# APPROVAL SHEET

MULTILAYER CERAMIC CAPACITORS
General Purpose Series (4V to 100V)
0201 to 1812 Sizes
NP0, X7R, Y5V, X6S & X5R Dielectrics
RoHS Compliance

\*Contents in this sheet are subject to change without prior notice.

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#### 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.

Surge's MLCC is made by NP0, X7R, X6S, X5R and Y5V dielectric material and which provides product with high electrical precision, stability and reliability.

#### 2. FEATURES

- a. A wide selection of sizes is available (0201 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.
- e. For automotive

## 4. HOW TO ORDER

#### PART NUMBERING SYSTEM

**Additional Designation** 

A-Standard

Series				SCM	10	<u>B</u>	103	<u>K</u>	B	<u>N</u>	<u>c</u>	<u>A</u>
Case Size	e Code											
03 - 0201 31 - 1206 60 - 2220 90 - 8060	05 - 0402 32 - 1210 44 - 2225	10 - 0603 50 - 1808 70 - 3640	21 - 0805 51 - 1812 80 - 5550									
Dielectric	Code											
B - X7R C - NPO/CC	)G	F - Y5V E - Z5U	D - X5R									
Capacita	nce Code											
Tolerance B - ±0.1pF C - ±0.25pF D - ±.5pF	F - ±1%	K - ±10% M - ±20% Z - +80/-2	0%									
Voltage C	ode											
J - 6.3V N - 10V O - 16V A - 25V	B - 50V C - 100V D - 160V	E - 200V F - 250V G - 500V	H - 1000V I - 2000V L - 2500V K - 3000V									
End Term N - Standard	nination Typed thickness	е										
Packagin	g Style											
B - Bulk (Vir A - Bulk (Vir P - Bulk Cas G - Bulk Cas C - Paper Ta	nyl Bag/ No Ma nyl Bag/ Markin se (No marking se (Marking) ape 7" Reel (No ape 7" Reel (Marking)	g) ) o Marking)	D - Paper Ta I - Paper Ta E - Embosse J - Embosse F - Embosse K - Embosse	pe 13" Ree ed Tape 7" ed Tape 7" ed Tape 13	Reel ( Reel ( Reel ( Reel	king) (No M Marki (No I	arking) ng) Marking					

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MT - Automotive Grade (AEC-Q200)

ST- Soft Termination

## 5. EXTERNAL DIMENSIONS

Outline	Size Inch (mm)	L (mm)	W (mm)	T (mm)/Symb	ol	Soldering Method *	M <sub>B</sub> (mm)
	01R5 (0402)	0.4±0.02	0.2±0.02	0.2±0.02	٧	R	0.10±0.03
		0.6±0.03	0.3±0.03	0.3±0.03			
	0201 (0603)	0.6±0.05 <sup>#2</sup>	0.3±0.05 <sup>#2</sup>	0.3±0.05 <sup>#2</sup>	L	R	0.15±0.05
		0.6±0.09 <sup>#3</sup>	0.3±0.09 <sup>#3</sup>	0.3±0.09 <sup>#3</sup>			0.15+0.1/-0.0
			0.50±0.05	0.50±0.05	N	R	0.25
	0402 (1005)	1.00±0.05	0.50±0.05	0.50+0.02/-0.05	Q	R	200 VINNAMO O VILLIAM
		1.00±0.20	0.50±0.20	0.5±0.20	Е	R	+0.05/-0.10
		1.60±0.10	0.80±0.10	0.80±0.07	s	R/W	
· · ·	0603 (1608)	1 60+0 15/ 0 10	0.90+0.15/.0.10	0.50±0.10	Н	R/W	0.40+0.45
// // T	0603 (1608)	1.60+0.15/-0.10	0.80+0.15/-0.10	0.80+0.15/-0.10			0.40±0.15
		1.60±0.20 <sup>#1</sup>	0.80±0.20#1	0.8±0.20 <sup>#1</sup>	X	R/W	
/w				0.50±0.10	н	R/W	
M, 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		0.00:0.45	4.05 - 0.40	0.60±0.10	Α	R/W	
	0005 (0040)	2.00±0.15	1.25±0.10	0.80±0.10	В	R/W	0.50.0.00
Fig. 1 The outline of MLCC	0805 (2012)			1.25±0.10	D	R	0.50±0.20
		0.00,0.00	4.05.0.00	0.85±0.10	Т	R/W	
		2.00±0.20	1.25±0.20	1.25±0.20	1	R	
				0.80±0.10	В	R/W	
		3.20±0.15		0.95±0.10	С	R	
			1.60±0.15	1.25±0.10	D	R	0.60±0.20
	1206 (3216)			1.15±0.15	J	R	With the participation of the
		3.20±0.20	12/12/20/12/12/2	1.60±0.20	G	R	(0.5±0.25)**
		7.39190391200000	1.60±0.20	0.85±0.10	Т	R/W	
		3.20	1.60	1.60+0.30/-0.10	P	R	
		0.20	1.00	0.95±0.10	С	R	
		3.20±0.30	2.50±0.20	0.85±0.10	Т	R	
				1.25±0.10	D	R	
	1210 (3225)			1.60±0.20	G	R	0.75±0.25
		3.20±0.40	2.50±0.30	2.00±0.20	K	R	
				2.50±0.30	М	R	
				1.25±0.10	D	R	
		4.50±0.40		1.40±0.15	F	R	0.75±0.25
	1808 (4520)	(4.5+0.5/-0.3)**	2.03±0.25	1.60±0.20	G	R	(0.5±0.25)**
		(1.0 - 0.0 - 0.0)		2.00±0.20	K	R	(0.020.20)
				1.25±0.10	D	R	
			3.20±0.30	1.60±0.20	G	R	
	1812 (4532)	4.50±0.40		2.00±0.20	K	R	0.75±0.25
	, , , , , ,	(4.5+0.5/-0.3)**		2.50±0.20 2.50±0.30	M	R	(0.5±0.25)**
			3.20±0.40				

<sup>\*</sup> R = Reflow soldering process; W = Wave soldering process.

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<sup>\*\*</sup> For 1808\_200V ~3kV, 1812\_200V~3kV and safety certificated products.

<sup>\*\*\*</sup> For 1206\_1000V ~3kV, 1808\_200V ~3kV, 1812\_200V~3kV and safety certificated products.

<sup>#1:</sup> For 0603/Cap  $\geq$  10µF or 0603(>10V)/Cap>1µF products.

<sup>#2:</sup> For 0201/Cap  $\geq$  0.68  $\mu F$  products.

<sup>#3:</sup> For 0201/Cap >1µF products.

## 6. GENERAL ELECTRICAL DATA

Dielectric	NP0	X7R	Y5V	X5R	X6S
Size		0402, 0603, 0	805, 1206, 1210, 1	812	
Capacitance range*	0.1pF to 0.1µF	100pF to 47µF	0.01µF to 100µF	100pF to 220µF	0.1μF to 100μF
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%)</cap<10pf: 	J (±5%), K (±10%), M (±20%)	M (±20%), Z (-20/+80%)	K (±10%), M (±20%)	K (±10%), M (±20%)
Rated voltage (WVDC)	10V, 16V, 25V, 50V, 100V	6.3V, 10V, 16V	25V, 50V, 100V	4V, 6.3V, 10V,	16V, 25V, 50V
DF(Tan δ)*	Cap<30pF: Q≥400+20C Cap≥30pF: Q≥1000		No	te 1	
Operating temperature	-55 to +125°	c	-25 to +85°C	-55 to +85°C	-55 to +105°C
Capacitance characteristic	±30ppm	±15%	+30/-80%	±15%	±22%
Termination		Ni/Sn (lea	d-free termination)		

<sup>\*</sup> 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: 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.

#### Note 1:

#### X7R/X5R/X6S

Rated vol.	D.F.≦	Exceptio	n of D.F. ≦
1001/	≤2.5%	≦3%	1206≥0.47µF
≥ 1000	≥2.5%	≦5%	0805>0.1μF, 0603≧0.068μF, 1206>1μF; TT series
		≦3%	$0201(50V)$ ; $0603 \ge 0.047 \mu F$ ; $0805 \ge 0.18 \mu F$ ; $1206 \ge 0.47 \mu F$
50V	≦2.5%	≦5%	1210≥4.7µF
50 V	E 2.070	≦10%	0402 ≥ 0.1μF;0603>0.1μF; 0805 ≥ 1μF;1206 ≥ 2.2μF; 1210 ≥ 10μF; TT series
35V	≤3.5%	≦10%	0603≥1μF;0805≥2.2μF; 1210≥10μF
		≤5%	0201≥0.01µF;0805≥1µF; 1210≥10µF
	or seems to be	≤7%	0603≥0.33μF; 1206≥4.7μF
25V	≦3.5%	≦10%	0402 ≥ 0.10μF;0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 6.8μF ; 1210 ≥ 22μF ; TT series
		≤12.5%	0402≧1μF
16V	≤3.5%	≦5%	0201 ≥ 0.01µF;0402 ≥ 0.033µF;0603 ≥ 0.15µF; 0805 ≥ 0.68µF;1206 ≥ 2.2µF;1210 ≥ 4.7µF
100	≥3.5%	≤10%	0201 ≥ 0.1uF; 0402 ≥ 0.22uF; 0603 ≥ 0.68μF;0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF; TT series
10V	≤5%	≦10%	0201 ≥ 0.012µF;0402 ≥ 0.33µF(0402/X7R ≥ 0.22µF); TT series 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; TT series
NAC-SAC	.TE-20093-852.1	≦20%	0402≥2.2µF
4V	≤15%		

#### Y5V

Rated vol.	D.F.≤	Excepti	on of D.F.≦
≥50V	5%	7%	0603≥0.1μF; 0805≥0.47μF; 1206≥4.7μF
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	70/	9%	0402≥0.068µF; 0603≥0.68µF
(C<1.0µF)	7%	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%		

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<sup>\*\*</sup> 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.

