

**CONTENT (MLCC)**

**E STANDARD NUMBER..... 3**

**STRUCTURE ..... 4**

**ORDERING CODE ..... 4**

**MIDDLE-HIGH VOLTAGE (100V~3KV)..... 5**

*NPO Series* ..... 6

*X7R Series*..... 11

    TEST SPEC. .... 17

**PACKAGE ..... 21**

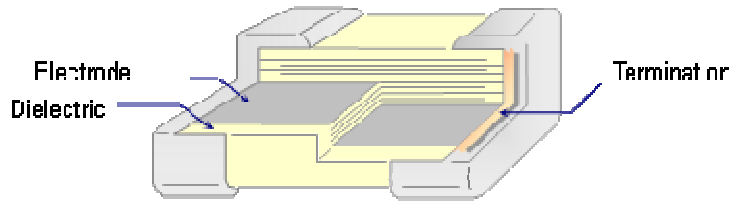
**OTHERS ..... 25**

**E Standard Number**

E3	1.0						2.2						4.7											
E6	1.0			1.5			2.2			3.3			4.7			6.8								
E12	1.0	1.2	1.5	1.8	2.2	2.7	3.3	3.9	4.7	5.6	6.8	8.2												
E24	1.0	1.1	1.2	1.3	1.5	1.6	1.8	2.0	2.2	2.4	2.7	3.0	3.3	3.6	3.9	4.3	4.7	5.1	5.6	6.2	6.8	7.5	8.2	9.1

MLCC

## Structure



## Ordering Code

**C 1005 NP0 101 J G T S Δ**

### PRODUCT CODE

C = MLCC

### SIZE in mm (EIA CODE, in inch)

0402(01005)	0603(0201)	1005 (0402)	1608 (0603)	2012 (0805)
3216 (1206)	3225(1210)	4520 (1808)	4532 (1812)	

### T. C.

NP0: $0 \pm 30\text{ppm}/^\circ\text{C}$	-55°C to +125°C		
X7R: $\pm 15\%$	-55°C to +125°C	X6S: $\pm 22\%$	-55°C to +105°C
X5R: $\pm 15\%$	-55°C to +85°C	Y5V: $+22\%/-82\%$	-30°C to +85°C

### CAPACITANCE CODE

Expressed in pico-farads and identified by a three-digit number.  
 First two digits represent significant figures.  
 Last digit specifies the number of zeros.  
 (Use 9 for 1.0 through 9.9pF ; Use 8 for 0.20 through 0.99pF)

Examples:

Code	Cap (pF)
478	0.47
229	2.2
101	100
102	1000

### TOLERANCE CODE

A: $\pm 0.05\text{pF}$	B: $\pm 0.1\text{pF}$	C: $\pm 0.25\text{pF}$	D: $\pm 0.5\text{pF}$	F: $\pm 1\%$	G: $\pm 2\%$
J: $\pm 5\%$	K: $\pm 10\%$	M: $\pm 20\%$	Z: $+80/-20\%$		

### VOLTAGE CODE

B: 4V	C: 6.3V	D: 10V	E: 16V	F: 25V	N: 35V	G: 50V	H: 100V
J: 200V	K: 250V	L: 500V	M: 630V	P: 1KV	Q: 2KV	R: 3KV	S: 4KV

### PACKAGING CODE

T: Paper tape reel Ø180mm (7")	P: Embossed tape reel Ø180mm (7")
N: Paper tape reel Ø250mm (10")	D: Embossed tape reel Ø250mm (10")
A: Paper tape reel Ø330mm (13")	E: Embossed tape reel Ø330mm (13")
W: Special Packing	

### Application Code

S: Standard    Q: High Q/Low ESR    F: Microwave    A: Automotive with AEC-Q200

### Thickness Code

Code	Thick (mm)	Code	Thick(mm)	Code	Thick (mm)
(blank)	Standard Thick	M	0.70	H	1.50
Z	0.20	D	0.80	L	1.60
A	0.30	E	0.85	N	2.00
Q	0.45	I	0.95	P	2.50
B	0.50	F	1.15	R	3.20
C	0.60	G	1.25		

## Middle-High Voltage (100V~3kV)

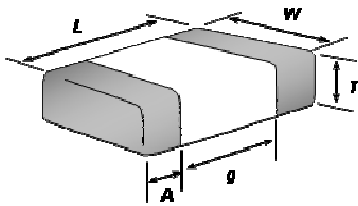
### ■ Feature

1. A monolithic structure ensures high reliability and mechanical strength.
2. Suitable for high speed SMT placement on PCBs.
3. RoHS compliant

### ■ Application

1. Input filtering circuit of modem and LAN Interface.
2. DC-DC Converters
3. Backlighting inverters of LCD screen.
4. Switching circuit.
5. General high voltage circuit.

### ■ Standard External Dimensions



TYPE	Dimension (mm)					
	(EIA Size)	L (Length)	W (Width)	T (Max.)	g (Min)	A (Min/Max)
C0603 (0201)		0.6 ± 0.03	0.30 ± 0.03	0.33	0.15	0.10 / 0.20
C1005 (0402)		1.0 ± 0.05	0.50 ± 0.05	0.55	0.30	0.15 / 0.35
C1608 (0603)		1.6 ± 0.10	0.80 ± 0.10	0.90	0.50	0.25 / 0.65
C2012 (0805)		2.0 ± 0.15	1.25 ± 0.15	1.45	0.70	0.25 / 0.75
C3216 (1206)		3.2 ± 0.15	1.60 ± 0.15	1.80	1.50	0.25 / 0.75
C3225 (1210)		3.2 ± 0.30	2.50 ± 0.20	2.70	1.50	0.25 / 0.75
C4520 (1808)		4.6 ± 0.30	2.00 ± 0.20	2.20	1.50	0.25 / 0.75
C4532 (1812)		4.6 ± 0.30	3.20 ± 0.30	3.40	1.50	0.25 / 0.75

For some special parts, please see the "Part Number & Characteristic" for detail specification.

### ■ Product Range

TCC	Series	EIA	Capacitance Range (F)									
			0.2pF	1pF	10pF	100pF	1nF	10nF	100nF	1uF	10uF	
NP0	C1005NP0_S	0402	0.2pF			220pF						
	C1608NP0_S	0603	1pF				1nF					
	C2012NP0_S	0805		10pF			3.3nF					
	C3216NP0_S	1206		10pF					10nF			
	C3225NP0_S	1210				330p						
	C4520NP0_S	1808			18p	100p						
X7R	C0603X7R_S	0201			100pF		1nF					
	C1005X7R_S	0402			100pF		6.8nF					
	C1608X7R_S	0603			100pF				100nF			
	C2012X7R_S	0805				150pF			100nF			
	C3216X7R_S	1206				150pF					2.2u	
	C3225X7R_S	1210					2.2n	22n	100n	1u	2.2u	
	C4520X7R_S	1808					1n	2.2n				
	C4532X7R_S	1812					1n			470n		

- Part Number & Characteristic
- NP0 Series
- C1005NP0 Series (EIA0402)

RV	DARFON P/N	Measuring Condition	Capacitance		Available Tolerance	Thick. (mm)	Tolerance(mm)		DF (max.)	Standard Packing	Test Spec.
			Value	Unit			L/W	Thick.			
100V	C1005NP0208□HTS	1V, 1MHz	0.20	pF	±0.1pF,±0.05pF	0.50	±0.05	±0.05	0.25%	Paper, 10kpcs	(I)
	C1005NP0308□HTS	1V, 1MHz	0.30	pF	±0.1pF,±0.05pF	0.50	±0.05	±0.05	0.25%		(I)
	C1005NP0408□HTS	1V, 1MHz	0.40	pF	±0.1pF,±0.05pF	0.50	±0.05	±0.05	0.25%		(I)
	C1005NP0508□HTS	1V, 1MHz	0.50	pF	±0.1pF,±0.05pF	0.50	±0.05	±0.05	0.24%		(I)
	C1005NP0608□HTS	1V, 1MHz	0.60	pF	±0.1pF,±0.05pF	0.50	±0.05	±0.05	0.24%		(I)
	C1005NP0708□HTS	1V, 1MHz	0.70	pF	±0.1pF,±0.05pF	0.50	±0.05	±0.05	0.24%		(I)
	C1005NP0808□HTS	1V, 1MHz	0.80	pF	±0.1pF,±0.05pF	0.50	±0.05	±0.05	0.24%		(I)
	C1005NP0908□HTS	1V, 1MHz	0.90	pF	±0.1pF,±0.05pF	0.50	±0.05	±0.05	0.24%		(I)
	C1005NP0109□HTS	1V, 1MHz	1.0	pF	±0.25pF,±0.1pF	0.50	±0.05	±0.05	0.24%		(I)
	C1005NP0129□HTS	1V, 1MHz	1.2	pF	±0.25pF,±0.1pF	0.50	±0.05	±0.05	0.24%		(I)
	C1005NP0159□HTS	1V, 1MHz	1.5	pF	±0.25pF,±0.1pF	0.50	±0.05	±0.05	0.23%		(I)
	C1005NP0189□HTS	1V, 1MHz	1.8	pF	±0.25pF,±0.1pF	0.50	±0.05	±0.05	0.23%		(I)
	C1005NP0229□HTS	1V, 1MHz	2.2	pF	±0.25pF,±0.1pF	0.50	±0.05	±0.05	0.23%		(I)
	C1005NP0279□HTS	1V, 1MHz	2.7	pF	±0.25pF,±0.1pF	0.50	±0.05	±0.05	0.22%		(I)
	C1005NP0339□HTS	1V, 1MHz	3.3	pF	±0.25pF,±0.1pF	0.50	±0.05	±0.05	0.21%		(I)
	C1005NP0399□HTS	1V, 1MHz	3.9	pF	±0.25pF,±0.1pF	0.50	±0.05	±0.05	0.21%		(I)
	C1005NP0409□HTS	1V, 1MHz	4.0	pF	±0.25pF,±0.1pF	0.50	±0.05	±0.05	0.21%		(I)
	C1005NP0479□HTS	1V, 1MHz	4.7	pF	±0.25pF,±0.1pF	0.50	±0.05	±0.05	0.20%		(I)
	C1005NP0509□HTS	1V, 1MHz	5.0	pF	±0.5pF,±0.25pF,±0.1pF	0.50	±0.05	±0.05	0.20%		(I)
	C1005NP0569□HTS	1V, 1MHz	5.6	pF	±0.5pF,±0.25pF,±0.1pF	0.50	±0.05	±0.05	0.20%		(I)
	C1005NP0689□HTS	1V, 1MHz	6.8	pF	±0.5pF,±0.25pF,±0.1pF	0.50	±0.05	±0.05	0.19%		(I)
	C1005NP0809□HTS	1V, 1MHz	8.0	pF	±0.5pF	0.50	±0.05	±0.05	0.18%		(I)
	C1005NP0829□HTS	1V, 1MHz	8.2	pF	±0.5pF,±0.25pF,±0.1pF	0.50	±0.05	±0.05	0.18%		(I)
	C1005NP0100□HTS	1V, 1MHz	10	pF	±5%,±2%,±1%	0.50	±0.05	±0.05	0.17%		(I)
	C1005NP0120□HTS	1V, 1MHz	12	pF	±5%,±2%,±1%	0.50	±0.05	±0.05	0.16%		(I)
	C1005NP0150□HTS	1V, 1MHz	15	pF	±5%,±2%,±1%	0.50	±0.05	±0.05	0.14%		(I)
	C1005NP0180□HTS	1V, 1MHz	18	pF	±5%,±2%,±1%	0.50	±0.05	±0.05	0.13%		(I)
	C1005NP0220□HTS	1V, 1MHz	22	pF	±5%,±2%,±1%	0.50	±0.05	±0.05	0.12%		(I)
	C1005NP0270□HTS	1V, 1MHz	27	pF	±5%,±2%,±1%	0.50	±0.05	±0.05	0.11%		(I)
	C1005NP0330□HTS	1V, 1MHz	33	pF	±5%,±2%,±1%	0.50	±0.05	±0.05	0.10%		(I)
C1005NP0390□HTS	1V, 1MHz	39	pF	±5%,±2%,±1%	0.50	±0.05	±0.05	0.10%	(I)		
C1005NP0470□HTS	1V, 1MHz	47	pF	±5%,±2%,±1%	0.50	±0.05	±0.05	0.10%	(I)		
C1005NP0560□HTS	1V, 1MHz	56	pF	±5%,±2%,±1%	0.50	±0.05	±0.05	0.10%	(I)		
C1005NP0680□HTS	1V, 1MHz	68	pF	±5%,±2%,±1%	0.50	±0.05	±0.05	0.10%	(I)		
C1005NP0820□HTS	1V, 1MHz	82	pF	±5%,±2%,±1%	0.50	±0.05	±0.05	0.10%	(I)		
C1005NP0101□HTS	1V, 1MHz	100	pF	±5%,±2%,±1%	0.50	±0.05	±0.05	0.10%	(I)		
C1005NP0121□HTS	1V, 1MHz	120	pF	±5%	0.50	±0.05	±0.05	0.10%	(I)		
C1005NP0151□HTS	1V, 1MHz	150	pF	±5%	0.50	±0.05	±0.05	0.10%	(I)		
C1005NP0181□HTS	1V, 1MHz	180	pF	±5%	0.50	±0.05	±0.05	0.10%	(I)		
C1005NP0221□HTS	1V, 1MHz	220	pF	±5%	0.50	±0.05	±0.05	0.10%	(I)		

- C1608NP0 Series (EIA0603)

RV	DARFON P/N	Measuring Condition	Capacitance		Available Tolerance	Thick. (mm)	Tolerance(mm)		DF (max.)	Standard Packing	Test Spec.
			Value	Unit			L/W	Thick.			
250V	C1608NP0109□KTS	1V, 1MHz	1.0	pF	±0.25pF,±0.1pF	0.80	±0.10	±0.10	0.24%	Paper, 4kpcs	(I)
	C1608NP0129□KTS	1V, 1MHz	1.2	pF	±0.25pF,±0.1pF	0.80	±0.10	±0.10	0.24%		(I)
	C1608NP0159□KTS	1V, 1MHz	1.5	pF	±0.25pF,±0.1pF	0.80	±0.10	±0.10	0.23%		(I)
	C1608NP0189□KTS	1V, 1MHz	1.8	pF	±0.25pF,±0.1pF	0.80	±0.10	±0.10	0.23%		(I)
	C1608NP0229□KTS	1V, 1MHz	2.2	pF	±0.25pF,±0.1pF	0.80	±0.10	±0.10	0.23%		(I)
	C1608NP0279□KTS	1V, 1MHz	2.7	pF	±0.25pF,±0.1pF	0.80	±0.10	±0.10	0.22%		(I)
	C1608NP0339□KTS	1V, 1MHz	3.3	pF	±0.25pF,±0.1pF	0.80	±0.10	±0.10	0.21%		(I)
	C1608NP0399□KTS	1V, 1MHz	3.9	pF	±0.25pF,±0.1pF	0.80	±0.10	±0.10	0.21%		(I)
C1608NP0479□KTS	1V, 1MHz	4.7	pF	±0.25pF,±0.1pF	0.80	±0.10	±0.10	0.20%	(I)		

□ Tolerance Code: A=±0.05 pF, B=±0.1pF, C=±0.25pF ,D=±0.5pF, F=±1%, G=±2%, J=±5%; Special tolerance on the request.

