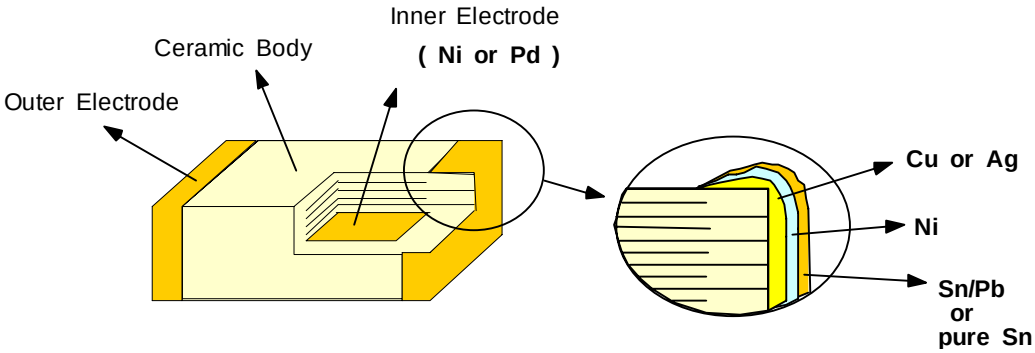
FEATURE



- Miniature Size
- Wide Capacitance, Temperature Compensation and Voltage Range
- Highly Reliable Performance
- Industry Standard Size
- Tape & Reel for Surface Mount Assembly

PART NUMBER CODE

CL	10	C	101	J	B	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

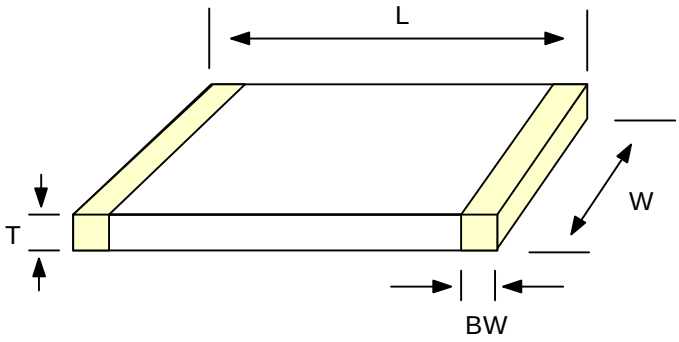
(6) Rated Voltage

(7) Chip thickness

- **N : standard thickness**
- **A : thinner than N**
- **B : thicker than N**
- **D : Pure Sn Plating**

(8) Packaging Type

CONFIGURATION AND DIMENSIONS



CODE	EIA CODE	DIMENSION (mm)			
		L	W	T (MAX)	BW
03	0201	0.6 +/- 0.03	0.3 +/- 0.03	0.3 +/- 0.03	0.15 +/- 0.05
05	0402	1.0 +/- 0.05	0.5 +/- 0.05	0.5 +/- 0.05	0.2 +0.15/-0.1
10	0603	1.6 +/- 0.1	0.8 +/- 0.1	0.8 +/- 0.1	0.3 +/- 0.2
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)

Symble	EIA Code	Temperature Coefficient(PPM/C)	* Temperature Characteristics	Operation Temperature Range
C	C0G(CH)	0 +/- 60	C Δ	-55 ~ +125C
P	P2H	-150 +/- 60	P Δ	
R	R2H	-220 +/- 60	R Δ	
S	S2H	-330 +/- 60	S Δ	
T	T2H	-470 +/- 60	T Δ	
U	U2J	-750 +/- 120	U Δ	
L	S2L	+350 ~ -1000	SL	

* Temperature Characteristics

Temperature Characteristics	below 2.0pF	2.2 ~ 3.9pF	above 4.0pF	above 10pF
C Δ	CK	CJ	CH	CG/CH
P Δ	PK	PJ	PH	PH
R Δ	RK	RJ	RH	RH
S Δ	SK	SJ	SH	SH
T Δ	TK	TJ	TH	TH
U Δ	UK	UJ	UJ	UJ

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

CLASS II(High Dielectric Constant)

