YAGEO

Product Selection Tables 2005

MLCC

Yageo brand

YAGEO

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NP0, 16V, general purpose

NP0 - 16V			
General purpose			
Capacitance	Last 3 digits of Yageo part number	16V	
		0402	0603
270 pF	271	0.5 ±0.05	
330 pF	331		
390 pF	391		
470 pF	471		
1.8 nF	182		0.8 ±0.07
2.2 nF	222		
2.7 nF	272		
3.3 nF	332		
Tape width		8mm	

Note: Values in shaded cells indicate thickness class (Unit: mm)

NP0, 25V, general purpose

NP0 - 25V					
General purpose					
Capacitance	Last 3 digits of Yageo part number	25V			
		0603	0805	1206	1210
820 pF	821	0.8 ±0.07			
1000 pF	102				
1.2 nF	122				
1.5 nF	152				
3.3 nF	332		0.85 ±0.1		
3.9 nF	392		1.25 ±0.1		
4.7 nF	472				
8.2 nF	822			0.85 ±0.1	
10 nF	103				
12 nF	123				0.6 ±0.1
15 nF	153				0.85 ±0.1
18 nF	183				
22 nF	223				1.15 ±0.15
Tape width		8mm			

Note: Values in shaded cells indicate thickness class (Unit: mm)

NP0, 50V, general purpose

NP0 - 50V							
General purpose							
Capacitance	Last 3 digits of Yageo part number	50V					
		0402	0603	0805	1206	1210	1812
0.47 pF	R47	0.5 ±0.05	0.8 ±0.07	0.6 ±0.1	0.6 ±0.1		
0.56 pF	R56						
0.68 pF	R68						
0.82 pF	R82						
1 pF	1R0						
1.2 pF	1R2						
1.5 pF	1R5						
1.8 pF	1R8						
2.2 pF	2R2						
2.7 pF	2R7						
3.3 pF	3R3						
3.9 pF	3R9						
4.7 pF	4R7						
5.6 pF	5R6						
6.8 pF	6R8						
8.2 pF	8R2						
10 pF	100						
12 pF	120						
15 pF	150						
18 pF	180						
22 pF	220						
27 pF	270						
33 pF	330						
39 pF	390						
47 pF	470					0.6 ±0.1	
56 pF	560						
68 pF	680						
82 pF	820						
100 pF	101						
120 pF	121						
150 pF	151						
180 pF	181						
220 pF	221						
270 pF	271						
330 pF	331						0.6 ±0.1
390 pF	391						
470 pF	471						
560 pF	561						
680 pF	681						
820 pF	821						
1000 pF	102						
1.2 nF	122			0.85 ±0.1			
1.5 nF	152						
1.8 nF	182						
2.2 nF	222			1.25 ±0.1			
2.7 nF	272						
3.3 nF	332				0.85 ±0.1		
3.9 nF	392						
4.7 nF	472						
5.6 nF	562				1.15 ±0.1	0.85 ±0.1	
6.8 nF	682						

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NP0, 50V, general purpose

NP0 - 50V							
General purpose							
Capacitance	Last 3 digits of Yageo part number	50V					
		0402	0603	0805	1206	1210	1812
8.2 nF	822						
10 nF	103						
12 nF	123						0.85 ±0.1
15 nF	153						
18 nF	183						1.15 ±0.15
22 nF	223						
Tape width		8mm					12mm

Note: Values in shaded cells indicate thickness class (Unit: mm)

NP0, 100V, general purpose

NP0 - 100V						
General purpose						
Capacitance	Last 3 digits of Yageo part number	100V				
		0603	0805	1206	1210	1812
10 pF	100	0.8 ±0.07	0.6 ±0.1	0.6 ±0.1		
12 pF	120					
15 pF	150					
18 pF	180					
22 pF	220					
27 pF	270					
33 pF	330					
39 pF	390					
47 pF	470					
56 pF	560					
68 pF	680					
82 pF	820					
100 pF	101					
120 pF	121					
150 pF	151					
180 pF	181					
220 pF	221					
270 pF	271					
330 pF	331					
390 pF	391					
470 pF	471					
560 pF	561					
680 pF	681					
820 pF	821					
1000 pF	102					
1.2 nF	122		0.85 ±0.1			
1.5 nF	152					
1.8 nF	182					
2.2 nF	222		1.25 ±0.1			
2.7 nF	272					
3.3 nF	332			0.85 ±0.1		
3.9 nF	392					
4.7 nF	472					
5.6 nF	562			1.15 ±0.1		
6.8 nF	682					
8.2 nF	822				0.85 ±0.1	
10 nF	103					
12 nF	123					0.85 ±0.1
15 nF	153					
18 nF	183					1.15 ±0.15
22 nF	223					
Tape width		8mm				12mm

Note: Values in shaded cells indicate thickness class (Unit: mm)

NP0, 200V and 500V, medium voltage

NP0 - 200V and 500V								
Medium voltage								
Capacitance	Last 3 digits of Yageo part number	200V				500V		
		0805	1206	1210	1812	1206	1210	1812
10 pF	100	0.6 ±0.1	0.6 ±0.1			0.6 ±0.1		
12 pF	120							
15 pF	150							
18 pF	180							
22 pF	220							
27 pF	270							
33 pF	330							
39 pF	390							
47 pF	470						0.85 ±0.1	
56 pF	560							
68 pF	680							
82 pF	820							
100 pF	101							
120 pF	121							
150 pF	151							
180 pF	181							
220 pF	221	0.85 ±0.1	0.85 ±0.1			0.85 ±0.1		
270 pF	271							
330 pF	331							
390 pF	391							
470 pF	471							
560 pF	561	1.25 ±0.1				1.15 ±0.1		
680 pF	681							
820 pF	821							
1000 pF	102						1.15 ±0.15	
1.2 nF	122							
1.5 nF	152		1.15 ±0.1					
1.8 nF	182			0.85 ±0.1				
2.2 nF	222							1.15 ±0.15
2.7 nF	272			1.15 ±0.15				
3.3 nF	332							
3.9 nF	392				0.85 ±0.1			
4.7 nF	472				1.15 ±0.15			
5.6 nF	562							
Tape width		8mm			12mm	8mm		12mm

Note: Values in shaded cells indicate thickness class (Unit: mm)

X7R, 10V, general purpose

X7R - 10V				
General purpose				
Cpacitance	Last 3 digits of Yageo part number	10V		
		0603	0805	1206
150 nF	154	0.8 ±0.07		
220 nF	224		0.6 ±0.1	
330 nF	334		0.85 ±0.1	
470 nF	474			
680 nF	684		1.25 ±0.1	
1000 nF	105			0.85 ±0.1
1.5 uF	155			1.15 ±0.1
2.2 uF	225			
4.7 uF	475			1.6 ±0.2
Tape width		8 mm		

Note: Values in shaded cells indicate thickness class (Unit: mm)

X7R, 16V and 25V, general purpose

X7R - 16V and 25V										
General purpose										
Capacitance	Last 3 digits of Yageo part number	16V				25V				
		0402	0603	0805	1206	0402	0603	0805	1206	1210
3.3 nF	332					0.5 ±0.05				
4.7 nF	472									
6.8 nF	682	0.5 ±0.05								
10 nF	103						0.8 ±0.07	0.6 ±0.1		
15 nF	153									
22 nF	223									
33 nF	333		0.8 ±0.07							
47 nF	473	0.5 ±0.05		0.6 ±0.1				0.85 ±0.1		
68 nF	683									
100 nF	104			0.85 ±0.1					0.85 ±0.1	
150 nF	154									
220 nF	224				0.85 ±0.1					0.85 ±0.1
330 nF	334			1.25 ±0.1					1.15 ±0.1	
470 nF	474				1.15 ±0.1					
680 nF	684									
1000 nF	105								1.6 ±0.2	
Tape width		8mm								

Note: Values in shaded cells indicate thickness class (Unit: mm)

X7R, 50V and 100V, general purpose

X7R - 50V and 100V											
General purpose											
Capacitance	Last 3 digits of Yageo part number	50V						100V			
		0402	0603	0805	1206	1210	1812	0805	1206	1210	1812
100 pF	101	0.5 ±0.05	0.8 ±0.07								
150 pF	151										
220 pF	221			0.6 ±0.1	0.85 ±0.1			0.6 ±0.1	0.85 ±0.1		
330 pF	331										
470 pF	471										
680 pF	681										
1000 pF	102										
1.5 nF	152										
2.2 nF	222										
3.3 nF	332										
4.7 nF	472										
6.8 nF	682										
10 nF	103					0.85 ±0.1					
15 nF	153							0.85 ±0.1			
22 nF	223										
33 nF	333			0.85 ±0.1							
47 nF	473									0.85 ±0.1	
68 nF	683								1.15 ±0.1		
100 nF	104						1.15 ±0.1				1.15 ±0.1
150 nF	154				1.15 ±0.1	1.15 ±0.1				1.15 ±0.1	
220 nF	224										
330 nF	334										
470 nF	474										1.6 ±0.2
680 nF	684						1.6 ±0.2				
1000 nF	105										
Tape width		8mm					12mm	8mm			12mm

Note: Values in shaded cells indicate thickness class (Unit: mm)

X7R, 200V, 250V and 500V, medium voltage

X7R - 200 V and 500 V								
Medium voltage								
Capacitance	Last 3 digits of Yageo part number	200V				500V		
		0805	1206	1210	1812	1206	1210	1812
220 pF	221	0.85 ±0.1						
330 pF	331							
470 pF	471					1.15 ±0.1		
680 pF	681		0.85 ±0.1					
1000 pF	102							
1.5 nF	152							
2.2 nF	222							
3.3 nF	332						1.15 ±0.1	
4.7 nF	472							
6.8 nF	682	1.25 ±0.1						
10 nF	103							1.15 ±0.1
15 nF	153							
22 nF	223		1.15 ±0.1	1.15 ±0.1				
33 nF	333							
47 nF	473				1.15 ±0.1			
68 nF	683							
100 nF	104							
Tape width		8mm			12mm	8mm		12mm

Note: Values in shaded cells indicate thickness class (Unit: mm)

Y5V, 10V to 50V, general purpose

Y5V - 16V to 50V											
General purpose											
Capacitance	Last 3 digits of Yageo part number	16V				25V			50V		
		0402	0603	0805	1206	0603	0805	1206	0603	0805	1206
10 nF	103	0.5 ±0.05				0.8 ±0.07			0.8 ±0.07	0.6 ±0.1	
22 nF	223										
47 nF	473										
100 nF	104						0.6 ±0.1	0.6 ±0.1			0.6 ±0.1
220 nF	224		0.8 ±0.07				0.85 ±0.1			0.85 ±0.1	
470 nF	474			0.85 ±0.1			1.25 ±0.1	0.85 ±0.1			0.85 ±0.1
1000 nF	105			1.25 ±0.1	0.85 ±0.1			1.15 ±0.1			1.15 ±0.1
Tape width		8mm									

Note: Values in shaded cells indicate thickness class (Unit: mm)

Ordering and packing

Ordering Information:

CC 0805 K R X7R 9 B B I04

Code 1~2
Series Name

CC = Multi-Layer Chip Cap.

Code 3~6
Size Code
inches (mm)

0402 (1005)
0603 (1608)
0805 (2012)
1206 (3216)
1210 (3225)
1812 (4532)

Code 7
Capacitance Tolerance

A = ±0.05pF G = ±2%
B = ±0.10pF J = ±5%
C = ±0.25pF K = ±10%
D = ±0.5pF M = ±20%
F = ±1% Z = –20~+80%

Code 8
Packing Style

R = PaperTape Reel ∅ 7 inch
P = PaperTape Reel ∅13 inch
K = Embossed Plastic Tape Reel ∅ 7 inch
F = Embossed Plastic Tape Reel ∅ 13 inch
C = Bulk Cassette

Code 9~11
TC Material

NPO
X7R
Y5V
X5R

Code 12
Rated Voltage

5 = 6.3V
6 = 10V
7 = 16V
8 = 25V
9 = 50V
0 = 100V
A = 200V
B = 500V
Y = 250V

Code 13
Termination

B = Ni-Barrier

Code 14
Process Code

N = Non BME
B = BME

Code 15~17
Capacitance Value
(2 Significant Digits +No. of Zeros)
The 3rd Digit :
Letter R is Decimal Point

0 = x 1
1 = x 10
2 = x 10^2
3 = x 10^3
4 = x 10^4
5 = x 10^5
6 = x 10^6

Thickness classes and packing quantities

Size Code	Thickness Classification (mm)	Tape Width Quantity Per Reel	180 mm / 7"		330 mm / 13"		Quantity Per Bulk Case
			Paper	Blister	Paper	Blister	
CC0402	0.5±0.05	8 mm	10 000	---	50 000	---	50 000
CC0603	0.8±0.07	8 mm	4 000	---	15 000	---	15 000
CC0805	0.6±0.1	8 mm	4 000	---	20 000	---	10 000
	0.85±0.1	8 mm	4 000	---	15 000	---	8 000
	1.25±0.1	8 mm	---	3 000	---	10 000	5 000
CC1206	0.6±0.1	8 mm	4 000	---	20 000	---	---
	0.85±0.1	8 mm	4 000	---	15 000	---	---
	1.15±0.1	8 mm	---	3 000	---	10 000	---
	1.6±0.2	8 mm	---	2 000	---	10 000	---
CC1210	0.6±0.1	8 mm	---	4 000	---	15 000	---
	0.85±0.1	8 mm	---	4 000	---	10 000	---
	1.15±0.1	8 mm	---	3 000	---	10 000	---
	1.15±0.15	8 mm	---	3 000	---	10 000	---
	1.9±0.2	8 mm	---	2 000	---	---	---
	2.5±0.2	8 mm	---	1 000	---	---	---
CC1812	0.6/0.85±0.1	12 mm	---	2 000	---	---	---
	1.15±0.1	12 mm	---	1 500	---	---	---
	1.15±0.15	12 mm	---	1 500	---	---	---
	1.6±0.2	12 mm	---	1 000	---	---	---
	2.5±0.2	12 mm	---	1 000	---	---	---

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ALUMINUM ELECTROLYTIC CAPACITORS

MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

19	**ST** [For Super Miniature]-5mm L	1,000hrs. at 85°C
21	**S7** [For Super Miniature]-7mm L	1,000hrs. at 85°C
23	**S5** [For Super Miniature]-5mm L	1,000hrs. at 105°C
25	**SS** [For Super Miniature]-7mm L	1,000hrs. at 105°C
27	**SK** [For General]	2,000hrs. at 85°C
30	**SE-K** [For General]	1,000hrs. at 105°C
33	**SH** [For General]	2,000hrs. at 105°C
36	**SG** [For Electronic Ballast]	5,000hrs. at 105°C
39	**SA** [For High Temperature and Load Life]	8,000hrs. at 105°C
43	**SP** [High Ripple and Long Life]	10,000hrs. at 105°C
46	**SB** [For Low Leakage Current]	1,000hrs. at 105°C
49	**SR** [For Horizontal Deflection]	1,000hrs. at 85°C
51	**SN** [For Non Polar]	1,000hrs. at 105°C
53	**SC** [For Low Impedance and Low E.S.R Suitable for Output of Mother Board]	2,000~3,000hrs. at 105°C
56	**SM** [For very Low Impedance and very Low E.S.R Suitable for Output of Mother Board]	2,000~3,000hrs. at 105°C
59	**SX** [For Low Impedance & Low E.S.R]	2,000~5,000hrs. at 105°C
63	**SY** [For Low Impedance and Low E.S.R Suitable for Output of Mother Board]	3,000~6,000hrs. at 105°C
66	**SZ** [For Ultra Low ESR]	2,000hrs. at 105°C
68	**SQ** [High Temperature for +125°C]	1,000hrs. at 125°C
70	**SV** [For adapter and power supply applications Series]	2,000hrs. at 105°C
72	**SF** [For Photo Flash Application]	5,000hrs. at 55°C

LARGE CAN ALUMINUM ELECTROLYTIC CAPACITORS

74	LH Series	2,000 hrs. at 85°C
79	LG Series	2,000 hrs. at 105°C
84	LV Series	3,000 hrs. at 105°C

SURFACE MOUNT ALUMINUM ELECTROLYTIC CAPACITORS

88	CA Series	2,000 hrs. at 85°C
90	CB Series	1,000 hrs. at 105°C

1-1 Precautions in Using Aluminum Electrolytic Capacitors

Please note the following recommendations when use capacitors:

1. Electrolytic capacitors for DC applications require polarization . Confirm the polarity before use . The circuit life may be shortened or the capacitor may be damaged if insert in reversed polarity . For use on circuits whose polarity is occasionally reversed , or whose polarity is unknown , use non-polar capacitors . Also note that the electrolytic capacitors cannot be used for AC applications .

2. Do not apply a voltage exceeding the capacitor's voltage rating. If a voltage exceeding the capacitor's voltage rating is applied , the capacitor may be damaged by increased leakage current . When using the capacitor with AC voltage do not exceed the rated voltage .

3. Do not allow excessive ripple current passing. Use the electrolytic capacitor at current value within the permissible ripple range . If the ripple exceeds the specified value , request capacitors for high ripple current applications .

4. Ascertain the operation temperature range . Use the electrolytic capacitors according to the specified operation temperature range . Use at room temperature will ensure a longer life .

5. The electrolytic capacitor is not suitable for circuits which are charged and discharged repeatedly . If used in circuits which are charged and discharged repeatedly , the capacitance value may drop or the capacitor may be damaged . Please consult our engineering department for assistance in these applications .

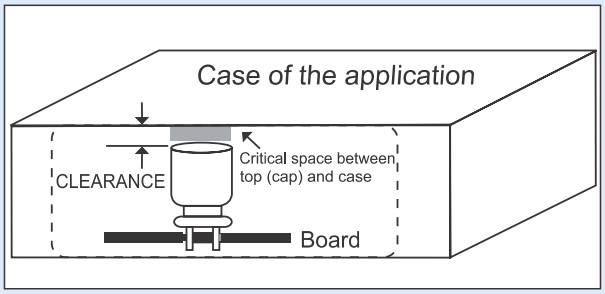
6. When capacitors have been left unused for long time , use them only after due voltage treatments . Long storage of capacitors tends to rise their leakage current levels . In such cases , be sure to provide the necessary voltage treatment before use .

7. Be careful of temperature and time when soldering . When soldering a printed circuit board with various components , care must be taken that the soldering temperature is not too high and that the dipping time is not too long . Otherwise , there will be adverse effect on the electrical characteristics and insulation sleeve of electrolytic capacitors . In the case of small -size electrolytic capacitors , nothing abnormal will be occurred if dipping is performed at less than 260°C for less than 10 seconds .

8. Cleaning circuit boards after soldering . Halogenated hydrocarbon cleaning solvents are not recommended for use in cleaning capacitors supplied with exposed end seals . Where cleaning with a halogenated solvent is desired , capacitors should be ordered with an Epoxy-coated end seal .

9. Do not apply excessive force to the lead wires or terminals . If excessive force is applied to the lead wires and terminals , they may be broken or their connections on the internal elements may be affected . (For strength of terminals , please refer to JIS C5102 and C5141 .)

10. Keep the following clearance between the vent of the capacitor and the case of the appliance . Do not block the operation of the vent , unless otherwise described on the catalogues or product specifications . The narrower clearance may adversely affect the vent operation and result in an explosion of the capacitor .



Case diameter	Clearance
ø 6.3 to ø 16 mm	2 mm minimum
ø 18 to ø 35 mm	3 mm minimum
ø 40 mm & up	5 mm minimum

Fig.1-1

Attention

- The description in this catalogue is subject to change without prior notice for product improvement . Therefore , please confirm the specification before ordering products .
- The general characteristics , reliability data , etc ., described in this catalogue should not be construed as guaranteed values , they are merely standard values .
- Before using the products , please read the notes in this catalogue carefully for proper use .

1-2 Technical Concepts

1. The material and structure of Electrolytic Capacitors

Electrolytic Capacitor is a simple module . It simply contains an insulator between relative conductors in an electrode. The major internal raw material contains an element constructed by an separator paper wrap around the anode foil and cathode foil , which is then impregnated with the electrolyte , inserted into an aluminum case and sealed.

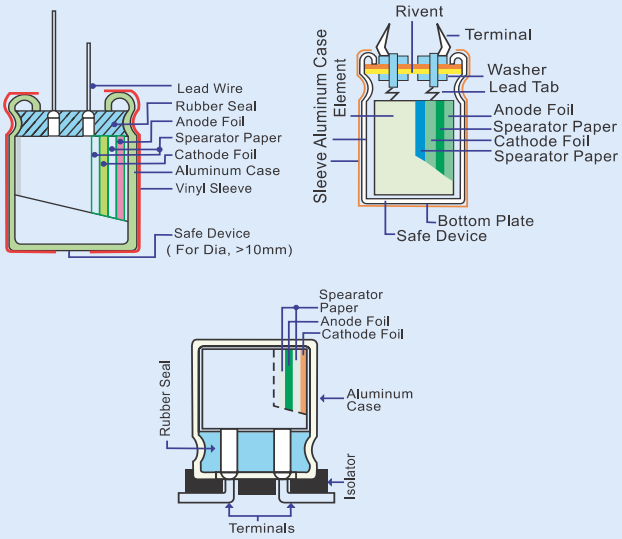


Fig.1-2

2. Production Processes

1. Etching : The process to increase surface area of aluminum foil by using chemical erosion or chemical corrosion method is called Etching Normally chemical corrosion method uses the ripple current of electrolyte , combination of the liquid and temperature to detemine the size, shape , and quantity of the dense network of microscopic channels on the aluminum foil surface .
2. Forming : The production process of the anode aluminum foil of electrolytic capacitors is by anodic oxidation of the etched aluminum foil . The production of the cathode aluminum foil sometimes involves oxidation in special purposes . This anodic oxidation process is called Forming . Boric acid or organic acid is used for high voltage forming and phosphoric acid or ammonium adipate is used for low voltage forming in order to obtain stable natural oxide layer of Al_2O_3 .
3. Slitting : The cutting of the aluminum foil and separator paper according to the required length .
4. Winding : The stitching or cold welding of cut anode and cathode foils and tab terminal , and wrap the electrolytic paper in between the anode and cathode , then fix the end with glue or sticky tape , and attached leads is called the capacitor "element" .
5. Impregnation : The process of eliminating the water from the elements by pressurizes or vacuum in order to soak the element with the electrolyte is called Impregnation . The elements fully filled with electrolyte is then centrifuged to remove excess electrolyte .
6. Assembly : The elements seal with rubber to stop the leakage of electrolyte then slip into a sleeve to form the final product .
7. Aging : The purpose of Aging is to repair the oxide film damage by recharging and electrolyte .

1-3 The Function of Electrolytic Capacitors

The electrolytic capacitors could be widely used in appliance (ie. TV , radio , audio equipment , watching machine and air conditioner.....etc .), computer equipment (mother board, image device & the peripherals such as the printer , drawing device, scanner etc) , communication equipment , estate equipment , measure instrument and also the industrial instrument , air plane , firebomb , satellite... etc. as a piloting equipment.

*According to the inflict electric wave & using purpose , it basically with some classified purposes as below :

1. **DC Voltage :**
   a. For Momentary High Voltage : For using to the impulse generator such as the shock wave resistance test of the heavy electric machine .
   b. For High Electric Current : For using to the welding machine , X- Ray facility , copy machine and discharge processing device .
   c. For DC High Voltage : The electrolytic capacitor and rectifier composing , a special DC high voltage been happened after charged , for using to the power of electronic microscope and accelerator .
   d. For Integration & Memory : For either memory circuit or compare circuit inside the calculator .

2. The DC voltage that with alternate ingredient :

a. For Wave Filter : Combination with the chip resistor & inductoras a internet , to be past by DC current or some frequency to closure or decline some other frequency .
b. For Bypass : A parallel track that outside from the circuit element , the IC (integrated circuit) has been rapidly developing in this years and thus a miniaturization or chip of electrolytic capa citors for by pass was conduced .
c. For Coupling : Combination of the electrolytic capacitor , chip resistor and inductor and thus coupling together .
d. For Arising of Toothed Wave : Composing of RC charge/discharge circuit through the electrolytic capacitor as well as the resistor and a toothed wave to be created by the RC charge/discharge circuit .
e. For Reverse (Change) of Circuit : The equipment for change the AC voltage to DC voltage .

3. For AC voltage :

a. For Power Improving : Connect the end loading of layout transporting & electrolytic capacitor for power improving .
b. For Wave Filter : Prevention of external interference in SCR circuit , use the LC wave filter circuit to inhibit or erase the interference .
c. For Phase Across : Phase change of the inductive electromotor(motor) with single phase .

1-4 Basic Electrical Characteristics

1. Capacitance (E.S.C.)

C : Capacitance(F)
R : Equivalent series resistance (Ω)
L : Equivalent aeries inductance(H)

Fig.1-3 Simplified equivalent circuit diagram of an electrolytic capacitor

The capacitive component of the equivalent series circuit (equiv alent series capacitance ESC) is determined by applying an alternate voltage of 0.5V at a frequency of 120 Hz .

Temperature dependence of the capacitance
The capacitance of an electrolytic capacitor depends on the temperature : with decreasing temperature , the viscosity of the electrolyte increa ses reducing its conductivity . The capacitance will decrease if the temperature decreases . Furthermore temperature drifts cause armature dilatation and the refore capacitance changes (up to 20% , depending on the series considered, from 0 to 80°C) . This phenomenon is more evident for electrolytic capacitors than for other types .

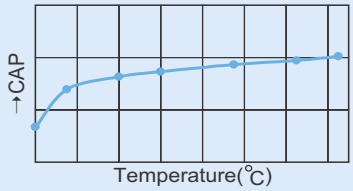


Fig 1-4 Capacitance change vs. temperature

Frequency dependence of the capacitance
The effective capacitance value is derived from the impedance curve , as long as the impedance is still in the range where the capacitance component is dominant .

$$C = \frac{1}{2\pi f Z}$$

C = Capacitance (F)
f = Frequency (Hz)
Z = Impedance (Ω)

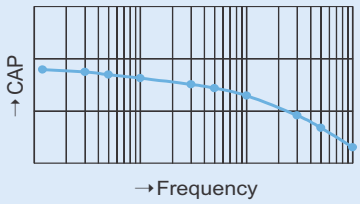


Fig 1-5 Capacitance change vs. frequency

2. Dissipation factor (tanδ)

The dissipation factor is the ratio between the active and the reactive power for a sinusoidal waveform voltage . It can be thought as a measurement of the gap between an actual and an ideal capacitor .

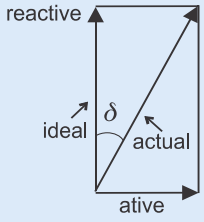


Fig 1-6

$$D.F. = \tan\delta \times 100\ (\%) = \omega CR \times 100\ (\%)$$
$$= 2\pi fCR \times 100\ (\%)$$

where: R = Equivalent Series Resistance
C = Equivalent Series Capacitance
$\omega = 2\pi f$

The tan δ is measured with the same set up as for the series capacitance ESC .

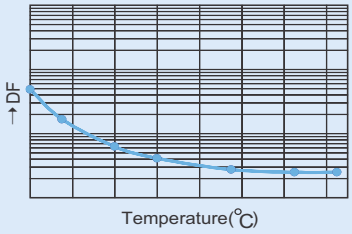


Fig 1-7 Dissipation factor vs. temperature

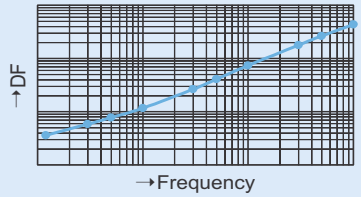


Fig 1-8 Dissipation factor vs. frequency

3. Equivalent series resistance (E.S.R.)

The equivalent series resistanceis the resistive component of the equivalent series circuit . The ESR value depends on frequency and temperature and is related to the tan δ by the following equation :

$$ESR = \frac{\tan\delta}{2\pi f\, ESC}$$

ESR = Equivalent Series Resistance (Ω)
tanδ = Dissipation Factor
ESC = Equivalent Series Capacitance (F)
f = Frequency (Hz)

The tolerance limits of the rated capacitance must be taken into account when calculating this value .

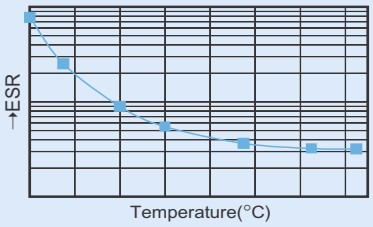


Fig 1-9 ESR change vs. temperature

The resistance of the electrolyte decreases strongly with increasing temperature.

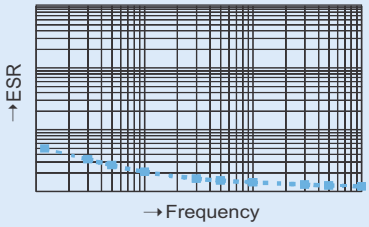


Fig 1-10 ESR change vs. frequency

4. Impedance (Z)

The impedance of an electrolytic capacitor results from here below circuit formed by the following individual equivalent series components :

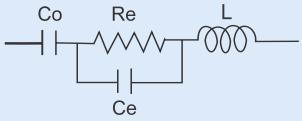


Fig 1-11

Co = Aluminum oxide capacitance (surface and thickness of the dielectric).
Re = Resistance of electrolyte and paper mixture (other resistances not depending on the frequency are not considered : tabs , plates , and so on).
Ce = Electrolyte soaked paper capacitance.
L = Inductive reactance of the capacitor winding and terminals.

The impedance of an electrolytic capacitor is not a constant quantity that retains its value under all the conditions : it changes depending on the frequency and the temperature .

The impedance as a function of frequency (sinusoidal waveform) for a certain temperature can be represented as follows :

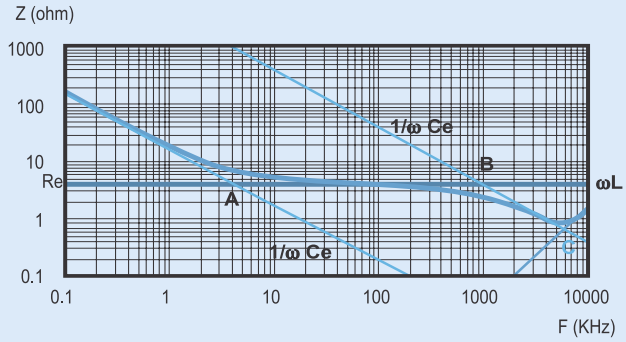


Fig 1-12

- Capacitive reactance predominates at low frequencies
- With increasing frequency , the Capacitive reactance Xc=1/ω Cdecreases until it reaches the order of magnitude of the electrolyte resistance Re (A)
- At even higher frequencies , the resistance of the electrolyte predominates : Z= Re (A - B)
- When the capacitor's resonance frequency is reached (ω 0) , capacitive and cancel each other 1/ω Cinductive reactance mutually cancel each other 1/ω Ce =ω L ,ω 0=SQR(1/LCe)(C) .
- Above this frequency , the inductive reactance of the winding and its terminals (XL=Z=ω L) becomes effective and leads to an increase in impedance .

Generally speaking it can be estimated that Ce ≒ 0.01 Co .

The impedance as a function of frequency (sinusoidal waveform) for different temperature values can be represented as follows (typical values) :

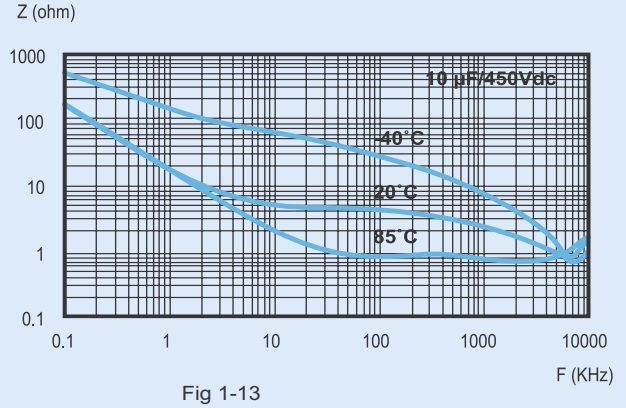


Fig 1-13

Re is the most temperature dependant component of electrolytic capacitor equivalent circuit . The electrolyte resistivity will decrease if the temperature rises . In order to obtain a low impedance value all over the temperature range , Re must be as little as possible , but too low Re values means a very aggressive electrolyte and then a shorter life of the electrolytic capacitor at the high temperatures . A compromise must be reached .

5. Leakage current (L.C.)

Duetothealuminum oxidelayer that serves as adielectric , a small current will continueto flow even after a DC voltage has been applied for long periods . This current is called leakage current . A high leakagecurrent flows after applying a voltage to the capacitor and then decreases in few minutes (e.g. after a prolonged storage without any applied voltage) . In the course of the continuous operation ,the leakage current will decrease and reach an almost constant value .

After avoltage free storage the oxide layer may deteriorate , especially at high temperature . Since there are no leakage current to transport oxygen ions to the anode , the oxide layer is not regenerated . The result is that ahigher thannormal leakagecurrent will flow whenavoltageis appliedafter prolongedstorage . As the oxide layer is regenerated in use , the leakage current will gradually decrease to its normal level .

The relationship between the leakage current and the voltage applied at constant temperature can be shown schematically as follows :

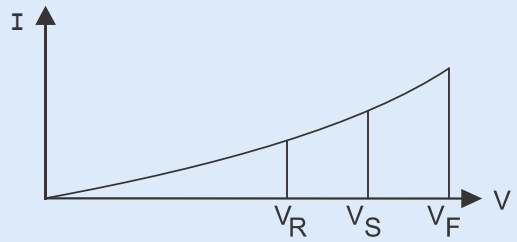


Fig 1-14

Where :

V_F = Forming voltage

If this level is exceeded a large quantity of heat and gas will be generated and the capacitor could be damaged .

V_R = Rated Voltage

This level represents the top of the linear part of the curve .

V_S = Surge voltage

It lies between VR and VF: the capacitor can be subjected to VS for short periods only .

1-5 Reliability

(1)The bathtub curve:

Aluminum electrolytic capacitors feature failure rates shown by the following bathtub curve.

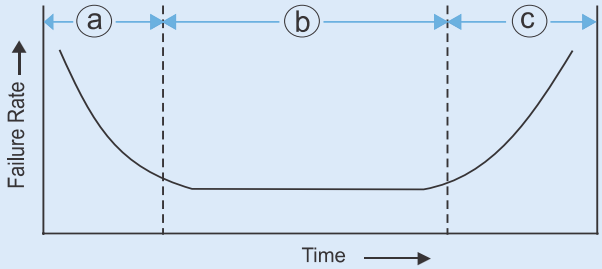


Fig.1-15 Bathtub curve

a. Initial failure period

Deficient Capacitors include any products before dispatch that may have some deficiency caused by the design, production process or used in inappropriate environments.

b. Random failure period

The capacitors have a low defect ratio in the period after it has been stabilized.

c. Wear out failure period

The performance of capacitors will decrease with an increase in usage period. The malfunction rate may vary due to the structural design.

(2) Failure types: (See Table-1)

a). Completely malfunction:

Capacitor is completely disabled to all functions, e.g.: short circuit, open circuit.

b). Malfunction cause by wear and tear gradual malfunctioning of the capacitor, the cause of the malfunction would depend on the environmental conditions.

1-6 Life of the Electrolytic Capacitors

A effects by using condition for the life of electrolytic capacitors which environmental condition & electrical condition .

Environmental condition include temperature , humidity , atmospheric pressure & vibration··· etc. and mostly affected by temperature factor .

Electrical condition include voltage , ripple current and charge / discharge condition··· etc.

