Innovative Service Around the Globe YAGEO

DATA SHEET

MULTILAYER CERAMIC CAPACITORS

CC Series

NP0, X7R

200V TO 500V

YAGEO

Product Specification – Aug. 13 V.04 Supersedes Date of Nov. 29, 2002

SCOPE

This specification describes Yageo CC NP0 & X7R, middle voltage 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 xxx x **B** x xxx
(1) (2) (3) (4) (5) (6) (7)

(1) SIZE– INCH-BASED (METRIC)

0805 (2012)
1206 (3216)
1210 (3225)
1812 (4832)

(2) TOLERANCE

G = ±2%
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) TEMPERATURE CHARACTERISTIC

NP0
X7R

(5) RATED VOLTAGE

A = 200V
Y = 250V
B = 500V

(6) PROCESS

B = BME
N = NME

(7) CAPACITANCE VALUE:

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

CONSTRUCTION

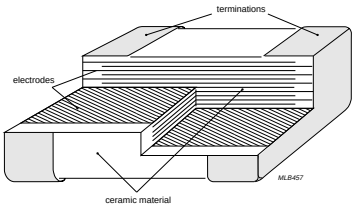

Fig. 1 Surface mounted multilayer ceramic capacitor construction

DIMENSION

For dimension see Table 1

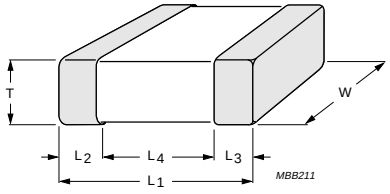

Fig. 2 Surface mounted multilayer ceramic capacitor dimension

Table 1

TYPE		CC0805	CC1206	CC1210	CC1812
L_1 (mm)		2.0±0.10	3.2±0.15	3.2±0.20	4.5±0.20
W (mm)		1.25±0.10	1.6±0.15	2.5±0.20	3.2±0.20
T (mm)	min.	0.50	0.50	0.50	0.50
	max.	1.35	1.75	1.80	1.80
L_2/L_3 (mm)	min.	0.25	0.25	0.25	0.25
	max.	0.75	0.75	0.75	0.75
L_4 (mm)	min.	0.55	1.40	1.40	2.20

CAPACITANCE RANGE & THICKNESS FOR NP0/200V TO 500V

Table 2

CAPACITANCE (pF)	200V 0805	200V 1206	250V 0805	250V 1206	250V 1210	250V 1812	500V 1206	500V 1210	500V 1812
10	0.6±0.1	0.6±0.1	0.6±0.1	0.6±0.1			0.6±0.1		
12									
15									
18									
22									
27									
33									
39									
47								0.8 to 1.0	
56									
68									
82									
100									
120									
150									
180									
220	0.85±0.1	0.85±0.1	0.85±0.1	0.85±0.1			0.85±0.1		
270									
330									
390									
470									
560	1.25±0.1		1.25±0.1						
680							1.15±0.1		
820									
1,000									
1,200								0.9 to 1.3	
1,500		1.15±0.1		1.15±0.1					
1,800					0.8 to 1.0			1.2 to 1.75	
2,200									
2,700					0.9 to 1.3				0.9 to 1.3
3,300									
3,900						0.8 to 1.0			
4,700						0.9 to 1.3			
5,600									

CAPACITANCE RANGE & THICKNESS FOR X7R/200V TO 500V

Table 3

CAPACITANCE (pF)	200V 0805	1206	1210	1812	250V 0805	1206	500V 1206	1210	1812
220	0.85±0.1				0.85±0.1				
270									
330									
390									
470									
560									
680									
820									
1,000									
1,200							1.15±0.1		
1,500									
1,800									
2,200									
2,700									
3,300		0.85±0.1				0.85±0.1			
3,900									
4,700								0.9 to 1.3	
5,600									
6,800	1.25±0.1				1.25±0.1				
8,200									
10,000									
12,000									0.9 to 1.3
15,000									
18,000									
22,000		1.15±0.1				1.15±0.1			
27,000									
33,000			0.9 to 1.3						
39,000									
47,000									
56,000									
68,000				0.9 to 1.3					
82,000									
100,000									
120,000									
150,000				0.9 to 1.3					

