



# CERAMIC CAPACITORS

SUCCESS ELECTRONICS CO., LTD.

SEC  
332MSE  
X1 Y1  
250V~

SEC  
222MSF  
X1 Y1  
250V~

SEC  
472M  
1KV

47  
SEC

SEC  
681KSB  
X1 Y1  
250V~

E  
103M  
2KV  
SEC

HIGH QUALITY



005448  
RYSTON Electronics



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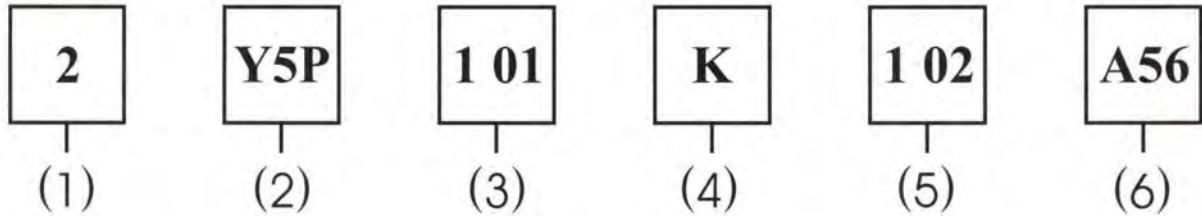
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# HOW TO ORDER:-Part Number Configuration

To order, please specify SEC part No. as the following:

(EXAMPLE)



## (1)TYPE

CODE	1	2	3	4	5	8	9
TYPE	T.C.	HI-K	S.C.	SPARK GAP	AC	DC-EPOXY COATED	LOW-DF

## (2)TEMPERATURE CHARACTERISTIC:(According to EIA RS-198C)

(a)T.C.TYPE:(TEMPERATURE COMPENSATING TYPE)

FIRST TWO CODE(T.C.)	C0	P2	R2	S2	T2	U2	P3	S3	T3
PPM/°C	0	-150	-220	-330	-470	-750	-1500	-3300	-4700
COMMON CODE	NPO	N150	N220	N330	N470	N750	N1500	N3300	N4700

THIRD CODE (T.C. Tolerance)	G	H	J	K	L	M	N
PPM/°C	±30	±60	±120	±250	±500	±1000	±2500

(EXAMPLE)

PPM/°C	0	0	-750	-3300		+350	
	±30	±60	±120	±500		-1000	
EIA CODE	COG	COH	U2J	S3L	S2L		S3N
JIS CODE	CG	CH	UJ	YL		SL	YN



(b)HI-K TYPE:(HIGH DIELECTRIC CONSTANT TYPE)  
S.C.TYPE:(SEMI-CONDUCTING TYPE)

FIRST CODE (LOW TEMP.)	X	Y	Z					
	-55°C	-30°C	+10°C					
SECOND CODE (HIGH TEMP.)	2	4	5	6	7			
	+45°C	+65°C	+85°C	+105°C	+125°C			
THIRD CODE (MAX. CAP. CHANGE)	E	F	P	R	S	T	U	V
	±4.7%	±7.5%	±10%	±15%	±22%	+22% -33%	+22% -56%	+22% -82%

(EXAMPLE)

Z5U= +10°C~+85°C, $\begin{matrix} +22\% \\ -56\% \end{matrix}$ MAX.
X7R= -55°C~+125°C, ±15% MAX.

### (3)NOMINAL CAPACITANCE:

CODE	3R3	470	101	102	222	103	473	104
NOMINAL CAPACITANCE	3.3pF	47pF	100pF	1000pF	2200pF	10000pF	47000pF	100000pF

### (4)CAPACITANCE TOLERANCE:

CODE	C	D	J	K	M	Z	P	V	U
CAPACITANCE TOLERANCE	±0.25pF	±0.5pF	±5%	±10%	±20%	+80% -20%	+100% -0%	Guaranteed Min.-Value	Guaranteed Max.-Value

### (5)RATED VOLTAGE:

CODE	160	250	500	101	501	102	152	302	103
RATED VOLTI.	16V	25V	50V	100V	500V	1000V (1KV)	1500V (1.5KV)	3000V (3KV)	10000V (10KV)

## (6) LEAD STYLE:

### (a) PACKAGING:

Fig NO.	FIRST CODE			SECOND CODE		THIRD CODE		
	CODE CONFIGURATION	BULK PACK	AMMO PACK	REEL PACK	CODE	F(mm)	CODE	D(mm)
1	Straight Long	A	S	L	2	$2.5 \pm 1.0$	4	0.48
2	Inside crimped short	C			5	$5.0 \pm 1.0$	6	0.60
3	Outside crimped short	D			6	$6.35 \pm 1.0$	7	0.65
4	Vertical crimped	E	M	P	7	$7.5 \pm 1.0$	8	0.80
5	Double crimped short	G			9	$9.5 \pm 1.0$	9	1.0
6	Straight short	H			0	$12.7 \pm 1.0$		
7	Inside crimped long	I	K	X	A	$15.0 \pm 1.0$		
8	Outside crimped long	J	N	Q	C	Cust spec.		
9	Cust spec.	F						

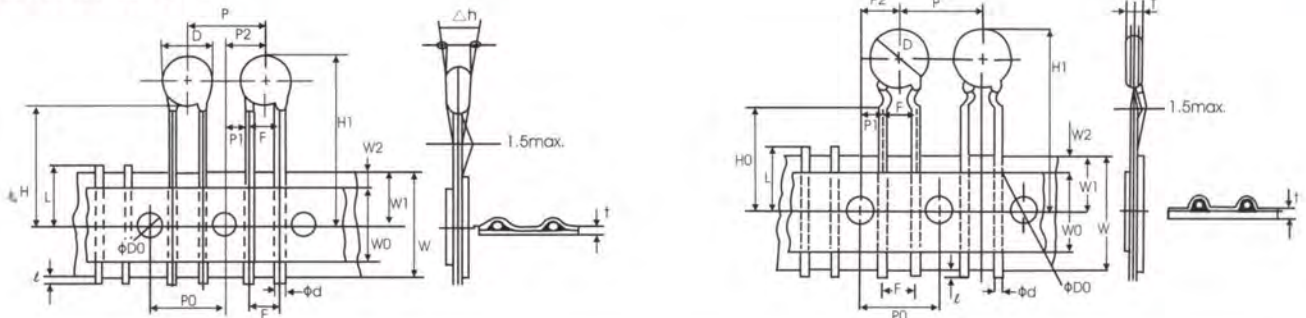
(Unit:mm)

<p><b>Fig 1</b></p>	<p><b>Fig 2</b></p>	<p><b>Fig 3</b></p>	<p><b>Fig 4</b></p> <p>(Side View)</p>	
<p><b>Fig 5</b></p>	<p><b>Fig 6</b></p>	<p><b>Fig 7</b></p>	<p><b>Fig 8</b></p>	<p>For other specifications not shown, please contact us for information.</p>



**(b) TAPING SPECIFICATION AND DIMENSION:**

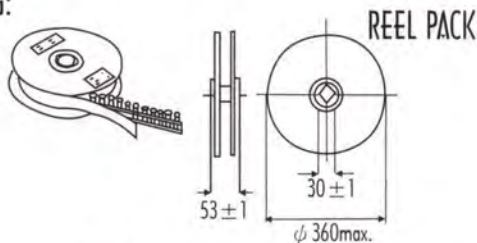
**RADIAL TAPED TYPE**



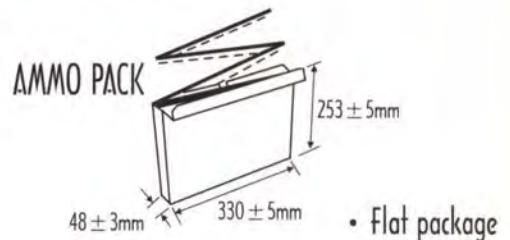
Item	Symbol	Specification	
		Value	Tolerance
Body diameter	D	11.0	max.
Body thickness	T	3.5	max.
Lead wire diameter	d	0.6	$\pm 0.05$
Pitch of component	P	12.7	$\pm 1.0$
Feed hole pitch	P0	12.7	$\pm 0.3$
Feed hole center to lead	P1	3.85	$\pm 0.7$
Hold center to component center	P2	6.35	$\pm 1.3$
Lead to lead distance	F	5.0	$+0.8 \sim -0.2$
Component alignment F-R	$\Delta h$	0	$\pm 2.0$
Tape width	W	18.0	$+1.0 \sim -0.5$
Hold down tape width	W0	11.5	min.
Hole position	W1	9.0	$+0.75 \sim -0.5$
Hold down tape position	W2	6.0	max.
Height of component from tape center	H	18.0	$+2.0 \sim -0$
	H0	16.0	$\pm 0.5$
Component height	H1	32.25	max.
lead wire protrusion	l	1.0	max.
Feed hole diameter	D0	4.0	$\pm 0.2$
Total tape thickness	t	0.7	$\pm 0.2$
Length of snipped lead	L	11.0	max.

Accumulative tolerance is  $\pm 2\text{mm}$  over 20 consecutive pitches.  
Start and end tape should be a lead tape with length of at least 5 pitches.

**PACKAGING:**



2000pcs. MAX. per reel depending upon dia. of capacitor



2000 pcs. per box.

# T.C.(TEMPERATURE COMPENSATING) TYPE-CLASS I

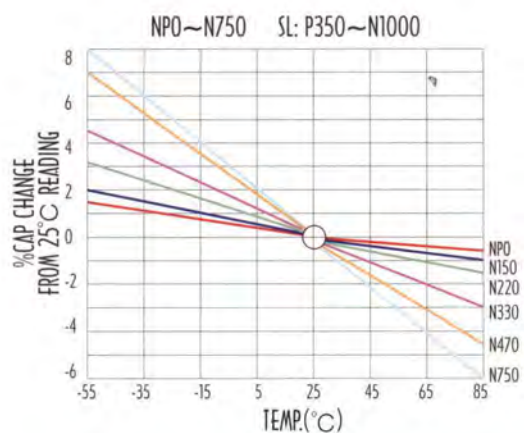
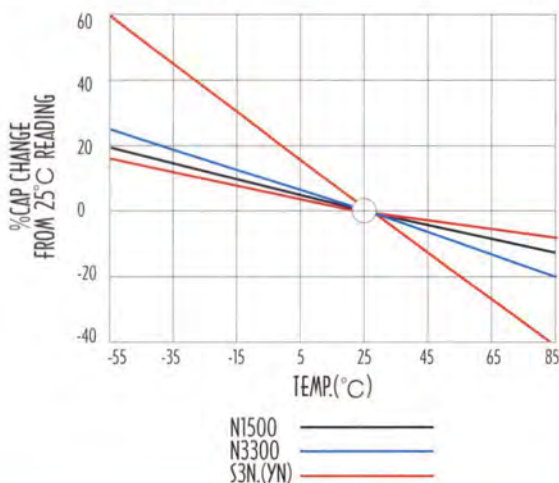
Applications:

- Resonant circuit
- High Q requirement
- High stability Cap. Char



## Specifications:

Capacitance (C)	Range	0.5pF~1200pF measured at 1MHz $\pm$ 10%, 1.0~5.0Vrms, 25°C					
	Tolerance	Code	C	D	J	K	M
			$\pm$ 0.25pF	$\pm$ 0.5pF	$\pm$ 5%	$\pm$ 10%	$\pm$ 20%
Quality Factor (Q)	NPO~N750 S2L(SL)	C $\geq$ 30pF	Q $\geq$ 1000				
		C < 30pF	Q $\geq$ 400 + 20 $\times$ C				
	N3300~N4700 S3N.(YN)	C $\geq$ 30pF	Q $\geq$ 500				
		C < 30pF	Q $\geq$ 200 + 10 $\times$ C				
Insulation Resistance(IR)	10,000M $\Omega$ Min. measured at W.V.DC, but not exceeding 500VDC						
Voltage	Working Voltage(W.V.)	12VDC~15KVDC					
	Test Condition		Test Voltage	Time	Current		
		W.V. < 1KV	2.5 $\times$ W.V.	1~5sec.	< 50mA		
		W.V. = 1KV	2.0 $\times$ W.V.	1~5sec.	< 50mA		
		W.V. > 1KV	1.75 $\times$ W.V.	1~5sec.	< 50mA		
		W.V. $\geq$ 3KV	1.5 $\times$ W.V.	1~5sec.	< 50mA		
W.V. $\geq$ 10KV	1.2 $\times$ W.V.	1~5sec.	< 50mA				
Operation Temp.Range	-55°C ~ +85°C						
Encapsulation	W.V. $\leq$ 1KV	Phenolic resin coated with wax impregnated					
	W.V. > 1KV	As mentioned or epoxy coated					
Markings	Capacitance	Shown on each piece					
	Working Voltage						
	Trade Mark(SEC)	Depending on the diameter of disc and the requirements.					
	Tolerance						
	Temp.Coef.						
	Others						





