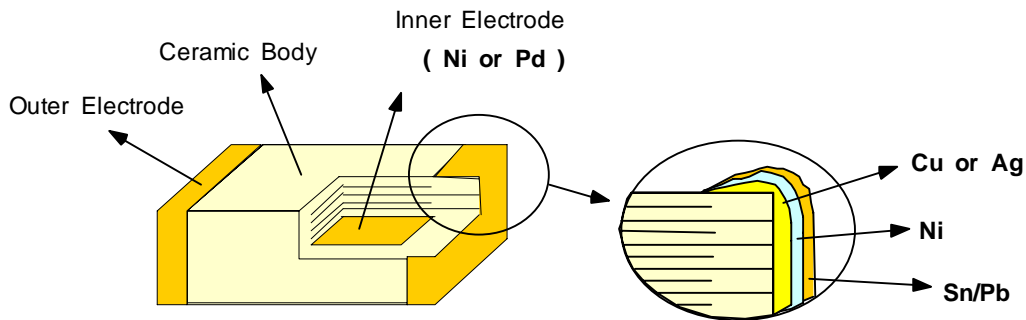


FEATURE



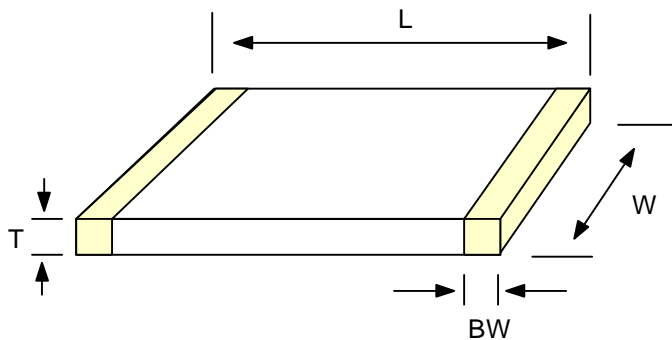
- Miniature Size
- Highly Reliable Performance in High-Voltage
- Industry Standard Size
- Tape & Reel for Surface Mount Assembly

PART NUMBER CODE

CL 21 C 101 J D N C
 (1) (2) (3) (4) (5) (6) (7) (8)

- (1) SAMSUNG Multilayer Ceramic Chip Capacitor
- (2) Type(Size)
- (3) Capacitance Temperature Characteristics
- (4) Nominal Capacitance
- (5) Capacitance Tolerance
- (6) Rated Voltage
- (7) Chip thickness
 - **N** : standard thickness
 - **A** : thinner than N
 - **B** : thicker than N
- (8) Packaging Type

CONFIGURATION AND DIMENSIONS



CODE	EIA CODE	DIMENSION (mm)			
		L	W	T (MAX)	BW
21	0805	2.0 +/- 0.1	1.25 +/- 0.1	1.25 +/- 0.1	0.5+0.2/-0.3
31	1206	3.2 +/- 0.2	1.6 +/- 0.2	1.6 +/- 0.2	0.5+0.2/-0.3
32	1210	3.2 +/- 0.3	2.5 +/- 0.2	2.5 +/- 0.2	0.6 +/- 0.3
43	1812	4.5 +/- 0.4	3.2 +/- 0.3	2.5 +/- 0.2	0.8 +/- 0.3
55	2220	5.7 +/- 0.4	5.0 +/- 0.3	2.5 +/- 0.3	1.0 +/- 0.3

CAPACITANCE TEMPERATURE CHARACTERISTIC

@ CLASS I (Temperature Compensation)

Temperature Characteristics	below 2.0pF	2.2 ~ 3.9pF	above 4.0pF	above 10pF
C Δ	CK	CJ	CH	CG/CH

K : +/-250 PPM/C J : +/-120 PPM/C H : +/-60 PPM/C G : +/-30 PPM/C

@ CLASS II (High Dielectric Constant)

Symble	EIA Code	Capacitance Change (Δ C : %)	Operation Temperature Range
B	X7R	+/- 15	-55 ~ +125°C
F	Y5V	+22 ~ -82	-30 ~ +85°C

NOMINAL CAPACITANCE

The value of nominal capacitance is expressed in pico-Farad(pF) with a three-digit number.