Symble	EIA Code	Capacitance Change (ΔC : %)	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 10^0 = 10pF
222 = 22 x 10^2 = 2200pF
020 = 2 x 10^0 = 2pF
1R5 = 1.5pF

CAPACITANCE TOLERANCE

Temperature Characteristics	Symbol	Tolerance	Applicable Capacitance & Range
C0G(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%	
F(Y5V)	Z	-20% ~ +80%	E-6 Series

Please Consult us for special tolerances. * : Option

RATED VOLTAGE

Symble	Rated Voltage(Vdc)
Q	6.3V
P	10V
O	16V
A	25V
B	50V
C	100V

PACKAGING TYPE

Symbol	Packaging	Symbol	Packaging
B	Bulk	D	Cardboard Tape, 13" Reel
P	Cassette	L	Cardboard Tape, 13" Reel
C	Cardboard Tape, 7" Reel	E	Embossed Tape, 7" Reel
O	Cardboard Tape, 10" Reel	F	Embossed Tape, 13" Reel

STANDARD CAPACITANCE STEP

Series	Capacitance Step											
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 * 10^{n} "

CAPACITANCE Vs CHIP THICKNESS STANDARD

Description			0603Type (0201)	1005Type (0402)	1608Type (0603)	2012 Type (0805)			3216 Type (1206)			3225 Type (1210)				4532 Type (1812)				5750 Type (2220)
Dimension (mm)L		L	0.6+/-0.03	1.0+/-0.05	1.6+/-0.1	2.0+/-0.1			3.2+/-0.2			3.2+/-0.3				4.5+/-0.4				5.7+/-0.4
		W	0.3+/-0.03	0.5+/-0.05	0.8+/-0.1	1.25+/-0.1			1.6+/-0.2			2.5+/-0.2				3.2+/-0.3				5.0+/-0.3
		T	0.3 +/-0.03	0.5 +/-0.05	0.8 +/-0.1	0.65 +0.05/-0.1	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)	SL	50V	-	240	1000	1000	1500	2700	2700	5600	8200	-	-	-	-	-	-	-	-	-
		100V	-	-	680	560	910	1000	1500	3300	3900	-	-	-	-	-	-	-	-	-
	C, TC (Except SL)	16V	68	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		25V	100	220	1000	-	-	-	3600	6800	10000	-	-	-	-	-	-	-	-	-
		50V	-	150	1000	560	1000	3300	2200	4700	-	10000	22000	47000	-	13000	22000	47000	68000	-
		100V	-	-	300	430	680	1200	2200	3600	5100	7500	10000	13000	18000	15000	20000	24000	36000	-
	B (X7R)	6.3V	10000	-	1000000	-	-	4700000	-	-	10000000	-	-	-	22000000	-	-	-	-	-
		10V	-	100000	470000	270000	470000	1000000	1000000	3300000	4700000	2200000	3300000	10000000	-	-	-	-	22000000	-
		16V	1000	68000	220000	200000	330000	1000000	910000	1500000	3300000	2400000	-	-	10000000	-	-	-	10000000	-
		25V	-	10000	100000	68000	130000	330000	390000	620000	1000000	1000000	-	-	-	-	-	-	4700000	-
		50V	-	10000	68000	39000	56000	100000	150000	240000	470000	470000	-	-	-	1500000	2200000	2700000	3300000	-
		100V	-	-	4700	12000	20000	33000	62000	100000	150000	180000	270000	330000	430000	360000	510000	560000	820000	-
	F (Y5V)	10V	-	220000	1000000	-	-	4700000	-	-	10000000	-	-	-	22000000	-	-	-	-	100000000
		16V	-	220000	470000	680000	1000000	2200000	2200000	4700000	-	6800000	10000000	-	-	-	-	-	-	-
		25V	-	33000	330000	220000	470000	1000000	1000000	2200000	3300000	3300000	-	-	-	-	-	-	-	-
		50V	-	10000	100000	68000	150000	470000	470000	680000	-	1000000	-	-	-	-	-	-	-	-