THICKNESS CLASSES AND PACKING QUANTITY

Table 4

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	0805
0.6±0.10	4,000	---	20,000	---	---	10,000
0.85±0.10	4,000	---	15,000	---	---	8,000
0.5 to 1.0	---	4,000	---	10,000	2,000	---
0.9 to 1.3	---	3,000	---	10,000	1,500	---
1.15±0.10	---	3,000	---	10,000	---	---
1.25±0.10	---	3,000	---	10,000	---	5,000
1.2 to 1.75	---	2,000	---	10,000	---	---

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	NP0: 0±30ppm/K X7R: ±15%
Capacitance tolerance	With respect to 20°C NP0: C≤1,000pF 1Vrms/1MHz C>1,000pF 1Vrms/1KHz X7R: 1Vrms/1KHz	NP0: ±2%, ±5% X7R: ±5%, ±10%
Dissipation factor (Tan δ)	With respect to 20°C NP0: C≤1,000pF 1Vrms/1MHz C>1,000pF 1Vrms/1KHz X7R: 1Vrms/1KHz	NP0: Tan δ≤10×10^{-4} X7R: Tan δ≤2.5%
Insulation resistance (IR)	At Ur (rated voltage) for 1 minute	NP0: R_{ins} ≥10GΩ or R_{ins} x C≥500s whichever is less X7R: C≤10nF; R_{ins}≥10GΩ C>10nF; R_{ins} x C≥500s
Dielectric withstanding Voltage	1.5xUr+100V for 5sec	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

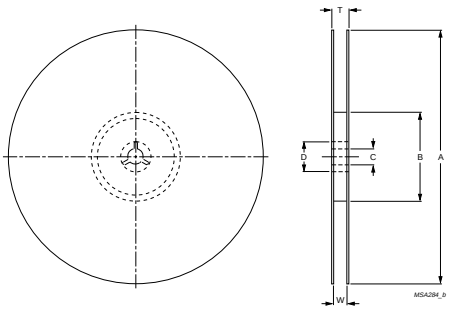

Fig. 3 Reel dimension

For dimension see Table 6

PAPER TAPE SPECIFICATION

Table 7

DIMENSION	0805	1206
A (mm)	1.65±0.05	2.0±0.1
B (mm)	2.4±0.05	3.5±0.1
W (mm)	8.0±0.2	8.0±0.2
E (mm)	1.75±0.1	1.75±0.1
F (mm)	3.5±0.05	3.5±0.05
P_0 (mm)	4±0.05	4±0.05
P_1 (mm)	4±0.1	4±0.1
P_2 (mm)	2±0.05	2±0.05
ØD_0 (mm)	1.5+0.1/–0	1.5+0.1/–0
T (mm)	0.95±0.05	0.95±0.05

