

**RoHS
Compliant**



Description

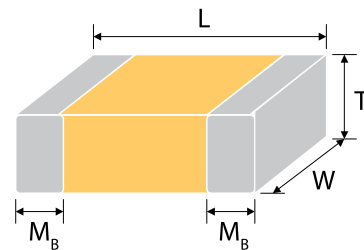
MLCC consists of a conducting material and electrodes. To manufacture a chip-type SMT and achieve miniaturization, high density and high efficiency, ceramic condensers are used. MLCC is made by NP0, X7R, X6S, X5R and Y5V dielectric material and which provides product with high electrical precision, stability and reliability.

Features

- wide selection of sizes is available (0201 to 1210).
- High capacitance in given case size.
- Capacitor with lead-free termination (pure Tin).

Applications

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



The outline of MLCC

External Dimensions

Size Inch (mm)	L (mm)	W (mm)	T (mm)/Symbol		Soldering Method *	M _B min (mm)
0201 (0603)	0.6 ±0.03	0.3 ±0.03	0.3 ±0.03	R	R	0.15 ±0.05
	0.6 ±0.05 ^{#2}	0.3 ±0.05 ^{#2}	0.3 ±0.05 ^{#2}	L		
	0.6 ±0.09 ^{#3}	0.3 ±0.09 ^{#3}	0.3 ±0.09 ^{#3}			
0402 (1005)	1 ±0.05	0.5 ±0.05	0.50 ±0.05	N	R	0.25 +0.05/-0.1
			0.5 +0.02/-0.05	Q	R	
	1 ±0.20	0.5 ±0.20	0.5±0.20	E	R	
0603 (1608)	1.6 ±0.1	0.8 ±0.1	0.8 ±0.07	S	R / W	0.4 ±0.15
	1.6+0.15/-0.1	0.8 +0.15/-0.1	0.5 ±0.1	H	R / W	
			0.8 +0.15/-0.1	X	R / W	
1.6 ±0.2 ^{#1}	0.8 ±0.2 ^{#1}	0.8 ±0.2 ^{#1}			R / W	
0805 (2012)	2 ±0.15	1.25 ±0.1	0.5 ±0.1	H	R / W	0.5 ±0.2
			0.6 ±0.1	A	R / W	
			0.8 ±0.1	B	R / W	
			1.25 ±0.1	D	R	
	2 ±0.20	1.25 ±0.2	0.85 ±0.1	T	R / W	
		1.25 ±0.2	I	R		

General Purpose Multilayer Ceramic Capacitors
4 to 100V (NPO, X7R, Y5V, X6S, X7S & X5R Dielectrics)



Size Inch (mm)	L (mm)	W (mm)	T (mm)/Symbol		Soldering Method *	M _B min (mm)
1206 (3216)	3.2 ±0.15	1.6 ±0.15	0.80±0.10	B	R / W	0.6 ±0.2 (0.5 ±0.25) ^{***}
			0.95±0.10	C	R	
			1.25±0.10	D	R	
			1.15±0.15	J	R	
	3.2 ±0.2	1.6 ±0.2	1.6 ±0.2	G	R	
			0.85 ±0.1	T	R / W	
3.2 +0.3/-0.1 3.3 +0.3/-0.1 ^{#5}	1.6 +0.3/-0.1	1.6 +0.3/-0.1	P	R		
1210 (3225)	3.2 ±0.3	2.50±0.20	0.95 ±0.1	C	R	0.75 ±0.25
			0.85 ±0.1	T	R	
			1.25 ±0.1	D	R	
	3.2 ±0.4	2.50±0.30	1.6 ±0.2	G	R	
			2 ±0.2	K	R	
	3.2 ±0.6 ^{#4}	2.50±0.50 ^{#4}	2.5 ±0.5 ^{#4}	M	R	

* R = Reflow soldering process ; W = Wave soldering process.

*** For 1206 ≥ 1000 volts and safety certificated products.

#1: For 0603/Cap≥10µF or 0603(≤6.3V)/Cap≥4.7µF or 0603(>10V)/Cap>1µF products.

#2: For 0201/ 0.1µF < Cap < 0.68µF products, Excluding 0201X334~474(≤6.3V) & 0201X224(≤10V).

#3: For 0201/Cap≥0.68µF products.

#4: For 1210(100V)/Cap>1µF or 1210(250V)/Cap>0.47µF or 1210(400V~630V)/Cap>0.22µF.

#5: For 1206(100V)/Cap≥1.2µF products.

General Electrical Data:

Dielectric	NPO	X7R	Y5V	Y5V	X6S	X7S
Size	0201, 0402, 0603, 0805, 1206, 1210					
Capacitance range*	0.1pF to 0.1µF	100pF to 47µF	0.01µF to 100µF	100pF to 220µF	0.1µF to 100µF	0.1µF to 100µF
Capacitance tolerance**	Cap5pF ^{#1} : A (±0.05pF), 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%)	K (±10%), M (±20%)	K (±10%), M (±20%)	K (±10%), M (±20%)
Rated voltage (WVDC)	10V, 16V, 25V, 50V,100V	6.3V, 10V, 16V, 25V, 50V, 100V				

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General Purpose Multilayer Ceramic Capacitors
4 to 100V (NP0, X7R, Y5V, X6S, X7S & X5R Dielectrics)



Dielectric	NP0	X7R	Y5V	Y5V	X6S	X7S
Operating temperature	-55 to +125°C		-25 to +85°C	-55 to +85°C	-55 to +105°C	-55 to +125°C
Capacitance characteristic	±30ppm	±15%	+30/-80%	±15%	±22%	±22%
Termination	Ni/Sn (lead-free termination)					

#1: NP0, 0.1pF product only provide B tolerance; 0603N0R3/0R4 provide B&C tolerance.

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

NP0: 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/X6S/X5R/X7S: Please refer to page 13 “Reliability test conditions and requirements” for detail.

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 and then leave in ambient condition for 24±2 hours before measurement.

Capacitance Range

Dielectric	NP0														
	0201					0402					0603				
Size	10	16	25	50	100	10	16	25	50	100	10	16	25	50	100
Rated Voltage (V DC)	10	16	25	50	100	10	16	25	50	100	10	16	25	50	100
0.1pF (0R1)	L	L	L	L	L	N	N	N	N						
0.2pF (0R2)	L	L	L	L	L	N	N	N	N						
0.3pF (0R3)	L	L	L	L	L	N	N	N	N		S	S	S	S	
0.4pF (0R4)	L	L	L	L	L	N	N	N	N		S	S	S	S	
0.5pF (0R5)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S
0.6pF (0R6)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S
0.7pF (0R7)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S
0.8pF (0R8)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S
0.9pF (0R9)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S
1.0pF (1R0)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S
1.2pF (1R2)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S
1.5pF (1R5)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S
1.8pF (1R8)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S
2.0pF (2R0)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S
2.2pF (2R2)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S
2.7pF (2R7)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S
3.0pF (3R0)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S
3.3pF (3R3)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S
3.9pF (3R9)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S

Capacitance



General Purpose Multilayer Ceramic Capacitors
4 to 100V (NPO, X7R, Y5V, X6S, X7S & X5R Dielectrics)



Dielectric	NPO														
	0201					0402					0603				
Size	10	16	25	50	100	10	16	25	50	100	10	16	25	50	100
Rated Voltage (V DC)	10	16	25	50	100	10	16	25	50	100	10	16	25	50	100
4.0pF (4R0)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S
4.7pF (4R7)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S
5.0pF (5R0)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S
5.6pF (5R6)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S
6.0pF (6R0)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S
6.8pF (6R8)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S
7.0pF (7R0)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S
8.0pF (8R0)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S
8.2pF (8R2)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S
9.0pF (9R0)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S
10pF (100)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S
12pF (120)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S
15pF (150)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S
18pF (180)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S
22pF (220)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S
27pF (270)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S
33pF (330)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S
39pF (390)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S
47pF (470)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S
56pF (560)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S
68pF (680)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S
82pF (820)	L	L	L	L		N	N	N	N	N	S	S	S	S	S
100pF (101)	L	L	L	L		N	N	N	N	N	S	S	S	S	S
120pF (121)	L	L	L	L		N	N	N	N	N	S	S	S	S	S
150pF (151)	L	L	L	L		N	N	N	N	N	S	S	S	S	S
180pF (181)	L	L	L	L		N	N	N	N	N	S	S	S	S	S
220pF (221)	L	L	L	L		N	N	N	N	N	S	S	S	S	S
270pF (271)	D		L			N	N	N	N		S	S	S	S	S
330pF (331)			L			N	N	N	N		S	S	S	S	S
390pF (391)			L			N	N	N	N		S	S	S	S	S
470pF (471)			L			N	N	N	N		S	S	S	S	S
560pF (561)			L			N	N	N	N		S	S	S	S	S
680pF (681)						N	N	N	N		S	S	S	S	S
820pF (821)						N	N	N	N		S	S	S	S	S
1,000pF (102)						N	N	N	N		S	S	S	S	S
1,200pF (122)											X	X	X	X	X*

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General Purpose Multilayer Ceramic Capacitors
4 to 100V (NPO, X7R, Y5V, X6S, X7S & X5R Dielectrics)



Dielectric	NPO														
	0201					0402					0603				
Size	10	16	25	50	100	10	16	25	50	100	10	16	25	50	100
Rated Voltage (V DC)															
1,500pF (152)											X	X	X	X	X*
1,800pF (182)											X	X	X	X	
2,200pF (222)											X	X	X	X	
2,700pF (272)											X	X	X	X	
3,300pF (332)											X	X	X	X	
3,900pF (392)											X	X	X	X	
4,700pF (472)											X	X	X	X	
5,600pF (562)											X*	X*	X*	X*	
6,800pF (682)											X*	X*	X*	X*	
8,200pF (822)											X*	X*	X*	X*	
0.010uF (103)											X*	X*	X*	X*	
0.012uF (123)															
0.015uF (153)															
0.018uF (183)															
0.022uF (223)															

1. The letter in cell is expressed the symbol of product thickness.
2. The letter in cell with " * " mark is expressed capacitance tolerance "J" (±5%) only.