CAPACITANCE RANGE

CLASS I

Temperature Characteristics	Size	Voltage	Capacitance Range (pF)
			0.5 10 100 1000 10000 100000 1000000 10000000 100000000
SL,UJ	05 (0402)	50 V	240
	10 (0603)	50 V	1000
		100V	680
	21 (0805)	50 V	2700
		100V	1000
	31 (1206)	50 V	8200
		100V	3900
C(COG) & TC Series	03 (0201)	16 V	100
		25 V	68
	05 (0402)	25 V	220
		50 V	150
	10 (0603)	25 V	1000
		50 V	1000
		100V	300
	21 (0805)	50 V	2200
		100V	1200
	31 (1206)	25 V	1500 10000
		50 V	4700
		100V	5100
	32 (1210)	50 V	560 47000
		100V	2200 18000
	43 (1812)	50V	1000 68000
		100V	1000 36000

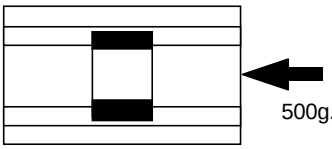
CLASS II , B(X7R)

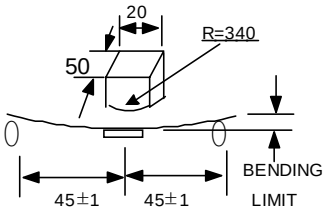
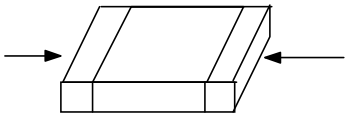
Temperature Characteristics	Size	Voltage	Capacitance Range (pF)
			10 100 1000 10000 100000 1000000 10000000 100000000
B(X7R)	03 (0201)	16 V	1500 – 10000
		25 V	100 – 1000
	05 (0402)	10 V	100 – 100000
		16 V	100 – 68000
		25 V	100 – 10000
		50 V	100 – 4700
	10 (0603)	6.3V	100000 – 1000000
		10 V	100 – 470000
		16 V	100 – 220000
		25 V	100 – 100000
		50 V	100 – 68000
		100 V	100 – 4700
	21 (0805)	6.3V	2200000 – 4700000
		10 V	100 – 1000000
		16 V	100 – 1000000
		25 V	100 – 330000
		50 V	100 – 100000
		100 V	100 – 33000
	31 (1206)	6.3V	4700000 – 10000000
		10 V	1000 – 4700000
		16 V	1000 – 3300000
		25 V	1000 – 1000000
		50 V	1000 – 470000
		100 V	1000 – 150000
	32 (1210)	6.3V	10000000 – 22000000
		10 V	1000 – 10000000
		16 V	1000 – 10000000
		25 V	1000 – 1000000
		50 V	1000 – 470000
		100 V	1000 – 430000
	43 (1812)	10V	10000000 – 22000000
		16V	1000000 – 10000000
		25V	1000000 – 4700000
		50V	10000 – 3300000
		100 V	10000 – 820000

CLASS II , F(Y5V)

Temperature Characteristics	Size	Voltage	Capacitance Range (pF)
			10 100 1000 10000 100000 1000000 10000000 100000000
F(Y5V)	05 (0402)	10 V	2200 – 220000
		16 V	2200 – 220000
		25 V	2200 – 33000
		50 V	2200 – 10000
	10 (0603)	10 V	2200 – 1000000
		16 V	2200 – 470000
		25 V	2200 – 330000
		50 V	2200 – 100000
	21 (0805)	10 V	1000000 – 4700000
		16 V	10000 – 2200000
		25 V	10000 – 1000000
		50 V	10000 – 470000
	31 (1206)	10 V	100000 – 10000000
		16 V	10000 – 4700000
		25 V	10000 – 3300000
		50 V	10000 – 680000
	32 (1210)	10 V	10000000 – 22000000
		16 V	100000 – 10000000
		25 V	100000 – 3300000
		50 V	100000 – 1000000
	55 (2220)	10V	100000000

