

1. FEATURES

- a. High Voltage in a given case size.
- b. High reliability and stability.
- c. RoHS Compliant

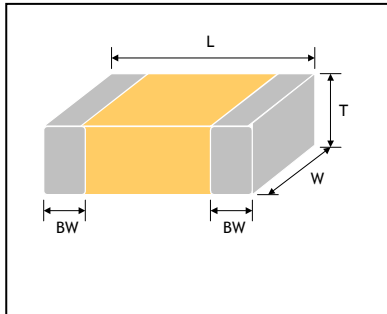
2. APPLICATIONS

- a. DC to DC converter.
- b. High voltage coupling/DC blocking.
- c. Back-lighting inverters.
- d. Sunbbers in high frequency power convertors.

3.HOW TO ORDER

<u>M</u>	<u>0805</u>	<u>B</u>	<u>102</u>	<u>K</u>	<u>101</u>	<u>B</u>	<u>D</u>
Type	Size	Dielectric	Capacitance	Tolerance	Rated voltage	Thickness	Packaging
	Inch (mm) 0402 (1005) 0603 (1608) 0805 (2012) 1206 (3216) 1210 (3225) 1808 (4520) 1812 (4532) 1825 (4563) 2220 (5750) 2225 (5763)	N: C0G(NPO) B: X7R Y: Y5V	Two significant digits followed by no. of zeros. And R is in place of decimal point. eg.: R47=0.47pF 0R5=0.5pF 1R0=1.0pF 100=10x10 ⁰ =10pF	B =±0.1pF C =±0.25pF D =±0.5pF F =±1% G =±2% J =±5% K =±10% M =±20% Z =-20/+80%	Two significant digits followed by no. of zeros. And R is in place of decimal point. 201 = 200 VDC 251 = 250 VDC 501 = 500 VDC 631 = 630 VDC	N : 0.50 ± 0.05mm A : 0.60 ± 0.10mm S : 0.80 ± 0.10mm X : 0.80 ± 0.20mm B : 0.85 ± 0.15mm C : 0.95±0.10mm D : 1.25 ± 0.10mm I : 1.25 ± 0.20mm G : 1.60 ± 0.20mm K : 2.00 ± 0.20mm M : 2.50 ± 0.30mm U : 2.80 ± 0.30mm	K=0.5kpcs/ reel A=1kpcs/ reel B=2kpcs/ reel C=3kpcs/ reel D=4kpcs/ reel I=10kpcs/ reel

4. EXTERNAL DIMENSIONS



Size	L (mm)	W (mm)	Tmax (mm)	BW min (mm)
0402 (1005)	1.00±0.05	0.50±0.05	0.55	0.15
0603 (1608)	1.60±0.15	0.80±0.15	0.95	0.20
0805 (2012)	2.00±0.20	1.25±0.20	1.45	0.30
1206 (3216)	3.20±0.20	1.60±0.20	1.80	0.30
	3.20+0.3/-0.1	1.60+0.3/0.1	1.90	
1210 (3225)	3.20±0.40	2.50±0.30	2.80	0.30
1808 (4520)	4.50±0.40	2.00±0.20	2.20	0.26
1812 (4532)	4.50±0.40	3.20±0.30	2.80	0.26
1825 (4563)	4.50±0.40	6.30±0.40	2.80	0.30
2220 (5750)	5.70±0.40	5.00±0.40	3.10	0.30
2225 (5763)	5.70±0.40	6.30±0.40	3.10	0.30

