

# ELECTROLYTIC CAPACITORS 2008





# INDEX

## ALUMINUM ELECTROLYTIC CAPACITORS

### MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

21	<b>S5</b> [ For Super Miniature ]-5mm L	1,000hrs. at 105°C
23	<b>SS</b> [ For Super Miniature ]-7mm L	1,000hrs. at 105°C
25	<b>SK</b> [ For General ]	2,000hrs. at 85°C
28	<b>SE-K</b> [ For General ]	1,000hrs. at 105°C
31	<b>SH</b> [ For General ]	2,000hrs. at 105°C
34	<b>SG</b> [ For Electronic Ballast ]	5,000hrs. at 105°C
37	<b>SP</b> [ Miniature and Long Life ]	10,000hrs. at 105°C
40	<b>SB</b> [ For Low Leakage Current ]	1,000hrs. at 105°C
44	<b>SN</b> [ For Non Polar ]	1,000hrs. at 105°C
46	<b>SR</b> [ Bi-Polar Horizontal Deflection Series]	1,000hrs. at 85°C
48	<b>SC</b> [ For Low Impedance and Low E.S.R Suitable for Output of Mother Board ]	2,000~3,000hrs. at 105°C
51	<b>SJ</b> [ Low Impedance and High Ripple Series ]	2,000~3,000hrs. at 105°C
54	<b>SQ</b> [ For Adapter and Power Supply Applications Series ]	2,000~5,000hrs. at 105°C
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59	<b>SZ</b> [ For Ultra Low ESR ]	2,000hrs. at 105°C

### LARGE CAN ALUMINUM ELECTROLYTIC CAPACITORS

61	<b>LH</b> [ For 85°C, 2000 Hours Miniature ]	2,000 hrs. at 85°C
66	<b>LG</b> [ For 105°C, 2000 Hours General ]	2,000 hrs. at 105°C
71	<b>LV</b> [ For 105°C, 3000 Hours Long Life ]	3,000 hrs. at 105°C

### SURFACE MOUNT ALUMINUM ELECTROLYTIC CAPACITORS

75	<b>CA Series</b>	2,000 hrs. at 85°C
77	<b>CB Series</b>	1,000 hrs. at 105°C
79	<b>CE Series</b>	1,000 hrs. at 105°C
81	<b>CZ Series</b>	1,000 hrs. at 105°C
83	<b>CD Series</b>	1,000 hrs. at 105°C

### CONDUCTIVE POLYMER SOLID CAPACITORS

85	<b>CP</b> [ For Ultra Low ESR & High Ripple Current ]	2,000 hrs. at 105°C
87	<b>CG</b> [ For Low ESR & High Ripple Current ]	2,000 hrs. at 105°C



## I-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 .

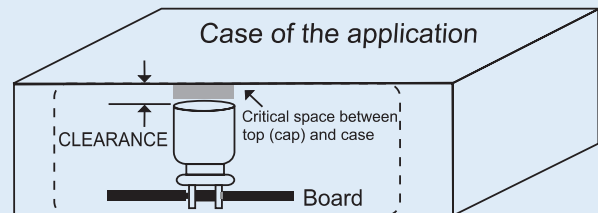
8. Cleaning circuit boards after soldering .

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 .



## I-2 Technical Concepts

### I. 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.

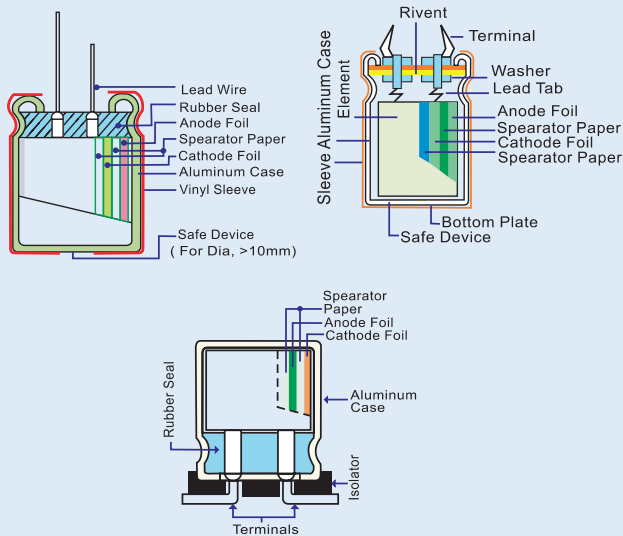


Fig. I-2

### 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 determine 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 .

## I-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 inflit electric wave & using purpose , it basically with some classified purposes as below :

### I. 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 & inductor as 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 capacitors for by pass was conducted .
- 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 .



## I-4 Basic Electrical Characteristics

### I. Capacitance (E.S.C.)

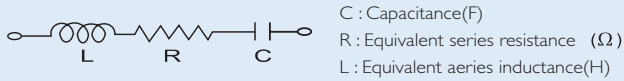


Fig.1-3 Simplified equivalent circuit diagram of an electrolytic capacitor

The capacitive component of the equivalent series circuit (equivalent 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 increases reducing its conductivity .The capacitance will decrease if the temperature decreases . Furthermore temperature drifts cause armature dilatation and the reform 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 .

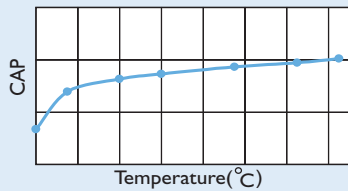


Fig. I-4 Capacitance change vs. temperature

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 .

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

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

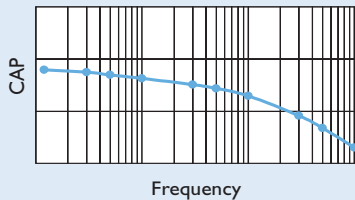


Fig. I-5 Capacitance change vs. frequency

### 2. Dissipation factor (tan δ)

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 .

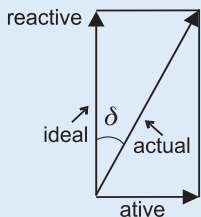


Fig. I-6

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

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 .

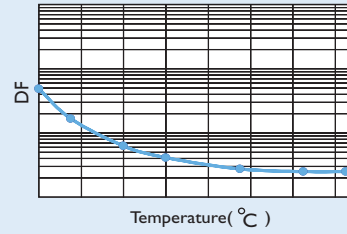


Fig. I-7 Dissipation factor vs. temperature

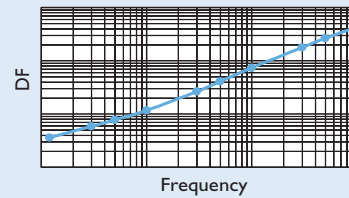


Fig. I-8 Dissipation factor vs. frequency

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

The equivalent series resistance is 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 :

$$ESR = \frac{\tan \delta}{2\pi fESC}$$

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 .

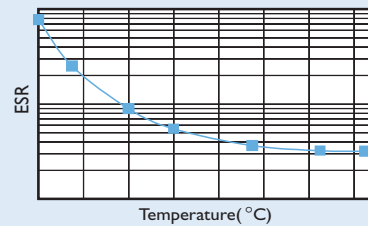


Fig. I-9 ESR change vs. temperature

The resistance of the electrolyte decreases strongly with increasing temperature.

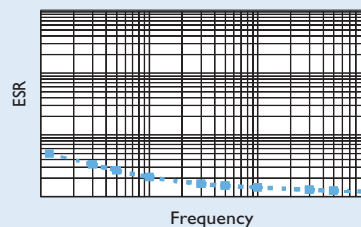


Fig. I-10 ESR change vs. frequency



#### 4. Impedance (Z)

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

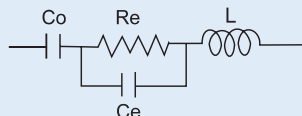


Fig. I-11

$C_o$  = Aluminum oxide capacitance (surface and thickness of the dielectric).

$R_e$  = Resistance of electrolyte and paper mixture (other resistances not depending on the frequency are not considered : tabs , plates ,and so on).

$C_e$  = 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 :

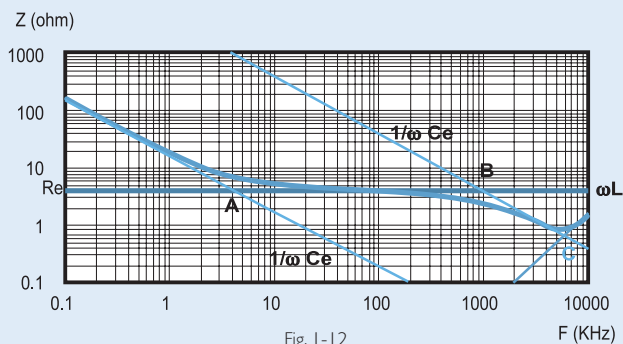


Fig. I-12

- Capacitive reactance predominates at low frequencies
  - With increasing frequency , the Capacitive reactance  $X_c = 1/\omega C$  decreases until it reaches the order of magnitude of the electrolyte resistance  $R_e$  (A)
  - At even higher frequencies , the resistance of the electrolyte predominates :  $Z = R_e$  (A - B)
  - When the capacitor's resonance frequency is reached ( $\omega_0$ ), capacitive and inductive reactance mutually cancel each other  $1/\omega C = \omega L$ ,  $\omega_0 = \sqrt{1/(LC_e)}$
  - Above this frequency , the inductive reactance of the winding and its terminals ( $X_L = \omega L$ ) becomes effective and leads to an increase in impedance .
- Generally speaking it can be estimated that  $C_e \approx 0.01 C_o$  .

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

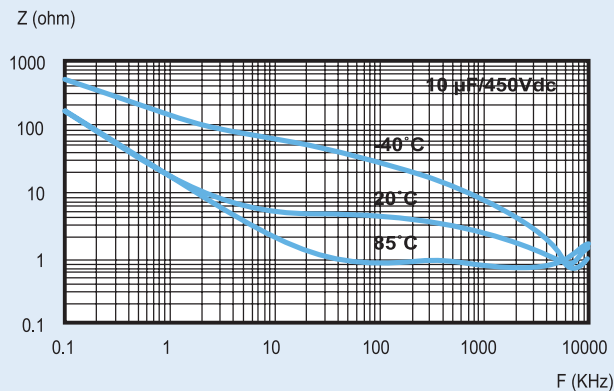


Fig. I-13

$R_e$  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 ,  $R_e$  must be as little as possible , but too low  $R_e$  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.)

Due to the aluminum oxide layer that serves as dielectric , a small current will continue to flow even after a DC voltage has been applied for long periods . This current is called leakage current .A high leakage current 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 voltage 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 a higher than normal leakage current will flow when a voltage is applied after prolonged storage .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 :

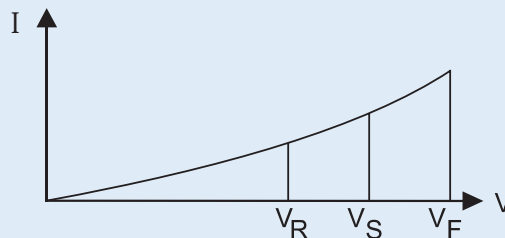


Fig. I-14

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  $V_R$  and  $V_F$ : the capacitor can be subjected to  $V_S$  for short periods only .



## I-5 Reliability

### (1) The bathtub curve:

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

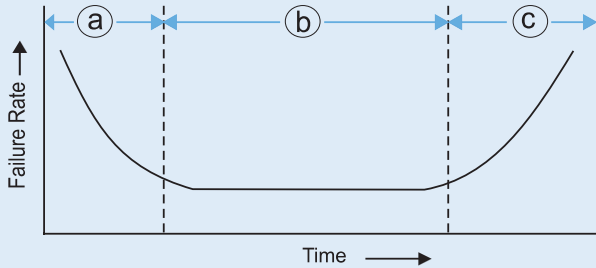


Fig. I - 15 Bathtub curve

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.

pressure & vibration etc. and mostly affected by temperature factor . Electrical condition include voltage , ripple current and charge / discharge condition etc.

### I. 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.

$$L_x = L_0 \times B^{\frac{T_0 - T_x}{10}} \tag{Eq. I}$$

- Lx: Expected Life at Operating Temperature Tx °C (hour)
- L0: Load Life at Maximum Operating Temperature To °C (hour)
- To: Maximum Operating Temperature (°C )
- Tx: Actual Operating Temperature. (°C )
- B: Accelerate Coefficient of Temperature( ≈ 2)

From the Eq. I , 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 voltage, although with little or more influence to electrolytic capacitors but, no necessary for special concern after compare with the influence by temperature.

## I-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

Table-1 Failure modes and causes

Failure Modes	Internal Causes	Primary Factors				
		Mismanaged Production	Mishandled Application	Unavoidable Factors in Normal Service		
Short Circuit	Short Circuit Between Electrodes	Burred Foil/ Metal Particle	Mechanical Stress	Deterioration With Time		
	Dielectrical Break of Oxide Layer	Local Deficiency in Oxide Layer				
Open Circuit	Dielectrical Break of Separator	Mechanical Stress	Poor Connection			
	Disconnection of Terminal Construction					
Capacitance Drop	Poor Terminal Connection	Electrochemical Reaction	Excessive Thermal Stress			
	Less Electrolyte				Excessive Operating Voltage	
	Electrolyte Vaporization					Reverse Voltage
	Anode Foil Capacitance Drop					
tanδ (ESR) Increase	Cathode Foil Capacitance Drop	Excessive Charge-Discharge Duty				
	Deterioration of Oxide Layer		Chloride Contamination By Assembly Board Cleaning			
Leakage Current Increase	Corrosion	Contamination By Chloride				
	Internal Pressure Rise		Poor Sealing			
Open Vent	Poor Sealing					
Electrolyte Leakage	Poor Sealing					





## I-7 Cleaning Agings

### 3. Influence of Input Ripple Current Against Working life

Passing of some ripple current when the electrolytic capacitor as a wave filter or smoothing function, the internal temperature of electrolytic capacitor will be bring some more influence to working life as well. Hence, a maximum ripple current will be listed caused by such ripple current and directly specifically by each manufacturer; it has been considered as a overlapping 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:

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

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:

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

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

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

$\beta$ : Heat radiation constant

A = Surface area of container (cm)<sup>2</sup>

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

D: case diameter (cm)

L: case length (cm)

$\Delta T$ : Temperature raising created by internal heating (°C).

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

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

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

Tan  $\delta$ : DF at 120HZ

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

C: The static capacity (F) at 120HZ

In general, the allowed ripple current value would be specifically 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
~47 $\mu$ F	0.30	0.40	0.50	0.70	0.80	1.00
5.6~33 $\mu$ F	0.40	0.50	0.60	0.80	0.90	1.00
34~330 $\mu$ F	0.60	0.70	0.80	0.90	0.95	1.00
331~1000 $\mu$ F	0.65	0.90	0.90	0.98	1.00	1.00
1200 $\mu$ F~Higher	0.85	0.90	0.95	0.98	1.00	1.00

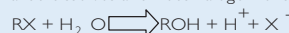
Table-4 The coefficient between allowed ripple current & working temperature to the electrolytic capacitors.

Type	Surrounding Temp[°C]	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

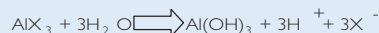
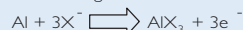
Circuit Board Cleaning

### 1. Foreword

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



Also the following reaction can occur



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.

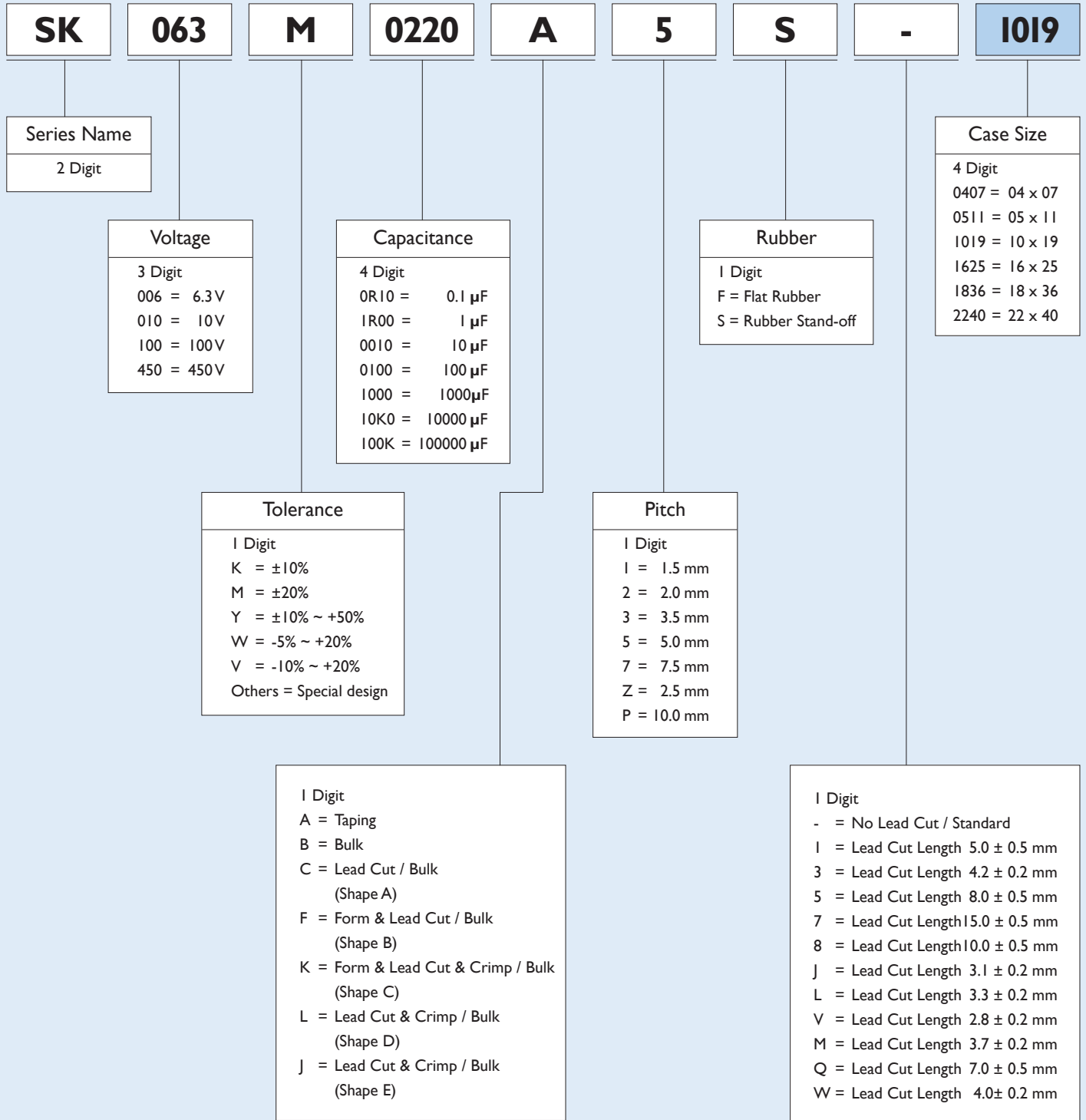
- Please dry the cleaning agent on the PC board before using affixing or coating material.

- 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.

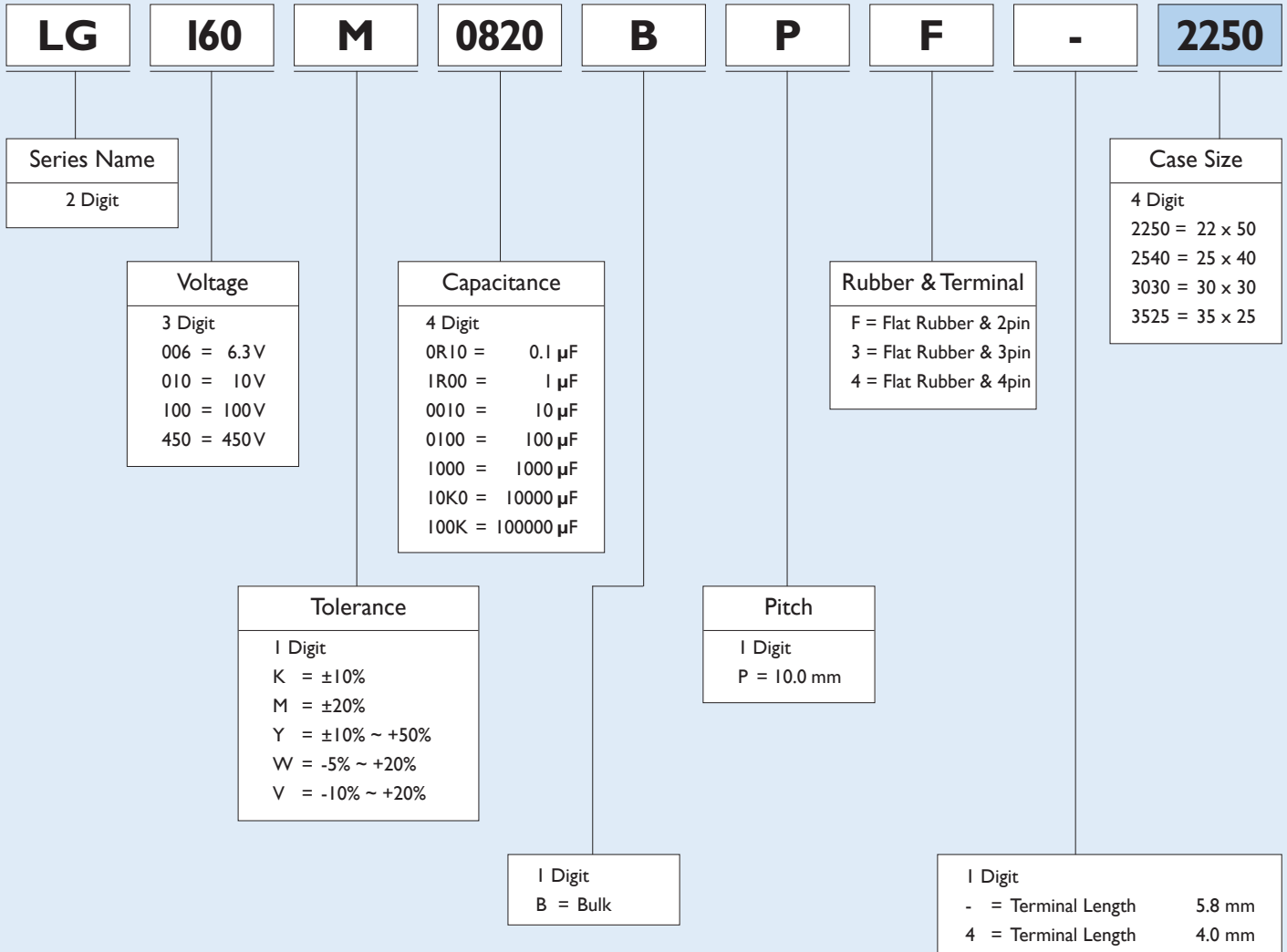


## RADIAL TYPE ORDERING CODE



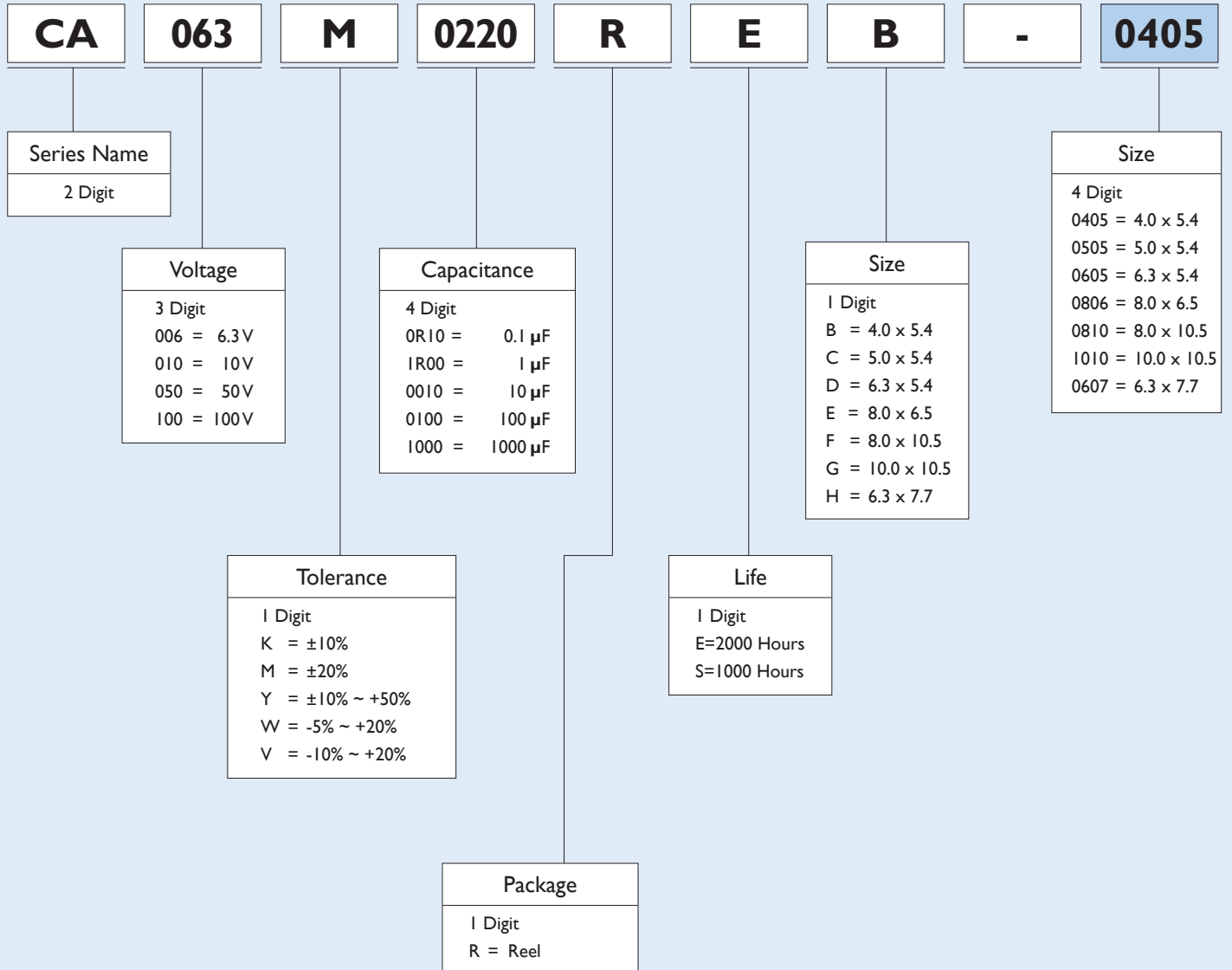


## SNAP IN TYPE ORDERING CODE





## SMD TYPE ORDERING CODE





## PACKAGE INFORMATION

TYPE	D x L	BULK			TAPING			LEAD CUTTING	
		RADIL (mm)	BAG/PCS	INNER BOX	CARTON	INNER BOX	CARTON	BAG/PCS	INNER BOX
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	1,000	1,600				500	3,000
16 x 36		200	1,000	1,200				500	3,000
16 x 40		200	1,000	1,200				500	3,000
18 x 20		200	1,000	1,600			200	1,000	2,000
18 x 25		200	1,000	1,600				500	2,000
18 x 32		100	1,000	1,000				500	2,000
18 x 36		100	1,000	1,000				500	2,000
18 x 40		100	1,000	1,000				500	2,000
22 x 40		100	1,000	600				400	800

