

# APPROVAL SHEET

**MULTILAYER CERAMIC CAPACITORS**

**General Purpose Series (10V to 100V)**

**0402 to 1812 Sizes**

**NP0, X7R & Y5V Dielectrics**

**RoHS Compliance**

**CUSTOMER:** \_\_\_\_\_

**APPROVAL NO.:** \_\_\_\_\_

**ISSUE DATE:** \_\_\_\_\_

**APPROVED BY:** **Hank Chiang**  
\_\_\_\_\_

**CUSTOMER APPROVAL:**

## 1. DESCRIPTION

# MULTILAYER CERAMIC CAPACITORS

## General Purpose Capacitors



### 1. DESCRIPTION

MLCC consists of a conducting material and electrodes. To manufacture a chip-type SMT and achieve miniaturization, high density and high efficiency, ceramic condensers are used.

WTC's MLCC is made by NP0, X7R and Y5V dielectric material and which provides product with high electrical precision, stability and reliability.

### 2. FEATURES

- A wide selection of sizes is available (0402 to 1812).
- High capacitance in given case size.
- Capacitor with lead-free termination (pure Tin).

### 3. APPLICATIONS

- For general digital circuit.
- For power supply bypass capacitors.
- For consumer electronics.
- For telecommunication.

### 4. HOW TO ORDER

<u>1206</u>	<u>F</u>	<u>104</u>	<u>Z</u>	<u>500</u>	<u>C</u>	<u>I</u>
<u>Size</u>	<u>Dielectric</u>	<u>Capacitance</u>	<u>Tolerance</u>	<u>Rated voltage</u>	<u>Termination</u>	<u>Packaging style</u>
Inch (mm)	N=NP0 (COG)	Two significant digits followed by no. of zeros. And R is in place of decimal point.	B=±0.1pF C=±0.25pF D=±0.5pF F=±1% G=±2% J=±5%	Two significant digits followed by no. of zeros. And R is in place of decimal point.	L=Ag/Ni/Sn C=Cu/Ni/Sn	T=7" reeled R=7" reeled (2mm pitch for 0603 size; paper tape) G=13" reeled
0402 (1005)			K=±10%	100=10 VDC		
0603 (1608)	B=X7R		M=±20%	160=16 VDC		
0805 (2012)	F=Y5V		Z=-20/+80%	250=25 VDC		
1206 (3216)		eg.: R47=4.7pF OR5=0.5pF 1R0=1.0pF 104=10×10 <sup>4</sup> =100nF		500=50 VDC		
1210 (3225)				101=100 VDC		
1812 (4532)						

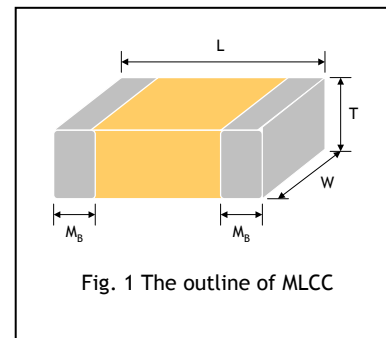
# MULTILAYER CERAMIC CAPACITORS

## General Purpose Capacitors



### 5. EXTERNAL DIMENSIONS

Size Inch (mm)	L (mm)	W (mm)	T (mm)/Symbol	Remark	M <sub>B</sub> (mm)
0402 (1005)	1.00±0.05	0.50±0.05	0.50±0.05	N #	0.25 +0.05/-0.10
0603 (1608)	1.60±0.10	0.80±0.10	0.80±0.07	S	0.40±0.15
	1.60 +0.15/-0.10	0.80 +0.15/-0.10	0.80 +0.15/-0.10	X	
0805 (2012)	2.00±0.15	1.25±0.10	0.60±0.10	A	0.50±0.20
			0.80±0.10	B	
			1.25±0.10	D #	
1206 (3216)	3.20±0.15	1.60±0.15	0.80±0.10	B	0.60±0.20
			0.95±0.10	C	
			1.15±0.15	J #	
			1.25±0.10	D #	
			1.60±0.20	G #	
			3.20+0.3/-0.1	1.60+0.3/-0.1	
1210 (3225)	3.20±0.30	2.50±0.20	0.95±0.10	C #	0.75±0.25
			1.25±0.10	D #	
1812 (4532)	4.50±0.40	3.20±0.30	1.25±0.10	D #	0.75±0.25
			2.00±0.20	K #	