5. GENERAL ELECTRICAL DATA

Dielectric	C0G(NPO)	X7R	Y5V
Size	0402, 0603, 0805, 1206, 1210, 1808, 1812	0603, 0805, 1206, 1210, 1808, 1812, 1825, 2220, 2225	0805, 1206, 1210, 1812
Capacitance range*	0.5pF to 39.0nF	100pF to 1.0µF	10nF to 1.0µF
Capacitance tolerance	Cap≤5pF: B (±0.1pF), C (±0.25pF) 5pF<Cap<10pF: C (±0.25pF), D (±0.5pF) Cap≥10pF: F (±1%), G (±2%), J (±5%), K (±10%)	J (±5%), K (±10%), M (±20%)	Z (-20/+80%)
Rated voltage (WVDC)	100V, 200V, 250V, 500V, 630V	100V, 200V, 250V, 500V, 630V	100V, 200V, 250V
Tan δ*	Cap<30pF: Q≥400+20C Cap≥30pF: Q≥1000	≤2.5% (Apply 1.0±0.2Vrms, 1.0KHz±10%)	≤5%
Insulation resistance at Ur**	≥100GΩ or R•C≥1000 whichever is smaller	≥10GΩ or R•C≥100Ω•F whichever is smaller	
Operating temperature	-55 to +125°C		-25 to +85°C
Capacitance characteristic	±30ppm / °C	±15%	+30/-80%
Termination	Cu (or Ag)/Ni/Sn (lead-free termination)		

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

C0G(NPO): 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: Apply 1.0±0.2Vrms, 1.0kHz±10%, at 25°C ambient temperature.

Y5V: Apply 1.0±0.2Vrms, 1.0kHz±10%, at 20°C ambient temperature.

