

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

* Partial NP0 items are with Ag/Ni/Sn terminations, please ref to below product range of NP0 dielectric for detail.

5. EXTERNAL DIMENSIONS

Size Inch (mm)	L (mm)	W (mm)	T (mm)/Symbol	Remark	M _B (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 #			
	1.25±0.20	I #			
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 #	
	3.20±0.40	2.50±0.30	2.00±0.20	K #	
			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.

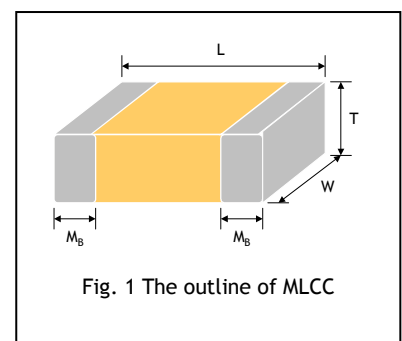


Fig. 1 The outline of MLCC

6. GENERAL ELECTRICAL DATA

Dielectric	NPO	X7R	Y5V
Size	0402, 0603, 0805, 1206, 1210, 1812		
Capacitance range*	0.5pF to 0.039uF	100pF to 0.82uF	10nF to 0.68uF
Capacitance tolerance**	Cap \leq 5pF: B (\pm 0.1pF), C (\pm 0.25pF) 5pF<Cap<10pF: C (\pm 0.25pF), D (\pm 0.5pF) Cap \geq 10pF: F (\pm 1%), G (\pm 2%), J (\pm 5%), K (\pm 10%)	J (\pm 5%), K (\pm 10%), M (\pm 20%)	M (\pm 20%), Z (-20/+80%)
Rated voltage (WVDC)	10V, 16V, 25V, 50V, 100V	6.3V, 10V, 16V, 25V, 50V, 100V	
Tan δ^*	Cap<30pF: Q \geq 400+20C Cap \geq 30pF: Q \geq 1000	Note 1	
Insulation resistance at Ur	\geq 10G Ω or RxC \geq 500 Ω xF whichever is less		
Operating temperature	-55 to +125 $^{\circ}$ C		-25 to +85 $^{\circ}$ C
Capacitance characteristic	\pm 30ppm	\pm 15%	+30/-80%
Termination	Ni/Sn (lead-free termination)		

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

NPO: Apply 1.0 \pm 0.2Vrms, 1.0MHz \pm 10% for Cap \leq 1000pF and 1.0 \pm 0.2Vrms, 1.0kHz \pm 10% for Cap>1000pF, 25 $^{\circ}$ C at ambient temperature

X7R: Apply 1.0 \pm 0.2Vrms, 1.0kHz \pm 10%, at 25 $^{\circ}$ C ambient temperature.

Y5V: Apply 1.0 \pm 0.2Vrms, 1.0kHz \pm 10%, at 20 $^{\circ}$ C ambient temperature.

** Preconditioning for Class II MLCC: Perform a heat treatment at 150 \pm 10 $^{\circ}$ C for 1 hour, then leave in ambient condition for 24 \pm 2 hours before measurement.

Note 1:

X7R/X5R

Rated vol.	D.F. \leq	Exception of D.F. \leq
\geq 50V	2.5%	3% 0603 \geq 0.047 μ F; 0805 \geq 0.18 μ F; 1206 \geq 0.47 μ F
25V	3.5%	5% 0805 \geq 1 μ F; 1210 \geq 10 μ F
		7% 0603 \geq 0.33 μ F; 1206 \geq 4.7 μ F
16V	3.5%	10% 0402 \geq 0.10 μ F; 0603 \geq 0.47 μ F; 0805 \geq 2.2 μ F; 1206 \geq 6.8 μ F
		5% 0402 \geq 0.033 μ F; 0603 \geq 0.15 μ F; 0805 \geq 0.68 μ F; 1206 \geq 2.2 μ F; 1210 \geq 4.7 μ F
10V	5%	10% 0603 \geq 0.68 μ F; 0805 \geq 2.2 μ F; 1206 \geq 4.7 μ F; 1210 \geq 22 μ F
		15% 0402 \geq 0.33 μ F; 0603 \geq 0.33 μ F; 0805 \geq 2.2 μ F; 1206 \geq 2.2 μ F; 1210 \geq 22 μ F; 1210 \geq 22 μ F
6.3V	10%	15% 0201 \geq 0.1 μ F; 0402 \geq 1 μ F
		20% 0603 \geq 10 μ F; 0805 \geq 4.7 μ F; 1210 \geq 100 μ F; 0402 \geq 2.2 μ F