NP0 Dielectric 1206 Size

Dielectric		NP0				
Size		1206				
Rated Voltage (V DC)		10	16	25	50	100
Capacitance	1.0pF (1R0)					
	1.2pF (1R2)	B	B	B	B	B
	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
	12pF (120)	B	B	B	B	B
	15pF (150)	B	B	B	B	B
	18pF (180)	B	B	B	B	B
	22pF (220)	B	B	B	B	B
	27pF (270)	B	B	B	B	B
	33pF (330)	B	B	B	B	B
	39pF (390)	B	B	B	B	B
	47pF (470)	B	B	B	B	B
	56pF (560)	B	B	B	B	B
	68pF (680)	B	B	B	B	B
	82pF (820)	B	B	B	B	B
	100pF (101)	B	B	B	B	B
	120pF (121)	B	B	B	B	B
	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	

General Purpose Multilayer Ceramic Capacitors
4 to 100V (NPO, X7R, Y5V, X6S, X7S & X5R Dielectrics)



Dielectric		NPO				
Size		1206				
Rated Voltage (V DC)		10	16	25	50	100
Capacitance	1,000pF (102)	B	B	B	B	B
	1,200pF (122)	B	B	B	B	B
	1,500pF (152)	B	B	B	B	B
	1,800pF (182)	B	B	B	B	B
	2,200pF (222)	B	B	B	B	B
	2,700pF (272)	B	B	B	B	B
	3,300pF (332)	B	B	B	B	B
	3,900pF (392)	B	B	B	B	B
	4,700pF (472)	B	B	B	B	B
	5,600pF (562)	B	B	B	B	B
	6,800pF (682)	C	C	C	C	C
	8,200pF (822)	D	D	D	D	D
	0.010μF (103)	D	D	D	D	D
	0.012μF (123)	P	P	P	P	P
	0.015μF (153)	P	P	P	P	P
	0.018μF (183)	P	P	P	P	P
	0.022μF (223)	P	P	P	P	P
	0.027μF (273)	P	P	P	P	
	0.033μF (333)	P	P	P	P	T
	0.039μF (393)	P	P	P	P	
0.047μF (473)	P	P	P	P		
0.056μF (563)	P	P	P	P		
0.068μF (683)	P	P	P	P		
0.082μF (823)	P	P	P	P		
0.1μF (104)	P	P	P	P		

1. The letter in cell is expressed the symbol of product thickness.
2. The letter in cell with “ * ” mark is expressed capacitance tolerance “J” (±5%) only.



X7R Dielectric 0402, 0603, 0805 Sizes

Dielectric		X7R																	
SIZE		0402					0603					0805							
Rated Voltage (VDC)		6.3	10	16	25	50	100	6.3	10	16	25	50	100	6.3	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	N		S	S	S	S	S		B	B	B	B	B
	2,700pF (272)		N	N	N	N	N		S	S	S	S	S		B	B	B	B	B
	3,300pF (332)		N	N	N	N	N		S	S	S	S	S		B	B	B	B	B
	3,900pF (392)		N	N	N	N	N		S	S	S	S	S		B	B	B	B	B
	4,700pF (472)		N	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	N			S	S	S	S	X		B	B	B	B	B
	0.015µF (153)		N	N	N	N			S	S	S	S	X		B	B	B	B	B
	0.018µF (183)		N	N	N	N			S	S	S	S	X		B	B	B	B	B
0.022µF (223)		N	N	N	N			S	S	S	S	X		B	B	B	B	B	
0.027µF (273)		N	N	N	N			S	S	S	S	X		B	B	B	B	D	
0.033µF (333)		N	N	N	N			S	S	S	X	X		B	B	B	B	D	
0.039µF (393)		N	N	N	N			S	S	S	X	X		B	B	B	B	D	
0.047µF (473)		N	N	N	N			S	S	S	X	X		B	B	B	B	D	
0.056µF (563)		N	N	N	E			S	S	S	X	X		B	B	B	B	D	
0.068µF (683)		N	N	N				S	S	S	X	X		B	B	B	B	D	
0.082µF (823)		N	N	N				S	S	S	X	X		B	B	B	B	D	

General Purpose Multilayer Ceramic Capacitors
4 to 100V (NPO, X7R, Y5V, X6S, X7S & X5R Dielectrics)



Dielectric		X7R																	
SIZE		0402					0603						0805						
Rated Voltage (VDC)		6.3	10	16	25	50	100	6.3	10	16	25	50	100	6.3	10	16	25	50	100
Capacitance	0.10µF (104)		N	N	N	N	E		S	S	S	X	X		B	B	B	B	D
	0.12µF (124)								S	S	X				B	B	B	B	I
	0.15µF (154)								S	S	X	X			D	D	D	D	I
	0.18µF (184)								S	S	X				D	D	D	D	I
	0.22µF (224)		N	N	N	N			S	S	X	X			D	D	D	D	I
	0.27µF (274)							X	X	X	X				D	D	D	I	I
	0.33µF (334)							X	X	X	X	X			D	D	D	I	I
	0.39µF (394)							X	X	X	X				D	D	D	I	I
	0.47µF (474)		N	N				X	X	X	X	X			D	D	D	I	I
	0.56µF (564)							X	X	X					D	D	D		
	0.68µF (684)							X	X	X					D	D	D	I	
	0.82µF (824)							X	X	X					D	D	D		
	1.0µF (105)		N					X	X	X	X	X			D	D	D	I	
	1.5µF (155)														I	I	I		
	2.2µF (225)							X	X	X				I	I	I	I	I	
	3.3µF (335)																		
	4.7µF (475)							X						I	I	I	I		
6.8µF (685)																			
10µF (106)													I	I	I*				
22µF (226)																			

1. The letter in cell is expressed the symbol of product thickness.
2. The letter in cell with “ * ” mark is expressed product not in 10% (code “K”) tolerance.



X7R Dielectric 1206 Size

Dielectric		X7R						
Size		1206						
Rated Voltage (VDC)	6.3	10	16	25	35	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
	1,200pF (122)		B	B	B		B	B
	1,500pF (152)		B	B	B		B	B
	1,800pF (182)		B	B	B		B	B
	2,200pF (222)		B	B	B		B	B
	2,700pF (272)		B	B	B		B	B
	3,300pF (332)		B	B	B		B	B
	3,900pF (392)		B	B	B		B	B
	4,700pF (472)		B	B	B		B	B
	5,600pF (562)		B	B	B		B	B
	6,800pF (682)		B	B	B		B	B
	8,200pF (822)		B	B	B		B	B
	0.010μF (103)		B	B	B		B	B
	0.012μF (123)		B	B	B		B	B
	0.015μF (153)		B	B	B		B	B
	0.018μF (183)		B	B	B		B	B
	0.022μF (223)		B	B	B		B	B
	0.027μF (273)		B	B	B		B	B
0.033μF (333)		B	B	B		B	B	
0.039μF (393)		B	B	B		B	B	
0.047μF (473)		B	B	B		B	B	
0.056μF (563)		B	B	B		B	B	
0.068μF (683)		B	B	B		B	B	
0.082μF (823)		B	B	B		B	D	

General Purpose Multilayer Ceramic Capacitors
4 to 100V (NPO, X7R, Y5V, X6S, X7S & X5R Dielectrics)



Dielectric		X7R						
Size		1206						
Rated Voltage (VDC)	6.3	10	16	25	35	50	100	
Capacitance	0.10µF (104)		B	B	B		B	C
	0.12µF (124)		B	B	B		B	D
	0.15µF (154)		C	C	C		C	G
	0.18µF (184)		C	C	C		C	G
	0.22µF (224)		C	C	C		C	G
	0.27µF (274)		C	C	C		D	G
	0.33µF (334)		C	C	C		D	G
	0.39µF (394)		C	C	J		P	G
	0.47µF (474)		J	J	J		P	G
	0.56µF (564)		J	J	J		P	P
	0.68µF (684)		J	J	J		P	P
	0.82µF (824)		J	J	J		P	P
	1.0µF (105)		J	J	J		P	P
	1.5µF (155)	J	J	J	P			
	2.2µF (225)	J	J	J	P		P	P
	3.3µF (335)		P	P	P			
	4.7µF (475)	P	P	P	P		P	
	6.8µF (685)							
	10µF (106)	P	P	P	P	P		
22µF (226)	P	P	P*					
47µF (476)								
100µF (107)								

1. The letter in cell is expressed the symbol of product thickness.
2. The letter in cell with " * " mark is expressed product not in 10% (code "K") tolerance.



