

Ceramic Type

Introduction

SAMWHA disc ceramic capacitors are designed and produced to offer the user capacitors with high reliability and small size.

With wide selection of temperature characteristics and voltage ratings, the user can make use for in various circuit application.

How to Order

CC C 1H 120 J 04 F K 5

1 2 3 4 5 6 7 8 9



1 Style & Class

Mark	Product Name	Mark	Product Name
CC, EC	Temperature Compensating Type	SD	AC250/400V(Testing Voltage : AC4000V)
CK, EK	High Dielectric Type	SC	AC250(Testing Voltage : AC2500V)
CG	Semiconductive Type		

2 Temp. Char.

CE, EC Type (PPM/°C)				CK, EK, CG, SC, SD Type			
C	NPO(0)	T	N470(-470)	B	Y5P(+10 -10%)		
L	N80(-80)	U	N750(-750)	R	Y5R(+15 -15%)		
P	N150(-150)	O	SL(+350 -1000)	E	Y5U(+22 -56%)		
R	N220(-220)			F	Y5V(+22 -82%)		
S	N330(-330)			Fz	Z4V(+22 -82%)		

3 Rating Voltage

1A	10V	1B	12.5V	1C	16V	1E	25V			1H	50V		
2A	100V	2B	125V			2E	250V			2G	400V	2H	500V
3A	1KV	3B	1.25KV	3D	2KV			3F	3.15KV	3G	4KV	3H	5KV
4A	10KV	4B	12.5KV	4C	16KV							3J	6.3KV

4 Capacitance

(in picofarads) The first two digits indicate significant digits. The 3rd digit indicate the number of zero following. R denotes decimal.

Ex.) 0.5 μ F-OR5, 10 μ F-100, 100 μ F-101

5 Cap. Tolerance

Mark	Cap. Tolerance	Mark	Cap. Tolerance	Mark	Cap. Tolerance
C	$\pm 0.25\mu$ F	J	$\pm 5\%$	P	+100%-0%
D	$\pm 0.5\mu$ F	K	$\pm 10\%$	Z	+80%-20%
F	$\pm 1.0\mu$ F	M	$\pm 20\%$		

6 Disc Diameter

Code	Dia(ϕ mm)	Code	Dia(ϕ mm)	Code	Dia(ϕ mm)	Code	Dia(ϕ mm)	Code	Dia(ϕ mm)
04	4.0	08	8.0	11	11.0	15	15.0	20	20.0
05	5.0	09	9.0	12	12.5	16	16.0		
06	6.3	10	10.0	14	14.0	18	18.0		

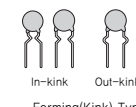
7 Packing Style

8 Lead Variation

	Packing Style	Lead Variation
F	Taping Type Flat Pack	S Straight Type
		K In - Kink Type
		F Out - Kink Type
B	Bulk	S Straight Long Type
		W Kink Short Type
		K Kink Long Type
		L Kink Short Type
		N Straight Short Type



Straight Type

In-kink Out-kink
Forming(Kink) Type

9 Lead Spacing & Pitch of Component

Taping Type			Bulk Type	
Code	Lead Spacing(mm)	Pitch of Component(mm)	Code	Lead Spacing(mm)
5	5.0	12.7	2	2.5
7	7.5	15.0	5	5.0
8	7.5	30.0	7	7.5
9	7.5	25.4	1	10.0
1	10.0	25.4		
2	10.0	30.0		

CLASS | Temperature Compensating Ceramic Capacitors

Specification

Temp. Range : -25 ~ +85°C (Y class)

Capacitance : Measured at 1MHz, 1 Vrms and 20°C ± 2°C

Testing Voltage

R.V	T.V
50V DC	150V DC
500V DC	1,250V DC
1-2KV DC	R.V × 2

Quality Factor(Q)

Capacitance	Q value
30µF and over	≥ 1000
less than 30µF	≥ 400+(20×C)

Insulation Resistance : 10,000MΩ Min. at Rating voltage for 1 minute(500V and above : 500V)

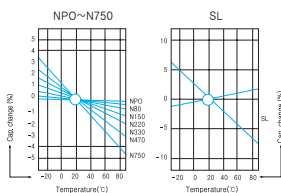
Temp. Coefficient Tolerance

Code	Tol.(PPM/°C)	Code	Tol.(PPM/°C)
G	± 30	L	± 500
H	± 60	M	± 1000
J	± 120	N	± 2500
K	± 250		

Color Code

TC.	Color	TC.	Color	TC.	Color
NPO(C)	Black	N 80(L)	Red	N150(P)	Orange
N220(R)	Yellow	N330(S)	Green	N470(T)	Blue
N750(U)	Purple	SL	Omitted		

Temp. Coefficient



Combination of the Capacitance Value and the TC.

Cap	TC. PPM/°C							
	NPO	N80	N150	N220	N330	N470	N750	P350
Less than 2µF	CK	LK	PK	RK	SK	TK	UK	SL
3µF	CJ	LJ	PJ	RJ	SJ	TJ	UJ	SL
4µF and above	CH	LH	PH	RH	SH	TH	UH	SL

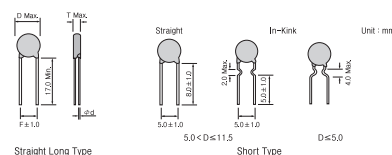
SAMWHA Standard (Cap. and Cap. Tol)

T.C	Cap.Tol	T.C	Cap.Tol	T.C	Cap.Tol	T.C	Cap.Tol
Cap.(µF)	C-U, SL	Cap.(µF)	C-U, SL	Cap.(µF)	C-U, SL	Cap.(µF)	C-U, SL
0.5	C, D	9	D, F	22	J, K	51	J
1	C, D	10	D, F	24	J	56	J, K
2	C, D	11	J	27	J, K	62	J
3	C, D	12	J, K	30	J	68	J, K
4	C, D	13	J	33	J, K	75	J
5	C, D	15	J, K	36	J	82	J, K
6	D, F	16	J	39	J, K	91	J
7	D, F	18	J, K	43	J	100	J, K
8	D, F	20	J	47	J, K	110	J

T.C	Cap.Tol	T.C	Cap.Tol	T.C	Cap.Tol	T.C	Cap.Tol
Cap.(µF)	C-U, SL	Cap.(µF)	C-U, SL	Cap.(µF)	C-U, SL	Cap.(µF)	C-U, SL
120	J, K	200	J	330	J, K	510	J
130	J	220	J, K	360	J	560	J, K
150	J, K	240	J	390	J, K	620	J
160	J	270	J, K	430	J	680	J, K
180	J, K	300	J	470	J, K	820	J

Lead Variation (Bulk Type)

R.V(DC)	Unit : mm
50	1.5Max.
500	2.0Max.
Above 1KV	3.0Max.