Y5V

Rated vol.	D.F. \leq	Exception of D.F. \leq
\geq 50V	5%	7% 0603 \geq 0.1 μ F; 0805 \geq 0.47 μ F; 1206 \geq 4.7 μ F
35V	7%	---
25V	5%	7% 0402 \geq 0.047 μ F; 0603 \geq 0.1 μ F; 0805 \geq 0.33 μ F; 1206 \geq 1 μ F; 1210 \geq 4.7 μ F
		9% 0402 \geq 0.068 μ F; 0603 \geq 0.47 μ F; 1206 \geq 4.7 μ F; 1210 \geq 22 μ F
16V (C<1.0 μ F)	7%	9% 0402 \geq 0.068 μ F; 0603 \geq 0.68 μ F 12.5% 0402 \geq 0.22 μ F
16V (C \geq 1.0 μ F)	9%	12.5% 0603 \geq 2.2 μ F; 0805 \geq 3.3 μ F; 1206 \geq 10 μ F; 1210 \geq 22 μ F; 1812 \geq 47 μ F
10V	12.5%	20% 0402 \geq 0.47 μ F
6.3V	20%	---

MULTILAYER CERAMIC CAPACITORS

General Purpose Capacitors

7. CAPACITANCE RANGE (NPO Dielectric)

7-1 0402, 0603, 0805 Sizes

DIELECTRIC	SIZE	NPO														
		0402					0603					0805				
RATED VOLTAGE (VDC)		10	16	25	50	100	10	16	25	50	100	10	16	25	50	100
Capacitance	0.1pF (0R1)	N^	N^	N^	N^											
	0.2pF (0R2)	N^	N^	N^	N^											
	0.3pF (0R3)	N^	N^	N^	N^											
	0.4pF (0R4)	N^	N^	N^	N^	N^										
	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	N	S	S	S	S	S	A	A	A	A	A
	220pF (221)	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
	270pF (271)	N	N	N	N		S	S	S	S	S	A	A	A	A	A
	330pF (331)	N	N	N	N		S	S	S	S	S	A	A	A	A	A
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)						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	S	B	B	B	B	B	
1,000pF (102)						S	S	S	S	S	B	B	B	B	B	
1,200pF (122)						X	X	X	X		B	B	B	B	B	
1,500pF (152)						X	X	X	X		B	B	B	B	B	
1,800pF (182)						X	X	X	X		B	B	B	B	B	
2,200pF (222)						X	X	X	X		B	B	B	B	B	
2,700pF (272)						X	X	X	X		D	D	D	D	D	
3,300pF (332)						X	X	X	X		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^				
0.010uF (103)											D^	D^				
0.012uF (123)											D^	D^				

1. The letter in cell is expressed the symbol of product thickness.
2. The letter in cell with “^” mark is expressed product with Ag/Ni/Sn terminations.
3. For more information about products with special capacitance or other data, please contact WTC local representative.