# Reflow soldering only is recommended.

### 6. GENERAL ELECTRICAL DATA

Dielectric	NPO	X7R	Y5V
Size	0402, 0603, 0805, 1206, 1210, 1812		
Capacitance range*	0.5pF to 0.039uF	100pF to 1uF	10nF to 680nF
Capacitance tolerance	Cap≤5pF: B (±0.1pF), C (±0.25pF) 5pF<Cap<10pF: C (±0.25pF), D (±0.5pF) Cap≥10pF: F (±1%), G (±2%), J (±5%), K (±10%)	J (±5%), K (±10%), M (±20%)	M (±20%), Z (-20/+80%)
Rated voltage (WVDC)	16V, 25V, 50V, 100V	10V, 16V, 25V, 50V, 100V	
Tan δ*	Cap<30pF: Q <sub>z</sub> ≥400+20C Cap≥30pF: Q <sub>z</sub> ≥1000	Note 1	
Insulation resistance at U <sub>r</sub>	≥10GΩ	≥10GΩ or R <sub>x</sub> C≥500ΩxF whichever is less	
Operating temperature	-55 to +125 °C		-25 to +85 °C
Capacitance characteristic	±30ppm	±15%	+30/-80%
Termination	Ni/Sn (lead-free termination)		

\* Measured at the condition of 30-70% related humidity.

NPO: Apply 1.0±0.2V<sub>rms</sub>, 1.0MHz±10% for Cap≤1000pF and 1.0±0.2V<sub>rms</sub>, 1.0kHz±10% for Cap>1000pF, 25 °C at ambient temperature

X7R: Apply 1.0±0.2V<sub>rms</sub>, 1.0kHz±10%, at 25 °C ambient temperature.

Y5V: Apply 1.0±0.2V<sub>rms</sub>, 1.0kHz±10%, at 20 °C ambient temperature.

Note 1:

X7R Dielectric			
Ur.	DF	Exception of DF	
≥50V	≤2.5%	≤3.0%	0603, ≥47nF; 0805, ≥180nF; 1206, ≥470nF
25V	≤3.5%	≤5.0%	-
16V	≤3.5%	≤5.0%	0402, ≥33nF; 0603, ≥150nF; 0805, ≥680nF
10V	≤5.0%	-	-

Y5V Dielectric			
Ur.	DF	Exception of DF	
≥50V	≤5.0%	-	-
25V	≤5.0%	≤7.0%	0603, ≥100nF; 0805, ≥330nF
16V	≤7.0%	≤9.0%	0402, ≥68nF
10V	≤12.5%	-	-

# MULTILAYER CERAMIC CAPACITORS

## General Purpose Capacitors



### 7. CAPACITANCE RANGE (NPO Dielectric - Noble Metal Electrode)

#### 7-1 0402, 0603, 0805 Sizes

DIELECTRIC		NPO														
SIZE		0402					0603					0805				
RATED VOLTAGE (VDC)		10	16	25	50	100	10	16	25	50	100	10	16	25	50	100
Capacitance	0.5pF (0R5)	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
	0.6pF (0R6)	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
	0.7pF (0R7)	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
	0.8pF (0R8)	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
	0.9pF (0R9)	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
	1.0pF (1R0)	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
	1.2pF (1R2)	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
	1.5pF (1R5)	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
	1.8pF (1R8)	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
	2.2pF (2R2)	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
	2.7pF (2R7)	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
	3.3pF (3R3)	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
	3.9pF (3R9)	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
	4.7pF (4R7)	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
	5.6pF (5R6)	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
	6.8pF (6R8)	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
	8.2pF (8R2)	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
	10pF (100)	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
	12pF (120)	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
	15pF (150)	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
	18pF (180)	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
	22pF (220)	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
	27pF (270)	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
	33pF (330)	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
	39pF (390)	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
	47pF (470)	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
	56pF (560)	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
	68pF (680)	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
	82pF (820)	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
	100pF (101)	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
120pF (121)	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A	
150pF (151)	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A	
180pF (181)	N	N	N	N		S	S	S	S	S	A	A	A	A	A	
220pF (221)	N	N	N	N		S	S	S	S	S	A	A	A	A	A	
270pF (271)	N	N	N			S	S	S	S	S	A	A	A	A	A	
330pF (331)	N	N				S	S	S	S	S	A	A	A	A	A	
390pF (391)	N	N				S	S	S	S	S	B	B	B	B	B	
470pF (471)	N	N				S	S	S	S	S	B	B	B	B	B	
560pF (561)						S	S	S	S	S	B	B	B	B	B	
680pF (681)						S	S	S	S		B	B	B	B	B	
820pF (821)						S	S	S	S		B	B	B	B	B	
1,000pF (102)						S	S	S	S		B	B	B	B	B	