Capacitance Value According to Type(µF)

T.C	R.V	Capacitance(µF)							Dimensions(mm)			Part No. (How to order)	Marking	
		NPO (C)	N80 (L)	N150 (P)	N220 (R)	N330 (S)	N470 (T)	N750 (U)	P350~N1000 (SL)	D	T			Ø
50V DC	0.5, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 15, 16, 18, 20, 22, 24, 27, 30	1.2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 15, 16, 18, 20	2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 15, 16, 18, 20	2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 15, 16, 18, 20, 22, 24, 27, 30	2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 15, 16, 18, 20	2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 15, 16, 18, 20, 22, 24, 27, 30	2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 15, 16, 18, 20, 22, 24, 27, 30	0.5, 1.2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 15, 16, 18, 20, 22, 24, 27, 30, 33, 36, 39, 43, 47, 51, 56, 62, 68, 75, 82, 91	4.0	3.5	5.0	0.50	CC * H * * * * 04 * * *	10 D ≤ 5.0
	33, 36, 39, 43, 47	20, 22, 24, 27, 30	22, 24, 27, 30	27, 30, 33, 36, 39, 43, 47, 51, 56, 62, 68, 75, 82, 91	22, 24, 27, 30, 33, 36, 39, 43, 47, 51, 56, 62, 68, 75, 82, 91	27, 30, 33, 36, 39, 43, 47, 51, 56, 62, 68, 75, 82, 91	27, 30, 33, 36, 39, 43, 47, 51, 56, 62, 68, 75, 82, 91	150, 180, 200, 220, 240	5.0	3.5	5.0	0.50	CC * H * * * * 05 * * *	82J 63 < D ≤ 9.0
	51, 56, 62, 68, 75	33, 36, 39, 43, 47	33, 36, 39, 43, 47	39, 43, 47, 51, 56, 62, 68, 75, 82, 91	43, 47, 51, 56, 62, 68, 75, 82, 91	43, 47, 51, 56, 62, 68, 75, 82, 91	43, 47, 51, 56, 62, 68, 75, 82, 91	150, 180, 200, 220, 240	6.3	3.5	5.0	0.50	CC * H * * * * 06 * * *	221J D ≥ 10.0
	82, 91, 100, 110, 120, 150, 180	51, 56, 62, 68, 75, 82	51, 56, 62, 68, 75, 82	56, 62, 68, 75, 82, 91, 100, 110, 120, 150, 180, 200	56, 62, 68, 75, 82, 91, 100, 110, 120, 150, 180	56, 62, 68, 75, 82, 91, 100, 110, 120, 150, 180	56, 62, 68, 75, 82, 91, 100, 110, 120, 150, 180	100, 110, 120, 150, 180, 200, 220, 240	8.0	3.5	5.0	0.50	CC * H * * * * 08 * * *	10 D ≥ 10.0
	160, 180, 200, 220, 240	91, 100, 110, 120	91, 100, 110, 120	100, 110, 120, 150, 180, 200	100, 110, 120, 150, 180	100, 110, 120, 150, 180	100, 110, 120, 150, 180	510, 540, 620, 680, 820	10.0	3.5	5.0	0.50	CC * 2H * * * * 10 * * *	10 D ≥ 10.0
	1.2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 15, 16, 18, 20, 22, 24	2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 15, 16, 18, 20	2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 15, 16, 18, 20	2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 15, 16, 18, 20, 22, 24, 27, 30, 33, 36, 39, 43	2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 15, 16, 18, 20, 22, 24, 27, 30, 33, 36, 39, 43	2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 15, 16, 18, 20, 22, 24, 27, 30, 33, 36, 39, 43	2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 15, 16, 18, 20, 22, 24, 27, 30, 33, 36, 39, 43	150, 180, 200, 220, 240	5.0	4.0	5.0	0.50	CC * 2H * * * * 05 * * *	10 D ≥ 5.0
	27, 30, 33, 36, 39, 43	2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 15, 16, 18, 20	2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 15, 16, 18, 20	2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 15, 16, 18, 20, 22, 24, 27, 30, 33, 36, 39, 43	2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 15, 16, 18, 20, 22, 24, 27, 30, 33, 36, 39, 43	2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 15, 16, 18, 20, 22, 24, 27, 30, 33, 36, 39, 43	2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 15, 16, 18, 20, 22, 24, 27, 30, 33, 36, 39, 43	150, 180, 200, 220, 240	6.3	4.0	5.0	0.50	CC * 2H * * * * 05 * * *	47J D ≥ 5.0
	47, 51, 56, 62, 68, 75, 82, 91, 100, 110, 120, 150	22, 24, 27, 30, 33, 36, 39, 43, 47, 51, 56, 62, 68, 75, 82, 91	22, 24, 27, 30, 33, 36, 39, 43, 47, 51, 56, 62, 68, 75, 82, 91	22, 24, 27, 30, 33, 36, 39, 43, 47, 51, 56, 62, 68, 75, 82, 91, 100, 110, 120, 150	22, 24, 27, 30, 33, 36, 39, 43, 47, 51, 56, 62, 68, 75, 82, 91, 100, 110, 120, 150	22, 24, 27, 30, 33, 36, 39, 43, 47, 51, 56, 62, 68, 75, 82, 91, 100, 110, 120, 150	22, 24, 27, 30, 33, 36, 39, 43, 47, 51, 56, 62, 68, 75, 82, 91, 100, 110, 120, 150	150, 180, 200, 220, 240	8.0	4.0	5.0	0.50	CC * 2H * * * * 08 * * *	10 D ≥ 5.0
	91, 100, 110, 120, 150, 180, 200	39, 43, 47, 51, 56, 62, 68, 75, 82, 91, 100, 110, 120, 150, 180	39, 43, 47, 51, 56, 62, 68, 75, 82, 91, 100, 110, 120, 150, 180	39, 43, 47, 51, 56, 62, 68, 75, 82, 91, 100, 110, 120, 150, 180, 200, 220, 240, 270, 300	39, 43, 47, 51, 56, 62, 68, 75, 82, 91, 100, 110, 120, 150, 180, 200, 220, 240, 270, 300	39, 43, 47, 51, 56, 62, 68, 75, 82, 91, 100, 110, 120, 150, 180, 200, 220, 240, 270, 300	39, 43, 47, 51, 56, 62, 68, 75, 82, 91, 100, 110, 120, 150, 180, 200, 220, 240, 270, 300	240, 270, 300, 330, 360, 430, 470, 510, 560	10.0	4.0	5.0	0.50	CC * 2H * * * * 10 * * *	100J D ≥ 10.0
	150, 160, 180, 200	68, 75, 82, 91, 100	82, 91, 100, 110, 120	100, 120, 150, 180	100, 110, 120, 150	100, 110, 120, 150, 180	100, 110, 120, 150, 180	200, 220, 240, 270, 300	12.5	4.0	5.0	0.50	CC * 2H * * * * 12 * * *	