# 7. CAPACITANCE RANGE

# 7-1. NP0 Dielectric 0201, 0402, 0603, 0805 Sizes

DI	ELECTRIC									\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	NP0								
	SIZE		0201				0402					0603		_			0805		
RATE	D VOLTAGE (VDC)	16	25	50	10	16	25	50	100	10	16	25	50	100	10	16	25	50	10
	0.1pF (0R1)	L	L	L	N	N	N	N											
	0.2pF (0R2)		L	L	N	N	N	N											
	0.3pF (0R3)		L	L	N	N	N	N											
	0.4pF (0R4)		L	L	N	N	N	N											
	0.5pF (0R5)		L	L	N	N	N	N	N	S	S	S	S	S	A	A	A	A	1
	0.6pF (0R6)	-	L	L	N	N	N	N	N	S	S	S	S	S	A	A	A	A	1
	0.7pF (0R7) 0.8pF (0R8)	Control bed them	L	L	N	N N	N	N	N	S	S	S	S	S	A	A	A	A	1
	0.9pF (0R9)		L	L	N	N	N	N	N	S	S	S	S	S	A	A	A	A	
	1.0pF (1R0)	-	Ĺ	L	N	N	N	N	N	S	S	S	S	S	A	A	A	A	1
	1.2pF (1R2)		L	L	N	N	N	N	N	S	S	S	S	S	A	A	A	A	1
	1.5pF (1R5)		L	L	N	N	N	N	N	S	S	S	S	S	Α	Α	Α	Α	1
	1.8pF (1R8)	L	L	L	N	N	N	N	N	S	S	S	S	S	Α	Α	Α	Α	1
	2.2pF (2R2)		L	L	N	N	N	N	N	S	S	S	S	S	Α	Α	Α	Α	1
	2.7pF (2R7)		L	L	N	N	N	N	N	S	S	S	S	S	Α	A	A	Α	1
	3.3pF (3R3)		L	L	N	N	N	N	N	S	S	S	S	S	A	A	A	A	
	3.9pF (3R9) 4.7pF (4R7)		L	L	N	N	N	N	N	S	S	S	S	S	A	A	A	A	1
	5.6pF (5R6)		L	L	N	N	N	N	N	S	S	S	S	S	A	A	A	A	1
	6.8pF (6R8)		L	L	N	N	N	N	N	S	S	S	S	S	A	A	A	A	
	8.2pF (8R2)		L	L	N	N	N	N	N	S	S	S	S	S	A	Α	A	A	
	10pF (100)	L	L	L	N	N	N	N	N	S	S	S	S	S	Α	Α	Α	Α	
	12pF (120)	L	L	L	N	N	N	N	N	S	S	S	S	S	Α	Α	Α	Α	1
	15pF (150)		L	L	N	N	N	N	N	S	S	S	S	S	Α	Α	Α	Α	
	18pF (180)		L	L	N	N	N	N	N	S	S	S	S	S	Α	Α	Α	Α	1
	22pF (220)		L	L	N	N	N	N	N	S	S	S	S	S	A	A	A	A	,
	27pF (270) 33pF (330)		L	L	N	N N	N	N	N	S	S	S	S	S	A	A	A	A	
D D	39pF (390)	Annual Property lies	L	L	N	N	N	N	N	S	S	S	S	S	A	A	A	A	1
capacitance	47pF (470)	A STATE OF THE PERSON NAMED IN	L	L	N	N	N	N	N	S	S	S	S	S	A	A	A	A	
	56pF (560)		L	L	N	N	N	N	N	S	S	S	S	S	Α	Α	Α	Α	
2	68pF (680)	L	L	L	N	N	N	N	N	S	S	S	S	S	Α	Α	Α	Α	
3	82pF (820)		L	L	N	N	N	N	N	S	S	S	S	S	Α	Α	Α	Α	1
-	100pF (101)		L	L	N	N	N	N	N	S	S	S	S	S	Α	Α	Α	Α	1
	120pF (121)	L	L	L	N	N	N	N	N	S	S	S	S	S	A	A	A	A	
	150pF (151) 180pF (181)	_			N	N	N	N	N	S	S	S	S	S	A	A	A	A	
	220pF (221)	_			N	N	N	N	N	S	S	S	S	S	A	A	A	A	1
	270pF (271)				N	N	N	N	1.2	S	S	S	S	S	A	A	A	A	
	330pF (331)				N	N	N	N		S	S	S	S	S	Α	Α	A	Α	
	390pF (391)				N	N	N	N		S	S	S	S	S	В	В	В	В	1
	470pF (471)				N	N	N	N		S	S	S	S	S	В	В	В	В	
	560pF (561)				N	N	N	N		S	S	S	S	S	В	В	В	В	1
	680pF (681)		-		N	N	N	N		S	S	S	S	S	В	В	В	В	
	820pF (821) 1,000pF (102)				N	N	N	N		S	S	S	S	S	B	B	B	B	
	1,200pF (102)				IN	IN	14	114		X	X	X	X	X	В	В	В	В	
	1,500pF (152)									X	X	X	X	X	В	В	В	В	Ti
	1,800pF (182)									X	X	X	X		В	В	В	В	
	2,200pF (222)									X	X	X	X		В	В	В	В	
	2,700pF (272)									X	X	X	X		D	D	D	D	
	3,300pF (332)									X	X	X	X		D	D	D	D	
	3,900pF (392)		-						-	X	X	X	X		D	D	D	D	
	4,700pF (472) 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	-
	0.010uF (103)									X	X	X	X		D	D	D	D	
	0.012uF (123)														T	Т	T	Т	
	0.018uF (183)														D	D	D	D	
	0.022uF (223)														D	D	D	D	

<sup>1.</sup> The letter in cell is expressed the symbol of product thickness.

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# 7-1. NP0 Dielectric 1206, 1210, 1812 Sizes

	DIELECTRIC			1206			n e	NP0	1210				1812	
BA	SIZE TED VOLTAGE								1210					
IX.	(VDC)	10	16	25	50	100	10	16	25	50	100	16	50	100
	1.0pF (1R0)													
	1.2pF (1R2)	В	В	В	В	В								
	1.5pF (1R5)	В	В	В	В	В								
	1.8pF (1R8)	В	В	В	В	В								
	2.2pF (2R2)	В	В	В	В	В								
	2.7pF (2R7)	В	В	В	В	В			-					
	3.3pF (3R3)	В	В	В	В	В			-					
	3.9pF (3R9)	В	В	В	В	В	-		-					
	4.7pF (4R7)	B	B	B	В	B	-		-	-				
	5.6pF (5R6) 6.8pF (6R8)	В	В	В	B	В						-		
	8.2pF (8R2)	В	В	В	В	В	-							
	10pF (100)	В	В	В	В	В	С	С	С	С	С	D	D	D
Ť	12pF (120)	В	В	В	В	В	C	C	C	C	C	D	D	D
	15pF (150)	В	В	В	В	В	C	C	C	C	C	D	D	D
	18pF (180)	В	В	В	В	В	C	C	C	C	c	D	D	D
	22pF (220)	В	В	В	В	В	C	C	C	C	C	D	D	D
	27pF (270)	В	В	В	В	В	С	С	С	С	С	D	D	D
	33pF (330)	В	В	В	В	В	C	С	С	С	С	D	D	D
	39pF (390)	В	В	В	В	В	С	С	С	С	С	D	D	D
	47pF (470)	В	В	В	В	В	С	С	С	С	С	D	D	D
	56pF (560)	В	В	В	В	В	С	С	С	С	С	D	D	D
	68pF (680)	В	В	В	В	В	С	С	С	С	С	D	D	D
	82pF (820)	В	В	В	В	В	С	С	С	С	С	D	D	D
_	100pF (101)	В	В	В	В	В	С	С	С	С	С	D	D	D
	120pF (121)	В	В	В	В	В	C	C	C	C	С	D	D	D
	150pF (151)	В	В	В	В	В	С	C	С	С	С	D	D	D
0	180pF (181)	В	B	В	В	В	C	C	C	C	C	D	D	D
2	220pF (221) 270pF (271)	B	В	B	B	B	C	C	C	C	C	D D	D	D
語	330pF (331)	В	В	В	В	В	C	C	C	C	c	D	D	D
bac	390pF (391)	В	В	В	В	В	C	C	C	C	C	D	D	D
Capacitance	470pF (471)	В	В	В	В	В	C	C	C	C	C	D	D	D
_	560pF (561)	В	В	В	В	В	C	C	C	C	C	D	D	D
	680pF (681)	В	В	В	В	В	C	C	C	C	C	D	D	D
	820pF (821)	В	В	В	В	В	С	С	С	С	С	D	D	D
	1,000pF (102)	В	В	В	В	В	С	С	С	С	С	D	D	D
	1,200pF (122)	В	В	В	В	В	С	С	С	С	С	D	D	D
	1,500pF (152)	В	В	В	В	В	С	С	C	С	C	D	D	D
	1,800pF (182)	В	В	В	В	В	С	С	С	С	С	D	D	D
	2,200pF (222)	В	В	В	В	В	С	С	С	С	С	D	D	D
	2,700pF (272)	В	В	В	В	В	С	С	С	С	С	D	D	D
	3,300pF (332)	В	В	В	В	В	С	С	С	С	С	D	D	D
	3,900pF (392)	В	В	В	В	В	С	C	C	С	С	D	D	D
	4,700pF (472)	В	В	В	В	В	C	C	C	C	C	D	D	_ D
	5,600pF (562)	В	В	В	В	В	C	C	C	C	C	D	D	D
	6,800pF (682) 8,200pF (822)	C	C	C	C	C	C	C	C	C	C	D D	D	D
	0.010µF (103)	D	D	D	D	D	C	C	C	C	C	D	D	D
-	0.012µF (123)	T	T	T	T	T	D	D	D	D	D	D	D	D
	0.015µF (153)	Ť	Ť	Ť	Ť	Ť	D	D	D	D	D	D	D	D
	0.018µF (183)	Ť	Ť	Ť	Ť	Ť						D	D	D
	0.022µF (223)	Ť	Ť	Ť	Ť	Ť						D	D	D
	0.027µF (273)	Ť	Ť	Ť	Ť							D	D	D
	0.033µF (333)	T	T	Т	Т							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									

