±0.1" - CTC code size 1812 revised
Version 4	Jan. 27, 2003	-	- Edit "SCOPE"
Version 3	Dec. 18, 2002	-	- New Yageo edition
Version 2	Jul. 04, 2002	-	-