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lead-free

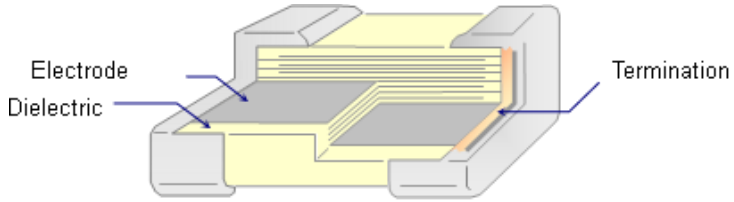
SPECIFICATIONS

High Frequency / Microwave MLCC

Cxx F-Series

Version October 2021

Structure



Ordering Code

C 0402 NP0 100 J F P F

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

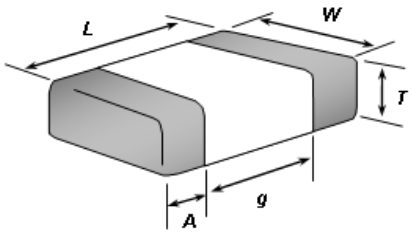
PACKAGING CODE

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 infotainment with AEC-Q200

External Dimensions



TYPE		Dimension (mm)				
Size (EIA Size)	Kind	L (Length)	W (Width)	T (Max.)	g (Min)	A (Min/Max)
C0402 (01005)	Standard	0.4±0.02	0.2±0.02	0.22	0.13	0.07/0.14
C0603 (0201)	Standard	0.6 ± 0.03	0.30 ± 0.03	0.33	0.15	0.10 / 0.20
C1005 (0402)	Standard	1.0 ± 0.05	0.50 ± 0.05	0.55	0.30	0.15 / 0.35

For special parts, please see the “Part Number & Characteristic” for detail specification.

DARFON

Microwave Type (F Series)

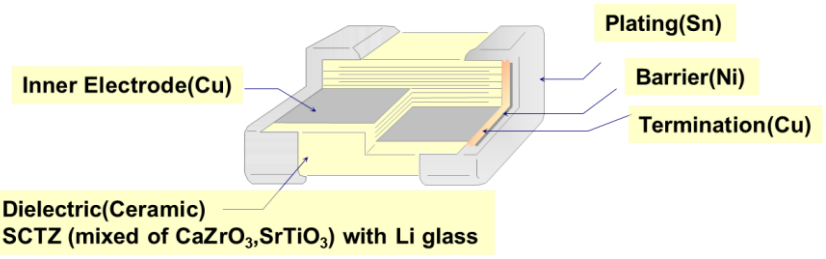
■ Feature

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

■ 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(1GHz) mΩ (max.)	Q(1GHz) (min.)	Standard Packing
			Value	Unit			L/W	Thick.				
25V	C0402NP0208□FPF	1V, 1MHz	0.2	pF	±0.25pF,±0.1pF, ±0.05pF	0.20	±0.02	±0.02	1GHz	1137	700	Embossed, 40Kpcs (W4P1)
	C0402NP0308□FPF	1V, 1MHz	0.3	pF	±0.25pF,±0.1pF, ±0.05pF	0.20	±0.02	±0.02	1GHz	758	700	
	C0402NP0408□FPF	1V, 1MHz	0.4	pF	±0.25pF,±0.1pF, ±0.05pF	0.20	±0.02	±0.02	1GHz	568	700	
	C0402NP0508□FPF	1V, 1MHz	0.5	pF	±0.25pF,±0.1pF, ±0.05pF	0.20	±0.02	±0.02	1GHz	455	700	
	C0402NP0608□FPF	1V, 1MHz	0.6	pF	±0.25pF,±0.1pF, ±0.05pF	0.20	±0.02	±0.02	1GHz	379	700	
	C0402NP0708□FPF	1V, 1MHz	0.7	pF	±0.25pF,±0.1pF, ±0.05pF	0.20	±0.02	±0.02	1GHz	325	700	
	C0402NP0808□FPF	1V, 1MHz	0.8	pF	±0.25pF,±0.1pF, ±0.05pF	0.20	±0.02	±0.02	1GHz	284	700	
	C0402NP0908□FPF	1V, 1MHz	0.9	pF	±0.25pF,±0.1pF, ±0.05pF	0.20	±0.02	±0.02	1GHz	253	700	
	C0402NP0109□FPF	1V, 1MHz	1.0	pF	±0.25pF, ±0.1pF,±0.05pF	0.20	±0.02	±0.02	1GHz	227	700	
	C0402NP0119□FPF	1V, 1MHz	1.1	pF	±0.25pF, ±0.1pF	0.20	±0.02	±0.02	1GHz	322	450	
	C0402NP0129□FPF	1V, 1MHz	1.2	pF	±0.25pF, ±0.1pF	0.20	±0.02	±0.02	1GHz	295	450	
	C0402NP0139□FPF	1V, 1MHz	1.3	pF	±0.25pF, ±0.1pF	0.20	±0.02	±0.02	1GHz	272	450	
	C0402NP0159□FPF	1V, 1MHz	1.5	pF	±0.25pF, ±0.1pF	0.20	±0.02	±0.02	1GHz	236	450	
	C0402NP0169□FPF	1V, 1MHz	1.6	pF	±0.25pF, ±0.1pF	0.20	±0.02	±0.02	1GHz	221	450	
	C0402NP0189□FPF	1V, 1MHz	1.8	pF	±0.25pF, ±0.1pF	0.20	±0.02	±0.02	1GHz	196	450	
	C0402NP0209□FPF	1V, 1MHz	2.0	pF	±0.25pF, ±0.1pF	0.20	±0.02	±0.02	1GHz	177	450	
	C0402NP0229□FPF	1V, 1MHz	2.2	pF	±0.25pF, ±0.1pF	0.20	±0.02	±0.02	1GHz	263	275	
	C0402NP0249□FPF	1V, 1MHz	2.4	pF	±0.25pF, ±0.1pF	0.20	±0.02	±0.02	1GHz	241	275	
	C0402NP0259□FPF	1V, 1MHz	2.5	pF	±0.25pF, ±0.1pF	0.20	±0.02	±0.02	1GHz	231	275	
	C0402NP0279□FPF	1V, 1MHz	2.7	pF	±0.25pF, ±0.1pF	0.20	±0.02	±0.02	1GHz	214	275	
	C0402NP0309□FPF	1V, 1MHz	3.0	pF	±0.25pF, ±0.1pF	0.20	±0.02	±0.02	1GHz	193	275	
	C0402NP0339□FPF	1V, 1MHz	3.3	pF	±0.25pF, ±0.1pF	0.20	±0.02	±0.02	1GHz	175	275	
	C0402NP0369□FPF	1V, 1MHz	3.6	pF	±0.25pF, ±0.1pF	0.20	±0.02	±0.02	1GHz	161	275	
	C0402NP0399□FPF	1V, 1MHz	3.9	pF	±0.25pF, ±0.1pF	0.20	±0.02	±0.02	1GHz	148	275	
	C0402NP0439□FPF	1V, 1MHz	4.3	pF	±0.25pF, ±0.1pF	0.20	±0.02	±0.02	1GHz	135	275	
	C0402NP0479□FPF	1V, 1MHz	4.7	pF	±0.25pF, ±0.1pF	0.20	±0.02	±0.02	1GHz	123	275	
	C0402NP0569□FPF	1V, 1MHz	5.6	pF	±0.5pF, ±0.25pF, ±0.1pF	0.20	±0.02	±0.02	1GHz	167	170	
	C0402NP0609□FPF	1V, 1MHz	6.0	pF	±0.5pF, ±0.25pF, ±0.1pF	0.20	±0.02	±0.02	1GHz	156	170	
	C0402NP0629□FPF	1V, 1MHz	6.2	pF	±0.5pF, ±0.25pF, ±0.1pF	0.20	±0.02	±0.02	1GHz	151	170	
	C0402NP0689□FPF	1V, 1MHz	6.8	pF	±0.5pF, ±0.25pF, ±0.1pF	0.20	±0.02	±0.02	1GHz	138	170	
	C0402NP0709□FPF	1V, 1MHz	7.0	pF	±0.5pF, ±0.25pF, ±0.1pF	0.20	±0.02	±0.02	1GHz	134	170	
	C0402NP0759□FPF	1V, 1MHz	7.5	pF	±0.5pF, ±0.25pF, ±0.1pF	0.20	±0.02	±0.02	1GHz	125	170	
	C0402NP0829□FPF	1V, 1MHz	8.2	pF	±0.5pF, ±0.25pF, ±0.1pF	0.20	±0.02	±0.02	1GHz	114	170	
	C0402NP0919□FPF	1V, 1MHz	9.1	pF	±0.5pF, ±0.25pF, ±0.1pF	0.20	±0.02	±0.02	1GHz	103	170	
	C0402NP0100□FPF	1V, 1MHz	10	pF	±5%, ±2%	0.20	±0.02	±0.02	1GHz	94	170	