MULTILAYER CERAMIC CAPACITORS

General Purpose Capacitors

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
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					C^				
3.9pF (3R9)	B	B	B	B	B					C^				
4.7pF (4R7)	B	B	B	B	B					C^				
5.6pF (5R6)	B	B	B	B	B					C^				
6.8pF (6R8)	B	B	B	B	B					C^				
8.2pF (8R2)	B	B	B	B	B					C^				
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^
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^
1,200pF (122)	B	B	B	B	B	C^	C^	C^	C^	C^	D^	D^		D^
1,500pF (152)	B	B	B	B	B	C^	C^	C^	C^	C^	D^	D^		D^
1,800pF (182)	B	B	B	B	B	C^	C^	C^	C^	C^	D^	D^		D^
2,200pF (222)	B	B	B	B	B	C^	C^	C^	C^	C^	D^	D^		D^
2,700pF (272)	B	B	B	B	B	C^	C^	C^	C^	C^	D^	D^		D^
3,300pF (332)	B	B	B	B	B	C^	C^	C^	C^	C^	D^	D^		D^
3,900pF (392)	B	B	B	B	B	C^	C^	C^	C^	C^	D^	D^		D^
4,700pF (472)	B	B	B	B	B	C^	C^	C^	C^	C^	D^	D^		D^
5,600pF (562)	B	B	B	B	B	C^	C^	C^	C^	C^	D^	D^		D^
6,800pF (682)	C	C	C	C	C	C^	C^	C^	C^	C^	D^	D^		D^
8,200pF (822)	D	D	D	D	D	C^	C^	C^	C^	C^	D^	D^		D^
0.010μF (103)	D	D	D	D		C^	C^	C^	C^	C^	D^	D^		D^
0.012μF (123)	D^	D^				C^	C^	D^	D^	D^	D^	D^		D^
0.015μF (153)	D^	D^				C^	C^	D^	D^	D^	D^	D^		D^
0.018μF (183)	D^	D^									D^	D^		D^
0.022μF (223)	D^	D^									D^	D^		D^
0.027μF (273)	D^	D^									D^	D^		D^
0.033μF (333)	D^	D^									D^	D^		D^
0.039μF (393)	G^	G^												D^

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3. For more information about products with special capacitance or other data, please contact WTC local representative.

8. CAPACITANCE RANGE (X7R Dielectric)

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	N		S	S	S	S		B	B	B	B	D
	0.033μF (333)	N	N	N		S	S	S	X		B	B	B	B	D
	0.039μF (393)	N	N	N		S	S	S	X		B	B	B	B	D
	0.047μF (473)	N	N	N		S	S	S	X		B	B	B	B	D
	0.056μF (563)	N	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	N			S	S	S	X		B	B	B	B	D
	0.10μF (104)	N	N			S	S	S	X		B	B	B	B	D
	0.12μF (124)					S	S	X			B	B	B	D	
	0.15μF (154)					S	S	X			D	D	D	D	
	0.18μF (184)					S	S	X			D	D	D	D	
0.22μF (224)					S	S	X			D	D	D	D		
0.27μF (274)					X	X	X			D	D	D			
0.33μF (334)					X	X	X			D	D	D	I		
0.39μF (394)					X	X	X			D	D	D			
0.47μF (474)					X	X	X			D	D	D	I		
0.56μF (564)										D	D	D			
0.68μF (684)										D	D	D			
0.82μF (824)										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

8-2 1206, 1210, 1812 Sizes

DIELECTRIC SIZE		X7R														
		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. 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.

9. CAPACITANCE RANGE (Y5V Dielectric)

9-1 0402, 0603, 0805 Sizes

DIELECTRIC		Y5V													
SIZE		0402					0603				0805				
RATED VOLTAGE		6.3	10	16	25	50	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	A	A	A	A	
	0.33μF (334)	N	N				S	S	S		B	B	B	B	
	0.47μF (474)	N	N				S	S	X		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.

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	-	-
	0.80±0.07	S	4k	15k	-	-
0603 (1608)	0.80±0.15/-0.10	X	4k	15k	-	-
	0.60±0.10	A	4k	15k	-	-
0805 (2012)	0.80±0.10	B	4k	15k	-	-
	1.25±0.10	D	-	-	3k	10k
	1.25±0.20	I	-	-	3k	10k
	0.80±0.10	B	4k	15k	-	-
1206 (3216)	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	-
	0.95±0.10	C	-	-	3k	10k
1210 (3225)	1.25±0.10	D	-	-	3k	10k
	1.60±0.20	G	-	-	2k	-
	2.00±0.20	K	-	-	1k	-
	2.50±0.30	M	-	-	1K	-
1812 (4532)	1.25±0.10	D	-	-	1k	-
	2.00±0.20	K	-	-	1k	-