1. Temperature & Life

The reduce capacitance & increase DF will be created by the influence from temperature on the life, such condition mostly caused by a slow evaporation from the electrolyte to seal position; the electric specificity that is affected by timing and surrounding temperature as following formula below and similar to the chemical kinetics of Arrhenius' rule and to be reputed as the connection rule of life in electrolytic capacitors.

$$Lx = L0 \times B^{\frac{T0-Tx}{10}} \qquad \text{Eq.1}$$

Lx: Expected Life at Operating Temperature Tx℃ (hour)

Lo: Load Life at Maximum Operating Temperature To℃ (hour)

To: Maximum Operating Temperature (℃)

Tx:Actual Operating Temperature. (℃)

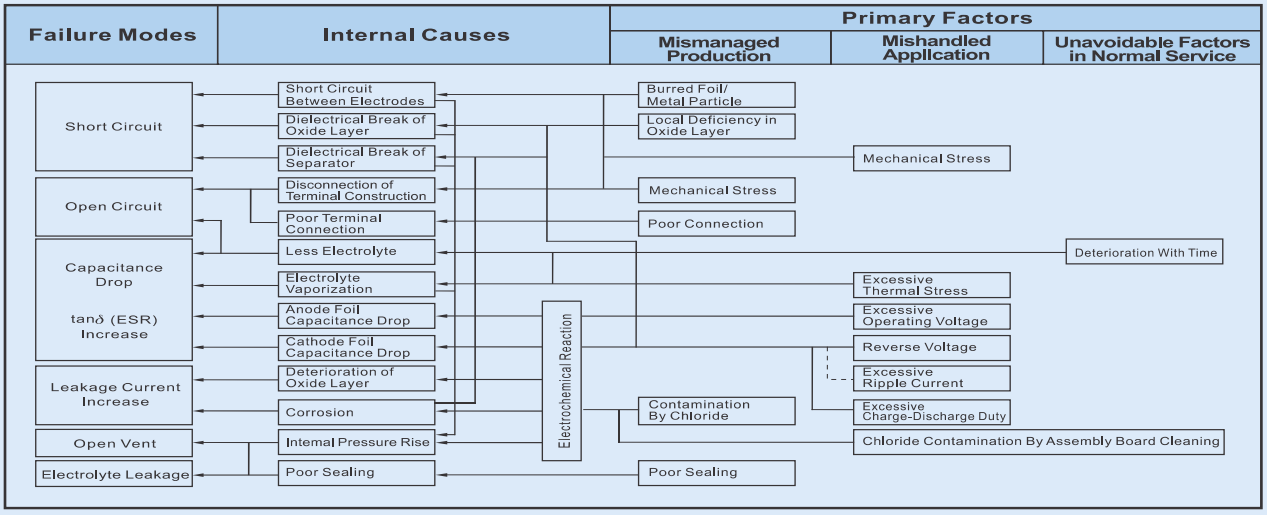
B: Accelerate Coefficient of Temperature(≒ 2)

From the Eq.1 , it means about double acceleration for temperature raising at 10 C . Therefore , it comes a longer working life once a temperature setting lower than Tx while products design .

2. Rated Voltage and Life

While working , the voltage under the input of rated voltage and for the reducing of volt age, although with little or more influence to electrolytic capacitors but, no necessary for special concern after compare with the influence by temperature.

Table-1 Failure modes and causes



3. Influence of Input Ripple Current Against Working life

Passing of some ripple current when the electrolytic capacitor a s a wave filteror smoothing function , the internal temperature of electrolytic capacitor will be bring some more influence to working life as well . Hence , amaximum ripple current will be listed caused by such ripple current anddirectly specifically by each manufacturer; it has been considered as aoverlapping by DC voltage & AC voltage when incorporate electrolytic capacitors with a power that ripple current included . The losing electronic power caused by the alternate resistance & direct leakage current inside the electrolytic capacitors will be come to heat . Kindly refer to following for relation between in rated ripple current and temperate raising:

$$W = (I_{Ripple})^2 \cdot R_{ESR} + V \cdot I_{Leakage} \qquad \text{Eq.3}$$

where W: Internal power loss

I Ripple : Ripple current

R ESR: Equivalent Series Resistance

V : Applied voltage

I Leakage: Leakage current

Normally the losing voltage power of DC leakage current that caused by the DC voltage which to be inflicted in the electrolytic capacitor will be lower than a losing voltage power caused by ripple current, therefore:

$$W \fallingdotseq (I_{RIPPLE})^2 \cdot R_{ESR} \qquad \text{Eq.4}$$

The formula for reaching of temperature balance on the internal temperature raising as well as the hot dissipation as below:

$$W \fallingdotseq (I_{RIPPLE})^2 \quad R_{ESR} = \beta \cdot A \cdot \triangle T \qquad \text{Eq.5}$$

β : Heat radiation constant

A= Surface area of container $(cm)^2$

$A = \pi/4 \cdot D \cdot (D + 4L)$

D: case diameter (cm)

L: case length (cm)

$\triangle T$: Temperature raising created by internal heating (℃).

Through the formula above can see the temperature raising caused by the ripple current and:

$$\triangle T = \frac{(I_{RIPPLE})^2 \cdot R_{ESR}}{\beta A} = \frac{(I_{RIPPLE})^2 \cdot \tan\delta}{\beta A \omega C} \qquad \text{Eq.6}$$

Due to : $R_{ESR} = \frac{\tan\delta}{\omega C}$

Tan δ : DF at 120HZ

w : $2\pi f$ (f = 120HZ)

C : The static capacity (F) at 120HZ

In general , the allowed ripple current value would be specifica lly listed by the manufacturer - A revised coefficient of allowed ripple current & working frequency to the electrolytic capacitor .

Table-2 Snap-in terminal type capacitors (for input smoothing circuit)

Frequency (Hz)		50 60	120	1K	10K~100K
Frequency Coefficient Kf	6.3~100V	0.88 0.90	1.00	1.15	1.16
	160~250V	0.85 0.88	1.00	1.15	1.20
	315~450V	0.88 0.90	1.00	1.10	1.15

Table-3 Lead type capacitors (for output smoothing circuit)

Frequency (Hz)	50	120	300	1K	10K	100K
~47μF	0.30	0.40	0.50	0.70	0.80	1.00
5.6~33μF	0.40	0.50	0.60	0.80	0.90	1.00
34~330μF	0.60	0.70	0.80	0.90	0.95	1.00
331~1000μF	0.65	0.90	0.90	0.98	1.00	1.00
1200μF~Higher	0.85	0.90	0.95	0.98	1.00	1.00

Table-4 The coefficient between allowed ripple current & working temperature to the electrolytic capacitors.

Surrounding Temp[℃] / Type	Revised coefficient of Temperature				
	60	65	70	85	105
Snap-in terminal type	2.37		2.17	1.67	1.00
Lead type capacitors		1.80		1.50	1.00

1-7 Cleaning Agings

Circuit Board Cleaning

1. Foreword

When a halide substance seeps into the aluminum electrolytic capacitor The halide dissolves and frees halogen ions.

$$RX + H_2O \Longrightarrow ROH + H^+ + X^-$$

Also the following reaction can occur

$$Al + 3X^- \Longrightarrow AlX_3 + 3e^-$$

$$AlX_3 + 3H_2O \Longrightarrow Al(OH)_3 + 3H^+ + 3X^-$$

When this reaction is repeated. The leakage current increases and the safety vent will be activated and may lead to open vent. Because of this halogen type cleaning agents or adhesive material and coating material is not recommended for usage. The following explains the recommended condition for cleaning. When a halogen type cleaning agent will be used due to cleaning capabilities.

2. Recommended Cleaning Condition

Applicable：Any type.any ratings

Cleaning Agents： Pine Alpha ST-100S

Clean Through 750H,750L,710M

Sanelek B-12

Aquq Cleaner 210 SEP

Techno Care FRw 14～17

Isopropyl Alcohol

Cleaning Conditions ： Total cleaning time shall be no greater than 5 minutes by immersion , ultrasonic or other method .

After cleaning , capacitors should be dried using hot air for minimum of 10 minutes along with the PC board .

Hot air temperature should be below the maximum operating temperature of the capacitor .

Insufficient dries after water runse may cause appearance problems , such as sleeve shrinking , bottom-plate bulging .

It is recommended to monitor conductivity , pH , and concentration of the agent . Please do not keep a product after cleaning in condition that cleaning agents exists as steam, or in non ventilated containers .

3. CFC substitute

The anti-solvent capacitor listed in the catalogue can be cleaned using AK-255AES. If used within the following condition.

Please monitor contamination of solution by measuring conductivity, pH , specific gravity , water content and such .

Furthermore , do not store capacitors in a cleaning agent atmosphere or sealed container after cleaning .

Also avoid using using ozone depleting substances for cleaning agents in difference to our global environments.

Applicable：Anti-solvent capacitors

Cleaning Agents：AK-255AES

Cleaning Conditions：Within 5 minutes, total cleaning time by immersion , vapor spray , or ultrasonic and such . For SMD and ultra-miniature type 2 minutes maximum of total cleaning time .

4. Fixing Material and Coating Material

- DO not use any affixing or coating materials, which contain halide substance.
- Remove flux and any contamination, which remains in the gap between the end seal and PC board.
- Remove flux and any contamination, which remains in the gap between the end seal and PC board.
- Please dry the cleaning agent on the PC board before using affixing or coating material.
- Please do not apply any material all around the end seal when using affixing or coating material.

There are variations of cleaning agents, fixing and coating material, so please contact those manufacture or our sales office to make sure that the material would not cause any problems.

RADIAL TYPE ORDERING CODE

SK	063	M	0220	A	5	S	–	1019

Series Name
2 Digit

Voltage
3 Digit
006 = 6.3V
010 = 10V
100 = 100V
450 = 450V

Capacitance
4 Digit
0R10 = 0.1 μF
1R00 = 1 μF
0010 = 10 μF
0100 = 100 μF
1000 = 1000 μF
10K0 = 10000 μF
100K = 100000 μF

Rubber
1 Digit
F = Flat Rubber
S = Rubber Stand-off

Case Size
4 Digit
0407 = 04 x 07
0511 = 05 x 11
1019 = 10 x 19
1625 = 16 x 25
1836 = 18 x 36
2240 = 22 x 40

Tolerance
1 Digit
K = ±10%
M = ±20%
Y = ±10% ~ +50%
W = -5% ~ +20%
V = -10% ~ +20%
Others = Special design

Pitch
1 Digit
1 = 1.5 mm
2 = 2.0 mm
3 = 3.5 mm
5 = 5.0 mm
7 = 7.5 mm
Z = 2.5 mm
P = 10.0 mm

1 Digit
A = Taping
B = Bulk
C = Lead Cut / Bulk (Shape A)
F = Form & Lead Cut / Bulk (Shape B)
K = Form & Lead Cut & Crimp / Bulk (Shape C)
L = Lead Cut & Crimp / Bulk (Shape D)
J = Lead Cut & Crimp / Bulk (Shape E)

1 Digit
– = No Lead Cut / Standard
1 = Lead Cut Length 5.0 ± 0.5 mm
3 = Lead Cut Length 4.2 ± 0.2 mm
5 = Lead Cut Length 8.0 ± 0.5 mm
7 = Lead Cut Length 15.0 ± 0.5 mm
8 = Lead Cut Length 10.0 ± 0.5 mm
J = Lead Cut Length 3.1 ± 0.2 mm
L = Lead Cut Length 3.3 ± 0.2 mm
V = Lead Cut Length 2.8 ± 0.2 mm
M = Lead Cut Length 3.7 ± 0.2 mm
Q = Lead Cut Length 7.0 ± 0.5 mm
W = Lead Cut Length 4.0 ± 0.2 mm

SNAP IN TYPE ORDERING CODE

LG	160	M	0820	B	P	F	–	2250

Series Name
2 Digit

Voltage
3 Digit
006 = 6.3 V
010 = 10 V
100 = 100 V
450 = 450 V

Tolerance
1 Digit
K = ±10%
M = ±20%
Y = ±10% ~ +50%
W = -5% ~ +20%
V = -10% ~ +20%

Capacitance
4 Digit
0R10 = 0.1 μF
1R00 = 1 μF
0010 = 10 μF
0100 = 100 μF
1000 = 1000 μF
10K0 = 10000 μF
100K = 100000 μF

B
1 Digit
B = Bulk

Pitch
1 Digit
P = 10.0 mm

Rubber & Terminal
F = Flat Rubber & 2pin
3 = Flat Rubber & 3pin
4 = Flat Rubber & 4pin

–
1 Digit
– = Terminal Length 5.8 mm
4 = Terminal Length 4.0 mm

Case Size
4 Digit
2250 = 22 x 50
2540 = 25 x 40
3030 = 30 x 30
3525 = 35 x 25

SMD TYPE ORDERING CODE

CA	063	M	0220	R	E	B	-	0405

Series Name
2 Digit

Voltage
3 Digit
006 = 6.3V
010 = 10V
050 = 50V
100 = 100V

Tolerance
1 Digit
K = ±10%
M = ±20%
Y = ±10% ~ +50%
W = -5% ~ +20%
V = -10% ~ +20%

Capacitance
4 Digit
0R10 = 0.1 μF
1R00 = 1 μF
0010 = 10 μF
0100 = 100 μF
1000 = 1000 μF

Package
1 Digit
R = Reel

Life
1 Digit
E=2000 Hours
S=1000 Hours

Size
1 Digit
B = 4.0 x 5.4
C = 5.0 x 5.4
D = 6.3 x 5.4
E = 8.0 x 6.5
F = 8.0 x 10.5
G = 10.0 x 10.5
H = 6.3 x 7.7

Size
4 Digit
0405 = 4.0 x 5.4
0505 = 5.0 x 5.4
0605 = 6.3 x 5.4
0806 = 8.0 x 6.5
0810 = 8.0 x 10.5
1010 = 10.0 x 10.5
0607 = 6.3 x 7.7

DIAGRAM OFTAPING DIMENSIONS

Unit : mm

Fig. 1

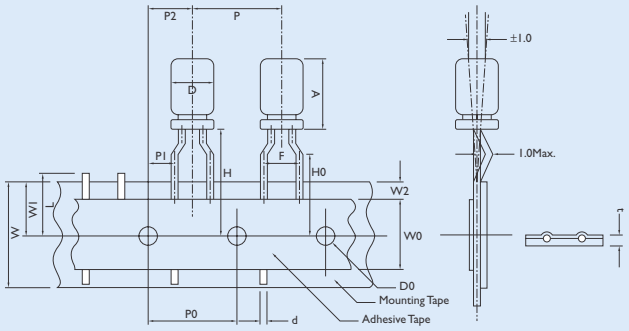


Fig. 2

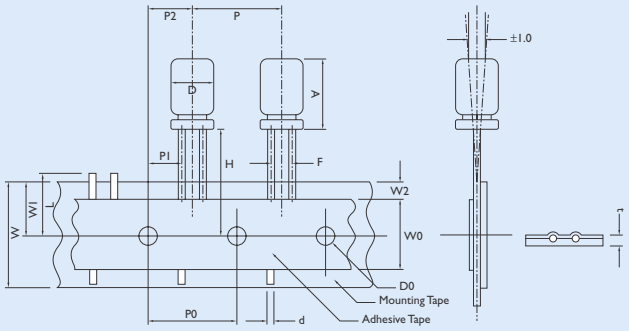


Fig. 3

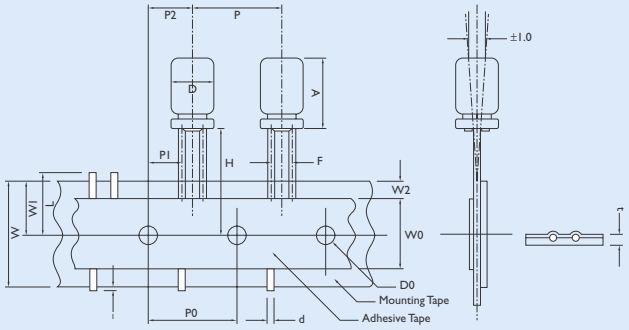


Fig. 4

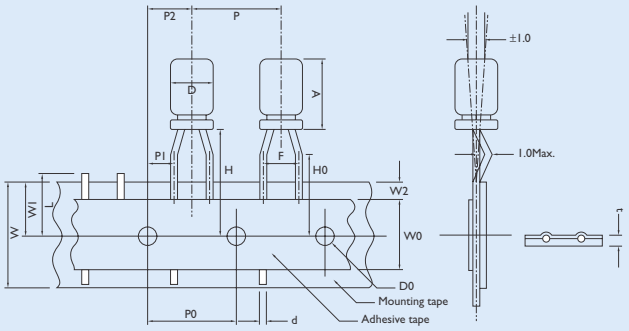


Fig. 5

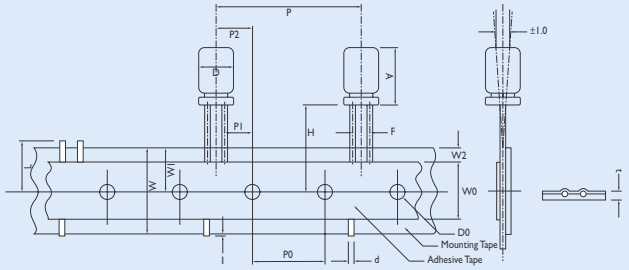
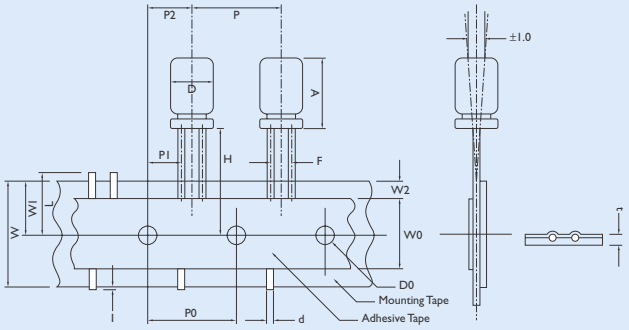


Fig. 6



SPECIFICATIONS INFORMATION

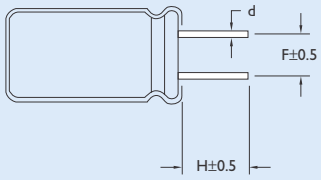
Unit : mm

ITEM	TOLERANCE	PH = 2.5			FORMED LEAD TYPE							STRAIGHT LEAD TYPE											
		L			L							L											
		5~7	≤7	>7	5~7	≤7	>7	≤7	>7	≤7	>7	5~7	≤7	>7	≤7	>7	≤7	>7	12~25	15~25			15~25	
D	+0.5 -0	4ø	5ø		4ø	5ø		6ø		8ø		4ø	5ø		6ø		8ø		10ø	12ø	12.5ø	13ø	16ø	18ø
A	Max.	8.0		13	8.0		13	8.0	13	8.0	22.0	8.0		13	8.0	13	8.0	22.0	27.0					
d	±0.05	0.45		0.5	0.45		0.5	0.5	0.5	0.5	0.5	0.45		0.5	0.5	0.5	0.5	0.5	0.6				0.8	
P	±1.0	12.7			12.7							12.7								15.0			30.0	
P0	±0.3	12.7			12.7							12.7								15.0				
P1	±0.7	5.1			3.85							5.6	5.35		5.1		4.6		3.85				3.75	
P2	±1.3	6.35			6.35							6.35								7.5				
F	+0.8, -0.2	2.5			5.0							1.5	2.0		2.5		3.5		5.0				7.5 ± 0.8	
W	+1.0, -0.5	18.0			18.0							18.0												
W0	±0.5	12.0			12.0							12.0												
W1	±0.5	9.0			9.0							9.0												
W2	Max.	3.0			3.0							3.0												
H	±0.75	18.5			18.5							18.5												
H0	±0.5	16.0			16.0							–												
I	Max.	–			–							–							1.0					
D0	±0.2	4.0			4.0							4.0												
t	±0.2	0.7			0.7							0.7												
L	Max.	11.0			11.0							11.0												
Fig.		**4**			**1**							**2**							**3, 6**				**5**	

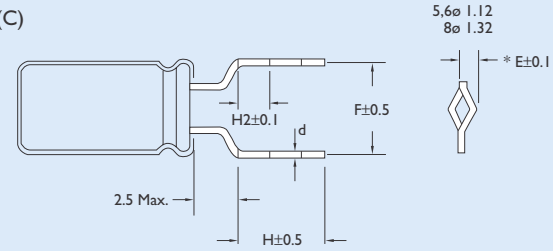
DIAGRAM OF LEAD CUTTING AND FORMING

Unit : mm

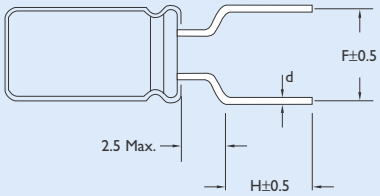
Shape (A)



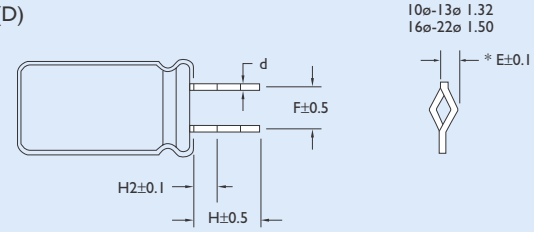
Shape (C)



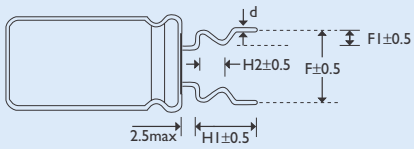
Shape (B)



Shape (D)



Shape (E)



SPECIFICATIONS INFORMATION

Unit : mm

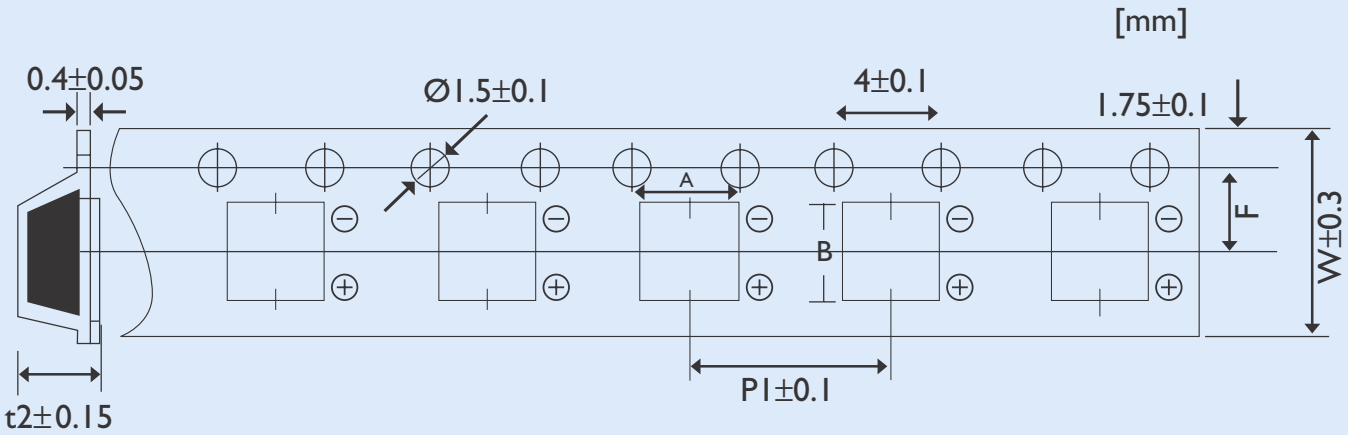
NO.	CUTTING & FORMING METHODS	Dø	4ø	5ø	6ø	8ø	10ø	12ø	13ø	16ø	18ø	22ø
A	Lead Cut Only	F	1.5	2.0	2.5	3.5	5.0	5.0	5.0	7.5	7.5	10
		H	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
		d	0.45	0.5	0.5	0.5	0.6	0.6	0.6	0.8	0.8	0.8
B	Lead Cut and Form	F	5.0	5.0	5.0	5.0						
		H	5.0	5.0	5.0	5.0						
		d	0.45	0.5	0.5	0.5						
C	Lead Cut, Crimp and Form	F	5.0	5.0 5.0 5.0	5.0 5.0 5.0	5.0 5.0 5.0						
		H1	5.0 4.2	5.0 4.2 4.0	5.0 4.2 4.0	5.0 4.2 4.0						
		H2	2.5 2.0	2.5 2.0 2.0	2.5 2.0 2.0	2.5 2.0 2.0						
		d	0.45	0.5 0.5 0.5	0.5 0.5 0.5	0.5 0.5 0.5						
D	Lead Cut and Crimp	F					5.0	5.0	5.0	7.5	7.5	7.5 10
		H1					5.0 4.2 4.0	5.0 4.2 4.0	5.0 4.2 4.0	5.0 4.2 4.0	5.0 4.2 4.0	5.0 4.2 4.0
		H2					2.5 2.0 2.0	2.5 2.0 2.0	2.5 2.0 2.0	2.5 2.0 2.0	2.5 2.0 2.0	2.5 2.0 2.0
		d					0.6	0.6	0.6	0.8	0.8	0.8
E	Lead Cut Form and Crimp	F	5.0	5.0	5.0	5.0						
		F1	1.2	1.2	1.2	1.2						
		H1	4.0	4.0	4.0	4.0						
		H2	1.8	1.8	1.8	1.8						
		d	0.45	0.5	0.5	0.5						

PACKAGE INFORMATION

TYPE	D x L	BULK			TAPING		LEAD CUTTING		
RADIL	(mm)	I BAG/PCS	I INNER BOX	I CARTON	I INNER BOX	I CARTON	I BAG/PCS	I INNER BOX	I CARTON
	04 x 05	1000	10,000	20,000	2,500	25,000	1000	15,000	30,000
	05 x 05	1000	10,000	20,000	2,000	20,000	1000	15,000	30,000
	06 x 05	1000	10,000	20,000	2,000	20,000	1000	15,000	30,000
	04 x 07	1000	10,000	20,000	2,500	25,000	1000	15,000	30,000
	05 x 07	1000	10,000	20,000	2,000	20,000	1000	15,000	30,000
	06 x 07	1000	10,000	20,000	2,000	20,000	1000	15,000	30,000
	05 x 11	500	10,000	20,000	2,000	20,000	500	15,000	30,000
	06 x 11	500	10,000	20,000	2,000	20,000	500	15,000	30,000
	08 x 11	500	6,000	12,000	1,000	10,000	500	8,000	16,000
	08 x 15	500	5,000	10,000	1,000	10,000	500	5,000	10,000
	08 x 20	200	4,000	8,000	1,000	10,000	200	4,000	8,000
	10 x 12	200	4,000	8,000	700	7,000	200	4,000	8,000
	10 x 15	200	3,000	6,000	700	7,000	200	4,000	8,000
	10 x 16	200	3,000	6,000	700	7,000	200	4,000	8,000
	10 x 19	200	2,400	4,800	700	7,000	200	3,000	6,000
	10 x 25	200	2,400	4,800	700	7,000	200	2,400	4,800
	10 x 27	200	2,000	4,000			200	2,000	4,000
	10 x 30	200	2,000	4,000			200	2,000	4,000
	12 x 20	200	2,000	4,000	500	5,000	200	2,000	4,000
	12 x 25	200	1,800	3,600	500	5,000	200	1,800	3,600
	12 x 30	200	1,600	3,200	500	5,000	200	1,600	3,200
	12 x 35	200	1,000	2,000	500	5,000		500	3,000
	12 x 40	200	1,000	2,000	500	5,000		500	3,000
	13 x 20	200	1,800	3,600	500	5,000	200	1,800	3,600
	13 x 25	200	1,400	2,800	500	5,000	200	1,400	2,800
	13 x 30	200	1,200	2,400	500	5,000		500	3,000
	13 x 40	200	1,000	2,000	500	5,000		500	3,000
	16 x 25	200	1,000	2,000	300	3,000		500	4,000
	16 x 32	200	800	1,600				500	3,000
	16 x 36	200	600	1,200				500	3,000
	16 x 40	200	600	1,200				500	3,000
	18 x 20	200	800	1,600			200	1,000	2,000
	18 x 25	200	800	1,600				500	2,000
	18 x 32	100	500	1,000				500	2,000
	18 x 36	100	500	1,000				500	2,000
	18 x 40	100	500	1,000				500	2,000
	22 x 40	100	300	600				400	800

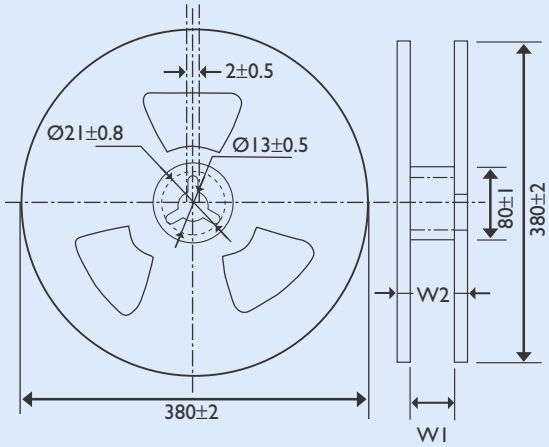
TYPE	D x L	BULK		
SNAP-IN	(mm)	I BAG/PCS	I INNER BOX	I CARTON
	22 x 25 ~ 45		400	800
	25 x 25 ~ 50		200	400
	30 x 25 ~ 35		200	400
	30 x 40 ~ 50		200	400
	35 x 30 ~ 50		200	400

1.Carrier Tape Dimension



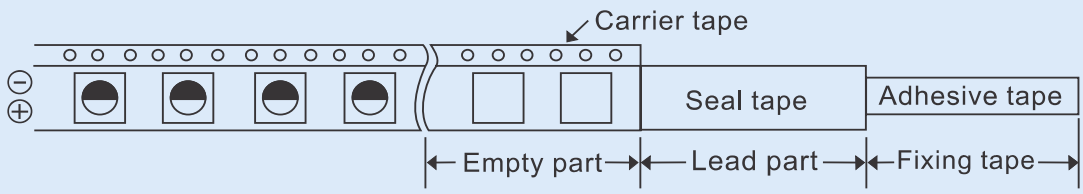
CASE SIZE	(ØD mm)	W	A	B	P1	F	t2
B	Ø4	12.0	4.7	4.7	8.0	5.5	5.75
C	Ø5	12.0	5.7	5.7	12.0	5.5	5.8
D	Ø6.3 x 5.4	16.0	7.0	7.0	12.0	7.5	5.75
E	Ø8 x 6.2	16.0	8.7	8.7	12.0	7.5	6.8
F	Ø8 x 10.2	24.0	8.7	8.7	16.0	11.5	11.0
G	Ø10 x 10.2	24.0	10.7	10.7	16.0	11.5	11.0
H	Ø6.3 x 7.7	16.0	7.0	7.0	12.0	7.5	8.0

2.Reel Dimension



SIZE CODE	B	C	D	E	F	G
W1	14	14	18	18	26	26
W2	18	18	22	22	30	30

3. Details of Carrier Tape



(1)

a. Last reeling empty part of carrier tape shall be more than .10 cm

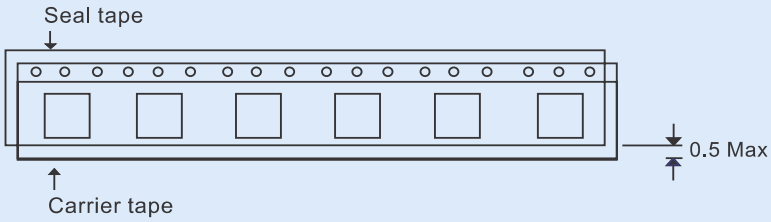
b. Leader part of seal tape shall be more than 20 cm.

c. First reeling Empty part of carrier tape shall beomre than 10 cm

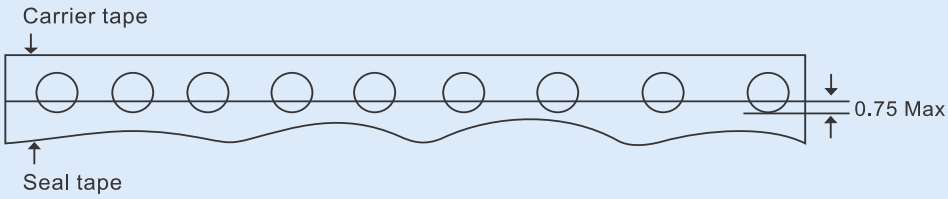
d. Adhesive tape fixing the end of the leader part shall be approx.10 cm

(2) Deviation between carrier tape and seal tape

a. Deviation between carrier tape and seal tape shall be less than 0.5 mm.

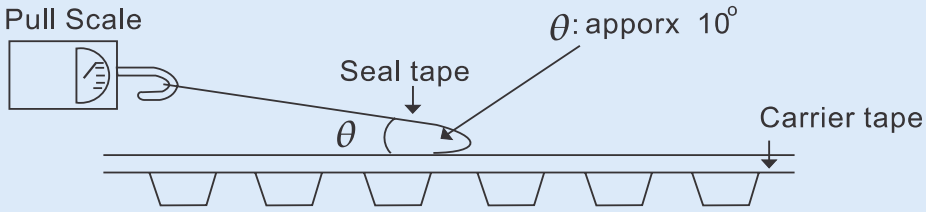


b. Seal tape shall not cover on the feeding holes more than 0.75 mm.



4. Adhesion Test

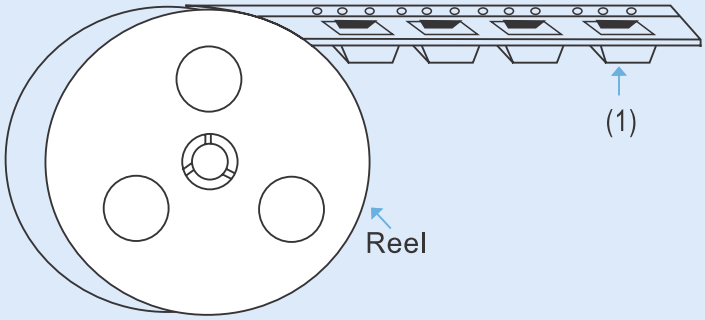
Reasonable pulling strength: 0.1~0.7N
Pulling speed: 300mm / min



5. Packing Style

(1) Carrier tape shall be reeled inside.(seal tape shall be outside)

(2) End of the tape shall be inside to the reel physically as shown in the below figure and leader part of seal tape shall not be attached.



6. Packaging Quantity

Size Code	D x L	One Reel (pcs)	Total Quantity pcs)
B	4x5.4	2000	20000
C	5x5.4	1000	10000
D	6.3x5.4	1000	10000
E	6.3x7.7	1000	10000
F	8x6.2	1000	10000
G	8x10.2	500	3000
H	10x10.2	500	3000

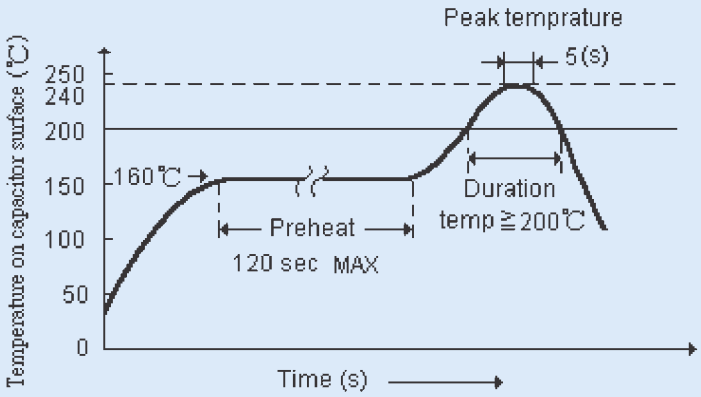
Reflow soldering for chip capacitors

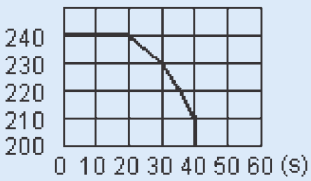
(1) For reflow, use a thermal conduction system such as infrared radiation (IR) or hot blast. Vapor heat transfer systems (VPS) are not recommended.

(2) Pbserve proper soldering conditions(temperature, time, etc.). Do not exceed the specified limits.

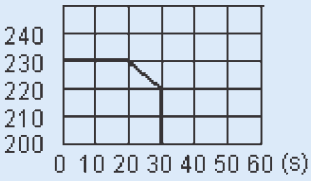
(3) Reflow shoud be performed one time. Consult us for additional reflow restrictions.