The first two digits denote significant figures and the last digit denotes the multiple of 10 in pF.

For values below 1pF, the letter "R" is used as the decimal point and the last digit becomes significant.

example 100 = 10 x 10⁰ = 10pF 222 = 22 x 10² = 2200pF
 020 = 2 x 10⁰ = 2pF 1R5 = 1.5pF

CAPACITANCE TOLERANCE

Temperature Characteristics	Symbol	Tolerance	Applicable Capacitance & Range
COG(NPO) or T.C Series	B	+/- 0.1pF	0.5 ~ 3pF
	C	+/- 0.25pF	0.5 ~ 10pF
	D	+/- 0.5pF	
	F	+/- 1.0pF	
	F	+/- 1%	E-24 Series for over 10pF
	*G	+/- 2%	
	J	+/- 5%	
K	+/- 10%		
B(X7R)	J	+/- 5%	E-12 Series
	K	+/- 10%	
	M	+/- 20%	

Please Consult us for special tolerances. * : Option

RATED VOLTAGE

Symbol	Rated Voltage(Vdc)
D	200V
E	250V
G	500V
H	630V
I	1000V
J	2000V
K	3000V

PACKAGING TYPE

Symbol	Packaging
B	Bulk
E	Embossed Tape, 7" Reel
F	Embossed Tape, 13" Reel

STANDARD CAPACITANCE STEP

Series	Capacitance Step											
	1.0				2.2				4.7			
E- 3	1.0				2.2				4.7			
E- 6	1.0	1.5	2.2	3.3	4.7	6.8						
E-12	1.0	1.2	1.5	1.8	2.2	2.7	3.3	3.9	4.7	5.6	6.8	8.2
E-24	1.0	1.2	1.5	1.8	2.2	2.7	3.3	3.9	4.7	5.6	6.8	8.2
	1.1	1.3	1.6	2.0	2.4	3.0	3.6	4.3	5.1	6.2	7.5	9.1

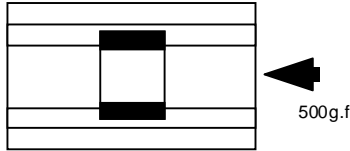
Standard Capacitance is " Each step x 10ⁿ "

Multilayer Chip Capacitors – High Voltage

CAPACITANCE Vs CHIP THICKNESS STANDARD

Description		2012 Type (0805)		3216 Type (1206)			3225 Type (1210)				4532 Type (1812)				5750 Type (2220)	
Dimension (mm)	L	2.0+/-0.1		3.2+/-0.2			3.2+/-0.3				4.5+/-0.4				5.7+/-0.4	
	W	1.25+/-0.1		1.6+/-0.2			2.5+/-0.2				3.2+/-0.3				5.0+/-0.3	
	T	0.85 +0.05/-0.1	1.25 +/-0.1	0.85 +/-0.15	1.25 +/-0.2	1.6 +/-0.2	1.25 +/-0.2	1.6 +/-0.2	2.0 +/-0.2	2.5 +/-0.2	1.25 +/-0.2	1.6 +/-0.2	2.0 +/-0.2	2.5 +/-0.2	2.5 +/-0.3	
MAX CAPACITANCE (pF)	C0G	200V	300	560	820	1600	2400	3600	5100	6200	8200	6800	10000	12000	16000	27000
		250V	270	470	750	1200	2000	3000	4300	5300	6800	5100	7500	9100	13000	22000
		500V	-	160	-	560	1000	1200	1800	2000	2700	2400	3600	3900	5100	8200
		630V	-	130	-	470	720	1000	1500	1800	2400	1600	2400	2700	3900	6800
		1000V	-	-	-	150	270	390	560	750	1000	680	1000	1200	1800	3000
		2000V	-	-	-	-	130	180	240	330	470	330	470	620	820	1300
		3000V	-	-	-	-	62	-	110	-	-	120	180	240	360	620
	X7R	200V	12000	20000	30000	56000	100000	120000	160000	200000	300000	220000	300000	330000	510000	820000
		250V	4300	15000	15000	27000	39000	36000	56000	68000	100000	68000	110000	130000	220000	360000
		500V	-	7500	-	24000	33000	33000	51000	62000	75000	62000	100000	120000	150000	240000
		630V	-	6200	-	20000	30000	27000	43000	51000	56000	33000	51000	82000	100000	160000
		1000V	-	-	-	6200	10000	7500	10000	-	-	15000	20000	-	-	36000
		2000V	-	-	-	-	3600	3600	5100	6800	-	6800	12000	15000	-	24000
		3000V	-	-	-	-	1800	1500	2400	3300	4700	3300	4300	-	-	7500