Unit: pieces

APPENDIXES

■ Tape & reel dimensions

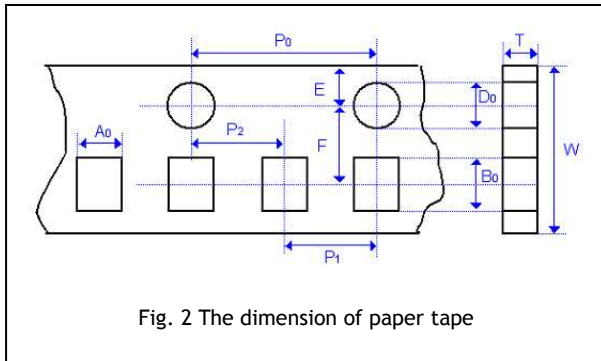


Fig. 2 The dimension of paper tape

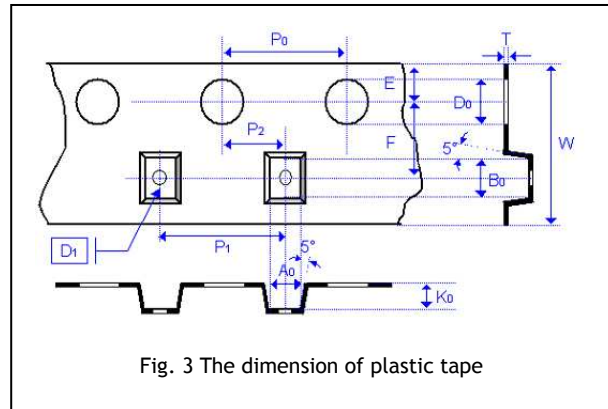


Fig. 3 The dimension of plastic tape

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 ₀	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 ₀	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 ₀	-	-	-	-	<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 ₀	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 ₀	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 ₁	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 ₂	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 ₀	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 ₁	-	-	-	-	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

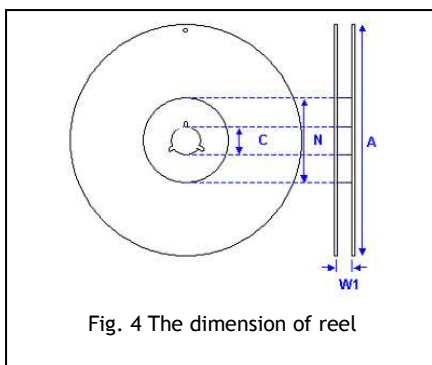
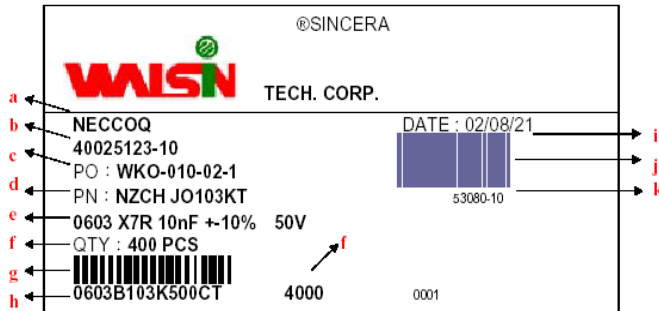


Fig. 4 The dimension of reel

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 ₁	8.4+1.5/-0	8.4+1.5/-0	8.4+1.5/-0	12.4+2.0/-0
A	178.0±0.10	250.0±1.0	330.0±1.0	178.0±0.10
N	60.0+1.0/-0	100.0±1.0	100±1.0	60.0+1.0/-0

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*	NPO, X7R, Y5V
①	Ceramic material	BaTiO ₃ based	
②	Inner electrode	AgPd alloy	Ni
③	Termination	Inner layer	Ag
④		Middle layer	Ni
⑤		Outer layer	Sn

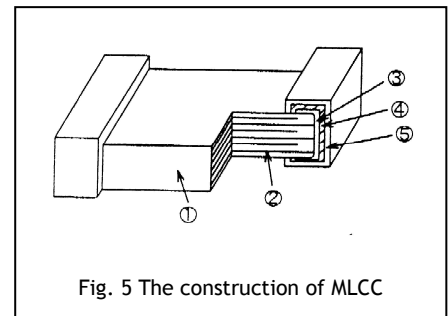


Fig. 5 The construction of MLCC

* Partial NPO items are with Ag/Ni/Sn terminations, please ref to product range of NPO dielectric for detail.

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 N₂ within oven are recommended.

