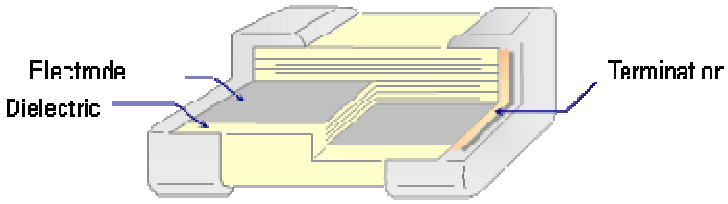
CONTENT (MLCC)

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

Structure



Ordering Code

C 1005 NP0 101 J G T S △

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 ± 30ppm/℃ -55℃ to +125℃
X7R: ±15% -55℃ to +125℃ X6S: ±22% -55℃ to +105℃
X5R: ±15% -55℃ to +85℃ Y5V: +22%/-82% -30℃ to +85℃

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: ± 0.05pF B: ± 0.1pF C: ± 0.25pF D: ± 0.5pF F: ±1% G: ±2%
J: ±5% K: ±10% M: ±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”)
N: Paper tape reel Ø250mm (10”)
A: Paper tape reel Ø330mm (13”)
W: Special Packing
P: Embossed tape reel Ø180mm (7”)
D: Embossed tape reel Ø250mm (10”)
E: Embossed tape reel Ø330mm (13”)

Application Code

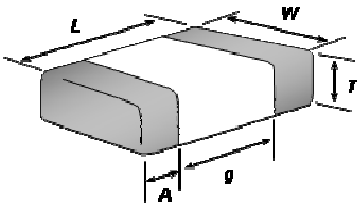
S: Standard Q: High Q/Low ESR F: Microwave A: Automotive with AEC-Q200

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		

High Frequency Application

■ Standard External Dimensions



TYPE (EIA Size)	Dimension (mm)				
	L (Length)	W (Width)	T (Max.)	g (Min)	A (Min/Max)
C0402 (01005)	0.4±0.02	0.2±0.02	0.22	0.13	0.07/0.14
C0603 (0201)	0.6±0.03	0.3±0.03	0.33	0.15	0.10/0.20
C1005 (0402)	1.0 ± 0.05	0.5 ± 0.05	0.55	0.30	0.15 / 0.35
C1608 (0603)	1.6 ± 0.10	0.8 ± 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

■ Product Range

■ High Q and Low ESR Type (Q Series)

TCC	Series	EIA	Capacitance Range (F)																	
				0.1p			1p			10p			100p		1n			10n		100n
NP0	C0603NP0_Q	0201		0.2pF							18pF									
	C1005NP0_Q	0402	0.1pF								22pF									
	C1608NP0_Q	0603		0.2pF							22pF									
	C2012NP0_Q	0805									15pF									

■ Microwave Type (F Series)

TCC	Series	EIA	Capacitance Range (F)																	
				0.1p			1p			10p			100p		1n			10n		100n
NP0	C0402NP0_F	01005		0.2pF							22pF									
	C0603NP0_F	0201		0.2pF							33pF									

DARFON

High Q & Low ESR Type (Q Series)

■ Feature

1. Ultra-stable
2. Tight tolerance available
3. Low ESR
4. Good frequency performance
5. No aging of capacitance
6. RoHS compliant

■ Application

1. LC and RC tuned circuit
2. Filtering
3. Timing

■ Part Number & Characteristic

● C0603NP0_Q Series (EIA0201)

RV	DARFON P/N	Measuring Condition	Capacitance		Available Tolerance	Thick. (mm)	Tolerance(mm)		Q(1GHz) (min.)	Standard Packing
			Value	Unit			L/W	Thick.		
50V	C0603NP0208□GTQ	1V, 1MHz	0.20	pF	±0.1pF, ±0.05pF	0.30	±0.03	±0.03	350	Paper, 15Kpcs
	C0603NP0308□GTQ	1V, 1MHz	0.30	pF	±0.1pF, ±0.05pF	0.30	±0.03	±0.03	350	
	C0603NP0408□GTQ	1V, 1MHz	0.40	pF	±0.1pF, ±0.05pF	0.30	±0.03	±0.03	350	
	C0603NP0508□GTQ	1V, 1MHz	0.50	pF	±0.1pF, ±0.05pF	0.30	±0.03	±0.03	350	
	C0603NP0608□GTQ	1V, 1MHz	0.60	pF	±0.1pF, ±0.05pF	0.30	±0.03	±0.03	350	
	C0603NP0708□GTQ	1V, 1MHz	0.70	pF	±0.1pF, ±0.05pF	0.30	±0.03	±0.03	350	
	C0603NP0758□GTQ	1V, 1MHz	0.75	pF	±0.1pF, ±0.05pF	0.30	±0.03	±0.03	350	
	C0603NP0808□GTQ	1V, 1MHz	0.80	pF	±0.1pF, ±0.05pF	0.30	±0.03	±0.03	350	
	C0603NP0908□GTQ	1V, 1MHz	0.90	pF	±0.1pF, ±0.05pF	0.30	±0.03	±0.03	350	
	C0603NP0109□GTQ	1V, 1MHz	1.0	pF	±0.25pF, ±0.1pF, ±0.05pF	0.30	±0.03	±0 .03	350	
	C0603NP0119□GTQ	1V, 1MHz	1.1	pF	±0.25pF, ±0.1pF, ±0.05pF	0.30	±0.03	±0 .03	300	
	C0603NP0129□GTQ	1V, 1MHz	1.2	pF	±0.25pF, ±0.1pF, ±0.05pF	0.30	±0.03	±0 .03	300	
	C0603NP0139□GTQ	1V, 1MHz	1.3	pF	±0.25pF, ±0.1pF, ±0.05pF	0.30	±0.03	±0 .03	300	
	C0603NP0159□GTQ	1V, 1MHz	1.5	pF	±0.25pF, ±0.1pF, ±0.05pF	0.30	±0.03	±0 .03	300	
	C0603NP0169□GTQ	1V, 1MHz	1.6	pF	±0.25pF, ±0.1pF, ±0.05pF	0.30	±0.03	±0 .03	300	
	C0603NP0189□GTQ	1V, 1MHz	1.8	pF	±0.25pF, ±0.1pF, ±0.05pF	0.30	±0.03	±0 .03	300	
	C0603NP0209□GTQ	1V, 1MHz	2.0	pF	±0.25pF, ±0.1pF, ±0.05pF	0.30	±0.03	±0 .03	250	
	C0603NP0229□GTQ	1V, 1MHz	2.2	pF	±0.25pF, ±0.1pF, ±0.05pF	0.30	±0.03	±0 .03	250	
	C0603NP0249□GTQ	1V, 1MHz	2.4	pF	±0.25pF, ±0.1pF, ±0.05pF	0.30	±0.03	±0 .03	250	
	C0603NP0259□GTQ	1V, 1MHz	2.5	pF	±0.25pF, ±0.1pF, ±0.05pF	0.30	±0.03	±0 .03	250	
	C0603NP0279□GTQ	1V, 1MHz	2.7	pF	±0.25pF, ±0.1pF, ±0.05pF	0.30	±0.03	±0 .03	250	
	C0603NP0309□GTQ	1V, 1MHz	3.0	pF	±0.25pF, ±0.1pF, ±0.05pF	0.30	±0.03	±0 .03	200	
	C0603NP0339□GTQ	1V, 1MHz	3.3	pF	±0.25pF, ±0.1pF, ±0.05pF	0.30	±0.03	±0 .03	200	
	C0603NP0369□GTQ	1V, 1MHz	3.6	pF	±0.25pF, ±0.1pF, ±0.05pF	0.30	±0.03	±0 .03	200	
	C0603NP0399□GTQ	1V, 1MHz	3.9	pF	±0.25pF, ±0.1pF, ±0.05pF	0.30	±0.03	±0 .03	200	
	C0603NP0479□GTQ	1V, 1MHz	4.7	pF	±0.25pF, ±0.1pF, ±0.05pF	0.30	±0.03	±0 .03	200	
	C0603NP0569□GTQ	1V, 1MHz	5.6	pF	±0.5pF, ±0.25pF, ±0.1pF	0.30	±0.03	±0. 03	180	
	C0603NP0609□GTQ	1V, 1MHz	6.0	pF	±0.5pF, ±0.25pF, ±0.1pF	0.30	±0.03	±0. 03	180	
	C0603NP0629□GTQ	1V, 1MHz	6.2	pF	±0.5pF, ±0.25pF, ±0.1pF	0.30	±0.03	±0. 03	180	
	C0603NP0689□GTQ	1V, 1MHz	6.8	pF	±0.5pF, ±0.25pF, ±0.1pF	0.30	±0.03	±0. 03	180	
	C0603NP0709□GTQ	1V, 1MHz	7.0	pF	±0.5pF, ±0.25pF, ±0.1pF	0.30	±0.03	±0. 03	120	
	C0603NP0759□GTQ	1V, 1MHz	7.5	pF	±0.5pF, ±0.25pF, ±0.1pF	0.30	±0.03	±0. 03	120	
	C0603NP0829□GTQ	1V, 1MHz	8.2	pF	±0.5pF, ±0.25pF, ±0.1pF	0.30	±0.03	±0. 03	120	
	C0603NP0909□GTQ	1V, 1MHz	9.0	pF	±0.5pF	0.30	±0.03	±0.03	120	
	C0603NP0919□GTQ	1V, 1MHz	9.1	pF	±0.5pF, ±0.25pF, ±0.1pF	0.30	±0.03	±0. 03	120	
	C0603NP0100□GTQ	1V, 1MHz	10	pF	±5%, ±2%	0.30	±0.03	±0.03	120	
	C0603NP0120□GTQ	1V, 1MHz	12	pF	±5%, ±2%	0.30	±0.03	±0.03	90	
	C0603NP0150□GTQ	1V, 1MHz	15	pF	±5%, ±2%	0.30	±0.03	±0.03	70	
	C0603NP0180□GTQ	1V, 1MHz	18	pF	±5%, ±2%	0.30	±0.03	±0.03	60	