RV	DARFON P/N	Measuring Condition	Capacitance		Available Tolerance	Thick. (mm)	Tolerance(mm)		DF (max.)	Standard Packing	Test Spec.
			Value	Unit			L/W	Thick.			
250V	C1608NP0569□KTS	1V, 1MHz	5.6	pF	±0.5pF,±0.25pF	0.80	±0.10	±0.10	0.20%	Paper, 4kpcs	(f)
	C1608NP0689□KTS	1V, 1MHz	6.8	pF	±0.5pF,±0.25pF	0.80	±0.10	±0.10	0.19%		(f)
	C1608NP0829□KTS	1V, 1MHz	8.2	pF	±0.5pF,±0.25pF	0.80	±0.10	±0.10	0.18%		(f)
	C1608NP0100□KTS	1V, 1MHz	10	pF	±5%	0.80	±0.10	±0.10	0.17%		(f)
	C1608NP0120□KTS	1V, 1MHz	12	pF	±5%	0.80	±0.10	±0.10	0.16%		(f)
	C1608NP0150□KTS	1V, 1MHz	15	pF	±5%	0.80	±0.10	±0.10	0.14%		(f)
	C1608NP0180□KTS	1V, 1MHz	18	pF	±5%	0.80	±0.10	±0.10	0.13%		(f)
	C1608NP0220□KTS	1V, 1MHz	22	pF	±5%	0.80	±0.10	±0.10	0.12%		(f)
	C1608NP0270□KTS	1V, 1MHz	27	pF	±5%	0.80	±0.10	±0.10	0.11%		(f)
	C1608NP0330□KTS	1V, 1MHz	33	pF	±5%	0.80	±0.10	±0.10	0.10%		(f)
	C1608NP0390□KTS	1V, 1MHz	39	pF	±5%	0.80	±0.10	±0.10	0.10%		(f)
	C1608NP0470□KTS	1V, 1MHz	47	pF	±5%	0.80	±0.10	±0.10	0.10%		(f)
	C1608NP0560□KTS	1V, 1MHz	56	pF	±5%	0.80	±0.10	±0.10	0.10%		(f)
	C1608NP0680□KTS	1V, 1MHz	68	pF	±5%	0.80	±0.10	±0.10	0.10%		(f)
	C1608NP0820□KTS	1V, 1MHz	82	pF	±5%	0.80	±0.10	±0.10	0.10%		(f)
	C1608NP0101□KTS	1V, 1MHz	100	pF	±5%	0.80	±0.10	±0.10	0.10%		(f)
	C1608NP0121□KTS	1V, 1MHz	120	pF	±5%	0.80	±0.10	±0.10	0.10%		(f)
	C1608NP0151□KTS	1V, 1MHz	150	pF	±5%	0.80	±0.10	±0.10	0.10%		(f)
	C1608NP0181□KTS	1V, 1MHz	180	pF	±5%	0.80	±0.10	±0.10	0.10%		(f)
	C1608NP0221□KTS	1V, 1MHz	220	pF	±5%	0.80	±0.10	±0.10	0.10%		(f)
C1608NP0271□KTS	1V, 1MHz	270	pF	±5%	0.80	±0.15	±0.15	0.10%	(f)		
C1608NP0331□KTS	1V, 1MHz	330	pF	±5%	0.80	±0.15	±0.15	0.10%	(f)		
C1608NP0391□KTS	1V, 1MHz	390	pF	±5%	0.80	±0.15	±0.15	0.10%	(f)		
C1608NP0471□KTS	1V, 1MHz	470	pF	±5%	0.80	±0.15	±0.15	0.10%	(f)		
C1608NP0561□KTS	1V, 1MHz	560	pF	±5%	0.80	±0.15	±0.15	0.10%	(f)		
C1608NP0681□KTS	1V, 1MHz	680	pF	±5%	0.80	±0.15	±0.15	0.10%	(f)		
100V	C1608NP0308□HTS	1V, 1MHz	0.30	pF	±0.1pF,±0.05pF	0.80	±0.10	±0.10	0.25%	Paper, 4kpcs	(f)
	C1608NP0408□HTS	1V, 1MHz	0.40	pF	±0.1pF,±0.05pF	0.80	±0.10	±0.10	0.25%		(f)
	C1608NP0508□HTS	1V, 1MHz	0.50	pF	±0.1pF,±0.05pF	0.80	±0.10	±0.10	0.24%		(f)
	C1608NP0608□HTS	1V, 1MHz	0.60	pF	±0.1pF,±0.05pF	0.80	±0.10	±0.10	0.24%		(f)
	C1608NP0708□HTS	1V, 1MHz	0.70	pF	±0.1pF,±0.05pF	0.80	±0.10	±0.10	0.24%		(f)
	C1608NP0758□HTS	1V, 1MHz	0.75	pF	±0.1pF,±0.05pF	0.80	±0.10	±0.10	0.24%		(f)
	C1608NP0808□HTS	1V, 1MHz	0.80	pF	±0.1pF,±0.05pF	0.80	±0.10	±0.10	0.24%		(f)
	C1608NP0908□HTS	1V, 1MHz	0.90	pF	±0.1pF,±0.05pF	0.80	±0.10	±0.10	0.24%		(f)
	C1608NP0109□HTS	1V, 1MHz	1.0	pF	±0.25pF,±0.1pF	0.80	±0.10	±0.10	0.24%		(f)
	C1608NP0129□HTS	1V, 1MHz	1.2	pF	±0.25pF,±0.1pF	0.80	±0.10	±0.10	0.24%		(f)
	C1608NP0159□HTS	1V, 1MHz	1.5	pF	±0.25pF,±0.1pF	0.80	±0.10	±0.10	0.23%		(f)
	C1608NP0189□HTS	1V, 1MHz	1.8	pF	±0.25pF,±0.1pF	0.80	±0.10	±0.10	0.23%		(f)
	C1608NP0209□HTS	1V, 1MHz	2.0	pF	±0.25pF,±0.1pF	0.80	±0.10	±0.10	0.23%		(f)
	C1608NP0229□HTS	1V, 1MHz	2.2	pF	±0.25pF,±0.1pF	0.80	±0.10	±0.10	0.23%		(f)
	C1608NP0249□HTS	1V, 1MHz	2.4	pF	±0.25pF,±0.1pF	0.80	±0.10	±0.10	0.22%		(f)
	C1608NP0279□HTS	1V, 1MHz	2.7	pF	±0.25pF,±0.1pF	0.80	±0.10	±0.10	0.22%		(f)
	C1608NP0309□HTS	1V, 1MHz	3.0	pF	±0.25pF,±0.1pF	0.80	±0.10	±0.10	0.22%		(f)
	C1608NP0339□HTS	1V, 1MHz	3.3	pF	±0.25pF,±0.1pF	0.80	±0.10	±0.10	0.21%		(f)
	C1608NP0399□HTS	1V, 1MHz	3.9	pF	±0.25pF,±0.1pF	0.80	±0.10	±0.10	0.21%		(f)
	C1608NP0409□HTS	1V, 1MHz	4.0	pF	±0.25pF,±0.1pF	0.80	±0.10	±0.10	0.21%		(f)
	C1608NP0439□HTS	1V, 1MHz	4.3	pF	±0.25pF,±0.1pF	0.80	±0.10	±0.10	0.21%		(f)
	C1608NP0479□HTS	1V, 1MHz	4.7	pF	±0.25pF,±0.1pF	0.80	±0.10	±0.10	0.20%		(f)
	C1608NP0509□HTS	1V, 1MHz	5.0	pF	±0.5pF,±0.25pF,±0.1pF	0.80	±0.10	±0.10	0.20%		(f)
	C1608NP0569□HTS	1V, 1MHz	5.6	pF	±0.5pF,±0.25pF,±0.1pF	0.80	±0.10	±0.10	0.20%		(f)
	C1608NP0609□HTS	1V, 1MHz	6.0	pF	±0.5pF,±0.25pF,±0.1pF	0.80	±0.10	±0.10	0.19%		(f)
	C1608NP0629□HTS	1V, 1MHz	6.2	pF	±0.5pF,±0.25pF,±0.1pF	0.80	±0.10	±0.10	0.19%		(f)
C1608NP0689□HTS	1V, 1MHz	6.8	pF	±0.5pF,±0.25pF,±0.1pF	0.80	±0.10	±0.10	0.19%	(f)		
C1608NP0709□HTS	1V, 1MHz	7.0	pF	±0.5pF,±0.25pF,±0.1pF	0.80	±0.10	±0.10	0.19%	(f)		
C1608NP0829□HTS	1V, 1MHz	8.2	pF	±0.5pF,±0.25pF,±0.1pF	0.80	±0.10	±0.10	0.18%	(f)		
C1608NP0909□HTS	1V, 1MHz	9.0	pF	±0.5pF,±0.25pF,±0.1pF	0.80	±0.10	±0.10	0.17%	(f)		
C1608NP0919□HTS	1V, 1MHz	9.1	pF	±0.5pF,±0.25pF,±0.1pF	0.80	±0.10	±0.10	0.17%	(f)		

MLCC  
Middle High Voltage

RV	DARFON P/N	Measuring Condition	Capacitance		Available Tolerance	Thick. (mm)	Tolerance(mm)		DF (max.)	Standard Packing	Test Spec.
			Value	Unit			L/W	Thick.			
100V	C1608NP0100□HTS	1V, 1MHz	10	pF	±5%,±2%,±1%	0.80	±0.10	±0.10	0.17%	Paper, 4kpcs	(I)
	C1608NP0110□HTS	1V, 1MHz	11	pF	±5%,±2%,±1%	0.80	±0.10	±0.10	0.16%		(I)
	C1608NP0120□HTS	1V, 1MHz	12	pF	±5%,±2%,±1%	0.80	±0.10	±0.10	0.16%		(I)
	C1608NP0150□HTS	1V, 1MHz	15	pF	±5%,±2%,±1%	0.80	±0.10	±0.10	0.14%		(I)
	C1608NP0180□HTS	1V, 1MHz	18	pF	±5%,±2%,±1%	0.80	±0.10	±0.10	0.13%		(I)
	C1608NP0200□HTS	1V, 1MHz	20	pF	±5%,±2%,±1%	0.80	±0.10	±0.10	0.13%		(I)
	C1608NP0220□HTS	1V, 1MHz	22	pF	±5%,±2%,±1%	0.80	±0.10	±0.10	0.12%		(I)
	C1608NP0240□HTS	1V, 1MHz	24	pF	±5%,±2%,±1%	0.80	±0.10	±0.10	0.11%		(I)
	C1608NP0270□HTS	1V, 1MHz	27	pF	±5%,±2%,±1%	0.80	±0.10	±0.10	0.11%		(I)
	C1608NP0300□HTS	1V, 1MHz	30	pF	±5%,±2%,±1%	0.80	±0.10	±0.10	0.10%		(I)
	C1608NP0330□HTS	1V, 1MHz	33	pF	±5%,±2%,±1%	0.80	±0.10	±0.10	0.10%		(I)
	C1608NP0360□HTS	1V, 1MHz	36	pF	±5%,±2%,±1%	0.80	±0.10	±0.10	0.10%		(I)
	C1608NP0390□HTS	1V, 1MHz	39	pF	±5%,±2%,±1%	0.80	±0.10	±0.10	0.10%		(I)
	C1608NP0430□HTS	1V, 1MHz	43	pF	±5%,±2%,±1%	0.80	±0.10	±0.10	0.10%		(I)
	C1608NP0470□HTS	1V, 1MHz	47	pF	±5%,±2%,±1%	0.80	±0.10	±0.10	0.10%		(I)
	C1608NP0560□HTS	1V, 1MHz	56	pF	±5%,±2%,±1%	0.80	±0.10	±0.10	0.10%		(I)
	C1608NP0620□HTS	1V, 1MHz	62	pF	±5%,±2%,±1%	0.80	±0.10	±0.10	0.10%		(I)
	C1608NP0680□HTS	1V, 1MHz	68	pF	±5%,±2%,±1%	0.80	±0.10	±0.10	0.10%		(I)
	C1608NP0750□HTS	1V, 1MHz	75	pF	±5%,±2%,±1%	0.80	±0.10	±0.10	0.10%		(I)
	C1608NP0820□HTS	1V, 1MHz	82	pF	±5%,±2%,±1%	0.80	±0.10	±0.10	0.10%		(I)
	C1608NP0910□HTS	1V, 1MHz	91	pF	±5%,±2%,±1%	0.80	±0.10	±0.10	0.10%		(I)
	C1608NP0101□HTS	1V, 1MHz	100	pF	±5%,±2%,±1%	0.80	±0.10	±0.10	0.10%		(I)
	C1608NP0121□HTS	1V, 1MHz	120	pF	±5%	0.80	±0.10	±0.10	0.10%		(I)
	C1608NP0151□HTS	1V, 1MHz	150	pF	±5%	0.80	±0.10	±0.10	0.10%		(I)
	C1608NP0181□HTS	1V, 1MHz	180	pF	±5%	0.80	±0.10	±0.10	0.10%		(I)
	C1608NP0201□HTS	1V, 1MHz	200	pF	±5%	0.80	±0.10	±0.10	0.10%		(I)
	C1608NP0221□HTS	1V, 1MHz	220	pF	±5%	0.80	±0.10	±0.10	0.10%		(I)
	C1608NP0271□HTS	1V, 1MHz	270	pF	±5%	0.80	±0.10	±0.10	0.10%		(I)
	C1608NP0331□HTS	1V, 1MHz	330	pF	±5%	0.80	±0.10	±0.10	0.10%		(I)
	C1608NP0391□HTS	1V, 1MHz	390	pF	±5%	0.80	±0.10	±0.10	0.10%		(I)
C1608NP0471□HTS	1V, 1MHz	470	pF	±5%	0.80	±0.10	±0.10	0.10%	(I)		
C1608NP0561□HTS	1V, 1MHz	560	pF	±5%	0.80	±0.10	±0.10	0.10%	(I)		
C1608NP0681□HTS	1V, 1MHz	680	pF	±5%	0.80	±0.10	±0.10	0.10%	(I)		
C1608NP0821□HTS	1V, 1MHz	820	pF	±5%	0.80	±0.10	±0.10	0.10%	(I)		
C1608NP0102□HTS	1V, 1MHz	1.0	nF	±5%	0.80	±0.10	±0.10	0.10%	(I)		

● C2012NP0 Series (EIA0805)

RV	DARFON P/N	Measuring Condition	Capacitance		Available Tolerance	Thick. (mm)	Tolerance(mm)		DF (max.)	Standard Packing	Test Spec.
			Value	Unit			L/W	Thick.			
250V	C2012NP0100□KTS	1V, 1MHz	10	pF	±5%	0.60	±0.15	±0.15	0.17%	Paper, 4kpcs	(I)
	C2012NP0120□KTS	1V, 1MHz	12	pF	±5%	0.60	±0.15	±0.15	0.16%		(I)
	C2012NP0150□KTS	1V, 1MHz	15	pF	±5%	0.60	±0.15	±0.15	0.14%		(I)
	C2012NP0180□KTS	1V, 1MHz	18	pF	±5%	0.60	±0.15	±0.15	0.13%		(I)
	C2012NP0220□KTS	1V, 1MHz	22	pF	±5%	0.60	±0.15	±0.15	0.12%		(I)
	C2012NP0270□KTS	1V, 1MHz	27	pF	±5%	0.60	±0.15	±0.15	0.11%		(I)
	C2012NP0330□KTS	1V, 1MHz	33	pF	±5%	0.60	±0.15	±0.15	0.10%		(I)
	C2012NP0390□KTS	1V, 1MHz	39	pF	±5%	0.60	±0.15	±0.15	0.10%		(I)
	C2012NP0470□KTS	1V, 1MHz	47	pF	±5%	0.60	±0.15	±0.15	0.10%		(I)
	C2012NP0560□KTS	1V, 1MHz	56	pF	±5%	0.60	±0.15	±0.15	0.10%		(I)
	C2012NP0680□KTS	1V, 1MHz	68	pF	±5%	0.60	±0.15	±0.15	0.10%		(I)
	C2012NP0820□KTS	1V, 1MHz	82	pF	±5%	0.60	±0.15	±0.15	0.10%		(I)
	C2012NP0101□KTS	1V, 1MHz	100	pF	±5%	0.60	±0.15	±0.15	0.10%		(I)
	C2012NP0121□KTS	1V, 1MHz	120	pF	±5%	0.60	±0.15	±0.15	0.10%		(I)
	C2012NP0151□KTS	1V, 1MHz	150	pF	±5%	0.60	±0.15	±0.15	0.10%		(I)
	C2012NP0271□KPS	1V, 1MHz	270	pF	±5%	1.25	±0.15	±0.15	0.10%		Embossed, 3kpcs
	C2012NP0331□KPS	1V, 1MHz	330	pF	±5%	1.25	±0.15	±0.15	0.10%	(I)	

□ Tolerance Code: A=±0.05 pF, B=±0.1pF, C=±0.25pF, D=±0.5pF, F=±1%, G=±2%, J=±5%; Special tolerance on the request.

RV	DARFON P/N	Measuring Condition	Capacitance		Available Tolerance	Thick. (mm)	Tolerance(mm)		DF (max.)	Standard Packing	Test Spec.
			Value	Unit			L/W	Thick.			
100V	C2012NP0100□HTS	1V, 1MHz	10	pF	±5%,±2%	0.60	±0.15	±0.15	0.17%	Paper, 4kpcs	(I)
	C2012NP0120□HTS	1V, 1MHz	12	pF	±5%,±2%	0.60	±0.15	±0.15	0.16%		(I)
	C2012NP0150□HTS	1V, 1MHz	15	pF	±5%,±2%	0.60	±0.15	±0.15	0.14%		(I)
	C2012NP0180□HTS	1V, 1MHz	18	pF	±5%,±2%	0.60	±0.15	±0.15	0.13%		(I)
	C2012NP0200□HTS	1V, 1MHz	20	pF	±5%,±2%	0.60	±0.15	±0.15	0.13%		(I)
	C2012NP0220□HTS	1V, 1MHz	22	pF	±5%,±2%	0.60	±0.15	±0.15	0.12%		(I)
	C2012NP0240□HTS	1V, 1MHz	24	pF	±5%,±2%	0.60	±0.15	±0.15	0.11%		(I)
	C2012NP0270□HTS	1V, 1MHz	27	pF	±5%,±2%	0.60	±0.15	±0.15	0.11%		(I)
	C2012NP0300□HTS	1V, 1MHz	30	pF	±5%,±2%	0.60	±0.15	±0.15	0.10%		(I)
	C2012NP0330□HTS	1V, 1MHz	33	pF	±5%,±2%	0.60	±0.15	±0.15	0.10%		(I)
	C2012NP0360□HTS	1V, 1MHz	36	pF	±5%,±2%	0.60	±0.15	±0.15	0.10%		(I)
	C2012NP0390□HTS	1V, 1MHz	39	pF	±5%,±2%	0.60	±0.15	±0.15	0.10%		(I)
	C2012NP0430□HTS	1V, 1MHz	43	pF	±5%,±2%	0.60	±0.15	±0.15	0.10%		(I)
	C2012NP0470□HTS	1V, 1MHz	47	pF	±5%,±2%	0.60	±0.15	±0.15	0.10%		(I)
	C2012NP0560□HTS	1V, 1MHz	56	pF	±5%,±2%	0.60	±0.15	±0.15	0.10%		(I)
	C2012NP0620□HTS	1V, 1MHz	62	pF	±5%,±2%	0.60	±0.15	±0.15	0.10%		(I)
	C2012NP0680□HTS	1V, 1MHz	68	pF	±5%,±2%	0.60	±0.15	±0.15	0.10%		(I)
	C2012NP0750□HTS	1V, 1MHz	75	pF	±5%,±2%	0.60	±0.15	±0.15	0.10%		(I)
	C2012NP0820□HTS	1V, 1MHz	82	pF	±5%,±2%	0.60	±0.15	±0.15	0.10%		(I)
	C2012NP0101□HTS	1V, 1MHz	100	pF	±5%,±2%	0.60	±0.15	±0.15	0.10%		(I)
	C2012NP0121□HTS	1V, 1MHz	120	pF	±5%	0.60	±0.15	±0.15	0.10%		(I)
	C2012NP0151□HTS	1V, 1MHz	150	pF	±5%	0.60	±0.15	±0.15	0.10%		(I)
	C2012NP0181□HTS	1V, 1MHz	180	pF	±5%	0.60	±0.15	±0.15	0.10%		(I)
	C2012NP0201□HTS	1V, 1MHz	200	pF	±5%	0.60	±0.15	±0.15	0.10%		(I)
	C2012NP0221□HTS	1V, 1MHz	220	pF	±5%	0.60	±0.15	±0.15	0.10%		(I)
	C2012NP0271□HTS	1V, 1MHz	270	pF	±5%	0.60	±0.15	±0.15	0.10%		(I)
	C2012NP0331□HTS	1V, 1MHz	330	pF	±5%	0.60	±0.15	±0.15	0.10%		(I)
	C2012NP0391□HTS	1V, 1MHz	390	pF	±5%	0.85	±0.15	±0.15	0.10%		(I)
	C2012NP0471□HTS	1V, 1MHz	470	pF	±5%	0.85	±0.15	±0.15	0.10%		(I)
	C2012NP0561□HTS	1V, 1MHz	560	pF	±5%	0.85	±0.15	±0.15	0.10%		(I)
	C2012NP0681□HTS	1V, 1MHz	680	pF	±5%	0.85	±0.15	±0.15	0.10%	(I)	
	C2012NP0821□HTS	1V, 1MHz	820	pF	±5%	0.85	±0.15	±0.15	0.10%	(I)	
	C2012NP0102□HTS	1V, 1MHz	1.0	nF	±5%	0.85	±0.15	±0.15	0.10%	(I)	
C2012NP0122□HTS	1V, 1kHz	1.2	nF	±5%	0.85	±0.15	±0.15	0.10%	(I)		
C2012NP0152□HTS	1V, 1kHz	1.5	nF	±5%	0.85	±0.15	±0.15	0.10%	(I)		
C2012NP0182□HTS	1V, 1kHz	1.8	nF	±5%	0.85	±0.15	±0.15	0.10%	(I)		
C2012NP0222□HTS	1V, 1kHz	2.2	nF	±5%	0.85	±0.15	±0.15	0.10%	(I)		
C2012NP0272□HPS	1V, 1kHz	2.7	nF	±5%	1.25	±0.15	±0.20	0.10%	(I)		
C2012NP0332□HPS	1V, 1kHz	3.3	nF	±5%	1.25	±0.15	±0.20	0.10%	(I)		