RELIABILITY AND TEST CONDITIONS

NO	ITEM		PERFORMANCE	TEST CONDITION														
1	APPEARANCE		NO ABNORMAL EXTERIOR APPEARANCE	THROUGH MICROSCOPE(x10)														
2	INSULATION RESISTANCE		10,000Mohm OR 500Mohm.uF PRODUCT WHICHEVER IS SMALLER	<table border="1"> <tr> <td>Rated Voltage</td> <td colspan="2">Applied Voltage</td> </tr> <tr> <td>R.V <= 500Vdc</td> <td colspan="2">Rated Voltage</td> </tr> <tr> <td>R.V > 500Vdc</td> <td colspan="2">500+/-50Vdc</td> </tr> </table> <p>MEASUREMENT TIME IS 60 +/-5 SEC.</p>			Rated Voltage	Applied Voltage		R.V <= 500Vdc	Rated Voltage		R.V > 500Vdc	500+/-50Vdc				
Rated Voltage	Applied Voltage																	
R.V <= 500Vdc	Rated Voltage																	
R.V > 500Vdc	500+/-50Vdc																	
3	WITHSTANDING VOLTAGE		NO DIELECTRIC BREAKDOWN OR MECHANICAL BREAKDOWN	<table border="1"> <tr> <td>Rated Voltage</td> <td colspan="2">Applied Voltage</td> </tr> <tr> <td>R.V < 500Vdc</td> <td colspan="2">200% of rated voltage</td> </tr> <tr> <td>500Vdc <= R.V < 1000Vdc</td> <td colspan="2">150% of rated voltage</td> </tr> <tr> <td>R.V >= 1000Vdc</td> <td colspan="2">120% of rated voltage</td> </tr> </table> <p>The charge and discharge current is less than 50mA</p>			Rated Voltage	Applied Voltage		R.V < 500Vdc	200% of rated voltage		500Vdc <= R.V < 1000Vdc	150% of rated voltage		R.V >= 1000Vdc	120% of rated voltage	
Rated Voltage	Applied Voltage																	
R.V < 500Vdc	200% of rated voltage																	
500Vdc <= R.V < 1000Vdc	150% of rated voltage																	
R.V >= 1000Vdc	120% of rated voltage																	
4	CAPACITANCE	CLASS I	WITHIN THE SPECIFIED TOLERANCE	CAPACITANCE	FREQUENCY	VOLTAGE												
				1,000pF AND BELOW	1MHz+/-10%	0.5 ~ 5 Vrms												
		CLASS II	WITHIN THE SPECIFIED TOLERANCE	MORE THAN 1,000pF	1KHz+/-10%	1.0+/-0.2Vrms												
				FREQUENCY		VOLTAGE												
1KHz+/-10%		1.0+/-0.2Vrms																
5	Q	CLASS I	AND OVER 30pF : Q >=1,000 LESS THAN 30pF: Q >=400 +20C (C : CAPACITANCE)	CAPACITANCE	FREQUENCY	VOLTAGE												
				1,000pF AND BELOW	1MHz+/-10%	0.5 ~ 5 Vrms												
				MORE THAN 1,000pF	1KHz+/-10%	1.0+/-0.2Vrms												
6	Tan delta (D.F)	CLASS II	B:2.5%MAX(0.025MAX)	FREQUENCY		VOLTAGE												
				1KHz+/-10%		1.0+/-0.2Vrms												
7	ADHESIVE STRENGTH OF TERMINATION		NO INDICATION OF PEELING SHALL OCCUR ON THE TERMINAL ELECTRODE.	<p>A 500g.f PULL FORCE SHALL BE APPLIED FOR 10+/-1SECOND.</p> 														