RV	DARFON P/N	Measuring Condition	Capacitance		Available Tolerance	Thick. (mm)	Tolerance(mm)		Testing Freq	ESR(1GHz) mΩ (max.)	Q(1GHz) (min.)	Standard Packing
			Value	Unit			L/W	Thick.				
16V	C0402NP0208□EPF	1V, 1MHz	0.2	pF	±0.25pF,±0.1pF, ±0.05pF	0.20	±0.02	±0.02	1GHz	1137	700	Embossed, 40Kpcs (W4P1)
	C0402NP0308□EPF	1V, 1MHz	0.3	pF	±0.25pF,±0.1pF, ±0.05pF	0.20	±0.02	±0.02	1GHz	758	700	
	C0402NP0408□EPF	1V, 1MHz	0.4	pF	±0.25pF,±0.1pF, ±0.05pF	0.20	±0.02	±0.02	1GHz	568	700	
	C0402NP0508□EPF	1V, 1MHz	0.5	pF	±0.25pF,±0.1pF, ±0.05pF	0.20	±0.02	±0.02	1GHz	455	700	
	C0402NP0608□EPF	1V, 1MHz	0.6	pF	±0.25pF,±0.1pF, ±0.05pF	0.20	±0.02	±0.02	1GHz	379	700	
	C0402NP0708□EPF	1V, 1MHz	0.7	pF	±0.25pF,±0.1pF, ±0.05pF	0.20	±0.02	±0.02	1GHz	325	700	
	C0402NP0808□EPF	1V, 1MHz	0.8	pF	±0.25pF,±0.1pF, ±0.05pF	0.20	±0.02	±0.02	1GHz	284	700	
	C0402NP0908□EPF	1V, 1MHz	0.9	pF	±0.25pF,±0.1pF, ±0.05pF	0.20	±0.02	±0.02	1GHz	253	700	
	C0402NP0109□EPF	1V, 1MHz	1.0	pF	±0.25pF, ±0.1pF,±0.05pF	0.20	±0.02	±0.02	1GHz	227	700	
	C0402NP0119□EPF	1V, 1MHz	1.1	pF	±0.25pF, ±0.1pF	0.20	±0.02	±0.02	1GHz	322	450	
	C0402NP0129□EPF	1V, 1MHz	1.2	pF	±0.25pF, ±0.1pF	0.20	±0.02	±0.02	1GHz	295	450	
	C0402NP0139□EPF	1V, 1MHz	1.3	pF	±0.25pF, ±0.1pF	0.20	±0.02	±0.02	1GHz	272	450	
	C0402NP0159□EPF	1V, 1MHz	1.5	pF	±0.25pF, ±0.1pF	0.20	±0.02	±0.02	1GHz	236	450	
	C0402NP0169□EPF	1V, 1MHz	1.6	pF	±0.25pF, ±0.1pF	0.20	±0.02	±0.02	1GHz	221	450	
	C0402NP0189□EPF	1V, 1MHz	1.8	pF	±0.25pF, ±0.1pF	0.20	±0.02	±0.02	1GHz	196	450	
	C0402NP0209□EPF	1V, 1MHz	2.0	pF	±0.25pF, ±0.1pF	0.20	±0.02	±0.02	1GHz	177	450	
	C0402NP0229□EPF	1V, 1MHz	2.2	pF	±0.25pF, ±0.1pF	0.20	±0.02	±0.02	1GHz	263	275	
	C0402NP0249□EPF	1V, 1MHz	2.4	pF	±0.25pF, ±0.1pF	0.20	±0.02	±0.02	1GHz	241	275	
	C0402NP0259□EPF	1V, 1MHz	2.5	pF	±0.25pF, ±0.1pF	0.20	±0.02	±0.02	1GHz	231	275	
	C0402NP0279□EPF	1V, 1MHz	2.7	pF	±0.25pF, ±0.1pF	0.20	±0.02	±0.02	1GHz	214	275	
	C0402NP0309□EPF	1V, 1MHz	3.0	pF	±0.25pF, ±0.1pF	0.20	±0.02	±0.02	1GHz	193	275	
	C0402NP0339□EPF	1V, 1MHz	3.3	pF	±0.25pF, ±0.1pF	0.20	±0.02	±0.02	1GHz	175	275	
	C0402NP0369□EPF	1V, 1MHz	3.6	pF	±0.25pF, ±0.1pF	0.20	±0.02	±0.02	1GHz	161	275	
	C0402NP0399□EPF	1V, 1MHz	3.9	pF	±0.25pF, ±0.1pF	0.20	±0.02	±0.02	1GHz	148	275	
	C0402NP0439□EPF	1V, 1MHz	4.3	pF	±0.25pF, ±0.1pF	0.20	±0.02	±0.02	1GHz	135	275	
	C0402NP0479□EPF	1V, 1MHz	4.7	pF	±0.25pF, ±0.1pF	0.20	±0.02	±0.02	1GHz	123	275	
	C0402NP0509□EPF	1V, 1MHz	5.0	pF	±0.25pF, ±0.1pF	0.20	±0.02	±0.02	1GHz	143	223	
	C0402NP0569□EPF	1V, 1MHz	5.6	pF	±0.5pF, ±0.25pF, ±0.1pF	0.20	±0.02	±0.02	1GHz	167	170	
	C0402NP0609□EPF	1V, 1MHz	6.0	pF	±0.5pF, ±0.25pF, ±0.1pF	0.20	±0.02	±0.02	1GHz	156	170	
	C0402NP0629□EPF	1V, 1MHz	6.2	pF	±0.5pF, ±0.25pF, ±0.1pF	0.20	±0.02	±0.02	1GHz	151	170	
	C0402NP0689□EPF	1V, 1MHz	6.8	pF	±0.5pF, ±0.25pF, ±0.1pF	0.20	±0.02	±0.02	1GHz	138	170	
	C0402NP0709□EPF	1V, 1MHz	7.0	pF	±0.5pF, ±0.25pF, ±0.1pF	0.20	±0.02	±0.02	1GHz	134	170	
	C0402NP0759□EPF	1V, 1MHz	7.5	pF	±0.5pF, ±0.25pF, ±0.1pF	0.20	±0.02	±0.02	1GHz	125	170	
	C0402NP0829□EPF	1V, 1MHz	8.2	pF	±0.5pF, ±0.25pF, ±0.1pF	0.20	±0.02	±0.02	1GHz	114	170	
	C0402NP0919□EPF	1V, 1MHz	9.1	pF	±0.5pF, ±0.25pF, ±0.1pF	0.20	±0.02	±0.02	1GHz	103	170	
	C0402NP0100□EPF	1V, 1MHz	10	pF	±5%, ±2%	0.20	±0.02	±0.02	1GHz	94	170	
	C0402NP0120□EPF	1V, 1MHz	12	pF	±5%, ±2%	0.20	±0.02	±0.02	1GHz	98	135	
	C0402NP0150□EPF	1V, 1MHz	15	pF	±5%, ±2%	0.20	±0.02	±0.02	1GHz	79	135	
	C0402NP0180□EPF	1V, 1MHz	18	pF	±5%, ±2%	0.20	±0.02	±0.02	1GHz	65	135	
	C0402NP0200□EPF	1V, 1MHz	20	pF	±5%, ±2%	0.20	±0.02	±0.02	1GHz	59	135	
	C0402NP0220□EPF	1V, 1MHz	22	pF	±5%, ±2%	0.20	±0.02	±0.02	1GHz	54	135	

- C0603NP0_F Series (EIA0201)