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

SMD Type	MOQ (Reel)	
	SPQ (Reel)	MOQ (Reel)
4 x 5	2000	20000
5 x 5	1000	10000
6 x 5	1000	10000
6 x 7	1000	10000
8 x 6	1000	10000
8 x 10	500	3000
10 x 10	5000	3000



## DIAGRAM OF TAPING DIMENSIONS

Unit : mm

Fig. 1

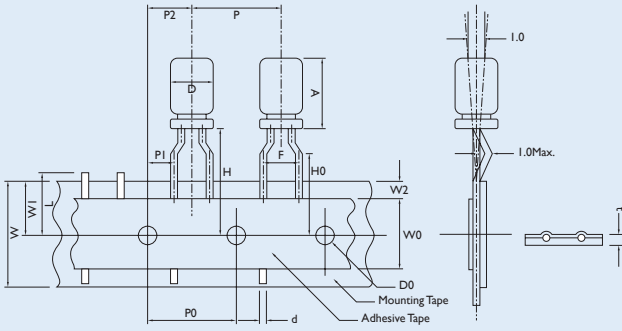


Fig. 4

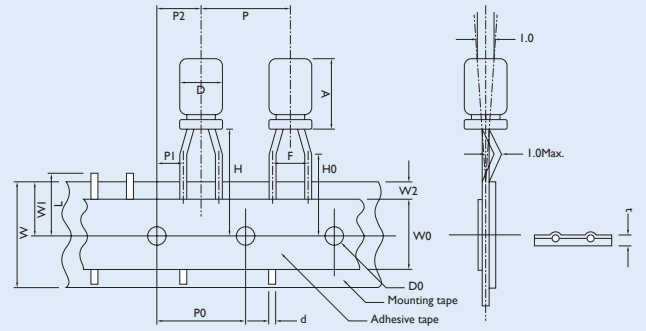


Fig. 2

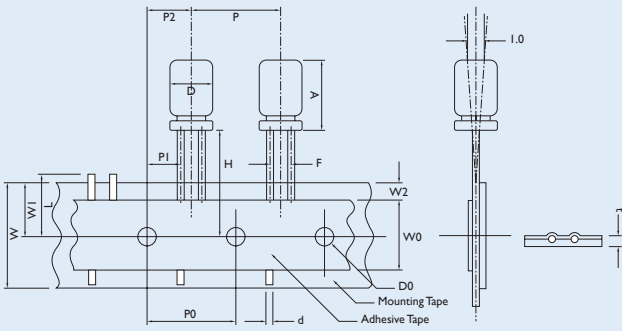


Fig. 5

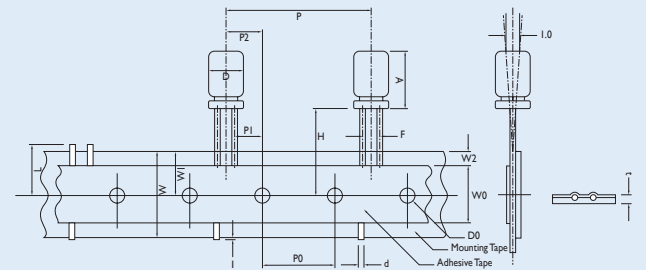


Fig. 3

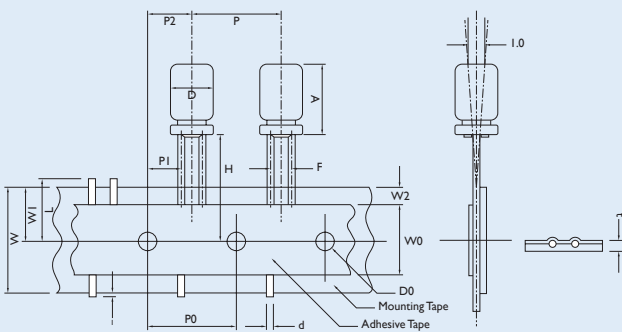
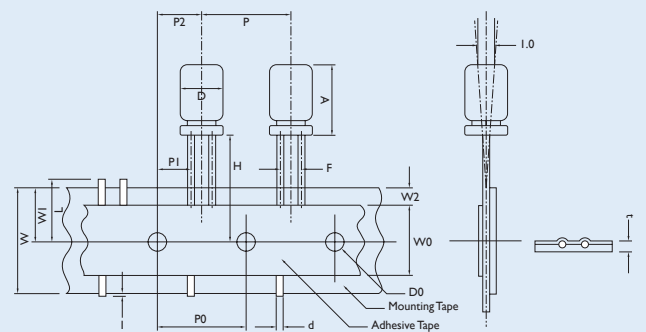


Fig. 6





## SPECIFICATIONS INFORMATION

Unit : mm

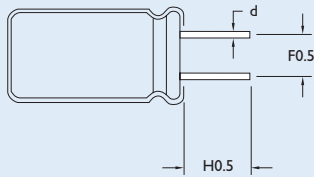
ITEM	TOLERANCE	PH = 2.5		FORMED LEAD TYPE							STRAIGHT LEAD TYPE										
		L		L		L			L				L			L			L		
		5~7	≤7 >7	5~7	≤7 >7	≤7 >7	≤7 >7	≤7 >7	5~7	≤7 >7	≤7 >7	≤7 >7	≤7 >7	≤7 >7	12~25	15~25	15~25	15~25	15~25		
D	+0.5 -0	4 $\emptyset$	5 $\emptyset$	4 $\emptyset$	5 $\emptyset$	6 $\emptyset$	8 $\emptyset$	4 $\emptyset$	5 $\emptyset$	6 $\emptyset$	8 $\emptyset$	10 $\emptyset$	12 $\emptyset$	12.5 $\emptyset$	13 $\emptyset$	16 $\emptyset$	18 $\emptyset$				
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						-											
l	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											
<b>Fig.</b>		<b>4</b>		<b>1</b>						<b>2</b>				<b>3, 6</b>		<b>5</b>					



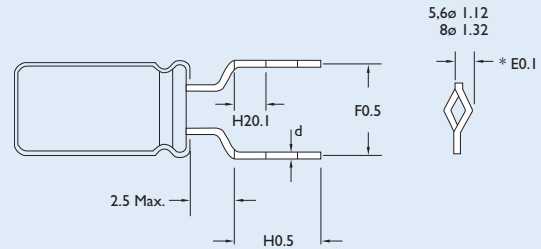
## DIAGRAM OF LEAD CUTTING AND FORMING

Unit : mm

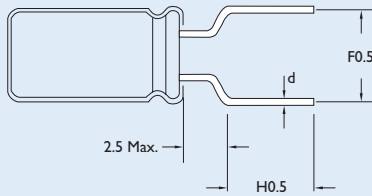
Shape (A)



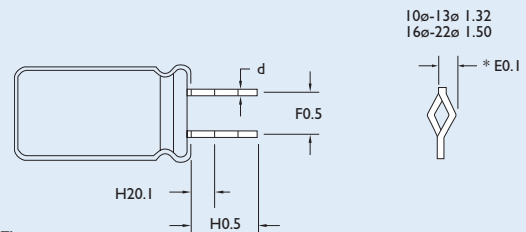
Shape (C)



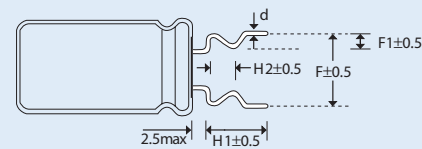
Shape (B)



Shape (D)



Shape (E)



## SPECIFICATIONS INFORMATION

Unit : mm

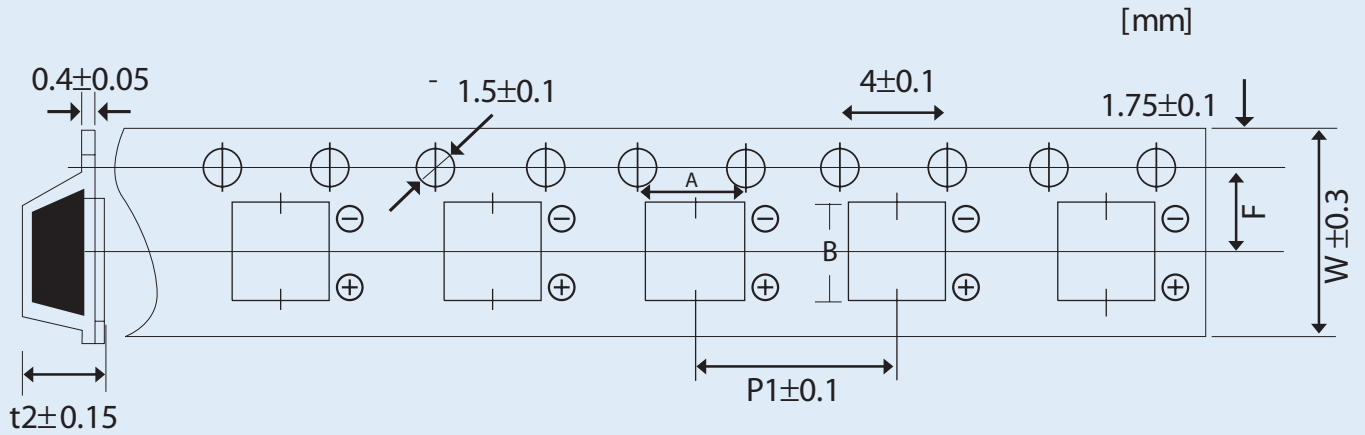
### NO.CUTTING &

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	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
		H2					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									



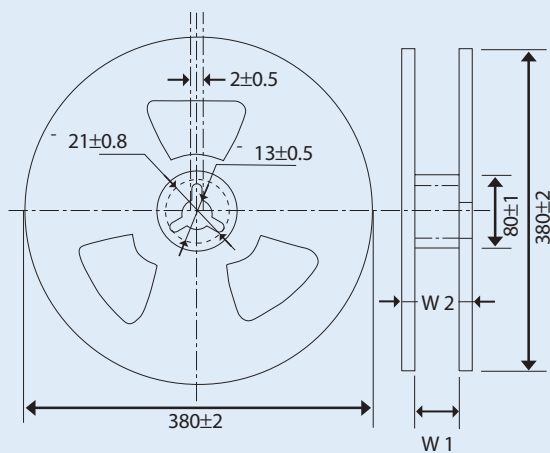


## CARRIER TAPE DIMENSION



CASE SIZE	( $\phi D$ mm)	W	A	B	PI	F	t2
B	$\phi 4$	12.0	4.7	4.7	8.0	5.5	5.75
C	$\phi 5$	12.0	5.7	5.7	12.0	5.5	5.8
D	$\phi 6.3 \times 5.4$	16.0	7.0	7.0	12.0	7.5	5.75
E	$\phi 8 \times 6.2$	16.0	8.7	8.7	12.0	7.5	6.8
F	$\phi 8 \times 10.2$	24.0	8.7	8.7	16.0	11.5	11.0
G	$\phi 10 \times 10.2$	24.0	10.7	10.7	16.0	11.5	11.0
H	$\phi 6.3 \times 7.7$	16.0	7.0	7.0	12.0	7.5	8.0

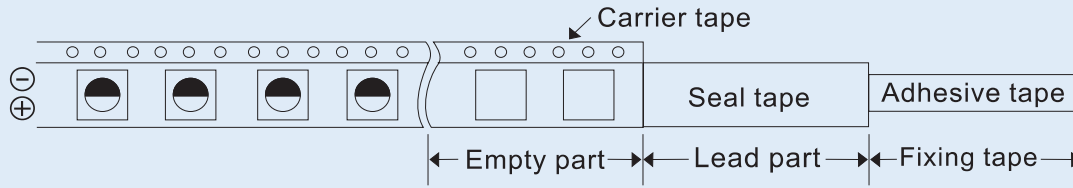
## REEL DIMENSION



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



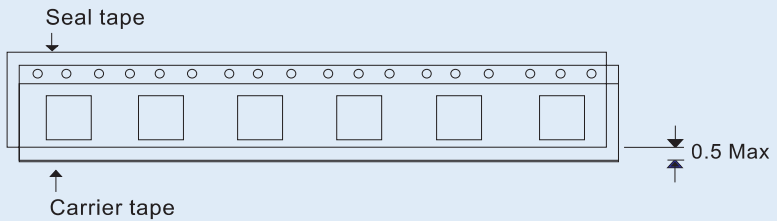
## DETAILS OF CARRIER TAPE



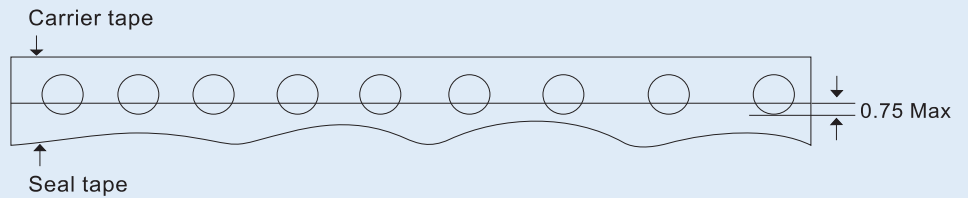
- (1)
- Last reeling empty part of carrier tape shall be more than 10 cm
  - Leader part of seal tape shall be more than 20 cm.
  - First reeling Empty part of carrier tape shall be more than 10 cm
  - Adhesive tape fixing the end of the leader part shall be approx. 10 cm

(2) Deviation between carrier tape and seal tape

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

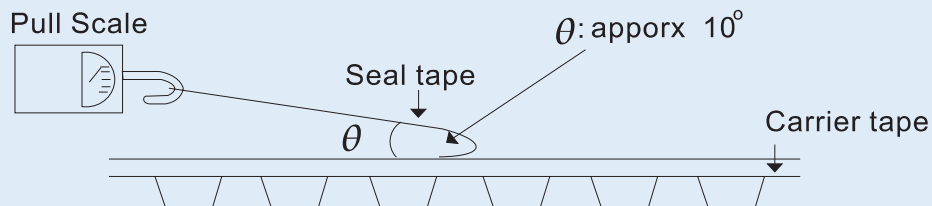


- Seal tape shall not cover on the feeding holes more than 0.75 mm.



## ADHESION TEST

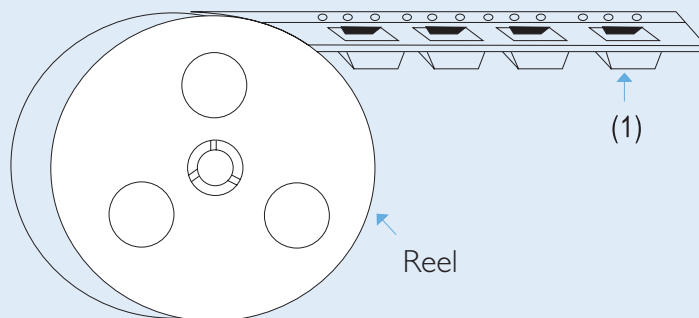
Reasonable pulling strength: 0.1~0.7N  
 Pulling speed: 300mm / min





## 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.



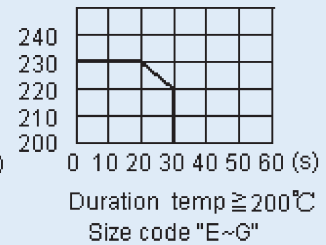
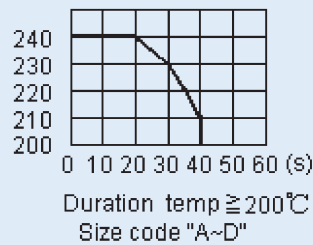
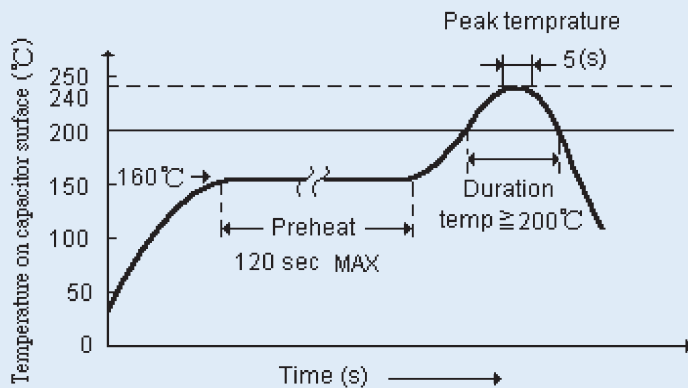
## PACKAGING QUANTITY

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

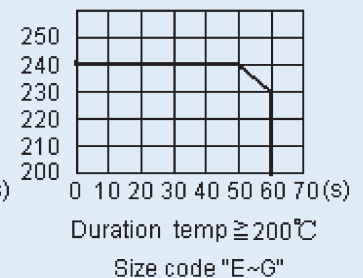
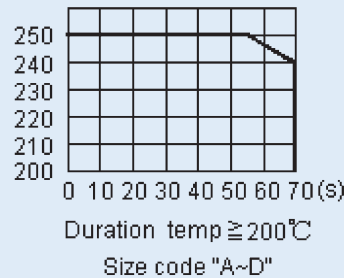
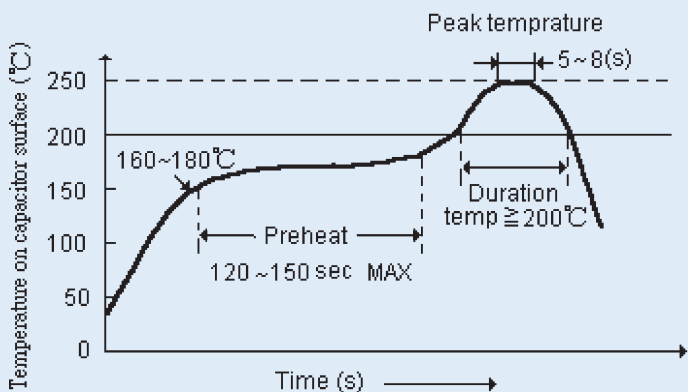


## Reflow soldering for chip capacitors

- (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) Observe proper soldering conditions (temperature, time, etc.). Do not exceed the specified limits.
- (3) Reflow should be performed one time. Consult us for additional reflow restrictions.
- (4) Reflow soldering profile for standard :



- (5) Reflow soldering profile for lead free :



### Manual Soldering

- (1) Observe temperature and time soldering specifications or do not exceed temperatures of  $300^{\circ}\text{C}$  for 3 seconds or less.
- (2) If a soldered capacitor must be removed and reinserted, avoid excessive stress on the capacitor leads.

### Capacitor handling 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.

# S5 [ For Super Miniature ]

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

## Miniature Aluminum Electrolytic Capacitors

### ELECTRICAL CHARACTERISTICS

Operating Temperature : -40° ~ +105°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, 20°C

WV (V):	4	6.3	10	16	25	35	50
D.F (%) :	35	24	20	17	15	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

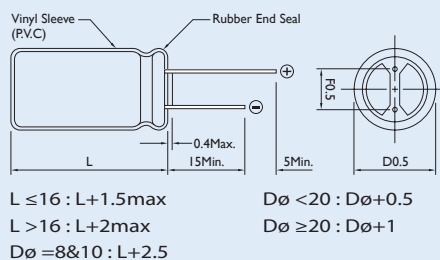
Shelf Life : 500 Hours, No Voltage Applied, at 105°C

- (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

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

Rubber Stand-off



### 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

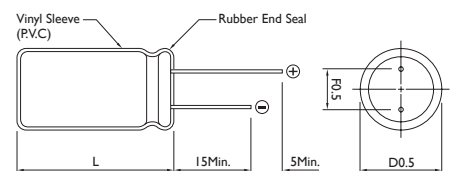
Frequency coefficient

Frequency (Hz)	120	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

Dimensions : mm





## CASE SIZE & PERMISSIBLE RIPPLE CURRENT OF STANDARD PRODUCTS

CAP. (μF)	RATED VOLTAGE WV													
	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
0.22													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	17
4.7							4 x 5	20	4 x 5	16	4 x 5	18	4 x 5	17
													5 x 5	20
10			4 x 5	18	4 x 5	20	4 x 5	23	4 x 5	20	5 x 5	30	6 x 5	33
									5 x 5	27				
22	4 x 5	20	4 x 5	28	5 x 5	33	4 x 5	29	6 x 5	42	6 x 5	48	6.3 x 5	55
							5 x 5	37						
33	4 x 5	25	4 x 5	33	4 x 5	34	5 x 5	44	5 x 5	45				
					5 x 5	41	6 x 5	49	6 x 5	53				
47	5 x 5	30	4 x 5	35	5 x 5	46	5 x 5	54	5 x 5	55				
			5 x 5	45	6 x 5	54	6 x 5	58	6.3 x 5	65				
68					6 x 5	54								
100			5 x 5	55										
	6 x 5	50	6 x 5	70	6 x 5	80	6 x 5	85	8 x 5	90				
220	6 x 5	70	6 x 5	90										
330	8 x 5	110	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

# SS [ For Super Miniature ]

105°C Single-Ended Lead Aluminum Electrolytic Capacitors

## Miniature Aluminum Electrolytic Capacitors

### ELECTRICAL CHARACTERISTICS

Operating Temperature : -40° ~ +105°C

Working Voltage : 4~63V

Rate Capacitance Range : 0.1 ~ 470μF

Capacitance Tolerance : +/-20% at 120Hz, 20°C

DC Leakage Current (μA) : I = I=0.01CV or 3(μA) whichever is greater.

