

■ PRODUCTS

- AL ELECTROLYTIC CAPACITOR
- METALLIZED FILM CAPACITOR
- TA ELECTROLYTIC CAPACITOR
- HYBRID-IC
- SAW FILTER
- RF MODULATOR
- RELAY
- BATTERY CHARGER
- THERMOSTAT
- VIF MODULE
- E-TUNER
- DY
- FBT
- THERMISTOR
- BATTERY PACK
- PAGER

■ HISTORY

- 1973.10. TAI HAN MARCON CO., LTD. (TMC) was established as joint ventured company.
- 1983. 5. TCC was merged with DAEWOO CORP. and started newly formed company DAEWOO ELECTRONIC COMPONENTS CO., LTD. (DEC)
- 1985. 7. Aluminum electrolytic capacitor manufacturer approval under IECQ system.
- 1985.11. Line of Tantalum Electrolytic capacitor was set up.
- 1989. 6. Jungeup plant was established. (Product : HIC, TA CAPACITORS, THERMISTOR, DY, FBT, etc.)
- 1993. 9. Aluminum electrolytic capacitor qualification approval under ISO-9002 system. (By LR-QA)
- 1994.12. Vietnam Plant was established. (CE, TA)
- 1998.4 Received the best award in Productivity competition from Korea Productivity center (KPC)
- 1998.11 Received the best award in industrial Engineering (I.E) competition from Korea Management Association Consulting (KMAC)

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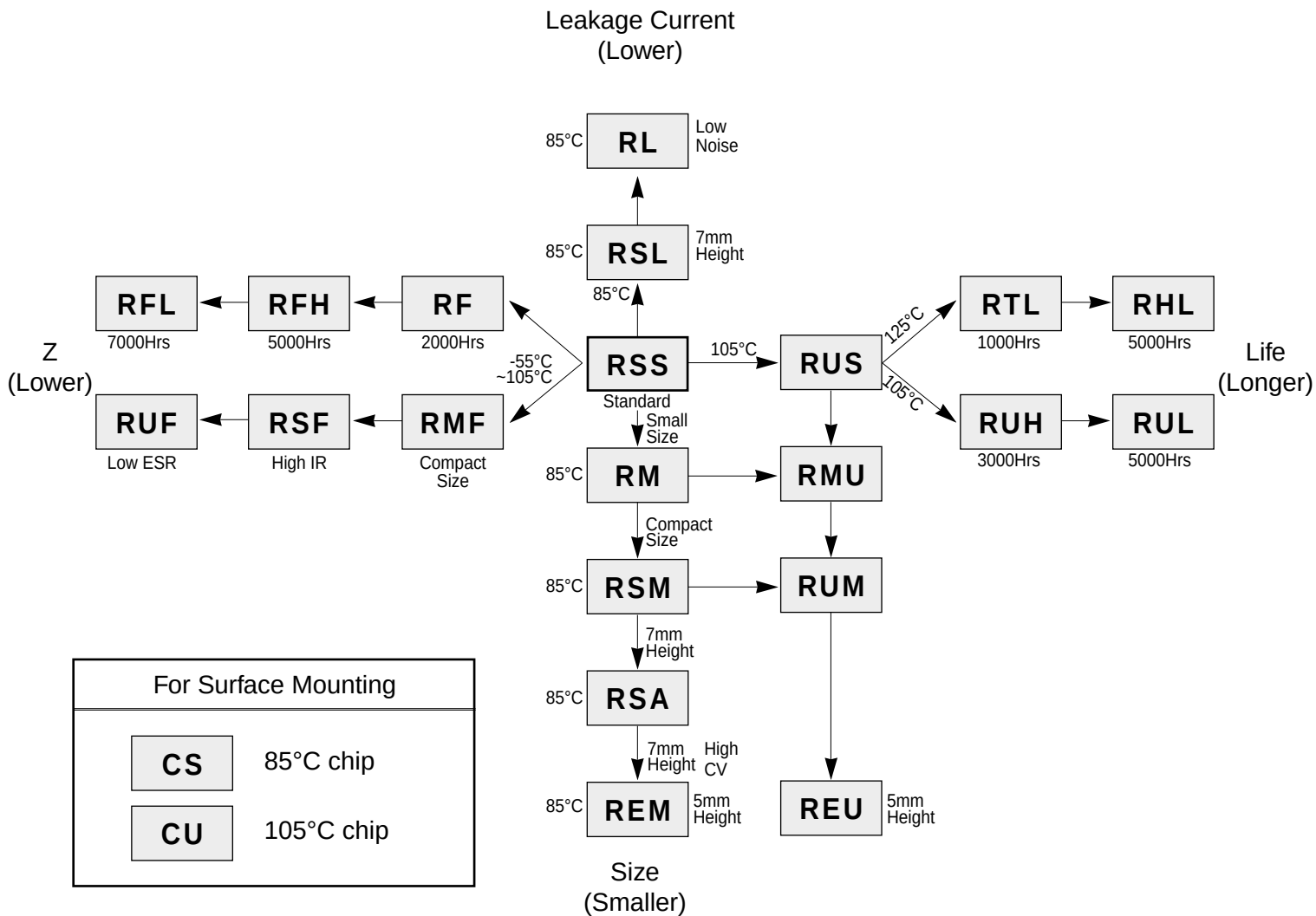
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■ Quick Guide

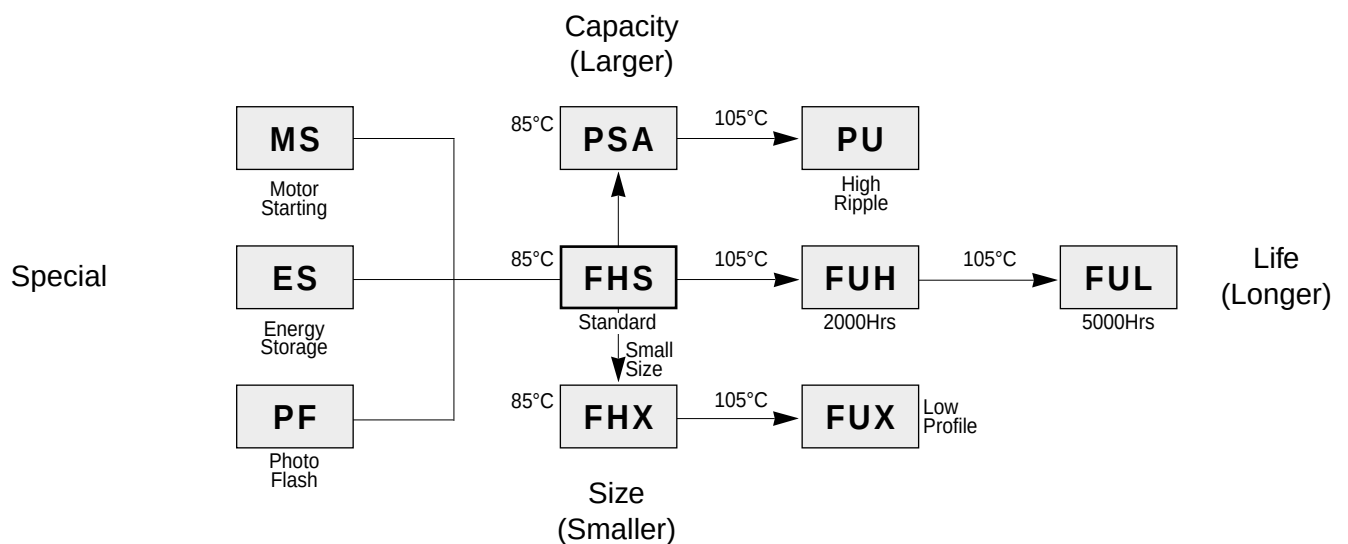
Requirement		Series	Lead Type	Feature, application of purpose	Voltage Range(V)	Capacitance Range(μF)	Temperature Range(°C)	Page	
Miniature	Chip	CS	Chip	5.5mm Height, 85°C, Standard	4.0~50	0.1~220	-40~85°C	18	
		CU	Chip	5.5mm Height, 105°C, Standard	6.3~50	0.1~100	-40~105°C	19	
	General	RSS	Radial	85°C, Standard	6.3~450	0.1~27000	-40(-25)~85°C	20	
		RUS	Radial	105°C, Standard	6.3~450	0.1~15000	-40(-25)~105°C	23	
		RM	Radial	85°C, Miniature	6.3~450	0.47~22000	-40(-25)~85°C	26	
		RMU	Radial	105°C, Miniature	6.3~450	0.47~22000	-40(-25)~105°C	28	
		RSM	Radial	7mm Height, 85°C, Standard	6.3~50	0.1~100	-40~85°C	30	
		RSA	Radial	7mm Height, 85°C, High CV	6.3~50	0.1~220	-40~85°C	31	
		RUM	Radial	7mm Height, 105°C, Standard	6.3~50	0.1~100	-40~105°C	32	
		REM	Radial	5mm Height, Microminiature	4.0~50	0.1~100	-40~85°C	33	
		REU	Radial	5mm Height,105°C, Standard	4.0~50	0.1~100	-40~105°C	35	
		Special	Low L C	RL	Radial	Low leakage current	6.3~100	0.1~2200	-40~85°C
	RSL			Radial	7mm Height, Low leakage current	6.3~50	0.1~100	-40~85°C	38
	Low Z		RUF	Radial	Low Impedance, Low ESR, High ripple, SMPS	6.3~50	1~1000	-55~105°C	39
			RSF	Radial	Low Impedance, High ripple, SMPS	6.3~63	22~2200	-55~105°C	42
			RMF	Radial	Low Impedance, Miniature, SMPS	6.3~63	0.47~6800	-55~105°C	44
			RF	Radial	Low Impedance, Superminiature, SMPS	6.3~50	0.47~15000	-55~105°C	47
			RFH	Radial	Low Impedance, Long Life	6.3~50	10~15000	-55~105°C	49
	Professional		RT	Radial	High stability, Low loss, TV vertical circuit	16~50	0.47~470	-55~105°C	51
			RLT	Radial	High Performance, Timing circuit	10~50	1~2200	-40~85°C	53
			RUH	Radial	105°C High Performance(3000Hrs)	6.3~250	4.7~10000	-40~105°C	54
			RUL	Radial	105°C High Performance(5000Hrs)	10~250	1~2200	-40~105°C	56
			RTL	Radial	125°C High reliability	10~250	0.47~1000	-40~125°C	58
	Bi-polar		RHL	Radial	125°C Long life(5000Hrs)	10~63	0.47~1000	-40~125°C	60
			RND	Radial	Bi-polar, General	10~50	0.47~1000	-40~85°C	62
			RBD	Radial	Bi-polar, Miniature, general	6.3~100	0.47~6800	-40~85°C	63
			RUB	Radial	Wide temperature range, Bi-polar	10~50	0.47~1000	-40~105°C	65
			RBU	Radial	Wide temperature range, Miniature, Bi-polar	6.3~100	0.47~1000	-40~105°C	66
			RNP	Radial	Speaker network, Bi-polar	25~50	1~100	-40~85°C	68
		RMB	Radial	7mm Height, Bi-polar	6.3~50	0.1~47	-40~85°C	69	
	RHD	Radial	Horizontal deflection circuit	25~50	1~10	-40~85°C	70		
	Large size	High-power	FHS	Snap-in	85°C, Standard, Power Supply	16~450	47~47000	-40(-25)~85°C	71
FUH			Snap-in	105°C, Standard, Switching Power Supply	10~450	47~47000	-40(-25)~105°C	75	
FHX			Snap-in	85°C, Subminiature, Power Supply	160~450	56~2700	-40(-25)~85°C	79	
FUX			Snap-in	105°C, Subminiature, Power Supply	160~450	56~2200	-40(-25)~105°C	81	
FUL			Snap-in	105°C, Long life(5000Hrs), Low ESR, Low impedance	160~400	39~1200	-40(-25)~105°C	83	
Special		PSA	Screw	Computer grade, High CV, Inverter	10~450	270~680000	-40(-25)~85°C	85	
		PU	Screw	105°C, Computer grade, High CV, Inverter	10~250	220~470000	-40~105°C	87	
		MS	Lug	Motor Starting	110~300	25~500	-25~70°C	89	
		ES	Lug	Energy Storage	150~450	100~1000	-25~70°C	90	
		PF	Lug	Photo Flash	330	60~1500	-10~50°C	91	

SCHEME OF DAEWOO AL ELECTROLYTIC CAPACITORS

Miniature Capacitors



Large Sized Capacitors



GUIDELINES FOR USING ALUMINUM ELECTROLYTIC CAPACITORS

1. DC Electrolytic Capacitors are polarized.

Make sure of the polarity. The polarity is marked on the body of the capacitor. Application of the reversed voltage may cause a short circuit or damage the capacitor. Use bipolar capacitors when the polarity is not determined or unknown. Note that DC electrolytic capacitors cannot be used for AC application.

2. Do not apply a voltage exceeding the rated voltage.

If a voltage exceeding the rated voltage is applied, the leakage current will increase, which may damage the capacitor. Using capacitors at recommended working voltage prolongs capacitor life.

3. Use specially designed capacitors for the circuits where charge and discharge are frequently repeated.

In the circuit subjected to rapid charge and discharge cycles, capacitors may be damaged. Be sure and use special capacitors in these applications.

4. Do not allow excessive ripple current through the capacitor.

The flow of ripple current over the permissible ripple current will cause heat of the capacitor, which may decrease the capacitance and damage the capacitor. Ripple current on the capacitor must be at or below allowable level.

5. Storage

The characteristics of electrolytic capacitors depend on temperature ; the higher the ambient temperature, the faster the deterioration proceeds (leakage current increases, $\tan\delta$ increases and capacitance drops). Humidity is another deteriorating factor. Capacitors may have their lead wires/terminals oxidized, impairing solderability, when stored in humid place for long periods of time. Aluminum electrolytic capacitors should be stored at room temperature in dry places out of direct sunlight.

- Apply voltage treatment to the capacitor which has been stored for a long time.

If the electrolytic capacitor is allowed to stand for a long time, its working voltage is liable to drop, resulting in increased leakage current. If the rated voltage is applied to such a product, a leakage current occurs and this generates internal heat, which damages the capacitor.

If the electrolytic capacitor is allowed to stand for more than 2 years, apply a voltage treatment (applying the rated voltage for 30 minutes at room temperature)

before use.

- Care should be used in selecting a storage area.

If electrolytic capacitors are exposed to high temperature caused by such things as direct sunlight, the life of the capacitor may be adversely affected.

Storage in a high humidity atmosphere may affect the solderability of lead wires and terminals.

6. Be sure of the temperature range.

The characteristics of capacitors change with the operating temperature.

The capacitance and leakage current increase and $\tan\delta$ decreases at higher temperature. The capacitance and leakage current decrease, and $\tan\delta$ increases at lower temperature. Usage at lower temperature will ensure longer life.

7. Tangent of loss angle increases at higher frequencies.

The tangent of loss angle ($\tan\delta$) increases as the applied frequency becomes higher whereas decreases as the ambient temperature becomes higher.

8. Capacitance decreases at higher frequencies.

The capacitance value is measured at 120Hz. The capacitance decreases as the applied frequency becomes higher whereas increases as the ambient temperature becomes high.

9. Do not apply excessive force to the terminals and leads.

The excessive strong force applied to the terminals and lead wires may break them and loosen the connections of the internal elements.

10. Hole positions on the circuit board.

Through-holes on the circuit board as well as lead holes of post-process parts can result in solder splashing onto the vinyl sleeve, causing damage. Consider hole positions carefully.

11. Be cautious of the temperature and duration when soldering

Incorrect soldering may shrink or break the sleeve. Please read the following information carefully, before soldering.

- Too high a soldering temperature or too long a soldering time may cause secondary shrinking of the sleeve which unnecessarily exposes the container. No problems will be observed at a soldering temperature of 260°C or below for no more than 10 seconds.

GUIDELINES FOR USING ALUMINUM ELECTROLYTIC CAPACITORS

- Soldering may melt or break the sleeve, if the sleeve is in contact with circuit patterns.

To avoid this problem, the capacitors should be mounted slightly raised from the circuit board. (Lead formed capacitors are recommended.)

- Sleeve may be melted by solder which has migrated up through the terminal holes on the circuit board. To avoid this problem, the same application as stated in the foregoing paragraph is recommended.

- When soldering, heated lead wires or terminals of adjacent components tear the sleeve if contacted. Please mount carefully so as not to bring adjacent components' terminals or lead wires into contact with the sleeve, particularly when mounting on through-hole circuit boards.

12. The capacitor case is not insulated from the cathode terminal.

The capacitor's case and cathode terminal connect through the electrolyte. If the case is to be completely insulated, that insulation must be at the capacitor's mounting point.

13. Adhesives and coating materials

When using a latex-based adhesive on the capacitor's rubber mouth seal for adhesion to a printed circuit board, corrosion may occur depending on the kind of solvent in the adhesive.

Select an adhesive as an organic solvent with dissolved polymer that is not halogenated. For polymer, avoid the use of chloroprene.

Also coating and dampproof materials are including halogenated hydrocarbon, so special case should be taken for use.

14. Cleaning of the circuit board after soldering

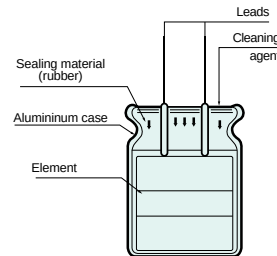
Aluminum can be aggressively attacked by halide ions, particularly by chloride ions.

Even small amounts of chloride ions inside the capacitor will cause corrosion accidents rapid capacitance drop and venting. Therefore, the prevention of chloride contamination is the most important check point for quality control in production lines. At present, the halogen organic solvent such as Freon are commonly used to remove soldering pastes from circuit boards.

When an aluminum electrolytic capacitor is immersed in a halogen organic solvent (e.g; chlorosene, Freon TE, Freon TES, etc.), the halogen organic solvent (cleaning agent) infiltrates into the aluminum electrolytic capacitor where the halogen ions separate and react with the aluminum to cause corrosion. The infiltration mechanism of the cleaning agent and the corrosion mechanism are hypothesized below.

nism of the cleaning agent and the corrosion mechanism are hypothesized below.

- Cleaning agent trapped inside sealing material (rubber packing, terminal board) when capacitor is cleaned.

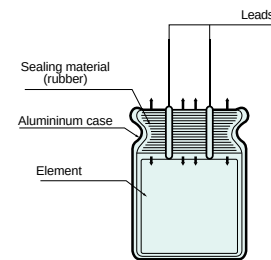


- When a capacitor is immersed in a cleaning agent, it causes the rubber packing to swell, thus trapping the cleaning agent in the rubber packing.

The amount trapped is greatly dependent on not only the duration of immersion and the temperature, but also the type of cleaning agent

and the properties of the rubber packing.

- Diffusion of cleaning agent trapped inside rubber packing.



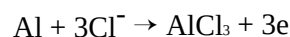
- Even when the capacitor is removed from the cleaning agent and the cleaning agent adhering to the capacitor dries, that trapped inside the rubber packing does not immediately dry and it gradually diffuses from inside the rubber packing toward the element and the atmosphere. Therefore, not all

the cleaning agent trapped in the rubber packing infiltrates towards the element.

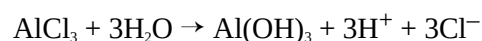
● Corrosion mechanism

The cleaning agent infiltrating the element undergoes a decomposition reaction which frees chloride. This chloride reacts with aluminum, resulting in corrosion. When the capacitor is powered, the negative chloride ions migrate toward the anode. Therefore, corrosion occurs only at the anode.

Chloride ion can penetrate through imperfections and microcracks in the aluminum oxide dielectric layer to reach the underlying aluminum metal. At these points the metal is attacked with production of a soluble chloride in this anodic half-cell reaction ;



There is always at least 1~2% water in the electrolyte and this is sufficient to hydrolyze the AlCl_3 :



This reaction releases chloride ion for further attack of aluminum. The hydrogen ion increases the local acidity which causes oxide dielectric to dissolve. Thus localized

GUIDELINES FOR USING ALUMINUM ELECTROLYTIC CAPACITORS

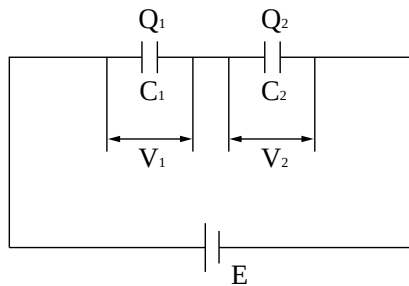
corrosion occurs at an accelerated pace with attack of both metal and dielectric. Therefore, with the exception of capacitors designated as solvent-proof, alcohol based solvents rather than chlorinated hydrocarbons are recommended for cleaning.

Some adhesives, dampproofing agents and dustproofing agents also contain halides and should be used with caution.

Recommended cleaning solvents

General name	Composition
Freon TF (Daiflon S3)	① 1.1.2 – trichloro 1.1.2 – trifluorethane
Freon TE (Daiflon S3-E)	② ; ① + ethanol
Freon TES (Daiflon S3-ES)	③ ; ① + ethanol + stabilizer
Freon TP-35 (Daiflon S3-P35)	④ ; ① + isopropyl alcohol
Freon TMS (-)	⑤ ; ① + methanol + stabilizer

15. For series connection



Where

C_1 : The capacitance of A

C_2 : The capacitance of B

V_1 : The voltage between terminals of A

V_2 : The voltage between terminals of B

E : The voltage of power supply

Q : The magnitude of the stored charge ($Q=Q_1=Q_2$)

● Analysis

$$Q_1 = Q = C_1 V_1, \quad Q_2 = Q = C_2 V_2 \quad \text{eq 1)}$$

From eq1)

$$V_1 = \frac{Q}{C_1} \quad V_2 = \frac{Q}{C_2} \quad \text{eq 2)}$$

$$E = V_1 + V_2 = \frac{Q}{C_1} + \frac{Q}{C_2} = \frac{C_1 + C_2}{C_1 \cdot C_2} \cdot Q$$

$$Q = \frac{C_1 \cdot C_2}{C_1 + C_2} \cdot E = C \cdot E$$

From eq 2)

$$C_1 V_1 = \frac{C_1 C_2}{C_1 + C_2} \cdot E \quad C_2 V_2 = \frac{C_1 C_2}{C_1 + C_2} \cdot E \quad \text{eq 3)}$$

From eq 3)

$$V_1 = \frac{C_2}{C_1 + C_2} \cdot E \quad V_2 = \frac{C_1}{C_1 + C_2} \cdot E$$

When capacitors are used in series connection, the voltage is divided reversal proportional to the ratio of the capacitance, when capacitors are being charged.

Thus, the voltage applied to the capacitor depends on the capacitance.

