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Multilayer Ceramic Chip Capacitors

(C Series)

Features

- A wide selection of sizes: 01005 - 2225
- High capacitance in given case size
- Capacitor with lead-free termination
- RoHS & HALOGEN compliant

Applications

- General digital circuits
- Power supply bypass capacitors
- Consumer electronics
- Telecommunications
- DC to DC converters

Size 01005~2225, C0G/X7R/X7S/X6S/X5R, $U_R \leq 50V$

Product Overview

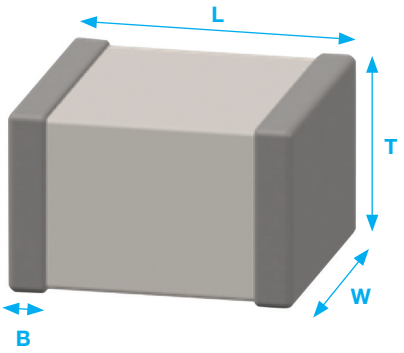
UTC's multilayer ceramic chip capacitors, available in bulk or tape & reel packages, are ideally suited for thick-film hybrid circuits and automatic surface mounting on any printed circuit board. The nickel-barrier terminations consist of a nickel barrier layer over the copper metallization finished by an electroplated solder tin layer to ensure good solderability. The nickel barrier layer in the terminations prevents the dissolution of the termination during extended immersion in molten solder at elevated solder temperatures.

How to Order

C	W	1812	X7R	102	K	W	I	-X
Series	Rated Voltage	Size Inch	Dielectric	Capacitance	Tolerance	Termination	Packaging	Special code
C=MLCC General Type	A=6.3 VDC C=10 VDC E=16 VDC L=25 VDC G=50 VDC	01005 0201 0402 0603 0805 1206 1210 1808 1812 1825 2220 2225	NPO X7R X7S X6S X5R	Two significant digits followed by no. of zeros. And R is in place of decimal point. eg.: 0R5=0.5pF 1R0=1.0pF 100=10x100 =10pF	A=±0.05pF B=±0.1pF C=±0.25pF D=±0.5pF F=±1% G=±2% J=±5% K=±10% M=±20% Z=-20%+80%	W= Cu/Ni/Sn B=Soft termination	T= Tape & Reel	-X

Thickness Description

Code	Description	Code	Description	Code	Description
A	0.60 ± 0.10 mm	I	1.25 ± 0.20 mm	Q	0.50 +0.02/-0.05 mm
B	0.8 + 0.15/-0.10 mm	J	1.15 ± 0.15 mm	R	3.10 ± 0.30 mm
C	1.25 ± 0.10 mm	K	0.50 ± 0.20 mm	S	0.80 ± 0.07 mm
D	1.40 ± 0.15 mm	L	0.30 ± 0.03 mm	T	0.85 ± 0.10 mm
E	1.60 ± 0.20 mm	M	0.95 ± 0.10 mm	U	0.50 ± 0.10 mm
F	2.00 ± 0.20 mm	N	0.50 ± 0.05 mm	V	0.20 ± 0.02 mm
G	2.50 ± 0.30 mm	O	3.50 ± 0.20 mm	X	0.80 ± 0.10 mm
H	2.80 ± 0.30 mm	P	1.60 +0.3/-0.10 mm	Z	0.25 ± 0.03 mm



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Thickness Description

Size Inch (mm)	L (mm)	W (mm)	Code / T (mm)	M_B (mm)
01005(0402)	0.40±0.02	0.20±0.02		0.10±0.03
0201(0603)	0.60±0.03 0.60±0.05 (Cap.≥0.68μF)	0.30±0.03 0.30±0.05 (Cap.≥0.68μF)		0.15±0.05
0402(1005)	1.00±0.10 1.00±0.20#1	0.50±0.10 0.50±0.20#1		0.25 +0.05/-0.10
0603(1608)	1.60±0.15	0.80±0.15		0.40±0.15
0805(2012)	2.00±0.20	1.25±0.20		0.50±0.20
1206(3216)	3.20±0.20 3.20 +0.30/-0.10#2	1.60±0.20 1.60 +0.30/-0.10#2	Reference to Thickness Description	0.60±0.20
1210(3225)	3.20±0.30	2.50±0.30		0.75±0.35
1808(4520)	4.50±0.40	2.00±0.25		0.75±0.35
1812(4532)	4.50±0.40	3.20±0.30		0.75±0.35
1825(4563)	4.50±0.40	6.30±0.40		0.75±0.35
2220(5750)	5.70±0.40	5.00±0.40		0.85±0.35
2225(5763)	5.70±0.40	6.30±0.40		0.85±0.35

#1. For 0402 size K thickness products. | #2. For 1206 size P thickness products.

Dialectric Properties & Electrical Summary

Dielectric	C0G	X7R	X5R	X6S	X7S
Size	01005, 0201, 0402, 0603, 0805, 1206, 1210, 1808, 1812, 1825, 2220, 2225	01005, 0201, 0402, 0603, 0805, 1206, 1210, 1812, 1825, 2220, 2225	01005, 0201, 0402, 0603, 0805, 1206, 1210	0201, 0402, 0603, 0805, 1206, 1210"	0201, 0402, 0603, 0805, 1206, 1210"
Rated voltage (WVDC)	10V, 16V, 25V, 50V	6.3V, 10V, 16V,	6.3V, 10V,	6.3V, 10V,16V, 25V	"6.3V,10V, 16V,25V"
Capacitance range*	0R1 to 100nF	100pF to 47uF	100pF to 220uF	100nF to 100uF	100nF to 100uF
Capacitance tolerance**	B(±0.1pF), C(±0.25pF),D(±0.5pF) F(±1%),G(±2%) J(±5%), K(±10%)	J(±5%), K(±10%), M(±20%)		K(±10%), M(±20%)	
Tan δ*	Cap.<30pF : Q≥400+20C Cap.≥30pF : Q≥1000				
Operating temperature	-55 to +125°C		-55 to +85°C	-55 to +105°C	-55 to +125°C
Capacitance characteristic	±30ppm/°C	±15%		±22%	±22%
Termination	Cu/Ni/Sn (lead-free termination)				

* Measured at the condition of 30~70% related humidity.

C0G : Apply 1.0±0.2Vrms, 1.0MHz±10% for Cap.≤1000pF and 1.0±0.2Vrms, 1.0KHz±10% for Cap.>1000pF, 25°C at ambient temperature. X7R/X5R/X7S/X6S : Apply 1.0±0.2Vrms, 1.0KHz±10%, at 25°C ambient temperature.

** Preconditioning for Class II MLCC : Perform a heat treatment at 150±10°C for 1 hour, then leave in ambient condition for 24±2 hours before measurement.

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Capacitance Range C0G

Cap(pF)	EIA Size Code	01005			0201				0402				0603				0805				1206			
		16V	25V	50V	10V	16V	25V	50V	10V	16V	25V	50V	10V	16V	25V	50V	10V	16V	25V	50V	10V	16V	25V	50V
0.1	0R1				L	L	L	L	N	N	N	N												
0.2	0R2	V	V	V	L	L	L	L	N	N	N	N												
0.3	0R3	V	V	V	L	L	L	L	N	N	N	N	S	S	S	S								
0.4	0R4	V	V	V	L	L	L	L	N	N	N	N	S	S	S	S								
0.5	0R5	V	V	V	L	L	L	L	N	N	N	N	S	S	S	S	A	A	A	A				
0.6	0R6				L	L	L	L	N	N	N	N	S	S	S	S	A	A	A	A				
0.7	0R7				L	L	L	L	N	N	N	N	S	S	S	S	A	A	A	A				
0.8	0R8				L	L	L	L	N	N	N	N	S	S	S	S	A	A	A	A				
0.9	0R9				L	L	L	L	N	N	N	N	S	S	S	S	A	A	A	A				
1.0	1R0	V	V	V	L	L	L	L	N	N	N	N	S	S	S	S	A	A	A	A				X
1.2	1R2				L	L	L	L	N	N	N	N	S	S	S	S	A	A	A	A	X	X	X	X
1.5	1R5	V	V	V	L	L	L	L	N	N	N	N	S	S	S	S	A	A	A	A	X	X	X	X
1.8	1R8				L	L	L	L	N	N	N	N	S	S	S	S	A	A	A	A	X	X	X	X
2.0	2R0	V	V	V																				
2.2	2R2				L	L	L	L	N	N	N	N	S	S	S	S	A	A	A	A	X	X	X	X
2.7	2R7				L	L	L	L	N	N	N	N	S	S	S	S	A	A	A	A	X	X	X	X
3.0	3R0	V	V	V																				
3.3	3R3				L	L	L	L	N	N	N	N	S	S	S	S	A	A	A	A	X	X	X	X
3.9	3R9				L	L	L	L	N	N	N	N	S	S	S	S	A	A	A	A	X	X	X	X
4.0	4R0	V	V	V																				
4.7	4R7				L	L	L	L	N	N	N	N	S	S	S	S	A	A	A	A	X	X	X	X
5.0	5R0	V	V	V																				
5.6	5R6				L	L	L	L	N	N	N	N	S	S	S	S	A	A	A	A	X	X	X	X
6.0	6R0	V	V	V																				
6.8	6R8				L	L	L	L	N	N	N	N	S	S	S	S	A	A	A	A	X	X	X	X
7.0	7R0	V	V	V																				
8.0	8R0	V	V	V																				
8.2	8R2				L	L	L	L	N	N	N	N	S	S	S	S	A	A	A	A	X	X	X	X
9.0	9R0	V	V	V																				
10	100	V	V	V	L	L	L	L	N	N	N	N	S	S	S	S	A	A	A	A	X	X	X	X
12	120	V	V	V	L	L	L	L	N	N	N	N	S	S	S	S	A	A	A	A	X	X	X	X
15	150	V	V	V	L	L	L	L	N	N	N	N	S	S	S	S	A	A	A	A	X	X	X	X
18	180	V	V	V	L	L	L	L	N	N	N	N	S	S	S	S	A	A	A	A	X	X	X	X
22	220	V	V	V	L	L	L	L	N	N	N	N	S	S	S	S	A	A	A	A	X	X	X	X
27	270	V	V	V	L	L	L	L	N	N	N	N	S	S	S	S	A	A	A	A	X	X	X	X
33	330	V	V	V	L	L	L	L	N	N	N	N	S	S	S	S	A	A	A	A	X	X	X	X
39	390	V	V	V	L	L	L	L	N	N	N	N	S	S	S	S	A	A	A	A	X	X	X	X
47	470	V	V	V	L	L	L	L	N	N	N	N	S	S	S	S	A	A	A	A	X	X	X	X
56	560	V	V	V	L	L	L	L	N	N	N	N	S	S	S	S	A	A	A	A	X	X	X	X
68	680	V	V	V	L	L	L	L	N	N	N	N	S	S	S	S	A	A	A	A	X	X	X	X
82	820	V	V	V	L	L	L	L	N	N	N	N	S	S	S	S	A	A	A	A	X	X	X	X
100	101	V	V	V	L	L	L	L	N	N	N	N	S	S	S	S	A	A	A	A	X	X	X	X
120	121	V	V		L	L	L	L	N	N	N	N	S	S	S	S	A	A	A	A	X	X	X	X
150	151	V	V		L	L	L	L	N	N	N	N	S	S	S	S	A	A	A	A	X	X	X	X
180	181	V	V		L	L	L	L	N	N	N	N	S	S	S	S	A	A	A	A	X	X	X	X
220	221	V	V		L	L	L	L	N	N	N	N	S	S	S	S	A	A	A	A	X	X	X	X
270	271						L		N	N	N	N	S	S	S	S	A	A	A	A	X	X	X	X
330	331								N	N	N	N	S	S	S	S	A	A	A	A	X	X	X	X
390	391						L		N	N	N	N	S	S	S	S	X	X	X	X	X	X	X	X
470	471						L		N	N	N	N	S	S	S	S	X	X	X	X	X	X	X	X
560	561								N	N	N	N	S	S	S	S	X	X	X	X	X	X	X	X
680	681								N	N	N	N	S	S	S	S	X	X	X	X	X	X	X	X
820	821								N	N	N	N	S	S	S	S	X	X	X	X	X	X	X	X
1000	102								N	N	N	N	S	S	S	S	X	X	X	X	X	X	X	X
1200	122												B	B	B	B	X	X	X	X	X	X	X	X
1500	152												B	B	B	B	X	X	X	X	X	X	X	X
1800	182												B	B	B	B	X	X	X	X	X	X	X	X
2200	222												B	B	B	B	X	X	X	X	X	X	X	X
2700	272												B	B	B	B	C	C	C	C	X	X	X	X
3300	332												B	B	B	B	C	C	C	C	X	X	X	X
3900	392												B	B	B	B	C	C	C	C	X	X	X	X
4700	472												B	B	B	B	C	C	C	C	X	X	X	X
5600	562												B	B	B	B	C	C	C	C	X	X	X	X
6800	682												B	B	B	B	C	C	C	C	C	C	C	C
8200	822												B	B	B	B	C	C	C	C	C	C	C	C
10000	103												B	B	B	B	C	C	C	C	C	C	C	C
12000	123																T/C	T/C	T/C	C	P	P	P	P
15000	153																C	C	C	C	P	P	P	P
18000	183																C	C	C	C	P	P	P	P
22000	223																C	C	C	C	P	P	P	P
27000	273																				P	P	P	P
33000	333																				P	P	P	P
39000	393																				P	P	P	P
47000	473																				P	P	P	P
56000	563																				P	P	P	P
68000	683																				P	P	P	P
82000	823																				P	P	P	P
100000	104																				E/P	E/P	E/P	E/P