RV	DARFON P/N	Measuring Condition	Capacitance		Available Tolerance	Thick. (mm)	Tolerance(mm)		Testing Freq	ESR(1GHz) mΩ (max.)	Q(1GHz) (min.)	Standard Packing
			Value	Unit			L/W	Thick.				
50V	C0603NP0208□GTF	1V, 1MHz	0.2	pF	±0.25pF,±0.1pF, ±0.05pF	0.30	±0.03	±0.03	1GHz	1895	420	Paper, 15Kpcs
	C0603NP0308□GTF	1V, 1MHz	0.3	pF	±0.25pF,±0.1pF, ±0.05pF	0.30	±0.03	±0.03	1GHz	1263	420	
	C0603NP0408□GTF	1V, 1MHz	0.4	pF	±0.25pF,±0.1pF, ±0.05pF	0.30	±0.03	±0.03	1GHz	947	420	
	C0603NP0508□GTF	1V, 1MHz	0.5	pF	±0.25pF,±0.1pF, ±0.05pF	0.30	±0.03	±0.03	1GHz	758	420	
	C0603NP0608□GTF	1V, 1MHz	0.6	pF	±0.25pF,±0.1pF, ±0.05pF	0.30	±0.03	±0.03	1GHz	632	420	
	C0603NP0708□GTF	1V, 1MHz	0.7	pF	±0.25pF,±0.1pF, ±0.05pF	0.30	±0.03	±0.03	1GHz	541	420	
	C0603NP0758□GTF	1V, 1MHz	0.75	pF	±0.25pF,±0.1pF, ±0.05pF	0.30	±0.03	±0.03	1GHz	505	420	
	C0603NP0808□GTF	1V, 1MHz	0.8	pF	±0.25pF,±0.1pF, ±0.05pF	0.30	±0.03	±0.03	1GHz	474	420	
	C0603NP0908□GTF	1V, 1MHz	0.9	pF	±0.25pF,±0.1pF, ±0.05pF	0.30	±0.03	±0.03	1GHz	421	420	
	C0603NP0109□GTF	1V, 1MHz	1.0	pF	±0.25pF, ±0.1pF,±0.05pF	0.30	±0.03	±0.03	1GHz	379	420	
	C0603NP0119□GTF	1V, 1MHz	1.1	pF	±0.25pF, ±0.1pF,±0.05pF	0.30	±0.03	±0.03	1GHz	413	350	
	C0603NP0129□GTF	1V, 1MHz	1.2	pF	±0.25pF, ±0.1pF,±0.05pF	0.30	±0.03	±0.03	1GHz	379	350	
	C0603NP0139□GTF	1V, 1MHz	1.3	pF	±0.25pF, ±0.1pF,±0.05pF	0.30	±0.03	±0.03	1GHz	350	350	
	C0603NP0149□GTF	1V, 1MHz	1.4	pF	±0.25pF, ±0.1pF,±0.05pF	0.30	±0.03	±0.03	1GHz	325	350	
	C0603NP0159□GTF	1V, 1MHz	1.5	pF	±0.25pF, ±0.1pF,±0.05pF	0.30	±0.03	±0.03	1GHz	303	350	
	C0603NP0169□GTF	1V, 1MHz	1.6	pF	±0.25pF, ±0.1pF,±0.05pF	0.30	±0.03	±0.03	1GHz	284	350	
	C0603NP0189□GTF	1V, 1MHz	1.8	pF	±0.25pF, ±0.1pF,±0.05pF	0.30	±0.03	±0.03	1GHz	253	350	
	C0603NP0209□GTF	1V, 1MHz	2.0	pF	±0.25pF, ±0.1pF,±0.05pF	0.30	±0.03	±0.03	1GHz	265	300	
	C0603NP0229□GTF	1V, 1MHz	2.2	pF	±0.25pF, ±0.1pF,±0.05pF	0.30	±0.03	±0.03	1GHz	241	300	
	C0603NP0249□GTF	1V, 1MHz	2.4	pF	±0.25pF, ±0.1pF	0.30	±0.03	±0.03	1GHz	221	300	
	C0603NP0259□GTF	1V, 1MHz	2.5	pF	±0.25pF, ±0.1pF	0.30	±0.03	±0.03	1GHz	212	300	
	C0603NP0279□GTF	1V, 1MHz	2.7	pF	±0.25pF, ±0.1pF	0.30	±0.03	±0.03	1GHz	196	300	
	C0603NP0309□GTF	1V, 1MHz	3.0	pF	±0.25pF, ±0.1pF	0.30	±0.03	±0.03	1GHz	221	240	
	C0603NP0339□GTF	1V, 1MHz	3.3	pF	±0.25pF, ±0.1pF	0.30	±0.03	±0.03	1GHz	201	240	
	C0603NP0369□GTF	1V, 1MHz	3.6	pF	±0.25pF, ±0.1pF	0.30	±0.03	±0.03	1GHz	184	240	
	C0603NP0399□GTF	1V, 1MHz	3.9	pF	±0.25pF, ±0.1pF	0.30	±0.03	±0.03	1GHz	170	240	
	C0603NP0439□GTF	1V, 1MHz	4.3	pF	±0.25pF, ±0.1pF	0.30	±0.03	±0.03	1GHz	154	240	