RV	DARFON P/N	Measuring Condition	Capacitance		Available Tolerance	Thick. (mm)	Tolerance(mm)		Q(1GHz) (min.)	Standard Packing
			Value	Unit			L/W	Thick.		
25V	C0603NP0208□FTQ	1V, 1MHz	0.20	pF	±0.1pF, ±0.05pF	0.30	±0.03	±0.03	350	Paper, 15Kpcs
	C0603NP0308□FTQ	1V, 1MHz	0.30	pF	±0.1pF, ±0.05pF	0.30	±0.03	±0.03	350	
	C0603NP0408□FTQ	1V, 1MHz	0.40	pF	±0.1pF, ±0.05pF	0.30	±0.03	±0.03	350	
	C0603NP0508□FTQ	1V, 1MHz	0.50	pF	±0.1pF, ±0.05pF	0.30	±0.03	±0.03	350	
	C0603NP0608□FTQ	1V, 1MHz	0.60	pF	±0.1pF, ±0.05pF	0.30	±0.03	±0.03	350	
	C0603NP0708□FTQ	1V, 1MHz	0.70	pF	±0.1pF, ±0.05pF	0.30	±0.03	±0.03	350	
	C0603NP0758□FTQ	1V, 1MHz	0.75	pF	±0.1pF, ±0.05pF	0.30	±0.03	±0.03	350	
	C0603NP0808□FTQ	1V, 1MHz	0.80	pF	±0.1pF, ±0.05pF	0.30	±0.03	±0.03	350	
	C0603NP0908□FTQ	1V, 1MHz	0.90	pF	±0.1pF, ±0.05pF	0.30	±0.03	±0.03	350	
	C0603NP0109□FTQ	1V, 1MHz	1.0	pF	±0.25pF, ±0.1pF, ±0.05pF	0.30	±0.03	±0 .03	350	
	C0603NP0119□FTQ	1V, 1MHz	1.1	pF	±0.25pF, ±0.1pF, ±0.05pF	0.30	±0.03	±0 .03	300	
	C0603NP0129□FTQ	1V, 1MHz	1.2	pF	±0.25pF, ±0.1pF, ±0.05pF	0.30	±0.03	±0 .03	300	
	C0603NP0139□FTQ	1V, 1MHz	1.3	pF	±0.25pF, ±0.1pF, ±0.05pF	0.30	±0.03	±0 .03	300	
	C0603NP0159□FTQ	1V, 1MHz	1.5	pF	±0.25pF, ±0.1pF, ±0.05pF	0.30	±0.03	±0 .03	300	
	C0603NP0169□FTQ	1V, 1MHz	1.6	pF	±0.25pF, ±0.1pF, ±0.05pF	0.30	±0.03	±0 .03	300	
	C0603NP0189□FTQ	1V, 1MHz	1.8	pF	±0.25pF, ±0.1pF, ±0.05pF	0.30	±0.03	±0 .03	300	
	C0603NP0209□FTQ	1V, 1MHz	2.0	pF	±0.25pF, ±0.1pF, ±0.05pF	0.30	±0.03	±0 .03	250	
	C0603NP0229□FTQ	1V, 1MHz	2.2	pF	±0.25pF, ±0.1pF, ±0.05pF	0.30	±0.03	±0 .03	250	
	C0603NP0249□FTQ	1V, 1MHz	2.4	pF	±0.25pF, ±0.1pF, ±0.05pF	0.30	±0.03	±0 .03	250	
	C0603NP0259□FTQ	1V, 1MHz	2.5	pF	±0.25pF, ±0.1pF, ±0.05pF	0.30	±0.03	±0 .03	250	
	C0603NP0279□FTQ	1V, 1MHz	2.7	pF	±0.25pF, ±0.1pF, ±0.05pF	0.30	±0.03	±0 .03	250	
	C0603NP0309□FTQ	1V, 1MHz	3.0	pF	±0.25pF, ±0.1pF, ±0.05pF	0.30	±0.03	±0 .03	200	
	C0603NP0339□FTQ	1V, 1MHz	3.3	pF	±0.25pF, ±0.1pF, ±0.05pF	0.30	±0.03	±0 .03	200	
	C0603NP0369□FTQ	1V, 1MHz	3.6	pF	±0.25pF, ±0.1pF, ±0.05pF	0.30	±0.03	±0 .03	200	
	C0603NP0399□FTQ	1V, 1MHz	3.9	pF	±0.25pF, ±0.1pF, ±0.05pF	0.30	±0.03	±0 .03	200	
	C0603NP0439□FTQ	1V, 1MHz	4.3	pF	±0.25pF, ±0.1pF, ±0.05pF	0.30	±0.03	±0 .03	200	
	C0603NP0479□FTQ	1V, 1MHz	4.7	pF	±0.25pF, ±0.1pF, ±0.05pF	0.30	±0.03	±0 .03	200	
	C0603NP0569□FTQ	1V, 1MHz	5.6	pF	±0.5pF, ±0.25pF, ±0.1pF	0.30	±0.03	±0. 03	180	
	C0603NP0519□FTQ	1V, 1MHz	5.1	pF	±0.5pF, ±0.25pF, ±0.1pF	0.30	±0.03	±0. 03	180	
	C0603NP0609□FTQ	1V, 1MHz	6.0	pF	±0.5pF, ±0.25pF, ±0.1pF	0.30	±0.03	±0. 03	180	
	C0603NP0629□FTQ	1V, 1MHz	6.2	pF	±0.5pF, ±0.25pF, ±0.1pF	0.30	±0.03	±0. 03	180	
	C0603NP0689□FTQ	1V, 1MHz	6.8	pF	±0.5pF, ±0.25pF, ±0.1pF	0.30	±0.03	±0. 03	180	
	C0603NP0709□FTQ	1V, 1MHz	7.0	pF	±0.5pF, ±0.25pF, ±0.1pF	0.30	±0.03	±0. 03	120	
	C0603NP0759□FTQ	1V, 1MHz	7.5	pF	±0.5pF, ±0.25pF, ±0.1pF	0.30	±0.03	±0. 03	120	
	C0603NP0829□FTQ	1V, 1MHz	8.2	pF	±0.5pF, ±0.25pF, ±0.1pF	0.30	±0.03	±0. 03	120	
	C0603NP0909□FTQ	1V, 1MHz	9.0	pF	±0.5pF	0.30	±0.03	±0.03	120	
	C0603NP0919□FTQ	1V, 1MHz	9.1	pF	±0.5pF, ±0.25pF, ±0.1pF	0.30	±0.03	±0. 03	120	
	C0603NP0959□FTQ	1V, 1MHz	9.5	pF	±0.5pF, ±0.25pF, ±0.1pF	0.30	±0.03	±0. 03	120	
	C0603NP0100□FTQ	1V, 1MHz	10	pF	±5%, ±2%	0.30	±0.03	±0.03	120	
	C0603NP0120□FTQ	1V, 1MHz	12	pF	±5%, ±2%	0.30	±0.03	±0.03	90	
	C0603NP0150□FTQ	1V, 1MHz	15	pF	±5%, ±2%	0.30	±0.03	±0.03	70	
	C0603NP0180□FTQ	1V, 1MHz	18	pF	±5%, ±2%	0.30	±0.03	±0.03	60	

- C1005NP0_Q Series (EIA0402)

RV	DARFON P/N	Measuring Condition	Capacitance		Available Tolerance	Thick. (mm)	Tolerance(mm)		Q(1GHz) (min.)	Standard Packing
			Value	Unit			L/W	Thick.		
50V	C1005NP0108□GTQ	1V, 1MHz	0.1	pF	±0.1pF	0.50	±0.05	±0.05	300	Paper, 10Kpcs
	C1005NP0208□GTQ	1V, 1MHz	0.2	pF	±0.1pF, ±0.05pF	0.50	±0.05	±0.05	300	
	C1005NP0308□GTQ	1V, 1MHz	0.3	pF	±0.1pF, ±0.05pF	0.50	±0.05	±0.05	300	
	C1005NP0408□GTQ	1V, 1MHz	0.4	pF	±0.1pF, ±0.05pF	0.50	±0.05	±0.05	300	
	C1005NP0508□GTQ	1V, 1MHz	0.5	pF	±0.1pF, ±0.05pF	0.50	±0.05	±0.05	300	
	C1005NP0608□GTQ	1V, 1MHz	0.6	pF	±0.1pF, ±0.05pF	0.50	±0.05	±0.05	300	
	C1005NP0708□GTQ	1V, 1MHz	0.7	pF	±0.1pF, ±0.05pF	0.50	±0.05	±0.05	300	
	C1005NP0808□GTQ	1V, 1MHz	0.8	pF	±0.1pF, ±0.05pF	0.50	±0.05	±0.05	300	
	C1005NP0908□GTQ	1V, 1MHz	0.9	pF	±0.1pF, ±0.05pF	0.50	±0.05	±0.05	300	
	C1005NP0109□GTQ	1V, 1MHz	1.0	pF	±0.25pF, ±0.1pF, ±0.05pF	0.50	±0.05	±0.05	300	
	C1005NP0119□GTQ	1V, 1MHz	1.1	pF	±0.25pF, ±0.1pF, ±0.05pF	0.50	±0.05	±0.05	300	
	C1005NP0129□GTQ	1V, 1MHz	1.2	pF	±0.25pF, ±0.1pF, ±0.05pF	0.50	±0.05	±0.05	250	
	C1005NP0139□GTQ	1V, 1MHz	1.3	pF	±0.25pF, ±0.1pF, ±0.05pF	0.50	±0.05	±0.05	250	
	C1005NP0159□GTQ	1V, 1MHz	1.5	pF	±0.25pF, ±0.1pF, ±0.05pF	0.50	±0.05	±0.05	250	
	C1005NP0189□GTQ	1V, 1MHz	1.8	pF	±0.25pF, ±0.1pF, ±0.05pF	0.50	±0.05	±0.05	250	
	C1005NP0209□GTQ	1V, 1MHz	2.0	pF	±0.25pF, ±0.1pF, ±0.05pF	0.50	±0.05	±0.05	200	
	C1005NP0229□GTQ	1V, 1MHz	2.2	pF	±0.25pF, ±0.1pF, ±0.05pF	0.50	±0.05	±0.05	200	