**Measured at 500VDC for 60 sec, for UR>500VDC

6.CAPACITANCERANGE

DIELECTRIC		NPO																					
SIZE	0402		0603		0805				1206				1210				1808		1812				
RATED VOLTAGE (VCD)	200	250	200	250	200	250	500	630	200	250	500	630	200	250	500	630	500	630	200	250	500	630	
Capacitance	0.5pF(0R5)	N	N	S	S	A	A	A	A														
	1.0pF(1R0)	N	N	S	S	A	A	A	A														
	1.2pF (1R2)	N	N	S	S	A	A	A	A														
	1.5pF (1R5)	N	N	S	S	A	A	A	A	B	B	B	B										
	1.8pF (1R8)	N	N	S	S	A	A	A	A	B	B	B	B					D	D				
	2.2pF (2R2)	N	N	S	S	A	A	A	A	B	B	B	B					D	D				
	2.7pF (2R7)	N	N	S	S	A	A	A	A	B	B	B	B					D	D				
	3.3pF (3R3)	N	N	S	S	A	A	A	A	B	B	B	B					D	D				
	3.9pF (3R9)	N	N	S	S	A	A	A	A	B	B	B	B					D	D				
	4.7pF (4R7)	N	N	S	S	A	A	A	A	B	B	B	B					D	D				
	5.6pF (5R6)	N	N	S	S	A	A	A	A	B	B	B	B					D	D				
	6.8pF (6R8)	N	N	S	S	A	A	A	A	B	B	B	B					D	D				
	8.2pF (8R2)	N	N	S	S	A	A	A	A	B	B	B	B					D	D				
	10pF (100)	N	N	S	S	A	A	A	A	B	B	B	B	C	C	C	C	D	D	D	D	D	D
	12pF (120)	N	N	S	S	A	A	A	A	B	B	B	B	C	C	C	C	D	D	D	D	D	D
	15pF (150)	N	N	S	S	A	A	A	A	B	B	B	B	C	C	C	C	D	D	D	D	D	D
	18pF (180)	N	N	S	S	A	A	A	A	B	B	B	B	C	C	C	C	D	D	D	D	D	D
	20pF (200)	N	N	S	S	A	A	A	A	B	B	B	B	C	C	C	C	D	D	D	D	D	D
	22pF (220)	N	N	S	S	A	A	A	A	B	B	B	B	C	C	C	C	D	D	D	D	D	D
	27pF (270)	N	N	S	S	A	A	A	A	B	B	B	B	C	C	C	C	D	D	D	D	D	D
	33pF (330)	N	N	S	S	A	A	A	A	B	B	B	B	C	C	C	C	D	D	D	D	D	D
	39pF (390)	N	N	S	S	A	A	A	A	B	B	B	B	C	C	C	C	D	D	D	D	D	D
	47pF (470)	N	N	S	S	A	A	A	A	B	B	B	B	C	C	C	C	D	D	D	D	D	D
	56pF (560)	N	N	S	S	A	A	A	A	B	B	B	B	C	C	C	C	D	D	D	D	D	D
	68pF (680)	N		S	S	A	A	A	A	B	B	B	B	C	C	C	C	D	D	D	D	D	D
	82pF (820)	N		S	S	A	A	A	A	B	B	B	B	C	C	C	C	D	D	D	D	D	D
	100pF (101)	N		S	S	A	A	A	A	B	B	B	B	C	C	C	C	D	D	D	D	D	D
	120pF (121)			S	S	A	B	D	D	B	B	B	B	C	C	C	C	D	D	D	D	D	D
	150pF (151)			S	S	B	D	D	D	B	B	B	B	C	C	C	C	D	D	D	D	D	D
	180pF (181)			S	S	B	D	D	D	B	B	B	B	C	C	C	C	D	D	D	D	D	D
	220pF (221)			S	S	D	D	D	D	B	B	B	B	C	C	C	C	D	D	D	D	D	D
	270pF (271)			X	X	D	D	D	D	B	C	C	C	C	C	C	C	K	K	D	D	D	D
	330pF (331)			X	X	D	D	D	D	B	C	C	C	C	C	C	C	K	K	D	D	D	D
	390pF (391)			X	X	D	D	D	D	B	C	C	C	C	C	C	C	K	K	D	D	D	D
	470pF (471)			X	X	D	D	I	I	C	C	C	C	C	C	C	C	K	K	D	D	D	D
	560pF (561)			X	X	D	D	I	I	C	C	C	C	C	C	C	C	K	K	D	D	D	D
	680pF (681)					D	D	I	I	C	D	D	D	C	C	C	C	K	K	D	D	D	D
	820pF (821)					D	D	I	I	C	D	D	D	C	C	C	C	K	K	D	D	D	D
	1,000pF(102)					D	D	I	I	C	G	G	G	D	D	D	D	K	K	D	D	D	D
	1,200pF (122)					D	D			C	G	G	G	D	D	D	D	K	K	D	D	D	D
1,500pF (152)					D	D			D	G	G	G	D	D	D	D	K	K	D	D	D	D	
1,800pF (182)					D	D			D	G	G	G	D	D	D	D	K	K	D	D	D	D	
2,200pF (222)					D	D			D	G	G	G	D	D	D	D	K	K	D	D	D	D	
2,700pF (272)									D	G			D	D	D	D			D	D	D	D	
3,300pF (332)									D	G			D	D	D	D			D	D	D	D	
3,900pF (392)									D	G			D	D	D	D			D	D	D	D	
4,700pF (472)									D	G			G	G					D	D	D	D	
5,600pF (562)													G	G					D	D	D	D	
6,800pF (682)													G	G					D	D	D	D	
8,200pF (822)													G	G							D	D	
0.010μF (103)													G	G							D	D	
0.022μF (223)													M	M							K	K	
0.033μF (333)													M	M							M	M	