Dimensions(mm):

W.V. D.(max.) (pF) Cap.	Char.	16~50V				500V				1KV			
		NPO	N750	S2L(SL)	S3N(YN) (N3300)	NPO	N750	S2L(SL)	S3N(YN) (N3300)	NPO	N750	S2L(SL)	S3N(YN) (N3300)
1		5						6		6		6	
5		5						6		6		6	
10		5	5				6	6		6	6	6	
12		5	5				6	6		6	6	6	
15		5	5				6	6		6	6	6	
18		5	5				6	6		6	6	6	
20		5	5				6	6		6	6	6	
22		5	5				6	6		6	6	6	
25		5	5				6	6		6	7	6	
27		5	5				7	6		6	7	6	
30		5	5	5		7	7	6		7	7	6	
33		5	5	5		7	7	6		7	7	6	
40		6	5	5		8	7	6		8	8	6	
47		6	5	5		8	7	6		8	8	6	
50		6	5	5		8	7	6	6	8	8	6	6
53		6	6	5		9	8	6	6	9	8	6	6
56		6	6	5		9	8	7	6	9	9	6	6
60		6	6	5		9	8	7	6	9	9	7	6
68		6	6	5		9	8	7	6	9	9	7	6
72		6	6	5		9	9	7	6	9	9	7	6
82		6	6	5	5	9	9	7	6	9	10	7	6
90		8	7	5	5	10	9	7	6	10	10	7	6
100		8	7	5	5	10	9	7	6	10	10	7	6
120		8	7	5	5	10	9	8	6	10	11	8	6
130		9	8	5	5	11	10	8	6	11	11	8	7
150		9	8	5	5	11	10	8	6	11	11	8	7
180		9	8	6	5	11	11	9	7	11	13	9	7
200		10	9	6	5		11	9	7	13	13	9	7
220		10	9	6	6		11	9	7	13	13	9	7
250		11	10	7	6		11	10	7		13	10	7
300		11	10	7	6		11	10	7			10	8
330		11	10	7	6		13	10	7			11	8
400		14	14	8	6		13	11	8			11	8
470		14	14	8	6		13	11	8			11	9
500				9	6		13	12	9			13	9
560				9	7		13	12	9			13	11
680				9	7		13	13	10			13	11
820				10	7		13	13	10				11
1000					9		13		12				13
1200					9		13		12				13
Thickness		4.0Max.				4.0Max.				4.0Max.			

W.V. Char.	2KV		3KV				5KV				10KV				15KV			
	SL	S3N	SL	S3N	SL	S3N	SL	S3N	SL	S3N	SL	S3N	SL	S3N	SL	S3N		
5	F	Max. Dia.	F	Max. Dia.	F	Max. Dia.	F	Max. Dia.	F	Max. Dia.	F	Max. Dia.	F	Max. Dia.	F	Max. Dia.		
10	5.0	6			5.0	6			9.5	8			9.5	20				
20	5.0	6			5.0	6			9.5	8			9.5	22				
50	5.0	6			6.35	7			9.5	10			9.5	26				
80	6.35	8	6.35	7	6.35	9	6.35	9	9.5	12	6.35	10		9.5	20.5			
100	6.35	8	6.35	7	6.35	9	6.35	9	9.5	12	6.35	10						
120	6.35	10	6.35	9	6.35	12	6.35	9	9.5	14	6.35	10						
150	6.35	10	6.35	9	6.35	12	6.35	11	9.5	14	6.35	10						
200	6.35	12	6.35	9	6.35	15	6.35	11	9.5	20	6.35	13						
250	6.35	12	6.35	9	9.5	15	6.35	11	9.5	20	6.35	14						
300	6.35	12	9.5	12	9.5	15	6.35	11	9.5	20	6.35	14						
390	9.5	18	9.5	12	9.5	19												
560	9.5	18	9.5	20	19													
Thickness	5.0Max.		6.5Max.				8.0Max.				12.0Max.				15.0Max.			

EIA code	Common code	ppm/°C
COG	NPO	0 ± 30
COH	NPO	0 ± 60
U2J	N750	-750 ± 120
S3L	N3300	-3300 ± 500
	(SL)	+350 ~ -1000
S3N	(YN)	-3300 ± 2500



# HIGH-K (DIELECTRIC CONSTANT)TYPE-CLASS II

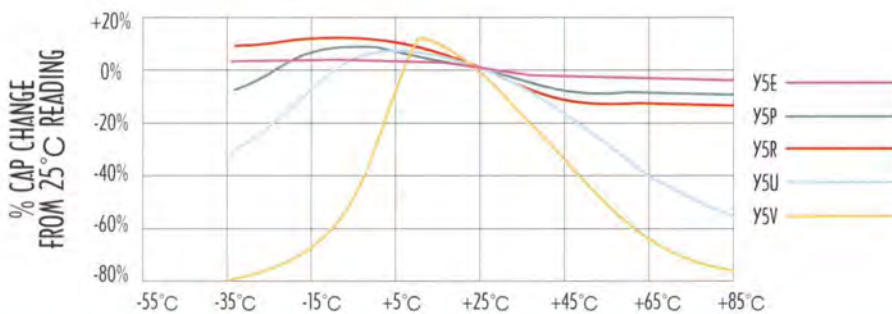
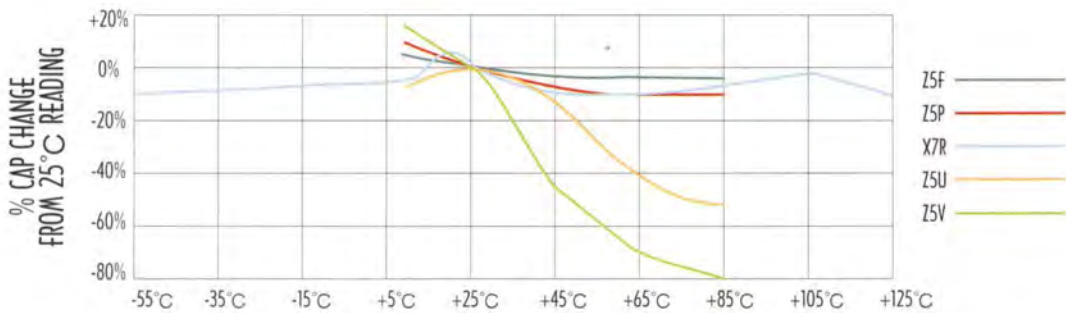
Applications:

- By-pass and coupling
- Frequency discriminating circuits where Q and stability of Cap. Char. are not major importance.



## Specifications:

Capacitance (C)	Range	80pF~0.2 $\mu$ F measured at 1KHz $\pm$ 10%, 1.0~5.0Vrms, 25°C					
	Tolerance	Code	K	M	Z	P	V
			$\pm$ 10%	$\pm$ 20%	+ 80%	+ 100%	Guaranteed Min. value
Dissipation Factor(DF)	2.5% Max.	at 1KHz, 1Vrms, 25°C for Y5E, Y5P, Y5U, Z5F, Z5P, Z5U, X7R					
	5.0% Max.	at 1KHz, 1Vrms, 25°C for Z5V, Y5V					
Insulation Resistance(IR)	7500M $\Omega$ Min. or $R \times C > 75 \Omega \cdot F$ , measured at W.V.DC, but not exceeding 500VDC						
Voltage	Working Voltage(W.V.)	12VDC~15KVDC					
	Test Condition	W.V. < 1KV	2.5 $\times$ W.V.	1~5sec.	< 50mA		
		W.V. = 1KV	2.0 $\times$ W.V.	1~5sec.	< 50mA		
		W.V. > 1KV	1.75 $\times$ W.V.	1~5sec.	< 50mA		
		W.V. $\geq$ 3KV	1.5 $\times$ W.V.	1~5sec.	< 50mA		
		W.V. $\geq$ 10KV	1.2 $\times$ W.V.	1~5sec.	< 50mA		
Operation Temp. Range	+ 10°C ~ + 85°C	Z5F, Z5P, Z5U, Z5V					
	- 30°C ~ + 85°C	Y5E, Y5P, Y5R, Y5V, Y5U					
	- 55°C ~ + 125°C	X7R					
Encapsulation	As mentioned						
Markings	As mentioned						





**Dimensions(mm):**

D.(max.) W.V. Cap.(pF)	12V-50V			500V			1KV			2KV		3KV	
	Z5F Z5P Y5F Y5P	Z5U Y5U	Z5V	Z5F Z5P Y5F Y5P	Z5U Y5U	Z5V	Z5F Z5P Y5F Y5P	Z5U Y5U	X7R	Y5P Max. Dia.	Z5U Max. Dia.	Y5P Max. Dia.	Z5U Max. Dia.
	80												
100	5.5			6			6.5		7.5	7.0	8.0	8.5	8.5
120	5.5			6			6.5		7.5	7.0	8.0	8.5	8.5
150	5.5			6			6.5		7.5	7.0	8.0	8.5	8.5
200	5.5			6			6.5		7.5	7.0	8.0	8.5	8.5
220	5.5			6			6.5		7.5	7.0	8.0	8.5	8.5
250	5.5			6			6.5		7.5	7.0	8.0	8.5	8.5
300	5.5			6			6.5		7.5	7.0	8.0	8.5	8.5
330	5.5			6			6.5		7.5	9	8.0	9.5	8.5
390	5.5			6			6.5		7.5	9	10.0	9.5	10.5
470	5.5			6			6.5		7.5	9	10.0	9.5	10.5
500	5.5			6			6.5		7.5	9	10.0	9.5	10.5
560	5.5			6			6.5		9.5	9	10.0	9.5	10.5
680	5.5			7.5			8		9.5	9	10.0	9.5	10.5
750	5.5	5		7.5	6		8	7	9.5	12	10.0	10	10.5
820	5.5	5		7.5	6		8	7	9.5	12	10.0	10	10.5
1000	5.5	5		7.5	6		8	7	9.5	12	11.0	10	11.5
1200	5.5	5		7.5	6		8	7	9.5	12	11.0	10	11.5
1500	6.5	5		8.5	6		10	7	11.5	15	11.0	15.5	11.5
1800	6.5	5		8.5	6		10	7	11.5	15	11.0	15.5	11.5
2000	6.5	5		8.5	8.5		10	9	11.5	15	11.0	15.5	11.5
2200	6.5	5		8.5	8.5		10	9	11.5	15	13.0	15.5	14.5
2500	7.5	6		8.5	8.5	6.5	10	9		18	13.0	18.5	14.5
2700	7.5	6		8.5	8.5	6.5	10	9		18	13.0	18.5	14.5
3000	7.5	6		10	8.5	6.5	11	9		18	13.0	18.5	14.5
3300	7.5	6	5.5	10	8.5	6.5	11	9		18	13.0	18.5	14.5
3900	7.5	6	5.5	10	8.5	8	11	9		18	13.0	18.5	14.5
5000	10	6	5.5	14	10	8	15	10		18	15	18.5	14.5
5600	10	6	5.5	14	10	8	15	10			15		14.5
6800	10	8	7	15	12	10.5	18	14			18		19
7500	11.5	8	7	15	12	10.5	18	14			18		19
8200	11.5	8	7	15	12	10.5	18	14			18		19
10000	11.5	8	7	15	12	12	18	14			18		19
15000	15	10	7		17	12		18					
20000	15	10	9.5		17	13		18					
22000	15	10	9.5		17	13		18					
33000	17	12.5	9.5		23	13		23					
47000		16	11		23	15		23					
56000		16	13			15							
100000		20	17										
200000													
Max.Thickness		4.0			4.0			4.0			5.0		6.5

For 4KV and over, please contact us.

**CHARACTERISTICS:**

Char.	X7R	Y5P	Y5U	Y5V	Z5F	Z5P	Z5U	Z5V
Temp.Range (°C)	-55~+125	-30~+85	-30~+85	-30~+85	+10~+85	+10~+85	+10~+85	+10~+85
Max.Change In cap.	±15%	±10.0%	+22% -56%	+22% -82%	±7.5%	±10.0%	+22% -56%	+22% -82%



## S.C.(SEMI-CONDUCTING)TYPE-CLASS III

Applications:

- Transistorized
- Low voltage electronic circuits for by-pass coupling
- Frequency determination, in which dielectric losses, Hi-IR and Cap.stability are not major importance.