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Capacitance Range (Con.) C0G

Cap(pF)	EIA Size	1210				1808		1812				1825		2220		2225	
	Code	10V	16V	25V	50V	25V	50V	10V	16V	25V	50V	25V	50V	25V	50V	25V	50V
2.2	2R2					C	C										
2.7	2R7					C	C										
3.3	3R3					C	C										
3.9	3R9					C	C										
4.7	4R7					C	C										
5.6	5R6					C	C										
6.8	6R8					C	C										
8.2	8R2					C	C										
10	100	M	M	M	M	C	C	C	C	C	C	F	F	F	F	F	F
12	120	M	M	M	M	C	C	C	C	C	C	F	F	F	F	F	F
15	150	M	M	M	M	C	C	C	C	C	C	F	F	F	F	F	F
18	180	M	M	M	M	C	C	C	C	C	C	F	F	F	F	F	F
22	220	M	M	M	M	C	C	C	C	C	C	F	F	F	F	F	F
27	270	M	M	M	M	C	C	C	C	C	C	F	F	F	F	F	F
33	330	M	M	M	M	C	C	C	C	C	C	F	F	F	F	F	F
39	390	M	M	M	M	C	C	C	C	C	C	F	F	F	F	F	F
47	470	M	M	M	M	C	C	C	C	C	C	F	F	F	F	F	F
56	560	M	M	M	M	C	C	C	C	C	C	F	F	F	F	F	F
68	680	M	M	M	M	C	C	C	C	C	C	F	F	F	F	F	F
82	820	M	M	M	M	C	C	C	C	C	C	F	F	F	F	F	F
100	101	M	M	M	M	C	C	C	C	C	C	F	F	F	F	F	F
120	121	M	M	M	M	C	C	C	C	C	C	F	F	F	F	F	F
150	151	M	M	M	M	C	C	C	C	C	C	F	F	F	F	F	F
180	181	M	M	M	M	C	C	C	C	C	C	F	F	F	F	F	F
220	221	M	M	M	M	C	C	C	C	C	C	F	F	F	F	F	F
270	271	M	M	M	M	C	C	C	C	C	C	F	F	F	F	F	F
330	331	M	M	M	M	C	C	C	C	C	C	F	F	F	F	F	F
390	391	M	M	M	M	C	C	C	C	C	C	F	F	F	F	F	F
470	471	M	M	M	M	C	C	C	C	C	C	F	F	F	F	F	F
560	561	M	M	M	M	C	C	C	C	C	C	F	F	F	F	F	F
680	681	M	M	M	M	C	C	C	C	C	C	F	F	F	F	F	F
820	821	M	M	M	M	C	C	C	C	C	C	F	F	F	F	F	F
1000	102	M	M	M	M	C	C	C	C	C	C	F	F	F	F	F	F
1200	122	M	M	M	M	C	C	C	C	C	C	F	F	F	F	F	F
1500	152	M	M	M	M	C	C	C	C	C	C	F	F	F	F	F	F
1800	182	M	M	M	M	C	C	C	C	C	C	F	F	F	F	F	F
2200	222	M	M	M	M	C	C	C	C	C	C	F	F	F	F	F	F
2700	272	M	M	M	M	C	C	C	C	C	C	F	F	F	F	F	F
3300	332	M	M	M	M	C	C	C	C	C	C	F	F	F	F	F	F
3900	392	M	M	M	M	C	C	C	C	C	C	F	F	F	F	F	F
4700	472	M	M	M	M	C	C	C	C	C	C	F	F	F	F	F	F
5600	562	M	M	M	M	C	C	C	C	C	C	F	F	F	F	F	F
6800	682	M	M	M/C	M/C	C	C	C	C	C	C	F	F	F	F	F	F
8200	822	M	M	M/C	M/C	C	C	C	C	C	C	F	F	F	F	F	F
10000	103	M	M	M/C	M/C	C	C	C	C	C	C	F	F	F	F	F	F
12000	123	C	C	C/E	C/E	E	E	C	C	C	C	F	F	F	F	F	F
15000	153	C	C	C/E	C/E	E	E	C	C	C	C	F	F	F	F	F	F
18000	183	F	F	F	F	F	F	C	C	C	C	F	F	F	F	F	F
22000	223	F	F	F	F	F	F	C	C	C	C	F	F	F	F	F	F
27000	273	F	F	F/G	F/G			C	C	E	E	F	F	F	F	F	F
33000	333	F	F	F/G	F/G			C	C	E	E	F	F	F	F	F	F
39000	393	F	F	F/G	F/G			G	G	G	G	F	F	F	F	F	F
47000	473	F	F	F/G	F/G			G	G	G	G	F	F	F	F	F	F
56000	563							G	G	G	G	F	F	F	F	F	F
68000	683							G	G	G	G	F	F	F	F	F	F
82000	823							G	G	G	G	F	F	F	F	F	F
100000	104							G	G	G	G	G	G	G	G	F	F

Capacitance Range (Con.) X7R

Cap(pF)	EIA Size Code	01005	0201					0402					0603					0805				
		10V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V
100	101	V		L	L	L	L		N	N	N	N		S	S	S	S		X	X	X	X
120	121				L	L	L		N	N	N	N		S	S	S	S		X	X	X	X
150	151	V			L	L	L		N	N	N	N		S	S	S	S		X	X	X	X
180	181				L	L	L		N	N	N	N		S	S	S	S		X	X	X	X
220	221	V			L	L	L		N	N	N	N		S	S	S	S		X	X	X	X
270	271				L	L	L		N	N	N	N		S	S	S	S		X	X	X	X
330	331	V			L	L	L		N	N	N	N		S	S	S	S		X	X	X	X
390	391				L	L	L		N	N	N	N		S	S	S	S		X	X	X	X
470	471	V			L	L	L		N	N	N	N		S	S	S	S		X	X	X	X
560	561				L	L	L		N	N	N	N		S	S	S	S		X	X	X	X
680	681				L	L	L		N	N	N	N		S	S	S	S		X	X	X	X
820	821				L	L	L		N	N	N	N		S	S	S	S		X	X	X	X
1000	102	V	L	L	L	L	L	N	N	N	N	N		S	S	S	S		X	X	X	X
1200	122		L	L	L	L			N	N	N	N		S	S	S	S		X	X	X	X
1500	152		L	L	L	L			N	N	N	N		S	S	S	S		X	X	X	X
1800	182		L	L	L	L			N	N	N	N		S	S	S	S		X	X	X	X
2200	222		L	L	L	L			N	N	N	N		S	S	S	S		X	X	X	X
2700	272		L	L	L	L			N	N	N	N		S	S	S	S		X	X	X	X
3300	332		L	L	L	L			N	N	N	N		S	S	S	S		X	X	X	X
3900	392		L	L	L	L			N	N	N	N		S	S	S	S		X	X	X	X
4700	472		L	L	L	L			N	N	N	N		S	S	S	S		X	X	X	X
5600	562		L	L	L	L			N	N	N	N		S	S	S	S		X	X	X	X
6800	682		L	L	L				N	N	N	N		S	S	S	S		X	X	X	X
8200	822		L	L	L				N	N	N	N		S	S	S	S		X	X	X	X
10000	103		L	L	L	L		N	N	N	N	N		S	S	S	S		X	X	X	X
12000	123								N	N	N	N/K		S	S	S	S		X	X	X	X
15000	153								N	N	N	N/K		S	S	S	S		X	X	X	X
18000	183								N	N	N	N/K		S	S	S	S		X	X	X	X
22000	223			L	L			N	N	N	N	N/K		S	S	S	S		X	X	X	X
27000	273								N	N	N	N/K		S	S	S	S		X	X	X	X
33000	333								N	N	N	N/K		S	S	B	B		X	X	X	X
39000	393								N	N	N	N/K		S	S	B	B		X	X	X	X
47000	473								N	N	N	N/K		S	S	B	B		X	X	X	X
56000	563								N	N	N	K		S	S	B	B		X	X	X	X
68000	683								N	N	N	K		S	S	B	B		X	X	X	X
82000	823								N	N	N	K		S	S	B	B		X	X	X	X/C
100000	104							N	N	N	N	K		S	S	B	B		X	X	X	X/C
120000	124													S	S	B			X	X	X	C
150000	154									N				S	S	B	B		C	C	C	C
180000	184													S	S	B			C	C	C	C
220000	224							N	N	N	N			S	S	B	B		C	C	C	C/I
270000	274												B	B	B	B		C	C	C	C	I
330000	334													B	B	B	B		C	C	C	I
390000	394													B	B	B			C	C	C	I
470000	474							N	N				B	B	B	B	B		C	C	C	I
560000	564													B	B				C	C	C	I
680000	684												B	B	B				C	C	C	I
820000	824													B	B				C	C	C	I
1000000	105							N					B	B	B	B	B		C	C	C	I
1200000	125																					
1500000	155																		I	I	I	
1800000	185																					
2200000	225												B	B	B			I	I	I	I	I
2700000	275																					
3300000	335																					
3900000	395																					
4700000	475												B					I	I	I	I	
5600000	565																					
6800000	685																					
8200000	825																					
10000000	106																	I	I	I		
12000000	126																					
15000000	156																					
18000000	186																					
22000000	226																					
47000000	476																					