DIELECTRIC	X7R																									
	SIZE	0603				0805				1206				1210				1808		1812						
	RATED VOLTAGE	200	250	200	250	500	630	200	250	400	450	500	630	200	250	400	450	500	630	500	630	200	250	500	630	
Capacitance	100pF (101)	X	X	B	B	B	B	D	D			D	D	D	D			D	D							
	120pF (121)	X	X	B	B	B	B	D	D			D	D	D	D			D	D							
	150pF (151)	X	X	B	B	B	B	D	D			D	D	D	D			D	D	D	D					
	180pF (181)	X	X	B	B	B	B	D	D			D	D	D	D			D	D	D	D					
	220pF (221)	X	X	B	B	B	B	D	D			D	D	D	D			D	D	D	D					
	270pF (271)	X	X	B	B	B	B	D	D			D	D	D	D			D	D	D	D					
	330pF (331)	X	X	B	B	B	B	D	D			D	D	D	D			D	D	D	D					
	390pF (391)	X	X	B	B	B	B	D	D			D	D	D	D			D	D	D	D					
	470pF (471)	X	X	B	B	B	B	D	D			D	D	D	D			D	D	D	D					
	560pF (561)	X	X	B	B	B	B	D	D			D	D	D	D			D	D	D	D					
	680pF (681)	X	X	B	B	B	B	D	D			D	D	C	C			D	D	D	D					
	820pF (821)	X	X	B	B	B	B	D	D			D	D	C	C			D	D	D	D					
	1,000pF (102)	X	X	B	B	B	B	D	D			D	D	C	C			D	D	D	D	D	D	D	D	D
	1,200pF (122)	X	X	B	B	B	B	D	D			D	D	C	C			D	D	D	D	D	D	D	D	D
	1,500pF (152)	X	X	B	B	B	B	D	D			D	D	C	C			D	D	D	D	D	D	D	D	D
	1,800pF (182)	X	X	B	B	B	B	D	D			D	D	C	C			D	D	D	D	D	D	D	D	D
	2,200pF (222)	X	X	B	B	B	B	D	D			D	D	C	C			D	D	D	D	D	D	D	D	D
	2,700pF (272)	X	X	B	B	B	B	D	D			D	D	C	C			D	D	D	D	D	D	D	D	D
	3,300pF (332)	X	X	B	B	B	B	D	D			D	D	C	C			D	D	D	D	D	D	D	D	D
	3,900pF (392)	X	X	B	B	B	B	D	D			D	D	C	C			D	D	D	D	D	D	D	D	D
	4,700pF (472)	X	X	B	B	D	D	D	D			D	D	C	C			D	D	D	D	D	D	D	D	D
	5,600pF (562)	X	X	D	D	D	D	D	D			D	D	C	C			D	D	K	K	D	D	D	D	D
	6,800pF (682)	X	X	D	D	D	D	D	D			D	D	C	C			D	D	K	K	D	D	D	D	D
	8,200pF (822)	X	X	D	D	D	D	D	D			D	D	C	C			D	D	K	K	D	D	D	D	D
	0.010µF (103)	X	X	D	D	D	D	D	B/D			D	D	C	C			D	D	K	K	D	D	D	D	D
	0.012µF (123)			D	D	D	D	D	D			D	D	C	C			D	D	K	K	D	D	D	D	D
	0.015µF (153)			D	D	D	D	D	D			D	D	C	C			D	D	K	K	D	D	D	D	D
	0.018µF (183)			D	D	D	D	D	D			D	D	C	C			D	D	K	K	D	D	D	D	D
	0.022µF (223)			D	D	D	D	D	D			G	G	C	C			D	D	K	K	D	D	D	D	D
	0.027µF (273)			D	D			D	D			G	G	C	C			G	G	K	K	D	D	D	D	D
	0.033µF (333)			D	D			G	G			G	G	C	C			G	G	K	K	D	D	D	D	D
	0.039µF (393)			D	D			G	G			G	G	C	C			G	G	K	K	D	D	D	D	D
	0.047µF (473)			D	D			G	G			G	G	D	D			G	G	K	K	D	D	D	D	D
	0.056µF (563)			D	D			G	G			G	G	D	D			G	G	K	K	D	D	K	K	K
	0.068µF (683)			D	D			G	G	G	G			G	G			K	K	K	K	D	D	K	K	K
	0.082µF (823)			D				G	G	G	G			G	G			K	K	K	K	D	D	K	K	K
	0.10µF (104)			D				G	G	G	G			G	G			K	K			D	D	K	K	K
	0.12µF (124)							G	G					G	G	M	M	M	M			D	D	M	M	M
	0.15µF (154)							G	G					M	M	M	M	M	M			K	K	M	M	M
	0.18µF (184)							G	G					M	M	M	M					K	K	M	M	M
0.22µF (224)							G	G					M	M	M	M					K	K	M	M	M	
0.27µF (274)													M	M	M	M					K	K	M			
0.33µF (334)													M	M	M	M					K	K	M			
0.39µF (394)													M	M							K	K	M			
0.47µF (474)													M	M							K	K	M			
0.56µF (564)													M	M							M	M				
0.68µF (684)													M	M							M	M				
0.84µF (844)																					M	M				
1.0µF (105)																					M	M				