### Specifications:

Capacitance (C)	Range	0.01 $\mu$ F ~ 0.47 $\mu$ F measured at 1KHz 0.1 Vrms max. 25°C			
	Tolerance	K	$\pm 10\%$	Y5P	
		M	$\pm 20\%$	Y5P, Y5U, Y5R	
	Z	$+80\% \sim -20\%$	Y5U, Y5V, Y5R		
Dissipation Factor (DF)	8.0% Max. measured at 1KHz 0.1 Vrms max. 25°C				
Insulation Resistance (IR)	Working Voltage	10 ~ 12VDC	16VDC	25VDC	50VDC
	Meg ohm · Microfarad	.04	.10	1.00	1.00
Voltage	Test Voltage	1.25 $\times$ W.V.	1.25 $\times$ W.V.	1.25 $\times$ W.V.	1.2 $\times$ W.V.
	Time	1sec			
Encapsulation	Phenolic resin coated with wax impregnated.				
Markings	As mentioned.				

### Dimensions(mm):

W.V.	12V(10V)				16V				25V				50V			
D. Char.	Y5P	Y5R	Y5U	Y5V	Y5P	Y5R	Y5U	Y5V	Y5P	Y5R	Y5U	Y5V	Y5P	Y5R	Y5U	Y5V
0.01	4	5	5	4	4	5	5	4	5	5	5	4	6	6	5	4
0.022	6	6	6	4	6	6	5	4	7	6	5	6	8	7	5	5
0.033	7	7	6	5	7	7	6	5	8	7	6	6	9	8	6	6
0.047	8	8	6	5	8	8	6	5	9	8	6	6	10	8	6	6
0.05	10	9	7	6	10	9	7	6	11	9	7	7	12	10	7	7
0.068	10	9	7	6	10	9	7	6	11	9	7	7	12	10	7	7
0.1	10	9	7	6	10	9	7	6	11	9	7	7	12	10	7	7
0.2			11	9			11	9			11	10				12
0.47			14	11			14	11				15				12
MAX.Thickness	4.0MAX.															

The above dimensions are Maximum.



## SPARK GAP TYPE

Applications:

Spark gap capacitors are designed to provide a reliable discharge path for stray, transient overvoltages and static voltage build-up. The construction of the spark gap enables the circuit designer to reduce costs by specifying lower voltage components with the assurance that over-voltage conditions will be prevented.



### Specifications:

Capacitance (C)	Range	0.75pF ~ 0.02 $\mu$ F measured at 1KHz 1 Vrms 25°C				
	Tolerance	Code	K	M	U	V
			$\pm 10\%$	$\pm 20\%$	Guaranted Max. Value	Guaranted Min. Value
Dissipation Factor(DF)	2.5%Max. measured at 1KHz 1 Vrms 25°C					
Insulation Resistance(IR)	7500M $\Omega$ Min. or $R \times C > 75 \Omega \cdot F$ , measured at W.V.D.C, but not exceeding 500 VDC.					
Voltage	Working Voltage	1.0KV DC	1.5KV DC	2.0KV DC	2.5KV DC	3.0KV DC
	Arc. Voltage	1.0~2.0KV DC	2.0~3.0KV DC	2.5~3.5KV DC	3.0~4.0KV DC	4.0~6.0KV DC
Operating Temp.Range	+ 10°C ~ + 85°C	Z5U				
	- 30°C ~ + 85°C	Y5P				
Encapsulation	Phenolic resin coated with wax impregnated.					
Markings	As mentioned.					

### Dimensions(mm):

Capacitance	Voltage	Lead Spacing(LS)	Dia.(D)	Length(L)	Thickness(T)
.75pF	1000V	6.35	9.0	13	6.35
.75pF	1500V	6.35	9.0	13	6.35
.75pF	2000V	6.35	9.0	13	6.35
.001 $\mu$ F	2000V	9.5	12.0	26	6.35
.004 $\mu$ F	3000V	9.5	24.0	27	6.35
.01 $\mu$ F	1500V	9.5	20.0	26	6.35
.01 $\mu$ F	2000V	9.5	20.0	26	6.35
.01 $\mu$ F	2500V	9.5	20.0	26	6.35
.02 $\mu$ F	1000V	9.5	24.0	27	6.35



# LOW-DF TYPE

Features:

- Low dissipation factor, less heat, high dielectric voltage withstanding strength.
- Flame-resistant insulating epoxy coating applied.

Applications:

- For use in horizontal TV/Monitor circuits and other high-frequency, high-voltage circuits.



## Specifications:

Capacitance (C)	Range	100pF~4700pF measured at 1KHz $\pm$ 10%, 1.0~5.0Vrms, 25°C			
	Tolerance	Code	K $\pm$ 10%	M $\pm$ 20%	
Dissipation Factor(DF)	0.3%Max.	at 1KHz $\pm$ 10 %, 1.0~5.0Vrms, 25°C for Y5R			
	0.5%Max.	at 1KHz $\pm$ 10 %, 1.0~5.0Vrms, 25°C for Y5P			
Insulation Resistance(IR)	10000M $\Omega$ ,Min. when measured at 500VDC				
Voltage	W.V.	1KV, 2KV, 3KV			
	Test Condition		Test Voltage	Time	Current
		W.V.=1KV	2.0 $\times$ W.V.	1~5sec	< 50mA
		W.V. > 1KV	1.75 $\times$ W.V.	1~5sec	< 50mA
W.V.=3KV	1.5 $\times$ W.V.	1~5sec	< 50mA		
Operating Temp.Range	-30°C~+85°C	Y5P, Y5R			

## Dimensions(mm):

Cap(pF)	W.V.	1KV		2KV		3KV	
		Max. Dia	F	Max. Dia	F	Max. Dia	F
100		7.0	6.35	7.0	6.35	7.0	6.35
150		7.0	6.35	7.0	6.35	7.0	6.35
220		7.0	6.35	7.0	6.35	7.0	6.35
270		7.0	6.35	8.0	6.35	7.0	6.35
330		7.0	6.35	8.0	6.35	8.0	6.35
390		7.0	6.35	8.0	6.35	9.0	6.35
470		7.0	6.35	9.0	6.35	10.0	9.5
560		8.0	6.35	9.0	6.35	10.0	9.5
680		8.0	6.35	10.0	9.5	11.0	9.5
820		9.0	6.35	11.0	9.5	12.0	9.5
1000		9.0	6.35	12.0	9.5	13.0	9.5
1200		11.0	9.5	12.0	9.5	14.0	9.5
1500		11.0	9.5	12.0	9.5	15.0	9.5
1800		13.0	9.5	14.0	9.5	16.0	9.5
2200		13.0	9.5	15.0	9.5	17.0	9.5
2700		15.0	9.5	17.0	9.5	19.0	9.5
3300		15.0	9.5	19.0	9.5		9.5
3900		17.0	9.5	20.0	9.5		9.5
4700		17.0	9.5	21.0	9.5		9.5
Max.Thickness		4.0		5.0		6.5	
$\phi$ d		0.65		0.65		0.65	

# CHARACTERISTICS:

NO.	ITEM	REQUIREMENTS			TEST CONDITION(JIS C5102)	
1	APPEARANCE & DIMENSIONS	appearance:normal configurations & dimensions as per chart 1 to 12			as per paragraph 6	
2	MARKING	Identified easily			as per paragraph 6.2.2	
3	DIELECTRIC WITHSTANDING VOLTAGE	class 1 class 2	W.V.	T.V.	as per paragraph 7.1 & 7.1.3(3)C *time:1~5 sec *current: 50mA max.	
			W.V. < 1KV	2.5 × W.V.		
			W.V.=1KV	2.0 × W.V.		
			W.V. > 1KV	1.75 × W.V.		
			W.V. ≥ 3KV	1.5 × W.V.		
		class 3	W.V. ≥ 10KV	1.2 × W.V.		
			10~25V	1.25 × W.V.		
	50V	1.2 × W.V.				
4	INSULATION RESISTANCE (IR)	class 1	10,000MΩ min.		as per paragraph 7.6 measured at W.V.DC, but not exceeding 500V DC	
		class 2	7,500MΩ min. or R × C > 75Ω · F			
		class 3	10-12V	0.04 ÷ C(μF)		
			16-20V	0.1 ÷ C(μF)		
			25-50V	1 ÷ C(μF)		
5	CAPACITANCE	within capacitance tolerance specification			as per paragraph 7.8 class 1: 1 MHz ± 10% 1~5 Vrms. 25°C class 2: 1 KHz ± 10% 1~5 Vrms. 25°C class 3: 1 KHz ± 10% 0.1 Vrms max. 25°C	
6	DISSIPATION FACTOR(D.F)	class 1 (Q)	NPO~N750 S2L(SL)	C ≥ 30pF	Q ≥ 1000	as per paragraph 7.9 test condition: same as capacitance
			C < 30pF	Q ≥ 400+20 × C		
		class 2 (D.F.)	N1000~N4700 S3N(YN)	C ≥ 30pF	Q ≥ 500	
			C < 30pF	Q ≥ 200+10 × C		
	type B: 2.5% max.		R: 2.5% max(X7R)			
	class 3 (D.F.)	type D: 2.5% max.	LOW-DF			
		type E: 2.5% max.	Y5P: 0.5% max.			
type F: 5.0% max.		Y5R: 0.3% max.				
7	TERMINAL STRENGTH	pull test	Capacitors no serious defects		*as per paragraph 8.1.2 table 9 method A	
		bend test	Wire-lead no damage		*as per paragraph 8.1 & 8.1.2(3)	



NO.	ITEM	REQUIREMENTS			TEST CONDITION(JIS C5102)
8	TEMPERATURE CHARACTERISTIC	type	Temperamre range(°C)	Temp. coefficient & Cap. variation	as per paragragh 7.12
		SL	-55°C to +85 °C	+350~-1000ppm/°C	
		YN	-55°C to +85 °C	-800~-5800ppm/°C	
		B	-25°C to +85 °C	±10% max.	
		D	-25°C to +85 °C	+22, -33% max.	
		E	+10°C to +85 °C	+22, -56% max.	
		F	+10°C to +85 °C	+22, -82% max.	
		R(X7R), -55°C~+125°C, ±15% max.			
9	VIBRATION TEST	appearance:normal			as per paragragh 8.2
		Cap.:within capacitance tolerance specification			
		D.F(or Q): same as item 6			
10	RESISTANCE TO SOLDERING HEAT	appearance:normal			*as per paragragh 8.5 temp: 350 ± 10°C time: 3 ± 0.5seconds *type Z diameter under 6.3mm: temp: 270 ± 5°C time: 5 ± 0.5seconds *sample kept at room temp. & normal humidity for 4 to 24 hrs. then test.
		Cap.	type	Cap. variation(ΔC)	
			SL	±5% or ±0.5pF max.	
			YN	±10% or ±1.0pF max.	
			B	±5% max.	
			D	±10% max.	
			E	±15% max.	
			F	±20% max.	
R(X7R), ±7.5% max.					
withstanding voltage: normal					
11	SOLDERABILITY	the area of dipped wire shall be covered by solder over 3/4			as per paragragh 8.4 temp: 230 ± 5°C time: 2 ± 0.5seconds
12	HEAT CYCLE TEST	appearance: no serious defects			as per paragragh 9.4 test condition: same as item 10
		Cap.	type	Cap. variation(ΔC)	
			SL	±5% or ±0.5pF max.	
			YN	±10% or ±1.0pF max.	
			B	±10% max.	
			D	±15% max.	
			E	±20% max.	
			F	±30% max.	
		R(X7R), ±15% max.			
		D.F.	type B: 5.0% max.		
type D: 5.0% max.					
I.R.	type E: 5.0% max.				
	type F: 7.5% max.				
R(X7R): 5.0% max.					
I.R. Shall be over 1/10 of item 4					
withstanding voltage: normal					