● C3216NP0 Series (EIA1206)

RV	DARFON P/N	Measuring Condition	Capacitance		Available Tolerance	Thick. (mm)	Tolerance(mm)		DF (max.)	Standard Packing	Test Spec.
			Value	Unit			L/W	Thick.			
2000V	C3216NP0100JQTS	1V, 1MHz	10	pF	±5%	0.80	±0.15	±0.10	0.17%	Paper, 4kpcs	(I)
	C3216NP0220JQTS	1V, 1MHz	22	pF	±5%	0.80	±0.15	±0.10	0.12%		(I)
1000V	C3216NP0100□PTSD	1V, 1MHz	10	pF	±5%	0.80	±0.15	±0.10	0.17%	Embossed, 3kpcs	(I)
	C3216NP0220□PTSD	1V, 1MHz	22	pF	±5%	0.80	±0.15	±0.10	0.12%		(I)
	C3216NP0100□PPS	1V, 1MHz	10	pF	±5%	1.25	±0.15	±0.20	0.17%		(I)
	C3216NP0120□PPS	1V, 1MHz	12	pF	±5%	1.25	±0.15	±0.20	0.16%		(I)
	C3216NP0150□PPS	1V, 1MHz	15	pF	±5%	1.25	±0.15	±0.20	0.14%		(I)
	C3216NP0180□PPS	1V, 1MHz	18	pF	±5%	1.25	±0.15	±0.20	0.13%		(I)
	C3216NP0220□PPS	1V, 1MHz	22	pF	±5%	1.25	±0.15	±0.20	0.12%		(I)
	C3216NP0270□PPS	1V, 1MHz	27	pF	±5%	1.25	±0.15	±0.20	0.11%		(I)
	C3216NP0330□PPS	1V, 1MHz	33	pF	±5%	1.25	±0.15	±0.20	0.10%		(I)
C3216NP0390□PPS	1V, 1MHz	39	pF	±5%	1.25	±0.15	±0.20	0.10%	(I)		

MLCC Middle High Voltage

RV	DARFON P/N	Measuring Condition	Capacitance		Available Tolerance	Thick. (mm)	Tolerance(mm)		DF (max.)	Standard Packing	Test Spec.	
			Value	Unit			L/W	Thick.				
1000V	C3216NP0470□PPS	1V,1MHz	47	pF	±5%	1.25	±0.15	±0.20	0.10%	Embossed,3kpcs	(I)	
	C3216NP0560□PPS	1V,1MHz	56	pF	±5%	1.25	±0.15	±0.20	0.10%		(I)	
	C3216NP0680□PPS	1V,1MHz	68	pF	±5%	1.25	±0.15	±0.20	0.10%		(I)	
	C3216NP0820□PPS	1V,1MHz	82	pF	±5%	1.25	±0.15	±0.20	0.10%		(I)	
	C3216NP0101□PPS	1V,1MHz	100	pF	±5%	1.25	±0.15	±0.20	0.10%		(I)	
	C3216NP0121□PPS	1V,1MHz	120	pF	±5%	1.25	±0.15	±0.20	0.10%		(I)	
	C3216NP0151□PPS	1V,1MHz	150	pF	±5%	1.25	±0.15	±0.20	0.10%	(I)		
	C3216NP0181□PPS	1V,1MHz	180	pF	±5%	1.25	±0.15	±0.20	0.10%	(I)		
	C3216NP0221□PPS	1V,1MHz	220	pF	±5%	1.25	±0.15	±0.20	0.10%	(I)		
	C3216NP0271□PPS	1V,1MHz	270	pF	±5%	1.60	±0.20	±0.20	0.10%	Embossed,2kpcs	(I)	
	C3216NP0331□PPS	1V,1MHz	330	pF	±5%	1.60	±0.20	±0.20	0.10%		(I)	
	C3216NP0391□PPS	1V,1MHz	390	pF	±5%	1.60	±0.20	±0.20	0.10%		(I)	
C3216NP0471□PPS	1V,1MHz	470	pF	±5%	1.60	±0.20	±0.20	0.10%	(I)			
630V	C3216NP0100□MTS	1V,1MHz	10	pF	±5%	0.85	±0.15	±0.15	0.17%	Paper,4 Kpcs	(I)	
	C3216NP0150□MTS	1V,1MHz	15	pF	±5%	0.85	±0.15	±0.15	0.14%		(I)	
	C3216NP0220□MTS	1V,1MHz	22	pF	±5%	0.85	±0.15	±0.15	0.12%		(I)	
	C3216NP0270□MTS	1V,1MHz	27	pF	±5%	0.85	±0.15	±0.15	0.11%		(I)	
	C3216NP0330□MTS	1V,1MHz	33	pF	±5%	0.85	±0.15	±0.15	0.10%		(I)	
	C3216NP0470□MTS	1V,1MHz	47	pF	±5%	0.85	±0.15	±0.15	0.10%		(I)	
	C3216NP0560□MTS	1V,1MHz	56	pF	±5%	0.85	±0.15	±0.15	0.10%		(I)	
	C3216NP0680□MTS	1V,1MHz	68	pF	±5%	0.85	±0.15	±0.15	0.10%		(I)	
	C3216NP0820□MTS	1V,1MHz	82	pF	±5%	0.85	±0.15	±0.15	0.10%		(I)	
	C3216NP0101□MTS	1V,1MHz	100	pF	±5%	0.85	±0.15	±0.15	0.10%		(I)	
	C3216NP0121□MTS	1V,1MHz	120	pF	±5%	0.85	±0.15	±0.15	0.10%		(I)	
	C3216NP0151□MTS	1V,1MHz	150	pF	±5%	0.85	±0.15	±0.15	0.10%		(I)	
	C3216NP0181□MTS	1V,1MHz	180	pF	±5%	0.85	±0.15	±0.15	0.10%		(I)	
	C3216NP0221□MTS	1V,1MHz	220	pF	±5%	0.85	±0.15	±0.15	0.10%		(I)	
	C3216NP0271□MTS	1V,1MHz	270	pF	±5%	0.85	±0.15	±0.15	0.10%		(I)	
	C3216NP0331□MTS	1V,1MHz	330	pF	±5%	0.85	±0.15	±0.15	0.10%		(I)	
	C3216NP0391□MTS	1V,1MHz	390	pF	±5%	0.85	±0.15	±0.15	0.10%		(I)	
	C3216NP0471□MTS	1V,1MHz	470	pF	±5%	0.85	±0.15	±0.15	0.10%		(I)	
	C3216NP0222□MPS	1V,1kHz	2.2	nF	±5%	1.60	±0.30/±0.20	±0.20	0.10%		Embossed,2kpc	(I)
	500V	C3216NP0471JLTS	1V,1MHz	470	pF	±5%	0.85	±0.15	±0.15		0.10%	Paper,4kpcs
250V	C3216NP0121□KTS	1V,1MHz	120	pF	±5%	0.85	±0.15	±0.15	0.10%	Paper,4kpcs	(I)	
	C3216NP0151□KTS	1V,1MHz	150	pF	±5%	0.85	±0.15	±0.15	0.10%		(I)	
	C3216NP0181□KTS	1V,1MHz	180	pF	±5%	0.85	±0.15	±0.15	0.10%		(I)	
	C3216NP0221□KTS	1V,1MHz	220	pF	±5%	0.85	±0.15	±0.15	0.10%		(I)	
	C3216NP0271□KTS	1V,1MHz	270	pF	±5%	0.85	±0.15	±0.15	0.10%		(I)	
	C3216NP0331□KTS	1V,1MHz	330	pF	±5%	0.85	±0.15	±0.15	0.10%		(I)	
	C3216NP0391□KTS	1V,1MHz	390	pF	±5%	0.85	±0.15	±0.15	0.10%		(I)	
C3216NP0471□KTS	1V,1MHz	470	pF	±5%	0.85	±0.15	±0.15	0.10%	(I)			
100V	C3216NP0100□HTS	1V,1MHz	10	pF	±5%	0.85	±0.15	±0.15	0.17%	Paper,4kpcs	(I)	
	C3216NP0120□HTS	1V,1MHz	12	pF	±5%	0.85	±0.15	±0.15	0.16%		(I)	
	C3216NP0150□HTS	1V,1MHz	15	pF	±5%	0.85	±0.15	±0.15	0.14%		(I)	
	C3216NP0180□HTS	1V,1MHz	18	pF	±5%	0.85	±0.15	±0.15	0.13%		(I)	
	C3216NP0220□HTS	1V,1MHz	22	pF	±5%	0.85	±0.15	±0.15	0.12%		(I)	
	C3216NP0270□HTS	1V,1MHz	27	pF	±5%	0.85	±0.15	±0.15	0.11%		(I)	
	C3216NP0330□HTS	1V,1MHz	33	pF	±5%	0.85	±0.15	±0.15	0.10%		(I)	
	C3216NP0390□HTS	1V,1MHz	39	pF	±5%	0.85	±0.15	±0.15	0.10%		(I)	
	C3216NP0470□HTS	1V,1MHz	47	pF	±5%	0.85	±0.15	±0.15	0.10%		(I)	
	C3216NP0560□HTS	1V,1MHz	56	pF	±5%	0.85	±0.15	±0.15	0.10%		(I)	
	C3216NP0680□HTS	1V,1MHz	68	pF	±5%	0.85	±0.15	±0.15	0.10%		(I)	
	C3216NP0820□HTS	1V,1MHz	82	pF	±5%	0.85	±0.15	±0.15	0.10%		(I)	
	C3216NP0101□HTS	1V,1MHz	100	pF	±5%	0.85	±0.15	±0.15	0.10%		(I)	
	C3216NP0121□HTS	1V,1MHz	120	pF	±5%	0.85	±0.15	±0.15	0.10%		(I)	
	C3216NP0151□HTS	1V,1MHz	150	pF	±5%	0.85	±0.15	±0.15	0.10%		(I)	
C3216NP0181□HTS	1V,1MHz	180	pF	±5%	0.85	±0.15	±0.15	0.10%	(I)			
C3216NP0221□HTS	1V,1MHz	220	pF	±5%	0.85	±0.15	±0.15	0.10%	(I)			

□ Tolerance Code: A=±0.05 pF, B=±0.1pF, C=±0.25pF ,D=±0.5pF, F=±1%, G=±2%, J=±5%; Special tolerance on the request.



RV	DARFON P/N	Measuring Condition	Capacitance		Available Tolerance	Thick. (mm)	Tolerance(mm)		DF (max.)	Standard Packing	Test Spec.
			Value	Unit			L/W	Thick.			
100V	C3216NP0271□HTS	1V, 1MHz	270	pF	±5%	0.85	±0.15	±0.15	0.10%	Paper, 4kpcs	(I)
	C3216NP0331□HTS	1V, 1MHz	330	pF	±5%	0.85	±0.15	±0.15	0.10%		(I)
	C3216NP0391□HTS	1V, 1MHz	390	pF	±5%	0.85	±0.15	±0.15	0.10%		(I)
	C3216NP0471□HTS	1V, 1MHz	470	pF	±5%	0.85	±0.15	±0.15	0.10%		(I)
	C3216NP0561□HTS	1V, 1MHz	560	pF	±5%	0.85	±0.15	±0.15	0.10%		(I)
	C3216NP0681□HTS	1V, 1MHz	680	pF	±5%	0.85	±0.15	±0.15	0.10%		(I)
	C3216NP0821□HTS	1V, 1MHz	820	pF	±5%	0.85	±0.15	±0.15	0.10%		(I)
	C3216NP0102□HTS	1V, 1MHz	1.0	nF	±5%	0.85	±0.15	±0.15	0.10%		(I)
	C3216NP0122□HTS	1V, 1kHz	1.2	nF	±5%	0.85	±0.15	±0.15	0.10%		(I)
	C3216NP0152□HTS	1V, 1kHz	1.5	nF	±5%	0.85	±0.15	±0.15	0.10%		(I)
	C3216NP0182□HTS	1V, 1kHz	1.8	nF	±5%	0.85	±0.15	±0.15	0.10%		(I)
	C3216NP0222□HTS	1V, 1kHz	2.2	nF	±5%	0.85	±0.15	±0.15	0.10%		(I)
	C3216NP0272□HTS	1V, 1kHz	2.7	nF	±5%	0.85	±0.15	±0.15	0.10%		(I)
	C3216NP0332□HTS	1V, 1kHz	3.3	nF	±5%	0.85	±0.15	±0.15	0.10%		(I)
	C3216NP0392□HTS	1V, 1kHz	3.9	nF	±5%	0.85	±0.15	±0.15	0.10%		(I)
	C3216NP0472□HTS	1V, 1kHz	4.7	nF	±5%	0.85	±0.15	±0.15	0.10%	(I)	
	C3216NP0562□HTS	1V, 1kHz	5.6	nF	±5%	0.85	±0.15	±0.15	0.10%	(I)	
	C3216NP0682□HPS	1V, 1kHz	6.8	nF	±5%	1.15	±0.15	±0.20	0.10%	(I)	
C3216NP0822□HPS	1V, 1kHz	8.2	nF	±5%	1.15	±0.15	±0.20	0.10%	(I)		
C3216NP0103□HPS	1V, 1kHz	10	nF	±5%	1.25	±0.15	±0.20	0.10%	(I)		

### ● C3225NP0Series (EIA1210)

RV	DARFON P/N	Measuring Condition	Capacitance		Available Tolerance	Thick. (mm)	Tolerance(mm)		DF (max.)	Standard Packing	Test Spec.
			Value	Unit			L/W	Thick.			
1000V	C3225NP0331□PPS	1V, 1MHz	330	pF	±5%	1.60	±0.40/±0.30	±0.20	0.10%	Embossed, 2kpcs	(I)

### ● C4520NP0Series (EIA1808)

RV	DARFON P/N	Measuring Condition	Capacitance		Available Tolerance	Thick. (mm)	Tolerance(mm)		DF (max.)	Standard Packing	Test Spec.
			Value	Unit			L/W	Thick.			
3000V	C4520NP0100□RPS	1V, 1MHz	10	pF	±5%	1.25	+0.5-0.3/±0.25	±0.10	0.17%	Embossed, 3kpcs	(I)
	C4520NP0101□RPS	1V, 1MHz	100	pF	±5%	1.25	+0.5-0.3/±0.25	±0.20	0.10%		(I)
2000V	C4520NP0180□QPS	1V, 1MHz	18	pF	±5%	1.25	+0.5-0.3/±0.25	±0.20	0.13%	Embossed, 2kpcs	(I)

### ● C4532NP0Series (EIA1812)

RV	DARFON P/N	Measuring Condition	Capacitance		Available Tolerance	Thick. (mm)	Tolerance(mm)		DF (max.)	Standard Packing	Test Spec.
			Value	Unit			L/W	Thick.			
2000V	C4532NP0222□RPS	1V, 1kHz	2.2	nF	±10%	1.25	+0.5-0.3/±0.30	±0.20	0.10%	Embossed, 3kpcs	(I)

□ Tolerance Code: A=±0.05 pF, B=±0.1pF, C=±0.25pF, D=±0.5pF, G=±2%, J=±5%; Special tolerance on the request.

### ■ X7R Series

### ● C1005X7R Series (EIA0402)

RV	DARFON P/N	Measuring Condition	Capacitance		Available Tolerance	Thick. (mm)	Tolerance(mm)		DF (max.)	Standard Packing	Test Spec.
			Value	Unit			L/W	Thick.			
100V	C1005X7R101□HTS	1V, 1kHz	100	pF	±10%	0.50	±0.05	±0.05	3.0%	Paper, 10kpcs	(I)
	C1005X7R121□HTS	1V, 1kHz	120	pF	±10%	0.50	±0.05	±0.05	3.0%		(I)
	C1005X7R151□HTS	1V, 1kHz	150	pF	±10%	0.50	±0.05	±0.05	3.0%		(I)
	C1005X7R181□HTS	1V, 1kHz	180	pF	±10%	0.50	±0.05	±0.05	3.0%		(I)
	C1005X7R221□HTS	1V, 1kHz	220	pF	±10%	0.50	±0.05	±0.05	3.0%		(I)
	C1005X7R271□HTS	1V, 1kHz	270	pF	±10%	0.50	±0.05	±0.05	3.0%		(I)
	C1005X7R331□HTS	1V, 1kHz	330	pF	±10%	0.50	±0.05	±0.05	3.0%		(I)
	C1005X7R391□HTS	1V, 1kHz	390	pF	±10%	0.50	±0.05	±0.05	3.0%		(I)
	C1005X7R471□HTS	1V, 1kHz	470	pF	±10%	0.50	±0.05	±0.05	3.0%		(I)
	C1005X7R561□HTS	1V, 1kHz	560	pF	±10%	0.50	±0.05	±0.05	3.0%		(I)
	C1005X7R681□HTS	1V, 1kHz	680	pF	±10%	0.50	±0.05	±0.05	3.0%		(I)
	C1005X7R821□HTS	1V, 1kHz	820	pF	±10%	0.50	±0.05	±0.05	3.0%		(I)
	C1005X7R102□HTS	1V, 1kHz	1.0	nF	±10%	0.50	±0.05	±0.05	3.0%		(I)
	C1005X7R122□HTS	1V, 1kHz	1.2	nF	±10%	0.50	±0.05	±0.05	3.0%		(I)
	C1005X7R152□HTS	1V, 1kHz	1.5	nF	±10%	0.50	±0.05	±0.05	3.0%		(I)
	C1005X7R182□HTS	1V, 1kHz	1.8	nF	±10%	0.50	±0.05	±0.05	3.0%		(I)
	C1005X7R222□HTS	1V, 1kHz	2.2	nF	±10%	0.50	±0.05	±0.05	3.0%		(I)
	C1005X7R272□HTS	1V, 1kHz	2.7	nF	±10%	0.50	±0.05	±0.05	3.0%		(I)
	C1005X7R332□HTS	1V, 1kHz	3.3	nF	±10%	0.50	±0.05	±0.05	3.0%		(I)
	C1005X7R392□HTS	1V, 1kHz	3.9	nF	±10%	0.50	±0.05	±0.05	3.0%		(I)
	C1005X7R472□HTS	1V, 1kHz	4.7	nF	±10%	0.50	±0.05	±0.05	3.0%		(I)
C1005X7R562□HTS	1V, 1kHz	5.6	nF	±10%	0.50	±0.05	±0.05	3.0%	(I)		
C1005X7R682□HTS	1V, 1kHz	6.8	nF	±10%	0.50	±0.05	±0.05	3.0%	(I)		

