

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 = $\pm 5\%$
K = $\pm 10\%$

(3) PACKING STYLE

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

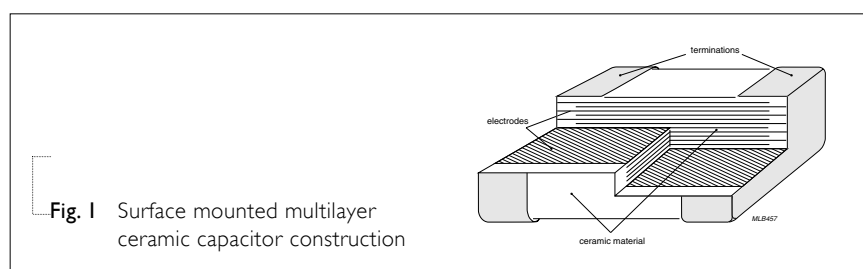
(4) RATED VOLTAGE

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

For dimension see Table I

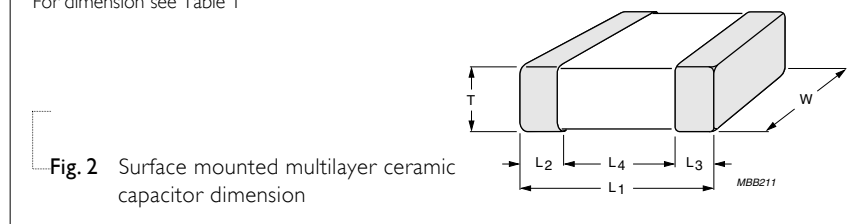


Table I

TYPE	CC0402	CC0603	CC0805	CC1206	CC1210	CC1812
L₁ (mm)	1.0 $\pm$ 0.05	1.6 $\pm$ 0.10	2.0 $\pm$ 0.10	3.2 $\pm$ 0.15	3.2 $\pm$ 0.20	4.5 $\pm$ 0.20
W (mm)	0.5 $\pm$ 0.05	0.8 $\pm$ 0.07	1.25 $\pm$ 0.10	1.6 $\pm$ 0.15	2.5 $\pm$ 0.20	3.2 $\pm$ 0.20
T (mm)	min.	0.45	0.73	0.50	0.50	0.50
	max.	0.55	0.87	1.35	1.35	1.80
L₂/L₃ (mm)	min.	0.15	0.20	0.25	0.25	0.25
	max.	0.30	0.60	0.75	0.75	0.75
L₄ (mm)	min.	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 0402	0603	0805	1206	1210	1812	100 V 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				
	Paper	Blister	Paper	Blister	1812		0402	0603	0805
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

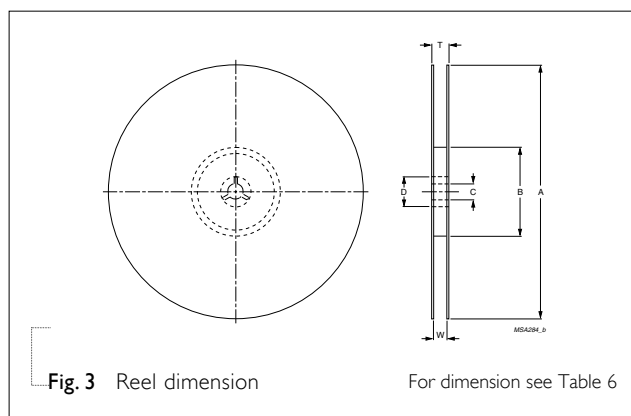
Table 5

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	$C \leq 10 \text{ nF}; R_{\text{ins}} \geq 10 \text{ G}\Omega$ $C > 10 \text{ nF}; R_{\text{ins}} \times C \geq 500 \text{ s}$
Dielectric withstanding Voltage	At $2.5 \times U_r$ (for $U_r \leq 100\text{V}$) $1.5 \times U_r + 100 \text{ V}$ for 5 sec	No breakdown

