ALTERNATION HISTORY RECORDS 变更记录

Date **日期**	**Version** **版本**	**Mark** **标记**	**Page** **页码**	**Description** **描述**	***Drafter*** **制定者**	***Approver*** **审批者**
2013-6-12	A	/	15	InitialIssue(首次发行)	汤勋	常斯琴

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. Aillen's MLCC is made by NPO(C0G),X7R,X5R and Y5V dielectric material and wihich provides product with high electrical precision,stability and reiliability.

2. FEATURES

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

3. APPLICATIONS

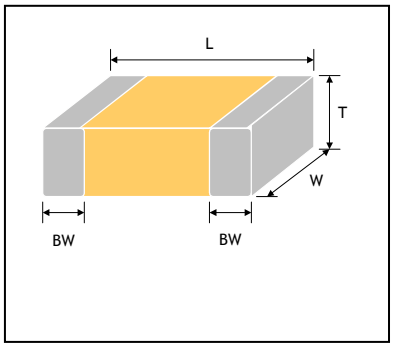
a. For general digital circuit.
b. For power supply bypass capacitors.
c. For consumer electronics.
d. For telecommunication.

4. HOW TO ORDER

1206	N	104	Z	500	C	D	-G
Size Inch (mm) **0201** (0603) **0402** (1005) **0603** (1608) **0805** (2012) **1206** (3216) **1210** (3225) **1812** (4532)	**Dielectric** **N**=NP0 (C0G) **B**=X7R **W**=X5R **Y**=Y5V	**Capacitance** 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	**Tolerance** **B**=±0.1pF **C**=±0.25pF **D**=±0.5pF **F**=±1% **G**=±2% **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. **100**=10 VDC **160**=16 VDC **250**=25 VDC **500**=50 VDC **101**=100 VDC	**Thickness** **A**=0.6 ±0.10mm **B**=0.8 ±0.10mm Reference to item 5 this page	**Packaging Q'TY** A=1kpcs/ reel B=2kpcs/ reel C=3kpcs/ reel D=4kpcs/ reel I=10kpcs/ reel E=15kpcs/ reel	**Suffix**

5. EXTERNAL DIMENSIONS

Size Inch (mm)	L (mm)	W (mm)	T (mm)/Symbol		Remark	BW (mm)
0201(0603)	0.6±0.09	0.3±0.09	0.3±0.09	L	#	0.15 +0.1/-0.05
0402 (1005)	1.00±0.05	0.50±0.2	0.50±0.2	N	#	0.25 +0.05/-0.10
0603 (1608)	1.60±0.10	0.80±0.10	0.80±0.1	S		0.40±0.15
	1.60 +0.15/-0.10	0.80±0.2	0.80±0.2	X		
0805 (2012)	2.00±0.15	1.25±0.10	0.60±0.10	A		0.50±0.20
			0.85±0.15	B		
			1.25±0.10	D	#	
	2.00±0.20	1.25±0.20	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		
			1.25±0.10	D	#	
	3.20±0.20		1.15±0.15	J	#	
		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	#	
	3.20±0.40	2.50±0.30	1.60±0.20	G	#	
			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	#	



6. GENERAL ELECTRICAL DATA

Dielectric	NP0	X7R	Y5V	X5R
Size	0201, 0402, 0603, 0805, 1206, 1210, 1812			
Capacitance range*	0.1pF to 0.1μF	100pF to 47 μF	10nF to 100 μF	100pF to 220μF
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%)	K (±10%), M(±20%)
Rated voltage (WVDC)	10V, 16V, 25V, 50V, 100V	6.3V, 10V, 16V, 25V, 50V, 100V		
DF(Tan δ)*	Cap<30pF: Q≥400+20C Cap≥30pF: Q≥1000	Note 1		
Operating temperature	-55 to +125°C		-25 to +85°C	-55 to +85°C
Capacitance characteristic	±30ppm	±15%	+30/-80%	±15%
Termination	Ni/Sn (lead-free termination)			

* 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/X5R: 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:

Rated vol.	D.F.≦	Exception of D.F. ≦	
≧100V	≦2.5%	≦3%	1206≧0.47μF
		≦5%	0603≧0.068μF;0805＞0.1μF;1206≧1μF;1210≧2.2μF;
		≦10%	0805＞0.22μF;1210≧3.3μF
50V	≦2.5%	≦3%	0201(50V); 0603≧0.047μF; 0805≧0.18μF;1206≧0.47μF
		≦5%	0201≧0.01uF; 1210≧4.7μF
		≦10%	0402≧0.012μF;0603>0.1μF; 0805/X7R>0.47μF; 1206≧2.2μF;1210≧10μF;
35V	≦3.5%	≦10%	0603≧1μF;0805≥2.2μF;1206≧2.2μF;1210≧10μF
25V	≦3.5%	≦5%	0201≧0.01μF;0805≧1μF;1210/X7R≧10μF
		≦7%	0603≧0.33μF
		≦10%	0201≧0.1μF;0402/X7R≧0.056μF;0603≧0.47μF; 0805≧2.2μF; 1206≧4.7μF;1210≧22μF;
		≦12.5%	0402≧0.47μF
16V	≦3.5%	≦5%	0201≧0.01μF;0402≧0.033μF;0603≧0.15μF; 0805≧0.68μF;1206≧2.2μF;1210≧4.7μF
		≦10%	0201/X7R≧0.022μF; 0402≧ 0.22uF; 0603>0.47μF;0805≧2.2μF;1206≧4.7μF; 1210≧22μF;
10V	≦5%	≦10%	0201≧0.012μF;0402≧0.22μF; 0603≧0.33μF; 0805≧2.2μF;1206≧2.2μF;1210≧22μF:01R5/X5R
		≦15%	0201≧0.1μF; 0402≧1μF
6.3V	≦10%	≦15%	0201≧0.1μF;0402≧1μF;0603≧10μF; 0805≧4.7μF; 1206≧47μF :1210≧100μF;
		≦20%	0402≧2.2μF
4V	≦15%	---	---

X5R:

Rated vol.	D.F.≦	Exception of D.F. ≦	
≧100V	≦2.5%	≦3%	1206≧0.47μF
		≦5%	0603≧0.068μF;0805＞0.1μF;1206≧1μF;1210≧2.2μF;
		≦10%	0805＞0.22μF;1210≧3.3μF
50V	≦2.5%	≦3%	0201(50V); 0603≧0.047μF; 0805≧0.18μF;1206≧0.47μF
		≦5%	0201≧0.01uF; 1210≧4.7μF
		≦10%	0402≧0.012μF;0603>0.1μF; 0805≧1μF; 1206≧2.2μF;1210≧10μF;
35V	≦3.5%	≦10%	0603≧1μF;0805≥2.2μF;1206≧2.2μF;1210≧10μF
25V	≦3.5%	≦5%	0201≧0.01μF;0805≧1μF;1210/X7R≧10μF
		≦7%	0603≧0.33μF
		≦10%	0201≧0.1μF;0402≧0.10μF;0603≧0.47μF; 0805≧2.2μF; 1206≧4.7μF; 1210/X5R≧10μF;
		≦12.5%	0402≧0.47μF
16V	≦3.5%	≦5%	0201≧0.01μF;0402≧0.033μF;0603≧0.15μF; 0805≧0.68μF;1206≧2.2μF;1210≧4.7μF
		≦10%	0201≧0.1uF; 0402≧ 0.22uF; 01R5/X5R 0603>0.47μF;0805≧2.2μF;1206≧4.7μF; 1210≧22μF;
10V	≦5%	≦10%	0201≧0.012μF;0402≧0.22μF; 0603≧0.33μF; 0805≧2.2μF;1206≧2.2μF;1210≧22μF :
		≦15%	0201≧0.1μF; 0402≧1μF
6.3V	≦10%	≦15%	0201≧0.1μF;0402≧1μF;0603≧10μF; 0805≧4.7μF; 1206≧47μF :1210≧100μF;
		≦20%	0402≧2.2μF
4V	≦15%	---	---