1. The letter in cell is expressed the symbol of product thickness.

# MULTILAYER CERAMIC CAPACITORS

## General Purpose Capacitors



### 7-1 0402, 0603, 0805 Sizes (Continued)

DIELECTRIC		NPO														
SIZE		0402					0603					0805				
RATED VOLTAGE (VDC)		10	16	25	50	100	10	16	25	50	100	10	16	25	50	100
Capacitance	1,200pF (122)						S	S				B	B	B	B	B
	1,500pF (152)						S	S				B	B	B	B	B
	1,800pF (182)						S	S				B	B	B	B	B
	2,200pF (222)						S	S				B	B	B	B	B
	2,700pF (272)						S	S				D	D	D	D	D
	3,300pF (332)						S	S				D	D	D	D	D
	3,900pF (392)											D	D	D	D	D
	4,700pF (472)											D	D	D	D	
	5,600pF (562)											D	D			
	6,800pF (682)											D	D			
	8,200pF (822)											D	D			
	0.010μF (103)											D	D			
	0.012μF (123)											D	D			

1. The letter in cell is expressed the symbol of product thickness.

### 7-2 1206, 1210, 1812 Sizes

DIELECTRIC		NPO												
SIZE		1206					1210					1812		
RATED VOLTAGE (VDC)		10	16	25	50	100	10	16	25	50	100	16	50	100
Capacitance	1.0pF (1R0)													
	1.2pF (1R2)													
	1.5pF (1R5)	B	B	B	B	B								
	1.8pF (1R8)	B	B	B	B	B								
	2.2pF (2R2)	B	B	B	B	B								
	2.7pF (2R7)	B	B	B	B	B								
	3.3pF (3R3)	B	B	B	B	B								
	3.9pF (3R9)	B	B	B	B	B								
	4.7pF (4R7)	B	B	B	B	B								
	5.6pF (5R6)	B	B	B	B	B								
	6.8pF (6R8)	B	B	B	B	B								
	8.2pF (8R2)	B	B	B	B	B								
	10pF (100)	B	B	B	B	B					C			D
	12pF (120)	B	B	B	B	B					C			D
	15pF (150)	B	B	B	B	B					C			D
	18pF (180)	B	B	B	B	B					C			D
	22pF (220)	B	B	B	B	B	C	C	C	C	C			D
	27pF (270)	B	B	B	B	B	C	C	C	C	C			D
	33pF (330)	B	B	B	B	B	C	C	C	C	C			D
	39pF (390)	B	B	B	B	B	C	C	C	C	C			D
47pF (470)	B	B	B	B	B	C	C	C	C	C			D	
56pF (560)	B	B	B	B	B	C	C	C	C	C			D	
68pF (680)	B	B	B	B	B	C	C	C	C	C			D	
82pF (820)	B	B	B	B	B	C	C	C	C	C			D	
100pF (101)	B	B	B	B	B	C	C	C	C	C			D	