TAPING REEL

Table 6

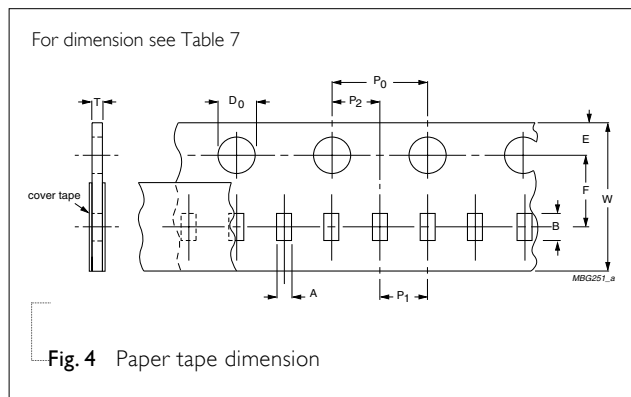
TAPE WIDE	8mm	8mm	12mm
ØA (mm)	180	330	180
ØB (mm)	62±1.5	62±1.5	62±1.5
ØD (mm)	20.5	20.5	20.5
ØC (mm)	12.75±0.15/-0	12.75±0.15/-0	12.75±0.15/-0
W (mm)	8.4+1.5/-0	8.4+1.5/-0	12.4+2/-0
T _{max} (mm)	14.4	14.4	18.4



PAPER TAPE SPECIFICATION

Table 7

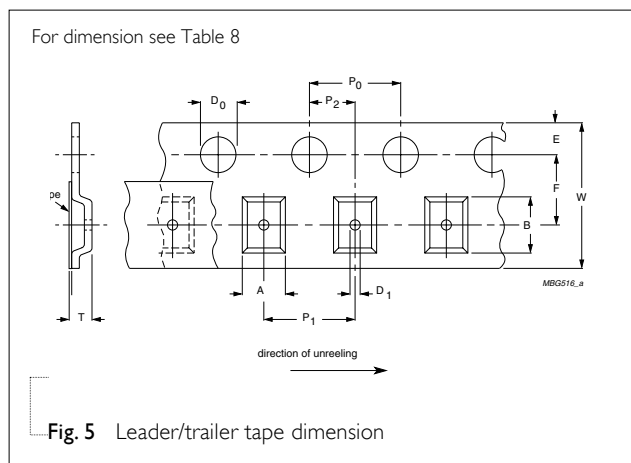
DIMENSION	0402	0603	0805	1206
A (mm)	0.62±0.05	1.10±0.05	1.65±0.05	2.0±0.1
B (mm)	1.12±0.05	1.90±0.05	2.4±0.05	3.5±0.1
W (mm)	8.0±0.2	8.0±0.2	8.0±0.2	8.0±0.2
E (mm)	1.75±0.1	1.75±0.1	1.75±0.1	1.75±0.1
F (mm)	3.5±0.05	3.5±0.05	3.5±0.05	3.5±0.05
P ₀ (mm)	4±0.05	4±0.05	4±0.05	4±0.05
P ₁ (mm)	2±0.05	4±0.1	4±0.1	4±0.1
P ₂ (mm)	2±0.05	2±0.05	2±0.05	2±0.05
ØD ₀ (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 ₀ (mm)	4±0.1	4±0.1	4±0.1	4±0.1
P ₁ (mm)	4±0.1	4±0.1	4±0.1	8±0.1
P ₂ (mm)	2±0.05	2±0.05	2±0.05	2±0.05
ØD ₀ (mm)	1.5+0.1/-0	1.5+0.1/-0	1.5+0.1/-0	1.5+0.1/-0
T _{max} (mm)	3.5	3.5	3.5	3.5



PACKING METHOD

LEADER/TRAILER TAPE SPECIFICATION

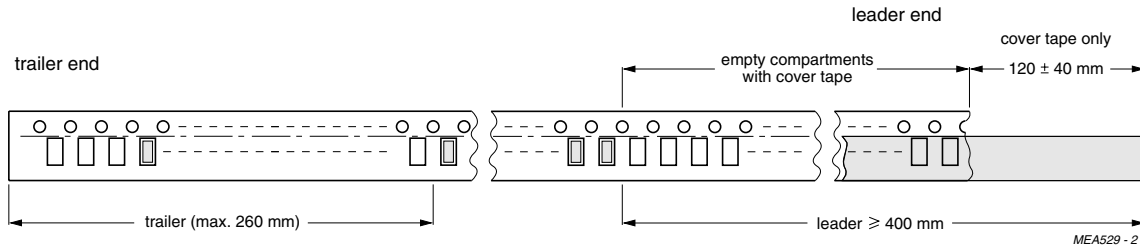


Fig. 6 Leader and trailer tape dimension

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.