<sup>1.</sup> The letter in cell is expressed the symbol of product thickness.

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## 7-2. X7R Dielectric 0201, 0402, 0603, 0805 Sizes

	DIELECTRIC									1000			X7R											
	SIZE			0201			Ь,		04	02	_				06	03	_	_	L	_	08	05	_	_
RA	TED 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
	100pF (101)			L	L	L		N	N	N	N	N		S	S	S	S	S		В	В	В	В	В
	120pF (121)			L	L	L		N	N	N	N	N		S	S	S	S	S		В	В	В	В	В
	150pF (151)			L	L	L		N	N	N	N	N	_	S	S	S	S	S		В	В	В	В	В
	180pF (181)			L	L	L		N	N	N	N	N		S	S	S	S	S		В	В	В	В	В
	220pF (221)			L	L	L		N	N	N	N	N		S	S	S	S	S		В	В	В	В	В
	270pF (271)	_		L	L	L		N	N	N	N	N	_	S	S	S	S	S		В	В	В	В	В
	330pF (331)			L	L	L	-	N	N	N	N	N	_	S	S	S	S	S		В	В	В	В	В
	390pF (391)	_		L	L	L	-	N	N	N	N	N	-	S	S	S	S	S	-	В	В	В	В	В
	470pF (471)	-		L	L	L		N	N	N	N	N	-	S	S	S	S	S		В	В	В	В	B
	560pF (561) 680pF (681)			L	L	L	-	N	N	N	N	N	-	S	S	S	S	S		B	В	B	В	B
	820pF (821)	-		L	L	L		N	N	N	N	N		S	S	S	S	S		В	В	В	В	B
	1,000pF (102)	1	L	L	ī	L		N	N	N	N	N		S	S	S	S	S		В	В	В	В	В
	1,200pF (102)	L.	L	L	L			N	N	N	N	14	-	S	S	S	S	S		В	В	В	В	В
	1,500pF (152)	L	L	L	L			N	N	N	N			S	S	S	S	S		В	В	В	В	В
	1,800pF (182)	L	Ĺ	L	_			N	N	N	N			S	S	S	S	S		В	В	В	В	В
	2,200pF (222)	L	Ĺ	Ĺ				N	N	N	N			S	S	S	S	S		В	В	В	В	В
	2,700pF (272)	L	L	L				N	N	N	N			S	S	S	S	S		В	В	В	В	В
	3,300pF (332)	L	L	L				N	N	N	N			S	S	S	S	S		В	В	В	В	В
	3,900pF (392)	L	L	L				N	N	N	N			S	S	S	S	S		В	В	В	В	В
	4,700pF (472)	L	L	L				N	N	N	N			S	S	S	S	S		В	В	В	В	В
	5,600pF (562)	L	L					N	N	N	N			S	S	S	S	S		В	В	В	В	В
	6,800pF (682)	L	L					N	N	N	N			S	S	S	S	S		В	В	В	В	В
	8,200pF (822)	L	L					N	N	N	N			S	S	S	S	S		В	В	В	В	В
	0.010µF (103)	L	L	L				N	N	N	N			S	S	S	S	S		В	В	В	В	В
Ø)	0.012µF (123)							N	N	N				S	S	S	S	X		В	В	В	В	В
5	0.015µF (153)							N	N	N				S	S	S	S	X		В	В	В	В	В
ta .	0.018µF (183)							N	N	N				S	S	S	S	X		В	В	В	В	В
Capacitance	0.022µF (223)							N	N	N	N			S	S	S	S	X		В	В	В	В	В
Sag	0.027µF (273)							N	N	N				S	S	S	S	X		В	В	В	В	D
~	0.033µF (333)							N	N	N	N			S	S	S	X	X		В	В	В	В	D
	0.039µF (393)							N	N	N				S	S	S	X	X		В	В	В	В	D
	0.047µF (473)							N	N	N	N			S	S	S	X	X		В	В	В	В	D
	0.056µF (563)							N	N				_	S	S	S	X	X		В	В	В	В	D
	0.068µF (683)						_	N	N	_	N		_	S	S	S	X	X	_	В	В	В	В	D
	0.082µF (823)	_						N	N				_	S	S	S	X	X	_	В	В	В	В	D
	0.10µF (104)						N	N	N	N	N			S	S	S	X	X		В	В	В	В	D
	0.12µF (124)	_			_		_			-		-	_	S	S	X	-	-	_	В	В	В	D	-
	0.15µF (154)	_		-		-	-	-	-	-		-	_	S	S	X	-	-	_	D	D	D	D	-
	0.18µF (184)						NI.	N1	NI.	NI.			-	S	S	X	v			D	D	D	D	Т
	0.22µF (224) 0.27µF (274)				_		N	N	N	N	-	-	V	S X	S	X	X	-		D	D	D	D	1
	0.33µF (334)				_					-			X	X	X	X		-	-	D	D	D	1	-
	0.39µF (394)				_					-		-	X	X	X	X		-		D	D	D	i	
	0.47µF (474)						N	N		1			X	X	X	X	X			D	D	D	i	1
	0.56µF (564)				-		14	.EN	-	1	_		X	x	X	^	^	1		D	D	D	1	1
	0.68µF (684)												X	X	X					D	D	D		
	0.82µF (824)												X	X	X					D	D	D		
	1.0µF (105)						N						X	X		X	X			D	D	D	1	
	1.5µF (155)												^	~	-	-		Î		ī	1	I		
	2.2µF (225)												X	Х					1	1	i	i	1	
	3.3µF (335)													-					Ė			Ė	_	
	4.7µF (475)																		1	1	1	1		1
	6.8µF (685)																				-			
	10µF (106)																		1	1	1			
	22µF (226)												i							1	-			

<sup>1.</sup> The letter in cell is expressed the symbol of product thickness.