Unbalanced capacitance could cause the excessive voltage application and safety vent operation.

The applying voltage unbalancing can be reduced by choosing a couple of capacitors that have the capacitance within 5% differences.

16. Blank terminals must be mounted to an electrically isolated palce.

Blank terminals are not perfectly isolated from the element. It is important when planning the printed circuit board to electrically isolate the blank terminals.

The blank terminals are for added stability only, and should never be electrically connected to either the positive or negative terminal.

17. Mounting

The distance between the terminal holes on the circuit board should be the same as that between the lead wires or terminal of the capacitor.

Excessive force in mounting on circuit boards should be avoided.

Radial lead type

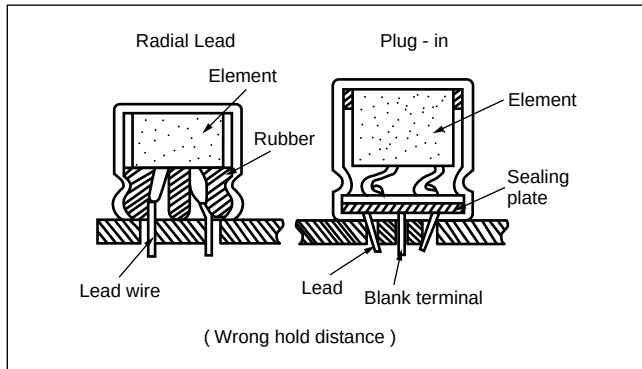
Improper insertion of the lead wires in circuit boards may cause electrolyte leakage or break the lead wires or impair their connection with the internal elements.

When the distance between the two terminal holes on the circuit board cannot be reduced to that between the lead wires, lead formed capacitors are recommended.

GUIDELINES FOR USING ALUMINUM ELECTROLYTIC CAPACITORS

Snap-in type

Improper insertion of the terminals in circuit boards may break the terminlas or impair their connection with the internal elements.



18. Method for testing

The method shall comply with KS C6035, KS C6421(JIS C5102, JIS C5141). Except lead solderability. The lead solderability meets the requirements of MIL-STD 202, Method 208.

19. When Ordering

When you order aluminum electrolytic capacitors, selecting parts listed in this catalog will result in favorable prices and delivery schedules.

When ordering items not listed in this catalog, confirm the following points before notification

- (1) Type and/or series name, application.
- (2) Rated voltage and nominal capacitance
- (3) Usage temperature range and ripple current
- (4) Sizes and dimensions
- (5) Other special requirement

20. Part number system

(1) Ordering code system

$\boxed{A} / \boxed{B} - \boxed{C} / \boxed{D} - \boxed{E} \times \boxed{F} \times \boxed{G}$

ex) RSS/TAA-100/10-5 x 11 x 5

$\boxed{A}$:Series code - See Quick guide of page 1

$\boxed{B}$:Lead taping & lead forming/cut code - See page 7~9

$\boxed{C}$:Capacitance(μF)

$\boxed{D}$:Rated voltage (W.V.)

$\boxed{E}$:Case dia (ϕD)

$\boxed{F}$:Case height (L)

$\boxed{G}$:Lead space (f)

(2) Production code system

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
(	A		B		C		D		E		F		G	)

Ⓐ Series code : See Quick guide of page 1

Ⓑ Rated voltage code

WV	4.0	6.3	10	16	25	35	40	50	63	80
Code	0G	0J	1A	1C	1E	1V	1G	1H	1J	1K
WV	100	160	180	200	250	315	350	400	450	—
Code	2A	2C	2S	2D	2E	2F	2V	2G	2W	—

Ⓒ Capacitance code

- Less than $10\mu\text{F}$: Replace period with “R”
ex) $0.1\mu\text{F} \rightarrow \text{R10}$, $4.7\mu\text{F} \rightarrow \text{4R7}$
exception : $1.0\mu\text{F} \rightarrow \text{010}$

- Over than or equal to $10\mu\text{F}$

$\boxed{6} \boxed{7} \boxed{8} \rightarrow \underline{67} \times 10^8$
 ————— Number of zero (0)
 ————— Effective number

ex) $10\mu \rightarrow 100(10 \times 10^0)$
 $470\mu\text{F} \rightarrow 471(47 \times 10^1)$
 $10000\mu\text{F} \rightarrow 103(10 \times 10^3)$

Cap.Tol	code	Cap.Tol	code	Cap.Tol	code
$\pm 5\%$	J	$\pm 20\%$	M	$-10\% \sim +30\%$	Q
$\pm 10\%$	K	$-10\% \sim +20\%$	V	$-10\% \sim +50\%$	T

Ⓓ Capacitance tolerance code

Ⓔ Design code

- Radial type
Case vent, standard : IS (Dia $\geq 8\phi$)
No case vent, standard : SS (Dia $< 8\phi$)
- Snap-in, Screw & Bolt type

11	Dia	22	25	30	35	40	45	51	63	76	89
	Code	I	J	K	L	M	N	G	H	Q	R
12	Standard : “S” Other:According to sequence of alphabet(A, B, C, D etc.)										

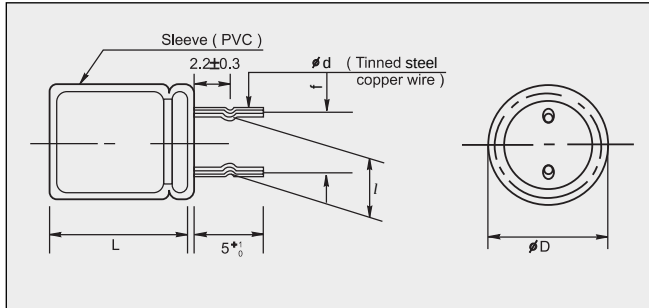
Ⓕ Brand code : Daewoo brand “A”

Ⓖ Lead taping & lead forming cut code
See page 7~9

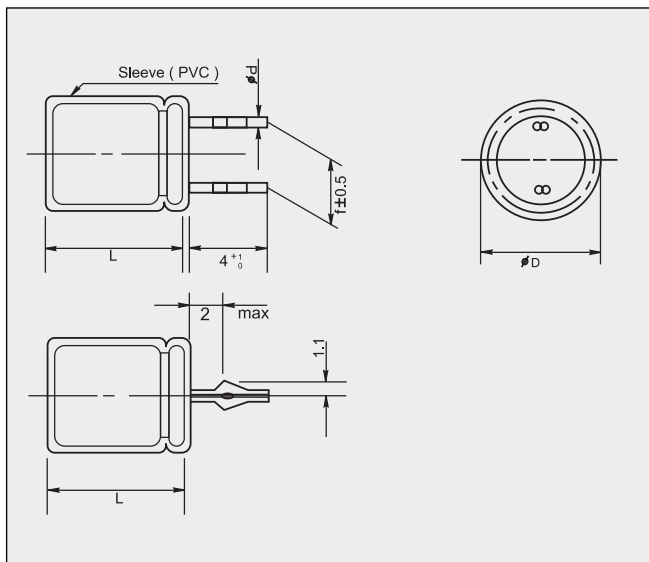
LEAD CUT AND FORMING

SNAP-IN CUT

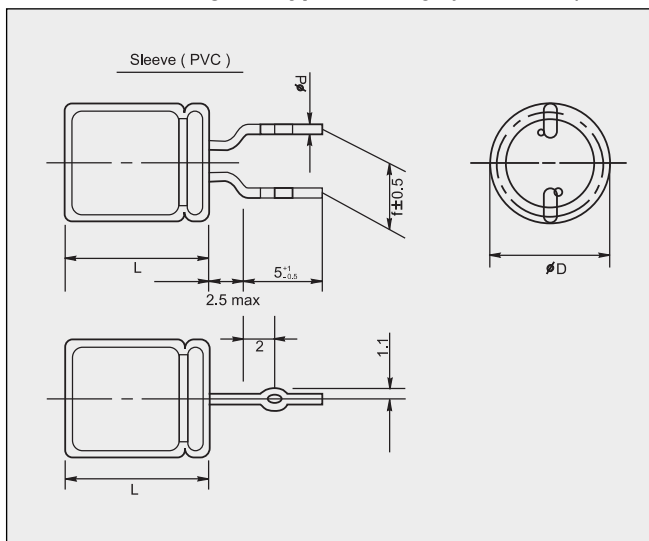
1. SNAP-IN CUT Type : Forming Symbol "S1"(10~18 ϕ)



2. SNAP-IN Cut Type : Forming Symbol "S2"(10~18 ϕ)

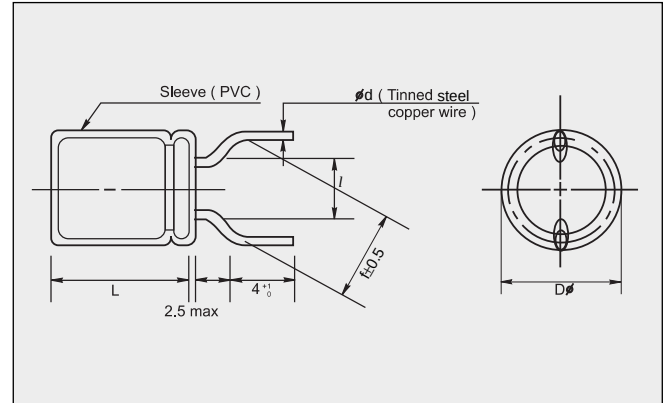


3. SNAP-IN Forming Cut Type : Forming Symbol "S3" (4~8 ϕ)



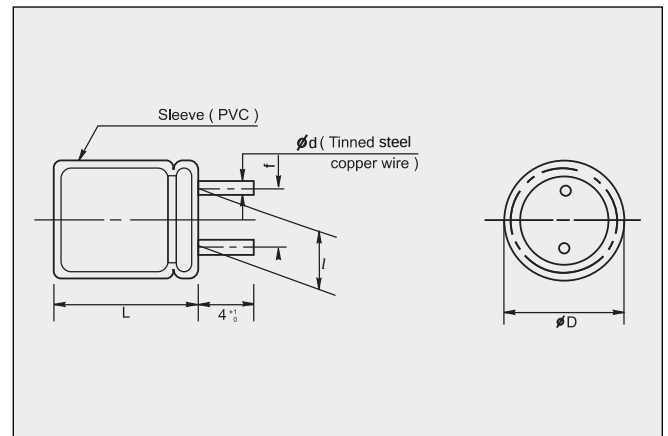
FORMING CUT TYPE

4. Forming Cut Type : Forming Symbol "FC" (4~8 ϕ)



STRAIGHT CUT TYPE

5. Straight Cut Type : Forming Symbol "C" (10~18 ϕ)

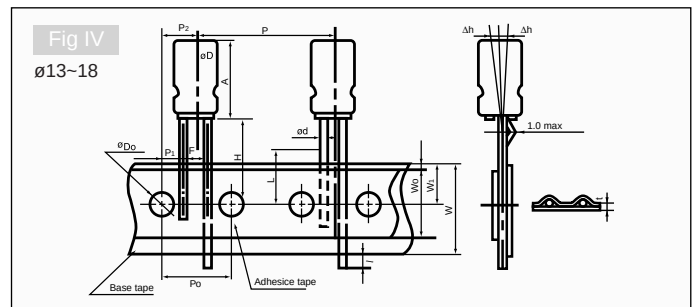
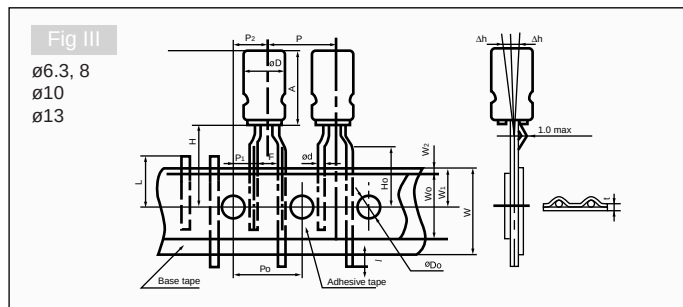
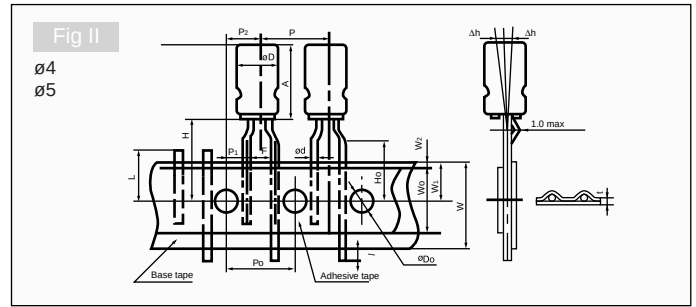
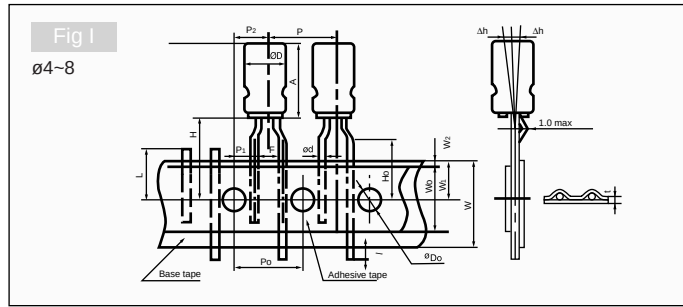


Case dia.(øD)		4	5	6.3	8	10	13	16	18
Lead space	f	5±0.5				5±0.5		7.5±0.5	
	l	15±05	20±05	25±05	35±05				
Applicable Fig.		③ ④				① ② ⑤			
Lead wire dia(ød)		0.45	0.5		0.6			0.8	

Code			
Item	Symbol		Code
Snap-in cut	S1	S1A(10~13 ϕ)	SA
		S1B(16~18 ϕ)	SB
	S2	S2A(10~13 ϕ)	SC
		S2B(16~18 ϕ)	SE
	S3	S3A(4~8 ϕ)	SG
Forming cut	FC	FCF(4~8 ϕ)	FF
Straight cut	C	CJ(10~18 ϕ)	CJ

All dimensions are in millimeters.

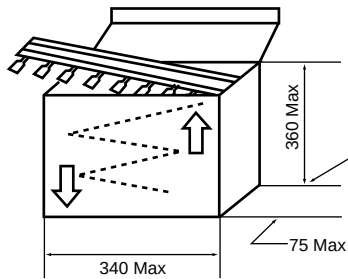
LEAD TAPING SPECIFICATIONS



Description	Symbol	Dimension								Tolerance
		4, 5, 6.3ø		8.0ø	4, 5ø		6.3ø	8.0ø		
Application figure		I			II		III			-
Body length	A	8.0Max	17.0Max	21.0Max	8.0Max	17.0Max	8.0Max	17.0Max	21.0Max	-
Lead wire diameter	ød	0.40, 0.45	0.5	0.6	0.40, 0.45	0.5	0.40, 0.45	0.5	0.6	±0.05
Pitch of component	P	12.7	12.7	12.7	12.7	12.7	12.7	12.7	12.7	±1.0
Pitch of feeding hole	P0	12.7	12.7	12.7	12.7	12.7	12.7	12.7	12.7	±0.2
Distance between feeding hole and lead	P1	3.85	3.85	3.85	5.1	5.1	5.1	5.1	4.6	±0.7
Feeding hole center to component center	P2	6.35	6.35	6.35	6.35	6.35	6.35	6.35	6.35	±1.0
Lead to lead distance	F	5.0	5.0	5.0	2.5	2.5	2.5	2.5	3.5	+0.8 -0.2
Base tape width	W	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	±0.5
Adhesive tape width	W0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	Min.
Hole position	W1	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	±0.5
Adhesive tape position	W2	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	Max.
Height of component	H	17.5	18.5	18.5	18.2	18.5	18.2	18.5	18.5	±0.75
Lead wire clinch height	H0	16.0	16.0	16.0	-	-	-	-	-	±0.5
Lead wire protrusion	e	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	Max.
Feeding hole diameter	D0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	±0.3
Off alignment of body	Δh	0	0	0	0	0	0	0	0	±2.0
Total tape thickness	t	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	±0.2
Length of shipped lead	L	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	Max.
CODE	Ammo.pack, anode lead leading	T5/TAA				TS/TSSAA				
	Ammo.pack, cathode lead leading	T6/TAC				TT/TSSAC				
	Reel pack, anode lead leading	T1/TRA				TQ/TSSRA				
	Reel pack, cathode lead leading	T2/TRC				TR/TSSRC				

LEAD TAPING SPECIFICATIONS

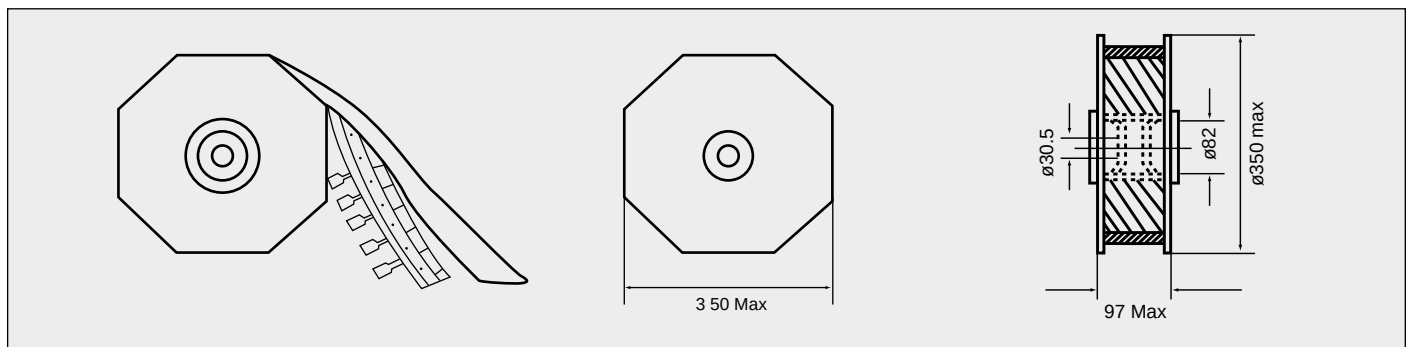
Packing (Ammunition Packing)



Case dia	Quantity/Box(Pcs)	
	Ammo	Reel
4	2500	1500
5	2000	1300
6.3	1600 (1500*)	1000
8	1000	800
10	500	500
13	400	250
16	250	—
18	200	—

*1500pcs : size 6.3 ϕ × 5 l only

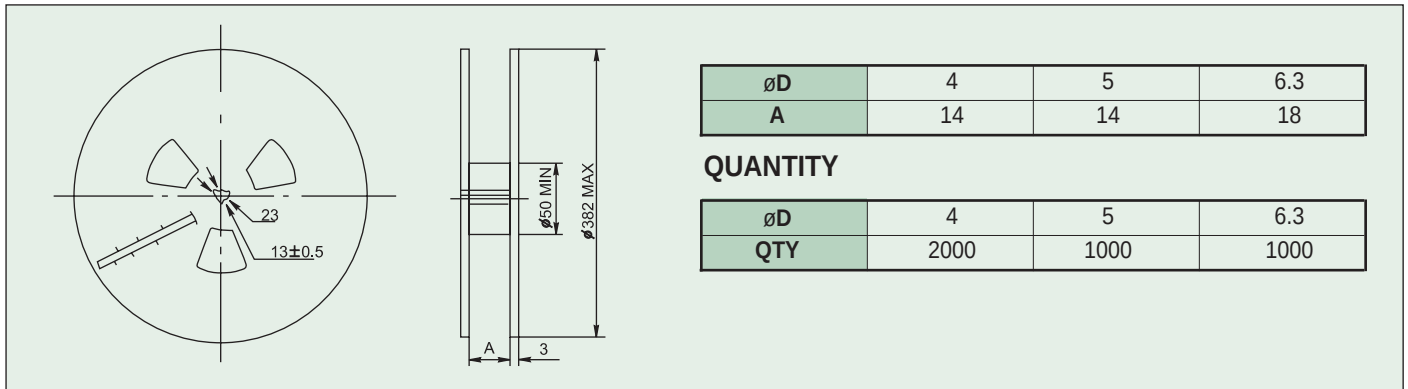
Packing (Reel Packing)



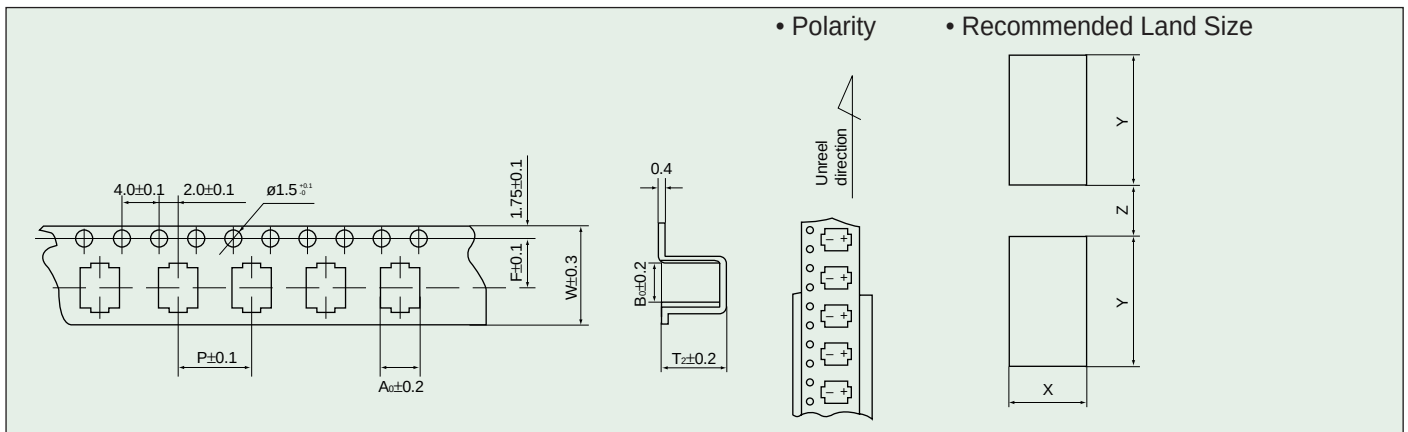
Description		Dimension				
		10 ϕ	13 ϕ	16 ϕ	18 ϕ	Tolerance
Application figure		III	III(IV)	IV	IV	
Body length	A	22.0Max	27.0Max	37.5Max	37.5Max	
Lead wire diameter	ϕd	0.6	0.6	0.8	0.8	± 0.05
Pitch of component	P	12.7	15.0(25.4)	30.0	30.0	± 1.0
Pitch of feeding hole	P ₀	12.7	15.0(12.7)	15.0	15.0	± 0.3
Distance between feeding hole and lead	P ₁	3.85	5.0(3.85)	3.75	3.75	± 0.7
Feeding hole center to component center	P ₂	6.35	7.5(6.35)	7.5	7.5	± 1.3
Lead to lead distance	F	5.0	5.0	7.5	7.5	+0.8 -0.2
Base tape width	W	18.0	18.0	18.0	18.0	± 0.5
Adhesive tape width	W ₀	12.5	12.5	12.5	12.5	Min.
Hole position	W ₁	9.0	9.0	9.0	9.0	± 0.5
Adhesive tape position	W ₂	1.5	1.5	1.5	1.5	Max.
Height of component	H	18.5	18.5	18.5	18.5	± 0.75
Lead wire protrusion	e	1.0	1.0	1.0	1.0	Max.
Feeding hole diameter	D ₀	4.0	4.0	4.0	4.0	± 0.3
Offalignment of body	$\angle h$	0	0	0	0	± 2.0
Total tape thickness	t	0.7	0.7	0.7	0.7	± 0.2
Length of shipped lead	L	11.0	11.0	11.0	11.0	Max.
CODE	Ammo.pack, anode lead leading	T7/TSAA	TE(T9)/TSAA	TB/TSAA		
	Ammo.pack, cathode lead leading	T8/TSAC	TF(TA)/TSAC	TC/TSAC		
	Reel pack, anode lead leading	T3/TSRA		—		
	Reel pack, cathode lead leading	T4/TSRC		—		

PACKAGING & REFLOW SOLDERING SPECIFICATIONS OF CHIP CAPACITORS

Taping Reel



Taping Dimensions in mm



øD	W	P	F	A ₀	B ₀	T ₂
4	12.0	8.0	5.5	4.8	4.8	5.8
5	12.0	12.0	5.5	6.0	6.0	5.8
6.3	16.0	12.0	7.5	7.0	7.0	5.8

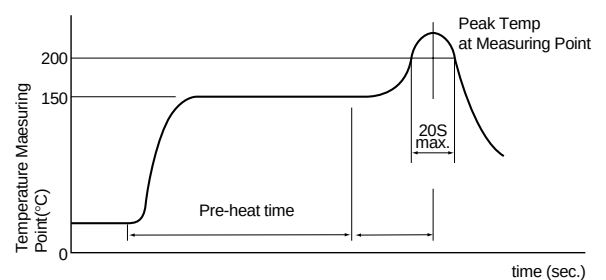
øD	X	Y	Z
4	1.6	2.6	1.0
5	1.6	3.0	1.4
6.3	1.6	3.5	2.1

Reflow soldering

- (1) For reflow, use a thermal conduction system such as infrared radiation or hot plate
- (2) Observe proper soldering conditions (temperature, time etc.). Do not exceed the specified limits.
- (3) Reflow should be performed one time.