Capacitance Range (Con.) X7R

Cap(pF)	EIA Size Code	1206					1210					1812				1825		2220		2225	
		6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	10V	16V	25V	50V	25V	50V	25V	50V	25V	50V
100	101				X	X															
120	121				X	X															
150	151		X	X	X	X															
180	181		X	X	X	X															
220	221		X	X	X	X				M	M										
270	271		X	X	X	X				M	M			C	C						
330	331		X	X	X	X				M	M			C	C						
390	391		X	X	X	X				M	M			C	C						
470	471		X	X	X	X				M	M			C	C						
560	561		X	X	X	X				M	M			C	C						
680	681		X	X	X	X				M	M			C	C						
820	821		X	X	X	X				M	M			C	C						
1000	102		X	X	X	X		M	M	M	M	C	C	C	C	F	F	F	F	F	F
1200	122		X	X	X	X		M	M	M	M	C	C	C	C	F	F	F	F	F	F
1500	152		X	X	X	X		M	M	M	M	C	C	C	C	F	F	F	F	F	F
1800	182		X	X	X	X		M	M	M	M	C	C	C	C	F	F	F	F	F	F
2200	222		X	X	X	X		M	M	M	M	C	C	C	C	F	F	F	F	F	F
2700	272		X	X	X	X		M	M	M	M	C	C	C	C	F	F	F	F	F	F
3300	332		X	X	X	X		M	M	M	M	C	C	C	C	F	F	F	F	F	F
3900	392		X	X	X	X		M	M	M	M	C	C	C	C	F	F	F	F	F	F
4700	472		X	X	X	X		M	M	M	M	C	C	C	C	F	F	F	F	F	F
5600	562		X	X	X	X		M	M	M	M	C	C	C	C	F	F	F	F	F	F
6800	682		X	X	X	X		M	M	M	M	C	C	C	C	F	F	F	F	F	F
8200	822		X	X	X	X		M	M	M	M	C	C	C	C	F	F	F	F	F	F
10000	103		X	X	X	X		M	M	M	M	C	C	C	C	F	F	F	F	F	F
12000	123		X	X	X	X		M	M	M	M	C	C	C	C	F	F	F	F	F	F
15000	153		X	X	X	X		M	M	M	M	C	C	C	C	F	F	F	F	F	F
18000	183		X	X	X	X		M	M	M	M	C	C	C	C	F	F	F	F	F	F
22000	223		X	X	X	X		M	M	M	M	C	C	C	C	F	F	F	F	F	F
27000	273		X	X	X	X		M	M	M	M	C	C	C	C	F	F	F	F	F	F
33000	333		X	X	X	X		M	M	M	M	C	C	C	C	F	F	F	F	F	F
39000	393		X	X	X	X		M	M	M	M	C	C	C	C	F	F	F	F	F	F
47000	473		X	X	X	X		M	M	M	M	C	C	C	C	F	F	F	F	F	F
56000	563		X	X	X	X		M	M	M	M	C	C	C	C	F	F	F	F	F	F
68000	683		X	X	X	X		M	M	M	M	C	C	C	C	F	F	F	F	F	F
82000	823		X	X	X	X		M	M	M	M	C	C	C	C	F	F	F	F	F	F
100000	104		X	X	X	X		M	M	M	M	C	C	C	C	F	F	F	F	F	F
120000	124		X	X	X	X		M	M	M	M	C	C	C	C	F	F	F	F	F	F
150000	154		M	M	M	M		M	M	M	M	C	C	C	C	F	F	F	F	F	F
180000	184		M	M	M	M		M	M	M	M	C	C	C	C	F	F	F	F	F	F
220000	224		M	M	M	M		M	M	M	M	C	C	C	C	F	F	F	F	F	F
270000	274		M	M	M	C		M	M	M	M	C	C	C	C	F	F	F	F	F	F
330000	334		M	M	M	C		M	M	M	C	C	C	C	C	F	F	F	F	F	F
390000	394		M	M	C	P		M	M	M	C	C	C	C	C	F	F	F	F	F	F
470000	474		J	J	C/J	P		M	M	M	C	C	C	C	C	F	F	F	F	F	F
560000	564		J	J	C/J	P		C	C	C	C	C	C	C	C	F	F	F	F	F	F
680000	684		J	J	C/J	P		C	C	C	C	C	C	C	F	F	F	F	F	F	F
820000	824		J	J	C/J	P		C	C	C	C	C	C	C	F	F	F	F	F	F	F
1000000	105		J	J	J	P		C	C	C	C	C	C	C	F	F	F	F	F	F	F
1200000	125					P				P	P/G			C	C	F	F	F	F	F	F
1500000	155	J	J	J	P	P			E	E	G	C	C	C	C	F	F	F	F	F	F
1800000	185					P					G			E	E	F	F	F	F	F	F
2200000	225	J	J	J	P	P			E	E/G	G	E	E	E	E	F	F	F	F	F	F
2700000	275										G			F	F	F	F	F	F	F	F
3300000	335		P	P	P	P			E	E/G	G	F	F	F	F	F	F	F	F	F	F
3900000	395									G	G			F	F	F	F	F	F	F	F
4700000	475	P	P	P	P	P		F	F	F/G	F/G	G	G	G	G	F	F	F	F	F	F
5600000	565									G	G			G	G	F	F	F	F	F	F
6800000	685									G	G	G	G	G	G	F	F	F	F	F	F
8200000	825									G	G			G	G	G	G	G	G	G	G
10000000	106	P	P	P	P		F	F	F	F/G	G	G	G	G	G	G	G	G	G	G	G
12000000	126													G				H	H	F/G	
15000000	156											G	G	G				H	H	F/G	
18000000	186													G				H	H		
22000000	226	P	P	P*				G	G	G		G	G	G				H	H		
27000000	276																	H			
33000000	336																	H			
39000000	396																	H			
47000000	476						G	G										R			

Capacitance Range (Con.) X5R

Cap(pF)	EIA Size	01005		0201					0402					0603				
	Code	6.3V	10V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V
100	101					L	L	L										
120	121																	
150	151					L	L	L										
180	181																	
220	221					L	L	L										
270	271																	
330	331					L	L	L										
390	391																	
470	471					L	L	L										
560	561																	
680	681					L	L	L										
820	821																	
1000	102	V	V		L	L	L	L										
1500	152		V		L	L	L											
2200	222		V		L	L	L											
2700	272																	
3300	332		V		L	L	L											
4700	472		V		L	L	L											
6800	682		V		L	L	L											
10000	103	V	V	L	L	L	L	L										
15000	153			L	L								N					
22000	223	V		L	L							N	N					
27000	273																	
33000	333	V		L	L						N		N					
39000	393																	
47000	473	V		L	L				N	N	N		N					
56000	563			L	L													
68000	683			L	L				N	N	N		K					
82000	823																	
100000	104	V		L	L	L	L		N	N	N	N	K				S	
150000	154								N	N	N	N						
220000	224								N	N	N	N	N	B	B	B	B	B
270000	274																	
330000	334			L					N	N	N			B	B	B	B	
390000	394																	
470000	474			L					N	N	N/K	K	K	B	B	B	B	B
680000	684								N	N				B	B	B	B	
820000	824																	
1000000	105			L*	L*	L*			N	N	N	N		B	B	B	B	B
1500000	155													B	B			
2200000	225			L*	L*				N	N	K	K		B	B	B	B	B*
3300000	335													B	B			
4700000	475								K	K	K*			B	B	B*	B*	
6800000	685																	
10000000	106								K*	K*				B	B	B	B*	
22000000	226								K*					B*	B*			
47000000	476													B*				
100000000	107																	
220000000	227																	

* M Tolerance only

Capacitance Range (Con.) X5R

Cap(pF)	EIA Size	0805					1206					1210				
	Code	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V
100	101															
120	121															
150	151															
180	181															
220	221															
270	271															
330	331															
390	391															
470	471															
560	561															
680	681															
820	821															
1000	102															
1500	152															
2200	222															
2700	272															
3300	332															
4700	472															
6800	682															
10000	103															
15000	153															
22000	223															
27000	273															
33000	333															
39000	393															
47000	473															
56000	563															
68000	683															
82000	823															
100000	104															
150000	154															
220000	224															
270000	274															
330000	334															
390000	394															
470000	474															
680000	684															
820000	824															
1000000	105		C	C	C	I					P					
1500000	155	I	I	I	I			J	J				F	F		
2200000	225	I	I	I	I	I		J	J	P	P		F	F		
3300000	335	I	I	I	I			P	P	P						
4700000	475	I	I	I	I	I	P	P	P	P	P		F	F	F	
6800000	685						P	P								
10000000	106	I	I	I	I	I	P	P	P	P	P	F	F	F	F	G
22000000	226	I	I*	I*	I*		P	P	P	P		G	G	G	G	
47000000	476	I*	I*				P	P	P*			G	G	G	G*	
100000000	107	I*					P*					G*	G*	G*		
220000000	227						P*					G*				