Y5V:

Rated vol.	D.F. ≦	Exception of D.F.≦	
≧50V	≦5%	≦7%	0603≧0.1μF; 0805≧0.47μF; 1206≧4.7μF;
		≦12.5%	1210≧6.8μF
35V	≦7%	---	---
25V	≦5%	≦7%	0402≧0.047μF;0603≧0.1μF; 0805≧0.33μF; 1206≧1μF; 1210≧4.7μF
		≦9%	0402≧0.068μF;0603≧0.47μF; 1206≧4.7μF; 1210≧22μF;
16V (C<1.0μF)	≦7%	≦9%	0402≧0.068μF; 0603≧0.68μF
		≦12.5%	0402≧0.22μF
16V (C≧1.0μF)	≦9%	≦12.5%	0603≧2.2μF; 0805≧3.3μF;1206≧10μF; 1210≧22μF; 1812≧47μF;
10V	≦12.5%	≦20%	0402≧0.47μF
6.3V	≦20%	---	---

7. CAPACITANCE RANGE (NP0 Dielectric)

7-1 0201, 0402, 0603, 0805 Sizes

DIELECTRIC		NP0																	
SIZE		0201			0402					0603					0805				
RATED VOLTAGE (VDC)		16	25	50	10	16	25	50	100	10	16	25	50	100	10	16	25	50	100
Capacitance	0.1pF (0R1)	L	L	L	N	N	N	N											
	0.2pF (0R2)	L	L	L	N	N	N	N											
	0.3pF (0R3)	L	L	L	N	N	N	N											
	0.4pF (0R4)	L	L	L	N	N	N	N											
	0.5pF (0R5)	L	L	L	N	N	N	N	N	S	S	S	S	S					
	0.6pF (0R6)	L	L	L	N	N	N	N	N	S	S	S	S	S					
	0.7pF (0R7)	L	L	L	N	N	N	N	N	S	S	S	S	S					
	0.8pF (0R8)	L	L	L	N	N	N	N	N	S	S	S	S	S					
	0.9pF (0R9)	L	L	L	N	N	N	N	N	S	S	S	S	S					
	1.0pF (1R0)	L	L	L	N	N	N	N	N	S	S	S	S	S					
	1.2pF (1R2)	L	L	L	N	N	N	N	N	S	S	S	S	S					
	1.5pF (1R5)	L	L	L	N	N	N	N	N	S	S	S	S	S					
	1.8pF (1R8)	L	L	L	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
	2.0pF (2R0)	L	L	L	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
	2.2pF (2R2)	L	L	L	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
	2.7pF (2R7)	L	L	L	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
	3.0pF (3R0)	L	L	L	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
	3.3pF (3R3)	L	L	L	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
	3.9pF (3R9)	L	L	L	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
	4.0pF (4R0)	L	L	L	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
	4.7pF (4R7)	L	L	L	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
	5.0pF (5R0)	L	L	L	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
	5.6pF (5R6)	L	L	L	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
	6.0pF (6R0)	L	L	L	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
	6.8pF (6R8)	L	L	L	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
	7.0pF (7R0)	L	L	L	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
	8.0pF (8R0)	L	L	L	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
	8.2pF (8R2)	L	L	L	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
	9.0pF (9R0)	L	L	L	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
	10pF (100)	L	L	L	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
	12pF (120)	L	L	L	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
	15pF (150)	L	L	L	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
	18pF (180)	L	L	L	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
	22pF (220)	L	L	L	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
	27pF (270)	L	L	L	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
	30pF (300)	L	L	L	N	N	N	N	N	S	S	S	S	S	A	A	A	A/B	A
	33pF (330)	L	L	L	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
	39pF (390)	L	L	L	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
	47pF (470)	L	L	L	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
	51pF (510)	L	L	L	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
	56pF (560)	L	L	L	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
	68pF (680)	L	L	L	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
	82pF (820)	L	L	L	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
	100pF (101)	L	L	L	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
	120pF (121)	L	L	L	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)				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)									X	X	X	X	X	B	B	B	B	B
	1,500pF (152)									X	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)									X	X	X	X		D	D	D	D	D
	4,700pF (472)									X	X	X	X		D	D	D	D	D
	5,600pF (562)									X	X	X	X		D	D	D	D	
	6,800pF (682)									X	X	X	X		D	D	D	D	
	8,200pF (822)									X	X	X	X		D	D	D	D	
	0.010μF (103)									X	X	X	X		D	D	D	D	
	0.012μF (123)														D	D			
	0.018μF (183)														D	D	D	D	
	0.022μF (223)														D	D	D	D	

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)	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	C	C	C	C	C	D	D	D
	15pF (150)	B	B	B	B	B	C	C	C	C	C	D	D	D
	18pF (180)	B	B	B	B	B	C	C	C	C	C	D	D	D
	22pF (220)	B	B	B	B	B	C	C	C	C	C	D	D	D
	27pF (270)	B	B	B	B	B	C	C	C	C	C	D	D	D
	33pF (330)	B	B	B	B	B	C	C	C	C	C	D	D	D
	39pF (390)	B	B	B	B	B	C	C	C	C	C	D	D	D
	47pF (470)	B	B	B	B	B	C	C	C	C	C	D	D	D
	56pF (560)	B	B	B	B	B	C	C	C	C	C	D	D	D
	68pF (680)	B	B	B	B	B	C	C	C	C	C	D	D	D
	82pF (820)	B	B	B	B	B	C	C	C	C	C	D	D	D
	100pF (101)	B	B	B	B	B	C	C	C	C	C	D	D	D
	120pF (121)	B	B	B	B	B	C	C	C	C	C	D	D	D
	150pF (151)	B	B	B	B	B	C	C	C	C	C	D	D	D
	180pF (181)	B	B	B	B	B	C	C	C	C	C	D	D	D
	220pF (221)	B	B	B	B	B	C	C	C	C	C	D	D	D
	270pF (271)	B	B	B	B	B	C	C	C	C	C	D	D	D
	330pF (331)	B	B	B	B	B	C	C	C	C	C	D	D	D
	390pF (391)	B	B	B	B	B	C	C	C	C	C	D	D	D
	470pF (471)	B	B	B	B	B	C	C	C	C	C	D	D	D
	560pF (561)	B	B	B	B	B	C	C	C	C	C	D	D	D
	680pF (681)	B	B	B	B	B	C	C	C	C	C	D	D	D
	820pF (821)	B	B	B	B	B	C	C	C	C	C	D	D	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	D	C	C	C	C	C	D	D	D
	0.012μF (123)	B	B	B	B		C	C	D	D	D	D	D	D
	0.015μF (153)	B	B	B	B		C	C	D	D	D	D	D	D
	0.018μF (183)	B	B	B	B							D	D	D
	0.022μF (223)	B	B	B	B							D	D	D
	0.027μF (273)	B	B	B	B							D	D	D
	0.033μF (333)	B	B	B	B							D	D	D
	0.039μF (393)	J	J	J	J									
	0.047μF (473)	J	J	J	J									
	0.056μF (563)	J	J	J	J									
	0.068μF (683)	G	G	G	G									
	0.082μF (823)	G	G	G	G									
	0.1μF (104)	G	G	G	G									