1. The letter in cell is expressed the symbol of product thickness.

# MULTILAYER CERAMIC CAPACITORS

## General Purpose Capacitors



### 7-2 1206, 1210, 1812 Sizes (Continued)

DIELECTRIC		NP0														
		1206					1210					1812				
SIZE		10	16	25	50	100	10	16	25	50	100	10	16	25	50	100
RATED VOLTAGE (VDC)		10	16	25	50	100	10	16	25	50	100	10	16	25	50	100
Capacitance	120pF (121)	B	B	B	B	B	C	C	C	C	C					D
	150pF (151)	B	B	B	B	B	C	C	C	C	C					D
	180pF (181)	B	B	B	B	B	C	C	C	C	C					D
	220pF (221)	B	B	B	B	B	C	C	C	C	C					D
	270pF (271)	B	B	B	B	B	C	C	C	C	C					D
	330pF (331)	B	B	B	B	B	C	C	C	C	C					D
	390pF (391)	B	B	B	B	B	C	C	C	C	C					D
	470pF (471)	B	B	B	B	B	C	C	C	C	C					D
	560pF (561)	B	B	B	B	B	C	C	C	C	C					D
	680pF (681)	B	B	B	B	B	C	C	C	C	C					D
	820pF (821)	B	B	B	B	B	C	C	C	C	C					D
	1,000pF (102)	B	B	B	B	B	C	C	C	C	C	D	D	D	D	D
	1,200pF (122)	B	B	B	B	B	C	C	C	C	C	D	D	D	D	D
	1,500pF (152)	B	B	B	B	B	C	C	C	C	C	D	D	D	D	D
	1,800pF (182)	B	B	B	B	B	C	C	C	C	C	D	D	D	D	D
	2,200pF (222)	B	B	B	B	B	C	C	C	C	C	D	D	D	D	D
	2,700pF (272)	B	B	B	B	B	C	C	C	C	C	D	D	D	D	D
	3,300pF (332)	B	B	B	B	B	C	C	C	C	C	D	D	D	D	D
	3,900pF (392)	B	B	B	B	B	C	C	C	C	C	D	D	D	D	D
	4,700pF (472)	B	B	B	B	B	C	C	C	C	C	D	D	D	D	D
	5,600pF (562)	B	B	B	B	B	C	C	C	C	C	D	D	D	D	D
	6,800pF (682)	D	D	D	D	D	C	C	C	C	C	D	D	D	D	D
	8,200pF (822)	D	D	D	D	D	C	C	C	C	C	D	D	D	D	D
	0.010μF (103)	D	D	D	D		C	C	C	C	C	D	D	D	D	D
0.012μF (123)	D	D	P	P		C	C	D	D	D	D	D	D	D	D	
0.015μF (153)	D	D	P	P		C	C	D	D	D	D	D	D	D	D	
0.018μF (183)	D	D									D	D	D	D	D	
0.022μF (223)	D	D									D	D	D	D	D	
0.027μF (273)	D	D									D	D	D	D	D	
0.033μF (333)	D	D									D	D	D	D	D	
0.039μF (393)	G	G														

1. The letter in cell is expressed the symbol of product thickness.
2. For more information about products with special capacitance or other data, please contact WTC local representative.