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## 7-2. X7R Dielectric 1206, 1210, 1812 Sizes

	DIELECTRIC										7R							
	SIZE			12	06					12	10					1812		
RA	(VDC)	6.3	10	16	25	50	100	6.3	10	16	25	50	100	10	16	25	50	100
	(VDC) 100pF (101)																	
	120pF (121)																	
	150pF (151)		В	В	В	В	В											
	180pF (181)		В	В	В	В	В											
	220pF (221)		В	В	В	В	В											
	270pF (271)		В	В	В	В	В											
	330pF (331)		В	В	В	В	В											
	390pF (391)		В	В	В	В	В	_										-
	470pF (471)		В	В	В	В	В	_										-
	560pF (561)		В	В	В	В	В	_			-							₩
	680pF (681)		В	В	В	В	В											-
	820pF (821)		В	В	В	В	В	-	_	_	_	_		-	-	-	-	-
	1,000pF (102)	7.	В	В	В	В	В		С	С	С	С	С	D	D	D	D	D
	1,200pF (122)		В	B	В	В	В		C	C	C	C	C	D	D	D	D	D
	1,500pF (152)	_	В	В	В	В	В	-	C	C	C	C	C	D D	D	D	D	D
	1,800pF (182) 2,200pF (222)	_	B	В	В	В	В		C	C	C	C	C	D	D	D	D	D
	2,700pF (272)		В	В	В	В	В		C	C	C	C	C	D	D	D	D	D
	3,300pF (332)	_	В	В	В	В	В		C	C	C	C	C	D	D	D	D	D
	3,900pF (392)		В	В	В	В	В		C	C	C	C	C	D	D	D	D	D
	4,700pF (472)		В	В	В	В	В		C	C	C	C	C	D	D	D	D	D
	5,600pF (562)		В	В	В	В	В		C	C	C	C	C	D	D	D	D	D
	6,800pF (682)		В	В	В	В	В		C	C	C	C	C	D	D	D	D	D
	8,200pF (822)		В	В	В	В	В		С	C	C	C	С	D	D	D	D	D
	0.010µF (103)		В	В	В	В	В		C	С	C	С	C	D	D	D	D	D
	0.012µF (123)		В	В	В	В	В		С	С	С	С	С	D	D	D	D	D
0	0.015µF (153)		В	В	В	В	В		С	С	C	С	C	D	D	D	D	D
DC I	0.018µF (183)		В	В	В	В	В		С	С	C	С	C	D	D	D	D	D
ita	0.022µF (223)		В	В	В	В	В		С	С	C	C	С	D	D	D	D	D
Dac	0.027µF (273)		В	В	В	В	В		С	С	C	С	C	D	D	D	D	D
Capacitance	0.033µF (333)		В	В	В	В	В		С	С	С	С	С	D	D	D	D	D
~	0.039µF (393)		В	В	В	В	В		С	С	С	С	С	D	D	D	D	D
	0.047µF (473)		В	В	В	В	В		С	С	С	С	С	D	D	D	D	D
	0.056µF (563)		В	В	В	В	В	_	С	С	С	С	С	D	D	D	D	D
	0.068µF (683)		В	В	В	В	В	_	С	С	С	С	С	D	D	D	D	D
	0.082µF (823)		В	В	В	В	D		С	С	С	С	С	D	D	D	D	D
	0.10µF (104)		В	В	В	В	D	_	С	С	С	С	С	D	D	D	D	D
	0.12µF (124)		В	В	В	В	D	-	С	С	C	C	С	D	D	D	D	D
	0.15µF (154)		C	C	C	C	G	-	C	C	C	C	D	D	D	D	D	D
	0.18µF (184) 0.22µF (224)		C	C	C	C	G		C	C	C	C	D	D D	D	D	D	D
	0.27µF (274)		C	C	C	D	G		C	C	C	C	G	D	D	D	D	D
	0.27µF (274) 0.33µF (334)		C	C	C	D	G		C	C	C	D	G	D	D	D	D	D
	0.39µF (394)		C	C	J	P	G		C	C	C	D	M	D	D	D	D	D
	0.47µF (474)		J	J	J	P	G		c	C	C	D	M	D	D	D	D	K
	0.56µF (564)		J	J	J	P	P	İ	D	D	D	D	M	D	D	D	D	K
	0.68µF (684)		J	J	J	P	P		D	D	D	D	K	D	D	D	K	K
	0.82µF (824)		J	J	J	P	P		D	D	D	D	K	D	D	D	K	K
	1.0µF (105)		J	J	J	Р	Р		D	D	D	D	K	D	D	D	K	K
	1.5µF (155)		J	J	Р					K	G	M	M					K
	2.2µF (225)	J	J	J	Р	Р	Р			K	G	M	M				М	N
	3.3µF (335)		Р	Р	Р					K	G							
	4.7µF (475)		Р	Р	Р	Р			K	K	K	M						
	6.8µF (685)																	
	10μF (106)		Р	Р	Р				K	K	K	M						
	22µF (226)		Р						M	M	M							
	47μF (476)							M	M									
	100µF (107)																	

<sup>1.</sup> The letter in cell is expressed the symbol of product thickness.

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# 7-3. Y5V Dielectric 0402, 0603, 0805 Sizes

	DIELECTRIC								Y	5V							
	SIZE			0402					0603					90	05		
RA	TED VOLTAGE (VDC)	6.3	10	16	25	50	6.3	10	16	25	50	6.3	10	16	25	50	100
	0.010µF (103)		N	N	N	N		S	S	S	S		Α	Α	Α	Α	В
	0.015µF (153)		N	N	N	N		S	S	S	S		Α	Α	Α	Α	В
	0.022µF (223)		N	N	N	N		S	S	S	S		Α	Α	Α	A	В
	0.033µF (333)		N	N	N	N		S	S	S	S		Α	Α	Α	Α	В
	0.047µF (473)		N	N	N			S	S	S	S		Α	Α	Α	Α	В
	0.068µF (683)		N	N	N			S	S	S	S		Α	Α	Α	Α	В
	0.10µF (104)		N	N	N			S	S	S	S		Α	Α	Α	Α	В
۵	0.15µF (154)		N	N				S	S	S	S		Α	Α	Α	Α	
Capacitance	0.22µF (224)	N	N	N				S	S	S	S		Α	Α	Α	Α	
Ħ	0.33µF (334)	N	N	N				S	S	S	X		В	В	В	В	
ac	0.47µF (474)	N	N	N				S	S	X	X		В	В	В	В	
a	0.68µF (684)	N						S	X	X			В	В	D	D	
۰	1.0µF (105)	N	N					S	X	X			В	В	D	D	
	1.5µF (155)							S					D	D			
	2.2µF (225)						S	S	X				D	D	1		
	3.3µF (335)												D	D			
	4.7µF (475)						X	X					D	D	1		
	6.8µF (685)												- 1				
	10µF (106)											1	- 1	1			
	22µF (226)										ij.	1	1				

<sup>1.</sup> The letter in cell is expressed the symbol of product thickness.

## 7-3. Y5V Dielectric 1206, 1210, 1812 Sizes

- [	DIELECTRIC									Y51	/							
	SIZE			12	06					12	10					1812		
RA	(VDC)	6.3	10	16	25	50	100	6.3	10	16	25	50	100	10	16	25	50	100
	0.010µF (103)		В	В	В	В	В						С					D
	0.015µF (153)		В	В	В	В	В						C					D
	0.022µF (223)		В	В	В	В	В						C					D
	0.033µF (333)		В	В	В	В	В						С					D
	0.047µF (473)		В	В	В	В	В						C					D
	0.068µF (683)		В	В	В	В	В						C					D
	0.10µF (104)		В	В	В	В	В		С	С	С	С	C	D	D	D	D	D
	0.15µF (154)		В	В	В	В	С		C	С	С	С	С	D	D	D	D	D
co co	0.22µF (224)		В	В	В	В	С		С	С	С	C	C	D	D	D	D	D
Š	0.33µF (334)		В	В	В	В			С	C	С	C	C	D	D	D	D	D
ta	0.47µF (474)		В	В	В	В			C	C	C	C		D	D	D	D	D
ac	0.68µF (684)		В	В	В	В			С	С	С	С		D	D	D	D	D
Capacitance	1.0µF (105)		С	С	С	С			C	С	С	С		D	D	D	D	D
O	1.5µF (155)		С	С	С		Ī		С	С	С			D	D	D	D	
	2.2µF (225)		С	С	С	J		ĺ	С	С	С	G		D	D	D	D	
	3.3µF (335)		J	J	J				С	С	C			D	D	D	D	
	4.7µF (475)		J	J	J	Р			С	С	D	G		D	D	D	D	
	6.8µF (685)		J	J					С	С	D			D	D	D	D	
	10µF (106)		J	J	Р			Ì	D	D	G			D	D	D	K	
	22µF (226)		Р	Р					K	K								
	47µF (476)	Р						K	K						M			1
	100µF (107)							M										

<sup>1.</sup> The letter in cell is expressed the symbol of product thickness.