* M Tolerance only

Capacitance Range (Con.) X5R

Cap(pF)	EIA Size Code	0805				1206					1210			
		6.3V	10V	16V	25V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V
100000	104	L	L	L	L	N								
150000	154													
220000	224	L	L*			N								
330000	334													
470000	474					K/N								
680000	684													
1000000	105					N	N	N	K					
1500000	155													
2200000	225					K	K	K			B	B	B	B
3300000	335													
4700000	475										B	B	B	B
6800000	685													
10000000	106					K					B*	B	B	
22000000	226										B*			
47000000	476													
100000000	107													
220000000	227													

Cap(pF)	EIA Size Code	0805				1206				1210			
		6.3V	10V	16V	25V	6.3V	10V	16V	25V	6.3V	10V	16V	25V
100000	104												
150000	154												
220000	224												
330000	334												
470000	474												
680000	684												
1000000	105												
1500000	155												
2200000	225			I									
3300000	335												
4700000	475												
6800000	685												
10000000	106	I	I	I	I				P				
22000000	226	I*	I*				P	P*	P				G
47000000	476					P				G	G	G	
100000000	107									G*			
220000000	227												

Capacitance Range (Con.) X7S

Cap(pF)	EIA Size Code	0201	0402	0603		0805		1206		1210
		10V	10V	16V	25V	16V	25V	6.3V	16V	6.3V
100000	104	L								
150000	154									
220000	224									
330000	334									
470000	474									
680000	684									
1000000	105		K	B						
1500000	155									
2200000	225		K	B	B					
3300000	335									
4700000	475						I			
6800000	685									
10000000	106					I				
22000000	226								P	
47000000	476							P*		
100000000	107									G*
220000000	227									

Reliability test conditions and requirements

No.	Item	Test Condition	Requirements			
1.	Visual and Dimensions		* No remarkable defect. * Dimensions to confirm to individual specification sheet.6.3V			
2.	Capacitance		* Shall not exceed the limits given in the detailed spec.			
3.	Q/D.F. (Tangent Of loss angle)	▪ Class II : (X7R, X7S, X6S, X5R Cap.≤10μF, 1.0±0.2Vrms, 1KHz±10%**. Cap.>10μF, 0.5±0.2Vrms, 120Hz±20%. ▪ ** Test condition : 0.5±0.2Vrms, 1KHz±10%. X7R: 0805=106(6.3V), 0603/475(6.3V) X5R: 0201≥224 (6.3V,10V,16V)#1, 0402≥475 (6.3V,16V), 0402≥225(10V), 0603=106 (6.3V) X6S: 0201/474(4V),0201≥104 (6.3V,10V#1), 0402≥225 (6.3V), 0402/475 (10V), 0603/106 (6.3V), X7S: 0402/225(6.3V) ▪ #1 Excluding X5R/0201/105(6.3V);225(10V), ▪ X6S/0201/104(10V) (1.0±0.2Vrms±1KHz±10%)	*X7R:			
			Rated	D.F.≤	Exception of D.F.≤	
			50V	≤ 2.5%	≤ 3.5%	0201(50V), 0603≥0.047μF, 0805≥0.18μF, 1206≥0.47μF, 1210≥2.2μF, 1812≥4.7μF, 1825≥4.7μF, 2220≥4.7μF, 2225≥4.7μF
					≤ 5%	0201≥0.01uF, 1210≥4.7μF
					≤ 10%	0402≥0.012μF, 0603>0.1μF, 0805≥1μF, 1206≥2.2μF, 1210≥10μF
			25V	≤ 3.5%	≤ 5%	0201≥0.01μF, 0805≥1μF, 1210≥10μF
					≤ 7%	0603≥0.33μF,
					≤ 10%	0201≥0.1μF, 0402≥0.056μF, 0603≥0.47μF, 0805≥2.2μF, 1206≥2.2μF, 1210≥22μF
			16V	≤ 3.5%	≤ 5%	0201≥0.01μF, 0402≥0.033μF, 0603≥0.15μF, 0805≥0.68μF, 1206≥2.2μF, 1210≥4.7μF
					≤ 10%	0201≥0.1uF(0201/X7R≥0.022μF), 0402≥0.22uF, 0603≥0.15μF, 0805≥2.2μF, 1206≥4.7μF, 1210≥22μF
					≤ 12.5%	0402=1μF;0805=10μF
			10V	≤5%	≤ 5%	0201≥0.012μF, 0402≥0.33μF(0402/X7R≥0.22μF), 0603≥0.33μF, 0805≥2.2μF, 1206≥2.2μF, 1210≥22μF
					≤ 10%	0805=10μF
					≤ 12.5%	0201≥0.1μF, 0402≥1μF, 0603≥10μF
			6.3V	≤ 10%	≤ 15%	0201≥0.1μF, 0402≥1μF, 0603≥10μF, 0805≥4.7μF, 1206≥47μF, 1210≥100μF
					≤ 20%	0402≥2.2μF
			*X5R:			
			Rated	D.F.≤	Exception of D.F.≤	
			50V	≤ 2.5%	≤ 3.5%	0201(50V); 0603≥0.047μF; 0805≥0.18μF; 1206≥0.47μF
					≤ 5%	0201≥0.01uF; 1210≥3.3μF
					≤ 10%	0402≥0.012μF; 0603>0.1μF; 0805≥1μF;1206≥2.2μF; 1210≥10μ
					≤12.5%	1206=10μF
			25V	≤ 3.5%	≤ 5%	0201≥0.01μF, 0805≥1μF, 1210≥10μF
					≤ 7%	0603≥0.33μF,
					≤ 10%	0201≥0.1μF, 0402≥0.056μF, 0603≥0.47μF, 0805≥2.2μF, 1206≥2.2μF, 1210≥22μF
			16V	≤ 3.5%	≤ 5%	0201≥0.01μF, 0402≥0.033μF, 0603≥0.15μF, 0805≥0.68μF, 1206≥2.2μF, 1210≥4.7μF
					≤ 10%	0201≥0.1uF(0201/X7R≥0.022μF), 0402≥0.22uF, 0603≥0.15μF, 0805≥2.2μF, 1206≥4.7μF, 1210≥22μF
					≤ 12.5%	0402=1μF;0805=10μF
			10V	≤5%	≤ 5%	0201≥0.012μF, 0402≥0.33μF(0402/X7R≥0.22μF), 0603≥0.33μF, 0805≥2.2μF, 1206≥2.2μF, 1210≥22μF
					≤ 10%	0805=10μF
					≤ 12.5%	0201≥0.1μF, 0402≥1μF, 0603≥10μF
			6.3V	≤ 10%	≤ 15%	0201≥0.1μF, 0402≥1μF, 0603≥10μF, 0805≥4.7μF, 1206≥47μF, 1210≥100μF
					≤ 20%	0402≥2.2μF

Reliability test conditions and requirements

No.	Item	Test Condition	Requirements			
3.	Q/D.F. (Tangent Of loss angle)	▪ Class II : (X7R, X7S, X6S, X5R Cap.≤10μF, 1.0±0.2Vrms, 1KHz±10%**. Cap.>10μF, 0.5±0.2Vrms, 120Hz±20%. ▪ ** Test condition : 0.5±0.2Vrms, 1KHz±10%. X7R: 0805=106(6.3V), 0603/475(6.3V) X5R: 0201≥224 (6.3V,10V,16V)#1, 0402≥475 (6.3V,16V), 0402≥225(10V), 0603=106 (6.3V) X6S: 0201/474(4V),0201≥104 (6.3V,10V#1), 0402≥225 (6.3V), 0402/475 (10V), 0603/106 (6.3V), X7S: 0402/225(6.3V) ▪ #1 Excluding X5R/0201/105(6.3V);225(10V), ▪ X6S/0201/104(10V) (1.0±0.2Vrms±1KHz±10%)	*X7S:			
			Rated	D.F.≤	Exception of D.F.≤	
			50V	≤ 2.5%	≤3%	0201(50V); 0603≥0.047μF; 0805≥0.18μF;1206≥0.47μF
					≤ 5%	0201≥0.01uF; 1210≥3.3μF
					≤ 10%	0402≥0.012μF;0603>0.1μF; 0805≥1μF; 1206≥2.2μF;1210≥10μF
			25V	≤ 3.5%	≤ 5%	0201≥0.01μF;0805≥1μF;1210≥10μF
					≤ 7%	0603≥0.33μF
					≤ 10%	0201≥0.1μF;0402≥0.10μF;0603≥0.47μF; 0805≥2.2μF; 1206≥4.7μF;1210≥22μF
					≤ 12.5%	0402≥0.47μF
			16V	≤ 3.5%	≤ 5%	0201≥0.01μF;0402≥0.033μF;0603≥0.15μF; 0805≥0.68μF;1206≥2.2μF;1210≥4.7μF
					≤ 10%	0201≥0.1uF; 0402≥ 0.22uF; 0603>0.47μF;0805≥2.2μF;1206≥4.7μF; 1210≥22μF
			10V	≤5%	≤ 5%	0201≥0.012μF;0402≥0.22μF; 0603≥0.33μF; 0805≥2.2μF;1206≥2.2μF;1210≥22μF
					≤ 15%	0201≥0.1μF; 0402≥1μF
			6.3V	≤ 10%	≤ 15%	0201≥0.1μF;0402≥1μF;0603≥10μF; 0805≥4.7μF; 1206≥47μF; 1210≥100μF
					≤ 20%	0402≥2.2μF
			*X5R:			
			Rated	D.F.≤	Exception of D.F.≤	
			50V	≤ 2.5%	≤ 3%	0201(50V); 0603≥0.047μF; 0805≥0.18μF;1206≥0.47μF
					≤ 5%	0201≥0.01uF;1210≥3.3μF
					≤ 10%	0402≥0.012μF;0603>0.1μF; 0805≥1μF; 1206≥2.2μF;1210≥10μF
			25V	≤ 3.5%	≤ 5%	0201≥0.01μF;0805≥1μF;1210≥10μF
					≤ 7%	0603≥0.33μF
					≤ 10%	0201≥0.1μF; 0402≥0.10μF;0603≥0.47μF; 0805≥2.2μF; 1206≥4.7μF;1210≥22μF
					≤ 12.5%	0402≥0.47μF;0805=10μF
			16V	≤ 3.5%	≤ 5%	0201≥0.01μF;0402≥0.033μF;0603≥0.15μF; 0805≥0.68μF;1206≥2.2μF;1210≥4.7μF
					≤ 10%	0201≥0.1uF; 0402≥0.22uF; 0603>0.47μF; 0805≥2.2μF;1206≥4.7μF;1210≥22μF
					≤ 12.5%	0402=1μF;0805=10μF
			10V	≤5%	≤ 10%	0201≥0.012μF;0402≥0.22μF; 0603≥0.33μF; 0805≥2.2μF;1206≥2.2μF;1210≥22μF
					≤ 12.5%	0805=10μF
					≤ 15%	0201≥0.1μF; 0402≥1μF
			6.3V	≤ 10%	≤ 15%	0201≥0.1μF;0402≥0.47μF; 0603≥10μF; 0805≥4.7μF;1206≥47μF; 1210≥100μF
					≤ 20%	0402≥2.2μF