For dimension see Table 7

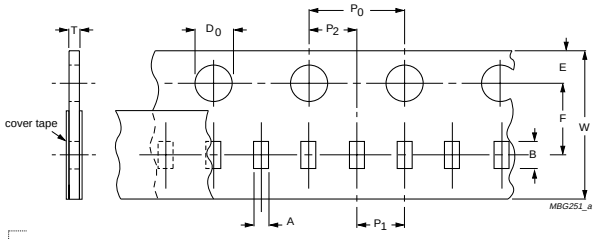

Fig. 4 Paper tape dimension

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

For dimension see Table 8

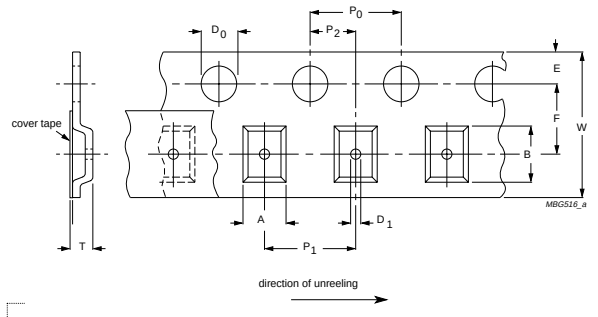

Fig. 5 Blister tape dimension

PACKING METHOD

LEADER/TRAILER TAPE SPECIFICATION

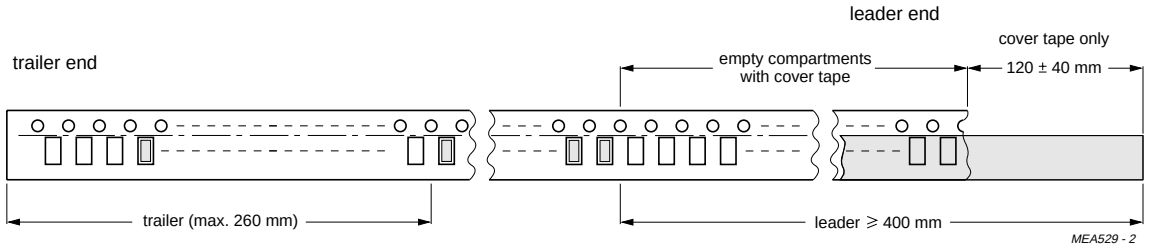

Fig. 6 Leader and trailer tape dimension

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 (sold line)
Process limits (dotted lines)

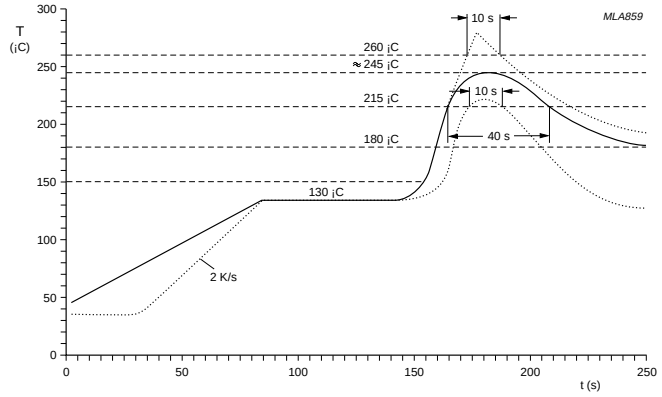

Fig. 7 Recommended reflow soldering profile

Typical values (sold line)
Process limits (dotted lines)
The capacitors may be soldered twice in accordance with this method if desired

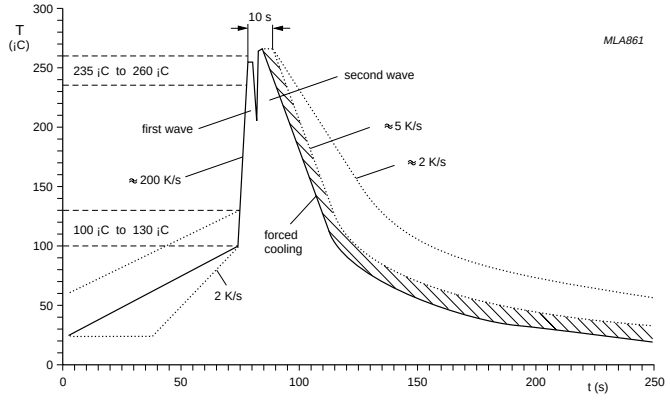

Fig. 8 Recommended wave soldering profile

TEST AND REQUIREMENT

Table 9

IEC384-10	TEST ITEMS	CONDITIONS	REQUIREMENTS
4.9	Bending	Bending rate 1mm/s, jig. radius 340mm	NP0: ΔC/C≤1% X7R: ΔC/C≤10%
4.10	Resistance to soldering heat	260±5°C for 10±0.5s in static solder bath	NP0: ΔC/C≤ 0.5% or 0.5pF whichever is greater X7R: –5%≤ΔC/C≤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	–55°C to +125°C, 5 cycles	NP0: ΔC/C≤1% or 1pF, whichever is greater X7R: ΔC/C≤15%
4.14	Damp heat	At 40°C, 90 to 95% RH and Ur applied (max. 500V) for 500 hours	NP0: ΔC/C: 2% or 1pF whichever is greater Tan δ≤2xspecified value IR≥2,500MΩ or RxC≥25s whichever is less X7R: ΔC/C≤15% Tan δ≤7% IR≥500MΩ or RxC≥25s whichever is less
4.15	Endurance	At upper category temperature 2xUr applied for 1,000 hours	NP0: ΔC/C: 2% or 1pF whichever is greater Tan δ≤2xspecified value IR≥4,000MΩ or RxC≥40s whichever is less X7R: ΔC/C≤20% Tan δ≤7% IR≥1,000MΩ or RxC≥50s whichever is less