7.APPLICATION 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 capacitors should be used within 6 months and checked the solderability before use.

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.

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 4°C per second and the final preheat temperature should be within 100°C of the soldering temperature for small chips such as 0402, 0603, 0805 and 1206, within 50°C of the soldering temperature for bigger chips such as 1210, 1808, 1812, 1825, 2220 and 2225, etc.

SOLDERING

Use mildly activated rosin RA and RMA 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.

Hand soldering with temperature-controlled iron not exceeding 30 watts and diameter of tip less than 1.2 mm is recommended, tip of iron should not contact the ceramic body directly, and the temperature of iron should be set to not more than 260°C.

For bigger chips such as 1210, 1808, 1812, 2220 and 2225, etc. wave soldering and hand soldering are not recommended.

Refer IPC/JEDEC J-STD-020D Method recommended soldering profiles :

Reflow not sooner than 15 minutes and not longer than 4 hrs after removal from the temperature/humidity chamber, subject the sample to 3 cycle of the appropriate reflow conditions as defined as blow Table description.

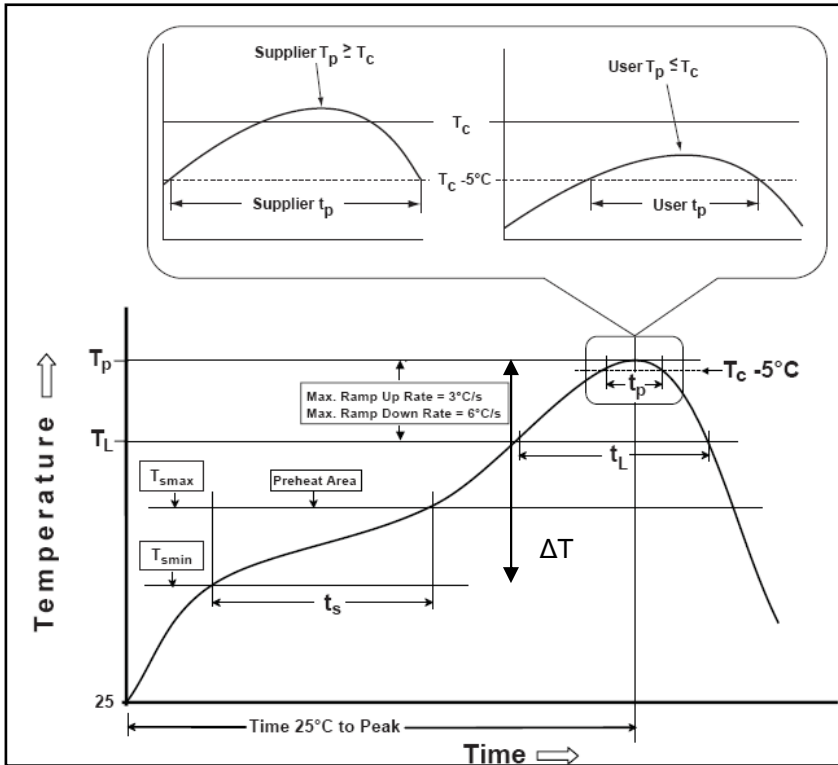
Profile Feature	Pb-Free Assembly
Preheat/Soak	
Temperature Min.(T _{smin})	150°C
Temperature Max.(T _{smax})	200°C
Time(t _s) from (T _{smin} to T _{smax})	60 to 120 seconds
Ramp-up rate(T _L to T _p)	3°C/second max.
Liquidous temperature(T _L)	217°C
Time(t _L) maintained above T _L	60 to 150 seconds
Peak package body temperature(T _p)	For user T _p must not exceed the Classification temp 260°C For suppliers T _p must equal or exceed the Classification temp 260°C
Time(T _p)* within 5°C of the specified classification temperature(T _c)	30* second
Ramp-down rate (T _p to T _L)	6°C/second max.
Time 25°C to peak temperature 260°C	8 minutes max.