(4) Reflow soldering profile for standard :



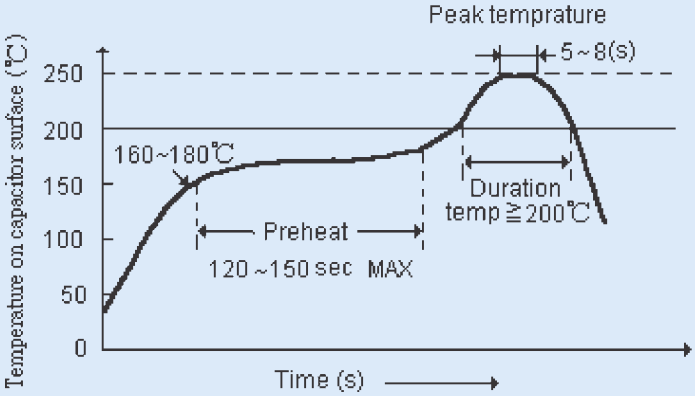


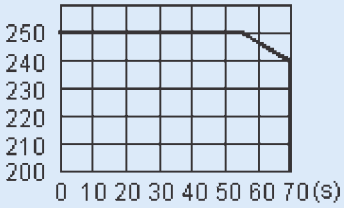
Duration temp≧200℃
Size code "A~D"



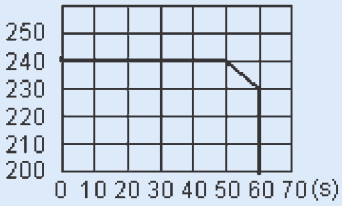
Duration temp≧200℃
Size code "E~G"

(5) Reflow soldering profile for lead free :





Duration temp≧200℃
Size code "A~D"



Duration temp≧200℃
Size code "E~G"

■ Manual Soldering

(1) Observe temperature and time soldering specifications or do not exceed temperatures of 300℃ for 3 seconds or less.

(2) If a soldered capacitor must be removed and reinserted , avoid excessive stress on the capacitor leads.

■ Capacitor handing after soldering

(1) Avoid moving the capacitor after soldering to prevent excessive stress on the lead wires where they enter the seal.

(2) Do not use the capacitor as a handle when moving the circuit board assembly.

(3) Avoid striking the capacitor after assembly to prevent failure due to excessive shock.

Miniature Size Aluminum Electrolytic Capacitors

ST [For Super Miniature]

85°C Single-Ended Lead, 5.0mm Height Type Aluminum Electrolytic Capacitors

DESCRIPTION

This type is designed for saving space and high density insertion.

Applications : VTR, Camera, Car Audio,Mini Audio and Other Industrial and Commercial Applications

Cap(μF) \ Freq.(Hz)	50	120	300	1K	10K-
~47	0.75	1.00	1.35	1.57	2.00
100~300	0.80	1.00	1.23	1.34	1.50

Temperature coefficient

Temperature(°C)	-55	60	70	85
Factor	1.65	1.50	1.30	1.00

ELECTRICAL CHARACTERISTICS

Operating Temperature : -40° ~ +85°C

Working Voltage : 4 ~ 50V

Rate Capacitance Range : 0.1 ~ 330μF

Capacitance Tolerance : -20 ~ +20%

DC Leakage Current (μA) : I = 0.01CV (μA) or 3μA Whichever is greater.
(After 2 Minutes Application of DC Working Voltage at 25°C)

Dissipation Factor : at 120 Hz, 25°C

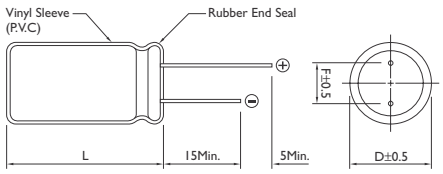
WV (V)		4	6.3	10	16	25	35	50
D.F (%)	ø3	40	38	30	23	17	15	13
	ø4~ø8	35	24	20	16	14	12	10

Load Life : 1000 Hours at 85°C Assured with Full Rated Maximum Ripple Current Applied
(a) Capacitance Change : Within 20% of Initial Value
(b) Dissipation Factor : Not Exceed 200% of Initial Requirement
(c) Leakage Current : Not Exceed the Initial Requirement

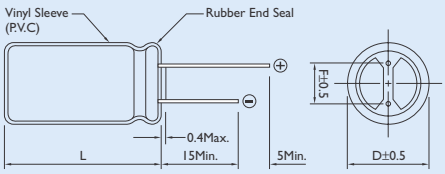
Shelf Life : 500 Hours, No Voltage Applied, at 85°C
(a) Capacitance Change : Within 20% of Initial Value
(b) Dissipation Factor : Not Exceed 200% of Initial Requirement
(c) Leakage Current : Not Exceed 200% of Initial Requirement

DIAGRAM OF DIMENSIONS

Dimensions : mm



Rubber Stand-off



L ≤ 12 L + 1.5Max.
13 ≤ L ≤ 15 $L^{+1.0}_{-0.5}$
L ≥ 16 L + 2.0Max.

Dø	F	dø
4.0	1.5	0.45
5.0	2.0	
6.3	2.5	
8.0	3.5	0.5

CASE SIZE & PERMISSIBLE RIPPLE CURRENT OF STANDARD PRODUCTS

CAP. (μF)	RATED VOLTAGE W V													
	4		6.3		10		16		25		35		50	
	Size	Ripple	Size	Ripple	Size	Ripple	Size	Ripple	Size	Ripple	Size	Ripple	Size	Ripple
0.1													4 x 5	1.0
0.22													4 x 5	2.0
0.33													4 x 5	2.8
0.47													4 x 5	4.0
1.0													4 x 5	8.4
2.2											3 x 5	8.4	4 x 5	13
3.3									3 x 5	10	4 x 5	15	4 x 5	17
4.7							3 x 5	10	4 x 5	16	4 x 5	18	5 x 5	20
10			3 x 5	15			4 x 5	23	5 x 5	27	5 x 5	29	6 x 5	33
22	3 x 5	19	4 x 5	28	5 x 5	33	5 x 5	37	6 x 5	42	6 x 5	46	8 x 5	52
33	4 x 5	28	4 x 5 5 x 5	37 37	5 x 5	41	6 x 5	49	6 x 5	52	8 x 5	62	8 x 5	71
47	4 x 5	33	4 x 5 5 x 5	45 45	6 x 5	52	6 x 5	58	8 x 5	70	8 x 5	80		
100	5 x 5	56	6 x 5	70	8 x 5	80	8 x 5	92	8 x 5	110				
220	6 x 5	96	8 x 5	110	8 x 5	135								
330	8 x 5	145												

Note : * 1. D x L : mm

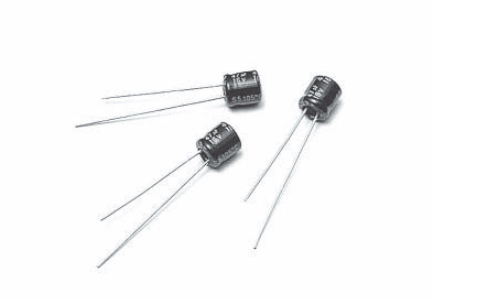
* 2. Size : 6 x 5 Actually is 6.3 x 5

* 3. mA rms at 85°C, 120Hz

Miniature Size Aluminum Electrolytic Capacitors

S7 [For Super Miniature]

85°C Single-Ended Lead, 5.0mm Height Type Aluminum Electrolytic Capacitors



DESCRIPTION

This type is designed to meet the demand or equipments for greatly reduced size and thickness. such as: portable micro computer, disk driver, small calculator and audio equipement.

Frequency coefficient

Cap(μF) \ Freq.(Hz)	50	120	300	1K	10K-
~47	0.75	1.00	1.35	1.57	2.00
100~470	0.80	1.00	1.23	1.34	1.50

Temperature coefficient

Temperature(°C)	-55	60	70	85
Factor	1.65	1.50	1.30	1.00

ELECTRICAL CHARACTERISTICS

Operating Temperature : -40° ~ +85°C

Working Voltage : 4 ~ 50V

Rate Capacitance Range : 0.1 ~ 470μF

Capacitance Tolerance : -20 ~ +20%

DC Leakage Current (μA) : I = 0.01CV (μA) or 3μA Whichever is greater.
(After 2 Minutes Application of DC Working Voltage at 25°C)

Dissipation Factor : at 120 Hz, 25°C

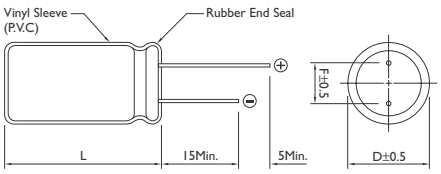
WV (V):	4	6.3	10	16	25	35	50
D.F (%) :	35	24	20	16	14	12	10

Load Life : 1000 Hours at 85°C Assured with Full Rated Maximum Ripple Current Applied
(a) Capacitance Change : Within 20% of Initial Value
(b) Dissipation Factor : Not Exceed 200% of Initial Requirement
(c) Leakage Current : Not Exceed the Initial Requirement

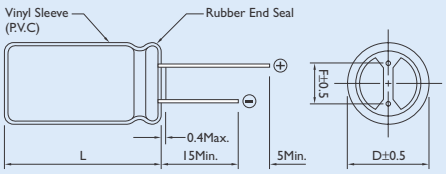
Shelf Life : 500 Hours, No Voltage Applied, at 85°C
(a) Capacitance Change : Within 20% of Initial Value
(b) Dissipation Factor : Not Exceed 200% of Initial Requirement
(c) Leakage Current : Not Exceed 200% of Initial Requirement

DIAGRAM OF DIMENSIONS

Dimensions : mm



Rubber Stand-off



L ≤ 12 L + 1.5Max.
13 ≤ L ≤ 15 $L^{+1.0}_{-0.5}$
L ≥ 16 L + 2.0Max.

Dø	F	dø
4.0	1.5	0.45
5.0	2.0	
6.3	2.5	
8.0	3.5	0.5

CASE SIZE & PERMISSIBLE RIPPLE CURRENT OF STANDARD PRODUCTS

CAP. (μF)	RATED VOLTAGE W V											
	6.3		10		16		25		35		50	
	Size	Ripple	Size	Ripple	Size	Ripple	Size	Ripple	Size	Ripple	Size	Ripple
0.1											4 x 7	10
0.22											4 x 7	2.3
0.33											4 x 7	3.5
0.47											4 x 7	5.0
1.0											4 x 7	10
2.2											4 x 7	19
3.3											4 x 7	24
4.7									4 x 7	24	4 x 7	28
10					4 x 7	28	4 x 7	28	4 x 7	31	5 x 7	38
22	4 x 7	34	4 x 7	35	4 x 7	39	5 x 7	48	5 x 7	52	6 x 7	58
33	4 x 7	40	4 x 7	43	5 x 7	59	5 x 7	58	6 x 7	65	8 x 7	75
47	4 x 7	48	5 x 7	59	5 x 7	65	6 x 7	71	8 x 7	85		
100	5 x 7	78	6 x 7	87	6 x 7	98	8 x 7	115				
220	6 x 7	120	8 x 7	145								
330	8 x 7	180	8 x 7	201								
470	8 x 7	215										

Note : * 1. D x L : mm

* 2. Size : 6 x 7 Actually is 6.3 x 7

* 3. mA rms at 85°C, 120Hz

Miniature Size Aluminum Electrolytic Capacitors

S5 [For Super Miniature]

105°C Single-Ended Lead, 5.0mm Height Type Aluminum Electrolytic Capacitors

DESCRIPTION

The S5 series are smaller than SS series.

This type is designed for saving space and high density insertion.

Applications : VTR, Camera, Car Audio, Miniaudio and Other Industrial and Commercial Applications

Multiplier for Ripple Current

Frequency coefficient

Frequency (Hz)	20	300	1K	10K~100K
0.1~47μF	1.00	1.20	1.30	1.50
100~330μF	1.00	1.10	1.15	1.20

Temperature coefficient

Temperature(°C)	65	85	105
Factor	1.40	1.20	1.00

ELECTRICAL CHARACTERISTICS

Operating Temperature : -40° ~ +105°C

Working Voltage : 6.3 ~ 50V

Rate Capacitance Range : 0.1 ~ 470μF

Capacitance Tolerance : -20 ~ +20%

DC Leakage Current (μA) : I = 0.01CV (μA) or 3μA Whichever is greater.
(After 2 Minutes Application of DC Working Voltage at 25°C)

Dissipation Factor : at 120 Hz, 25°C

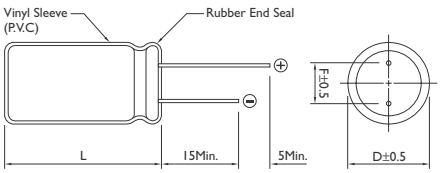
WV (V):	6.3	10	16	25	35	50
D.F (%) :	24	20	16	14	12	10

Load Life : 1000 Hours at 105°C Assured with Full Rated Maximum Ripple Current Applied
(a) Capacitance Change : Within 20% of Initial Value
(b) Dissipation Factor : Not Exceed 200% of Initial Requirement
(c) Leakage Current : Not Exceed the Initial Requirement

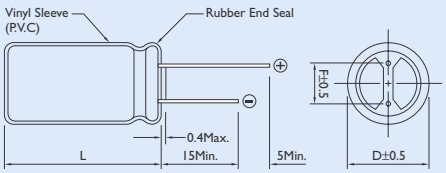
Shelf Life : 500 Hours, No Voltage Applied, at 105°C
(a) Capacitance Change : Within 20% of Initial Value
(b) Dissipation Factor : Not Exceed 200% of Initial Requirement
(c) Leakage Current : Not Exceed 200% of Initial Requirement

DIAGRAM OF DIMENSIONS

Dimensions : mm



Rubber Stand-off



$L \le 12$ L + 1.5Max.
$13 \le L \le 15$ $L^{+1.0}_{-0.5}$
$L \ge 16$ L + 2.0Max.

Dø	F	dø
4.0	1.5	0.45
5.0	2.0	
6.3	2.5	
8.0	3.5	0.5

CASE SIZE & PERMISSIBLE RIPPLE CURRENT OF STANDARD PRODUCTS

CAP. (μF)	RATED VOLTAGE W V											
	6.3		10		16		25		35		50	
	Size	Ripple	Size	Ripple	Size	Ripple	Size	Ripple	Size	Ripple	Size	Ripple
0.1											4 x 5	1
0.22											4 x 5	2
0.33											4 x 5	3
0.47											4 x 5	4
1.0											4 x 5	9
2.2											4 x 5	13
3.3							4 x 5	13			4 x 5	17
4.7	4 x 5	16			4 x 5	20	4 x 5	16	4 x 5	18	4 x 5 5 x 5	17 20
10	4 x 5	18	4 x 5	20	4 x 5	23	4 x 5 5 x 5	20 27	5 x 5	30	6 x 5	33
22	4 x 5	28	5 x 5	33	4 x 5 5 x 5	29 37	6 x 5	42	6 x 5	48	6.3 x 5	33
33	4 x 5	33	4 x 5 5 x 5	34 41	5 x 5 6 x 5	44 49	5 x 5 6 x 5	45 53				
47	4 x 5 5 x 5	35 45	5 x 5	46	5 x 5 6 x 5	54 58	5 x 5 6.3 x 5	55 65				
68			6 x 5	54								
100	5 x 5 6 x 5	55 70	6 x 5	80	6 x 5	85	8 x 5	90				
220	6 x 5	90	8 x 5	90								
330	8 x 5	115										
470	8 x 5	100										

Note : * 1. D x L : mm

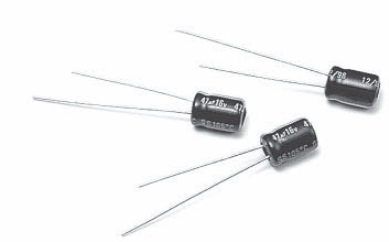
* 2. Size : 6 x 5 Actually is 6.3 x 5

* 3. mA rms at 105°C, 120Hz

Miniature Size Aluminum Electrolytic Capacitors

SS [For Super Miniature]

105°C Single-Ended Lead Aluminum Electrolytic Capacitors



DESCRIPTION

This type is designed to meet the demand or equipments for greatly reduced size and thickness, such as: portable micro computer, disk driver, small calculator and audio equipement.

Application : Portable Micro Computer,
Disk Driver,
Small Calculator and Audio

Multiplier for Ripple Current

Frequency coefficient

Frequency (Hz)	50	120	300	1K	10K
0.1~47μF	0.75	1.00	1.20	1.30	1.50
100~330μF	0.75	1.00	1.10	1.15	1.20

Temperature coefficient

Temperature(°C)	65	85	105
Factor	1.70	1.30	1.00

ELECTRICAL CHARACTERISTICS

Operating Temperature : -40° ~ +105°C

Working Voltage : 6.3 ~ 63V

Rate Capacitance Range : 0.1 ~ 470μF

Capacitance Tolerance : -20 ~ +20%

DC Leakage Current (μA) : I = 0.01CV (μA) or 3μA Whichever is greater.
(After 2 Minutes Application of DC Working Voltage at 25°C)

Dissipation Factor : at 120 Hz, 25°C

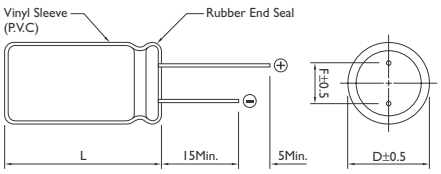
WV (V):	6.3	10	16	25	35	50	63
D.F (%) :	24	20	17	15	12	10	8

Load Life : 1000 Hours at 105°C Assured with Full Rated Maximum Ripple Current Applied
(a) Capacitance Change : Within 20% of Initial Value
(b) Dissipation Factor : Not Exceed 200% of Initial Requirement
(c) Leakage Current : Not Exceed the Initial Requirement

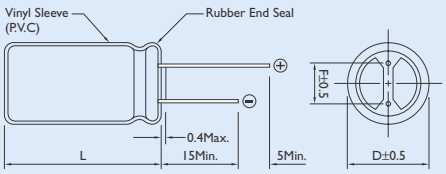
Shelf Life : 500 Hours, No Voltage Applied, at 105°C
(a) Capacitance Change : Within 20% of Initial Value
(b) Dissipation Factor : Not Exceed 200% of Initial Requirement
(c) Leakage Current : Not Exceed 200% of Initial Requirement

DIAGRAM OF DIMENSIONS

Dimensions : mm



Rubber Stand-off



$L \leq 12$ L + 1.5Max.
$13 \leq L \leq 15$ $L^{+1.0}_{-0.5}$
$L \geq 16$ L + 2.0Max.

Dø	F	dø
4.0	1.5	0.45
5.0	2.0	
6.3	2.5	
8.0	3.5	0.5

CASE SIZE & PERMISSIBLE RIPPLE CURRENT OF STANDARD PRODUCTS

CAP. (μF)	RATED VOLTAGE W V													
	6.3		10		16		25		35		50		63	
	Size	Ripple	Size	Ripple	Size	Ripple	Size	Ripple	Size	Ripple	Size	Ripple	Size	Ripple
0.1											4 x 7	1	4 x 7	1
0.22											4 x 7	2	4 x 7	2
0.33											4 x 7	3	4 x 7	4
0.47											4 x 7	5	4 x 7	6
0.68											4 x 7	6		
1.0											4 x 7	10	4 x 7	13
2.2					4 x 7	7					4 x 7	19	4 x 7	21
3.3					4 x 7	13					4 x 7	24	4 x 7	26
4.7					4 x 7	19	4 x 7	24	4 x 7 5 x 7	24 24	4 x 7 5 x 7	29 31	4 x 7 6 x 7	26 33
10			4 x 7		4 x 7	29	4 x 7 5 x 7 6 x 7	33 35 35	4 x 7 5 x 7	34 36	4 x 7 5 x 7 6 x 7	37 45 45	5 x 7 6 x 7	42 50
22	4 x 7	37	4 x 7 5 x7	31 38	4 x 7 5 x 7	36 44	4 x 7 5 x 7 6 x 7	43 51 53	5 x 7 6 x7	48 57	6 x 7	65		
33	5 x 7	42	4 x 7 5 x 7	39 47	4 x 7 5 x 7	50 57	5 x 7 6 x 7	55 55	6 x 7	70				
47	4 x 7 5 x 7	46 55	4 x 7 5 x 7 6 x 7	50 60 60	5 x 7 6 x 7	75 77	5 x 7 6 x 7	67 79	6 x 7	81	8 x 7			
68					5 x 7	84								
100	5 x 7 6 x 7	75 90	5 x 7 6 x 7	85 100	5 x 7 6 x 7	94 110	6 x 7 8 x 7	120 120	8 x 7					
150					6 x 7	120								
220	6 x 7	130	6 x 7	135	8 x 7 8 x 9	140 140								
330	8 x 7	140	8 x 7		8 x 9	155								
470	8 x 7		8 x 9	165										

Note : * 1. D x L : mm

* 2. Size : 6 x 7 Actually is 6.3 x 7

* 3. mA rms at 105°C, 120Hz

Miniature Size Aluminum Electrolytic Capacitors

SK [For General]

85°C Single-Ended Lead Aluminum Electrolytic Capacitors

DESCRIPTION

Lower-cost capacitors expressly intended for high density printed circuit board.

Very High Volumetric Efficiency

Ideally suited for general-purpose applications, decoupling, by pass, and filtering circuit in entertainment electronics.

Feature High CV Product with Moderate Cost

Multiplier for Ripple Current

Frequency coefficient

Frequency (Hz)	120	300	1K	10K~100K
6.3~100V Below~68μF	1.00	1.20	1.30	1.50
6.3~100V 100~680μF	1.00	1.10	1.15	1.20
6.3~110V 1000~22000μF	1.00	1.05	1.10	1.15
160~450V Below~220μF	1.00	1.25	1.40	1.40
160~450V 220μF Above	1.00	1.10	1.13	1.13

Temperature coefficient

Temperature(°C)	50	70	85
Factor	1.30	1.15	1.00

ELECTRICAL CHARACTERISTICS

Operating Temperature : -40° ~ +85°C / -25° ~ +85°C

Working Voltage : 6.3 ~ 100V / 160 ~ 450V

Rate Capacitance Range : 0.1 ~ 22000μF / 0.47 ~ 470μF

Capacitance Tolerance : -20 ~ +20%

DC Leakage Current (μA) : 0.01 CV or 3 μA / 0.03 CV +10 Whichever is greater.
(After 2 Minutes Application of DC Working Voltage at 25°C)

Dissipation Factor : at 120Hz, 25°C

W V (V) :	6.3	10	16	25	35	50	63	100	160 ~ 250	350 ~ 450
D.F (%) :	22	19	16	14	12	10	9	8	15	20

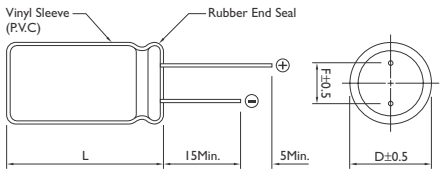
For capacitor whose capacitance exceeds 1000μF. The value of DF(%) is increased by 2% for every addition of 1000μF.

Load Life : 2000 Hours at 85°C Assured with Full Rated Maximum Ripple Current Applied
(a) Capacitance Change : Within 20% of Initial Value
(b) Dissipation Factor : Not Exceed 200% of Initial Requirement
(c) Leakage Current : Not Exceed the Initial Requirement

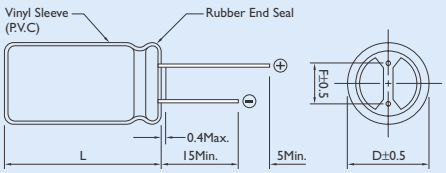
Shelf Life : 1000 Hours, No Voltage Applied at 85°C
(a) Capacitance Change : Within 20% of Initial Value
(b) Dissipation Factor : Not Exceed 200% of Initial Requirement
(c) Leakage Current : Not Exceed 200% of Initial Requirement

DIAGRAM OF DIMENSIONS

Dimensions : mm



Rubber Stand-off



L ≤ 12 L + 1.5Max.
13 ≤ L ≤ 15 $L^{+1.0}_{-0.5}$
L ≥ 16 L + 2.0Max.

Dø	F	dø
4.0	1.5	0.45
5.0	2.0	0.5
6.0	2.5	
8.0	3.5	
10.0	5.0	0.6
12.0		
13.0		
16.0	7.5	0.8
18.0		
22.0	10.0	0.8

CASE SIZE & PERMISSIBLE RIPPLE CURRENT OF STANDARD PRODUCTS

CAP. (μF)	RATED VOLTAGE W V													
	6.3		10		16		25		35		50		63	
	Size	Ripple	Size	Ripple	Size	Ripple	Size	Ripple	Size	Ripple	Size	Ripple	Size	Ripple
0.1											5 x 11	1		
0.22											5 x 11	2		
0.33											5 x 11	3	5 x 11	3
0.47											5 x 11	5	5 x 11	5
0.68											5 x 11	7		
1.0											5 x 11	10	5 x 11	10
2.2											5 x 11	23	5 x 11	29
3.3											5 x 11	35	5 x 11	40
4.7			5 x 11	20	5 x 11	25	5 x 11	30	5 x 11	35	5 x 11	40	5 x 11	45
6.8											5 x 11	50		
10			5 x 11	35	5 x 11	40	5 x 11	50	5 x 11	60	5 x 11	65	5 x 11	70
15					5 x 11	50					5 x 11	80		
22	5 x 11	35	5 x 11	55	5 x 11	75	5 x 11	90	5 x 11	95	5 x 11	100	5 x 11 6 x 11	95 115
33	5 x 11	55	5 x 11	80	5 x 11	110	5 x 11	115	5 x 11	120	5 x 11 6 x 11	105 125	6 x 11 8 x 11	130 140
47	5 x 11	75	5 x 11	95	5 x 11	130	5 x 11	135	5 x 11 6 x 11	120 140	6 x 11 8 x 11	140 150	8 x 11 6 x 11	190 130
68					5x 11	150	5x 11	135						
100	5 x 11	130	5 x 11	180	5 x 11 6 x 11	165 185	6 x 11	160	6 x 11 8 x 11	185 230	8 x 11 10 x 12	230 250	8 x 11 10 x12	190 300
220	5 x 11 6 x 11	200 240	5 x 11	180	6 x 11 8 x 11	260 320	8 x 11 10 x 12	290 340	10 x 12 10 x 15	370 370	10 x 12 10 x 15	380 440	10 x 15 10 x 19	410 490
330	6 x 11 8 x 11	260 300	6 x 11 8 x 11	265 330	6 x 11 8 x 11	290 360	8 x 11 8 x 15 10 x 12	315 380 420	10 x 12 10 x 15	420 490	10 x 15 10 x 19	490 580	10 x 19 13 x 20	540 680
470	6 x 11 8 x 11	330 380	6 x 11 8 x 11	320 440	8 x 11 10 x 12	400 470	8 x 15 10 x 12 10 x 15	420 460 540	10 x 15 10 x 19 13 x 12	430 510 640	10 x 19 13 x 20	610 760	13 x 20 13 x 25 16 x 25	755 880 8820
680	8 x 11	410	10 x 12	460	10 x 12 10 x 15	510 565	10 x 15 10 x 19	540 595	13 x 20 13 x 25	705 780			13 x 25	965
1000	8 x 11 10 x 12	460 580	10 x 12 10 x 15	580 630	10 x 15 10 x 19	630 790	10 x 19 12 x 16 13 x 20	760 760 950	13 x 20 13 x 25	950 1100	13 x 25 16 x 25	1100 1350	16 x 25 16 x 32	1310 1550
1500			10 x 19	700					16 x 25	1240			18 x 36	2090
2200	10 x 19 13 x 20	840 1050	10 x 19 13 x 20	880 1100	10 x 25 13 x 25	925 1350	13 x 25 16 x 25 18 x 20	1300 1550 1550	16 x 25 16 x 32	1600 1800	16 x 36 18 x 36	1850 2090	18 x 40 22 x 35	2200 2200
3300	10 x 19	1000	13 x 20	1250	13 x 25 16 x 25	1400 1700	16 x 25 16 x 32	1660 1950	16 x 36 18 x 36	1970 2220	18 x 36 18 x 40	2170 2400	22 x 40	2500
4700	13 x 20	1300	13 x 25 16 x 25	1500 1800	16 x 25 16 x 32	1800 2100	16 x 32 18 x 36	1950 2360	18 x 36	2400	22 x 35 22 x 40	2240 2500		
6800	16 x 25	1900	16 x 25 16 x 32	1900 2150	16 x 32 16 x 36 18 x 36	1980 2200 2500	18 x 36	2550	22 x 40	2600				
10000	16 x 25 16 x 32	1900 2250	18 x 36	2500	18 x 36	2700	22 x 40	2800						
15000	16 x 36	2500	18 x 36	2950	22 x 40	3150	22 x 40	3200						
22000	18 x 40	3650	22 x 40	3700	22 x 40	3800								

Note : * 1. D x L : mm

* 2. mA rms at 85°C, 120Hz

CASE SIZE & PERMISSIBLE RIPPLE CURRENT OF STANDARD PRODUCTS

CAP. (μF)	RATED VOLTAGE W V													
	100		160		200		250		350		400		450	
	Size	Ripple	Size	Ripple	Size	Ripple	Size	Ripple	Size	Ripple	Size	Ripple	Size	Ripple
0.22	5 x 11	5												
0.47	5 x 11	10	5 x 11	12	5 x 11	14	5 x 11	14	5 x 11	14	6 x 11	14	6 x 11	14
1.0	5 x 11	21	5 x 11 6 x 11	17 17	5 x 11	19	5 x 11 6 x 11	17 19	6 x 11	19	6 x 11 8 x 11	16 19	8 x 11	19
2.2	5 x 11	30	6 x 11	26	6 x 11 8 x 11	22 27	6 x 11 8 x 11	24 30	8 x 11 10 x 10	33 33	8 x 11 10 x 12	26 33	10 x 12	33
3.3	5 x 11	45	6 x 11 8 x 11	30 35	6 x 11 8 x 11	30 37	8 x 11 10 x 12	30 38	8 x 11 10 x 12	33 39	10 x 12	40	10 x 15	42
4.7	5 x 11	50	6 x 11 8 x 11	32 40	8 x 11 10 x 12	36 45	8 x 11 10 x 12	36 45	10 x 12 10 x 15	39 45	8 x 15 10 x 15	33 45	10 x 15 10 x 19	50 50
6.8	5 x 11	55					8 x 11 10 x 12	40 50					10 x 15 10 x 19	50 56
10	5 x 11 6 x 11	65 75	8 x 11 10 x 12 10 x 15	50 65 65	10 x 12 10 x 15	57 70	10 x 15 10 x 19	70 70	10 x 15 10 x 19 13 x 20	70 70 70	10 x 15 10 x 19 13 x 20	50 56 70	10 x 19 13 x 20 13 x 25	56 60 75
15	8 x 11	93					10 x 19 13 x 20	75 90	10 x 19	90				
22	6 x 11 8 x 11	105 130	10 x 15 10 x 19	110 110	10 x 15	120	10 x 19	130	13 x 20	130	13 x 20 13 x 25 16 x 25	100 110 130	16 x 20 16 x 25 16 x 32	100 110 130
33	8 x 11 10 x 12	140 170	10 x 19	150	10 x 19	150	13 x 20 13 x 25	140 160	13 x 25 16 x 25	170 170	13 x 25 16 x 20 16 x 25	140 145 170	16 x 25 16 x 32 16 x 36	145 160 180
47	10 x 12 10 x 15	190 230	12 x 16 12 x 25 13 x 20	145 180 180	13 x 20 13 x 25	160 190	13 x 25 16 x 25	210 210	16 x 25	220	16 x 25 16 x 32 16 x 36	180 220 220	18 x 36 18 x 40	200 230
68	10 x 15	280			13 x 25	230	16 x 25	210			16 x 32	220	18 x 32	265
100	10 x 19	400	13 x 25 16 x 25	250 300	16 x 25	330	16 x 32	310	16 x 36 18 x 36	320 360	18 x 36 18 x 32	360 360	22 x 40	370
150	13 x 20	500					18 x 40	410			18 x 40	410		
220	13 x 25	710	16 x 32 16 x 36	450 510	18 x 25 18 x 32 18 x 36	485 540 600	18 x 36 18 x 40	540 600						
330	13 x 25 16 x 25	720 860	18 x 36 18 x 40	540 600	16 x 40 16 x 45 18 x 32 18 x 36 18 x 40	710 750 685 725 800	18 x 40	600						
470	13 x 40 16 x 25 16 x 32	1100 1100 1100	22 x 40	900	18 x 40 22 x 35	750 1000								
680	16 x 36	1260												
1000	18 x 40 22 x 35	1350 1680												
2200	22 x 40	2300												

Note : * 1. D x L : mm

* 2. mA rms at 85°C, 120Hz

SE-K [For General]

105°C Single-Ended Lead Aluminum Electrolytic Capacitors Rated Voltage up to 450V

Miniature Size Aluminum Electrolytic Capacitors

ELECTRICAL CHARACTERISTICS

Operating Temperature : -40° ~ +105°C / -25° ~ +105°C

Working Voltage : 6.3 ~ 250V / 350 ~ 450V

Rate Capacitance Range : 0.47 ~ 15000μF / 0.47 ~ 150μF

Capacitance Tolerance : -20 ~ +20%

DC Leakage Current (μA) : I = 0.01CV + 3 / 0.03CV + 10
(After 2 Minutes Application of DC Working Voltage at 25°C)

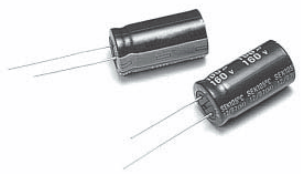
Dissipation Factor : at 120 Hz, 25°C

WV (V):	6.3	10	16	25	35	50	63	80	100	160 ~ 250	350 ~ 450
D.F (%) :	26	22	18	16	14	12	10	10	10	15	20

For capacitor whose capacitance excceds 1000 μF. The value of DF(%) is increased by 2% for every addition of 1000 μF.

Load Life : 1000 Hours at Assured with Full Rated Maximum Ripple Current Applied
(a) Capacitance Change : Within 20% of Initial Value
(b) Dissipation Factor : Not Exceed 200% of Initial Requirement
(c) Leakage Current : Not Exceed the Initial Requirement

Shelf Life : 500 Hours, No Voltage Applied
(a) Capacitance Change : Within 20% of Initial Value
(b) Dissipation Factor : Not Exceed 200% of Initial Requirement
(c) Leakage Current : Not Exceed 200% of Initial Requirement



DESCRIPTION

Lower-cost capacitors expressly intended for high density printed circuit board.

Very High Volumetric Efficiency

Ideally suited for general-purpose applications, coupling, decoupling, by pass, and filtering circuit in entertainment electronics.

Feature High CV Product with Moderate Cost

Multiplier for Ripple Current

Frequency coefficient

Frequency (Hz)	120	300	1K	10K~100K
6.3~100V Below~68μF	1.00	1.20	1.30	1.45
6.3~100V 100~680μF	1.00	1.10	1.15	1.25
6.3~110V 1000~22000μF	1.00	1.05	1.10	1.15
160~450V ALL Cap(μF)	1.00	1.05	1.10	1.50

Temperature coefficient

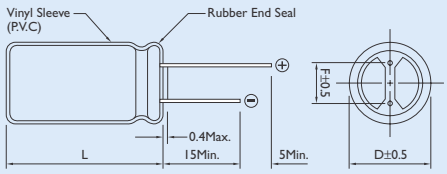
Temperature(°C)	65	85	105
Factor	1.80	1.40	1.00

DIAGRAM OF DIMENSIONS

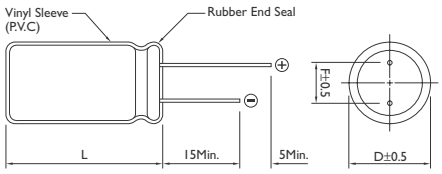
Dimensions : mm

Dø	F	dø
4.0	1.5	0.45
5.0	2.0	0.5
6.0	2.5	
8.0	3.5	
10.0	5.0	0.6
12.0		
13.0		
16.0	7.5	0.8
18.0		
22.0	10.0	0.8

Rubber Stand-off



$L \leq 12$ L + 1.5Max.
$13 \leq L \leq 15$ $L^{+1.0}_{-0.5}$
$L \geq 16$ L + 2.0Max.