Method	Allowable range of reflow
Hot-plate reflow	
Infrared-ray reflow Air reflow	

Temperature Profile



- Pre-heat Condition
- Temperature : 150°C. max.
- Time : 120sec. max.

MINI GLOSSARY

• Summary of electrolytic capacitors

• Principle

The ability of a capacitor to store electrical energy is a direct function of its mechanical geometry and its chemical composition. The amount of energy that it can store is given by equation :

$$Q = CV$$

where Q = the magnitude of the stored charge

C = the capacitance in farads

V = the applied voltage

The value of capacitance is directly proportional to the(anode) surface area and inversely proportional to the thickness of the dielectric layer, thus :

$$C = \epsilon_r \cdot \epsilon_0 \cdot \frac{A}{d}$$

where ϵ_0 = absolute permittivity(8.85×10^{-12} F/m)

ϵ_r = relative dielectric constant(dimensionless)

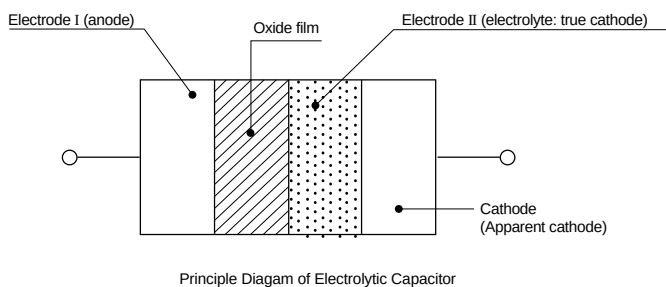
A = surface area (m^2)

d = thickness of dielectric (oxide layer in electrolytic capacitors) in m

The energy content of a capacitor is given by :

$$P = \frac{1}{2} C \cdot V^2$$

Electrolytic capacitors are distinguished from other capacitors by the uniqueness of their electrode materials and dielectric. This is explained in the principle diagram of the electrolytic capacitor in below.



General capacitors can, in theory, use any kind of material for electrodes I and II as long as it is a conductor, and the same is true for the dielectric as long as it is a good insulator. In addition, electrode I and II can serve as the anode and cathode or vice versa without any problem.

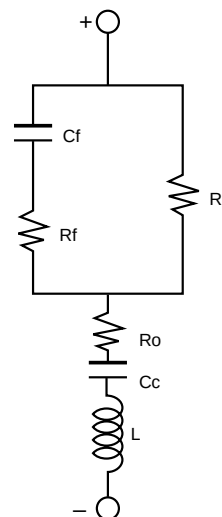
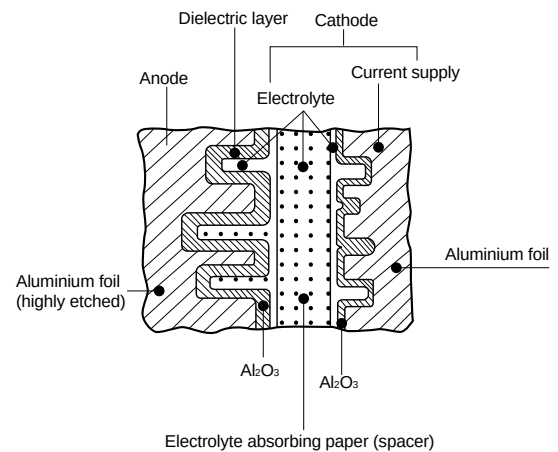
However, this is not true with electrolytic capacitors, in which electrode I is limited to aluminum(Al), tantalum(Ta), niobium(Nb), titanium(Ti), zirconium(Zr), hafnium(Hf) and other metals (referred to as valve metals) which form a fine, highly insulative oxide film on its surface during anodic oxidation in an electrolyte solution. Currently, the only two metals in practical application are aluminum and tantalum.

The oxide film that forms on the surface of electrode I due to anodic oxidation serves as a dielectric.

The oxide film becomes an electrical insulator and functions as a dielectric only when the electrode on which it forms is the anode. Therefore, electrolytic capacitors are, in principle, capacitors with polarity.

Electrode II serves as a cathode that yields capacitance with a liquid or solid electrolyte.

• Equivalent circuit of Aluminum electrolytic capacitor



C_f : capacitance of anode oxide film

C_c : capacitance of cathode

R_f : equivalent series resistance of anode oxide film

R_o : composite resistance of electrolyte and electrolytic paper

R_L : resistance of leakage current

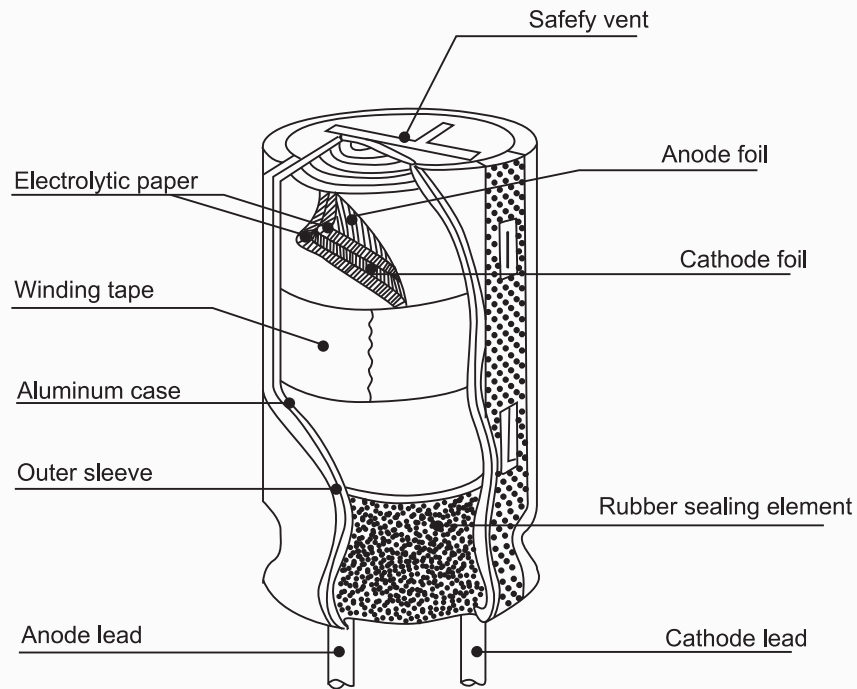
L : inductance of electrode length, leads, etc.

R : equivalent series resistance ($R_f + R_o$ combined resistance)

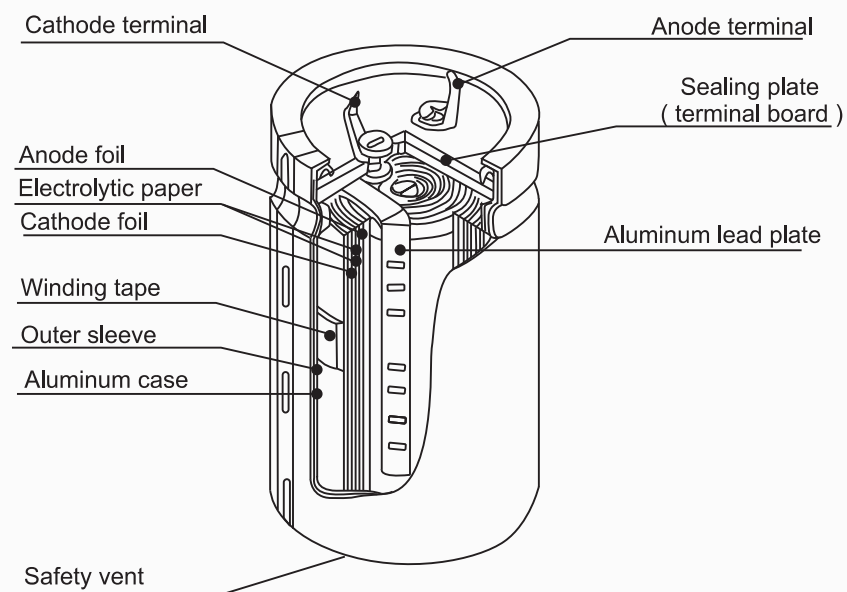
MINI GLOSSARY

● Construction

• Radial lead type



• Snap-in type



MINI GLOSSARY

II Definition of the electrical parameters

1. Nominal Capacitance

The nominal capacitance of the capacitor is the value which is indicated upon it.

2. Leakage Current

The leakage current is the conduction current flowing through a capacitor, when a DC voltage equal to the rated voltage is applied to the capacitor.

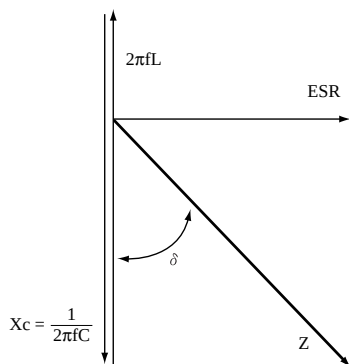
3. Tangent of Loss Angle($\tan \delta$)/Dissipation Factor

The power loss of the capacitors divided by the reactive power of the capacitor at a sinusoidal voltage of specified frequency.

Where ESR: Equivalent series resistance(Ω) of capacitor
 X_c : Reactance(Ω) of capacitor

$$\tan \delta = \frac{ESR}{X_c}$$

$$D.F. = ESR/X_c \times 100(\%)$$



Vector diagram showing the AC parameters of a capacitor.

Note : Equivalent series resistance (E.S.R) may also be used as a means to define a single resistance representing all the ohmic losses in the capacitor.

$$ESR(\Omega) = \frac{\tan \delta}{2\pi fC} = \frac{D.F.}{2\pi fC \times 100}$$

where f = measured frequency in Hz
 C = measured capacitance in farads

4. Operating Temperature Range

The operating temperature range is the range of ambient temperature for which the capacitor has been designed to operate continuously.

5. Rated Voltage / Working Voltage

The rated DC voltage is the maximum operating voltage which is the sum of the DC voltage and peak AC voltage applied to the capacitors and which may be applied continuously to the capacitors at temperature within the operating temperature range.

6. Capacitance Tolerance

The tolerance for capacitance stated in percent of the nominal capacitance.

7. Surge Voltage

The surge voltage is the maximum DC voltage to which the capacitor may be subjected at normal room temperature for 30 seconds at infrequent intervals of not less than 5 minutes. The rated surge voltages are as follows :

Rated Voltage (V)	4	6.3	10	16	25	35	40
Surge Voltage (V)	5	8	13	20	32	44	50

Rated Voltage (V)	50	63	80	100	160	180	200
Surge Voltage (V)	63	79	100	125	200	225	250

Rated Voltage (V)	250	315	350	400	450
Surge Voltage (V)	300	365	400	450	500

8. Ripple Current

Any pulsating voltage(or ripple voltage superimposed on DC bias) across a capacitor results in an alternating current through the capacitor.

Because of ohmic and dielectric losses in the capacitor, this alternating current produces an increase of temperature in the capacitor cell.

The heat generation depends on frequency and wave form of the alternating current.

The maximum RMS value of this alternating current, which is permitted to pass through the capacitor during its entire specified useful life(at defined frequency and defined ambient temperature), is called rated ripple current (I_R).

Usually the rated ripple current will cause a temperature increase of the capacitor's surface compared with ambient temperature.

MINI GLOSSARY

This temperature rise is the result of the balance between heat generated by dielectric losses :

$$P = I_R^2 \cdot ESR \quad \text{equation 1)}$$

and the carried off heat by radiation, convection and conduction :

$$P = \Delta T \cdot A \cdot \beta \quad \text{equation 2)}$$

from equation 1) and 2)

$$I_R = \sqrt{\frac{\beta \cdot A \cdot \Delta T}{ESR}} = \sqrt{\frac{2\pi f C \cdot \beta \cdot A \cdot \Delta T}{\tan \delta}}$$

$$\Delta T = I_R^2 \cdot ESR / \beta \cdot A$$

Where

ΔT = Difference of temperature between ambient and case surface

β = Heat transfer constant

A = Geometric surface area of the capacitor

I_R = Ripple current

ESR = Equivalent series resistance

The heat, generated by ripple current, is an important factor of influence for non-solid electrolytic capacitors for calculating the useful life under certain circumstances.

The flow of ripple current over the permissible ripple current will cause heat of the capacitor, which may decrease the capacitance and damage the capacitor.

Ripple current on the capacitor must be at or below allowable level. (The sum of DC voltage and peak voltage shall not exceed the rated DC voltage)

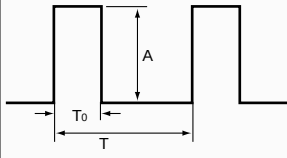
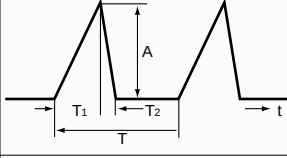
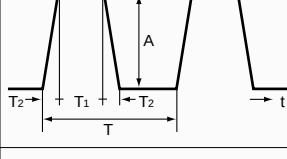
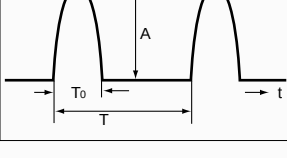
● Ripple current coefficient

When the capacitor is operated in other condition of temperature and frequency which are specified in relevant specification, ripple current multiplied by the factor(coefficient) which is specified in relevant specification can be applied as maximum permissible ripple current.

● Calculation of the applicable RMS ripple current

Non-sinusoidal ripple current (if not accessible by direct measurement) have to be analyzed into a number of sinusoidal ripple currents by means of Fourier-analysis; the sum of the currents thus found may not exceed the applicable ripple current.

For some frequently occurring waveforms, approximation formulae are stated in next for calculating the corresponding RMS value.

WAVE FORM	RMS VALUE
	$A \sqrt{\frac{t_0}{T}}$
	$A \sqrt{\frac{3t_1+2t_2}{3T}}$
	$A \sqrt{\frac{2t_1+3t_2}{3T}}$
	$A \sqrt{\frac{t_0}{2T}}$

Approximation formulae for RMS values of nonsinusoidal ripple currents.

9. Impedance

The impedance(Z) of an electrolytic capacitor is given by capacitance, ESR and ESL according to the following equation :

$$Z_C = \sqrt{ESR^2 + (X_L - X_C)^2}$$

where

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

$$X_L = 2\pi f L$$

f = Frequency, C = Farads, L = Henries

where the ESR, capacitance and inductance are the values specified in the manufacturer's literature.

From above equations, the resonant frequency is

$$\text{Freq.} = \frac{1}{2\pi \sqrt{LC}}$$

At resonant frequency, the impedance is equal to the ESR.

MINI GLOSSARY

10. Life and failure rate

- Impress the rated voltage (or superpose prescribed ripple current) for a prescribed time period at the maximum operating temperature.
The test duration, conditions and acceptable drift of electrical parameters after the life test are stated in the relevant detail specification (individual specification).
- Influence of temperature and ripple current on life

The influence of temperature on life is indicated by the so-called doubling 10°C-rule. The doubling 10°C-rule means that each time the temperature increases 10°C, the life of the capacitor decreases by half. This relation is described in next equation.

$$L = L_0 \times 2^{\frac{T_0 - T}{10}}$$

where T_0 : maximum use temperature (°C)
 L_0 : guaranteed life time (h)
 T : ambient temperature(°C)
 L : estimated life (h) at T (°C)

When capacitor is used with ripple current, temperature rises due to this ripple current effects the life of the capacitor, the allowable ripple current at which aluminum electrolytic capacitors can stand up for the guaranteed maximum temperature rise can be treated in the same way as that due to ambient temperature, and an equation which adds the temperature rise due to ripple current to the ambient temperature is sufficient.

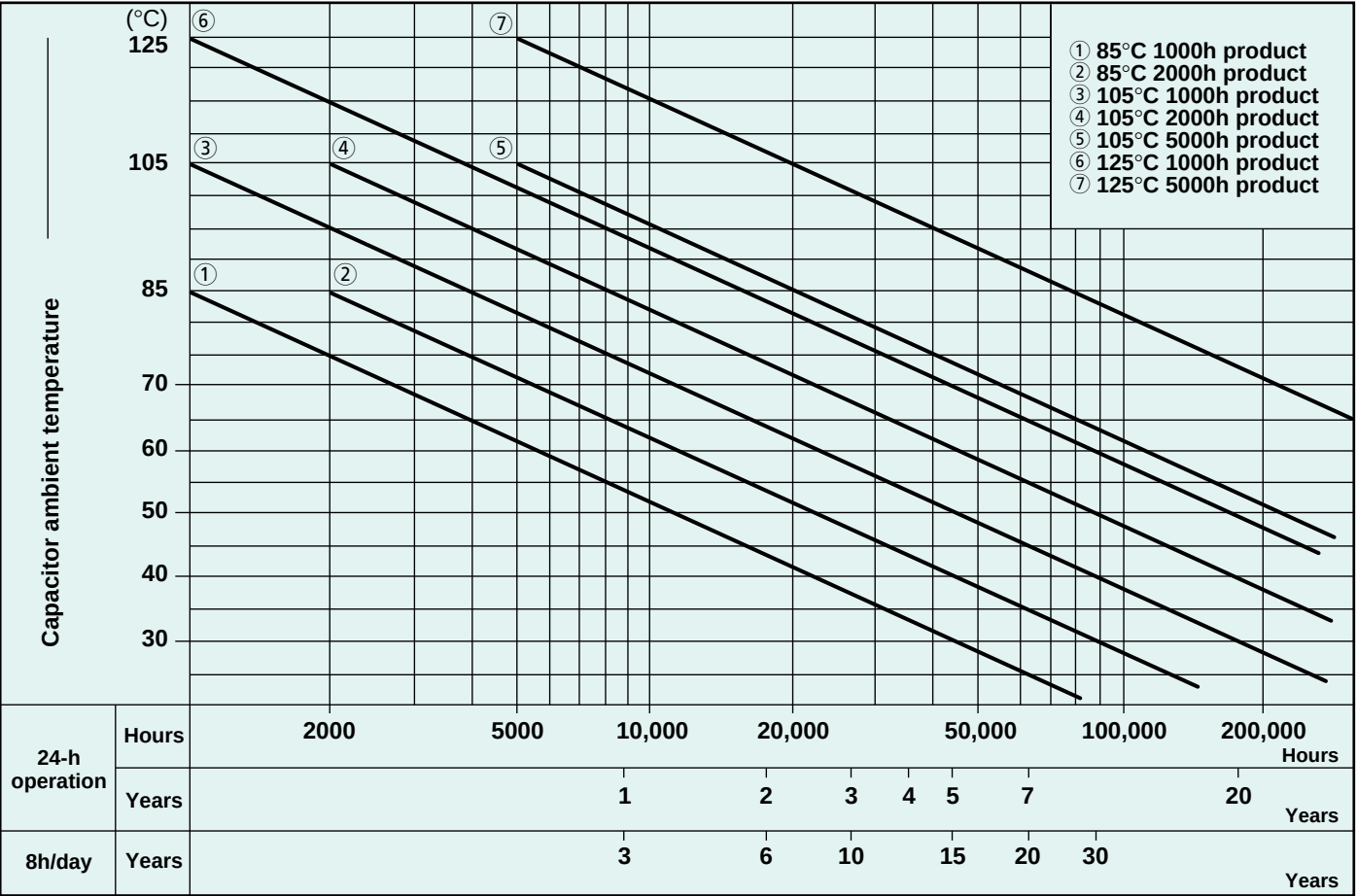
$$L = L_0 \times 2^{\frac{T_0 - (T + \Delta T)}{10}}$$

where
 ΔT = Temperature rise by ripple current

When used with ripple currents exceeding the allowable ripple current, the “doubling 10°C-rule” dose not hold valid for life acceleration and the life of the capacitor may be markedly shortened and the failure mode changed.

ALUMINUM ELECTROLYTIC CAPACITORS

Life Estimate Chart



MINI GLOSSARY

Failure rate (λ)

The failure rate is defined by the number of components failing within a unit of time, related to the total quantity of components observed :

$$\lambda = \frac{\text{number of failures (statistical upper limit 60\%)}}{\text{total number of components} \times \text{duration}}$$

The failure rate(λ) is generally expressed in so-called “fit”(failure in time) = 10^{-9} /hours with an upper confidence level(UCL) of 60%. It is calculated from results of periodical tests in the quality laboratories or derived from field observations respectively.

