

# 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	B=±0.1pF C=±0.25pF	Two significant digits followed by no. of zeros.	L=Ag/Ni/Sn (for NP0 dielectric)	T=7" reeled
0402 (1005)	B=X7R	no. of zeros. And R	D=±0.5pF	And R is in place of	C=Cu/Ni/Sn (for X7R, Y5V dielectric)	R=7" reeled (2mm pitch for 0603 size; paper tape)
0603 (1608)	F=Y5V	is in place of	F=±1%	decimal point.		G=13" reeled
0805 (2012)		decimal point.	G=±2%			
1206 (3216)		eg.:	J=±5%	100=10 VDC		
1210 (3225)		R47=4.7pF	K=±10%	160=16 VDC		
1812 (4532)		0R5=0.5pF	M=±20%	250=25 VDC		
		1R0=1.0pF	Z=-20/+80%	500=50 VDC		
		104=10x10 <sup>4</sup> =100nF		101=100 VDC		

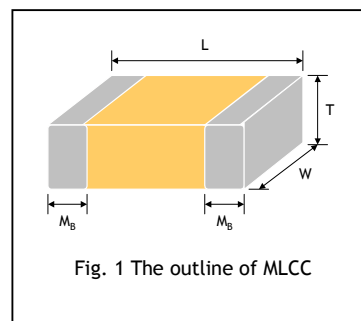
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### 5. EXTERNAL DIMENSIONS

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 #			
			3.20±0.20	1.60±0.20		1.60±0.20	G #
			3.20+0.3/-0.1	1.60+0.3/-0.1		1.60+0.30/-0.10	P #
1210 (3225)	3.20±0.30	2.50±0.20	0.95±0.10	C #	0.75±0.25		
			1.25±0.10	D #			
			1.60±0.20	G #			
			2.50±0.30	M #			
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 1.0uF	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≥400+20C Cap≥30pF: Q≥1000	Note 1	
Insulation resistance at U <sub>r</sub>	≥10GΩ or RxC≥500Ω×F 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±0.2Vrms, 1.0MHz±10% for Cap≤1000pF and 1.0±0.2Vrms, 1.0kHz±10% for Cap>1000pF, 25 °C at ambient temperature

X7R: Apply 1.0±0.2Vrms, 1.0kHz±10%, at 25 °C ambient temperature.

Y5V: Apply 1.0±0.2Vrms, 1.0kHz±10%, at 20 °C ambient temperature.

\*\* Preconditioning for Class II MLCC: Perform a heat treatment at 150±10 °C for 1 hour, then leave in ambient condition for 24±2 hours before measurement.

Note 1:

X7R/X5R

Rated vol.	D.F.	Exception of D.F.
≥50V	≤2.5%	≤3% 0603≥0.047μF; 0805≥0.18μF, 1206≥0.47μF
25V	≤3.5%	≤5% 0805≥1μF;
		≤7% 0603≥0.33μF
		10% 0402 ≥ 0.10μF; 0603 ≥ 0.68μF
16V	≤3.5%	≤5% 0402≥0.033μF; 0603≥0.15μF; 0805≥0.68μF;
		≤10% 0603 ≥ 0.68μF
10V	≤5.0%	≤10% 0603≥0.33μF;

Y5V

Rated vol.	D.F.	Exception of D.F.
≥50V	≤5.0%	7.0% 0603 ≥ 0.1μF; 0805 ≥ 0.47μF
25V	≤5.0%	≤7% 0402 ≥ 0.047μF; 0603 ≥ 0.1μF; 0805 ≥ 0.33μF; 1206 ≥ 1μF
		≤9% 0402 ≥ 0.068μF; 0603 ≥ 0.47μF
16V (C<1.0μF)	≤7.0%	≤9% 0402 ≥ 0.068μF; 0603 ≥ 0.68μF
16V (C≥1.0μF)	≤9.0%	---
10V	≤12.5%	---

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## 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	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