RELIABILITY AND TEST CONDITIONS

<table>
<tr><th>NO</th><th colspan="2">ITEM</th><th>PERFORMANCE</th><th colspan="3">TEST CONDITION</th></tr>
<tr><td>1</td><td colspan="2">APPEARANCE</td><td>NO ABNORMAL EXTERIOR APPEARANCE</td><td colspan="3">THROUGH MICROSCOPE(×10)</td></tr>
<tr><td>2</td><td colspan="2">INSULATION RESISTANCE</td><td>10,000MΩ OR 500MΩ·μF PRODUCT WHICHEVER IS SMALLER(RATED VOLTAGE IS BELOW 16V : 10,000MΩ OR 100MΩ·μF)</td><td colspan="3">RATED VOLTAGE SHALL BE APPLIED. MEASUREMENT TIME IS 60 ~ 120 RATED VOLTAGE TIME 60 SEC.</td></tr>
<tr><td>3</td><td colspan="2">WITHSTANDING VOLTAGE</td><td>NO DIELECTRIC BREAKDOWN OR MECHANICAL BREAKDOWN</td><td colspan="3">CLASS Ⅰ : 300% OF THE RATED VOLTAGE FOR 1~5 SEC,
CLASS Ⅱ : 250% OF THE RATED VOLTAGE FOR 1~5 SEC IS APPLIED WITH LESS THAN 50mA CURRENT</td></tr>
<tr><td rowspan="4">4</td><td rowspan="4">CAPACITANCE</td><td rowspan="2">CLASS Ⅰ</td><td rowspan="2">WITHIN THE SPECIFIED TOLERANCE</td><td>CAPACITANCE</td><td>FREQUENCY</td><td>VOLTAGE</td></tr>
<tr><td>1,000pF AND BELOW</td><td>1MHz±10%</td><td rowspan="2">0.5 ~ 5 Vrms</td></tr>
<tr><td rowspan="2">CLASS Ⅱ</td><td rowspan="2">WITHIN THE SPECIFIED TOLERANCE</td><td>MORE THAN 1,000pF</td><td>1kHz±10%</td></tr>
<tr><td>CAPACITANCE</td><td>FREQUENCY</td><td>VOLTAGE</td></tr>
<tr><td>22μF AND BELOW</td><td>1kHz±10%</td><td>1.0± 0.2Vrms</td></tr>
<tr><td>MORE THAN 22μF</td><td>120Hz±20%</td><td>0.5± 0.1Vrms</td></tr>
<tr><td>5</td><td>Q</td><td>CLASS Ⅰ</td><td>OVER 30pF : Q ≥1,000
LESS THAN 30pF : Q ≥400 +20C
(C : CAPACITANCE)</td><td>CAPACITANCE</td><td>FREQUENCY</td><td>VOLTAGE</td></tr>
<tr><td rowspan="2">6</td><td rowspan="2">Tanδ</td><td rowspan="2">CLASS Ⅱ</td><td rowspan="2">
<table>
<tr><td>CHAR</td><td>50V AND OVER</td><td>25V AND OVER</td><td>16V</td><td>10V</td><td>6.3V</td></tr>
<tr><td>B</td><td>0.025 MAX</td><td>0.025 MAX</td><td>0.035 MAX</td><td>0.05 MAX</td><td>0.05 MAX</td></tr>
<tr><td>F</td><td>0.05 MAX</td><td>C < 1μF 0.07(MAX)
C ≥ 1μF 0.09(MAX)</td><td>Refer-ence For*</td><td>0.125 MAX</td><td>0.16 MAX</td></tr>
</table>
<table>
<tr><td>Reference For*</td><td colspan="2">16V</td></tr>
<tr><td>SIZE</td><td>CAPACITANCE</td><td>SPEC</td></tr>
<tr><td>1005 AND BELOW</td><td>-</td><td>0.09 (MAX)</td></tr>
<tr><td rowspan="2">1608</td><td>C < 470nF</td><td>0.07 (MAX)</td></tr>
<tr><td>C ≥ 470nF</td><td>0.09 (MAX)</td></tr>
<tr><td rowspan="2">2012 AND OVER</td><td>C < 1μF</td><td>0.07 (MAX)</td></tr>
<tr><td>C ≥ 1μF</td><td>0.09 (MAX)</td></tr>
</table>
</td><td>CAPACITANCE</td><td>FREQUENCY</td><td>VOLTAGE</td></tr>
<tr><td>22μF AND BELOW</td><td>1kHz±10%</td><td>1.0± 0.2Vrms</td></tr>
<tr><td>MORE THAN 22μF</td><td>120Hz±20%</td><td>0.5± 0.1Vrms</td></tr>
<tr><td></td><td></td><td></td><td>NO INDICATION OF PEELING SHALL OCCUR ON THE TERMINAL ELECTRODE.</td><td colspan="3">A 500g.f PRESSURE SHALL BE APPLIED FOR 10±1 SECOND.
 