X5R Dielectric 0402, 0603, 0805, 1206, 1210 Sizes

Dielectric		X5R												
		0402						0603						
Size		4	6.3	10	16	25	50	4	6.3	10	16	25	50	
Rated Voltage (VDC)		4	6.3	10	16	25	50	4	6.3	10	16	25	50	
Capacitance	100pF (101)													
	150pF (151)													
	220pF (221)													
	330pF (331)													
	470pF (471)													
	680pF (681)													
	820pF (821)													
	1,000pF (102)													
	1,500pF (152)													
	2,200pF (222)													
	2,700pF (272)													
	3,300pF (332)													
	4,700pF (472)													
	6,800pF (682)													
	0.010µF (103)													
	0.015µF (153)							N						
	0.022µF (223)							N						
	0.033µF (333)					N		N						
	0.047µF (473)			N	N	N		N						
	0.068µF (683)			N	N	N		E						
	0.082µF (823)			N	N	N		E						
	0.10µF (104)			N	N	N	N	E						
	0.15µF (154)			N	N	N	N							
	0.22µF (224)			N	N	N	N	N		X	X	X	X	
	0.33µF (334)			N	N	N				X	X	X	X	
	0.47µF (474)			N	N	N	N	E		X	X	X	X	X
	0.68µF (684)			N	N					X	X	X	X	
	0.82µF (824)									X	X	X	X	
	1.0µF (105)			N	N	N	N	N		X	X	X	X	X
	1.5µF (155)									X				
2.2µF (225)			N	N	E	E			X	X	X	X	X	
3.3µF (335)									X	X				
4.7µF (475)			E	E	E*				X	X	X	X		
6.8µF (685)														
10µF (106)			E*	E*	E*			X	X	X	X	X*		
22µF (226)				E*				X*	X*	X*				
47µF (476)								X*	X*					

Dielectric		X5R																			
Size		0805						1206						1210							
Rated Voltage (VDC)		48	6.3	10	16	25	50	4	6.3	10	16	25	50	4	6.3	10	16	25	35	50	
Capacitance	1.0µF (105)			D	D	D	I														
	1.5µF (155)		I	I	I	I				J	J					K	K				
	2.2µF (225)		I	I	I	I	I			J	J	P	P			K	K				
	3.3µF (335)		I	I	I	I		P	P	P											
	4.7µF (475)		I	I	I	I	I		P	P	P	P	P			K	K	K			
	6.8µF (685)								P	P											
	10µF (106)		I	I	I	I	I		P	P	P	P	P		K	K	K	K	M	M	
	22µF (226)		I	I*	I*	I*			P	P	P	P			M	M	M	M	M		
	47µF (476)		I*	I*					P	P	P*				M	M	M	M*			
	100µF (107)	I*	I*						P						M*	M*	M*				
	220µF (227)							P*						M*	M*						

1. The letter in cell is expressed the symbol of product thickness.
2. The letter in cell with “ * ” mark is expressed product not in 10% (code “K”) tolerance.

X6S Dielectric 0402 Size

Dielectric		X6S			
Size		0402			
Rated Voltage (VDC)		6.3	10	16	25
Capacitance	0.10µF (104)				
	0.15µF (154)				
	0.22µF (224)				
	0.33µF (334)				
	0.47µF (474)	E			
	0.68µF (684)				
	1.0µF (105)	N	N	N	E
	1.5µF (155)				
	2.2µF (225)	E	E	E	
	3.3µF (335)				
	4.7µF (475)				
	6.8µF (685)				
	10µF (106)	E*			
	22µF (226)				
	47µF (476)				
100µF (107)					

1. The letter in cell is expressed the symbol of product thickness.
2. The letter in cell with “ * ” mark is expressed product not in 10% (code “K”) tolerance.

Packaging Style And Quantity

Size	Thickness (mm)/Symbol		Paper tape		Plastic tape	
			7" reel	13" reel	7" reel	13" reel
0201 (0603)	0.3 ±0.03	L	15,000	70,000	-	-
	0.3 ±0.05	L	15,000	-	-	-
0402 (1005)	0.5 ±0.05	N	10,000	50,000	-	-
	0.5+0.02/-0.05	Q	10,000	50,000	-	-
	0.5 ±0.2	E	10,000	-	-	-
	0.5 ±0.1	H	4,000	-	-	-
0603 (1608)	0.8 ±0.07	S	4,000	15,000	-	-
	0.8+0.15/-0.1	X	4,000	15,000	-	-
0805 (2012)	0.5 ±0.1	H	4,000	15,000	-	-
	0.6 ±0.1	A	4,000	15,000	-	-
	0.8 ±0.1	B	4,000	15,000	-	-
	0.85 ±0.1	T	4,000	15,000	-	-
	1.25 ±0.1	D	-	-	3,000	10,000
	1.25 ±0.2	I	-	-	3,000	10,000
1206 (3216)	0.8 ±0.1	B	4,000	15,000	-	-
	0.85 ±0.1	T	4,000	15,000	-	-
	0.95 ±0.1	C	-	-	3,000	10,000
	1.15 ±0.15	J	-	-	3,000	10,000
	1.25 ±0.1	D	-	-	3,000	10,000
	1.6 ±0.2	G	-	-	2,000	10,000
	1.6+0.3/-0.1	P	-	-	2,000	9,000
1210 (3225)	0.85 ±0.1	T	-	-	3,000	10,000
	0.95 ±0.1	C	-	-	3,000	10,000
	1.25 ±0.1	D	-	-	3,000	10,000
	1.6 ±0.2	G	-	-	2,000	-
	2 ±0.2	K	-	-	1,000	6,000
	2.5 ±0.3	M	-	-	1,000	6,000

Reliability Test Conditions And Requirements

No	Item	Test Condition	Requirements			
1	Visual and Mechanical	-	* No remarkable defect. * Dimensions to conform to individual specification sheet.			
2	Capacitance	*Test temp.: Room Temperature.	* Shall not exceed the limits given in the detailed spec.			
3	Q/ D.F. (Dissipation Factor)	*Class I: (NP0) $\leq 1000\mu\text{F}$, $1 \pm 0.2V_{\text{rms}}$, $1\text{MHz} \pm 10\%$ $> 1000\mu\text{F}$, $1 \pm 0.2V_{\text{rms}}$, $1\text{KHz} \pm 10\%$ Class II: (X7R, X7E, X6S, X5R, X7S, Y5V) $C \leq 10\mu\text{F}$, $1 \pm 0.2V_{\text{rms}}$, $1\text{KHz} \pm 10\%$ ** $C > 10\mu\text{F}$, $0.5 \pm 0.2V_{\text{rms}}$, $120\text{Hz} \pm 20\%$ ** Test condition: $0.5 \pm 0.2V_{\text{rms}}$, $1\text{KHz} \pm 10\%$ X7R: 0805=106(6.3V), 0603/475(6.3V) X5R: 0201 \geq 224 (6.3V,10V,16V) ^{#1} , 0402 \geq 475 (6.3V,16V), 0402 \geq 225(10V), 0603=106 (6.3V) TT18X \geq 475(10V) , TT15X series X6S: 0201/474(4V),0201 $>$ 104 (6.3V,10V), 0402 \geq 225 (6.3V), 0402/475 (10V), 0603/106 (6.3V), X7S: 0402/225(6.3V) #1 Excluding X5R/0201/105(6.3V);225(10V) , 0402X475M6R3 (1.0 \pm 0.2Vrms, 1KHz \pm 10%) *Before initial measurement (Class II only): To apply de-aging at 150°C for 1hr then set for 24 \pm 2 hrs at room temp.	NP0: Cap \geq 30pF, Q \geq 1000; Cap $<$ 30pF,Q \geq 400+20C X7R:			
			Rated vol.	D.F.≤	Exception of D.F.≤	
			≥ 100V	≤2.5%	≤3%	1206 \geq 0.47 μF
					≤5%	0603 \geq 0.068 μF ;0805 $>$ 0.1 μF ;1206 \geq 1 μF ;1210 \geq 2.2 μF
					≤10%	0805 $>$ 0.22 μF ;1210 \geq 3.3 μF
			50V	≤2.5%	≤3%	0201(50V);0603 \geq 0.047 μF ;0805 \geq 0.18 μF ;1206 \geq 0.47 μF
					≤5%	0201 \geq 0.01 μF ;1210 \geq 3.3 μF
					≤10%	0402 \geq 0.012 μF ;0603 $>$ 0.1 μF ; 0805/X7R $>$ 0.47 μF ; 1206 \geq 2.2 μF ;1210 \geq 10 μF
			35V	≤3.5%	≤10%	0603 \geq 1 μF ;0805 \geq 2.2 μF ;1206 \geq 2.2 μF ;1210 \geq 10 μF
			25V	≤3.5%	≤5%	0201 \geq 0.01 μF ;0805 \geq 1 μF ;1210 \geq 10 μF
					≤7%	0603 \geq 0.33 μF
					≤10%	0201 \geq 0.1 μF ; 0402 \geq 0.056 μF ;0603 \geq 0.47 μF ; 0805 \geq 2.2 μF ;1206 \geq 4.7 μF ;1210 \geq 22 μF
					≤12.5%	0402 \geq 0.47 μF
			16V	≤3.5%	≤5%	0603 \geq 0.15 μF ;0805 \geq 0.68 μF ;1206 \geq 2.2 μF ;1210 \geq 4.7 μF
≤10%	0201 \geq 0.022 μF ;0402 \geq 0.033 μF ; 0603 $>$ 0.47 μF ;0805 \geq 2.2 μF ;1206 \geq 4.7 μF ;1210 \geq 22 μF					
10V	≤5%	≤10%	0201 \geq 0.012 μF ;0402 \geq 0.22 μF ; 0603 \geq 0.33 μF ;0805 \geq 2.2 μF ;1206 \geq 2.2 μF ;1210 \geq 22 μF			
		≤15%	0201 \geq 0.1 μF ;0402 \geq 1 μF			
6.3V	≤10%	≤15%	0201 \geq 0.1 μF ;0402 \geq 1 μF ;0603 \geq 10 μF ; 0805 \geq 4.7 μF ;1206 \geq 47 μF ;1210 \geq 100 μF			
		≤20%	0402 \geq 2.2 μF			
4V	≤15%	---	---			