NO	ITEM		PERFORMANCE	TEST CONDITION									
8	BENDING STRENGTH	APPEARANCE	NO MECHANICAL DAMAGE SHALL OCCUR.	<p>BENDING SHALL BE APPLIED TO THE LIMIT(1mm) WITH 0.3mm/SEC.</p>									
9	SOLDERABILITY		<p>MORE THAN 75% OF THE TERMINAL SURFACE IS TO BE SOLEDER NEWLY, SO METAL PART(A) DOES NOT COME OUT OR DISSOLVE</p>	<p>SOLDER TEMPERATURE : 230+/-5C DIPPING : 10 TO 15mm DEPTH DIP TIME : 2+/-0.5SEC. SOLDER : H63A FLUX : ROSIN PRE-HEATING : AT 80-120C FOR 10-30SEC.</p>									
10	RESISTANCE TO SOLDERING HEAT	APPEARANCE	NO MECHANICAL DAMAGE SHALL OCCUR	<p>DIP : SOLDER TEMPERATURE OF 270+/-5C DIP TIME :10+/-1SEC. EACH TERMINATION SHALL BE FULLY IMMERSSED AND PREHEATED AS FOLLOWING:</p> <table border="1"> <thead> <tr> <th>STEP</th> <th>TEMP.(C)</th> <th>TIME (SEC.)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>80~100</td> <td>60</td> </tr> <tr> <td>2</td> <td>150~180</td> <td>60</td> </tr> </tbody> </table> <p>MEASURE AT ROOM TEMP. AFTER COOLING FOR CLASS I : 24 +/- 2 HOURS CLASS II : 48 +/- 4 HOURS</p>	STEP	TEMP.(C)	TIME (SEC.)	1	80~100	60	2	150~180	60
		STEP	TEMP.(C)		TIME (SEC.)								
		1	80~100		60								
		2	150~180		60								
		CAPACITANCE	CHARACTERISTIC		CAP. CHANGE	<p>WITHIN +/-2.5% OR +/-0.25pF WHICHEVER IS LARGER</p>							
			CLASS I										
			CLASS II		B	WITHIN +/-7.5%							
Q	CLASS I		30pF AND OVER : Q >= 1000 LESS THAN 30pF : Q >= 400+20xC										
Tan delta	CLASS II		TO SATISFY THE SPECIFIED INITIAL VALUE										
INSULATION RESISTANCE			TO SATISFY THE SPECIFIED INITIAL VALUE										
WITHSTANDING VOLTAGE			PASS THE PERFORMANCE NO 3.										
11	VIBRATION TEST	APPEARANCE	NO MECHANICAL DAMAGE SHALL OCCUR.	<p>THE CAPACITOR SHALL BE SUBJECTED TO A HARMONIC MOTION HAVING A TOTAL AMPLITUDE OF 1.5mm.</p> <p>THE ENTIRE FREQUENCY RANGE, FROM 10 TO 55Hz AND RETURN TO 10Hz, SHALL BE TRAVERSED IN 1 MINUTE.</p> <p>THIS CYCLE SHALL BE PERFORMED 2 HOURS IN EACH THERE MUTUALLY PERPENDICULAR DIRECTION, FOR TOTAL PERIOD OF 6 HOURS.</p>									
		CAPACITANCE	CHARACTERISTIC		CAP. CHANGE								
			CLASS I			WITHIN +/-2.5% OR +/-0.25pF WHICHEVER IS LARGER							
			CLASS II		B	WITHIN +/-5%							
		Q	CLASS I		30pF AND OVER : Q >= 1000 LESS THAN 30pF : Q >= 400+20xC								
		Tan delta	CLASS II		TO SATISFY THE SPECIFIED INITIAL VALUE								
INSULATION RESISTANCE			TO SATISFY THE SPECIFIED INITIAL VALUE										