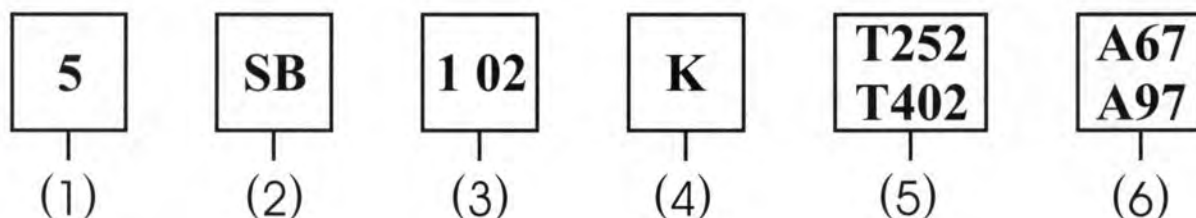


NO.	ITEM	REQUIREMENTS	TEST CONDITION(JIS C5102)																											
13	MOISTURE RESISTANCE (HUMIDITY TEST)	appearance, cap. variation, D.F. I.R. etc., same as item 12	as per paragraph 9.5 *temp: $40 \pm 2^\circ\text{C}$ *R.H.: 90 to 95% *time: x type: $1000 + 48 - 0$ hrs y type: $500 + 24 - 0$ hrs z type: $240 + 12 - 0$ hrs																											
14	DAMP LOAD	appearance: normal <table border="1"> <tr> <td rowspan="7">Cap.</td> <td>type</td> <td>Cap. variation(<math>\Delta C</math>)</td> </tr> <tr> <td>SL</td> <td><math>\pm 7.5\%</math> or <math>\pm 0.75\text{pF}</math> max.</td> </tr> <tr> <td>YN</td> <td><math>\pm 15\%</math> or <math>\pm 1.5\text{pF}</math> max.</td> </tr> <tr> <td>B</td> <td><math>\pm 10\%</math> max.</td> </tr> <tr> <td>D</td> <td><math>\pm 15\%</math> max.</td> </tr> <tr> <td>E</td> <td><math>\pm 20\%</math> max.</td> </tr> <tr> <td>F</td> <td><math>\pm 30\%</math> max.</td> </tr> </table> R(X7R), $\pm 15\%$ max. D.F. type B: 5.0% max. type D: 5.0% max. type E: 5.0% max. type F: 7.5% max. R(X7R): 5.0% max. I.R. $500\text{M}\Omega$ min.	Cap.	type	Cap. variation( $\Delta C$ )	SL	$\pm 7.5\%$ or $\pm 0.75\text{pF}$ max.	YN	$\pm 15\%$ or $\pm 1.5\text{pF}$ max.	B	$\pm 10\%$ max.	D	$\pm 15\%$ max.	E	$\pm 20\%$ max.	F	$\pm 30\%$ max.	as per paragraph 9.9 *test condition: temp, R.H., time same as item 13 *current limited 50mA max. *test volt.=rated volt.												
Cap.	type	Cap. variation( $\Delta C$ )																												
	SL	$\pm 7.5\%$ or $\pm 0.75\text{pF}$ max.																												
	YN	$\pm 15\%$ or $\pm 1.5\text{pF}$ max.																												
	B	$\pm 10\%$ max.																												
	D	$\pm 15\%$ max.																												
	E	$\pm 20\%$ max.																												
	F	$\pm 30\%$ max.																												
15	HIGH TEMPERATURE LOAD EXPOSURE	appearance: normal <table border="1"> <tr> <td rowspan="7">Cap.</td> <td>type</td> <td>Cap. variation(<math>\Delta C</math>)</td> </tr> <tr> <td>SL</td> <td><math>\pm 3\%</math> or <math>\pm 0.3\text{pF}</math> max.</td> </tr> <tr> <td>YN</td> <td><math>\pm 7.5\%</math> or <math>\pm 0.75\text{pF}</math> max.</td> </tr> <tr> <td>B</td> <td><math>\pm 10\%</math> max.</td> </tr> <tr> <td>D</td> <td><math>\pm 15\%</math> max.</td> </tr> <tr> <td>E</td> <td><math>\pm 20\%</math> max.</td> </tr> <tr> <td>F</td> <td><math>\pm 30\%</math> max.</td> </tr> </table> R(X7R), $\pm 15\%$ max. D.F. type B: 4.0% max. type D: 4.0% max. type E: 4.0% max. type F: 7.5% max. R(X7R): 4.0% max. I.R. same as item 13	Cap.	type	Cap. variation( $\Delta C$ )	SL	$\pm 3\%$ or $\pm 0.3\text{pF}$ max.	YN	$\pm 7.5\%$ or $\pm 0.75\text{pF}$ max.	B	$\pm 10\%$ max.	D	$\pm 15\%$ max.	E	$\pm 20\%$ max.	F	$\pm 30\%$ max.	as per paragraph 9.10 *test condition: <table border="1"> <thead> <tr> <th>type</th> <th>temp.(<math>^\circ\text{C}</math>)</th> <th>time(Hrs.)</th> </tr> </thead> <tbody> <tr> <td>X</td> <td><math>85 \pm 2</math></td> <td><math>2000 + 72 - 0</math></td> </tr> <tr> <td>Y</td> <td><math>85 \pm 2</math></td> <td><math>1000 + 48 - 0</math></td> </tr> <tr> <td>Z</td> <td><math>70 \pm 2</math></td> <td><math>500 + 24 - 0</math></td> </tr> </tbody> </table> * test volt.= 200% of rated volt. *current limited 50mA max.	type	temp.( $^\circ\text{C}$ )	time(Hrs.)	X	$85 \pm 2$	$2000 + 72 - 0$	Y	$85 \pm 2$	$1000 + 48 - 0$	Z	$70 \pm 2$	$500 + 24 - 0$
Cap.	type	Cap. variation( $\Delta C$ )																												
	SL	$\pm 3\%$ or $\pm 0.3\text{pF}$ max.																												
	YN	$\pm 7.5\%$ or $\pm 0.75\text{pF}$ max.																												
	B	$\pm 10\%$ max.																												
	D	$\pm 15\%$ max.																												
	E	$\pm 20\%$ max.																												
	F	$\pm 30\%$ max.																												
type	temp.( $^\circ\text{C}$ )	time(Hrs.)																												
X	$85 \pm 2$	$2000 + 72 - 0$																												
Y	$85 \pm 2$	$1000 + 48 - 0$																												
Z	$70 \pm 2$	$500 + 24 - 0$																												



# HOW TO ORDER:-Part Number Configuration

(EXAMPLE)



**(1).TYPE:5→AC CAPACITORS SAFETY**

**(2).TEMPERATURE CHARACTERISTIC:**

TYPE CODE	SB	SE	SF
Temp. char.	(Y5P)	(Y5U)	(Y5V)
Operating temp. range	- 30°C ~ + 85°C		
Cap.change MAX.	± 10%	+ 22, - 56%	+ 22, - 82%

**(3).NOMINAL CAPACITANCE:**

CODE	101	331	102	222	103
Nominal Capacitance	100pF	330pF	1000pF	2200pF	10000pF

**(4).CAPACITANCE TOLERANCE:**

CODE	K	M	Z
Capacitance Tolerance	± 10%	± 20%	+ 80, - 20%




**(5).RATED VOLTAGE:**

CODE	T252	T402
Rated Voltage	125V AC, 250V AC, 400V AC	250V AC, 400V AC

**(6).LEAD STYLE:**

When ordering, please use the SEC part number as indicated on page No.4.

## Approval standard and Recognized No.

Standard No.		Recognized No.	Class/Rated Voltage	Approved Monogram	
UL 1414		E 114280	125VAC 250VAC	 (U.S.A)	
CSA 22.2 NO.0,1		LR 82827	125VAC Y1/X1,250VAC	 (Canada)	
VDE 0560-2		94680 94681	400VAC 400VAC	 (Germany)	
VDE 0565-1	IEC 384-14 2nd Edition EN 132400	87495 89780 121379 118218	Y2,250VAC Y2,250VAC Y1/X1, 250VAC Y1/X1,250VAC		
SEV		95,7 70531,01 95,7 70743,01 95,6 60037,01 95,7 70323,02 99,6 60001,01 99,6 60001,02	Y2,250VAC Y2,250VAC X1,400VAC X1,400VAC Y1/X1,250VAC Y1/X1,250VAC		 (Switzerland)
SEMKO		9535018 9526010 9436088 9835118/01,02	Y2,250VAC Y2,250VAC X1,400VAC Y1/X1,250VAC		 (Sweden)
FIMKO		195704-01 195703-01 12326	Y2,250VAC Y2,250VAC Y1/X1,250VAC		 (Finland)
DEMKO		304521 304318 308261	Y2,250VAC Y2,250VAC Y1/X1,250VAC		 (Denmark)
NEMKO		P95103317 P95103074 P98102923	Y2,250VAC Y2,250VAC Y1/X1,250VAC	 (Norway)	



# T252 TYPE:CLASS X1/Y2

## AC RATED CERAMIC CAPACITORS 125VAC,250VAC,400VAC

Applications:

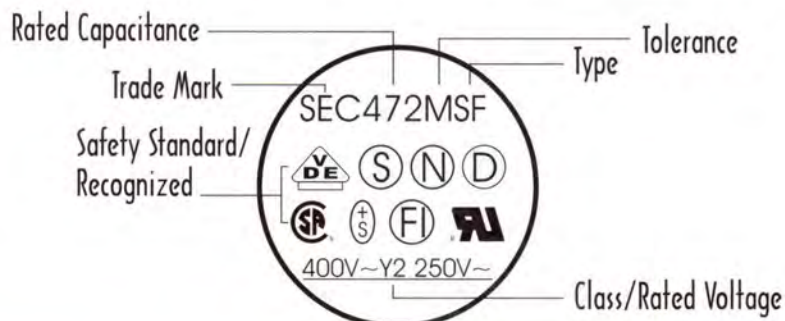
- For use in circuit where alternating, pulsating, intermittent and steady high voltages exist.



### Specifications:

Operating Temp. Range	- 30°C to 85°C			
Rated Voltage	Applicable Standards		Rated Voltage	
	CSA,UL		125VAC	
	CSA,UL,SEMKO,SEV,FIMKO, NEMKO,DEMKO,VDE(0565-1)		250VAC	
Dielectric Withstanding Voltage	Rated Voltage		Test Voltage	
	125VAC, 250VAC, 400VAC		2500VAC for 1 minute	
Dissipation Factor(DF)	SB(Y5P),SE(Y5U)	$\tan \delta \leq 2.5\%$ , measured at 1KHz $\pm 10\%$ , 1.0~5.0Vrms, 25°C		
	SF(Y5V)	$\tan \delta \leq 5.0\%$ , measured at 1KHz $\pm 10\%$ , 1.0~5.0Vrms, 25°C		
Capacitance(C)	Range	100pF to 10000pF. Measured at 1KHz $\pm 10\%$ , 1.0~5.0Vrms, 25°C		
	Tolerance	K	$\pm 10\%$	Y5P
		M	$\pm 20\%$	Y5P,Y5U,Y5V
		Z	+ 80%, - 20%	Y5V
Insulation Resistance(IR)	10000M $\Omega$ min. measured at 500VDC			
Temperature Characteristics	Type Code	Char.	Cap.Change	Temp.Range
	SB	Y5P	$\pm 10\%$ ,max	- 30 to 85°C
	SE	Y5U	+ 22, - 56% max.	- 30 to 85°C
	SF	Y5V	+ 22, - 82% max.	- 30 to 85°C
The reference temperature: 25°C				

### MARKING:





**Dimensions(mm):  
Rated 125VAC,250VAC,400VAC**

TYPE	Part Number	Temp.Char.	Cap.Value (pF)	MAX. Diameter	MAX. Thickness	Lead Spacing
SB	5SB101KT252A67	Y5P	100	7.0	6.5	6.35(7.5)
	5SB151KT252A67	Y5P	150	7.0	6.5	6.35(7.5)
	5SB221KT252A67	Y5P	220	7.0	6.5	6.35(7.5)
	5SB271KT252A67	Y5P	270	7.0	6.5	6.35(7.5)
	5SB331KT252A67	Y5P	330	9.0	6.5	6.35(7.5)
	5SB391KT252A67	Y5P	390	9.0	6.5	6.35(7.5)
	5SB471KT252A67	Y5P	470	9.0	6.5	6.35(7.5)
	5SB561KT252A67	Y5P	560	10.0	7.5	6.35(7.5)
	5SB681KT252A67	Y5P	680	10.0	7.5	6.35(7.5)
	5SB821KT252A67	Y5P	820	12.0	7.5	6.35(7.5)
	5SB102KT252A67	Y5P	1000	12.0	7.5	6.35(7.5)
	5SB152KT252A97	Y5P	1500	14.0	7.5	9.5(10)
	5SB222KT252A97	Y5P	2200	15.0	7.5	9.5(10)
SE	5SE102MT252A67	Y5U	1000	9.0	6.5	6.35(7.5)
	5SE152MT252A67	Y5U	1500	10.0	6.5	6.35(7.5)
	5SE222MT252A67	Y5U	2200	12.0	6.5	6.35(7.5)
	5SE332MT252A97	Y5U	3300	14.0	7.5	9.5(10)
	5SE472MT252A97	Y5U	4700	16.0	7.5	9.5(10)
SF	5SF102MT252A67	Y5V	1000	8.0	6.5	6.35(7.5)
	5SF152MT252A67	Y5V	1500	9.0	6.5	6.35(7.5)
	5SF222MT252A67	Y5V	2200	10.0	6.5	6.35(7.5)
	5SF332MT252A97	Y5V	3300	13.0	7.5	9.5(10)
	5SF472MT252A97	Y5V	4700	13.0	7.5	9.5(10)
	5SF682MT252A97	Y5V	6800	15.0	7.5	9.5(10)
	5SF822MT252A97	Y5V	8200	17.0	7.5	9.5(10)
	5SF103MT252A97	Y5V	10000	17.0	7.5	9.5(10)



# T402 TYPE:CLASS X1/Y1

## AC RATED CERAMIC CAPACITORS 250VAC,400VAC

Applications:

- For use in circuit where alternating, pulsating, intermittent and steady high voltages exist.