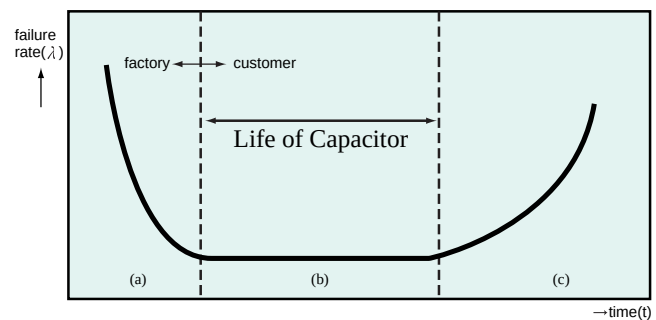
Usually the failure rate during time shows the well known “bathtub” curve (see next)

There are 3 periods in a typical capacitor life cycle :

a) Initial failure period, showing a rapidly decreasing failure rate. During production of DAEWOO electrolytic capacitors, initial failures are removed after re-forming(which is short aging) : all capacitors shipped, have passed aging.

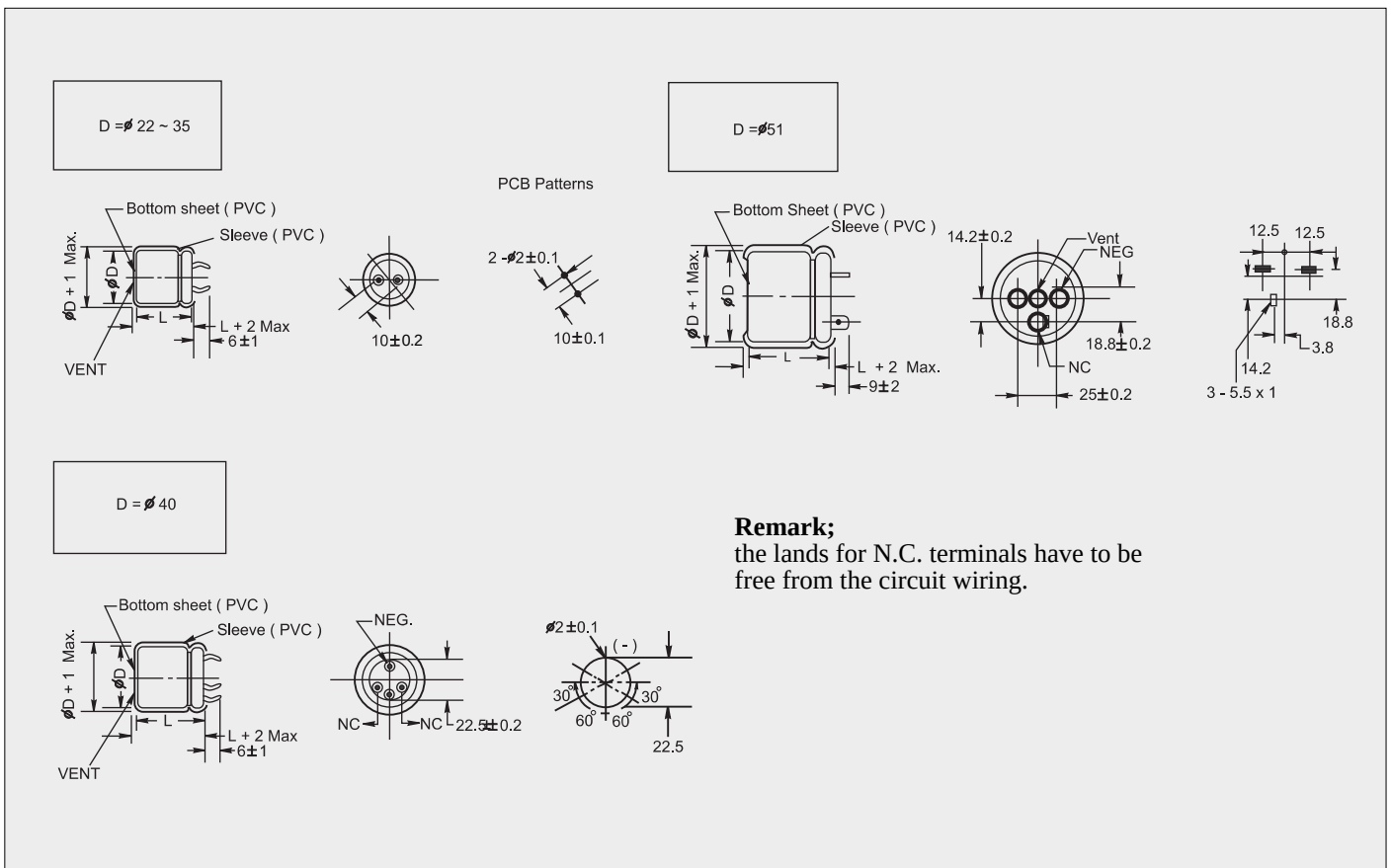
b) Random failure period, showing a low and constant failure rate. This period is identical with “useful life”. The sum total of all (drift and accident) failures during this period, related to the total number of observed capacitors, is called “failure percentage”.

c) Wear-out failure period, showing an increasing failure rate due to gradual deterioration.



- a) initial failure period (“infant mortality”)
- b) random failure period (=useful life period)
- c) wear-out failure period

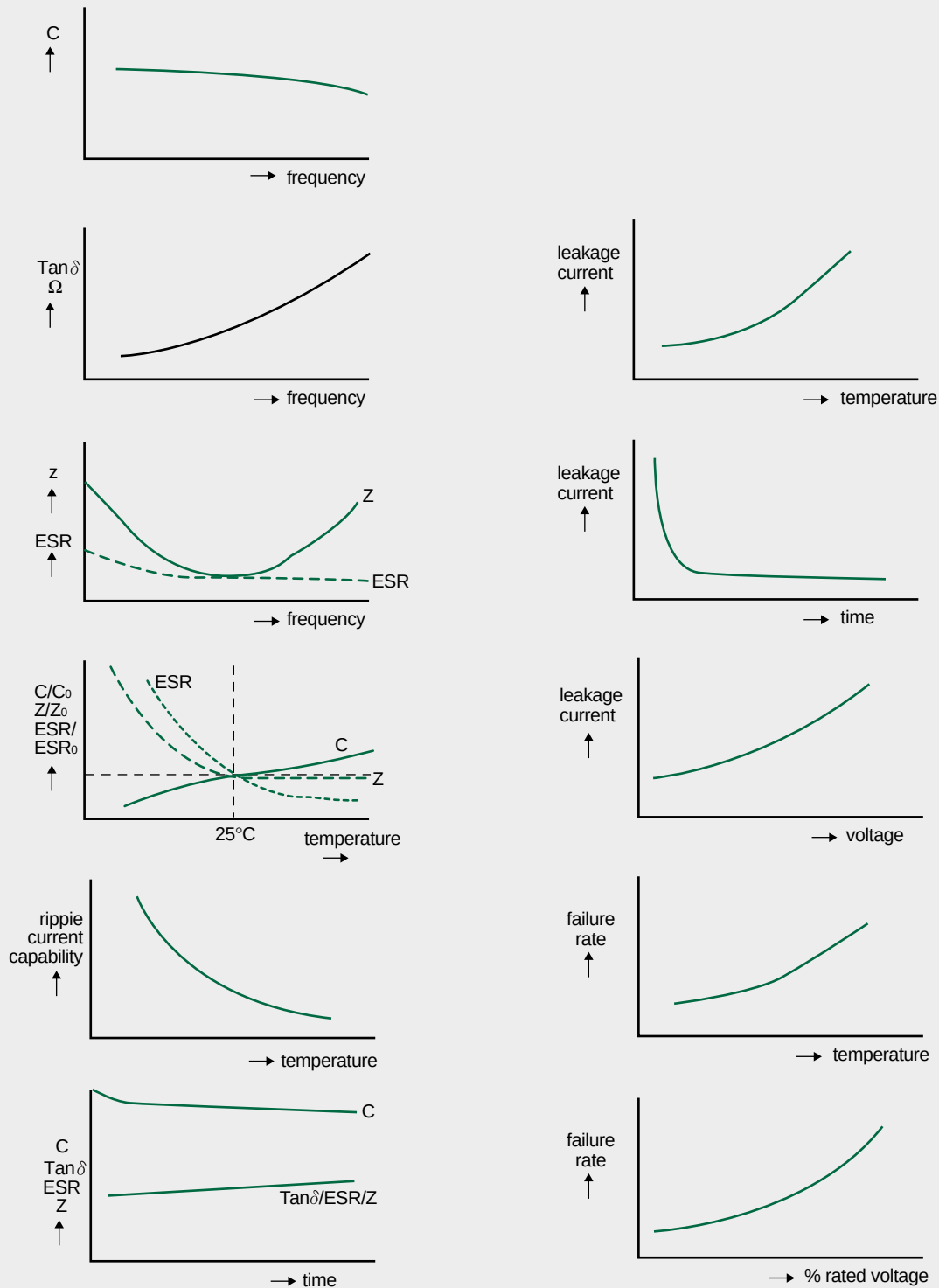
●Standard PCB patterns of PCB mounting type



MINI GLOSSARY

ELECTRICAL CHARACTERISTICS

Characteristics of electrolytic capacitors vary temperature, frequency, time and applied voltage.



Typical variation of electrical parameters as a function of frequency, ambient temperature, voltage and time.

CS SERIES

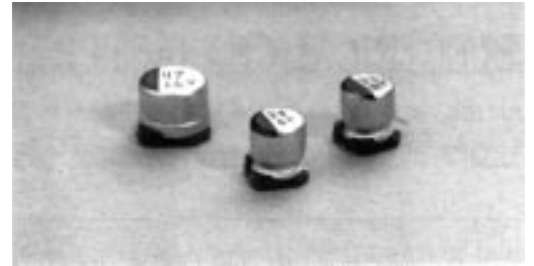
ALUMINUM ELECTROLYTIC CAPACITORS

Chip type, For surface mounting

■ Features

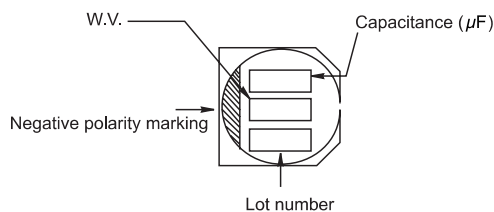
- Life time : 85°C, 2000 hours
- 5.5mm Height
- For surface mounting

■ Specifications

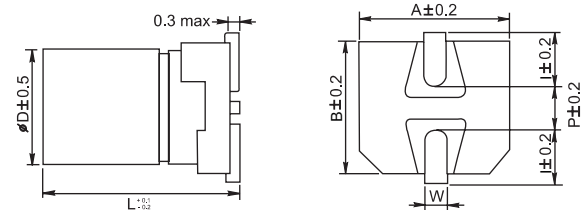


Item	Performance Characteristics							
Operating temperature range	-40°C ~ +85°C							
Rated working voltage range	4.0 ~ 50V							
Nominal capacitance range	0.1 ~ 220μF, ±20%(at 20°C, 120Hz)							
D.C Leakage current(at 20°C)	I ≤ 0.01CV or 3μA(2min), Whichever is greater.							
Tan δ (max., at 20°C, 120Hz)	W.V(V)	4.0	6.3	10	16	25	35	50
	Tan δ	0.35	0.26	0.20	0.17	0.15	0.13	0.10
Characteristics at low temperature (max., at 120Hz)	W.V(V)	4.0	6.3	10	16	25	35	50
	Z-25°C/Z20°C	7	4	3	2	2	2	2
	Z-40°C/Z20°C	15	8	6	4	4	3	3
Load life	After applying rated working voltage for 2000 hours at +85°C, and then being stabilized at +20°C, capacitors shall meet following limits. (4V : 1000hours)							
	Capacitance change		Within ± 20% of initial measured value					
	Tan δ		≤ 200% of initial specified value					
	Leakage current		≤ Initial specified value					
Shelf life	After storage for 1000 hours at + 85°C with no voltage applied and then being stabilized at +20°C, capacitors shall meet load life specification.							
Resistance to soldering heat	After reflow soldering(Refer to reflow soldering temperature profile ; see page 10) and then being stabilized at + 20°C, capacitors shall meet following limits.							
	Capacitance change		Whithin ±10% of initial measured value					
	Tan δ		≤ Initial sepcified value					
	Leakage current		≤ Initial specified value					

■ Marking



■ Dimensions in mm (not to scale)



Size code	D	L	A	B	I	W	P
B	4	5.4	4.3	4.3	1.8	0.5 to 0.8	1.0
C	5	5.4	5.3	5.3	2.2	0.5 to 0.8	1.5
D	6.3	5.4	6.6	6.6	2.4	0.5 to 0.8	2.2

■ Dimensions & Maximum permissible ripple current [mA(rms) at 85°C, 125Hz]

Cap(μF)	W.V(V)	4.0(0G)		6.3(0J)		10(1A)		16(1C)		25(1E)		35(1V)		50(1H)	
0.1														B	1
0.22														B	2
0.33														B	3
0.47														B	5
1.0														B	10
2.2														B	16
3.3														B	16
4.7										B	22	B	22	C	23
10								B	28	C	28	C	30	D	35
22	B	19	B	29	B	34	C	39	D	55	D	60			
33	B	26	C	37	C	43	D	50	D	65					
47	B	34	C	46	D	54	D	70							
100	C	61	D	71											
220	D	82													

CU SERIES

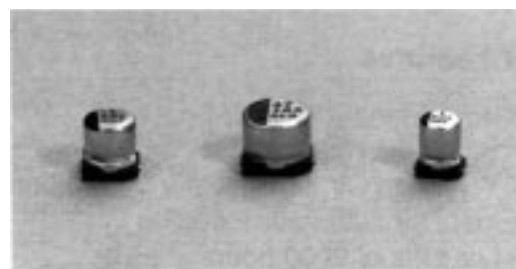
ALUMINUM ELECTROLYTIC CAPACITORS

Chip type, For surface mounting

■ Features

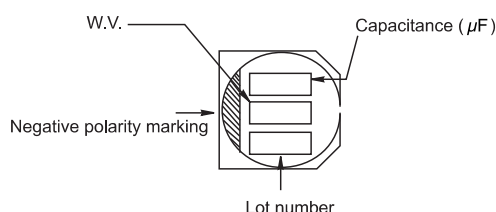
- Life time : 105°C, 1000 hours
- 5.5mm Height
- For surface mounting

■ Specifications

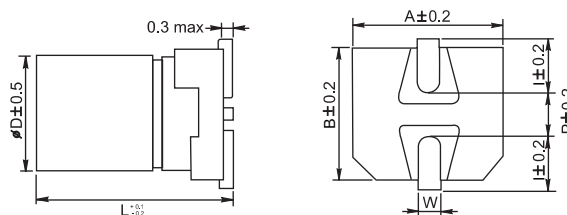


Item	Performance Characteristics						
Operating temperature range	-40°C ~ +105°C						
Rated working voltage range	6.3 ~ 50V						
Nominal capacitance range	0.1 ~ 100 μF, ±20%(at 20°C, 120Hz)						
D.C Leakage current(at 20°C)	I ≤ 0.01CV or 3μA(2min), Whichever is greater.						
Tan δ (max., at 20°C, 120Hz)	W.V(V)	6.3	10	16	25	35	50
	Tan δ	0.30	0.22	0.16	0.14	0.12	0.12
Characteristics at low temperature (max., at 120Hz)	W.V(V)	6.3	10	16	25	35	50
	Z-25°C/Z20°C	4	3	2	2	2	2
	Z-40°C/Z20°C	8	6	4	4	3	3
Load life	After applying rated working voltage for 1000 hours at +105°C, and then being stabilized at +20°C, capacitors shall meet following limits.						
	Capacitance change			Within ± 20% of initial measured value			
	Tan δ			≤ 200% of initial specified value			
	Leakage current			≤ Initial specified value			
Shelf life	After storage for 1000hours at + 105°C with no voltage applied and then being stabilized at +20°C, capacitors shall meet load life specification.						
Resistance to soldering heat	After reflow soldering(Refer to reflow soldering temperature profile ; see page 10) and then being stabilized at + 20°C, capacitors shall meet following limits.						
	Capacitance change			Whithin ±10% of initial measured value			
	Tan δ			≤ Initial sepcified value			
	Leakage current			≤ Initial specified value			

■ Marking



■ Dimensions in mm(not to scale)



Size code	D	L	A	B	I	W	P
B	4	5.4	4.3	4.3	1.8	0.5 to 0.8	1.0
C	5	5.4	5.3	5.3	2.2	0.5 to 0.8	1.5
D	6.3	5.4	6.6	6.6	2.4	0.5 to 0.8	2.2

■ Dimensions & Maximum permissible ripple current [mA(rms) at 105°C, 120Hz]

Cap(μ F)	W.V(V)	6.3(0J)		10(1A)		16(1C)		25(1E)		35(1V)		50(1H)	
0.1												B	1
0.22												B	2
0.33												B	3
0.47												B	5
1.0												B	8
2.2												B	13
3.3										B	15	B	16
4.7								B	20	B	21	C	22
10				B	18	B	20	C	26	C	30	D	35
22	B	25		C	30	C	35	D	48	D	52		
33	C	33		C	37	D	45	D	60				
47	C	42		D	52	D	57						
100	D	70											

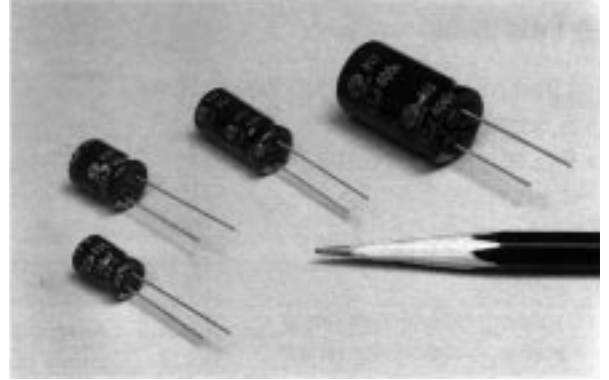
RSS SERIES

ALUMINUM ELECTROLYTIC CAPACITORS

85°C Standard, Radial Leads

■ Features

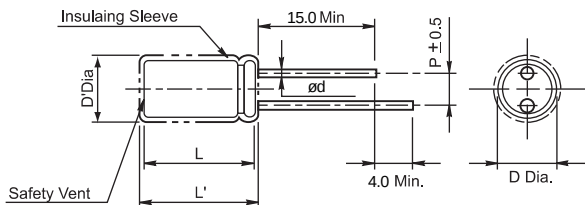
- 85°C Standard, Radial
- High performance
- Very high CV capacity per unit volume
- Ideal for automatic insertion
- Load life of 2000 hours at 85°C
- Possible cleaning by Freon TE (to 100V : 3 min)



■ Specifications

Item	Performance Characteristics										
Operating temperature range	-40°C ~ +85°C				-40°C ~ +85°C			-25°C ~ +85°C			
Rated working voltage range	6.3V ~ 100V				160V ~ 250V			350V ~ 450V			
Nominal capacitance range	0.1μF ~ 27000μF, ±20%(at 20°C, 120Hz)										
D.C Leakage current(at 20°C)	The following specifications shall be satisfied when the rated voltage is applied for the required time.										
	I ≤ 0.01CV or 3μF (2min) Whichever is greater				I ≤ 0.01CV + 10μA (3min)			I ≤ 0.02CV + 30μA (3min)			
	Where I= Leakage current(μA) C= Nominal capacitance (μF) V= Rated voltage (V)										
Tan δ(max., at 20°C, 120Hz)	W.V(V)	6.3	10	16	25	35	50	63	100	160~250	350~450
	Tan δ	0.26	0.22	0.17	0.15	0.12	0.10	0.10	0.08	0.20	0.20
	When capacitance is over 1000μF, Tan δ shall be added 0.02 to the listed value with increase of every each 1000 μF.										
Characteristics at low temperature(max.) (impedance ratio at 120Hz)	W.V(V)		6.3	10	16	25	35	50~100	160~250	350~450	
	Z-25°C/Z20°C		4	3	2	2	2	2	2	6	
	Z-40°C/Z20°C		10	8	6	4	3	3	3	—	
Load life	After applying rated working voltage for 2000 hours at +85°C and then being stabilized at +20°C, capacitors shall meet following limits.										
	Capacitance change				Within ± 20% of initial measured value						
	Tan δ				≤ 150% of initial specified value						
	Leakage current				≤ Initial sepcified value						
Shelf life	After storage for 1000 hours at +85°C with no voltage applied and then being stabilized at +20°C, capacitors shall meet following limits.										
	Capacitance change				Within ± 20% of initial measured value						
	Tan δ				≤ 150% of initial specified value						
	Leakage current				≤ 200% of initial sepcified value						

■ Case sizes and Dimensions



• Standard lead style

Ø D	5.0	6.3	8.0	10.0	13.0	16.0	18.0	22.0	25.0
P	2.0	2.5	3.5	5.0		7.5	10.0	12.5	
Ø d	0.5		0.6	0.8	1.0				

D' = [D + 0.5] Max.