Multilayer Chip Capacitors – High Voltage

NO	ITEM	PERFORMANCE	TEST CONDITION		
12	HUMIDITY (STEADY STATE)	APPEARANCE	NO MECHANICAL DAMAGE SHALL OCCUR		
		CAPACITANCE	CHARACTERISTIC	CAPACITANCE CHANGE	
			CLASS I	WITHIN +/-5% OR +/-0.5pF WHICHEVER IS LARGER	
			CLASS II	B	WITHIN +/-12.5%
		Q CLASS I	30pF AND OVER : Q>= 350 10 ~30pF : Q>= 275 + 2.5xC LESS THAN 10pF : Q>= 200 + 10xC		
		Tan delta CLASS II	B : 5% MAX(0.05MAX)		
INSULATION RESISTANCE	MINIMUM INSULATION RESISTANCE: 1,000 Mohm OR 50Mohm uF PRODUCT WHICHEVER IS SMALLER				
13	MOISTURE RESISTANCE	APPEARANCE	NO MECHANICAL DAMAGE SHALL OCCUR		
		CAPACITANCE	CHARACTERISTIC	CAPACITANCE CHANGE	
			CLASS I	WITHIN +/-7.5% OR +/-0.75pF WHICHEVER IS LARGER	
			CLASS II	B	WITHIN +/-12.5%
		Q CLASS I	30pF AND OVER : Q>= 200 30pF AND BELOW : Q>= 100 + 10/3xC		
		Tan delta CLASS II	Char.	25V and over	16V
B	0.05 MAX		0.05 MAX	0.05 MAX	0.075 MAX
INSULATION RESISTANCE	MINIMUM INSULATION RESISTANCE: 500 Mohm OR 25Mohm uF PRODUCT, WHICHEVER IS SMALLER.				
			APPLIED VOLTAGE : RATED VOLTAGE		
			TEMPERATURE : 40+/-2 C		
			RELATIVE HUMIDITY : 90-95%RH		
			TEST TIME : 500 +12/-0 Hr.		
			CURRENT APPLIED : 50mA MAX.		
			MEASURING AT ROOM TEMPERATURE		
			AFTER COOLING FOR CLASS I : 24+/-2 Hr. CLASS II : 48+/-4 Hr.		