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

RV	DARFON P/N	Measuring Condition	Capacitance		Available Tolerance	Thick. (mm)	Tolerance(mm)		Q(1GHz) (min.)	Standard Packing
			Value	Unit			L/W	Thick.		
50V	C1005NP0249□GTQ	1V, 1MHz	2.4	pF	±0.25pF, ±0.1pF, ±0.05pF	0.50	±0.05	±0.05	200	Paper, 10Kpcs
	C1005NP0279□GTQ	1V, 1MHz	2.7	pF	±0.25pF, ±0.1pF, ±0.05pF	0.50	±0.05	±0.05	200	
	C1005NP0299□GTQ	1V, 1MHz	2.9	pF	±0.25pF, ±0.1pF, ±0.05pF	0.50	±0.05	±0.05	200	
	C1005NP0309□GTQ	1V, 1MHz	3.0	pF	±0.25pF, ±0.1pF, ±0.05pF	0.50	±0.05	±0.05	200	
	C1005NP0339□GTQ	1V, 1MHz	3.3	pF	±0.25pF, ±0.1pF, ±0.05pF	0.50	±0.05	±0.05	200	
	C1005NP0369□GTQ	1V, 1MHz	3.6	pF	±0.25pF, ±0.1pF, ±0.05pF	0.50	±0.05	±0.05	180	
	C1005NP0399□GTQ	1V, 1MHz	3.9	pF	±0.25pF, ±0.1pF, ±0.05pF	0.50	±0.05	±0.05	180	
	C1005NP0409□GTQ	1V, 1MHz	4.0	pF	±0.25pF, ±0.1pF, ±0.05pF	0.50	±0.05	±0.05	180	
	C1005NP0479□GTQ	1V, 1MHz	4.7	pF	±0.25pF, ±0.1pF, ±0.05pF	0.50	±0.05	±0.05	180	
	C1005NP0509□GTQ	1V, 1MHz	5.0	pF	±0.5pF, ±0.25pF, ±0.1pF	0.50	±0.05	±0.05	150	
	C1005NP0519□GTQ	1V, 1MHz	5.1	pF	±0.5pF, ±0.25pF, ±0.1pF	0.50	±0.05	±0.05	150	
	C1005NP0569□GTQ	1V, 1MHz	5.6	pF	±0.5pF, ±0.25pF, ±0.1pF	0.50	±0.05	±0.05	150	
	C1005NP0609□GTQ	1V, 1MHz	6.0	pF	±0.5pF, ±0.25pF, ±0.1pF	0.50	±0.05	±0.05	150	
	C1005NP0629□GTQ	1V, 1MHz	6.2	pF	±0.5pF, ±0.25pF, ±0.1pF	0.50	±0.05	±0.05	150	
	C1005NP0689□GTQ	1V, 1MHz	6.8	pF	±0.5pF, ±0.25pF, ±0.1pF	0.50	±0.05	±0.05	150	
	C1005NP0709□GTQ	1V, 1MHz	7.0	pF	±0.5pF, ±0.25pF, ±0.1pF	0.50	±0.05	±0.05	100	
	C1005NP0809□GTQ	1V, 1MHz	8.0	pF	±0.5pF, ±0.25pF, ±0.1pF	0.50	±0.05	±0.05	100	
	C1005NP0829□GTQ	1V, 1MHz	8.2	pF	±0.5pF, ±0.25pF, ±0.1pF	0.50	±0.05	±0.05	100	
	C1005NP0909□GTQ	1V, 1MHz	9.0	pF	±0.5pF, ±0.25pF, ±0.1pF	0.50	±0.05	±0.05	100	
	C1005NP0919□GTQ	1V, 1MHz	9.1	pF	±0.5pF, ±0.25pF, ±0.1pF	0.50	±0.05	±0.05	100	
	C1005NP0100□GTQ	1V, 1MHz	10	pF	±5%, ±2%	0.50	±0.05	±0.05	80	
	C1005NP0120□GTQ	1V, 1MHz	12	pF	±5%, ±2%	0.50	±0.05	±0.05	60	
	C1005NP0150□GTQ	1V, 1MHz	15	pF	±5%, ±2%, ±1%	0.50	±0.05	±0.05	40	
	C1005NP0180□GTQ	1V, 1MHz	18	pF	±5%, ±2%	0.50	±0.05	±0.05	30	
	C1005NP0220□GTQ	1V, 1MHz	22	pF	±5%, ±2%	0.50	±0.05	±0.05	20	

- C1608NP0_Q Series (EIA0603)

RV	DARFON P/N	Measuring Condition	Capacitance		Available Tolerance	Thick. (mm)	Tolerance(mm)		Q(1GHz) (min.)	Standard Packing
			Value	Unit			L/W	Thick.		
250V	C1608NP0308□KTQ	1V, 1MHz	0.30	pF	±0.1pF, ±0.05pF	0.80	±0.10	±0.10	250	Paper, 4Kpcs
	C1608NP0508□KTQ	1V, 1MHz	0.50	pF	±0.1pF, ±0.05pF	0.80	±0.10	±0.10	250	
	C1608NP0758□KTQ	1V, 1MHz	0.75	pF	±0.1pF, ±0.05pF	0.80	±0.10	±0.10	250	
	C1608NP0109□KTQ	1V, 1MHz	1.0	pF	±0.25pF, ±0.1pF	0.80	±0.10	±0.10	250	
	C1608NP0129□KTQ	1V, 1MHz	1.2	pF	±0.25pF, ±0.1pF	0.80	±0.10	±0.10	200	
	C1608NP0159□KTQ	1V, 1MHz	1.5	pF	±0.25pF, ±0.1pF	0.80	±0.10	±0.10	200	
	C1608NP0189□KTQ	1V, 1MHz	1.8	pF	±0.25pF, ±0.1pF	0.80	±0.10	±0.10	200	
	C1608NP0209□KTQ	1V, 1MHz	2.0	pF	±0.25pF, ±0.1pF	0.80	±0.10	±0.10	150	
	C1608NP0229□KTQ	1V, 1MHz	2.2	pF	±0.25pF, ±0.1pF	0.80	±0.10	±0.10	150	
	C1608NP0279□KTQ	1V, 1MHz	2.7	pF	±0.25pF, ±0.1pF	0.80	±0.10	±0.10	150	
	C1608NP0309□KTQ	1V, 1MHz	3.0	pF	±0.25pF, ±0.1pF	0.80	±0.10	±0.10	100	
	C1608NP0339□KTQ	1V, 1MHz	3.3	pF	±0.25pF, ±0.1pF	0.80	±0.10	±0.10	100	
	C1608NP0399□KTQ	1V, 1MHz	3.9	pF	±0.25pF, ±0.1pF	0.80	±0.10	±0.10	100	
	C1608NP0479□KTQ	1V, 1MHz	4.7	pF	±0.25pF, ±0.1pF	0.80	±0.10	±0.10	100	
	C1608NP0569□KTQ	1V, 1MHz	5.6	pF	±0.5pF, ±0.25pF	0.80	±0.10	±0.10	80	
	C1608NP0609□KTQ	1V, 1MHz	6.0	pF	±0.5pF, ±0.25pF	0.80	±0.10	±0.10	80	
	C1608NP0689□KTQ	1V, 1MHz	6.8	pF	±0.5pF, ±0.25pF	0.80	±0.10	±0.10	80	
	C1608NP0829□KTQ	1V, 1MHz	8.2	pF	±0.5pF, ±0.25pF	0.80	±0.10	±0.10	70	
	C1608NP0919□KTQ	1V, 1MHz	9.1	pF	±0.5pF, ±0.25pF	0.80	±0.10	±0.10	70	
	C1608NP0100□KTQ	1V, 1MHz	10	pF	±5%	0.80	±0.10	±0.10	70	
	C1608NP0120□KTQ	1V, 1MHz	12	pF	±5%	0.80	±0.10	±0.10	40	
	C1608NP0150□KTQ	1V, 1MHz	15	pF	±5%	0.80	±0.10	±0.10	35	
	C1608NP0180□KTQ	1V, 1MHz	18	pF	±5%	0.80	±0.10	±0.10	30	
	C1608NP0220□KTQ	1V, 1MHz	22	pF	±5%	0.80	±0.10	±0.10	25	

RV	DARFON P/N	Measuring Condition	Capacitance		Available Tolerance	Thick. (mm)	Tolerance(mm)		Q(1GHz) (min.)	Standard Packing
			Value	Unit			L/W	Thick.		
50V	C1608NP0228□GTQ	1V, 1MHz	0.22	pF	±0.1pF, ±0.05pF	0.80	±0.10	±0.10	250	Paper, 4Kpcs
	C1608NP0308□GTQ	1V, 1MHz	0.30	pF	±0.1pF, ±0.05pF	0.80	±0.10	±0.10	250	
	C1608NP0508□GTQ	1V, 1MHz	0.50	pF	±0.1pF, ±0.05pF	0.80	±0.10	±0.10	250	
	C1608NP0758□GTQ	1V, 1MHz	0.75	pF	±0.1pF, ±0.05pF	0.80	±0.10	±0.10	250	
	C1608NP0109□GTQ	1V, 1MHz	1.0	pF	±0.25pF, ±0.1pF	0.80	±0.10	±0.10	250	
	C1608NP0129□GTQ	1V, 1MHz	1.2	pF	±0.25pF, ±0.1pF	0.80	±0.10	±0.10	200	
	C1608NP0159□GTQ	1V, 1MHz	1.5	pF	±0.25pF, ±0.1pF	0.80	±0.10	±0.10	200	
	C1608NP0189□GTQ	1V, 1MHz	1.8	pF	±0.25pF, ±0.1pF	0.80	±0.10	±0.10	200	
	C1608NP0209□GTQ	1V, 1MHz	2.0	pF	±0.25pF, ±0.1pF	0.80	±0.10	±0.10	150	
	C1608NP0229□GTQ	1V, 1MHz	2.2	pF	±0.25pF, ±0.1pF	0.80	±0.10	±0.10	150	
	C1608NP0279□GTQ	1V, 1MHz	2.7	pF	±0.25pF, ±0.1pF	0.80	±0.10	±0.10	150	
	C1608NP0309□GTQ	1V, 1MHz	3.0	pF	±0.25pF, ±0.1pF	0.80	±0.10	±0.10	100	
	C1608NP0339□GTQ	1V, 1MHz	3.3	pF	±0.25pF, ±0.1pF	0.80	±0.10	±0.10	100	
	C1608NP0399□GTQ	1V, 1MHz	3.9	pF	±0.25pF, ±0.1pF	0.80	±0.10	±0.10	100	
	C1608NP0479□GTQ	1V, 1MHz	4.7	pF	±0.25pF, ±0.1pF	0.80	±0.10	±0.10	100	
	C1608NP0569□GTQ	1V, 1MHz	5.6	pF	±0.5pF, ±0.25pF	0.80	±0.10	±0.10	80	
	C1608NP0609□GTQ	1V, 1MHz	6.0	pF	±0.5pF, ±0.25pF	0.80	±0.10	±0.10	80	
	C1608NP0689□GTQ	1V, 1MHz	6.8	pF	±0.5pF, ±0.25pF	0.80	±0.10	±0.10	80	
	C1608NP0829□GTQ	1V, 1MHz	8.2	pF	±0.5pF, ±0.25pF	0.80	±0.10	±0.10	70	
	C1608NP0919□GTQ	1V, 1MHz	9.1	pF	±0.5pF, ±0.25pF	0.80	±0.10	±0.10	70	
	C1608NP0100□GTQ	1V, 1MHz	10	pF	±5%	0.80	±0.10	±0.10	70	
	C1608NP0120□GTQ	1V, 1MHz	12	pF	±5%	0.80	±0.10	±0.10	40	
	C1608NP0150□GTQ	1V, 1MHz	15	pF	±5%	0.80	±0.10	±0.10	35	
	C1608NP0180□GTQ	1V, 1MHz	18	pF	±5%	0.80	±0.10	±0.10	30	
	C1608NP0220□GTQ	1V, 1MHz	22	pF	±5%	0.80	±0.10	±0.10	25	

- C2012NP0_Q Series (EIA0805)

RV	DARFON P/N	Measuring Condition	Capacitance		Available Tolerance	Thick. (mm)	Tolerance(mm)		Q(1GHz) (min.)	Standard Packing
			Value	Unit			L/W	Thick.		
250V	C2012NP0150□KTQ	1V, 1MHz	15	pF	±5%	1.25	±0.15	±0.15	53	Embossed, 3kpcs

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

Microwave Type (F Series)