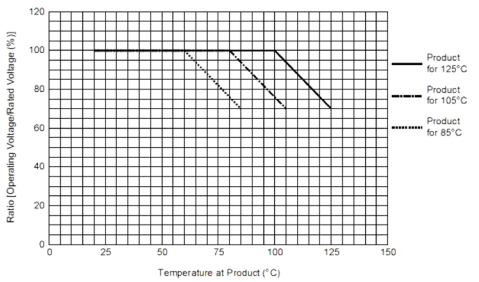
Reliability test conditions and requirements

<table>
<tr><th>No.</th><th>Item</th><th colspan="3">Test Condition</th><th colspan="2">Requirements</th></tr>
<tr><td rowspan="20">4.</td><td rowspan="20">Temperature Coefficient (Temperature characteristic of capacitance)</td><td colspan="3">* With no electrical load.</td><td>T.C.</td><td>Capacitance Change</td></tr>
<tr><td colspan="2">T.C.</td><td>Operating Temp.</td><td>X7R</td><td>Within ±15%</td></tr>
<tr><td colspan="2">X7R/X7S</td><td>-55~125°C at 25°C</td><td>X7S</td><td>Within ±22%</td></tr>
<tr><td colspan="2">X6S</td><td>-55~105°C at 25°C</td><td>X6S</td><td>Within ±22%</td></tr>
<tr><td colspan="2">X5R</td><td>-55~ 85°C at 25°C</td><td>X5R</td><td>Within ±15%</td></tr>
<tr><td>Size</td><td>Cap Range</td><td>Condition</td><td colspan="2" rowspan="15"></td></tr>
<tr><td rowspan="3">0201</td><td>Cap.<0.1μF</td><td>1V</td></tr>
<tr><td>0.1μF≤Cap.<1μF</td><td>0.2V</td></tr>
<tr><td>Cap.≥1μF</td><td>0.1V</td></tr>
<tr><td rowspan="4">0402</td><td>Cap.<0.1μF</td><td>1V</td></tr>
<tr><td>Cap.=1μF</td><td>0.5V</td></tr>
<tr><td>1μF<Cap.<10μF</td><td>0.2V</td></tr>
<tr><td>Cap.≥10μF</td><td>0.1V</td></tr>
<tr><td rowspan="3">0603</td><td>Cap.≤1μF</td><td>1V</td></tr>
<tr><td>1μF<Cap.≤4.7μF</td><td>0.5V</td></tr>
<tr><td>Cap.>4.7μF</td><td>0.2V</td></tr>
<tr><td rowspan="3">0805</td><td>Cap.<10μF</td><td>1V</td></tr>
<tr><td>Cap.=10μF</td><td>0.5V</td></tr>
<tr><td>Cap.>10μF</td><td>0.2V</td></tr>
<tr><td rowspan="3">1206/1210</td><td>Cap.≤10μF</td><td>1V</td></tr>
<tr><td>10μF<Cap.≤100μF</td><td>0.5V</td></tr>
<tr><td>Cap.>100μF</td><td>0.2V</td></tr>
<tr><td colspan="7"></td></tr>
<tr><td rowspan="15">5.</td><td rowspan="15">Insulation Resistance</td><td>Size</td><td>Cap Range</td><td>Condition</td><td colspan="2">* ≥10GΩ or RxC≥500Ω-F, whichever is smaller.
* Except:</td></tr>
<tr><td>Rated Vol.(V)</td><td>Apply Voltage</td><td>Charge Time</td><td>Rated voltage (X7R/X5R)</td><td>I.R.</td></tr>
<tr><td>≤100</td><td>1 times of U_R</td><td>Max. 120 sec.</td><td>50V: 0402>0.01μF, 0603≥1μF, 0805≥1μF, 1206≥4.7μF, 1210≥4.7μF, 1812≥10μF, 2220≥22μF</td><td rowspan="5">≥10GΩ or RxC≥100Ω-F, whichever is smaller</td></tr>
<tr><td>200≤V≤500</td><td>1 times of U_R</td><td>60 sec.</td><td>25V: 0402≥1μF, 0603≥2.2μF, 0805≥2.2μF, 1206≥10μF, 1210≥10μF</td></tr>
<tr><td>>500</td><td>500Vdc</td><td>60 sec.</td><td>16V: 0201≥0.1μF, 0402≥0.22μF, 0603≥1μF, 0805≥2.2μF, 1206≥10μF, 1210≥47μF</td></tr>
<tr><td colspan="3" rowspan="11"></td><td>10V: 0201≥47nF, 0402≥0.47μF, 0603≥0.47μF, 0805≥2.2μF, 1206≥4.7μF, 1210≥47μF</td></tr>
<tr><td>6.3V; 4V</td></tr>
<tr><td>Rated voltage (X7R/X7S/X6S/X5R)</td><td>I.R.</td></tr>
<tr><td>50V : 0402≥0.1μF, 0603≥2.2μF, 0805≥10μF, 1206≥10μF</td><td rowspan="7">RxC≥50Ω-F</td></tr>
<tr><td>25V: 0201≥0.1μF, 0402≥2.2μF, 0603≥10μF, 0805≥10μF, 1206≥22μF</td></tr>
<tr><td>16V: 0603≥10μF, 0402≥1μF, 0201≥0.22μF</td></tr>
<tr><td>10V: 0201>0.1μF, 0402≥1μF, 0603≥10μF, 0805≥47μF</td></tr>
<tr><td>6.3V: 0201≥0.1μF, 0603>4.7μF, 0805≥47μF, 1206≥10μF</td></tr>
<tr><td>4V: 0603≥22μF, 0805≥47μF, 1206≥100μF</td></tr>
<tr><td>All X7S items; All X6S items</td></tr>
</table>

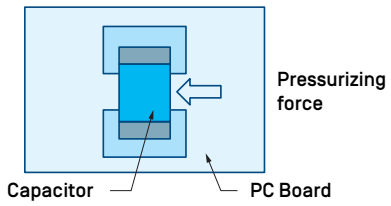
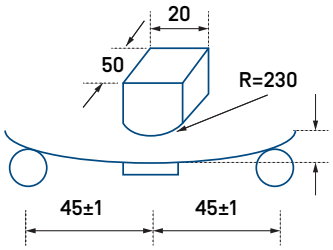
Reliability test conditions and requirements

<table>
<tr><th>No.</th><th>Item</th><th>Test Condition</th><th>Requirements</th></tr>
<tr><td>6.</td><td>Dielectric Strength</td><td>▪ To apply 250% of rated voltage.
▪ Duration: 1 to 5 sec.
▪ Charge and discharge current less than 50mA.</td><td>▪ No evidence of damage or flash over during test.</td></tr>
<tr><td>7.</td><td>Solderability</td><td>▪ Solder temperature: 235±5°C for (01005~1210).
▪ Solder temperature: 245±5°C for (1808~2225).
▪ Dipping time: 2±0.5 sec.</td><td>▪ * 75% min. coverage of all metalized area.
▪ * 95% min. coverage of all metalized area. (for 01005)</td></tr>
<tr><td>8.</td><td>Resistance to Soldering Heat</td><td>▪ Solder temperature: 260±5°C.
▪ Dipping time: 10±1 sec.
▪ Preheating: 120 to 150°C for 1 minute before
▪ immerse the capacitor in a eutectic solder.
▪ Before initial measurement (Class II only) : To apply de-aging at 150°C for 1hr then set for 24±2 hrs at room temp.
▪ Measurement to be made after keeping at room temp. for 24±2 hrs (Class I) or 48±4 hrs (Class II).</td><td>▪ No remarkable damage.
▪ Cap. change:
C0G: Within ±2.5% or ±0.25pF, whichever is larger.
X7R, X5R, X6S,X7S : Within ±7.5%.
▪ D.F.(Q)/I.R.: To meet initial requirements.
▪ 25% max. leaching on each edge.</td></tr>
<tr><td>9.</td><td>Temperature Cycle (Rapid change of temperature)</td><td>▪ Conduct the five cycles according to the temperatures and time.
<table><tr><th>Step</th><th>Temp.(°C)</th><th>Time(min.)</th></tr><tr><td>1</td><td>Min. operating temp. +0/-3</td><td>30±3</td></tr><tr><td>2</td><td>Room temp.</td><td></td></tr><tr><td>3</td><td>Max. operating temp. +3/-0</td><td></td></tr><tr><td>4</td><td>Room temp.</td><td></td></tr></table>▪ Before initial measurement (Class II only): To apply de-aging at 150°C for 1hr then set for 24±2 hrs at room temp.
▪ Measurement to be made after keeping at room temp. for 24±2 hrs (Class I) or 48±4 hrs (Class II).</td><td>▪ No remarkable damage.
▪ Cap. change:
C0G: Within ±2.5% or ±0.25pF, whichever is larger.
X7R, X5R, X7S, X6S: Within ±7.5%.
01005 X5R: Within ±15.0%
▪ Q for C0G: To meet initial requirements.
▪ D.F. (Class II): ≤150% of initial requirement.
▪ I.R.: To meet initial requirements.
▪ 01005 Q/D.F., I.R. and dielectric strength:
To meet initial requirements.</td></tr>
<tr><td colspan="4"></td></tr>
<tr><td>10.</td><td>Humidity (Damp Heat) Steady State</td><td>▪ Test temp.: 40±2°C.
▪ Humidity: 90~95% RH.
▪ Test time: 500 +24/-0hrs.
▪ Before initial measurement (Class II only) To apply de-aging at 150°C for 1hr then set for 24±2 hrs at room temp.
▪ Measurement to be made after keeping at room temp. for 24±2 hrs (Class I) or 48±4 hrs (Class II).</td><td>▪ No remarkable damage.
▪ Cap. change:
▪ C0G: Within ±5.0% or ±0.5pF, whichever is larger.
X7R, X5R, X6S, X7S: Within ±12.5% for ≥10V**,
within ±25% for 6.3V. 01R5 X5R: within ±25.0%
**10V: Within ±25% for 0603≥4.7μF, 0402≥1μF, 0201≥0.1μF.
▪ Q/DF for C0G:
Cap.>30pF, Q≥350. 10pF≤Cap.≤30pF, Q≥275+2.5C. Cap.<10pF, Q≥200+10C.
01R5 X7R: ≤7.5%
01R5 X5R: ≤20%
▪ I.R. 01005.:
NP0, X7R: ≥1GΩ or RxC≥50Ω-F whichever is smaller.
X5R: RxC≥10Ω-F.
▪ D.F. (Class II): ≤200% of initial requirement.
▪ I.R.: ≥10V, ≥1GΩ or R×C≥50Ω-F, whichever is smaller.
Class II (X7R, X5R, X7S,X6S)
<table><tr><th>Rated voltage</th><th>I.R.</th></tr><tr><td>50V: 0402>0.01μF, 0603≥1μF, 0805≥1μF, 1206≥4.7μF, 1210≥4.7μF</td><td rowspan="5">≥500MΩ or RxC≥5Ω-F, whichever is smaller</td></tr><tr><td>25V: 0201≥0.1uF, 0402≥0.22μF, 0603≥2.2μF, 0805≥2.2μF, 1206≥10μF, 1210≥10μF</td></tr><tr><td>16V: 0201≥0.1uF, 0402≥0.22μF, 0603≥1μF, 0805≥2.2μF, 1206≥10μF, 1210≥47μF</td></tr><tr><td>10V: 0201≥47nF, 0402≥0.47μF, 0603≥0.47μF, 0805≥2.2μF, 1206≥4.7μF, 1210≥47μF</td></tr><tr><td>6.3V; 4V; All X6S/X7S items; Size≥1812</td></tr></table></td></tr>
</table>