* I.R.: 10GΩ or RxC500Ω-F whichever is smaller.
Class II (X7R)

X5R:

No	Item	Test Condition	Requirements																																																								
3	Q/ D.F. (Dissipation Factor)	<p>*Test temp.: Room Temperature. *Class I: (NP0) $\leq 1000\text{pF}$, $1 \pm 0.2\text{Vrms}$, $1\text{MHz} \pm 10\%$ $> 1000\text{pF}$, $1 \pm 0.2\text{Vrms}$, $1\text{KHz} \pm 10\%$ Class II: (X7R, X7E, X6S, X5R, X7S, Y5V) $C \leq 10\mu\text{F}$, $1 \pm 0.2\text{Vrms}$, $1\text{KHz} \pm 10\%$ ** $C > 10\mu\text{F}$, $0.5 \pm 0.2\text{Vrms}$, $120\text{Hz} \pm 20\%$</p> <p>** Test condition: $0.5 \pm 0.2\text{Vrms}$, $1\text{KHz} \pm 10\%$ X7R: 0805=106(6.3V), 0603/475(6.3V) X5R: 0201\geq224 (6.3V,10V,16V)#1, 0402\geq475 (6.3V,16V), 0402\geq225(10V), 0603=106 (6.3V) TT18X\geq475(10V) , TT15X series X6S: 0201/474(4V),0201>104 (6.3V,10V), 0402\geq225 (6.3V), 0402/475 (10V), 0603/106 (6.3V), X7S: 0402/225(6.3V)</p> <p>#1 Excluding X5R/0201/105(6.3V);225(10V) , 0402X475M6R3 ($1.0 \pm 0.2\text{Vrms}$, $1\text{KHz} \pm 10\%$) *Before initial measurement (Class II only): To apply de-aging at 150°C for 1hr then set for 24 ± 2 hrs at room temp.</p>	<p>* Shall not exceed the limits given in the detailed spec.</p> <p>NP0: $\text{Cap} \geq 30\text{pF}$, $Q \geq 1000$; $\text{Cap} < 30\text{pF}$, $Q \geq 400 + 20C$ X7R:</p> <table border="1"> <thead> <tr> <th>Rated vol.</th> <th>D.F.≤</th> <th colspan="2">Exception of D.F.≤</th> </tr> </thead> <tbody> <tr> <td rowspan="3">≥ 100V</td> <td rowspan="3">≤2.5%</td> <td>≤3%</td> <td>1206\geq0.47μF</td> </tr> <tr> <td>≤5%</td> <td>0603\geq0.068μF;0805$>$0.1μF;1206\geq1μF;1210\geq2.2μF</td> </tr> <tr> <td>≤10%</td> <td>0805$>$0.22μF;1210\geq3.3μF</td> </tr> <tr> <td rowspan="3">50V</td> <td rowspan="3">≤2.5%</td> <td>≤3%</td> <td>0201(50V);0603\geq0.047μF;0805\geq0.18μF;1206\geq0.47μF</td> </tr> <tr> <td>≤5%</td> <td>0201\geq0.01μF;1210\geq3.3μF</td> </tr> <tr> <td>≤10%</td> <td>0402\geq0.012μF;0603$>$0.1μF; 0805/X7R$>$0.47μF; 1206\geq2.2μF;1210\geq10μF</td> </tr> <tr> <td>35V</td> <td>≤3.5%</td> <td>≤10%</td> <td>0603\geq1μF;0805\geq2.2μF;1206\geq2.2μF;1210\geq10μF</td> </tr> <tr> <td rowspan="4">25V</td> <td rowspan="4">≤3.5%</td> <td>≤5%</td> <td>0201\geq0.01μF;0805\geq1μF;1210\geq10μF</td> </tr> <tr> <td>≤7%</td> <td>0603\geq0.33μF</td> </tr> <tr> <td>≤10%</td> <td>0201\geq0.1μF; 0402\geq0.056μF;0603\geq0.47μF; 0805\geq2.2μF;1206\geq4.7μF;1210\geq22μF</td> </tr> <tr> <td>≤12.5%</td> <td>0402\geq0.47μF</td> </tr> <tr> <td rowspan="2">16V</td> <td rowspan="2">≤3.5%</td> <td>≤5%</td> <td>0603\geq0.15μF;0805\geq0.68μF;1206\geq2.2μF;1210\geq4.7μF</td> </tr> <tr> <td>≤10%</td> <td>0201\geq0.022μF;0402\geq0.033μF; 0603$>$0.47μF;0805\geq2.2μF;1206\geq4.7μF;1210\geq22μF</td> </tr> <tr> <td rowspan="2">10V</td> <td rowspan="2">≤5%</td> <td>≤10%</td> <td>0201\geq0.012μF;0402\geq0.22μF; 0603\geq0.33μF;0805\geq2.2μF;1206\geq2.2μF;1210\geq22μF</td> </tr> <tr> <td>≤15%</td> <td>0201\geq0.1μF;0402\geq1μF</td> </tr> <tr> <td rowspan="2">6.3V</td> <td rowspan="2">≤10%</td> <td>≤15%</td> <td>0201\geq0.1μF;0402\geq1μF;0603\geq10μF; 0805\geq4.7μF;1206\geq4.7μF;1210\geq100μF</td> </tr> <tr> <td>≤20%</td> <td>0402\geq2.2μF</td> </tr> <tr> <td>4V</td> <td>≤15%</td> <td>---</td> <td>---</td> </tr> </tbody> </table> <p>* I.R.: 10GΩ or RxC500Ω-F whichever is smaller. Class II (X7R)</p>	Rated vol.	D.F.≤	Exception of D.F.≤		≥ 100V	≤2.5%	≤3%	1206 \geq 0.47 μF	≤5%	0603 \geq 0.068 μF ;0805 $>$ 0.1 μF ;1206 \geq 1 μF ;1210 \geq 2.2 μF	≤10%	0805 $>$ 0.22 μF ;1210 \geq 3.3 μF	50V	≤2.5%	≤3%	0201(50V);0603 \geq 0.047 μF ;0805 \geq 0.18 μF ;1206 \geq 0.47 μF	≤5%	0201 \geq 0.01 μF ;1210 \geq 3.3 μF	≤10%	0402 \geq 0.012 μF ;0603 $>$ 0.1 μF ; 0805/X7R $>$ 0.47 μF ; 1206 \geq 2.2 μF ;1210 \geq 10 μF	35V	≤3.5%	≤10%	0603 \geq 1 μF ;0805 \geq 2.2 μF ;1206 \geq 2.2 μF ;1210 \geq 10 μF	25V	≤3.5%	≤5%	0201 \geq 0.01 μF ;0805 \geq 1 μF ;1210 \geq 10 μF	≤7%	0603 \geq 0.33 μF	≤10%	0201 \geq 0.1 μF ; 0402 \geq 0.056 μF ;0603 \geq 0.47 μF ; 0805 \geq 2.2 μF ;1206 \geq 4.7 μF ;1210 \geq 22 μF	≤12.5%	0402 \geq 0.47 μF	16V	≤3.5%	≤5%	0603 \geq 0.15 μF ;0805 \geq 0.68 μF ;1206 \geq 2.2 μF ;1210 \geq 4.7 μF	≤10%	0201 \geq 0.022 μF ;0402 \geq 0.033 μF ; 0603 $>$ 0.47 μF ;0805 \geq 2.2 μF ;1206 \geq 4.7 μF ;1210 \geq 22 μF	10V	≤5%	≤10%	0201 \geq 0.012 μF ;0402 \geq 0.22 μF ; 0603 \geq 0.33 μF ;0805 \geq 2.2 μF ;1206 \geq 2.2 μF ;1210 \geq 22 μF	≤15%	0201 \geq 0.1 μF ;0402 \geq 1 μF	6.3V	≤10%	≤15%	0201 \geq 0.1 μF ;0402 \geq 1 μF ;0603 \geq 10 μF ; 0805 \geq 4.7 μF ;1206 \geq 4.7 μF ;1210 \geq 100 μF	≤20%	0402 \geq 2.2 μF	4V	≤15%	---	---
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5.	Insulation Resistance	*Test temp.: Room Temperature. *To apply rated voltage for MAX. 120sec.	10G or $RxC \geq 500\text{-F}$ whichever is smaller. Class II (X7R, X7E, X5R, X6S, X7S, Y5V:)												
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No	Item	Test Condition	Requirements		
6.	Temperature Coefficient	With no electrical load.			
		T.C.	Operating Temp	T.C.	Capacitance Change
		NPO	55~125°C at 25°C	NPO	Within ±30ppm/°C
		X7R	-55~125°C at 25°C	X7R	Within ±15%
		X7S	-55 ~ 125°C at 25°C	X7S	Within ±22%
		X5R	-55~ 85°C at 25°C	X5R	Within ±15%
		X6S	-55~105°C at 25°C	X6S	Within ±22%
		Y5V	-25~ 85°C at 20°C	Y5V	Within +30%/-80%
		01005		0201	
		Cap≤0.01µF: 0.5V		Cap<0.1µF:1V	
		Cap>0.01µF: 0.2V		0.1µF≤Cap<1µF: 0.2V*	
				Cap≥1µF: 0.1V*	
		*0201X104/6.3V~25V: 0.5V 0201X224/10V: 0.5V		*0201S104/6.3V~16V: 0.3V 0201S224/6.3V: 0.3V 0201X105/6.3V&10V: 0.3V	
		0402		0603	
		Cap<1µF: 1V		Cap<1µF: 1V	
		Cap=1µF: 0.5V** 0402B224-16V: 0.5V 0402B474-10V: 0.5V 0402X475M6R3: 0.5V		1µF≤Cap≤4.7µF: 0.5V	
		1µF<Cap<10µF: 0.2V **0402B105M6R3V: 0.2V		Cap>4.7µF: 0.2V	
Cap≥10µF: 0.1V					
0805		1206/1210			
Cap<10µF: 1V		Cap≤10µF: 1V			
Cap=10µF: 0.5V 0805B475/6.3V~25V: 0.5V		10µF<Cap≤100µF: 0.5V			
Cap>10µF: 0.2V		Cap>100µF: 0.2V			
7.	Adhesive Strength of Termination	* Pressurizing force: 2N (0201) and 5N (≤0603) and 10N (>0603) * Test time: 10±1 sec.	* No remarkable damage or removal of the terminations.		
8.	Vibration Resistance	* Vibration frequency: 10~55 Hz/min. * Total amplitude: 1.5mm * Test time: 6 hrs. (Two hrs each in three mutually* perpendicular directions.) *Before initial measurement (Class II only): To apply de-aging at 150°C for 1hr then set for 24± 2 hrs at room temp. *Cap./DF(Q) Measurement to be made after de-aging at 150°C for 1hr then set for 24±2 hrs at room temp.	* No remarkable damage. * Cap change and Q/D.F.: To meet initial spec.		