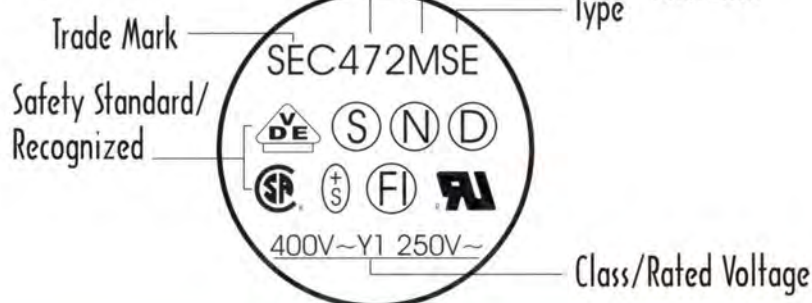


### Specifications:

Operating Temp. Range	- 30°C to 125°C		
Rated Voltage	Applicable Standards	Rated Voltage	
	CSA,UL,SEMKO,SEV,FIMKO, NEMKO,DEMKO,VDE	250VAC	
	SEMKO,SEV,VDE(0560-2)	400VAC	
Dielectric Withstanding Voltage	Rated Voltage	Test Voltage	
	250VAC, 400VAC	4000VAC for 1 minute	
Dissipation Factor(DF)	SB(Y5P)	$\tan \delta \leq 2.5\%$ , measured at 1KHz $\pm 10\%$ , 1.0~5.0Vrms, 25°C	
	SE(Y5U)	$\tan \delta \leq 2.5\%$ , measured at 1KHz $\pm 10\%$ , 1.0~5.0Vrms, 25°C	
Capacitance(C)	Range	100pF to 4700pF, Measured at 1KHz $\pm 10\%$ , 1.0~5.0Vrms, 25°C	
	Tolerance	K	$\pm 10\%$ Y5P
		M	$\pm 20\%$ Y5P,Y5U
Insulation Resistance(IR)	10000M $\Omega$ min.measured at 500VDC		
Temperature Characteristics	Type Code	Char.	Cap.Change
	SB	Y5P	$\pm 10\%$ ,max
	SE	Y5U	+ 22, - 56%max.
The reference temperature: 25°C			

### MARKING:

Rated Capacitance ————— Type Tolerance



**Dimensions(mm):  
Rated 250VAC,400VAC**

TYPE	Part Number	Temp.Char.	Cap.Value (pF)	MAX. Diameter	MAX. Thickness	Lead Spacing
SB	5SB101KT402A97	Y5P	100	10.0	8.0	9.5(10)
	5SB151KT402A97	Y5P	150	10.0	8.0	9.5(10)
	5SB221KT402A97	Y5P	220	10.0	8.0	9.5(10)
	5SB271KT402A97	Y5P	270	10.0	8.0	9.5(10)
	5SB331KT402A97	Y5P	330	10.0	8.0	9.5(10)
	5SB391KT402A97	Y5P	390	10.0	8.0	9.5(10)
	5SB471KT402A97	Y5P	470	11.0	8.0	9.5(10)
	5SB561KT402A97	Y5P	560	13.0	8.0	9.5(10)
	5SB681KT402A97	Y5P	680	13.0	8.0	9.5(10)
	5SB821KT402A97	Y5P	820	13.0	8.0	9.5(10)
	5SB102KT402A97	Y5P	1000	14.0	8.0	9.5(10)
	5SB152KT402A97	Y5P	1500	16.0	8.0	9.5(10)
	5SB222KT402A97	Y5P	2200	19.0	8.0	9.5(10)
	SE	5SE102MT402A97	Y5U	1000	10.0	8.0
5SE152MT402A97		Y5U	1500	12.0	8.0	9.5(10)
5SE222MT402A97		Y5U	2200	13.0	8.0	9.5(10)
5SE332MT402A97		Y5U	3300	15.0	8.0	9.5(10)
5SE392MT402A98		Y5U	3900	17.0	8.0	9.5(10)
5SE472MT402A98		Y5U	4700	17.0	8.0	9.5(10)



# SPECIFICATION AND TEST METHOD (Based on IEC384-14 2nd Edition)

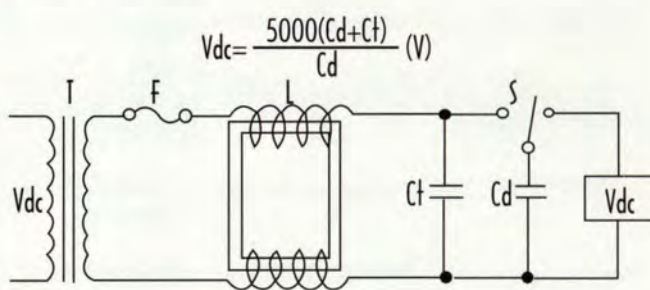
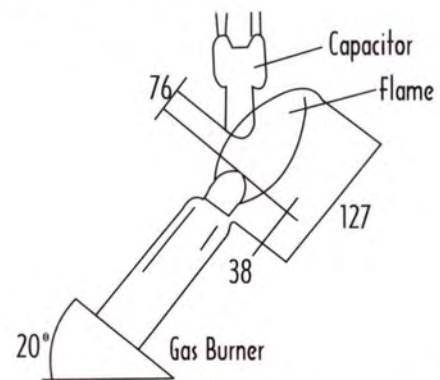
## Performance Tests

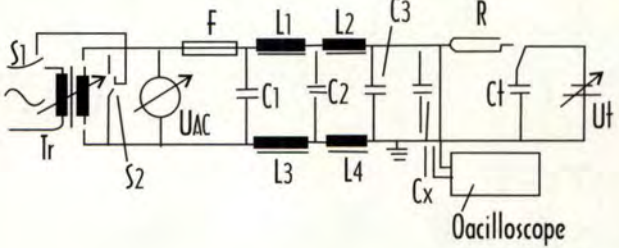
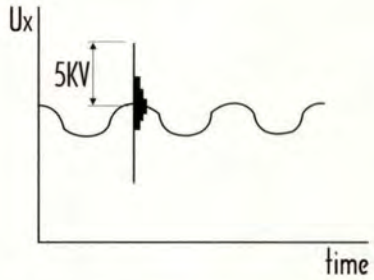
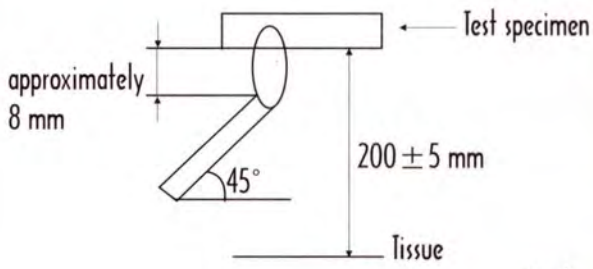
Item		Specification	Testing Method																				
1	Dielectric Strength	Between lead wires No failure.	The capacitors shall not be damage when AC4000V(Y1)/AC2500V(Y2) are applied between the lead wires for 60sec. (Charge/discharge current $\leq 50\text{mA}$ )																				
		Body Insulation No failure.	First, the terminals of the capacitor shall be connected together. Then, a metal foil shall be closely wrapped around the body of the capacitor distance of about 3 to 4 mm from each terminal. Then, the capacitor shall be inserted into a container filled with metal balls of about 1 mm diameter. Finally, AC4000V(Y1)/AC2500V(Y2) is applied for 60 sec. between the capacitor lead wires and metal balls. (Charge/discharge current $\leq 50\text{mA}$ )																				
2	Insulation Resistance(IR)	10,000M $\Omega$ min.	The insulation resistance shall be measured with 500 $\pm$ 50VDC within 60 $\pm$ 5 sec. of charging.																				
3	Capacitance	Within specified tolerance.	The Capacitance shall be measured at 25°C With 1 $\pm$ 0.1KHz and 5Vrms max.																				
4	Dissipation Factor(D.F.)	SB(Y5P) $\tan \delta \leq 2.5\%$ SE(Y5U) $\tan \delta \leq 2.5\%$ SF(Y5V) $\tan \delta \leq 5.0\%$	The dissipation factor shall be measured at 25°C With 1 $\pm$ 0.1KHz and 5Vrms max.																				
5	Temperature Characteristic	<table border="1"> <thead> <tr> <th>Char.</th> <th>Capacitance Change</th> </tr> </thead> <tbody> <tr> <td>SB</td> <td>Within <math>\pm 10\%</math></td> </tr> <tr> <td>SE</td> <td>Within + 22, - 56%</td> </tr> <tr> <td>SF</td> <td>Within + 22, - 82%</td> </tr> </tbody> </table>	Char.	Capacitance Change	SB	Within $\pm 10\%$	SE	Within + 22, - 56%	SF	Within + 22, - 82%	<p>The capacitance measurement shall be made at each step specified in Table 1.</p> <table border="1"> <thead> <tr> <th>Step</th> <th>Temperature(°C)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>+ 25 <math>\pm</math> 2</td> </tr> <tr> <td>2</td> <td>- 30 <math>\pm</math> 2</td> </tr> <tr> <td>3</td> <td>+ 25 <math>\pm</math> 2</td> </tr> <tr> <td>4</td> <td>+ 85 <math>\pm</math> 2</td> </tr> <tr> <td>5</td> <td>+ 25 <math>\pm</math> 2</td> </tr> </tbody> </table> <p>Pre-treatment: Capacitor shall be stored at 85 <math>\pm</math> 2°C for 1 hour, then placed at room condition for 24 <math>\pm</math> 2 hours before measurements.</p>	Step	Temperature(°C)	1	+ 25 $\pm$ 2	2	- 30 $\pm$ 2	3	+ 25 $\pm$ 2	4	+ 85 $\pm$ 2	5	+ 25 $\pm$ 2
		Char.	Capacitance Change																				
SB	Within $\pm 10\%$																						
SE	Within + 22, - 56%																						
SF	Within + 22, - 82%																						
Step	Temperature(°C)																						
1	+ 25 $\pm$ 2																						
2	- 30 $\pm$ 2																						
3	+ 25 $\pm$ 2																						
4	+ 85 $\pm$ 2																						
5	+ 25 $\pm$ 2																						
6	Robustness Of Terminations	Tensile Lead wire shall not cut off. Capacitor shall not be broken.	With the termination in its normal position, the specimen is held by its body in such a manner that the axis of the termination is vertical; the tensile force of 10 N shall be applied to the termination in the direction of its axis and acting in a direction away from the body of the specimen.																				
		Bending Lead wire shall not cut off. Capacitor shall not be broken.	With the termination in its normal position, the specimen is held by its body in such a manner that the axis of the termination is vertical; a mass applying a force of 5N is then suspended from the end of the termination. The body of the specimen is then inclined. Within a period of 2 to 3 sec, through an angle of approximately 90° in the vertical plane and then returned to its initial position over the same period of time. This operation constitutes one bend. One bend immediately followed by a second bend in the opposite direction.																				
7	Soldering Effect	Appearance No marked defect.	Solder temperature 350 $\pm$ 10°C (or 260 $\pm$ 5°C) Immersion time 3.0 $\pm$ 0.5sec (in case of 260 $\pm$ 5°C; 10 $\pm$ 1sec)																				
		IR 1000M $\Omega$ min.																					
		Dielectric Strength Per item 1	<p>The depth of immersion shall be a position 1.5~2.0mm from the seating plane, using a thermal insulating screen of 1.5 <math>\pm</math> 0.5mm thickness</p>																				
		Capacitance SB: within $\pm 10\%$ SE: within $\pm 15\%$ SF: within $\pm 20\%$	<p>Pre-treatment Capacitor shall be stored at 85 <math>\pm</math> 2°C for 1 hour, then placed at room condition for 24 <math>\pm</math> 2 hours before initial measurements</p> <p>Post-treatment Capacitor shall be stored for 1 to 2 hours at room condition.</p>																				