</td></tr>
</table>

<table>
<tr><th>NO</th><th colspan="3">ITEM</th><th colspan="3">PERFORMANCE</th><th>TEST CONDITION</th></tr>
<tr><td rowspan="5">8</td><td rowspan="5">BENDING STRENGTH</td><td>APPEARANCE</td><td colspan="3">NO MECHANICAL DAMAGE SHALL OCCUR.</td><td rowspan="5">BENDING SHALL BE APPLIED TO THE LIMIT(1mm) WITH 0.3mm/SEC.
 
</td></tr>
<tr><td rowspan="4">CAPACITANCE</td><td colspan="2">CHARACTER</td><td>CHANGE OF CAPACITANCE</td></tr>
<tr><td colspan="2">CLASS I</td><td>WITHIN +/-5% OR +/- 0.5 pF WHICHEVER IS LARGER</td></tr>
<tr><td rowspan="2">CLASS II</td><td>B(X7R)</td><td>WITHIN +/-12.5%</td></tr>
<tr><td>F</td><td>WITHIN +/-30%</td></tr>
<tr><td>9</td><td colspan="3">SOLDERABILITY</td><td colspan="3">MORE THAN 95% OF THE TERMINAL SURFACE IS TO BE SOLDERED NEWLY, SO METAL PART(A) DOES NOT COME OUT OR DISSOLVE
  </td><td>SOLDER TEMPERATURE : 230+/-5c
SOLDER : H63A
FLUX : ROSIN
PRE-HEATING : AT 80~120c
FOR 10~30SEC.</td></tr>
<tr><td rowspan="7">10</td><td rowspan="7">RESISTANCE TO SOLDERING HEAT</td><td>APPEARANCE</td><td colspan="3">NO MECHANICAL DAMAGE SHALL OCCUR</td><td rowspan="7">DIP : SOLDER TEMPERATURE OF 270+/-5c
DIP TIME : 10+/-1 SEC.
EACH TERMINATION SHALL BE FULLY IMMERSED AND PREHEATED AS FOLLOWING:
<table><tr><th>STEP</th><th>TEMP.(C)</th><th>TIME (SEC.)</th></tr><tr><td>1</td><td>80~100</td><td>60</td></tr><tr><td>2</td><td>150~180</td><td>60</td></tr></table>
MEASURE AT ROOM TEMP. AFTER COOLING FOR
CLASS I : 24 +/- 2 HOURS
CLASS II : 48 +/- 4 HOURS</td></tr>
<tr><td rowspan="3">CAPACITANCE</td><td colspan="2">CHARACTERISTIC</td><td>CAP. CHANGE</td></tr>
<tr><td colspan="2">CLASS I</td><td>WITHIN +/-2.5% OR +/-0.25pF WHICHEVER IS LARGER</td></tr>
<tr><td rowspan="2">CLASS II</td><td>B</td><td>WITHIN +/-7.5%</td></tr>
<tr><td>F</td><td>WITHIN +/-20%</td></tr>
<tr><td>Q
CLASS I</td><td colspan="3">30pF AND OVER : Q>= 1000
LESS THAN 30pF : Q>= 400+20*C</td></tr>
<tr><td>Tan delta
CLASS II</td><td colspan="3">TO SATISFY THE SPECIFIED INITIAL VALUE</td></tr>
<tr><td>INSULATION RESISTANCE</td><td colspan="3">TO SATISFY THE SPECIFIED INITIAL VALUE</td></tr>
<tr><td>WITHSTANDING VOLTAGE</td><td colspan="3">TO SATISFY THE SPECIFIED INITIAL VALUE</td></tr>
</table>

<table>
<tr><th>NO</th><th colspan="2">ITEM</th><th colspan="3">PERFORMANCE</th><th>TEST CONDITION</th></tr>
<tr><td rowspan="6">11</td><td rowspan="6">VIBRATION TEST</td><td>APPEARANCE</td><td colspan="3">NO MECHANICAL DAMAGE SHALL OCCUR.</td><td rowspan="6">THE CAPACITOR SHALL BE SUBJECTED TO A HARMONIC MOTION HAVING A TOTAL AMPLITUDE OF 1.5mm.