( After rated voltage applied for 2 minutes )

Dissipation Factor : at 120 Hz, 20°C

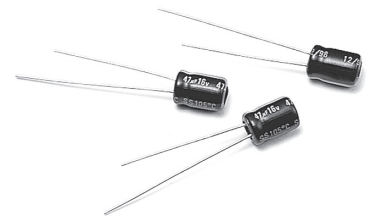
WV (V):	4	6.3	10	16	25	35	50	63
tan δ :	0.35	0.24	0.20	0.17	0.15	0.12	0.10	0.08

Endurance :After applying rated voltage for 1000 horus at 105°C

- (a) Capacitance Change :Within 20% of Initial Value
- (b) Dissipation Factor : 200% or less of initial specified value
- (c) Leakage Current : initial specified value or less

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

- (a) Capacitance Change :Within 20% of Initial Value
- (b) Dissipation Factor : 200% or less of initial specified value
- (c) Leakage Current : 200% or less of initial specified value



### 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 equipment.

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

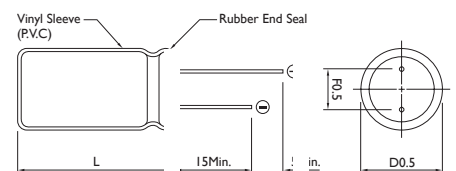
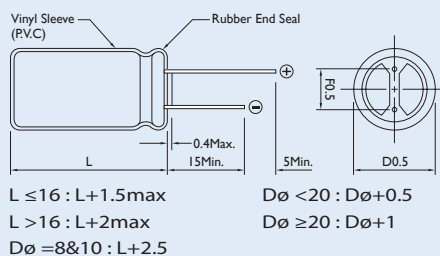
Temperature(°C)	65	85	105
Factor	1.70	1.30	1.00

### DIAGRAM OF DIMENSIONS

Dimensions : mm

#### Rubber Stand-off

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 WV															
	4.0		6.3		10		16		25		35		50		63	
	SIZE	RIPPLE	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	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	24	4 x 7	29	4 x 7	26
											5 x 7	24	5 x 7	31	6 x 7	33
					4 x 7	22	4 x 7	29	4 x 7	33	4 x 7	34	4 x 7	37	5 x 7	42
10									5 x 7	35	5 x 7	36	5 x 7	45	6 x 7	50
									6 x 7	53			6 x 7	45		
			4 x 7	37	4 x 7	31	4 x 7	36	4 x 7	43	5 x 7	48	6 x 7	65		
22					5 x 7	38	5 x 7	44	5 x 7	51	6 x 7	57				
									6 x 7	53						
33	4 x 7	30	5 x 7	42	4 x 7	39	4 x 7	50	5 x 7	55	6 x 7	70				
					5 x 7	47	5 x 7	57	6 x 7	65						
47	4 x 7	35	4 x 7	46	4 x 7	50	5 x 7	75	5 x 7	67	6 x 7	81				
			5 x 7	55	5 x 7	60	6 x 7	77	6 x 7	79						
					6 x 7	60										
68							5 x 7	84								
100	5 x 7	55	5 x 7	75	5 x 7	85	5 x 7	94	6 x 7	120						
			6 x 7	90	6 x 7	100	6 x 7	110	8 x 7	120						
150							6 x 7	120								
220	6 x 7	95	6 x 7	130	6 x 7	135	8 x 7	140								
							8 x 9	140								
330			8 x 7	140			8 x 9	155								
470					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



# SK [ For General ]

85°C Single-Ended Lead Aluminum Electrolytic Capacitors

## Miniature Aluminum Electrolytic Capacitors

### 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

WV (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

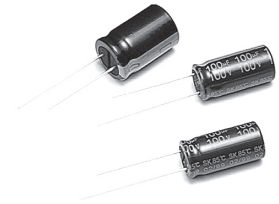
For capacitor whose capacitance exceeds 1000μF. The value of DF(%) is increased by 2% for every addition of 1000μF.

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



### 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

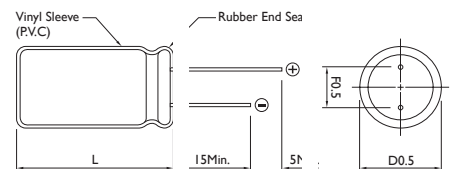
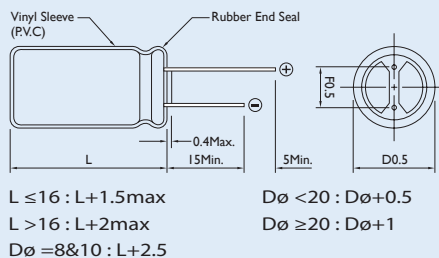
Temperature coefficient

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

### DIAGRAM OF DIMENSIONS

Dø	F	dø
4.0	1.5	0.45
5.0	2.0	0.5
6.3	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



Dimensions : mm





## CASE SIZE & PERMISSIBLE RIPPLE CURRENT OF STANDARD PRODUCTS

CAP. (μF)	RATED VOLTAGE WV													
	100		160		200		250		350		400		450	
	SIZE	RIPPLE	SIZE	RIPPLE	SIZE	RIPPLE	SIZE	RIPPLE	SIZE	RIPPLE	SIZE	RIPPLE	SIZE	RIPPLE
0.22														
0.47	5 x 11	10	5 x 11	12	5 x 11	14	5 x 11	14	5 x 11	14	6.3 x 11	14	6.3 x 11	14
	5 x 11	21	5 x 11	17	5 x 11	19	5 x 11	17	6 x 11	19	6.3 x 11	16	8 x 11	19
1.0														
							6.3 x 11	19			8 x 11	19		
2.2	5 x 11	30	6.3 x 11	26	6.3 x 11	22	6.3 x 11	24	8 x 11	33	8 x 11	26	10 x 12	33
					8 x 11	27	8 x 11	30	10 x 12	33	10 x 12	33		
3.3	5 x 11	45	6.3 x 11	30	6.3 x 11	30	8 x 11	30	8 x 11	33	10 x 12	40	10 x 15	42
			8 x 11	35	8 x 11	37	10 x 12	38	10 x 12	39				
4.7	5 x 11	50	6.3 x 11	32	8 x 11	36	8 x 11	36	8 x 11	36			10 x 15	50
			8 x 11	40	10 x 12	45	10 x 12	45	10 x 12	45	10 x 15	45	10 x 19	50
									10 x 15	45				
6.8							8 x 11	40					10 x 15	50
							10 x 12	50					10 x 19	56
10	6.3 x 11	75	8 x 11	50	10 x 12	57	10 x 15	70	10 x 15	70	10 x 15	50	13 x 20	60
			10 x 12	65	10 x 15	70	10 x 19	70	13 x 20	70	10 x 19.5	56	13 x 25	75
			10 x 15	65							13 x 20	70	13 x 25	75
15							10 x 19	75	10 x 19	90			13 x 20	77
							13 x 20	90						
22	8 x 11	130	10 x 15	110	10 x 15	120	10 x 19.5	130			13 x 20	100	16 x 20	100
			10 x 19	110					13 x 20	130	13 x 25	110	16 x 25	110
											16 x 25	130	16 x 32	130
33	8 x 11	140	10 x 19.5	150	10 x 19.5	160	13 x 20	140	13 x 25	170	13 x 25	140	16 x 25	145
	10 x 12	170					13 x 25	160	16 x 25	170	16 x 20	145	16 x 32	160
											16 x 25	170	16 x 36	180
47	10 x 12	190	12 x 15	145	13 x 20	160	13 x 25	210	16 x 25	220	16 x 25	180	18 x 36	200
	10 x 15	230	12 x 25	180	13 x 25	190	16 x 5	210			16 x 36	220	18 x 40	230
			13 x 20	180							16 x 32	220		
68					13 x 25	230					18 x 25	236	18 x 32	265
100	10 x 19.5	400	13 x 25	250	16 x 25	330	16 x 32	310	16 x 36	320	18 x 36	360	22 x 40	370
			16 x 25	300										
120					16 x 25	375			18 x 36	360				
150					16 x 25	440	18 x 40	410						
180					16 x 32	472								
220	13 x 25	710	16 x 32	450	18 x 25	485	18 x 36	540						
					18 x 32	540	18 x 40	600						
			16 x 36	510	18 x 36	600								
330	13 x 25	720	18 x 36	540	16 x 40	710								
	16 x 25	860	18 x 40	600	16 x 45	750								
					18 x 36	725								
					18 x 32	685								
					18 x 40	800								
470	16 x 25	1100	22 x 40	900	18 x 40	750								
	16 x 32	1164			22 x 35	1000								
680														
1000	18 x 40	1680												
2200	22 x 40	2300												

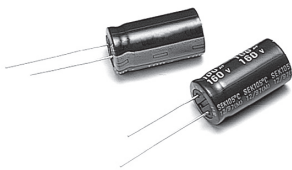
Note : \* I. D x L : mm

\* 2. mA rms at 85°C, 120Hz

# Miniature Aluminum Electrolytic Capacitors

# SE-K [ For General ]

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



## DESCRIPTION

Features: 105°C 1000 hours

Features: For general purpose coupling, decoupling, by pass, and filtering circuit in entertainment electronics.

## ELECTRICAL CHARACTERISTICS

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

Working Voltage : 6.3~100V / 160~250V / 350~450V

Rate Capacitance Range : 0.47 ~ 15000μF / 0.47~470 μF 0.47~105 μF

Capacitance Tolerance : +/-20% at 120Hz, 20°C

DC Leakage Current (μA) :  $I = 0.01CV + 3 / 0.03CV + 10$   
(whichever is greater, (After rated voltage applied for 2 minutes) )

Dissipation Factor : at 120 Hz, 25°C

WV (V):	6.3	10	16	25	35	50	63~100	160 ~ 250	350 ~ 450
tan δ :	0.26	0.22	0.18	0.16	0.14	0.12	0.10	0.15	0.20

Endurance : After applying rated voltage for 1000 hours at 105°C the capacitors shall meet the following requirements.

- (a) Capacitance Change : Within 20% of Initial Value
- (b) Dissipation Factor : 200% or less of initial specified value
- (c) Leakage Current : initial specified value or less

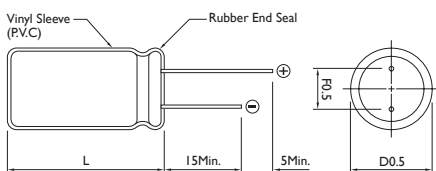
Shelf Life : After leaving capacitors under no load at 105°C for 500 hours. the capacitors shall meet the same requirement as Endurance.

## Multiplier for Ripple Current

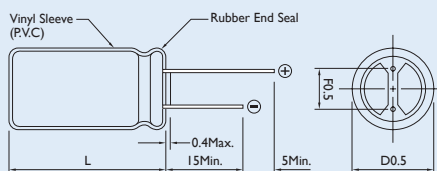
Frequency coefficient

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

## DIAGRAM OF DIMENSIONS



### Rubber Stand-off



Dimensions : mm

Dø	F	dø
5.0	2.0	0.5
6.3	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(1.0)



## CASE SIZE & PERMISSIBLE RIPPLE CURRENT OF STANDARD PRODUCTS

CAP. (μF)	RATED VOLTAGE WV		RATED VOLTAGE WV		RATED VOLTAGE WV		RATED VOLTAGE WV		RATED VOLTAGE WV		RATED VOLTAGE WV		RATED VOLTAGE WV	
	6.3 SIZE	RIPPLE	10 SIZE	RIPPLE	16 SIZE	RIPPLE	25 SIZE	RIPPLE	35 SIZE	RIPPLE	50 SIZE	RIPPLE	63 SIZE	RIPPLE
0.1														
0.22														
0.33														
0.47														
0.68											5 x 11	7	5 x 11	8
1.0											5 x 11	7		
2.2											5 x 11	12	5 x 11	13
3.3											5 x 11	18	5 x 11	20
4.7											5 x 11	25	5 x 11	27
6.8							5 x 11	20	5 x 11	25	5 x 11	30	5 x 11	34
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	6.3 x 11	90
33			5 x 11	60	5 x 11	70	5 x 11	75	5 x 11	85	6.3 x 11	105	6.3 x 11	110
47	5 x 11	60	5 x 11	75	5 x 11	85	5 x 11	90	5 x 11	95	6.3 x 11	100	8 x 11	155
68	5 x 11	75	5 x 11	80	5 x 11	100	6.3 x 11	125	8 x 11	130	8 x 11	159	10 x 12	198
100	5 x 11	100	6 x 11	135	5 x 11	110	6.3 x 11	145	6.3 x 11	150	8 x 11	160	8 x 15	230
150	5 x 11	120												
220	5 x 11	140	6.3 x 11	130	8 x 11	180	8 x 11	200	10 x 12	240	10 x 12	289	10 x 15	330
330	6.3 x 11	160	6.3 x 11	205	8 x 11	285	8 x 11	265	8 x 15	345	10 x 15	450	10 x 19.5	520
470	8 x 11	200	8 x 11	255			8 x 15	320	8 x 20	420	10 x 19.5	535	13 x 20	650
680	8 x 11	320	8 x 11	335	10 x 12	455	10 x 12	335	10 x 12	380	13 x 20	580	13 x 25	840
1000	10 x 12	320	8 x 15	385	10 x 15	530	10 x 15	470	13 x 20	580	13 x 25	860	16 x 25	1000
1500	8 x 11	370	8 x 11	410	8 x 20	600	10 x 19.5	680	13 x 20	850	13 x 25	930	16 x 25	1020
2200	10 x 12	470	8 x 15	470	10 x 15	590	13 x 25	995	16 x 25	1110	16 x 25	1110	16 x 32	1200
3300	10 x 15	600	10 x 12	490	10 x 19.5	700	13 x 20	855						
4700	10 x 19.5	880	10 x 15	570	10 x 19.5	680	13 x 25	1020	13 x 25	935	16 x 32	1350	16 x 32	1300
6800	13 x 20	930	10 x 19.5	750	13 x 20	860	16 x 25	1230	16 x 25	1110	16 x 25	1110	16 x 36	1450
10000	13 x 20	930	10 x 25	800	10 x 25	895	13 x 25	1030	16 x 25	1230	16 x 36	1360	18 x 36	1455
15000	13 x 20	930	13 x 20	1010	13 x 20	990	16 x 25	1230	16 x 32	1450	18 x 36	1530		
	10 x 19.5	880	13 x 25	1150										
	13 x 20	1100	13 x 25	1140	13 x 25	1140	13 x 25	1035	16 x 36	1470	18 x 36	1540		
			16 x 25	1350	16 x 25	1350	16 x 25	1230	18 x 36	1660	18 x 40	1700		
			13 x 20	1050			16 x 32	1450						
			13 x 25	1220										
	13 x 25	1100	13 x 25	1190	16 x 25	1330	16 x 32	1420	18 x 36	1580	22 x 35	1900		
	16 x 25	1320	16 x 25	1410	16 x 32	1560	18 x 36	1690	18 x 40	1750				
	13 x 25	1250	16 x 25	1370	16 x 36	1590	18 x 36	1850	22 x 40	1885				
	16 x 25	1490	16 x 32	1610	16 x 40	1670								
					18 x 36	1790								
	16 x 25	1560	16 x 36	1760	18 x 36	2100								
	16 x 32	1830	18 x 36	1980										
	18 x 36	2280	18 x 40	1960										

Note : \* I. D x L : mm

\* 2. mA rms at 85°C, 120Hz



# SH [ For General ]

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

## Miniature Aluminum Electrolytic Capacitors

### ELECTRICAL CHARACTERISTICS

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

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

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

Capacitance Tolerance : -20 ~ +20%

DC Leakage Current (μA) : 0.01CV + 3 / 0.03CV+10

( Measurements shall be made after a2 minute charge at rated 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 exceeds 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
	Z - 40°C / Z + 20°C		8	6	4	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

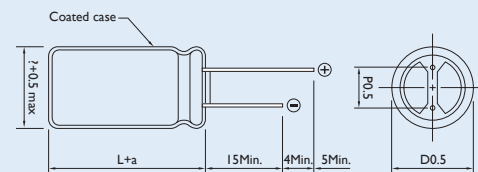
Shelf Life : 1000 Hours, No Voltage Applied

- (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

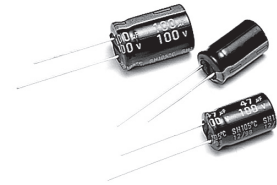
### DIAGRAM OF DIMENSIONS

Dø	F	dø
5.0	2.0	0.5
6.3	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 ≤ 16 : L+1.5max  
L > 16 : L+2max  
Dø = 8&10 : L+2.5  
Dø < 20 : Dø+0.5  
Dø ≥ 20 : Dø+1



### 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

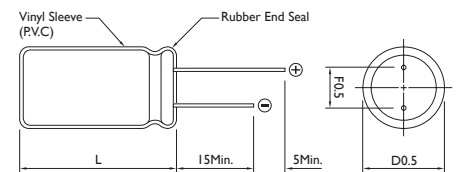
Frequency coefficient

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

Dimensions : mm





## CASE SIZE & PERMISSIBLE RIPPLE CURRENT OF STANDARD PRODUCTS

CAP. (μF)	RATED VOLTAGE WV													
	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	3		
0.22											5 x 11	5		
0.33														
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	43	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	6.3 x 11	105	8 x 11	110
47			5 x 11	75	5 x 11	85	5 x 11	90			6.3 x 11	101	8 x 11	155
68			5 x 11	80	5 x 11	100	6.3 x 11	125	8 x 11	130	8 x 11	159	10 x 12	198
100	5 x 11	100	5 x 11	110	6.3 x 11	135	6.3 x 11	145	8 x 11	190	8 x 11	169	10 x 12	260
150					5 x 11	115					10 x 12	210		
220	5 x 11	120	6.3 x 11	130	8 x 11	180	8 x 11	200	10 x 12	240	10 x 12	289	10 x 15	330
330	6.3 x 11	165	6.3 x 11	180	6 x 11	180	10 x 12	250	10 x 12	315	10 x 15	400	10 x 19.5	465
470					8 x 11	235			8 x 11	253	10 x 12	346		
680	8 x 11	200	8 x 11	255	8 x 11	315	10 x 12	355	10 x 15	440	10 x 19	535	13 x 20	650
1000	6 x 11	161			10 x 12	285			10 x 12	380	13 x 20	600		
1500	8 x 11	280	8 x 11	305	8 x 11	315	10 x 15	470	10 x 15	440	13 x 20	730	13 x 25	800
2200									10 x 19	460				
3300	6 x 11	225			10 x 12	395	10 x 12	400	13 x 20	580	10 x 19	560	13 x 20	690
4700	10 x 12	320	10 x 12	420	10 x 15	530	10 x 19.5	650	13 x 20	730	13 x 25	860	16 x 25	1000
6800	10 x 12	470	8 x 15	477	10 x 19.5	700	13 x 20	855	13 x 25	995	16 x 25	1110	16 x 32	1200
10000			10 x 12	490										
15000			10 x 15	570	10 x 15	600			13 x 20	857			16 x 25	1023
22000	10 x 15	600	10 x 19.5	750	13 x 20	860	13 x 25	1020	16 x 25	1110	16 x 32	1350	16 x 36	1450
33000	13 x 20	930	10 x 19	800	13 x 25	1150	16 x 25	1230	16 x 32	1450	18 x 36	1530		
47000			13 x 20	1010	13 x 20	991			16 x 25	1236	16 x 36	1360		
68000	13 x 20	1100	13 x 25	1220	16 x 25	1350	16 x 32	1450	18 x 36	1660				
100000					13 x 25	1150			16 x 36	1477				
150000	16 x 25	1320	16 x 25	1410	16 x 25	1330	18 x 36	1690						
					16 x 32	1560								
	16 x 25	1490	16 x 32	1610	18 x 36	1790								
	16 x 32	1830	18 x 36	1980										
	18 x 36	2280												

Note : \* I, D x L : mm

\* 2. mA rms at 105°C, 120Hz





## CASE SIZE & PERMISSIBLE RIPPLE CURRENT OF STANDARD PRODUCTS

CAP. (μF)	RATED VOLTAGE WV		100		160		200		250		350		400		450	
	SIZE	RIPPLE	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	5 x 11	12	6 x 11	14	6 x 11	14	6.3 x 11	16
1.0	5 x 11	15	5 x 11	17	6.3 x 11	17	6.3 x 11	17					8 x 11	20	8 x 11	22
											8 x 11	20				
2.2	5 x 11	22	6 x 11	25	6.3 x 11	25	8 x 11	29					10 x 12	35	10 x 12	37
							6 x 11	23			10 x 12	35	8 x 11	28		
3.3	5 x 11	29	8 x 11	36	8 x 11	36	10 x 12	42					10 x 12	42	10 x 15	51
							8 x 11	34			10 x 15	47	10 x 15	49		
4.7	5 x 11	37	8 x 11	43	10 x 12	50	10 x 12	52			10 x 12	43	8 x 11	57	10 x 15	59
			6 x 11	34			10 x 19	60			10 x 15	55	10 x 15	57		
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
							13 x 25	94								
10	6.3 x 11	65	10 x 12	70	10 x 15	80	10 x 19.5	80			10 x 19	76	10 x 19.5	75	13 x 25	99
					10 x 12	69	10 x 15	75			10 x 15	65	13 x 20	97		
15	8 x 11	82	10 x 15	90	10 x 19.5	110	13 x 20	120			13 x 20	140	13 x 25	145	16 x 25	150
	8 x 11	115	10 x 19.5	130	10 x 19.5	150	13 x 25	155					13 x 25	140	16 x 32	175
22						10 x 15	140	13 x 20	130	16 x 25	165	16 x 20	147			
											13 x 20	120				
33											16 x 25	170	16 x 25	170	16 x 25	145
	10 x 12	160	13 x 20	180			13 x 25	200			16 x 20	164	16 x 20	164	18 x 36	250
47							13 x 25	190			16 x 32	195	16 x 32	230		
							13 x 20	160					16 x 25	190	16 x 32	211
68													16 x 25	200	18 x 40	350
	10 x 15	210	13 x 25	250			13 x 25	260	13 x 25	228	16 x 36	210	16 x 32	240		
82							13 x 20	220			18 x 36	240	18 x 25	245		
													18 x 36	300		
100	10 x 19.5	241	13 x 25	270	16 x 25	220	16 x 32	300	18 x 36	320	18 x 36	320	18 x 36	325	22 x 40	380
					16 x 20	242							18 x 25	310		
120													18 x 32	310		
													18 x 30	286		
150	13 x 20	385	16 x 25	390	16 x 32	400	18 x 36	440	18 x 40	300	18 x 30	254				
	10 x 19	305					16 x 36	390	22 x 40	360	18 x 32	275				
220							16 x 32	372			18 x 36	290				
											22 x 40	265				
330											18 x 36	320	22 x 40	440		
											18 x 32	289				
470											18 x 40	350				
680	13 x 25	414	16 x 32	435	16 x 36	450	18 x 40	600	22 x 40	480	22 x 40	465	22 x 40	470		
220	13 x 25	495	16 x 36	700	18 x 36	675	22 x 40	800								
	16 x 25	590			18 x 40	750										
330	16 x 25	720	18 x 40	850	18 x 40	780										
					22 x 40	920										
470	16 x 32	875	22 x 40	980												
680	16 x 36	1200														

Note : \* I. D x L : mm

\* 2. mA rms at 105°C, 120Hz

# Miniature Aluminum Electrolytic Capacitors

# SG [ Electronic Ballast ]

105°C Single-Ended Lead Aluminum Electrolytic Capacitors



### Multiplier for Ripple Current

Frequency coefficient

Frequency (Hz)	50,60	120	300	1K	10K~100K
6.3~100V Below~68μF	0.50	0.625	0.75	0.875	1.00

## 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% at 120Hz, 20°C

DC Leakage Current (μA) :  $I=0.06CV+10(\mu A)$ , whichever is greater.

(After rated voltage applied for 2 minutes )

Dissipation Factor : at 120 Hz, 20°C

WV (V) :	160	200	250	350	400	450
$\tan \delta$ :	0.15	0.15	0.15	0.20	0.24	0.24

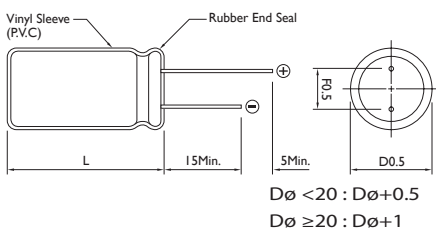
Endurance : After applying rated voltage with rated ripple current for 5000 hours at 105°C, the capacitors shall meet the following requirements.

- (a) Capacitance Change : Within 20% of Initial Value
- (b) Dissipation Factor : 200% or less of initial specified value
- (c) Leakage Current : initial specified value or less

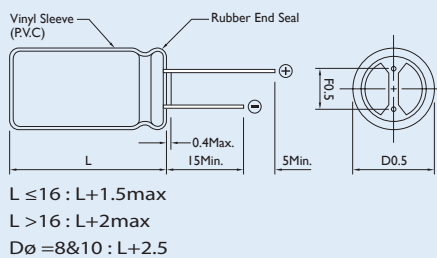
Shelf Life : After placed at 105°C without voltage applied for 1000 hours, the capacitors shall meet the same requirement as Endurance.