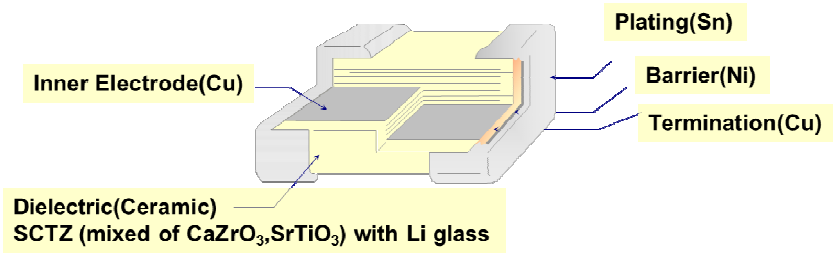
■ Feature

1. Ultra-stable
2. Tight tolerance available
3. Low ESR
4. Good frequency performance
5. No aging of capacitance
6. RoHS compliant

■ Application

- LC and RC tuned circuit
- Filtering
- Timing
- PA Module, Wireless equipment, Smartphone

■ Structure



■ Part Number & Characteristic

- C0402NP0_F Series (EIA01005)

RV	DARFON P/N	Measuring Condition	Capacitance		Available Tolerance	Thick. (mm)	Tolerance(mm)		Testing Freq	ESR (max.)	Q (min.)	Standard Packing
			Value	Unit			L/W	Thick.				
25V	C0402NP0208□FPF	1V, 1MHz	0.2	pF	±0.1pF, ±0.05pF	0.20	±0.02	±0.02	1GHz	700	1,137	Embossed, 40Kpcs (W4P1)
	C0402NP0308□FPF	1V, 1MHz	0.3	pF	±0.1pF, ±0.05pF	0.20	±0.02	±0.02	1GHz	700	758	
	C0402NP0408□FPF	1V, 1MHz	0.4	pF	±0.1pF, ±0.05pF	0.20	±0.02	±0.02	1GHz	700	568	
	C0402NP0508□FPF	1V, 1MHz	0.5	pF	±0.1pF, ±0.05pF	0.20	±0.02	±0.02	1GHz	700	455	
	C0402NP0608□FPF	1V, 1MHz	0.6	pF	±0.1pF, ±0.05pF	0.20	±0.02	±0.02	1GHz	700	379	
	C0402NP0708□FPF	1V, 1MHz	0.7	pF	±0.1pF, ±0.05pF	0.20	±0.02	±0.02	1GHz	700	325	
	C0402NP0808□FPF	1V, 1MHz	0.8	pF	±0.1pF, ±0.05pF	0.20	±0.02	±0.02	1GHz	700	284	
	C0402NP0908□FPF	1V, 1MHz	0.9	pF	±0.1pF, ±0.05pF	0.20	±0.02	±0.02	1GHz	700	253	
	C0402NP0109□FPF	1V, 1MHz	1.0	pF	±0.25pF, ±0.1pF,±0.05pF	0.20	±0.02	±0.02	1GHz	700	227	
	C0402NP0119□FPF	1V, 1MHz	1.1	pF	±0.25pF, ±0.1pF	0.20	±0.02	±0.02	1GHz	450	322	
	C0402NP0129□FPF	1V, 1MHz	1.2	pF	±0.25pF, ±0.1pF	0.20	±0.02	±0.02	1GHz	450	295	
	C0402NP0139□FPF	1V, 1MHz	1.3	pF	±0.25pF, ±0.1pF	0.20	±0.02	±0.02	1GHz	450	272	
	C0402NP0159□FPF	1V, 1MHz	1.5	pF	±0.25pF, ±0.1pF	0.20	±0.02	±0.02	1GHz	450	236	
	C0402NP0169□FPF	1V, 1MHz	1.6	pF	±0.25pF, ±0.1pF	0.20	±0.02	±0.02	1GHz	450	221	
	C0402NP0189□FPF	1V, 1MHz	1.8	pF	±0.25pF, ±0.1pF	0.20	±0.02	±0.02	1GHz	450	196	
	C0402NP0209□FPF	1V, 1MHz	2.0	pF	±0.25pF, ±0.1pF	0.20	±0.02	±0.02	1GHz	450	177	
	C0402NP0229□FPF	1V, 1MHz	2.2	pF	±0.25pF, ±0.1pF	0.20	±0.02	±0.02	1GHz	275	263	
	C0402NP0249□FPF	1V, 1MHz	2.4	pF	±0.25pF, ±0.1pF	0.20	±0.02	±0.02	1GHz	275	241	
	C0402NP0259□FPF	1V, 1MHz	2.5	pF	±0.25pF, ±0.1pF	0.20	±0.02	±0.02	1GHz	275	231	
	C0402NP0279□FPF	1V, 1MHz	2.7	pF	±0.25pF, ±0.1pF	0.20	±0.02	±0.02	1GHz	275	214	
	C0402NP0309□FPF	1V, 1MHz	3.0	pF	±0.25pF, ±0.1pF	0.20	±0.02	±0.02	1GHz	275	193	
	C0402NP0339□FPF	1V, 1MHz	3.3	pF	±0.25pF, ±0.1pF	0.20	±0.02	±0.02	1GHz	275	175	
	C0402NP0369□FPF	1V, 1MHz	3.6	pF	±0.25pF, ±0.1pF	0.20	±0.02	±0.02	1GHz	275	161	
	C0402NP0399□FPF	1V, 1MHz	3.9	pF	±0.25pF, ±0.1pF	0.20	±0.02	±0.02	1GHz	275	148	
	C0402NP0439□FPF	1V, 1MHz	4.3	pF	±0.25pF, ±0.1pF	0.20	±0.02	±0.02	1GHz	275	135	
	C0402NP0479□FPF	1V, 1MHz	4.7	pF	±0.25pF, ±0.1pF	0.20	±0.02	±0.02	1GHz	275	123	
	C0402NP0569□FPF	1V, 1MHz	5.6	pF	±0.5pF, ±0.25pF, ±0.1pF	0.20	±0.02	±0.02	1GHz	170	167	
	C0402NP0609□FPF	1V, 1MHz	6.0	pF	±0.5pF, ±0.25pF, ±0.1pF	0.20	±0.02	±0.02	1GHz	170	156	
	C0402NP0629□FPF	1V, 1MHz	6.2	pF	±0.5pF, ±0.25pF, ±0.1pF	0.20	±0.02	±0.02	1GHz	170	151	
	C0402NP0689□FPF	1V, 1MHz	6.8	pF	±0.5pF, ±0.25pF, ±0.1pF	0.20	±0.02	±0.02	1GHz	170	138	
	C0402NP0709□FPF	1V, 1MHz	7.0	pF	±0.5pF, ±0.25pF, ±0.1pF	0.20	±0.02	±0.02	1GHz	170	134	
	C0402NP0759□FPF	1V, 1MHz	7.5	pF	±0.5pF, ±0.25pF, ±0.1pF	0.20	±0.02	±0.02	1GHz	170	125	
	C0402NP0829□FPF	1V, 1MHz	8.2	pF	±0.5pF, ±0.25pF, ±0.1pF	0.20	±0.02	±0.02	1GHz	170	114	
	C0402NP0919□FPF	1V, 1MHz	9.1	pF	±0.5pF, ±0.25pF, ±0.1pF	0.20	±0.02	±0.02	1GHz	170	103	
	C0402NP0100□FPF	1V, 1MHz	10	pF	±5%, ±2%	0.20	±0.02	±0.02	1GHz	170	94	

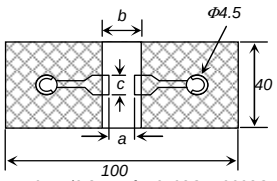
RV	DARFON P/N	Measuring Condition	Capacitance		Available Tolerance	Thick. (mm)	Tolerance(mm)		Testing Freq	ESR (max.)	Q (min.)	Standard Packing
			Value	Unit			L/W	Thick.				
16V	C0402NP0208□EPF	1V, 1MHz	0.2	pF	±0.1pF, ±0.05pF	0.20	±0.02	±0.02	1GHz	700	1,137	Embossed, 40Kpcs (W4P1)
	C0402NP0308□EPF	1V, 1MHz	0.3	pF	±0.1pF, ±0.05pF	0.20	±0.02	±0.02	1GHz	700	758	
	C0402NP0408□EPF	1V, 1MHz	0.4	pF	±0.1pF, ±0.05pF	0.20	±0.02	±0.02	1GHz	700	568	
	C0402NP0508□EPF	1V, 1MHz	0.5	pF	±0.1pF, ±0.05pF	0.20	±0.02	±0.02	1GHz	700	455	
	C0402NP0608□EPF	1V, 1MHz	0.6	pF	±0.1pF, ±0.05pF	0.20	±0.02	±0.02	1GHz	700	379	
	C0402NP0708□EPF	1V, 1MHz	0.7	pF	±0.1pF, ±0.05pF	0.20	±0.02	±0.02	1GHz	700	325	
	C0402NP0808□EPF	1V, 1MHz	0.8	pF	±0.1pF, ±0.05pF	0.20	±0.02	±0.02	1GHz	700	284	
	C0402NP0908□EPF	1V, 1MHz	0.9	pF	±0.1pF, ±0.05pF	0.20	±0.02	±0.02	1GHz	700	253	
	C0402NP0109□EPF	1V, 1MHz	1.0	pF	±0.25pF, ±0.1pF,±0.05pF	0.20	±0.02	±0. 02	1GHz	700	227	
	C0402NP0119□EPF	1V, 1MHz	1.1	pF	±0.25pF, ±0.1pF	0.20	±0.02	±0.02	1GHz	450	322	
	C0402NP0129□EPF	1V, 1MHz	1.2	pF	±0.25pF, ±0.1pF	0.20	±0.02	±0.02	1GHz	450	295	
	C0402NP0139□EPF	1V, 1MHz	1.3	pF	±0.25pF, ±0.1pF	0.20	±0.02	±0.02	1GHz	450	272	
	C0402NP0159□EPF	1V, 1MHz	1.5	pF	±0.25pF, ±0.1pF	0.20	±0.02	±0.02	1GHz	450	236	
	C0402NP0169□EPF	1V, 1MHz	1.6	pF	±0.25pF, ±0.1pF	0.20	±0.02	±0.02	1GHz	450	221	
	C0402NP0189□EPF	1V, 1MHz	1.8	pF	±0.25pF, ±0.1pF	0.20	±0.02	±0.02	1GHz	450	196	
	C0402NP0209□EPF	1V, 1MHz	2.0	pF	±0.25pF, ±0.1pF	0.20	±0.02	±0.02	1GHz	450	177	
	C0402NP0229□EPF	1V, 1MHz	2.2	pF	±0.25pF, ±0.1pF	0.20	±0.02	±0.02	1GHz	275	263	
	C0402NP0249□EPF	1V, 1MHz	2.4	pF	±0.25pF, ±0.1pF	0.20	±0.02	±0.02	1GHz	275	241	
	C0402NP0259□EPF	1V, 1MHz	2.5	pF	±0.25pF, ±0.1pF	0.20	±0.02	±0.02	1GHz	275	231	
	C0402NP0279□EPF	1V, 1MHz	2.7	pF	±0.25pF, ±0.1pF	0.20	±0.02	±0.02	1GHz	275	214	
	C0402NP0309□EPF	1V, 1MHz	3.0	pF	±0.25pF, ±0.1pF	0.20	±0.02	±0.02	1GHz	275	193	
	C0402NP0339□EPF	1V, 1MHz	3.3	pF	±0.25pF, ±0.1pF	0.20	±0.02	±0.02	1GHz	275	175	
	C0402NP0369□EPF	1V, 1MHz	3.6	pF	±0.25pF, ±0.1pF	0.20	±0.02	±0.02	1GHz	275	161	
	C0402NP0399□EPF	1V, 1MHz	3.9	pF	±0.25pF, ±0.1pF	0.20	±0.02	±0.02	1GHz	275	148	
	C0402NP0439□EPF	1V, 1MHz	4.3	pF	±0.25pF, ±0.1pF	0.20	±0.02	±0.02	1GHz	275	135	
	C0402NP0479□EPF	1V, 1MHz	4.7	pF	±0.25pF, ±0.1pF	0.20	±0.02	±0.02	1GHz	275	123	
	C0402NP0569□EPF	1V, 1MHz	5.6	pF	±0.5pF, ±0.25pF, ±0.1pF	0.20	±0.02	±0. 02	1GHz	170	167	
	C0402NP0609□EPF	1V, 1MHz	6.0	pF	±0.5pF, ±0.25pF, ±0.1pF	0.20	±0.02	±0. 02	1GHz	170	156	
	C0402NP0629□EPF	1V, 1MHz	6.2	pF	±0.5pF, ±0.25pF, ±0.1pF	0.20	±0.02	±0. 02	1GHz	170	151	
	C0402NP0689□EPF	1V, 1MHz	6.8	pF	±0.5pF, ±0.25pF, ±0.1pF	0.20	±0.02	±0. 02	1GHz	170	138	
	C0402NP0709□EPF	1V, 1MHz	7.0	pF	±0.5pF, ±0.25pF, ±0.1pF	0.20	±0.02	±0. 02	1GHz	170	134	
	C0402NP0759□EPF	1V, 1MHz	7.5	pF	±0.5pF, ±0.25pF, ±0.1pF	0.20	±0.02	±0. 02	1GHz	170	125	
	C0402NP0829□EPF	1V, 1MHz	8.2	pF	±0.5pF, ±0.25pF, ±0.1pF	0.20	±0.02	±0. 02	1GHz	170	114	
	C0402NP0919□EPF	1V, 1MHz	9.1	pF	±0.5pF, ±0.25pF, ±0.1pF	0.20	±0.02	±0. 02	1GHz	170	103	
	C0402NP0100□EPF	1V, 1MHz	10	pF	±5%, ±2%	0.20	±0.02	±0.02	1GHz	170	94	
	C0402NP0120□EPF	1V, 1MHz	12	pF	±5%, ±2%	0.20	±0.02	±0.02	1GHz	135	98	
	C0402NP0150□EPF	1V, 1MHz	15	pF	±5%, ±2%	0.20	±0.02	±0.02	1GHz	135	79	
	C0402NP0180□EPF	1V, 1MHz	18	pF	±5%, ±2%	0.20	±0.02	±0.02	1GHz	135	65	
	C0402NP0200□EPF	1V, 1MHz	20	pF	±5%, ±2%	0.20	±0.02	±0.02	1GHz	135	59	
	C0402NP0220□EPF	1V, 1MHz	22	pF	±5%, ±2%	0.20	±0.02	±0.02	1GHz	135	54	