L' = [L + 1.0]Max. at D ≤ 8.0

L' = [L + 1.5]Max. at D ≥ 10.0

■ Ripple current coefficient

• Frequency

Cap(μF) \ Freq(Hz)	50	120	400	1K	10K	50~100K
Cap ≤ 10	0.8	1	1.30	1.45	1.65	1.70
10 < Cap ≤ 100	0.8	1	1.23	1.36	1.48	1.53
100 < Cap ≤ 1000	0.8	1	1.16	1.25	1.35	1.38
1000 < Cap	0.8	1	1.11	1.17	1.25	1.28

• Temperature

Temperature	60°C	70°C	85°C
Factor	1.65	1.37	1.0

RSS SERIES

Dimensions & Maximum Permissible ripple current [mA(rms) at 85°C, 120Hz]

øD x L (mm)

W.V(V) Cap(μF)	6.3(0J)		10(1A)		16(1C)		25(1E)		35(1V)		50(1H)		63(1J)		100(2A)	
	SIZE	I _R	SIZE	I _R	SIZE	I _R	SIZE	I _R	SIZE	I _R	SIZE	I _R	SIZE	I _R	SIZE	I _R
0.1											5x11	6			5x11	6
0.22											5x11	8			5x11	8
0.33											5x11	10			5x11	10
0.47											5x11	14			5x11	14
1.0											5x11	19			5x11	21
2.2											5x11	29			5x11	32
3.3											5x11	37			5x11	45
4.7											5x11	45			5x11	52
10											5x11	68	5x11	72	6.3x11	85
22									5x11	95	5x11	105	6.3x11	120	8x11.5	142
33							5x11	110	5x11	120	6.3x11	140	6.3x11	157	10x12.5	207
47					5x11	130	5x11	140	6.3x11	157	6.3x11	172	8x11.5	210	10x16	284
100	5x11	135	5x11	150	6.3x11	200	6.3x11	210	8x11.5	258	8x11.5	283	10x12.5	365	13x20	470
220	6.3x11	240	6.3x11	255	8x11.5	330	8x11.5	360	10x12.5	470	10x16	545	10x12.5	638	16x25	820
330	6.3x11	310	8x11.5	365	8x11.5	415	10x12.5	523	10x16	615	10x20	720	10x20	910	16x25	1095
470	8x11.5	400	8x11.5	430	10x12.5	550	10x16	730	10x20	810	13x20	965	13x20	1150	16x31.5	1370
1000	10x12.5	690	10x16	810	10x20	1020	13x20	1220	13x25	1510	16x25	1760	13x25	1850	22x40	2610
2200	13x20	1240	13x20	1310	13x25	1590	16x25	1835	16x31.5	2090	18x35.5	2540	22x40	3150	25x40	3510
3300	13x20	1460	13x25	1685	16x25	2010	16x31.5	2315	18x35.5	2740	22x40	3500	16x31.5	4060		
4700	16x25	1990	16x25	2120	16x31.5	2485	18x35.5	2875	22x40	3660	25x40	4270	22x40			
6800	16x25	2275	16x31.5	2550	18x35.5	2990	22x40	3900	25x40	4510			25x40			
10000	16x31.5	2760	18x35.5	3160	22x40	3920	25x40	4550								
15000	18x35.5	3270	22x40	4020	25x40	4590										
22000	22x40	4050	25x40	4700												
27000	25x40	4750														

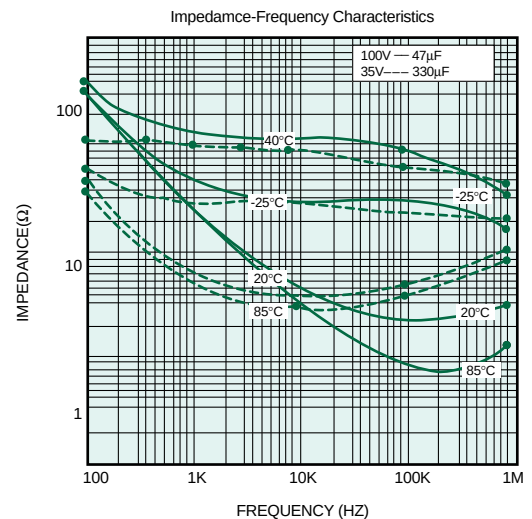
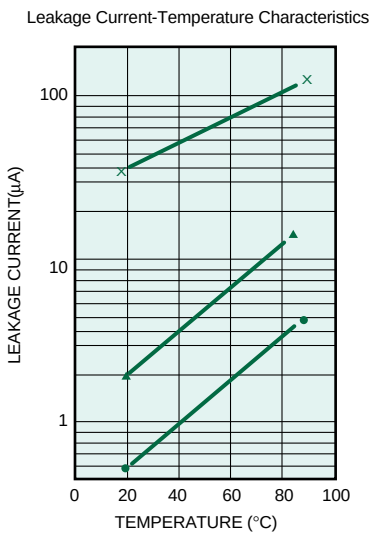
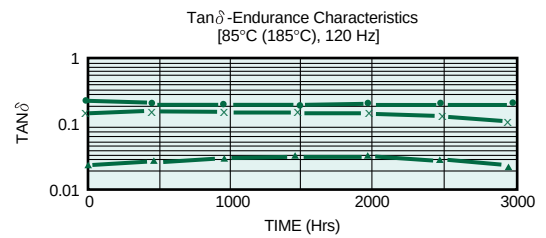
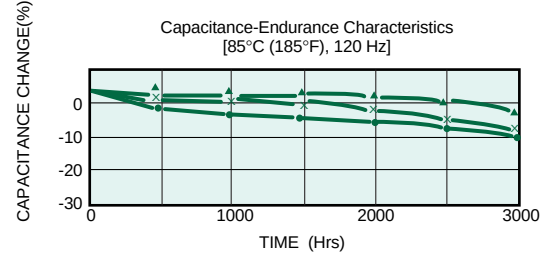
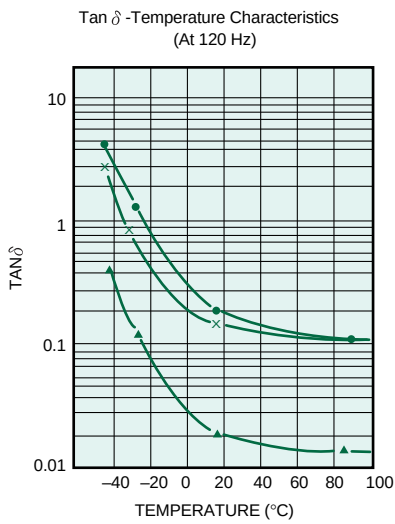
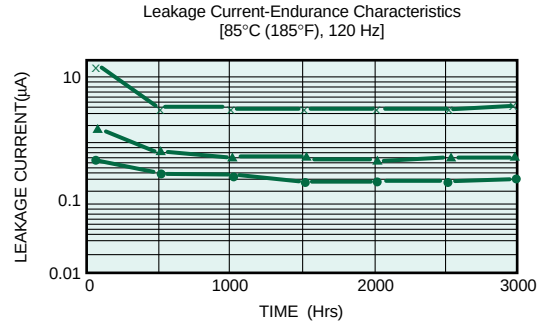
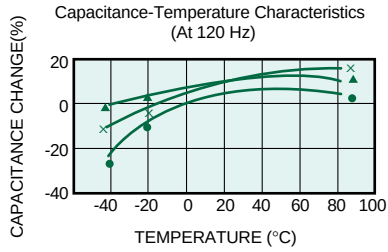
W.V(V) Cap(μF)	160(2C)		200(2D)		250(2E)		350(2V)		400(2G)		450(2W)	
	SIZE	I _R	SIZE	I _R	SIZE	I _R	SIZE	I _R	SIZE	I _R	SIZE	I _R
1.0	6.3x11	22	6.3x11	22	6.3x11	22	8x11.5	24	8x11.5	24	8x11.5	24
2.2	6.3x11	33	6.3x11	33	8x11.5	39	10x12.5	45	10x12.5	47	10x12.5	47
3.3	8x11.5	51	8x11.5	51	10x12.5	58	10x12.5	56	10x16	58	10x16	58
4.7	8x11.5	57	10x12.5	64	10x16	73	10x16	72	10x16	74	10x20	76
10	10x16	95	10x16	95	10x20	108	10x20	118	13x20	132	13x20	135
22	10x20	171	10x20	171	13x20	205	13x25	215	16x25	235	16x25	235
33	13x20	248	13x25	265	13x25	275	16x25	270	16x31.5	298	16x35.5	305
47	13x25	295	13x25	305	16x25	340	16x35.5	368	16x35.5	405	18x40	415
100	16x25	530	16x31.5	540	18x35.5	560	18x40	640	22x40	720	25x40	740
220	18x35.5	890	18x40	910	22x40	990	25x50	1260				
330	22x40	1220	22x40	1290	25x40	1410						
470	25x40	1740	25x40	1810								

I_R : Maximum permissible ripple current [mA(rms) at 85°C, 120Hz]

RSS SERIES

PERFORMANCE CURVES

- ● 10V-100 μ F
- × × 35V-3300 μ F
- ▲ ▲ 100V-47 μ F

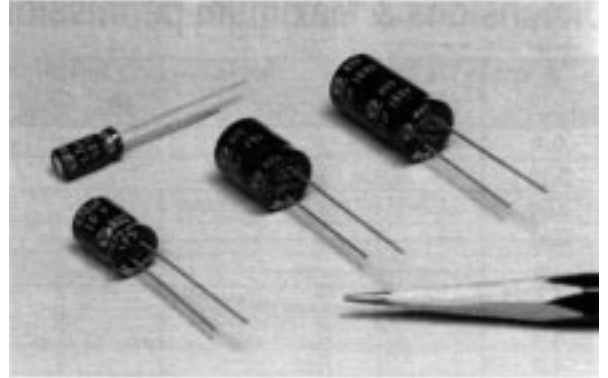


RUS SERIES

ALUMINUM ELECTROLYTIC CAPACITORS 105°C Standard, Radial Leads

■ Features

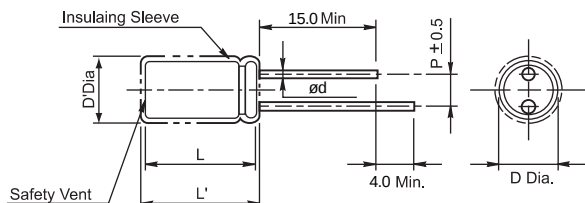
- 105°C Standard, Radial
- Wide operating temperature range
- High and stable quality
- Very high CV capacity per unit volume
- Load life of 1000 hours at 105°C
- Possible cleaning by Freon TE (to 100V : 3 min)



■ Specifications

Item	Performance Characteristics										
Operating temperature range	-40℃ ~ +105℃				-40℃ ~ +105℃				-25℃ ~ +105℃		
Rated working voltage range	6.3V ~ 100V				160V ~ 250V				350 V ~ 450V		
Nominal capacitance range	0.1μF ~ 15000 μF, ±20%(at 20℃, 120Hz)										
D.C Leakage current(at 20℃)	The following specifications shall be satisfied when the rated voltage is applied for the required time.										
	I ≤ 0.01CV + 3μF (2min)				I ≤ 0.01CV + 20μA (5min)				I ≤ 0.02CV + 30μA (5min)		
	Where I = Leakage current(μA) C= Nominal capacitance (μF) V= Rated voltage (V)										
Tan δ (max., at 20℃, 120Hz)	W.V(V)	6.3	10	16	25	35	50	63	100	160~250	350~450
	Tan δ	0.24	0.20	0.17	0.15	0.12	0.10	0.10	0.08	0.12	0.20
	When capacitance is over 1000μF, Tan δ shall be added 0.02 to the listed value with increase of every each 1000 μF.										
Characteristics at low temperature(max.) (impedance ratio at 120Hz)	W.V(V)	6.3	10	16	25	35	50~100	160~250	350~450		
	Z-25℃/Z20℃	4	3	2	2	2	2	2	2	6	
	Z-40℃/Z20℃	8	6	4	3	3	3	3	3	-	
Load life	After applying rated working voltage for 1000 hours at +105℃ and then being stabilized at +20℃,capacitors shall meet following limits.										
	Capacitance change				Within ± 25% of initial measured value(6.3V~16V)						
					Within ± 20% of initial measured value (25V~)						
	Tan δ				≤ 150% of initial specified value						
Leakage current				≤ Initial sepcified value							
Shelf life	After storage for 1000 hours at +105℃ with no voltage applied and then being stabilized at + 20℃, capacitors shall meet following limits.										
	Capacitance change				Within ± 20% of initial measured value						
	Tan δ				≤ 200% of initial specified value						
	Leakage current				≤ 200% of initial sepcified value						

■ Case sizes and Dimensions



• Standard lead style

øD	5.0	6.3	8.0	10.0	13.0	16.0	18.0
P	2.0	2.5	3.5	5.0		7.5	
øD	0.5		0.6		0.8		

D'=[D +0.5] Max.

L' =[L+1.0] Max. at D≤8.0

L' = [L+1.5]Max. at D≥10.0

■ Ripple current coefficient

• Frequency

Cap(μF)	Freq(Hz)					
	50	120	400	1K	10K	50~100K
Cap ≤ 10	0.8	1	1.30	1.45	1.65	1.70
10 < Cap ≤ 100	0.8	1	1.23	1.36	1.48	1.53
100 < Cap ≤ 1000	0.8	1	1.16	1.25	1.35	1.38
1000 < Cap	0.8	1	1.11	1.17	1.25	1.28

• Temperature

Temperature	≤70°C	85°C	105°C
Factor	1.95	1.65	1.0

RUS SERIES

Dimensions & Maximum permissible ripple current [mA(rms) at 105°C, 120Hz]

ø D x L(mm)

W.V(V) Cap(μF)	6.3(0J)		10(1A)		16(1C)		25(1E)		35(1V)		50(1H)		63(1J)		100(2A)	
	SIZE	I _R	SIZE	I _R	SIZE	I _R	SIZE	I _R	SIZE	I _R	SIZE	I _R	SIZE	I _R	SIZE	I _R
0.1											5x11	3			5x11	3
0.22											5x11	5			5x11	5
0.33											5x11	6			5x11	6
0.47											5x11	9			5x11	9
1.0											5x11	14			5x11	15
2.2											5x11	21			5x11	23
3.3											5x11	26			5x11	32
4.7											5x11	32			5x11	37
10											5x11	48	5x11	51	6.3x11	60
22									5x11	66	5x11	73	6.3x11	85	8x11.5	103
33							5x11	77	5x11	84	6.3x11	98	6.3x11	109	10x12.5	148
47					5x11	91	5x11	98	6.3x11	110	6.3x11	120	8x11.5	147	10x16	191
100	5 x 11	96	5 x 11	105	6.3x11	142	6.3x11	147	8x11.5	180	8x11.5	198	10x12.5	255	13x20	343
220	6.3 x 11	168	6.3 x 11	179	8x11.5	231	8x11.5	252	10x12.5	329	10x16	382	10x20	460	16x25	623
330	6.3 x 11	207	8 x 11.5	255	8x11.5	290	10x12.5	366	10x16	430	10x20	521	13x20	637	16x25	799
470	8 x 11.5	280	8 x 11.5	316	10x12.5	385	10x16	510	10x20	550	13x20	685	13x25	815	16x31.5	1020
1000	10 x 12.5	483	10 x 16	570	10x20	714	13x20	854	13x25	1025	16x25	1250	16x31.5	1290		
2200	13 x 20	868	13 x 20	927	13x25	1115	16x25	1280	16x31.5	1420	18x35.5	1760				
3300	13 x 20	1025	13 x 25	1180	16x25	1370	16x31.5	1590	18x35.5	1850						
4700	16 x 25	1390	16 x 25	1480	16x31.5	1740	18x35.5	1950								
6800	16 x 25	1595	16 x 31.5	1795	18x35.5	2090										
10000	16 x 31.5	1930	18 x 35.5	2210												
15000	18 x 35.5	2290														

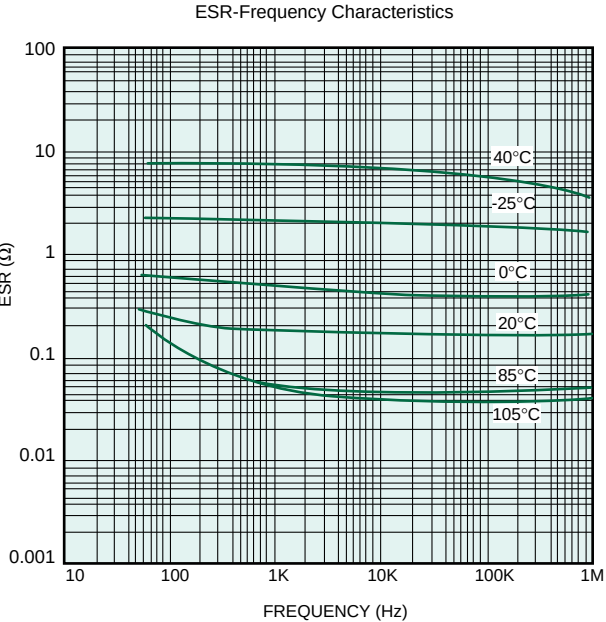
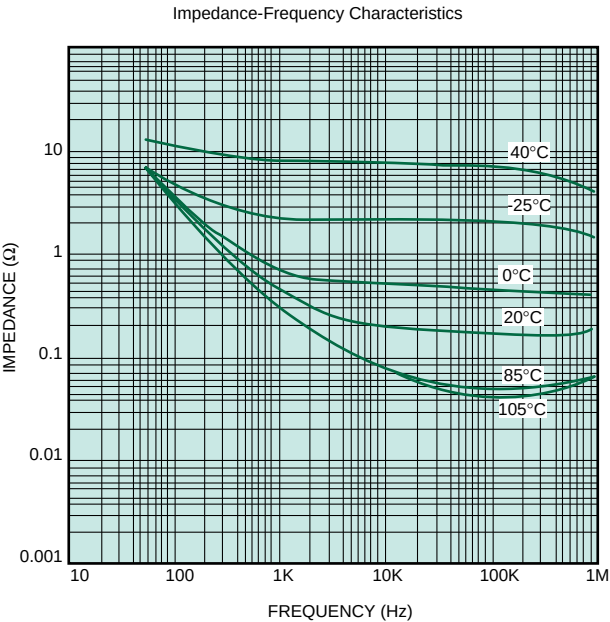
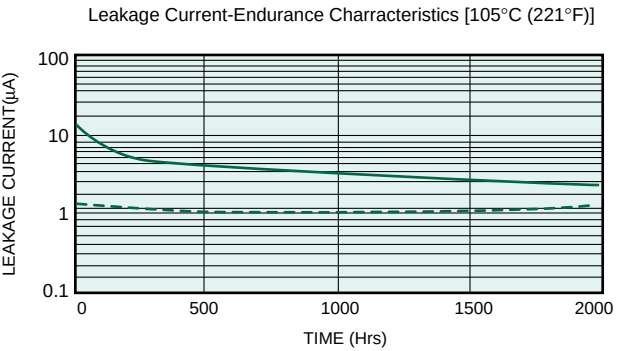
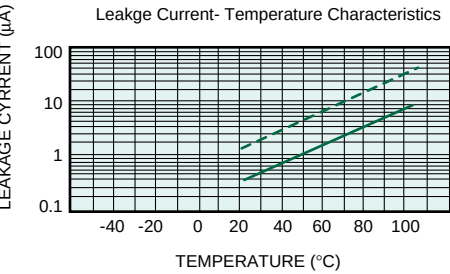
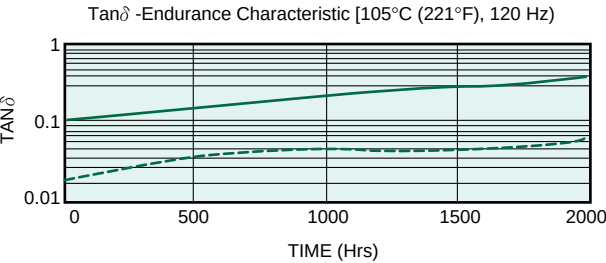
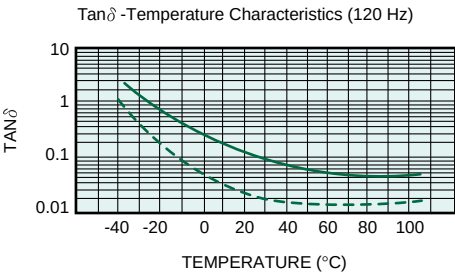
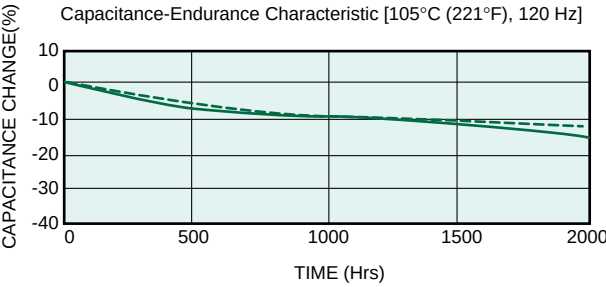
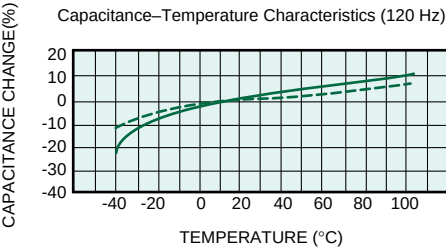
W.V(V) Cap(μF)	160(2C)		200(2D)		250(2E)		350(2V)		400(2G)		450(2W)	
	SIZE	I _R	SIZE	I _R	SIZE	I _R	SIZE	I _R	SIZE	I _R	SIZE	I _R
1.0	6.3 x 11	14	6.3 x 11	14	6.3 x 11	14	8 x 11.5	16	8 x 11.5	16	8x11.5	16
2.2	6.3 x 11	22	6.3 x 11	22	8 x 11.5	26	10 x 12.5	30	10 x 12.5	30	10x12.5	30
3.3	8 x 11.5	32	8 x 11.5	31	10 x 12.5	37	10 x 12.5	38	10 x 16	39	10x16	39
4.7	8 x 11.5	36	10 x 12.5	42	10 x 16	45	10 x 16	48	10 x 16	48	10x20	48
10	10 x 16	66	10 x 16	66	10 x 20	72	10 x 20	77	13 x 20	85	13x20	85
22	10 x 20	110	10 x 20	110	13 x 20	133	13 x 25	142	16 x 25	148	16x25	148
33	13 x 20	161	13 x 25	168	13 x 25	172	16 x 25	181	16 x 31.5	200	16x35.5	200
47	13 x 25	195	13 x 25	198	16 x 25	214	16 x 35.5	248	16 x 35.5	262	18 x 40	265
100	16 x 25	340	16 x 31.5	361	18 x 35.5	384	18 x 40	424				
220	18 x 35.5	596	18 x 40	615								

I_R : Maximum permissible ripple current [mA(rms) at 105°C, 120Hz]

RUS SERIES

PERFORMANCE CURVES

—— 16V-470 μ F
- - - - 250V-47 μ F

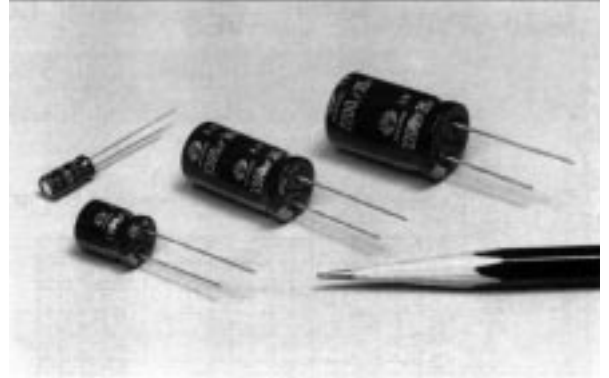


RM SERIES

ALUMINUM ELECTROLYTIC CAPACITORS 85°C, Miniature, Radial Leads

■ Features

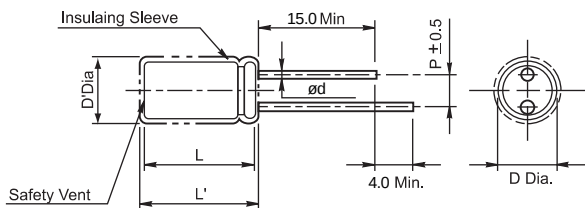
- 85°C, Miniature, Radial
- High CV (Smaller than RSS)
- Ideal for automatic insertion
- Load life of 2000 hours at 85°C



■ Specifications

Item	Performance Characteristics										
Operating temperature range	-40°C ~ +85°C				-40°C ~ +85°C				-25°C ~ +85°C		
Rated working voltage range	6.3V ~ 100V				160V ~ 250V				350 V ~ 450V		
Nominal capacitance range	0.47μF ~ 22000μF, ±20%(at 20°C, 120Hz)										
D.C Leakage current(at 20°C)	The following specifications shall be satisfied when the rated voltage is applied for the required time										
	I ≤ 0.01CV or 3μA (2min) Whichever is greater				I ≤ 0.01CV + 10μA (3min)				I ≤ 0.02CV + 30μA (3min)		
	Where I = Leakage current(μA) C= Nominal capacitance (μF) V= Rated voltage (V)										
Tan δ (max., at 20°C, 120Hz)	W.V(V)	6.3	10	16	25	35	50	63	100	160~250	350~450
	Tan δ	0.28	0.24	0.20	0.16	0.14	0.12	0.10	0.08	0.20	0.20
	When capacitance is over 1000μF, Tan δshall be added 0.02 to the listed value with increase of every each 1000μF.										
Characteristics at low temperature(max.) (impedance ratio at 120Hz)	W.V(V)	6.3	10	16	25	35	50~100		160~250		350~450
	Z-25°C/Z20°C	5	4	3	2	2	2		3		6
	Z-40°C/Z20°C	12	10	8	5	4	3		5		—
Load life	After applying rated working voltage for 2000 hours at +85°C and then being stabilized at +20°C, capacitors shall meet following limits.										
	Capacitance change					Within ± 20% of initial measured value					
	Tan δ					≤ 200% of initial specified value					
	Leakage current					≤ Initial sepcified value					
Shelf life	After storage for 1000 hours at +85°C with no voltage applied and then being stabilized at +20°C, capacitors shall meet following limits.										
	Capacitance change					Within ± 20% of initial measured value					
	Tan δ					≤ 150% of initial specified value					
	Leakage current					≤ Initial sepcified value					

■ Case sizes and Dimensions



• Standard lead style

øD	5.0	6.3	8.0	10.0	13.0	16.0	18.0
P	2.0	2.5	3.5	50		7.5	
ød	0.5		0.6			0.8	

D'=[D +0.5] Max.