## DIAGRAM OF DIMENSIONS

Dimensions : mm



### Rubber Stand-off



Dø	F	dø
5.0	2.0	0.5
6.3	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(1.0)



## CASE SIZE OF STANDARD PRODUCTS

CAP. ( $\mu$ F)	RATED VOLTAGE					
	160 SIZE	RIPPLE	200 SIZE	RIPPLE	250 SIZE	RIPPLE
10			10 x 15	160	10 x 15 10 x 19.5	136 160
15			10 x 15	128		
22	10 x 19.5	256	10 x 19.5	256	10 x 25 13 x 20	232 256
33	10 x 19.5	336	10 x 19.5 13 x 20	256 336	13 x 20	336
47	13 x 20	416	13 x 20	416	13 x 25 16 x 20	432 440
68	13 x 25 16 x 20	576 688	13 x 25 16 x 20	576 688	16 x 25 18 x 20	608 600
82						
100			16 x 25	760	16 x 25	832
	16 x 25 18 x 20	760 744	18 x 20	744	18 x 25	800
150	16 x 32 18 x 25	1040 1000	18 x 25	1040	18 x 32	1040
220	16 x 32 18 x 25	1200 1160	18 x 32	1248	18 x 40	1312
330	18 x 32	1536				

Note : \* 1. D x L : mm

\* 2. mA rms at 105°C, 120KHz

\* 3. Down Size : 3000Hrs



## CASE SIZE & PERMISSIBLE RIPPLE CURRENT OF STANDARD PRODUCTS

CAP. (μF)	RATED VOLTAGE WV					
	350 SIZE		400 SIZE		450 SIZE	
		RIPPLE		RIPPLE		RIPPLE
3.3					10 x 19.5	96
4.7			10 x 15	96	13 x 20	128
6.8			10 x 15	115	10 x 12	144
10	10 x 19.5	160	10 x 19.5	160	13 x 20	176
15					13 x 25	176
22	13 x 20	256	13 x 25	272	16 x 25	304
			16 x 20	320	18 x 20	320
33	13 x 25	368	16 x 25	368	16 x 32	440
	16 x 20	400	18 x 20	400	18 x 25	448
	16 x 25	480	18 x 32	544		
47			16 x 32	480		
	18 x 20	504	18 x 25	520		
68	16 x 32	640	18 x 36	672	18 x 40	736
	18 x 25	608			18 x 32	632
82						
100	18 x 32	848	18 x 40	872	22 x 40	928
150			22 x 40	1040		

Note : \* 1. D x L : mm

\* 2. mA rms at 105°C, 120KHz

\* 3. Down Size : 3000Hrs

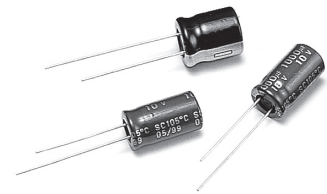
# SP [ Miniature and Long Life ]

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

## Miniature Aluminum Electrolytic Capacitors

### ELECTRICAL CHARACTERISTICS

Operating Temperature : -40° ~ +105°C	-25° ~ +105°C
Working Voltage : 160 ~ 400V	450V
Rate Capacitance Range : 2.2 ~ 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 at 25°C )	
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	



### 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

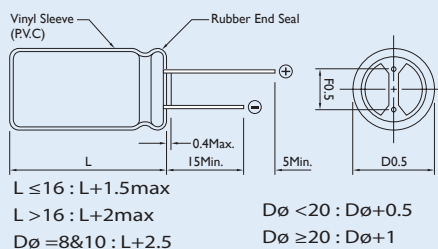
#### Temperature coefficient

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

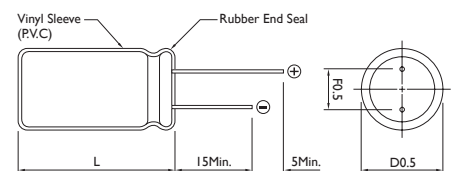
### DIAGRAM OF DIMENSIONS

Dø	F	dø
4.0	1.5	0.45
5.0	2.0	0.5
6.3	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



Dimensions : mm





## CASE SIZE OF STANDARD PRODUCTS

CAP. (μF)	RATED VOLTAGE			
	160 SIZE	RIPPLE	200 SIZE	RIPPLE
22			10 x 19	440
33	10 x 19	500	10 x 19	520
			13 x 20	580
47	10 x 19	580	13 x 20	660
	13 x 20	660		
68	12 x 25	720	13 x 25	720
	16 x 20	760	16 x 20	760
100	16 x 20	1120		
	16 x 25	1120	16 x 25	1120
	18 x 20 18 x 25	1120 978	16 x 32	1280
150	16 x 32	1300	16 x 32	1280
	16 x 25	1200		
220	16 x 32	1300		
	18 x 25	1300		
330	18 x 36	1380		

Note : \* I.D x L : mm

\* 2. mA rms at 105°C, 120Hz



## CASE SIZE OF STANDARD PRODUCTS AND PERMISSIBLE RIPPLE CURRENT

CAP. ( $\mu$ F)	RATED VOLTAGE WV			
	400 SIZE	RIPPLE	450 SIZE	RIPPLE
2.2				
3.3			10 x 15	100
4.7			10 x 19	140
6.8	10 x 19	150	10 x 19 13 x 20	150 180
10	10 x 19	180	13 x 20	310
15				
22	16 x 20	300	16 x 25 18 x 20	560 550
33	16 x 25	520	16 x 32 18 x 25	620 590
47	16 x 32	700	16 x 36 18 x 32	880 880
68	18 x 32	870		
82				

Note : \* I. D x L : mm

\* 2. mA rms at 105°C, 120Hz

# Miniature Aluminum Electrolytic Capacitors

# SB [ For Low Leakage Current ]

105°C Single-Ended Lead Aluminum Electrolytic Capacitors



## DESCRIPTION

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

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)	60	70	85	105
Factor	1.95	1.75	1.20	1.00

## DIAGRAM OF DIMENSIONS

Dø	F	dø
4.0	1.5	0.45
5.0	2.0	0.5
6.3	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

## 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

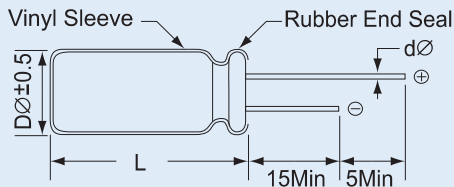
- (a) Capacitance Change : Within 25% of Initial Value
- (b) Dissipation Factor : Not Exceed 200% of Initial Requirement
- (c) Leakage Current : Not Exceed the Initial Requirement

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

Dimensions : mm



L ≤ 16 : L+1.5max  
 L > 16 : L+2max  
 Dø = 8&10 : L+2.5



Dø < 20 : Dø+0.5  
 Dø ≥ 20 : Dø+1





## CASE SIZE OF STANDARD PRODUCTS $D\varnothing \geq 6\text{mm}$ with Safety Vent at Can Bottom

CAP. ( $\mu\text{F}$ )	RATED VOLTAGE WV					
	6.3		10		16	
	SIZE	RIPPLE 120Hz	SIZE	RIPPLE 120Hz	SIZE	RIPPLE 120Hz
10					5x11	40
15					5x11	56
22			5x11	68	6.3x11	70
33			6.3x11	78	6.3x11	95
47			6.3x11	106	8x11	122
68	6.3x11	80	6.3x11	142	8x11	168
100	6x11	126				
			8x11	179	10x12	264
150	8x11	196	10x12	280	10x15	416
220						
330	10x12	272	10x15	355	10x19.5	553
	10x15	388	10x19.5	480	13x20	732
470	10x19.5	507	13x20	640	13x20	1040
680	13x20	700	13x20	848	13x25	1280
820	13x25	850	13x25	980	16x25	1450
			13x25	1081		
1000	13x25	896			16x25	1700
1500	13x25	1204	16x25	1376		
			16x32	1680		
2200	16x25	1513	16x32	1680	18x36	1900
3300	16x36	1902	16x36	2155	18x40	2250
4700	18x36	2272	18x40	2560		

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 $D\varnothing \geq 6\text{mm}$ with Safety Vent at Can Bottom

CAP. ( $\mu\text{F}$ )	RATED VOLTAGE WV					
	25		35		50	
	SIZE	RIPPLE 120Hz	SIZE	RIPPLE 120Hz	SIZE	RIPPLE 120Hz
0.1					5x11	1
0.15					5x11	4
0.22					5x11	4
0.33					5x11	6
0.47					5x11	7
0.56					5x11	7
0.68					5x11	9
1.0					5x11	18
1.5					5x11	24
2.2					5x11	30
3.3					5x11	36
4.7	5x11	27	5x11	40	6.3x11	45
6.8	5x11	42	5x11	45	6.3x11	55
10	6.3x11	63	6.3x11	67	8x11	82
	6.3x11	67	8x11	75	8x11	97
22	8x11	84	8x11	97	10x12	127
33	8x11	102	10x12	139	10x15	156
47	10x12	141	10x12	166	10x15	217
68	10x12	190	10x15	238	10x19.5	300
100	10x15	277	10x19.5	310	13x20	390
150	10x19.5	455	13x20	491	13x25	569
220			13 x 25	630		
330	13 x 20	590	16 x 25	771	16 x 25	910
680	16x25	1110	16x25	1150	16x36	1249
	16x32	1385	16x32	1462	16x36	1870
820	16x32	1540	16x36	1630	16x36	1950
1000	16x36	1710	18x36	1723	18x40	2070
1500	16x36	1779	18x4	2006		
2200	18x40	2174				
3300						
4700						

Note : \* 1. D x L : mm

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


**CASE SIZE OF STANDARD PRODUCTS**  $D\varnothing \geq 6\text{mm}$  with SafetyVent at Can Bottom

**CAP. ( $\mu\text{F}$ )    RATED VOLTAGE WV**

	<b>63 SIZE</b>	<b>RIPPLE 120Hz</b>	<b>80 SIZE</b>	<b>RIPPLE 120Hz</b>	<b>100 SIZE</b>	<b>RIPPLE 120Hz</b>
0.1	5 x 11	1	5 x 11	1	5 x 11	1
0.15	5 x 11	4	5 x 11	4	5 x 11	4
0.22	5 x 11	4	5 x 11	4	5 x 11	4
0.33	5 x 11	6	5 x 11	6	5 x 11	6
0.47	5 x 11	7	5 x 11	7	5 x 11	7
0.56	5 x 11	7	5 x 11	7	5 x 11	7
0.68	5 x 11	9	5 x 11	9	5 x 11	9
1.0	5 x 11	18	5 x 11	18	5 x 11	18
1.5	5 x 11	24	5 x 11	24	5 x 11	24
2.2	5 x 11	30	5 x 11	30	6.3 x 11	30
3.3	5 x 11	36	6.3 x 11	36	8 x 11	36
4.7	6.3 x 11	45	6.3 x 11	45	8 x 11	60
6.8	6.3 x 11	55	8 x 11	60	10 x 12	67
10	8 x 11	82	10 x 12	90	10 x 15	94
15	10 x 12	103	10 x 15	112	10 x 19.5	117
22	10 x 15	148	10 x 15	165	10 x 19	187
33	10 x 15	210	10 x 19.5	217	13 x 20	225
47	10 x 19.5	240	10 x 19.5	276	13 x 25	285
68	10 x 19.5	328	13 x 20	631	13 x 25	375
100	13 x 25	420	13 x 25	447	16 x 25	456
150	13 x 25	648	16 x 25	663	16 x 32	707
220	16 x 32	930	16 x 32	970	18 x 36	1010
330	16 x 36	1088	16 x 36	1198	18 x 40	1377
470	18 x 36	1385	18 x 36	1509		
680	18 x 36	1870				
820						
1000	18 x 36	1950				
1500						
2200						
3300						
4700						

# Miniature 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.

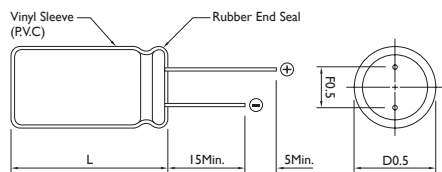
Load Life : 1000 Hours at 105°C with the Polarity Inverted Every 250 Hours

- (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

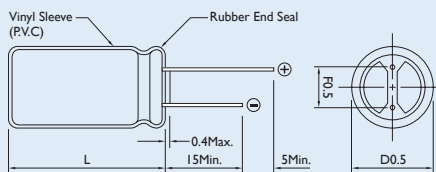
Shelf Life : 500 Hours, No Voltage Applied, at 105°C

- (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 ≤ 16 : L + 1.5max  
 L > 16 : L + 2max  
 Dø = 8 & 10 : L + 2.5

Dø < 20 : Dø + 0.5  
 Dø ≥ 20 : Dø + 1

Dimensions : mm

Dø	F	dø
4.0	1.5	0.45
5.0	2.0	0.5
6.3	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																	
	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	11	5x11	11	5x11	11	5x11	14
0.68																		
1											5x11	17	5x11	17	5x11	17	5x11	21
1.5																		
2.2											5x11	25	5x11	25	5x11	29	6.3x11	34
3.3											5x11	31					8x11	49
													6.3x11	37	6.3x11	39	8x11	49
									5x11	34	5x11	34	5x11	37	8x11	47	8x11	58
													6.3x11	41	6.3x11	44		
4.7					6.3x11	42	5x11	42	6.3x11	54	6.3x11	56	8x11	74	10x12	88	8x11	80
10							6.3x11	50			8x11	70					10x12	100
			5x11	57	5x11	57	6.3x11	69	8x11	94	6x11	75	8x11	95	10x19.5	150	13x20	180
22					6.3x11	69	8x11	86			8x11	97	10x15	130				
											10x12	115						
33	5x11	63	6.3x11	77	8x11	98	8x11	105	10x12	125	8x11	110	8x11	115	13x20	205	13x20	220
											10x15	150	10x19.5	175				
47	6.3x11	84	6.3x11	93	8x11	115	10x12	140	10x15	165	8x11	130	13x20	230	13x20	245	13x25	285
											10x19.5	190						
68																		
100	8x11	140	8x11	193	8x11	140	10x19.5	240	13x20	285	13x20	310	16x25	410	16x25	435	16x32	510
					10x12	175												
					10x15	205			10x15	230								
220	10x12	235	10x15	255	10x19.5	330	13x20	390	16x25	520	16x25	570	16x32	660				
330	10x15	310	10x19.5	380	13x20	445	16x25	580	16x25	630	16x36	790						
470	10x19.5	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 Aluminum Electrolytic Capacitors

# SR [ Bi-Polar Horizontal Deflection Series ]

Features: 85°C 1000hours Recommended Application: Non-polar capacitors for horizontal deflection circuits of TV sets, Correction at frequency and high ripple currents



## DESCRIPTION

Non-polar capacitors for horizontal deflection circuits of TV sets, Correction at high frequency and ripple currents

### Frequency coefficient

Frequency(Hz)	60	120	400~1K	15.75K
Factor	0.4	0.4	0.8	1.0

### Temperature coefficient

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

## ELECTRICAL CHARACTERISTICS

Operating Temperature : -40°C ~ +85°C

Working Voltage : 25, 35, 50

Rate Capacitance Range : 2.2 ~47 µF

Capacitance Tolerance : +/- 20% at 120Hz, 20°C

DC Leakage Current (µA) : 100 µA Max

( After 2 minutes both direction )

Dissipation Factor : at 120Hz, 20°C

WV (V) :	25	35	50
D.F (%) :	0.05	0.05	0.05

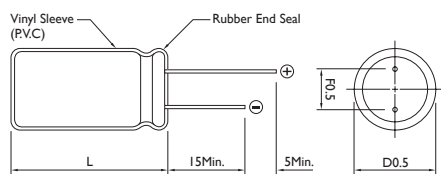
Load Life : 1000 Hours at 85°C with the Polarity Inverted Every 250 Hours

- (a) Capacitance Change : Within 20% of Initial Value
- (b) Dissipation Factor : Not more than 150% of specified value
- (c) Leakage Current : Not more than the specified value

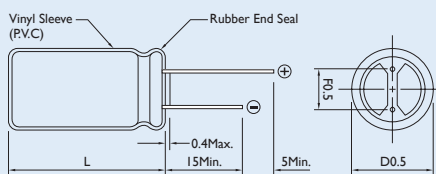
Shelf Life : 500 Hours, No Voltage Applied, at 85°C

## DIAGRAM OF DIMENSIONS

Dimensions : mm



### Rubber Stand-off



L ≤ 16 : L+1.5max  
 L > 16 : L+2max  
 Dø = 8&10 : L+2.5

Dø < 20 : Dø+0.5  
 Dø ≥ 20 : Dø+1

Dø	F	dø
12.0	5.0	0.6
13.0	5.0	0.6
16.0	7.5	0.8
18.0	7.5	0.8
22.0	10.0	0.8(1.0)



## CASE SIZE & PERMISSIBLE RIPPLE CURRENT OF STANDARD PRODUCTS

CAP. (μF)	RATED VOLTAGE WV					
	25		35		50	
	SIZE	RIPPLE	SIZE	RIPPLE	SIZE	RIPPLE
2.2	16x25	6000	16x25	6000	16x25	6000
3.3	16x25	7000	16x25	7000	16x25	7000
4.7	16x25	7000	16x25	7000	16x25	7000
5.6	16x32	7000	16x32	7000	16x32	7000
6.8	16x36	8000	16x36	8000	16x36	8000
8.2	16x36	8000	16x36	8000	16x36	8000
10	18x40	12000	18x40	12000	18x40	12000
13	18x40	12000	18x40	12000	18x40	12000
15	18x40	12000	18x40	12000	18x40	12000
18	22x40	13000	22x40	13000	22x40	13000
20	22x40	13000	22x40	13000	22x40	13000
22	22x40	13000	22x40	13000	22x40	13000
25	22x40	13000	22x40	13000	22x40	13000
47	22x40	13000	22x40	13000	22x40	13000

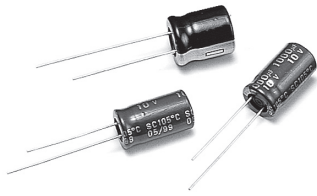
Note : \*1. D x L : mm

\*2. Ripple Current : (Ap-p) Sawtooth waveform 15.75KHz, 85°C

# Miniature 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

Recommended Applications: Applicable for switching regulator of computer, especially for high frequency

### 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	0.90	0.90	0.98	1.00	1.00
1200μF Higher	0.85	0.90	0.95	0.98	1.00	1.00

## ELECTRICAL CHARACTERISTICS

Operating Temperature : -40° ~ +105°C

Working Voltage : 6.3 ~ 100V

Rate Capacitance Range : 4.7 ~ 15000μF

Capacitance Tolerance : +/-20% at 120Hz, 20°C

DC Leakage Current (μA) : I=0.01CV or 3μA, whichever is greater

(After rated voltage applied for 2 minutes)

Dissipation Factor : at 120 Hz, 20°C

WV (V)	6.3	10	16	25	35	50	63	100
tan δ	0.15	0.14	0.12	0.10	0.10	0.08	0.08	0.07

When nominal capacitance is over 1000 μF,

WV (V)	6.3	10	16	25	35	50	63	100
Impedance : Z - 40°C / Z + 20°C	8	6	4	4	4	4	4	4

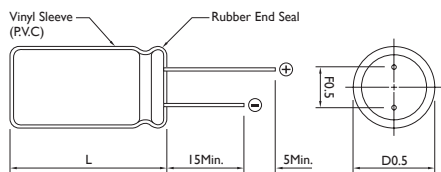
Endurance : After applying rated voltage with ripple current for 3000 hours at 105°C, the capacitors shall meet the following requirements.

If dimension is down size, Endurance will be less 1000 hours than standard

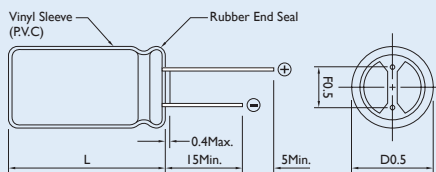
- (a) Capacitance Change : Within 20% of Initial Value
- (b) Not more than 200% of specified value
- (c) Not more than the specified value

Shelf Life : After placed at 105°C without voltage applied for 1000 hours, the capacitors shall meet the same requirement as Endurance.

## DIAGRAM OF DIMENSIONS



### Rubber Stand-off



L ≤ 16 : L + 1.5max  
 L > 16 : L + 2max  
 Dø = 8 & 10 : L + 2.5

Dø < 20 : Dø + 0.5  
 Dø ≥ 20 : Dø + 1

Dimensions : mm

Dø	F	dø
4.0	1.5	0.45
5.0	2.0	0.5
6.3	2.5	
8.0	3.5	0.6
10.0	5.0	0.6
12.0		
13.0		
16.0	7.5	0.8
18.0		
22.0	10.0	0.8 (1.0)




**CASE SIZE OF STANDARD PRODUCTS**  $D\varnothing \geq 6\text{mm}$  with Safety Vent at Can Bottom

CAP. ( $\mu\text{F}$ )	RATED VOLTAGE WV			RATED VOLTAGE WV			RATED VOLTAGE WV			RATED VOLTAGE WV		
	6.3 SIZE	RIPPLE	ESR	10 SIZE	RIPPLE	ESR	16 SIZE	RIPPLE	ESR	25 SIZE	RIPPLE	ESR
4.7												
6.8												
10							5 x 11	29	0.064	4 x 7	40	2.00
										5 x 11	50	0.550
22							5 x 11	77	0.060			
39							5 x 11	95	0.500			
47							5 x 11	117	0.500			
56							5 x 11	100	0.630	5 x 11	150	0.042
68							5 x 11	150	0.420	6 x 11	200	0.370
82												
100				5 x 11	150	0.420	5 x 11	200	0.370	6 x 11	250	0.220
							6 x 7	164	0.240			
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
180				6 x 11	250	0.32						
220	6 x 11	250	0.320	6 x 11	300	0.220	8 x 11	550	0.140	*8 x 11	620	0.120
										8 x 15	750	0.100
270	*6 x 11	300	0.220							10 x 12	865	0.08
330	*6 x 11	320	0.230	8 x 11	550	0.140	*8 x 11	623	0.120	*8 x 15	660	0.100
	8 x 11	400	0.180				8 x 15	750	0.100	8 x 20	800	0.069
							10 x 12	688	0.080	10 x 15	900	0.086
470	*6 x 11	440	0.180				*8 x 15	730	0.093	*8 x 20	1000	0.067
	8 x 11	550	0.140	8 x 15	750	0.100	10 x 12	800	0.085	8 x 15	835	0.086
										10 x 12	900	0.086
				8 x 11	620	0.120	8 x 11	644	0.150	10 x 15	1050	0.064
560							10 x 12	846	0.073			
680	8 x 11	580	0.120	8 x 11	640	0.110	10 x 15	1050	0.064	10 x 19	1100	0.039
	8 x 15	700	0.100	10 x 12	800	0.085	8 x 15	880	0.076			
820	8 x 15	620	0.100									
	8 x 20	750	0.085	10 x 15	1050	0.064	10 x 19	1100	0.044	10 x 19	1250	0.039
	*8 x 11	580	0.150	8 x 20	1080	0.065				10 x 20	1160	0.047
1000	*8 x 15	670	0.085	8 x 15	900	0.077						
	8 x 20	800	0.069	10 x 12	930	0.075	10 x 19	1250	0.039	*10 x 25	1310	0.042
	10 x 12	690	0.080	10 x 15	990	0.085	10 x 15	1140	0.043	13 x 20	1450	0.038
1200	10 x 15	1000	0.064	10 x 19	1250	0.044	*10 x 25	1310	0.042	13 x 25	1600	0.029
	8 x 15	840	0.076				13 x 20	1450	0.038			
	*10 x 15	1070	0.055	10 x 19	1450	0.039	10 x 20	1200	0.045			
1500	10 x 19	1250	0.044				13 x 20	1600	0.035	16 x 25	2000	0.028
	8 x 15	980	0.085									
	8 x 20	1070	0.051									
	10 x 19	1220	0.051	*10 x 19	1330	0.047	10 x 30	1780	0.032	13 x 30	1810	0.029
2200	*10 x 25	1310	0.048	10 x 25	1450	0.025	13 x 20	1720	0.033	16 x 25	1660	0.032
							10 x 25	1644	0.034			
				13 x 20	1450	0.043	13 x 25	2000	0.028	16 x 32	2200	0.024
	10 x 19	1236	0.048	10 x 30	1740	0.032				16 x 36	2540	0.019
3300	13 x 25	1700	0.035	13 x 25	2000	0.028	16 x 25	2200	0.024			
	10 x 25	1400	0.043				13 x 40	2200	0.026	18 x 36	2550	0.019
3900												
	*13 x 30	1570	0.033	13 x 25	1860	0.028				18 x 36	2800	0.019
4700				16 x 25	2200	0.024	16 x 36	2550	0.019			
	16 x 25	1800	0.028									
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
	16 x 32	2350	0.019				18 x 36	3638	0.019			
8200				18 x 36	2800	0.019						
10000	16 x 36	2350	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 ( $\Omega$  Max20°C/100KHz)

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



## CASE SIZE OF STANDARD PRODUCTS $D\varnothing \geq 6\text{mm}$ with Safety Vent at Can Bottom

CAP. ( $\mu\text{F}$ )	RATED VOLTAGE WV			RATED VOLTAGE WV			RATED VOLTAGE WV			RATED VOLTAGE WV		
	35 SIZE	RIPPLE	ESR	50 SIZE	RIPPLE	ESR	63 SIZE	RIPPLE	ESR	100 SIZE	RIPPLE	ESR
1.0				5 x 11	100	4.000						
2.2				5 x 11	100	3.000						
3.3												
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	120	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
12												
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
18												
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
27												
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
39												
47	6 x 11	250	0.370	6.3 x 11	300	0.520	8 x 11	450	0.700	10 x 15	550	0.350
56										8 x 20	362	0.264
68	6 x 11	340	0.220	8 x 11	450	0.350	8 x 11	550	0.520	10 x 19	650	0.240
82	8 x 11	640	0.130									
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				10 x 12	800	0.160				13 x 25	1300	0.110
	8 x 15	650	0.100				10 x 15	1050	0.200			
180												
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	10 x 25	1050	0.068						
270												
330	*10 x 15	900	0.052	10 x 19	1300	0.072				16 x 32	1550	0.049
	8 x 20	902	0.051				13 x 20	1400	0.100			
	10 x 19	1050	0.044									
390												
470	10 x 19.5	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						
560												
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	0.030	16 x 25	1900	0.039	16 x 32	2100	0.042			
	13 x 20	1724	0.034									
1200				16 x 32	2100	0.025	16 x 36	2550	0.036			
1500	16 x 25	1900	0.028									
1800	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	18 x 40	2800	0.026			
	16 x 25	2062	0.023									
	16 x 36	2550	0.019									
2700												
3300	18 x 36	2880	0.019									
3900												
4700				22 x 40	2850	0.025						
6800												
8200												
10000												
15000												

Note : \* I. D x L : mm

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

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

# SJ [ Low Impedance and High Ripple Series ]

Features: 105°C 1000~5000hours, Low impedance and high ripple

Recommended Applications: AV(TV, Video, Audio), Monitor/Computer, OA/HA/

Commuciation, Converter/Inverter, Adapter, SMPS

## Miniature Aluminum Electrolytic Capacitors

### ELECTRICAL CHARACTERISTICS

Operating Temperature : -40° ~ +105°C

Working Voltage : 6.3 ~ 100V

Rate Capacitance Range : 5.6 ~ 6800μF

Capacitance Tolerance : -20 ~ +20%

DC Leakage Current (μA) : I = 0.01 CV(μA) or 3μA Whichever is greater.