No	Item	Test Condition	Requirements															
9.	Solderability	* Solder temperature: 235±5°C * Dipping time: 2±0.5 sec.	95% min. coverage of all metalized area.															
10.	Bending Test	* The middle part of substrate shall be pressurized by means of the pressurizing rod at a rate of about 1 mm per second until the deflection becomes 1 mm and then the pressure shall be maintained for 5±1 sec. *Before initial measurement (Class II only): To apply de-aging at 150°C for 1hr then set for 24± 2 hrs at room temp. * Measurement to be made after keeping at room temp. for 24±2 hrs.	* No remarkable damage. * Cap change: NP0: within ±5% or 0.5pF whichever is larger X7R, X5R, X6S, X7S: within ±12.5% Y5V: within ±30% (This capacitance change means the change of capacitance under specified flexure of substrate from the capacitance measured before the test.)															
11.	Resistance to Soldering Heat	* Solder temperature: 260±5°C * Dipping time: 10±1 sec * Preheating: 120 to 150°C for 1 minute before immerse the capacitor in a eutectic solder. *Before initial measurement (Class II only): To apply de-aging at 150°C for 1hr then set for 24±2 hrs at room temp. *Cap. / DF(Q) / I.R. Measurement to be made after de-aging at 150°C for 1hr then set for 24±2 hrs at room temp.	* No remarkable damage. * Cap change: NP0: within ±2.5% or 0.25pF whichever is larger X7R, X5R, X6S, X7S: within ±7.5% Y5V: within ±20% * Q/D.F., I.R. and dielectric strength: To meet initial requirements. * 25% max. leaching on each edge.															
12.	Temperature Cycle	* Conduct the five cycles according to the temperatures and time. <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>Step</th> <th>Temp. (°C)</th> <th>Time (min.)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Min. operating temp. +0/-3</td> <td>30± 3</td> </tr> <tr> <td>2</td> <td>Room temp.</td> <td>2~3</td> </tr> <tr> <td>3</td> <td>Max. operating temp. +3/-0</td> <td>30±3</td> </tr> <tr> <td>4</td> <td>Room temp.</td> <td>2~3</td> </tr> </tbody> </table> *Before initial measurement (Class II only): To apply de-aging at 150°C for 1hr then set for 24±2 hrs at room temp. * Cap. / DF(Q) / I.R. Measurement to be made after de-aging at 150°C for 1hr then set for 24±2 hrs at room temp.	Step	Temp. (°C)	Time (min.)	1	Min. operating temp. +0/-3	30± 3	2	Room temp.	2~3	3	Max. operating temp. +3/-0	30±3	4	Room temp.	2~3	* No remarkable damage. * Cap change: NP0: within ±2.5% or 0.25pF whichever is larger X7R, X5R, X6S, X7S: within ±7.5% Y5V: within ±20% * Q/D.F., I.R. and dielectric strength: To meet initial requirements.
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13.	Humidity (Damp Heat) Steady State	*Test temp.: 40±2°C *Humidity: 90~95%RH *Test time: 500+24/-0hrs. *Before initial measurement (Class II only): To apply de-aging at 150°C for 1hr then set for 24±2 hrs at room temp. * Cap. / DF(Q) / I.R. Measurement to be made after de-aging at 150°C for 1hr then set for 24±2 hrs at room temp.	* No remarkable damage. * Cap change: NP0: within ±5% or 0.5pF whichever is larger X7R, X5R, X6S, X7S: ≥10V**, within ±12.5%; ≤6.3V within ±25%; **10V: 0603≥4.7μF;0402≥1μF;0201≥0.1μF, within ±25%; Y5V: ≥10V, within ±30%; ≤6.3V, within +30/-40% * Q/D.F. value: NP0: More than 30pF Q≥350, 10pF≤C≤30pF, Q≥275+2.5C Less than 10pF Q200+10C X7R, X5R, X6S, X7S:																																																						
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14.	Humidity (Damp Heat) Load	<p>*Test temp.: 40±2°C *Humidity: 90~95%RH *Test time: 500+24/-0hrs. *To apply voltage: Rated voltage (MAX. 500V) *Before initial measurement (Class II only): To apply de-aging at 150°C for 1hr then set for 24±2 hrs at room temp. * Cap. / DF(Q) / I.R. Measurement to be made after de-aging at 150°C for 1hr then set for 24±2 hrs at room temp.</p>	<p>* No remarkable damage. * Cap change: NP0: ±7.5% or 0.75pF whichever is larger. X7R, X5R, X6S, X7S: ≥10V**, within ±12.5%; ≤6.3V within ±25%; **10V: 0603≥4.7µF;0402≥1µF;0201≥0.1µF, within ±25%; Y5V: ≥10V, within ±30%; ≤6.3V, within +30/-40% * Q/D.F. value: NP0: C≥30pF,Q≥200;C<30pF, Q≥100+10/3C X7R, X5R, X6S, X7S:</p> <table border="1"> <thead> <tr> <th>Rated vol.</th> <th>D.F.≤</th> <th colspan="2">Exception of D.F.≤</th> </tr> </thead> <tbody> <tr> <td rowspan="3">≥ 100V</td> <td rowspan="3">≤3%</td> <td>≤6%</td> <td>1206≥0.47µF</td> </tr> <tr> <td>≤7.5%</td> <td>0603≥0.068µF;0805>0.1µF;1206≥1µF;1210≥2.2µF</td> </tr> <tr> <td>≤20%</td> <td>0805>0.22µF;1210≥3.3µF</td> </tr> <tr> <td rowspan="3">50V</td> <td rowspan="3">≤3%</td> <td>≤6%</td> <td>0201(50V);0603≥0.047µF;0805≥0.18µF;1206≥0.47µF</td> </tr> <tr> <td>≤10%</td> <td>0201≥0.01µF;1210≥3.3µF</td> </tr> <tr> <td>≤20%</td> <td>0402≥0.012µF;0603>0.1µF; 0805/X7R>0.47µF; 1206≥2.2µF;1210≥10µF</td> </tr> <tr> <td>35V</td> <td>≤5%</td> <td>≤20%</td> <td>0603≥1µF;0805≥2.2µF;1206≥2.2µF;1210≥10µF</td> </tr> <tr> <td rowspan="4">25V</td> <td rowspan="4">≤5%</td> <td>≤10%</td> <td>0201≥0.01µF;0805≥1µF;1210≥10µF</td> </tr> <tr> <td>≤14%</td> <td>0603≥0.33µF</td> </tr> <tr> <td>≤15%</td> <td>0201≥0.1µF; 0402≥0.056µF;0603≥0.47µF; 0805≥2.2µF;1206≥4.7µF;1210≥22µF</td> </tr> <tr> <td>≤20%</td> <td>0402≥0.47µF</td> </tr> <tr> <td rowspan="2">16V</td> <td rowspan="2">≤5%</td> <td>≤10%</td> <td>0603≥0.15µF;0805≥0.68µF;1206≥2.2µF;1210≥4.7µF</td> </tr> <tr> <td>≤15%</td> <td>0201≥0.022µF;0402≥0.033µF; 0603>0.47µF;0805≥2.2µF;1206≥4.7µF;1210≥22µF</td> </tr> <tr> <td rowspan="2">10V</td> <td rowspan="2">≤7.5%</td> <td>≤15%</td> <td>0201≥0.012µF;0402≥0.22µF; 0603≥0.33µF;0805≥2.2µF;1206≥2.2µF;1210≥22µF</td> </tr> <tr> <td>≤20%</td> <td>0201≥0.1µF;0402≥1µF</td> </tr> <tr> <td>6.3V</td> <td>≤15%</td> <td>≤30%</td> <td>0201≥0.1µF;0402≥1µF(0402/X6S≥0.47µF); 0603≥10µF;0805≥4.7µF;1206≥47µF;1210≥100µF</td> </tr> <tr> <td>4V</td> <td>≤20%</td> <td>---</td> <td>---</td> </tr> </tbody> </table> <p>*I.R.: 10V, 500M or 25 -F whichever is smaller. Class II (X7R, X5R, X6S, X7S, Y5V)</p> <table border="1"> <thead> <tr> <th>Rated voltage</th> <th>Insulation Resistance</th> </tr> </thead> <tbody> <tr> <td>100V: All X7R;1210≥3.3µF</td> <td rowspan="7">500MΩor RxC≥5Ω-F whichever is smaller.</td> </tr> <tr> <td>50V: 0402>0.01µF;0603≥1µF;0805≥1µF;12064.7µF;1210≥4.7µF</td> </tr> <tr> <td>35V:0603≥1µF;0805≥2.2µF; 1206≥2.2µF;1210≥10µF</td> </tr> <tr> <td>25V:0201≥0.1µF; 0402≥0.22µF; 0603≥2.2µF;0805≥2.2µF; 1206≥10µF;1210≥10µF</td> </tr> <tr> <td>16V: 0201≥0.1µF;0402≥0.22µF;0603≥1µF;0805≥2.2µF; 1206≥10µF;1210≥47µF</td> </tr> <tr> <td>10V:0201≥47nF;0402≥0.47µF;0603≥0.47µF;0805≥2.2µF; 1206≥4.7µF;1210≥47µF</td> </tr> <tr> <td>6.3V ; 4V ; All X6S/X7S items; Size≥1812</td> </tr> </tbody> </table>	Rated vol.	D.F.≤	Exception of D.F.≤		≥ 100V	≤3%	≤6%	1206≥0.47µF	≤7.5%	0603≥0.068µF;0805>0.1µF;1206≥1µF;1210≥2.2µF	≤20%	0805>0.22µF;1210≥3.3µF	50V	≤3%	≤6%	0201(50V);0603≥0.047µF;0805≥0.18µF;1206≥0.47µF	≤10%	0201≥0.01µF;1210≥3.3µF	≤20%	0402≥0.012µF;0603>0.1µF; 0805/X7R>0.47µF; 1206≥2.2µF;1210≥10µF	35V	≤5%	≤20%	0603≥1µF;0805≥2.2µF;1206≥2.2µF;1210≥10µF	25V	≤5%	≤10%	0201≥0.01µF;0805≥1µF;1210≥10µF	≤14%	0603≥0.33µF	≤15%	0201≥0.1µF; 0402≥0.056µF;0603≥0.47µF; 0805≥2.2µF;1206≥4.7µF;1210≥22µF	≤20%	0402≥0.47µF	16V	≤5%	≤10%	0603≥0.15µF;0805≥0.68µF;1206≥2.2µF;1210≥4.7µF	≤15%	0201≥0.022µF;0402≥0.033µF; 0603>0.47µF;0805≥2.2µF;1206≥4.7µF;1210≥22µF	10V	≤7.5%	≤15%	0201≥0.012µF;0402≥0.22µF; 0603≥0.33µF;0805≥2.2µF;1206≥2.2µF;1210≥22µF	≤20%	0201≥0.1µF;0402≥1µF	6.3V	≤15%	≤30%	0201≥0.1µF;0402≥1µF(0402/X6S≥0.47µF); 0603≥10µF;0805≥4.7µF;1206≥47µF;1210≥100µF	4V	≤20%	---	---	Rated voltage	Insulation Resistance	100V: All X7R;1210≥3.3µF	500MΩor RxC≥5Ω-F whichever is smaller.	50V: 0402>0.01µF;0603≥1µF;0805≥1µF;12064.7µF;1210≥4.7µF	35V:0603≥1µF;0805≥2.2µF; 1206≥2.2µF;1210≥10µF	25V:0201≥0.1µF; 0402≥0.22µF; 0603≥2.2µF;0805≥2.2µF; 1206≥10µF;1210≥10µF	16V: 0201≥0.1µF;0402≥0.22µF;0603≥1µF;0805≥2.2µF; 1206≥10µF;1210≥47µF	10V:0201≥47nF;0402≥0.47µF;0603≥0.47µF;0805≥2.2µF; 1206≥4.7µF;1210≥47µF	6.3V ; 4V ; All X6S/X7S items; Size≥1812
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General Purpose Multilayer Ceramic Capacitors
4 to 100V (NPO, X7R, Y5V, X6S, X7S & X5R Dielectrics)