8. CAPACITANCE RANGE (X7R Dielectric)

8-1 0201, 0402, 0603, 0805 Sizes

DIELECTRIC		X7R																					
SIZE		0201					0402						0603						0805					
RATED VOLTAGE(VDC)		6.3	10	16	25	50	6.3	10	16	25	50	100	6.3	10	16	25	50	100	6.3	10	16	25	50	100
Capacitance	100pF (101)			L	L	L	N	N	N	N	N	N	S	S	S	S	S	S	B	B	B	B	B	B
	120pF (121)			L	L	L	N	N	N	N	N	N	S	S	S	S	S	S	B	B	B	B	B	B
	150pF (151)			L	L	L	N	N	N	N	N	N	S	S	S	S	S	S	B	B	B	B	B	B
	180pF (181)			L	L	L	N	N	N	N	N	N	S	S	S	S	S	S	B	B	B	B	B	B
	220pF (221)			L	L	L	N	N	N	N	N	N	S	S	S	S	S	S	B	B	B	B	B	B
	270pF (271)			L	L	L	N	N	N	N	N	N	S	S	S	S	S	S	B	B	B	B	B	B
	330pF (331)			L	L	L	N	N	N	N	N	N	S	S	S	S	S	S	B	B	B	B	B	B
	390pF (391)			L	L	L	N	N	N	N	N	N	S	S	S	S	S	S	B	B	B	B	B	B
	470pF (471)			L	L	L	N	N	N	N	N	N	S	S	S	S	S	S	B	B	B	B	B	B
	560pF (561)			L	L	L	N	N	N	N	N	N	S	S	S	S	S	S	B	B	B	B	B	B
	680pF (681)			L	L	L	N	N	N	N	N	N	S	S	S	S	S	S	B	B	B	B	B	B
	820pF (821)			L	L	L	N	N	N	N	N	N	S	S	S	S	S	S	B	B	B	B	B	B
	1,000pF (102)	L	L	L	L	L	N	N	N	N	N	N	S	S	S	S	S	S	B	B	B	B	B	B
	1,200pF (122)	L	L	L	L		N	N	N	N	N	N	S	S	S	S	S	S	B	B	B	B	B	B
	1,500pF (152)	L	L	L	L		N	N	N	N	N	N	S	S	S	S	S	S	B	B	B	B	B	B
	1,800pF (182)	L	L	L			N	N	N	N	N	N	S	S	S	S	S	S	B	B	B	B	B	B
	2,200pF (222)	L	L	L			N	N	N	N	N	N	S	S	S	S	S	S	B	B	B	B	B	B
	2,700pF (272)	L	L	L			N	N	N	N	N	N	S	S	S	S	S	S	B	B	B	B	B	B
	3,300pF (332)	L	L	L			N	N	N	N	N		S	S	S	S	S	S	B	B	B	B	B	B
	3,900pF (392)	L	L	L			N	N	N	N	N		S	S	S	S	S	S	B	B	B	B	B	B
	4,700pF (472)	L	L	L			N	N	N	N	N		S	S	S	S	S	S	B	B	B	B	B	B
	5,600pF (562)	L	L	L			N	N	N	N	N		S	S	S	S	S	S	B	B	B	B	B	B
	6,800pF (682)	L	L				N	N	N	N	N		S	S	S	S	S	S	B	B	B	B	B	B
	8,200pF (822)	L	L				N	N	N	N	N		S	S	S	S	S	S	B	B	B	B	B	B
	0.010μF (103)	L	L	L							N		S	S	S	S	S	S	B	B	B	B	B	B
	0.012μF (123)						N	N	N	N	N		S	S	S	S	S	X	B	B	B	B	B	B
	0.015μF (153)						N	N	N	N	N		S	S	S	S	S	X	B	B	B	B	B	B
	0.018μF (183)						N	N	N	N	N		S	S	S	S	S	X	B	B	B	B	B	B
	0.022μF (223)		L	L			N	N	N	N	N		S	S	S	S	S	X	B	B	B	B	B	B
	0.027μF (273)						N	N	N	N	N		S	S	S	S	S	X	B	B	B	B	B	D
	0.033μF (333)						N	N	N	N	N		S	S	S	S	X	X	B	B	B	B	B	D
	0.039μF (393)						N	N	N	N	N		S	S	S	S	X	X	B	B	B	B	B	D
	0.047μF (473)						N	N	N	N	N		S	S	S	S	X	X	B	B	B	B	B	D
	0.056μF (563)						N	N	N	N	N		S	S	S	S	X	X	B	B	B	B	B	D
	0.068μF (683)						N	N	N	N	N		S	S	S	S	X	X	B	B	B	B	B	D
	0.082μF (823)						N	N	N	N	N		S	S	S	S	X	X	B	B	B	B	B	D
	0.10μF (104)						N	N	N	N	N		S	S	S	S	X	X	B	B	B	B	B	D
	0.12μF (124)												S	S	X	X			B	B	B	B	D	I
	0.15μF (154)												S	S	X	X	X		D	D	D	D	D	I
	0.18μF (184)												S	S	X	X			D	D	D	D	D	I
	0.22μF (224)						N	N	N	N			S	S	X	X	X		D	D	D	D	D	I
	0.27μF (274)												X	X	X	X			D	D	D	D	I	
	0.33μF (334)												X	X	X	X	X		D	D	D	C/D	I	
	0.39μF (394)												X	X	X	X			D	D	D	D	I	
	0.47μF (474)						N	N					X	X	X	X	X		D	D	D	D	I	I
	0.56μF (564)												X	X	X				D	D	D	D		
	0.68μF (684)												X	X	X				D	D	D	D		
	0.82μF (824)												X	X	X				D	D	D	D		
	1.0μF (105)						N						X	X	X	X	X		D	D	D	C/D	I	
	1.5μF (155)																		I	I	I	I		
	2.2μF (225)												X	X	X				I	I	I	I	I	
	3.3μF (335)																							
	4.7μF (475)												X	X	X				I	I	I	I		
	6.8μF (685)																							
	10μF (106)																		I	I	I			
	22μF (226)																							

8-2 1206, 1210, 1812 Sizes

DIELECTRIC		X7R																
SIZE		1206						1210						1812				
RATED VOLTAGE(VDC)		6.3	10	16	25	50	100	6.3	10	16	25	50	100	10	16	25	50	100
Capacitance	100pF (101)																	
	120pF (121)																	
	150pF (151)	B	B	B	B	B	B											
	180pF (181)	B	B	B	B	B	B											
	220pF (221)	B	B	B	B	B	B											
	270pF (271)	B	B	B	B	B	B											
	330pF (331)	B	B	B	B	B	B											
	390pF (391)	B	B	B	B	B	B											
	470pF (471)	B	B	B	B	B	B											
	560pF (561)	B	B	B	B	B	B											
	680pF (681)	B	B	B	B	B	B											
	820pF (821)	B	B	B	B	B	B											
	1,000pF (102)	B	B	B	B	B	B		C	C	C	C	C	D	D	D	D	D
	1,200pF (122)	B	B	B	B	B	B		C	C	C	C	C	D	D	D	D	D
	1,500pF (152)	B	B	B	B	B	B		C	C	C	C	C	D	D	D	D	D
	1,800pF (182)	B	B	B	B	B	B		C	C	C	C	C	D	D	D	D	D
	2,200pF (222)	B	B	B	B	B	B		C	C	C	C	C	D	D	D	D	D
	2,700pF (272)	B	B	B	B	B	B		C	C	C	C	C	D	D	D	D	D
	3,300pF (332)	B	B	B	B	B	B		C	C	C	C	C	D	D	D	D	D
	3,900pF (392)	B	B	B	B	B	B		C	C	C	C	C	D	D	D	D	D
	4,700pF (472)	B	B	B	B	B	B		C	C	C	C	C	D	D	D	D	D
	5,600pF (562)	B	B	B	B	B	B		C	C	C	C	C	D	D	D	D	D
	6,800pF (682)	B	B	B	B	B	B		C	C	C	C	C	D	D	D	D	D
	8,200pF (822)	B	B	B	B	B	B		C	C	C	C	C	D	D	D	D	D
	0.010µF (103)	B	B	B	B	B	B		C	C	C	C	C	D	D	D	D	D
	0.012µF (123)	B	B	B	B	B	B		C	C	C	C	C	D	D	D	D	D
	0.015µF (153)	B	B	B	B	B	B		C	C	C	C	C	D	D	D	D	D
	0.018µF (183)	B	B	B	B	B	B		C	C	C	C	C	D	D	D	D	D
	0.022µF (223)	B	B	B	B	B	B		C	C	C	C	C	D	D	D	D	D
	0.027µF (273)	B	B	B	B	B	B		C	C	C	C	C	D	D	D	D	D
	0.033µF (333)	B	B	B	B	B	B		C	C	C	C	C	D	D	D	D	D
	0.039µF (393)	B	B	B	B	B	B		C	C	C	C	C	D	D	D	D	D
	0.047µF (473)	B	B	B	B	B	B		C	C	C	C	C	D	D	D	D	D
	0.056µF (563)	B	B	B	B	B	B		C	C	C	C	C	D	D	D	D	D
	0.068µF (683)	B	B	B	B	B	B		C	C	C	C	C	D	D	D	D	D
	0.082µF (823)	B	B	B	B	B	D		C	C	C	C	C	D	D	D	D	D
	0.10µF (104)	B	B	B	B	B	D		C	C	C	C	C	D	D	D	D	D
	0.12µF (124)	B	B	B	B	B	D		C	C	C	C	C	D	D	D	D	D
	0.15µF (154)	C	C	C	C	C	G		C	C	C	C	D	D	D	D	D	D
	0.18µF (184)	C	C	C	C	C	G		C	C	C	C	D	D	D	D	D	D
	0.22µF (224)	C	C	C	C	B/C	G		C	C	C	C	D	D	D	D	D	D
	0.27µF (274)	C	C	C	C	D	G		C	C	C	C	G	D	D	D	D	D
	0.33µF (334)	C	C	C	C	D	G		C	C	C	D	G	D	D	D	D	D
	0.39µF (394)	C	C	C	J	P	G		C	C	C	D	M	D	D	D	D	D
	0.47µF (474)	J	J	J	J	P	G		C	C	C	D	M	D	D	D	D	D
	0.56µF (564)	J	J	J	J	P	P		D	D	D	D	M	D	D	D	D	D
	0.68µF (684)	J	J	J	J	P	P		D	D	D	D	K	D	D	D	K	K
	0.82µF (824)	J	J	J	J	P	P		D	D	D	D	K	D	D	D	K	K
	1.0µF (105)	J	J	J	J	P	P		D	D	D	D	K	D	D	D	K	K
	1.5µF (155)	J	J	J	P					G	G	M	M				K	K
	2.2µF (225)	J	J	J	P	P	P			G	G	M	M				M	M
	3.3µF (335)	P	P	P	P	P				G	G	M						
	4.7µF (475)	P	P	P	P	P			K	K	K	M	M					
	6.8µF (685)																	
	10µF (106)	P	P	P	P				K	K	K	M						
	22µF (226)	P	P	P					M	M	M							
	47µF (476)								M									
	100µF (107)																	