CLASS || High Dielectric Constant Ceramic Capacitors

Specification

Temp. Range : -25 ~ +85°C (Y class), -10 ~ +65°C (Fz)
 Capacitance : Measured at 1KHz, 1 Vrms and 20 °C ± 2°C

Testing Voltage

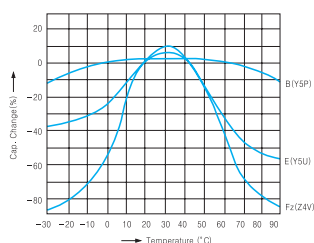
R.V	50V DC	500V DC	1~2KV DC	3KV DC	4~KV DC
T.V	R.V×3	R.V×2.5	R.V×2	R.V×1.75	R.V×1.5

Insulation Resistance : 10,000MΩ or 200MΩ · μF Which ever less at Rating Voltage for 1minute

Dissipation Factor(tanδ)

T.C	B	E	Fz
tanδ	2.5% Max.	2.5% Max.	5.0% Max.

Temp. Char.



Capacitance Value According to Type(μF)

T.C	Capacitance(μF)			Dimensions(mm)				Part No. (How to order)	Marking
	Y5P(B)	Y5U(E)	Z4V(Fz)	D	T	F	∅d		
50V DC	150, 180, 220, 270, 330, 390, 470, 560, 680	-	2200, 3300	4.0	3.5	5.0(2.5)	0.50	CK*1H***04**	
	100, 120, 820, 1000, 1200, 1500	-	1000, 15000, 4700	5.0	3.5	5.0(2.5)	0.50	CK*1H***05**	
	1800, 2200	-	5600, 10000	6.3	3.5	5.0	0.50	CK*1H***06**	
	2700, 3300, 3900, 4700, 5600	-	15000, 22000, 27000	8.0	3.5	5.0	0.50	CK*1H***08**	
	6800, 8200	-	3300, 40000	10.0	3.5	5.0	0.50	CK*1H***10**	
500V DC	120, 150, 180, 220, 270, 330, 390, 470, 560, 680	-	2200	5.0	4.0	5.0	0.50	CK*2H***05**	
	100, 820, 1000, 1200, 1500	1000	1000, 4700	6.3	4.0	5.0	0.50	CK*2H***06**	
	1800, 2200	2200	10000	8.0	4.0	5.0	0.50	CK*2H***08**	
	2700, 3900	4700	-	10.0	4.0	5.0	0.50	CK*2H***10**	
	4700, 5600, 6800	6800	20000, 22000	12.5	4.0	5.0	0.50	CK*2H***12**	
8200, 10000	10000	-	16.0	4.0	10.0	0.60	CK*2H***16**		

DC High Voltage Ceramic Capacitors

High Voltage Ceramic Capacitors(Epoxy Coated Ceramic Capacitors)