THE ENTIRE FREQUENCY RANGE, FROM 10 TO 55Hz AND RETURN TO 10Hz, SHALL BE TRAVERSED IN 1 MINUTE.

THIS CYCLE SHALL BE PERFORMED 2 HOURS IN EACH THERE MUTUALLY PERPENDICULAR DIRECTION, FOR TOTAL PERIOD OF 6 HOURS.</td></tr>
<tr><td rowspan="3">CAPACITANCE</td><td>CHARACTERISTIC</td><td colspan="2">CAP. CHANGE</td></tr>
<tr><td>CLASS I</td><td colspan="2">WITHIN +/-2.5% OR +/-0.25pF WHICHEVER IS LARGER</td></tr>
<tr><td rowspan="2">CLASS II</td><td>B</td><td>WITHIN +/-5%</td></tr>
<tr><td>F</td><td>WITHIN +/-20%</td></tr>
<tr><td>Q
CLASS I</td><td colspan="3">30pF AND OVER : Q>= 1000
LESS THAN 30pF : Q>= 400+20*C</td></tr>
<tr><td>Tan delta
CLASS II</td><td colspan="3">TO SATISFY THE SPECIFIED INITIAL VALUE</td></tr>
<tr><td>INSULATION RESISTANCE</td><td colspan="3">TO SATISFY THE SPECIFIED INITIAL VALUE</td></tr>
<tr><td rowspan="7">12</td><td rowspan="7">HUMIDITY (STEADY STATE)</td><td>APPEARANCE</td><td colspan="3">NO MECHANICAL DAMAGE SHALL OCCUR</td><td rowspan="7">TEMPERATURE : 40+/-2C
RELATIVE HUMIDITY : 90~95 %RH
TEST TIME : 500 +12/-0 Hr.

MEASURE AT ROOM TEMPERATURE AFTER COOLING FOR
CLASS I : 24+/-2 Hr.
CLASS II : 48+/-4 Hr.</td></tr>
<tr><td rowspan="3">CAPACITANCE</td><td>CHARACTERISTIC</td><td colspan="2">CAPACITANCE CHANGE</td></tr>
<tr><td>CLASS I</td><td colspan="2">WITHIN +/-5% OR +/-0.5pF WHICHEVER IS LARGER</td></tr>
<tr><td rowspan="2">CLASS II</td><td>B</td><td>WITHIN +/-12.5%</td></tr>
<tr><td>F</td><td>WITHIN +/-30%</td></tr>
<tr><td>Q
CLASS I</td><td colspan="3">30pF AND OVER : Q>= 350
10 ~30pF : Q>= 275 + 2.5*C
LESS THAN 10pF : Q>= 200 + 10*C</td></tr>
<tr><td>Tan delta
CLASS II</td><td colspan="3"><table>
<tr><td>Char.</td><td>25V and over</td><td>16V</td><td>10V</td><td>6.3V</td></tr>
<tr><td>B</td><td>0.05 MAX</td><td>0.05 MAX</td><td>0.05 MAX</td><td>0.075 MAX</td></tr>
<tr><td>F</td><td>0.075 MAX</td><td>0.1 MAX (C<1.0uF)
0.125 MAX (C>=1.0uF)</td><td>0.15 MAX</td><td>–</td></tr>
</table></td></tr>
<tr><td>INSULATION RESISTANCE</td><td colspan="3">MINIMUM INSULATION RESISTANCE:
1,000 Mohm OR 50Mohm*uF PRODUCT
WHICHEVER IS SMALLER</td></tr>
</table>

* THE INITIAL VALUE OF HIGH DIELECTRIC CONSTANT SERIES SHALL BE MEASURED AFTER THE HEAT TREATMENT OF 150 +0/-10C, 1Hr AND SITTING OF 48+/-4hr AT ROOM TEMPERATURE & ROOM HUMIDITY.