CASE SIZE & PERMISSIBLE RIPPLE CURRENT OF STANDARD PRODUCTS

CAP. (μF)	RATED VOLTAGE W V													
	6.3		10		16		25		35		50		63	
	Size	Ripple	Size	Ripple	Size	Ripple	Size	Ripple	Size	Ripple	Size	Ripple	Size	Ripple
0.47											5 x 11	7	5 x 11	8
1.0											5 x 11	12	5 x 11	13
2.2											5 x 11	18	5 x 11	20
3.3											5 x 11	25	5 x 11	27
4.7							5 x 11	20	5 x 11	25	5 x 11	30	5 x 11	34
6.8							5 x 11	25	5 x 11	30	5 x 11	32	5 x 11	37
10					5 x 11	25	5 x 11	30	5 x 11	40	5 x 11	50	5 x 11	55
15					5 x 11	40	5 x 11	45	5 x 11	50	5 x 11	60	5 x 11	65
22			5 x 11	45	5 x 11	55	5 x 11	60	5 x 11	65	5 x 11	75	6 x 11	90
33			5 x 11	60	5 x 11	70	5 x 11	75	5 x 11	85	6 x 11	105	6 x 11 8 x 11	110 120
47	5 x 11	60	5 x 11	75	5 x 11	85	5 x 11	90	5 x 11 6 x 11	95 115	6 x 11 8 x 11	100 125	8 x 11	155
68	5 x 11	75	5 x 11	80	5 x 11	100	6 x 11	125	8 x 11	130	8 x 11	159	10 x 12	198
100	5 x 11	100	5 x 11	110	5 x 11 6 x 11	110 135	6 x 11	145	6 x 11 8 x 11	150 190	8 x 11 10 x 12	160 210	8 x 15 10 x12	230 260
150	5 x 11	120	5 x 11 6 x 11	110 130	8 x 11	180	8 x 11	200	10 x 12	240	10 x 12	289	10 x 15	330
220	5 x 11 6 x 11	140 165	6 x 11	180	6 x 11 8 x 11	180 235	8 x 11 10 x 12	200 250	8 x 11 8 x 15 10 x 12	230 280 315	10 x 12 10 x 15	340 400	10 x 15 10 x 19	400 460
330	6 x 11 8 x 11	160 200	6 x 11 8 x 11	205 255	8 x 11	285	8 x 11 8 x 15 10 x 12	265 320 355	8 x 15 8 x 20 10 x 12 10 x 15	345 420 380 440	10 x 15 10 X 19	450 535	10 x 19 13 X20	520 650
470	6 x 11 8 x 11	220 280	6 x 11 8 x 11	245 305	8 x 11 8 x 15 10 x 12	310 360 395	8 x 15 10 x 12 10 x 15	365 400 470	10 x 15 10 x 19 13 x 20	415 490 580	10 x 19 13 x 20	580 730	13 x 20 13 x 25	700 800
680	8 x 11 10 x 12	255 320	8 x 11 8 x 15 10 x 12	335 385 420	10 x 12 10 x 15	455 530	10 x 19	650	13 x 20	730	13 x 25	860	13 x 25 16 x 25	840 1000
1000	8 x 11 10 x 12	370 470	8 x 11 8 x 15 10 x 12 10 x 15	390 450 490 570	8 x 20 10 x 15 10 x 19	600 590 700	10 x 19 12 x 20 13 x 20	680 775 855	13 x 20 13 x 25	850 995	13 x 25 16 x 25	930 1110	16 x 25 16 x 32	1020 1200
1500	10 x 15	600	10 x 19	750	10 x 19 13 x 20	680 860	13 x 25	1020	13 x 25 16 x 25	935 1110	16 x 32	1350	16 x 32 16 x 36	1300 1450
2200	10 x 19 13 x 20	740 930	10 x 19 13 x 20	800 1010	10 x 25 12 x 25 13 x 20 13 x 25	895 1040 990 1150	13 x 25 16 x 25	1030 1230	16 x 25 16 x 32	1230 1450	16 x 36 18 x 36	1360 1530	18 x 36	1455
3300	10 x 19 13 x 20	880 1100	10 x 25 10 x 30 13 x 20 13 x 25	950 1090 1050 1220	13 x 25 16 x 25	1140 1350	13 x 25 16 x 25 16 x 32	1035 1230 1450	16 x 36 18 x 36	1470 1660	18 x 36 18 x 40	1540 1700		
4700	13 x 25 16 x 25	1100 1320	13 x 25 16 x 25	1190 1410	16 x 25 16 x 32	1330 1560	16 x 32 18 x 36	1420 1690	18 x 36 18 x 40	1580 1750	22 x 35	1900		
6800	13 x 25 16 x 25	1250 1490	16 x 25 16 x 32	1370 1610	16 x 36 16 x 40 18 x 36	1590 1670 1790	18 x 36	1850	22 x 40	1885				
10000	16 x 25 16 x 32	1560 1830	16 x 36 18 x 36	1760 1980	18 x 36	2100								
15000	18 x 36	2280	18 x 40	1960										

Note : * 1. D x L : mm

* 2. mA rms at 85°C, 120Hz

CASE SIZE & PERMISSIBLE RIPPLE CURRENT OF STANDARD PRODUCTS

CAP. (μF)	RATED VOLTAGE W V													
	100		160		200		250		350		400		450	
	Size	Ripple	Size	Ripple	Size	Ripple	Size	Ripple	Size	Ripple	Size	Ripple	Size	Ripple
0.47	5 x 11	10	5 x 11	12	5 x 11	14	5 x 11	14	5 x 11	14	6 x 11	14	6 x 11	14
1.0	5 x 11	15	5 x 11	17	5 x 11	19	6 x 11	19	6 x 11	20	6 x 11 8 x 11	16 20	8 x 11	20
2.2	5 x 11	22	6 x 11	25	6 x 11 8 x 11	22 28	6 x 11 8 x 11	23 29	8 x 11	35	8 x 11 10 x 12	28 35	10 x 12	35
3.3	5 x 11	29	6 x 11 8 x 11	30 36	6 x 11 8 x 11	32 40	8 x 11 10 x 12	33 42	8 x 11 10 x 12	37 47	8 x 11 10 x 12	38 50	10 x 15	54
4.7	5 x 11	37	6 x 11 8 x 11	34 43	8 x 11 10 x 12	40 50	8 x 11 10 x 12	41 52	10 x 12 10 x 15	47 55	8 x 15 10 x 12 10 x 15	45 49 57	10 x 15	60
6.8	5 x 11	46	10 x 12	54	10 x 12	60	8 x 15 10 x 12	57 62	10 x 15	65	10 x 15 10 x 19	60 72	10 x 19	80
10	5 x 11 6 x 11	55 65	8 x 11 10 x 12	56 70	10 x 12 10 x 15	69 80	10 x 15	88	10 x 15	95	10 x 15 10 x 19 13 x 20	65 77 97	13 x 20 13 x 25	85 100
15	8 x 11	82	10 x 15	90	10 x 15	110	10 x 15	120	10 x 19	140	10 x 19 13 x 20 13 x 25	100 125 150	16 x 25	160
22	8 x 11	115	8 x 20 10 x 15	125 130	10 x 15	140	10 x 19	155	13 x 20	165	13 x 20 13 x 25	150 175	13 x 25 16 x 25 16 x 32	125 150 180
33	8 x 11 10 x 12	120 160	10 x 19	180	10 x 19	190	13 x 20 13 x 25	170 200	13 x 25	220	13 x 25 16 x 20 16 x 25	190 195 230	16 x 25 16 x 36	190 240
47	10 x 12 10 x 15	180 210	13 x 20	270	13 x 20 13 x 25	240 290	13 x 25	330	16 x 25	340	16 x 25 16 x 32 16 x 36 18 x 20 18 x 25	280 315 350 275 300	16 x 36 18 x 40	300 360
68	10 x 15	241	13 x 25	300	13 x 25	330	16 x 25	350	16 x 32	370	16 x 32 16 x 36 18 x 25 18 x 36	320 335 305 380	18 x 32 22 x 40	305 400
100	10 x 19	385	13 x 25 16 x 25	330 400	13 x 25 16 x 25	340 410	16 x 32	430	18 x 36	460	16 x 36 18 x 32 18 x 36	425 430 480		
120											18 x 36	480		
150	13 x 25	414	16 x 32	435	16 x 36	450	18 x 40	460	22 x 40	480	22 x 40	450		
220	13 x 25	590	16 x 32 16 x 36	550 620	18 x 32 18 x 36 18 x 40	520 580 650	22 x 40	680						
330	13 x 25 16 x 25	600 720	18 x 36 18 x 40	770 850	18 x 36 18 x 40 22 x 40	705 780 920								
470	16 x 25 16 x 32	740 875	22 x 40	980										
680	16 x 36	1200												
1000	18 x 40 22 x 40	1340 1500												

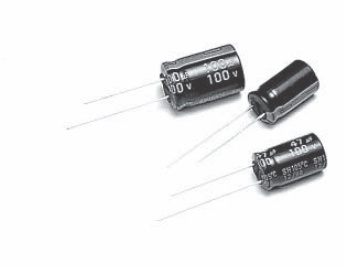
Note : * 1. D x L : mm

* 2. mA rms at 105°C, 120Hz

Miniature Size Aluminum Electrolytic Capacitors

SH [For General]

105°C Single-Ended Lead Aluminum Electrolytic Capacitors for the Rated Voltage up to 450V



DESCRIPTION

Long life for 2,000 hours at 105°C, ideally suited for high quality and high reliability applications.

Feature High CV Product

Multiplier for Ripple Current

Frequency coefficient

Frequency (Hz)	120	300	1K	10K~100K
6.3~100V Below~68μF	1.00	1.30	1.57	2.00
6.3~100V 100~470μF	1.00	1.23	1.34	1.50
6.3~100V 471~22000μF	1.00	1.10	1.13	1.15
160~450V ALL Cap(μF)	1.00	1.25	1.40	1.60

Temperature coefficient

Temperature(°C)	65	85	105
Factor	1.70	1.40	1.00

ELECTRICAL CHARACTERISTICS

Operating Temperature : -40° ~ +105°C / -25° ~ +105°C

Working Voltage : 6.3 ~ 100V / 160 ~ 450V

Rate Capacitance Range : 0.47 ~ 15000μF / 0.47 ~ 470μF

Capacitance Tolerance : -20 ~ +20%

DC Leakage Current (μA) : 0.01CV +3 / 0.03CV+10
(After 2 Minutes Application of DC Working Voltage at 25°C)

Dissipation Factor : at 120 Hz, 25°C

WV (V) :	6.3	10	16	25	35	50	63 ~ 100	160 ~ 250	350 ~ 450
D.F (%) :	26	22	18	16	14	12	10	15	20

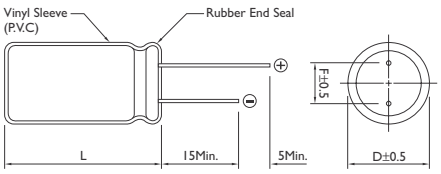
For capacitor whose capacitance excceds 1000μF. The value of DF(%) is increased by 2% for every addition of 1000μF.

WV (V) :		6.3	10	16	25	35 ~ 100	160 ~ 250	350 ~ 450
Impedance :	Z - 25°C / Z + 25°C	4	3	2	2	2	4	4
	Z - 40°C / Z + 20°C	8	6	4	3	3	6	8

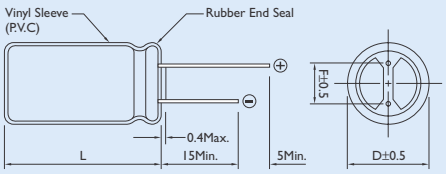
Load Life : 2000 Hours at 105°C Assured with Full Rated Maximum Ripple Current Applied
(a) Capacitance Change : Within 20% of Initial Value
(b) Dissipation Factor : Not Exceed 200% of Initial Requirement
(c) Leakage Current : Not Exceed the Initial Requirement

Shelf Life : 1000 Hours, No Voltage Applied
(a) Capacitance Change : Within 20% of Initial Value
(b) Dissipation Factor : Not Exceed 200% of Initial Requirement
(c) Leakage Current : Not Exceed 200% of Initial Requirement

DIAGRAM OF DIMENSIONS



Rubber Stand-off



L ≤ 12 L + 1.5Max.
13 ≤ L ≤ 15 $L^{+1.0}_{-0.5}$
L ≥ 16 L + 2.0Max.

Dimensions : mm

Dø	F	dø
4.0	1.5	0.45
5.0	2.0	0.5
6.0	2.5	
8.0	3.5	
10.0	5.0	0.6
12.0		
13.0		
16.0	7.5	0.8
18.0		
22.0	10.0	0.8

CASE SIZE & PERMISSIBLE RIPPLE CURRENT OF STANDARD PRODUCTS

CAP. (μF)	RATED VOLTAGE W V													
	6.3		10		16		25		35		50		63	
	Size	Ripple	Size	Ripple	Size	Ripple	Size	Ripple	Size	Ripple	Size	Ripple	Size	Ripple
0.47											5 x 11	7	5 x 11	8
1.0											5 x 11	12	5 x 11	12
2.2											5 x 11	18	5 x 11	20
3.3											5 x 11	25	5 x 11	27
4.7											5 x 11	30	5 x 11	34
6.8											5 x 11	30	5 x 11	37
10									5 x 11	44	5 x 11	50	5 x 11	55
15									5 x 11	50	5 x 11	50	5 x 11	65
22							5 x 11	60	5 x 11	65	5 x 11	75	6 x 11	90
33					5 x 11	70	5 x 11	75	5 x 11	85	6 x 11	105	8 x 11	110
47			5 x 11	75	5 x 11	85	5 x 11	90	6 x 1	115	8 x 11	125	8 x 11	155
68			5 x 11	80	5 x 11	100	6 x 11	125	8 x 11	130	8 x 11	159	10 x 12	198
100	5 x 11	100	5 x 11	110	6 x 11	135	6 x 11	145	8 x 11	190	10 x 12	210	10 x 12	260
150	5 x 11	120	6 x 11	130	8 x 11	180	8 x 11	200	10 x 12	240	10 x 12	289	10 x 15	330
220	6 x 11	165	6 x 11	180	6 x 11 8 x 11	180 235	10 x 12	250	10 x 12	315	10 x 15	400	10 x 19	465
330	8 x 11	200	8 x 11	255	10 x 12	285	10 x 12	355	10 x15	440	10 x 19	535	13 x 20	650
470	8 x 11	280	8 x 11	305	8 x 11 10 x 12	315 395	10 x 15	470	10 x 19 13 x 20	460 580	13 x 20	730	13 x 25	800
680	10 x 12	320	10 x 12	420	10 x 15	530	10 x 19	650	13 x 20	730	13 x 25	860	16 x 25	1000
1000	10 x 12	470	10 x 12 10 x 15	490 570	10 x 19	700	13 x 20	855	13 x 25	995	16 x 25	1110	16 x 32	1200
1500	10 x 15	600	10 x 19	750	13 x 20	860	13 x 25	1020	16 x 25	1110	16 x 32	1350	18 x 40	1450
2200	13 x 20	930	10 x 19 13 x 20	800 1010	13 x 25	1150	16 x 25	1230	16 x 32	1450	18 x 36	1530		
3300	13 x 20	1100	13 x 25	1220	16 x 25	1350	16 x 32	1450	18 x 36	1660				
4700	16 x 25	1320	16 x 25	1410	16 x 25 16 x 32	1330 1560	18 x 36	1690						
6800	16 x 25	1490	16 x 32	1610	18 x 36	1790								
10000	16 x 32	1830	18 x 36	1980										
15000	18 x 36	2280												

Note : * 1. D x L : mm

* 2. mA rms at 105°C, 120Hz

CASE SIZE & PERMISSIBLE RIPPLE CURRENT OF STANDARD PRODUCTS

CAP. (μF)	RATED VOLTAGE W V													
	100		160		200		250		350		400		450	
	Size	Ripple	Size	Ripple	Size	Ripple	Size	Ripple	Size	Ripple	Size	Ripple	Size	Ripple
0.47	5 x 11	10	5 x 11	12	5 x 11	12	5 x 11	12	6 x 11	14	6 x 11	14	6 x 11	16
1.0	5 x 11	15	5 x 11	17	6 x 11	17	6 x 11	17	8 x 11	20	8 x 11	20	8 x 11	22
2.2	5 x 11	22	6 x 11	25	6 x 11	25	8 x 11	29	10 x 12	35	10 x 12	35	10 x 12	37
3.3	5 x 11	29	8 x 11	36	8 x 11	36	10 x 12	42	10 x 15	47	10 x 12 10 x 15	42 49	10 x 15	51
4.7	5 x 11	37	8 x 11	43	10 x 12	50	10 x 12	52	10 x 15	55	10 x 15	57	10 x 15	59
6.8	5 x 11	46	10 x 12	54	10 x 12	60	10 x 12	62	10 x 19	65	10 x 15	67	13 x 20	69
10	6 x 11	65	10 x 12	70	10 x 15	80	10 x 15 10 x 19	75 88	13 x 20	95	10 x 19 13 x 20	75 97	13 x 25	99
15	8 x 11	82	10 x 15	90	10 x 19	110	13 x 20	120	13 x 20	140	13 x 25	145	16 x 25	150
22	8 x 11	115	10 x 15	130	10 x 15	140	13 x 20 13 x 25	130 155	16 x 25	165	13 x20 13 x 25 16 x 25	120 140 170	16 x 25 16 x 32	145 175
33	10 x 12	160	13 x 20	180	13 x 20 13 x 25	160 190	13 x 25	200	16 x 32	195	16 x 25 16 x 32	190 230	18 x 36	250
47	10 x 15	210	13 x 25	250	13 x 20 13 x 25	220 260	16 x 25	270	16 x 36 18 x 36	210 240	16 x 25 16 x 32 18 x 36	200 250 300	18 x 40	350
68	10 x 15	241	13 x 25	270	16 x 25	280	16 x 32	300	16 x 36	320	18 x 36	325	22 x 40	380
100	10 x 19 13 x 20	305 385	16 x25	390	16 x 32	400	18 x 36	440	18 x 40 22 x 40	300 360	18 x 36 22 x 40	290 365		
120											18 x 36 18 x40	320 350		
150	13 x 25	414	16 x 32	435	16 x 36	450	18 x 40	600	22 x 40	480	22 x 40	465		
220	13 x 25 16 x 25	495 590	16 x36	700	18 x 36 18 x 40	675 750	22 x 40	800						
330	16 x 25	720	18 x 40	850	18 x 40 22 x 40	780 920								
470	16 x 32	875	22 x 40	980										
680	16 x 36	1200												

Note : * 1. D x L : mm

* 2. mA rms at105°C, 120Hz

SG [Electronic Ballast]

105°C Single-Ended Lead Aluminum Electrolytic Capacitors

Miniature Size Aluminum Electrolytic Capacitors

ELECTRICAL CHARACTERISTICS

Operating Temperature : -40 ~ +105°C / -25 ~ +105°C

Working Voltage : 160 ~ 400V / 450V

Rate Capacitance Range : 4.7 ~ 330μF / 3.3~100μF

Capacitance Tolerance : -20 ~ +20%

DC Leakage Current (μA) : I = 0.06 CV + 10
(After 2 Minute Application of DC Working Voltage at 25°C)

Dissipation Factor : at 120 Hz, 25°C

WV (V) :	160	200	250	350	400	450
D.F (%) :	15	15	15	20	24	24

For capacitor whose capacitance exceeds 1000μF. The value of D.F(%) is increased by 2% for every addition of 1000μF.

Load Life : 5000 Hours at Assured with Full Rated Maximum Ripple Current Applied

(a) Capacitance Change : Within 20% of Initial Value

(b) Dissipation Factor : Not Exceed 200% of Initial Requirement

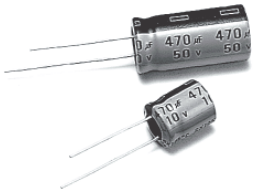
(c) Leakage Current : Not Exceed the Initial Requirement

Shelf Life : Hours, No Voltage Applied

(a) Capacitance Change : Within 20% of Initial Value

(b) Dissipation Factor : Not Exceed 200 % of Initial Requirement

(c) Leakage Current : Not Exceed 200% of Initial Requirement



Multiplier for Ripple Current

Frequency coefficient

Frequency (Hz)	50,60	120	300	1K	10K~100K
6.3~100V Below~68μF	0.80	1.00	1.20	1.40	1.6

Temperature coefficient

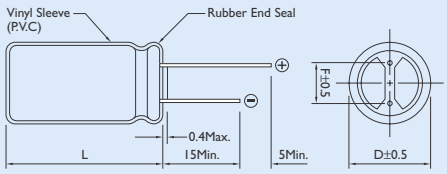
Temperature(°C)	65	85	105
Factor	1.70	1.40	1.00

DIAGRAM OF DIMENSIONS

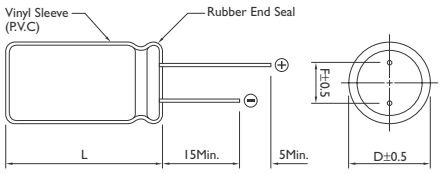
Dimensions : mm

Dø	F	dø
4.0	1.5	0.45
5.0	2.0	0.5
6.0	2.5	
8.0	3.5	
10.0	5.0	0.6
12.0		
13.0		
16.0	7.5	0.8
18.0		
22.0	10.0	0.8

Rubber Stand-off



$L \le 12$ L + 1.5Max.
$13 \le L \le 15$ $L^{+1.0}_{-0.5}$
$L \ge 16$ L + 2.0Max.



CASE SIZE OF STANDARD PRODUCTS

CAP. (μF)	RATED VOLTAGE								
	160			200			250		
	SIZE	Ripple	Impedance	SIZE	Ripple	Impedance	SIZE	Ripple	Impedance
10				*10 x 15	100	2.50	*10 x 15	85	4.10
							10 x 19	100	3.50
15				*10 x 15	80	5.00			
22	10 x 19	160	1.52	10 x 19	160	1.50	*10 x 25	145	2.75
							13 x 20	160	2.50
33	10 x 19	210	1.30	*10 x 19	160	1.20	13 x 20	210	1.90
				13 x 20	210	0.95			
47	13 x 20	260	0.95	13 x 20	260	0.91	13 x 25	270	1.70
							16 x 20	275	1.50
68	13 x 25	360	0.60	13 x 25	360	0.60	16 x 25	380	0.80
	16 x 20	430	0.55	16 x 20	430	0.55	18 x 20	375	0.90
100	16 x 25	475	0.30	16 x 25	475	0.30	16 x 32	520	0.65
	18 x 20	465	0.31	18 x 20	465	0.31	18 x 25	500	0.65
150	16 x 32	650	0.22	18 x 25	650	0.27	18 x 32	650	0.45
	18 x 25	625	0.24						
220	16 x 32	750	0.22	18 x 32	780	0.22	18 x 40	820	0.35
	18 x 25	725	0.24						
330	18 x 32	960	0.22						

Note : * 1. D x L : mm

* 2. mA rms at 105°C, 100KHz

* 3. Impedance Spec :100KHz / 25°C (Ω MAX)

* 4. Down Size : 3000Hrs

CASE SIZE OF STANDARD PRODUCTS

CAP. (μF)	RATED VOLTAGE								
	350			400			450		
	SIZE	Ripple	Impedance	SIZE	Ripple	Impedance	SIZE	Ripple	Impedance
3.3							10 x 19	60	6.50
4.7				*10 x 15	60	3.50	13 x 20	80	3.60
6.8				*10 x 15	72	3.40	*10 x 19	90	3.40
10	10 x 19	100	3.00	10 x 19	100	2.90	13 x 20	110	3.00
22	13 x 20	160	2.10	13 x 25	170	1.35	16 x 25	190	1.80
				16 x 20	200	1.00	18 x 20	200	2.20
33	13 x 25	230	1.00	16 x 25	230	0.95	16 x 32	275	1.30
	16 x 20	250	0.91	18 x 20	250	0.91	18 x 25	280	1.20
47	16 x 25	300	0.75	16 x 32	300	0.75	18 x 32	340	1.00
	18 x 20	315	0.80	18 x 25	325	0.80			
68	16 x 32	400	0.50	18 x 36	420	0.49	18 x 40	460	0.80
	18 x 25	380	0.55						
100	18 x 32	530	0.40	18 x 40	545	0.34	22 x 40	580	0.60
150				22 x 40	650	0.30			

Note : * 1. D x L : mm

* 2. mA rms at 105°C, 100KHz

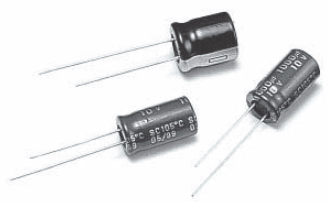
* 3. Impedance Spec :100KHz / 25°C (Ω MAX)

* 4. Down Size : 3000Hrs

Miniature Size Aluminum Electrolytic Capacitors

SA [High Ripple Current and Long load life]

105°C Single-Ended Lead Aluminum Electrolytic Capacitors



DESCRIPTION

High Temperature Load Life at 105°C for 3000~8000 Hours

Frequency coefficient

Rated voltage(V)	Cap(μF) \ Freq.(Hz)	50	120	300	1K	10K-
6.3~100V	-47	0.75	1.00	1.35	1.57	2.00
	100~470	0.80	1.00	1.23	1.34	1.50
	≥560	0.85	1.00	1.10	1.13	1.15
160~450	0.47~220	0.80	1.00	1.25	1.40	1.60
	≥270	0.90	1.00	1.10	1.13	1.15

Temperature coefficient

Temperature(°C)	~55	60	70	85	105
Factor	2.23	2.17	2.00	1.75	1.00

ELECTRICAL CHARACTERISTICS

Operating Temperature : -40° ~ +105°C -25° ~ +105°C

Working Voltage : 6.3 ~ 100V 160 ~ 450V

Rate Capacitance Range : 0.1 ~ 22000μF

Capacitance Tolerance : -20 ~ +20%

DC Leakage Current (μA) : I ≤ 0.03 CV or 4(μA) after 1 minute , I ≤ 0.04 CV +40(μA) after 1 minute
(Measurements shall be Made After a 1 Minute Charge at Rated Working Voltage)

Dissipation Factor : at 120 Hz, 25°C

WV (V) :	6.3	10	16	25	35	50	63	100	160	200	250	315	400	450
D.F (%) :	28	24	20	16	14	12	10	8	20	20	20	25	25	25

For capacitor whose capacitance exceeds 1000μF. The value of D.F(%) is increased by 2% for every addition of 1000μF.

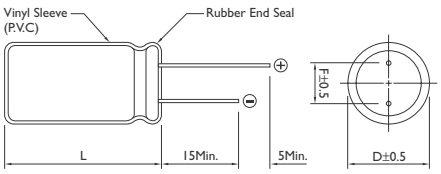
WV (V) :	6.3	10	16	25	35	50	63	100
Impedance : Z - 25°C / Z + 20°C	5	4	3	2	2	2	2	2
Impedance : Z - 40°C / Z + 20°C	12	10	8	5	4	3	3	3

WV (V) :	160	200	250	350	400	450
Impedance : Z - 25°C / Z + 20°C	3	3	4	4	6	15

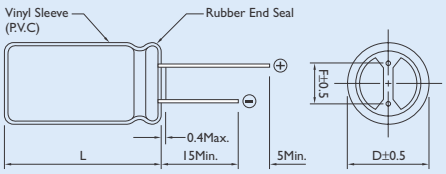
Load Life : At 105°C Assured with Full Rated Maximum Ripple Current Applied
ø5~ø6=3000 hours.
ø8~ø10=5000 hours.
>ø12=8000 hours.
(a) Capacitance Change : Within 20% of Initial Value
(b) Dissipatijon Factor : Not Exceed 200% of Initial Requirement
(c) Leakage Current : Not Exceed the Initial Requirement

Shelf Life : 1000 Hours, No Voltage Applied, at 105°C
(a) Capacitance Change : Within 20% of Initial Value
(b) Dissipation Factor : Not Exceed 200 % of Initial Requirement
(c) Leakage Current : Not Exceed 200% of Initial Requirement

DIAGRAM OF DIMENSIONS



Rubber Stand-off



L ≤ 12 L + 1.5Max.
13 ≤ L ≤ 15 $L^{+1.0}_{-0.5}$
L ≥ 16 L + 2.0Max.

Dimensions : mm

Dø	F	dø
4.0	1.5	0.45
5.0	2.0	0.5
6.0	2.5	
8.0	3.5	
10.0	5.0	0.6
12.0		
13.0		
16.0	7.5	0.8
18.0		
22.0	10.0	0.8

CASE SIZE OF STANDARD PRODUCTS Dø ≥ 6mm with Safety Vent at Can Bottom

CAP. (μF)	RATED VOLTAGE W V									
	6.3		10		16		25		35	
	Size	Ripple	Size	Ripple	Size	Ripple	Size	Ripple	Size	Ripple
0.1										
0.22										
0.33										
0.47										
1										
2.2										
3.3										
4.7							5 x 11	18	5 x 11	21
10					5 x 11	24	5 x 11	30	5 x 11	33
22	5 x 11	21	5 x 11	33	5 x 11	45	5 x 11	48	5 x 11	51
33	5 x 11	33	5 x 11	48	5 x 11	54	5 x 11	57	5 x 11	63
47	5 x 11	45	5 x 11	57	5 x 11	66	5 x 11	69	6 x 11	84
100	5 x 11	78	5 x 11	87	6 x 11	105	6 x 11	111	8 x 11	138
220	6 x 11	129	6 x 11	138	8 x 11	180	8 x 11	192	10 x 12	222
330	6 x 11	159	8 x 11	198	8 x 11	216	10 x 12	252	10 x 15	294
470	8 x 11	216	8 x 11	234	10 x 12	282	10 x 15	324	10 x 19	384
1000	10 x 12	342	10 x 15	378	10 x 19	474	12 x 20	570	13 x 25	660
2200	13 x 20	630	13 x 20	660	13 x 25	810	16 x 25	730	16 x 32	708
3300	13 x 20	750	13 x 25	840	16 x 25	1020	16 x 32	1170	18 x 36 22 x 30	1330 1330
4700	16 x 25	1020	16 x 25	1080	16 x 32	260	18 x 36 22 x 30	1410 1410	18 x 40 22 x 35	1490 1470
6800	16 x 25	1140	16 x 32	1290	18 x 36 22 x 30	1500 1480	22 x 40	1550		
10000	16 x 32	1350	18 x 36 22 x 30	1500 1480	18 x 40 22 x 35	1580 1560				
12000	16 x 36	1470	18 x 36 22 x 30	1560 1530	22 x 40	1640				
15000	18 x 36 22 x 30	1508 1590	18 x 40 22 x 35	1632 1600						
18000	18 x 40 22 x 35	1650 1650	22 x 40	1710						
22000	22 x 40	1710								

Note : * 1. D x L : mm

* 2. mA rms at 105°C, 120Hz

CASE SIZE OF STANDARD PRODUCTS Dø ≥ 6mm with Safety Vent at Can Bottom

CAP. (μF)	RATED VOLTAGE W V									
	50		63		100		160		200	
	Size	Ripple	Size	Ripple	Size	Ripple	Size	Ripple	Size	Ripple
0.1	5 x 11	1.1			5 x 11	1.1				
0.22	5 x 11	2.3			5 x 11	2.3				
0.33	5 x 11	3.5			5 x 11	3.5				
0.47	5 x 11	5			5 x 11	5	6 x 11	7.2	6 x 11	7.2
1	5 x 11	10			5 x 11	10	6 x 11	10.2	6 x 11	10.2
2.2	5 x 11	14			5 x 11	18	6 x 11	16	6 x 11	16
3.3	5 x 11	21			5 x 11	24	8 x 11	21	8 x 11	21
4.7	5 x 11	24	5 x 11	27	5 x 11	27	8 x 11	24	10 x 12	27
10	5 x 11	39	5 x 11	42	6 x 11	45	10 x 12	39	10 x 15	42
22	6 x 11	57	6 x 11	69	8 x 11	78	10 x 19	66	10 x 22	66
33	6 x 11	75	8 x 11	84	10 x 12	102	13 x 20	90	13 x 25	96
47	6 x 11	90	8 x 11	114	10 x 15	138	13 x 25	108	13 x 25	108
100	8 x 11	150	10 x 12	180	13 x 20	240	16 x 25	180	16 x 32	198
150							16 x 36	252	18 x 36 22 x 30	270 270
220	10 x 15	264	10 x 19	294	16 x 25	436	18 x 36 22 x 30	306 306	18 x 40 22 x 35	312 312
270							18 x 40 22 x 35	324 324	22 x 40	342
330	10 x 19	398	13 x 20	408	16 x 25	516	22 x 40	360		
470	13 x 20	456	13 x 25	528	16 x 32	660				
1000	16 x 25	810	18 x 32	930	18 x 40 22 x 35	1010 1010				
2200	18 x 36 22 x 30	1250 1250	18 x 40 22 x 35	1320 1350						
3300	22 x 40	1420								

Note : * 1. D x L : mm

* 2. mA rms at 105°C, 120Hz

CASE SIZE OF STANDARD PRODUCTS Dø ≥ 6mm with Safety Vent at Can Bottom

CAP. (μF)	RATED VOLTAGE W V									
	250		315		350		400		450	
	Size	Ripple	Size	Ripple	Size	Ripple	Size	Ripple	Size	Ripple
0.47	6 x 11	7.2								
1	6 x 11	10.2	6 x 11	10.2	8 x 11	10.8	8 x 11	10.8	10 x 12	11.4
2.2	8 x 11	18	8 x 11	18	10 x 12	18	10 x 12	18	10 x 19	17.4
3.3	10 x 12	21	10 x 12	21	10 x 15	21	10 x 19	21	10 x 19	21
4.7	10 x 12	27	10 x 15	45	10 x 15	27	10 x 19	27	13 x 20	30
10	10 x 19	42	10 x 19	42	13 x 20	42	13 x 20	42	13 x 25	45
22	13 x 25	78	13 x 25	72	13 x 25	66	16 x 25	66	16 x 32	66
33	13 x 25	96	16 x 25	90	16 x 32	84	16 x 32	84	18 x 36 22 x 30	90 84
47	16 x 25	126	16 x 30	144	18 x 36 22 x 30	132 132	18 x 36 22 x 30	132 132	22 x 40	138
100	18 x 36 22 x 30	204 204	18 x 40 22 x 35	204 204	22 x 40	216				
150	18 x 40 22 x 35	276 276	22 x 40	270						
220	22 x 40	320								

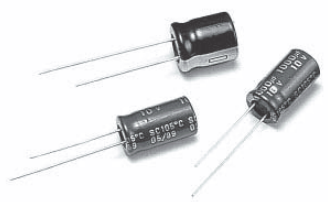
Note : * 1. D x L : mm

* 2. mA rms at 105°C, 120Hz

Miniature Size Aluminum Electrolytic Capacitors

SP [Miniature and Long Life]

105°C Single-Ended Lead Aluminum Electrolytic Capacitors For Electronic Ballast



DESCRIPTION

Applicable for Electronic Ballast

High Temperature Load Life at 105°C for 8000~10000 Hours

Frequency coefficient

Frequency(Hz)	120	1K	10K	100K
Coefficient	0.50	0.80	0.90	1.00

Temperature coefficient

Temperature(°C)	65	85	105
Factor	1.70	1.40	1.00

ELECTRICAL CHARACTERISTICS

Operating Temperature : -40° ~ +105°C -25° ~ +105°C

Working Voltage : 160 ~ 400V 450V

Rate Capacitance Range : 3.3 ~ 330μF

Capacitance Tolerance : -20 ~ +20%

DC Leakage Current (μA) : I = 0.04 + 100 CV(μA)
(Measurements shall be Made After a 2 Minute Charge at Rated Working Voltage)

Dissipation Factor : at 120 Hz, 25°C

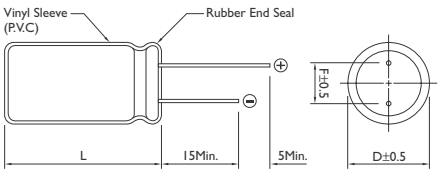
WV (V) :	160	200	400	450
D.F (%) :	20	20	24	24

WV (V) :	160	200	400	450
Z - 25°C / Z + 20°C	3	3	5	6
Z - 40°C / Z + 20°C	6	6	6	

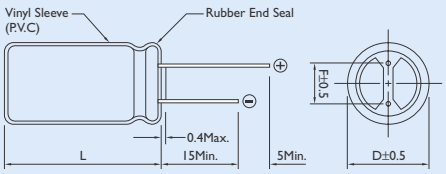
Load Life : 8000~10000 Hours at 105°C Assured with Full Rated Maximum Ripple Current Applied
(a) Capacitance Change : Within 20% of Initial Value
(b) Dissipation Factor : Not Exceed 200% of Initial Requirement
(c) Leakage Current : Not Exceed the Initial Requirement

Shelf Life : 1000 Hours, No Voltage Applied, at 105°C
(a) Capacitance Change : Within 20% of Initial Value
(b) Dissipation Factor : Not Exceed 200 % of Initial Requirement
(c) Leakage Current : Not Exceed 200% of Initial Requirement

DIAGRAM OF DIMENSIONS



Rubber Stand-off



$L \le 12$ $L + 1.5Max.$
$13 \le L \le 15$ $L^{+1.0}_{-0.5}$
$L \ge 16$ $L + 2.0Max.$

Dimensions : mm

Dø	F	dø
4.0	1.5	0.45
5.0	2.0	0.5
6.0	2.5	
8.0	3.5	
10.0	5.0	0.6
12.0		
13.0		
16.0	7.5	0.8
18.0		
22.0	10.0	0.8

CASE SIZE OF STANDARD PRODUCTS AND PERMISSIBLE RIPPLE CURRENT

CAP. (μF)	RATED VOLTAGE WV					
	160			200		
	Size	Ripple	Impedance	Size	Ripple	Impedance
22				10 x 19	440	1.30
33	10 x 19	500	1.30	10 x 19	520	0.91
				13 x 20	580	0.91
47	10 x 19	580	0.96	13 x 20	660	0.91
	13 x 20	660	0.96			
68	12 x 25	720	0.64	13 x 25	720	0.63
	16 x 20	760	0.64	16 x 20	760	0.56
100	13 x 25	970	0.48	16 x 25	1120	0.27
	16 x 20	1120	0.56			
	16 x 25	1120	0.48			
	18 x 20	1120	0.56			
150	16 x 25	1200	0.40	16 x 32	1280	0.22
	16 x 32	1300	0.40			
	18 x 25	1300	0.40			
220	16 x 32	1300	0.27			
	18 x 25	1300	0.36			
330	18 x 36	1380	0.21			

Note : * 1. D x L : mm

* 2. mA rms at 105°C, 120Hz

CASE SIZE OF STANDARD PRODUCTS AND PERMISSIBLE RIPPLE CURRENT

CAP. (μF)	RATED VOLTAGE WV					
	400			450		
	Size	Ripple	Impedance	Size	Ripple	Impedance
3.3				10 x 15	100	7.00
4.7				10 x 19	140	5.10
6.8	10 x 19	150	4.80	10 x 19	150	4.80
				13 x 20	180	4.20
10	10 x 19	180	2.90	13 x 20	310	2.50
22	16 x 20	300	0.95	16 x 25	560	1.70
				18 x 20	550	2.10
33	16 x 25	520	0.91	16 x 32	620	1.10
				18 x 25	590	1.10
47	16 x 32	700	0.68	16 x 36	880	0.93
				18 x 32	880	0.93
68	18 x 32	870	0.63			

Note : * 1. D x L : mm

* 2. mA rms at 105°C, 120Hz

SB [For Low Leakage Current]

105°C Single-Ended Lead Aluminum Electrolytic Capacitors

Miniature Size Aluminum Electrolytic Capacitors

ELECTRICAL CHARACTERISTICS

Operating Temperature : -40° ~ +105°C

Working Voltage : 6.3 ~ 100V

Rate Capacitance Range : 0.1 ~ 4700μF

Capacitance Tolerance : -20 ~ +20%

DC Leakage Current (μA) : I = 0.002CV (μA) or 0.4μA Whichever is greater.
(After 2 Minutes Application of DC Working Voltage at 25°C)

Equivalent Series Resistance (E.S.R., at 120Hz):
When measured at 25°C and 1 KHz E.S.R value shall not exceed the value given in the table on the next page.