● C1608X7R Series (EIA0603)

RV	DARFON P/N	Measuring Condition	Capacitance		Available Tolerance	Thick. (mm)	Tolerance(mm)		DF (max.)	Standard Packing	Test Spec.
			Value	Unit			L/W	Thick.			
250V	C1608X7R101□KTS	1V, 1kHz	100	pF	±10%	0.80	±0.10	±0.10	2.5%	Paper, 4kpcs	(I)
	C1608X7R121□KTS	1V, 1kHz	120	pF	±10%	0.80	±0.10	±0.10	2.5%		(I)
	C1608X7R151□KTS	1V, 1kHz	150	pF	±10%	0.80	±0.10	±0.10	2.5%		(I)
	C1608X7R181□KTS	1V, 1kHz	180	pF	±10%	0.80	±0.10	±0.10	2.5%		(I)
	C1608X7R221□KTS	1V, 1kHz	220	pF	±10%	0.80	±0.10	±0.10	2.5%		(I)
	C1608X7R271□KTS	1V, 1kHz	270	pF	±10%	0.80	±0.10	±0.10	2.5%		(I)
	C1608X7R331□KTS	1V, 1kHz	330	pF	±10%	0.80	±0.10	±0.10	2.5%		(I)
	C1608X7R391□KTS	1V, 1kHz	390	pF	±10%	0.80	±0.10	±0.10	2.5%		(I)
	C1608X7R471□KTS	1V, 1kHz	470	pF	±10%	0.80	±0.10	±0.10	2.5%		(I)
	C1608X7R561□KTS	1V, 1kHz	560	pF	±10%	0.80	±0.10	±0.10	2.5%		(I)
	C1608X7R681□KTS	1V, 1kHz	680	pF	±10%	0.80	±0.10	±0.10	2.5%		(I)
	C1608X7R821□KTS	1V, 1kHz	820	pF	±10%	0.80	±0.10	±0.10	2.5%		(I)
	C1608X7R102□KTS	1V, 1kHz	1.0	nF	±10%	0.80	±0.10	±0.10	2.5%		(I)
	C1608X7R122□KTS	1V, 1kHz	1.2	nF	±10%	0.80	±0.10	±0.10	2.5%		(I)
	C1608X7R152□KTS	1V, 1kHz	1.5	nF	±10%	0.80	±0.10	±0.10	2.5%		(I)
	C1608X7R182□KTS	1V, 1kHz	1.8	nF	±10%	0.80	±0.10	±0.10	2.5%		(I)
	C1608X7R222□KTS	1V, 1kHz	2.2	nF	±10%	0.80	±0.10	±0.10	2.5%		(I)
	C1608X7R272□KTS	1V, 1kHz	2.7	nF	±10%	0.80	±0.10	±0.10	2.5%		(I)
	C1608X7R332□KTS	1V, 1kHz	3.3	nF	±10%	0.80	±0.10	±0.10	2.5%		(I)
	C1608X7R392□KTS	1V, 1kHz	3.9	nF	±10%	0.80	±0.10	±0.10	2.5%		(I)
C1608X7R472□KTS	1V, 1kHz	4.7	nF	±10%	0.80	±0.10	±0.10	2.5%	(I)		
C1608X7R562□KTS	1V, 1kHz	5.6	nF	±10%	0.80	±0.10	±0.10	2.5%	(I)		
C1608X7R682□KTS	1V, 1kHz	6.8	nF	±10%	0.80	±0.10	±0.10	2.5%	(I)		
100V	C1608X7R101□HTS	1V, 1kHz	100	pF	±10%	0.80	±0.10	±0.10	3.0%	Paper, 4kpcs	(I)
	C1608X7R121□HTS	1V, 1kHz	120	pF	±10%	0.80	±0.10	±0.10	3.0%		(I)
	C1608X7R151□HTS	1V, 1kHz	150	pF	±10%	0.80	±0.10	±0.10	3.0%		(I)
	C1608X7R181□HTS	1V, 1kHz	180	pF	±10%	0.80	±0.10	±0.10	3.0%		(I)
	C1608X7R221□HTS	1V, 1kHz	220	pF	±10%	0.80	±0.10	±0.10	3.0%		(I)
	C1608X7R271□HTS	1V, 1kHz	270	pF	±10%	0.80	±0.10	±0.10	3.0%		(I)
	C1608X7R331□HTS	1V, 1kHz	330	pF	±10%	0.80	±0.10	±0.10	3.0%		(I)
	C1608X7R391□HTS	1V, 1kHz	390	pF	±10%	0.80	±0.10	±0.10	3.0%		(I)
	C1608X7R471□HTS	1V, 1kHz	470	pF	±10%	0.80	±0.10	±0.10	3.0%		(I)
	C1608X7R561□HTS	1V, 1kHz	560	pF	±10%	0.80	±0.10	±0.10	3.0%		(I)
	C1608X7R681□HTS	1V, 1kHz	680	pF	±10%	0.80	±0.10	±0.10	3.0%		(I)
	C1608X7R821□HTS	1V, 1kHz	820	pF	±10%	0.80	±0.10	±0.10	3.0%		(I)
	C1608X7R102□HTS	1V, 1kHz	1.0	nF	±10%	0.80	±0.10	±0.10	3.0%		(I)
	C1608X7R122□HTS	1V, 1kHz	1.2	nF	±10%	0.80	±0.10	±0.10	3.0%		(I)
	C1608X7R152□HTS	1V, 1kHz	1.5	nF	±10%	0.80	±0.10	±0.10	3.0%		(I)
	C1608X7R182□HTS	1V, 1kHz	1.8	nF	±10%	0.80	±0.10	±0.10	3.0%		(I)
	C1608X7R222□HTS	1V, 1kHz	2.2	nF	±10%	0.80	±0.10	±0.10	3.0%		(I)
	C1608X7R272□HTS	1V, 1kHz	2.7	nF	±10%	0.80	±0.10	±0.10	3.0%		(I)
	C1608X7R332□HTS	1V, 1kHz	3.3	nF	±10%	0.80	±0.10	±0.10	3.0%		(I)
	C1608X7R392□HTS	1V, 1kHz	3.9	nF	±10%	0.80	±0.10	±0.10	3.0%		(I)
C1608X7R472□HTS	1V, 1kHz	4.7	nF	±10%	0.80	±0.10	±0.10	3.0%	(I)		
C1608X7R562□HTS	1V, 1kHz	5.6	nF	±10%	0.80	±0.10	±0.10	3.0%	(I)		
C1608X7R682□HTS	1V, 1kHz	6.8	nF	±10%	0.80	±0.10	±0.10	3.0%	(I)		
C1608X7R822□HTS	1V, 1kHz	8.2	nF	±10%	0.80	±0.10	±0.10	3.0%	(I)		
C1608X7R103□HTS	1V, 1kHz	10	nF	±10%	0.80	±0.10	±0.10	3.0%	(I)		
C1608X7R223□HTS	1V, 1kHz	22	nF	±10%	0.80	±0.10	±0.10	3.0%	(I)		
C1608X7R473□HTS	1V, 1kHz	47	nF	±10%	0.80	±0.15	±0.15	3.0%	(I)		
C1608X7R104□HTS	1V, 1kHz	100	nF	±10%	0.80	±0.15	±0.15	10.0%	(I)		

□ Tolerance Code: J=±5%, K=±10%, M=±20%; Special tolerance on the request.

● C2012X7R Series (EIA0805)

RV	DARFON P/N	Measuring Condition	Capacitance		Available Tolerance	Thick. (mm)	Tolerance(mm)		DF (max.)	Standard Packing	Test Spec.	
			Value	Unit			L/W	Thick.				
630V	C2012X7R181□MTS	1V, 1kHz	180	pF	±10%	0.85	±0.15	±0.15	2.5%	Paper, 4kpcs	(I)	
	C2012X7R221□MTS	1V, 1kHz	220	pF	±10%	0.85	±0.15	±0.15	2.5%		(I)	
	C2012X7R271□MTS	1V, 1kHz	270	pF	±10%	0.85	±0.15	±0.15	2.5%		(I)	
	C2012X7R331□MTS	1V, 1kHz	330	pF	±10%	0.85	±0.15	±0.15	2.5%		(I)	
	C2012X7R391□MTS	1V, 1kHz	390	pF	±10%	0.85	±0.15	±0.15	2.5%		(I)	
	C2012X7R471□MTS	1V, 1kHz	470	pF	±10%	0.85	±0.15	±0.15	2.5%		(I)	
	C2012X7R561□MTS	1V, 1kHz	560	pF	±10%	0.85	±0.15	±0.15	2.5%		(I)	
	C2012X7R681□MTS	1V, 1kHz	680	pF	±10%	0.85	±0.15	±0.15	2.5%		(I)	
	C2012X7R821□MTS	1V, 1kHz	820	pF	±10%	0.85	±0.15	±0.15	2.5%		(I)	
	C2012X7R102□MTS	1V, 1kHz	1.0	nF	±10%	0.85	±0.15	±0.15	2.5%		(I)	
	C2012X7R122□MTS	1V, 1kHz	1.2	nF	±10%	0.85	±0.15	±0.15	2.5%		(I)	
	C2012X7R152□MTS	1V, 1kHz	1.5	nF	±10%	0.85	±0.15	±0.15	2.5%		(I)	
	C2012X7R182□MTS	1V, 1kHz	1.8	nF	±10%	0.85	±0.15	±0.15	2.5%		(I)	
	C2012X7R222□MTS	1V, 1kHz	2.2	nF	±10%	0.85	±0.15	±0.15	2.5%		(I)	
C2012X7R272□MTS	1V, 1kHz	2.7	nF	±10%	0.85	±0.15	±0.15	2.5%	(I)			
C2012X7R332□MTS	1V, 1kHz	3.3	nF	±10%	0.85	±0.15	±0.15	2.5%	(I)			
C2012X7R103□MPS	1V, 1kHz	10	nF	±10%	1.25	±0.15	±0.20	2.5%	Embossed, 3kpcs	(I)		
500V	C2012X7R221□LTS	1V, 1kHz	220	pF	±10%	0.85	±0.15	±0.15	2.5%	Paper, 4kpcs	(I)	
	C2012X7R271□LTS	1V, 1kHz	270	pF	±10%	0.85	±0.15	±0.15	2.5%		(I)	
	C2012X7R331□LTS	1V, 1kHz	330	pF	±10%	0.85	±0.15	±0.15	2.5%		(I)	
	C2012X7R471□LTS	1V, 1kHz	470	pF	±10%	0.85	±0.15	±0.15	2.5%		(I)	
	C2012X7R561□LTS	1V, 1kHz	560	pF	±10%	0.85	±0.15	±0.15	2.5%		(I)	
	C2012X7R681□LTS	1V, 1kHz	680	pF	±10%	0.85	±0.15	±0.15	2.5%		(I)	
C2012X7R102□LTS	1V, 1kHz	1.0	nF	±10%	0.85	±0.15	±0.15	2.5%	(I)			
250V	C2012X7R181□KTS	1V, 1kHz	180	pF	±10%	0.85	±0.15	±0.15	2.5%	Paper, 4kpcs	(I)	
	C2012X7R221□KTS	1V, 1kHz	220	pF	±10%	0.85	±0.15	±0.15	2.5%		(I)	
	C2012X7R331□KTS	1V, 1kHz	330	pF	±10%	0.85	±0.15	±0.15	2.5%		(I)	
	C2012X7R471□KTS	1V, 1kHz	470	pF	±10%	0.85	±0.15	±0.15	2.5%		(I)	
	C2012X7R681□KTS	1V, 1kHz	680	pF	±10%	0.85	±0.15	±0.15	2.5%		(I)	
	C2012X7R102□KTS	1V, 1kHz	1.0	nF	±10%	0.85	±0.15	±0.15	2.5%		(I)	
	C2012X7R222□KTS	1V, 1kHz	2.2	nF	±10%	0.85	±0.15	±0.15	2.5%		(I)	
	C2012X7R332□KTS	1V, 1kHz	3.3	nF	±10%	0.85	±0.15	±0.15	2.5%		(I)	
	C2012X7R392□KTS	1V, 1kHz	3.9	nF	±10%	0.85	±0.15	±0.15	2.5%		(I)	
	C2012X7R472□KTS	1V, 1kHz	4.7	nF	±10%	0.85	±0.15	±0.15	2.5%		(I)	
	C2012X7R562□KPS	1V, 1kHz	5.6	nF	±10%	1.25	±0.15	±0.20	2.5%		Embossed, 3kpcs	(I)
	C2012X7R682□KPS	1V, 1kHz	6.8	nF	±10%	1.25	±0.15	±0.20	2.5%			(I)
	C2012X7R822□KPS	1V, 1kHz	8.2	nF	±10%	1.25	±0.15	±0.20	2.5%			(I)
	C2012X7R103□KPS	1V, 1kHz	10	nF	±10%	1.25	±0.15	±0.20	2.5%			(I)
C2012X7R123□KPS	1V, 1kHz	12	nF	±10%	1.25	±0.15	±0.20	2.5%	(I)			
100V	C2012X7R151□HTS	1V, 1kHz	150	pF	±10%	0.85	±0.15	±0.15	3.0%	Paper, 4kpcs	(I)	
	C2012X7R181□HTS	1V, 1kHz	180	pF	±10%	0.85	±0.15	±0.15	3.0%		(I)	
	C2012X7R221□HTS	1V, 1kHz	220	pF	±10%	0.85	±0.15	±0.15	3.0%		(I)	
	C2012X7R271□HTS	1V, 1kHz	270	pF	±10%	0.85	±0.15	±0.15	3.0%		(I)	
	C2012X7R331□HTS	1V, 1kHz	330	pF	±10%	0.85	±0.15	±0.15	3.0%		(I)	
	C2012X7R391□HTS	1V, 1kHz	390	pF	±10%	0.85	±0.15	±0.15	3.0%		(I)	
	C2012X7R471□HTS	1V, 1kHz	470	pF	±10%	0.85	±0.15	±0.15	3.0%		(I)	
	C2012X7R561□HTS	1V, 1kHz	560	pF	±10%	0.85	±0.15	±0.15	3.0%		(I)	
	C2012X7R681□HTS	1V, 1kHz	680	pF	±10%	0.85	±0.15	±0.15	3.0%		(I)	
	C2012X7R821□HTS	1V, 1kHz	820	pF	±10%	0.85	±0.15	±0.15	3.0%		(I)	
	C2012X7R102□HTS	1V, 1kHz	1.0	nF	±10%	0.85	±0.15	±0.15	3.0%		(I)	
	C2012X7R122□HTS	1V, 1kHz	1.2	nF	±10%	0.85	±0.15	±0.15	3.0%		(I)	
	C2012X7R152□HTS	1V, 1kHz	1.5	nF	±10%	0.85	±0.15	±0.15	3.0%		(I)	
	C2012X7R182□HTS	1V, 1kHz	1.8	nF	±10%	0.85	±0.15	±0.15	3.0%		(I)	
	C2012X7R222□HTS	1V, 1kHz	2.2	nF	±10%	0.85	±0.15	±0.15	3.0%		(I)	
	C2012X7R272□HTS	1V, 1kHz	2.7	nF	±10%	0.85	±0.15	±0.15	3.0%		(I)	
	C2012X7R332□HTS	1V, 1kHz	3.3	nF	±10%	0.85	±0.15	±0.15	3.0%		(I)	
	C2012X7R392□HTS	1V, 1kHz	3.9	nF	±10%	0.85	±0.15	±0.15	3.0%		(I)	
	C2012X7R472□HTS	1V, 1kHz	4.7	nF	±10%	0.85	±0.15	±0.15	3.0%	(I)		
	C2012X7R562□HPS	1V, 1kHz	5.6	nF	±10%	1.25	±0.15	±0.20	3.0%	Embossed, 3kpcs	(I)	
	C2012X7R682□HPS	1V, 1kHz	6.8	nF	±10%	1.25	±0.15	±0.20	3.0%		(I)	
	C2012X7R822□HPS	1V, 1kHz	8.2	nF	±10%	1.25	±0.15	±0.20	3.0%		(I)	
	C2012X7R103□HPS	1V, 1kHz	10	nF	±10%	1.25	±0.15	±0.20	3.0%		(I)	
	C2012X7R123□HPS	1V, 1kHz	12	nF	±10%	1.25	±0.15	±0.20	3.0%		(I)	
	C2012X7R153□HTS	1V, 1kHz	15	nF	±10%	0.85	±0.20	±0.15	3.0%		(I)	
	C2012X7R183□HTS	1V, 1kHz	18	nF	±10%	0.85	±0.20	±0.15	3.0%	Paper, 4kpcs	(I)	
	C2012X7R223□HTS	1V, 1kHz	22	nF	±10%	0.85	±0.20	±0.15	3.0%		(I)	
	C2012X7R273□HTS	1V, 1kHz	27	nF	±10%	0.85	±0.20	±0.15	3.0%		(I)	
	C2012X7R473□HTS	1V, 1kHz	47	nF	±10%	0.85	±0.20	±0.15	3.0%		(I)	
	C2012X7R333□HPS	1V, 1kHz	33	nF	±10%	1.25	±0.15/±0.10	±0.10	2.5%		(I)	
	C2012X7R473□HPS	1V, 1kHz	47	nF	±10%	1.25	±0.15/±0.10	±0.10	2.5%		Embossed, 3kpcs	(I)
	C2012X7R563□HPS	1V, 1kHz	56	nF	±10%	1.25	±0.15/±0.10	±0.10	2.5%	(I)		
	C2012X7R683□HPS	1V, 1kHz	68	nF	±10%	1.25	±0.15/±0.10	±0.10	2.5%	(I)		
	C2012X7R823□HPS	1V, 1kHz	82	nF	±10%	1.25	±0.15/±0.10	±0.10	2.5%	(I)		
C2012X7R104□HPS	1V, 1kHz	100	nF	±10%	1.25	±0.20	±0.20	10.0%	(I)			

Middle High Voltage MLCC

● C3216X7R Series (EIA1206)