T.C	Capacitance(μF)			Dimensions(mm)				Part No. (How to order)	Marking
	Y5P(B)	Y5U(E)	Z4V(Fz)	D	T	F	∅d		
500V DC	10000			16.0	4.0	10.0	0.60	EKΔ2HΔΔΔ16ΔΔ	
	100, 120, 150, 180, 220, 270, 330, 390, 470, 560, 680	1000	1000, 2200	6.3	5.0	5.0	0.50	EKΔ3AΔΔΔ06ΔΔ	
1KV DC	820, 1000, 1200, 1500		4700	8.0	5.0	5.0	0.50	EKΔ3AΔΔΔ08ΔΔ	
	1800, 2200	2200	10000	10.0	5.0	5.0(7.5)	0.50(0.60)	EKΔ3AΔΔΔ10ΔΔ	
	2700, 3300	4700		12.5	5.0	5.0(7.5)	0.50(0.60)	EKΔ3AΔΔΔ12ΔΔ	
	3900, 4700			14.0	5.0	7.5(10.0)	0.60	EKΔ3AΔΔΔ14ΔΔ	
	5600, 6800		22000	16.0	5.0	7.5(10.0)	0.60	EKΔ3AΔΔΔ16ΔΔ	
	8200, 10000	10000		18.0	5.0	7.5(10.0)	0.60	EKΔ3AΔΔΔ18ΔΔ	
2KV DC	100, 120, 150, 180, 220, 270, 330, 390, 470, 560		1000, 2200	6.3	5.0	5.0	0.50	EKΔ3DΔΔΔ06ΔΔ	
	680, 820, 1000	1000		8.0	5.0	7.5(5.0)	0.60(0.50)	EKΔ3DΔΔΔ08ΔΔ	
	1200, 1500		4700	10.0	5.0	10.0(7.5)	0.60	EKΔ3DΔΔΔ10ΔΔ	
	1800, 2200, 2700	2200	6800, 10000	12.5	5.0	10.0(7.5)	0.60	EKΔ3DΔΔΔ12ΔΔ	
	3300, 3900	4700		14.0	5.0	10.0(7.5)	0.60	EKΔ3DΔΔΔ14ΔΔ	
	4700	6800, 10000		16.0	5.0	10.0(7.5)	0.60	EKΔ3DΔΔΔ16ΔΔ	
	5600			18.0	5.0	10.0(7.5)	0.60	EKΔ3DΔΔΔ18ΔΔ	
	6800, 8200, 10000	10000		20.0	5.0	10.0(7.5)	0.60	EKΔ3DΔΔΔ20ΔΔ	
				7.0	6.0	7.5(10.0)	0.60	EKΔ3FΔΔΔ07ΔΔ	
				8.0	6.0	7.5(10.0)	0.60	EKΔ3FΔΔΔ08ΔΔ	
3.15KV DC	100, 120, 150, 180, 220, 270, 330, 390, 470, 560			8.0	6.0	7.5(10.0)	0.60	EKΔ3FΔΔΔ09ΔΔ	
	680	1500		9.0	6.0	7.5(10.0)	0.60	EKΔ3FΔΔΔ10ΔΔ	
	820, 1000	2200	4700	10.0	6.0	7.5(10.0)	0.60	EKΔ3FΔΔΔ11ΔΔ	
			6800	11.0	6.0	7.5(10.0)	0.60	EKΔ3FΔΔΔ12ΔΔ	
	1200, 1500	3300		12.5	6.0	7.5(10.0)	0.60	EKΔ3FΔΔΔ14ΔΔ	
	1800, 2200	4700	10000	14.0	6.0	7.5(10.0)	0.60	EKΔ3FΔΔΔ16ΔΔ	
	2700			16.0	6.0	7.5(10.0)	0.60	EKΔ3FΔΔΔ18ΔΔ	
	3300			18.0	6.0	7.5(10.0)	0.60	EKΔ3FΔΔΔ20ΔΔ	
				10.0	7.0	10.0	0.60	EKΔ3JΔΔΔ08ΔΔ	
				9.0	7.0	10.0	0.60	EKΔ3JΔΔΔ09ΔΔ	
6.3KV DC	100, 120, 150, 180, 220, 330, 470	1000	1000	8.0	7.0	10.0	0.60	EKΔ3JΔΔΔ10ΔΔ	
		1500		9.0	7.0	10.0	0.60	EKΔ3JΔΔΔ12ΔΔ	
	1000	2200	2200, 4700	12.5	7.0	10.0	0.60	EKΔ3JΔΔΔ14ΔΔ	
		3300		14.0	7.0	10.0	0.60	EKΔ3JΔΔΔ15ΔΔ	
		3900, 4700		15.5	7.0	10.0	0.60	EKΔ3JΔΔΔ16ΔΔ	
10KV DC			10000	20.0	7.0	10.0	0.60	EKΔ3JΔΔΔ20ΔΔ	
	100, 120, 150, 180, 220			8.0	8.0	10.0	0.60	EKΔ4AΔΔΔ08ΔΔ	
	270		1000	10.0	8.0	10.0	0.60	EKΔ4AΔΔΔ10ΔΔ	
	330, 390, 470	1000	2200	12.5	8.0	10.0	0.60	EKΔ4AΔΔΔ12ΔΔ	
	560, 680, 820, 1000	2200	4700	16.0	8.0	10.0	0.60	EKΔ4AΔΔΔ16ΔΔ	

CLASS III Semi-Conductor Capacitors

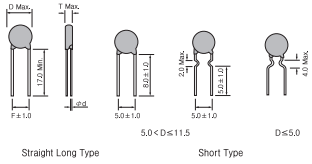
Specification

Temp. Range : -25 ~ +85°C (Y class)
 Capacitance : Measured at 1KHz, 0.1 Vrms and 25°C ± 2°C

Testing Voltage

Rating Voltage	25V DC	50V DC
Testing Voltage	R.V × 1.5	R.V × 1.5

Lead Variation



Insulation Resistance

T.C	Y5P	Y5R	Y5V
I.R(MΩ)	5MΩ · μF Min.	1000MΩ · or 20MΩ · μF Whichever less	5MΩ · μF Min.

Dissipation Factor(tanδ)

T.C	Y5P	Y5R	Y5V
R.V	25V, 50V	25V	25V, 50V
Tanδ	5.0% Max.	1.5% Max.	5.0% Max.

Temperature Characteristics

T.C	Y5P	Y5R	Y5V
Change Rate	± 10%	± 15%	+22% -82%

Capacitance Value According to Type(μF)

R.V	T.C	Capacitance(μF)			Dimensions(mm)				Part No. (How to order)	Marking
		Y5P(B)	Y5U(E)	Y5V(F)	D	T	F	Ød		
25V DC		10000	2200, 2700, 3300, 3900, 4700, 6800	10000	4.0	3.0	5.0(2.5)	0.5	CG * 1E **** 04 **	Ⓟ 100 25V D ≤ 5.0
			10000, 15000	22000	5.0	3.0	5.0(2.5)	0.5	CG * 1E **** 05 **	Ⓟ 220M 25V 63SD5Y8
		22000	22000, 27000, 33000	47000, 56000, 100000	6.3	3.0	5.0	0.5	CG * 1E **** 06 **	Ⓟ 100M 50V D ≥ 10.0
		47000	47000		8.0	3.0	5.0	0.5	CG * 1E **** 08 **	Ⓟ 100M 50V D ≥ 10.0
			56000, 68000	220000	10.0	3.0	5.0	0.5	CG * 1E **** 10 **	Ⓟ 100M 50V D ≥ 10.0
50V DC			10000		4.0	3.0	5.0(2.5)	0.5	CG * 1H **** 04 **	Ⓟ 100 50V D ≤ 5.0
		10000	22000, 33000		5.0	3.0	5.0(2.5)	0.5	CG * 1H **** 05 **	Ⓟ 100M 50V D ≥ 10.0
			47000, 56000	68000, 100000	6.3	3.0	5.0	0.5	CG * 1H **** 06 **	Ⓟ 100M 50V D ≥ 10.0

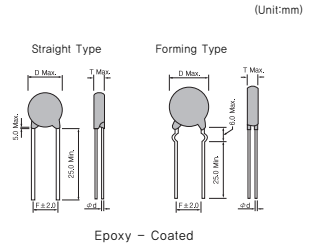
Low Loss Ceramic Capacitors(SL & R Series)

Specification

Temp. Range : -25 ~ +85°C
 Capacitance : Measured at 1KHz, 0.1 Vrms and 20°C ± 2°C
 Testing Voltage : R.V × 2
 Insulation Resistance : 10,000MΩ Min.
 at 500V DC for 1 minute

Temperature Characteristics & Dissipation Factor

T.C	SL	R(Y5V)
Change Rate	-1000-350PPM	± 15%
D.F	30μF and over : 1000Min. less than 30μF : 400+(20 × C)Min.	0.2%Max.