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15.	High Temperature Load (Endurance)	*Test temp.: NPO, X7R/X7E/X7S: 125±3°C X6S: 105±3°C X5R, Y5V: 85±3°C *Test time: 1000+24/-0 hrs. *To apply voltage: (1) 100% of rated voltage for below range.	* No remarkable damage. Cap change: NPO: ±3.0% or ±0.3pF whichever is larger X7R, X5R, X6S, X7S: ≥10V**, within ±12.5%; ≤6.3V within ±25%; **10V: 0603≥4.7µF;0402≥1µF;0201≥0.1µF, within ±25% Y5V: ≥10V, within ±30%; ≤6.3V, within +30/-40% Q/D.F. value: NPO: More than 30pF, Q≥350 10pF≤C<30pF, Q≥275+2.5C Less than 10pF, Q≥200+10C X7R, X5R, X6S, X7S:																																																																																																																											
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			X7R/X7S	16V,25V	C≥10µF																																																																																																																									
			X5R	16V,25V	C≥22µF																																																																																																																									
		1206	X5R/X7R/ X6S	≤6.3V	C≥47µF																																																																																																																									
		1210	X5R/X7R/ X6S	16V	C≥47µF																																																																																																																									
				X7R	100V	C≥3.3µF																																																																																																																								
		Rated vol.	D.F.≤	Exception of D.F.≤																																																																																																																										
≥ 100V	≤3%	≤6%	1206≥0.47µF																																																																																																																											
		≤7.5%	0603≥0.068µF;0805>0.1µF;1206≥1µF;1210≥2.2µF																																																																																																																											
		≤20%	0805>0.22µF;1210≥3.3µF																																																																																																																											
50V	≤3%	≤6%	0201(50V);0603≥0.047µF;0805≥0.18µF;1206≥0.47µF																																																																																																																											
		≤10%	0201≥0.01µF;1210≥3.3µF																																																																																																																											
		≤20%	0402≥0.012µF;0603>0.1µF; 0805/X7R>0.47µF; 1206≥2.2µF;1210≥10µF																																																																																																																											
35V	≤5%	≤20%	0603≥1µF;0805≥2.2µF;1206≥2.2µF;1210≥10µF																																																																																																																											
25V	≤5%	≤10%	0201≥0.01µF;0805≥1µF;1210≥10µF																																																																																																																											
		≤14%	0603≥0.33µF																																																																																																																											
		≤15%	0201≥0.1µF; 0402≥0.056µF;0603≥0.47µF; 0805≥2.2µF;1206≥4.7µF;1210≥22µF																																																																																																																											
		≤20%	0402≥0.47µF																																																																																																																											
16V	≤5%	≤10%	0603≥0.15µF;0805≥0.68µF;1206≥2.2µF;1210≥4.7µF																																																																																																																											
		≤15%	0201≥0.022µF;0402≥0.033µF; 0603>0.47µF;0805≥2.2µF;1206≥4.7µF;1210≥22µF																																																																																																																											
10V	≤7.5%	≤15%	0201≥0.012µF;0402≥0.22µF; 0603≥0.33µF;0805≥2.2µF;1206≥2.2µF;1210≥22µF																																																																																																																											
		≤20%	0201≥0.1µF;0402≥1µF																																																																																																																											
6.3V	≤15%	≤30%	0201≥0.1µF;0402≥1µF(0402/X6S≥0.47µF); 0603≥10µF;0805≥4.7µF;1206≥47µF;1210≥100µF																																																																																																																											
4V	≤20%	---	---																																																																																																																											
		**1WV items must follow de-rating conditions. (2) 150% of rated voltage for below range.	*1.R.: 10V, 1GΩ or 50Ω-F whichever is smaller. Class II (X7R, X5R, X6S, X7S, Y5V)																																																																																																																											
			<table border="1"> <thead> <tr> <th>Rated voltage</th> <th>Insulation Resistance</th> </tr> </thead> <tbody> <tr> <td>100V: All X7R;1210≥3.3µF</td> <td rowspan="7">1GΩor RxC≥10Ω-F whichever is smaller.</td> </tr> <tr> <td>50V: 0402>0.01µF;0603≥1µF;0805≥1µF;12064.7µF;1210≥4.7µF</td> </tr> <tr> <td>35V:0603≥1µF;0805≥2.2µF; 1206≥2.2µF;1210≥10µF</td> </tr> <tr> <td>25V:0201≥0.1µF; 0402≥0.22µF; 0603≥2.2µF;0805≥2.2µF; 1206≥10µF;1210≥10µF</td> </tr> <tr> <td>16V: 0201≥0.1µF;0402≥0.22µF;0603≥1µF;0805≥2.2µF; 1206≥10µF;1210≥47µF</td> </tr> <tr> <td>10V:0201≥47nF;0402≥0.47µF;0603≥0.47µF;0805≥2.2µF; 1206≥4.7µF;1210≥47µF</td> </tr> <tr> <td>6.3V ; 4V ; All X6S/X7S items; Size≥1812</td> </tr> </tbody> </table>	Rated voltage	Insulation Resistance	100V: All X7R;1210≥3.3µF	1GΩor RxC≥10Ω-F whichever is smaller.	50V: 0402>0.01µF;0603≥1µF;0805≥1µF;12064.7µF;1210≥4.7µF	35V:0603≥1µF;0805≥2.2µF; 1206≥2.2µF;1210≥10µF	25V:0201≥0.1µF; 0402≥0.22µF; 0603≥2.2µF;0805≥2.2µF; 1206≥10µF;1210≥10µF	16V: 0201≥0.1µF;0402≥0.22µF;0603≥1µF;0805≥2.2µF; 1206≥10µF;1210≥47µF	10V:0201≥47nF;0402≥0.47µF;0603≥0.47µF;0805≥2.2µF; 1206≥4.7µF;1210≥47µF	6.3V ; 4V ; All X6S/X7S items; Size≥1812																																																																																																																	
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General Purpose Multilayer Ceramic Capacitors
4 to 100V (NPO, X7R, Y5V, X6S, X7S & X5R Dielectrics)