9. CAPACITANCE RANGE(X5R Dielectric)

Dielectric		X5R														
Size		0201					0402					0603				
Rated Voltage (VDC)		6.3	10	16	25	50	6.3	10	16	25	50	6.3	10	16	25	50
Capacitance	100pF (101)			L	L	L										
	120pF (121)			L	L	L										
	150pF (151)			L	L	L										
	180pF (181)			L	L	L										
	220pF (221)			L	L	L										
	270pF (271)			L	L	L										
	330pF (331)			L	L	L										
	390pF (391)			L	L	L										
	470pF (471)			L	L	L										
	560pF (561)			L	L	L										
	680pF (681)			L	L	L										
	820pF (821)			L	L	L										
	1,000pF (102)		L	L	L	L										
	1,500pF (152)		L	L												
	2,200pF (222)		L	L												
	2,700pF (272)		L	L												
	3,300pF (332)		L	L												
	4,700pF (472)		L	L												
	6,800pF (682)		L													
	0.010μF (103)	L	L	L	L	L										
	0.015μF (153)	L	L								N					
	0.022μF (223)	L	L								N					
	0.027μF (273)	L	L						N		N					
	0.033μF (333)	L	L						N		N					
	0.039μF (393)	L	L						N		N					
	0.047μF (473)	L	L				N	N	N		N					
	0.056μF (563)	L	L				N	N	N		N					
	0.068μF (683)	L	L				N	N	N		N					
	0.082μF (823)	L	L				N	N	N		N					
	0.10μF (104)	L	L	L	L		N	N	N	N	N					
	0.15μF (154)						N	N	N	N						
	0.22μF (224)	L	L	L*			N	N	N	N	N	X	X	X	X	
	0.27uF (274)												X	X	X	
	0.33μF (334)	L*					N	N				X	X	X	X	
	0.39μF (394)												X	X	X	
	0.47μF (474)	L					N	N	N	N	N	X	X	X	X	X
	0.68μF (684)						N	N				X	X	X	X	
	0.82uF (824)											X	X	X	X	
	1.0μF (105)	L*	L*	L*			N	N	N	N	N	X	X	X	X	X
	1.5μF (155)											X				
	2.2μF (225)	L*	L*				N	N	N	N		X	X	X	X	X
	3.3μF (335)											X	X			
	4.7μF (475)						N	N	N*			X	X	X	X	
	6.8uF(685)						N*	N*								
	10μF (106)											X	X	X	X*	
	22μF (226)											X*	X*			

Dielectric		X5R															
Size		0805						1206					1210				
Rated Voltage (VDC)		4	6.3	10	16	25	50	6.3	10	16	25	50	4	6.3	10	16	25	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	
	6.8uF (685)							P	P									
	10μF (106)		I	I	I	I	I	P	P	P	P	P		K	K	K	K	M
	22μF (226)		I	I*	I*	I*		P	P	P	P			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)													M*				

10. CAPACITANCE RANGE(Y5V Dielectric)

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	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			B	B	B	B	
	0.68μF (684)						S	X			B	B	D	D	
	1.0μF (105)	N	N				S	X			B	B	D	D	
	1.5μF (155)						S				D	D			
	2.2μF (225)						S				D	D			
	3.3μF (335)										D	D			
	4.7μF (475)										D	D			
	6.8μF (685)										I				
	10 μF (106)										I				

DIELECTRIC		Y5V																	
SIZE		1206						1210							1812				
RATED VOLTAGE(VDC)		6.3	10	16	25	50	100	6.3	10	16	25	35	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	I		C	C	C		C	C	D	D	D	D	D
	0.22μF (224)		B	B	B	B	I		C	C	C		C	C	D	D	D	D	D
	0.33μF (334)		B	B	B	B			C	C	C		C	C	D	D	D	D	D
	0.47μF (474)		B	B	B	B			C	C	C		C		D	D	D	D	D
	0.68μF (684)		B	B	B	B			C	C	C		C		D	D	D	D	D
	1.0μF (105)		C	C	C	C			C	C	C		C		D	D	D	D	D
	1.5μF (155)		C	C	C				C	C	C				D	D	D	D	
	2.2μF (225)		C	C	C				C	C	C		G		D	D	D	D	
	3.3μF (335)		J	J	J				C	C	C				D	D	D	D	
	4.7μF (475)		J	J	J				C	C	D		G		D	D	D	D	
	6.8μF (685)		J	J					C	C	D				D	D	D	D	
	10μF (106)		J	J					D	D	G	K			D	D	D		
	22μF (226)		P						K	K									
	47μF (476)							K	K							M			
	100μF (107)							M											

11. PACKAGING STYLE AND QUANTITY

Size	Thickness (mm)/Symbol		Paper tape		Plastic tape	
			7" reel	13" reel	7" reel	13" reel
0201(0603)	0.30±0.03	L	15k	-	-	-
0402 (1005)	0.50±0.20	N	10k	50k		-
0603 (1608)	0.80±0.10	S	4k	15k	-	-
	0.80±0.20	X	4k	15k	-	-
0805 (2012)	0.60±0.10	A	4k	15k	-	-
	0.85±0.15	B	4k	15k	-	-
	1.25±0.10	D	-	-	3k	10k
	1.25±0.20	I	-	-	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	10k
	1.60+0.30/-0.10	P	-	-	2k	9k
1210 (3225)	0.95±0.10	C	-	-	3k	10k
	1.25±0.10	D	-	-	3k	10k
	1.60±0.20	G	-	-	2k	-
	2.00±0.20	K	-	-	1k	6k
	2.50±0.30	M	-	-	1k	-
1812 (4532)	1.25±0.10	D	-	-	1k	5k
	2.00±0.20	K	-	-	1k	-