DARFON

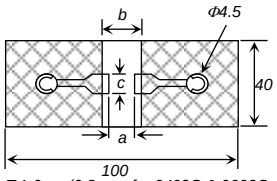
RV	DARFON P/N	Measuring Condition	Capacitance Value	Capacitance Unit	Available Tolerance	Thick. (mm)	Tolerance(mm) L/W	Tolerance(mm) Thick.	Testing Freq	ESR(1GHz) mΩ (max.)	Q(1GHz) (min.)	Standard Packing
50V	C0603NP0479□GTF	1V, 1MHz	4.7	pF	±0.25pF, ±0.1pF	0.30	±0.03	±0.03	1GHz	141	240	
	C0603NP0509□GTF	1V, 1MHz	5.0	pF	±0.5pF, ±0.25pF, ±0.1pF	0.30	±0.03	±0.03	1GHz	147	216	
	C0603NP0519□GTF	1V, 1MHz	5.1	pF	±0.5pF, ±0.25pF, ±0.1pF	0.30	±0.03	±0.03	1GHz	144	216	
	C0603NP0569□GTF	1V, 1MHz	5.6	pF	±0.5pF, ±0.25pF, ±0.1pF	0.30	±0.03	±0.03	1GHz	132	216	
	C0603NP0609□GTF	1V, 1MHz	6.0	pF	±0.5pF, ±0.25pF, ±0.1pF	0.30	±0.03	±0.03	1GHz	123	216	
	C0603NP0629□GTF	1V, 1MHz	6.2	pF	±0.5pF, ±0.25pF, ±0.1pF	0.30	±0.03	±0.03	1GHz	119	216	
	C0603NP0689□GTF	1V, 1MHz	6.8	pF	±0.5pF, ±0.25pF, ±0.1pF	0.30	±0.03	±0.03	1GHz	108	216	
	C0603NP0709□GTF	1V, 1MHz	7.0	pF	±0.5pF, ±0.25pF, ±0.1pF	0.30	±0.03	±0.03	1GHz	158	144	
	C0603NP0759□GTF	1V, 1MHz	7.5	pF	±0.5pF, ±0.25pF, ±0.1pF	0.30	±0.03	±0.03	1GHz	147	144	
	C0603NP0809□GTF	1V, 1MHz	8.0	pF	±0.5pF, ±0.25pF, ±0.1pF	0.30	±0.03	±0.03	1GHz	138	144	
	C0603NP0829□GTF	1V, 1MHz	8.2	pF	±0.5pF, ±0.25pF, ±0.1pF	0.30	±0.03	±0.03	1GHz	135	144	
	C0603NP0919□GTF	1V, 1MHz	9.1	pF	±0.5pF, ±0.25pF, ±0.1pF	0.30	±0.03	±0.03	1GHz	121	144	
	C0603NP0100□GTF	1V, 1MHz	10	pF	±5%, ±2%	0.30	±0.03	±0.03	1GHz	111	144	
	C0603NP0110□GTF	1V, 1MHz	11	pF	±5%, ±2%	0.30	±0.03	±0.03	1GHz	115	126	
	C0603NP0120□GTF	1V, 1MHz	12	pF	±5%, ±2%	0.30	±0.03	±0.03	1GHz	123	108	
	C0603NP0130□GTF	1V, 1MHz	13	pF	±5%, ±2%	0.30	±0.03	±0.03	1GHz	128	96	
	C0603NP0150□GTF	1V, 1MHz	15	pF	±5%, ±2%, ±1%	0.30	±0.03	±0.03	1GHz	126	84	
	C0603NP0160□GTF	1V, 1MHz	16	pF	±5%, ±2%	0.30	±0.03	±0.03	1GHz	138	72	
	C0603NP0180□GTF	1V, 1MHz	18	pF	±5%, ±2%	0.30	±0.03	±0.03	1GHz	123	72	
	C0603NP0200□GTF	1V, 1MHz	20	pF	±5%, ±2%	0.30	±0.03	±0.03	1GHz	159	50	
	C0603NP0220□GTF	1V, 1MHz	22	pF	±5%, ±2%	0.30	±0.03	±0.03	1GHz	181	40	
25V	C0603NP0208□FTF	1V, 1MHz	0.2	pF	±0.25pF,±0.1pF, ±0.05pF	0.30	±0.03	±0.03	1GHz	1895	420	Paper, 15Kpcs
	C0603NP0308□FTF	1V, 1MHz	0.3	pF	±0.25pF,±0.1pF, ±0.05pF	0.30	±0.03	±0.03	1GHz	1263	420	
	C0603NP0408□FTF	1V, 1MHz	0.4	pF	±0.25pF,±0.1pF, ±0.05pF	0.30	±0.03	±0.03	1GHz	947	420	
	C0603NP0508□FTF	1V, 1MHz	0.5	pF	±0.25pF,±0.1pF, ±0.05pF	0.30	±0.03	±0.03	1GHz	758	420	
	C0603NP0608□FTF	1V, 1MHz	0.6	pF	±0.25pF,±0.1pF, ±0.05pF	0.30	±0.03	±0.03	1GHz	632	420	
	C0603NP0708□FTF	1V, 1MHz	0.70	pF	±0.25pF,±0.1pF, ±0.05pF	0.30	±0.03	±0.03	1GHz	541	420	
	C0603NP0758□FTF	1V, 1MHz	0.75	pF	±0.25pF,±0.1pF, ±0.05pF	0.30	±0.03	±0.03	1GHz	505	420	
	C0603NP0808□FTF	1V, 1MHz	0.8	pF	±0.25pF,±0.1pF, ±0.05pF	0.30	±0.03	±0.03	1GHz	474	420	
	C0603NP0908□FTF	1V, 1MHz	0.9	pF	±0.25pF,±0.1pF, ±0.05pF	0.30	±0.03	±0.03	1GHz	421	420	
	C0603NP0109□FTF	1V, 1MHz	1.0	pF	±0.25pF, ±0.1pF,±0.05pF	0.30	±0.03	±0.03	1GHz	379	420	
	C0603NP0119□FTF	1V, 1MHz	1.1	pF	±0.25pF, ±0.1pF,±0.05pF	0.30	±0.03	±0.03	1GHz	413	350	
	C0603NP0129□FTF	1V, 1MHz	1.2	pF	±0.25pF, ±0.1pF,±0.05pF	0.30	±0.03	±0.03	1GHz	379	350	
	C0603NP0139□FTF	1V, 1MHz	1.3	pF	±0.25pF, ±0.1pF,±0.05pF	0.30	±0.03	±0.03	1GHz	350	350	
	C0603NP0149□FTF	1V, 1MHz	1.4	pF	±0.25pF, ±0.1pF,±0.05pF	0.30	±0.03	±0.03	1GHz	325	350	
	C0603NP0159□FTF	1V, 1MHz	1.5	pF	±0.25pF, ±0.1pF,±0.05pF	0.30	±0.03	±0.03	1GHz	303	350	
	C0603NP0169□FTF	1V, 1MHz	1.6	pF	±0.25pF, ±0.1pF,±0.05pF	0.30	±0.03	±0.03	1GHz	284	350	
	C0603NP0189□FTF	1V, 1MHz	1.8	pF	±0.25pF, ±0.1pF,±0.05pF	0.30	±0.03	±0.03	1GHz	253	350	
	C0603NP0209□FTF	1V, 1MHz	2.0	pF	±0.25pF, ±0.1pF,±0.05pF	0.30	±0.03	±0.03	1GHz	265	300	
	C0603NP0229□FTF	1V, 1MHz	2.2	pF	±0.25pF, ±0.1pF,±0.05pF	0.30	±0.03	±0.03	1GHz	241	300	
	C0603NP0249□FTF	1V, 1MHz	2.4	pF	±0.25pF, ±0.1pF	0.30	±0.03	±0.03	1GHz	221	300	
	C0603NP0259□FTF	1V, 1MHz	2.5	pF	±0.25pF, ±0.1pF	0.30	±0.03	±0.03	1GHz	212	300	
	C0603NP0279□FTF	1V, 1MHz	2.7	pF	±0.25pF, ±0.1pF	0.30	±0.03	±0.03	1GHz	196	300	
	C0603NP0309□FTF	1V, 1MHz	3.0	pF	±0.25pF, ±0.1pF	0.30	±0.03	±0.03	1GHz	221	240	
	C0603NP0339□FTF	1V, 1MHz	3.3	pF	±0.25pF, ±0.1pF	0.30	±0.03	±0.03	1GHz	201	240	
	C0603NP0369□FTF	1V, 1MHz	3.6	pF	±0.25pF, ±0.1pF	0.30	±0.03	±0.03	1GHz	184	240	
	C0603NP0399□FTF	1V, 1MHz	3.9	pF	±0.25pF, ±0.1pF	0.30	±0.03	±0.03	1GHz	170	240	
	C0603NP0409□FTF	1V, 1MHz	4.0	pF	±0.25pF, ±0.1pF,±0.05pF	0.30	±0.03	±0.03	1GHz	166	240	
	C0603NP0439□FTF	1V, 1MHz	4.3	pF	±0.25pF, ±0.1pF	0.30	±0.03	±0.03	1GHz	154	240	
	C0603NP0479□FTF	1V, 1MHz	4.7	pF	±0.25pF, ±0.1pF	0.30	±0.03	±0.03	1GHz	141	240	
	C0603NP0509□FTF	1V, 1MHz	5.0	pF	±0.5pF, ±0.25pF, ±0.1pF	0.30	±0.03	±0.03	1GHz	147	216	
	C0603NP0569□FTF	1V, 1MHz	5.6	pF	±0.5pF, ±0.25pF, ±0.1pF	0.30	±0.03	±0.03	1GHz	132	216	
	C0603NP0609□FTF	1V, 1MHz	6.0	pF	±0.5pF, ±0.25pF, ±0.1pF	0.30	±0.03	±0.03	1GHz	123	216	
	C0603NP0629□FTF	1V, 1MHz	6.2	pF	±0.5pF, ±0.25pF, ±0.1pF	0.30	±0.03	±0.03	1GHz	119	216	
	C0603NP0689□FTF	1V, 1MHz	6.8	pF	±0.5pF, ±0.25pF, ±0.1pF	0.30	±0.03	±0.03	1GHz	108	216	
	C0603NP0709□FTF	1V, 1MHz	7.0	pF	±0.5pF, ±0.25pF, ±0.1pF	0.30	±0.03	±0.03	1GHz	158	144	
	C0603NP0759□FTF	1V, 1MHz	7.5	pF	±0.5pF, ±0.25pF, ±0.1pF	0.30	±0.03	±0.03	1GHz	147	144	
	C0603NP0809□FTF	1V, 1MHz	8.0	pF	±0.5pF, ±0.25pF, ±0.1pF	0.30	±0.03	±0.03	1GHz	138	144	
	C0603NP0829□FTF	1V, 1MHz	8.2	pF	±0.5pF, ±0.25pF, ±0.1pF	0.30	±0.03	±0.03	1GHz	135	144	
	C0603NP0909□FTF	1V, 1MHz	9.0	pF	±0.5pF, ±0.25pF, ±0.1pF	0.30	±0.03	±0.03	1GHz	123	144	
	C0603NP0919□FTF	1V, 1MHz	9.1	pF	±0.5pF, ±0.25pF, ±0.1pF	0.30	±0.03	±0.03	1GHz	121	144	
	C0603NP0100□FTF	1V, 1MHz	10	pF	±5%, ±2%	0.30	±0.03	±0.03	1GHz	111	144	
	C0603NP0120□FTF	1V, 1MHz	12	pF	±5%, ±2%	0.30	±0.03	±0.03	1GHz	123	108	
	C0603NP0130□FTF	1V, 1MHz	13	pF	±5%, ±2%	0.30	±0.03	±0.03	1GHz	128	96	
	C0603NP0150□FTF	1V, 1MHz	15	pF	±5%, ±2%	0.30	±0.03	±0.03	1GHz	126	84	
	C0603NP0160□FTF	1V, 1MHz	16	pF	±5%, ±2%	0.30	±0.03	±0.03	1GHz	138	72	
	C0603NP0180□FTF	1V, 1MHz	18	pF	±5%, ±2%, ±1%	0.30	±0.03	±0.03	1GHz	123	72	
	C0603NP0200□FTF	1V, 1MHz	20	pF	±5%, ±2%	0.30	±0.03	±0.03	1GHz	159	50	
	C0603NP0220□FTF	1V, 1MHz	22	pF	±5%, ±2%	0.30	±0.03	±0.03	1GHz	181	40	
	C0603NP0240□FTF	1V, 1MHz	24	pF	±5%, ±2%	0.30	±0.03	±0.03	500MHz	166	40	
	C0603NP0270□FTF	1V, 1MHz	27	pF	±5%, ±2%	0.30	±0.03	±0.03	500MHz	196	30	
	C0603NP0330□FTF	1V, 1MHz	33	pF	±5%, ±2%	0.30	±0.03	±0.03	500MHz	241	20	
6.3V	C0603NP0220JCTF	1V, 1MHz	22	pF	±5%	0.30	±0.03	±0.03	1GHz	181	40	Paper, 15Kpcs
	C0603NP0270□CTF	1V, 1MHz	27	pF	±5%, ±2%	0.30	±0.03	±0.03	500MHz	196	30	

C1005NP0_F Series (EIA0402)