L'=[L+1.0]Max. at D≤8.0

L' = [L+1.5]Max. at D≥10.0

■ Ripple current coefficient

• Frequency

Cap(μF)	Freq(Hz)					
	50	120	400	1K	10K	50~100K
Cap ≤ 10	0.8	1	1.30	1.45	1.65	1.70
10 < Cap ≤ 100	0.8	1	1.23	1.36	1.48	1.53
100 < Cap ≤ 1000	0.8	1	1.16	1.25	1.35	1.38
1000 < Cap	0.8	1	1.11	1.17	1.25	1.28

• Temperature

Temperature	≤ 60°C	70°C	85°C
Factor	1.65	1.37	1.0

RM SERIES

Dimensions & Maximum permissible ripple current [mA(rms) at 85°C, 120Hz]

øD x L(mm)

W.V(V) Cap(μF)	6.3(0J)		10(1A)		16(1C)		25(1E)		35(1V)		50(1H)		63(1J)		100(2A)	
	SIZE	I _R	SIZE	I _R	SIZE	I _R	SIZE	I _R	SIZE	I _R	SIZE	I _R	SIZE	I _R	SIZE	I _R
0.47											5x11	16				
1.0											5x11	20				
2.2											5x11	32				
3.3											5x11	37				
4.7											5x11	44			5x11	47
10											5x11	65			6.3x11	73
22											5x11	97	5x11	102	6.3x11	122
33											5x11	120	6.3x11	148	8x11.5	169
47							5x11	120	5x11	130	6.3x11	153	6.3x11	173	10x12.5	255
100					5x11	155	6.3x11	195	6.3x11	205	8x11.5	278	10x12.5	305	10x20	424
220	5x11	200	5x11	210	6.3x11	260	8x11.5	350	8x11.5	375	10x12.5	470	10x16	566	13x20	740
330	6.3x11	275	6.3x11	280	8x11.5	385	8x11.5	425	10x12.5	517	10x16	634	10x20	705	13x25	890
470	6.3x11	310	6.3x11	330	8x11.5	460	10x12.5	587	10x16	678	10x20	793	13x20	1010	16x25	1270
680	8x11.5	470	8x11.5	510	10x12.5	675	10x16	784	10x20	896	13x20	1187	13x25	1372	16x35.5	1710
1000	8x11.5	550	10x12.5	680	10x16	836	10x20	985	13x20	1310	13x25	1495	16x25	1686	18x40	1850
1500	10x16	780	10x16	897	10x20	1075	13x20	1340	13x25	1590	16x31.5	1854	16x35.5	2150		
2200	10x20	1040	10x20	1154	13x20	1330	13x25	1680	16x25	1980	16x35.5	2370	18x35.5	2630		
3300	10x20	1200	13x20	1515	13x25	1728	16x25	2064	16x35.5	2525	18x35.5	2864				
4700	13x20	1620	13x25	1901	16x25	2170	16x31.5	2585	18x35.5	3090						
6800	13x25	2020	16x25	2324	16x31.5	2720	18x35.5	3220								
10000	16x25	2410	16x35.5	2950	18x35.5	3350										
15000	16x35.5	3150	18x35.5	3495												
22000	18x40	3750														

W.V(V) Cap(μF)	160(2C)		200(2D)		250(2E)		350(2V)		400(2G)		450(2W)	
	SIZE	I _R	SIZE	I _R	SIZE	I _R	SIZE	I _R	SIZE	I _R	SIZE	I _R
1.0	6.3x11	15	6.3x11	16	6.3x11	16	6.3x11	20	8x11.5	25	8x11.5	24
2.2	6.3x11	27	6.3x11	28	6.3x11	28	8x11.5	37	8x11.5	40	10x12.5	38
3.3	6.3x11	42	6.3x11	44	8x11.5	44	8x11.5	48	10x12.5	58	10x12.5	55
4.7	6.3x11	52	8x11.5	63	8x11.5	63	10x12.5	70	10x16	70	10x16	68
10	10x12.5	95	10x12.5	106	10x12.5	110	10x16	115	10x20	120	13x20	105
22	10x16	168	10x16	168	10x20	179	13x20	198	13x25	205	13x25	200
33	10x20	213	10x20	227	13x20	258	13x25	280	16x25	292	16x25	285
47	13x20	296	13x20	296	13x25	329	16x25	358	16x25	360	16x35.5	346
100	13x25	475	16x25	524	16x31.5	582	16x35.5	596	18x40	600		
220	16x31.5	877	18x35.5	920	18x40	1000						
330	18x35.5	1126										

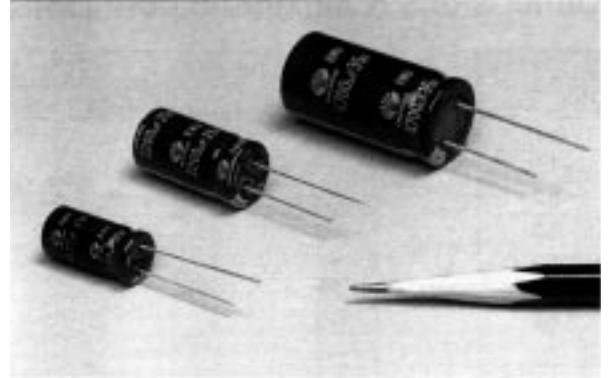
I_R : Maximum permissible ripple current [mA(rms) at 85°C, 120Hz]

RMU SERIES

ALUMINUM ELECTROLYTIC CAPACITORS 105°C, Miniature, Radial Leads

■ Features

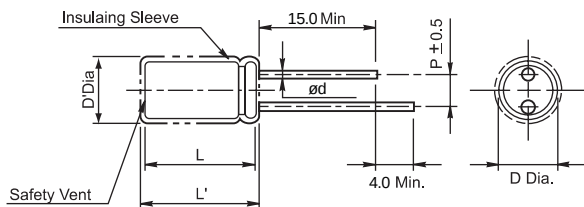
- 105°C, Miniature, radial
- Wide operating temperature range
- High CV (Smaller than RUS)
- Load life of 1000 hours at 105°C



■ Specifications

Item	Performance Characteristics										
Operating temperature range	-40℃ ~ +105℃				-40℃ ~ +105℃				-25℃ ~ +105℃		
Rated working voltage range	6.3V ~ 100V				160V ~ 250V				350V ~450V		
Nominal capacitance range	0.47μF ~ 22000μF, ± 20%(at 20℃, 120Hz)										
D.C Leakage current(at 20℃)	The following specifications shall be satisfied when the rated voltage is applied for the required time.										
	I ≤ 0.01CV +3μA (2 min)				I ≤ 0.01CV +10μA (3 min)				I ≤ 0.02CV + 30μA (5 min)		
	Where I =Leakage current(μA), C=Nominal capacitance(μF), V=Rated voltage(V)										
Tan δ(max., at 20℃, 120Hz)	W.V(V)	6.3	10	16	25	35	50	63	100	160~250	350~450
	Tan δ	0.28	0.24	0.20	0.16	0.14	0.12	0.10	0.08	0.15	0.20
	When capacitance is over 1000μF, Tanδshall be added 0.02 to the listed value with increase of every each 1000μF.										
Characteristics at low temperature(max.) (impedance ratio at 120Hz)	W.V(V)	6.3	10	16	25	35	50~100		160~250		350~450
	Z-25℃/Z20℃	5	4	3	2	2	2		3		6
	Z-40℃/Z20℃	10	8	6	4	3	3		4		—
Load life	After applying rated working voltage for 1000 hours at +105℃, and then being stabilized at +20℃, capacitors shall meet following limits.										
	Capacitance change					Within ± 20% of initial measured value					
	Tan δ					≤ 200% of initial specified value					
	Leakage current					≤ Initial specified value					
Shelf life	After storage for 1000 hours at +105℃ with no voltage applied and then being stabilized at +20℃, capacitors shall meet following limits.										
	Capacitance change					Within ±20% of initial measured value					
	Tan δ					≤ 150% of initial specified value					
	Leakage current					≤ Initial specified value					

■ Case sizes and Dimensions



• Standard lead style

øD	5.0	6.3	8.0	10.0	13.0	16.0	18.0
P	2.0	2.5	3.5	5.0	7.5		
ød	0.5		0.6		0.8		

D'=[D+0.5]Max.

L'=[L+1.0]max. at D ≤ 8.0

L' = [L+1.5]Max. at D ≥ 10.0

■ Ripple current coefficient

• Frequency

Cap(μF)	Freq(Hz)	50	120	400	1K	10K	50~100K
Cap ≥ 10		0.8	1	1.30	1.45	1.65	1.70
10 < Cap ≤ 100		0.8	1	1.23	1.36	1.48	1.53
100 < Cap ≤ 1000		0.8	1	1.16	1.25	1.35	1.38
1000 < Cap		0.8	1	1.11	1.17	1.25	1.28

• Temperature

Temperature	≤ 70°C	85°C	105°C
Factor	1.95	1.65	1.0

RMU SERIES

Dimensions & Maximum permissible ripple current [mA(rms) at 105°C, 120Hz]

ø D x L(mm)

W.V(V) Cap(μF)	6.3(0J)		10(1A)		16(1C)		25(1E)		35(1V)		50(1H)		63(1J)		100(2A)	
	SIZE	I _R	SIZE	I _R	SIZE	I _R	SIZE	I _R	SIZE	I _R	SIZE	I _R	SIZE	I _R	SIZE	I _R
0.47											5x11	7				
1											5x11	14				
2.2											5x11	23				
3.3											5x11	27				
4.7											5x11	32			5x11	34
10											5x11	46			6.3x11	52
22											5x11	70	5x11	73	6.3x11	89
33											5x11	88	6.3x11	108	8x11.5	123
47							5x11	84	5x11	91	6.3x11	112	6.3x11	126	10x12.5	182
100					5x11	113	6.3x11	137	6.3x11	149	8x11.5	202	10x12.5	220	10x20	305
220	5x11	144	5x11	153	6.3x11	190	8x11.5	255	8x11.5	270	10x12.5	343	10x16	407	13x20	540
330	6.3x11	201	6.3x11	204	8x11.5	274	8x11.5	306	10x12.5	372	10x16	460	10x20	520	13x25	670
470	6.3x11	233	6.3x11	248	8x11.5	328	10x12.5	423	10x16	488	10x20	583	13x20	740	16x25	921
680	8x11.5	340	8x11.5	383	10x12.5	429	10x16	556	10x20	618	13x20	820	13x25	956	16x35.5	1230
1000	8x11.5	405	10x12.5	496	10x16	585	10x20	729	13x20	920	13x25	1096	16x25	1230	18x40	1480
1500	10x16	569	10x16	653	10x20	720	13x20	911	13x25	1092	16x31.5	1279	16x35.5	1500		
2200	10x20	760	10x20	820	13x20	957	13x25	1173	16x25	1380	16x35.5	1660	18x35.5	1820		
3300	10x20	885	13x20	1070	13x25	1244	16x25	1486	16x35.5	1770	18x35.5	2010				
4700	13x20	1166	13x25	1310	16x25	1520	16x31.5	1835	18x35.5	2160						
6800	13x25	1410	16x25	1626	16x31.5	1904	18x35.5	2254								
10000	16x25	1687	16x35.5	2060	18x35.5	2315										
15000	16x35.5	2100	18x35.5	2360												
22000	18x40	2500														

W.V(V) Cap(μF)	160(2C)		200(2D)		250(2E)		350(2V)		400(2G)		450(2W)	
	SIZE	I _R	SIZE	I _R	SIZE	I _R	SIZE	I _R	SIZE	I _R	SIZE	I _R
1.0	6.3x11	11	6.3x11	11	6.3x11	12	6.3x11	12	8x11.5	12	8x11.5	11
2.2	6.3x11	19	6.3x11	19	6.3x11	20	8x11.5	24	8x11.5	24	10x12.5	23
3.3	6.3x11	27	6.3x11	27	8x11.5	31	8x11.5	32	10x12.5	36	10x12.5	34
4.7	6.3x11	33	8x11.5	39	8x11.5	39	10x12.5	46	10x16	46	10x16	42
10	10x12.5	66	10x12.5	69	10x12.5	69	10x16	75	10x20	78	13x20	76
22	10x16	112	10x16	112	10x20	120	13x20	128	13x25	140	13x25	138
33	10x20	142	10x20	150	13x20	165	13x25	183	16x25	195	16x25	190
47	13x20	198	13x20	202	13x25	220	16x25	232	16x25	245	16x35.5	240
100	13x25	325	16x25	345	16x31.5	375	16x35.5	382	18x40	395		
220	16x31.5	570	18x35.5	585	18x40	600						
330	18x35.5	754										

I_R : Maximum permissible ripple current [mA(rms) at 105°C, 120Hz]

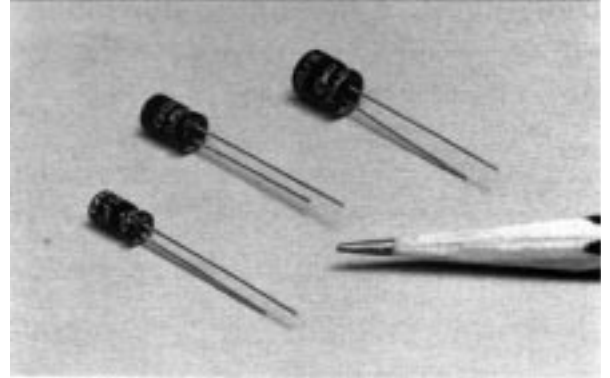
RSM SERIES

ALUMINUM ELECTROLYTIC CAPACITORS

7mm Height Standard, Radial Leads

■ Features

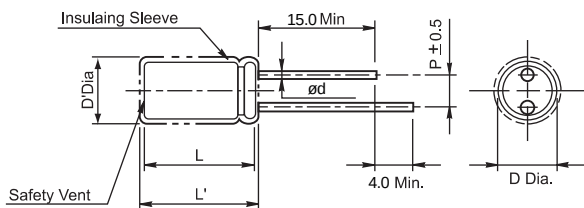
- Lengths are all 7mm
- VTR, video camera, car radio, micro cassette tape recorder etc.
- Load life of 1000 hours at 85°C



■ Specifications

Item	Performance Characteristics						
Operating temperature range	-40°C ~ +85°C						
Rated working voltage range	6.3V ~ 50V						
Nominal capacitance range	0.1μF ~ 100μF, ± 20% (at 20°C, 120Hz)						
D.C Leakage current(at 20°C)	The following specifications shall be satisfied when the rated voltage is applied for the required time. I ≤ 0.01CV or 3μA(2 min), whichever is greater Where I =Leakage current(μA) C=Nominal capacitance(μF) V=Rated voltage(V)						
Tan δ(max., at 20°C, 120Hz)	W.V(V)	6.3	10	16	25	35	50
	Tan δ	0.24	0.20	0.17	0.15	0.12	0.10
Characteristics at low temperature(max.) (impedance ratio at 120Hz)	W.V(V)	6.3	10	16	25	35	50
	Z-25°C/Z20°C	4	3	2	2	2	2
	Z-40°C/Z20°C	8	6	4	4	4	4
Load life	After applying rated working voltage for 1000 hours at +85°C and then being stabilized at +20°C, capacitors shall meet following limits.						
	Capacitance change		Within ± 25% of initial measured value				
	Tan δ		≤ 200% of initial specified value				
	Leakage current		≤ Initial specified value				
Shelf life	After storage for 1000 hours at +85°C with no voltage applied and then being stabilized at +20°C, capacitors shall meet following limits.						
	Capacitance change		Within ± 20% of initial measured value				
	Tan δ		≤ 150% of initial specified value				
	Leakage current		≤ 200% of initial specified value				

■ Case sizes and Dimensions



- Standard lead style

ØD	4.0	5.0	6.3
P	1.5	2.0	2.5
Ød	0.45		

D'=[D+0.5]Max.

L'=[L+1.0]Max.

■ Dimensions & Maximum permissible ripple current [mA(rms) at 85°C, 120Hz]

ØD x L (mm)

W.V Cap(μF)	6.3		10		16		25		35		50	
	SIZE	I _r	SIZE	I _r	SIZE	I _r	SIZE	I _r	SIZE	I _r	SIZE	I _r
0.1											4x7	2
0.22											4x7	3
0.33											4x7	5
0.47											4x7	7
1.0											4x7	10
2.2											4x7	20
3.3											4x7	25
4.7							4x7	20	4x7	25	5x7	30
6.8					4x7	25	4x7	30	5x7	35	5x7	40
10					4x7	35	5x7	40	5x7	45	5x7	50
22	4x7	35	5x7	40	5x7	45	5x7	55	6.3x7	60		
33	5x7	45	5x7	50	5x7	65	6.3x7	70				
47	5x7	60	5x7	75	5x7	80	6.3x7	95				
100	6.3x7	90	6.3x7	110	6.3x7	125						

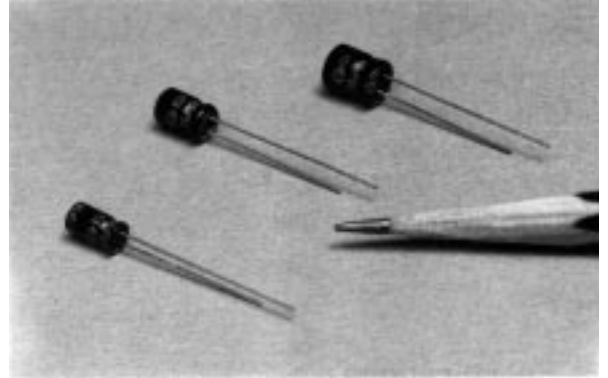
RSA SERIES

ALUMINUM ELECTROLYTIC CAPACITORS

Miniature, 7mm Height, High CV, Radial Leads

■ Features

- Miniature, High CV, Radial
- Lengths are all 7mm (Smaller than RSM)
- VTR, video camera, car radio, micro cassette tape recorder etc.
- Low cost alternative to tantalum beads
- Load life of 1000 hours at 85°C

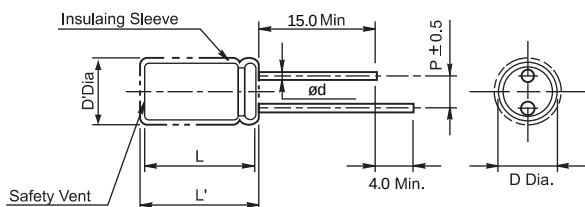


■ Specifications

Item	Performance Characteristics						
Operating temperature range	-40°C ~ +85°C						
Rated working voltage range	6.3V ~ 50V						
Nominal capacitance range	0.1μF ~ 220μF, ±20%(at 20°C, 120Hz)						
D.C Leakage current(at 20°C)	The following specifications shall be satisfied when the rated voltage is applied for the required time. I ≤ 0.01CV or 3μA(2 min), whichever is greater Where I =Leakage current(μA) C=Nominal capacitance(μF) V=Rated voltage(V)						
Tan δ (max., at 20°C, 120Hz)	W.V(V)	6.3	10	16	25	35	50
	Tan δ	0.26	0.22	0.19	0.16	0.12	0.10
Characteristics at low temperature(max.) (impedance ratio at 120Hz)	W.V(V)	6.3	10	16	25	35	50
	Z-25°C/Z20°C	4	3	2	2	2	2
	Z-40°C/Z20°C	8	6	4	4	4	4
Load life	After applying rated working voltage for 1000 hours at +85°C and then being stabilized at +20°C, capacitors shall meet following limits.						
	Capacitance change		Within ± 25% of initial measured value				
	Tan δ		≤ ± 200% of initial specified value				
	Leakage current		≤ Initial specified value				
Shelf life	After storage for 1000 hours at + 85°C with no voltage applied and then being stabilized at +20°C, capacitors shall meet following limits.						
	Capacitance change		Within ± 20% of initial measured value				
	Tan δ		≤ 200% of initial specified value				
	Leakage current		≤ 200% of initial specified value				

■ Case sizes and Dimensions

■ Dimensions & Maximum permissible ripple current [mA(rms) at 85°C, 120Hz]