R.V	Capacitance (μF)			Dimensions(mm)				Part No. (How to order)	Marking	
	SL	R(Y5R)	R(Y5V)	D	T	F	Ød			
1KV DC	10, 11, 12, 15, 18, 20, 22, 24, 27, 30, 33, 39, 45, 47, 51	220, 270, 330, 390		6.3	5.0	5.0	0.50	EK Δ3A Δ Δ Δ Δ 06 Δ Δ	Ⓟ 220 1KV 63 ≤ D ≤ 9.0	
		470		7.0	5.0	5.0	0.50	EK Δ3A Δ Δ Δ Δ 07 Δ Δ		
		560, 680		8.0	5.0	5.0	0.50	EK Δ3A Δ Δ Δ Δ 08 Δ Δ	Ⓟ 220M 25V D ≥ 10.0	
		820, 1000		9.0	5.0	5.0(7.5)	0.50(0.60)	EK Δ3A Δ Δ Δ Δ 09 Δ Δ		
		110, 120, 150		10.0	5.0	5.0(7.5)	0.50(0.60)	EK Δ3A Δ Δ Δ Δ 10 Δ Δ	Ⓟ 220M 25V D ≥ 10.0	
		1500		11.0	5.0	5.0(7.5)	0.50(0.60)	EK Δ3A Δ Δ Δ Δ 11 Δ Δ		
		180, 200, 220, 240, 270		12.5	5.0	5.0(7.5)	0.50(0.60)	EK Δ3A Δ Δ Δ Δ 12 Δ Δ	Ⓟ 220M 25V D ≥ 10.0	
		300, 330, 360	1800, 2200, 2700	14.0	5.0	10.0	0.60	EK Δ3A Δ Δ Δ Δ 14 Δ Δ		
		390, 430, 470, 510	3300	15.0	5.0	10.0	0.60	EK Δ3A Δ Δ Δ Δ 15 Δ Δ	Ⓟ 220M 25V D ≥ 10.0	
		560, 620	3900	16.0	5.0	10.0	0.60	EK Δ3A Δ Δ Δ Δ 16 Δ Δ		
2KV DC	18, 20, 22, 24, 27, 30, 33, 36, 39, 45, 47	120		6.3	5.0	5.0	0.50	EK Δ3D Δ Δ Δ Δ 06 Δ Δ	Ⓟ 270M 2KV 63 ≤ D ≤ 9.0	
		220, 270		7.0	5.0	5.0	0.50	EK Δ3D Δ Δ Δ Δ 06 Δ Δ		
		51, 56, 62, 68, 75, 82, 91, 100	330, 390		8.0	5.0	10.0	0.60	EK Δ3D Δ Δ Δ Δ 07 Δ Δ	Ⓟ 270M 2KV 63 ≤ D ≤ 9.0
		470, 560, 680	820, 1000		10.0	5.0	10.0	0.60	EK Δ3D Δ Δ Δ Δ 11 Δ Δ	
		120, 150, 180, 200		11.0	5.0	10.0	0.60	EK Δ3D Δ Δ Δ Δ 12 Δ Δ	Ⓟ 270M 2KV D ≥ 10.0	
		220, 240	1200, 1500		14.0	5.0	10.0	0.60		EK Δ3D Δ Δ Δ Δ 14 Δ Δ
		270, 300, 330, 360	1800, 2200		15.0	5.0	10.0	0.60	EK Δ3D Δ Δ Δ Δ 15 Δ Δ	Ⓟ 270M 2KV D ≥ 10.0
		390, 430, 470	2700		16.0	5.0	10.0	0.60	EK Δ3D Δ Δ Δ Δ 16 Δ Δ	
		15, 16, 18, 20, 22, 27, 30	3300		18.0	5.0	10.0	0.60	EK Δ3D Δ Δ Δ Δ 17 Δ Δ	Ⓟ 270M 2KV D ≥ 10.0
					18.0	5.0	10.0	0.60	EK Δ3D Δ Δ Δ Δ 18 Δ Δ	
3.15KV DC	33, 36, 39, 45, 47, 51, 56	150, 180, 220, 270		6.3	6.0	5.0	0.50	EK Δ3F Δ Δ Δ Δ 06 Δ Δ	Ⓟ 330M 3KV 63 ≤ D ≤ 9.0	
		330, 390		7.0	6.0	5.0	0.50	EK Δ3F Δ Δ Δ Δ 07 Δ Δ		
		62, 68, 75, 82	470, 560, 680		8.0	6.0	10.0	0.60	EK Δ3F Δ Δ Δ Δ 10 Δ Δ	Ⓟ 330M 3KV 63 ≤ D ≤ 9.0
		91, 100, 110, 120, 150	820, 1000		10.0	6.0	10.0	0.60	EK Δ3F Δ Δ Δ Δ 12 Δ Δ	
		180, 200	1200, 1500		12.5	6.0	10.0	0.60	EK Δ3F Δ Δ Δ Δ 14 Δ Δ	Ⓟ 330M 3KV D ≥ 10.0
		220, 240	1800		14.0	6.0	10.0	0.60	EK Δ3F Δ Δ Δ Δ 16 Δ Δ	
		270, 300, 330, 360	2200, 2700		16.0	6.0	10.0	0.60	EK Δ3F Δ Δ Δ Δ 18 Δ Δ	Ⓟ 330M 3KV D ≥ 10.0
		22, 24, 27, 30, 35, 36			8.0	7.0	10.0	0.60	EK Δ3J Δ Δ Δ Δ 08 Δ Δ	
		45, 47	220, 270, 330		10.0	7.0	10.0	0.60	EK Δ3J Δ Δ Δ Δ 10 Δ Δ	Ⓟ 330M 3KV D ≥ 10.0
		51, 56, 62, 68, 75	390, 470		12.5	7.0	10.0	0.60	EK Δ3J Δ Δ Δ Δ 12 Δ Δ	
	120	560, 680		16.0	7.0	10.0	0.60	EK Δ3J Δ Δ Δ Δ 16 Δ Δ		

Safety Standard Recognized Ceramic Capacitors

SC Type : Rating Voltage AC 250V, X1 and Y2 Testing Voltage AC 2500V

UL	File No. E97754, E154171, E151195
VDE	File No. 40001503, 40001516, 116012
SEMKO	File No. 0215162/01-04
FIMKO	File No. 219387, 18099
KTL	File No. SU03004-2001, 02-920-2641 File No. SU03004-2002, 02-920-2691
DEMKO	File No. 311353-02
CSA	File No. 1513084, LR-78923-1 File No. 1577876, LR-60366-2
NEMKO	File No. P02100817
ISO 9001:2000	File No. ID03/0294