● C0603NP0_F Series (EIA0201)

RV	DARFON P/N	Measuring Condition	Capacitance		Available Tolerance	Thick. (mm)	Tolerance(mm)		Testing Freq	ESR (max.)	Q(1GHz) (min.)	Standard Packing
			Value	Unit			L/W	Thick.				
25V	C0603NP0208□FTF	1V, 1MHz	0.2	pF	±0.1pF, ±0.05pF	0.30	±0.03	±0.03	1GHz	350	2,274	Paper, 15Kpcs
	C0603NP0308□FTF	1V, 1MHz	0.3	pF	±0.1pF, ±0.05pF	0.30	±0.03	±0.03	1GHz	350	1,516	
	C0603NP0408□FTF	1V, 1MHz	0.4	pF	±0.1pF, ±0.05pF	0.30	±0.03	±0.03	1GHz	350	1,137	
	C0603NP0508□FTF	1V, 1MHz	0.5	pF	±0.1pF, ±0.05pF	0.30	±0.03	±0.03	1GHz	350	909	
	C0603NP0608□FTF	1V, 1MHz	0.6	pF	±0.1pF, ±0.05pF	0.30	±0.03	±0.03	1GHz	350	758	
	C0603NP0708□FTF	1V, 1MHz	0.7	pF	±0.1pF, ±0.05pF	0.30	±0.03	±0.03	1GHz	350	650	
	C0603NP0808□FTF	1V, 1MHz	0.8	pF	±0.1pF, ±0.05pF	0.30	±0.03	±0.03	1GHz	350	568	
	C0603NP0908□FTF	1V, 1MHz	0.9	pF	±0.1pF, ±0.05pF	0.30	±0.03	±0.03	1GHz	350	505	
	C0603NP0109□FTF	1V, 1MHz	1.0	pF	±0.25pF, ±0.1pF,±0.05pF	0.30	±0.03	±0. 03	1GHz	350	455	
	C0603NP0119□FTF	1V, 1MHz	1.1	pF	±0.25pF, ±0.1pF,±0.05pF	0.30	±0.03	±0. 03	1GHz	300	482	
	C0603NP0129□FTF	1V, 1MHz	1.2	pF	±0.25pF, ±0.1pF,±0.05pF	0.30	±0.03	±0. 03	1GHz	300	442	
	C0603NP0139□FTF	1V, 1MHz	1.3	pF	±0.25pF, ±0.1pF,±0.05pF	0.30	±0.03	±0. 03	1GHz	300	408	
	C0603NP0159□FTF	1V, 1MHz	1.5	pF	±0.25pF, ±0.1pF,±0.05pF	0.30	±0.03	±0. 03	1GHz	300	354	
	C0603NP0169□FTF	1V, 1MHz	1.6	pF	±0.25pF, ±0.1pF,±0.05pF	0.30	±0.03	±0. 03	1GHz	300	332	
	C0603NP0189□FTF	1V, 1MHz	1.8	pF	±0.25pF, ±0.1pF,±0.05pF	0.30	±0.03	±0. 03	1GHz	300	295	
	C0603NP0209□FTF	1V, 1MHz	2.0	pF	±0.25pF, ±0.1pF,±0.05pF	0.30	±0.03	±0. 03	1GHz	300	265	
	C0603NP0229□FTF	1V, 1MHz	2.2	pF	±0.25pF, ±0.1pF,±0.05pF	0.30	±0.03	±0. 03	1GHz	200	362	
	C0603NP0249□FTF	1V, 1MHz	2.4	pF	±0.25pF, ±0.1pF,±0.05pF	0.30	±0.03	±0. 03	1GHz	200	332	
	C0603NP0259□FTF	1V, 1MHz	2.5	pF	±0.25pF, ±0.1pF,±0.05pF	0.30	±0.03	±0. 03	1GHz	200	318	
	C0603NP0279□FTF	1V, 1MHz	2.7	pF	±0.25pF, ±0.1pF,±0.05pF	0.30	±0.03	±0. 03	1GHz	200	295	
	C0603NP0309□FTF	1V, 1MHz	3.0	pF	±0.25pF, ±0.1pF,±0.05pF	0.30	±0.03	±0. 03	1GHz	200	265	
	C0603NP0339□FTF	1V, 1MHz	3.3	pF	±0.25pF, ±0.1pF,±0.05pF	0.30	±0.03	±0. 03	1GHz	200	241	
	C0603NP0369□FTF	1V, 1MHz	3.6	pF	±0.25pF, ±0.1pF,±0.05pF	0.30	±0.03	±0. 03	1GHz	200	221	
	C0603NP0399□FTF	1V, 1MHz	3.9	pF	±0.25pF, ±0.1pF,±0.05pF	0.30	±0.03	±0. 03	1GHz	200	204	
	C0603NP0479□FTF	1V, 1MHz	4.7	pF	±0.25pF, ±0.1pF,±0.05pF	0.30	±0.03	±0. 03	1GHz	200	169	
	C0603NP0569□FTF	1V, 1MHz	5.6	pF	±0.5pF, ±0.25pF, ±0.1pF	0.30	±0.03	±0. 03	1GHz	150	189	
	C0603NP0609□FTF	1V, 1MHz	6.0	pF	±0.5pF, ±0.25pF, ±0.1pF	0.30	±0.03	±0. 03	1GHz	150	177	
	C0603NP0629□FTF	1V, 1MHz	6.2	pF	±0.5pF, ±0.25pF, ±0.1pF	0.30	±0.03	±0. 03	1GHz	150	171	
	C0603NP0689□FTF	1V, 1MHz	6.8	pF	±0.5pF, ±0.25pF, ±0.1pF	0.30	±0.03	±0. 03	1GHz	150	156	
	C0603NP0709□FTF	1V, 1MHz	7.0	pF	±0.5pF, ±0.25pF, ±0.1pF	0.30	±0.03	±0. 03	1GHz	150	152	
	C0603NP0759□FTF	1V, 1MHz	7.5	pF	±0.5pF, ±0.25pF, ±0.1pF	0.30	±0.03	±0. 03	1GHz	150	141	
	C0603NP0829□FTF	1V, 1MHz	8.2	pF	±0.5pF, ±0.25pF, ±0.1pF	0.30	±0.03	±0. 03	1GHz	150	129	
	C0603NP0919□FTF	1V, 1MHz	9.1	pF	±0.5pF, ±0.25pF, ±0.1pF	0.30	±0.03	±0. 03	1GHz	150	117	
	C0603NP0100□FTF	1V, 1MHz	10	pF	±5%, ±2%	0.30	±0.03	±0.03	1GHz	150	106	
	C0603NP0110□FTF	1V, 1MHz	11	pF	±5%, ±2%	0.30	±0.03	±0.03	1GHz	250	58	
	C0603NP0120□FTF	1V, 1MHz	12	pF	**±5%, ±2%**	0.30	±0.03	±0.03	1GHz	250	53	
	C0603NP0130□FTF	1V, 1MHz	13	pF	±5%, ±2%	0.30	±0.03	±0.03	1GHz	250	49	
	C0603NP0150□FTF	1V, 1MHz	15	pF	**±5%, ±2%**	0.30	±0.03	±0.03	1GHz	250	42	
	C0603NP0160□FTF	1V, 1MHz	16	pF	±5%, ±2%	0.30	±0.03	±0.03	1GHz	250	40	
	C0603NP0180□FTF	1V, 1MHz	18	pF	**±5%, ±2%**	0.30	±0.03	±0.03	1GHz	250	35	
	C0603NP0200□FTF	1V, 1MHz	20	pF	±5%, ±2%	0.30	±0.03	±0.03	1GHz	250	32	
	C0603NP0220□FTF	1V, 1MHz	22	pF	**±5%, ±2%**	0.30	±0.03	±0.03	1GHz	250	29	
	C0603NP0240□FTF	1V, 1MHz	24	pF	**±5%, ±2%**	0.30	±0.03	±0.03	500MHz	300	22	
	C0603NP0270□FTF	1V, 1MHz	27	pF	**±5%, ±2%**	0.30	±0.03	±0.03	500MHz	300	20	
	C0603NP0300□FTF	1V, 1MHz	30	pF	**±5%, ±2%**	0.30	±0.03	±0.03	500MHz	300	18	
	C0603NP0330□FTF	1V, 1MHz	33	pF	**±5%, ±2%**	0.30	±0.03	±0.03	500MHz	300	16	

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

Test Spec.