Lead-free : Soldering temperature = 235 to 260°C, depending on product.

Maximum temperature = Minimum temperature (235°C)+ ΔT + Tolerance for oven process and measurement(5 ~ 7°C)

Time at peak temperature = 10sec, Dwell above 217°C = 90sec, Ramping rate = 3°C/sec(heating) and 6°C/sec(heating).

Classification Reflow Profiles



Chip Size	ΔT
0402,0603,0805,1206	100 °C
1210, 1808, 1812, 2211, 2220, 2225	50 °C

Soldering	Solder Temp.(Tc)	Soldering Time (tp)
Reflow	235 – 260 °C	< 15 sec.
Wave	230 – 260 °C	< 5 sec.

Note : For example , T_c is 260°C and time tp is 15sec.
for user : The peak temperature must not exceed 260°C . The time above 255°C must not exceed 15 seconds.

COOLING

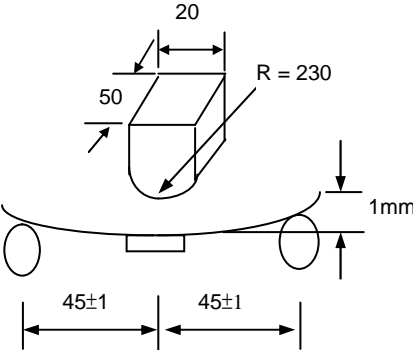
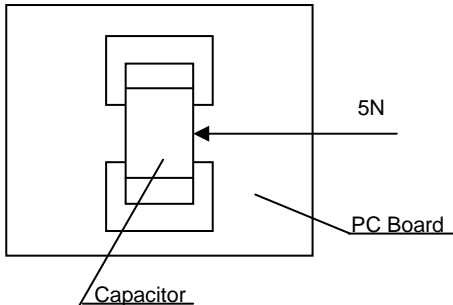
After soldering, cool the chips and the substrate gradually to room temperature. Natural cooling in air is recommended to minimize stress in the solder joint. A cooling rate not exceeding 4°C per second should be used when forced cooling is necessary.

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.