RV	DARFON P/N	Measuring Condition	Capacitance		Available Tolerance	Thick. (mm)	Tolerance(mm)		DF (max.)	Standard Packing	Test Spec.
			Value	Unit			L/W	Thick.			
2000V	C3216X7R151□QPS	1V, 1kHz	150	pF	±10%	1.25	±0.30	±0.20	2.5%	Embossed, 3kpcs	(I)
	C3216X7R181□QPS	1V, 1kHz	180	pF	±10%	1.25	±0.30	±0.20	2.5%		(I)
	C3216X7R221□QPS	1V, 1kHz	220	pF	±10%	1.25	±0.30	±0.20	2.5%		(I)
	C3216X7R271□QPS	1V, 1kHz	270	pF	±10%	1.25	±0.30	±0.20	2.5%		(I)
	C3216X7R331□QPS	1V, 1kHz	330	pF	±10%	1.25	±0.30	±0.20	2.5%		(I)
	C3216X7R471□QPS	1V, 1kHz	470	pF	±10%	1.25	±0.30	±0.20	2.5%		(I)
	C3216X7R561□QPS	1V, 1kHz	560	pF	±10%	1.25	±0.30	±0.20	2.5%	(I)	
	C3216X7R681□QPS	1V, 1kHz	680	pF	±10%	1.25	±0.30	±0.20	2.5%	(I)	
	C3216X7R821□QPSG	1V, 1kHz	820	pF	±10%	1.25	±0.30	±0.20	2.5%	(I)	
	C3216X7R821□QPS	1V, 1kHz	820	pF	±10%	1.60	±0.30	±0.20	2.5%	Embossed, 2kpcs	(I)
	C3216X7R102□QPSG	1V, 1kHz	1.0	nF	±10%	1.25	±0.30	±0.20	2.5%	Embossed, 3kpcs	(I)
	C3216X7R102□QPS	1V, 1kHz	1.0	nF	±10%	1.60	±0.30	±0.20	2.5%	Embossed, 2kpcs	(I)
	C3216X7R122□QPS	1V, 1kHz	1.2	nF	±10%	1.60	±0.30	±0.20	2.5%		(I)
	C3216X7R152□QPS	1V, 1kHz	1.5	nF	±10%	1.60	±0.30	±0.20	2.5%		(I)
C3216X7R182□QPS	1V, 1kHz	1.8	nF	±10%	1.60	±0.30	±0.20	2.5%	(I)		
C3216X7R222□QPS	1V, 1kHz	2.2	nF	±10%	1.60	±0.30	±0.20	2.5%	Embossed, 3kpcs	(I)	
C3216X7R222□QPSG	1V, 1kHz	2.2	nF	±10%	1.25	±0.30	±0.20	2.5%		(I)	
1000V	C3216X7R151□PPS	1V, 1kHz	150	pF	±10%	1.25	±0.30	±0.20	2.5%	Embossed, 3kpcs	(I)
	C3216X7R181□PPS	1V, 1kHz	180	pF	±10%	1.25	±0.30	±0.20	2.5%		(I)
	C3216X7R221□PPS	1V, 1kHz	220	pF	±10%	1.25	±0.30	±0.20	2.5%		(I)
	C3216X7R271□PPS	1V, 1kHz	270	pF	±10%	1.25	±0.30	±0.20	2.5%		(I)
	C3216X7R331□PPS	1V, 1kHz	330	pF	±10%	1.25	±0.30	±0.20	2.5%		(I)
	C3216X7R471□PPS	1V, 1kHz	470	pF	±10%	1.25	±0.30	±0.20	2.5%		(I)
	C3216X7R561□PPS	1V, 1kHz	560	pF	±10%	1.25	±0.30	±0.20	2.5%		(I)
	C3216X7R681□PPS	1V, 1kHz	680	pF	±10%	1.25	±0.30	±0.20	2.5%		(I)
	C3216X7R821□PPS	1V, 1kHz	820	pF	±10%	1.25	±0.30	±0.20	2.5%		(I)
	C3216X7R102□PPS	1V, 1kHz	1.0	nF	±10%	1.25	±0.30	±0.20	2.5%		(I)
	C3216X7R122□PPS	1V, 1kHz	1.2	nF	±10%	1.25	±0.30	±0.20	2.5%		(I)
	C3216X7R152□PPS	1V, 1kHz	1.5	nF	±10%	1.25	±0.30	±0.20	2.5%		(I)
	C3216X7R182□PPS	1V, 1kHz	1.8	nF	±10%	1.25	±0.30	±0.20	2.5%		(I)
	C3216X7R222□PPS	1V, 1kHz	2.2	nF	±10%	1.25	±0.30	±0.20	2.5%		(I)
	C3216X7R272□PPS	1V, 1kHz	2.7	nF	±10%	1.25	±0.30	±0.20	2.5%		(I)
	C3216X7R332□PPS	1V, 1kHz	3.3	nF	±10%	1.25	±0.30	±0.20	2.5%		(I)
	C3216X7R392□PPS	1V, 1kHz	3.9	nF	±10%	1.25	±0.30	±0.20	2.5%		(I)
	C3216X7R472□PPS	1V, 1kHz	4.7	nF	±10%	1.25	±0.30	±0.20	2.5%		(I)
C3216X7R562□PPS	1V, 1kHz	5.6	nF	±10%	1.25	±0.30	±0.20	2.5%	(I)		
C3216X7R682□PPS	1V, 1kHz	6.8	nF	±10%	1.25	±0.30	±0.20	2.5%	(I)		
C3216X7R822□PPS	1V, 1kHz	8.2	nF	±10%	1.25	±0.30	±0.20	2.5%	(I)		
C3216X7R103□PPS	1V, 1kHz	10	nF	±10%	1.25	±0.30	±0.20	2.5%	(I)		
630V	C3216X7R181□MTS	1V, 1kHz	180	pF	±10%	0.85	±0.15	±0.15	2.5%	Paper, 4kpcs	(I)
	C3216X7R221□MTS	1V, 1kHz	220	pF	±10%	0.85	±0.15	±0.15	2.5%		(I)
	C3216X7R271□MTS	1V, 1kHz	270	pF	±10%	0.85	±0.15	±0.15	2.5%		(I)
	C3216X7R331□MTS	1V, 1kHz	330	pF	±10%	0.85	±0.15	±0.15	2.5%		(I)
	C3216X7R391□MTS	1V, 1kHz	390	pF	±10%	0.85	±0.15	±0.15	2.5%		(I)
	C3216X7R471□MTS	1V, 1kHz	470	pF	±10%	0.85	±0.15	±0.15	2.5%		(I)
	C3216X7R561□MTS	1V, 1kHz	560	pF	±10%	0.85	±0.15	±0.15	2.5%		(I)
	C3216X7R681□MTS	1V, 1kHz	680	pF	±10%	0.85	±0.15	±0.15	2.5%		(I)
	C3216X7R821□MTS	1V, 1kHz	820	pF	±10%	0.85	±0.15	±0.15	2.5%		(I)
	C3216X7R102□MTS	1V, 1kHz	1.0	nF	±10%	0.85	±0.15	±0.15	2.5%		(I)
	C3216X7R122□MTS	1V, 1kHz	1.2	nF	±10%	0.85	±0.15	±0.15	2.5%		(I)
	C3216X7R152□MTS	1V, 1kHz	1.5	nF	±10%	0.85	±0.15	±0.15	2.5%		(I)
	C3216X7R182□MTS	1V, 1kHz	1.8	nF	±10%	0.85	±0.15	±0.15	2.5%		(I)
	C3216X7R222□MTS	1V, 1kHz	2.2	nF	±10%	0.85	±0.15	±0.15	2.5%		(I)
	C3216X7R272□MTS	1V, 1kHz	2.7	nF	±10%	0.85	±0.15	±0.15	2.5%		(I)
	C3216X7R332□MTS	1V, 1kHz	3.3	nF	±10%	0.85	±0.15	±0.15	2.5%		(I)
	C3216X7R392□MTS	1V, 1kHz	3.9	nF	±10%	0.85	±0.15	±0.15	2.5%		(I)
	C3216X7R472□MTS	1V, 1kHz	4.7	nF	±10%	0.85	±0.15	±0.15	2.5%		(I)
	C3216X7R562□MTS	1V, 1kHz	5.6	nF	±10%	0.85	±0.15	±0.15	2.5%	(I)	
	C3216X7R682□MTS	1V, 1kHz	6.8	nF	±10%	0.85	±0.15	±0.15	2.5%	(I)	
	C3216X7R102KMPS	1V, 1kHz	1.0	nF	±10%	1.25	±0.15	±0.10	2.5%	Embossed, 3kpcs	(II)
	C3216X7R822KMPS	1V, 1kHz	8.2	nF	±10%	1.25	±0.15	±0.10	2.5%		(II)
	C3216X7R103KMPS	1V, 1kHz	10	nF	±10%	1.25	±0.15	±0.10	2.5%		(II)
	C3216X7R123KMPS	1V, 1kHz	12	nF	±10%	1.25	±0.15	±0.10	2.5%	Embossed, 2kpcs	(I)
	C3216X7R153□MPS	1V, 1kHz	15	nF	±10%	1.60	±0.20	±0.20	2.5%		(I)
	C3216X7R183□MPS	1V, 1kHz	18	nF	±10%	1.60	±0.20	±0.20	2.5%		(I)
C3216X7R223□MPS	1V, 1kHz	22	nF	±10%	1.60	±0.20	±0.20	2.5%	(I)		
C3216X7R273□MPS	1V, 1kHz	27	nF	±10%	1.60	±0.30	±0.20	2.5%	(II)		
C3216X7R333□MPS	1V, 1kHz	33	nF	±10%	1.60	±0.30	±0.20	2.5%	(II)		
C3216X7R473KMPS	1V, 1kHz	47	nF	±10%	1.60	±0.30	±0.20	2.5%	(II)		

□ Tolerance Code: J=±5%, K=±10%, M=±20%; Special tolerance on the request.

RV	DARFON P/N	Measuring Condition	Capacitance		Available Tolerance	Thick. (mm)	Tolerance(mm)		DF (max.)	Standard Packing	Test Spec.	
			Value	Unit			L/W	Thick.				
500V	C3216X7R103□LPS	1V, 1kHz	10	nF	±10%	1.15	±0.15	±0.20	2.5%	Embossed, 3kpcs	(I)	
	C3216X7R223□LPS	1V, 1kHz	22	nF	±10%	1.60	±0.20	±0.20	2.5%	Embossed, 2kpcs	(I)	
250V	C3216X7R181□KTS	1V, 1kHz	180	pF	±10%	0.85	±0.15	±0.15	2.5%	Paper, 4kpcs	(I)	
	C3216X7R221□KTS	1V, 1kHz	220	pF	±10%	0.85	±0.15	±0.15	2.5%		(I)	
	C3216X7R271□KTS	1V, 1kHz	270	pF	±10%	0.85	±0.15	±0.15	2.5%		(I)	
	C3216X7R331□KTS	1V, 1kHz	330	pF	±10%	0.85	±0.15	±0.15	2.5%		(I)	
	C3216X7R471□KTS	1V, 1kHz	470	pF	±10%	0.85	±0.15	±0.15	2.5%		(I)	
	C3216X7R561□KTS	1V, 1kHz	560	pF	±10%	0.85	±0.15	±0.15	2.5%		(I)	
	C3216X7R681□KTS	1V, 1kHz	680	pF	±10%	0.85	±0.15	±0.15	2.5%		(I)	
	C3216X7R821□KTS	1V, 1kHz	820	pF	±10%	0.85	±0.15	±0.15	2.5%		(I)	
	C3216X7R102□KTS	1V, 1kHz	1.0	nF	±10%	0.85	±0.15	±0.15	2.5%		(I)	
	C3216X7R122□KTS	1V, 1kHz	1.2	nF	±10%	0.85	±0.15	±0.15	2.5%		(I)	
	C3216X7R152□KTS	1V, 1kHz	1.5	nF	±10%	0.85	±0.15	±0.15	2.5%		(I)	
	C3216X7R182□KTS	1V, 1kHz	1.8	nF	±10%	0.85	±0.15	±0.15	2.5%		(I)	
	C3216X7R222□KTS	1V, 1kHz	2.2	nF	±10%	0.85	±0.15	±0.15	2.5%		(I)	
	C3216X7R272□KTS	1V, 1kHz	2.7	nF	±10%	0.85	±0.15	±0.15	2.5%		(I)	
	C3216X7R332□KTS	1V, 1kHz	3.3	nF	±10%	0.85	±0.15	±0.15	2.5%		(I)	
	C3216X7R392□KTS	1V, 1kHz	3.9	nF	±10%	0.85	±0.15	±0.15	2.5%		(I)	
	C3216X7R472□KTS	1V, 1kHz	4.7	nF	±10%	0.85	±0.15	±0.15	2.5%		(I)	
	C3216X7R562□KTS	1V, 1kHz	5.6	nF	±10%	0.85	±0.15	±0.15	2.5%		(I)	
	C3216X7R682□KTS	1V, 1kHz	6.8	nF	±10%	0.85	±0.15	±0.15	2.5%		(I)	
	C3216X7R822□KTS	1V, 1kHz	8.2	nF	±10%	0.85	±0.15	±0.15	2.5%		(I)	
	C3216X7R103□KTS	1V, 1kHz	10	nF	±10%	0.85	±0.15	±0.15	2.5%		(I)	
	C3216X7R123□KTS	1V, 1kHz	12	nF	±10%	0.85	±0.15	±0.15	2.5%		(I)	
	C3216X7R153□KTS	1V, 1kHz	15	nF	±10%	0.85	±0.15	±0.15	2.5%		(I)	
	C3216X7R183□KPS	1V, 1kHz	18	nF	±10%	1.15	±0.15	±0.20	2.5%		Embossed, 3kpcs	(I)
	C3216X7R223□KPS	1V, 1kHz	22	nF	±10%	1.15	±0.15	±0.20	2.5%			(I)
	C3216X7R273□KPS	1V, 1kHz	27	nF	±10%	1.15	±0.15	±0.20	2.5%			(I)
	C3216X7R333□KPS	1V, 1kHz	33	nF	±10%	1.15	±0.15	±0.20	2.5%			(I)
	C3216X7R393□KPS	1V, 1kHz	39	nF	±10%	1.15	±0.15	±0.20	2.5%			(I)
C3216X7R473□KPS	1V, 1kHz	47	nF	±10%	1.15	±0.15	±0.20	2.5%	Embossed, 2kpcs	(I)		
C3216X7R104□KPS	1V, 1kHz	100	nF	±10%	1.60	±0.20	±0.20	2.5%		(I)		
100V	C3216X7R103KHTS	1V, 1kHz	10	nF	±10%	0.80	±0.15	±0.10	3.5%	Paper, 4kpcs	(I)	
	C3216X7R123KHTS	1V, 1kHz	12	nF	±10%	0.80	±0.15	±0.10	3.5%		(I)	
	C3216X7R153KHTS	1V, 1kHz	15	nF	±10%	0.80	±0.15	±0.10	3.5%		(I)	
	C3216X7R183KHTS	1V, 1kHz	18	nF	±10%	0.80	±0.15	±0.10	3.5%		(I)	
	C3216X7R223KHTS	1V, 1kHz	22	nF	±10%	0.80	±0.15	±0.10	3.5%		(I)	
	C3216X7R273KHTS	1V, 1kHz	27	nF	±10%	0.80	±0.15	±0.10	3.5%		(I)	
	C3216X7R333KHTS	1V, 1kHz	33	nF	±10%	0.80	±0.15	±0.10	3.5%		(I)	
	C3216X7R393KHTS	1V, 1kHz	39	nF	±10%	0.80	±0.15	±0.10	3.5%		(I)	
	C3216X7R473KHTS	1V, 1kHz	47	nF	±10%	0.80	±0.15	±0.10	3.5%		(I)	
	C3216X7R563KHTS	1V, 1kHz	56	nF	±10%	0.80	±0.15	±0.10	3.5%		(I)	
	C3216X7R683KHTS	1V, 1kHz	68	nF	±10%	0.80	±0.15	±0.10	3.5%		(I)	
	C3216X7R823KHTS	1V, 1kHz	82	nF	±10%	0.80	±0.15	±0.10	3.5%		(I)	
	C3216X7R823KHPS	1V, 1kHz	82	nF	±10%	1.25	±0.15	±0.10	3.5%		Embossed, 3kpcs	(I)
	C3216X7R104KHPS	1V, 1kHz	100	nF	±10%	0.80	±0.15	±0.10	3.5%		Paper, 4kpcs	(I)
	C3216X7R104KHPS	1V, 1kHz	100	nF	±10%	1.25	±0.15	±0.10	3.5%		Embossed, 3kpcs	(I)
	C3216X7R154KHPS	1V, 1kHz	150	nF	±10%	1.60	±0.20	±0.20	2.5%		Embossed, 2kpcs	(I)
C3216X7R224KHPS	1V, 1kHz	220	nF	±10%	1.60	±0.20	±0.20	2.5%	(I)			
C3216X7R105□HPS	1V, 1kHz	1.0	uF	±10%	1.60	±0.30	±0.30	10.0%	(I)			
C3216X7R225□HPS	1V, 1kHz	2.2	uF	±10%	1.60	±0.30	±0.30	10.0%	(II)			

## ● C3225X7R Series (EIA1210)

RV	DARFON P/N	Measuring Condition	Capacitance		Available Tolerance	Thick. (mm)	Tolerance(mm)		DF (max.)	Standard Packing	Test Spec.
			Value	Unit			L/W	Thick.			
2000V	C3225X7R102KQPS	1V, 1kHz	1.0	nF	±10%	1.25	±0.30/±0.20	±0.20	2.50%	Embossed, 3kpcs	(I)
	C3225X7R222KQPS	1V, 1kHz	2.2	nF	±10%	2.00	±0.30/±0.20	±0.20	2.50%	Embossed, 2kpcs	(I)
1000V	C3225X7R103KPPS	1V, 1kHz	10	nF	±10%	1.60	±0.40/±0.30	±0.20	2.50%	Embossed, 2kpcs	(I)
500V	C3225X7R103KLPS	1V, 1kHz	10	nF	±10%	1.25	±0.30/±0.20	±0.20	2.50%	Embossed, 3kpcs	(I)
	C3225X7R223KLPS	1V, 1kHz	22	nF	±10%	1.25	±0.30/±0.20	±0.20	2.50%	Embossed, 3kpcs	(I)
	C3225X7R104KLPS	1V, 1kHz	100	nF	±10%	2.00	±0.40/±0.30	±0.20	2.50%	Embossed, 2kpcs	(I)
250V	C3225X7R224KKPS	1V, 1kHz	220	nF	±10%	2.50	±0.40/±0.30	±0.30	2.50%	Embossed, 1kpcs	(I)
100V	C3225X7R104KHPS	1V, 1kHz	100	nF	±10%	0.95	±0.30/±0.20	±0.10	2.50%	Embossed, 3kpcs	(I)
	C3225X7R105KHPS	1V, 1kHz	1.0	uF	±10%	2.00	±0.30/±0.20	±0.20	10.0%	Embossed, 2kpcs	(I)
	C3225X7R225KHPS	1V, 1kHz	2.2	uF	±10%	2.00	±0.30/±0.20	±0.20	10.0%		(I)

● C4520X7R Series (EIA1808)

RV	DARFON P/N	Measuring Condition	Capacitance		Available Tolerance	Thick. (mm)	Tolerance(mm)		DF (max.)	Standard Packing	Test Spec.
			Value	Unit			L/W	Thick.			
3000V	C4520X7R102□RPSG	1V, 1kHz	1.0	nF	±10%	1.25	±0.30/±0.20	±0.20	2.50%	Embossed, 3kpcs	(I)
	C4520X7R102□RPS	1V, 1kHz	1.0	nF	±10%	2.00	±0.40/±0.30	±0.20	2.50%	Embossed, 1kpcs	(I)
2000V	C4520X7R222□QPS	1V, 1kHz	2.2	nF	±10%	1.60	±0.30/±0.20	±0.20	2.50%	Embossed, 2kpcs	(I)

● C4532X7R Series (EIA1812)

RV	DARFON P/N	Measuring Condition	Capacitance		Available Tolerance	Thick. (mm)	Tolerance(mm)		DF (max.)	Standard Packing	Test Spec.
			Value	Unit			L/W	Thick.			
3000V	C4532X7R102□RPS	1V, 1kHz	1.0	nF	±10%, ±20%	2.00	+0.5-0.3/±0.3	±0.20	2.50%	Embossed, 1kpcs	(I)
2000V	C4532X7R102KQPS	1V, 1kHz	1.0	nF	±10%	1.25	±0.40/±0.30	±0.10	2.50%	Embossed, 1kpcs	(I)
	C4532X7R222KQPS	1V, 1kHz	2.2	nF	±10%	1.25	±0.40/±0.30	±0.10	2.50%		(I)
	C4532X7R222KQPSL	1V, 1kHz	2.2	nF	±10%	1.60	±0.30	±0.20	2.50%		(II)
250V	C4532X7R474KKPS	1V, 1kHz	470	nF	±10%	2.00	+0.5-0.3/±0.3	±0.20	2.50%	Embossed, 1kpcs	(I)
200V	C4532X7R105KJPS	1V, 1kHz	1.0	uF	±10%	2.50	+0.5-0.3/±0.4	±0.30	2.50%	Embossed, 0.5kpcs	(I)

□ Tolerance Code: J=±5%, K=±10%, M=±20%; Special tolerance on the request.