Multilayer Chip Capacitors – High Voltage

NO	ITEM	PERFORMANCE	TEST CONDITION															
14	HIGH TEMPERATURE RESISTANCE	APPEARANCE	NO MECHANICAL DAMAGE SHALL OCCUR															
		CAPACITANCE	CHARACTERISTIC	CAP. CHANGE														
			CLASS I	WITHIN +/-3% OR +/-0.3pF, WHICHEVER IS LARGER														
			CLASS II	B	WITHIN +/-12.5%													
		Q CLASS I	30pF AND OVER : Q >= 350 10 ~ 30 pF : Q >= 275 + 2.5xC LESS THAN 10pF : Q >= 200 + 10xC															
		Tan delta CLASS II	B : 5% MAX(0.05MAX)															
INSULATION RESISTANCE	MINIMUM INSULATION RESISTANCE: 1,000 Mohm OR 50Mohm uF PRODUCT WHICHEVER IS SMALLER																	
			<table border="1"> <tr> <td>Rated Voltage</td> <td>Applied Voltage</td> </tr> <tr> <td>R.V < 500Vdc</td> <td>200% of rated voltage</td> </tr> <tr> <td>500Vdc<= R.V and R.V <1000Vdc</td> <td>120% of rated voltage</td> </tr> <tr> <td>R.V >= 1000Vdc</td> <td>rated voltage</td> </tr> </table> <p>TEST TIME : 1000 +48/-0 Hr. CURRENT APPLIED : 50mA MAX.</p> <table border="1"> <tr> <td>CHAR.</td> <td>TEMP.</td> </tr> <tr> <td>CLASS I</td> <td>125 +/-3 C</td> </tr> <tr> <td>CLASS II</td> <td>B</td> <td>125 +/-3 C</td> </tr> </table> <p>(INITIAL VALUE MEASUREMENT) THE INITIAL VALUE OF CLASS II SHALL BE MEASURED AFTER THE HEAT TREATMENT OF 150+0/-10°C, 1HR AND SITTING OF 48+/-4HRS AT ROOM TEMPERATURE AND ROOM HUMIDITY.</p>	Rated Voltage	Applied Voltage	R.V < 500Vdc	200% of rated voltage	500Vdc<= R.V and R.V <1000Vdc	120% of rated voltage	R.V >= 1000Vdc	rated voltage	CHAR.	TEMP.	CLASS I	125 +/-3 C	CLASS II	B	125 +/-3 C
Rated Voltage	Applied Voltage																	
R.V < 500Vdc	200% of rated voltage																	
500Vdc<= R.V and R.V <1000Vdc	120% of rated voltage																	
R.V >= 1000Vdc	rated voltage																	
CHAR.	TEMP.																	
CLASS I	125 +/-3 C																	
CLASS II	B	125 +/-3 C																
15	TEMPERATURE CYCLE	APPEARANCE	NO MECHANICAL DAMAGE SHALL OCCUR															
		CAPACITANCE	CHARACTERISTIC	CAP. CHANGE														
			CLASS I	WITHIN +/-2.5% OR +/-0.25pF WHICHEVER IS LARGER														
			CLASS II	B	WITHIN +/-7.5%													
		Q CLASS I	30 pF AND OVER : Q >= 1000 LESS THAN 30pF:Q >=400 +20xC															
		Tan delta CLASS II	TO SATISFY THE SPECIFIED INITIAL VALUE															
INSULATION RESISTANCE	TO SATISFY THE SPECIFIED INITIAL VALUE																	
			<p>CAPACITORS SHALL BE SUBJECTED TO FIVE CYCLES OF THE TEMPERATURE CYCLE AS FOLLOWING</p> <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. RATED TEMP. +0/-3</td> <td>30</td> </tr> <tr> <td>2</td> <td>25</td> <td>2~3</td> </tr> <tr> <td>3</td> <td>MAX. RATED TEMP. +3/-0</td> <td>30</td> </tr> <tr> <td>4</td> <td>25</td> <td>2~3</td> </tr> </tbody> </table> <p>MEASURE AT ROOM TEMPERATURE AFTER COOLING FOR CLASS I : 24+/-2 Hr. CLASS II : 48+/-4 Hr.</p>	STEP	TEMP.(C)	TIME (MIN)	1	MIN. RATED TEMP. +0/-3	30	2	25	2~3	3	MAX. RATED TEMP. +3/-0	30	4	25	2~3
STEP	TEMP.(C)	TIME (MIN)																
1	MIN. RATED TEMP. +0/-3	30																
2	25	2~3																
3	MAX. RATED TEMP. +3/-0	30																
4	25	2~3																

Multilayer Chip Capacitors – High Voltage

NO	ITEM	PERFORMANCE	TEST CONDITION	
16	Recommend Method of Soldering			
	SOLDERING GROUP BY SIZE&CAP	SIZE(mm)	CONDITION	
			FLOW	REFLOW
		2012		
		3216		
		3225	-	
		4532	-	
5750	-			

※ When Solderability Is Considered, Capacitors Are Recommended To Be Used In 12 Months.