8.RELIABILITY TEST CONDITIONS AND REQUIREMENTS

No.	Item	Test Condition	Requirements																
1.	Visual and Dimensions	---	* No remarkable defect. * Dimensions to confirm to individual specification sheet.																
2.	Capacitance	Class I: C0G(NP0)	* Shall not exceed the limits given in the detailed spec.																
3.	Q/ D.F. (Dissipation Factor)	Cap≤1000pF, 1.0±0.2Vrms, 1MHz±10% Cap>1000pF, 1.0±0.2Vrms, 1KHz±10% Class II: (X7R, Y5V) 1.0±0.2Vrms, 1KHz±10%	C0G(NP0): Cap≥30pF, Q≥1000; Cap<30pF, Q≥400+20C X7R: ≤2.5% Y5V: ≤5.0%																
4.	Temperature Coefficient	With no electrical load. <table border="1"> <thead> <tr> <th>T.C.</th> <th>Operating Temp</th> </tr> </thead> <tbody> <tr> <td>C0G(NP0)</td> <td>-55~125°C at 25°C</td> </tr> <tr> <td>X7R</td> <td>-55~125°C at 25°C</td> </tr> <tr> <td>Y5V</td> <td>-25~85°C at 20°C</td> </tr> </tbody> </table>	T.C.	Operating Temp	C0G(NP0)	-55~125°C at 25°C	X7R	-55~125°C at 25°C	Y5V	-25~85°C at 20°C	<table border="1"> <thead> <tr> <th>T.C.</th> <th>Capacitance Change</th> </tr> </thead> <tbody> <tr> <td>C0G(NP0)</td> <td>Within ±30ppm/°C</td> </tr> <tr> <td>X7R</td> <td>Within ±15%</td> </tr> <tr> <td>Y5V</td> <td>Within +30%/-80%</td> </tr> </tbody> </table>	T.C.	Capacitance Change	C0G(NP0)	Within ±30ppm/°C	X7R	Within ±15%	Y5V	Within +30%/-80%
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5.	Insulation Resistance	U _R =100V: To apply voltage at U _R for max. 120 sec. U _R >100V: To apply voltage at U _R (500V max.) for 60 sec.	≥10GΩ or RxC≥100Ω-F whichever is smaller.																
6.	Dielectric Strength	* To apply voltage: 100V =2.5 times of U _R 200V/250V =2 times of U _R 500V/630V =1.5 times of U _R * Duration: 1 to 5 sec.	* No evidence of damage or flashover during test.																
7.	Solderability	* Solder temperature: 235±5°C * Dipping time: 2±0.5 sec.	95% min. coverage of all metalized area.																
8.	Resistance to Soldering Heat	* 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): Perform 150+0/-10°C for 1 hr and then set for 48±4 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).	* No remarkable damage. * Cap change: C0G(NP0): within ±2.5% or ±0.25pF whichever is larger. X7R: within ±7.5% Y5V: within ±20% * Q/D.F.: C0G(NP0) / X7R / Y5V : ≤ 1.0 × Initial requirement * 25% max. leaching on each edge.																
9.	Temperature Cycle	* Conduct the five cycles according to the temperatures and time. <table border="1"> <thead> <tr> <th>Step</th> <th>Temp. (°C)</th> <th>Time (min.)</th> </tr> </thead> <tbody> <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>2~3</td> </tr> <tr> <td>3</td> <td>Max. operating temp. +3/-0</td> <td>30±3</td> </tr> <tr> <td>4</td> <td>Room temp.</td> <td>2~3</td> </tr> </tbody> </table> * Before initial measurement (Class II only): Perform 150+0/-10°C for 1 hr and then set for 48±4 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).	Step	Temp. (°C)	Time (min.)	1	Min. operating temp. +0/-3	30±3	2	Room temp.	2~3	3	Max. operating temp. +3/-0	30±3	4	Room temp.	2~3	* No remarkable damage. * Cap change : C0G(NP0): within ±2.5% or ±0.25pF whichever is larger. X7R: within ±7.5% Y5V: within ±20% * Q/D.F.: C0G(NP0) / X7R / Y5V : ≤ 1.0 × Initial requirement * I.R. ≥ 0.25 × initial requirements.	
Step	Temp. (°C)	Time (min.)																	
1	Min. operating temp. +0/-3	30±3																	
2	Room temp.	2~3																	
3	Max. operating temp. +3/-0	30±3																	
4	Room temp.	2~3																	
10.	Humidity (Damp Heat) Load	* Test temp.: 40±2°C * Humidity: 90~95%RH * Test time: 500+24/-0 hrs. * To apply voltage : rated voltage (Max. 500V) * Measurement to be made after keeping at room temp. for 24±2 hrs. (Class I) or 48±4 hrs. (Class II).	* No remarkable damage. * Cap change: NP0: within ±7.5% or ±0.75pF whichever is larger. X7R: within ±12.5% Y5V: within ±30% * Q/D.F. value: NP0: Cap≥30pF, Q≥200; Cap<30pF, Q≥100+10/3C X7R: ≤3.0% Y5V: ≤7.5% * I.R.: ≥500MΩ or RxC≥25Ω-F whichever is smaller.																