Reliability test conditions and requirements

<table>
<tr><th>No.</th><th>Item</th><th>Test Condition</th><th>Requirements</th></tr>
<tr><td>11.</td><td>Humidity (Damp Heat) Load</td><td>▪ Test temp.: 40±2°C.
▪ Humidity: 90~95%RH.
▪ Test time : 500 +24/-0hrs.
▪ To apply voltage: Rated voltage.
▪ Before initial measurement (Class II only): To apply de-aging at 150°C for 1hr then set for 24±2 hrs at room temp.
▪ Measurement to be made after keeping at room temp. for 24±2 hrs (Class I) or 48±4 hrs (Class II).</td><td>▪ No remarkable damage.
▪ Cap. change:
X7R/X7S/X6S/X5R: Within ±12.5% for ≥10V**, within ±25% for 6.3V.
**10V: Within ±25% for 0603≥4.7μF, 0402≥1μF, 0201≥0.1μF.
▪ D.F. : ≤200% of the initial requirement.
▪ I.R. : ≥10V, ≥500MΩ or RxC≥25Ω-F, whichever is smaller. Except :
<table>
<tr><th>Rated voltage</th><th>I.R.</th></tr>
<tr><td>50V: 0402>0.01μF, 0603≥1μF, 0805≥1μF, 1206≥4.7μF, 1210≥4.7μF</td><td rowspan="5">≥500MΩ or RxC≥5Ω-F, whichever is smaller</td></tr>
<tr><td>25V: 0201≥0.1uF, 0402≥0.22μF, 0603≥2.2μF, 0805≥2.2μF, 1206≥10μF, 1210≥10μF</td></tr>
<tr><td>16V: 0201≥0.1uF, 0402≥0.22μF, 0603≥1μF, 0805≥2.2μF, 1206≥10μF, 1210≥47μF</td></tr>
<tr><td>10V: 0201≥47nF, 0402≥0.47μF, 0603≥0.47μF, 0805≥2.2μF, 1206≥4.7μF, 1210≥47μF</td></tr>
<tr><td>6.3V; 4V; All X6S/X7S items; Size≥1812</td></tr>
</table></td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td>12.</td><td>High Temperature Load (Endurance)</td><td>▪ Test temp. :
C0G, X7R,X7S : 125±3°C. X5R : 85±3°C. X6S: 105±3°C
▪ To apply voltage:
(1) ≤6.3V: 150% of rated voltage.
(2) 10V≤Ur≤50V: 200% of rated voltage.
(3) 100% of rated voltage for below range:
<table>
<tr><th>Size</th><th>Dielectric</th><th>Rated</th><th>Capacitance</th></tr>
<tr><td rowspan="2">0201</td><td rowspan="2">X5R/X7R</td><td>≤10V</td><td>C≥0.1μF</td></tr>
<tr><td>≥16V</td><td>C>0.1μF</td></tr>
<tr><td>01005</td><td>X5R</td><td>6.3V</td><td>-</td></tr>
</table>
(4) 150% of rated voltage for below range:
<table>
<tr><th>Size</th><th>Dielectric</th><th>Rated Voltage</th><th>Capacitance</th></tr>
<tr><td>01005</td><td>X5R</td><td>10V</td><td>-</td></tr>
<tr><td rowspan="2">0201</td><td>X5R/X7R/X6S</td><td>16V/25V</td><td>C≥0.1μF</td></tr>
<tr><td>X7R</td><td>16V</td><td>C≥0.022μF</td></tr>
<tr><td rowspan="2">0402</td><td rowspan="2">X5R/X7R/X6S</td><td>50V</td><td>C≥0.1μF</td></tr>
<tr><td>10~25V</td><td>C≥0.22μF</td></tr>
<tr><td>0603</td><td>X7R</td><td>≥50V</td><td>C≥0.082μF</td></tr>
<tr><td>0805</td><td>X5R/X7R</td><td>50V</td><td>C≥0.47μF</td></tr>
</table>
▪ Test time : 1000 +24/-0 hrs.
▪ Before initial measurement (Class II only) : To apply de-aging at 150°C for 1hr then set for 24±2 hrs at room temp.
▪ Measurement to be made after keeping at room temp. for 24±2 hrs (Class I) or 48±4 hrs (Class II).
** De-rating conditions: (For 100% of rated voltage items)
 
</td><td>▪ No remarkable damage.
▪ Cap. change:
C0G: Within ±3.0% or ±0.3pF, whichever is larger.
X7R, X5R, X7S, X6S : Within ±12.5% for ≥10V**,
within ±25% for ≤6.3V. 01005: X7R
Within ±12.5%,X5R Within ±25.0%
**10V: Within ±25% for 0603≥4.7μF, 0402≥1μF, 0201≥0.1μF.
▪ Q for C0G:
Cap.>30pF, Q≥350. 10pF≤Cap.≤30pF, Q≥275+2.5C.
01005: X7R ≤7.5%, X5R ≤20% Cap.<10pF, Q≥200+10C.
▪ D.F. (Class II) : ≤200% of initial requirement.
▪ I.R. : ≥10V, ≥1GΩ or RxC≥50Ω-F, whichever is smaller.
▪ 01005 I.R.: NP0, X7R: ≥1GΩ or RxC≥50Ω-F whichever is smaller.
X5R: RxC≥10Ω-F.
Class II (X7R, X5R, X7S, X6S)
<table>
<tr><th>Rated voltage</th><th>I.R.</th></tr>
<tr><td>50V: 0402>0.01μF</td><td rowspan="5">≥1GΩ or RxC≥10Ω- F, whichever is smaller</td></tr>
<tr><td>25V: 0201≥0.1uF, 0402≥0.22μF</td></tr>
<tr><td>16V: 0201≥0.1uF, 0402≥0.22μF</td></tr>
<tr><td>10V: 0201≥47nF, 0402≥0.47μF, 0603≥0.47μF</td></tr>
<tr><td>6.3V; 4V; Size≥1812</td></tr>
</table></td></tr>
</table>

Reliability test conditions and requirements

<table>
<tr><th>No.</th><th>Item</th><th>Test Condition</th><th>Requirements</th></tr>
<tr><td>13.</td><td>Adhesive Strength of Termination (Robustness of termination)</td><td>▪ Capacitors mounted on a substrate. A force of 1N(01005) or 2N(0201) or 5N(0402~0603) or 10N(>0603) applied perpendicular to the place of substrate and parallel the line joining the center of terminations for 10±1 second.
 
</td><td>▪ No remarkable damage or removal of the terminations.</td></tr>
<tr><td colspan="4"></td></tr>
<tr><td>14.</td><td>Resistance to Flexure of Substrate (Substrate bending test)</td><td>▪ The middle part of substrate shall be pressurized by means of the pressurizing rod at a rate of about 1mm per second until the deflection becomes 1mm.
 