RV	DARFON P/N	Measuring Condition	Capacitance Value	Capacitance Unit	Available Tolerance	Thick. (mm)	Tolerance(mm) L/W	Tolerance(mm) Thick.	Testing Freq	ESR(1GHz) mΩ (max.)	Q(1GHz) (min.)	Standard Packing
200V	C1005NP0208□JTF	1V, 1MHz	0.2	pF	±0.25pF,±0.1pF	0.50	±0.05	±0.05	1GHz	2411	330	Paper, 10Kpcs
	C1005NP0109□JTF	1V, 1MHz	1.0	pF	±0.25pF,±0.1pF,±0.05pF	0.50	±0.05	±0.05	1GHz	482	330	
	C1005NP0129□JTF	1V, 1MHz	1.2	pF	±0.25pF, ±0.1pF	0.50	±0.05	±0.05	1GHz	482	275	
	C1005NP0159□JTF	1V, 1MHz	1.5	pF	±0.25pF, ±0.1pF	0.50	±0.05	±0.05	1GHz	386	275	
	C1005NP0189□JTF	1V, 1MHz	1.8	pF	±0.25pF, ±0.1pF	0.50	±0.05	±0.05	1GHz	322	275	
	C1005NP0229□JTF	1V, 1MHz	2.2	pF	±0.25pF, ±0.1pF	0.50	±0.05	±0.05	1GHz	329	220	
	C1005NP0279□JTF	1V, 1MHz	2.7	pF	±0.25pF, ±0.1pF,±0.05pF	0.50	±0.05	±0.05	1GHz	268	220	
	C1005NP0339□JTF	1V, 1MHz	3.3	pF	±0.25pF, ±0.1pF,±0.05pF	0.50	±0.05	±0.05	1GHz	219	220	
	C1005NP0399□JTF	1V, 1MHz	3.9	pF	±0.25pF, ±0.1pF,±0.05pF	0.50	±0.05	±0.05	1GHz	206	198	
	C1005NP0479□JTF	1V, 1MHz	4.7	pF	±0.25pF, ±0.1pF,±0.05pF	0.50	±0.05	±0.05	1GHz	171	198	
	C1005NP0569□JTF	1V, 1MHz	5.6	pF	±0.5pF, ±0.25pF, ±0.1pF	0.50	±0.05	±0.05	1GHz	172	165	
	C1005NP0689□JTF	1V, 1MHz	6.8	pF	±0.5pF, ±0.25pF, ±0.1pF	0.50	±0.05	±0.05	1GHz	142	165	
	C1005NP0829□JTF	1V, 1MHz	8.2	pF	±0.5pF, ±0.25pF, ±0.1pF	0.50	±0.05	±0.05	1GHz	176	110	
	C1005NP0100□JTF	1V, 1MHz	10	pF	±5%, ±2%, ±1%	0.50	±0.05	±0.05	1GHz	181	88	
100V	C1005NP0608□HTF	1V, 1MHz	0.60	pF	±0.25pF,±0.1pF,±0.05pF	0.50	±0.05	±0.05	1GHz	804	330	Paper, 10Kpcs
50V	C1005NP0208□GTF	1V, 1MHz	0.20	pF	±0.25pF,±0.1pF	0.50	±0.05	±0.05	1GHz	2411	330	Paper, 10Kpcs
	C1005NP0308□GTF	1V, 1MHz	0.30	pF	±0.25pF,±0.1pF,±0.05pF	0.50	±0.05	±0.05	1GHz	1608	330	
	C1005NP0408□GTF	1V, 1MHz	0.40	pF	±0.25pF,±0.1pF,±0.05pF	0.50	±0.05	±0.05	1GHz	1206	330	
	C1005NP0508□GTF	1V, 1MHz	0.50	pF	±0.25pF,±0.1pF,±0.05pF	0.50	±0.05	±0.05	1GHz	965	330	
	C1005NP0608□GTF	1V, 1MHz	0.60	pF	±0.25pF,±0.1pF	0.50	±0.05	±0.05	1GHz	804	330	
	C1005NP0708□GTF	1V, 1MHz	0.70	pF	±0.25pF,±0.1pF,±0.05pF	0.50	±0.05	±0.05	1GHz	689	330	
	C1005NP0808□GTF	1V, 1MHz	0.80	pF	±0.25pF,±0.1pF,±0.05pF	0.50	±0.05	±0.05	1GHz	603	330	
	C1005NP0908□GTF	1V, 1MHz	0.90	pF	±0.25pF,±0.1pF	0.50	±0.05	±0.05	1GHz	536	330	
	C1005NP0109□GTF	1V, 1MHz	1.0	pF	±0.25pF,±0.1pF,±0.05pF	0.50	±0.05	±0.05	1GHz	482	330	
	C1005NP0119□GTF	1V, 1MHz	1.1	pF	±0.25pF, ±0.1pF	0.50	±0.05	±0.05	1GHz	526	275	
	C1005NP0129□GTF	1V, 1MHz	1.2	pF	±0.25pF, ±0.1pF	0.50	±0.05	±0.05	1GHz	482	275	
	C1005NP0139□GTF	1V, 1MHz	1.3	pF	±0.25pF,±0.1pF,±0.05pF	0.50	±0.05	±0.05	1GHz	445	275	
	C1005NP0159□GTF	1V, 1MHz	1.5	pF	±0.25pF,±0.1pF,±0.05pF	0.50	±0.05	±0.05	1GHz	386	275	
	C1005NP0169□GTF	1V, 1MHz	1.6	pF	±0.25pF,±0.1pF,±0.05pF	0.50	±0.05	±0.05	1GHz	362	275	
	C1005NP0189□GTF	1V, 1MHz	1.8	pF	±0.25pF, ±0.1pF	0.50	±0.05	±0.05	1GHz	322	275	
	C1005NP0209□GTF	1V, 1MHz	2.0	pF	±0.25pF, ±0.1pF,±0.05pF	0.50	±0.05	±0.05	1GHz	362	220	
	C1005NP0229□GTF	1V, 1MHz	2.2	pF	±0.25pF, ±0.1pF	0.50	±0.05	±0.05	1GHz	329	220	
	C1005NP0249□GTF	1V, 1MHz	2.4	pF	±0.25pF, ±0.1pF,±0.05pF	0.50	±0.05	±0.05	1GHz	301	220	
	C1005NP0279□GTF	1V, 1MHz	2.7	pF	±0.25pF, ±0.1pF,±0.05pF	0.50	±0.05	±0.05	1GHz	268	220	
	C1005NP0289□GTF	1V, 1MHz	2.8	pF	±0.25pF, ±0.1pF	0.50	±0.05	±0.05	1GHz	258	220	
	C1005NP0309□GTF	1V, 1MHz	3.0	pF	±0.25pF, ±0.1pF	0.50	±0.05	±0.05	1GHz	241	220	
	C1005NP0339□GTF	1V, 1MHz	3.3	pF	±0.25pF, ±0.1pF,±0.05pF	0.50	±0.05	±0.05	1GHz	219	220	
	C1005NP0369□GTF	1V, 1MHz	3.6	pF	±0.25pF, ±0.1pF,±0.05pF	0.50	±0.05	±0.05	1GHz	223	198	
	C1005NP0399□GTF	1V, 1MHz	3.9	pF	±0.25pF, ±0.1pF,±0.05pF	0.50	±0.05	±0.05	1GHz	206	198	
	C1005NP0409□GTF	1V, 1MHz	4.0	pF	±0.25pF, ±0.1pF,±0.05pF	0.50	±0.05	±0.05	1GHz	201	198	
	C1005NP0479□GTF	1V, 1MHz	4.7	pF	±0.25pF, ±0.1pF,±0.05pF	0.50	±0.05	±0.05	1GHz	171	198	
	C1005NP0509□GTF	1V, 1MHz	5.0	pF	±0.5pF, ±0.25pF, ±0.1pF	0.50	±0.05	±0.05	1GHz	193	165	
	C1005NP0569□GTF	1V, 1MHz	5.6	pF	±0.5pF, ±0.25pF, ±0.1pF	0.50	±0.05	±0.05	1GHz	172	165	
	C1005NP0609□GTF	1V, 1MHz	6.0	pF	±0.5pF, ±0.25pF, ±0.1pF	0.50	±0.05	±0.05	1GHz	161	165	
	C1005NP0629□GTF	1V, 1MHz	6.2	pF	±0.5pF, ±0.25pF, ±0.1pF	0.50	±0.05	±0.05	1GHz	156	165	
	C1005NP0689□GTF	1V, 1MHz	6.8	pF	±0.5pF, ±0.25pF, ±0.1pF	0.50	±0.05	±0.05	1GHz	142	165	
	C1005NP0709□GTF	1V, 1MHz	7.0	pF	±0.5pF, ±0.25pF, ±0.1pF	0.50	±0.05	±0.05	1GHz	165	138	
	C1005NP0759□GTF	1V, 1MHz	7.5	pF	±0.5pF, ±0.25pF, ±0.1pF	0.50	±0.05	±0.05	1GHz	154	138	
	C1005NP0809□GTF	1V, 1MHz	8.0	pF	±0.5pF, ±0.25pF, ±0.1pF	0.50	±0.05	±0.05	1GHz	181	110	
	C1005NP0829□GTF	1V, 1MHz	8.2	pF	±0.5pF, ±0.25pF, ±0.1pF	0.50	±0.05	±0.05	1GHz	176	110	
	C1005NP0909□GTF	1V, 1MHz	9.0	pF	±0.5pF, ±0.25pF, ±0.1pF	0.50	±0.05	±0.05	1GHz	161	110	
	C1005NP0919□GTF	1V, 1MHz	9.1	pF	±0.5pF, ±0.25pF, ±0.1pF	0.50	±0.05	±0.05	1GHz	159	110	
	C1005NP0100□GTF	1V, 1MHz	10	pF	±5%, ±2%, ±1%	0.50	±0.05	±0.05	1GHz	181	88	
	C1005NP0120□GTF	1V, 1MHz	12	pF	±5%, ±2%	0.50	±0.05	±0.05	1GHz	201	66	
	C1005NP0150□GTF	1V, 1MHz	15	pF	±5%, ±2%, ±1%	0.50	±0.05	±0.05	1GHz	241	44	
	C1005NP0160□GTF	1V, 1MHz	16	pF	±5%, ±2%	0.50	±0.05	±0.05	1GHz	255	39	
	C1005NP0180□GTF	1V, 1MHz	18	pF	±5%, ±2%	0.50	±0.05	±0.05	1GHz	268	33	
	C1005NP0200□GTF	1V, 1MHz	20	pF	±5%, ±2%, ±1%	0.50	±0.05	±0.05	1GHz	332	24	
	C1005NP0220□GTF	1V, 1MHz	22	pF	±5%, ±2%	0.50	±0.05	±0.05	1GHz	301	24	
	C1005NP0240□GTF	1V, 1MHz	24	pF	±5%, ±2%	0.50	±0.05	±0.05	1GHz	276	24	
	C1005NP0270□GTF	1V, 1MHz	27	pF	±5%, ±2%	0.50	±0.05	±0.05	1GHz	246	24	
	C1005NP0300□GTF	1V, 1MHz	30	pF	±5%, ±2%, ±1%	0.50	±0.05	±0.05	1GHz	253	21	
	C1005NP0330□GTF	1V, 1MHz	33	pF	±5%, ±2%, ±1%	0.50	±0.05	±0.05	1GHz	254	19	
	C1005NP0390□GTF	1V, 1MHz	39	pF	±5%, ±2%	0.50	±0.05	±0.05	1GHz	255	16	
	C1005NP0470□GTF	1V, 1MHz	47	pF	±5%, ±2%	0.50	±0.05	±0.05	1GHz	242	14	
	C1005NP0560□GTF	1V, 1MHz	56	pF	±5%, ±2%	0.50	±0.05	±0.05	1GHz	258	11	
25V	C1005NP0680□FTF	1V, 1MHz	68	pF	±5%, ±2%	0.50	±0.05	±0.05	1GHz	260	9	Paper, 10Kpcs
	C1005NP0820□FTF	1V, 1MHz	82	pF	±5%, ±2%	0.50	±0.05	±0.05	1GHz	243	8	
	C1005NP0101□FTF	1V, 1MHz	100	pF	±5%, ±2%	0.50	±0.05	±0.05	1GHz	265	6	
16V	C1005NP0808□ETF	1V, 1MHz	0.80	pF	±0.1pF,±0.05pF	0.50	±0.05	±0.05	1GHz	603	330	Paper, 10Kpcs