Item		Specification	Testing Method
8	Humidity (Under Steady State)	Appearance	Set the capacitor for $500 \pm 12$ hours at $40 \pm 2^\circ\text{C}$ in 90 to 95% humidity. Then Capacitor shall be stored for 1 to 2 hours at room condition.
		Capacitance	
		D.F.	
		IR.	
		Dielectric Strength	
9	Humidity Loading	Appearance	Apply the rated voltage for $500 \pm 12$ hours at $40 \pm 2^\circ\text{C}$ in 90 to 95% humidity and set it for 1 to 2 hours at room condition.
		Capacitance	
		D.F.	
		IR.	
		Dielectric Strength	
10	Life	Appearance	<p>Impulse Voltage</p> <p>Each individual capacitor shall be subjected to 8KV(Y1)/5KV(Y2) impulses for these time. After the capacitors are applied to life test.</p> <p>The specimen capacitors are placed in a circulating air oven for a period of 1500h. The air in the oven is maintained at a temperature of <math>85 \pm 2^\circ\text{C}</math>. Throughout the test, the capacitors are subjected to a 800Vrms alternating voltage of mains frequency, except that once each hour the voltage is increased to 1600Vrms for 0.1sec.</p>
		Capacitance	
		D.F.	
		IR.	
		Dielectric Strength	
		Discharge Test(2)	
11	Discharge Test(1)	Appearance	<p>As in Figure 1, discharge is made 50 times at 5 sec. Intervals from the capacitor <math>\langle C_d \rangle</math> charged at DC voltage of specified.</p> <p>(Figure 1)</p> <p>Ct: Capacitor under test R1: <math>1\text{K} \Omega \pm 10\%</math> Rs: Surge resistance Vs: 10KVDC S: High-voltage switch R2: <math>100\text{M} \Omega</math> Cd: 1000PF</p>
		IR.	
		Dielectric Strength	



Item	Specification	Testing Method									
12	<p>Discharge Test(II) The cheese-cloth around capacitors shall not glow or flame.</p>	<p>A single layer of cheesecloth is to be placed around the body of the test capacitor. Each sample is to be subjected to four discharges from a dump capacitor charged to a voltage that, when discharged, placed 5KV across the capacitors under test. The interval between successive discharge is to be 5 sec, 240V(Y1)/120V(Y2), 60Hz potential is to be applied across the capacitor under test and is to be maintained for 30 sec. after the fourth discharge, unless the circuit is opened in a shorter time by breakdown of the test capacitor. The direct current supply is to be adjusted to provide a potential in accordance with the following.</p> <div style="text-align: center;">  <p>(Figure 2)</p> </div> <p>Vdc : Variable direct-current voltage source            S : High-voltage switch            L : Choke coil of approximately 3 mH and 0.03 Ω            F : Plug fuse rated 30A and 250V            Vac : Supply source rated 240V (or 120V), 60Hz and 30A            Ct : Capacitor under test            Cd : Dump capacitor            Capacitance value and D.F. are as follows.</p> <table border="1" data-bbox="725 1388 1375 1545"> <tr> <td>Cap. value of Ct</td> <td>0~0.005 μ F</td> <td>0.0051 μ F~0.05 μ F</td> </tr> <tr> <td>Cap. value of Cd</td> <td>0.005 μ F</td> <td>0.05 μ F</td> </tr> <tr> <td>D.F. of Cd</td> <td>0.5% max.</td> <td>0.5% max.</td> </tr> </table>	Cap. value of Ct	0~0.005 μ F	0.0051 μ F~0.05 μ F	Cap. value of Cd	0.005 μ F	0.05 μ F	D.F. of Cd	0.5% max.	0.5% max.
Cap. value of Ct	0~0.005 μ F	0.0051 μ F~0.05 μ F									
Cap. value of Cd	0.005 μ F	0.05 μ F									
D.F. of Cd	0.5% max.	0.5% max.									
13	<p>Flame Test The capacitors flame discontinue as follows.</p> <table border="1" data-bbox="393 1702 650 1825"> <thead> <tr> <th>Cycle</th> <th>Time</th> </tr> </thead> <tbody> <tr> <td>1~4</td> <td>30 sec. max.</td> </tr> <tr> <td>5</td> <td>60 sec. max.</td> </tr> </tbody> </table>	Cycle	Time	1~4	30 sec. max.	5	60 sec. max.	<p>The capacitors shall be subjected to applied for 15 sec. And then removed for 15 sec. until 5 cycles.</p> <div style="text-align: center;">  </div> <p>(Unit:mm)</p>			
Cycle	Time										
1~4	30 sec. max.										
5	60 sec. max.										

Item	Specification	Testing Method
14	<p>Active Flammability</p> <p>The cheese-cloth shall not be on fire.</p>	<p>The specimen shall be individually wrapped in at least one but more than two complete layers of cheese-cloth.</p> <p>The specimens shall be subjected to 20 discharges.</p> <p>The interval between successive discharges shall be 5 sec.</p> <p>The UAC shall be maintained for 2 min. after the last discharge.</p>  <p> <math>C_{1,2} : 1 \mu F \pm 10\%</math>,      <math>C_3 : 0.033 \mu F \pm 5\% \text{ 10KV}</math>  <math>L_{1-4} : 1.5mH \pm 20\%</math>      16A Rod core choke  <math>R : 100 \Omega \pm 2\%</math>      <math>C_t : 3 \mu F \pm 5\% \text{ 10KV}</math>  <math>U_{AC} : U_R \pm 5\%</math>      <math>U_R : \text{Rated working voltage}</math>  <math>C_x : \text{Capacitor.}</math>      <math>F : \text{Fuse. Rated 16A}</math>  <math>U_t : \text{Voltage applied to } C_t</math> </p> 
15	<p>Passive Flammability</p> <p>The burning time shall not be exceeded the time 30sec.</p> <p>The tissue paper shall not ignite.</p>	<p>The capacitor under test shall be held in the flame in the position which best promotes burning. Each specimen shall only be exposed once to the flame.</p> <p>Time of exposure to flame: 30sec.</p> <p>Length of flame : <math>12 \pm 1 \text{ mm}</math></p> <p>Gas burner : Length 35 mm min.</p> <p>Inside Dia. : <math>0.5 \pm 0.1 \text{ mm}</math></p> <p>Outside Dia: 0.9 mm max.</p> <p>Gas : Butane gas Purity 95% min.</p>  <p>(Unit:mm)</p>



# HOW TO ORDER:-Part Number Configuration

To order, please specify SEC part No. as the following:

(EXAMPLE)

0

(1)

NPO

(2)

1 01

(3)

J

(4)

500

(5)

CHI  
K56

(6)

## (1)TYPE:

0:Multilayer Ceramic Capacitor

## (2)TEMPERATURE CHARACTERISTIC:

(a)NPO:TEMPERATURE COMPENSATING TYPE,

NPO=  $-55^{\circ}\text{C} \sim +125^{\circ}\text{C}, 0 \pm 30\text{PPM}/^{\circ}\text{C}$

(b)HI-K:HIGH DIELECTRIC CONSTANT TYPE,

Z5U=  $+10^{\circ}\text{C} \sim +85^{\circ}\text{C}, +22\% - 56\%$  MAX

Y5V=  $-30^{\circ}\text{C} \sim +85^{\circ}\text{C}, +22\% - 82\%$  MAX

X7R=  $-55^{\circ}\text{C} \sim +125^{\circ}\text{C}, \pm 15\%$  MAX

## (3)NOMINAL CAPACITANCE:

CODE	3R3	470	101	102	222	103	473	104
NOMINAL CAPACITANCE	3.3pF	47pF	100pF	1000pF	2200pF	0.01uF	0.047uF	0.1uF

## (4)CAPACITANCE TOLERANCE:

CODE	C	D	J	K	M	Z
CAPACITANCE TOLERANCE	$\pm 0.25\text{pF}$	$\pm 0.5\text{pF}$	$\pm 5\%$	$\pm 10\%$	$\pm 20\%$	+80% -20%

## (5)RATED VOLTAGE:

CODE	160	250	500	101
RATED VOLT.	16V	25V	50V	100V

**(6) LEAD STYLE:**

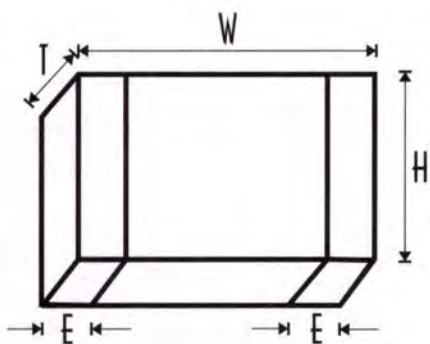
FIRST CODE		SECOND CODE		THIRD CODE	
CODE	COFIGURATION	CODE	F(mm)	CODE	d(mm)
H	Straight short	2	$2.5 \pm 0.5$	6	$0.60 \pm 0.05$
D	Outside crimped short	5	$5.0 \pm 0.5$		
K	Inside crimped Taping				
CHI	CHIP Capacitors				

**FEATURES MLC:**

**(1) Multilayer ceramic chip capacitors**



CHIP SIZE	0805		1206	
	m/m	inches	m/m	inches
W	$2.0 \pm 0.2$	$0.080 \pm 0.008$	$3.2 \pm 0.2$	$0.126 \pm 0.008$
H	$1.2 \pm 0.2$	$0.050 \pm 0.008$	$1.6 \pm 0.2$	$0.063 \pm 0.008$
T	1.25max	0.049	1.25max	0.049
E	$0.5 \pm 0.2$	$0.020 \pm 0.008$	$0.5 \pm 0.2$	$0.020 \pm 0.008$
PACKAGE	Bulk/Bag	10,000pcs		
	Tape/Reel	4,000pcs		



**(2) RADIAL-LEADED Multilayer Ceramic Capacitors**

The radial lead MLC is built with superior moisture and shock resistant epoxy coating material, can be supplied in both bulk or taping form for automatic insertion.

**(a) BULK LEAD CONFIGURATION AND DIMENSION(Unit:mm)**

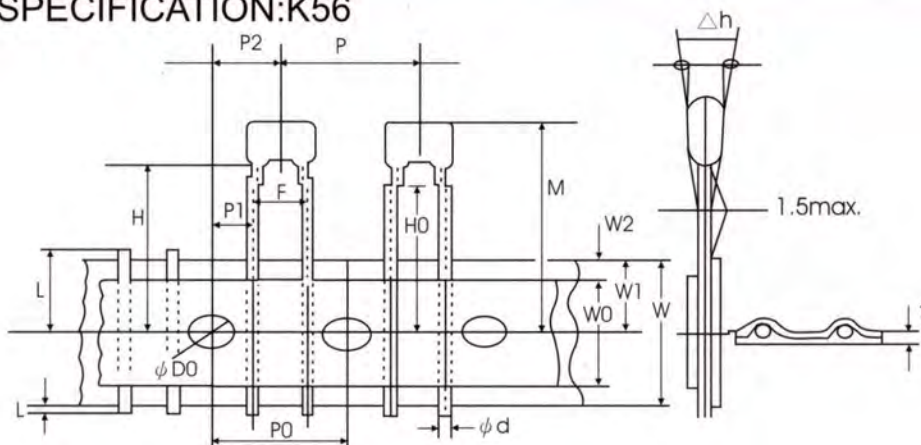
			<p>For other specifications not shown, please contact us for information.</p>
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**DIMENSION(mm) Max**

CHIP SIZE	W	H	T	L	F	P	D
0805 Fig H,D	5.08	5.08	3.2	$10.0 \pm 1.0$	$2.5/5.0$	1.5max	$0.6 \pm 0.05$
1206 Fig H,D	7.62	7.62	3.8		$\pm 0.5$		



(b) TAPING SPECIFICATION: K56

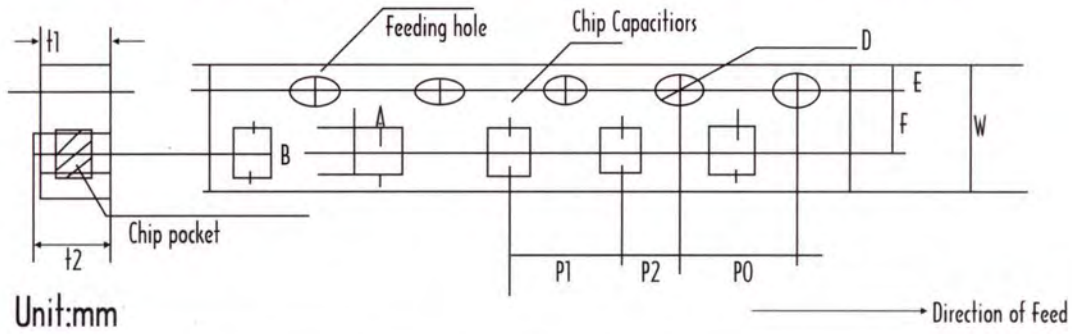


DESCRIPTION	SYMBOL	DIMENSIONS(mm)	REMARKS
Pitch of component	P	$12.7 \pm 1.0$	
Feed hold pitch	P0		Cumulative Pitch Error: $\pm 1.0\text{mm}/20\text{pitches}$
Feed hold center to lead	P1	$3.85 \pm 0.7$	
Feed hold center to component center	P2	$8.35 \pm 1.3$	
Lead to lead spacing	F	$5.0, +0.8/-0.2$ OR $2.5, +0.8/-0.2$	To lead tip within tol
Component alignment, F-R	$\Delta h$	2.0max	The alignment from the center of the lead is $\pm 1.0\text{mm}$
Tape width	W	$18.0, +1.0/-0.5$	
Adhesive tape width	W0	11.0	
Hole position	W1	$9.0 \pm 0.5$	
Adhesive tape position	W2	3.0max	Adhesive tape must not protrude from base paer
Height of bottom body from tape center	H	$18.0, +2.0/-0$	$H \pm 12.5\text{mm} \leq H1$
Lead-wire clinch height	H0	$16.0 \pm 0.5$ OR $1.8 \pm 0.5$	$6.5 \leq H0 - W1$
Component height	H1	32.25max	
Feed hole diameter	D0	$4.0 \pm 0.3$	
Total tape thickness	T	$0.7 \pm 0.2$	