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### 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		NPO														
SIZE		1206					1210					1812				
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)	C	C	C	C	C	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				C	C	D	D	D	D	D	D	D	D
	0.015μF (153)	D	D				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)		10	16	25	50	10	16	25	50	100	10	16	25	50	100
Capacitance	100pF (101)	N	N	N	N	S	S	S	S	S	B	B	B	B	B
	120pF (121)	N	N	N	N	S	S	S	S	S	B	B	B	B	B
	150pF (151)	N	N	N	N	S	S	S	S	S	B	B	B	B	B
	180pF (181)	N	N	N	N	S	S	S	S	S	B	B	B	B	B
	220pF (221)	N	N	N	N	S	S	S	S	S	B	B	B	B	B
	270pF (271)	N	N	N	N	S	S	S	S	S	B	B	B	B	B
	330pF (331)	N	N	N	N	S	S	S	S	S	B	B	B	B	B
	390pF (391)	N	N	N	N	S	S	S	S	S	B	B	B	B	B
	470pF (471)	N	N	N	N	S	S	S	S	S	B	B	B	B	B
	560pF (561)	N	N	N	N	S	S	S	S	S	B	B	B	B	B
	680pF (681)	N	N	N	N	S	S	S	S	S	B	B	B	B	B
	820pF (821)	N	N	N	N	S	S	S	S	S	B	B	B	B	B
	1,000pF (102)	N	N	N	N	S	S	S	S	S	B	B	B	B	B
	1,200pF (122)	N	N	N	N	S	S	S	S	S	B	B	B	B	B
	1,500pF (152)	N	N	N	N	S	S	S	S	S	B	B	B	B	B
	1,800pF (182)	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)	N				S	S	S	X		B	B	B	B	D	
0.068μF (683)	N	N			S	S	S	X		B	B	B	B	D	
0.082μF (823)	N				S	S	S	X		B	B	B	B	D	
0.10μF (104)	N	N								B	B	B	B	D	
0.12μF (124)										B	B	B	D		
0.15μF (154)										D	D	D	D		
0.18μF (184)										D	D	D	D		
0.22μF (224)										D	D	D	D		
0.27μF (274)										D	D	D			
0.33μF (334)										D	D	D			
0.39μF (394)										D	D	D			
0.47μF (474)										D	D	D			
0.56μF (564)										D	D	D			
0.68μF (684)										D	D	D			
0.82μF (824)										D	D	D			
1.0uF (105)										D	D	D			

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

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Revision G

Dec. 11, 2008

6/12

# 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	
1.0uF (105)										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	N				S	S	S	S	S	A	A	A	A	
	0.33μF (334)	N	N					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		

#### 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. 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
	1.60±0.20	G	-	-	2k	-
	2.50±0.30	M	-	-	1K	-
1812 (4532)	1.25±0.10	D	-	-	1k	-
	2.00±0.20	K	-	-	1k	-