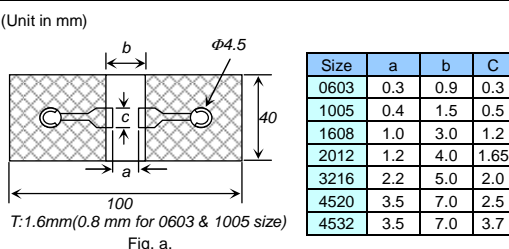
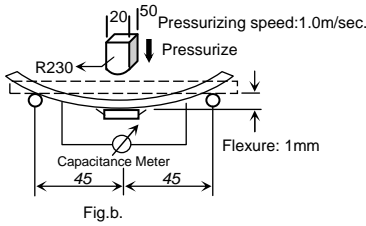
- Test Spec.
- Middle-High Voltage (I)

Item	Specification		Test Method
	Temp. compensation type	High dielectric constant type	
1	Operation Temperature Range		---
2	Rated Voltage		The rated voltage is defined as the maximum voltage, which may be applied continuously to the capacitor.
3	Appearance		Visual inspection
4	Dimensions		Using calipers
5	Dielectric Strength		No failure shall be observed when 250% of the rated voltage (150% for 500V, 120% for above 1KV) is applied between the terminations for 1 to 5 seconds. The charge and discharge current is less than 50mA.
6	Rated Voltage <200V	To apply rated voltage.	The insulation resistance shall be measured with a DC voltage not exceeding the rated voltage at 25°C and 75%RH max, and within 1 minute of charging.
	Rated Voltage <500V	To apply rated voltage.	
	Rated Voltage ≥500V	To apply 500V.	
7	Capacitance		The capacitance / D.F. shall be measured at 25°C at the frequency and voltage shown in the table of "Part Number & Characteristic".
8	Q/Dissipation Factor ( D.F.)		
9	Capacitance change		1.Temperature compensation type: The capacitance value at 25°C and 85°C shall be measured and calculated from the formula given below. $T.C. = (C_{85} - C_{25}) / C_{25} * \Delta T * 10^6 (PPM/°C)$ 2.High dielectric constant type: The ranges of capacitance change compared with the 25°C value over the temperature ranges shall be within the specified ranges.
	Capacitance Temperature Characteristics		
10	Termination Strength		Apply a parallel force of 5N to a PCB mounted sample for 10±1sec.
11	Deflection (Bending Strength)		Solder the capacitor to the test jig (glass epoxy boards) shown in Fig.a using a SAC305(Sn96.5Ag3.0Cu0.5) solder (then let sit for 24±2 hours for X7R).
			Then apply a force in the direction shown in Fig.b. The soldering shall be done with the reflow method and shall be conducted with care so that the soldering is uniform and free of defects such as heat shock.
12	Solderability of Termination		Immerse the test capacitor into a methanol solution containing rosin for 3 to 5 seconds, preheat it 150 to 180°C for 2 to 3 minutes and immerse it into SAC305(Sn96.5Ag3.0Cu0.5) solder of 245 ± 5°C for 3±1seconds.
13	Appearance	No marking defects	*Preheat the capacitor at 120 to 150°C for 1 minute.
	Cap. Change	NPO within ±2.5% or 0.25pF ( whichever is larger )	Immerse the capacitor in a SAC305(Sn96.5Ag3.0Cu0.5) solder solution at 270±5°C for 10±1 seconds. Let sit at room temperature for 24±2 hours, then measure.
	Q/D.F.	If C ≤ 30pF, DF ≤ 1/(400+20C) If C > 30pF, DF ≤ 0.1%	* Preheat 150 to 200°C for size ≥ 3216.
	I.R.	I.R. ≥ 10,000MΩ or R <sub>C</sub> R ≥ 500Ω-F. (whichever is smaller)	*High dielectric constant type: Initial measurement : perform a heat treatment at 150+0/-10°C for one hour and then let sit for 24±2 hours at room temperature. Perform the initial measurement.

	Item	Specification		Test Method	
		Temp. compensation type	High dielectric constant type		
14	Temperature cycle (Thermal shock)	Appearance	No marking defects		Solder the capacitor to supporting jig (Glass epoxy board) and perform the five cycles according to the four heat treatments listed in the following table. Let sit for 24±2hrs at room temperature, then measure. Step 1: Minimum operating temperature 30±3min Step 2: Room temperature 2~3 min Step 3: Maximum operating temperature 30±3min Step 4: Room temperature 2~3min *High dielectric constant type: Initial measurement: perform a heat treatment at 150±10°C for one hour and then let sit for 24±2 hours at room temp. Perform the initial measurement.
		Cap. Change	NPO within ±2.5% or 0.25pF ( whichever is larger )	X7R within ±7.5%	
		Q/D.F.	If C ≤ 30pF, DF ≤ 1/(400+20C) If C > 30pF, DF ≤ 0.1%	To satisfy the specified initial spec.	
		I.R.	I.R. ≥ 10,000MΩ or R <sub>C</sub> R ≥ 500Ω-F. (whichever is smaller)	I.R. ≥ 10,000MΩ or R <sub>C</sub> R ≥ 500Ω-F. (whichever is smaller)	
15	Humidity load	Appearance	No marking defects		Apply the rated voltage at 40±2°C and 90 to 95% humidity for 500±12 hours. The charge / discharge current is less than 50mA. [Temperature compensation type] Remove and let sit for 24±2 hours at room temperature, then measure. [High dielectric constant type] *Initial measurement Perform a heat treatment at 150+0/-10°C for one hour and then let sit for 24±2 hours at room temperature. Perform the initial measurement. *Measurement after test Perform a heat treatment and then let sit for 24±2 hours at room temperature, then measure.
		Cap. Change	NPO within ±7.5% or 0.75pF ( whichever is larger )	X7R within ±12.5%	
		Q/D.F.	If C > 30pF, DF ≤ 0.5% If C ≤ 30pF, DF ≤ 1/(100+10xC/3) C in pF	X7R 200% max of initial spec.	
		I.R.	I.R. ≥ 500MΩ or R <sub>C</sub> R ≥ 25Ω-F. (whichever is smaller)	I.R. ≥ 500MΩ or R <sub>C</sub> R ≥ 25Ω-F. (whichever is smaller)	
16	High temperature load life test	Appearance	No marking defects		Apply 200%(150% for ≥ 500V; 120% for ≥ 1000V) of the rated voltage for 1000±12 hours at the maximum operating temperature ± 3°C. The charge / discharge current is less than 50mA. [Temperature compensation type] Remove and let sit for 24±2 hours at room temperature, then measure. [High dielectric constant type] *Initial measurement Perform a heat treatment at 150+0/-10°C for one hour and then let sit for 24±2 hours at room temperature. Perform the initial measurement. *Measurement after test Perform a heat treatment and then let sit for 24±2 hours at room temperature, then measure.
		Cap. Change	NPO within ±7.5% or 0.75pF ( whichever is larger )	X7R within ±12.5%	
		Q/D.F.	If C > 30pF, DF ≤ 0.3% If 10pF < C ≤ 30pF, DF ≤ 1/(275+5xC/2) If C ≤ 10pF, DF ≤ 1/(200+10C), C in pF	X7R 200% max of initial spec.	
		I.R.	More than 1GΩ or R <sub>C</sub> R ≥ 50Ω-F (whichever is less.)	More than 1GΩ or R <sub>C</sub> R ≥ 50Ω-F (whichever is less.)	



## ● Middle-High Voltage (II)

	Item	Specification		Test Method																																
		Temp. compensation type	High dielectric constant type																																	
1	Operation Temperature Range	NP0: -55 to 125 °C	X7R: -55 to 125 °C	---																																
2	Rated Voltage	Shown in the table of "Part Number & Characteristic"		The rated voltage is defined as the maximum voltage, which may be applied continuously to the capacitor.																																
3	Appearance	No defects or abnormalities.		Visual inspection																																
4	Dimensions	Within the specified dimension.		Using calipers																																
5	Dielectric Strength	No defects or abnormalities.		No failure shall be observed when 250% of the rated voltage (150% for 500V, 120% for above 1KV) is applied between the terminations for 1 to 5 seconds. The charge and discharge current is less than 50mA.																																
6	Insulation Resistance (I.R.)	C ≤ 0.047μF : More than 10000 MΩ C > 0.047μF : More than 500Ω-F C: Nominal Capacitance		The insulation resistance shall be measured with a DC voltage not exceeding the rated voltage at 25°C and 75%RH max, and within 1 minute of charging.																																
7	Capacitance	Within the specified tolerance * X7R at 1000 hours		The capacitance / D.F. shall be measured at 25°C at the frequency and voltage shown in the table of "Part Number & Characteristic".																																
8	Q/Dissipation Factor (D.F.)	NP0: If C ≤ 30pF, DF ≤ 1/(400+20C), C in pF If C > 30pF, DF ≤ 0.1%.	Shown in the table of "Part Number & Characteristic"																																	
9	Capacitance Temperature Characteristics	Capacitance change NP0 within 0±30ppm/°C under operating temperature range.	Capacitance change X7R within ±15%	1. Temperature compensation type: The capacitance value at 25°C and 85°C shall be measured and calculated from the formula given below. T.C. = (C <sub>85</sub> - C <sub>25</sub> ) / C <sub>25</sub> * ΔT * 10 <sup>6</sup> (PPM/°C) 2. High dielectric constant type: The ranges of capacitance change compared with the 25°C value over the temperature ranges shall be within the specified ranges.																																
10	Termination Strength	No removal of the terminations or marking defect.		Apply a parallel force of 5N to a PCB mounted sample for 10±1sec.																																
11	Deflection (Bending Strength)	No cracking or marking defects shall occur at 1mm deflection. Capacitance change: NP0: within ±5% or ± 0.5pF. (whichever is larger) X7R, X5R: within ±12.5%		Solder the capacitor to the test jig (glass epoxy boards) shown in Fig.a using a SAC305(Sn96.5Ag3.0Cu0.5) solder (then let sit for 24±2 hours for X7R). Then apply a force in the direction shown in Fig.b. The soldering shall be done with the reflow method and shall be conducted with care so that the soldering is uniform and free of defects such as heat shock.																																
		 <p>(Unit in mm)</p> <p>Fig. a.</p> <table border="1" data-bbox="774 1310 981 1489"> <thead> <tr> <th>Size</th> <th>a</th> <th>b</th> <th>C</th> </tr> </thead> <tbody> <tr> <td>0603</td> <td>0.3</td> <td>0.9</td> <td>0.3</td> </tr> <tr> <td>1005</td> <td>0.4</td> <td>1.5</td> <td>0.5</td> </tr> <tr> <td>1608</td> <td>1.0</td> <td>3.0</td> <td>1.2</td> </tr> <tr> <td>2012</td> <td>1.2</td> <td>4.0</td> <td>1.65</td> </tr> <tr> <td>3216</td> <td>2.2</td> <td>5.0</td> <td>2.0</td> </tr> <tr> <td>4520</td> <td>3.5</td> <td>7.0</td> <td>2.5</td> </tr> <tr> <td>4532</td> <td>3.5</td> <td>7.0</td> <td>3.7</td> </tr> </tbody> </table>		Size	a	b	C	0603	0.3	0.9	0.3	1005	0.4	1.5	0.5	1608	1.0	3.0	1.2	2012	1.2	4.0	1.65	3216	2.2	5.0	2.0	4520	3.5	7.0	2.5	4532	3.5	7.0	3.7	 <p>Fig. b.</p>
Size	a	b	C																																	
0603	0.3	0.9	0.3																																	
1005	0.4	1.5	0.5																																	
1608	1.0	3.0	1.2																																	
2012	1.2	4.0	1.65																																	
3216	2.2	5.0	2.0																																	
4520	3.5	7.0	2.5																																	
4532	3.5	7.0	3.7																																	
12	Solderability of Termination	90% of the terminations are to be soldered evenly and continuously.		Immerse the test capacitor into a methanol solution containing rosin for 3 to 5 seconds, preheat it 150 to 180°C for 2 to 3 minutes and immerse it into SAC305(Sn96.5Ag3.0Cu0.5) solder of 245 ± 5°C for 3±1seconds.																																
13	Resistance to Soldering Heat	Appearance	No marking defects	*Preheat the capacitor at 120 to 150°C for 1 minute.																																
Cap. Change		NP0 within ±2.5% or 0.25pF (whichever is larger)	X7R within ±7.5%	Immerse the capacitor in a SAC305(Sn96.5Ag3.0Cu0.5) solder solution at 270±5°C for 10±1 seconds. Let sit at room temperature for 24±2 hours, then measure.																																
Q/D.F.		If C ≤ 30pF, DF ≤ 1/(400+20C) If C > 30pF, DF ≤ 0.1%	To satisfy the specified initial spec.	* Preheat 150 to 200°C for size ≥ 3216.																																
I.R.		I.R. ≥ 10,000MΩ or R <sub>C</sub> R ≥ 500Ω-F. (whichever is smaller)	I.R. ≥ 10,000MΩ or R <sub>C</sub> R ≥ 500Ω-F. (whichever is smaller)	*High dielectric constant type: Initial measurement : perform a heat treatment at 150+0/-10°C for one hour and then let sit for 24±2 hours at room temperature. Perform the initial measurement.																																

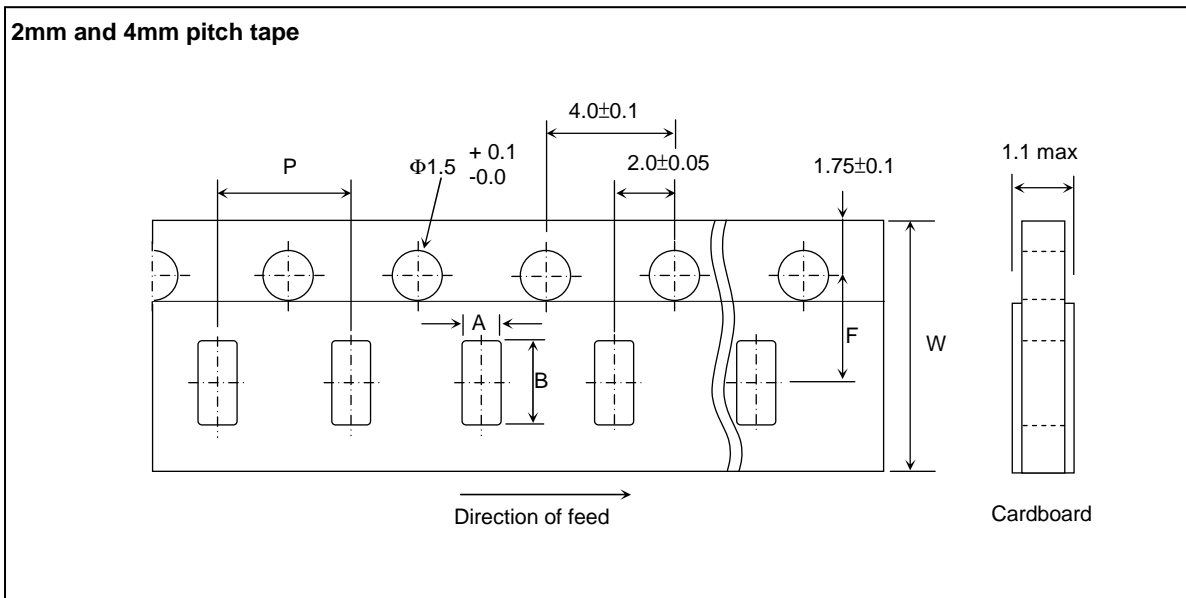
	Item	Specification		Test Method	
		Temp. compensation type	High dielectric constant type		
14	Temperature cycle (Thermal shock)	Appearance	No marking defects		Solder the capacitor to supporting jig (Glass epoxy board) and perform the five cycles according to the four heat treatments listed in the following table. Let sit for 24±2hrs at room temperature, then measure. Step 1: Minimum operating temperature 30±3min Step 2: Room temperature 2~3 min Step 3: Maximum operating temperature 30±3min Step 4: Room temperature 2~3min *High dielectric constant type: Initial measurement: perform a heat treatment at 150±10°C for one hour and then let sit for 24±2 hours at room temp. Perform the initial measurement.
		Cap. Change	NPO within ±2.5% or 0.25pF ( whichever is larger )	X7R within ±7.5%	
		Q/D.F.	If C ≤ 30pF, DF ≤ 1/(400+20C) If C > 30pF, DF ≤ 0.1%	To satisfy the specified initial spec.	
		I.R.	I.R. ≥ 10,000MΩ or R <sub>C</sub> R ≥ 500Ω-F. (whichever is smaller)	I.R. ≥ 10,000MΩ or R <sub>C</sub> R ≥ 500Ω-F. (whichever is smaller)	
15	Humidity load	Appearance	No marking defects		Apply the rated voltage at 40±2°C and 90 to 95% humidity for 500±12 hours. The charge / discharge current is less than 50mA. [Temperature compensation type] Remove and let sit for 24±2 hours at room temperature, then measure. [High dielectric constant type] *Initial measurement Perform a heat treatment at 150+0/-10°C for one hour and then let sit for 24±2 hours at room temperature. Perform the initial measurement. *Measurement after test Perform a heat treatment and then let sit for 24±2 hours at room temperature, then measure.
		Cap. Change	NPO within ±7.5% or 0.75pF ( whichever is larger )	X7R within ±12.5%	
		Q/D.F.	If C > 30pF, DF ≤ 0.5% If C ≤ 30pF, DF ≤ 1/(100+10xC/3) C in pF	X7R 200% max of initial spec.	
		I.R.	I.R. ≥ 500MΩ or R <sub>C</sub> R ≥ 25Ω-F. (whichever is smaller)	I.R. ≥ 500MΩ or R <sub>C</sub> R ≥ 25Ω-F. (whichever is smaller)	
16	High temperature load life test	Appearance	No marking defects		Apply 150%(120% for ≥ 250V; 100% for ≥ 1000V) of the rated voltage for 1000±12 hours at the maximum operating temperature ± 3°C. The charge / discharge current is less than 50mA. [Temperature compensation type] Remove and let sit for 24±2 hours at room temperature, then measure. [High dielectric constant type] *Initial measurement Perform a heat treatment at 150+0/-10°C for one hour and then let sit for 24±2 hours at room temperature. Perform the initial measurement. *Measurement after test Perform a heat treatment and then let sit for 24±2 hours at room temperature, then measure.
		Cap. Change	NPO within ±7.5% or 0.75pF ( whichever is larger )	X7R within ±12.5%	
		Q/D.F.	If C > 30pF, DF ≤ 0.3% If 10pF < C ≤ 30pF, DF ≤ 1/(275+5xC/2) If C ≤ 10pF, DF ≤ 1/(200+10C), C in pF	X7R 200% max of initial spec.	
		I.R.	More than 1GΩ or R <sub>C</sub> R ≥ 50Ω-F (whichever is less.)	More than 1GΩ or R <sub>C</sub> R ≥ 50Ω-F (whichever is less.)	