WV (V) :	6.3	10	16	25	35 ~ 100
D.F (%) :	20	16	13	12	10

For capacitor whose capacitance exceeds 1000μF. The value of D.F(%) is increased by 2% for every addition of 1000μF.

Load Life : 1000 Hours at 105°C Assured with Full Rated Maximum Ripple Current Applied
(a) Capacitance Change : Within 25% of Initial Value
(b) Dissipation Factor : Not Exceed 200% of Initial Requirement
(c) Leakage Current : Not Exceed the Initial Requirement

Shelf Life : 500 Hours, No Voltage Applied, at 105°C
(a) Capacitance Change : Within 25% of Initial Value
(b) Dissipation Factor : Not Exceed 200% of Initial Requirement
(c) Leakage Current : Not Exceed 200% of Initial Requirement

WV (V) :	6.3	10	16	25	35 ~ 100
Impedance : Z - 40°C / Z + 20°C	4	4	3	3	3

DESCRIPTION

Used in where low leakage current is essential as in coupling of pre-amplifies.

Very low leakage current remains even after prolonged storage.

Multiplier for Ripple Current

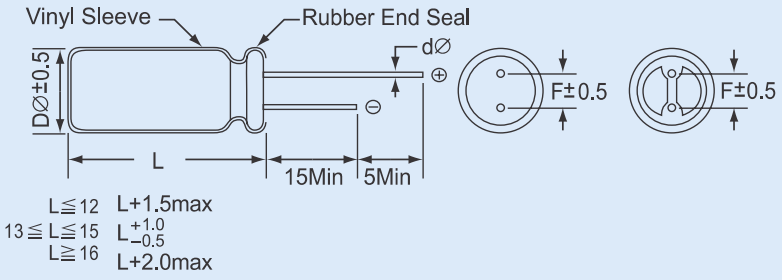
Frequency coefficient

Frequency(Hz)	50	120	300	1K	10K	100K
6.3~25V	0.85	1.00	1.04	1.08	1.19	1.19
26~50V	0.80	1.00	1.30	1.40	1.43	1.43
50~100V	0.77	1.00	1.34	1.43	1.48	1.48

Temperature coefficient

Temperature(°C)	65	85	105
Factor	1.50	1.20	1.00

DIAGRAM OF DIMENSIONS



Dimensions : mm

Dø	F	dø
4.0	1.5	0.45
5.0	2.0	0.5
6.0	2.5	
8.0	3.5	
10.0	5.0	0.6
12.0		
13.0		
16.0	7.5	0.8
18.0		
22.0	10.0	0.8

CASE SIZE OF STANDARD PRODUCTS Dø ≥ 6mm with Safety Vent at Can Bottom

CAP. (μF)	RATED VOLTAGE WV														
	6.3					10					16				
	SIZE	Ripple 120Hz	Impedance 10K Hz	ESR 120Hz	ESR 1K Hz	SIZE	Ripple 120Hz	Impedance 10K Hz	ESR 120Hz	ESR 1K Hz	SIZE	Ripple 120Hz	Impedance 10K Hz	ESR 120Hz	ESR 1K Hz
0.1															
0.15															
0.22															
0.33															
0.47															
0.56															
0.68															
1.0															
1.5															
2.2															
3.3															
4.7															
6.8															
10											5x11	40	5.00	17.00	11.30
15											5x11	56	4.43	10.60	7.07
22						5x11	68	4.01	7.83	5.22	6x11	70	3.70	7.23	4.82
33						6x11	78	2.67	5.22	3.48	6x11	95	2.46	4.82	3.21
47						6x11	106	1.87	3.66	2.44	8x11	122	1.73	3.38	2.25
68	6x11	80	1.50	3.00	2.00	6x11	142	1.29	2.53	1.68	8x11	168	1.20	2.34	1.56
100	6x11	126	0.88	1.72	1.15	8x11	179	0.87	1.72	1.14	10x12	264	0.81	1.59	1.06
150	8x11	196	0.59	1.15	0.77	10x12	280	0.58	1.14	0.76	10x15	416	0.53	1.06	0.70
220	10x12	272	0.40	0.78	0.52	10x15	355	0.40	0.78	0.52	10x19	553	0.36	0.72	0.48
330	10x15	388	0.26	0.52	0.34	10x19	480	0.26	0.52	0.34	13x20	732	0.24	0.48	0.32
470	10x19	507	0.18	0.36	0.24	13x20	640	0.18	0.36	0.24	13x20	1040	0.16	0.33	0.22
680	13x20	700	0.12	0.25	0.16	13x25	848	0.12	0.25	0.16	13x25	1280	0.11	0.23	0.15
820	13x25	850	0.11	0.21	0.14	13x25	980	0.11	0.21	0.14	16x25	1450	0.09	0.18	0.12
1000	13x25	896	0.08	0.17	0.11	13x25	1081	0.08	0.17	0.11	16x25	1700	0.06	0.14	0.10
1500	13x25	1204	0.05	0.11	0.07	16x25	1376	0.05	0.11	0.07	16x32	1750	0.06	0.10	0.06
2200	16x25	1513	0.04	0.09	0.06	16x32	1680	0.04	0.09	0.06	18x36	1900	0.05	0.08	0.06
3300	16x36	1902	0.04	0.06	0.04	16x36	2155	0.03	0.06	0.04	18x40	2250	0.04	0.06	0.04
4700	18x36	2272	0.02	0.05	0.03	18x36	2560	0.02	0.05	0.03					

Note : * 1. D x L : mm

* 2. Ripple Current mA rms at 105°C, 100Hz

* 3. Impedance : (ohm) 25°C/10KHz

* 4. ESR : (ohm) 25°C/120Hz and 1KHz

CASE SIZE OF STANDARD PRODUCTS Dø ≥ 6mm with Safety Vent at Can Bottom

CAP. (μF)	RATED VOLTAGE WV														
	25					35					50				
	SIZE	Ripple 120Hz	Impedance 10K Hz	ESR 120Hz	ESR 1K Hz	SIZE	Ripple 120Hz	Impedance 10K Hz	ESR 120Hz	ESR 1K Hz	SIZE	Ripple 120Hz	Impedance 10K Hz	ESR 120Hz	ESR 1K Hz
0.1											5x11	1	323.00	510.0	215.0
0.15											5x11	4	270.00	355.0	126.0
0.22											5x11	4	235.00	223.0	80.00
0.33											5x11	6	175.00	185.0	65.20
0.47											5x11	7	90.00	96.00	45.70
0.56											5x11	7	40.00	50.00	33.00
0.68											5x11	9	38.50	47.00	31.20
1.0											5x11	18	32.70	43.40	25.30
1.5											5x11	24	28.50	35.20	21.70
2.2											5x11	30	22.40	32.50	17.50
3.3											5x11	36	17.40	24.30	13.20
4.7	5x11	27	8.00	20.00	13.00	5x11	40	14.40	28.20	18.80	6x11	45	12.50	20.70	9.20
6.8	5x11	42	7.60	19.50	11.00	5x11	45	10.00	19.50	13.00	6x11	55	10.00	19.50	9.00
10	6x11	63	6.80	13.20	8.84	6x11	67	6.80	13.20	8.84	8x11	82	6.80	13.20	8.84
15	6x11	67	4.53	8.84	5.89	8x11	75	4.53	8.80	5.89	8x11	97	4.56	8.84	5.89
22	8x11	84	3.08	6.02	4.01	8x11	97	3.08	6.02	4.01	10x12	127	3.08	6.02	4.01
33	8x11	102	2.05	4.01	2.67	10x12	139	2.05	4.01	2.67	10x15	156	2.05	4.01	2.67
47	10x12	141	1.44	2.82	1.88	10x12	166	1.44	2.82	1.88	10x15	217	1.44	2.82	1.88
68	10x12	190	1.00	1.95	1.30	10x15	238	1.00	1.95	1.30	10x19	300	1.00	1.95	1.30
100	10x15	277	0.67	1.32	0.88	10x19	310	0.67	1.32	0.88	13x25	390	0.67	1.32	0.88
150	10x19	455	0.44	0.88	0.58	13x20	491	0.44	0.88	0.58	13x25	569	0.44	0.88	0.58
220	13x20	590	0.30	0.60	0.40	13x25	630	0.30	0.60	0.40	16x25	910	0.30	0.60	0.40
330	13x25	754	0.20	0.40	0.26	16x25	771	0.20	0.40	0.26	16x32	986	0.20	0.40	0.26
470	16x25	1110	0.13	0.28	0.18	16x25	1150	0.15	0.28	0.18	16x36	1249	0.13	0.28	0.18
680	16x32	1385	0.09	0.19	0.12	16x3	1462	0.09	0.19	0.12	16x36	1870	0.09	0.19	0.12
820	16x32	1540	0.08	0.15	0.10	16x36	1630	0.08	0.15	0.10	16x36	1950	0.08	0.15	0.10
1000	16x36	1710	0.06	0.13	0.08	18x36	1723	0.06	0.13	0.08	18x40	2070	0.06	0.13	0.08
1500	16x36	1779	0.03	0.08	0.05	18x4	2006	0.03	0.08	0.05					
2200	18x40	2174	0.03	0.06	0.04										
3300															
4700															

Note : * 1. D x L : mm

* 2. Ripple Current mA rms at 105°C, 100Hz

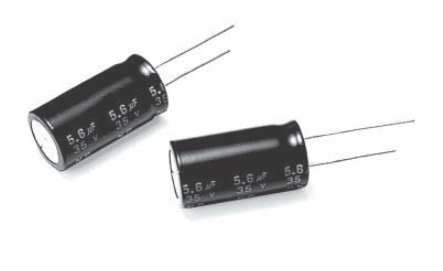
* 3. Impedance : (ohm) 25°C/10KHz

* 4. ESR : (ohm) 25°C/120Hz and 1KHz

Miniature Size Aluminum Electrolytic Capacitors

SR [For Horizontal Deflection]

Bi-Polarized Capacitors for Horizontal Deflection Circuits of TV Sets



DESCRIPTION

Non-Polar Type for Used in Horizontal Deflection Current

Correction at High Frequency and High Ripple Currents

ELECTRICAL CHARACTERISTICS

Operating Temperature : -40° ~ +85°C

Working Voltage : 25, 35, 50V

Rate Capacitance Range : 2.2 ~ 47μF

Capacitance Tolerance : -20 ~ +20%

DC Leakage Current (μA) : 100μA Max.
(After 5 Minutes in Both Direction, at 25°C)

Dissipation Factor : at 120 Hz, 25°C

WV (V) :	25	35	50
D.F (%) :	5	5	5

Load Life : 1000 Hours at 70°C with Permissible Ripple Current at 15.75 KHz
(Polarity Inverted Every 250 Hours)
(a) Capacitance Change : Within 20% of Initial Value
(b) Dissipation Factor : Not Exceed 200% of Initial Requirement
(c) Leakage Current : Not Exceed the Initial Requirement

Shelf Life : 500 Hours, No Voltage Applied, at 85°C
(a) Capacitance Change : Within 20% of Initial Value
(b) Dissipation Factor : Not Exceed 200% of Initial Requirement
(c) Leakage Current : Not Exceed 200% of Initial Requirement

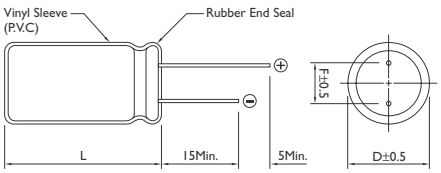
Frequency coefficient

Frequency(Hz)	60	120	400~1K	15.75K
Coefficient	0.40	0.40	0.80	1.00

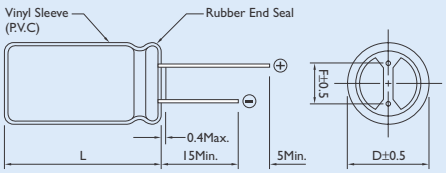
Temperature coefficient

Temperature(°C)	65	70	85
Factor	1.15	1.00	0.80

DIAGRAM OF DIMENSIONS



Rubber Stand-off



L ≤ 12 L + 1.5Max.
13 ≤ L ≤ 15 $L^{+1.0}_{-0.5}$
L ≥ 16 L + 2.0Max.

Dimensions : mm

Dø	F	dø
4.0	1.5	0.45
5.0	2.0	0.5
6.0	2.5	
8.0	3.5	
10.0	5.0	0.6
12.0		
13.0		
16.0	7.5	0.8
18.0		
22.0	10.0	0.8

CASE SIZE & PERMISSIBLE RIPPLE CURRENT OF STANDARD PRODUCTS

CAP. (μF)	RATED VOLTAGE WV					
	25		35		50	
	Size	Ripple	Size	Ripple	Size	Ripple
2.2	16 x 25	6	16 x 25	6	16 x 25	6
3.3	16 x 25	7	16 x 25	7	16 x 25	7
4.7	16 x 25	7	16 x 25	7	16 x 25	7
5.6	16 x 32	7	16 x 32	7	16 x 32	7
6.8	16 x 36	8	16 x 36	8	16 x 36	8
8.2	16 x 36	8	16 x 36	8	16 x 36	8
10	18 x 40	12	18 x 40	12	18 x 40	12
13	18 x 40	12	18 x 40	12	18 x 40	12
15	18 x 40	12	18 x 40	12	18 x 40	12
18	22 x 40	13	22 x 40	13	22 x 40	13
20	22 x 40	13	22 x 40	13	22 x 40	13
22	22 x 40	13	22 x 40	13	22 x 40	13
25	22 x 40	13	22 x 40	13	22 x 40	13
47	22 x 40	13	22 x 40	13		

Note : * 1. D x L : mm

* 2. mA rms at 105°C, 120Hz

Miniature Size Aluminum Electrolytic Capacitors

SN [For Non Polar]

105°C Single-Ended Lead Aluminum Electrolytic Capacitors For Non-Polar General Purpose

DESCRIPTION

Non-polar miniature type for used in reversing polarity DC voltage circuits.

Frequency coefficient

Frequency(Hz)	60	120	300	1K	10K~100K
Factor	0.75	1.00	1.20	1.32	1.65

Temperature coefficient

Temperature(°C)	65	85	105
Factor	1.30	1.20	1.00

ELECTRICAL CHARACTERISTICS

Operating Temperature : -40°C ~ +105°C

Working Voltage : 6.3 ~ 100V

Rate Capacitance Range : 0.47 ~ 2200μF

Capacitance Tolerance : -20 ~ +20%

DC Leakage Current (μA) : I = 0.03 CV + 3μA

(After 5 Minutes Application of DC Working Voltage at 25°C)

Dissipation Factor : at 120Hz, 25°C

WV (V) :	6.3	10	16	25	35	50	100
D.F (%) :	24	20	17	15	14	12	10

For capacitor whose capacitance exceeds 1000μF. The value of D.F(%) is increased by 2% for every addition of 1000μF.

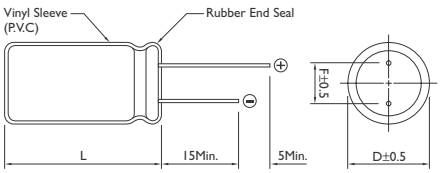
Load Life : 1000 Hours at 105°C with the Polarity Inverted Every 250 Hours

(a) Capacitance Change : Within 25% of Initial Value
(b) Dissipation Factor : Not Exceed 150% of Initial Requirement
(c) Leakage Current : Not Exceed the Initial Requirement

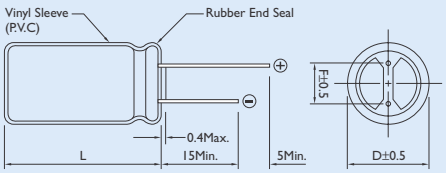
Shelf Life : 500 Hours, No Voltage Applied, at 105°C

(a) Capacitance Change : Within 25% of Initial Value
(b) Dissipation Factor : Not Exceed 200% of Initial Requirement
(c) Leakage Current : Not Exceed 200% of Initial Requirement

DIAGRAM OF DIMENSIONS



Rubber Stand-off



$L \leq 12$ L + 1.5Max.
$13 \leq L \leq 15$ $L^{+1.0}_{-0.5}$
$L \geq 16$ L + 2.0Max.

Dimensions : mm

Dø	F	dø
4.0	1.5	0.45
5.0	2.0	0.5
6.0	2.5	
8.0	3.5	
10.0	5.0	0.6
12.0		
13.0		
16.0	7.5	0.8
18.0		
22.0	10.0	0.8

CASE SIZE & PERMISSIBLE RIPPLE CURRENT OF STANDARD PRODUCTS

CAP. (μF)	RATED VOLTAGE W V																	
	6.3		10		16		25		35		50		63		80		100	
	Size	Ripple	Size	Ripple	Size	Ripple	Size	Ripple	Size	Ripple	Size	Ripple	Size	Ripple	Size	Ripple	Size	Ripple
0.22											5x11	5						
0.47											5x11	5	5x11	11	5x11	11	5x11	14
1											5x11	17	5x11	17	5x11	17	5x11	21
2.2											5x11	25	5x11	25	5x11	29	6x11	34
3.3											6x11	31	6x11	37	6x11	39	8x11	49
4.7									5x11	34	5x11	34	5x11	37	8x11	47	8x11	58
											6x11	41	6x11	44				
10					6x11	45	5x11	42	6x11	54	6x11	56	8x11	74	10x12	88	8x11	80
							6x11	50			8x11	70					10x12	100
22			5x11	57	5x11	59	6x11	69	8x11	94	6x11	75	8x11	95	10x19	150	13x20	180
					6x11	69	8x11	86			8x11	97	10x15	130				
											10x12	115						
33	5x11	63	6x11	77	8x11	98	8x11	105	10x12	125	8x11	110	8x11	115	13x20	205	13x20	220
											10x15	150	10x19	175				
47	6x11	84	6x11	93	8x11	115	10x12	140	10x15	165	8x11	130	13x20	230	13x20	245	13x25	285
											10x19	190						
	8x11	140	8x11	193	8x11	140	10x19	240	13x20	285	13x20	310	16x25	410	16x25	435	16x32	510
100					10x12	175												
					10x15	205												
220	10x12	235	10x15	255	10x19	330	13x20	390	16x25	520	16x25	570	16x32	660				
330	10x15	310	10x19	380	13x20	445	16x25	580	16x25	630	16x36	790						
470	10x19	400	13x20	470	13x25	570	16x25	690	16x32	820								
1000	13x25	690	16x25	885	16x32	1020												
2200	16x32	1250	16x36	1450														

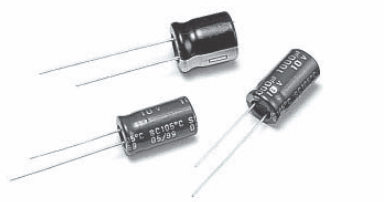
Note : * 1. D x L : mm

* 2. Ripple Current mA rms at 105°C, 120KHz

Miniature Size Aluminum Electrolytic Capacitors

SC [For Low Impedance and Low E.S.R Suitable for Output of Mother Board]

105°C Single-Ended Lead Aluminum Electrolytic Capacitors For High Frequency Applications



DESCRIPTION

Used in switching regulator applications in computers. Especially for high frequency.

Low impedance and E.S.R., high permissible ripple current at high frequency and higher operating temperature (-40°C to +105°C).

High Temperature Load Life at 105°C for 3000 Hours

Multiplier for Ripple Current

Frequency coefficient

Frequency(Hz)	50	120	300	1K	10K	100K
~4.7μF	0.30	0.40	0.50	0.70	0.80	1.00
5.6~33μF	0.40	0.50	0.60	0.80	0.90	1.00
34~330μF	0.60	0.70	0.80	0.90	0.95	1.00
331~1000μF	0.65	0.95	0.90	0.98	1.00	1.00
1200μF Higher	0.85	0.90	0.95	0.98	1.00	1.00

Temperature coefficient

Temperature(°C)	65	85	105
Factor	1.80	1.50	1.00

ELECTRICAL CHARACTERISTICS

Operating Temperature : -40° ~ +105°C

Working Voltage : 6.3 ~ 100V

Rate Capacitance Range : 4.7 ~ 15000μF

Capacitance Tolerance : -20 ~ +20%

DC Leakage Current (μA) : I = 0.01 CV(μA) or 3μA Whichever is greater.
(Measurements shall be Made After a 2 Minute Charge at Rated Working Voltage)

Dissipation Factor : at 120 Hz, 25°C

WV (V) :	6.3	10	16	25	35	50	63	80	100
D.F (%) :	15	14	12	10	10	8	8	7	7

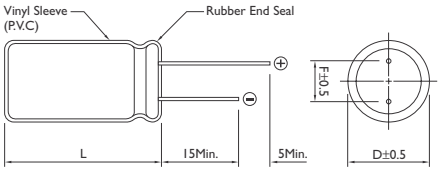
For capacitor whose capacitance exceeds 1000μF. The value of D.F(%) is increased by 2% for every addition of 1000μF.

WV (V) :	6.3	10	16	25	35	50	63	100
Impedance : Z - 40°C / Z + 20°C	10	8	5	4	4	4	4	4

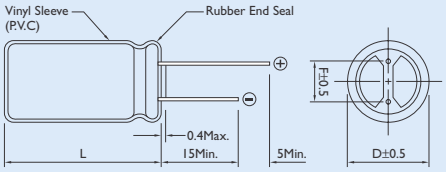
Load Life : 3000 Hours at 105°C Assured with Full Rated Maximum Ripple Current Applied
5 x 11 ~ 10 x 12 : Life = 2000 Hours
10 x 15 or Higher : Life = 3000 Hours
(a) Capacitance Change : Within 20% of Initial Value
(b) Dissipation Factor : Not Exceed 200% of Initial Requirement
(c) Leakage Current : Not Exceed the Initial Requirement

Shelf Life : 1000 Hours, No Voltage Applied, at 105°C
(a) Capacitance Change : Within 20% of Initial Value
(b) Dissipation Factor : Not Exceed 200 % of Initial Requirement
(c) Leakage Current : Not Exceed 200% of Initial Requirement

DIAGRAM OF DIMENSIONS



Rubber Stand-off



L ≤ 12 L + 1.5Max.
13 ≤ L ≤ 15 $L^{+1.0}_{-0.5}$
L ≥ 16 L + 2.0Max.

Dimensions : mm

Dø	F	dø
4.0	1.5	0.45
5.0	2.0	0.5
6.0	2.5	
8.0	3.5	
10.0	5.0	0.6
12.0		
13.0		
16.0	7.5	0.8
18.0		
22.0	10.0	0.8

CASE SIZE OF STANDARD PRODUCTS Dø ≥ 6mm with Safety Vent at Can Bottom

CAP. (μF)	RATED VOLTAGE W V											
	6.3			10			16			25		
	Size	Ripple	ESR	Size	Ripple	ESR	Size	Ripple	ESR	Size	Ripple	ESR
4.7												
6.8												
10										*4 x 7 5 x 11	40 50	2.000 0.550
22												
33												
47										5 x 11	150	0.420
56												
68							5 x 11	150	0.420	6 x 11	200	0.370
100				5 x 11	150	0.420	5 x 11	200	0.370	6 x 11	250	0.220
120				5 x 11	200	0.370	6 x 11	250	0.320	8 x 11	300	0.200
150	5 x 11	200	0.420	6 x 11	250	0.320	6 x 11	300	0.220	8 x 11	550	0.140
220	6 x 11	250	0.320	6 x 11	300	0.220	8 x 11	550	0.140	*8 x 11 8 x 15	620 750	0.120 0.100
270	*6 x 11	300	0.220									
330	*6 x 11 8 x 11	320 400	0.230 0.180	8 x 11	550	0.140	*8 x 11 8 x 15	620 750	0.120 0.100	*8 x 15 8 x 20 10 x 15	660 800 900	0.100 0.069 0.086
470	*6 x 11 8 x 11	440 550	0.160 0.140	*8 x 11 8 x 15	620 750	0.120 0.100	*8 x 15 10 x 12	730 800	0.093 0.085	*8 x 20 *10 x 12 10 x 15	1000 900 1050	0.067 0.086 0.064
680	*8 x 11 8 x 15	580 700	0.120 0.100	*8 x 11 10 x 12	640 800	0.110 0.085	10 x 15	1050	0.064	10 x 19	1100	0.039
820	8 x 20	750	0.085	10 x 15	1050	0.064	10 x 19	1100	0.044	10 x 19	1250	0.039
1000	*8 x 11 *8 x 15 8 x 20 10 x 12	580 670 800 690	0.150 0.069 0.069 0.080	8 x 20 10 x 12 10 x 15 10 x 19	1080 930 990 1100	0.065 0.075 0.085 0.050	*10 x 15 10 x 19	1140 1250	0.043 0.039	*10 x 19 *10 x 25 13 x 20	1160 1310 1450	0.047 0.042 0.038
1200	10 x 15	1000	0.064	10 x 19	1250	0.044	*10 x 25 13 x 20	1310 1450	0.042 0.038			
1500	*8 x 15 *8 x 20 *10 x 15 10 x 19	980 1070 1070 1250	0.085 0.051 0.055 0.044	10 x 9	1450	0.039	*10 x 19 13 x 20	1200 1600	0.045 0.034	*12 x 30 16 x 25	1750 2000	0.032 0.028
2200	*10 x 19 *10 x 25 13 x 20	1220 1310 1450	0.051 0.048 0.043	*10 x 19 *10 x 25 13 x 20	1330 1450 1600	0.047 0.025 0.038	*10 x 30 *13 x 20 13 x 25	1780 1720 2000	0.032 0.033 0.028	*13 x 30 *16 x 25 16 x 32	1810 1660 2200	0.029 0.032 0.024
3300	*10 x 25 13 x 25	1400 1700	0.043 0.035	*10 x 30 13 x 25	1740 2000	0.032 0.028	*13 x 40 16 x 25	2200 2200	0.026 0.024	16 x 36	2550	0.019
3900	13 x 25	1750	0.032									
4700	*12 x 30 *13 x 25 16 x 25	1570 1570 1800	0.033 0.032 0.028	*13 x 25 16 x 25	1860 2200	0.028 0.024	16 x 6	2550	0.019	18 x 36	2800	0.019
6800	16 x 32	2000	0.024	16 x 36	2550	0.019	18 x 36	2800	0.019	18 x 36	2800	0.019
8200	16 x 32	2350	0.019	18 x 36	2800	0.019						
10000	16 x 36	2550	0.019									
15000	18 x 36	3000	0.019									

Note : * 1. D x L : mm

*2. Ripple Current :(mA r.m.s 105°C / 100KHz), ESR (Ω Max20°C/100KHz)

3. "" is down size, Edurance is less 1000 hrs than standard

CASE SIZE OF STANDARD PRODUCTS Dø ≥ 6mm with Safety Vent at Can Bottom

CAP. (μF)	RATED VOLTAGE W V											
	35			50			63			100		
	Size	Ripple	ESR	Size	Ripple	ESR	Size	Ripple	ESR	Size	Ripple	ESR
4.7	5 x 11	115	1.200	5 x 11	115	2.000	5 x 11	115	2.200	5 x 11	120	2.000
6.8	5 x 11	120	1.000	5 x 11	120	1.850	5 x 11	200	2.000	5 x 11	140	1.850
10	5 x 11	140	0.900	5 x 11	140	1.700	5 x 11	140	1.850	6 x 11	200	1.500
15	5 x 11	170	0.690	5 x 11	180	1.200	5 x 11	200	1.700	6 x 11	250	1.200
22	5 x 11	190	0.420	5 x 11	200	0.700	6 x 11	250	1.200	8 x 11	300	0.790
33	5 x 11	200	0.420	6 x 11	250	0.600	6 x 11	300	0.900	8 x 15	450	0.590
47	6 x 11	250	0.370	6 x 11	300	0.520	8 x 11	450	0.700	10 x 15	550	0.350
68	6 x 11	300	0.220	8 x 11	450	0.350	8 x 11	550	0.520	10 x 9	650	0.240
100	*6 x 11	360	0.180	*8 x 11	480	0.290	8 x 20	650	0.350	13 x 20	800	0.180
	8 x 11	450	0.140	8 x 15	550	0.250						
120	8 x 11	550	0.130	8 x 20	650	0.210	10 x 15	800	0.300	13 x 25	1050	0.150
150	8 x 15	650	0.100	10 x 12	800	0.160	10 x 15	1050	0.200	13 x 5	1300	0.110
220	*8 x 15	730	0.075	10 x 15	1050	0.100	10 x 19	1300	0.150	16 x 25	1400	0.071
	10 x 12	800	0.069									
330	*10 x 15	900	0.052	10 x 9	1300	0.072	13 x 0	1400	0.100	16 x 2	1550	0.049
	10 x 19	1050	0.044									
470	10 x 19	1300	0.039	*10 x 19	1390	0.075	13 x 25	1550	0.064	18 x 36	1700	0.038
				13 x 20	1400	0.060						
680	13 x 20	1400	0.038	13 x 25	1550	0.050	16 x 25	1700	0.052			
820	13 x 20	1550	0.034	16 x 25	1700	0.040	16 x 32	1900	0.048			
1000	13 x 25	1700	0.029	16 x 25	1900	0.039	16 x 32	2100	0.042			
1200	16 x 25	1900	0.028	16 x 32	2100	0.025	16 x 36	2550	0.036			
1500	16 x 25	2100	0.024	16 x 36	2550	0.025	18 x 36	2800	0.033			
2200	*16 x 32	2300	0.021	18 x 40	2800	0.025						
	16 x 36	2550	0.019									
3300	18 x 36	2880	0.019									
3900												
4700												
6800												
8200												
10000												
15000												

Note : * 1. D x L : mm

*2. Ripple Current :(mA r.m.s 105°C / 100KHz), ESR (Ω Max20°C / 100KHz)

3. "" is down size, Edurance is less 1000 hrs than standard

SM [For Very Low Impedance and Very Low E.S.R Suitable for Output of Mother Board]

105°C Single-Ended Lead Aluminum Electrolytic Capacitors For High Frequency Applications

Miniature Size Aluminum Electrolytic Capacitors

ELECTRICAL CHARACTERISTICS

Operating Temperature : -40° ~ +105°C

Working Voltage : 6.3 ~ 25V

Rate Capacitance Range : 470 ~ 4700μF

Capacitance Tolerance : -20 ~ +20%

DC Leakage Current (μA) : I = 0.01 CV(μA)

(Measurements shall be Made After a 2 Minute Charge at Rated Working Voltage)

Dissipation Factor : at 120 Hz, 25°C

WV (V):	6.3	10	16
D.F (%) :	15	14	12

For capacitor whose capacitance exceeds 1000μF. The value of D.F(%) is increased by 2% for every addition of 1000μF.

Load Life : 2000 Hours for D = 8ø; 3000 Hours for D ≥ 10ø at 105°C

(a) Capacitance Change : Within 20% of Initial Value
(b) Dissipation Factor : Not Exceed 200% of Initial Requirement
(c) Leakage Current : Not Exceed the Initial Requirement

Shelf Life : 1000 Hours, No Voltage Applied, at 105°C

(a) Capacitance Change : Within 20% of Initial Value
(b) Dissipation Factor : Not Exceed 200 % of Initial Requirement
(c) Leakage Current : Not Exceed 200% of Initial Requirement

DESCRIPTION

Used in switching regulator applications in computers. Especially for high frequency.

Very low impedance and E.S.R., high permissible ripple current at high frequency and higher operating temperature (-40°C to +105°C).