SD Type : Rating Voltage AC 250/400V, X1 and Y1 Testing Voltage AC 4000V

UL	File No. E97754, E154171, E151195
VDE	File No. 40001503, 40001516, 116012
SEMKO	File No. 0215162/01-04
FIMKO	File No. 219387, 18099
KTL	File No. SU03004-2001, 02-920-2641 File No. SU03004-2002, 02-920-2691
DEMKO	File No. 311353-02
CSA	File No. 1513084, LR-78923-1 File No. 1577876, LR-60366-2
NEMKO	File No. P02100817
ISO 9001:2000	File No. ID03/0294

How to Order (Product Identification)

SC B 2E 101 K 08 FF 7



- 1 Type
- 2 Temperature Characteristic
- 3 Voltage
- 4 Capacitance
- 5 Capacitance Tolerance
- 6 Disc Size
- 7 Packing and Lead Style
- 8 Lead Spacing & Pitch of Component

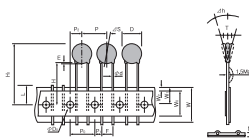
Specification

Type	Temp char.	Capacitance (pF)	Size				D ≤ 9.0		D ≥ 10.0
			D	T	F	ød	Front	Rear	
SC	B	100, 150, 220, 330, 390, 470, 560	8.0	6.0	7.5 (10.0)	0.60	SC 101K SWC 250~		SC 472M NDSF 250~ SWC J
		680, 820	10.0						
		1000	10.0						
	E	1000	7.0						
		1500	9.0						
		1800, 2200	10.0						
		3300, 3900	12.0						
	Fz	4700	14.0						
		6800	14.0						
		10000	14.0						
SD	B	100, 150, 220, 390, 470	8.0	7.0	10.0	0.60	SC 101K SWC 250~		SD 472M NDSF 250~ SWC J
		1000	8.0						
	E	1500	9.0						
		2200	12.0						
		3300, 3900	14.0						
		4700	15.0						

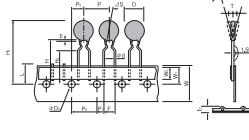
Safety Standard Recognized Ceramic Capacitors

Design

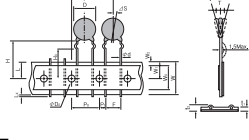
FS5 Type



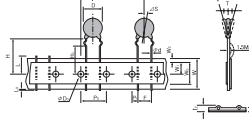
FK5 Type



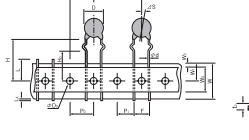
FF7 Type



FF8 Type



FF1 Type



Item	Code	Taping Specification	
		FS5 or FKS	FF1
Body Diameter	D	12.5Max.	6.3 ≤ D ≤ 20.0
Body Thickness	T	6.0Max.	7.0Max.
Lead Diameter	ød	0.5/0.50 ± 0.05	0.6/0.8 ± 0.05
Pitch of sprocket Hole	P _s	12.7 ± 0.3	12.7 ± 0.3
Pitch of Component	P	12.7 ± 1.0	25.4 ± 1.0
Lead Length from Hole	P _l	3.85 ± 0.7	7.7 ± 1.0
Center to Component Center	P _c	6.35 ± 1.3	12.7 ± 1.5
Lead Spacing	F	5.0 ± 0.1	10.0 ± 1.0
Deviation Along Tape, Left or Right	ΔS	0 ± 1.0	0 ± 1.0
Deviation Across Tape	Δh	0 ± 2.0	0 ± 2.0
Carrier Tape Width	W	18.0 ± 0.1	18.0 ± 0.1
Hold Down Tape Width	W _h	5.0Min.	9.0Min.
Position of Sprocket Hole	W _s	9.0 ± 0.5	9.0 ± 0.5
Hold Down Tape Position	W _d	3.0Max.	3.0Max.
Height of Component from Hole Center	H	18.0 ± 0.1	20.0 ± 0.1
Lead Wire Clinch Height	H _l	16.0 ± 0.5	16.0 ± 0.5
Component Height	H _c	32.25Max.	
Length of Snipped Lead	L	11.0Max.	11.0Max.
Diameter of Sprocket Hole	øD _s	4.0 ± 0.2	4.0 ± 0.2
Total Tape Thickness	t	0.7 ± 0.2	0.7 ± 0.2
Total Thickness, Tape and Lead Wire	t _l	15Max.	1.7Max.
Lead Wire Protrusion	L _x	1.0Max.	1.0Max.

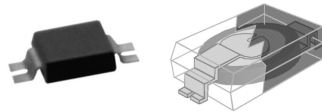
Item	Code	Taping Specification	
		FF7	FF8
Body Diameter	D	6.3 ≤ D ≤ 14.0	15.0 ≤ D ≤ 20.0
Body Thickness	T		6.0Max.
Lead Diameter	ød		0.6/0.8 ± 0.05
Pitch of sprocket Hole	P _s		15.0 ± 0.3
Pitch of Component	P	15.0 ± 1.0	30.0 ± 1.0
Lead Length from Hole Center Lead	P _l		3.75 ± 1.0
Lead Length from Hole Center to Component Center	P _c		7.5 ± 1.5
Lead Spacing	F		7.5 ± 1.0
Deviation Along Tape	ΔS		0 ± 1.0
Deviation Across Tape	Δh		0 ± 2.0
Carrier Tape Width	W		18.0 ± 0.1
Hold Down Tape Width	W _h		5.0Min.
Position of Sprocket Hole	W _s		9.0 ± 0.5
Hold Down Tape Position	W _d		3.0Max.
Lead Wire Clinch Height	H _l		16.0 ± 0.5
Height of Component Height	H		20.0 ± 0.1
Diameter of Sprocket Hole	øD _s		4.0 ± 0.2
Length of Snipped Lead	L		11.0Max.
Total Tape Thickness	t		0.7 ± 0.2
Lead Wire Protrusion	L _x		1.0Max.

Surface Mount Disc Capacitors

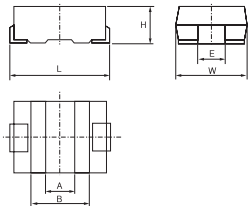
Introduction

- Samwha's high voltage ceramic capacitors offer superior performance and reliability.
- SMDC is the resin molded SMD type that surface mounting is available.
- SMDC exhibits high reliability through use of disc capacitor element.
- Competitive lower maintenance cost is guaranteed.
- Wide rated voltage ranges from 1kV to 6kV, through a disc element which withstand high voltage and outcurve terminals.
- Design flexibility ensures down sizing and higher resistance to outer impact.