No.	Item	Test Condition	Requirements																						
11.	High Temperature Load (Endurance)	<p>* Test temp.: C0G(NPO), X7R: 125±3°C Y5V: 85±3°C</p> <p>* To apply voltage: (1) $U_R \leq 250V$: 200% of rated voltage. Exception item:</p> <table border="1"> <thead> <tr> <th>U_R</th> <th>Size</th> <th>Cap</th> <th>Voltage</th> </tr> </thead> <tbody> <tr> <td rowspan="3">100V</td> <td>0805</td> <td>≥ 124</td> <td rowspan="6">1.5 times of U_R</td> </tr> <tr> <td>1206</td> <td>≥ 105</td> </tr> <tr> <td>1210</td> <td>≥ 105</td> </tr> <tr> <td rowspan="4">200V and 250V</td> <td>1210</td> <td>> 224</td> </tr> <tr> <td>1812</td> <td>> 474</td> </tr> <tr> <td>1825</td> <td rowspan="2">≥ 105</td> </tr> <tr> <td>2220</td> </tr> <tr> <td>2225</td> <td>≥ 105</td> </tr> </tbody> </table> <p>(2) $250 < U_R \leq 500V$: 150% of rated voltage. (3) $U_R > 500V$: 120% of rated voltage. (4) 1206, NPO $\geq 1.5pF$: 100% of rated voltage.</p> <p>* Test time: 1000+24/-0 hrs. * Measurement to be made after keeping at room temp. for 24±2 hrs (Class I) or 48±4 hrs (Class II).</p>	U_R	Size	Cap	Voltage	100V	0805	≥ 124	1.5 times of U_R	1206	≥ 105	1210	≥ 105	200V and 250V	1210	> 224	1812	> 474	1825	≥ 105	2220	2225	≥ 105	<p>* No remarkable damage.</p> <p>* Cap change: C0G(NPO) : within ±3% or ±0.3pF whichever is larger X7R : within ±12.5% Y5V : within ±30%</p> <p>* Q/D.F Value: C0G(NPO): Cap\geq30pF :Q\geq350; 10pF\leqCap$<$30pF :Q\geq275+2.5C; Cap$<$10pF :Q\geq200+10C</p> <p>X7R: \leq3.0% Y5V: \leq7.5%</p> <p>* I.R.: \geq1GΩ or Rx$C \geq$50Ω-F whichever is smaller.</p>
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12.	Resistance to Flexure of Substrate	<p>* The middle part of substrate shall be pressurized by means of the pressurizing rod at a rate of about 1mm per second until the deflection becomes 1mm.</p> 	<p>* No remarkable damage.</p> <p>* Cap change: C0G(NPO): within ±5.0% or ±0.5pF whichever is larger. X7R: within ±12.5% Y5V: within ±30%</p> <p>(This capacitance change means the change of capacitance under specified flexure of substrate from the capacitance measured before the test.)</p>																						
13.	Adhesive Strength of Termination	<p>* Capacitors mounted on a substrate. A force of 5N(\leq 0603) or 10N($>$ 0603) applied perpendicular to the place of substrate and parallel the line joining the center of terminations for 10±1 second.</p> 	<p>* No remarkable damage or removal of the terminations.</p>																						
14.	Vibration Resistance	<p>* Vibration frequency: 10~55 Hz/min. * Total amplitude: 1.5mm * Test time: 6 hrs. (Two hrs each in three mutually perpendicular directions.)</p>	<p>* No remarkable damage. * Cap change and Q/D.F.: To meet initial spec.</p>																						