Dissipation Factor : at 100KHz, 105°C

WV (V) :	6.3	10	16	25	35	50	63	100
D.F (%) :	22	19	16	14	12	10	9	8

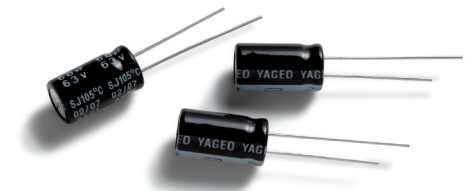
For capacitor whose capacitance exceeds 1000μF. The value of D.F(%) is increased by 2% for every addition of 1000μF.

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

After applying rated voltage with max ripple current for 1000~5000 hours at 105°C, the capacitor shall meet the following requirement.

- (a) Capacitance Change: Within ±25% of the initial value
- (b) Dissipation Factor: Not more than 200% of the specified value
- (c) Leakage Current: Not more than the specified value

After placed at 105°C without voltage applied for 1000 hours (500 hours for L=7), the capacitor shall meet the same requirement as Endurance.



### DESCRIPTION

Features: 105°C 1000~5000hours, Low impedance and high ripple

Recommended Applications: AV(TV, Video, Audio), Monitor/Computer, OA/HA/ Commuciation, Converter/Inverter, Adapter, SMPS

### Multiplier for Ripple Current

Frequency coefficient

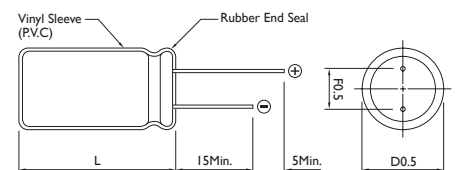
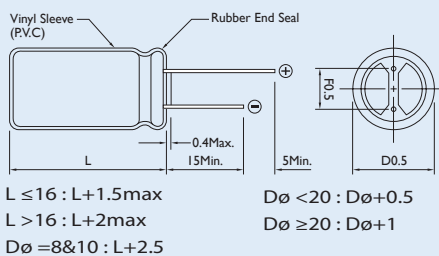
Frequency(Hz)	50	120	1K	10K	100K
5.6~390μF	0.60	0.70	0.85	0.95	1.00
470~1000μF	0.65	0.75	0.90	0.98	1.00
1200~6800μF	0.75	0.80	0.95	1.00	1.00

### DIAGRAM OF DIMENSIONS

Dimensions : mm

Dø	F	dø
4.0	1.5	0.45
5.0	2.0	0.5
6.3	2.5	
8.0	3.5	
10.0	5.0	0.6
12.0		
13.0		
16.0	7.5	0.8
18.0		

Rubber Stand-off





## CASE SIZE & PERMISSIBLE RIPPLE CURRENT OF STANDARD PRODUCTS

CAP. (μF)	RATED VOLTAGE WV		6.3		10		16		25		35	
	SIZE	RIPPLE	SIZE	RIPPLE	SIZE	RIPPLE	SIZE	RIPPLE	SIZE	RIPPLE	SIZE	RIPPLE
10											4X7	130
15									4X7	130	5X7	190
18					4X7	130	5X7	190	5X7	170	5X7	210
27			4X7	130	5X7	190	5X7	190	5X7	210	5X11	230
33			5X7	160	5X7	210	5X7	210	5X11	220	5X11	250
39	4X7	130	5X7	175	5X11	220	5X11	220	5X11	230	6X7	300
47	5X7	175	5X7	190	5X11	230	5X11	230	5X11	250	6X11	380
											8X7	350
56	5X7	190	5X7	210	5X11	250	6X7	300	6X7	300	6X11	410
											8X7	380
68	5X7	210	5X11	210	6X7	300	6X11	340	6X11	340	8X11	510
							8X7	310				
100	5X11	200	5X11	250	6X11	370	6X11	410	6X11	410	8X11	620
	6X7	240			8X7	350	8X7	380	8X7	380		
120	5X11	220	6X7	300	6X11	410	8X11	560	8X11	560	8X11	680
	6X7	270			8X7	380						
150	5X11	250	8X7	350	8X11	510	8X11	630	8X11	630	8X11	760
	6X7	300										
180	8X7	340	8X7	380	8X11	560	8X11	690	8X11	690	8X15	910
											10X12	930
220	8X7	380	6X11	410	8X11	620	8X11	760	8X11	760	10X12	1030
270	6X11	370	8X11	580	8X11	690	8X15	900	8X15	900	8X20	1250
							10X12	930				
330	6X11	410	8X11	640	8X11	760	10X12	1030	10X12	1030	10X15	1430
470	8X11	582	8X11	760	8X15	1000	8X20	1250	8X20	1250	10X19	1820
					10X12	1030	10X15	1430				
560	8X11	760	8X15	910							10X25	2150
			10X12	940								
680	8X15	900	8X15	995	10X15	1430	10X19	1820	10X19	1820	13X20	2360
			10X12	1030		8X20	1250					
820	8X15	995					10X25	2150	10X25	2150	13X25	2510
1000	10X12	1030	8X20	1250	10X19	1820	13X20	2360	13X20	2360	13X25	2770
			10X15	1430								
1200	10X15	1430	10X19	1820	10X25	2150	13X25	2510	13X25	2510	13X30	3290
	8X20	1250									16X20	3140
1500	10X19	1820	10X25	2150	13X20	2360	13X25	2770	13X25	2770	13X35	3400
1800	10X12	1940	13X20	2230	13X25	2510	13X30	3290	13X30	3290	16X25	3460
							16X20	3140				
2200	10X25	2150	10X22	2010	13X25	2770	13X35	3400	13X35	3400		
2700	10X25	2200			13X30	3290	16X25	3460				
	13X20	2230										
3300	13X20	2360	13X25	2770				13X35	3400			
3900	13X25	2770										
4700	13X30	3290	13X35	3400								
5600	13X35	3400	16X25	3460								
	16X20	3140										
6800	16X25	3460										

Note: \*1. D x L: mm

\*2. Ripple Current : (mA/rms 105°C / 100KHz), ESR (Ω Max20°C / 100KHz)



## CASE SIZE & PERMISSIBLE RIPPLE CURRENT OF STANDARD PRODUCTS

CAP. (μF)	RATED VOLTAGE WV					
	50		63		100	
	SIZE	RIPPLE	SIZE	RIPPLE	SIZE	RIPPLE
5.6	4X7	130				
6.8	5X7	170			5X11	125
10	5X7	210			6X11	170
15	6X7	220	5X11	170	6X11	210
	5X11	215				
22	6X7	300	6X11	220	8X11	330
	5X11	240				
27	8X7	340	6X11	240	8X11	360
33	8X7	380	6X11	270	8X15	375
39	6X11	330	8X11	385	8X15	450
47	6X11	360	8X11	420	10X12	450
56	6X11	390	8X11	500	8X20	570
68	8X11	600	8X15	610	10X15	580
			10X12	625		
82	8X11	660	8X15	670	10X19	750
			10X12	690	13X16	740
100	8X11	730	10X15	800	10X25	880
120	8X15	950	8X20	820	13X20	1050
			10X15	950		
150	10X12	980	10X19	1010	13X25	1100
			13X16	1040		
180	8X20	1190	10X19	1100	13X25	1200
			13X16	1140		
220	10X15	1370	10X25	1300	13X30	1410
					16X20	1300
270	10X19	1580	13X20	1500	13X35	1560
					16X25	1600
					18X20	1470
330	10X25	1870	13X25	1850	13X40	1700
390	13X20	1870	13X30	2050	16X32	1750
			16X20	1810	18X25	1620
470	13X20	2050	13X30	2250	16X36	1890
			16X20	1990	18X32	1780
560	13X25	2410	13X25	2450	16X40	2080
			16X25	2550	18X36	2060
680	13X30	2860	13X40	2780	18X40	2570
			18X20	2450		
820	13X35	2960	16X32	2810		
	16X20	2730	18X25	2780		
1000	16X32	3350	16X36	2840		
			18X32	3270		
1200			16X40	3340		
			18X36	3310		
1500			18X40	3420		

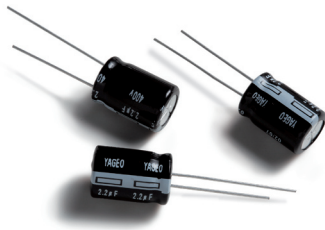
Note: \*1. D x L: mm

\*2. Ripple Current : (mA/rms 105°C / 100KHz), ESR (Ω Max20°C / 100KHz)

# Miniature Aluminum Electrolytic Capacitors

## SQ [ For Adapter and Power Supply Applications Series ]

Features: 105°C 2000 hours; Wide temperature range; Low impedance  
 Recommended Applications: AV(TV, Video, Audio); Monitor/Computer; OA/HA/  
 Communication; Converter/Inverter; Energy saving lamp; PFC circuit; SMPS; Ballast; Adapter



### DESCRIPTION

Features: 105°C 2000 hours; Wide temperature range; Low impedance

Recommended Applications: AV(TV, Video, Audio); Monitor/Computer; OA/HA/  
 Communication; Converter/Inverter; Energy saving lamp; PFC circuit; SMPS; Ballast; Adapter

Frequency coefficient

Frequency(Hz)	50	50	1K	10K	100K
Coefficient	<33μF	0.45	0.75	0.85	1.00
	≥33μF	0.60	0.90	0.95	1.00

### ELECTRICAL CHARACTERISTICS

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

Working Voltage : 160V ~ 450V

Rate Capacitance Range : 2.2~220μF

Capacitance Tolerance : -20 ~ +20%

DC Leakage Current (μA) :  $I \leq 0.03CV + 10\mu A$  (After rated voltage applied for 3 minutes)

I=Leakage Current (μA)

C=Nominal Capacitance(μF)

V=Rated Voltage(V)

Dissipation Factor : at 120 Hz, 0°C

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

WV (V) : 160 200 250 350 400 450

Impedance :  $Z - 25^{\circ}C / Z + 20^{\circ}C$  3 3 3 3 3 3

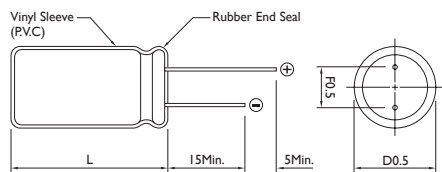
Impedance :  $Z - 40^{\circ}C / Z + 20^{\circ}C$  6 6 6 6 6 6

Load Life : After apply rated voltage with rated ripple current for 2000hrs at 105°C the capacitors shall meet the following requirements.

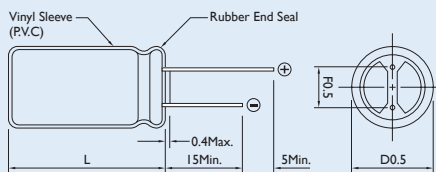
- (a) Capacitance Change : Within 20% of Initial Value
- (b) Dissipation Factor : Not more than 200% of the specified value
- (c) Leakage Current : Not more than the specified value

After leaving capacitors under no load at 105°C for 1000 hours, the capacitors shall meet the same requirement as Endurance.

### DIAGRAM OF DIMENSIONS



Rubber Stand-off



Dimensions : mm

Dø	p	dø	a
10.0	5.0	0.6	1
13.0	5	0.6	2
16.0	7.5	0.8	2
18.0	7.5	0.8	2



## CASE SIZE & PERMISSIBLE RIPPLE CURRENT OF STANDARD PRODUCTS

CAP. (μF)	RATED VOLTAGE WV											
	160		200		250		350		400		450	
	SIZE	RIPPLE	SIZE	RIPPLE	SIZE	RIPPLE	SIZE	RIPPLE	SIZE	RIPPLE	SIZE	RIPPLE
2.2							10X15	30	10X15	80	10X15	60
3.3							10X15	35	10X19	110	10X19	75
4.7							10X19	45	10X25	120	13X20	105
10					10X19	120	13X20	75	13X25	200	13X25	140
22	10X19	195	10X19	195	13X25	165	16X25	115	16X25	315	16X32	265
33	13X20	315	13X20	365	13X25	280	16X32	180	16X32	490	18X36	455
47	13X25	420	13X25	420	16X25	505	18X32	225	18X32	600		
68	13X25	420	16X25	665	16X32	570						
100	16X25	665	16X32	840	18X36	735	18X45	370				
220	18X36	980										

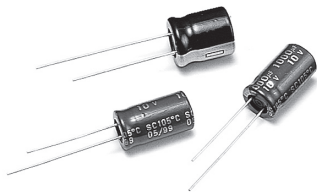
Note: \*1. D x L: mm

\*2. Ripple Current : (mA/rms 105°C / 100KHz)

# Miniature 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

Features: Low ESR, high permissible ripple current at high frequency and long life than SC

Recommended Applications: Used switching regulator applications in computers. Especially for high frequency.

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

## ELECTRICAL CHARACTERISTICS

Operating Temperature : -40° ~ +105°C

Working Voltage : 6.3 ~ 50V

Rate Capacitance Range : 1~18000μF

Capacitance Tolerance : -20 ~ +20%

Leakage Current (Max) (20°C): I=0.01CV or 3μA, whichever is greater. (After rated voltage applied for 2 minutes)

I=Leakate Current (μA) C=nOMINAL cAPACITANCE (μF) V=Rated Voltage (V)

Dissipation Factor : at 120 Hz, 20°C

WV (V) :	6.3	10	16	25	35	50
tan δ :	0.22	0.19	0.16	0.14	0.12	0.10

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

Load Life

Dø : 5ø~6.3ø 8ø~10øx12.5 10øx15~12ø 13ø~18ø

Life : 3000hrs 4000hrs 5000hrs 6000hrs

After applying rated voltage with rated ripple current for 6000 horus at 105°C, the capacitors shall meet the following requirements.

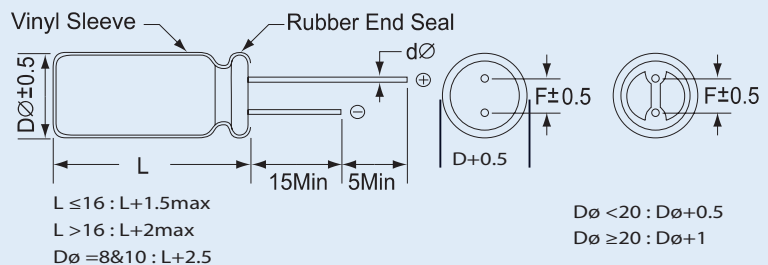
- (a) Capacitance Change : Within 25% of Initial Value
- (b) Dissipation Factor : Not more than 200% of specified value
- (c) Leakage Current : Not more than the specified value

Shelf Life : After placed at 105°C without voltage applied for 1000 hours, the capacitors shall meet the same requirement as Endurance.

## DIAGRAM OF DIMENSIONS

Dimensions : mm

Dø	F	dø
5.0	2.0	0.5
6.3	2.5	
8.0	3.5	
10.0	5.0	0.6
12.0		
13.0		
16.0	7.5	0.8
18.0		







## CASE SIZE OF STANDARD PRODUCTS $D \geq \varnothing 6\text{mm}$ with Safety Vent at Can Bottom

CAP. ( $\mu\text{F}$ )	RATED VOLTAGE								
	6.3			10			16		
	SIZE	RIPPLE	ESR	SIZE	RIPPLE	ESR	SIZE	RIPPLE	ESR
47						5 x 11	155	0.630	
68									
56						5 x 11	210	0.580	
82							5 x 11	184	0.754
100				5 x 11	210	0.580			
120						6.3 x 11	340	0.220	
150	5 x 11	210	0.580						
180									
220				6 x 11	340	0.220			
330	6.3 x 11	340	0.220				6 x 11	469	0.185
390							8 x 11	640	0.130
470	6 x 11	510	0.160	8 x 11	640	0.130	8 x 15	840	0.087
	8 x 11	570	0.160			10 x 12	865	0.080	
560									
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	8 x 15	737	0.113	10 x 12	865	0.080			
	10 x 12	865	0.080						
	8 x 11	697	0.104	8 x 20	1050	0.069	10 x 19.5	1400	0.046
1000				10 x 15	1210	0.060			
	8 x 15	840	0.087			13 x 15	1450	0.049	
1200	8 x 20	1050	0.069	10 x 19.5	1400	0.046	10 x 25	1650	0.042
	10 x 15	1210	0.060						
1500	10 x 19.5	1210	0.060	10 x 25	1650	0.042	10 x 30	1910	0.031
				13 x 15	1450	0.049	13 x 20	1900	0.035
	8 x 20	1050	0.069			16 x 15	1940	0.042	
1800							13 x 25	1863	0.039
	13 x 15	1450	0.049						
	10 x 25	1650	0.042	10 x 30	1910	0.031	13 x 25	2230	0.027
2200				13 x 20	1900	0.035	18 x 15	2210	0.043
	10 x 19.5	1400	0.046	16 x 15	1940	0.042			
	10 x 30	1910	0.031	18 x 15	2210	0.043	13 x 30	2650	0.024
2700							16 x 20	2530	0.027
	16 x 15	1940	0.042						
3300	13 x 20	1900	0.035	13 x 25	2230	0.027	13 x 35	2280	0.020
	10 x 25	1650	0.042	10 x 30	1990	0.030			
	13 x 25	2230	0.027	13 x 30	2650	0.024	13 x 40	3350	0.017
3900	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 25	2880	0.020	16 x 32	3450	0.017
							18 x 25	3140	0.019
	13 x 35	2880	0.020	13 x 40	3350	0.017	16 x 36	3160	0.015
5600	16 x 20	2530	0.027	16 x 25	2930	0.021	18 x 32	4170	0.015
				18 x 20	2860	0.026			
	13 x 40	3350	0.017	16 x 32	3450	0.017	16 x 40	4080	0.013
6800	16 x 25	2930	0.021	18 x 25	3140	0.019			
	18 x 20	2860	0.026						
	16 x 32	2450	0.017	16 x 36	3160	0.015	18 x 36	4220	0.014
8200				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			
				18 x 40	4280	0.012			
12000	18 x 32	4170	0.015						
15000	18 x 36	4220	0.014						
18000									

Note : \* 1. D x L : mm

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



## CASE SIZE OF STANDARD PRODUCTS $D \geq \phi 6\text{mm}$ with Safety Vent at Can Bottom

CAP. ( $\mu\text{F}$ )	RATED VOLTAGE								
	25			35			50		
	SIZE	RIPPLE	ESR	SIZE	RIPPLE	ESR	SIZE	RIPPLE	ESR
1									
2.2							5 x 11	85	2.28
3.3									
4.7							5 x 11	135	2
10				5 x 11	130	2.4	5 x 11	100	1.2
12				5 x 11	275	0.39			
15									
18									
22							5 x 11	180	0.7
27									
33				5 x 11	210	0.58			
39									
47	5 x 11	210	0.58	6 x 11	275	0.39	6 x 11	300	0.52
56				6 x 11	340	0.22	6 x 11	295	0.300
68									
82									
100	6 x 11	340	0.22	6 x 11	580	0.15	8 x 11	555	0.170
120							8 x 15	730	0.12
150	8 x 11	640	0.160	8 x 11	640	0.13	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
	8 x 15	840	0.087	10 x 15	1210	0.060	10 x 25	1440	0.055
330	10 x 12	865	0.080				10 x 19	1400	0.058
				10 x 19	1040	0.062			
390									
	8 x 20	1050	0.069	10 x 19	1400	0.046	10 x 30	1690	0.043
470	10 x 15	1210	0.060	13 x 15	1450	0.049	13 x 20	1660	0.045
	10 x 12	1050	0.070						
							16 x 15	1690	0.055
560				10 x 25	1650	0.42	13 x 25	1950	0.034
							18 x 15	1930	0.054
	10 x 19	1400	0.046	10 x 30	1910	0.031	13 x 30	2310	0.030
680	13 x 15	1450	0.049	13 x 20	1900	0.035			
820	10 x 25	1650	0.042	13 x 20	1900	0.035	13 x 35	2510	0.025
							16 x 20	2210	0.034
	10 x 30	1910	0.031	13 x 25	2230	0.027	13 x 40	2920	0.021
1000	13 x 20	1990	0.035	18 x 15	2210	0.043	16 x 25	2555	0.025
	10 x 19	1400	0.046				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
							18 x 25	3740	0.026
1500	13 x 25	2230	0.027	13 x 35	2880	0.020	16 x 36	3150	0.019
	13 x 30	2650	0.024	13 x 40	3350	0.017	16 x 40	3710	0.016
1800	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			
	18 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 : \* I. D x L : mm

\* 2. Ripple Current : (A r.m.s 105°C / 100KHz), ESR ( $\Omega$  Max20°C / 100KHz)

# SZ [ Ultra Low ESR ]

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

## Miniature Aluminum Electrolytic Capacitors

### 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.

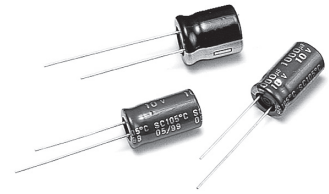
WV (V) : Rated Voltage (V)    6.3    10    16  
Impedance : Z - 25°C / Z + 20°C    2    2    2  
Impedance : Z - 40°C / Z + 20°C    3    3    3