□ 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>No</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 and over.: Q≧1000
30pF and below.: 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)
 

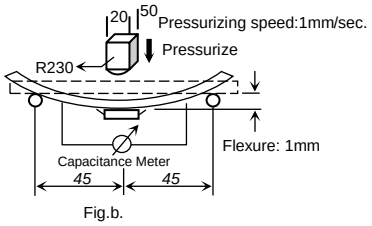
T:1.6mm(0.8 mm for 0402C & 0603C & 1005C size)
Fig. a.
<table><tr><th>Size</th><th>a</th><th>b</th><th>C</th></tr><tr><td>0402</td><td>0.2</td><td>0.56</td><td>0.23</td></tr><tr><td>0603</td><td>0.3</td><td>0.9</td><td>0.3</td></tr><tr><td>1005</td><td>0.4</td><td>1.5</td><td>0.5</td></tr><tr><td>1608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

No	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”

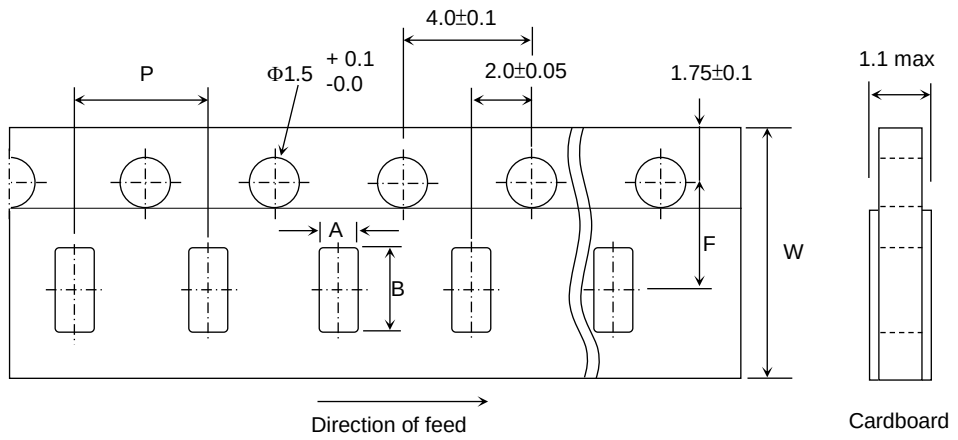
Package

- **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】

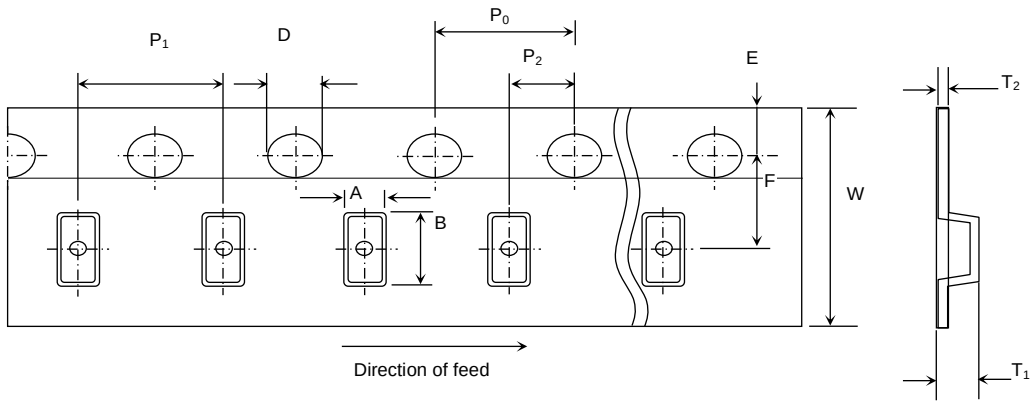
2mm and 4mm pitch tape



SYMBOL	PRODUCT SIZE CODE				UNIT
	0603(0201)		1005(0402)		
	SIZE	TOL.	SIZE	TOL.	
A	0.38	± 0.04	0.65	± 0.10	mm
B	0.68	± 0.04	1.15	± 0.10	mm
F	3.5	± 0.05	3.5	± 0.05	mm
P	2	± 0.10	2	± 0.10	mm
W	8	± 0.20	8	± 0.20	mm

【Embossed tape specifications】

1mm and 4mm and 8mm pitch tape

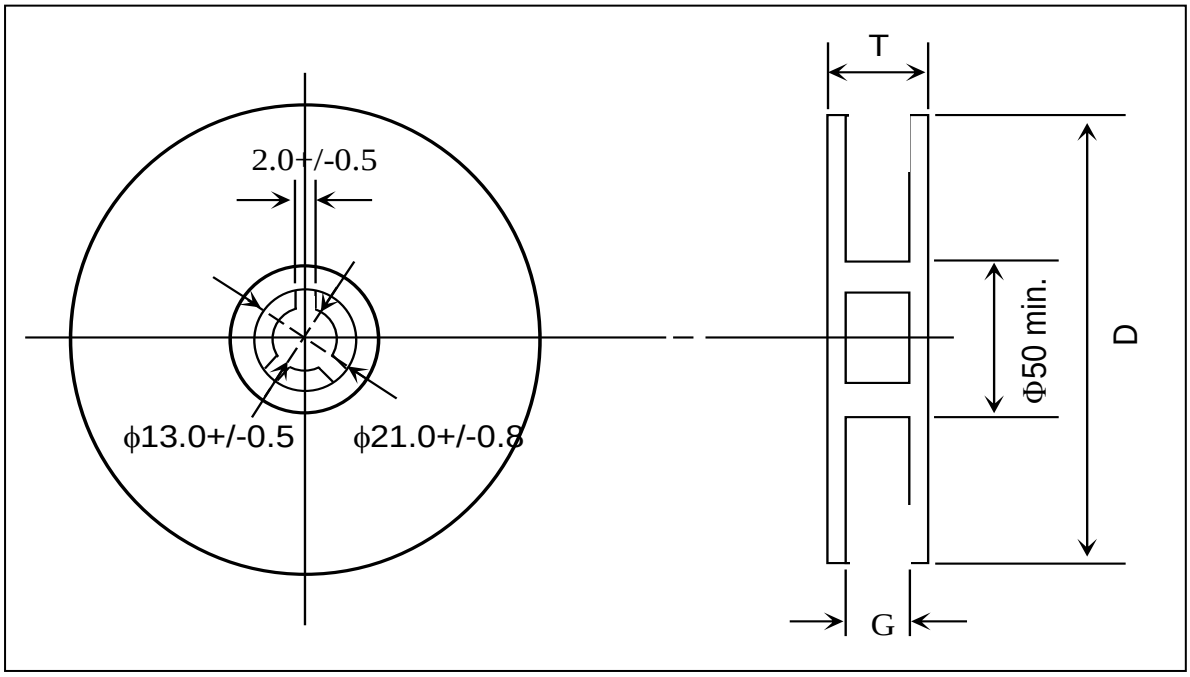


For W= 8mm: T_1=2.5mm max.