Unit: pieces

11. RELIABILITY TEST CONDITIONS AND REQUREMENTS

<table>
<tr><th>No.</th><th>Item</th><th>Test Condition</th><th>Requirements</th></tr>
<tr><td>1.</td><td>Visual and Mechanical</td><td>---</td><td>* No remarkable defect.
* Dimensions to conform to individual specification sheet.</td></tr>
<tr><td>2.</td><td>Capacitance</td><td>Class I: NP0
Cap≤1000pF 1.0±0.2Vrms, 1MHz±10%
Cap>1000pF 1.0±0.2Vrms, 1KHz±10%

Class II: X7R,X7E, X5R,Y5V
Caps≤10μF, 1.0±0.2Vrms, 1kHz±10% **
Cap>10μF, 0.5±0.2Vrms, 120Hz±20%

** Test condition: 0.5±0.2Vrms，1KHz±10%
X7R: 0603≧225(10V),0805=106(6.3V&10V)
X5R: 01R5≧103, 0201≧224 (6.3V),
0402≧475 (6.3V), 0402≧225(10V),
0603=106 (6.3V),
TT18X≧475(10V) , TT15X series</td><td>* Shall not exceed the limits given in the detailed spec.
NP0: Cap≥30pF, Q≥1000; Cap<30pF,Q≥400+20C
X7R, X5R:
<table>
<tr><th>Rated vol.</th><th>D.F.≦</th><th colspan="2">Exception of D.F. ≦</th></tr>
<tr><td rowspan="3">≧100V</td><td rowspan="3">≦2.5%</td><td>≦3%</td><td>1206≧0.47μF</td></tr>
<tr><td>≦5%</td><td>0603≧0.068μF; 0805＞0.1μF; 1206≧1μF; 1210≧2.2μF;</td></tr>
<tr><td>≦10%</td><td>0805＞0.22μF; 1210≧3.3μF</td></tr>
<tr><td rowspan="3">50V</td><td rowspan="3">≦2.5%</td><td>≦3%</td><td>0201(50V); 0603≧0.047μF; 0805≧0.18μF; 1206≧0.47μF</td></tr>
<tr><td>≦5%</td><td>0201≧0.01uF; 1210≧4.7μF</td></tr>
<tr><td>≦10%</td><td>0402≧0.012μF; 0603>0.1μF; 0805/X7R>0.47μF;
1206≧2.2μF; 1210≧10μF;</td></tr>
<tr><td rowspan="4">25V</td><td rowspan="4">≦3.5%</td><td>≦5%</td><td>0201≧0.01μF; 0805≧1μF; 1210≧10μF</td></tr>
<tr><td>≦7%</td><td>0603≧0.33μF</td></tr>
<tr><td>≦10%</td><td>0201≧0.1μF; 0402≧0.1uF / X7R≧0.056μF; 0603≧0.47μF;
0805≧2.2μF; 1206≧4.7μF; 1210≧22μF</td></tr>
<tr><td>≦12.5%</td><td>0402≧0.47μF</td></tr>
<tr><td rowspan="2">16V</td><td rowspan="2">≦3.5%</td><td>≦5%</td><td>0201≧0.01μF; 0402≧0.033μF; 0603≧0.15μF;
0805≧0.68μF; 1206≧2.2μF; 1210≧4.7μF</td></tr>
<tr><td>≦10%</td><td>0201/X7R≧0.022μF; 0402≧0.22uF;
0603≧ 0.68μF; 0805≧2.2μF; 1206≧4.7μF; 1210≧22μF;</td></tr>
<tr><td rowspan="2">10V</td><td rowspan="2">≦5%</td><td>≦10%</td><td>0201≧0.012μF; 0402≧0.22μF;
0603≧0.33μF; 0805≧2.2μF; 1206≧2.2μF; 1210≧22μF</td></tr>
<tr><td>≦15%</td><td>0201≧0.1μF; 0402≧1μF</td></tr>
<tr><td rowspan="2">6.3V</td><td rowspan="2">≦10%</td><td>≦15%</td><td>0201≧0.1μF; 0402≧1μF; 0603≧10μF;
0805≧4.7μF; 1206≧47μF; 1210≧100μF;</td></tr>
<tr><td>≦20%</td><td>0402≧2.2μF</td></tr>
</table>
Y5V:
<table>
<tr><th>Rated vol.</th><th>D.F.≦</th><th colspan="2">Exception of D.F.≦</th></tr>
<tr><td>≧50V</td><td>5%</td><td>7%</td><td>0603≧0.1μF; 0805≧0.47μF;
1206≧4.7μF</td></tr>
<tr><td rowspan="2">25V</td><td rowspan="2">5%</td><td>7%</td><td>0402≧0.047μF;0603≧0.1μF;
0805≧0.33μF;1206≧1μF;
1210≧4.7μF</td></tr>
<tr><td>9%</td><td>0402≧0.068μF;0603≧0.47μF;
1206≧4.7μF; 1210≧22μF</td></tr>
<tr><td>16V
(C<1.0μF)</td><td>7%</td><td>9%</td><td>0402≧0.068μF; 0603≧0.68μF</td></tr>
<tr><td></td><td></td><td>12.5%</td><td>0402≧0.22μF</td></tr>
<tr><td>16V
(C≧1.0μF)</td><td>9%</td><td>12.5%</td><td>0603≧2.2μF; 0805≧3.3μF;
1206≧10μF; 1210≧22μF;
1812≧47μF</td></tr>
<tr><td>10V</td><td>12.5%</td><td>20%</td><td>0402≧0.47μF</td></tr>
<tr><td>6.3V</td><td>20%</td><td>---</td><td>---</td></tr>
</table></td></tr>
<tr><td>3.</td><td>Q/ D.F. (Dissipation Factor)</td><td></td><td></td></tr>
<tr><td>4.</td><td>Dielectric Strength</td><td>* To apply voltage (≤100V) 250%.
* Duration: 1 to 5 sec.
* Charge and discharge current less than 50mA.</td><td>* No evidence of damage or flash over during test.</td></tr>
<tr><td>5.</td><td>Insulation Resistance</td><td>To apply rated voltage for max. 120 sec.</td><td>Class I: (NP0) 10G Ω or RxC≧500Ω-F whichever is smaller.
Class II (X7R, X5R, Y5V)
<table>
<tr><th>Rated voltage</th><th>Insulation Resistance</th></tr>
<tr><td>100V: X7R
50V:0402＞0.01μF 0603≥1μF;0805≥1μF;1206≥4.7μF;1210≥4.7μF
25V :0402≥1μF;0603≥2.2μF;0805≥2.2μF;1206≥10μF;1210≥10μF
16V:0201 ≥0.1μF
16V: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 Size ≥1812</td><td>10GΩ or RxC≧100 Ω-F whichever is smaller.</td></tr>
</table></td></tr>
<tr><td>6.</td><td>Temperature Coefficient</td><td>With no electrical load.
<table>
<tr><th>T.C.</th><th>Operating Temp</th></tr>
<tr><td>NPO</td><td>-55~125°C at 25°C</td></tr>
<tr><td>X7R</td><td>-55~125°C at 25°C</td></tr>
<tr><td>X5R</td><td>-55~ 85°C at 25°C</td></tr>
<tr><td>Y5V</td><td>-25~ 85°C at 20°C</td></tr>
</table>
<table>
<tr><th>T.C.</th><th>Capacitance Change</th></tr>
<tr><td>NPO</td><td>Within ±30ppm/°C</td></tr>
<tr><td>X7R</td><td>Within ±15%</td></tr>
<tr><td>X5R</td><td>Within ±15%</td></tr>
<tr><td>Y5V</td><td>Within +30%/-80%</td></tr>
</table></td><td></td></tr>
<tr><th>No.</th><th>Item</th><th>Test Condition</th><th>Requirements</th></tr>
</table>