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# 7-4. X5R Dielectric 0201, 0402, 0603, 0805, 1206, 1210 Sizes

	Dielectric								X5R							
	Size			0201					0402					0603		
Rate	d Voltage (VDC)	6.3	10	16	25	50	6.3	10	16	25	50	6.3	10	16	25	50
	100pF (101)			L	L	L										
	120pF (121)			L	L	L										4
	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										_
Ļ	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											
0	0.015µF (153)	L	L													
2	0.022µF (223)	L	L													
Capacitance	0.027µF (273)	L	L						N							
pac	0.033µF (333)	L	L						N							
Ca	0.039µF (393)	L	L						N							
Ŭ.,	0.047µF (473)	L	L						N							
	0.056µF (563)	L	L					N	N							
	0.068µF (683)	L	L					N	N							
	0.082µF (823)	L	L				N	N	N							
1	0.10µF (104)	L	L	L	L		N	N	N	N	N					
	0.15µF (154)						N	N	N	N						
	0.22µF (224)	L	L				N	N	N	N	N			X	X	
	0.27uF (274)												X	X	Х	
	0.33µF (334)						N	N				X	X	X	X	
	0.39µF (394)												X	X	X	
	0.47µF (474)	L					N	N	E	E	E		Х	Х	X	X
	0.68µF (684)						N	N				X	X	X	X	
	0.82uF (824)											X	X	X		
	1.0µF (105)	L	L				N	N	N	N		X	Х	X	Х	X
	1.5µF (155)											Х				-
	2.2µF (225)	L					N	N	E	E		X	X	X	X	X
	3.3µF (335)											X	X			
	4.7µF (475)						E	E				X	X	X	X	
	6.8uF (685)												100		200	
	10µF (106)						E					Х	X	X	Х	
	22µF (226)											X	X			

	Dielectric									X5R								
	Size			08	05					1206					12	10		
Rated	Voltage (VDC)	4	6.3	10	16	25	50	6.3	10	16	25	50	4	6.3	10	16	25	50
	1.0µF (105)			D	D	D	1											
	1.5µF (155)		- 1	ı	- 1	1			J	J					K	K		
	2.2µF (225)		1	-1	-1	- 1	1		J	J	P	P			K	K		
9	3.3µF (335)		1	1	1	1			P	Р	P							
au	4.7µF (475)		- 1	1	-1	1	- 1	P	Р	P	P	Р			K	K	K	
cit	6.8uF (685)							Р	Р									
Capacitance	10µF (106)		1	1	-1	1	1	Р	P	P	Р	Р		K	K	K	K	M
ပိ	22µF (226)		1	-1	1			Р	P	P	P			M	M	M	M	
	47µF (476)		1	-1				P	Р					M	М	M		
	100µF (107)	1						Р						M	M			
	220µF (227)												M					

<sup>1.</sup> The letter in cell is expressed the symbol of product thickness.

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# 7-5. X6S Dielectric 0201, 0402, 0603, 0805, 1206, 1210 Sizes

	Dielectric													X	S													
	Size	0:	201		04	02				0603					08	05					12	06				1210		
Rate	d Voltage (VDC)	4	6.3	6.3	10	16	25	4	6.3	10	16	25	4	6.3	10	16	25	50	6.3	10	16	25	50	6.3	10	16	25	50
	0.10µF (104)	L	L																									
	0.15µF (154)																											
	0.22µF (224)		L																									
	0.33µF (334)																											
	0.47µF (474)			N																								
	0.68µF (684)																		ĺ									
8	1.0µF (105)	L		N	E	E	E																					
tan	1.5µF (155)												П						П									
Capacitance	2.2µF (225)			N	Ε	Е						X																
ပိ	3.3µF (335)																						İ					
	4.7µF (475)							Ì	X		X	X	İ				1	1										
	6.8uF (685)																		Ì									
	10µF (106)								X	X	X		1	1	1	1	1					G		Î				
	22µF (226)							X	X					1	1	1				P	P						M	
	47µF (476)												1						P					M	М	M		
	100µF (107)																						İ	M				

<sup>1.</sup> The letter in cell is expressed the symbol of product thickness.

# 8. PACKAGING STYLE AND QUANTITY

A	T111	make a second	Pape	r tape	Plasti	c tape
Size	Thickness (mm)/Sy	/mboi –	7" reel	13" reel	7" reel	13" reel
	0.30±0.03	L	15,000	70,000		2
0201 (0603)	0.30±0.05	L	15,000			-
- Marine and Marine and Alberta	0.30±0.09	L	15,000		25	
	0.50±0.05	N	10,000	50,000		
0402 (1005)	0.50+0.02/-0.05	Q	10,000	50,000		
and the second second	0.50±0.20	E	10,000			
	0.50±0.10	Н	4,000			
0603 (1608)	0.80±0.07	S	4,000	15,000		
	0.80+0.15/-0.10	X	4,000	15,000		
	0.50±0.10	Н	4,000	15,000	24	
	0.60±0.10	A	4,000	15,000		
0005 (2012)	0.80±0.10	В	4,000	15,000		-
0805 (2012)	0.85±0.10	T	4,000	15,000	-	
	1.25±0.10	D			3,000	10,000
	1.25±0.20	1			3,000	10,000
	0.80±0.10	В	4,000	15,000		-
	0.85±0.10	T	4,000	15,000		-
	0.95±0.10	C			3,000	10,000
1206 (3216)	1.15±0.15	J			3,000	10,000
	1.25±0.10	D			3,000	10,000
- II	1.60±0.20	G			2,000	10,000
	1.60+0.30/-0.10	P			2,000	9,000
	0.85±0.10	T		24	3,000	10,000
	0.95±0.10	C	*		3,000	10,000
1210 (2225)	1.25±0.10	D			3,000	10,000
1210 (3225)	1.60±0.20	G	2	-	2,000	-
	2.00±0.20	K		5 <del>0</del> .	1,000	6,000
	2.50±0.30	M			1,000	6,000
	1.25±0.10	D	* .		2,000	10,000
1909 (4520)	1.10±0.15	F		9	2,000	10,000
1808 (4520)	1.60±0.20	G	-		2,000	8,000
	2.00±0.20	K	*		1,000	6,000
	1.25±0.10	D	3		1,000	5,000
	1.60±0.20	G	2		1,000	-
1812 (4532)	2.00±0.20	K			1,000	
	2.50±0.30	M			500	3,000
	2.80±0.30	U	2		500	-

Unit: pieces

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# 9. RELIABILITY TEST CONDITIONS AND REQUIREMENTS

No.	Item	Test Condition					Requirements				
1.	Visual and Mechanical		* No rem				ndividual specification sheet.				
2.	Capacitance	Class I: (NP0)					given in the detailed spec.				
	Q/ D.F.	≤1000pF, 1.0±0.2Vrms • 1MHz±10%	NP0:	Cap≥3	0pF, Q≥	1000;	Cap<30pF,Q≥400+20C				
	(Dissipation	>1000pF, 1.0±0.2Vrms · 1KHz±10%	X7R,X	_							
	Factor)	Class II: (X7R, X7E, X6S, X5R, Y5V)	Rated vol.	D.F.≦	Exce	ption	of D.F. ≦				
		C≦10µF, 1.0±0.2Vrms • 1KHz±10% **		-0.51	_ ≤3%	1	206≥0.47μF				
		C>10µF, 0.5±0.2Vrms · 120Hz±20%	≥100V	≦2.59	% ≤5%	0	805>0.1µF, 0603≥0.068µF, 1206>1µF;	TT series			
					≦3%	0	201(50V); 0603≥0.047μF; 0805≥0.18μ	ıF;1206≧0.47μF			
		** Test condition: 0.5±0.2Vrms · 1KHz±10%	50V	≤2.59	% ≦5%	_	210≧4.7μF				
		X7R: 0805=106(6.3V&10V)			≤10		402≧0.1μF;0603>0.1μF; 0805≧1μF;12 210≧10μF; TT series	06≧2.2μF;			
		X5R: 01R5≥103, 0201≥224 (6.3V,10V),	35V	≤3.59	% ≤10	_	603≥1µF;0805≥2.2µF; 1210≥10µF				
		0402≥475 (6.3V), 0402≥225(10V),			≤5%	_	201≥0.01µF;0805≥1µF; 1210≥10µF				
		0603=106 (6.3V,10V),			≤7%	_	603≥0.33μF; 1206≥4.7μF				
		TT18X≧475(10V) , TT15X series	25V	≦3.59	% ≤10°		402≥0.10μF;0603≥0.47μF; 0805≥2.2μ 206≥6.8μF; 1210≥22μF; TT series	μ <b>F</b> ;			
		X6S:0201≥104 (6.3V),0402≥225 (6.3V),			≤12		402≥1μF				
		0603≥106 (6.3V),			≤5%	0	201≥0.01µF;0402≥0.033µF;0603≥0.1				
			16V	≤3.59	Same Co.	0	805≥ 0.68μF;1206≥ 2.2μF;1210≥ 4.7μF 201≥ 0.1υF; 0402≥ 0.22υF; 0603≥ 0.68 206≥ 4.7μF; 1210≥ 22μF; TT series				
			10V	≤5%	≤10	<sub>6</sub> 0	201 ≥ 0.012µF;0402 ≥ 0.33µF(0402/X7R ≥ 0 603 ≥ 0.33µF; 0805 ≥ 2 2µF;1206 ≥ 2 2µF;1				
				=0.0	≤15		201≥0.1μF; 0402≥1μF				
					≤15		201≥0.1µF;0402≥1µF;0603≥10µF; 08	805≥4.7μF;			
			6.3V	≤10%	≤20	_	206≥47µF :1210≥100µF; TT series 402≥2.2µF				
			4V	≤15%		~ -					
			Y5V:			_					
			Rated v			STREET, STREET	ption of D.F.≦				
			≥50V 35V	$\overline{}$		7%	0603≥0.1μF; 0805≥0.47μF;1206≥4	4.7µF			
			25V		5%	7%	$0402 \ge 0.047 \mu F; 0603 \ge 0.1 \mu F; \\ 0805 \ge 0.33 \mu F; 1206 \ge 1 \mu F; 1210 \ge 4.7$				
			16V (C<1.0)	ıF)	7%	9% 9% 12.5%	0402≥0.068μF;0603≥0.47μF;1206 0402≥0.068μF;0603≥0.68μF 6 0402≥0.22μF	≧4.7μF;1210≧22μ			
			16V			12.5%	0603≥2.2μF; 0805≥3.3μF;	Rio!			
			(C≧1.0 10V	pr)	***	20%	°   1206≥10μF; 1210≥22μF;1812≥47j   0402≥0.47μF	μF			
			6.3V	-	20%						
	Dielectric Strength	* To apply voltage (≤100V) 250%.  * Duration: 1 to 5 sec.  * Charge and discharge current less than 50mA.					flash over during test.				
5.	Insulation Resistance	To apply rated voltage for max. 120 sec.					chever is smaller.				
	Resistance		2000 U	1015	X5R, X6	5, 15	,,,	Insulation			
			Rated v	MARKATAN.				Resistance			
			100V: X		F-0805>	luF:1	206≥4.7μF;1210≥4.7μF	- 1			
			and the second second	-	μF:1210	-		10GΩ or			
							:0805≥2.2µF;1206≥10µF;1210≥10µF	RxC≥100 Ω-F			
			16V:040	02≥0.2	2μF;060	3≥1µl	F;0805≥2.2µF;1206≥10µF;1210≥47µF	whichever is smaller.			
					ηF;04022 μF;1210		μF;0603≥0.47μF;0805≥2.2μF;	- Containon			
			6.3V ; 4	No. of Concession, Name of Street, or other Designation, Name of Street, or other Designation, Name of Street,	μι , ι 2 ι 0	=47 p		1			
			Rated v	oltage	§ I			Insulation			
			All X6S	items		_		Resistance			
					μF; 060	3≥2.2	μF; 0805≥10μF;1206≥10μF	j			
			35V: 06					]			
						2≥0.2	2μF;0603≥10μF;1206≥22μF	RxC≥50 Ω-F.			
			16V: 06			3≥10	μF; 0805≥47μF	- 1			
			6.3V: 02					-			
			0.5V. UZ								