<table>
<tr><th></th><th colspan="2">Item</th><th>Specification</th><th>Test Method</th></tr>
<tr><td>1</td><td colspan="2">Operating Temperature Range</td><td>NP0: -55 to 125 ℃</td><td>---</td></tr>
<tr><td>2</td><td colspan="2">Rated Voltage</td><td>Shown in the table of “Part Number & Characteristic”</td><td>The rated voltage is defined as the maximum voltage, which may be applied continuously to the capacitor.</td></tr>
<tr><td>3</td><td colspan="2">Appearance</td><td>No defects or abnormalities.</td><td>Visual inspection</td></tr>
<tr><td>4</td><td colspan="2">Dimensions</td><td>Within the specified dimension.</td><td>Using calipers or Microscope.</td></tr>
<tr><td>5</td><td colspan="2">Dielectric Strength (Flash)</td><td>No defects or abnormalities.</td><td>No failure shall be observed when 250% of the rated voltage is applied between the terminations for 1 to 5 seconds. The charge and discharge current is less than 50mA.</td></tr>
<tr><td>6</td><td colspan="2">Insulation Resistance (I.R.)</td><td>I.R.≧10GΩ</td><td>The insulation resistance shall be measured with a DC voltage not exceeding the rated voltage at 25℃ and 75%RH max, and within 1 minute of charging.</td></tr>
<tr><td>7</td><td colspan="2">Capacitance</td><td>Within the specified tolerance</td><td rowspan="2">The capacitance /Q shall be measured at 25℃ at the frequency and voltage shown in the tables.
<table><tr><td>Frequency</td><td>1.0±0.2MHz</td></tr><tr><td>Voltage</td><td>1.0±0.2Vrms</td></tr></table></td></tr>
<tr><td>8</td><td colspan="2">Quality Factor (Q)</td><td>30pF min.: Q≧1000
30pF max.: Q≧400+20C
C: Nominal Capacitance (pF)</td></tr>
<tr><td>9</td><td colspan="2">Capacitance Temperature Characteristics</td><td>Capacitance change within 0±30ppm/℃ under operating temperature range.</td><td>The capacitance value at 25℃ and 85℃ shall be measured and calculated from the formula given below.
T.C.=(C_{85}-C_{25})/C_{25}*ΔT*10^6(PPM/℃)</td></tr>
<tr><td>10</td><td colspan="2">Termination Strength</td><td>No removal of the terminations or marking defect.</td><td>Apply a parallel force of 5N to a PCB mounted sample for 10±1sec.
*2N for 0603 (EIA 0201).</td></tr>
<tr><td rowspan="2">11</td><td colspan="2" rowspan="2">Deflection (Bending Strength)</td><td>No cracking or marking defects shall occur at 1mm deflection.
Capacitance change:
NP0: within ±5% or ± 0.5pF. (whichever is larger)</td><td>Solder the capacitor to the test jig (glass epoxy boards) shown in Fig.a using a SAC305(Sn96.5Ag3.0Cu0.5) solder.
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.</td></tr>
<tr><td colspan="2">(Unit in mm)
 

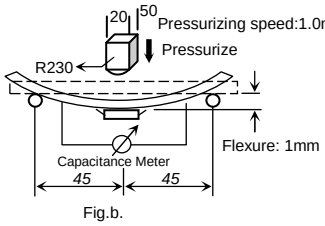
T:1.6mm(0.8 mm for 0402C & 0603C & 1005C size)
Fig. a.
<table><tr><th>Size</th><th>a</th><th>b</th><th>C</th></tr><tr><td>0402</td><td>0.2</td><td>0.56</td><td>0.23</td></tr><tr><td>0603</td><td>0.3</td><td>0.9</td><td>0.3</td></tr><tr><td>1005</td><td>0.4</td><td>1.5</td><td>0.5</td></tr><tr><td>1608</td><td>1.0</td><td>3.0</td><td>1.2</td></tr></table> 

Fig.b.</td></tr>
<tr><td>12</td><td colspan="2">Solderability of Termination</td><td>90% of the terminations are to be soldered evenly and continuously.
C0402 Series:
75% of the terminations are to be soldered evenly and continuously.</td><td>Immerse the test capacitor into a methanol solution containing rosin for 3 to 5 seconds, preheat it 150 to 180℃ for 2 to 3 minutes and immerse it into SAC305(Sn96.5Ag3.0Cu0.5) solder of 245 ± 5℃ for 3±1seconds.</td></tr>
<tr><td rowspan="4">13</td><td rowspan="4">Resistance to Soldering Heat</td><td>Appearance</td><td>No marking defects</td><td rowspan="4">Immerse the capacitor in a SAC305(Sn96.5Ag3.0Cu0.5) solder solution at 270±5℃ for 10±1 seconds. Let sit at room temperature for 24±2 hours, then measure.
*C0402 Series is not suitable for this testing</td></tr>
<tr><td>Cap. Change</td><td>NP0 within ±2.5% or ±0.25pF (whichever is larger)</td></tr>
<tr><td>Q</td><td>Initial spec.</td></tr>
<tr><td>I.R.</td><td>Initial spec.</td></tr>
</table>

	Item		Specification	Test Method
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
		Cap. Change	NP0 within ±2.5% or 0.25pF (whichever is larger)	
		Q	Initial spec.	
		I.R.	Initial spec.	
15	Humidity load	Appearance	No marking defects	Apply the rated voltage at 40±2℃ and 90 to 95% humidity for 500±12 hours. Remove and let sit for 24±2 hours at room temperature, then measure. The charge / discharge current is less than 50mA.
		Cap. Change	NP0 within ±5% or ±0.5pF (whichever is larger)	
		Q	200 min.	
		I.R.	I.R.≧500MΩ	
16	High temperature load life test	Appearance	No marking defects	Apply 200% of the rated voltage for 1000±12 hours at the maximum operating temperature ± 3℃. Let sit for 24± 2 hours at room temperature, then measure. The charge/discharge current is less than 50mA.
		Cap. Change	NP0 within ±5% or ±0.5pF (whichever is larger)	
		Q	30pF and over : Q≧350 10pF and over, 30pF and below : Q≧275+5C/2 10pF and below : Q≧200+10C C:Nominal Capacitance(pF)	
		I.R.	I.R.≧1GΩ	
17	ESR & Q		Shown in the table of “Part Number & Characteristic”	Testing frequency is shown in the table of “Part Number & Characteristic”

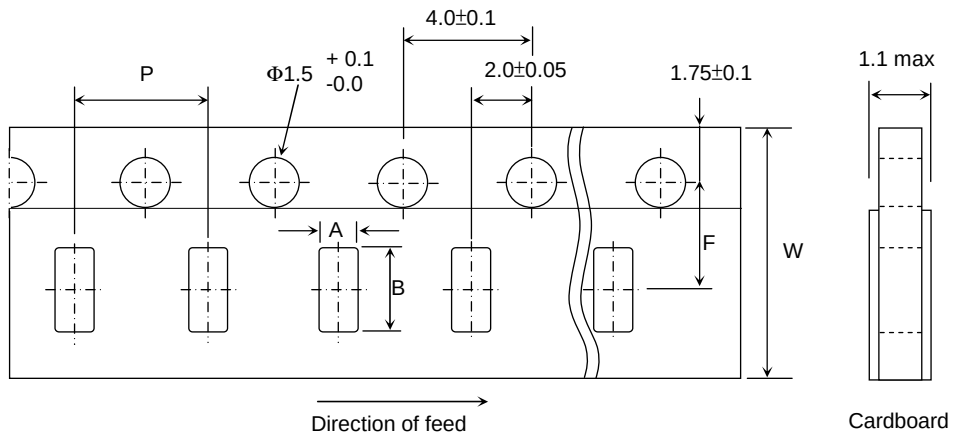
Package

- **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】

2mm and 4mm pitch tape

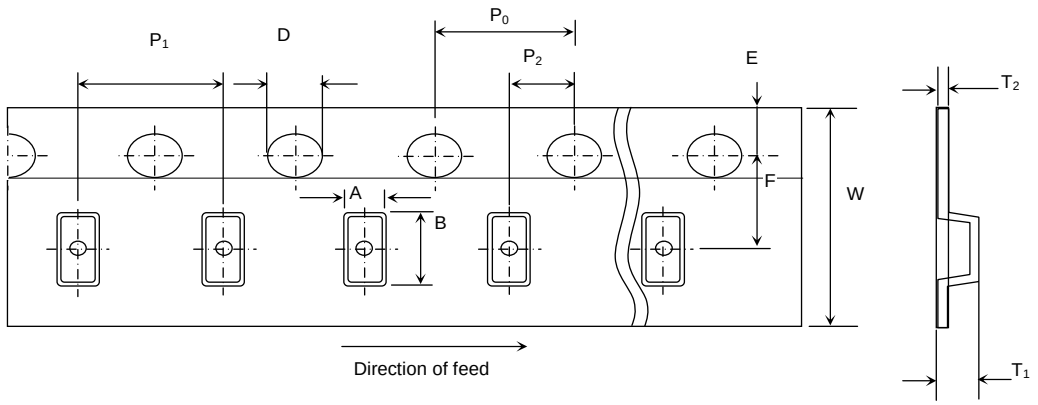


SYMBOL	PRODUCT SIZE CODE												UNIT
	0402(01005)		0603(0201)		1005(0402) (±0.05 mm)		1005(0402) (±0.10 mm)		1005(0402) (±0.15 mm)		1005(0402) (±0.20 mm)		
	SIZE	TOL.	SIZE	TOL.	SIZE	TOL.	SIZE	TOL.	SIZE	TOL.	SIZE	TOL.	
A	0.23	± 0.02	0.38	± 0.04	0.65	± 0.10	0.70	± 0.10	0.72	± 0.10	0.80	± 0.10	mm
B	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