For W= 12mm: T_1= 4.5mm

DIMENSION (mm)	PRODUCT SIZE CODE
	1mm tape
	0402 (01005)
P_1	1±0.02
P_O	2±0.04
P_2	1±0.02
A	0.23±0.02
B	0.43±0.02
W	4±0.05
E	0.9±0.05
F	1.8±0.02
D	0.8±0.04
T_1	0.5 max
T_2	0.15~0.40

【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)	--	40K#1	--	--
A	0.30	0603 (0201)	15K	--	50K	--
B	0.50	1005 (0402)	10K	--	50K	--

#1: 4mm width 1mm pitch Embossed Taping

【Packing Rule】

EIA SIZE	Tape	Reel Size	Reels/Box	Boxes/ Carton
01005	Emboss	7”	8	12
0201	Paper	7"	5	12
0402	Paper	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】

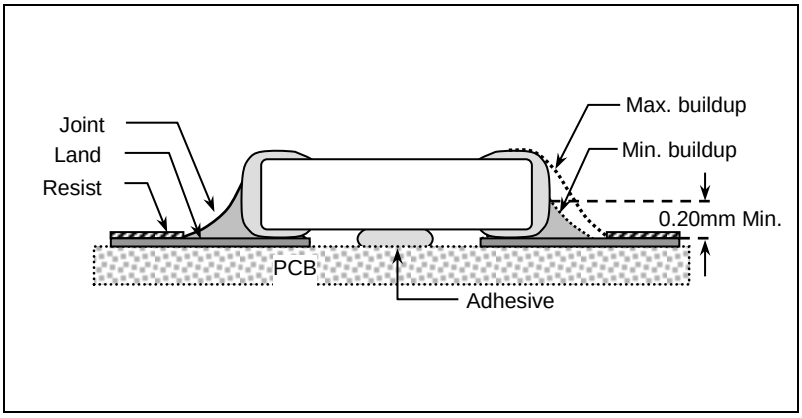
1. An excessive amount of flux or too rapid temperature rise can causes solvent burst, solder can generate a large quantity of gas. The gas can spreads small solder particles to cause solder balling effect or bridging problem.
2. Flux containing too high of a percentage of halide may cause corrosion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

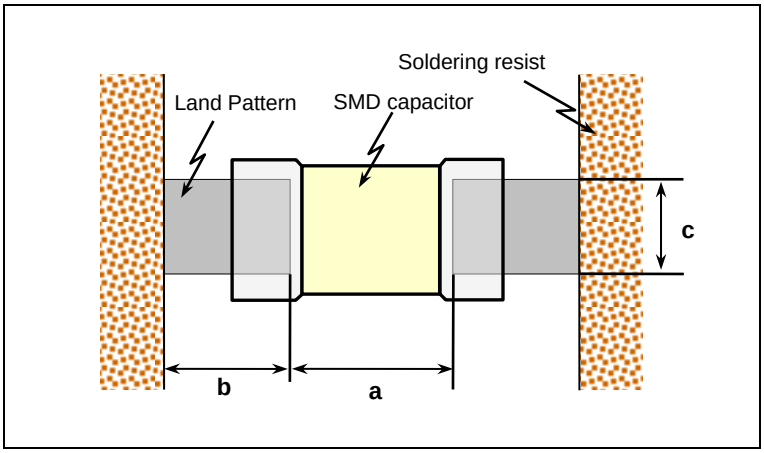
Too much solder amount may increase solder stress and cause crack risk. Insufficient solder amount may reduce adhesive Strength and cause parts falling off PCB. When soldering, confirm that the solder is placed over 0.2mm of the surface of the terminations.



【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.



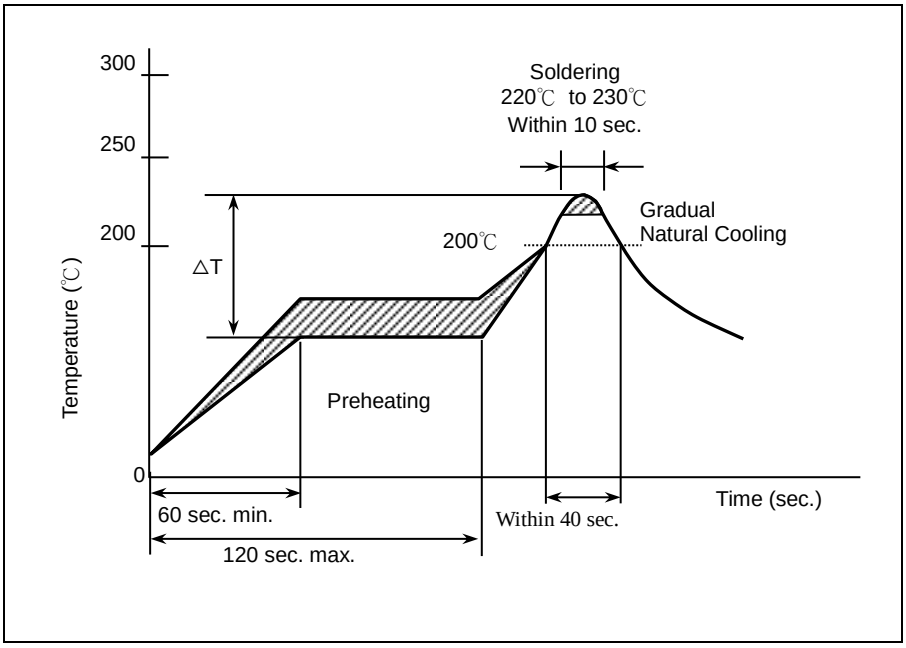
Size mm (EIA)	L x W (mm) (Dimension tolerance)	a (mm)	b (mm)	c (mm)
0402 (01005)	0.4*0.2	0.16 to 0.20	0.12 to 0.18	0.20 to 0.23
0603 (0201)	0.6*0.3	0.15 to 0.35	0.2 to 0.3	0.25 to 0.3
1005 (0402)	1.0*0.5	0.3 to 0.5	0.35 to 0.45	0.4 to 0.5

【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】

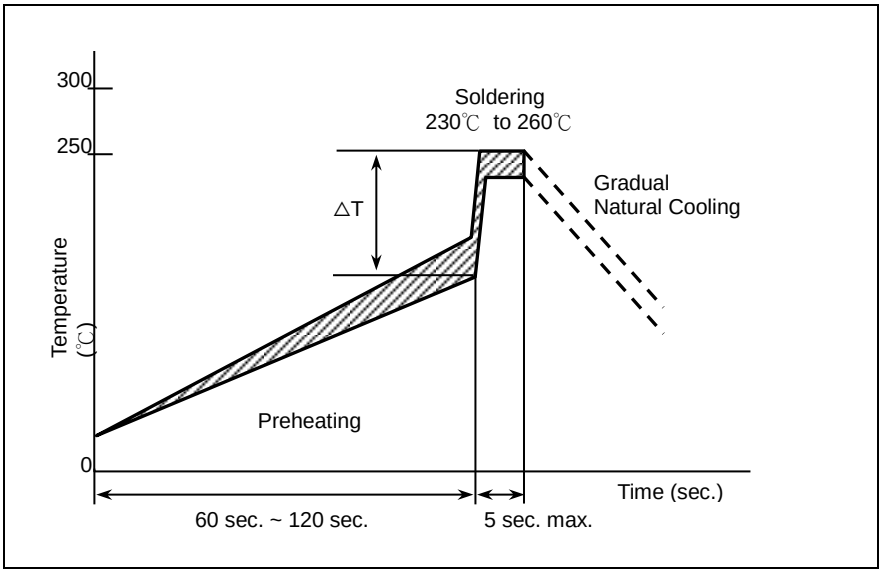
Reflow Soldering



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.