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No.	Item		Test Condition			Requirements	
6.	Temperature	With no e	electrical load.				
	Coefficient	T.C.	Operating Temp		T.C.	Capacitance Change	
	o considera	NPO	-55~125°C at 25°C		NPO	Within ±30ppm/°C	
		X7R	-55~125°C at 25°C		X7R	Within ±15%	
		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%	
7.	Adhesive Strength of Termination	1N (02	rizing force : :01) and 5N (≤0603) and 10N ( :e: 10±1 sec.	(>0603)	* No rema	arkable damage or removal of the terminations	é.
8.	Vibration Resistance	* Total ar * Test tim perpendi	on frequency: 10-55 Hz/min. inplitude: 1.5mm ine: 6 hrs. (Two hrs each in thre cular directions.) rement to be made after keepin hrs.		- A-4-17-11-05-11-05-	arkable damage. ange and Q/D.F.: To meet initial spec.	
9.	Solderability	Control of the Control	temperature: 235±5°C		95% min.	coverage of all metalized area.	
10.	Bending Test	means of second u pressure	ddle part of substrate shall be if the pressurizing rod at a rate intil the deflection becomes 1 if shall be maintained for 5±1 serement to be made after keeping hrs.	of about 1 mm per mm and then the ec.	* Cap cha NP0: wit X7R, X5 Y5V: wit (This ca	arkable damage.  Inge: hin ±5% or 0.5pF whichever is larger R, X6S: within ±12.5% hin ±30% pacitance change means the change of capaciflexure of substrate from the capacitance means	
11.	Resistance to	* Solder	temperature: 260±5°C		* No rema	arkable damage.	
	Soldering Heat	* Dipping * Prehea the capa * Before 150+0/-1 temp.	time: 10±1 sec ting: 120 to 150°C for 1 minute citor in a eutectic solder. initial measurement (Class II o 0°C for 1 hr and then set for 2	only): Perform 4±2 hrs at room	* Cap cha NP0: w X7R, X Y5V: w * Q/D.F.,		irements.
12.	Temperature Cycle		t the five cycles according to t	the temperatures	* No rema	rkable damage.	
		and time			* Cap cha	nge:	
		Step	Temp. (°C)	Time (min.)	NP0: wi	thin ±2.5% or 0.25pF whichever is larger	
		1	Min. operating temp. +0/-3	30±3	ALC: UNKNOWN	5R, X6S: within ±7.5%	
				2~3		ithin ±20%	
		2	Room temp.			I.R. and dielectric strength: To meet initial requ	irements
		3	Max. operating temp. +3/-0	30±3			
		4	Room temp.	2~3			
		150+0/-1 temp.	initial measurement (Class II on 0°C for 1 hr and then set for 2 rement to be made after keeping hrs.	4±2 hrs at room			

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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): 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.	* Cap of NP0: X7R, **10\ Y5V: * Q/D.F NP0:	change within X5R, V: 0603 ≥10V, value More Less t	±5% or X6S: ≥10 TT: i≥4.7µF within ± : than 30µ han 10p	0.5pF w 0V**,with series & 7;0402≧ 30%; ≦	whichever is larger hin ±12.5%; ≤6.3V within ±25%; C≥ 1uF, within ±25% 1μF, 0201≥0.1μF, within ±25%; 6.3V, within +30/-40%  0, 10pF≤C≤30pF, Q≥275+2.5C 0+10C	
			X7R, X			ion of D.		
			≥100\			1206≥		
			≥ 1001	≥3%			$0.1\mu\text{F},0603 \ge 0.068\mu\text{F},1206 > 1\mu\text{F};T$	
					_	_	60V);0603≥0.047μF; 0805≥0.18μF;	1206≧0.47µF
			≥50V	≦3%		1210 ≥	4.7µF; 0.1µF; 0603>0.1µF; 0805≧1µF; 120	16 ≥ 2 2µF·
					≤20%		10µF; TT series	о≡ Елері ,
			35V	≦5%			1μF; 0805≥2.2μF;1210≥10μF	
					_	-	0.01µF;0805≥1µF; 1210≥10µF	
			25V	≤5%		0402	$0.33\mu\text{F}; 1206 \ge 4.7\mu\text{F}$ $0.10\mu\text{F}; 0603 \ge 0.47\mu\text{F}; 0805 \ge 2.2\mu\text{F};$	1206 > 6 9E.
			F		≤15%		22μF; TT series	1200 € 0.0µm,
					≦20%	0402≥	1μF	
					≦10%		$0.15\mu F;0805\!\ge\!0.68\mu F;1206\!\ge\!2.2\mu F;$	
			16V	≦5%	≤15%		0.01µF;0402≥0.033µF;0603≥0.68µ 4.7µF; 1210≥22µF; TT series	ıF;0805≧2.2µl
			$\vdash$	-		0201	0.012µF; 0402≥0.33µF(0402/X7R≥	0.22nE):
			10V	≤7.59	≤15%		0.33µF;0805≥2.2µF;1206≥2.2µF;	
			,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		≦20%		0.1μF :0402≧1μF; TT series	
			6.3V	≤15%	≤30%		$0.1\mu F;0402 \ge 1\mu F;0603 \ge 10\mu F;$	
			4V	≤20%	-	0605≧	4.7μF;1206≥47μF;1210≥100μF;TT	series
				≥20%				
			Y5V:	Total	D.F.S	Event	on of D.F.≦	
							0603≥0.1μF; 0805≥0.47μF;	
			≥50V		7.5%	10%	1206≥4.7μF	
			35V		10%	***		
			25V		7.5%	10%	0402≥0.047μF;0603≥0.1μF; 0805≥0.33μF;1206≥1μF; 1210≥4.7μF	
						15%	0402≥0.068μF;0603≥0.47μF; 1206≥4.7μF; 1210≥22μF	
			16V		10%	12.5%	0402 ≥ 0.068µF; 0603 ≥ 0.68µF	
			(C<1.0	)μF)	10%	20%	0402≧0.22µF	
			16V (C≧1.	.0μF)	12.5%	20%	0603 ≥ 2.2μF; 0805 ≥ 3.3μF;   1206 ≥ 10μF;1210 ≥ 22μF;   1812 ≥ 47μF;	
			10V		20%	30%	0402≧0.47µF	
				10V, 10		0 Ω-F wt	nichever is smaller.	
			Rated	voltage				Insulation Resistance
			100V:	X7R				TOSISIBILE
					μF;060	3≥1µF;0	805≥1μF;1206≥4.7μF;1210≥4.7μF	1
				0.99-2-11-11-11			210≧10μF	-
			25V:02	201≥0	A A STATE OF THE S	02≥0.22	rμF; 0603≥2.2μF;0805≥2.2μF;	IGΩ or RxC≥10 Ω-F
			12	206≥10	μF;1210	≥47μF	'μF;0603≥1μF;0805≥2.2μF;	whichever is smaller.
							F;0603≥0.47μF;0805≥2.2μF;	
			$\overline{}$		μF;121	: All X69	itame	-1