# MULTILAYER CERAMIC CAPACITORS

## General Purpose Capacitors



### 8. CAPACITANCE RANGE (X7R Dielectric - Based Metal Electrode)

#### 8-1 0402, 0603, 0805 Sizes

DIELECTRIC		X7R														
SIZE		0402					0603					0805				
RATED VOLTAGE (VDC)		6.3	10	16	25	50	10	16	25	50	100	10	16	25	50	100
Capacitance	100pF (101)	N	N	N	N	N	S	S	S	S	S	B	B	B	B	B
	120pF (121)	N	N	N	N	N	S	S	S	S	S	B	B	B	B	B
	150pF (151)	N	N	N	N	N	S	S	S	S	S	B	B	B	B	B
	180pF (181)	N	N	N	N	N	S	S	S	S	S	B	B	B	B	B
	220pF (221)	N	N	N	N	N	S	S	S	S	S	B	B	B	B	B
	270pF (271)	N	N	N	N	N	S	S	S	S	S	B	B	B	B	B
	330pF (331)	N	N	N	N	N	S	S	S	S	S	B	B	B	B	B
	390pF (391)	N	N	N	N	N	S	S	S	S	S	B	B	B	B	B
	470pF (471)	N	N	N	N	N	S	S	S	S	S	B	B	B	B	B
	560pF (561)	N	N	N	N	N	S	S	S	S	S	B	B	B	B	B
	680pF (681)	N	N	N	N	N	S	S	S	S	S	B	B	B	B	B
	820pF (821)	N	N	N	N	N	S	S	S	S	S	B	B	B	B	B
	1,000pF (102)	N	N	N	N	N	S	S	S	S	S	B	B	B	B	B
	1,200pF (122)	N	N	N	N	N	S	S	S	S	S	B	B	B	B	B
	1,500pF (152)	N	N	N	N	N	S	S	S	S	S	B	B	B	B	B
	1,800pF (182)	N	N	N	N	N	S	S	S	S	S	B	B	B	B	B
	2,200pF (222)		N	N	N	N	S	S	S	S	S	B	B	B	B	B
	2,700pF (272)		N	N	N	N	S	S	S	S	S	B	B	B	B	B
	3,300pF (332)		N	N	N	N	S	S	S	S	S	B	B	B	B	B
	3,900pF (392)		N	N	N	N	S	S	S	S	S	B	B	B	B	B
	4,700pF (472)		N	N	N	N	S	S	S	S	S	B	B	B	B	B
	5,600pF (562)		N	N	N	N	S	S	S	S	S	B	B	B	B	B
	6,800pF (682)		N	N	N	N	S	S	S	S	S	B	B	B	B	B
	8,200pF (822)		N	N	N	N	S	S	S	S	S	B	B	B	B	B
	0.010μF (103)		N	N	N	N	S	S	S	S	S	B	B	B	B	B
	0.012μF (123)		N	N	N		S	S	S	S		B	B	B	B	B
	0.015μF (153)		N	N	N		S	S	S	S		B	B	B	B	B
	0.018μF (183)		N	N	N		S	S	S	S		B	B	B	B	B
	0.022μF (223)		N	N	N		S	S	S	S		B	B	B	B	B
	0.027μF (273)		N	N			S	S	S	S		B	B	B	B	D
	0.033μF (333)		N	N			S	S	S	X		B	B	B	B	D
	0.039μF (393)		N	N			S	S	S	X		B	B	B	B	D
	0.047μF (473)		N	N			S	S	S	X		B	B	B	B	D
0.056μF (563)						S	S	S	X		B	B	B	B	D	
0.068μF (683)						S	S	S	X		B	B	B	B	D	
0.082μF (823)						S	S	S	X		B	B	B	B	D	
0.10μF (104)						S	S	S	X		B	B	B	B	D	
0.12μF (124)						S	S				B	B	B	D		
0.15μF (154)						S	S				D	D	D	D		
0.18μF (184)						S	S				D	D	D	D		
0.22μF (224)						S	S				D	D	D	D		
0.27μF (274)						X					D	D	D			
0.33μF (334)						X					D	D	D			
0.39μF (394)						X					D	D	D			
0.47μF (474)						X	X				D	D	D			
0.56μF (564)											D	D	D			
0.68μF (684)							X				D	D	D			
0.82μF (824)											D	D	D			
1.0μF (105)							X				D	D	D			