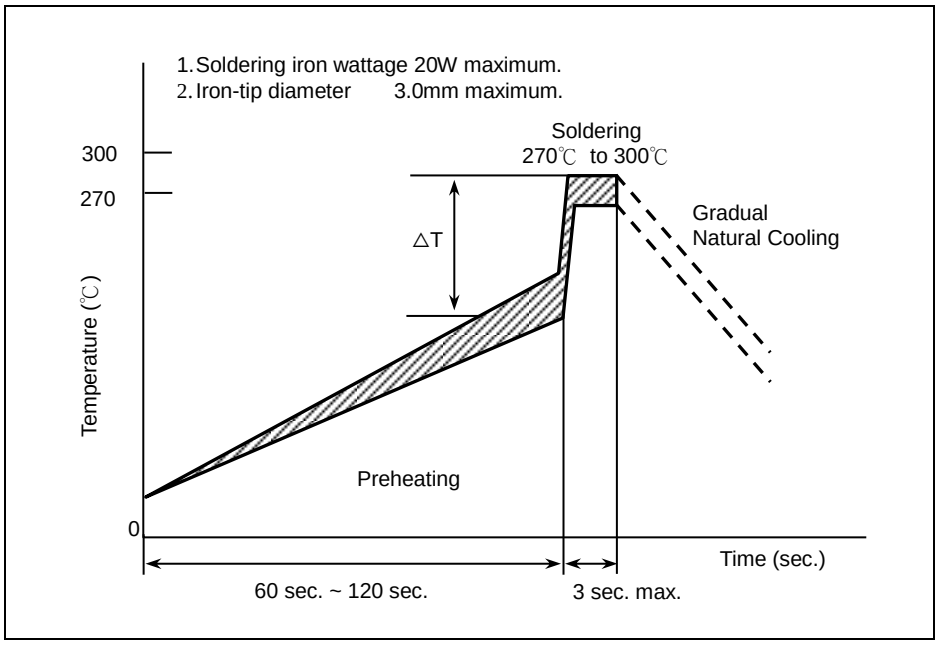
Chip Size	3216 and smaller	3225 and above
Preheating	△T≦150℃	△T≦130℃

Wave Soldering



Chip Size	1608/2012/3216	3225 and above
Preheating	△T≦150℃	-

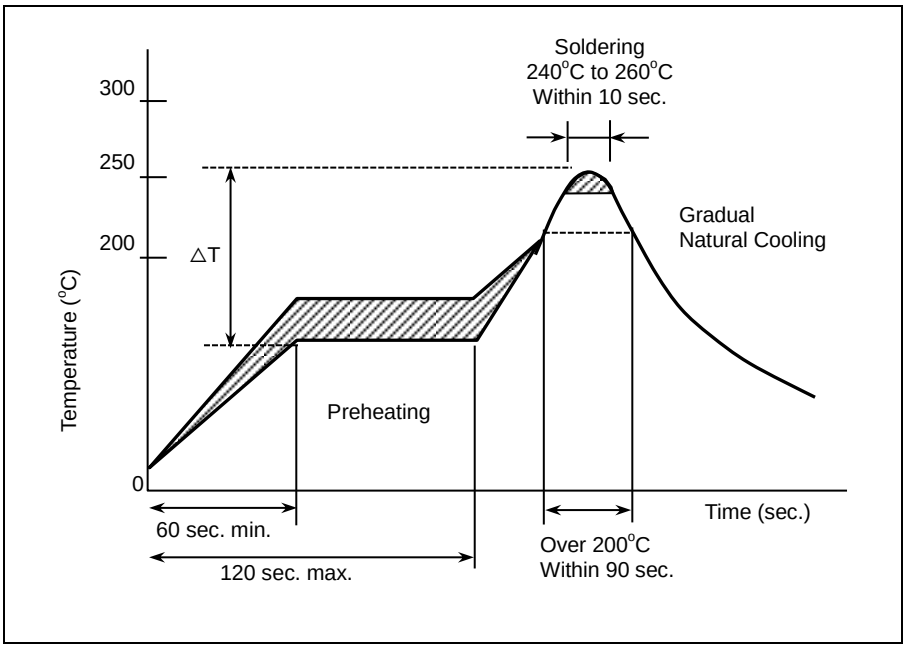
Soldering Iron



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

【Soldering】

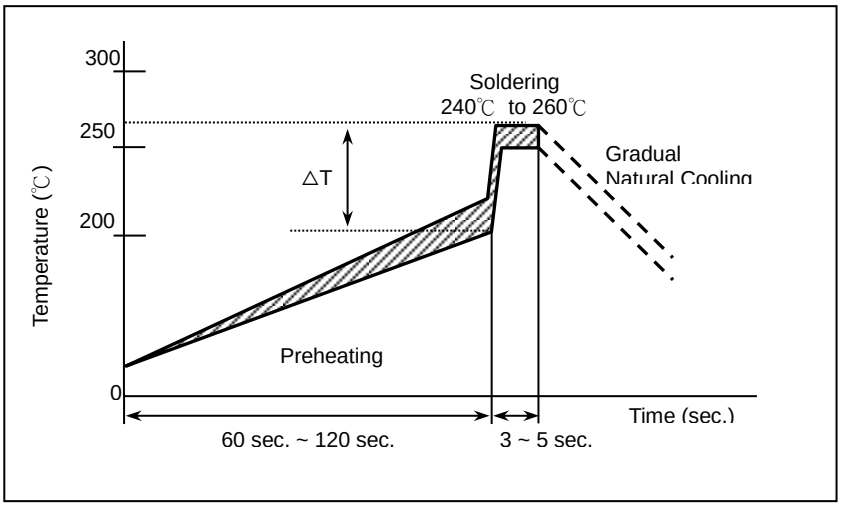
Reflow Soldering for Lead free Termination



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.

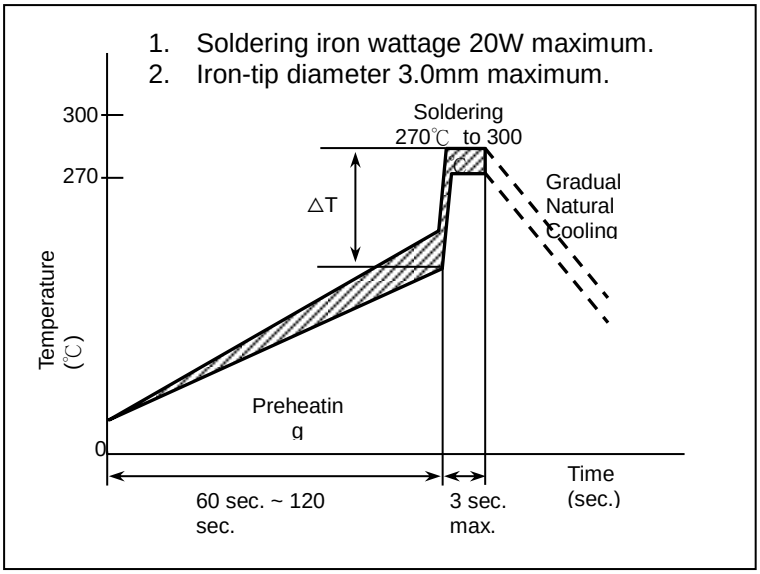
Chip Size	3216 and smaller	3225 and above
Preheating	△T≦150℃	△T≦130℃

Flow Soldering for Lead free Termination



Chip Size	1608/2012/3216	3225 and above
Preheating	△T≦150℃	-

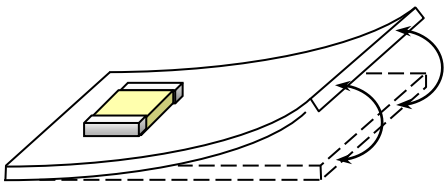
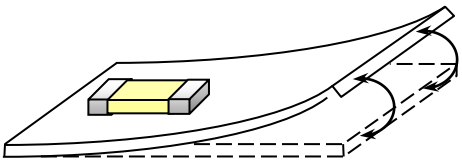
Soldering Iron



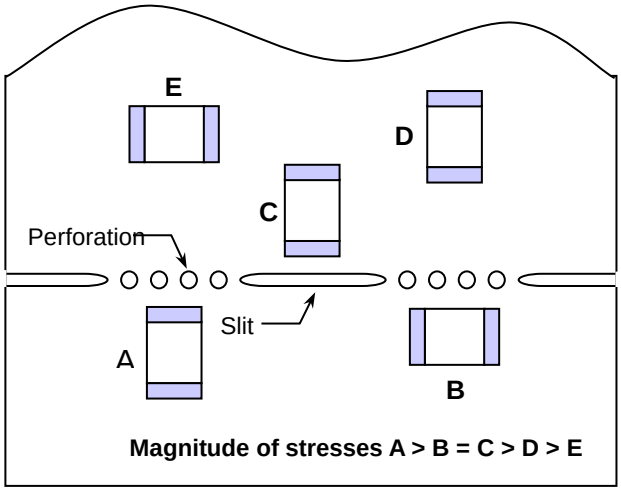
Chip Size	3216 and smaller	3225 and above
Preheating	△T≦190℃	△T≦130℃

【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
	

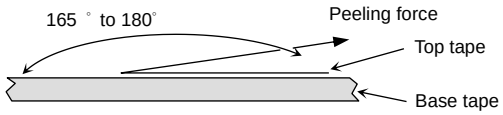
2. When breaking PCB, the layout should be noted that the mechanical stresses are depending on the position of capacitors. The following example shows recommendation for better design.



【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.