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



### 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

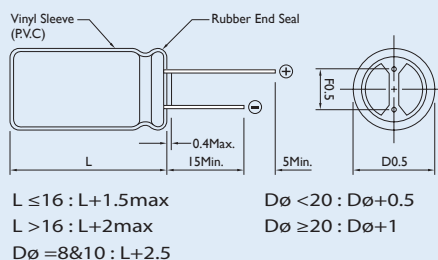
Temperature coefficient

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

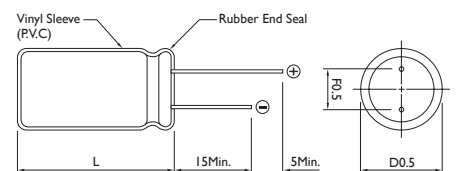
### DIAGRAM OF DIMENSIONS

Dø	F	dø
4.0	1.5	0.45
5.0	2.0	0.5
6.3	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



Dimensions : mm





## CASE SIZE OF STANDARD PRODUCTS $D\phi \geq 6\text{mm}$ with Safety Vent at Can Bottom

CAP. ( $\mu\text{F}$ )	RATED VOLTAGE WV														
	6.3					10					16				
	SIZE	D.F.	RIPPLE	L.C.	ESR	SIZE	D.F.	RIPPLE	L.C.	ESR	SIZE	D.F.	RIPPLE	L.C.	ESR
470											8 x 11	225.6	0.16	1140	36
						8 x 11	204.0	0.19	1140	36	10 x 12	326.4	0.16	1540	26
680											8 x 15	326.4	0.16	1490	28
820	8 x 11	155.0	0.22	1140	36										
						8 x 15	300.0	0.19	1490	28	8 x 20	480.0	0.16	1870	21
1000						10 x 12	300.0	0.19	1540	26	10 x 15	480.0	0.16	2000	19
1200	8 x 15	226.8	0.22	1490	28										
						8 x 20	450.0	0.19	1870	21	10 x 19.5	720.0	0.16	2550	16
1500						10 x 15	450.0	0.19	2000	19					
	10 x 12	283.5	0.22	1540	26										
	8 x 20	340.2	0.22	1870	21	10 x 19.5	540.0	0.19	2550	16	10 x 22	864.0	0.16	2800	12
1800	10 x 15	340.2	0.22	2000	19										
2200	10 x 19.5	415.8	0.22	2550	16	10 x 22	660.0	0.21	2800	12					
3300	10 x 22	623.7	0.26	2800	12										

Note : \* 1. D x L : mm

\* 2. Ripple Current : (A r.m.s 105°C / 100KHz), ESR ( $\Omega$  Max 20°C, 100KHz)

\* 3. D.F. ; Dissipation Factor ( $\tan \delta$ ) , L.C. ; Leakage Current ( $\mu\text{A}$ )

# Large Can Aluminum Electrolytic Capacitors

## LH [For 85°C, 2000 Hours Miniature]

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

### ELECTRICAL CHARACTERISTICS

Operating Temperature Range	-40 to+85°C	-25 to+85°C
Rated Voltage Range	6.3~100V	160 to 450VDC
Capacitance Tolerance	820~120000µF 56~2200µF	
Leakage Current	I = 0.02CV or 3mA Whichever is smaller. (At 20°C, After 5 Minutes Application of DC Working Voltage at 20°C)	
Dissipation Factor	Rate Voltage (V)	6.3 10 16 25 35 50 63~100 160~400 450
	tan δ	0.60 0.55 0.55 0.45 0.35 0.30 0.25 0.15 0.20
Endurance	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 2 4 8
	Z(-40°C) / Z(20°C)	12 10 8 6 5 - -
Shelf Life	After applying rated voltage with rated Ripple current for 2000hrs at 85°C, the capacitor shall meet the following requirements.	
	Capacitance Change	Within 20% of the Initial Value
	Dissipation Factor	200% or less of initial specified value
	Leakage Current	initial specified value or less
After placed at 85°C without voltage applied for 1000 hours, the capacitor shall meet the same requirement as Endurance. 25°C		



### DESCRIPTION

Endurance : 85°C 2000 hours

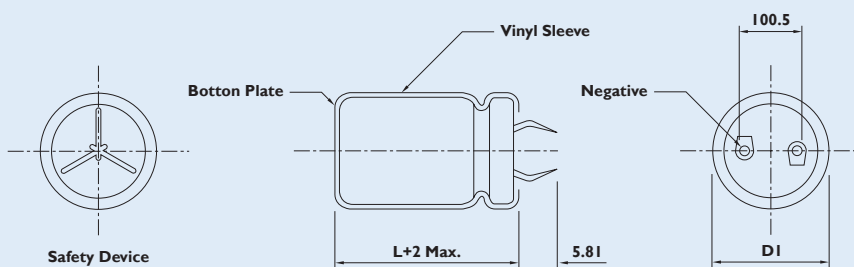
Ideally suitable for using in Switching Power Supplies and other industrial / commercial applications

### Multiplier for Ripple Current

Frequency coefficient

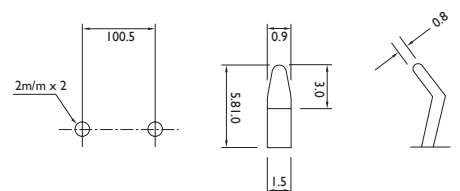
Frequency(Hz)	50	60	120	1K	10K
6.3~100V	0.88	0.90	1.00	1.15	1.16
160~250V	0.75	0.78	1.00	1.16	1.23
350~450V	0.74	0.76	1.00	1.10	1.15

### DIAGRAM OF DIMENSIONS



Unit : mm

Location of P.C.B. Holes





## CASE SIZE OF STANDARD PRODUCTS AND PERMISSIBLE RIPPLE CURRENT

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

Note : \*1. D L : mm

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



## CASE SIZE OF STANDARD PRODUCTS AND PERMISSIBLE RIPPLE CURRENT

CAP. (μF)	RATED VOLTAGE WV							
	35 SIZE		50 SIZE		63 SIZE		80 SIZE	
	SIZE	RIPPLE	SIZE	RIPPLE	SIZE	RIPPLE	SIZE	RIPPLE
1000								
1200							22 × 25	1.65
1500							22 × 30	1.90
							25 × 25	1.90
1800					22 × 25	1.85	22 × 35	2.20
							25 × 30	2.20
							30 × 25	2.20
2200			22 × 25	1.90	22 × 30	2.30	22 × 40	2.45
					25 × 25	2.30	25 × 30	2.45
							30 × 25	2.50
2700			22 × 30	2.10	22 × 35	2.45	22 × 45	2.80
			25 × 25	2.20	25 × 30	2.45	25 × 35	2.80
					30 × 25	2.50	30 × 30	2.85
							35 × 25	2.85
3300			22 × 30	2.35	22 × 40	2.60	22 × 50	3.15
			25 × 25	2.35	25 × 30	2.65	25 × 40	2.80
					30 × 25	2.70	30 × 30	3.20
							35 × 25	3.20
3900	22 × 25	2.20	22 × 35	2.65	22 × 45	2.95	25 × 45	3.60
			25 × 30	2.65	25 × 35	2.95	30 × 35	3.60
			30 × 25	2.65	30 × 30	3.00	35 × 30	3.60
	22 × 30	2.40	22 × 40	3.00	22 × 50	3.40	25 × 50	4.05
4700	25 × 25	2.40	25 × 35	3.00	25 × 40	3.35	30 × 40	4.05
			30 × 25	2.95	30 × 30	3.35		
					35 × 25	3.40	35 × 35	4.10
5600	22 × 35	2.75	22 × 45	3.35	25 × 45	3.70	30 × 45	4.55
	25 × 25	2.75	25 × 40	3.35	30 × 35	3.75	35 × 35	4.50
			30 × 30	3.35	35 × 30	3.75		
			35 × 25	3.40				
6800	22 × 40	2.85			30 × 40	4.25	30 × 50	5.15
	25 × 30	2.85	25 × 40	3.80	35 × 30	4.20	35 × 40	5.15
			22 × 40	3.26				
	30 × 25	2.90	35 × 30	3.85				
			30 × 35	3.85				
6900								
8200	22 × 45	3.45	25 × 50	4.35	30 × 45	4.80	35 × 45	5.85
	25 × 35	3.10	30 × 40	4.35	35 × 35	4.80		
	30 × 30	3.15	35 × 30	4.40				
	22 × 50	3.55	30 × 45	5.00	30 × 50	5.50	35 × 50	6.60
10000	25 × 40	3.50	35 × 35	4.95				
	30 × 30	3.45			35 × 40	5.45		
	35 × 25	3.40						
12000	25 × 45	3.95	30 × 50	5.60	35 × 45	6.20		
	30 × 35	4.05	35 × 40	5.55				
	35 × 30	4.05						
15000	25 × 50	4.95	35 × 45	6.45				
	30 × 40	4.95						
	35 × 35	5.00						
18000	30 × 45	5.55	35 × 50	6.70				
	35 × 40	5.55						
22000	30 × 50	6.00						
	35 × 45	6.05						
27000	35 × 50	6.90						

Note : \*1. D × L : mm

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



## CASE SIZE OF STANDARD PRODUCTS AND PERMISSIBLE RIPPLE CURRENT

CAP. (μF)	RATED VOLTAGE WV							
	100 SIZE	RIPPLE	160 SIZE	RIPPLE	180 SIZE	RIPPLE	200 SIZE	RIPPLE
180					22 x 20	1.00	22 x 25	0.95
220					22 x 25	1.10	22 x 25	1.10
270					22 x 25	1.25	22 x 25	1.25
					25 x 20	1.25	22 x 30	1.25
330			22 x 25	1.40			22 x 30	1.45
			25 x 20	1.35	22 x 30	1.40	22 x 30	1.45
					25 x 25	1.40		
390			22 x 30	1.55	22 x 30	1.60	22 x 30	1.60
			25 x 25	1.55	25 x 25	1.60	25 x 25	1.55
			30 x 25	1.50				
470			22 x 30	1.75	22 x 35	1.80	22 x 35	1.80
			25 x 25	1.75	25 x 30	1.80	25 x 30	1.80
			30 x 25	1.70	30 x 25	1.80	30 x 25	1.80
560			22 x 30	1.95			22 x 40	2.00
			25 x 30	1.95	22 x 40	2.00	25 x 35	2.00
			30 x 25	1.90			30 x 25	2.00
					30 x 25	2.00		
680			22 x 40	2.20	22 x 45	2.25	22 x 45	2.35
			25 x 30	2.20	25 x 35	2.20	25 x 40	2.30
			30 x 25	2.15	30 x 30	2.20	30 x 30	2.30
					30 x 25	2.20	35 x 25	2.30
	22 x 25	1.85	22 x 45	2.50	22 x 50	2.55	25 x 45	2.60
					25 x 40	2.55		
820			25 x 35	2.55			30 x 35	2.60
			30 x 30	2.50	30 x 35	2.60		
			35 x 25	2.50	35 x 25	2.60	35 x 30	2.60
	22 x 30	2.10	22 x 50	2.85	25 x 45	2.85	25 x 50	3.00
			25 x 40	2.80				
1000	25 x 25	2.10	30 x 35	2.80	30 x 35	2.85	30 x 40	3.05
			35 x 25	2.80	35 x 30	2.90		
							35 x 30	3.00
1200	22 x 35	2.40	25 x 45	3.15	30 x 40	3.25	30 x 45	3.30
	25 x 30	2.45	30 x 35	3.15			35 x 35	3.30
			35 x 30	3.20	35 x 35	3.30		
1500	22 x 40	2.70	30 x 45	3.75	30 x 45	3.85	30 x 50	3.80
	25 x 30	2.75	35 x 35	3.70	35 x 40	3.80	35 x 40	3.80
	30 x 25	2.75						
	22 x 45	3.10	30 x 50	4.20			35 x 45	4.35
1800	25 x 35	3.15	35 x 40	4.20	35 x 50	4.30		
	30 x 30	3.15						
	35 x 25	3.15						
2200	22 x 50	3.50						
	25 x 40	3.55	35 x 45	4.80	35 x 50	4.90	35 x 50	4.95
	30 x 30	3.55						
	35 x 25	3.60						
2700	25 x 45	4.10						
	30 x 35	4.05						
	35 x 30	4.05						
3300	25 x 50	4.50						
	30 x 40	4.55						
	35 x 30	4.50						
3900	30 x 45	5.15						
	35 x 35	5.10						
4700	35 x 40	5.75						
5600	35 x 50	6.20						
10000								

Note : \*1. D x L : mm

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





## CASE SIZE OF STANDARD PRODUCTS AND PERMISSIBLE RIPPLE CURRENT

CAP. (μF)	RATED VOLTAGE WV							
	250 SIZE		350 SIZE		400 SIZE		450 SIZE	
		RIPPLE		RIPPLE		RIPPLE		RIPPLE
47								
56					22 x 20	0.55	25 x 25	0.65
68			22 x 20	0.55	22 x 25	0.60	22 x 30	0.70
					25 x 20	0.60	22 x 25	0.70
82			22 x 25	0.65	22 x 25	0.80	22 x 30	0.80
			25 x 20	0.65	25 x 20	0.80	25 x 25	0.80
100			22 x 30	0.90	22 x 30	0.90	22 x 35	0.95
			25 x 20	0.90	25 x 25	0.90	25 x 30	0.95
120							30 x 25	0.95
	22 x 20	0.78	22 x 30	1.00	22 x 35	1.05	22 x 40	1.05
			25 x 25	1.00	25 x 25	1.05	25 x 30	1.05
150							30 x 25	1.05
	22 x 25	0.90	22 x 35	1.15	22 x 35	1.05	22 x 45	1.20
			25 x 30	1.15	25 x 30	1.15	25 x 35	1.20
			30 x 25	1.15	30 x 25	1.15	30 x 30	1.20
180	22 x 25	1.05	22 x 40	1.30	22 x 45	1.30	25 x 40	1.35
	25 x 20	1.00	25 x 30	1.25	25 x 35	1.30		
			30 x 25	1.25	30 x 30	1.35	30 x 35	1.25
220	22 x 30	1.15	22 x 45	1.45	22 x 50	1.50	25 x 50	1.55
			25 x 35	1.45	25 x 40	1.50	30 x 40	1.55
	25 x 25	1.15	30 x 30	1.45	30 x 30	1.50	35 x 30	1.55
			35 x 25	1.45	35 x 25	1.50		
270	22 x 30	1.30	25 x 40	1.65	25 x 40	1.65	30 x 45	1.75
							35 x 35	1.70
	25 x 25	1.30	30 x 35	1.65	30 x 35	1.65		
300			35 x 25	1.65	35 x 30	1.65		
	22 x 35	1.50						
330			25 x 50	1.80	30 x 40	1.90	30 x 50	2.00
	25 x 30	1.50	30 x 40	1.80				
	30 x 25	1.50	35 x 30	1.80	35 x 30	1.85	35 x 40	2.00
	22 x 40	1.66	30 x 40	2.00	30 x 45	2.15	35 x 45	2.25
390			35 x 30	2.00				
	25 x 35	1.65			35 x 35	2.10		
470	30 x 25	1.65						
	22 x 45	1.85	30 x 45	2.25	30 x 50	2.40	35 x 50	2.50
			35 x 35	2.25	35 x 40	2.40		
560	25 x 35	1.85						
	30 x 30	1.90						
	35 x 25	1.90						
	22 x 50	2.09	35 x 40	2.50	35 x 45	2.70		
680	25 x 40	2.10						
	30 x 35	1.99						
	35 x 25	2.10						
820	25 x 50	2.43	35 x 45	2.90	35 x 50	2.90		
	30 x 40	2.46						
	35 x 30	2.49						
1000	30 x 45	2.75						
	35 x 35	2.77						
1200	30 x 45	3.30						
	35 x 45	3.30						
	35 x 40	3.55						

Note : \*1. D x L : mm

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

# Large Can 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)

Endurance : 105°C 2000 hours, high temperature than LH.

Ideally suitable for using in Switching Power Supplies and orther industrial / commercial applications.

### Multiplier for Ripple Current

Frequency coefficient

Frequency(Hz)	50	60	120	1K	10K
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

## ELECTRICAL CHARACTERISTICS

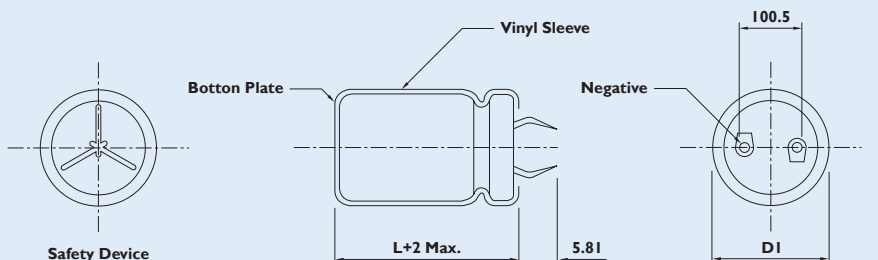
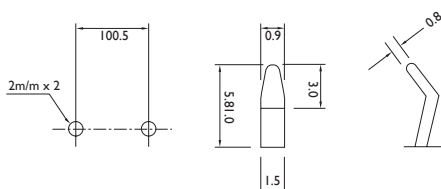
Rated Voltage Range	6.3 to 100VDC	160 to 450VDC
Operating Temperature Range	-40 to +105°C	-25 to +105°C
Capacitance Tolerance	±20% (At 20°C, 120Hz)	
Leakage Current	I = 0.02CV, L = 20m/m, I = 0.03CV or 3mA Whichever is smaller. (At 25°C, After 5 Minutes)	
Dissipation Factor (tanδ)	Rate Voltage (V) 6.3 10 16 25 35 50 63-100 160-400 450 tan δ 0.60 0.55 0.50 0.45 0.35 0.30 0.25 0.15 0.20 * Note : 15% For D = 35m/m or L = 20m/m (At 20°C, 120Hz)	

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	-	-
Endurance	After applying rated voltage with rated Ripple current for 2000hrs at 105°C, the capacitor shall meet the following requirements.							
	Capacitance Change	≤ ±20% of the Inital Value						
	D.F	≤ 200% of the Initial Specified Value						
	Leakage Current	≤ the Initial Specified Value						
Shelf Life	After placed at 105°C without voltage applied for 1000 hours, the capacitor shall meet the same requirement as Endurance.							

## DIAGRAM OF DIMENSIONS

Unit : mm

Location of P.C.B. Holes





## CASE SIZE OF STANDARD PRODUCTS AND PERMISSIBLE RIPPLE CURRENT

CAP. (μF)	RATED VOLTAGE WV							
	6.3 SIZE		10 SIZE		16 SIZE		25 SIZE	
		RIPPLE		RIPPLE		RIPPLE		RIPPLE
3900								
4700							22 x 25	1.50
5600							22 x 30 25 x 25	1.65 1.65
6800					22 x 25	1.55	22 x 30 25 x 25	1.85 1.85
8200					22 x 30 25 x 25	1.70 1.70	22 x 35 25 x 30 30 x 25	2.10 2.10 2.15
10000			25 x 25	1.55	22 x 30 25 x 25	1.95 1.95	22 x 40 25 x 35 30 x 30 35 x 25	2.40 2.40 2.40 2.40
12000	22 x 25	1.55	22 x 30	1.90	22 x 35 25 x 30 30 x 25	2.20 2.25 2.30	22 x 45 25 x 40 30 x 30 35 x 25	2.70 2.75 2.70 2.75
15000	22 x 30 25 x 25	1.70 1.70	22 x 30 25 x 25	1.90 1.90	22 x 40 25 x 35 30 x 30 35 x 25	2.55 2.60 2.60 2.65	25 x 45 30 x 35 35 x 30	3.15 3.15 3.25
18000	22 x 30 25 x 25	1.95 1.95	22 x 35 25 x 30	2.20 2.25	22 x 45 25 x 40 30 x 30 35 x 25	2.90 2.90 2.90 2.95	25 x 50 30 x 40 35 x 35	3.55 3.55 3.55
22000	22 x 35 25 x 30 30 x 25	2.25 2.25 2.25	22 x 40 25 x 35 30 x 25	2.50 2.55 2.45	25 x 45 30 x 35 35 x 30	3.30 3.30 3.30	30 x 45 35 x 35	4.05 3.80
27000	22 x 40 25 x 35 30 x 30 35 x 25	2.55 2.55 2.55 2.55	22 x 50 25 x 40 30 x 30 35 x 25	2.95 2.90 2.85 2.80	25 x 50 30 x 40 35 x 30	3.80 3.75 3.75	35 x 45	4.70
33000	22 x 45 25 x 40 30 x 30 35 x 25	2.90 2.95 2.90 2.95	25 x 45 30 x 35 35 x 30	3.30 3.30 3.30	30 x 45 35 x 35	4.30 4.25	35 x 50	5.40
39000	25 x 50 30 x 35 35 x 30	3.25 3.25 3.30	25 x 50 30 x 40 35 x 30	3.70 3.70 3.65	30 x 50 35 x 40	4.80 4.80		
47000	25 x 50 30 x 40	3.70 3.70	30 x 45 35 x 35	4.20 3.80	35 x 45	5.45		
56000	30 x 45 35 x 35	4.15 4.10	30 x 50 35 x 40	4.65 4.65				
68000	30 x 50 35 x 40	4.70 4.70	35 x 50	5.50				
82000	35 x 45	5.30						

Note : \*1. D x L : mm

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



## CASE SIZE OF STANDARD PRODUCTS AND PERMISSIBLE RIPPLE CURRENT

CAP. (μF)	RATED VOLTAGE WV							
	35 SIZE		50 SIZE		63 SIZE		80 SIZE	
		Ripple		Ripple		Ripple		Ripple
820							22 x 25	1.10
1000							22 x 30 25 x 25	1.20 1.20
1200					22 x 25	1.20	22 x 30 25 x 25	1.40 1.40
1500					22 x 30 25 x 25	1.30 1.30	22 x 35 25 x 30 30 x 25	1.60 1.60 1.65
1800			22 x 25	1.30	22 x 30 25 x 25	1.50 1.50	22 x 40 25 x 35 30 x 25	1.80 1.85 1.80
2200			22 x 30 25 x 25	1.55 1.55	22 x 35 25 x 30 30 x 25	1.70 1.75 1.80	22 x 45 25 x 35 30 x 30 35 x 25	2.05 2.00 2.05 2.05
2700			22 x 30 25 x 25	1.70 1.70	22 x 40 25 x 35 30 x 25	2.00 2.00 1.95	25 x 45 30 x 35 35 x 30	2.35 2.35 2.35
3300	22 x 25	1.40	22 x 35 25 x 30	1.95 1.85	22 x 50 25 x 40 30 x 30 35 x 25	2.30 2.30 2.25 2.10	25 x 50 30 x 40 35 x 30	2.70 2.70 2.55
3900	22 x 30 25 x 25	1.55 1.55	22 x 40 25 x 35 30 x 25	2.15 2.20 1.95	25 x 45 30 x 35 35 x 30	2.55 2.55 2.55	30 x 45 35 x 35	3.00 3.00
4700	22 x 35 25 x 25	1.80 1.80	22 x 45 25 x 40 30 x 30 35 x 25	2.45 2.45 2.45 2.50	25 x 50 30 x 40 35 x 30	2.85 2.85 2.80	30 x 50 35 x 40	3.40 3.40
5600	22 x 35 25 x 30 30 x 25	1.95 1.95 2.00	22 x 50 25 x 40 30 x 35 35 x 30	2.75 2.70 2.75 2.75	30 x 45 35 x 35	3.20 3.20	35 x 45	3.80
6800	22 x 40 25 x 35 30 x 30 35 x 25	2.20 2.25 2.30 2.35	25 x 50 30 x 40 35 x 30	3.30 3.30 3.25	30 x 50 35 x 40	3.65 3.65	35 x 50	3.90
8200	22 x 50 25 x 40 30 x 30 35 x 25	2.55 2.50 2.75 2.75	30 x 45 35 x 35	3.60 3.55	35 x 45	3.90		
10000	25 x 45 30 x 35 35 x 30	2.85 2.90 2.95	30 x 50 35 x 40	4.05 4.00	35 x 50	4.40		
12000	25 x 50 30 x 40 35 x 30	3.25 3.25 3.15	35 x 45	4.55				
15000								
18000	35 x 40	4.35						
22000	35 x 50 35 x 45	4.90 4.90						