## Package

- Tape and reel packaging**

Tape and reel packaging is currently the most promising system for high-speed production. A typical 180mm (7 inch) diameter reel contains 1,500 to 15,000 capacitors, 250mm (10 inch) contains 10,000 capacitors, and 330mm (13 inch) contains 10,000 to 50,000 capacitors. Three standard sizes are available in taped and reeled package either with paper carrier tapes or embossed tapes.

### 【Paper tape specifications】

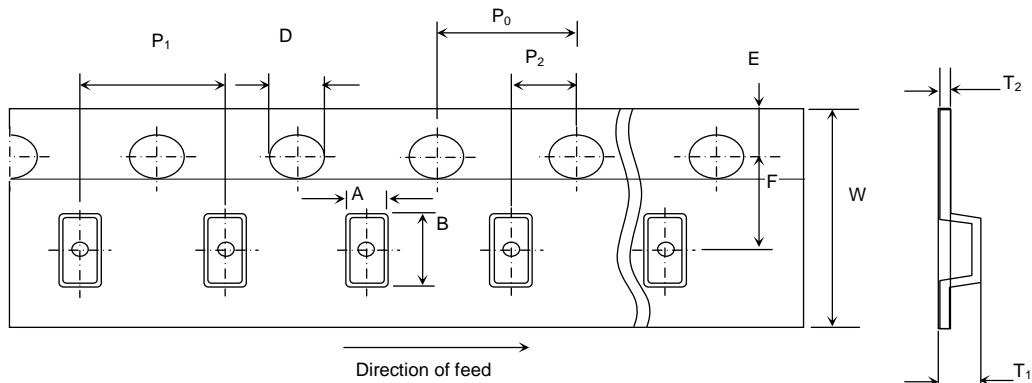


SYMBOL	PRODUCT SIZE CODE												UNIT
	0402(01005)		0603(0201)		1005(0402) (±0.05 mm)		1005(0402) (±0.10 mm)		1005(0402) (±0.15 mm)		1005(0402) (±0.20 mm)		
	SIZE	TOL.	SIZE	TOL.	SIZE	TOL.	SIZE	TOL.	SIZE	TOL.	SIZE	TOL.	
A	0.23	± 0.02	0.38	± 0.04	0.65	± 0.10	0.70	± 0.10	0.72	± 0.10	0.80	± 0.10	mm
B	0.43	± 0.02	0.68	± 0.04	1.15	± 0.10	1.19	± 0.10	1.25	± 0.10	1.35	± 0.10	mm
F	3.5	± 0.05	3.5	± 0.05	3.5	± 0.05	3.5	± 0.05	3.5	± 0.05	3.5	± 0.05	mm
P	2	± 0.05	2	± 0.10	2	± 0.10	2	± 0.10	2	± 0.10	2	± 0.10	mm
W	8	± 0.20	8	± 0.20	8	± 0.20	8	± 0.20	8	± 0.20	8	± 0.20	mm

SYMBOL	PRODUCT SIZE CODE (EIA)								UNIT
	1608 (0603) (±0.15 mm)		1608 (0603) (±0.20 mm)		2012 (0805)		3216 (1206)		
	Size	Tol.	Size	Tol.	Size	Tol.	Size	Tol.	
A	1.0	±0.2	1.1	±0.2	1.5	±0.2	1.9	±0.2	mm
B	1.8	±0.2	1.9	±0.2	2.3	±0.2	3.6	±0.2	mm
F	3.5	±0.05	3.5	±0.05	3.5	±0.05	3.5	±0.05	mm
P	4	±0.1	4	±0.1	4	±0.1	4	±0.1	mm
W	8	±0.2	8	±0.2	8	±0.2	8	±0.2	mm

**【 Embossed tape specifications 】**

1mm and 4mm and 8mm pitch tape

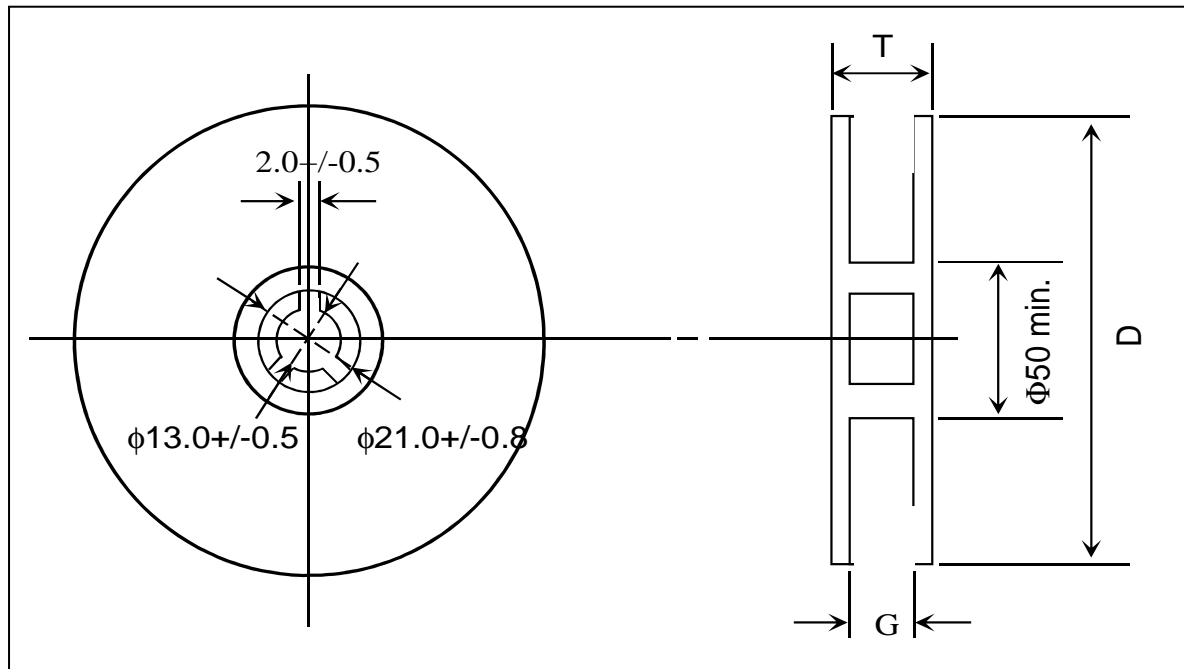


For W= 8mm: T<sub>1</sub>=2.5mm max.

For W= 12mm: T<sub>1</sub>= 4.5mm

DIMENSION (mm)	PRODUCT SIZE CODE						
	1mm tape	4 mm tape				8 mm tape	
	0402 (01005)	1608 (0603)	2012 (0805)	3216 (1206)	3225 (1210)	4520 (1808)	4532 (1812)
P <sub>1</sub>	1±0.02	4±0.1	4±0.1	4±0.1	4±0.1	8±0.1	8±0.1
P <sub>0</sub>	2±0.04	4±0.1	4±0.1	4±0.1	4±0.1	4±0.1	4±0.1
P <sub>2</sub>	1±0.02	2±0.05	2±0.05	2±0.05	2±0.05	2±0.05	2±0.05
A	0.23±0.02	1.2±0.2	1.45±0.2	1.9±0.2	2.8±0.2	2.3±0.2	3.6±0.2
B	0.43±0.02	2.0±0.2	2.3±0.2	3.5±0.2	3.6±0.2	4.9±0.2	4.9±0.2
W	4±0.05	8±0.3	8±0.2	8±0.2	8±0.2	12±0.2	12±0.2
E	0.9±0.05	1.75±0.1	1.75±0.1	1.75±0.1	1.75±0.1	1.75±0.1	1.75±0.1
F	1.8±0.02	3.5±0.05	3.5±0.05	3.5±0.05	3.5±0.05	5.5±0.05	5.5±0.05
D	0.8±0.04	1.5 (+0.1/-0.0)	1.5 (+0.1/-0.0)	1.5 (+0.1/-0.0)	1.5 (+0.1/-0.0)	1.5 (+0.1/-0.0)	1.5 (+0.1/-0.0)
T <sub>1</sub>	0.5 max	1.4 max.	2.5 max.	2.5 max.	2.5 max.	4.5	4.5
T <sub>2</sub>	0.15~0.40	0.25±0.1	0.305±0.1	0.30±0.1	0.30±0.1	0.30±0.1	0.30±0.1

**【Reel specifications】**



TAPE WIDTH (mm)	G (mm)	T max. (mm)	D (mm)
4	5.0 ± 1.5	8.0	180
8	10.0 ± 1.5	14.5	180
8	10.0 ± 1.5	14.5	250
8	10.0 ± 1.5	14.5	330
12	14.0 ± 1.5	18.5	180

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**【Thickness and Packing Amount】**

Thickness			Amount per reel			
Code	Spec.(mm)	Size (EIA)	180 mm (7")		330 mm (13")	
			Paper	Embossed	Paper	Embossed
Z	0.20	0402 (01005)	20K	40K <sup>#1</sup>		
A	0.30	0603 (0201)	15K		50K	
		1005 (0402)	15K		50K	
B	0.50	1005 (0402)	10K		50K	
Q	0.45	1005 (0402)	10K		50K	
		1608 (0603)	4K		15K	
C	0.60	2012 (0805)	4K		15K	
		3216 (1206)	4K		15K	
D	0.80	1608 (0603)	4K	4K	15K	
E	0.85	2012 (0805)	4K		15K	
		3216 (1206)	4K		15K	
		3225 (1210)		3K		10K
I	0.95	4532 (1812)		1K		
		2012 (0805)		3K		
F	1.15	3216 (1206)		3K		10K
		4520 (1808)		3K		
H	1.25	2012 (0805)		2K/3K		10K
		3216 (1206)		3K		10K
		3225 (1210)		3K		
		4520 (1808)		2K/3K		
		4532 (1812)		1K		
		3225 (1210)		3K		
L	1.60	3216 (1206)		2K		
		3225 (1210)		2K		
		4520 (1808)		2K		
		4532 (1812)		1K		
N	2.00	3216 (1206)		2K/3K		
		3225 (1210)		2K		
		4520 (1808)		1K		
		4532 (1812)		1K		
P	2.50	3225 (1210)		500pcs/1K		

#1: 4mm width 1mm pitch Embossed Taping

**【Packing Rule】**

EIA SIZE	Tape	Reel Size	Reels/Box	Boxes/ Carton
01005	Emboss	7"	8	12
01005	Paper	7"	5	12
0201	Paper	7"	5	12
0402	Paper	7"	5	12
0603	Paper/Emboss	7"	5	12
0805	Paper/Emboss	7"	5	12
1206	Paper/Emboss	7"	5	12
1210	Emboss	7"	5	12
1808	Emboss	7"	5	12
1812	Emboss	7"	5	12

## Others

### 【Storage】

1. The chip capacitors shall be packaged in carrier tapes or bulk cases.
2. Keep storage place temperatures from +5°C to +35°C, humidity from 45 to 70% RH.
3. The storage atmosphere must be free of gas containing sulfur and chlorine. Also, avoid exposing the product to saline moisture. If the product is exposed to such atmospheres, the terminations will oxidize and solderability will be affected.
4. The solderability is assured for 12 months from our final inspection date if the above storage condition is followed.

### 【Circuit Design】

1. Once application and assembly environments have been checked, the capacitor may be used in conformance with the rating and performance, which are provided in both the catalog and the specifications. Exceeding the specifications listed may result in inferior performance. It may also cause a short, open, smoking, or flaming to occur, etc.
2. Please use the capacitors in conformance with the operating temperature provided in both the catalog and the specifications. Be especially cautious not to exceed the maximum temperature. In the situation the maximum temperature set forth in both the catalog and specifications is exceeded, the capacitor's insulation resistance may deteriorate, power may suddenly surge and short-circuit may occur. The loss of capacitance will occur, and may self-heat due to equivalent series resistance when alternating electric current is passed through. As this effect becomes critical in high frequency circuits, please exercise with caution. When using the capacitor in a (self-heating) circuit, please make sure the surface of the capacitor remains under the maximum temperature for usage. Also, please make certain temperature rise remain below 20°C.
3. Please keep voltage under the rated voltage, which is applied to the capacitor. Also, please make certain the peak voltage remains below the rated voltage when AC voltage is super-imposed to the DC voltage. In the situation where AC or pulse voltage is employed, ensure average peak voltage does not exceed the rated voltage. Exceeding the rated voltage provided in both catalog and specifications may lead to defective withstanding voltage or, in worse case situations, may cause the capacitor to burn out.
4. It's is a common phenomenon of high-dielectric products to have a deteriorated amount of static electricity due to the application of DC voltage.

**【Handling】**

Chip capacitors should be handled with care to avoid contamination or damage. The use of vacuum pick-up or plastic tweezers is recommended for manual placement. Tape and reeled packages are suitable for automatic pick and placement machine.

**【Flux】**

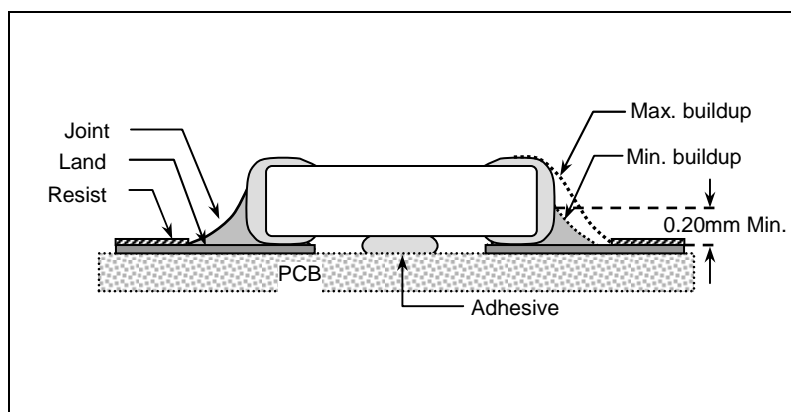
1. An excessive amount of flux or too rapid temperature rise can causes solvent burst, solder can generate a large quantity of gas. The gas can spreads small solder particles to cause solder balling effect or bridging problem.
2. Flux containing too high of a percentage of halide may cause corrosion of termination unless sufficient cleaning is applied.
3. Use rosin-type flux. Highly acidic flux (halide content less than 0.2wt%) is not recommended.
4. The water soluble flux causes deteriorated insulation resistance between outer terminations unless sufficiently cleaned.

**【Component Spacing】**

For wave soldering components, the spacing must be sufficient far apart to prevent bridging or shadowing. This is not so important for reflow process but enough space for rework should be considered. The suggested spacing for reflow soldering and wave soldering is 0.5mm and 1.0mm, respectively.

**【Solder Fillet】**

Too much solder amount may increase solder stress and cause crack risk. Insufficient solder amount may reduce adhesive Strength and cause parts falling off PCB. When soldering, confirm that the solder is placed over 0.2mm of the surface of the terminations.

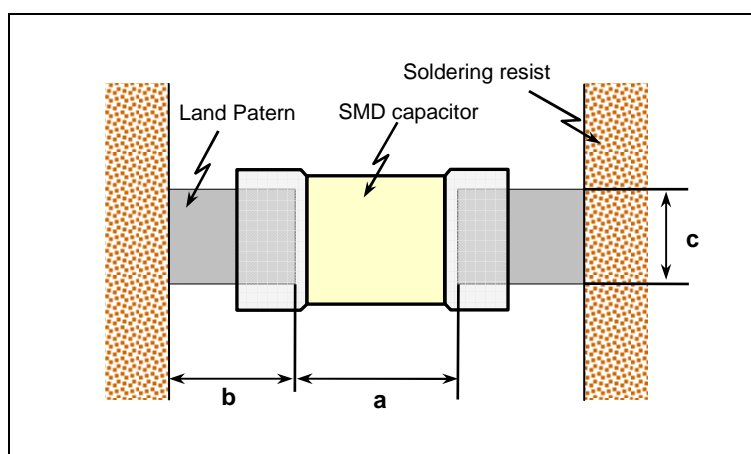




## 【Recommended Land Pattern Dimensions】

When mounting the capacitor to substrate, it's important to consider that the amount of solder (size of fillet) used has a direct effect upon the capacitor once it's mounted.

1. The greater the amount of solder, the greater the stress to the elements, as this may cause the substrate to break or crack.
2. In the situation where two or more devices are mounted onto a common land, separate the device into exclusive pads by using soldering resist.
3. Land width equal to or less than component. It is permissible to reduce land width to 80% of component width.