High Temperature Load Life at 105°C for 3000 Hours

Multiplier for Ripple Current

Frequency coefficient

Frequency(Hz)	60	120	1K	10K	100K
5.6~33μF	0.45	0.55	0.75	0.90	1.00
39~330μF	0.6	0.70	0.85	0.95	1.00
470~1000μF	0.65	0.75	0.90	0.98	1.00
1200~6800μF	0.75	0.80	0.95	1.00	1.00

Temperature coefficient

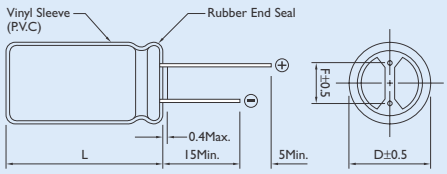
Temperature(°C)	65	85	105
Factor	2.00	1.60	1.00

DIAGRAM OF DIMENSIONS

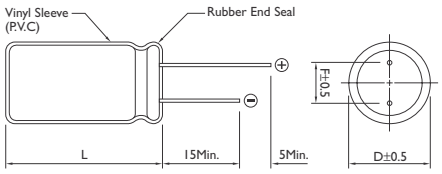
Dimensions : mm

Dø	F	dø
4.0	1.5	0.45
5.0	2.0	0.5
6.0	2.5	
8.0	3.5	
10.0	5.0	0.6
12.0		
13.0		
16.0	7.5	0.8
18.0		
22.0	10.0	0.8

Rubber Stand-off



$L \le 12$ L + 1.5Max.
$13 \le L \le 15$ $L^{+1.0}_{-0.5}$
$L \ge 16$ L + 2.0Max.



CASE SIZE OF STANDARD PRODUCTS Dø ≥ 6mm with Safety Vent at Can Bottom

CAP. (μF)	RATED VOLTAGE								
	6.3			10			16		
	SIZE	Ripple	ESR	SIZE	Ripple	ESR	SIZE	Ripple	ESR
330							*8 x 11		0.066
470	8 x 11	582	0.100	8 x 11	760	0.072	8 x 15	995	0.056
							10 x 12	1030	0.053
680				8 x 11	760	0.056	8 x 20	1250	0.041
				8 x 15	995	0.067	10 x 15	1430	0.038
1000	8 x 15	950	0.053	8 x 20	1250	0.041	10 x 19	1820	0.023
				10 x 15	1430	0.038			
1200	8 x 20	1250	0.041	10 x 19	1820	0.023	*10 x 19	1900	0.023
	10 x 12	1240	0.044				10 x 22	2150	0.022
	10 x 15	1430	0.038						
1500	10 x 19	1820	0.023	*10 x 22	1920	0.025	13 x 20	2360	0.028
				10 x 25	2150	0.022			
2200	10 x 22	2150	0.023	13 x 20	2360	0.021	13 x 25	2770	0.025
2700	10 x 25	2200	0.022				13 x 30	3290	0.023
3300	*10 x 25	2200	0.024	13 x 25	2770	0.018			
	13 x 20	2360	0.021						
3900				13 x 30	3290	0.016			
4700	13 x 30	3290	0.016						

Note : * 1. D x L : mm

*2. Ripple Current :(mA r.m.s 105°C / 100KHz), ESR (Ω Max20°C / 100KHz)

3. "" is down size, Edurance is less 1000 hrs than standard

CASE SIZE OF STANDARD PRODUCTS Dø ≥ 6mm with Safety Vent at Can Bottom

CAP. (μF)	RATED VOLTAGE					
	25			35		
	SIZE	Ripple	ESR	SIZE	Ripple	ESR
220	8 x 11	760	0.072	8 x 15	995	0.056
				10 x 12	1030	0.053
270	*8 x 15		0.057	8 x 20	1250	0.041
330	10 x 12	1030	0.053	10 x 15	1430	0.038
470	8 x 20	1250	0.041	10 x 19	1820	0.023
	10 x 15	1430	0.038			
680	10 x 19	1820	0.028	13 x 20	2360	0.021
820	10 x 22	2150	0.024			
	10 x 25	2200	0.021			
1000	*10 x 30	2200	0.024	13 x 25	2770	0.025
	12 x 20	2360	0.025			
	13 x 25		0.021			
1200				13 x 30	3290	0.016
1500	13 x 30	2700	0.029			
2200						
2700						
3300						
3900						
4700						

Note : * 1. D x L : mm

*2. Ripple Current :(mA r.m.s 105°C / 100KHz), ESR (Ω Max20°C / 100KHz)

3. "" is down size, Edurance is less 1000 hrs than standard

SX [For Low Impedance & Low E.S.R]

105°C Single-Ended Lead Aluminum Electrolytic Capacitors For High Frequency Applications

Miniature Size Aluminum Electrolytic Capacitors

ELECTRICAL CHARACTERISTICS

Operating Temperature : -40° ~ +105°C

Working Voltage : 6.3 ~ 100V

Rate Capacitance Range : 22 ~ 15000μF

Capacitance Tolerance : -20 ~ +20%

DC Leakage Current (μA) : I = 0.01 CV or 3(μA) Whichever is greater.
(Measurements shall be Made After a 2 Minute Charge at Rated Working Voltage)

Dissipation Factor : at 120 Hz, 25°C

WV (V) :	6.3	10	16	25	35	50	63	80	100
D.F (%) :	19	16	14	12	10	8	8	7	7

For capacitor whose capacitance exceeds 1000μF. The value of D.F(%) is increased by 2% for every addition of 1000μF.

Temperature Characteristics : at 120 Hz

WV (V) :	6.3	10	16	25	35	50	63	100
Impedance : Z - 40°C / Z + 20°C	10	6	5	4	4	4	4	4

Load Life : At 105°C Assured with Full Rated Maximum Ripple Current Applied

Case Dia	øD ≤ 8	øD = 10	øD ≥ 12
Load Life	2000	3000	5000

(a) Capacitance Change : Within 20% of Initial Value

(b) Dissipation Factor : Not Exceed 200% of Initial Requirement

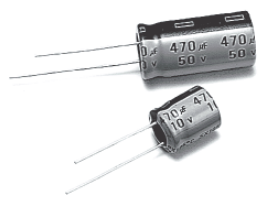
(c) Leakage Current : Not Exceed the Initial Requirement

Shelf Life : 1000 Hours, No Voltage Applied, at 105°C

(a) Capacitance Change : Within 20% of Initial Value

(b) Dissipation Factor : Not Exceed 200 % of Initial Requirement

(c) Leakage Current : Not Exceed 200% of Initial Requirement



DESCRIPTION

Used in switching regulator applications in computers. Especially for high frequency.

Low impedance and E.S.R., high permissible ripple current at high frequency and highter operation temperature (-40°C to +105°C).

High Temperature Load Life at 105°C for 2000 ~ 5000 Hours

Multiplier for Ripple Current

Frequency coefficient

Frequency(Hz)	50	120	300	1K	10K	100K
~4.4μF	0.30	0.40	0.50	0.70	0.80	1.00
5.6~33μF	0.40	0.50	0.60	0.80	0.90	1.00
34~330μF	0.60	0.70	0.80	0.90	0.95	1.00
331~1000μF	0.65	0.90	0.90	0.98	1.00	1.00
1200μF higher	0.85	0.90	0.95	0.98	1.00	1.00

Temperature coefficient

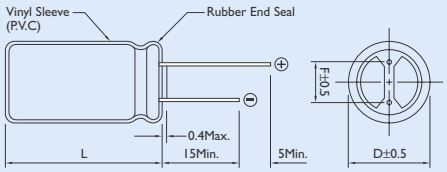
Temperature(°C)	65	85	105
Factor	1.80	1.50	1.00

DIAGRAM OF DIMENSIONS

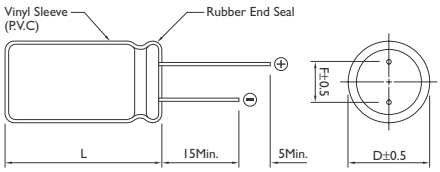
Dimensions : mm

Dø	F	dø
4.0	1.5	0.45
5.0	2.0	0.5
6.0	2.5	
8.0	3.5	
10.0	5.0	0.6
12.0		
13.0		
16.0	7.5	0.8
18.0		
22.0	10.0	0.8

Rubber Stand-off



L ≤ 12 L + 1.5Max.
13 ≤ L ≤ 15 $L^{+1.0}_{-0.5}$
L ≥ 16 L + 2.0Max.



CASE SIZE OF STANDARD PRODUCTS Dø ≥ 6mm with Safety Vent at Can Bottom

CAP. (μF)	RATED VOLTAGE								
	6.3			10			16		
	SIZE	Ripple	ESR	SIZE	Ripple	ESR	SIZE	Ripple	ESR
4.7									
6.8									
10				5 x 11	20	5.900			
							5 x 11	42	1.180
22				5 x 11	44	5.400	5 x 11	53	3.300
33				5 x 11	66	3.300	5 x 11	79	2.100
47				5 x 11	94	2.200	5 x 11	113	1.300
68				5 x 11	136	1.300	5 x 11	145	0.920
							6 x 11	163	0.920
100	5 x 11	166	1.500	5 x 11	170	1.150	6 x 11	190	1.100
				6 x 11	200	1.150	8 x 11	241	0.890
120	5 x 11	175	1.300	6 x 11	240	0.910	8 x 11	290	0.580
150	6 x 11	225	0.920	6 x 11	265	0.700	8 x 11	380	0.470
220	8 x 11	285	0.610	6 x 11	290	0.590	8 x 11	410	0.330
				8 x 11	370	0.480			
330	8 x 11	410	0.400	8 x 11	470	0.330	10 x 12	600	0.230
470	10 x 12	550	0.280	8 x 11	480	0.300	8 x 20	710	0.180
				10 x 12	590	0.240	10 x 15	750	0.180
680	10 x 15	735	0.220	8 x 20	790	0.180	10 x 19	1050	0.140
				10 x 15	750	0.170			
820	10 x 15	795	0.190	10 x 19	990	0.140	10 x 25	1220	0.120
1000	10 x 19	950	0.170	10 x 15	900	0.135	10 x 30	1400	0.091
				10 x 19	1060	0.120			
1200	10 x 19	1020	0.140	10 x 25	1290	0.120	10 x 25	1240	0.100
							12 x 25	1450	0.086
1500	10 x 19	1000	0.140	10 x 30	1450	0.093	12 x 25	1650	0.072
	10 x 25	1200	0.120						
2200	10 x 30	1450	0.095	12 x 30	1570	0.087	12 x 30	1820	0.069
				13 x 20	1900	0.073	13 x 25	2000	0.063
3300	12 x 35	1700	0.081	10 x 30	1690	0.077	13 x 40	2400	0.055
				12 x 35	2110	0.062			
4700	12 x 35	2110	0.063	13 x 40	2300	0.057	16 x 6	2650	0.046
				16 x 32	2450	0.054			
6800	16 x 32	2350	0.055	16 x 36	2680	0.046	18 x 36	2900	0.040
8200	16 x 36	2550	0.047	16 x 40	2850	0.038	18 x 40	3050	0.036
10000	16 x 40	2750	0.039	16 x 40	3050	0.037			
15000	18 x 40	2950	0.037						

Note : * 1. D x L : mm

*2. Ripple Current : (mA r.m.s 105°C / 100KHz)

*3. ESR (Ω Max20°C / 100KHz)

CASE SIZE OF STANDARD PRODUCTS Dø ≥ 6mm with Safety Vent at Can Bottom

CAP. (μF)	RATED VOLTAGE								
	25			35			50		
	SIZE	Ripple	ESR	SIZE	Ripple	ESR	SIZE	Ripple	ESR
4.7									
6.8							5 x 11	39	3.100
10				5 x 11	42	3.100	5 x 1	58	2.000
22	5 x 11	66	3.300	5 x 11	101	1.300	6 x 11	129	0.900
33	5 x 11	99	1.300	6 x 11	151	0.870	8 x 11	194	0.720
47	5 x 1	141	1.100	8 x 11	216	0.870	8 x 11	276	0.660
68	8 x 11	204	0.570	8 x 11	312	0.370	10 x 12	400	0.310
100	6 x 11	240	0.530	8 x 11	370	0.390	8 x 15	530	0.240
	8 x 11	300	0.420	10 x 12	460	0.320	10 x 15	635	0.200
120	8 x 11	400	0.380	10 x 12	550	0.260	10 x 15	670	0.170
150	10 x 12	460	0.330	10 x 12	600	0.230	10 x 19	860	0.150
220	10 x 15	630	0.230	10 x 12	690	0.210	10 x 15	780	0.150
				10 x 15	800	0.180	10 x 25	1030	0.110
330	10 x 12	690	0.220	10 x 19	1060	0.130	10 x 30	1070	0.110
	10 x 15	800	0.190				12 x 20	1220	0.092
							13 x 25	1300	0.086
470	10 x 15	890	0.165	10 x 30	990	0.089	12 x 25	1500	0.068
	10 x 19	1050	0.140	13 x 25	1060	0.086			
560	10 x 19	1170	0.120	12 x 20	1500	0.080			
	12 x 16	1200	0.120						
680	10 x 30	1400	0.090	12 x 25	1650	0.070	12 x 35	1850	0.058
820	12 x 25	1450	0.085	12 x 30	1750	0.066	12 x 40	2020	0.052
1000	12 x 20	1420	0.091	12 x 30	2000	0.061	16 x 25	1800	0.060
	12 x 25	1650	0.078				16 x 32	2120	0.050
1200	12 x 30	1700	0.070	12 x 35	2200	0.049	16 x 36	2260	0.043
1500	12 x 30	1950	0.062	12 x 40	2350	0.046	16 x 40	2420	0.035
2200	12 x 40	2360	0.054	16 x 36	2700	0.044			
3300	16 x 36	2700	0.045	18 x 40	3050	0.035			
3900									
4700	18 x 40	3000	0.036						
6800									
8200									
10000									
15000									

Note : * 1. D x L : mm

*2. Ripple Current : (mA r.m.s 105°C / 100KHz)

*3. ESR (Ω Max20°C / 100KHz)

CASE SIZE OF STANDARD PRODUCTS Dø ≥ 6mm with Safety Vent at Can Bottom

CAP. (μF)	RATED VOLTAGE								
	SIZE	63 Ripple	ESR	SIZE	80 Ripple	ESR	SIZE	100 Ripple	ESR
4.7	5 x 11	36	4.600	5 x 11	43	4.200	5 x 11	65	4.100
6.8	5 x 11	52	4.300	5 x 11	62	1.900	8 x 11	94	1.300
10	5 x 11	77	2.000	6 x 11	92	1.400	8 x 11	138	1.100
15	6 x 11	116	1.400	8 x 11	138	1.100	8 x 11	207	0.800
22	8 x 11	170	1.200	8 x 11	203	0.640	10 x 12	305	0.530
33	8 x 11	256	0.660	10 x 12	305	0.540	10 x 15	500	0.350
47	10 x 12	365	0.560	10 x 15	410	0.360	10 x 19	600	0.300
68	10 x 15	500	0.360	10 x 19	600	0.260	10 x 25	795	0.190
100	10 x 15	750	0.310	10 x 25	795	0.190	10 x 30	870	0.170
							13 x 20	955	0.150
120	10 x 19	820	0.270	10 x 30	900	0.170	12 x 30	1040	0.130
150	10 x 25	950	0.200	10 x 30	955	0.150	12 x 30	1200	0.110
180							13 x 25	1300	0.100
220	12 x 25	1150	0.160	12 x 30	1200	0.130	16 x 32	1440	0.086
330	12 x 30	1360	0.140	12 x 35	1450	0.088	16 x 32	1610	0.070
	13 x 25	1420	0.130				16 x 36	1790	0.062
470	12 x 35	1780	0.091	16 x 32	1790	0.063	16 x 40	2160	0.048
							18 x 36	2200	0.047
560									
680	16 x 32	2050	0.065	16 x 40	1990	0.058			
820	16 x 36	2200	0.056	18 x 36	2200	0.050			
1000	18 x 36	2330	0.049	18 x 40	2370	0.044			
1200	18 x 40	2520	0.046						
1500									
2200									
3300									
3900									
4700									
6800									
8200									
10000									
15000									

Note : * 1. D x L : mm

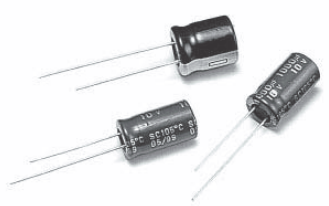
*2. Ripple Current : (mA r.m.s 105°C / 100KHz)

*3. ESR (Ω Max25°C / 100KHz)

Miniature Size Aluminum Electrolytic Capacitors

SY [For Low Impedance and Low E.S.R Suitable for Output of Mother Board]

105°C Single-Ended Lead Aluminum Electrolytic Capacitors For High Frequency Applications



DESCRIPTION

Used in switching regulator applications in computers. Especially for high frequency.

Low impedance and E.S.R., high permissible ripple current at high frequency and higher operating temperature (-40°C to +105°C).

High Temperature Load Life at 105°C for 6000 Hours

Frequency coefficient

Frequency(Hz)	120	1K	10K	100K
22~180μF	0.40	0.75	0.90	1.00
220~560μF	0.50	0.85	0.94	1.00
680~1800μF	0.60	0.87	0.95	1.00
2200~3900μF	0.75	0.90	0.95	1.00
4700μF Higher	0.85	0.95	0.98	1.00

Temperature coefficient

Temperature(°C)	65	85	105
Factor	1.80	1.50	1.00

ELECTRICAL CHARACTERISTICS

Operating Temperature : -40° ~ +105°C

Working Voltage : 6.3 ~ 50V

Rate Capacitance Range : 22 ~ 15000μF

Capacitance Tolerance : -20 ~ +20%

DC Leakage Current (μA) : I = 0.01 CV(μA) or 3μA Whichever is greater.
(Measurements shall be Made After a 2 Minute Charge at Rated Working Voltage)

Dissipation Factor : at 120 Hz, 25°C

WV (V) :	6.3	10	16	25	35	50
D.F (%) :	22	19	16	14	12	10

For capacitor whose capacitance exceeds 1000μF. The value of D.F(%) is increased by 2% for every addition of 1000μF.

WV (V) : Rated Voltage (V)	6.3	10	16	25	35	50
Impedance : Z - 25°C / Z + 20°C	4	3	2	2	2	2
Impedance : Z - 40°C / Z + 20°C	8	6	4	3	3	3

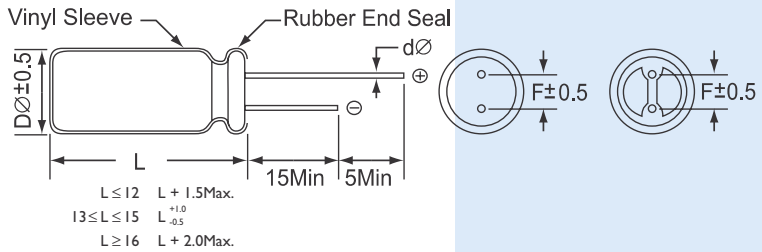
Dø :	5ø~6.3ø	8ø~10øx12	10øx15~12ø	13ø~18ø
Life :	3000hrs	4000hrs	5000hrs	6000hrs

If dimension is down size , Endurance will be less 1000 hrs than standard.
(a) Capacitance Change : Within 20% of Initial Value
(b) Dissipation Factor : Not Exceed 200% of Initial Requirement
(c) Leakage Current : Not Exceed the Initial Requirement

Shelf Life : 1000 Hours, No Voltage Applied, at 105°C
(a) Capacitance Change : Within 20% of Initial Value
(b) Dissipation Factor : Not more than 200% of specified value
(c) Leakage Current : Not more than 200% of specified value

DIAGRAM OF DIMENSIONS

■ Dimensions[mm]



Dimensions : mm

Dø	F	dø
4.0	1.5	0.45
5.0	2.0	0.5
6.0	2.5	
8.0	3.5	
10.0	5.0	0.6
12.0		
13.0		
16.0	7.5	0.8
18.0		
22.0	10.0	0.8

CASE SIZE OF STANDARD PRODUCTS Dø ≥ 6mm with Safety Vent at Can Bottom

CAP. (μF)	RATED VOLTAGE								
	6.3			10			16		
	Size	Ripple	Impedance	Size	Ripple	Impedance	Size	Ripple	Impedance
56							5 x 11	210	0.580
100				5 x 11	210	0.580			
120							6.3 x 11	340	0.220
150	5 x 11	210	0.580						
220	6 x 11	210	0.580	6 x 11	340	0.220			
330	6 x 11	340	0.220				8 x 11	640	0.130
470				8 x 11	640	0.130	8 x 15	840	0.087
							10 x 12	865	0.080
680	8 x 11	640	0.130	8 x 15	840	0.087	8 x 20	1050	0.069
							10 x 15	1210	0.060
820	10 x 12	865	0.080	10 x 12	865	0.080			
1000	8 x 15	840	0.087	8 x 20	1050	0.069	10 x 19	1400	0.046
				10 x 15	1210	0.060	13 x 15	1450	0.049
1200	8 x 20	1050	0.069	10 x 19	1400	0.046	10 x 25	1650	0.042
	10 x 15	1210	0.060						
1500	10 x 19	1400	0.046	10 x 25	1650	0.042	10 x 30	1910	0.031
				13 x 15	1450	0.049	13 x 20	1900	0.035
							16 x 15	1940	0.042
1800	13 x 15	1450	0.049						
2200	10 x 25	1650	0.042	10 x 30	1910	0.031	13 x 25	2230	0.027
				13 x 20	1900	0.042	18 x 15	2210	0.043
				16 x 15	1940	0.042			
2700	10 x 30	1910	0.031	18 x 15	2210	0.043	13 x 30	2650	0.024
	16 x 15	1940	0.042				16 x 20	2530	0.027
3300	13 x 20	1900	0.035	13 x 25	2230	0.027	13 x 35	2880	0.020
3900	13 x 25	2230	0.027	13 x 30	2650	0.024	13 x 40	3350	0.017
	18 x 15	2210	0.043	16 x 20	2530	0.027	16 x 25	2930	0.021
							18 x 20	2860	0.026
4700	13 x 30	2650	0.024	13 x 35	2880	0.020	16 x 32	3450	0.017
							18 x 25	3140	0.019
5600	13 x 35	2880	0.020	13 x 40	3350	0.017	16 x 36	3610	0.015
	16 x 20	2530	0.027	16 x 25	2930	0.021	18 x 32	4170	0.015
				18 x 20	2860	0.026			
6800	13 x 40	3350	0.017	16 x 32	3450	0.017	16 x 40	4080	0.013
	16 x 25	2930	0.021	18 x 25	3140	0.019			
	18 x 20	2860	0.026						
8200	16 x 32	3450	0.017	16 x 36	3610	0.015	18 x 36	4220	0.014
				18 x 32	4170	0.015			
10000	16 x 36	3610	0.015	16 x 40	4080	0.013	18 x 40	4280	0.012
	18 x 25	3140	0.017	18 x 36	4220	0.014			
12000	18 x 32	4170	0.015	18 x 40	4280	0.012			
15000	18 x 36	4220	0.014						

Note : * 1. D x L : mm

*2. Ripple Current : (mA r.m.s 105°C / 100KHz), Impedance (Ω Max25°C / 100KHz)

CASE SIZE OF STANDARD PRODUCTS Dø ≥ 6mm with Safety Vent at Can Bottom

CAP. (μF)	RATED VOLTAGE								
	25			35			50		
	Size	Ripple	Impedance	Size	Ripple	Impedance	Size	Ripple	Impedance
22							5 x 11	180	0.700
33				5 x 11	210	0.580			
47	5 x 11	210	0.580						
56				6 x 11	340	0.220	6 x 11	295	0.300
100	6 x 11	340	0.220				8 x 11	555	0.170
120	6 x 11	340	0.220				8 x 15	730	0.120
150				8 x 11	640	0.130	10 x 12	760	0.120
180							8 x 20	910	0.091
220	8 x 11	640	0.130	8 x 15	840	0.087	10 x 15	1050	0.084
				10 x 12	865	0.080			
270				8 x 20	1050	0.069	10 x 19	1220	0.060
							13 x 15	1260	0.061
330	8 x 15	840	0.087	10 x 15	1210	0.060	10 x 25	1440	0.055
	10 x 12	865	0.080						
470	8 x 20	1050	0.069	10 x 19	1400	0.046	10 x 30	1690	0.043
	10 x 15	1210	0.060	13 x 15	1450	0.049	13 x 20	1660	0.045
							16 x 15	1690	0.055
560				10 x 25	1650	0.042	13 x 25	1950	0.034
							18 x 15	1930	0.054
680	10 x 19	1400	0.046	10 x 30	1910	0.031	13 x 30	2310	0.030
	13 x 15	1450	0.049	13 x 20	1900	0.035			
				16 x 15	1940	0.042			
820	10 x 25	1650	0.042				13 x 35	2510	0.025
							16 x 20	2210	0.034
1000	10 x 30	1910	0.031	13 x 25	2230	0.027	13 x 40	2920	0.021
	13 x 20	1900	0.035	18 x 15	2210	0.043	16 x 25	2555	0.025
	16 x 15	1940	0.042				18 x 20	2490	0.036
1200	18 x 15	2210	0.043	13 x 30	2650	0.024	16 x 32	3010	0.022
				16 x 20	2530	0.027	18 x 25	2740	0.026
1500	13 x 25	2230	0.027	13 x 35	2880	0.020	16 x 36	3150	0.019
1800	13 x 30	2650	0.024	13 x 40	3350	0.017	16 x 40	3710	0.016
	16 x 20	2530	0.027	16 x 25	2930	0.021	18 x 32	3635	0.021
				18 x 20	2860	0.026			
2200	13 x 35	2880	0.020	16 x 32	3450	0.017	18 x 36	3680	0.017
	18 x 20	2860	0.026	18 x 25	3140	0.019			
2700	13 x 40	3350	0.017	16 x 36	3610	0.015	18 x 40	3800	0.014
	16 x 25	2930	0.021	18 x 32	4170	0.015			
3300	16 x 32	3450	0.017	16 x 40	4080	0.013			
	16 x 25	3140	0.019	18 x 36	4220	0.014			
3900	18 x 32	4170	0.015	18 x 40	4280	0.012			
4700	18 x 36	4220	0.014						
5600	18 x 40	4280	0.012						

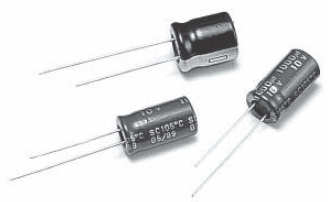
Note : * 1. D x L : mm

*2. Ripple Current : (mA r.m.s 105°C / 100KHz), Impedance (Ω Max25°C / 100KHz)

Miniature Size Aluminum Electrolytic Capacitors

SZ [Ultra Low ESR]

105°C Single-Ended Lead Aluminum Electrolytic Capacitors For High Frequency Applications



DESCRIPTION

Used in switching regulator applications in computers. Especially for high frequency.

Low impedance and E.S.R., high permissible ripple current at high frequency and higher operating temperature (-40°C to +105°C).

High Temperature Load Life at 105°C for 2000 Hours

Frequency coefficient

Frequency(Hz)	120	1K	10K	100K ≤
Factor	0.50	0.80	0.90	1.00

Temperature coefficient

Temperature(°C)	65	85	105
Factor	2.10	1.70	1.00

ELECTRICAL CHARACTERISTICS

Operating Temperature : -40° ~ +105°C

Working Voltage : 6.3 ~ 16V

Rate Capacitance Range : 470 ~ 3300μF

Capacitance Tolerance : -20 ~ +20%

DC Leakage Current (μA) : I = 0.03 CV Whichever is greater.
(Measurements shall be Made After a 2 Minute Charge at Rated Working Voltage)

Dissipation Factor : at 120 Hz, 25°C

WV (V) :	6.3	10	16
D.F (%) :	22	19	16

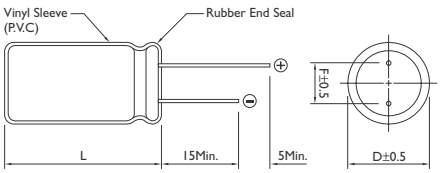
For capacitor whose capacitance exceeds 1000μF. The value of D.F(%) is increased by 2% for every addition of 1000μF.

WV (V) : Rated Voltage (V)	6.3	10	16
Impedance : Z - 25°C / Z + 20°C	2	2	2
Impedance : Z - 40°C / Z + 20°C	3	3	3

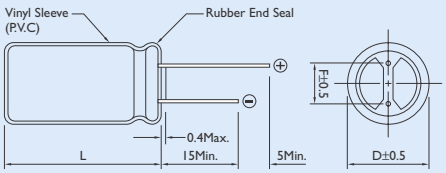
Load Life : 2000 Hours at 105°C Assured with Full Rated Maximum Ripple Current Applied
(a) Capacitance Change : Within 20% of Initial Value
(b) Dissipation Factor : Not Exceed 200% of Initial Requirement
(c) Leakage Current : Not Exceed the Initial Requirement

Shelf Life : 1000 Hours, No Voltage Applied, at 105°C
(a) Capacitance Change : Within 20% of Initial Value
(b) Dissipation Factor : Not Exceed 200 % of Initial Requirement
(c) Leakage Current : Not Exceed 200% of Initial Requirement

DIAGRAM OF DIMENSIONS



Rubber Stand-off



L ≤ 12 L + 1.5Max.
13 ≤ L ≤ 15 $L^{+1.0}_{-0.5}$
L ≥ 16 L + 2.0Max.

Dimensions : mm

Dø	F	dø
4.0	1.5	0.45
5.0	2.0	0.5
6.0	2.5	
8.0	3.5	
10.0	5.0	0.6
12.0		
13.0		
16.0	7.5	0.8
18.0		
22.0	10.0	0.8

CASE SIZE OF STANDARD PRODUCTS Dø ≥ 6mm with Safety Vent at Can Bottom

CAP. (μF)	RATED VOLTAGE WV								
	6.3			10			16		
	SIZE	Ripple	ESR	SIZE	Ripple	ESR	SIZE	Ripple	ESR
470							8 x 11	1140	36
680				8 x 11	1140	36	8 x 15	1490	28
							10 x 12	1540	26
820	8 x 11	1140	36						
1000				8 x 15	1490	28	8 x 20	1870	19
				10 x 12	1540	26	10 x 15	2000	19
1200	8 x 15	1490	28						
1500	10 x 12	1540	26	8 x 20	1870	19	10 x 19	2550	13
				10 x 15	2000	19			
1800	8 x 20	1870	19	10 x 19	2550	13	10 x 22	2800	12
	10 x 15	2000	19						
2200	10 x 19	2550	13	10 x 22	2800	12			
3300	10 x 22	2800	12						

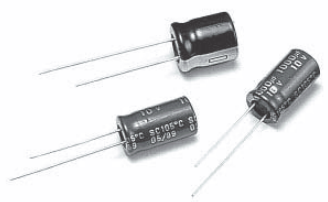
Note : * 1. D x L : mm

*2. Ripple Current : (mA r.m.s 105°C / 100KHz), ESR (MΩ Max25°C / 100KHz)

Miniature Size Aluminum Electrolytic Capacitors

SQ [High Temperature for +125°C]

125°C Single-Ended Lead Aluminum Electrolytic Capacitors For High Frequency Applications



DESCRIPTION

Wide operating temperature range it as long load life product at 125°C

Suit for use in DC or pulse circuits in various electronic and industrial

ELECTRICAL CHARACTERISTICS

Operating Temperature : -40° ~ +125°C

Working Voltage : 10 ~ 50V

Rate Capacitance Range : 4.7 ~ 3900μF

Capacitance Tolerance : -20 ~ +20%

DC Leakage Current (μA) : I ≤ 0.03 CV(μA) or 4μA Whichever is greater.
(Measurements shall be Made After a 2 Minute Charge at Rated Working Voltage)

Dissipation Factor : at 120 Hz, 25°C

WV (V) :	10	16	25	35	50
D.F (%) :	15	12	10	10	8

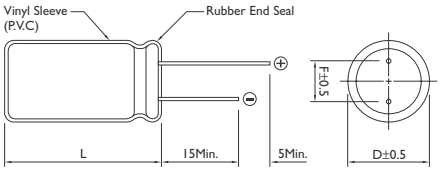
Value in ()are applicable for products which dimensions are in ().

WV (V)	: Rated Voltage (V)	10	16	25	35	50
Impedance	: Z - 25°C / Z + 20°C	3	2	2	2	2
Impedance	: Z - 40°C / Z + 20°C	6	4	4	4	4

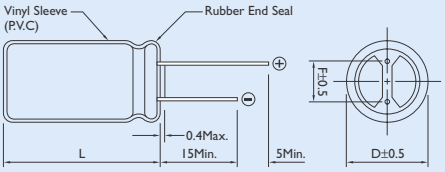
Load Life : 1000 Hours at 125°C Assured with Full Rated Maximum Ripple Current Applied
(a) Capacitance Change : Within 20% of Initial Value
(b) Dissipation Factor : Not Exceed 200% of Initial Requirement
(c) Leakage Current : Not Exceed the Initial Requirement

Shelf Life : 1000 Hours, No Voltage Applied, at 125°C
(a) Capacitance Change : Within 20% of Initial Value
(b) Dissipation Factor : Not Exceed 200 % of Initial Requirement
(c) Leakage Current : Not Exceed 200% of Initial Requirement

DIAGRAM OF DIMENSIONS



Rubber Stand-off



L ≤ 12 L + 1.5Max.
13 ≤ L ≤ 15 $L^{+1.0}_{-0.5}$
L ≥ 16 L + 2.0Max.

Dimensions : mm

Dø	F	dø
4.0	1.5	0.45
5.0	2.0	0.5
6.0	2.5	
8.0	3.5	
10.0	5.0	0.6
12.0		
13.0		
16.0	7.5	0.8
18.0		
22.0	10.0	0.8

CASE SIZE & PERMISSIBLE RIPPLE CURRENT OF STANDARD PRODUCTS

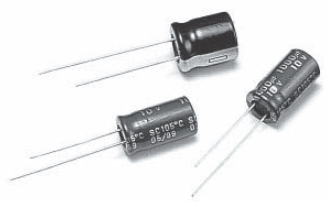
CAP. (μF)	RATED VOLTAGE WV				
	10	16	25	35	50
0.47					8 x 11
1					8 x 11
2.2					8 x 11
3.3					8 x 11
4.7					8 x 11
10					8 x 11
22				8 x 11	10 x 12
33			8 x 11	10 x 12	10 x 15
47		8 x 11	10 x 12	10 x 15	10 x 19
100	10 x 12	10 x 15	10 x 19	13 x 20	13 x 25
220	10 x 19	13 x 20	13 x 25	16 x 25	
330	13 x 20	13 x 25	16 x 25		
470	13 x 25	16 x 25			
1000			16 x 32		
2200			16 x 32		
3900			18 x 36		

Note : * 1. D x L : mm

Miniature Size Aluminum Electrolytic Capacitors

SV [For adapter and power supply applications Series]

105°C Single-Ended Lead Aluminum Electrolytic Capacitors For High Frequency Applications



DESCRIPTION

Used in switching regulator applications in computers. Especially for high frequency.

Low impedance and E.S.R., high permissible ripple current at high frequency and higher operating temperature (-40°C to +105°C).