<table>
<tr><td>7.</td><td>Adhesive Strength of Termination</td><td>* Pressurizing force：
2N：0201 5N：(0402/ 0603) and 10N (>0603)
* Test time: 10±1 sec.</td><td>* No remarkable damage or removal of the terminations.</td></tr>
<tr><td>8.</td><td>Vibration Resistance</td><td>* Vibration frequency: 10~55 Hz/min.
* Total amplitude: 1.5mm
* Test time: 6 hrs. (Two hrs each in three mutually perpendicular directions.)
* Measurement to be made after keeping at room temp. for 24±2 hrs.</td><td>* No remarkable damage.
* Cap change and Q/D.F.: To meet initial spec.</td></tr>
<tr><td>9.</td><td>Solderability</td><td>* Solder temperature: 235±5°C
* Dipping time: 2±0.5 sec.</td><td>95% min. coverage of all metalized area.</td></tr>
<tr><td>10.</td><td>Bending Test</td><td>* 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.
* Measurement to be made after keeping at room temp. for 24±2 hrs.</td><td>* No remarkable damage.
* Cap change：
NP0: within ±5% or 0.5pF whichever is larger
X7R, X5R: 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.)</td></tr>
<tr><td>11.</td><td>Resistance to Soldering Heat</td><td>* 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): Perform 150+0/-10°C for 1 hr and then set for 24±2 hrs at room temp.
* Measurement to be made after keeping at room temp. for 24±2 hrs.</td><td>* No remarkable damage.
* Cap change:
NP0: within ±2.5% or 0.25pF whichever is larger
X7R, X5R: within ±7.5%
Y5V: within ±20%
* Q/D.F., I.R. and dielectric strength: To meet initial requirements.
* 25% max. leaching on each edge.</td></tr>
<tr><td>12.</td><td>Temperature Cycle</td><td>* Conduct the five cycles according to the temperatures and time.
<table>
<tr><th>Step</th><th>Temp. (°C)</th><th>Time (min.)</th></tr>
<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>
</table>
* Before initial measurement (Class II only): Perform 150+0/-10°C for 1 hr and then set for 24±2 hrs at room temp.
* Measurement to be made after keeping at room temp. for 24±2 hrs.</td><td>* No remarkable damage.
* Cap change：
NP0: within ±2.5% or 0.25pF whichever is larger
X7R, X5R: within ±7.5%
Y5V: within ±20%
* Q/D.F., I.R. and dielectric strength: To meet initial requirements.</td></tr>
</table>

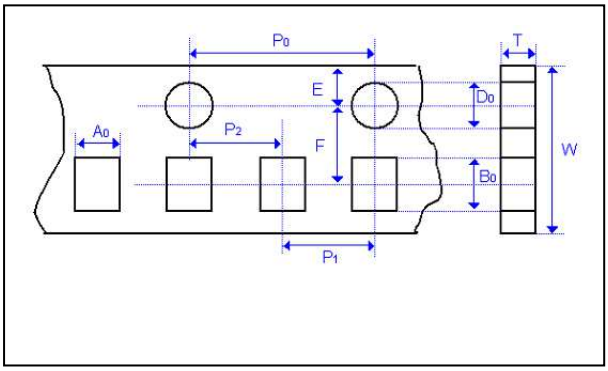
<table>
<tr><th>No.</th><th>Item</th><th>Test Condition</th><th>Requirements</th></tr>
<tr><td>13.</td><td>Humidity (Damp Heat) Steady State</td><td>* Test temp.: 40±2°C
* Humidity: 90~95% RH
* Test time: 500+24/-0hrs.
*Before initial measurement (Class II only): Perform 150+0/-10°C for 1 hr and then set for 24±2 hrs at room temp.
* Measurement to be made after keeping at room temp. for 24±2 hrs.</td><td>* No remarkable damage.
* Cap change:
NP0: within ±5% or 0.5pF whichever is larger
X7R, X7E, X5R: ≥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 Q≥200+10C
X7R, X5R:
<table><tr><th>Rated vol.</th><th>D.F.≦</th><th colspan="2">Exception of D.F. ≦</th></tr><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≧0.01uF;1210≧4.7μF</td></tr><tr><td>≦20%</td><td>0402≧0.012μF;0603>0.1μF; 0805≧1μF(0805/X7R>0.47μF);
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≧0.10μF&(0402/X7R≧0.056μF);0603≧0.47μF;
0805≧2.2μF; 1206≧4.7μF;1210≧22μF(1210/X5R≧10μF)</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≧0.01μF(0201/X7R≧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(0201/X5R>0.1μF) ;0402≧1μF ; 01R5/X5R</td></tr><tr><td>6.3V</td><td>≦15%</td><td>≦30%</td><td>0201≧0.1μF(0201/X5R>0.1μF);0402≧1μF(0402/X6S≧0.47μF);
0603≧10μF;0805≧4.7μF;1206≧47μF;1210≧100μF</td></tr></table>
Y5V:
<table><tr><th>Rated vol.</th><th>D.F.≦</th><th colspan="2">Exception of D.F.≦</th></tr><tr><td>≧50V</td><td>7.5%</td><td>10%</td><td>0603≧0.1μF; 0805≧0.47μF;
1206≧4.7μF</td></tr><tr><td>35V</td><td>10%</td><td>---</td><td>---</td></tr><tr><td rowspan="2">25V</td><td rowspan="2">7.5%</td><td>10%</td><td>0402≧0.047μF;0603≧0.1μF;
0805≧0.33μF;1206≧1μF;
1210≧4.7μF</td></tr><tr><td>15%</td><td>0402≧0.068μF;0603≧0.47μF;
1206≧4.7μF; 1210≧22μF</td></tr><tr><td rowspan="2">16V
(C<1.0μF)</td><td rowspan="2">10%</td><td>12.5%</td><td>0402≧0.068μF; 0603≧0.68μF</td></tr><tr><td>20%</td><td>0402≧0.22μF</td></tr><tr><td>16V
(C≧1.0μF)</td><td>12.5%</td><td>20%</td><td>0603≧2.2μF; 0805≧3.3μF;
1206≧10μF;1210≧22μF;
1812≧47μF;</td></tr><tr><td>10V</td><td>20%</td><td>30%</td><td>0402≧0.47μF</td></tr><tr><td>6.3V</td><td>30%</td><td>---</td><td>---</td></tr></table>
*I.R.: ≥10V, 1GΩ or 50 Ω-F whichever is smaller.
Class II (X7R, X5R, Y5V)
<table><tr><th>Rated voltage</th><th>Insulation Resistance</th></tr><tr><td>100V: All X7R;1210≥3.3μF</td><td rowspan="6">1GΩ or RxC≧10 Ω-F whichever is smaller.</td></tr><tr><td>50V: 0402>0.01μF;0603≥1μF;0805≥1μF;1206≥4.7μF;1210≥4.7μF</td></tr><tr><td>35V:0603≥1μF;0805≥2.2μF; 1206≧2.2μF;1210≧10μF</td></tr><tr><td>25V:0201≧0.1uF; 0402≥0.22μF; 0603≥2.2μF;0805≥2.2μF;
1206≥10μF;1210≥10μF</td></tr><tr><td>16V: 0201≧0.1uF;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 Size ≥1812</td></tr></table></td></tr>
</table>