PACKING QUANTITY:

CASE SIZE	BULK	TAPING	
	Quantity per Bag	Quantity per Ammo Box	Quantity per Reel
PACKING QUANTITY	1000pcs	2000pcs	3000pcs

(c) Multilayer Ceramic Chip Capacitors Cardboard Tape Dimensions



Symbol Sige Code	A	B	W	F	E	P1	P2	P0	D	T1	T3
0805	1.65 ± 0.2	2.4 ± 0.2	8.0	3.5	1.75	4.0	2.0	4.0	1.5	1.1max	1.4max
1206	2.0 ± 0.2	3.6 ± 0.2	± 0.2	± 0.05	± 0.1	± 0.1	± 0.05	± 0.1	+0.1,-0		

CAPACITANCE CHART

Temp.Char:	Rated Voltage	Case Size	Capacitance	
			Range	Tolerance
NPO	50V	0805	0R5~152	C,D(Under 10pF) J,K(Over 10pF)
		1206	0R5~472	
	100V	0805	0R5~102	
		1206	0R5~332	
X7R	50V	0805	101~104	K,M
		1206	102~154	
	100V	0805	101~223	
		1206	102~563	
Z5U	25V	0805	272~124	M
		1206	103~564	
	50V	0805	272~104	
		1206	103~474	
Y5V	25V	0805	333~474	M,Z
		1206	104~105	
	50V	0805	333~334	
		1206	104~684	



# NPO DIELECTRIC-GENERAL SPECIFICATION

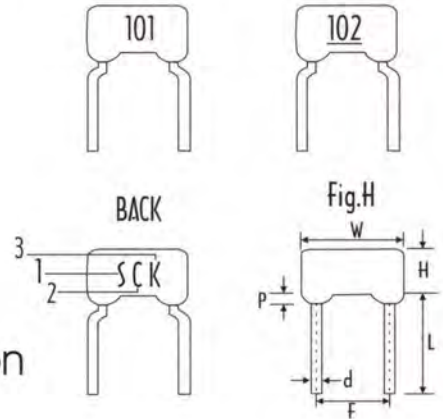
## INTRODUCTION:

The NPO(COG) is a high Q, low K temperature compensating type of dielectric with stable electrical properties under varying voltage, temperature, frequency and time, It's suitable for circuits that require low loss, as well as timing and tuning applications.



## FEATURES:

- Very low temperature coefficient
- Stable electrical characteristics
- Small size with high capacitance values
- Consistent dimension and finish surface
- Engineered for automatic handling and insertion



## GENERAL SPECIFICATIONS:

Operating Temperature Range	$-55^{\circ}\text{C} \sim +125^{\circ}\text{C}$
Temperature Coefficient	$0 \pm 30\text{ppm}/^{\circ}\text{C}$
Rated Voltage	50V, 100V
Quality Factor(Q)	$\geq 1000$ for $C \geq 30\text{pF}$ $> 400+20C$ , $C < 30\text{pF}$
Testing Parameters	For Values $\leq 1000\text{pf}$ : 1MHz 1.0Vrms @ $25^{\circ}\text{C}$ For Values $> 1000\text{pf}$ : 1KHz 1.0Vrms @ $25^{\circ}\text{C}$
Insulation Resistance(I.R.) @ $25^{\circ}\text{C}$ @ $125^{\circ}\text{C}$	Lesser of $100\text{G}\Omega$ or $1000\text{M}\Omega \mu\text{F}$ Lesser of $1\text{G}\Omega$ or $10\text{M}\Omega \mu\text{F}$
Voltage Proof	$2.5 \times$ Rated Voltage
Aging Rate	0% per Decade hour

# X7R DIELECTRIC-GENERAL SPECIFICATION

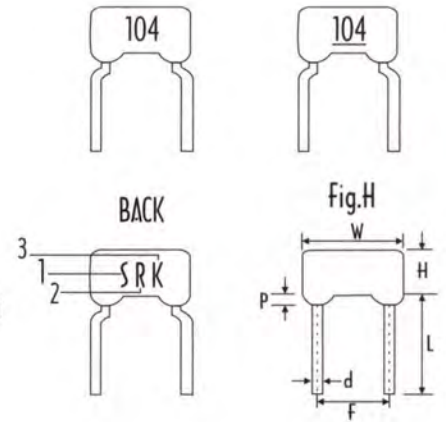
## INTRODUCTION:

The X7R has moderate K value and is temperature stable. It shows moderate change in electrical properties under changing temperature, voltage, and frequency. It`s suitable for by-passing, and frequency discrimination circuits applications.



## FEATURES:

- Stable electrical characteristics
- Small size with high capacitance values
- Consistent dimension and finish surface
- Engineered for automatic handling and insertion



## GENERAL SPECIFICATIONSS:

Operating Temperature Range	-55°C ~ +125°C
Temperature Coefficient	± 15%
Rated Voltage	50V,100V
Dissipation Factor(tan δ )	≤ 2.5% max
Testing Parameters	1KHz ± 50Hz, 1.0Vrms @ 25°C
Insulation Resistance(I.R.) @ 25°C @ 125°C	Lesser of 10G Ω or 1000M Ω uF Lesser of 1G Ω or 10M Ω uF
Voltage Proof	2.5 × Rated Voltage
Aging Rate	-1.5% per Decade hour



# Z5U DIELECTRIC-GENERAL SPECIFICATION

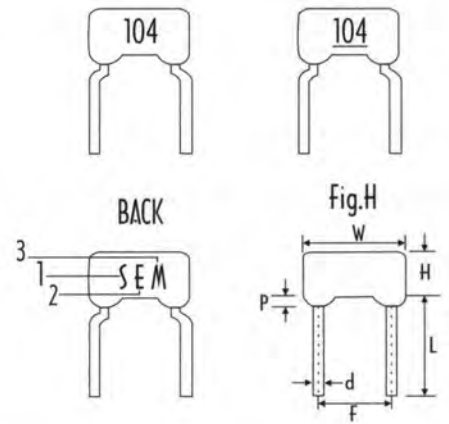
## INTRODUCTION:

The Z5U has high K value ,Its electrical properties vary considerably under changing temperature,voltage, and time. It`s suitable for all general purpose applications where high capacitance values are required, and are ideal for room temperature applications with low DC bias.



## FEATURES:

- Small size with high capacitance values
- Consistent dimension and finish surface
- Engineered for automatic handling and insertion



## GENERAL SPECIFUCATIONSS:

Operating Temperature Range	+10°C~+85°C
Temperature Coefficient	+22%~-56%
Rated Voltage	25V,50V
Dissipation Factor( $\tan \delta$ )	5.0% max
Testing Parameters	1KHz $\pm$ 50Hz, 0.5Vrms @ 25°C
Insulation Resistance(I.R.) @ 25°C	Lesser of 10G $\Omega$ or 1000M $\Omega$ uF
Voltage Proof	2.5 $\times$ Rated Voltage
Aging Rate	-5% per Decade hour

# Y5V DIELECTRIC-GENERAL SPECIFICATION

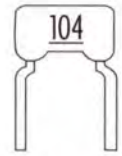
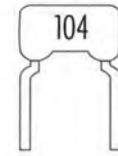
## INTRODUCTION:

The Y5V has high K value ,Its electrical properties vary considerably under changing temperature, voltage, and time. It`s suitable for all general purpose applications where high capacitance values are required, and are ideal for room temperature applications with low DC bias.

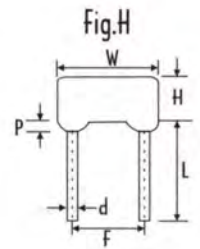
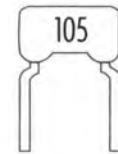


## FEATURES:

- Small size with high capacitance values
- Consistent dimension and finish surface
- Engineered for automatic handling and insertion



BACK

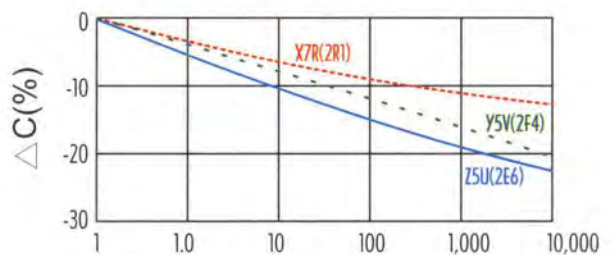
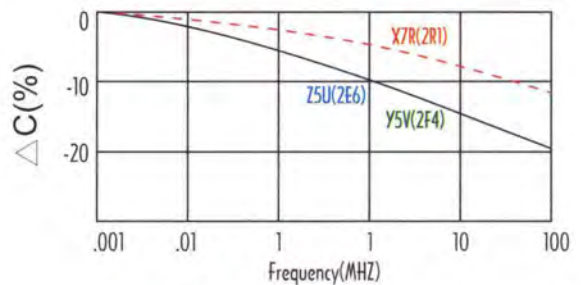
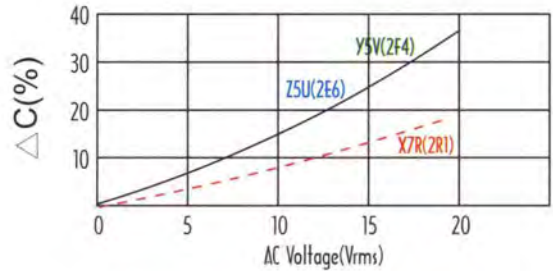
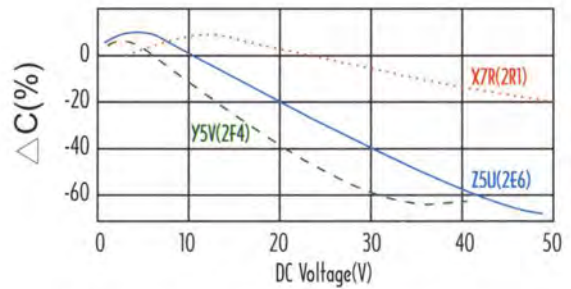
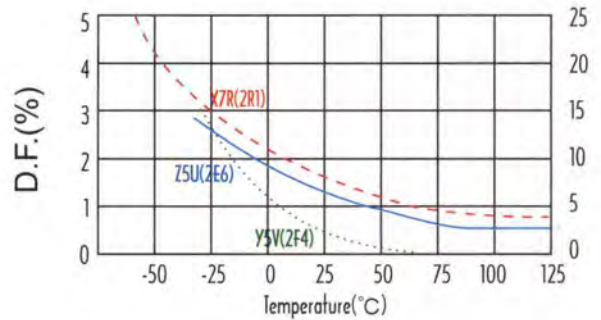
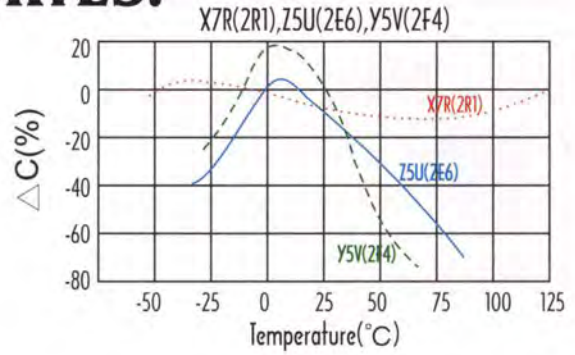
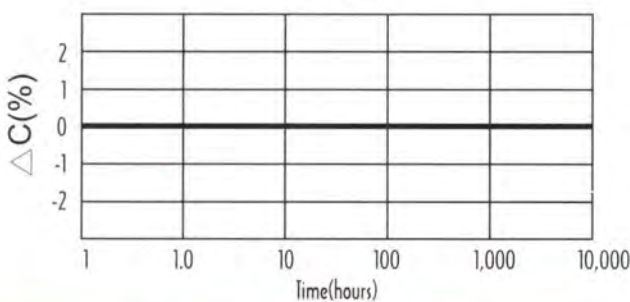
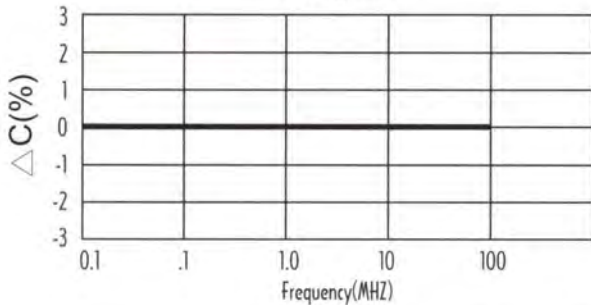
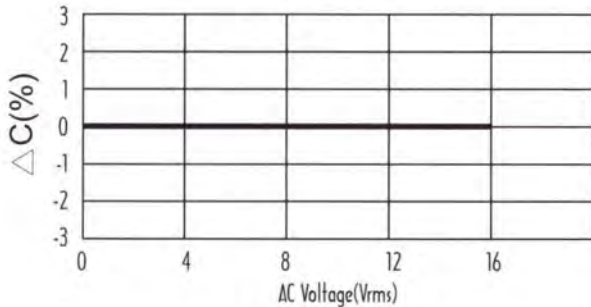
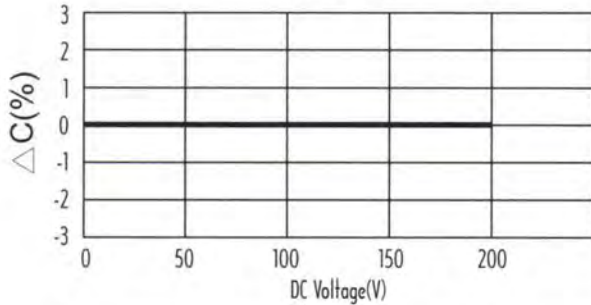
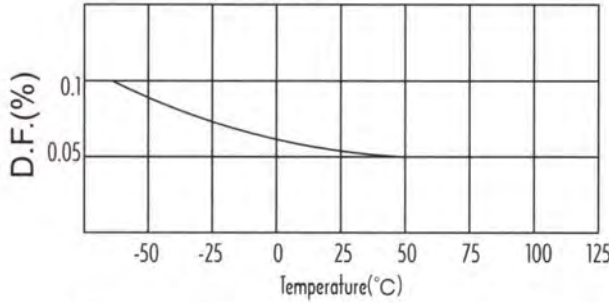
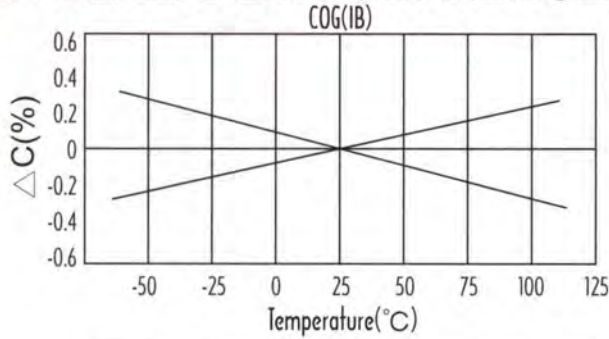