</td><td>▪ No remarkable damage.
<table><tr><th>Dielectric</th><th>Cap. Change</th></tr><tr><td>C0G</td><td>Within ±5.0% or ±0.5pF, whichever is larger</td></tr><tr><td>X7R, X5R,X7S,X6S</td><td>Within ±12.5%</td></tr><tr><td>01005 X5R</td><td>Within ±25.0%</td></tr></table>(This capacitance change means the change of capacitance under specified flexure of substrate from the capacitance measured before the test)</td></tr>
<tr><td colspan="4"></td></tr>
<tr><td>15.</td><td>Vibration Resistance</td><td>▪ Vibration frequency : 10~55 Hz/min.
▪ Total amplitude : 1.5mm.
▪ Test time : 6 hrs. (Two hrs each in three mutually perpendicular directions)
▪ Before initial measurement (Class II only) : To apply de-aging at 150°C for 1hr then set for 24±2 hrs at room temp.
▪ Measurement to be made after keeping at room temp. for 24±2 hrs (Class I) or 48±4 hrs (Class II).</td><td>▪ No remarkable damage.
▪ Cap. change and D.F. : To meet initial spec.</td></tr>
</table>

Package Dimension and Quantity

Size	EIA Size Code	Paper tape		Plastic tape	
		7" reel	13" reel	7" reel	13" reel
01005 (0402)	0.20±0.02	20k	-	-	-
0201(0603)	0.30±0.03	15k	70k	-	-
	0.30±0.05	15k	-	-	-
	0.30±0.09	15k	-	-	-
0402(1005)	0.50±0.05	10k	50k	-	-
	0.50 +0.02/-0.05	10k	50k	-	-
	0.50±0.20	10k	-	-	-
0603(1608)	0.50±0.10	4k	-	-	-
	0.80±0.07	4k	15k	-	-
	0.80 +0.15/-0.10	4k	15k	-	-
0805(2012)	0.50±0.10	4k	15k	-	-
	0.60±0.10	4k	15k	-	-
	0.80±0.10	4k	15k	-	-
	0.85±0.10	4k	15k	-	-
	1.25±0.10	-	-	3k	10k
	1.25±0.20	-	-	3k	10k
1206(3216)	0.80±0.10	4k	15k	-	-
	0.85±0.10	4k	15k	-	-
	0.95±0.10	-	-	3k	10k
	1.15±0.15	-	-	3k	10k
	1.25±0.10	-	-	3k	10k
	1.60±0.20	-	-	2k	10k
	1.60 +0.30/-0.10	-	-	2k	9k
1210(3225)	0.85±0.10	-	-	3k	10k
	0.95±0.10	-	-	3k	10k
	1.25±0.10	-	-	3k	10k
	1.60±0.20	-	-	2k	-
	2.00±0.20	-	-	1k	6k
	2.50±0.30	-	-	1k	6k
1808(4520)	1.25±0.10	-	-	2k	10k
	1.60±0.20	-	-	2k	8k
	2.00±0.20	-	-	1k	6k
1812(4532)	1.25±0.10	-	-	1k	5k
	1.60±0.20	-	-	1k	-
	2.00±0.20	-	-	1k	-
	2.50±0.30	-	-	0.5k	3k
	2.80±0.30	-	-	0.5k	-
1825(4563)	1.60±0.20	-	-	1k	-
	2.00±0.20	-	-	1k	-
	2.50±0.30	-	-	0.5k	-
	2.80±0.30	-	-	0.5k	-
2220(5750)	1.60±0.20	-	-	1k	-
	2.00±0.20	-	-	1k	-
	2.50±0.30	-	-	0.5k	-
	2.80±0.30	-	-	0.5k	-
2225(5763)	1.60±0.20	-	-	1k	-
	2.00±0.20	-	-	1k	-
	2.50±0.30	-	-	0.5k	-
	2.80±0.30	-	-	0.5k	-

Unit : pcs

Packaging Dimensions & Part Count

EMBOSSED TAPE DIMENSIONS

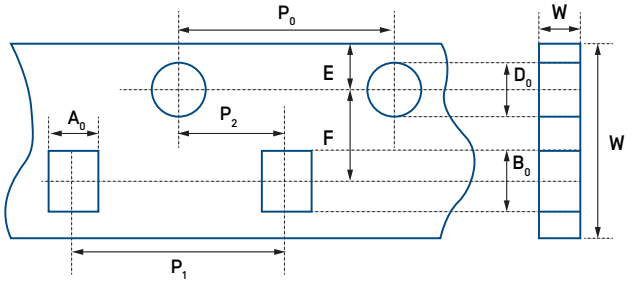


Fig. 9.1 The dimension of paper tape

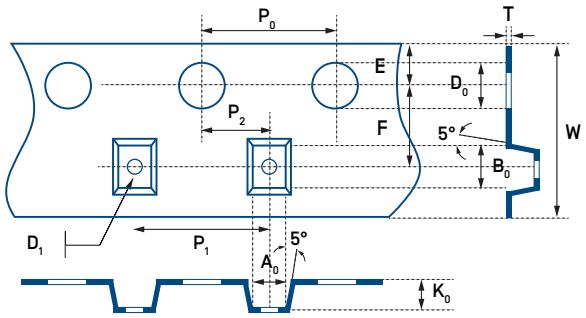


Fig. 9.2 The dimension of plastic tape

Size	01005	0201	0402	0603
Chip Thickness	0.20±0.02	0.50±0.05 0.50±0.10	0.50±0.05 0.50±0.10	0.80±0.07 0.80 +0.15/-0.1
A_0	0.25±0.05	0.40±0.10	0.70±0.20	1.05 ±0.30
B_0	0.45±0.07	0.70±0.10	1.20±0.20	1.80±0.30
T	≤0.50	≤0.55	≤0.80	≤1.20
K_0	-	-	-	-
W	8.00±0.30	8.00±0.30	8.00±0.30	8.00±0.30
P_0	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10
$10xP_0$	40.00±0.10	40.00±0.10	40.00±0.10	40.00±0.20
P_1	2.00±0.05	2.00±0.05	2.00±0.05	4.00±0.10
P_2	2.00±0.05	2.00±0.05	2.00±0.05	2.00±0.05
D_0	1.50+0.1/-0	1.50+0.1/-0	1.50+0.1/-0	1.50+0.1/-0
D_1	-	-	-	-
E	1.75±0.10	1.75±0.10	1.75±0.10	1.75±0.10
F	3.50±0.05	3.50±0.05	3.50±0.05	3.50±0.05
Unit :	mm	mm	mm	mm

Size	0805		1206			1210	
Chip Thickness	0.80±0.10	1.25±0.10 1.25±0.20	0.80±0.10	0.95±0.10 1.25±0.10	1.60±0.20 1.60 +0.30/-0.10	1.25±0.10 1.60±0.20	2.50±0.30
A_0	1.50±0.20	<1.80	2.00±0.10	<2.00	<2.50	<3.05	<3.20
B_0	2.30±0.20	<2.70	3.50±0.50	<3.70	<4.00	<3.80	<4.00
T	0.95±0.05	0.23±0.05	0.95±0.05	0.23±0.05	0.23±0.05	0.23±0.05	0.23±0.05
K_0	-	<2.50	-	<2.50	<2.50	<2.50	<3.50
W	8.00±0.10	8.00±0.10	8.00±0.10	8.00±0.10	8.00±0.10	8.00±0.10	8.00±0.10
P_0	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10
$10xP_0$	40.00±0.20	40.00±0.20	40.00±0.20	40.00±0.20	40.00±0.20	40.00±0.20	40.00±0.20
P_1	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10
P_2	2.00±0.05	2.00±0.05	2.00±0.05	2.00±0.05	2.00±0.05	2.00±0.05	2.00±0.05
D_0	1.50 +0.10/-0	1.50 +0.10/-0	1.50 +0.10/-0	1.50 +0.10/-0	1.50 +0.10/-0	1.50 +0.10/-0	1.50 +0.10/-0
D_1	-	1.00±0.10	-	1.00±0.10	1.50±0.10	1.50±0.10	1.00±0.10
E	1.75±0.05	1.75±0.10	1.75±0.10	1.75±0.10	1.75±0.10	1.75±0.10	1.75±0.10
F	3.50±0.05	3.50±0.05	3.50±0.05	3.50±0.05	5.50±0.05	5.50±0.05	3.50±0.05
Unit :	mm	mm	mm	mm	mm	mm	mm

Packaging Dimensions & Part Count

Size	1808		1812		1825	
Chip Thickness	1.25±0.10 1.60±0.20	2.00±0.20	1.25±0.10 1.60±0.20 2.00±0.20	2.50±0.30 2.80±0.30	1.60±0.20 2.00±0.20	2.50±0.30 2.80±0.30
A_0	<2.50	<2.50	<3.90	<3.90	<6.80	<6.80
B_0	<5.30	<5.30	<5.30	<5.30	<5.30	<5.30
T	0.25±0.05	0.25±0.05	0.25±0.05	0.25±0.05	0.30±0.10	0.30±0.10
K_0	<2.50	<2.50	<2.50	<3.00	<2.50	<3.10
W	12.00±0.20	12.00±0.20	12.00±0.20	12.00±0.20	12.00±0.20	12.00±0.20
P_0	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10
$10xP_0$	40.00±0.20	40.00±0.20	40.00±0.20	40.00±0.20	40.00±0.20	40.00±0.20
P_1	4.00±0.10	4.00±0.10	8.00±0.10	8.00±0.10	8.00±0.10	8.00±0.10
P_2	2.00±0.05	2.00±0.05	2.00±0.05	2.00±0.05	2.00±0.05	2.00±0.05
D_0	1.50 +0.10/-0	1.50 +0.10/-0	1.50 +0.10/-0	1.50 +0.10/-0	1.50 +0.10/-0	1.50 +0.10/-0
D_1	1.50±0.10	1.50±0.10	1.50±0.10	1.50±0.10	1.50±0.10	1.50±0.10
E	1.75±0.10	1.75±0.10	1.75±0.10	1.75±0.10	1.75±0.10	1.75±0.10
F	5.50±0.05	5.50±0.05	5.50±0.05	5.50±0.05	5.50±0.05	5.50±0.05
Unit :	mm	mm	mm	mm	mm	mm

Size	2220		2225	
Chip Thickness	1.40±0.15 1.60±0.20 2.00±0.20	2.50±0.30 2.80±0.30	1.60±0.20 2.00±0.20	2.50±0.30 2.80±0.30
A_0	<5.80	<6.80	<6.80	<6.80
B_0	<6.50	<6.50	<6.50	<6.50
T	0.30±0.10	0.30±0.10	0.30±0.10	0.30±0.10
K_0	<2.50	<3.10	<2.50	<3.10
W	12.00±0.20	12.00±0.20	12.00±0.20	12.00±0.20
P_0	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10
$10xP_0$	40.00±0.20	40.00±0.20	40.00±0.20	40.00±0.20
P_1	8.00±0.10	8.00±0.10	8.00±0.10	8.00±0.10
P_2	2.00±0.05	2.00±0.05	2.00±0.05	2.00±0.05
D_0	1.50 +0.10/-0	1.50 +0.10/-0	1.50 +0.10/-0	1.50 +0.10/-0
D_1	1.50±0.10	1.50±0.10	1.50±0.10	1.50±0.10
E	1.75±0.10	1.75±0.10	1.75±0.10	1.75±0.10
F	5.50±0.05	5.50±0.05	5.50±0.05	5.50±0.05
Unit :	mm	mm	mm	mm