Unit: pieces

# MULTILAYER CERAMIC CAPACITORS

## General Purpose Capacitors



### 11. APPENDIXES

#### ■ Tape & reel dimensions

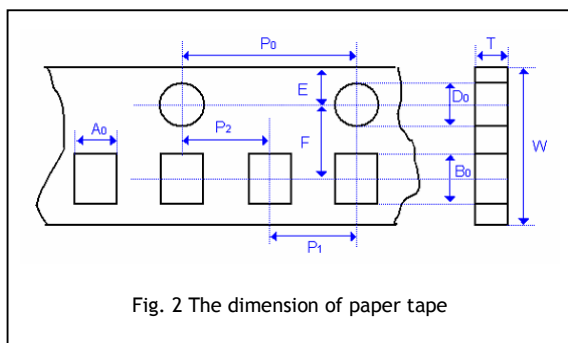


Fig. 2 The dimension of paper tape

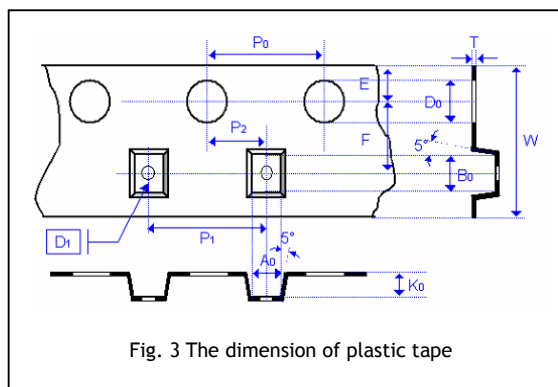


Fig. 3 The dimension of plastic tape

Size	0402	0603	0805			1206			1210		1812
Thickness	N	S, X	A	B	C, D, I	B	C, J, D	G	C, D, G	M	D, K
A <sub>0</sub>	0.62±0.05	1.02±0.05	1.50±0.10	1.50±0.10	<1.57	2.00±0.10	<1.85	<1.95	<2.97	<2.97	<3.81
B <sub>0</sub>	1.12±0.05	1.80±0.05	2.30±0.10	2.30±0.10	<2.40	3.50±0.10	<3.46	<3.67	<3.73	<3.73	<5.30
T	0.60±0.05	0.95±0.05	0.75±0.05	0.95±0.05	0.23±0.05	0.95±0.05	0.23±0.05	0.23±0.05	0.23±0.05	0.23±0.05	0.25±0.05
K <sub>0</sub>	-	-	-	-	<2.50	-	<2.50	<2.50	<2.50	<3.00	<2.50
W	8.00±0.10	8.00±0.10	8.00±0.10	8.00±0.10	8.00±0.10	8.00±0.10	8.00±0.10	8.00±0.10	8.00±0.10	8.00±0.10	12.0±0.20
P <sub>0</sub>	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.100	4.00±0.10	4.00±0.10
10xP <sub>0</sub>	40.0±0.10	40.0±0.10	40.0±0.10	40.0±0.10	40.0±0.10	40.0±0.10	40.0±0.10	40.0±0.10	40.0±0.10	40.0±0.10	40.0±0.10
P <sub>1</sub>	2.00±0.05	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10	8.00±0.10
P <sub>2</sub>	2.00±0.05	2.00±0.05	2.00±0.05	2.00±0.05	2.00±0.05	2.00±0.05	2.00±0.05	2.00±0.05	2.00±0.05	2.00±0.05	2.00±0.05
D <sub>0</sub>	1.55±0.05	1.55±0.05	1.55±0.05	1.55±0.05	1.50±0.05	1.50±0.05	1.50±0.05	1.50±0.05	1.50±0.05	1.50±0.05	1.50±0.05
D <sub>1</sub>	-	-	-	-	1.00±0.10	-	1.00±0.10	1.00±0.10	1.00±0.10	1.00±0.10	1.50±0.10
E	1.75±0.05	1.75±0.05	1.75±0.05	1.75±0.05	1.75±0.10	1.75±0.10	1.75±0.10	1.75±0.10	1.75±0.10	1.75±0.10	1.75±0.10
F	3.50±0.05	3.50±0.05	3.50±0.05	3.50±0.05	3.50±0.05	3.50±0.05	3.50±0.05	3.50±0.05	3.50±0.05	3.50±0.05	5.50±0.05