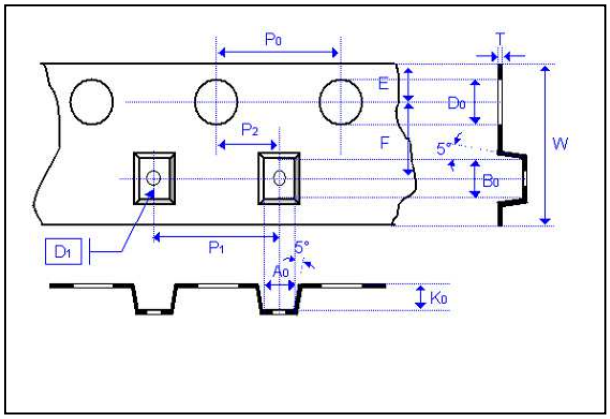
<table>
<tr><th>No</th><th>Item</th><th>Test Condition</th><th>Requirements</th></tr>
<tr><td>14</td><td>Humidity (Damp Heat) Load</td><td>* Test temp.: 40±2°C
* Humidity: 90~95%RH
* Test time: 500+24/-0 hrs.
* To apply voltage：rated voltage.
* Before initial measurement (Class II only): To apply test voltage for 1hr at 40°C and then set for 24±2 hrs at room temp.
* Measurement to be made after keeping at room temp. for 24±2 hrs.</td><td>* No remarkable damage.
Cap change:
NP0: ±7.5% or 0.75pF whichever is larger.
X7R, X5R: ≥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:
<table>
<tr><th>Rated vol.</th><th>D.F.≦</th><th colspan="2">Exception of D.F. ≦</th></tr>
<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≧0.01uF;1210≧4.7μF</td></tr>
<tr><td>≦20%</td><td>0402≧0.012μF;0603>0.1μF; 0805≧1μF(0805/X7R>0.47μF);
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≧0.10μF&(0402/X7R≧0.056μF);0603≧0.47μF;
0805≧2.2μF; 1206≧4.7μF;1210≧22μF(1210/X5R≧10μF)</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≧0.01μF(0201/X7R≧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(0201/X5R>0.1μF); 0402≧1μF ; 01R5/X5R</td></tr>
<tr><td>6.3V</td><td>≦15%</td><td>≦30%</td><td>0201≧0.1μF(0201/X5R>0.1μF);0402≧1μF(0402/X6S≧0.47μF);
0603≧10μF;0805≧4.7μF;1206≧47μF;1210≧100μF</td></tr>
</table>
Y5V:
<table>
<tr><th>Rated vol.</th><th>D.F.≦</th><th colspan="2">Exception of D.F.≦</th></tr>
<tr><td rowspan="2">≧50V</td><td rowspan="2">7.5%</td><td>10%</td><td>0603≧0.1μF; 0805≧0.47μF;
1206≧4.7μF</td></tr>
<tr><td>20%</td><td>1210≧6.8μF</td></tr>
<tr><td rowspan="2">25V</td><td rowspan="2">7.5%</td><td>10%</td><td>0402≧0.047μF;0603≧0.1μF;
0805≧0.33μF;1206≧1μF;
1210≧4.7μF</td></tr>
<tr><td>15%</td><td>0402≧0.068μF;0603≧0.47μF;
1206≧4.7μF; 1210≧22μF</td></tr>
<tr><td rowspan="2">16V
(C<1.0μF)</td><td rowspan="2">10%</td><td>12.5%</td><td>0402≧0.068μF; 0603≧0.68μF</td></tr>
<tr><td>20%</td><td>0402≧0.22μF</td></tr>
<tr><td>16V
(C≧1.0μF)</td><td>12.5%</td><td>20%</td><td>0603≧2.2μF; 0805≧3.3μF;
1206≧10μF;1210≧22μF;
1812≧47μF;</td></tr>
<tr><td>10V</td><td>20%</td><td>30%</td><td>0402≧0.47μF</td></tr>
<tr><td>6.3V</td><td>30%</td><td>---</td><td>---</td></tr>
</table>
*I.R.: ≥10V, 500MΩ or 25 Ω-F whichever is smaller.
Class II (X7R, X5R, Y5V)
<table>
<tr><th>Rated voltage</th><th>Insulation Resistance</th></tr>
<tr><td>100V: All X7R;1210≥3.3μF</td><td rowspan="6">500MΩ or RxC≧5 Ω-F whichever is smaller.</td></tr>
<tr><td>50V: 0402>0.01μF;0603≥1μF;0805≥1μF;1206≥4.7μF;1210≥4.7μF</td></tr>
<tr><td>35V:0603≥1μF;0805≥2.2μF; 1206≧2.2μF;1210≧10μF</td></tr>
<tr><td>25V:0201≧0.1uF; 0402≥0.22μF; 0603≥2.2μF;0805≥2.2μF;
1206≥10μF;1210≥10μF</td></tr>
<tr><td>16V: 0201≧0.1uF;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 ; Size ≥1812</td><td></td></tr>
</table></td></tr>
</table>

<table>
<tr><th>No</th><th>Item</th><th>Test Condition</th><th>Requirements</th></tr>
<tr><td>15.</td><td>High Temperature Load (Endurance)</td><td>
*Test temp.：
NP0, X7R : 125±3℃
X5R, Y5V: 85±3°C
*Test time: 1000+24/-0 hrs.
*To apply voltage:
(1) 6.3V or C≧10μF or TT series:
150% of rated voltage.
(2) 10V≦Ur<500V:
200% of rated voltage.
(3) 500V: 150% of rated voltage.
(4) Ur≧630V:
120% of rated voltage.
(5) 100% of rated voltage for below range.
<table>
<tr><th>Size</th><th>Dielectric</th><th>Rated voltage</th><th>Capacitance range</th></tr>
<tr><td>0201</td><td>X5R/X7R</td><td>6.3V,10V</td><td>C≧0.1μF</td></tr>
<tr><td>0402</td><td>X5R/X7R</td><td>6.3V,10V</td><td>C≧1.0μF</td></tr>
<tr><td>0603</td><td>X5R/X7R</td><td>6.3V,10V</td><td>C≧4.7μF</td></tr>
<tr><td>0805</td><td>X5R/X7R</td><td>6.3V</td><td>C≧22μF</td></tr>
<tr><td rowspan="2">1206</td><td>X5R/X7R</td><td>6.3V</td><td>C≧47μF</td></tr>
<tr><td>NP0</td><td>3000V</td><td>C≧1.5pF</td></tr>
</table>
(6)150% of rated voltage for below range.
<table>
<tr><th>Size</th><th>Dielectric</th><th>Rated voltage</th><th>Capacitance range</th></tr>
<tr><td rowspan="2">0402</td><td>X5R/X7R</td><td>10V,16V, 25V</td><td>C≧0.22μF</td></tr>
<tr><td>Y5V</td><td>16V</td><td>C≧0.47μF</td></tr>
<tr><td rowspan="2">0603</td><td>X5R/X7R</td><td>10V,16V</td><td>C≧1.0μF</td></tr>
<tr><td>Y5V</td><td>16V</td><td>C≧2.2μF</td></tr>
<tr><td rowspan="2">0805</td><td>X5R/X7R</td><td>10V</td><td>C≧4.7μF</td></tr>
<tr><td>Y5V</td><td>16V</td><td>C≧4.7μF</td></tr>
</table>
*Before initial measurement (Class II only): To apply test voltage for 1hr at test temp. and then set for 24±2 hrs at room temp.
*Measurement to be made after keeping at room temp. for 24±2 hrs
</td><td>
* No remarkable damage.
Cap change:
NP0: ±3.0% or ±0.3pF whichever is larger
X7R, X5R: ≥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, Q≥200+10C
X7R, X5R:
<table>
<tr><th>Rated vol.</th><th>D.F.≦</th><th colspan="2">Exception of D.F. ≦</th></tr>
<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≧0.01uF;1210≧4.7μF</td></tr>
<tr><td>≦20%</td><td>0402≧0.012μF;0603>0.1μF; 0805≧1μF(0805/X7R>0.47μF);
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≧0.10μF&(0402/X7R≧0.056μF);0603≧0.47μF;
0805≧2.2μF; 1206≧4.7μF;1210≧22μF(1210/X5R≧10μF)</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≧0.01μF(0201/X7R≧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(0201/X5R>0.1μF); 0402≧1μF</td></tr>
<tr><td>6.3V</td><td>≦15%</td><td>≦30%</td><td>0201≧0.1μF(0201/X5R>0.1μF);0402≧1μF
0603≧10μF;0805≧4.7μF;1206≧47μF;1210≧100μF</td></tr>
</table>
Y5V:
<table>
<tr><th>Rated vol.</th><th>D.F.≦</th><th colspan="2">Exception of D.F.≦</th></tr>
<tr><td>≧50V</td><td>7.5%</td><td>10%</td><td>0603≧0.1μF; 0805≧0.47μF;
1206≧4.7μF</td></tr>
<tr><td rowspan="2">25V</td><td rowspan="2">7.5%</td><td>10%</td><td>0402≧0.047μF;0603≧0.1μF;
0805≧0.33μF;1206≧1μF;
1210≧4.7μF</td></tr>
<tr><td>15%</td><td>0402≧0.068μF;0603≧0.47μF;
1206≧4.7μF; 1210≧22μF</td></tr>
<tr><td rowspan="2">16V
(C<1.0μF)</td><td rowspan="2">10%</td><td>12.5%</td><td>0402≧0.068μF; 0603≧0.68μF</td></tr>
<tr><td>20%</td><td>0402≧0.22μF</td></tr>
<tr><td>16V
(C≧1.0μF)</td><td>12.5%</td><td>20%</td><td>0603≧2.2μF; 0805≧3.3μF;
1206≧10μF;1210≧22μF;
1812≧47μF;</td></tr>
<tr><td>10V</td><td>20%</td><td>30%</td><td>0402≧0.47μF</td></tr>
<tr><td>6.3V</td><td>30%</td><td>---</td><td>---</td></tr>
</table>
*I.R.: ≥10V, 1GΩ or 50 Ω-F whichever is smaller.
Class II (X7R, X5R, Y5V)
<table>
<tr><th>Rated voltage</th><th>Insulation Resistance</th></tr>
<tr><td>100V: All X7R;1210≥3.3μF</td><td rowspan="6">1GΩ or RxC≧ 10 Ω-F whichever is smaller.</td></tr>
<tr><td>50V: 0402>0.01μF;0603≥1μF;0805≥1μF;1206≥4.7μF;1210≥4.7μF</td></tr>
<tr><td>25V:0201≧0.1uF; 0402≥0.22μF; 0603≥2.2μF;0805≥2.2μF;
1206≥10μF;1210≥10μF</td></tr>
<tr><td>16V: 0201≧0.1uF;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 ; Size ≥1812</td></tr>
</table>
</td></tr>
</table>