Packaging Dimensions & Part Count

REEL DIMENSIONS

Size	01005	0201, 0402, 0603, 0805, 1206, 1210		1808, 1812, 1825, 2220, 2225
Reel size	7	7	13	7
C	13.0 ±0.05	13.0 +0.5/-0.2	13.0 +0.5/-0.2	13.0 +0.7/-0.3
W1	8.4 +1.5	8.4 +1.5	8.4 +1.5	12.4 +2.0/-0
W	14.4max	14.4max	14.4max	shall accommodate tape width without interference
A	178.0 ±0.20	178.0 ±0.20	330.0 ±1.0	178.0 ±0.20
N	60.0 +1.0/-0	60.0 +1.0/-0	100 ±1.0	60.0 +1.0/-0

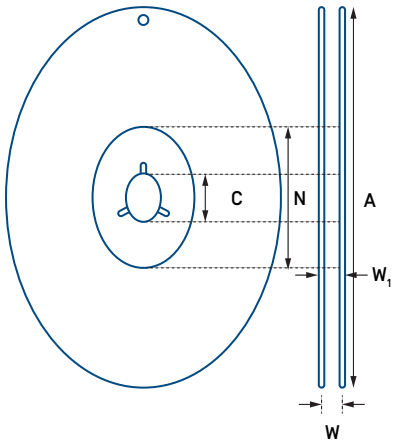


Fig. 9.3 The dimension of reel

Applications Notes

Storage

To prevent the damage of solderability of terminations, the following storage conditions are recommended :

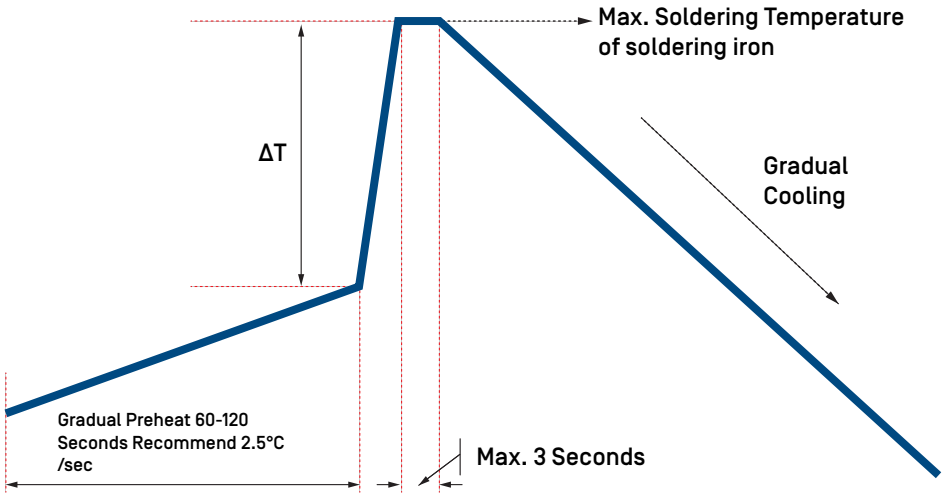
- Indoors under 5 ~ 40°C and 20% ~ 70% RH.
- No harmful gases containing sulfuric acid, ammonia, hydrogen sulfide or chlorine.
- Packaging should not be opened until the capacitors are required for use. If opened, the pack should be re-sealed as soon as is practicable. Taped product should be stored out of direct sunlight, which might promote deterioration in tape or adhesion performance. The product is recommended to be used within 12 months after shipment and checked the solderability before use.

Soldering

Use mildly activated rosin fluxes do not use activated flux. The amount of solder in each solder joint should be controlled to prevent the damage of chip capacitors caused by the stress between solder, chips, and substrate.

a.) Hand soldering :

Fig. 10.1 Hand Soldering Profile



Chip Size	Pre-Heat temp.	ΔT	Max. soldering iron temp.
≤1206	≥150°C	≤150°C	≤350°C
1210~2225	≥150°C	≤130°C	≤280°C

- Soldering iron tip diameter ≤1.0 mm and wattage max. 20W.
- The Capacitors shall be pre-heated and that the temperature gradient between the devices and the tip of the soldering iron.
- The required amount of solder shall be melted on the soldering tip.
- The tip of iron should not contact the ceramic body directly.
- The Capacitors shall be cooled gradually at room temperature after soldering.
- Forced air cooling is not allowed.

Handling

Chip capacitors are dense, hard, brittle, and abrasive materials. They are liable to suffer mechanical damage, in the form of cracks or chips. Chip Capacitors should be handled with care to avoid contamination or damage. To use vacuum or plastic tweezers to pick up or plastic tweezers is recommended for manual placement. Tape and reeled packages are suitable for automatic pick and placement machine.with the ceramic capacitor body or termination.

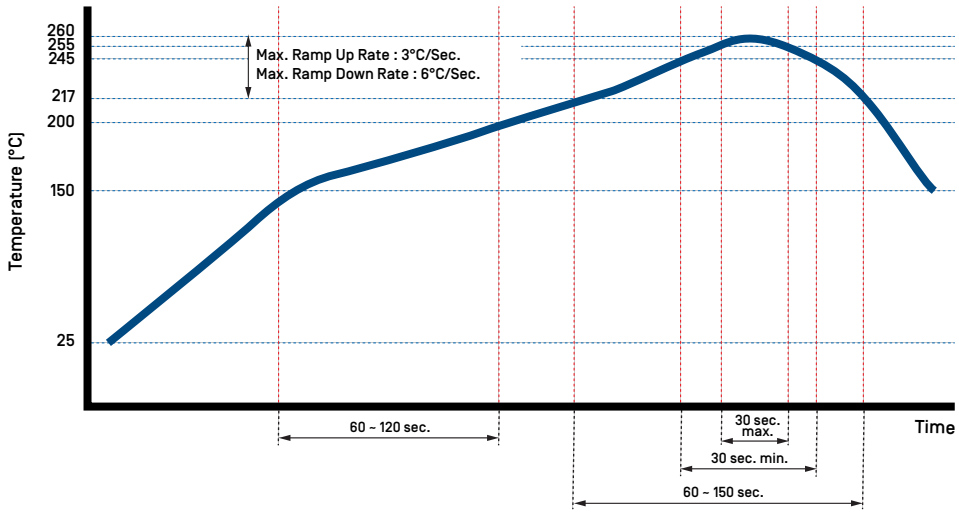
Preheat

- In order to minimize the risk of thermal shock during soldering, a carefully controlled preheat is required.
- The rate of preheat should not exceed 3°C per second.

Applications Notes

b.) Reflow soldering :

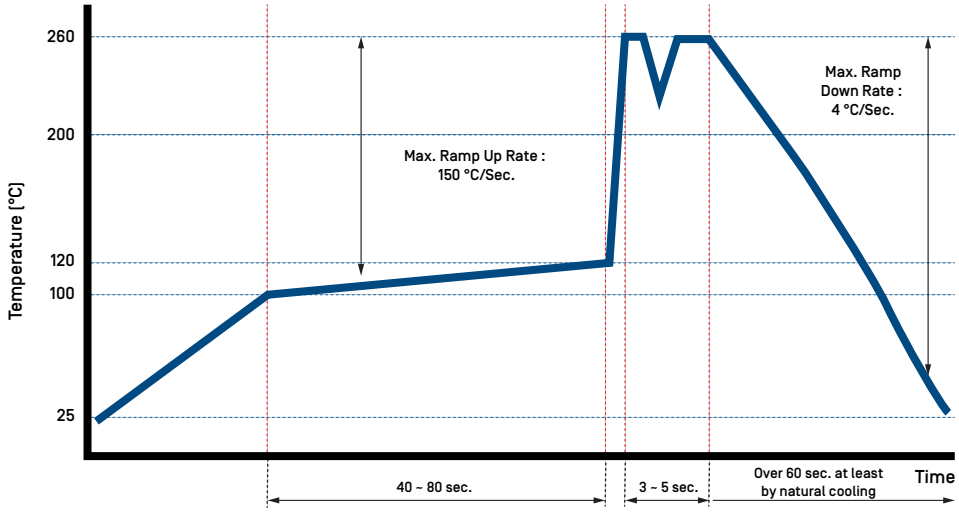
Fig. 10.2 Reflow soldering profile



For Sn/Ag/Cu Series solder paste (Pb-Free)

c.) Wave soldering :

Fig. 10.3 Wave soldering profile



For Sn/Ag/Cu Series solder paste (Pb-Free)

Soldering conditions :

Class I :

Size Inch (mm)	Temper. Cher.	Capacitance	Condition	
			Wave	Reflow
≤0402 (1005)	Class I	All	X	○
0603 (1608)	Class I	All	○	○
0805 (2012)	Class I	All	○	○
1206 (3216)	Class I	All Thickness >0.95mm	○	○
≥1210 (3225)	Class I	All	X	○
Coating Products	All	mm	X	○

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Applications Notes

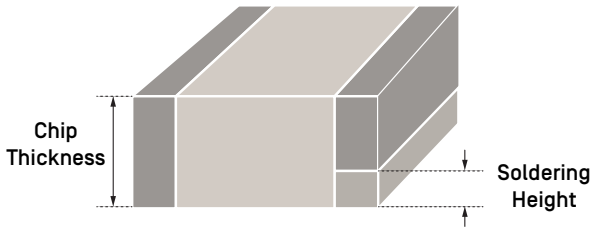
Soldering conditions :

Class I :

Size Inch (mm)	Temper. Cher.	Capacitance	Condition	
			Wave	Reflow
≤0402 (1005)	Class II	All	X	○
0603 (1608)	Class II	Cap. <2.2μF	○	○
		Cap. ≥2.2μF	X	○
0805 (2012)	Class II	Thickness ≤ 0.95mm	○	○
		Thickness > 0.95mm	X	○
1206 (3216)	Class II	Thickness ≤ 0.95mm	○	○
		Thickness > 0.95mm	X	○
≥1210 (3225)	Class II	All	X	○
Coating Products	All	All	X	○

Soldering height :

The solder climbing minimum height is suggesting to 25% of chip thickness or 500um whichever is less. (Reference from IPC-610E)



Cooling

After soldering, cool the chips and the substrate gradually to room temperature. Natural cooling in air is recommended to minimize stress in the solder joint.

Cleaning

All flux residues must be removed by using suitable electronic-grade vapor-cleaning solvents to eliminate contamination that could cause electrolytic surface corrosion. Good results can be obtained by using ultrasonic cleaning of the solvent. The choice of the proper system is depends upon many factors such as component mix, flux, and solder paste and assembly method. The ability of the cleaning system to remove flux residues and contamination from under the chips is very important.

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