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No	Item	Test Condition					Requirements	
14	Humidity (Damp Heat) Load	* 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.	Cap ch NP0 X7R **10' Y5V Q/D.F.	nange: : ±7.5% , X5R, X V: 0603 : ≥10V, value:	X6S: ≥10 TT : i≥4.7µF within ±	pF which 0V**,with series & ;0402≧ 30%; ≦	hever is larger. hin ±12.5%; ≤6.3V within ±25%; C≥ 1uF,within ±25% 1μF;0201≥0.1μF, within ±25%; 6.3V, within +30/-40% oF, Q≥100+10/3C	
		* Measurement to be made after	_	X5R,				
		keeping at room temp. for 24±2 hrs.	Rated	_		on of D.I		
			≥100\	≦3%			0.1µF, 0603≥ 0.068µF, 1206>1µF; TT	series
					-	-	0V);0603≥0.047μF; 0805≥0.18μF; 1	NAME OF TAXABLE PARTY.
			≥50V	≤3%	≤10%	1210≧		
					≦20%		0.1μF; 0603>0.1μF; 0805≥1μF; 1206 10μF; TT series	≥2.2μF;
			35V	≤5%	≤20%	-	1μF; 0805≥2.2μF;1210≥10μF	
							0.01µF;0805≥1µF; 1210≥10µF	
				191222	≤14%	-	0.33μF;1206≧4.7μF	
			25V	≤5%	≤15%		$0.10\mu\text{F};0603 \ge 0.47\mu\text{F};0805 \ge 2.2\mu\text{F};1.22\mu\text{F};TT series}$	206≧6.8µF;
				1	< 20%	0402≥	NAME OF TAXABLE PARTY O	
					-		0.15µF;0805≥0.68µF;1206≥2.2µF;1	210≥4.7µF
			16V	≦5%	≤15%	0201≥	$0.01\mu\text{F};0402 \ge 0.033\mu\text{F};0603 \ge 0.68\mu\text{F}$	Name and Address of the Owner, where the Owner, which is the Owner, which
						0201	4.7μF; 1210≥22μF; TT series 0.012μF; 0402≥0.33μF(0402/X7R≥0.	22μF):
			10V	≦7.59		0603≥	0.33μF;0805≥2.2μF;1206≥2.2μF; 12 0.1μF;0402≥1μF; TT series	
			6.3V	≤15%		0201≧	0.1µF;0402≥1µF;0603≥10µF;	
			4V	≤20%		0805≥	4.7μF;1206≥47μF;1210≥100μF;TT s	series
			Y5V:		_			
			Rated	vol.	D.F.≦	Excepti	on of D.F.≦	
			≥50V		7.5%	10%	0603≥0.1μF; 0805≥0.47μF; 1206≥4.7μF	
			35V		10%			
						10%	0402≥0.047μF;0603≥0.1μF; 0805≥0.33μF;1206≥1μF;	
			25V		7.5%	15%	1210≥4.7μF   0402≥0.068μF;0603≥0.47μF;	
			161/			10000	1206≥4.7µF; 1210≥22µF	
			16V (C<1.0	OµF)	10%	12.5%	0402≥0.068μF; 0603≥0.68μF 0402≥0.22μF	
			16V		12.5%		0603≥2.2μF; 0805≥3.3μF; 1206≥10μF;1210≥22μF;	
			(C≧1	.0μ-)			1812≥47µF;	
			10V 6.3V	$\overline{}$	20% 30%	30%	0402≥0.47μF	
			0.50		JU /0			
						25 Ω-F 6S, Y5V	whichever is smaller.	
				voltage			for	Insulation Resistance
			100V:	X7R				Todistance
			50V:04	402≥0.1	μF;060	3≥1µF;0	805≥1µF;1206≥4.7µF;1210≥4.7µF	1
			35V:06	603≥1µ	F;0805≥	2.2µF;1	210≧10µF	1
					1uF; 04 µF;1210		μF; 0603≥2.2μF;0805≥2.2μF;	500MΩ or RxC≥5 Ω-F
			16V: 0	201≥0		02≥0.22	μF;0603≥1μF;0805≥2.2μF;	whichever is smaller.
			10V:02	201≥47	nF;0402	≥0.47µF	F;0603≥0.47µF;0805≥2.2µF;	1
				_	μF;121		14.	-1
			IIO .3 V	4V 1	series	All XD	items	

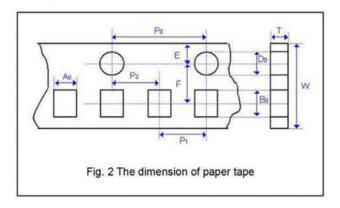
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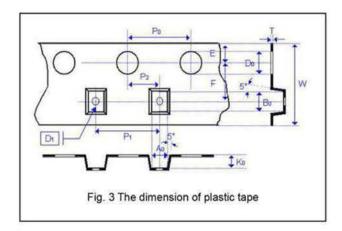
lo	Item		Test C	ondition						Requirements	
5.	High Temperature	*Test ter	mp. :			* No re	markat	ole dama	age.		
	Load		K7R/X7E: 125±3	3°C		Cap ch	ange:		7.53		
	(Endurance)	X6S; 1	05±3°C			2 Charles			The state of the s	hever is larger	
		X5R, 1	75V: 85±3°C			X7R	, X5R,			nin ±12.5%; ≤6.3V within ±25%;	
		*Test tin	ne: 1000+24/-0	hrs.		**10	nv. nen			C≥ 1uF, within ±25% ≥ 1µF; 0201 ≥ 0.1µF, within ±25%;	
		*To appl	y voltage:			1				6.3V, within +30/-40%	
		(1) ≦6.	3V or $C \ge 10 \mu F$	or TT serie	s:	Q/D.F.	- September 1	within 2	30 %,	6.5V, WILLIII +30/-40%	
		100000000000000000000000000000000000000	% of rated voltag	A				than 30r	F, Q≥35	50	
		(2) 10V	≤Ur<500V: 200	% of rated	voltage.	1		A Landau Common	75+2.50		
			/: 150% of rated			1			200+100		
			630V: 120% of		**************************************	The state of the state of	5R, X6				
		The second second	% of rated voltage			Rated		1			
		Size	Dielectric	Rated	Capacitance	vol.	D.F.≦	Except	ion of D.I	5.S	
		0201	X5R/X7R/X6S	≤10V	C≥0.1µF	≥100\	≤3%	≤6%	1206≥	0.47µF	
	1	0402	X5R/X7R/X6S	6.3V,10V	C≥1.0µF	100	2070	_	-	$0.1\mu\text{F}, 0603 \ge 0.068\mu\text{F}, 1206 > 1\mu\text{F};$	WHEN PERSON NAMED IN COLUMN
		0402	Y5V	,25V	C ≤ 1.0µF			≦6%		$0V$ );0603 $\geq$ 0.047 $\mu$ F; 0805 $\geq$ 0.18 $\mu$ F	; 1206≥0.47µF
				4V	C≧22µF	≥50V	≤3%	≤10%	1210≥	THE STATE OF THE S	
		0603	X5R/X7R/X6S	6.3V,10V	C≧4.7µF			≤20%		0.1µF; 0603>0.1µF; 0805≥1µF; 12	206≥2.2μF;
				25V,35V	C≥1.0µF	35V	≤5%	≤20%	-	10μF; TT series 1μF; 0805≥2.2μF;1210≥10μF	
				4V	C≧47µF	357	≥5%		_	1μF; 0805≥2.2μF; 1210≥10μF 0.01μF;0805≥1μF; 1210≥10μF	
		0805	X5R/X7R/X6S	6.3V	C≧22µF	The state of the s				0.33µF;1206≥4.7µF	
		3000		10V~50V		25V	≤5%		0402	0.10μF;0603 ≥ 0.47μF;0805 ≥ 2.2μ	F:1206 > 6 8uF
			VEDIVATIVA		C≥10µF			≤15%		22μF; TT series	,,200 _ 0.0µr,
		1206	X5R/X7R/X6S	6.3V	C≧47µF			≤20%	0402≥	The state of the s	
			NP0	3000V	C≥1.5pF			≤10%	0603≥	0.15µF;0805≥0.68µF;1206≥2.2µ	F;1210≥4.7µF
		1210	X5R/X7R/X6S	16V	C≧47µF	16V	≦5%	≤15%		$0.01\mu\text{F};0402 \ge 0.033\mu\text{F};0603 \ge 0.66$	
		TT18	Y5V	6.3V,10V	C≧2.2µF			≥ 15%		4.7μF; 1210 ≥ 22μF; TT series	
		TT21	Y5V	6.3V	C≧10µF			_≤15%		$0.012 \mu F; 0402 \! \ge \! 0.33 \mu F (0402/X7R)$	
		TT31	Y5V	6.3V	C≥22µF	10V	≤7.5%	0		$0.33\mu\text{F};0805 \ge 2.2\mu\text{F};1206 \ge 2.2\mu\text{F}$	; 1210≥22µF
			tems must follo	1,000,000,000			_	≤20%		0.1μF ;0402≥1μF; TT series	
			6 of rated voltage	Constitution of the Consti		6.3V	≤15%	≤30%		0.1µF;0402≥1µF;0603≥10µF;	TT and an
		Size	Dielectric	Rated	Capacitano	1	≤20%	_	0000	$4.7\mu\text{F};1206 \ge 47\mu\text{F};1210 \ge 100\mu\text{F};7$	i i series
	1		X5R/X7R/X6	voltage		TV.	≥20%				
		0201	ASKIATRIAG	16V/25V		H					
			X5R/X7R/X6	50V	C≧0.1µF	Y5V:					
		0402	S	10~25V	C≧0.22µF	Rated	vol.	D.F.≤	Excepti	on of D.F.≦	
			Y5V	16V	C≧0.47µF	≥50V		7.5%	10%	0603≥0.1μF; 0805≥0.47μF;	
			X7R	50V	C>0.1µF	35V		10%		1206≧4.7μF	
		0603	X5R/X7R/X6	10~50V	_	1000	_	1076		0402≥0.047µF;0603≥0.1µF;	
			Y5V	16V	C≥2.2µF	Ħ			10%	0805≥ 0.33μF;1206≥ 1μF;	
			X5R/X7R/X6			25V		7.5%	0.020	1210≥4.7µF	
			ASIOATIOAO	10~50V	-	#			15%	$0402 \ge 0.068 \mu F; 0603 \ge 0.47 \mu F;$	
		0805	X5R/X7R	50V	C≧2.2µF	161/				1206≥4.7μF; 1210≥22μF 0402≥0.068μF; 0603≥0.68μF	
			(A) (A) (A) (A) (A) (A) (A) (A) (A) (A)	100V	C≧0.47µF	16V (C<1.0	OuF)	10%	12.5%	0402≥0.068µF; 0603≥0.68µF	
			Y5V	16V	C≥4.7µF		p. /		2076	0603≥2.2μF; 0805≥3.3μF;	
		1206	X5R/X7R/X6	100V	C>1.0µF	16V	0	12.5%	20%	1206≥ 10µF;1210≥ 22µF;	
		2220	X7R	100V	C≧6.8µF	(C≧1	.орг)			1812≧47µF;	
						10V		20%	30%	0402≥0.47μF	
		100000000000000000000000000000000000000	initial measurer			6.3V		30%		***	
			st voltage for 1h		mp. and then		2023/09/1007		Marian a	N CO	
		STATE OF THE PARTY.	24±2 hrs at room		oning of	*I.R.: ≥	10V, 10	$3\Omega$ or $50$	Ω-F wh	nichever is smaller.	
		1000	rement to be ma	ide after Ke	eping at room	Class I	I (X7R.	X5R, X	6S, Y5V	)	
			r 24±2 hrs								Leaved and
		De-ra	ting conditions:			Rated	voltage				Insulation Resistance
		120 FF			TTTTT	100V:	X7R				- toolounoc
		Z 100		ЩШ				μF:060	3≥1µF:0	805≥1µF;1206≥4.7µF;1210≥4.7µF	_
		degen	HHHIN	NN	- Product for 128Yo	_		_		210≧10µF	
		M 60		MININ	Produit for 106°C	251/-01				μF; 0603≥2.2μF;0805≥2.2μF;	1GΩ or
		B 40			- Product No Allino			μF;1210		p. , soosse.ehi ,ooosee.ehi ,	RxC≥10
		g 45				· Designation of the last of t	-		_	μF;0603≥1μF;0805≥2.2μF;	Ω-F whichever
		8						μF;1210			smaller.
		2 "					_			;0603≥0.47µF;0805≥2.2µF;	
		0	25 50 15	100	125 150	3		μF;121			- 1
						1		-			_
			Temperature a	Propiet (*C)					All X6S	items	