1. The letter in cell is expressed the symbol of product thickness.

# MULTILAYER CERAMIC CAPACITORS

## General Purpose Capacitors



### 8-2 1206, 1210, 1812 Sizes

DIELECTRIC		X7R														
SIZE		1206					1210					1812				
RATED VOLTAGE (VDC)		10	16	25	50	100	10	16	25	50	100	10	16	25	50	100
Capacitance	100pF (101)															
	120pF (121)															
	150pF (151)	B	B	B	B	B										
	180pF (181)	B	B	B	B	B										
	220pF (221)	B	B	B	B	B										
	270pF (271)	B	B	B	B	B										
	330pF (331)	B	B	B	B	B										
	390pF (391)	B	B	B	B	B										
	470pF (471)	B	B	B	B	B										
	560pF (561)	B	B	B	B	B										
	680pF (681)	B	B	B	B	B										
	820pF (821)	B	B	B	B	B										
	1,000pF (102)	B	B	B	B	B	C	C	C	C	C	D	D	D	D	D
	1,200pF (122)	B	B	B	B	B	C	C	C	C	C	D	D	D	D	D
	1,500pF (152)	B	B	B	B	B	C	C	C	C	C	D	D	D	D	D
	1,800pF (182)	B	B	B	B	B	C	C	C	C	C	D	D	D	D	D
	2,200pF (222)	B	B	B	B	B	C	C	C	C	C	D	D	D	D	D
	2,700pF (272)	B	B	B	B	B	C	C	C	C	C	D	D	D	D	D
	3,300pF (332)	B	B	B	B	B	C	C	C	C	C	D	D	D	D	D
	3,900pF (392)	B	B	B	B	B	C	C	C	C	C	D	D	D	D	D
	4,700pF (472)	B	B	B	B	B	C	C	C	C	C	D	D	D	D	D
	5,600pF (562)	B	B	B	B	B	C	C	C	C	C	D	D	D	D	D
	6,800pF (682)	B	B	B	B	B	C	C	C	C	C	D	D	D	D	D
	8,200pF (822)	B	B	B	B	B	C	C	C	C	C	D	D	D	D	D
	0.010μF (103)	B	B	B	B	B	C	C	C	C	C	D	D	D	D	D
	0.012μF (123)	B	B	B	B	B	C	C	C	C	C	D	D	D	D	D
	0.015μF (153)	B	B	B	B	B	C	C	C	C	C	D	D	D	D	D
	0.018μF (183)	B	B	B	B	B	C	C	C	C	C	D	D	D	D	D
	0.022μF (223)	B	B	B	B	B	C	C	C	C	C	D	D	D	D	D
	0.027μF (273)	B	B	B	B	B	C	C	C	C	C	D	D	D	D	D
	0.033μF (333)	B	B	B	B	B	C	C	C	C	C	D	D	D	D	D
	0.039μF (393)	B	B	B	B	B	C	C	C	C	C	D	D	D	D	D
0.047μF (473)	B	B	B	B	B	C	C	C	C	C	D	D	D	D	D	
0.056μF (563)	B	B	B	B	B	C	C	C	C	C	D	D	D	D	D	
0.068μF (683)	B	B	B	B	B	C	C	C	C	C	D	D	D	D	D	
0.082μF (823)	B	B	B	B	D	C	C	C	C	C	D	D	D	D	D	
0.10μF (104)	B	B	B	B	D	C	C	C	C	C	D	D	D	D	D	
0.12μF (124)	B	B	B	B	D	C	C	C	C	C	D	D	D	D	D	
0.15μF (154)	C	C	C	C	G	C	C	C	C	D	D	D	D	D	D	
0.18μF (184)	C	C	C	C	G	C	C	C	C	D	D	D	D	D	D	
0.22μF (224)	C	C	C	C	G	C	C	C	C	D	D	D	D	D	D	
0.27μF (274)	C	C	C	D		C	C	C	C	G	D	D	D	D	D	
0.33μF (334)	C	C	C	D		C	C	C	D	G	D	D	D	D	D	
0.39μF (394)	C	C	J	P		C	C	C	D	M	D	D	D	D	D	
0.47μF (474)	J	J	J	P		C	C	C	D	M	D	D	D	D	K	
0.56μF (564)	J	J	J	P		D	D	D	D	M	D	D	D	D	K	
0.68μF (684)	J	J	J	P		D	D	D	D	K	D	D	D	K	K	
0.82μF (824)	J	J	J	P		D	D	D	D	K	D	D	D	K	K	
1.0μF (105)	J	J	J	P		D	D	D	D	K	D	D	D	K	K	

1. The letter in cell is expressed the symbol of product thickness.
2. For more information about products with special capacitance or other data, please contact WTC local representative.
3. [^] means the said item is made by NME (Noble Metal Electrode) process.



# MULTILAYER CERAMIC CAPACITORS

## General Purpose Capacitors



### 9. CAPACITANCE RANGE (Y5V Dielectric - Based Metal Electrode)

#### 9-1 0402, 0603, 0805 Sizes

DIELECTRIC		Y5V														
SIZE		0402					0603					0805				
RATED VOLTAGE (VDC)		6.3	10	16	25	50	6.3	10	16	25	50	10	16	25	50	100
Capacitance	0.010μF (103)		N	N	N	N		S	S	S	S	A	A	A	A	B
	0.015μF (153)		N	N	N	N		S	S	S	S	A	A	A	A	B
	0.022μF (223)		N	N	N	N		S	S	S	S	A	A	A	A	B
	0.033μF (333)		N	N	N	N		S	S	S	S	A	A	A	A	B
	0.047μF (473)		N	N	N			S	S	S	S	A	A	A	A	B
	0.068μF (683)		N	N	N			S	S	S	S	A	A	A	A	B
	0.10μF (104)		N	N	N			S	S	S	S	A	A	A	A	B
	0.15μF (154)		N					S	S	S	S	A	A	A	A	
	0.22μF (224)		N				S	S	S	S		A	A	A	A	
	0.33μF (334)	N	N					S	S	S	S	B	B	B	B	
	0.47μF (474)	N	N					S	S			B	B	B	B	
	0.68μF (684)	N						S	X			B	B	D	D	
1.0μF (105)	N						S	X			B	B	D	D		