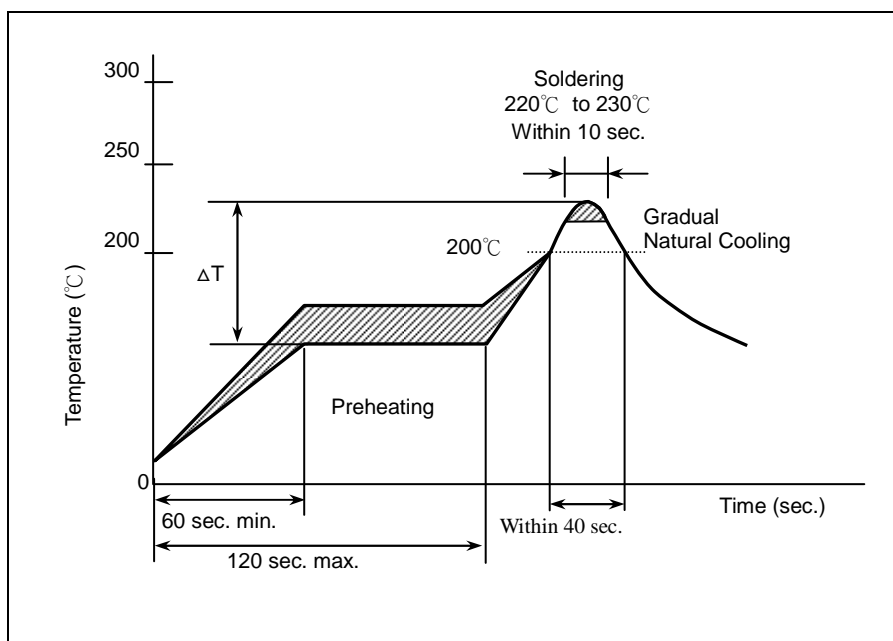
Size mm (EIA)	L x W (mm) (Dimension tolerance)	a (mm)	b (mm)	c (mm)
0402 (01005)	0.4*0.2	0.16 to 0.20	0.12 to 0.18	0.20 to 0.23
0603 (0201)	0.6*0.3	0.15 to 0.35	0.2 to 0.3	0.25 to 0.3
1005 (0402)	1.0*0.5 (within±0.10)	0.3 to 0.5	0.35 to 0.45	0.4 to 0.5
	1.0*0.5 (±0.15 or ±0.20)	0.4 to 0.6	0.4 to 0.5	0.5 to 0.6
1608 (0603)	1.6*0.8 (within±0.10)	0.7 to 1.0	0.6 to 0.8	0.7 to 0.8
	1.6*0.8 (±0.15 or ±0.20)	0.8 to 1.1	0.7 to 0.9	0.8 to 0.9
2012 (0805)	2.0*1.25	1.0 to 1.3	0.7 to 0.9	1.0 to 1.2
3216 (1206)	3.2*1.6	2.1 to 2.5	1.0 to 1.2	1.3 to 1.6
3225 (1210)	3.2*2.5	2.1 to 2.5	1.0 to 1.2	2.0 to 2.5
4520 (1808)	4.5*2.0	3.2 to 3.8	1.2 to 1.4	1.7 to 2.0
4532 (1812)	4.5*3.2	3.2 to 3.8	1.2 to 1.4	2.7 to 3.2

## 【Resin Mold】

If a large amount of resin is used for molding the chip, cracks may occur due to contraction stress during curing. To avoid such cracks, use a low shrinkage resin. The insulation resistance of the chip will degrade due to moisture absorption. Use a low moisture absorption resin. Check carefully that the resin does not generate a decomposition gas or reaction gas during the curing process or during normal storage. Such gases may crack the chip capacitor or damage the device itself.

## 【Soldering Profile for SMT Process with SnPb Solder Paste】

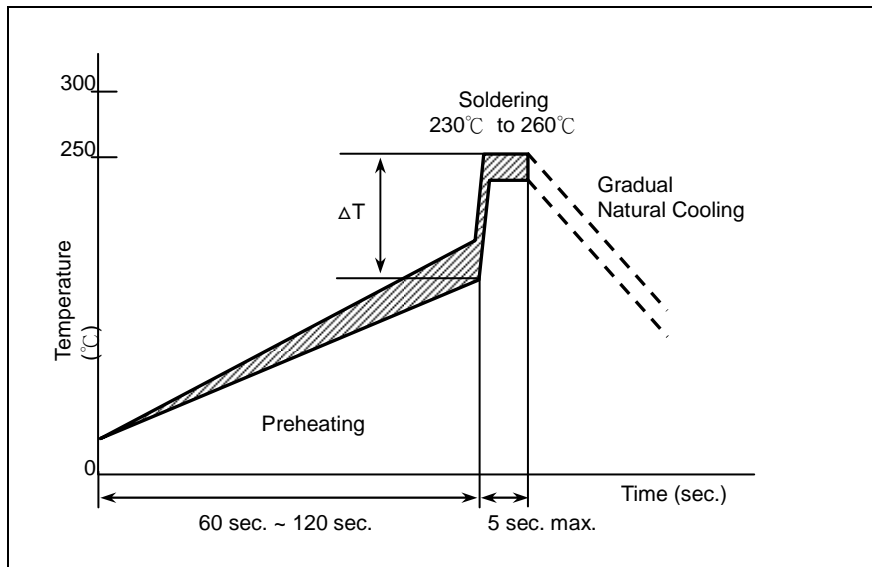
### Reflow Soldering



The difference between solder and chip surface should be controlled as following table. The rate of preheat should not exceed 4°C/sec and a target of 2°C/sec is preferred.

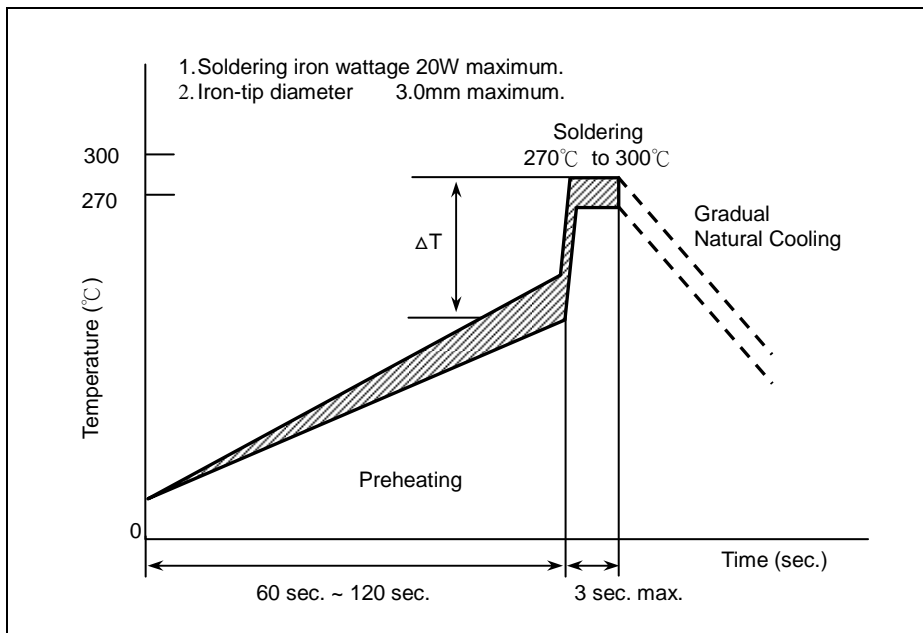
Chip Size	3216 and smaller	3225 and above
Preheating	$\Delta T \leq 150^\circ\text{C}$	$\Delta T \leq 130^\circ\text{C}$

**Wave Soldering**



Chip Size	3216 and smaller	3225 and above
Preheating	$\Delta T \leq 150^\circ\text{C}$	-

**Soldering Iron**

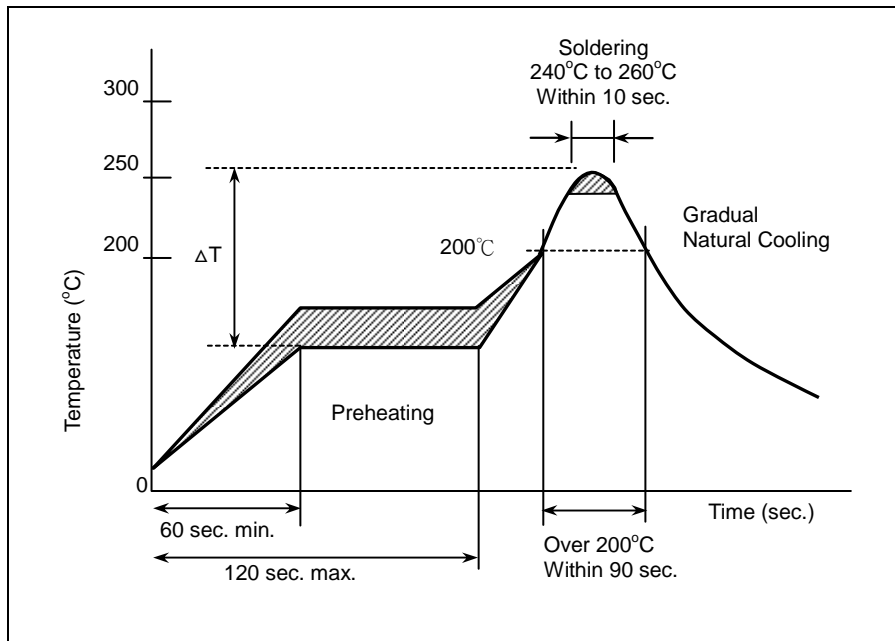


Chip Size	3216 and smaller	3225 and above
Preheating	$\Delta T \leq 190^\circ\text{C}$	$\Delta T \leq 130^\circ\text{C}$

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**[Soldering]**

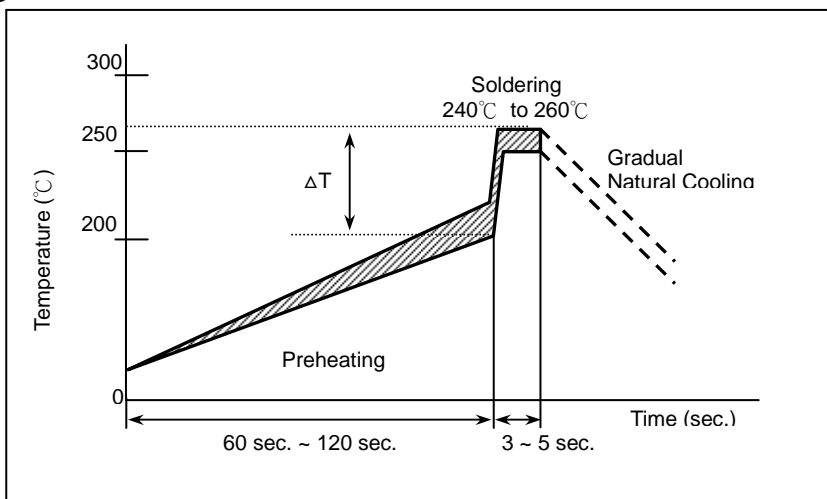
**Reflow Soldering for Lead free Termination**



The difference between solder and chip surface should be controlled as following table. The rate of preheat should not exceed 4°C/sec and a target of 2°C/sec is preferred.

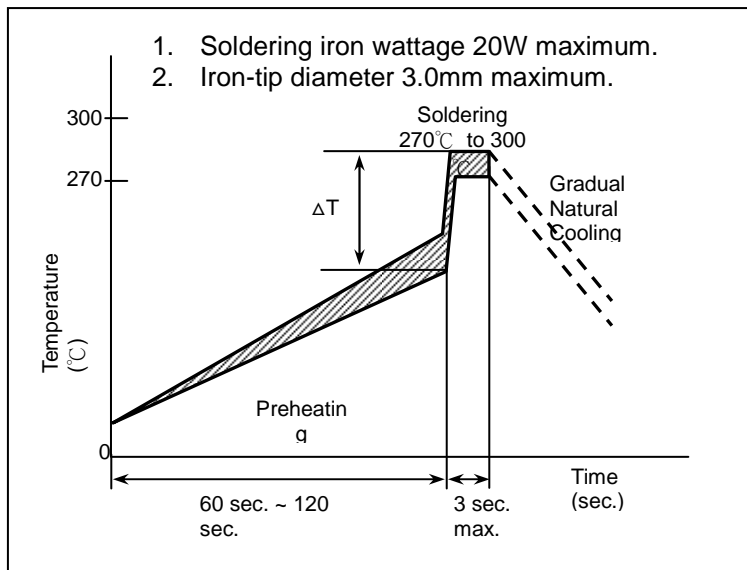
Chip Size	3216 and smaller	3225 and above
Preheating	$\Delta T \leq 150^\circ\text{C}$	$\Delta T \leq 130^\circ\text{C}$

**Flow Soldering for Lead free Termination**



Chip Size	3216 and smaller	3225 and above
Preheating	$\Delta T \leq 150^\circ\text{C}$	-

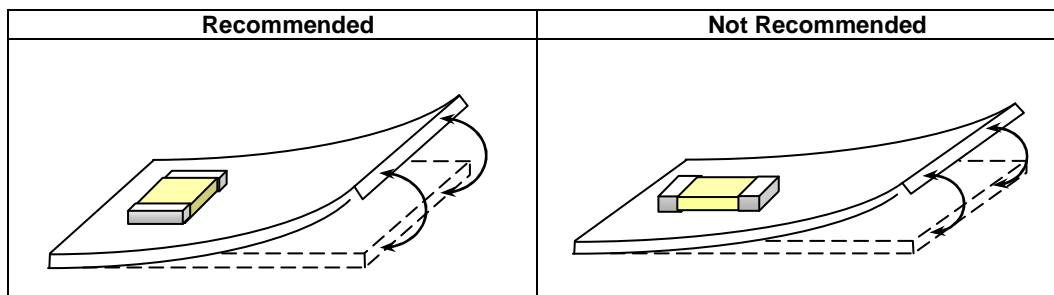
**Soldering Iron**



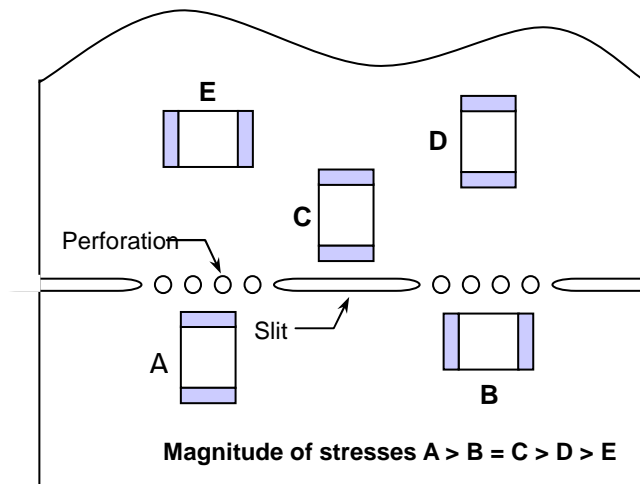
Chip Size	3216 and smaller	3225 and above
Preheating	$\Delta T \leq 190^{\circ}\text{C}$	$\Delta T \leq 130^{\circ}\text{C}$

**【Chip Layout and Breaking PCB】**

- To layout the SMD capacitors for reducing bend stress from board deflection of PCB. The following are examples of Hood and bad layout.



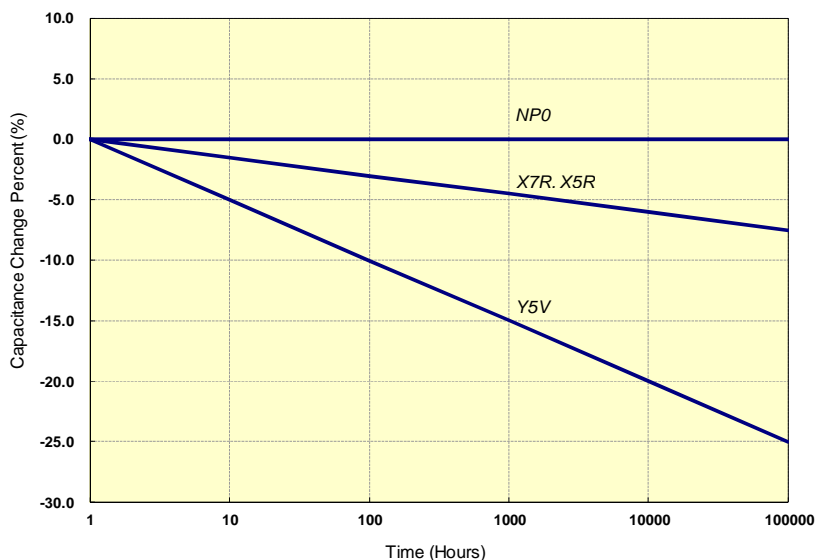
- When breaking PCB, the layout should be noted that the mechanical stresses are depending on the position of capacitors. The following example shows recommendation for better design.



## 【Aging Rate】

The capacitance and dissipation factor of class 2 capacitors decreases with time. It is known as 'aging' that follows a logarithmic law and expressed in terms of an aging constant. Aging is caused by a gradual re-alignment of the crystalline structure of the ceramic. The aging constant is defined as the percentage loss of capacitance at a 'time decade'. The law of capacitance aging is expressed as following equation:

Typical Curve of Aging Rate of Different Dielectric Material



$$C_{t_2} = C_{t_1} \times (1 - k \times \log_{10}(t_2/t_1))$$

$C_{t_1}$ : Capacitance after  $t_1$  hours of start aging.

$C_{t_2}$ : Capacitance after  $t_2$  hours of start aging.

$k$ : aging constant (capacitance decrease per decade)

$t_1, t_2$ : time in hours from start of aging.

A typical curve of aging rate is shown in following figure.

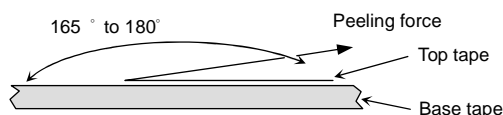
When heating the capacitors above Curie temperature ( $130^{\circ}\text{C} \sim 150^{\circ}\text{C}$ ) the capacitance can be re-new. So capacitance of class 2 capacitors will be complete de-aged by soldering process; subsequently a new aging process begins.

Because of aging, it is specified an age for measurement to meet the prescribed tolerance for class 2 capacitors. Normally, 1000 hours ( $t_2=1000$  hrs) is defined.

## 【Peeling Off Force】

Peeling off force:  $0.1\text{N}$  to  $1.0\text{N}^*$  in the direction shown as below.

The peeling speed:  $300 \pm 10$  mm/min



1. The taped tape on reel is wound clockwise. The sprocket holes are to the right as the tape is pulled toward the user.
2. There are minimum 150 mm as the leader and minimum 40 mm empty tape as the tail is attached to the end of the tape.