ELECTRICAL CHARACTERISTICS

Operating Temperature : -40° ~ +105°C -25° ~ +105°C

Working Voltage : 200V 400V

Rate Capacitance Range : 22 ~ 220μF 10 ~ 150μF

Capacitance Tolerance : -20 ~ +20%

DC Leakage Current (μA) : I = 0.06 CV + 10(μA)
whichever is greater.(After 2 minutes application of rated voltage at 25°C)

Dissipation Factor : at 120 Hz, 25°C

WV (V) :	200	400
D.F (%) :	15	20

WV (V) :	200	400
Impedance : Z - 25°C / Z + 20°C	3	5
Impedance : Z - 40°C / Z + 20°C	6	—

Load Life : After apply rated voltage with rated ripple current for 2000hrs at 105°C the capacitors shall meet the following reuirements.
(a) Capacitance Change : Within 20% of Initial Value
(b) Dissipation Factor : Not Exceed 200% of Initial Requirement
(c) Leakage Current : Not Exceed the Initial Requirement

Shelf Life : 1000 Hours, No Voltage Applied, at 105°C
(a) Capacitance Change : Within 20% of Initial Value
(b) Dissipation Factor : Not Exceed 200 % of Initial Requirement
(c) Leakage Current : Not Exceed 200% of Initial Requirement

Frequency coefficient

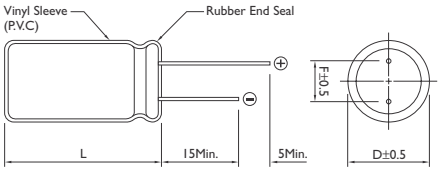
Frequency(Hz)	120	500	1K	10K~100K
Coefficient	1.00	1.20	1.40	1.50

Temperature coefficient

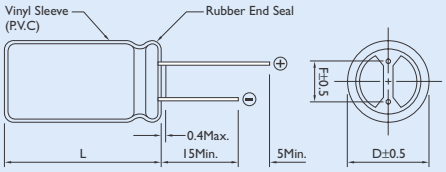
Temperature(°C)	65	85	105
Factor	2.10	1.70	1.00

DIAGRAM OF DIMENSIONS

Dimensions : mm



Rubber Stand-off



L ≤ 12 L + 1.5Max.
13 ≤ L ≤ 15 $L^{+1.0}_{-0.5}$
L ≥ 16 L + 2.0Max.

Dø	F	dø
4.0	1.5	0.45
5.0	2.0	0.5
6.0	2.5	
8.0	3.5	
10.0	5.0	0.6
12.0		
13.0		
16.0	7.5	0.8
18.0		
22.0	10.0	0.8

PERMISSIBLE RIPPLE CURRENT (mA, rms) at 105°C, 120HZ

CAP. (μF)	RATED VOLTAGE W V			
	200		400	
	Size	Ripple	Size	Ripple
10			10 x 15	64
			10 x 19	120
			13 x 25	200
22	10 x 19	233	12 x 25	190
			13 x 25	225
			16 x 25	300
33	13 x 20	366	16 x 20	360
			16 x 25	400
			16 x 32	437
47	13 x 25	400	13 x 30	370
			16 x 25	450
			18 x 25	470
			18 x 32	538
68	13 x 25	600	13 x 40	480
			18 x 25	480
82			16 x 32	520
			18 x 32	520
100	16 x 32	800	18 x 32	580
120			18 x 32	670
			18 x 32	670
150			18 x 36	700
220	16 x 36	933		

Note : * 1. D x L : mm

*2. Ripple Current : (mA r.m.s 105°C / 120Hz)

Miniature Size Aluminum Electrolytic Capacitors

SF [For Photo Flash Applications]

105°C Single-Ended Lead, 5.0mm Height Type Aluminum Electrolytic Capacitors

DESCRIPTION

Applications : Digital Camera

ELECTRICAL CHARACTERISTICS

Operating Temperature : -25° ~ +55°C

Working Voltage : 300, 330, 360V

Rate Capacitance Range : 36 ~ 300μF

Capacitance Tolerance : -10 ~ +20%

DC Leakage Current : I = 1xC (μA) max.(After 5 minute)

Dissipation Factor : Less than 0.06

Charge and Discharge Characteristics :

Test condition	: For 5000 times at room temperature (5~35°C)
Charge & discharge cycles	: 30 sec
Leakage current	: ≤150% of initial specified value
Capacitance change	: within ± 10% of initial value
tan d(DF)	: ≤150% of initial specified value

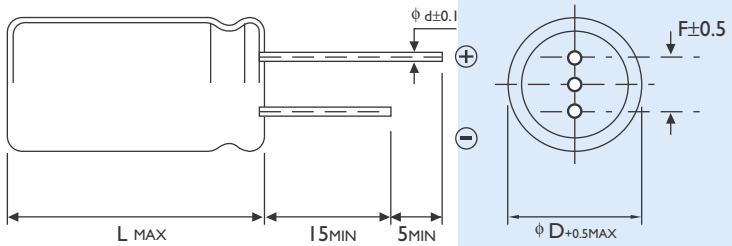
Shelf Life:

Storae without voltage applied at 55°C for 1000 hours and measured at 25°C

(a) Leakage current	: ≤150% of initial specified value
(b) Capacitance change	: within ± 20% of initial value
(c) tan 8(DF)	: ≤150% of initial specified value

DIAGRAM OF DIMENSIONS

Flat Rubber



Dimensions : mm

Dø	F	dø
10	5.0	0.6
12.5	5.0	0.8
13	5.0	0.8
14.5	7.5	0.8
16	7.5	0.8
18	7.5	0.8
20	7.5	0.8

CASE SIZE & PERMISSIBLE RIPPLE CURRENT OF STANDARD PRODUCTS

CAP. (μF)	RATED VOLTAGE WV						
	10	12.5	13	14.5	16	18	20
36	10 x 27						
47	10 x 30	12.5 x 20					
60	10 x 34	12.5 x 23					
80		12.5 x 27					
100		12.5 x 34	13 x 34	14.5 x 26			
120		12.5 x 37	13 x 34	14.5 x 30	16 x 27		
140		12.5 x 42	13 x 39	14.5 x 33	16 x 29	18 x 25	
160		12.5 x 47	13 x 43	14.5 x 36	16 x 32	18 x 27	
180				14.5 x 40	16 x 35	18 x 29	
200				14.5 x 43	16 x 38	18 x 31	
220				14.5 x 47	16 x 40	18 x 33	
240					16 x 43	18 x 36	
250						18 x 37	20 x 31
300						18 x 42	20 x 35

Note : * 1. D x L : mm

* 2. Flat Rubbet

LH [For 85°C, 2000 Hours Miniature]

For Printed Circuit Board High-Performance Aluminum Electrolytic Power Supply Input and Output Filter Capacitors

Miniature Size Aluminum Electrolytic Capacitors

ELECTRICAL CHARACTERISTICS

Operating Temperature Range	-40 to+85°C	-25 to+85°C
Rated Voltage Range	6.3 to 100VDC	160 to 450VDC
Capacitance Tolerance	±20% (at 25°C,120Hz)	
Leakage Current	I = 0.02CV or 3mA Whichever is smaller. (At 25°C, After 5 Minutes Application of DC Working Voltage at 25°C) Where, I; Leakage Current (μA) C: Nominal Capacitance (μF) V; Rated Voltage (V)	
Dissipation Factor		

Rate Voltage (V)	6.3	10	16	25	35	50~80	100	160~250	315~450
D.F (%)	60	50	40	25	25	20	15	10 *	15

Note: * (15%) For Case Size D = 35m/m or L = 20m/m (At 120Hz, 25°C)
(WV = 6.3 ~ 100V For Capacitor Whose Capacitance Exceeds 1000μF
The value of D.F(%) is increased by 2% for every addition of 1000μF.

Rated Voltage(v)	6.3~16	25	35	50~63	80~100	160~400	450
Z(-25°C) / Z(20°C)	3	3	3	2	2	4	8
Z(-40°C) / Z(20°C)	12	10	8	6	5	–	–

Load Life	After the capacitors are subjected to DC with the full rated ripple current applied at 85°C for 2000 hours. The following specifications shall be satisfied when the capacitors are restored to 25°C the sum of DC voltage and peak AC voltage must not exceed their full rated voltage.	
	Capacitance Change	≤ ±20% of the Inital Value
	D.F (tanδ)	≤ 200% of the Initial Specified Value
	Leakage Current	≤ the Initial Specified Value
Shelf Life	The following specifications shall be satisfied when the capacitor are restored to 25°C after exposing them for 1000 hours at 85°C without voltage applied.	
	Capacitance Change	≤ ±20% of the Inital Value
	D.F (%)	≤ 150% of the Intial Specified Value
	Leakage Current	≤ 150% of the Initial Speciffied Value

DESCRIPTION

LH type capacitiors, size are combined with snap-lock terminals for easy to mount on P.C. Board.

They are ideally suitable to be used in switching.

Power Supplies and Orther Industrial or Commercial Applications

Multiplier for Ripple Current

Frequency coefficient

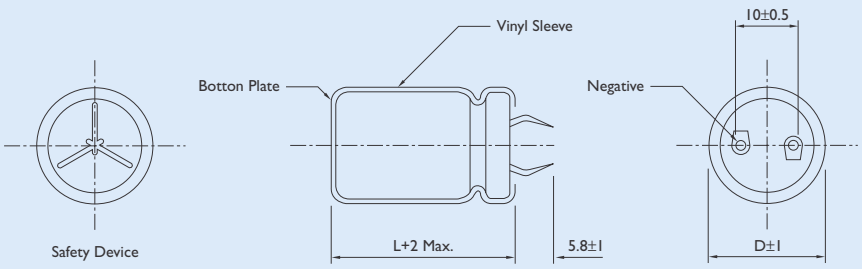
Frequency(Hz)	50	60	120	1K	10K~00K
6.3~100V	0.88	0.90	1.00	1.15	1.16
160~250V	0.75	0.78	1.00	1.16	1.23
350~450V	0.74	0.76	1.00	1.10	1.15

Temperature coefficient

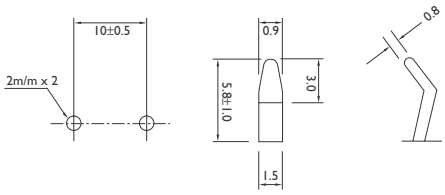
Temperature(°C)	60	70	85
Factor	1.42	1.30	1.00

DIAGRAM OF DIMENSIONS

Unit : mm



Location of P.C.B. Holes



CASE SIZE OF STANDARD PRODUCTS AND PERMISSIBLE RIPPLE CURRENT

CAP. (μF)	RATED VOLTAGE W V							
	6.3		10		16		25	
	Size	Ripple	Size	Ripple	Size	Ripple	Size	Ripple
5600							22 × 25	2.20
6800							22 × 30 25 × 25	2.40 2.45
8200					22 × 25	2.60	22 × 35 25 × 25	2.70 2.75
10000					22 × 30 25 × 25	2.70 2.75	22 × 40 25 × 30 30 × 25	3.10 3.15 3.20
12000			22 × 25	2.40	22 × 30 25 × 25	2.90 2.95	22 × 45 25 × 35 30 × 30 35 × 25	3.50 3.45 3.50 3.55
15000	22 × 25	2.44	22 × 30 25 × 25	2.75 2.75	22 × 35 25 × 30 30 × 25	3.30 3.45 3.50	22 × 50 25 × 40 30 × 35 35 × 30	4.00 3.95 4.00 4.05
18000	22 × 30 25 × 25	2.60 2.62	22 × 35 25 × 25	3.15 3.05	22 × 40 25 × 35 30 × 30	3.70 3.75 3.80	25 × 45 30 × 35 35 × 30	4.45 4.45 4.60
22000	22 × 30 25 × 25	3.06 3.07	22 × 40 25 × 30 30 × 25	3.55 3.50 3.55	22 × 50 25 × 40 30 × 30 35 × 25	4.35 4.30 4.25 4.20	30 × 40 35 × 35	5.20 5.15
27000	22 × 35 25 × 30 30 × 25	3.49 3.52 3.57	22 × 45 25 × 35 30 × 30	4.05 4.00 4.05	25 × 45 30 × 35 35 × 30	4.70 4.65 4.65	30 × 45 35 × 40	5.95 5.90
33000	22 × 40 25 × 35 30 × 30 35 × 25	3.97 4.02 4.05 4.10	22 × 50 25 × 40 30 × 30 35 × 25	4.60 4.55 4.50 4.50	30 × 40 35 × 30	5.35 5.40	30 × 50 35 × 45	6.70 6.75
39000	22 × 50 25 × 40 30 × 30 35 × 25	4.56 4.50 4.46 4.51	25 × 45 30 × 35 35 × 30	5.10 5.05 5.05	30 × 45 35 × 35	6.00 5.95	35 × 50	7.55
47000	25 × 45 30 × 35 35 × 30	5.09 5.06 5.03	25 × 50 30 × 40 35 × 30	5.75 5.70 5.65	30 × 50 35 × 40	6.80 6.75		
56000	25 × 50 30 × 40 35 × 30	5.71 5.70 5.75	30 × 45 35 × 35	6.45 6.40	35 × 45	7.60		
68000	30 × 45 35 × 35	6.48 6.42	30 × 50 35 × 40	7.05 7.10	35 × 50	8.00		
82000	30 × 50 35 × 40	7.32 7.29	35 × 50	7.50				
100000	35 × 45	8.31						
120000	35 × 50	8.60						

Note : *1. D x L : mm

*2. Ripple Current : (mA r.m.s 85°C / 120Hz)

CASE SIZE OF STANDARD PRODUCTS AND PERMISSIBLE RIPPLE CURRENT

CAP. (μF)	RATED VOLTAGE W V							
	35		50		63		80	
	Size	Ripple	Size	Ripple	Size	Ripple	Size	Ripple
1200							22 × 25	1.65
1500							22 × 30 25 × 25	1.90 1.90
1800					22 × 25	1.85	22 × 35 25 × 30 30 × 25	2.20 2.20 2.20
2200			22 × 25	1.90	22 × 30 25 × 25	2.30 2.30	22 × 40 25 × 30 30 × 25	2.45 2.45 2.50
2700			22 × 30 25 × 25	2.10 2.20	22 × 35 25 × 30 30 × 25	2.45 2.45 2.50	22 × 45 25 × 35 30 × 30 35 × 25	2.80 2.80 2.85 2.85
3000			22 × 30 25 × 25	2.35 2.35	22 × 40 25 × 30 30 × 25	2.60 2.65 2.70	22 × 50 25 × 40 30 × 30 35 × 25	3.15 3.20 3.20 3.20
3900	22 × 25	2.20	22 × 35 25 × 30 30 × 25	2.65 2.65 2.65	22 × 45 25 × 35 30 × 30	2.95 2.95 3.00	25 × 45 30 × 35 35 × 30	3.60 3.60 3.60
4700	22 × 30 25 × 25	2.40 2.40	22 × 40 25 × 35 30 × 25	3.00 3.00 2.95	22 × 50 25 × 40 30 × 30 35 × 25	3.40 3.35 3.35 3.40	25 × 50 30 × 40 35 × 35	4.05 4.05 4.10
5600	22 × 35 25 × 25	2.75 2.75	22 × 45 25 × 40 30 × 30 35 × 25	3.35 3.35 3.35 3.40	25 × 45 30 × 35 35 × 30	3.70 3.75 3.75	30 × 45 35 × 35	4.55 4.50
6800	22 × 40 25 × 30 30 × 25	2.85 2.85 2.90	22 × 50 25 × 40 30 × 30 30 × 35 35 × 30	3.80 3.80 3.80 3.85 3.85	30 × 40 35 × 30	4.25 4.20	30 × 50 35 × 40	5.15 5.15
8200	22 × 45 25 × 35 30 × 30	3.15 3.10 3.15	25 × 50 30 × 40 35 × 30	4.35 4.35 4.40	30 × 45 35 × 35	4.80 4.80	35 × 45	5.85
10000	22 × 50 25 × 40 30 × 30 35 × 25	3.55 3.50 3.45 3.40	30 × 45 35 × 35	5.00 4.95	30 × 50 35 × 40	5.50 5.45	35 × 50	6.60
12000	25 × 45 30 × 35 35 × 30	3.95 4.00 4.05	30 × 50 35 × 40	5.60 5.55	35 × 45	6.20		
15000	25 × 50 30 × 40 35 × 35	4.95 4.95 5.00	35 × 45	6.45				
18000	30 × 45 35 × 40	5.50 5.55	35 × 50	6.70				
22000	30 × 50 35 × 45	6.00 6.05						
27000	35 × 50	6.90						

Note : *1. D x L : mm

*2. Ripple Current : (mA r.m.s 85°C / 120Hz)

CASE SIZE OF STANDARD PRODUCTS AND PERMISSIBLE RIPPLE CURRENT

CAP. (μF)	RATED VOLTAGE W V							
	100		160		180		200	
	Size	Ripple	Size	Ripple	Size	Ripple	Size	Ripple
180					22 × 20	1.00	22 × 25	0.95
220					22 × 25	1.10	22 × 25	1.10
270			22 × 25	1.15	22 × 25 25 × 20	1.25 1.25	22 × 25 22 × 30 25 × 25	1.25 1.25 1.25
330			22 × 25 25 × 20	1.40 1.35	22 × 25 22 × 30 25 × 25	1.40 1.40 1.40	22 × 25 22 × 30 25 × 25	1.45 1.45 1.45
390			22 × 30 25 × 25 30 × 25	1.55 1.55 1.50	22 × 30 25 × 25	1.60 1.60	22 × 30 25 × 25	1.60 1.55
470			22 × 30 25 × 25 30 × 25	1.75 1.75 1.70	22 × 35 25 × 30 30 × 25	1.80 1.80 1.80	22 × 35 25 × 30 30 × 25	1.80 1.80 1.80
560			22 × 30 25 × 30 30 × 25	1.95 1.95 1.90	22 × 35 22 × 40 25 × 30 30 × 25	2.00 2.00 1.95 2.00	22 × 40 25 × 35 30 × 25	2.00 2.00 2.00
680			22 × 40 25 × 30 30 × 25	2.20 2.20 2.15	22 × 45 25 × 35 30 × 30 30 × 25	2.25 2.20 2.20 2.20	22 × 45 25 × 35 30 × 30 35 × 25	2.35 2.30 2.30 2.30
820	22 × 25	1.85	22 × 45 25 × 35 30 × 30 35 × 25	2.50 2.55 2.50 2.50	22 × 50 25 × 40 30 × 30 30 × 35 35 × 25	2.55 2.55 2.60 2.60 2.60	25 × 40 25 × 45 30 × 30 30 × 35 35 × 30	2.60 2.60 2.60 2.60 2.60
1000	22 × 30 25 × 25	2.10 2.10	22 × 50 25 × 40 30 × 35 35 × 25	2.85 2.80 2.80 2.80	25 × 45 30 × 35 35 × 30	2.85 2.85 2.90	25 × 45 25 × 50 30 × 35 30 × 40 35 × 30	3.00 3.00 3.05 3.05 3.00
1200	22 × 35 25 × 30	2.40 2.45	25 × 45 30 × 35 35 × 30	3.15 3.15 3.20	30 × 40 35 × 30 35 × 35	3.25 3.30 3.30	25 × 50 30 × 40 30 × 45 35 × 30 35 × 35	3.30 3.30 3.30 3.30 3.30
1500	22 × 40 25 × 30 30 × 25	2.70 2.75 2.75	30 × 45 35 × 30 35 × 35	3.75 3.70 3.70	30 × 45 35 × 35 35 × 40	3.85 3.80 3.80	30 × 50 35 × 40	3.80 3.80
1800	22 × 45 25 × 35 30 × 30 35 × 25	3.10 3.15 3.15 3.15	30 × 50 35 × 40	4.20 4.20	35 × 40 35 × 45	4.30 4.30	35 × 45	4.35
2200	22 × 50 25 × 40 30 × 30 35 × 25	3.50 3.55 3.55 3.60	35 × 40 35 × 45	4.60 4.80	35 × 45 35 × 50	4.90 4.90	35 × 45 35 × 50	4.95 4.95
2700	25 × 45 30 × 35 35 × 25	4.10 4.05 4.05	35 × 50	5.45				
3300	25 × 50 30 × 40 35 × 30	4.50 4.55 4.50						
3900	30 × 45 35 × 35	5.15 5.10						
4700	35 × 40	5.75						
5600	35 × 50	6.20						

Note : *1. D x L : mm

*2. Ripple Current : (mA r.m.s 85°C / 120Hz)

CASE SIZE OF STANDARD PRODUCTS AND PERMISSIBLE RIPPLE CURRENT

CAP. (μF)	RATED VOLTAGE W V							
	250		350		400		450	
	Size	Ripple	Size	Ripple	Size	Ripple	Size	Ripple
47							22 × 25	0.50
56					22 × 20	0.55	25 × 25	0.65
68			22 × 20	0.55	22 × 25 22 × 20	0.60 0.60	22 × 30 22 × 25	0.70 0.70
82			22 × 25 25 × 20	0.65 0.65	22 × 25 25 × 20	0.80 0.80	22 × 30 25 × 25	0.80 0.80
100			22 × 30 25 × 20	0.90 0.90	22 × 30 25 × 25	0.90 0.90	22 × 35 25 × 30 30 × 25	0.95 0.95 0.95
120	22 × 20	0.78	22 × 30 25 × 25	1.00 1.00	22 × 35 25 × 25	1.05 1.05	22 × 40 25 × 30 30 × 25	1.05 1.05 1.05
150	22 × 25	0.90	22 × 35 25 × 30 30 × 25	1.15 1.15 1.15	22 × 35 25 × 30 30 × 25	1.15 1.15 1.15	22 × 45 25 × 35 30 × 30	1.20 1.20 1.20
180	22 × 25 25 × 20	1.05 1.00	22 × 40 25 × 30 30 × 25	1.30 1.25 1.25	22 × 45 25 × 35 30 × 30	1.30 1.30 1.35	25 × 40 30 × 35 35 × 25	1.35 1.35 1.35
220	22 × 30 22 × 35 25 × 25	1.15 1.15 1.15	22 × 45 25 × 35 30 × 30 35 × 25	1.45 1.45 1.45 1.45	22 × 50 25 × 40 30 × 30 35 × 25	1.50 1.50 1.50 1.50	25 × 50 30 × 40 35 × 30	1.55 1.55 1.55
270	22 × 30 25 × 25	1.30 1.30	25 × 40 30 × 35 35 × 25	1.65 1.65 1.65	25 × 40 30 × 35 35 × 30	1.65 1.65 1.65	30 × 45 35 × 35	1.75 1.70
330	22 × 35 25 × 25 30 × 25	1.50 1.50 1.50	25 × 50 30 × 40 35 × 30	1.80 1.80 1.80	25 × 50 30 × 40 35 × 30	1.90 1.90 1.85	30 × 50 35 × 40	2.00 2.00
390	22 × 40 25 × 35 30 × 25	1.65 1.65 1.65	30 × 40 35 × 30	2.00 2.00	30 × 45 35 × 35	2.15 2.10	35 × 45	2.25
470	22 × 40 25 × 35 30 × 30 35 × 25	1.85 1.85 1.90 1.90	30 × 45 35 × 35	2.25 2.25	30 × 50 35 × 40	2.40 2.40	35 × 50	2.50
560	22 × 45 25 × 40 30 × 30 35 × 25	2.10 2.10 2.10 2.10	35 × 40	2.50	35 × 45	2.70		
680	25 × 45 30 × 35 35 × 30	2.45 2.45 2.45	35 × 45	2.90	35 × 50	2.90	35 × 60	2.9
820	30 × 45 35 × 30	2.75 2.75						
1000	30 × 50 35 × 40	3.30 3.30						
1200	35 × 40	3.55						
1500	35 × 45	4.05						

Note : *1. D x L : mm

*2. Ripple Current : (mA r.m.s 85°C / 120Hz)

Miniature Size Aluminum Electrolytic Capacitors

LG [For 105°C, 2000 Hours General]

For Printed Circuit Board High-Performance Aluminum Electrolytic Power Supply Input and Output Filter Capacitors

DESCRIPTION (LG Series 105°C 2000 Hours Assured)

LG type capacitors are combined with snaplock terminals for easy to mount on P.C. Board.

They are ideally suitable to be used in switching power supplies and other industrial or commercial applications.

Multiplier for Ripple Current

Frequency coefficient

Frequency(Hz)	50	60	120	1K	10K~00K
6.3~100V	0.88	0.90	1.00	1.15	1.16
160~250V	0.85	0.88	1.00	1.15	1.20
315~450V	0.88	0.9	1.00	1.10	1.15

Temperature coefficient

Temperature(°C)	60	70	85	105
Factor	2.37	2.17	1.67	1.00

ELECTRICAL CHARACTERISTICS

Rated Voltage Range	6.3 to 100VDC	160 to 450VDC
Operating Temperature Range	-40 to +105°C	-25 to+105°C
Capacitance Tolerance	±20% (At 25°C,120Hz)	
Leakage Current	I = 0.02CV, L = 20m/m, I = 0.03CV or 3mA Whichever is smaller. (At 25°C, After 5 Minutes) Where, I; Leakage Current (μA) C: Nominal Capacitance (μF) V; Rated Voltage (V)	

Dissipation Factor (tanδ)

Rate Voltage (V)	6.3	10	16	25	35	50~80	100	160~250	315~450
D.F (%)	60	50	40	25	25	20	15	10 *	15

* Note : 15% For D = 35m/m or L = 20m/m (At 25°C, 120Hz)

(WV = 6.3 ~ 100V For Capacitor Whose Capacitance Exceeds 1000μF

The value of D.F (%) is increased by 2% for every addition of 1000μF.)

Low Temperature Characteristics (120Hz)

Rated Voltage (V)	6.3~16	25	35	50~63	80~100	160~400	450
Z(-25°C) / Z(20°C)	4	3	3	2	2	4	8
Z(-40°C) / Z(20°C)	15	10	8	6	5	–	–

Load Life

The following specifications shall be satisfied when the capacitors are restored to 25°C after the rated voltage with maximum ripple current is applied for 2000 hours at 105°C.

Capacitance Change	≤ ±20% of the Inital Value
D.F	≤ 200% of the Initial Specified Value
Leakage Current	≤ the Initial Specified Value

Shelf Life

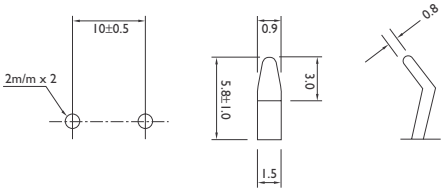
The following specifications shall be satisfied when the capacitor are restored to 25°C after exposing them for 1000 hours at 105°C without voltage applied.

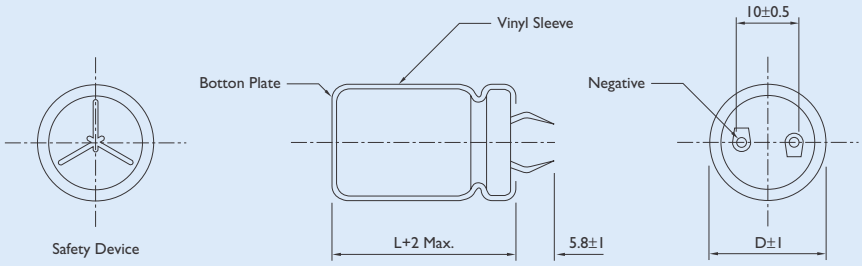
Capacitance Change	≤ ±20% of the Inital Value
D.F	≤ 150% of the Intial Specified Value
Leakage Current	≤ 150% of Initial Speciffied Value

DIAGRAM OF DIMENSIONS

Unit : mm

Location of P.C.B. Holes





CASE SIZE OF STANDARD PRODUCTS AND PERMISSIBLE RIPPLE CURRENT

CAP. (μF)	RATED VOLTAGE W V							
	6.3		10		16		25	
	Size	Ripple	Size	Ripple	Size	Ripple	Size	Ripple
4700							22 × 25	1.50
5600							22 × 30 25 × 25	1.65 1.65
6800					22 × 25	1.55	22 × 30 25 × 25	1.85 1.85
8200					22 × 30 25 × 25	1.70 1.70	22 × 35 25 × 30 30 × 25	2.10 2.10 2.15
10000			25 × 25	1.55	22 × 30 25 × 25	1.95 1.95	22 × 40 25 × 35 30 × 30 35 × 25	2.40 2.40 2.40 2.40
12000	22 × 25	1.55	22 × 30	1.75	22 × 35 25 × 30 30 × 25	2.20 2.25 2.30	22 × 45 25 × 40 30 × 30 35 × 25	2.70 2.75 2.70 2.75
15000	22 × 30 25 × 25	1.70 1.70	22 × 30 25 × 25	1.90 1.90	22 × 40 25 × 35 30 × 30 35 × 25	2.55 2.60 2.60 2.65	25 × 45 30 × 35 35 × 30	3.15 3.15 3.25
18000	22 × 30 25 × 25	1.95 1.95	22 × 35 25 × 30	2.20 2.25	22 × 45 25 × 40 30 × 30 35 × 25	2.90 2.90 2.90 2.95	25 × 50 30 × 40 35 × 35	3.55 3.55 3.55
22000	22 × 35 25 × 30 30 × 25	2.25 2.25 2.25	22 × 40 25 × 35 30 × 25	2.50 2.55 2.45	25 × 45 30 × 35 35 × 30	3.30 3.30 3.30	30 × 45 35 × 35	4.05 3.80
27000	22 × 40 25 × 35 30 × 30 35 × 25	2.55 2.55 2.55 2.55	22 × 50 25 × 40 30 × 30 35 × 25	2.95 2.90 2.85 2.80	25 × 50 30 × 40 35 × 30	3.80 3.75 3.75	35 × 45	4.70
33000	22 × 45 25 × 40 30 × 30 35 × 25	2.90 2.95 2.90 2.95	25 × 45 30 × 35 35 × 30	3.30 3.30 3.30	30 × 45 35 × 35	4.30 4.25	35 × 50	5.40
39000	25 × 50 30 × 35 35 × 30	3.25 3.25 3.30	25 × 50 30 × 40 35 × 30	3.70 3.70 3.65	30 × 50 35 × 40	4.80 4.80		
47000	25 × 50 30 × 40	3.70 3.70	30 × 45 35 × 35	4.20 3.80	35 × 45	5.45		
56000	30 × 45 35 × 35	4.15 4.10	30 × 50 35 × 40	4.65 4.65				
68000	30 × 50 35 × 40	4.70 4.70	35 × 50	5.50				
82000	35 × 45	5.30						

Note : *1. D x L : mm

*2. Ripple Current : (mA r.m.s 105°C / 120Hz)

CASE SIZE OF STANDARD PRODUCTS AND PERMISSIBLE RIPPLE CURRENT

CAP. (μF)	RATED VOLTAGE W V							
	35		50		63		80	
	Size	Ripple	Size	Ripple	Size	Ripple	Size	Ripple
820							22 × 25	1.10
1000							22 × 30 25 × 25	1.20 1.20
1200					22 × 25	1.20	22 × 30 25 × 25	1.40 1.40
1500					22 × 30 25 × 25	1.30 1.30	22 × 35 25 × 30 30 × 25	1.60 1.60 1.65
1800			22 × 25	1.30	22 × 30 25 × 25	1.50 1.50	22 × 40 25 × 35 30 × 25	1.80 1.85 1.80
2200			22 × 30 25 × 25	1.55 1.55	22 × 35 25 × 30 30 × 25	1.70 1.75 1.80	22 × 45 25 × 35 30 × 30 35 × 25	2.05 2.00 2.05 2.05
2700			22 × 30 25 × 25	1.70 1.70	22 × 40 25 × 35 30 × 25	2.00 2.00 1.95	25 × 45 30 × 35 35 × 30	2.35 2.35 2.35
3300	22 × 25	1.40	22 × 35 25 × 30	1.95 1.85	22 × 50 25 × 40 30 × 30 35 × 25	2.30 2.30 2.25 2.10	25 × 50 30 × 40 35 × 30	2.70 2.70 2.55
3900	22 × 30 25 × 25	1.55 1.55	22 × 40 25 × 35 30 × 25	2.15 2.20 1.95	25 × 45 30 × 35 35 × 30	2.55 2.55 2.55	30 × 45 35 × 35	3.00 3.00
4700	22 × 35 25 × 25	1.80 1.80	22 × 45 25 × 40 30 × 30 35 × 25	2.45 2.45 2.45 2.50	25 × 50 30 × 40 35 × 30	2.85 2.85 2.80	30 × 50 35 × 40	3.40 3.40
5600	22 × 35 25 × 30 30 × 25	1.95 1.95 2.00	22 × 50 25 × 40 30 × 35 35 × 30	2.75 2.70 2.75 2.75	30 × 45 35 × 35	3.20 3.20	35 × 45	3.80
6800	22 × 40 25 × 35 30 × 30 35 × 25	2.20 2.25 2.30 2.35	25 × 50 30 × 40 35 × 30	3.30 3.30 3.25	30 × 50 35 × 40	3.65 3.65	35 × 50	3.90
8200	22 × 50 25 × 40 30 × 30 35 × 25	2.55 2.50 2.75 2.75	30 × 45 35 × 35	3.60 3.55	35 × 45	3.90		
10000	22 × 45 30 × 35 35 × 30	2.85 2.90 2.95	30 × 50 35 × 40	4.50 4.00	35 × 50	4.40		
12000	25 × 50 30 × 40 35 × 30	3.25 3.25 3.15	35 × 45	4.55				
15000	30 × 45 35 × 35	3.70 3.65						
18000	35 × 40	4.35						
22000	35 × 50	4.90						

Note : *1. D x L : mm

*2. Ripple Current : (mA r.m.s 105°C / 120Hz)

CASE SIZE OF STANDARD PRODUCTS AND PERMISSIBLE RIPPLE CURRENT

CAP. (μF)	RATED VOLTAGE W V							
	100		160		180		200	
	Size	Ripple	Size	Ripple	Size	Ripple	Size	Ripple
150							22 × 20	0.65
180					22 × 20	0.75	22 × 20	0.70
220			22 × 20	0.80	22 × 25	0.85	22 × 25 25 × 20	0.80 0.80
270			22 × 25	1.00	22 × 25 25 × 20	0.95 0.90	22 × 25 25 × 25	0.85 0.85
330			22 × 25 25 × 20	1.20 1.15	22 × 25 22 × 30 25 × 25	1.20 1.10 1.10	22 × 30 25 × 25	1.20 1.20
390			22 × 30 25 × 25	1.30 1.30	22 × 30 25 × 25	1.30 1.30	22 × 30 22 × 35 25 × 30 30 × 25	1.30 1.30 1.30 1.30
470			22 × 30 25 × 25	1.30 1.40	22 × 30 22 × 35 25 × 30 30 × 25	1.30 1.35 1.40 1.40	22 × 35 22 × 40 25 × 30 30 × 25	1.40 1.40 1.40 1.50
560	22 × 25	1.05	22 × 40 25 × 30 30 × 25	1.50 1.50 1.50	22 × 40 25 × 35 30 × 25	1.50 1.55 1.50	22 × 45 25 × 35 30 × 30	1.55 1.55 1.55
680	22 × 25	1.20	22 × 45 25 × 35 30 × 25	1.70 1.70 1.70	22 × 45 22 × 50 25 × 35 25 × 40 30 × 30 35 × 25	1.70 1.70 1.70 1.75 1.70 1.70	22 × 50 25 × 40 30 × 30 35 × 25	1.75 1.75 1.75 1.70
820	22 × 30 25 × 25	1.30 1.33	22 × 50 25 × 40 30 × 30 35 × 25	1.95 2.00 2.00 1.90	22 × 50 25 × 40 25 × 45 30 × 35 35 × 25	1.95 2.00 2.00 2.00 1.90	25 × 50 30 × 35 35 × 30	2.05 2.00 2.05
1000	22 × 35 25 × 30	1.50 1.50	25 × 45 30 × 35 35 × 30	2.20 2.20 2.20	25 × 45 25 × 50 30 × 35 30 × 40 35 × 30	2.20 2.20 2.25 2.25 2.25	20 × 40 30 × 45 35 × 30 35 × 35	2.30 2.30 2.30 2.30
1200	22 × 40 25 × 35 30 × 25	1.70 1.70 1.70	25 × 50 30 × 40 35 × 30	2.45 2.45 2.45	25 × 50 30 × 40 30 × 45 35 × 35	2.45 2.45 2.50 2.50	30 × 50 35 × 40	2.60 2.65
1500	22 × 45 25 × 40 30 × 30 35 × 25	1.95 2.00 1.95 2.00	30 × 45 35 × 35	2.80 2.80	30 × 45 30 × 50 35 × 40	2.80 2.90 2.90	35 × 45	3.10
1800	25 × 45 30 × 35 35 × 30	2.20 2.50 2.45	30 × 50 35 × 45	3.30 3.30	30 × 50 35 × 50	3.30 3.30	35 × 50	3.15
2200	25 × 50 30 × 40 35 × 30	2.55 2.70 2.55	35 × 50	3.75	35 × 50	3.60		
2700	30 × 45 35 × 35	2.90 2.85						
3300	30 × 50 35 × 40	3.25 3.25						
3900	35 × 40	3.70						
4700	30 × 50 35 × 50	3.80 3.80						

Note : *1. D x L : mm
*2. Ripple Current : (mA r.m.s 105°C / 120Hz)

CASE SIZE OF STANDARD PRODUCTS AND PERMISSIBLE RIPPLE CURRENT

CAP. (μF)	RATED VOLTAGE W V							
	250		350		400		450	
	Size	Ripple	Size	Ripple	Size	Ripple	Size	Ripple
47					22 × 20	0.35		
56			22 × 20	0.40	22 × 20	0.40	22 × 25	0.40
68			22 × 25	0.45	22 × 25 25 × 20	0.50 0.50	22 × 30 25 × 25	0.50 0.50
82			22 × 25 25 × 20	0.55 0.50	22 × 30 25 × 25	0.60 0.65	22 × 35 25 × 30 30 × 25	0.55 0.55 0.55
100			22 × 30 25 × 25	0.70 0.70	22 × 35 25 × 30	0.65 0.65	22 × 40 25 × 30 30 × 25	0.65 0.60 0.65
120	22 × 20	0.60	22 × 35 25 × 30 30 × 25	0.75 0.75 0.75	22 × 35 25 × 30 30 × 25	0.70 0.70 0.75	22 × 45 25 × 35 30 × 30 35 × 25	0.70 0.70 0.70 0.70
150	22 × 25	0.65	22 × 40 25 × 30 30 × 25	0.80 0.80 0.85	22 × 40 25 × 30 25 × 35 30 × 30 35 × 25	0.80 0.85 0.85 0.85 0.80	22 × 50 25 × 40 30 × 30 35 × 25	0.80 0.80 0.75 0.75
180	22 × 25 25 × 20	0.80 0.75	22 × 45 25 × 35 30 × 30	0.90 0.90 0.90	25 × 50 25 × 40 30 × 30	0.95 0.95 0.90	25 × 45 30 × 35 35 × 30	0.85 0.85 0.85
220	22 × 30 25 × 25	0.95 0.95	22 × 50 25 × 40 30 × 30 35 × 25	1.05 1.05 1.00 1.05	25 × 45 30 × 35 35 × 30	1.05 1.05 1.10	25 × 50 30 × 40 35 × 30	1.00 1.00 1.00
270	22 × 35 25 × 30 30 × 25	1.15 1.15 1.15	25 × 45 30 × 35 35 × 30	1.20 1.20 1.20	25 × 50 30 × 40 35 × 35	1.20 1.20 1.20	30 × 45 35 × 35	1.15 1.15
330	22 × 40 25 × 30 30 × 25	1.25 1.20 1.25	30 × 40 35 × 35	1.35 1.35	30 × 45 35 × 35	1.40 1.35	30 × 50 35 × 40	1.40 1.40
390	22 × 45 25 × 35 30 × 30	1.50 1.50 1.50	30 × 45 35 × 35	1.50 1.50	30 × 50 35 × 40	1.55 1.55	35 × 45	1.55
470	22 × 50 25 × 40 30 × 30 35 × 25	1.55 1.55 1.55 1.55	35 × 40	1.70	30 × 50 35 × 45	1.75 1.75	35 × 50	1.70
560	25 × 45 30 × 35 35 × 30	1.80 1.80 1.80	35 × 45	1.90	30 × 50 35 × 45	1.90 1.90		
680	25 × 50 30 × 40 35 × 35	1.95 2.00 2.00			35 × 50	2.15		
820	30 × 45 35 × 35	2.15 2.10						
1000	35 × 40	2.30						
1500	35 × 50	3.63						

Note : *1. D × L : mm

*2. Ripple Current : (mA r.m.s 105°C / 120Hz)

Miniature Size Aluminum Electrolytic Capacitors

LV [For 105°C, 3000 Hours General]

For Printed Circuit Board High-Performance Aluminum Electrolytic Power Supply Input and Output Filter Capacitors

DESCRIPTION (LG Series 105°C 2000 Hours Assured)

LV type capacitors are combined with snaplock terminals for easy to mount on P.C. Board.