- Standard lead style

ØD	4.0	5.0	6.3
P	1.5	2.0	2.5
Ød	0.45		

$D' = [D + 0.5] \text{Max.}$

$L' = [L + 1.0] \text{Max.}$

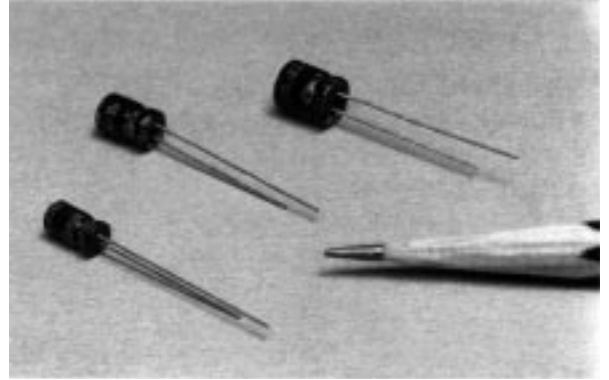
		ØD x L (mm)													
W.V	Cap (μF)	6.3		10		16		25		35		50			
		SIZE	I _r	SIZE	I _r	SIZE	I _r	SIZE	I _r	SIZE	I _r	SIZE	I _r		
	0.1											4x7	1		
	0.22											4x7	2		
	0.33											4x7	3		
	0.47											4x7	5		
	1.0											4x7	10		
	2.2											4x7	16		
	3.3											4x7	18		
	4.7									4x7	21	4x7	25		
	6.8									4x7	25	5x7	28		
	10							4x7	28	4x7	31	5x7	35		
	22			4x7	35	4x7	40	5x7	50	5x7	55	6.3x7	58		
	33	4x7	40	4x7	44	5x7	55	5x7	63	6.3x7	66				
	47	4x7	48	5x7	60	5x7	65	6.3x7	78						
	100	5x7	78	6.3x7	87	6.3x7	98								
	220	6.3x7	110												

RUM SERIES

ALUMINUM ELECTROLYTIC CAPACITORS 7mm Height, 105°C Standard, Radial Leads

■ Features

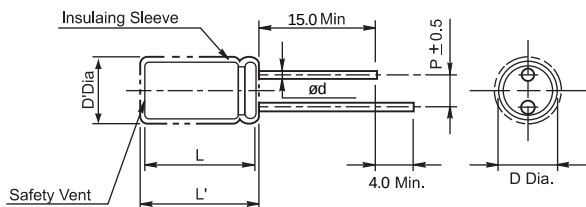
- Lengths are all 7mm Radial
- Wide temperature range
- Miniature, high reliability
- Car radio, VTR, video camera etc.
- Load life of 1000 hours at 105°C



■ Specifications

Item	Performance Characteristics						
Operating temperature range	-55°C ~ +105°C						
Rated working voltage range	6.3V ~ 50V						
Nominal capacitance range	0.1μF ~ 100μF, ±20% (at 20°C, 120Hz)						
D.C Leakage current(at 20°C)	The following specifications shall be satisfied when the rated voltage is applied for the required time. I ≤ 0.01CV or 3μA (2 min), whichever is greater Where I =Leakage current(μA) C=Nominal capacitance(μF) V=Rated voltage(V)						
Tan δ (max., at 20°C, 120Hz)	W.V(V)	6.3	10	16	25	35	50
	Tan δ	0.24	0.20	0.17	0.15	0.12	0.10
Characteristics at low temperature(max.) (impedance ratio at 120Hz)	W.V(V)	6.3	10	16	25	35	50
	Z-25°C/Z20°C	4	3	2	2	2	2
	Z-40°C/Z20°C	8	6	4	4	3	3
Load life	After applying rated working voltage for 1000 hours at +105°C and then being stabilized at +20°C, capacitors shall meet following limits.						
	Capacitance change		Within ± 25% of initial measured value(6.3V~16V)				
			Within ± 20% of initial measured value(25V~)				
	Tan δ		≤ 200% of initial specified value				
Leakage current		≤ Initial specified value					
Shelf life	After storage for 1000 hours at +105°C with no voltage applied and then being stabilized at +20°C, capacitors shall meet following limits.						
	Capacitance change		Within ± 25% of initial measured value(6.3V~16V)				
			Within ± 20% of initial measured value(25V)				
	Tan δ		≤ 200% of initial specified value				
Leakage current		≤ 200% of initial specified value					

■ Case sizes and Dimensions



- Standard lead style

øD	4.0	5.0	6.3
P	1.5	2.0	2.5
ød	0.45		

D'=[D+0.5]Max.

L'=[L+1.0]Max.

■ Dimensions & Maximum permissible ripple current [mA(rms) at 105°C, 120Hz]

		øD x L (mm)													
W.V	Cap(μF)	6.3		10		16		25		35		50			
		SIZE	I _r	SIZE	I _r	SIZE	I _r	SIZE	I _r	SIZE	I _r	SIZE	I _r	SIZE	I _r
0.1												4x7	2		
0.22												4x7	3		
0.33												4x7	5		
0.47												4x7	6		
1.0												4x7	5		
2.2												4x7	10		
3.3												4x7	20		
4.7								4x7	20	4x7	25	5x7	25		
6.8						4x7	25	4x7	30	5x7	35	6.3x7	30		
10						4x7	35	5x7	40	5x7	45	6.3x7	40		
22	4x7	35		5x7	40	5x7	45	6.3x7	55	6.3x7	60		50		
33	5x7	45		5x7	50	6.3x7	65	6.3x7	70						
47	5x7	60		6.3x7	75	6.3x7	80								
100	6.3x7	90													

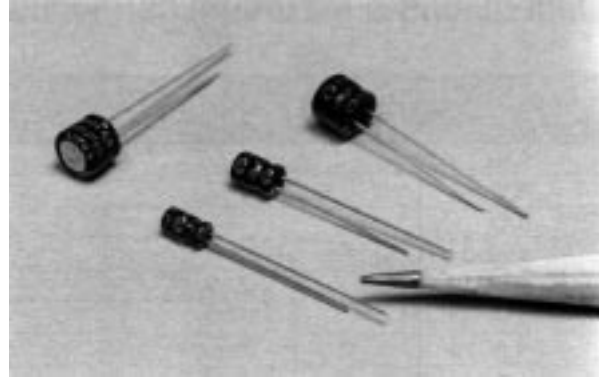
REM SERIES

ALUMINUM ELECTROLYTIC CAPACITORS

Lengths are all 5mm, Radial Leads

■ Features

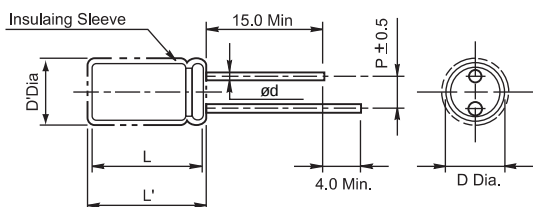
- Lengths are all 5mm, Radial
- Automatic insertion is available
- Video camera, car radio, compact radio etc.
- Load life of 1000 hours at 85°C



■ Specifications

Item	Performance Characteristics							
Operating temperature range	-40°C ~ +85°C							
Rated working voltage range	4.0V ~ 50V							
Nominal capacitance range	0.1μF ~ 100μF, ±20% (at 20°C, 120Hz)							
D.C Leakage current(at 20°C)	The following specifications shall be satisfied when the rated voltage is applied for the required time. I ≤ 0.01CV or 3μA (2 min), whichever is greater Where I =Leakage current(μA) C=Nominal capacitance(μF) V=Rated voltage(V)							
Tan δ(max., at 20°C, 120Hz)	W.V(V)	4.0	6.3	10	16	25	35	50
	Tan δ	0.35	0.25	0.20	0.17	0.15	0.12	0.10
Characteristics at low temperature(max.) (impedance ratio at 120Hz)	W.V(V)	4.0	6.3	10	16	25	35	50
	Z-25°C/Z20°C	7	5	4	3	2	2	2
	Z-40°C/Z20°C	15	10	8	6	4	4	4
Load life	After applying rated working voltage for 1000 hours at +85°C and then being stabilized at +20°C, capacitors shall meet following limits.							
	Capacitance change			Within ± 25% of initial measured value				
	Tan δ			≤ 200% of initial specified value				
	Leakage current			≤ Initial specified value				
Shelf life	After storage for 1000 hours at +85°C with no voltage applied and then being stabilized at +20°C, capacitors shall meet following limits.							
	Capacitance change			Within ± 20% of initial measured value				
	Tan δ			≤ 200% of initial specified value				
	Leakage current			≤ 175% of initial specified value				

■ Case sizes and Dimensions



• Standard lead style

øD	3.0	4.0	5.0	6.3
P	1.0	1.5	2.0	2.5
ød	0.40	0.45		

D' = [D+0.5]Max.

L' = [L+1.0]Max.

REM SERIES

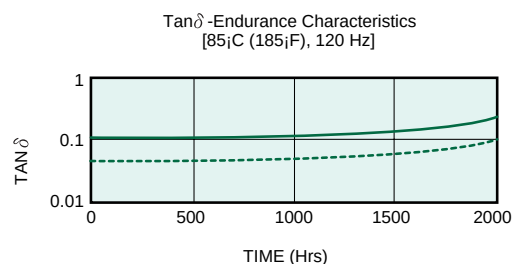
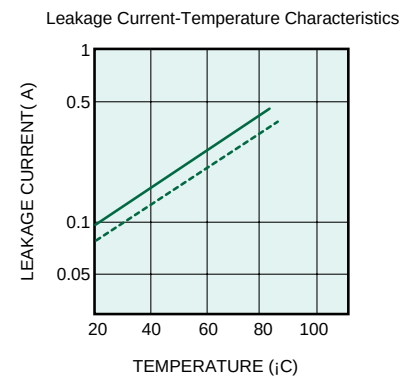
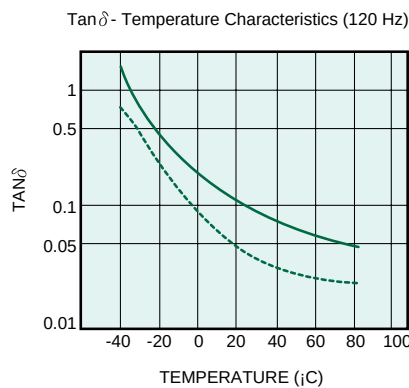
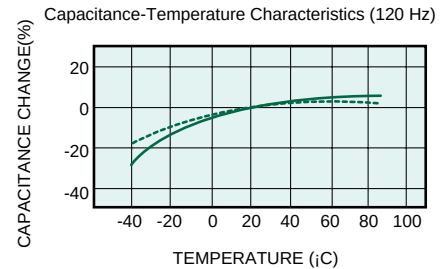
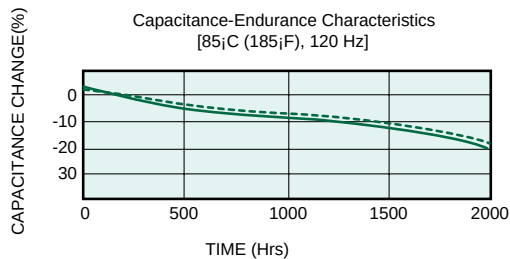
Dimensions & Maximum permissible ripple current [mA(rms) at 85°C, 120Hz]

 $\varnothing D \times L (mm)$

W.V Cap(μF)	4.0		6.3		10		16		25		35		50	
	SIZE	I _R	SIZE	I _R	SIZE	I _R	SIZE	I _R	SIZE	I _R	SIZE	I _R	SIZE	I _R
0.10													3x5,4x5	1
0.15													3x5,4x5	1.5
0.22													3x5,4x5	2
0.33													3x5,4x5	2.5
0.47													3x5,4x5	3.5
0.68													3x5,4x5	5
1.0													3x5,4x5	6.5
1.5													3x5,4x5	9
2.2											3x5,4x5	10	4x5	12
3.3									3x5,4x5	12	4x5	13	4x5	16
4.7							3x5,4x5	14	4x5	16	4x5	18	5x5	20
6.8					3x5,4x5	15	4x5	18	4x5	20	5x5	22	6.3x5	26
10			3x5,4x5	17	4x5	20	4x5	22	5x5	26	5x5	28	6.3x5	32
15			4x5	23	4x5	25	5x5	28	6.3x5	33	6.3x5	36		
22	3x5,4x5	23	4x5	28	5x5	32	5x5	36	6.3x5	41	6.3x5	45		
33	4x5	28	5x5	36	5x5	40	6.3x5	46	6.3x5	54				
47	4x5	36	5x5	44	6.3x5	53	6.3x5	58						
68	5x5	45	6.3x5	54	6.3x5	65								
100	5x5	56	6.3x5	70										

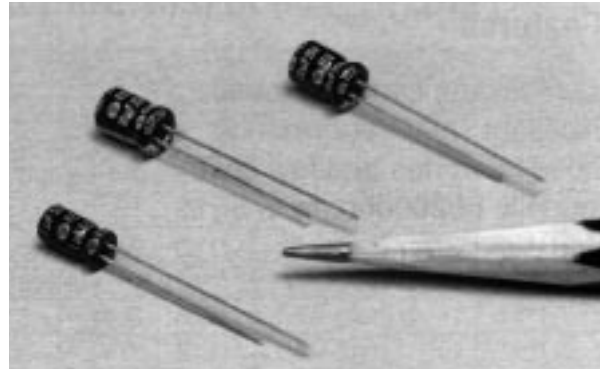
PERFORMANCE CURVES

— 16V—22 F
 - - - 50V—4.7 F



■ Features

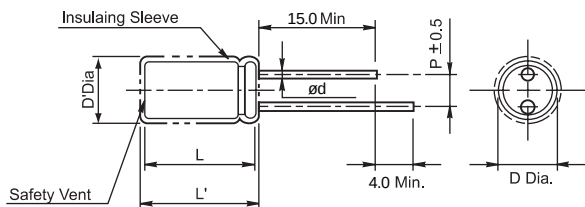
- Lengths are all 5mm, Radial
- Wide temperature range
- For automatic insertion
- Load life of 1000 hours at 105°C



■ Specifications

Item	Performance Characteristics							
Operating temperature range	-40°C ~ +105°C							
Rated working voltage range	4.0 ~ 50V							
Nominal capacitance range	0.1μF ~ 100μF, ± 20%(at 20°C, 120Hz)							
D.C Leakage current(at 20°C)	The following specifications shall be satisfied when the rated voltage is applied for the required time. I ≤ 0.01CV or 3μA (2 min), Whichever is greater Where I =Leakage current(μA) C=Nominal capacitance(μF) V=Rated voltage(V)							
Tan δ(max., at 20°C, 120Hz)	W.V(V)	4.0	6.3	10	16	25	35	50
	Tan δ	0.35	0.26	0.22	0.19	0.15	0.13	0.10
Characteristics at low temperature(max.) (impedance ration at 120Hz)	W.V(V)	4.0	6.3	10	16	25	35	50
	Z-25°C/Z20°C	6	4	4	3	2	2	2
	Z-40°C/Z20°C	12	9	7	5	3	3	3
Load life	After applying rated working voltage for 1000 hours at +105°C and then being stabilized at +20°C, capacitors shall meet following limits.							
	Capacitance change			Within ± 25% of initial measured value				
	Tan δ			≤ 200% of initial specified value				
	Leakage current			≤ Initial specified value				
Shelf life	After storage for 1000 hours at +105°C with no voltage applied and then being stabilized at +20°C, capacitors shall meet following limits.							
	Capacitance change			Within ± 25% of initial measured value				
	Tan δ			≤ 200% of initial specified value				
	Leakage current			≤ 200% of initial specified value				

■ Case sizes and Dimensions



• Standard lead style

øD	4.0	5.0	6.3
P	1.5	2.0	2.5
ød	0.45		

D' = [D+0.5]Max.

L' = [L+1.0]Max.

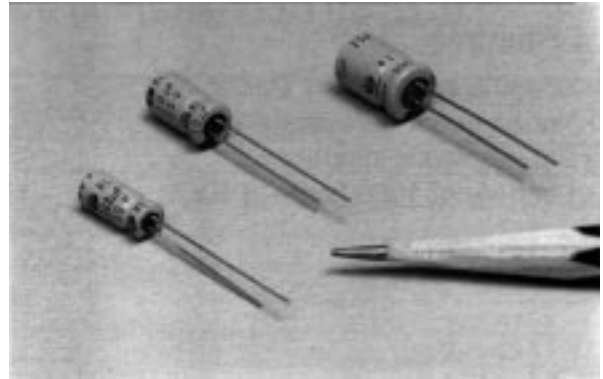
■ Dimensions & Maximum permissible ripple current [mA(rms) at 105°C, 120Hz]

øD × L(mm)

W.V Cap(μF)	4.0(0G)	6.3(0J)	10(1A)	16(1C)	25(1E)	35(1V)	50(1H)
0.1							4x5, 20
0.15							4x5, 24
0.22							4x5, 32
0.33							4x5, 37
0.47							4x5, 48
0.68							4x5, 50
1.0							4x5, 67
1.5							4x5, 89
2.2							4x5, 10
3.3						4x5, 10	4x5, 14
4.7					4x5, 16	4x5, 15	5x5, 18
6.8			4x5, 12	4x5, 14	4x5, 18	5x5, 21	5x5, 24
10		4x5, 15	4x5, 16	4x5, 17	5x5, 23	5x5, 26	6.3x5, 31
15	4x5, 16	4x5, 19	4x5, 22	5x5, 25	5x5, 30	6.3x5, 36	6.3x5, 38
22	4x5, 21	4x5, 22	5x5, 28	5x5, 32	6.3x5, 36	6.3x5, 44	
33	4x5, 27	4x5, 30	5x5, 33	6.3x5, 38	6.3x5, 45		
47	4x5, 33	5x5, 38	6.3x5, 45	6.3x5, 50			
68	5x5, 42	6.3x5, 50	6.3x5, 55				
100	5x5, 52	6.3x5, 62					

■ Features

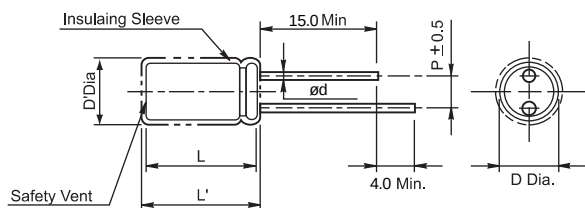
- Low leakage current, Radial
- Excellent shelf performance
- Close tolerance and low cost
- Load life of 2000hours at 85°C



■ Specifications

Item	Performance Characteristics							
Operating temperature range	-40°C~ +85°C							
Rated working voltage range	6.3V ~ 100V							
Nominal capacitance range	0.1μF ~ 2200μF, ±20% or ±10% (at 20°C, 120Hz)							
D.C Leakage current(at 20°C)	The following specifications shall be satisfied when the rated voltage is applied for the required time. I ≤ 0.002CV or 0.4μA(2 min),whichever is greater Where I= Leakage current(μA) C = Nominal capacitance(μF) V = Rated voltage(V)							
Tan δ(max., at 20°C., 120Hz)	W.V(V)	6.3	10	16	25	35	50~80	100
	Tan δ	0.22	0.19	0.16	0.14	0.12	0.10	0.08
	When capacitance is over 1000μF, Tan δshall be added 0.02 to the listed value with increase of every each 1000μF.							
Characteristics at low temperature(max.) (impedance ratio at 120Hz)	W.V(V)	6.3	10	16	25	35	50~100	
	Z-25°C/Z20°C	4	3	2	2	2	2	
	Z-40°C/Z20°C	8	6	4	4	4	4	
Load life	After applying rated working voltage for 2000hours at +85°C and then being stabilized at +20°C, capacitors shall meet following limits.							
	Capacitance change			Within ± 20% of initial measured value				
	Tan δ			≤ 200% of initial specified value				
	Leakage current			≤ Initial specified value				
Shelf life	After storage for 1000hours at +85°C with no voltage applied and then being stabilized at +20°C, capacitors shall meet following limits.							
	Capacitance change			Within ± 20% of initial measured value				
	Tan δ			≤ 150% of initial specified value				
	Leakage current			≤ 0.002CV + 1μA(2 min)				

■ Case sizes and Dimensions



• Standard lead style

øD	5.0	6.3	8.0	10.0	13.0	16.0
P	2.0	2.5	3.5	5.0	7.5	
ød	0.5		0.6		0.8	

D' = [D+0.5] Max.