Note : \*1. D x L : mm

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



## CASE SIZE OF STANDARD PRODUCTS AND PERMISSIBLE RIPPLE CURRENT

CAP. (μF)	RATED VOLTAGE WV							
	100 SIZE		160 SIZE		180 SIZE		200 SIZE	
		RIPPLE		RIPPLE		RIPPLE		RIPPLE
150							22 x 20	0.65
180					22 x 20	0.75	22 x 20	0.70
220			22 x 20	0.80	22 x 25	0.85	22 x 25 25 x 20	0.80 0.80
270			22 x 25	1.00	22 x 25 25 x 20	0.95 0.90	22 x 25 25 x 25	0.85 0.85
330			22 x 25 25 x 20	1.30 1.15	22 x 30 25 x 25	1.10 1.10	22 x 30 25 x 25	1.20 1.20
390			22 x 30 25 x 25	1.17 1.30	22 x 30 25 x 25	1.30 1.30	22 x 35 25 x 30 30 x 25	1.30 1.30 1.30
470			25 x 25 22 x 35	1.40 1.40	22 x 35 25 x 30 30 x 25	1.35 1.40 1.40	22 x 40 25 x 30 30 x 25	1.40 1.40 1.48
560	22 x 25	1.05	22 x 40 25 x 30 30 x 25	1.50 1.50 1.50	22 x 40 25 x 35 30 x 25	1.50 1.55 1.50	22 x 45 25 x 35 30 x 30	1.55 1.55 1.55
680	22 x 25	1.20	22 x 45 25 x 35 30 x 25	1.70 1.70 1.70	22 x 50  25 x 40 30 x 30 35 x 25	1.70  1.75 1.70 1.70	22 x 50 25 x 40 30 x 30 35 x 25	1.75 1.75 1.75 1.70
820	22 x 30 25 x 25	1.30 1.33	22 x 50 25 x 40 30 x 30 35 x 25	1.95 2.00 2.00 1.90	22 x 50  25 x 45 30 x 35 35 x 25	2.00  1.95 2.00 1.90	25 x 50 30 x 35 35 x 30	2.05 2.00 2.05
1000	22 x 35 25 x 30	1.50 1.50	25 x 45 30 x 35 35 x 30	2.20 2.20 2.20	25 x 50  30 x 40	2.20  2.25 35 x 30	30 x 45 35 x 35	2.30 2.30
1200	22 x 40 25 x 35 30 x 25	1.70 1.70 1.70	25 x 50 30 x 40 35 x 30	2.45 2.45 2.45	30 x 45 35 x 35	2.50 2.50	30 x 50 35 x 40	2.60 2.65
1500	22 x 45 25 x 40 30 x 30 35 x 25	1.95 2.00 1.95 2.00	30 x 45 35 x 35	2.80 2.80	30 x 50 35 x 40	2.90 2.90	35 x 45	3.10
1800	30 x 25 25 x 45 30 x 35 35 x 30	1.95 2.20 2.50 2.45	30 x 50 35 x 45	3.30 3.30	35 x 50	3.30	35 x 50	3.15
2200	25 x 50 30 x 40 35 x 30	2.55 2.70 2.55	35 x 50	3.75	35 x 50	3.60		
2700	30 x 45 35 x 35	2.90 2.85						
3300	30 x 50 35 x 40	3.25 3.25						
3900	35 x 40	3.70						
4700	35 x 50	3.80						
5600								

Note : \*1. D x L : mm

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



## CASE SIZE OF STANDARD PRODUCTS AND PERMISSIBLE RIPPLE CURRENT

CAP. (μF)	RATED VOLTAGE WV							
	250 SIZE		350 SIZE		400 SIZE		450 SIZE	
		RIPPLE		RIPPLE		RIPPLE		RIPPLE
47					22 x 20	0.35		
							22 x 25	0.40
56			22 x 20	0.40	22 x 20	0.40		
							20 x 30	0.50
68			22 x 25	0.45	22 x 25	0.50		
					25 x 20	0.50	25 x 25	0.50
82			22 x 25	0.55	22 x 30	0.60	22 x 35	0.5
			25 x 20	0.50	25 x 25	0.65	25 x 30	0.55
							30 x 25	0.55
100			22 x 30	0.70	22 x 35	0.65	22 x 40	0.65
			25 x 25	0.70	25 x 30	0.65	25 x 30	0.60
							30 x 25	0.65
120	22 x 20	0.60	22 x 35	0.75	22 x 35	0.70	22 x 45	0.70
			25 x 30	0.75	25 x 30	0.70	25 x 35	0.70
			30 x 25	0.75	30 x 25	0.75	30 x 30	0.70
							35 x 25	0.70
	22 x 25	0.65	22 x 40	0.80	22 x 40	0.80	22 x 50	0.80
			25 x 30	0.80	25 x 30	0.85	25 x 40	0.80
150					30 x 25	0.85		
					30 x 30	0.85	30 x 30	0.75
					35 x 25	0.80	35 x 25	0.75
180	22 x 25	0.80	22 x 45	0.90	25 x 40	0.95	25 x 45	0.85
	25 x 20	0.75	25 x 35	0.90	30 x 30	0.90	30 x 35	0.85
			30 x 30	1.00			35 x 30	0.85
					22 x 50	0.95		
220	22 x 30	0.95	22 x 50	1.05	25 x 45	1.05	25 x 50	1.00
	25 x 25	0.95	25 x 40	1.05	30 x 35	1.05	30 x 40	1.00
			30 x 30	1.00	35 x 30	1.10	35 x 30	1.00
					35 x 25	1.05		
270	22 x 35	1.15	25 x 45	1.20	25 x 50	1.20	30 x 45	1.15
	25 x 30	1.15	30 x 35	1.20	30 x 40	1.20	35 x 35	1.15
	30 x 25	1.15	35 x 30	1.20	35 x 35	1.20		
330	22 x 40	1.25	30 x 40	1.35	30 x 45	1.40	30 x 50	1.40
	25 x 30	1.20	35 x 35	1.35	35 x 35	1.35	35 x 40	1.40
	30 x 25	1.25						
390	22 x 45	1.50	30 x 45	1.50	30 x 50	1.55	35 x 45	1.55
	25 x 35	1.50	35 x 35	1.50	35 x 40	1.55		
	30 x 30	1.50						
470	22 x 50	1.55	35 x 40	1.70			35 x 50	1.70
	25 x 40	1.55						
	30 x 30	1.55						
	35 x 25	1.55						
560	25 x 45	1.80	35 x 45	1.90	35 x 45	1.72		
	30 x 35	1.80						
	35 x 30	1.80						
680	25 x 50	1.95					35 x 50	2.15
	30 x 40	2.00					35 x 60	2.15
	35 x 35	2.00						
820	30 x 45	2.15						
	35 x 35	2.10						
1000	35 x 40	2.30						
1200								

Note : \*1. D x L : mm

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

# LV [ For 105°C, 3000 Hours Long Life ]

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

## Large Can Aluminum Electrolytic Capacitors

### 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	560~68000 μF	270~2200 μF
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
	Dissipation Factor (tan δ) shall not exceed the values showed in the table of standard rating	
Endurance	Leakage current	: Not more than the specified value
	Capacitance Change	: Within +/-20% of the initial value
	Dissipation Factor	: Not more than 200% of the specified value
Shelf Life 25°C	After placed at 105°C without voltage applied for 1000 hours, the capacitor shall meet the same requirements as Endurance.	



### DESCRIPTION

(LG Series 105°C 3000 Hours Assured)

Features : 105°C 3000 hours, Wide temperature range for LF, Longer life than LG, Snap-in terminal, High ripple current.

Recommended Applications : Smoothing circuit, TV/Monitor, Adapter, SMPS.

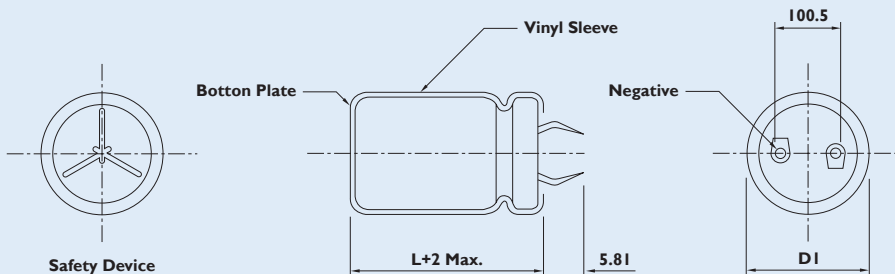
### MULTIPLIER FOR RIPPLE CURRENT

Frequency coefficient

Frequency(Hz)	50	60	120	400
Coefficient	0.8	0.85	1.0	1.14

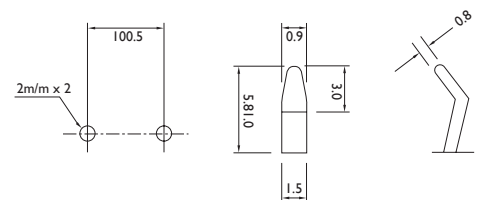
Frequency(Hz)	1K	2.4K	5K	10K
Coefficient	1.23	1.3	1.36	1.4

### DIAGRAM OF DIMENSIONS



Unit : mm

Location of P.C.B. Holes





## CASE SIZE OF STANDARD PRODUCTS AND PERMISSIBLE RIPPLE CURRENT

CAP. (μF)	RATED VOLTAGE WV											
	10		16		25		35		50		63	
	SIZE	RIPPLE	SIZE	RIPPLE	SIZE	RIPPLE	SIZE	RIPPLE	SIZE	RIPPLE	SIZE	RIPPLE
1200											22 x 25	1.25
1500									30 x 25	1.25	25 x 25	1.45
											22 x 30	1.45
1800									20 x 30	1.45	22 x 35	1.60
											25 x 30	1.60
2200									22 x 30	1.60	30 x 25	1.85
									25 x 25	1.60	25 x 30	1.80
2700							22 x 25	1.45	22 x 35	1.80	22 x 45	2.60
									25 x 25	1.80	25 x 35	2.00
											30 x 30	2.08
3300									22 x 40	2.05	25 x 40	2.32
									30 x 25	2.01	35 x 25	2.35
							22 x 30	1.60	25 x 30	1.95	30 x 30	2.30
3900					22 x 25	1.50			22 x 45	2.27	25 x 45	2.55
							22 x 30	1.80	25 x 35	2.20	30 x 35	2.55
									30 x 30	2.29	35 x 30	2.63
4700					22 x 30	1.80			22 x 50	2.50	25 x 50	2.83
							22 x 35	2.23	25 x 40	2.42	30 x 40	2.86
									35 x 25	2.45		
							25 x 25	2.10	30 x 30	2.40	35 x 30	2.80
									22 x 40	2.41	30 x 45	3.18
5600					22 x 30	1.95			25 x 45	2.70	35 x 35	3.15
					25 x 25	1.95	30 x 25	2.37	35 x 30	2.78		
									30 x 35	2.70		
6800			22 x 25	1.80	22 x 35	2.20	22 x 45	2.68			30 x 50	3.5
					25 x 30	2.20	25 x 35	2.60	30 x 40	3.06	35 x 40	3.5
							30 x 30	2.70	35 x 30	3.00		
8200			20 x 25	2.05	22 x 40	2.47	22 x 50	3.02	30 x 45	3.38	35 x 45	3.9
			22 x 30	2.05	25 x 35	2.50	25 x 40	2.93	35 x 35	3.35		
							35 x 25	2.96				
							30 x 30	2.90				
10000	22 x 25	1.80	22 x 35	2.45	22 x 45	2.75	25 x 45	3.20				
			25 x 30	2.45	25 x 40	2.80	30 x 35	3.20	35 x 40	3.70		
					30 x 30	2.75	35 x 30	3.30				
12000			22 x 40	2.73	22 x 50	3.13	25 x 50	3.64	35 x 50	4.20		
	22 x 30	2.05	25 x 30	2.60	25 x 45	3.22	30 x 40	3.67				
					35 x 25	3.10						
	25 x 25	2.05	30 x 25	2.68	30 x 30	3.19	35 x 30	3.60				
15000	30 x 25	2.55	22 x 45	2.99	25 x 50	3.43	30 x 45	4.04				
	22 x 35	2.45	25 x 35	2.90	30 x 40	3.47	35 x 35	4.00				
	25 x 30	2.45	30 x 30	3.02	35 x 30	3.40						
18000	22 x 40	2.94	22 x 50	3.43	30 x 45	3.94	30 x 40	4.61				
	25 x 30	2.80	25 x 40	3.33	35 x 35	3.90						
			35 x 25	3.37								
	30 x 30	3.11	30 x 30	3.30								
22000	22 x 45	3.24	25 x 45	3.70	30 x 50	4.30	35 x 50	5.10				
	25 x 35	3.15	30 x 35	3.70	35 x 40	4.30						
	30 x 30	3.28	35 x 30	3.81								
	35 x 25	3.37										
27000	35 x 30	3.78			35 x 45	4.85						
	25 x 40	3.50	30 x 40	4.15								
	30 x 35	3.67	35 x 35	4.27								
33000	25 x 45	4.00	30 x 50	4.65								
	30 x 40	4.20	35 x 40	4.65								
	35 x 30	4.08										
39000	30 x 45	4.67										
	35 x 35	4.63	35 x 45	5.25								
	25 x 50	4.45										
47000			35 x 50	5.80								
	35 x 40	4.90	35 x 45	5.53								
56000	35 x 45	5.50										

Note : \*1. D x L : mm

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





## CASE SIZE OF STANDARD PRODUCTS AND PERMISSIBLE RIPPLE CURRENT

CAP. (μF)	RATED VOLTAGE WV											
	80 SIZE		100 SIZE		160 SIZE		180 SIZE		200 SIZE			
		RIPPLE		RIPPLE		RIPPLE		RIPPLE		RIPPLE		
220									22 x 25	0.85		
270					22 x 25	0.85		22 x 25	0.85	20 x 30	1.00	
330					22 x 30	1.00	22 x 30	1.10	22 x 30	1.15	25 x 25	1.15
390					22 x 30	1.15			22 x 35	1.30	25 x 30	1.30
					25 x 25	1.15		22 x 35	1.32	25 x 30	1.30	
470								22 x 40	1.47	22 x 40	1.52	
					22 x 35	1.30				25 x 35	1.54	
					25 x 30	1.30	25 x 30	1.40		30 x 25	1.49	
560			22 x 25	1.20	22 x 40	1.57	22 x 45	1.70		22 x 45	1.70	
					25 x 30	1.50	25 x 35	1.63		25 x 35	1.65	
					30 x 25	1.54	30 x 25	1.60		30 x 30	1.72	
680			22 x 30	1.35	22 x 45	1.75	22 x 50	1.87		25 x 45	1.97	
					25 x 35	1.70	25 x 40	1.82		30 x 35	1.97	
					30 x 30	1.77	30 x 30	1.80		35 x 30	2.02	
	22 x 25	1.20	22 x 35	1.50	22 x 50	2.03	25 x 45	2.05		25 x 45	2.20	
820					25 x 40	1.97	30 x 35	2.05		30 x 35	2.10	
					35 x 35	1.99						
			25 x 25	1.50	30 x 30	1.95	35 x 30	2.11		35 x 30	2.16	
					25 x 45	2.15	25 x 50	2.27				
1000	22 x 30	1.35	22 x 35	1.70	30 x 35	2.15	30 x 40	2.29		30 x 45	2.32	
			25 x 30	1.70	35 x 30	2.21	35 x 30	2.25		35 x 35	2.30	
	22 x 35	1.59	22 x 40	1.97			30 x 45	2.57		30 x 50	2.75	
1200			25 x 35	1.99	30 x 40	2.45	35 x 35	2.55		35 x 40	2.75	
	25 x 25	1.50	30 x 25	1.95	35 x 35	2.52						
	22 x 40	1.78	22 x 45	2.15	30 x 50	2.75				35 x 45	2.90	
	25 x 30	1.75	25 x 40	2.19	35 x 40	2.75	35 x 40	2.85				
1500			35 x 25	2.21								
	30 x 25	1.75	30 x 30	2.15								
			25 x 45	2.45			35 x 50	3.10				
1800	25 x 35	1.95	30 x 35	2.45	35 x 45	3.00						
	30 x 30	2.03	35 x 30	2.52								
	25 x 40	2.17	25 x 50	2.75	35 x 50	3.50						
2200	30 x 30	2.15	30 x 40	2.75								
	35 x 25	2.19	35 x 35	2.86								
	25 x 45	2.45										
2700	30 x 35	2.45	30 x 45	3.08								
	35 x 30	2.52	35 x 35	3.05								
			30 x 50	3.45								
3300	30 x 40	2.75	35 x 40	3.45								
	35 x 35	2.85										
3900	30 x 45	3.13	35 x 45	3.90								
	35 x 35	3.10										
			35 x 50	4.30								
4700	35 x 40	3.40										
5600	35 x 50	3.80										
6800												
8200												

Note : \*1. D x L : mm

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



## CASE SIZE OF STANDARD PRODUCTS AND PERMISSIBLE RIPPLE CURRENT

CAP. (μF)	RATED VOLTAGE WV									
	250		315		350		400		450	
	SIZE	RIPPLE	SIZE	RIPPLE	SIZE	RIPPLE	SIZE	RIPPLE	SIZE	RIPPLE
47										
56									22 x 25	0.55
68							22 x 25	0.55	22 x 30	0.64
82			22 x 25	0.55	22 x 25	0.60	20 x 30	0.65	22 x 35	0.80
							25 x 25	0.65	25 x 25	0.75
100			22 x 30	0.65	25 x 30	0.70			22 x 40	0.89
					25 x 25	0.70	22 x 35	0.79	25 x 30	0.85
							25 x 25	0.75		
120			22 x 30	0.75			20 x 40	0.89	22 x 45	0.95
			25 x 25	0.75	25 x 35	0.80			25 x 35	0.92
					25 x 30	0.80	25 x 30	0.85	30 x 25	0.90
							30 x 25	0.87		
150	22 x 25	0.75			20 x 40	0.86	22 x 45	0.93	22 x 50	1.14
			22 x 35	0.80	25 x 35	0.87	25 x 35	0.90	25 x 40	1.11
			25 x 30	0.80	30 x 25	0.85	30 x 30	0.94	30 x 30	1.11
							35 x 25	0.96		
180	22 x 30	0.85			22 x 45	1.05	22 x 40	1.14	25 x 45	1.25
			22 x 40	1.01	25 x 40	1.07	25 x 40	1.11	30 x 35	1.24
			25 x 35	1.02	30 x 30	1.05	30 x 30	1.11	35 x 25	1.20
			30 x 25	1.10			35 x 25	1.12		
220			22 x 45	1.10	22 x 50	1.16	25 x 45	1.20	25 x 50	1.36
	22 x 30	1.00	25 x 40	1.12	25 x 45	1.20	30 x 25	1.20	30 x 40	1.38
	25 x 25	1.00	30 x 30	1.10	30 x 35	1.18	35 x 30	1.24	35 x 30	1.35
270			25 x 45	1.25	25 x 50	1.31	25 x 50	1.36	30 x 45	1.51
	22 x 35	1.22	30 x 35	1.25	30 x 40	1.33	30 x 40	1.38	35 x 35	1.50
	25 x 25	1.15	30 x 25	1.15	35 x 30	1.30	35 x 30	1.35		
330	22 x 40	1.36					30 x 45	1.56	30 x 50	1.70
	25 x 30	1.30	25 x 45	1.53	30 x 45	1.46	35 x 35	1.50	35 x 40	1.70
			30 x 35	1.53	35 x 35	1.45				
			35 x 30	1.50						
390	22 x 45	1.54					30 x 50	1.70	35 x 45	1.90
	25 x 35	1.48	30 x 45	1.71	30 x 50	1.65	35 x 40	1.70		
	30 x 25	1.45	35 x 30	1.60	35 x 40	1.65				
	35 x 25	1.59								
470	22 x 50	1.78	30 x 50	1.85			35 x 45	1.90		
	25 x 40	1.75	35 x 35	1.75	35 x 45	1.85			35 x 50	2.10
	30 x 30	1.72								
	35 x 30	1.88								
560	25 x 40	1.80								
	30 x 35	1.89	35 x 40	2.00	35 x 50	2.10				
	35 x 30	1.94								
680	25 x 50	2.10	35 x 45	2.20						
	30 x 40	2.10								
	35 x 30	2.18								
820	30 x 45	2.30								
	35 x 40	2.39								
1000	30 x 50	2.55								
	35 x 45	2.65								
1200	35 x 50	2.90								

Note : \*1. D x L : mm

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

# CA Series

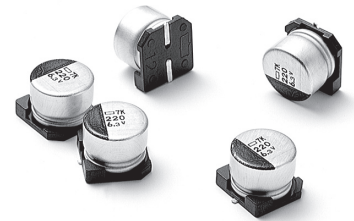
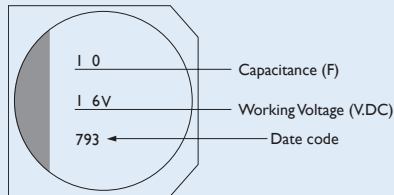
## Surface Mount Aluminum Electrolytic

### FEATURE

For General Purposes Series with 85°C 2000 Hours

Suitable for AV (TV, Video, Audio)Monitor/Computer;Home appliance,OA/HA/Communication

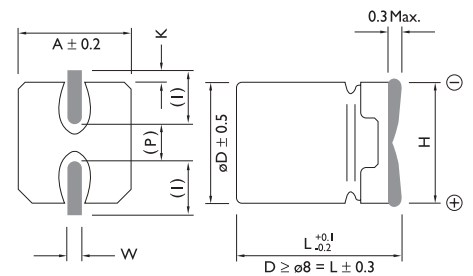
### MARKING



### DIMENSIONS

SIZE CODE	D $\phi$	L	A	H	I	W	P	K
B	4.0	5.4	4.3	5.5 Max.	1.8	0.65 $\pm$ 0.1	1.0 $\pm$ 0.2	0.35 $^{+0.15}_{-0.20}$
C	5.0	5.4	5.3	6.5 Max.	2.2	0.65 $\pm$ 0.1	1.5 $\pm$ 0.2	0.35 $^{+0.15}_{-0.20}$
D	6.3	5.4	6.6	7.8 Max.	2.6	0.65 $\pm$ 0.1	1.8 $\pm$ 0.2	0.35 $^{+0.15}_{-0.20}$
E	8.0	6.2	8.3	9.5 Max.	3.4	0.65 $\pm$ 0.1	2.2 $\pm$ 0.2	0.35 $^{+0.15}_{-0.20}$
F	8.0	10.2	8.3	10.0 Max.	3.4	0.90 $\pm$ 0.2	3.1 $\pm$ 0.2	0.70 $\pm$ 0.20
G	10.0	10.2	10.3	12.0 Max.	3.5	0.90 $\pm$ 0.2	4.6 $\pm$ 0.2	0.70 $\pm$ 0.20
H	6.3	7.7	6.6	7.8 Max.	2.6	0.65 $\pm$ 0.1	1.8 $\pm$ 0.2	0.35 $^{+0.15}_{-0.20}$

Unit : mm



( ) Reference Size



# CB Series

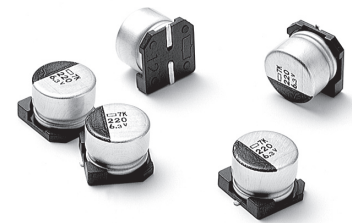
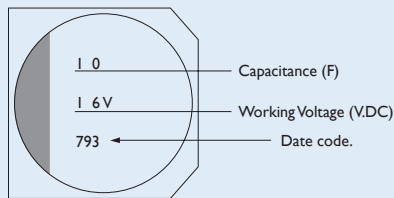
## Surface Mount Aluminum Electrolytic

### FEATURE

For General Purposes Series with 105°C 1000 Hours

Suitable for AV (TV, Video, Audio) Monitor/Computer/OA/HA/Communication

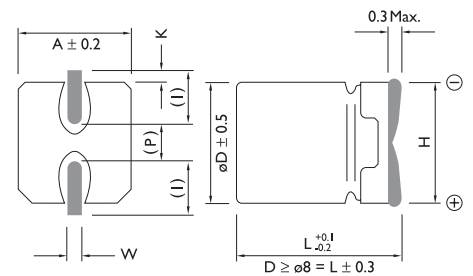
### MARKING



### DIMENSIONS

SIZE CODE	D $\phi$	L	A	H	I	W	P	K
B	4.0	5.4	4.3	5.5 Max.	1.8	0.65 $\pm$ 0.1	1.0 $\pm$ 0.2	0.35 $\pm$ 0.15
C	5.0	5.4	5.3	6.5 Max.	2.2	0.65 $\pm$ 0.1	1.5 $\pm$ 0.2	0.35 $\pm$ 0.15
D	6.3	5.4	6.6	7.8 Max.	2.6	0.65 $\pm$ 0.1	1.8 $\pm$ 0.2	0.35 $\pm$ 0.15
E	8.0	6.2	8.3	9.5 Max.	3.4	0.65 $\pm$ 0.1	2.2 $\pm$ 0.2	0.35 $\pm$ 0.15
F	8.0	10.2	8.3	10.0 Max.	3.4	0.90 $\pm$ 0.2	3.1 $\pm$ 0.2	0.70 $\pm$ 0.20
G	10.0	10.2	10.3	12.0 Max.	3.5	0.90 $\pm$ 0.2	4.6 $\pm$ 0.2	0.70 $\pm$ 0.20
H	6.3	7.7	6.6	7.8 Max.	2.6	0.65 $\pm$ 0.1	1.8 $\pm$ 0.2	0.35 $\pm$ 0.15