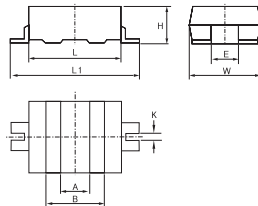
Shape & Dimensions



Inside Terminal (Style 1)
(Development Product)



Outside Terminal (Style 2)
(Mass Product)



(Unit : mm)

Rated Voltage	Capacitance (pF)	L ±0.5	W ±0.3	H ±0.2	E ±0.2	A	B	K ±0.1	L1 ±0.3	L2 Min.	Terminal Form	Development/Mass
3kV	5 - 33	5.7	4.5	2.3	2.5	1.7	3.1	-	-	-	Style 1	Development
	5 - 33	5.7	4.5	2.3	2.5	1.7	3.1	-	-	-	Style 1	Development
4kV	39 - 47	7.1	6.3	2.4	2.5	2.0	3.7	-	-	-	Style 1	Development
	18 - 27	5.5	4.5	2.3	2.5	1.7	3.1	0.5	9.4	6.7	Style 2	Mass
	39 - 47	7.1	6.3	2.4	2.5	2.0	3.7	0.5	10.8	7.9	Style 2	Development
5kV	5 - 15	5.5	4.5	2.3	2.5	1.7	3.1	0.5	9.4	6.7	Style 2	Mass
	18 - 27	7.1	6.3	2.4	2.5	2.0	3.7	0.5	10.8	7.9	Style 2	Development
6kV	5 - 15	7.1	6.3	2.4	2.5	2.0	3.7	0.5	10.8	7.9	Style 2	Development

How to Order (Product Identification)

SCC O 3H 150 J 2 E 00



1 Style

Mark	Product Name	Mark	Product Name
SCC	Temperature Compensating Type	SSD	AC250/400V(Testing Voltage:AC4000V)
SCK	High Dielectric Type	SSC	AC250(Testing Voltage:AC2500V)
SCG	Semiconductor Type		

2 Capacitance temperature characteristic

SCC Type (PPM/°C)				SCK, SCG, SSC, SSD Type	
C	NPO(0)	T	N470(-470)	B	Y5P(+10~-10%)
L	N80(-80)	U	N750(-750)	R	Y5R(+15~-15%)
P	N150(-150)	O	SL(+350~-1000)	E	Y5U(+22~-56%)
R	N220(-220)			F	Y5V(+22~-82%)
S	N330(-330)				

3 Rating Voltage

1A	10V	1B	12.5V	1C	16V	1E	25V			1H	50V		
2A	100V	2B	125V			2E	250V		2G	400V	2H	500V	
3A	1kV	3B	1.25kV	3D	2kV			3F	3.15kV	3G	4kV	3H	5kV
4A	10kV	4B	16kV									3J	6.3kV

4 Capacitance

(in picofarads) The first two digits indicate significant digits. The 3rd digit indicate the number of zero following.
R denotes decimal. Ex.) 0.5pF : 0R5, 10pF : 100, 100pF : 101

5 Cap. Tolerance

Mark	Cap. Tolerance	Mark	Cap. Tolerance	Mark	Cap. Tolerance
C	±0.25pF	J	±5%	P	+100%, -0%
D	±0.5pF	K	±10%	Z	+80%, -20%
F	±1.0pF	M	±20%		

6 Style

Mark	Terminal Form
1	Inside Terminal
2	Outside Terminal

7 Packing Style

Mark	Packaging Style
B	Bulk
E	Embossed Carrier Taping

8 Spare Code

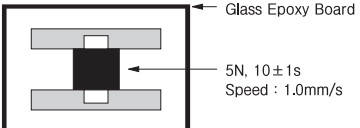
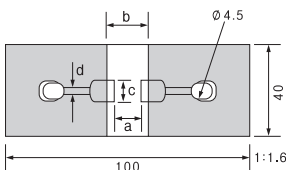
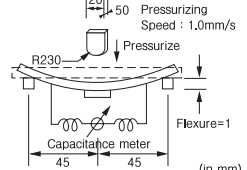
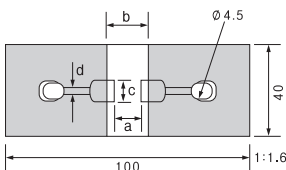
Electrical Performance

No.	Item	Requirement		Test Conditions						
		SCC Type	SCK, SCG, SSC, SSD Type							
1	Operating Temperature Range	-25°C ~ 110°C	B,E: -25°C ~ +85°C F : +10°C ~ +65°C							
2	Capacitance	Within the specified range		- Temperature : 20±2°C - Frequency : 1±0.1MHz(SCC Type) 1±0.1KHz (SCK,SCG,SSC,SSD Type)						
3	Dissipation Factor (tan δ, Q)	Q ≥ 400+20C (C : capacitance, pF)	B,E : 2.5% Max. F : 5.0% Max.	- Relative Humidity : 60-70% - Measure voltage : 1±0.1Vrms						
4	Insulation resistance	More than 1000MΩ		- Applied Voltage : • To be below 500V - Rating Voltage • Above 500V - 500V - Charge Time : 60±5sec						
5	Dielectric Withstanding Voltage	No remarkable abnormality is recognized		- Testing Voltage <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>RV</th> <th>3kV</th> <th>4kV~</th> </tr> </thead> <tbody> <tr> <td>W.V</td> <td>RV × 1.75</td> <td>RV × 1.5</td> </tr> </tbody> </table> For 1 to 5 sec.(Between terminals) The discharge current, however was 50 mA or less	RV	3kV	4kV~	W.V	RV × 1.75	RV × 1.5
RV	3kV	4kV~								
W.V	RV × 1.75	RV × 1.5								
6	Capacitance temperature Characteristics			Based on Items 2.2. 12 of EIA RS-198-C						