Highly reiable capacitors that withstand under high ripple current. Two to Four dimensions with same ratings. Aluminum case designed explosion-proof vent.

Best for switching power supplies.

Multiplier for Ripple Current

Frequency coefficient

Frequency(Hz)	60	120	1K	10~50K
10~100V	0.9	1.0	1.15	1.25
160~250V	0.8	1.0	1.25	1.47
315~450V	0.8	1.0	1.30	1.47

Temperature coefficient

Temperature(°C)	20~45	65	85	105
Factor	2-10	1.89	1.52	1.0

ELECTRICAL CHARACTERISTICS

Operating Temperature Range	-40 to +105°C	-25 to+105°C
Rated Voltage Range	10 to 100VDC	160 to 450VDC
Nominal Capacitance Range	47 to 56000μF	
Capacitance Tolerance	±20% (At 25°C,120Hz)	
Leakage Current	$I = 3\sqrt{CV}$ (μA) after 5 minutes application of rated working voltage at +20°C	

Dissipation Factor (tanδ)

Rate Voltage (V)	10	16	25	35	50	63	80	100	160	250	315~450
D.F (%)	55	50	45	40	35	30	25	20	15	15	25

For capacitance value > 33000μF, add following calculated value :

$$\frac{(\text{rated capacitance}) - 33000\mu F}{10000\mu F} \times 0.1$$

Low Temperature Characteristics (120Hz)

Rated Voltage (V)	16~25	35	50	63~100	160	450
Z(-25°C) / Z(20°C)	6	6	4	3	8	8
Z(-40°C) / Z(20°C)	15	10	8	6	–	–

High Temperature Loading

Test conditions

After 3000 hours application of rated voltage at +105°C

the capacitor shall meet the following limits

Post test requirements at +20°C

Leakage current	: ≤ Initial specified valus
Capacitance Change	: within ±20% of the Inital measured value
tan δ	: ≤ 200% of initial specified value

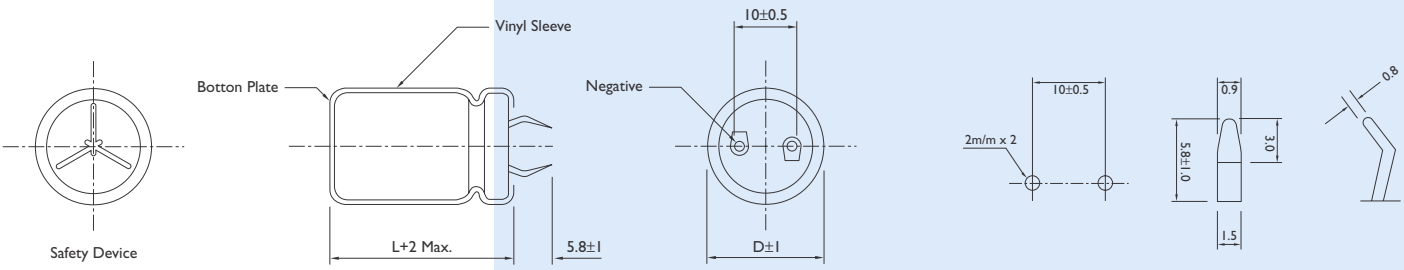
Shelf Life

The following specifications shall be satisfied when the capacitor are restored to 25°C after exposing them for 1000 hours at 105°C without voltage applied.

Capacitance Change	≤ ±20% of the Inital Value
D.F	≤ 200% of the Intial Specified Value
Leakage Current	≤ 200% of Initial Speciffied Value

DIAGRAM OF DIMENSIONS

Unit : mm



CASE SIZE OF STANDARD PRODUCTS AND PERMISSIBLE RIPPLE CURRENT

CAP. (μF)	RATED VOLTAGE W V											
	10		16		25		35		50		63	
	Size	Ripple	Size	Ripple	Size	Ripple	Size	Ripple	Size	Ripple	Size	Ripple
1000											20 × 25	1.10
1200											20 × 30 22 × 25	1.20 1.20
1500									20 × 25	1.15	20 × 35 22 × 30	1.47 1.47
1800									20 × 30 22 × 25	1.39 1.34	20 × 35 22 × 30 25 × 25	1.58 1.58 1.52
2200									20 × 35 22 × 30	1.60 1.60	20 × 40 22 × 35 25 × 30	1.80 1.82 1.75
2700							20 × 25	1.29	20 × 35 22 × 30 25 × 25	1.73 1.70 1.70	22 × 40 25 × 35 30 × 25	2.07 2.11 1.72
3300							20 × 30 22 × 25	1.57 1.45	20 × 40 22 × 35 25 × 30	1.97 1.97 1.88	22 × 45 25 × 35 30 × 30	2.33 2.27 2.24
3900					20 × 25	1.58	20 × 35 22 × 30	1.78 1.69	22 × 40 25 × 30 30 × 25	2.22 2.20 1.95	25 × 40 30 × 35	2.51 2.55
4700					20 × 30 22 × 25	1.65 1.61	20 × 40 22 × 35 25 × 25	2.02 2.02 1.62	22 × 45 25 × 35 30 × 30	2.43 2.43 2.25	25 × 50 30 × 40 35 × 30	2.91 2.86 2.80
5600			20 × 25	1.68	20 × 35 22 × 30	1.85 1.80	22 × 35 25 × 30	2.13 2.00	22 × 50 25 × 40 30 × 30	2.75 2.72 2.64	30 × 40 35 × 35	3.22 3.20
6800	20 × 25	1.31	20 × 30 22 × 25	1.80 1.75	20 × 40 22 × 35 25 × 25	2.11 2.09 1.87	22 × 40 25 × 35 30 × 25	2.41 2.31 2.31	25 × 45 30 × 35 35 × 30	3.30 3.30 3.25	30 × 50 35 × 40	3.65 3.65
8200	20 × 30	1.59	20 × 35 22 × 30	2.08 2.00	22 × 40 25 × 30 30 × 25	2.31 2.34 2.16	22 × 50 25 × 40 30 × 30	2.85 2.73 2.75	30 × 40 35 × 35	3.60 3.60	35 × 45	4.04
10000	20 × 30 22 × 25	1.88 1.77	20 × 40 22 × 30 25 × 25	2.15 2.10 2.05	22 × 45 25 × 35 30 × 30	2.65 2.61 2.61	25 × 45 30 × 35	3.05 3.05	30 × 50 35 × 40	4.05 4.04	35 × 50	4.48
12000	20 × 35 22 × 30 25 × 25	2.18 2.10 1.94	22 × 35 25 × 30	2.31 2.30	22 × 50 25 × 40 30 × 30	2.80 2.81 2.74	25 × 50 30 × 40 35 × 30	3.37 3.23 3.19	35 × 45	4.56		
15000	20 × 40 22 × 35 25 × 30	2.27 2.23 2.10	22 × 40 25 × 35 30 × 25	2.68 2.58 2.30	25 × 45 30 × 35 35 × 30	3.27 3.13 3.26	30 × 45 35 × 35	3.72 3.67	35 × 50	4.77		
18000	22 × 40 25 × 30 30 × 25	2.41 2.34 2.25	22 × 50 25 × 40 30 × 30	3.20 3.16 2.57	30 × 40 35 × 35	3.56 3.84	35 × 40	4.37				
22000	22 × 45 25 × 35 30 × 30	2.58 2.54 2.50	25 × 45 30 × 30 35 × 30	3.36 2.98 3.25	30 × 45 35 × 35	4.04 3.75	35 × 45	4.92				
27000	22 × 50 25 × 40 30 × 30	3.17 3.07 2.95	25 × 50 30 × 35 35 × 35	3.85 3.30 3.93	35 × 45	4.74						
33000	25 × 45 30 × 35 35 × 30	3.39 3.33 3.21	30 × 40 35 × 35	3.80 4.27	35 × 50	5.50						
39000	30 × 40 35 × 35	3.70 3.68	30 × 45 35 × 40	4.30 4.80								
47000	30 × 45 35 × 40	4.22 4.16	30 × 50 35 × 45	4.81 5.53								
56000	35 × 50	5.00										

Note : *1. D × L : mm

*2. Ripple Current : (mA r.m.s 105°C / 120Hz)

CASE SIZE OF STANDARD PRODUCTS AND PERMISSIBLE RIPPLE CURRENT

CAP. (μF)	RATED VOLTAGE W V											
	80		100		160		180		200		220	
	Size	Ripple	Size	Ripple	Size	Ripple	Size	Ripple	Size	Ripple	Size	Ripple
180											20 × 25	0.81
220							20 × 25	0.81	20 × 25	0.83	20 × 30 22 × 25	0.94 0.94
270					20 × 25	0.87	20 × 30 22 × 25	0.95 0.97	20 × 30 22 × 25	0.97 0.99	20 × 35 22 × 30	1.10 1.09
330					20 × 30 22 × 25	1.02 1.03	20 × 35 22 × 30	1.09 1.13	20 × 35 22 × 30 25 × 25	1.17 1.20 1.20	20 × 40 22 × 35 25 × 25	1.18 1.24 1.14
390					20 × 35 22 × 30	1.15 1.17	20 × 35 22 × 30 25 × 25	1.28 1.32 1.33	20 × 40 22 × 35 25 × 30	1.27 1.30 1.34	20 × 45 22 × 35 25 × 25	1.33 1.30 1.26
470					20 × 40 22 × 30 25 × 25	1.25 1.28 1.29	22 × 40 22 × 35 25 × 30	1.34 1.39 1.43	22 × 40 25 × 30 30 × 25	1.44 1.44 1.48	22 × 40 25 × 30 30 × 25	1.41 1.39 1.37
560			20 × 25	0.95	22 × 35 25 × 30	1.45 1.49	22 × 40 25 × 30 30 × 25	1.56 1.53 1.56	22 × 45 25 × 35 30 × 30	1.60 1.60 1.60	22 × 45 25 × 35 30 × 30 35 × 25	1.60 1.56 1.61 1.52
680			20 × 30 22 × 25	1.15 1.09	22 × 40 25 × 35 30 × 25	1.64 1.70 1.63	22 × 45 25 × 35 30 × 30	1.76 1.76 1.74	22 × 50 25 × 40 30 × 30	1.75 1.76 1.74	25 × 40 30 × 35 35 × 30	1.75 1.76 1.72
820	20 × 25	1.04	20 × 35 22 × 30	1.31 1.32	22 × 45 25 × 40 30 × 30	1.85 1.92 1.91	22 × 50 25 × 40 30 × 30	1.97 1.99 1.93	25 × 45 30 × 35 35 × 30	2.10 2.11 2.10	25 × 45 30 × 40 35 × 30	1.97 2.06 1.95
1000	20 × 30 22 × 25	1.24 1.19	20 × 35 22 × 30 25 × 25	1.43 1.47 1.45	25 × 45 30 × 35	2.17 2.19	25 × 45 30 × 35 35 × 30	2.24 2.24 2.20	25 × 50 30 × 40 35 × 35	2.36 2.40 2.30	30 × 45 35 × 35	2.44 2.20
1200	20 × 35 22 × 30	1.43 1.44	20 × 40 22 × 35 25 × 30	1.61 1.69 1.68	25 × 50 30 × 40 35 × 30	2.43 2.48 2.25	30 × 40 35 × 35	2.53 2.54	30 × 45 35 × 35	2.69 2.53	35 × 40	2.37
1500	20 × 35 22 × 30 25 × 25	1.57 1.59 1.59	22 × 40 25 × 35 30 × 25	1.97 1.98 1.95	30 × 45 35 × 35	2.82 2.62	30 × 50 35 × 40	3.03 2.91	35 × 40	2.97	35 × 45	2.64
1800	20 × 40 22 × 35 25 × 30	1.77 1.79 1.71	22 × 45 25 × 40 30 × 30	2.23 2.20 2.20	30 × 50 35 × 40	3.13 2.97	35 × 45	3.25	35 × 45	3.45		
2200	22 × 40 25 × 35 30 × 25	2.03 1.98 1.98	25 × 45 30 × 35 35 × 30	2.53 2.55 2.50	35 × 45	3.34	35 × 50	3.62				
2700	22 × 45 25 × 40 30 × 30	2.39 2.35 2.35	25 × 50 30 × 40 35 × 35	2.82 2.86 2.89								
3300	25 × 45 30 × 35 35 × 30	2.64 2.61 2.47	30 × 45 35 × 35	3.30 3.25								
3900	25 × 50 30 × 40 35 × 30	2.92 2.82 2.97	30 × 50 35 × 40	3.60 3.67								
4700	30 × 45 35 × 35	3.34 3.38	35 × 45	3.80								
5600	30 × 50 35 × 40	3.80 3.80	35 × 50	4.05								
6800	35 × 45	3.90										
8200	35 × 50	4.20										

Note : *1. D x L : mm

*2. Ripple Current : (mA r.m.s 105°C / 120Hz)

CASE SIZE OF STANDARD PRODUCTS AND PERMISSIBLE RIPPLE CURRENT

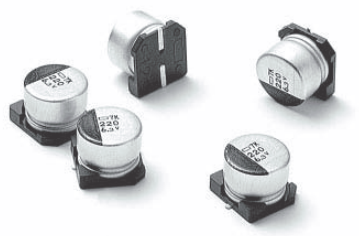
CAP. (μF)	RATED VOLTAGE W V													
	250		315		350		385		400		420		450	
	Size	Ripple	Size	Ripple	Size	Ripple	Size	Ripple	Size	Ripple	Size	Ripple	Size	Ripple
47													20 × 25	0.36
56							20 × 25	0.37	20 × 25	0.40	20 × 25	0.40	20 × 30 22 × 25	0.41 0.42
68					20 × 25	0.41	20 × 30 22 × 25	0.44 0.45	20 × 30 22 × 25	0.48 0.49	20 × 30 22 × 25	0.48 0.50	20 × 35 22 × 30 25 × 25	0.47 0.50 0.50
82			20 × 25	0.39	20 × 30	0.45	20 × 30 22 × 30	0.50 0.52	20 × 30 22 × 30	0.54 0.56	20 × 35 22 × 30 25 × 25	0.53 0.56 0.56	20 × 40 22 × 35 25 × 30	0.53 0.56 0.57
100			20 × 30	0.45	20 × 30 22 × 25	0.51 0.53	20 × 35 22 × 30 25 × 25	0.56 0.58 0.57	20 × 35 22 × 30 25 × 25	0.60 0.62 0.61	20 × 35 22 × 30 25 × 25	0.58 0.63 0.63	22 × 40 25 × 30 30 × 25	0.64 0.63 0.67
120			20 × 30 22 × 25	0.54 0.56	20 × 35 22 × 30 25 × 25	0.59 0.61 0.62	20 × 40 22 × 35 25 × 30	0.66 0.68 0.68	20 × 40 22 × 35 25 × 30	0.71 0.73 0.73	20 × 45 22 × 35 25 × 30 30 × 25	0.71 0.73 0.72 0.75	22 × 45 25 × 35 30 × 30	0.72 0.71 0.77
150	20 × 25	0.71	20 × 35 22 × 30 25 × 25	0.64 0.66 0.65	20 × 40 22 × 35 25 × 30	0.70 0.73 0.73	22 × 40 25 × 30 30 × 25	0.79 0.78 0.75	22 × 40 25 × 35 30 × 25	0.85 0.85 0.79	22 × 45 25 × 35 30 × 25	0.86 0.83 0.83	22 × 50 25 × 40 30 × 30	0.80 0.82 0.85
180	20 × 30 22 × 25	0.82 0.84	20 × 40 22 × 35 25 × 30	0.75 0.78 0.71	22 × 40 25 × 30 30 × 25	0.83 0.80 0.81	22 × 45 25 × 35 30 × 30	0.89 0.86 0.88	22 × 45 25 × 35 30 × 30	0.95 0.92 0.95	22 × 50 25 × 40 30 × 30 35 × 25	1.02 0.94 0.95 0.90	25 × 45 30 × 35	0.93 0.97
220	20 × 35 22 × 30 25 × 25	0.95 0.97 0.99	22 × 40 25 × 30 30 × 25	0.89 0.85 0.83	22 × 45 25 × 35 30 × 30	0.94 0.92 0.98	22 × 50 25 × 40 30 × 30	1.01 1.00 1.00	22 × 50 25 × 40 30 × 35	1.08 1.05 1.24	25 × 45 30 × 35 35 × 30	1.13 1.09 1.05	25 × 50 30 × 40 35 × 30	1.05 1.10 1.01
270	20 × 40 22 × 35 25 × 30	1.08 1.11 1.15	22 × 45 25 × 35 30 × 30	1.01 0.98 1.01	22 × 50 25 × 40 30 × 30	1.07 1.05 1.03	25 × 45 30 × 40 35 × 30	1.13 1.14 1.10	25 × 50 30 × 40 35 × 30	1.29 1.30 1.18	25 × 50 30 × 40 35 × 35	1.37 1.25 1.25	30 × 45 35 × 35	1.25 1.26
330	22 × 40 25 × 30 30 × 25	1.26 1.26 1.31	22 × 50 25 × 40 30 × 35	1.14 1.12 1.21	25 × 45 30 × 35 35 × 30	1.24 1.24 1.18	30 × 45 35 × 35	1.31 1.32	30 × 45 35 × 35	1.47 1.41	30 × 45 35 × 35	1.49 1.42	30 × 50 35 × 40	1.42 1.44
390	22 × 45 25 × 35 30 × 30	1.41 1.42 1.50	25 × 45 30 × 35 35 × 30	1.31 1.30 1.23	25 × 50 30 × 40 35 × 35	1.38 1.39 1.39	30 × 50 35 × 40	1.48 1.48	30 × 50 35 × 40	1.64 1.59	30 × 50 35 × 40	1.67 1.61	35 × 45	1.61
470	22 × 50 25 × 40 30 × 30	1.58 1.61 1.61	30 × 40 35 × 35	1.53 1.47	30 × 45 35 × 35	1.57 1.50	35 × 45	1.76	35 × 45	1.87	35 × 45	1.86	35 × 45	1.80
560	25 × 45 30 × 35	1.80 1.84	30 × 45 35 × 40	1.65 1.66	30 × 50 35 × 40	1.75 1.69	35 × 50	1.95	35 × 50	2.09				
680	25 × 50 30 × 40 35 × 30	2.03 2.09 1.96	35 × 45	1.96	35 × 45	1.96								
820	30 × 45 35 × 35	2.35 2.26	35 × 50	2.19										
1000	30 × 50 35 × 40	2.64 2.57												
1200	30 × 45	2.88												

Note : *1. D x L : mm

*2. Ripple Current : (mA r.m.s 105°C / 120Hz)

Surface Mount
Aluminum Electrolytic

CA Series

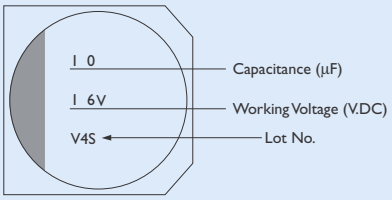


FEATURE

For General Purposes Series with 85°C 2000 Hours

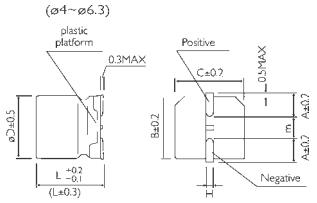
Suitable for AV (TV, Video, Audio), Personal Computer, Home Appliance

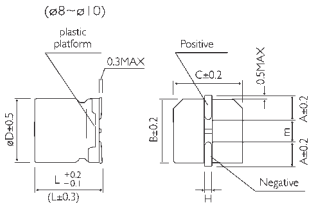
MARKING



DIMENSIONS

Unit : mm





SIZE CODE	DØ	L	A	H	I	W	P	K
B	4.0	5.4	4.3	5.5 Max.	1.8	0.65 ± 0.1	1.0	$0.35^{+0.15}_{-0.20}$
C	5.0	5.4	5.3	6.5 Max.	2.2	0.65 ± 0.1	1.5	$0.35^{+0.15}_{-0.20}$
D	6.3	5.4	6.6	7.8 Max.	2.6	0.65 ± 0.1	2.2	$0.35^{+0.15}_{-0.20}$
E	8.0	6.5	8.3	9.4 Max.	3.4	0.65 ± 0.1	2.2	$0.35^{+0.15}_{-0.20}$
F	8.0	10.5	8.3	10.0 Max.	3.4	0.90 ± 0.2	3.1	0.70 ± 0.20
G	10.0	10.5	10.3	12.0 Max.	3.5	0.90 ± 0.2	4.6	0.70 ± 0.20
H	6.3	7.7	6.6	0.8 Max.	2.6	0.65 ± 0.1	2.2	$0.35^{+0.15}_{-0.20}$

SPECIFICATION

ITEM	CHARACTERISTIC
Operation Temperature Range	-40 to +85°C
Rated Working Voltage Range	4 to 100 V.DC
Rated Capacitqnce	Range = 0.1 ~ 1500μF
Capacitance Tolerance	±20% (120Hz / +25°C)
Leakage Current (25°C)	Polarized : I ≤ 0.01CV or 3 (μA) Whichever is greater after 2 minutes application of DC rated working voltage at 25°C. I : Leakage Current (μA) C : Rated Capacitance (μF) V : Working Voltage (V)
Dissipation Factor (tanδ) (120Hz / +25°C)	**Polarized** ( ) : D.F of Downsized

WV (V)	4	6.3	10	16	25	35	50	63	100
D.F	35	28	24	20	16	14	12	12	10

Low Temperature Stability

Impedance Ratio at 120Hz

WV (V)		4	6.3	10	16	25	35	50	63	100
Z(-25°C)	<Ø8	7	4	3	2	2	2	2	2	2
/Z(+20°C)	≥Ø8	7	5	4	3	2	2	2	2	2
Z(-40°C)	<Ø8	15	8	8	4	4	3	3	3	3
/Z(+20°C)	≥Ø8	15	10	8	6	4	3	3	3	3

ITEM	CHARACTERISTIC
Shelf Life	At +85°C no voltage application after 1000 hours and then through the aging treatment, the capacitor shall meet limits for load life characteristics.

CASE SIZE & MAX RIPPLE CURRENT

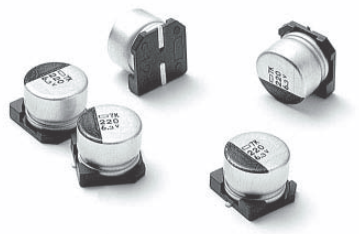
Max. Ripple Current (mA) r.m.s. (120Hz / +85°C)

POLARIZED

μF	4		6.3		10		16		25		35		50		63		100	
0.1													4 × 5.4	1.0	4 × 5.4	1.0		
0.22													4 × 5.4	2.0	4 × 5.4	2.3		
0.33													4 × 5.4	2.8	4 × 5.4	3.5		
0.47													4 × 5.4	4.0	4 × 5.4	5.0		
1.0													4 × 5.4	8.4	4 × 5.4	10		
2.2													4 × 5.4	13	4 × 5.4	15		
3.3													4 × 5.4	17	4 × 5.4	20	6.3 × 7.7	28
4.7							4 × 5	23	4 × 5.4	16	4 × 5.4	18	4 × 5.4 5 × 5.4	18 20	4 × 5.4	23	6.3 × 7.7	35
10							4 × 5.4	23	4 × 5.4 5 × 5.4	24 27	4 × 5.4 5 × 5.4	24 29	5 × 5.4 6.3 × 5.4	30 33	6.3 × 5.4	34	6.3 × 7.7	50
22			4 × 5.4	28	4 × 5.4 5 × 5.4	30 33	4 × 5.4 5 × 5.4	30 37	5 × 5.4 6.3 × 5.4	38 42	5 × 5.4 6.3 × 5.4	39 46	6.3 × 5.4	43	6.3 × 7.7	70	8 × 10.5	120
33	4 × 5.4	28	4 × 5.4 5 × 5.4	34 37	4 × 5.4 5 × 5.4	34 41	5 × 5.4 6.3 × 5.4	44 49	5 × 5.4 6.3 × 5.4	46 52	6.3 × 5.4	53	6.3 × 7.7	85	8 × 10.5	160	10 × 10.5	190
47	4 × 5.4	33	4 × 5.4 5 × 5.4	40 45	5 × 5.4 6.3 × 5.4	47 52	5 × 5.4 6.3 × 5.4	52 58	6.3 × 5.4	60	6.3 × 7.7	70	6.3 × 7.7 8 × 10.5	90 140	8 × 10.5	170		
56	5 × 5.4	42	5 × 5.4 6.3 × 5.4	46 52	5 × 5.4 6.3 × 5.4	50 57	5 × 5.4 6.3 × 5.4	57 63	6.3 × 7.7	65	6.3 × 7.7	80	8 × 10.5	150	8 × 10.5	230		
100	5 × 5.4	56	5 × 5.4 6.3 × 5.4	47 70	5 × 5.4 6.3 × 5.4	54 76	6.3 × 5.4	86	6.3 × 7.7	130	6.3 × 5.4 8 × 10.5	120 175	8 × 10.5 10 × 10.5	181 195	8 × 10.5	280		
150	6.3 × 5.4	79	6.3 × 5.4	71	6.3 × 7.7	76	6.3 × 7.7	135	8 × 10.5	192	8 × 10.5	214	10 × 10.5	238				
220	6.3 × 5.4	96	6.3 × 7.7	95	6.3 × 7.7	150	6.3 × 7.7 8 × 10.5	150 215	8 × 10.5 10 × 10.5	232 250	8 × 10.5 10 × 10.5	246 265	10 × 10.5	289				
330	6.3 × 7.7	152	6.3 × 7.7	150	8 × 10.5	240	8 × 10.5	270	8 × 10.5 10 × 10.5	284 305	10 × 10.5	324						
470	6.3 × 7.7	200	8 × 10.5	265	8 × 10.5	290	8 × 10.5 10 × 10.5	307 330	10 × 10.5	393								
680	8 × 10.5	284	8 × 10.5	318	10 × 10.5	374	10 × 10.5	374	10 × 10.5	396								
1000	8 × 0.5	344	8 × 10.5 10 × 10.5	372 400	10 × 10.5	374 454												
1500	10 × 10.5	347	10 × 10.5	489														

Surface Mount
Aluminum Electrolytic

CB Series

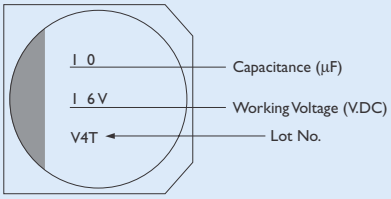


FEATURE

For General Purposes Series with 105°C 1000 Hours

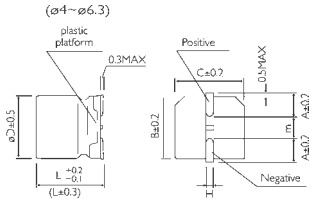
Suitable for AV (TV, Video, Audio), Personal Computer, Home Appliance

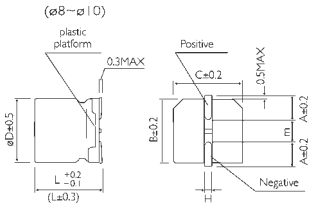
MARKING



DIMENSIONS

Unit : mm





SIZE CODE	DØ	L	A	H	I	W	P	K
B	4.0	5.4	4.3	5.5 Max.	1.8	0.65 ± 0.1	1.0	$0.35^{+0.15}_{-0.20}$
C	5.0	5.4	5.3	6.5 Max.	2.2	0.65 ± 0.1	1.5	$0.35^{+0.15}_{-0.20}$
D	6.3	5.4	6.6	7.8 Max.	2.6	0.65 ± 0.1	2.2	$0.35^{+0.15}_{-0.20}$
E	8.0	6.5	8.3	9.5 Max.	3.4	0.65 ± 0.1	2.2	$0.35^{+0.15}_{-0.20}$
F	8.0	10.5	8.3	10.0 Max.	3.4	0.90 ± 0.2	3.1	0.70 ± 0.20
G	10.0	10.5	10.3	12.0 Max.	3.5	0.90 ± 0.2	4.6	0.70 ± 0.20
H	6.3	7.7	6.6	0.8 Max.	2.6	0.65 ± 0.1	2.2	$0.35^{+0.15}_{-0.20}$

SPECIFICATION

ITEM	CHARACTERISTIC
Operation Temperature Range	-40 to +105°C
Rated Working Voltage Range	4 to 50V. DC
Rated Capacitqnce	Range = 0.1 ~ 1000μF
Capacitance Tolerance	±20% (120Hz / +25°C)
Leakage Current (25°C)	Polarized : I ≤ 0.01CV or 3 (μA) Whichever is greater after 2 minutes application of DC rated working voltage at 25°C. I : Leakage Current (μA) C : Rated Capacitance (μF) V : Working Voltage (V)
Dissipation Factor (tanδ) (120Hz / +25°C)	**Polarized** ( ) : D.F of Downsized

WV (V)	4	6.3	10	16	25	35	50
D.F.	35	28	24	20	16	14	12

Low Temperature Stability

Impedance Ratio at 120Hz

WV (V)	4	6.3	10	16	25	35	50
Z(-25°C)/Z(+20°C)	7	4	3	2	2	2	2
Z(-40°C)/Z(+20°C)	15	8	6	4	4	3	3

Load Life

After 1000 hours application of WV at 105°C, the capacitor shall meet following limits.

Capacitance Change	≤ ±20% of Initial Value
Dissipation Factor	≤ 200% of Initial Specified Value
Leakage Current	≤ Initial Specified Value

Shelf Life

At +105°C no voltage application after 1000 hours and then through the aging treatment, the capacitor shall meet limits for load life characteristics.

CASE SIZE & MAX RIPPLE CURRENT

Max. Ripple Current (mA) r.m.s. (120Hz / +85°C)

POLARIZED

μF	4		6.3		10		16		25		35		50	
0.1													4 x 5.4	0.7
0.22													4 x 5.4	1.6
0.33													4 x 5.4	2.5
0.47													4 x 5.4	3.5
1.0													4 x 5.4	4
2.2													4 x 5.4	11
3.3											4 x 5.4	13	4 x 5.4	13
4.7									4 x 5.4	13	4 x 5.4	14	5 x 5.4	16
10									4 x 5.4	13	4 x 5.4	21	6.3 x 5.4	24
							4 x 5.4	18	5 x 5.4	20				
22			4 x 5.4	22	4 x 5.4	22	4 x 5.4	18	6.3 x 5.4	36	5 x 5.4	38	6.3 x 7.7	51
					4 x 5.4	25	5 x 5.4	37						
33	4 x 5.4	18	5 x 5.4	27	5 x 5.4	30	6.3 x 5.4	40	6.3 x 5.4	44	6.3 x 5.4	42	6.3 x 7.7	60
47	4 x 5.4	23	5 x 5.4	33	6.3 x 5.4	41	6.3 x 5.4	48	6.3 x 5.4	48	6.3 x 7.7	49	6.3 x 7.7	63
100	5 x 5.4	42	6.3 x 5.4	50	6.3 x 5.4	53	6.3 x 5.4	60	6.3 x 7.7	91	8 x 10.5	155	8 x 10.5	155
150	6.3 x 5.4	61	6.3 x 5.4	55	6.3 x 5.4	62	6.3 x 7.7	95	8 x 10.5	140	8 x 10.5	155	10 x 10.5	300
220	6.3 x 5.4	68	6.3 x 7.7	105	6.3 x 7.7	105	6.3 x 7.7	105	8 x 10.5	175	10 x 10.5	300		
330	6.3 x 7.7	73	6.3 x 7.7	10.5	8 x 10.5	175	8 x 10.5	195	10.5 x 10.5	220				
470	6.3 x 7.7	105	8 x 10.5	170	8 x 10.5	210	8 x 10.5	310						
680	8 x 10.5	210	8 x 10.5	210	10 x 10.5	230	10 x 10.5	350						
1000	8 x 10.5	260	10 x 10.5	230										