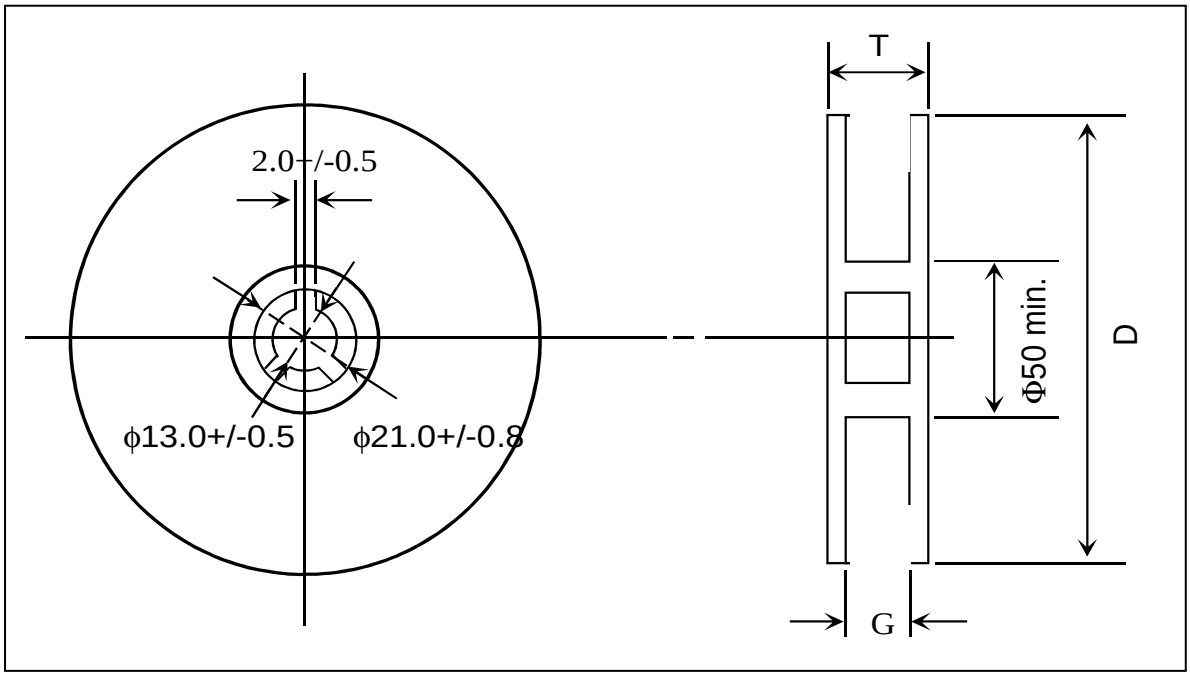


For W= 8mm: T_1=2.5mm max.

For W= 12mm: T_1= 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_1	1±0.02	4±0.1	4±0.1	4±0.1	4±0.1	8±0.1	8±0.1
P_O	2±0.04	4±0.1	4±0.1	4±0.1	4±0.1	4±0.1	4±0.1
P_2	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_1	0.5 max	1.4 max.	2.5 max.	2.5 max.	2.5 max.	4.5	4.5
T_2	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

【Thickness and Packing Amount】

Thickness			Amount per reel			
			180 mm (7”)		330 mm (13”)	
Code	Spec.(mm)	Size (EIA)	Paper	Embossed	Paper	Embossed
Z	0.20	0402 (01005)	20K	40K#1		
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
		4532 (1812)		1K		
I	0.95	2012 (0805)		3K		
		3216 (1206)		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℃ to +35℃, 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℃.
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】

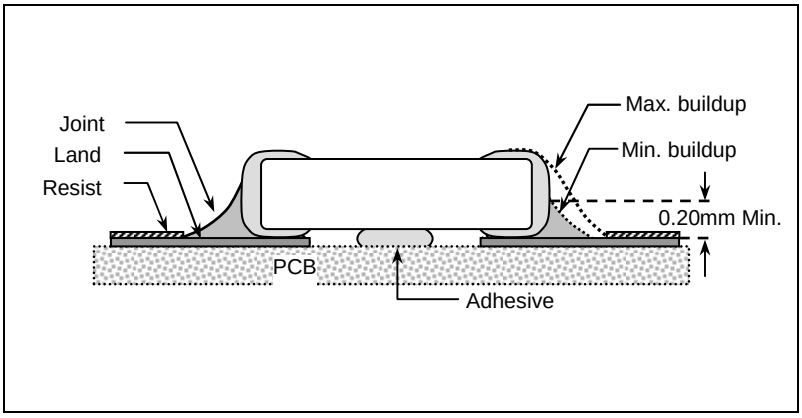
1. An excessive amount of flux or too rapid temperature rise can causes solvent burst, solder can generate a large quantity of gas. The gas can spreads small solder particles to cause solder balling effect or bridging problem.
2. Flux containing too high of a percentage of halide may cause corrosion 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】

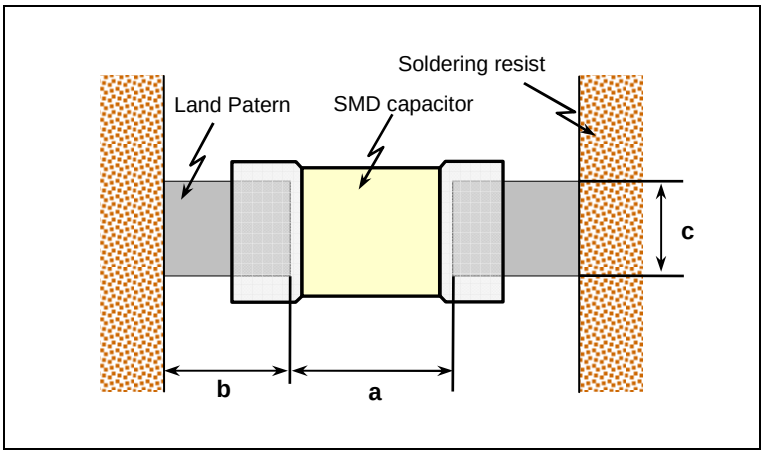
Too much solder amount may increase solder stress and cause crack risk. Insufficient solder amount may reduce adhesive Strength and cause parts falling off PCB. When soldering, confirm that the solder is placed over 0.2mm of the surface of the terminations.



【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.



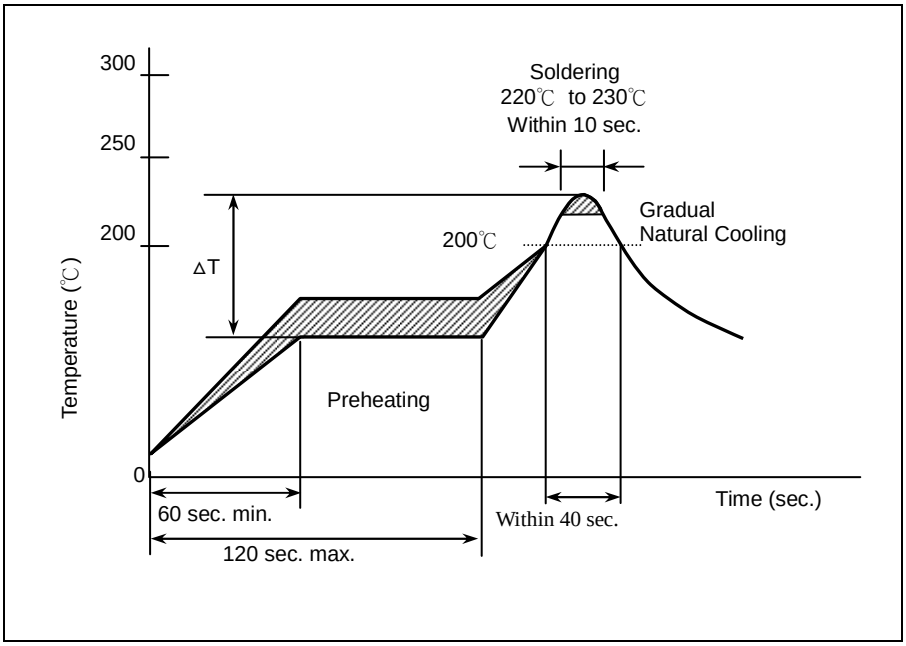
Size mm (EIA)	L x W (mm) (Dimension tolerance)	a (mm)	b (mm)	c (mm)
0402 (01005)	0.4*0.2	0.16 to 0.20	0.12 to 0.18	0.20 to 0.23
0603 (0201)	0.6*0.3	0.15 to 0.35	0.2 to 0.3	0.25 to 0.3
1005 (0402)	1.0*0.5 (within±0.10)	0.3 to 0.5	0.35 to 0.45	0.4 to 0.5
	1.0*0.5 (±0.15 or ±0.20)	0.4 to 0.6	0.4 to 0.5	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】

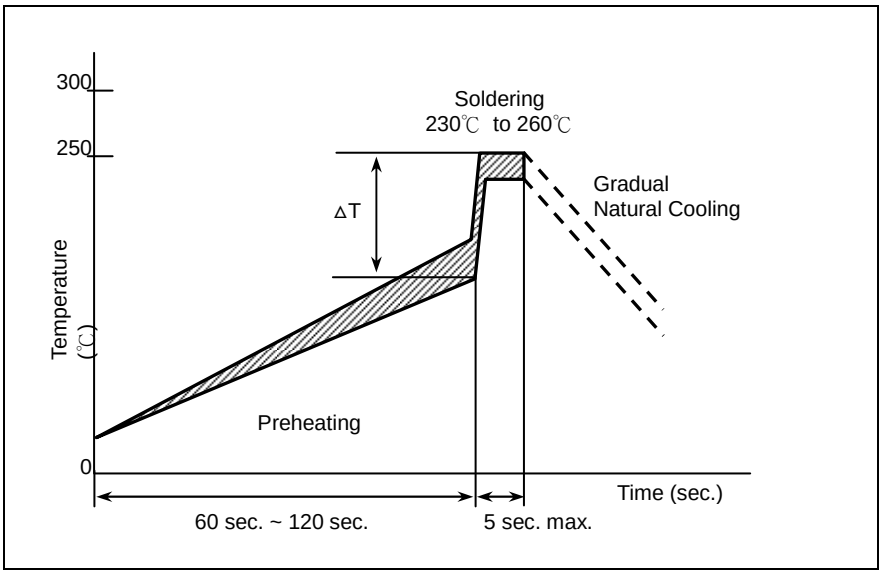
Reflow Soldering



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

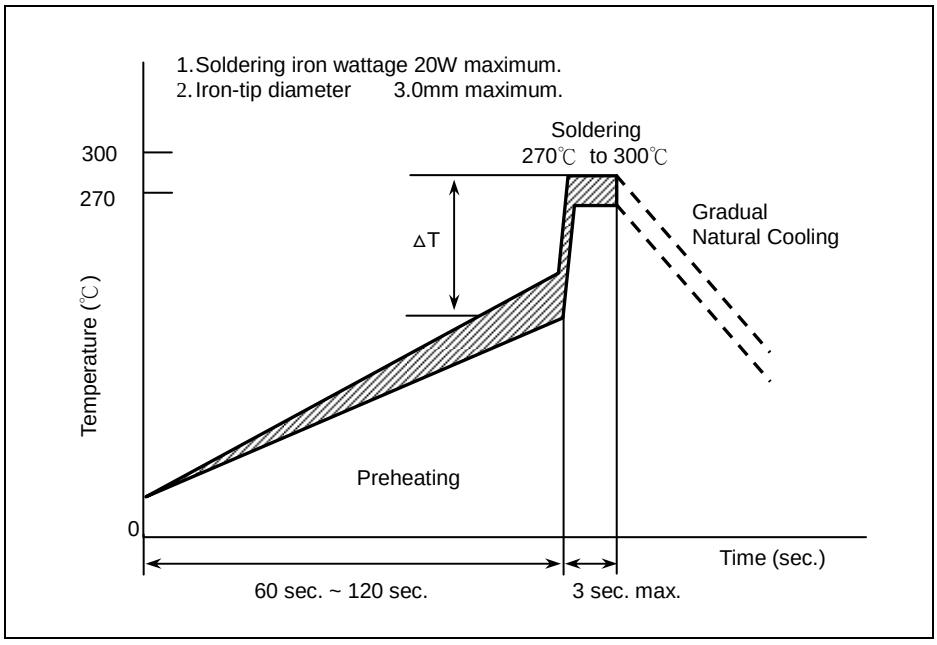
Chip Size	3216 and smaller	3225 and above
Preheating	△T≦150℃	△T≦130℃