Temperature and Humidity Test Characteristics

No.	Item	Requirement		Test Conditions																
		SCC Type	SCK, SCG, SSC, SSD Type																	
1	High Temperature Test	Appearance	No. visible damage		- Temperature : 85±2°C - Test voltage : 1.2 times of the rated voltage - Operating time of test: 1000 +48/-0 hours After testing, The capacitor shall be subjected to the standard test condition for a period 4-24 hours and shall be measured. Charge and discharge current shall be 50 mA or less. ※Standard test condition : - Temperature : 20±2°C - Frequency : 1±0.1MHz(SCC Type) 1±0.1KHz (SCK, SCG, SSC, SSD Type)															
		Capacitance Change	±5% or ±0.5 pF Whichever is larger from initial measurement	B : With ± 10% E : With ± 20% F : With ± 30%																
		Dissipation Factor (tan δ, Q)	Q ≥ 200	B,E : 5% Max. F : 7.5% Max.																
		IR	More than 2000MΩ																	
2	Humidity Resistance Test	Appearance	No. visible damage		- Temperature : 40±2°C - Relative Humidity : 90-95% R.H - Operating time of test : 500 +24, -0 hours After testing, The capacitor shall be subjected to the standard test condition for a period 4-24 hours and shall be measured. Charge and discharge current shall be 50 mA or less. ※Standard test condition : - Temperature : 20±2°C - Frequency : 1±0.1MHz(SCC Type) 1±0.1KHz (SCK, SCG, SSC, SSD Type)															
		Capacitance Change	±5% or ±0.5 pF Whichever is larger from initial measurement	B : With ± 10% E : With ± 20% F : With ± 30%	- Relative Humidity : 60 ~ 70% - Measure voltage : 1± 0.1Vrms															
		Dissipation Factor (tan δ, Q)	Q ≥ 200	B,E : 5% Max. F : 7.5% Max.																
		IR	More than 500MΩ																	
3	Temperature Cycle Test	Appearance	No. visible damage		- The capacitors shall be subjected to 5cycles of the temperature cycle under Table.															
		Capacitance Change	±5% or ±0.5 pF Whichever is larger from initial measurement	B : With ± 10% E : With ± 20% F : With ± 30%	<table border="1" style="margin-left: 20px;"> <thead> <tr> <th>Step</th> <th>Temperature(°C)</th> <th>Period(minutes)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>-25, ±0/3</td> <td>30</td> </tr> <tr> <td>2</td> <td>Standard test condition</td> <td>10-15</td> </tr> <tr> <td>3</td> <td>+85, ±0/3</td> <td>30</td> </tr> <tr> <td>4</td> <td>Standard test condition</td> <td>10-15</td> </tr> </tbody> </table> After testing, The capacitor shall be subjected to the standard test condition for a period 4-24 hours and shall be measured. Charge and discharge current shall be 50 mA or less. ※Standard test condition : - Temperature : 20±2°C - Frequency : 1±0.1MHz(SCC Type) 1±0.1KHz (SCK, SCG, SSC, SSD Type)	Step	Temperature(°C)	Period(minutes)	1	-25, ±0/3	30	2	Standard test condition	10-15	3	+85, ±0/3	30	4	Standard test condition	10-15
		Step	Temperature(°C)	Period(minutes)																
		1	-25, ±0/3	30																
2	Standard test condition	10-15																		
3	+85, ±0/3	30																		
4	Standard test condition	10-15																		
Dissipation Factor (tan δ, Q)	Q ≥ 200	B,E : 5% Max. F : 7.5% Max.																		
IR	More than 1000MΩ																			

Mechanical test and Environmental Substance

No.	Item	Requirement		Test Conditions	
		SCC Type	SCK, SCG, SSC, SSD Type		
1	Adhesive Strength of Terminal	No removal of the termination or other defect should occur.		<p>Solder the capacitor to the testing jig (glass epoxy board) shown in Fig. 2 using a eutectic solder. Then apply 5 N force in the direction of the arrow. The soldering should be used the reflow method and should be conducted with care so that the soldering is uniform and free of defects such as heat shock.</p>  <p>Fig.2</p>	
2	Vibration Resistance	Appearance	No. visible damage		<p>The capacitor should be subjected to a simple harmonic motion having a total amplitude of 1.5mm, the frequency being varied uniformly between the approximate limits of 10 and 55Hz. The frequency range, from 10 to 55Hz and return to 10Hz, should be traversed in approximately 1 min. This motion should be applied for a period of 2hrs. in each 3 mutually perpendicular directions (total of 6hrs.)</p>
		Capacitance Change	±5% or ±0.5 pF Whichever is larger from initial measurement	B : With ± 10% E : With ± 20% F : With ± 30%	
		Dissipation Factor (tan δ, Q)	Q ≥ 200	B,E : 5% Max. F : 7.5% Max.	
		I.R	More than 1000MΩ		
3	Bending Strength	Appearance	No. visible damage		<p>Solder the capacitor to the testing jig (glass epoxy board) shown in Fig. 3 using a eutectic solder. Then apply a force in the direction shown in Fig. 4. The soldering should be done either with an iron or using the reflow method and should be conducted with care so that the soldering is uniform and free of defects such as heat shock.</p>  <p>Fig.3</p>  <p>Fig.4</p>
		Capacitance Change	±5% or ±0.5 pF Whichever is larger from initial measurement	B : With ± 10% E : With ± 20% F : With ± 30%	
		 <p>Fig.3</p>			
4	Solderability Test	Visual examination terminals area shall be at least 90% covered with a new solder coating		<p>Soldering Method : Reflow Soldering</p> <ul style="list-style-type: none"> - Maximum Temperature : 250°C max. (245 ± 5°C, 5 ± 0.5 sec.) - Preheating Temperature : 150~180°C, 60~180 sec. 	
5	Solder Heat Resistance	Appearance	No. visible damage		<p>Soldering Method : Reflow Soldering</p> <ul style="list-style-type: none"> - Maximum Temperature : 250°C max. (245 ± 5°C, 5 ± 0.5 sec.) - Preheating Temperature : 150~180°C, 60~180 sec. - After testing, The capacitors shall be subjected to the standard test condition for a period 24 hours and shall be measured.
		Capacitance Change	±5% or ±0.5 pF Whichever is larger from initial measurement	B : With ± 5% E : With ± 15% F : With ± 20%	
		Dielectric Strength	No. Failure		
6	The regulation of environmental pollution materials.	<ul style="list-style-type: none"> ※ Never use materials mentioned below in high voltage products regulated this document. ※ Pb, Hg, Cr+6, PBB, PBDE : 100ppm, Cd : 5ppm ※ Exception : - Pb of solder : <1000ppm - Pb of ceramic(dielectric) 			