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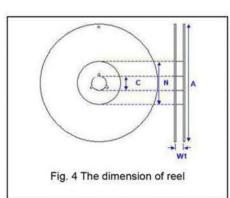
# **APPENDIXES**

## ■ Tape & reel dimensions





Size	0201	04	102	0603		0805			1206			1210			1812	
Thickness	L	N	E	S, X	A, H	B, T	C, D, I	B, T	C, J, D	G,P	C, D	F, G, K	м	D, F, G, K	М	U
Ao	0.38±0.05	0.62±0.05	0.70±0.10	1.02±0.05	1.50±0.10	1.50±0.10	<1.57	2.00±0.10	<1.85	<1.95	<2.97	<2.97	<2.97	<3.81	<3.81	<3.90
B <sub>0</sub>	0.68±0.05	1.12±0.05	1.20±0.10	1.80±0.05	2.30±0.10	2.30±0.10	<2.40	3.50±0.10	<3.46	<3.67	<3.73	<3.73	<3.73	<5.30	<5.30	<5.30
Т	0.42±0.05	0.60±0.05	0.70±0.10	0.95±0.05	0.75±0.05	0.95±0.05	0.23±0.05	0.95±0.05	0.23±0.05	0.23±0.05	0.23±0.05	0.23±0.05	0.23±0.05	0.25±0.05	0.25±0.05	0.25±0.05
K <sub>0</sub>		-	6		-		<2.50	+	<2.50	<2.50	<2.50	<2.50	<3.00	<2.50	<3.00	<3.50
w	8.00±0.10	8.00±0.10	8.00±0,10	8.00±0.10	8.00±0.10	8.00±0.10	8.00±0.10	8.00±0.10	8.00±0.10	8.00±0.10	8.00±0.10	8.00±0.10	8.00±0.10	12.0±0.20	12.0±0.20	12.0±0.20
Po	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	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10
10xPo	40.0±0.10	40.0±0.10	40.0±0.10	40.0±0.10	40.0±0.10	40.0±0.10	40.0±0.10	40.0±0.10	40.0±0.10	40.0±0.10	40.0±0.10	40.0±0.10	40.0±0.10	40.0±0.10	40.0±0.10	40.0±0.20
P <sub>1</sub>	2.00±0.05	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	4.00±0.10	8.00±0.10	8.00±0.10	8.00±0.10
P2	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±0.05	2.00±0.05	2.00±0.05	2.00±0.05	2.00±0.05
D <sub>0</sub>	1.55±0.05	1.55±0.05	1.55±0.05	1.55±0.05	1.55±0.05	1.55±0.05	1.50±0.05	1.50±0.05	1.50±0.05	1.50±0.05	1.50±0.05	1.50±0.05	1.50±0.05	1.50±0.05	1.50±0.05	1.50±0.10
D,		*	•			- 94	1.00±0.10		1.00±0.10	1.00±0.10	1.00±0.10	1.00±0.10	1.00±0.10	1.50±0.10	1.50±0.10	1.50±0.10
E	1.75±0.05	1.75±0.05	1.75±0.05	1.75±0.05	1.75±0.05	1.75±0.05	1.75±0.10	1.75±0.10	1.75±0.10	1.75±0.10	1.75±0.10	1.75±0.10	1.75±0.10	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	3.50±0.05	3.50±0.05	5.50±0.05	5.50±0.05	5.50±0.05

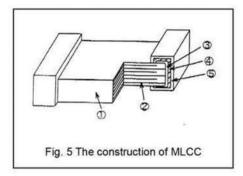


Size	0201, 04	02, 0603, 0805, 12	06, 1210	1812
Reel size	7"	10"	13"	7"
С	13.0+0.5/-0.2	13.0+0.5/-0.2	13.0+0.5/-0.2	13.0+0.5/-0.2
W <sub>1</sub>	8.4+1.5/-0	8.4+1.5/-0	8.4+1.5/-0	12.4+2.0/-0
Α	178.0±0.10	250.0±1.0	330.0±1.0	178.0±0.10
N	60.0+1.0/-0	100.0±1.0	100±1.0	60.0+1.0/-0

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#### ■ Constructions

No.	Na	me	NPO, X7R, X5R, X6S, Y5V
①	Ceramic	material	BaTiO <sub>3</sub> based
2	Inner e	lectrode	Ni
3		Inner layer	Cu
4	Termination	Middle layer	Ni
(3)		Outer layer	Sn



## Storage and handling conditions

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

#### Cautions:

- a. 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.)
- 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.

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## ■ 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.

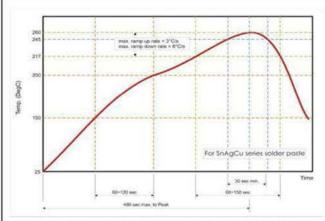


Fig. 6 Recommended reflow soldering profile for SMT process with SnAgCu series solder paste.

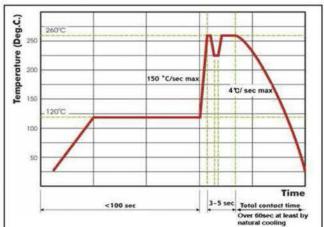


Fig. 7 Recommended wave soldering profile for SMT process with SnAgCu series solder.

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