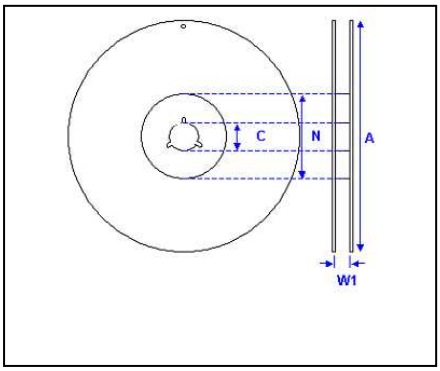
APPENDIXES

◙ Tape & reel dimensions





Size	0201	0402	0603	0805			1206			1210		1812
Thickness	L	N	S, X	A	B	C, D, I	B	C,J, D	G	C,D,G,	M	D, K
A_0	0.40 +/-0.10	0.70 +/-0.20	1.05 +/-0.30	1.50 +/-0.20	1.50 +/-0.20	< 1.80	1.90 +/-0.50	< 2.00	<2.30	< 3.05	< 3.20	< 3.90
B_0	0.70 +/-0.10	1.20 +/-0.20	1.80 +/-0.30	2.30 +/-0.20	2.30 +/-0.20	< 2.70	3.50 +/-0.50	< 3.70	< 4.00	< 3.80	<4.00	< 5.30
T	≦0.55	≦0.80	≦1.20	≦1.15	≦1.20	0.23 +/-0.1	≦1.20	0.23 +/-0.1	0.23 +/-0.1	0.23 +/-0.1	0.23 +/-0.1	0.25 +/-0.1
K_0	-	-	-	-	-	< 2.50	-	< 2.50	< 2.50	< 2.50	< 3.20	< 2.50
W	8.00 +/-0.30	8.00 +/-0.30	8.00 +/-0.30	8.00 +/-0.30	8.00 +/-0.30	8.00 +/-0.30	8.00 +/-0.30	8.00 +/-0.30	8.00 +/-0.30	8.00 +/-0.30	8.00 +/-0.30	12.00 +/-0.30
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 +/-0.10	4.00 +/-0.10	4.00 +/-0.10	4.00 +/-0.10
$10xP_0$	40.00 +/-0.10	40.00 +/-0.10	40.00 +/-0.20	40.00 +/-0.20	40.00 +/-0.20	40.00 +/-0.20	40.00 +/-0.20	40.00 +/-0.20	40.00 +/-0.20	40.00 +/-0.20	40.00 +/-0.20	40.00 +/-0.20
P_1	2.00 +/-0.05	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	2.00 +/-0.10
D_0	1.50 +0.1/-0	1.50 +0.1/-0	1.50 +0.1/-0	1.50 +0.1/-0	1.50 +0.1/-0	1.50 +0.1/-0	1.50 +0.1/-0	1.50 +0.1/-0	1.50 +0.1/-0	1.50 +0.1/-0	1.50 +0.1/-0	1.50 +0.1/-0
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 +/-0.10	1.75 +/-0.10	1.75 +/-0.10	1.75 +/-0.10	1.75 +/-0.10	1.75 +/-0.10	1.75 +/-0.10	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	3.50 +/-0.05	5.50 +/-0.10



Size	0201, 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±1.0	250.0±1.0	330.0±1.0	178.0±1.0
N	60.0+1.0/-0	100.0±1.0	100±1.0	60.0+1.0/-0

◙ 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:

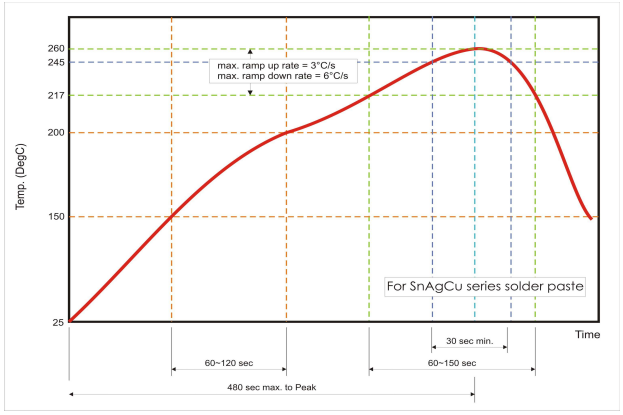
a. The corrosive gas reacts on the terminal electrodes of capacitors, and results in the poor solderability. Do not store the capacitors in the ambience of corrosive gas (e.g., hydrogen sulfide, sulfur dioxide, chlorine, ammonia gas etc.)

b. In corrosive atmosphere, solderability might be degraded, and silver migration might occur to cause low reliability.

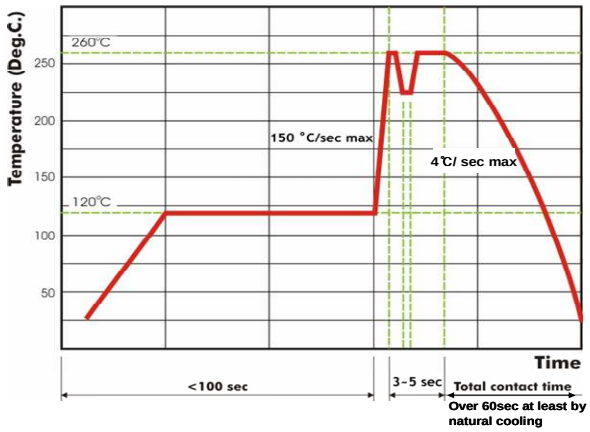
c. Due to the dewing by rapid humidity change, or the photochemical change of the terminal electrode by direct sunlight,the solderability and electrical performance may deteriorate. Do not store capacitors under direct sunlight or dewing condition. To store products on the shelf and avoid exposure to 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 N_2 within oven are recommended.



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



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