## GENERAL SPECIFUCATIONSS:

Operating Temperature Range	- 30°C ~ + 85°C
Temperature Coefficient	+ 22% ~ - 82%
Rated Voltage	25V,50V
Dissipation Factor(tan δ )	5.0% max for rated voltage 50V 7.0% max for rated voltage 25V
Testing Parameters	1KHz ± 50Hz,1.0Vrms @ 25°C
Insulation Resistance(I.R.) @ 25°C	Lesser of 10GΩ or 1000MΩ uF
Voltage Proof	2.5 × Rated Voltage
Aging Rate	- 7% per Decade hour



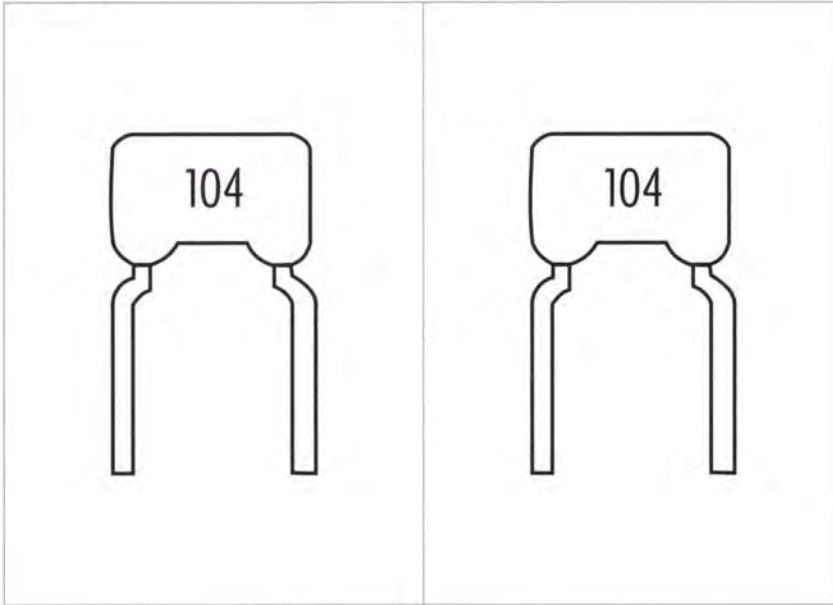
# TYPICAL PERFORMANCE CURVES:



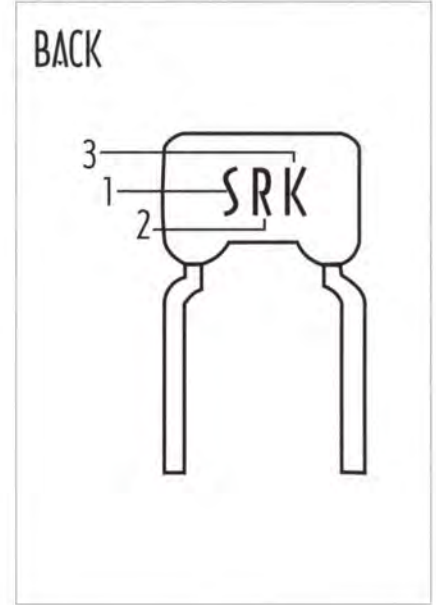
**MAKING:**

(1).JIS Specification, Rated voltage underling the capacitance value for 50V, No marking for 12V, 16V, 25V, 100V.

**PLOT1**



**PLOT2**



(2). Temperature characteristic Y5V adopt one sided marking Form ditto plot 1.

(3). Temperature characteristic NPO、X7R、Z5U shall be marked on the body of capacitors using both sides:

(a) FRONT (ditto plot 1)

- 1.Nominal Capacitance
- 2.Rated Voltage

(b) BACK (ditto plot 2)

- 1.Manufacturer`s name--SEC:S
- 2.Temperature Characteristic
  - X7R:R
  - NPO:C
  - Z5U:E

3.Capacitance Tolerance

C:±0.25pF D:±0.5pF J:±5% K±10% M:±20% Z:+80%,-20%



# CHARACTERISTICS:

ITEMS		REQUIREMENTS			TEST CONDITION(JIS-C5102)
1	APPEARANCE DIMENSIONS	Appearance:normal Configurations & dimensions as per chart 1 to 3			As per paragraph 6
2	MARKING	Identified easily			As per paragraph 6.2.2
3	DIELECTRIC WITHSTANDING VOLTAGE	Type	Rated voltage(R.V.)	Testing voltage(T.V.)	As per paragraph 7.1 & 7.1.3(3)C *time : $5 \pm 1$ seconds *current limited 50mA max
		NPO	25V-100V	2.5 × R.V.	
		X7R Z5U Y5V	16V-50V		
4	INSULATION RESISTANCE	CAP. $\leq 10$ nF: I.R. $\geq 10000M \Omega$ CAP. $> 10$ nF: I.R. $\geq 1000M \Omega$ -uF			Insulation resistance shall be measured 60 $\pm$ 5 sec, at rated voltage
5	CAPACITANCE WITH NO DC BIAS VOLTAGE APPLIED	Within capacitance tolerance specification			Capacitance and Dissipation factor shall be measured at 25 $\pm$ 2°C NPO:1.0 $\pm$ 0.2Vrms and 1MHz $\pm$ 50Hz, 1KHz $\pm$ 50Hz for value above 1000pF. X7R:0.5 $\pm$ 0.1Vrms and 1KHz $\pm$ 50Hz, Z5U:0.5 $\pm$ 0.1Vrms and 1KHz $\pm$ 50Hz, Y5V:0.5 $\pm$ 0.1Vrms and 1KHz $\pm$ 50Hz,
6	DISSIPATION FACTOR(D.F.) QUALITY FACTOR(Q)	NPO(CH):C $> 30$ pF, 0.1%max, C $\leq 30$ pF. Q=400+20C min X7R(R):2.5%max. Z5U(E):5.0%max. Y5V(F):5.0%max.			As per paragraph 7.9 test condition same as capacitance
7	TERMINAL STRENGTH	pull test	Capacitors no serious defects		As per paragraph 8.1.2table 9 method
		bend test	Wire-lead no damage		As per paragraph 8.1 & 8.2(3)
8	TEMPERATURE CHARACTERISTIC	Type	Temperature range(°C)	Temp.coefficient & CAP.variation	As per paragraph 7.12
		NPO	-55°C~+125°C	0 $\pm$ 30ppm/°C	
		X7R	-55°C~+125°C	$\pm 15$ %max	
		Z5U	+10°C~+85°C	-56%~+22%max	
		Y5V	-30°C~+85°C	-82%~+22%max	
9	VIBRATION TEST	Appearance:normal			As per paragraph 8.2
		CAP.:within capacitance tolerance specification			
		D.F.(Q):same as item 6			



## CHARACTERISTICS:

ITEMS		REQUIREMENTS	TEST CONDITION(JIS-C5102)
10	RESISTANCE TO SOLDERING HEAT	Appearance:No damage	*Solder temperature:260 ± 10°C *Dipping:10 ± 0.5seconds
		Capacitance:Change from the value before test: NPO: ± 2.5% or ± 0.25%pF max X7R: ± 7.5% Z5U,Y5V: ± 20% Dissipation factor:To increase no more than 1%	
11	SOLDERABILITY	Lead wire to be soldered up to the dipped end point, with no gap in the axial direction over 3/4 of the circumferential direction.	As per paragraph 8.4 Temperature:235 ± 5°C Time:2 ± 0.5seconds
12	HUMIDITY TEST AND HUMIDITY LOADING	Appearance:No damage	As per paragraph 9.9 Ambient temperature:40 ± 2°C Relative humidity: 90 to 95% RH. Duration: 500+24/-0 hrs. Before Humidity test: Measure CAP./D.F. after curing 40 ± 5°C for 24hrs. After Humidity test: Remove and let sit 1 hour at room temp. before measure Humidity Loading Ambient temperature:40 ± 2°C Relative humidity: 90 to 95% R.H. Applied voltage:Twice the rated voltage Duration:500+24/-0 hrs
		Capacitance:Capacitance change NPO: ± 2% or 1.0pF whichever is large X7R: ± 15% max Z5U: ± 20%max Y5V: ± 30% max	
		Dissipation factor:Dissipation factor change NPO:0.5% max X7R:5.0% max Z5U:5.0% max Y5V:7.5% max	
13	LIFE TEST HIGH TEMPERATURE LOAD EXPOSURE	Appearance:No damage	As per paragraph 9.10 Ambient temperature:85 ± 2°C Applied voltage:Twice the rated voltage Duration:1000+48/-0 hrs Charging and discharging current shall be Limited to 50 mA max. Deaging at 150°C for 2hrs and recover 24hrs before measure(NPO unnecessary)
		Capacitance:Capacitance change NPO: ± 2% or 1.0pF whichever is large X7R: ± 15% max Z5U: ± 20%max Y5V: ± 30% max	
		Dissipation factor:Dissipation factor change NPO:0.5% max X7R:5.0% max Z5U:5.0% max Y5V:7.5% max	
		Insulation:CAP. ≤ 10nF, I.R. ≥ 10000M Ω CAP. > 10nF, I.R. ≥ 100M Ω -uF	





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