#### 9-2 1206, 1210, 1812 Sizes

DIELECTRIC		Y5V														
SIZE		1206					1210					1812				
RATED		10	16	25	50	100	10	16	25	50	100	10	16	25	50	100
Capacitance	0.010μF (103)	B	B	B	B	B					C					D
	0.015μF (153)	B	B	B	B	B					C					D
	0.022μF (223)	B	B	B	B	B					C					D
	0.033μF (333)	B	B	B	B	B					C					D
	0.047μF (473)	B	B	B	B	B					C					D
	0.068μF (683)	B	B	B	B	B					C					D
	0.10μF (104)	B	B	B	B	B	C	C	C	C	C	D	D	D	D	D
	0.15μF (154)	B	B	B	B	C	C	C	C	C	C	D	D	D	D	D
	0.22μF (224)	B	B	B	B	C	C	C	C	C	C	D	D	D	D	D
	0.33μF (334)	B	B	B	B		C	C	C	C	C	D	D	D	D	D
	0.47μF (474)	B	B	B	B		C	C	C	C		D	D	D	D	D
	0.68μF (684)	B	B	B	B		C	C	C	C		D	D	D	D	D
1.0μF (105)	C	C	C	C		C	C	C	C		D	D	D	D		

1. The letter in cell is expressed the symbol of product thickness.
2. For more information about products with special capacitance or other data, please contact WTC local representative.

# MULTILAYER CERAMIC CAPACITORS

## General Purpose Capacitors



### 10. PACKAGING STYLE AND QUANTITY

Size	Thickness (mm)/Symbol		Paper tape		Plastic tape	
			7" reel	13" reel	7" reel	13" reel
0402 (1005)	0.50±0.05	N	10k	50k	-	-
0603 (1608)	0.80±0.07	S	4k	15k	-	-
	0.80+0.15/-0.10	X	4k	15k	-	-
0805 (2012)	0.60±0.10	A	4k	15k	-	-
	0.80±0.10	B	4k	15k	-	-
	1.25±0.10	D	-	-	3k	10k
1206 (3216)	0.80±0.10	B	4k	15k	-	-
	0.95±0.10	C	-	-	3k	10k
	1.15±0.15	J	-	-	3k	10k
	1.25±0.10	D	-	-	3k	10k
	1.60±0.20	G	-	-	2k	-
	1.60+0.30/-0.10	P	-	-	2k	-
1210 (3225)	0.95±0.10	C	-	-	3k	10k
	1.25±0.10	D	-	-	3k	10k
1812 (4532)	1.25±0.10	D	-	-	1k	-
	2.00±0.20	K	-	-	1k	-

Unit: pieces

### APPENDIXES

#### ▣ Constructions

No.	Name	NPO	X7R, X5R, Y5V
①	Ceramic material	BaTiO <sub>3</sub> based	
②	Inner electrode	AgPd alloy	Ni
③	Termination	Inner layer	Ag
④		Middle layer	Ni
⑤		Outer layer	Sn

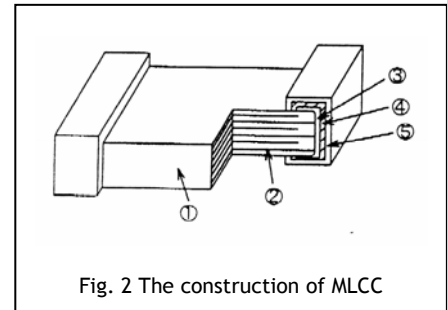


Fig. 2 The construction of MLCC

#### ▣ Storage and handling conditions

- (1) To store products at 5 to 40°C ambient temperature and 20 to 70% related humidity conditions.
- (2) The product is recommended to be used within one year after shipment. Check solderability in case of shelf life extension is needed.

Cautions:

- a. Don't store products in a corrosive environment such as sulfide, chloride gas, or acid. It may cause oxidization of electrode, which easily be resulted in poor soldering.
- b. To store products on the shelf and avoid exposure to moisture.
- c. Don't expose products to excessive shock, vibration, direct sunlight and so on.

#### ▣ Recommended soldering conditions

The lead-free termination MLCCs are not only to be used on SMT against lead-free solder paste, but also suitable against lead-containing solder paste. If the optimized solder joint is requested, increasing soldering time, temperature and concentration of N<sub>2</sub> within oven are recommended.