<table>
<tr><th>NO</th><th colspan="2">ITEM</th><th>PERFORMANCE</th><th>TEST CONDITION</th></tr>
<tr><td rowspan="5">13</td><td rowspan="5">MOISTURE RESISTANCE</td><td>APPEARANCE</td><td>NO MECHANICAL DAMAGE SHALL OCCUR</td><td rowspan="5">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.</td></tr>
<tr><td>CAPACITANCE</td><td><table><tr><td colspan="2">CHARACTERISTIC</td><td>CAPACITANCE CHANGE</td></tr><tr><td colspan="2">CLASS I</td><td>WITHIN +/-7.5% OR +/-0.75pF WHICHEVER IS LARGER</td></tr><tr><td rowspan="2">CLASS II</td><td>B</td><td>WITHIN +/-12.5%</td></tr><tr><td>F</td><td>WITHIN +/-30%</td></tr></table></td></tr>
<tr><td>Q
CLASS I</td><td>30pF AND OVER : Q>= 200
30pF AND BELOW : Q>= 100 + 10/3*C</td></tr>
<tr><td>Tan delta
CLASS II</td><td><table><tr><td>Char.</td><td>25V and over</td><td>16V</td><td>10V</td><td>6.3V</td></tr><tr><td>B</td><td>0.05 MAX</td><td>0.05 MAX</td><td>0.05 MAX</td><td>0.075 MAX</td></tr><tr><td>F</td><td>0.075 MAX</td><td>0.1 MAX (C 〈1.0uF) 0.125 MAX (C>=1.0uF)</td><td>0.15 MAX</td><td>–</td></tr></table></td></tr>
<tr><td>INSULATION RESISTANCE</td><td>MINIMUM INSULATION RESISTANCE:
500 Mohm OR 25Mohm*uF PRODUCT,
WHICHEVER IS SMALLER.</td></tr>
<tr><td rowspan="5">14</td><td rowspan="5">HIGH TEMPERATURE RESISTANCE</td><td>APPEARANCE</td><td>NO MECHANICAL DAMAGE SHALL OCCUR</td><td rowspan="5">APPLIED VOLTAGE :
200% OF RATED VOLTAGE
TEST TIME : 1000 +48/-0 Hr.
CURRENT APPLIED : 50mA MAX.

<table><tr><td colspan="2">CHAR.</td><td>TEMP.</td></tr><tr><td colspan="2">CLASS I</td><td>125 +/-3 C</td></tr><tr><td rowspan="2">CLASS II</td><td>B</td><td>125 +/-3 C</td></tr><tr><td>F</td><td>85 +/-3 C</td></tr></table></td></tr>
<tr><td>CAPACITANCE</td><td><table><tr><td colspan="2">CHARACTERISTIC</td><td>CAP. CHANGE</td></tr><tr><td colspan="2">CLASS I</td><td>WITHIN +/-3% OR +/-0.3pF, WHICHEVER IS LARGER</td></tr><tr><td rowspan="2">CLASS II</td><td>B</td><td>WITHIN +/-12.5%</td></tr><tr><td>F</td><td>WITHIN +/-30%</td></tr></table></td></tr>
<tr><td>Q
CLASS I</td><td>30pF AND OVER : Q >= 350
10 ~ 30 pF : Q >= 275 + 2.5*C
LESS THAN 10pF :Q >=200 + 10*C</td></tr>
<tr><td>Tan delta
CLASS II</td><td><table><tr><td>Char.</td><td>25V over</td><td>16V</td><td>10V</td><td>6.3V</td></tr><tr><td>B</td><td>0.05 MAX</td><td>0.05 MAX</td><td>0.05 MAX</td><td>0.075 MAX</td></tr><tr><td>F</td><td>0.075 MAX</td><td>0.1 MAX (C 〈1.0uF) 0.125 MAX (C>=1.0uF)</td><td>0.15 MAX</td><td>–</td></tr></table></td></tr>
<tr><td>INSULATION RESISTANCE</td><td>MINIMUM INSULATION RESISTANCE:
1,000 Mohm OR 50Mohm*uF PRODUCT
WHICHEVER IS SMALLER</td></tr>
</table>