Unit : mm



( ) Reference Size



# CE Series

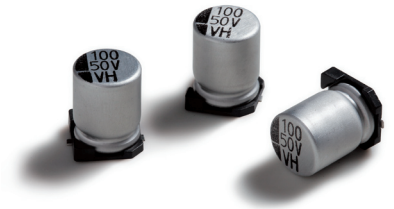
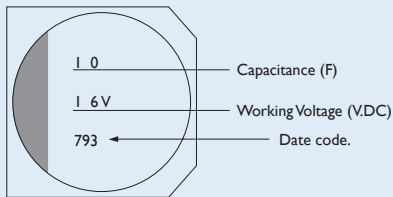
## Surface Mount Aluminum Electrolytic

### FEATURE

For Long Life Series with 105°C 2000 Hours

Suitable for AV (TV, Video, Audio), Monitor/Computer, OA/HA/Communication

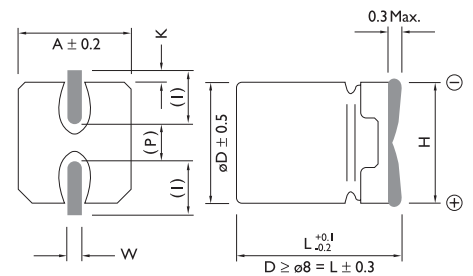
### MARKING



### DIMENSIONS

SIZE CODE	D $\phi$	L	A	H	I	W	P	K
B	4.0	5.4	4.3	5.5 Max.	1.8	0.65 $\pm$ 0.1	1.0 $\pm$ 0.2	0.35 $\pm$ 0.15
C	5.0	5.4	5.3	6.5 Max.	2.2	0.65 $\pm$ 0.1	1.5 $\pm$ 0.2	0.35 $\pm$ 0.15
D	6.3	5.4	6.6	7.8 Max.	2.6	0.65 $\pm$ 0.1	1.8 $\pm$ 0.2	0.35 $\pm$ 0.15
E	8.0	6.2	8.3	9.5 Max.	3.4	0.65 $\pm$ 0.1	2.2 $\pm$ 0.2	0.35 $\pm$ 0.15
F	8.0	10.2	8.3	10.0 Max.	3.4	0.90 $\pm$ 0.2	3.1 $\pm$ 0.2	0.70 $\pm$ 0.20
G	10.0	10.2	10.3	12.0 Max.	3.5	0.90 $\pm$ 0.2	4.6 $\pm$ 0.2	0.70 $\pm$ 0.20
H	6.3	7.7	6.6	7.8 Max.	2.6	0.65 $\pm$ 0.1	1.8 $\pm$ 0.2	0.35 $\pm$ 0.15

Unit : mm



( ) Reference Size



## SPECIFICATION

ITEM	CHARACTERISTIC																					
Operation Temperature Range	-40 to +105°C																					
Rated Working Voltage Range	6.3 to 50V DC																					
Rated Capacitance	Range = 0.1 ~ 1000μF																					
Capacitance Tolerance	±20% (120Hz / 20°C)																					
Leakage Current (25°C)	Polarized : $I \leq 0.01CV$ 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)																					
Low Temperature Stability	Impedance Ratio at 120Hz <table border="1"> <thead> <tr> <th>WV (V)</th> <th>6.3</th> <th>10</th> <th>16</th> <th>25</th> <th>35</th> <th>50</th> </tr> </thead> <tbody> <tr> <td>Z(-25°C)/Z(+20°C)</td> <td>4</td> <td>3</td> <td>2</td> <td>2</td> <td>2</td> <td>2</td> </tr> <tr> <td>Z(-40°C)/Z(+20°C)</td> <td>8</td> <td>6</td> <td>4</td> <td>4</td> <td>3</td> <td>3</td> </tr> </tbody> </table>	WV (V)	6.3	10	16	25	35	50	Z(-25°C)/Z(+20°C)	4	3	2	2	2	2	Z(-40°C)/Z(+20°C)	8	6	4	4	3	3
WV (V)	6.3	10	16	25	35	50																
Z(-25°C)/Z(+20°C)	4	3	2	2	2	2																
Z(-40°C)/Z(+20°C)	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	After placed at 105°C without voltage applied for 1000 hours, the capacitor shall meet the same requirement as Endurance.																					

## CASE SIZE & MAX RIPPLE CURRENT

Max Ripple Current : (120KHz / 105°C)

### POLARIZED

μF	6.3	10	16	25	35	50	6.3	10	16	25	35	50	
0.1												4X5.4	1
0.22												4X5.4	2
0.33												4X5.4	3
0.47												4X5.4	5
1												4X5.4	10
2.2												4X5.4	16
3.3												4X5.4	16
4.7					4X5.4	22			4X5.4	22		5X5.4	23
6.8					5X5.4	25			5X5.4	27		5X5.4	30
10				4X5.4	28	4X5.4	28	5X5.4	30	6.3X5.4	35		
22	5X5.4	29	5X5.4	36	5X5.4	39	6.3X5.4	55	6.3X5.4	60	8X10.2	70	
33	5X5.4	43	5X5.4	45	6.3X5.4	65	6.3X5.4	65	6.3X7.7	79	8X10.2	91	
									8X6.2	84			
47	5X5.4	44	6.3X5.4	70	6.3X5.4	70	6.3X7.7	86	6.3X5.4	66	10X10.2	100	
	6.3X5.4	46			6.3X7.7	80	8X6.2	91	8X10.2	98			
	6.3X5.4	71	6.3X7.7	104	6.3X7.7	130	8X10.2	130	10X10.2	160	10X10.2	145	
100			8X6.2	110	8X10.2	140							
	6.3X7.7	115	6.3X7.7	105	10X10.2	210	10X10.2	273	10X10.2	240			
220	8X10.2	150	8X10.2	160	10X10.2	230							
330	8X10.2	230	10X10.2	230	10X10.2	275	10X10.2	334					
470	10X10.2	260	10X10.2	270									
680													
1000	10X10.2	380	10X10.2	390									

Note: \*1. D × L: mm

\*2. Ripple Current : (mA/rms 105°C / 120Hz), ESR (Ω Max20°C / 120Hz)



# CZ Series

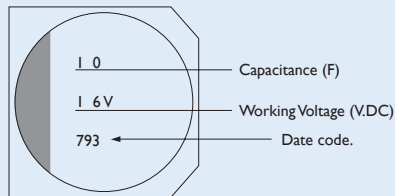
## Surface Mount Aluminum Electrolytic

### FEATURE

For Low esr Series with 105°C 1000 Hours

Suitable for AV (TV, Video, Audio), Monitor/Computer, Battery charger, DC/DC converter, SMPS, Noise filter

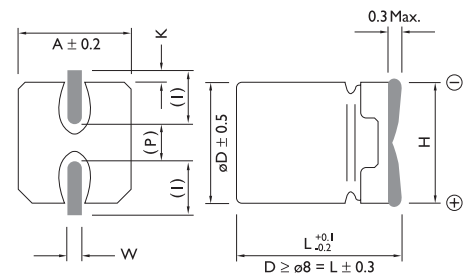
### MARKING



### DIMENSIONS

SIZE CODE	D $\phi$	L	A	H	I	W	P	K
B	4.0	5.4	4.3	5.5 Max.	1.8	0.65 $\pm$ 0.1	1.0 $\pm$ 0.2	0.35 $\pm$ 0.15
C	5.0	5.4	5.3	6.5 Max.	2.2	0.65 $\pm$ 0.1	1.5 $\pm$ 0.2	0.35 $\pm$ 0.15
D	6.3	5.4	6.6	7.8 Max.	2.6	0.65 $\pm$ 0.1	1.8 $\pm$ 0.2	0.35 $\pm$ 0.15
E	8.0	6.2	8.3	9.5 Max.	3.4	0.65 $\pm$ 0.1	2.2 $\pm$ 0.2	0.35 $\pm$ 0.15
F	8.0	10.2	8.3	10.0 Max.	3.4	0.90 $\pm$ 0.2	3.1 $\pm$ 0.2	0.70 $\pm$ 0.20
G	10.0	10.2	10.3	12.0 Max.	3.5	0.90 $\pm$ 0.2	4.6 $\pm$ 0.2	0.70 $\pm$ 0.20
H	6.3	7.7	6.6	7.8 Max.	2.6	0.65 $\pm$ 0.1	1.8 $\pm$ 0.2	0.35 $\pm$ 0.15

Unit : mm



( ) Reference Size



## SPECIFICATION

ITEM	CHARACTERISTIC																								
Operation Temperature Range	-40 to +105°C																								
Rated Working Voltage Range	4 to 50V.DC																								
Rated Capacitance	Range = 0.1 ~ 1000μF																								
Capacitance Tolerance	±20% (120Hz / 20°C)																								
Leakage Current (25°C)	Polarized : $I \leq 0.01CV$ 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)																								
Low Temperature Stability	Impedance Ratio at 120Hz <table border="1"> <thead> <tr> <th>WV (V)</th> <th>4</th> <th>6.3</th> <th>10</th> <th>16</th> <th>25</th> <th>35</th> <th>50</th> </tr> </thead> <tbody> <tr> <td>Z(-25°C)/Z(+20°C)</td> <td>4</td> <td>2</td> <td>2</td> <td>2</td> <td>2</td> <td>2</td> <td>2</td> </tr> <tr> <td>Z(-40°C)/Z(+20°C)</td> <td>8</td> <td>4</td> <td>4</td> <td>3</td> <td>3</td> <td>3</td> <td>3</td> </tr> </tbody> </table>	WV (V)	4	6.3	10	16	25	35	50	Z(-25°C)/Z(+20°C)	4	2	2	2	2	2	2	Z(-40°C)/Z(+20°C)	8	4	4	3	3	3	3
WV (V)	4	6.3	10	16	25	35	50																		
Z(-25°C)/Z(+20°C)	4	2	2	2	2	2	2																		
Z(-40°C)/Z(+20°C)	8	4	4	3	3	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	After placed at 105°C without voltage applied for 1000 hours, the capacitor shall meet the same requirement as Endurance.																								

## CASE SIZE & MAX RIPPLE CURRENT

Max Ripple Current : (100KHz / 105°C)

### POLARIZED

μF	4	RIPPLE	6.3	RIPPLE	10	RIPPLE	16	RIPPLE	25	RIPPLE	35	RIPPLE	50	RIPPLE
0.1													4X5.4	60
0.22													4X5.4	60
0.33													4X5.4	60
0.47													4X5.4	60
1											4X5.4	60	4X5.4	60
2.2											4X5.4	60	4X5.4	60
3.3											4X5.4	60	4X5.4	60
4.7	4X5.4	60					4X5.4	60	4X5.4	60	4X5.4	60	5X5.4	95
6.8	4X5.4	60					4X5.4	60	4X5.4	60	5X5.4	95	6.3X5.4	140
10	4X5.4	60			4X5.4	60	4X5.4	60	5X5.4	95	5X5.4	95	6.3X5.4	140
22	4X5.4	60	4X5.4	60	5X5.4	95	5X5.4	95	6.3X5.4	140	6.3X5.4	140	8X6.2	230
33	4X5.4	60	5X5.4	95	5X5.4	95	5X5.4	95	6.3X5.4	140	8X6.2	230	8X10.2	450
47	4X5.4	60	5X5.4	95	6.3X5.4	95	6.3X5.4	140	6.3X5.4	140	6.3X7.7	200	10X10.2	670
											8X6.2	230		
68	4X5.4	60	6.3X5.4	140	6.3X5.4	140	8X6.2	230	8X10.2	450	8X10.2	450	10X10.2	670
100	5X5.4	95	6.3X5.4	140	6.3X5.4	140	8X6.2	230	8X10.2	450	10X10.2	670	10X10.2	670
150	6.3X5.4	140	8X6.2	230	8X6.2	230	10X10.2	450	10X10.2	670	10X10.2	670		
220	6.3X5.4	140	8X6.2	230	8X6.2	230	10X10.2	450	10X10.2	670	10X10.2	670		
330			8X10.2	450	8X10.2	450	10X10.2	670						
470			10X10.2	670	10X10.2	670	10X10.2	670						
1000			10X10.2	670	10X10.2	670								

Note: \*1.D x L: mm

\*2.Ripple Current : (mA/rms 105°C / 100KHz), ESR (Ω Max20°C / 100KHz)

# CD Series

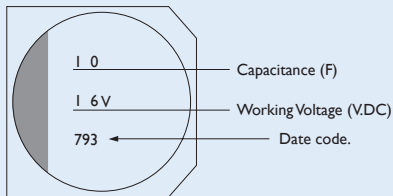
## Surface Mount Aluminum Electrolytic

### FEATURE

For Ultra Low Impedance Series with 105°C 2000 Hours

Suitable for AV (TV, Video, Audio), Monitor/Computer, OA/HA/Communication, SMPS

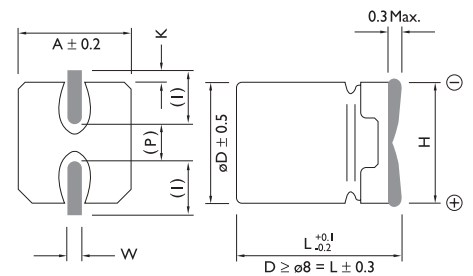
### MARKING



### DIMENSIONS

SIZE CODE	D $\phi$	L	A	H	I	W	P	K
B	4.0	5.4	4.3	5.5 Max.	1.8	0.65 $\pm$ 0.1	1.0 $\pm$ 0.2	0.35 $\pm$ 0.15
C	5.0	5.4	5.3	6.5 Max.	2.2	0.65 $\pm$ 0.1	1.5 $\pm$ 0.2	0.35 $\pm$ 0.15
D	6.3	5.4	6.6	7.8 Max.	2.6	0.65 $\pm$ 0.1	1.8 $\pm$ 0.2	0.35 $\pm$ 0.15
E	8.0	6.2	8.3	9.5 Max.	3.4	0.65 $\pm$ 0.1	2.2 $\pm$ 0.2	0.35 $\pm$ 0.15
F	8.0	10.2	8.3	10.0 Max.	3.4	0.90 $\pm$ 0.2	3.1 $\pm$ 0.2	0.70 $\pm$ 0.20
G	10.0	10.2	10.3	12.0 Max.	3.5	0.90 $\pm$ 0.2	4.6 $\pm$ 0.2	0.70 $\pm$ 0.20
H	6.3	7.7	6.6	7.8 Max.	2.6	0.65 $\pm$ 0.1	1.8 $\pm$ 0.2	0.35 $\pm$ 0.15

Unit : mm



( ) Reference Size



## SPECIFICATION

ITEM	CHARACTERISTIC																		
Operation Temperature Range	-40 to +105°C																		
Rated Working Voltage Range	6.3 to 35V.DC																		
Rated Capacitance	Range = 4.7 ~ 1500μF																		
Capacitance Tolerance	±20% (120Hz / 20°C)																		
Leakage Current (25°C)	Polarized : $I \leq 0.01CV$ 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)																		
Low Temperature Stability	Impedance Ratio at 120Hz <table border="1"> <thead> <tr> <th>WV (V)</th> <th>6.3</th> <th>10</th> <th>16</th> <th>25</th> <th>35</th> </tr> </thead> <tbody> <tr> <td>Z(-25°C)/Z(+20°C)</td> <td>2</td> <td>2</td> <td>2</td> <td>2</td> <td>2</td> </tr> <tr> <td>Z(-40°C)/Z(+20°C)</td> <td>3</td> <td>3</td> <td>3</td> <td>3</td> <td>3</td> </tr> </tbody> </table>	WV (V)	6.3	10	16	25	35	Z(-25°C)/Z(+20°C)	2	2	2	2	2	Z(-40°C)/Z(+20°C)	3	3	3	3	3
WV (V)	6.3	10	16	25	35														
Z(-25°C)/Z(+20°C)	2	2	2	2	2														
Z(-40°C)/Z(+20°C)	3	3	3	3	3														
Load Life	After 1000 hours application of WV at 105°C, the capacitor shall meet following limits. Capacitance Change                    ≤ ±30% of Initial Value Dissipation Factor                      ≤ 200% of Initial Specified Value Leakage Current                         ≤ Initial Specified Value																		
Shelf Life	After placed at 105°C without voltage applied for 1000 hours, the capacitor shall meet the same requirement as Endurance.																		

## CASE SIZE & MAX RIPPLE CURRENT

Max Ripple Current : RC(mArms)/100KHz / 105°C

### POLARIZED

μF	6.3	RIPPLE	10	RIPPLE	16	RIPPLE	25	RIPPLE	35	RIPPLE
4.7									4X5.4	90
10							4X5.4	90	4X5.4	90
									5X5.4	160
22	4X5.4	90	4X5.4	90	4X5.4	90	5X5.4	160	5X5.4	160
					5X5.4	160				
33			4X5.4	90			5X5.4	160	6.3X5.4	240
			5X5.4	160			6.3X5.4	240		
47	4X5.4	90			5X5.4	160	6.3X5.4	240	6.3X5.4	240
	5X5.4	160			6.3X5.4	240				
68							6.3X5.4	240	6.3X7.7	280
100	5X5.4	160	6.3X5.4	190	6.3X5.4	240	6.3X7.7	280	6.3X7.7	280
	6.3X5.4	240					8X6.2	300	8X10.2	600
150			6.3X7.7	240	6.3X7.7	280	8X10.2	600	8X10.2	600
220	8X6.2	300	6.3X7.7	280	8X10.2	370	8X10.2	600	10X10.2	600
			8X6.2	300						
330	6.3X7.7	280	8X10.2	600	8X10.2	600	10X10.2	600	10X10.2	850
	8X6.2	300								
470	8X10.2	600	8X10.2	600	10X10.2	600	10X10.2	850		
680			10X10.2	600	10X10.2	850				
1000	10X10.2	600								

Note: \*1. D x L: mm

\*2. Ripple Current : (mArms 105°C / 100KHz), ESR (Ω Max20°C / 100KHz)

# CP [ For Ultra Low ESR & High Ripple Current ]

Features: 105°C, 2000hrs, Super lower ESR & higher ripple  
 Recommended Applications: Motherboard, DC/DC Converter, DSC, PDA, HD Drive, MO Drive, DVD Drive, Navigation system, Portable Communication Devices

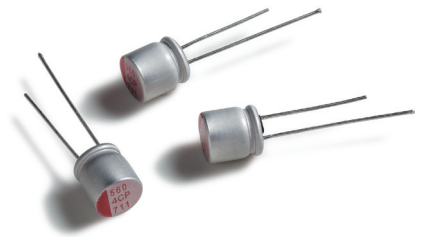
## Conductive Polymer Solid Capacitors

### ELECTRICAL CHARACTERISTICS

Operating Temperature :	-55~+105°C
Working Voltage :	2.5~6.3VDC
Rate Capacitance Range :	470~820μF
Capacitance Tolerance :	-20 ~ +20%
DC Leakage Current (μA) :	$I \leq 0.2 CV$ (After rated voltage applied for 2 minutes)
Dissipation Factor :	at 120 Hz, 20°C
WV (V) :	2.5~6.3V
D.F (%) :	0.08
WV (V) :	2.5~16V
Impedance :	$Z - 25^{\circ}C / Z + 20^{\circ}C \leq 1.15$ $Z - 55^{\circ}C / Z + 20^{\circ}C \leq 1.25$

After applying rated voltage for 2000 hours at 105°C, the capacitors shall meet the following requirements.

- (a) Appearance: No significant damage
- (b) Capacitance Change: Within ±20% of the initial value
- (c) Dissipation Factor: Not more than 150% of the initial specified value
- (d) Equivalent Series Resistance: Not more than 150% of the initial specified value
- (e) Leakage Current: Not more than the initial specified value

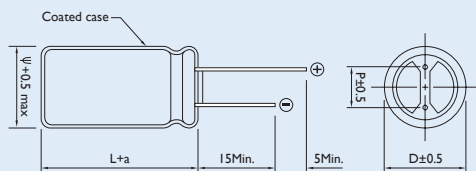


### DESCRIPTION

Features: 105°C, 2000hrs, Super lower ESR & higher ripple  
 Recommended Applications: Motherboard, DC/DC Converter, DSC, PDA, HD Drive, MO Drive, DVD Drive, Navigation system, Portable Communication Devices

### DIAGRAM OF DIMENSIONS

Rubber Stand-off



$L \leq 16 : L + 1.5 \text{max}$   
 $L > 16 : L + 2 \text{max}$   
 $D\phi = 8 \& 10 : L + 2.5$   
 $D\phi < 20 : D\phi + 0.5$   
 $D\phi \geq 20 : D\phi + 1$

Dimensions : mm

Dφ	8	10
P	3.5	5
a(MAX)	1.0	1.0



## CASE SIZE & PERMISSIBLE RIPPLE CURRENT OF STANDARD PRODUCTS

CAP. (μF)	RATED VOLTAGE WV								
	2.5			4			6.3		
	SIZE	RIPPLE	Z	SIZE	RIPPLE	Z	SIZE	RIPPLE	Z
470							8x8	4400	8.000
560	8x8	4400	6	8x8	4400	7.000			
820	8x8	4400	6						

Note : \* 1. D x L : mm

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

# CG [ For Low ESR & High Ripple Current ]

Features: 105°C, 2000hrs lower ESR & higher ripple

Recommended Applications: switching regulators, motherboard and other high frequency applications

## Conductive Polymer Solid Capacitors

### ELECTRICAL CHARACTERISTICS

Operating Temperature : -55~+105°C

Working Voltage : 2.5~16VDC

Rate Capacitance Range : 270~1500μF

Capacitance Tolerance : -20 ~ +20%

DC Leakage Current (μA) :  $I \leq 0.2 CV$   
( After rated voltage applied for 2 minutes )

Dissipation Factor : at 120 Hz, 20°C

WV (V) : 2.5~16V

D.F (%) : 0.08~0.15

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

WV (V) : 2.5~16V

Impedance : Z - 25°C / Z + 20°C  $\leq 1.15$   
Z - 55°C / Z + 20°C  $\leq 1.25$

After applying rated voltage for 2000 hours at 105°C, the capacitors shall meet the follow requirements.

- (a) Capacitance Change: Within  $\pm 20\%$  of Initial Value
- (b) Dissipation Factor: Not more than 150% of the initial specified value
- (c) Equivalent Series Resistance: Not more than 150% of the initial specified value
- (d) Leakage Current: Not more than the initial specified value



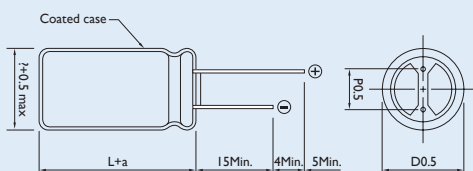
### DESCRIPTION

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

Feature High CV Product

### DIAGRAM OF DIMENSIONS

Diagram of Dimensions



Dimensions : mm

D $\phi$	6.3	8	10
P	1.5	3.5	5
$\phi d$	0.5	0.6	0.6
a(MAX)	1.0	1.0	1.0



## CASE SIZE & PERMISSIBLE RIPPLE CURRENT OF STANDARD PRODUCTS

CAP. (μF)	RATED VOLTAGE WV									
	2.5 SIZE		4 SIZE		6.3 SIZE		10 SIZE		16 SIZE	
	SIZE	RIPPLE	SIZE	RIPPLE	SIZE	RIPPLE	SIZE	RIPPLE	SIZE	RIPPLE
270							8 x 11	5600	8 x 11	5000
330									10 x 12	6100
470					8 x 11	5600	10 x 12	6100	10 x 12	6100
680			8 x 11	5600						
820	8 x 11	5600			10 x 12	6100				
1200			10 x 12	6100						
1500	10 x 12	6100								

Note : \* 1. D x L : mm

\* 2. Ripple current: A r.m.s. 105°C/100KHz, ESR(Ω Max 20°C/100KHz)



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