No	Item	Test Condition				Requirements
		Size	Dielectric	Rated voltage	Capacitance	
15.	High Temperature Load (Endurance)	0201	X5R/X6S	6V,25V	C=0.1μF	
			X7R	16V	C≥0.022μF	
		0402	X7R/X5R/ X6S	50V	C>0.01μF	
				10~25V	C≥0.22μF	
			Y5V	16V	C≥0.47μF	
		0603	X7S	50V~100V	C>0.22μF	
				50V	C>0.1μF	
			X7R	25V	C=1.0μF	
				50V	C≥1.0μF	
			X5R/X7R/ X6S/X7S	10V,16V	C≥1.0μF	
				Y5V	16V	C≥2.2μF
		0805	X5R/X7R/ X6S/X7S	100V	C≥0.47μF	
				50V	C≥0.68μF	
				35V	C≥2.2μF	
				10~25V	C≥4.7μF	
			Y5V	16V	C≥4.7μF	
		1206	X7R	100V	C≥1.0μF	
				50V	C≥2.2μF	
			X5R/X6S/ X7S	100V	C>1.0μF	
				50V	C=4.7μF	
		1210	X5R/X7R/ X6S/X7S	50V~100V	C≥2.2μF	

(3) 6.3V or C 10μF :150% of rated voltage.
(4) 10V Ur < 500V: 200% of rated voltage.
(5) 500V: 150% of rated voltage.
(6) Ur 630V: 120% of rated voltage

* Before initial measurement (Class II only): To apply de-aging at 150°C for 1hr then set for 24±2 hrs at room temp.
* Cap. / DF(Q) / I.R. Measurement to be made after de-aging at 150°C for 1hr then set for 24±2 hrs at room temp.
** De-rating conditions:

* "Room condition" Temperature: 15 to 35°C, Relative humidity: 25 to 75%, Atmospheric pressure: 86 to 106kPa.

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APPENDICES

Tape & reel dimensions

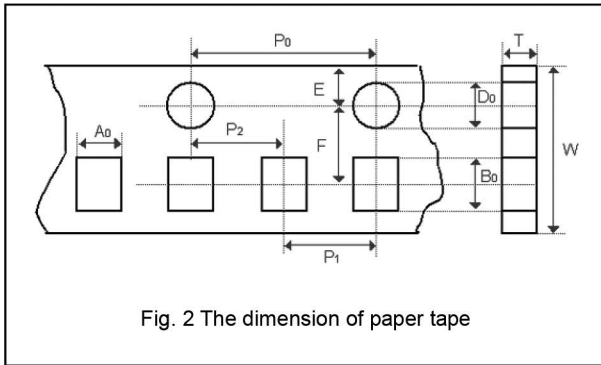


Fig. 2 The dimension of paper tape

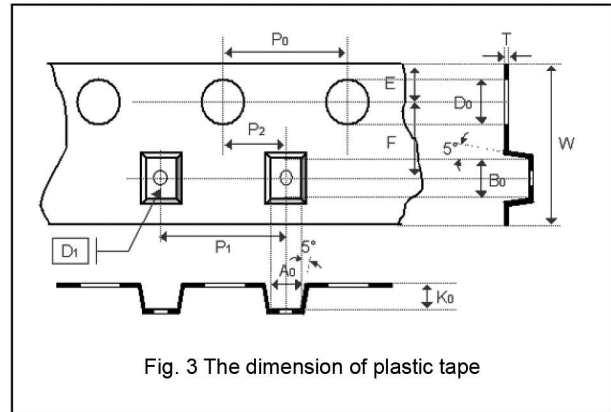


Fig. 3 The dimension of plastic tape

Size	0201	0402	0603	0805			1206			1210			
Thickness	L	N,E	S,H,X	A,H	B,T	D,I	B,T	C,J,D	G,P	T	C,D	G,K	M
A0	0.4 +/-0.1	0.7 +/-0.2	1.05 +/-0.3	1.5 +/-0.2	1.5 +/-0.2	< 1.8	1.9 +/-0.5	< 2	<2.3	< 3.05	< 3.05	< 3.05	< 3.2
B0	0.7 +/-0.1	1.2 +/-0.2	1.8 +/-0.3	2.3 +/-0.2	2.3 +/-0.2	< 2.7	3.5 +/-0.5	< 3.7	< 4	< 3.8	< 3.8	< 3.8	<4
T	≤0.55	≤0.8	≤1.2	≤1.15	≤1.2	0.23 +/-0.1	≤1.2	0.23 +/-0.1	0.23 +/-0.1	0.23 +/-0.1	0.23 +/-0.1	0.23 +/-0.1	0.23 +/-0.1
K0	-	-	-	-	-	< 2	-	< 2	< 2.5	< 1.5	< 2	< 2.5	< 3.2
W	8 +/-0.3	8 +/-0.3	8 +/-0.3	8 +/-0.3	8 +/-0.3	8 +/-0.3	8 +/-0.3	8 +/-0.3	8 +/-0.3	8 +/-0.3	8 +/-0.3	8 +/-0.3	8 +/-0.3
P0	4 +/-0.1	4 +/-0.1	4 +/-0.1	4 +/-0.1	4 +/-0.1	4 +/-0.1	4 +/-0.1	4 +/-0.1	4 +/-0.1	4 +/-0.1	4 +/-0.1	4 +/-0.1	4 +/-0.1
10xP0	40 +/-0.1	40 +/-0.1	40 +/-0.2	40 +/-0.2	40 +/-0.2	40 +/-0.2	40 +/-0.2	40 +/-0.2	40 +/-0.2	40 +/-0.2	40 +/-0.2	40 +/-0.2	40 +/-0.2
P1	2 +/-0.05	2 +/-0.05	4 +/-0.1	4 +/-0.1	4 +/-0.1	4 +/-0.1	4 +/-0.1	4 +/-0.1	4 +/-0.1	4 +/-0.1	4 +/-0.1	4 +/-0.1	4 +/-0.1
P2	2 +/-0.05	2 +/-0.05	2 +/-0.05	2 +/-0.05	2 +/-0.05	2 +/-0.05	2 +/-0.05	2 +/-0.05	2 +/-0.05	2 +/-0.05	2 +/-0.05	2 +/-0.05	2 +/-0.05
D0	1.5 +0.1/-0	1.5 +0.1/-0	1.5 +0.1/-0	1.5 +0.1/-0	1.5 +0.1/-0	1.5 +0.1/-0	1.5 +0.1/-0	1.5 +0.1/-0	1.5 +0.1/-0	1.5 +0.1/-0	1.5 +0.1/-0	1.5 +0.1/-0	1.5 +0.1/-0
D1	-	-	-	-	-	1 +/-0.10	-	1 +/-0.1	1 +/-0.1	1 +/-0.1	1 +/-0.1	1 +/-0.1	1 +/-0.1
E	1.75 +/-0.1	1.75 +/-0.1	1.75 +/-0.1	1.75 +/-0.1	1.75 +/-0.1	1.75 +/-0.1	1.75 +/-0.1	1.75 +/-0.1	1.75 +/-0.1	1.75 +/-0.1	1.75 +/-0.1	1.75 +/-0.1	1.75 +/-0.1
F	3.5 +/-0.05	3.5 +/-0.05	3.5 +/-0.05	3.5 +/-0.05	3.5 +/-0.05	3.5 +/-0.05	3.5 +/-0.05	3.5 +/-0.05	3.5 +/-0.05	3.5 +/-0.05	3.5 +/-0.05	3.5 +/-0.05	3.5 +/-0.05

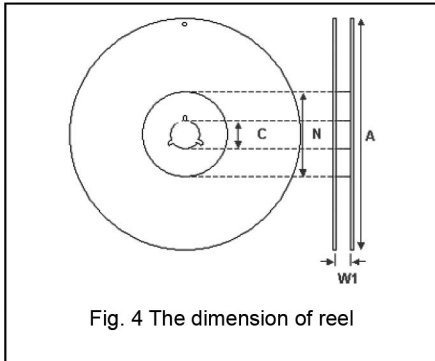
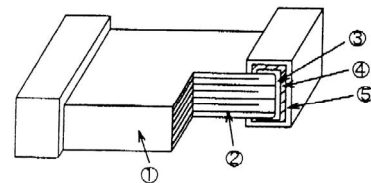


Fig. 4 The dimension of reel

Size	0402, 0603, 0805			
Reel size	7"	10"	13"	7"
C	13 ±0.5	13 ±0.5	13 ±0.5	13 ±0.5
W ₁	10 ±1.5	10 ±1.5	10 ±1.5	12.4 +2/-0
A	178 ±2	250 ±2	330 ±2	178 ±2
N	60 +1/-0	50 min	50 min	60+1.0/-0

Constructions

No.	Name	NPO	X7R
1	Ceramic material	CaZrO ₃ based	BaTiO ₃ based
2	Inner electrode	Ni	
3	Termination	Inner layer	Cu
4		Middle layer	Ni
5		Outer layer	Sn



The construction of MLCC

Application Notes

Storage and handling conditions

- (1) To store products at 5°C to 40°C ambient temperature and 20% to 70% related humidity conditions; MSL Level 1.
- (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. The corrosive gas reacts on the terminal electrodes of capacitors, and results in the poor solderability. Do not store the capacitors in the ambience of corrosive gas (e.g., hydrogen sulfide, sulfur dioxide, chlorine, ammonia gas etc.)
- b. In corrosive atmosphere, solderability might be degraded, and silver migration might occur to cause low reliability.
- c. Due to the dewing by rapid humidity change, or the photochemical change of the terminal electrode by direct sunlight, the solderability and electrical performance may deteriorate. Do not store capacitors under direct sunlight or dewing condition. To store products on the shelf and avoid exposure to moisture.