<table>
<tr><th>NO</th><th colspan="3">ITEM</th><th colspan="3">PERFORMANCE</th><th>TEST CONDITION</th></tr>
<tr><td rowspan="6">15</td><td rowspan="6">TEMPERATURE CYCLE</td><td>APPEARANCE</td><td colspan="3">NO MECHANICAL DAMAGE SHALL OCCUR</td><td rowspan="6">CAPACITORS SHALL BE SUBJECTED TO FIVE CYCLES OF THE TEMPERATURE CYCLE AS FOLLOWING

STEP | TEMP.(℃) | TIME (MIN)
1 | MIN. RATED TEMP. +0/-3 | 30
2 | 25 | 2~3
3 | MAX. RATED TEMP. +3/-0 | 30
4 | 25 | 2~3

MEASURE AT ROOM TEMPERATURE AFTER COOLING FOR
CLASSⅠ : 24±2 Hr.
CLASSⅡ : 48±4 Hr.</td></tr>
<tr><td rowspan="3">CAPACITANCE</td><td>CHARACTERISTIC</td><td colspan="2">CAP. CHANGE</td></tr>
<tr><td>CLASS Ⅰ</td><td colspan="2">WITHIN ±2.5% OR ±0.25pF WHICHEVER IS LARGER</td></tr>
<tr><td rowspan="2">CLASS Ⅱ</td><td>B</td><td>WITHIN ±7.5%</td></tr>
<tr><td>F</td><td>WITHIN ±20%</td></tr>
<tr><td>Q
CLASSⅠ</td><td colspan="3">30 pF AND OVER : Q ≥ 1000
LESS THAN 30pF :Q ≥400 +20×C</td></tr>
<tr><td>Tanδ
CLASSⅡ</td><td colspan="3">TO SATISFY THE SPECIFIED INITIAL VALUE</td></tr>
<tr><td>INSULATION RESISTANCE</td><td colspan="3">TO SATISFY THE SPECIFIED INITIAL VALUE</td></tr>
<tr><td rowspan="15">16</td><td colspan="7">Recommend Method of Soldering</td></tr>
<tr><td rowspan="14">SOLDERING GROUP BY SIZE&CAP</td><td rowspan="2">SIZE(㎜)</td><td rowspan="2">CHAR</td><td rowspan="2">CAPACITANCE</td><td colspan="2">CONDITION</td></tr>
<tr><td>FLOW</td><td>REFLOW</td></tr>
<tr><td>0603</td><td rowspan="2">-</td><td rowspan="2">-</td><td rowspan="2">-</td><td rowspan="2">O</td></tr>
<tr><td>1005</td></tr>
<tr><td rowspan="3">1608</td><td>B</td><td>-</td><td>O</td><td>O</td></tr>
<tr><td rowspan="2">F</td><td>C＜1㎌</td><td>O</td><td>O</td></tr>
<tr><td>C ≥1㎌</td><td>-</td><td>O</td></tr>
<tr><td rowspan="3">2012</td><td>B</td><td>-</td><td>O</td><td>O</td></tr>
<tr><td rowspan="2">F</td><td>C＜4.7㎌</td><td>O</td><td>O</td></tr>
<tr><td>C ≥4.7㎌</td><td>-</td><td>O</td></tr>
<tr><td rowspan="3">3216</td><td>B</td><td>-</td><td>O</td><td>O</td></tr>
<tr><td rowspan="2">F</td><td>C＜10㎌</td><td>O</td><td>O</td></tr>
<tr><td>C ≥10㎌</td><td>-</td><td>O</td></tr>
<tr><td>3225</td><td rowspan="3">-</td><td rowspan="3">-</td><td rowspan="3">-</td><td rowspan="3">O</td></tr>
<tr><td>4532</td></tr>
<tr><td>5750</td></tr>
</table>

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