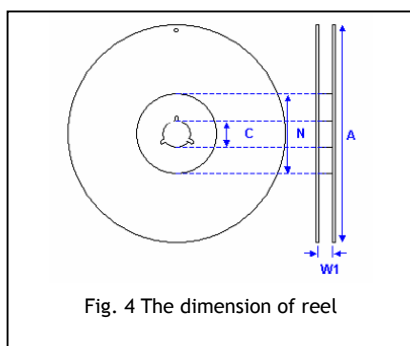


Fig. 4 The dimension of reel

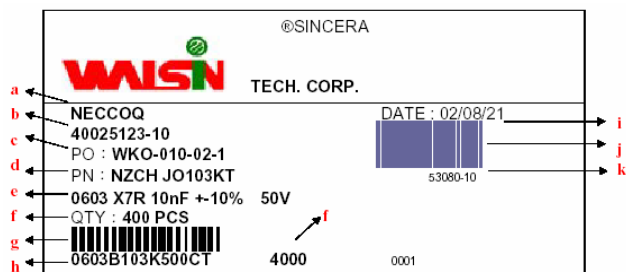
Size	0402, 0603, 0805, 1206, 1210			1812
Reel size	7"	10"	13"	7"
C	13.0+0.5/-0.2	13.0+0.5/-0.2	13.0+0.5/-0.2	13.0+0.5/-0.2
W <sub>1</sub>	8.4+1.5/-0	8.4+1.5/-0	8.4+1.5/-0	12.4+2.0/-0
A	178.0±1.0	250.0±1.0	330.0±1.0	178.0±1.0
N	60.5±1.0	100.0±1.0	100±1.0	60.5±1.0

# MULTILAYER CERAMIC CAPACITORS

## General Purpose Capacitors



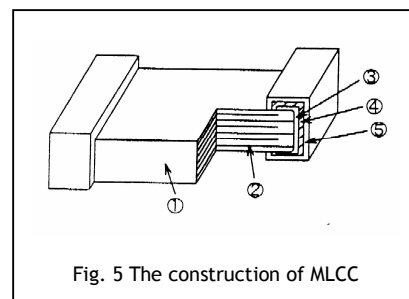
### Description of customer label



- a. Customer name
- b. WTC order series and item number
- c. Customer P/O
- d. Customer P/N
- e. Description of product
- f. Quantity
- g. Bar code including quantity & WTC P/N or customer
- h. WTC P/N
- i. Shipping date
- j. Order bar code including series and item numbers
- k. Serial number of label

### 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



### 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.

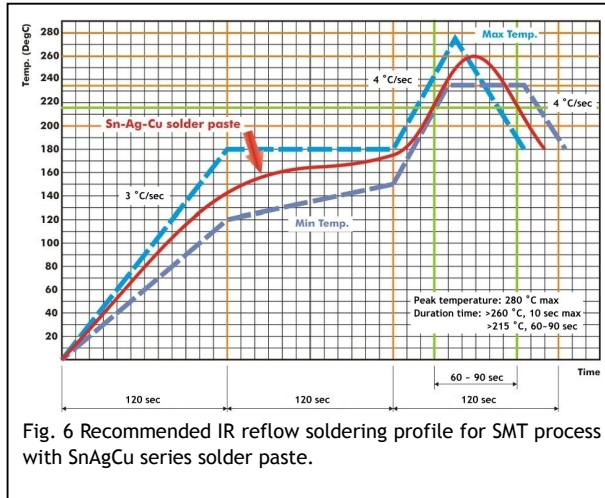


Fig. 6 Recommended IR reflow soldering profile for SMT process with SnAgCu series solder paste.

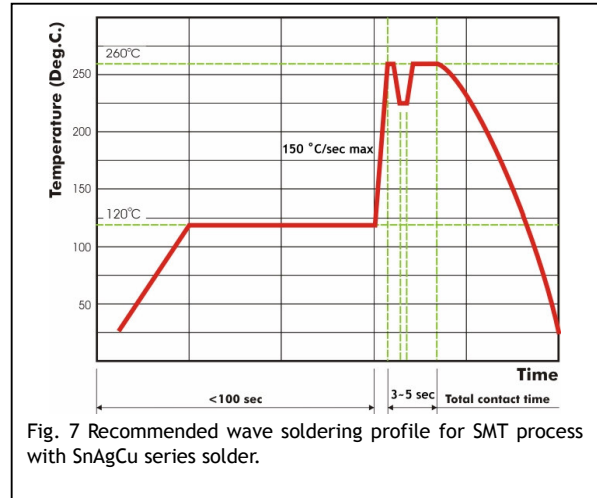


Fig. 7 Recommended wave soldering profile for SMT process with SnAgCu series solder.