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.

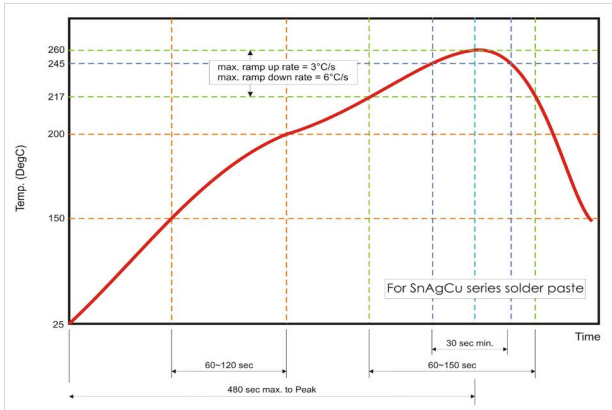


Fig. 6 Recommended reflow soldering profile for SMT process with SnAgCu series solder paste.

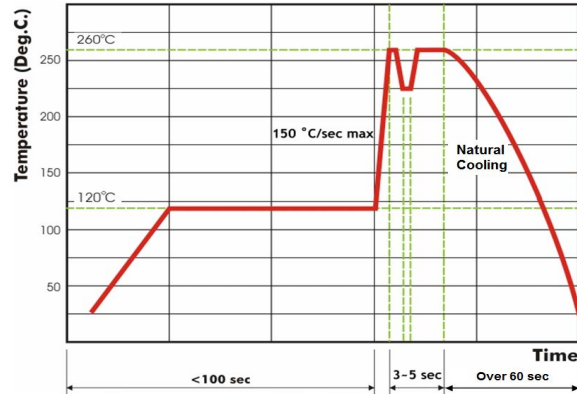
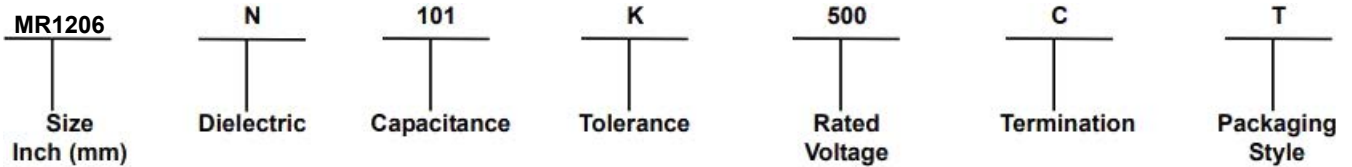


Fig. 7 Recommended wave soldering profile for SMT process with SnAgCu series solder.

Part Number Explanation



- Size : 0201 (0603), 0402 (1005), 0603 (1608), 0805 (2012), 1206 (3216), 1210 (3225)
- Dielectric : N = NP0 (C0G), B = X7R, F = Y5V X=X5R S=X6S and A=X7S
- Capacitance : Two significant digits followed by no. of zeros and R is in place of decimal point
 eg.:
 0R5 = 0.5 pF
 1R0 = 1 pF
 104 = 10 × 10⁴ = 100 nF
- Tolerance : A=±0.05pF, B=±0.1pF C = ±0.25 pF, D = ±0.5 pF, F = ±1%, J = ±5%, K = ±10%, M = ±20%, Z = -20 / +80%
- Rated voltage : Two significant digits followed by no. of zeros. And R is in place of decimal point
 4R0=4V DC
 6R3=6.3V DC
 100=10V DC
 160=16V DC
 250=25V DC
 500=50V DC
 101=100V DC
- Termination : C=Cu/Ni/Sn
- Packaging Style : T = 7" reeled G=13" reeled

Part Number Table

Description	Part Number
Capacitor, 0201, NPO, 36pF, 50V DC	MP0201N360J500CT
Capacitor, 0402, X7R, 18nF, 25V DC	MP0402B183K250CT
Capacitor, 0402, X7R, 2700pF, 50V DC	MP0402B272M500CT
Capacitor, 0402, X7R, 27nF, 16V DC	MP0402B273K160CT
Capacitor, 0402, X7R, 3nF, 50V DC	MP0402B302K500CT
Capacitor, 0402, NPO, 18pF, 50V DC	MP0402N180F500CT
Capacitor, 0402, NPO, 1.0pF, 50V DC	MP0402N1R0A500CT
Capacitor, 0402, X6S, 1uF, 6.3V DC	MP0402S105K6R3CT
Capacitor, 0402, X5R, 2.2uF, 6.3V DC	MP0402X225K6R3CT
Capacitor, 0402, X5R, 470nF, 16V DC	MP0402X474K160CT
Capacitor, 0603, X7R, 1nF, 250V DC	MP0603B102K251CT
Capacitor, 0603, X7R, 10nF, 50V DC	MP0603B103M500CT
Capacitor, 0603, X7R, 1uF, 10V DC	MP0603B105K100CT
Capacitor, 0603, X7R, 1uF, 25V DC	MP0603B105K250CT
Capacitor, 0603, X7R, 220nF, 10V DC	MP0603B224J100CT
Capacitor, 0603, X7R, 3300pF, 100V DC	MP0603B332K101CT
Capacitor, 0603, X7R, 330nF, 10V DC	MP0603B334K100CT
Capacitor, 0603, NPO, 100pF, 50V DC	MP0603N101F500CT
Capacitor, 0603, NPO, 100pF, 50V DC	MP0603N101G500CT
Capacitor, 0603, NPO, 100pF, 10V DC	MP0603N101K100CT
Capacitor, 0603, NPO, 120pF, 50V DC	MP0603N121G500CT
Capacitor, 0603, NPO, 13pF, 50V DC	MP0603N130J500CT
Capacitor, 0603, NPO, 150pF, 50V DC	MP0603N151G500CT
Capacitor, 0603, NPO, 150pF, 100V DC	MP0603N151J101CT
Capacitor, 0603, NPO, 180pF, 50V DC	MP0603N181G500CT
Capacitor, 0603, NPO, 220pF, 50V DC	MP0603N221G500CT
Capacitor, 0603, NPO, 27pF, 50V DC	MP0603N270F500CT
Capacitor, 0603, NPO, 330pF, 50V DC	MP0603N331G500CT
Capacitor, 0603, NPO, 470pF, 50V DC	MP0603N471G500CT
Capacitor, 0603, NPO, 51pF, 100V DC	MP0603N510J101CT
Capacitor, 0603, NPO, 56pF, 50V DC	MP0603N560G500CT
Capacitor, 0603, NPO, 68pF, 50V DC	MP0603N680F500CT
Capacitor, 0603, NPO, 6.8pF 0603, NPO, 6.8pF, +-0.1pF, 50V DC	MP0603N6R8B500CT
Capacitor, 0603, X5R, 1uF, 10V DC	MP0603X105M100CT
Capacitor, 0603, X5R, 1uF, 25V DC	MP0603X105M250CT
Capacitor, 0603, X5R, 10uF, 6.3V DC	MP0603X106K6R3CT
Capacitor, 0603, X5R, 2.2uF, 16V DC	MP0603X225K160CT
Capacitor, 0603, X5R, 4.7uF, 6.3V DC	MP0603X475M6R3CT

General Purpose Multilayer Ceramic Capacitors
4 to 100V (NPO, X7R, Y5V, X6S, X7S & X5R Dielectrics)



Description	Part Number
Capacitor, 0805, X7R, 1nF, 250V DC	MP0805B102K251CT
Capacitor, 0805, X7R, 100nF, 16V DC	MP0805B104J160CT
Capacitor, 0805, X7R, 1uF, 50V DC	MP0805B105K500CT
Capacitor, 0805, X7R, 10uF, 10V DC	MP0805B106K100CT
Capacitor, 0805, X7R, 2200pF, 250V DC	MP0805B222K251CT
Capacitor, 0805, X7R, 220nF, 16V DC	MP0805B224M160CT
Capacitor, 0805, X7R, 2.2uF, 16V DC	MP0805B225K160CT
Capacitor, 0805, X7R, 330nF, 100V DC	MP0805B334K101CT
Capacitor, 0805, X7R, 4.7uF, 25V DC	MP0805B475K250CT
Capacitor, 0805, X5R, 10uF, 25V DC	MP0805X106M250CT
Capacitor, 0805, X5R, 10uF, 6.3V DC	MP0805X106M6R3CT
Capacitor, 0805, X5R, 4.7uF, 16V DC	MP0805X475M160CT
Capacitor, 1206, X7R, 1uF, 25V DC	MP1206B105J250CT
Capacitor, 1206, X7R, 10uF, 6.3V DC	MP1206B106K6R3CT
Capacitor, 1206, X7R, 150nF, 100V DC	MP1206B154J101CT
Capacitor, 1206, X7R, 2.2uF, 50V DC	MP1206B225K500CT
Capacitor, 1206, NPO, 100nF, 25V DC	MP1206N104J250CT
Capacitor, 1206, X5R, 10uF, 50V DC	MP1206X106M500CT
Capacitor, 1206, X5R, 22uF, 25V DC	MP1206X226K250CT
Capacitor, 1206, X5R, 22uF, 16V DC	MP1206X226M160CT
Capacitor, 1206, X5R, 47uF, 6.3V DC	MP1206X476M6R3CT
Capacitor, 1210, X5R, 10uF, 16V DC	MP1210X106M160CT
Capacitor, 1210, X5R, 100uF, 10V DC	MP1210X107M100CT
Capacitor, 1210, X5R, 47uF, 6.3V DC	MP1210X476M6R3CT

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