Typical values (solid line)
Process limits (dotted lines)

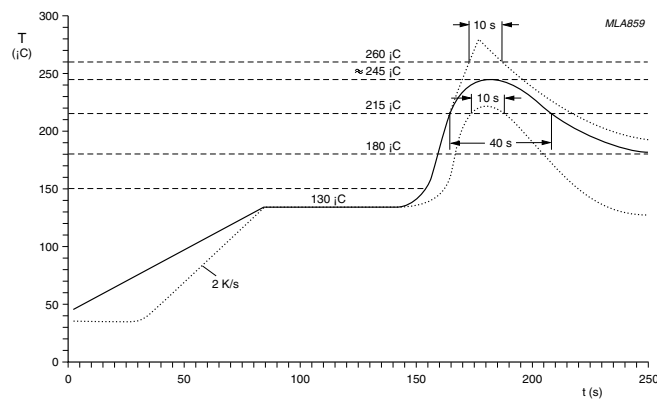


Fig. 7 Recommended reflow soldering profile

Typical values (solid line)
Process limits (dotted lines)

The capacitors may be soldered twice in accordance with this method if desired

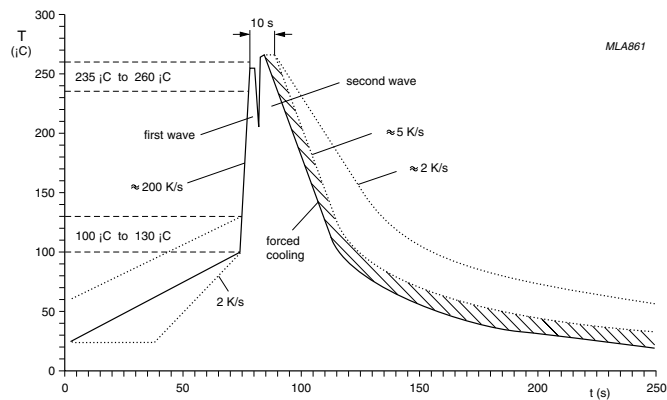


Fig. 8 Recommended wave soldering profile

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	$260 \pm 5^\circ\text{C}$ for $10 \pm 0.5\text{s}$ in static solder bath	$-5\% \leq \Delta C/C \leq 10\%$
4.11	Solderability	$235 \pm 5^\circ\text{C}$ for $2 \pm 0.5\text{s}$ in a static solder bath	75% minimum coverage of metallic area
4.12	Rapid change of temperature	Preconditioning -55°C to $+125^\circ\text{C}$, 5cycles	$\Delta C/C$ within 15%
4.14	Damp heat	Preconditioning At 40°C , 90 to 95% RH and U_r applied (max. 500V) for 500 hours	$\Delta C/C$ within 15% $\text{Tan } \delta \leq 7\%$ $IR \geq 500\text{M}\Omega$ or $RxC \geq 25\text{s}$ whichever is less
4.15	Endurance	Preconditioning $2 \times U_r$ applied for 1,000 hours, at upper category temperature	$\Delta C/C$ within 20% $\text{Tan } \delta \leq 7\%$ $IR \geq 1,000\text{M}\Omega$ or $RxC \geq 50\text{s}$ 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	-	-

Series Code	Size Code	Tolerance Code	Packing Code	TC Code	Voltage Code	Termination Code	Process Code	Capacitance Code
CC	1210	Z	R	Y5V	6	B	B	226
CC = MLCC	0201	A = +/- 0.05 pF	R = 7" Paper	NPO	5 = 6.3V	B = Ni-Barrier	N = Noble Metal Electrodes B = Base Metal Electrodes	0 = x 1
CA = MLCC Array	0402	B = +/- 0.1 pF	P = 13" Paper	X7R	6 = 10V			1 = x 10
CL = Low Inductance	0603	C = +/- 0.25 pF	K = 7" Plastic	X5R	7 = 16V			2 = x 10 E2
CM = Microwave	0805	D = +/- 0.5 pF	F = 13" Plastic	Y5V	8 = 25V			3 = x 10 E3
	1206	F = +/- 1%	B = Bulk Bag	Z5U	9 = 50V			4 = x 10 E4
	1210	G = +/- 2%	C = Bulk Case		0 = 100V			5 = x 10 E5
	1808	J = +/- 5%			A = 200V			6 = x 10 E6
	1812	K = +/- 10%			Y = 250V			R47 = 0.47 pF
	0306	M = +/- 20%			B = 500V			4R7 = 4.7 pF
	0405	Z = -20+80%			C = 1kV			101 = 100 pF
	0508				D = 2kV			104 = 0.1 uF
	0612				E = 3kV			105 = 1 uF
					H = 4kV			226 = 22 uF