Wave Soldering



Chip Size	3216 and smaller	3225 and above
Preheating	△T≦150℃	-

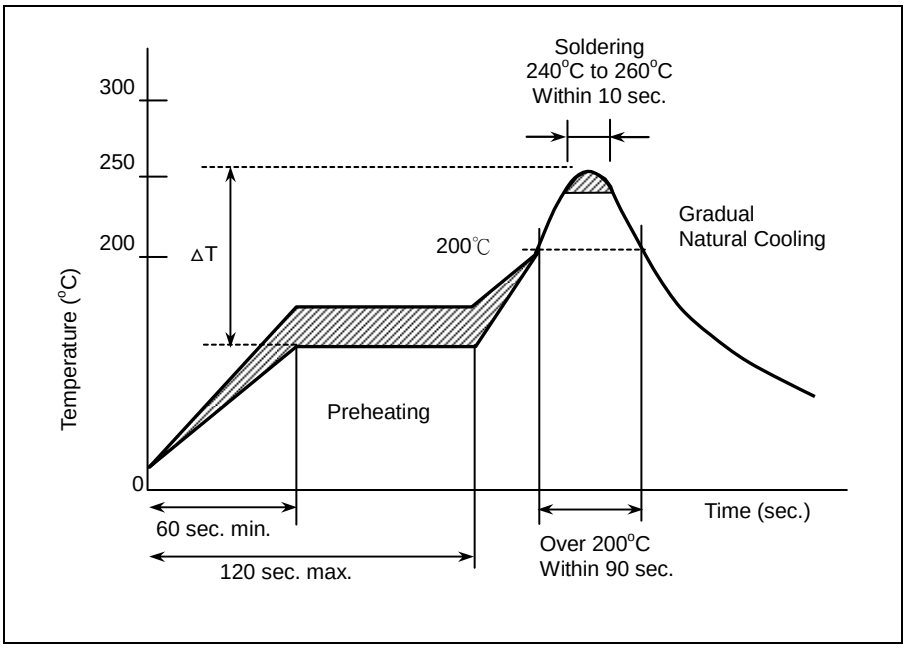
Soldering Iron



Chip Size	3216 and smaller	3225 and above
Preheating	△T≦190℃	△T≦130℃

【Soldering】

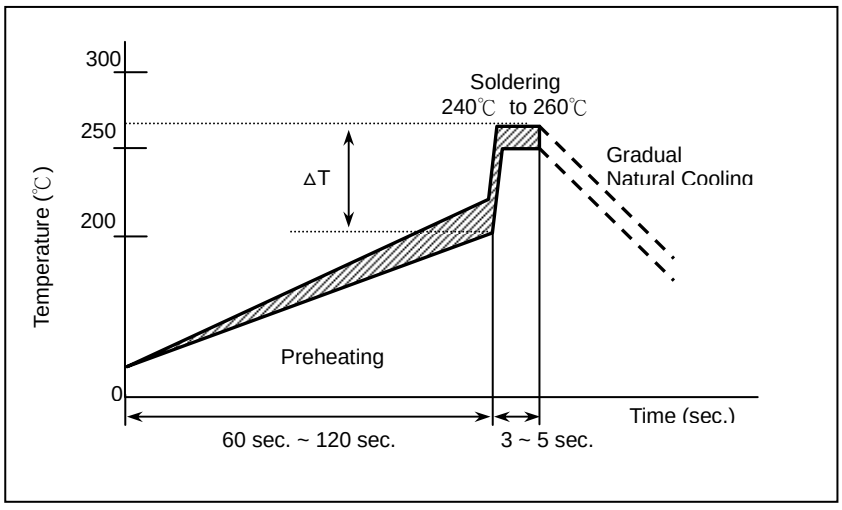
Reflow Soldering for Lead free Termination



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

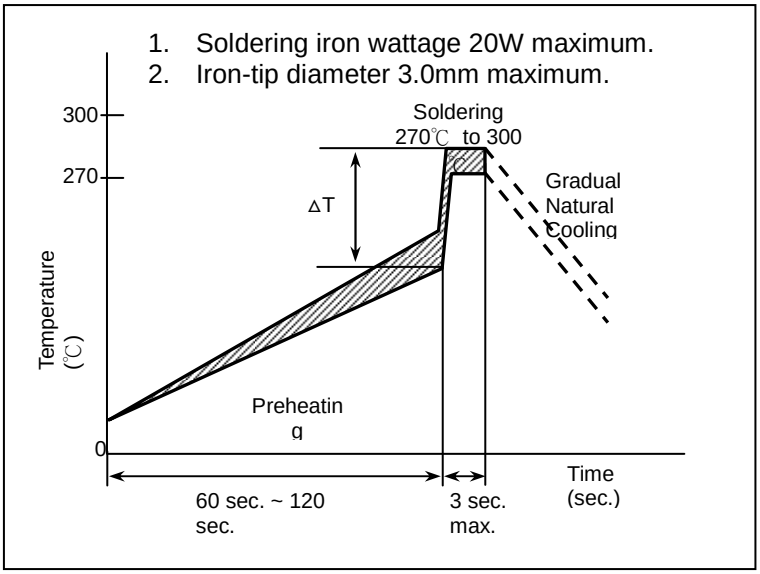
Chip Size	3216 and smaller	3225 and above
Preheating	△T≦150℃	△T≦130℃

Flow Soldering for Lead free Termination



Chip Size	3216 and smaller	3225 and above
Preheating	△T≦150℃	-

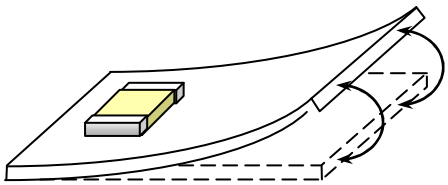
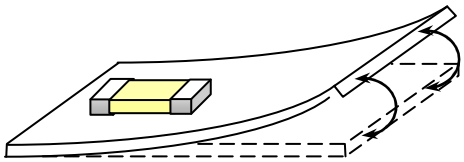
Soldering Iron



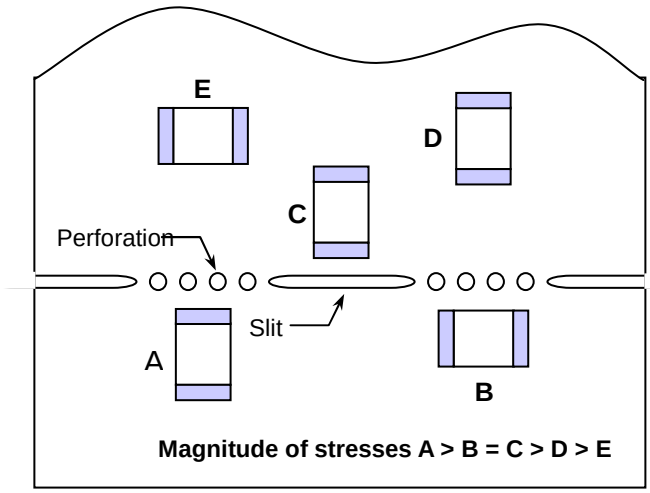
Chip Size	3216 and smaller	3225 and above
Preheating	△T≦190℃	△T≦130℃

【Chip Layout and Breaking PCB】

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

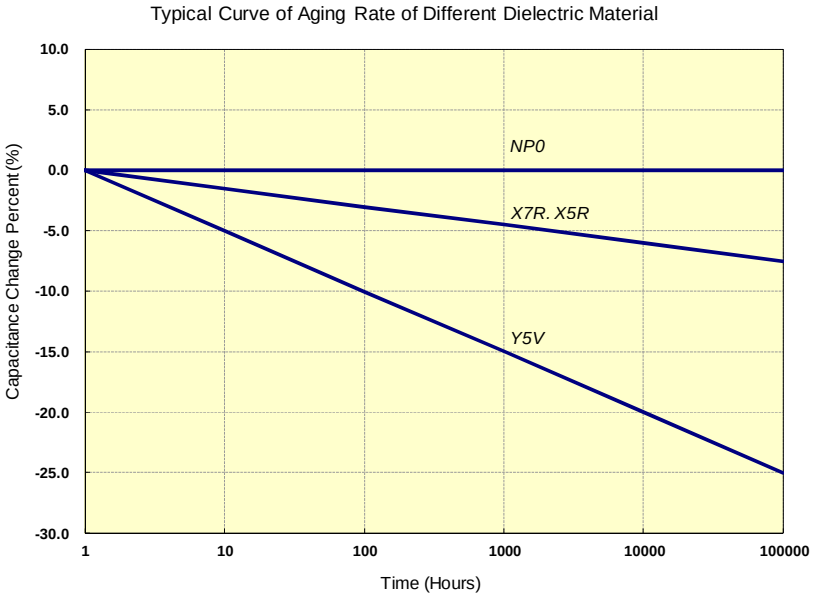
Recommended	Not Recommended
	

2. 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 low 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:



$C_{t2} = C_{t1} \times (1 - k \times \log_{10}(t_2/t_1))$

C_{t1}: Capacitance after t1 hours of start aging.

C_{t2}: Capacitance after t2 hours of start aging.

k: aging constant (capacitance decrease per decade)

t1, t2: time in hours from start of aging.

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

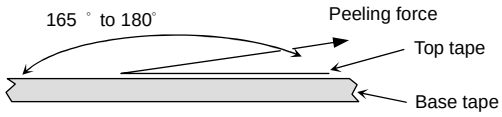
When heating the capacitors above Curie temperature (130℃~150℃) the capacitance can be re-new. So capacitance of class 2 capacitors will be complete de-aged by soldering process; subsequently a new aging process begins.

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: 0.1N to 1.0 N* in the direction shown as below.

The peeling speed: 300±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.