L' = [L+1.0] Max. at D ≤ 8.0

L' = [L+1.5] Max. at D ≥ 10.0

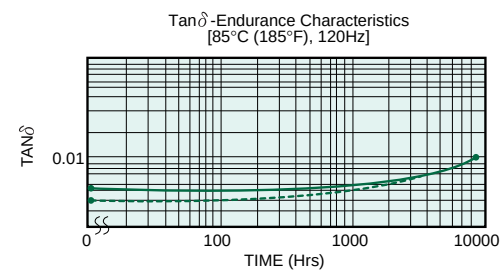
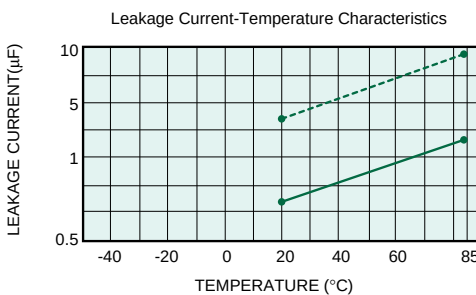
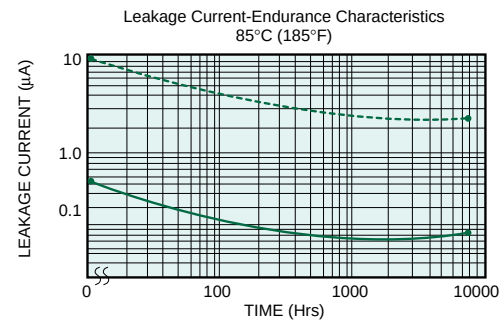
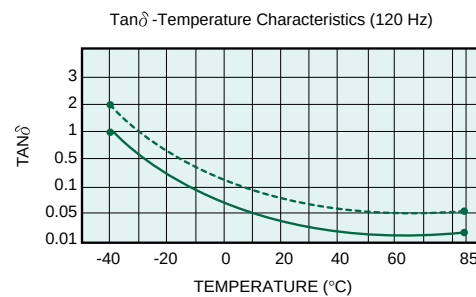
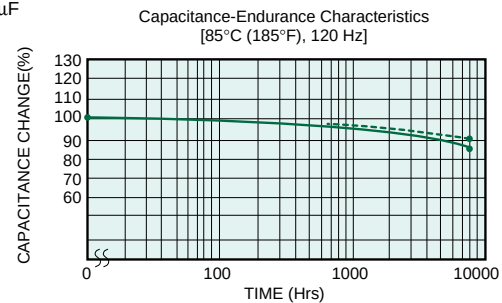
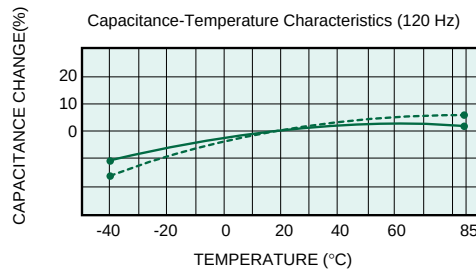
Dimensions & Maximum permissible ripple current [mA(rms) at 85°C, 120Hz]

W.V Cap(μF)	6.3		10		16		25		35		50		63		80		100	
	SIZE	I _r	SIZE	I _r	SIZE	I _r	SIZE	I _r	SIZE	I _r	SIZE	I _r	SIZE	I _r	SIZE	I _r	SIZE	I _r
0.1											5x11	4	5x11	4	5x11	4	5x11	4
0.22											5x11	6	5x11	6	5x11	6	5x11	6
0.33											5x11	7	5x11	7	5x11	7	5x11	7
0.47											5x11	9	5x11	9	5x11	9	5x11	9
0.68											5x11	12	5x11	12	5x11	12	5x11	14
1.0											5x11	15	5x11	15	5x11	17	5x11	17
2.2											5x11	21	5x11	21	5x11	27	63x11	28
3.3											5x11	30	63x11	31	63x11	44	8x115	45
4.7							5x11	35	5x11	35	63x11	35	63x11	50	63x11	50	8x115	55
6.8							5x11	40	63x11	50	8x115	50	8x115	65	8x115	70	10x125	75
10					5x11	60	63x11	61	63x11	61	8x115	61	8x115	74	10x125	100	10x16	100
22			5x11	75	63x11	80	8x115	105	8x115	110	10x125	120	10x16	150	10x16	170	10x20	175
33			63x11	100	63x11	115	8x115	140	10x125	150	10x16	155	10x16	160	10x20	210	13x20	220
47			63x11	125	8x115	145	10x125	175	10x125	190	10x16	210	10x16	220	10x20	320	13x25	320
68			63x11	135	8x115	160	10x125	200	10x16	225	10x20	250	10x20	280	13x25	340	16x25	360
100			8x115	200	10x125	250	10x16	290	10x20	330	13x20	340	13x25	360	13x25	470	16x25	505
220	10x125	260	10x16	335	10x16	400	13x20	480	13x25	545	16x25	550	16x31.5	600	16x31.5	750		
330	10x16	340	10x20	430	10x20	480	13x25	580	16x25	630	16x31.5	680	16x35.5	760				
470	10x20	440	13x20	575	13x20	725	16x25	780	16x25	850	16x35.5	850						
680	13x20	550	13x20	700	13x25	800	16x25	850	16x31.5	900	16x35.5	900						
1000	13x25	680	13x25	1000	16x25	1050	16x31.5	1100										
2200	16x25	950	16x31.5	1100														

ø D x L(mm)

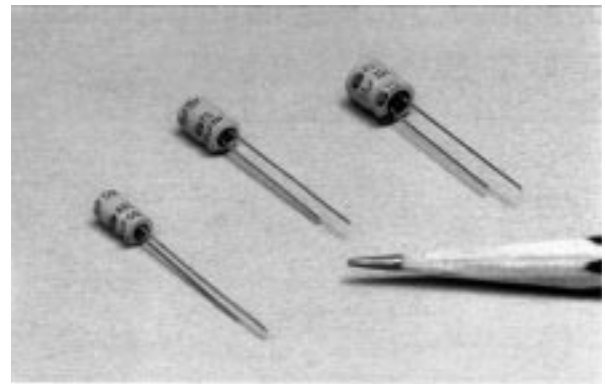
PERFORMANCE CURVES

— 25V-100μF
- - - 16V-47μF



■ Features

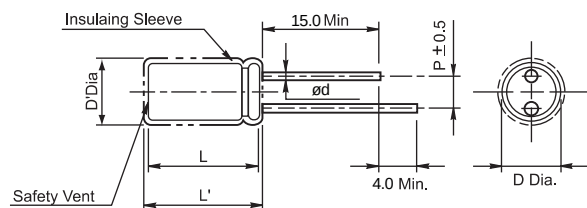
- Subminiature Low leakage current, Radial
- Lengths are all 7mm
- Ideal for tantalum capacitor replacement
- Load life of 1000 hours at 85°C



■ Specifications

Item	Performance Characteristics						
Operating temperature range	-40°C ~ +85°C						
Rated working voltage range	6.3V ~ 50V						
Nominal capacitance range	0.1μF ~ 100μF, ±20%(at 20°C, 120Hz)						
D.C Leakage current(at 20°C)	The following specifications shall be satisfied when the rated voltage is applied for the required time. I ≤ 0.002CV or 0.4μA(2 min), whichever is greater Where I=Leakage current(μA) C=Nominal capacitance(μF) V=Rated voltage(V)						
Tan δ (max., at 20°C, 120Hz)	W.V(V)	6.3	10	16	25	35	50
	Tan δ	0.24	0.20	0.17	0.15	0.12	0.10
Characteristics at low temperature(max.) (impedance ratio at 120Hz)	W.V(V)	6.3	10	16	25	35	50
	Z-25°C/Z20°C	4	3	2	2	2	2
	Z-40°C/Z20°C	8	6	4	4	4	4
Load life	After applying rated working voltage for 1000 hours at +85°C and then being stabilized at +20°C, capacitors shall meet following limits.						
	Capacitance change			Within ±25% of initial measured value			
	Tan δ			≤ 150% of initial specified value			
	Leakage current			≤ Initial specified value			
Shelf life	After storage for 1000 hours at +85°C with no voltage applied and then being stabilized at +20°C, capacitors shall meet following limits.						
	Capacitance change			Within ±20% of initial measured value			
	Tan δ			≤ 150% of initial specified value			
	Leakage current			≤ 200% of initial specified value			

■ Case sizes and Dimensions



- Standard lead style

øD	4.0	5.0	6.3
P	1.5	2.0	2.5
ød	0.45		

D' = [D+0.5]Max.

L' = [L+1.0]Max.

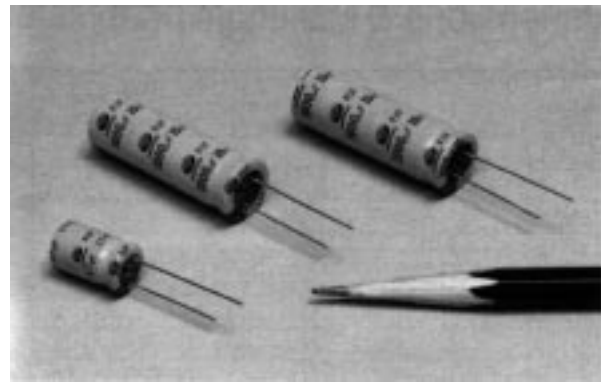
■ Dimensions & Maximum permissible ripple current [mA(rms) at 85°C, 120Hz]

øD x L(mm)

W.V	6.3		10		16		25		35		50	
	SIZE	I _R	SIZE	I _R	SIZE	I _R	SIZE	I _R	SIZE	I _R	SIZE	I _R
Cap(μF)												
0.1											4x7	2
0.22											4x7	4
0.33											4x7	6
0.47											4x7	8
1.0											4x7	11
2.2											4x4	20
3.3											4x7	27
4.7							4x7	25	4x7	27	5x7	35
6.8					4x7	30	5x7	30	5x7	35	6.3x7	40
10					4x7	40	5x7	47	5x7	47	6.3x7	52
22	4x7	37	5x7	46	5x7	47	6.3x7	62	6.3x7	62		
33	5x7	52	5x7	55	6.3x7	72	6.3x7	92				
47	5x7	65	6.3x7	82	6.3x7	82						
100	6.3x7	92										

■ Features

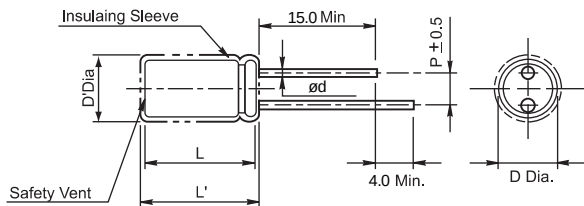
- Very low impedance and ESR at high frequency
- Large permissible ripple current
- High performance and reliability
- For switching mode power supplies (SMPS)
- Load life of 2000 hours at 105°C
- Possible cleaning by Freon TE, TES, TMS (5 min)



■ Specifications

Item	Performance Characteristics						
Operating temperature range	-55°C ~ +105°C						
Rated working voltage range	6.3V ~ 50V						
Nominal capacitance range	1μF ~ 1000μF, ±20%(at 20°C, 120Hz)						
D.C Leakage current(at 20°C)	The following specifications shall be satisfied when the rated voltage is applied for the required time. I ≤ 0.002CV or 2μA(3 min), whichever is greater Where I =Leakage current(μA) C=Nominal capacitance(μF) V=Rated voltage(V)						
Tan δ(max., at 20°C, 120Hz)	W.V(V)	6.3	10	16	25	35	50
	Tan δ	0.12	0.10	0.08	0.06	0.06	0.05
Characteristics at low temperature(max.) (impedance ratio at 120Hz)	W.V(V)	6.3~10		16		25~50	
	Z-55°C/Z20°C	3		2		2	
Load life	After applying rated working voltage for 2000 hours at +105°C and then being stabilized at +20°C, capacitors shall meet following limits.						
	Capacitance change			Within ± 15% of initial measured value			
	Tan δ			≤ 150% of initial specified value			
	Leakage current			≤ Initial specified value			
Shelf life	After storage for 500 hours at +105°C with no voltage applied and then being stabilized at +20°C, capacitors shall meet following limits.						
	Capacitance change			Within ± 10% of initial measured value			
	Tan δ			≤ 115% of initial specified value			
	Leakage current			≤ 200% of initial specified value			

■ Case sizes and Dimensions



• Standard lead style

øD	8.0	10.0	13.0
P	3.5	5.0	
ød	0.6		

D' = [D+0.5]Max.

L' = [L+1.0]Max. at D ≤ 8.0

L' = [L+1.5]Max. at D ≥ 10.0

■ Ripple current coefficient

• Frequency

W.V	Freq(Hz)	50	120	300	1K	10~100K
6.3~16V		0.54	0.70	0.85	0.95	1
25~35V		0.43	0.57	0.73	0.88	1
50V		0.39	0.55	0.71	0.86	1

• Temperature

Temperature	≤ 40°C	70°C	85°C	105°C
Factor	1.5	1.3	1	0.55

RUF SERIES

Dimensions & Maximum permissible ripple current [mA(rms) at 85°C, 100Hz]

øD x L(mm)

Cap(μF) \ W.V	6.3		10		16		25		35		50	
	SIZE	I _R	SIZE	I _R	SIZE	I _R	SIZE	I _R	SIZE	I _R	SIZE	I _R
1.0											8x11.5	80
2.2											8x11.5	100
3.3											8x11.5	130
4.7											8x11.5	150
10									8x11.5	220	8x11.5	220
22							8x11.5	330	10x12.5	330	10x12.5	340
33					8x11.5	350	10x12.5	410	10x16	410	10x16	420
47			8x11.5	370	10x12.5	420	10x12.5	480	10x16	480	10x20	510
100	10x12.5	510	10x16	560	10x16	630	10x20	730	13x20	750	13x25	780
220	10x20	780	10x20	850	13x20	970	13x20	1100	13x25	1120	13x40	1280
330	13x20	970	13x20	1060	13x25	1310	13x25	1410	13x40	1550		
470	13x20	1280	13x25	1420	13x40	2440	13x40	1900				
1000	13x25	1970	13x40	2870								

Max. Impedance (Ω at 20°C, 100 KHz)

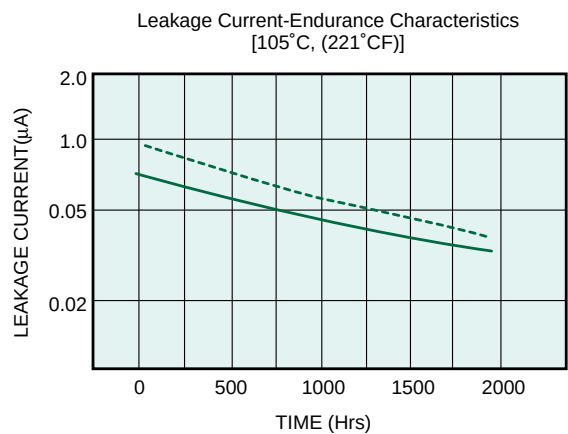
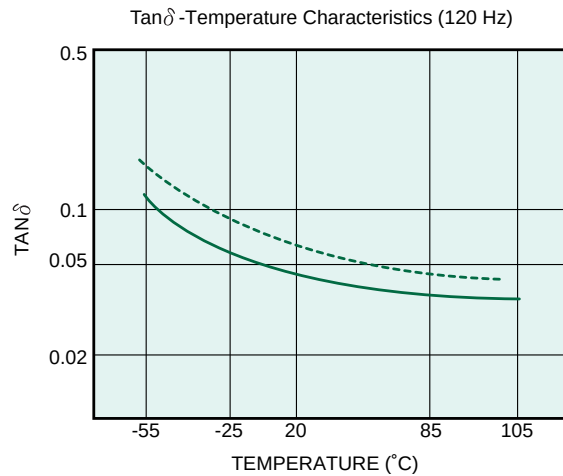
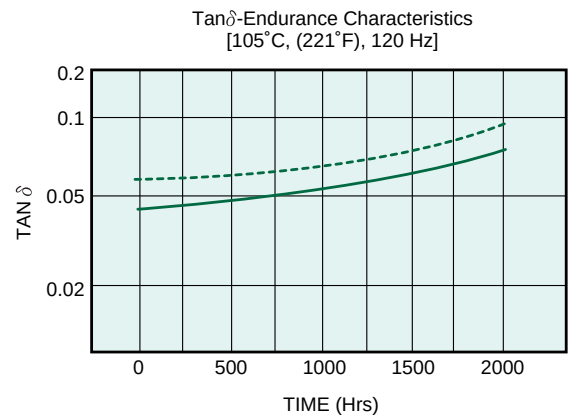
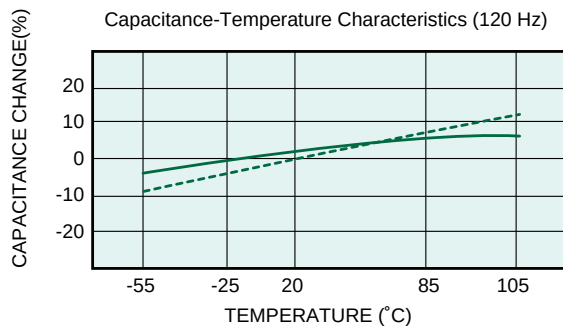
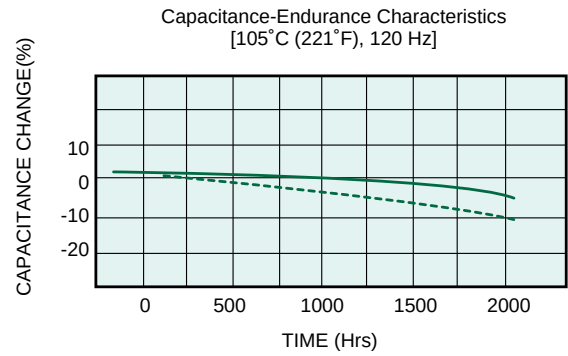
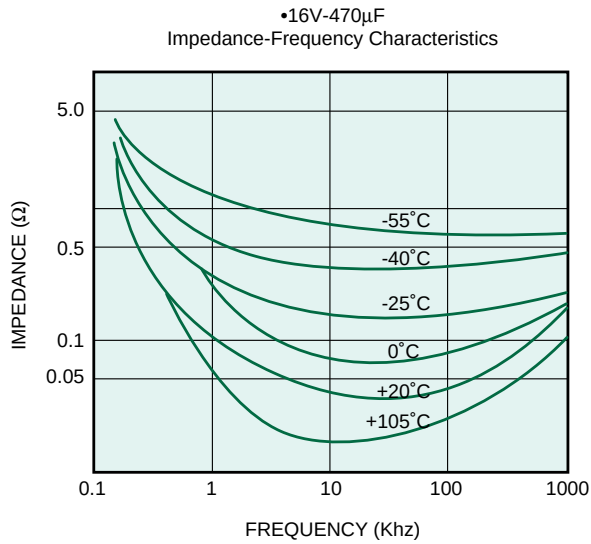
Cap(μF) \ W.V	6.3	10	16	25	35	50
1.0						31
2.2						14
3.3						9.3
4.7						6.5
10					1.5	2.1
22				0.97	1.2	1.40
33			0.97	0.95	0.93	0.90
47		0.90	0.85	0.68	0.67	0.65
100	0.67	0.57	0.45	0.35	0.30	0.26
220	0.33	0.27	0.23	0.16	0.17	0.15
330	0.24	0.20	0.12	0.12	0.12	
470	0.17	0.12	0.11	0.07		
1000	0.09	0.06				

Max.ESR (Ω at 20°C)

Cap(μF) \ W.V	6.3		10		16		25		35		50	
	120Hz	1KHz	120Hz	1KHz	120Hz	1KHz	120Hz	1KHz	120Hz	1KHz	120Hz	1KHz
1.0											66.4	46.2
2.2											30.2	21.0
3.3											20.0	14.0
4.7											14.0	9.8
10									8.00	2.0	6.6	4.5
22							3.60	2.0	3.60	1.5	3.0	2.1
33					3.20	1.92	2.60	1.44	2.40	1.3	2.0	1.4
47			2.80	1.68	2.30	1.38	1.70	1.02	1.70	1.02	1.4	1.0
100	1.59	0.95	1.33	0.80	1.06	0.63	0.80	0.48	0.80	0.40	0.66	0.46
220	0.72	0.43	0.60	0.36	0.48	0.29	0.36	0.22	0.36	0.22	0.30	0.21
330	0.48	0.29	0.40	0.24	0.28	0.17	0.24	0.14	0.24	0.14		
470	0.34	0.20	0.28	0.17	0.23	0.14	0.17	0.10				
1000	0.16	0.10	0.13	0.08								

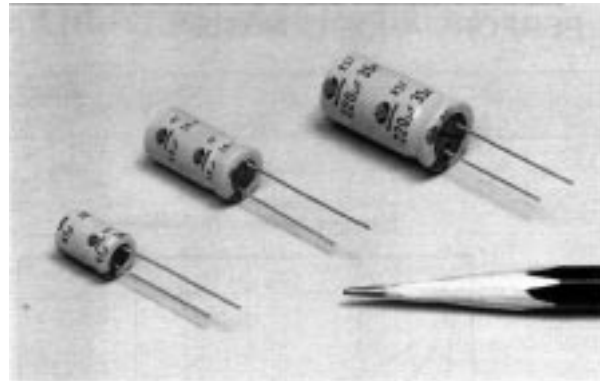
PERFORMANCE CURVES

—— 50V-47 μ F
 - - - - 16V-470 μ F



Features

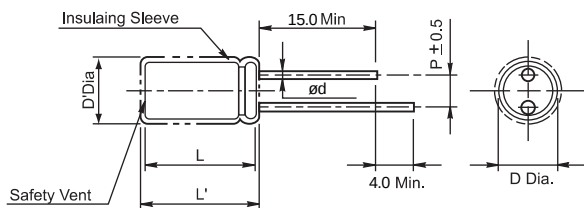
- Low ESR, Low impedance, Subminiature, Radial
- Large permissible ripple current
- High performance and reliability
- Load life of 2000 hours at 105°C
- Possible cleaning by Freon TE, TES, TMS (5 min)



Specifications

Item	Performance Characteristics							
Operating temperature range	-55°C ~ +105°C							
Rated working voltage range	6.3V ~ 63V							
Nominal capacitance range	22μF ~ 2200μF, ±20%(at 20°C, 120Hz)							
D.C Leakage current(at 20°C)	The following specifications shall be satisfied when the rated voltage is applied for the required time. I ≤ 0.01CV (2 min) Where I =Leakage current(μA) C=Nominal capacitance(μF) V=Rated voltage(V)							
Tan δ(max., at 20°C, 120Hz)	W.V(V)	6.3	10	16	25	35	50	63
	Tan δ	0.20	0.15	0.10	0.08	0.07	0.06	0.05
	When capacitance is over 1000μF, Tanδ shall be added 0.02 to the listed value with increase of every each 1000μF.							
Characteristics at low temperature(max.) (impedance ratio at 120Hz)	W.V(V)		6.3~10		16		25~63	
	Z-55°C/Z20°C		3		2		2	
Load life	After applying rated working voltage for 2000 hours at +105°C and then being stabilized at +20°C, capacitors shall meet following limits.							
	Capacitance change			Within ± 20% of initial measured value				
	Tan δ			≤ 200% of initial specified value				
	Leakage current			≤ Initial specified value				
Shelf life	After storage for 1000 hours at +105°C with no voltage applied and then being stabilized at +20°C, capacitors shall meet following limits.							
	Capacitance change			Within ± 20% of initial measured value				
	Tan δ			≤ 150% of initial specified value				
	Leakage current			≤ 200% of initial specified value				

Case sizes and Dimensions



Standard lead style

øD	10.0	13.0	16.0
P	5.0	5.0	7.5
ød	0.6		0.8

D' = [D+0.5]Max.

L' = [L+1.5]Max.

Ripple current coefficient

Frequency

W.V	Freq(Hz)	50	120	300	1K	10~100K
6.3~16V		0.54	0.70	0.85	0.95	1
25~35V		0.43	0.57	0.73	0.88	1
50~63V		0.39	0.55	0.71	0.86	1

Temperature

Temperature	≤ 70°C	85°C	105°C
Factor	2.83	2.2	1.0

Dimensions & Maximum permissible ripple current [mA(rms) at 105°C, 10~100Hz]

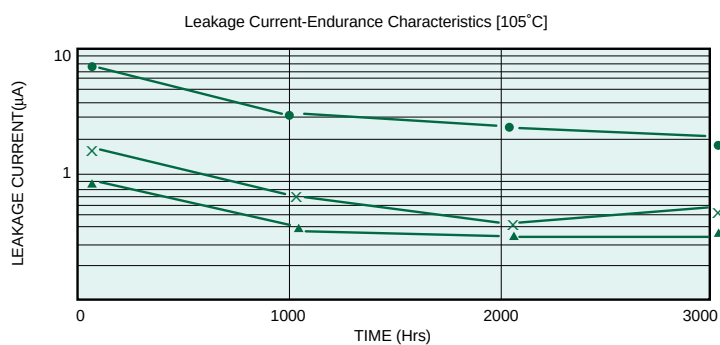
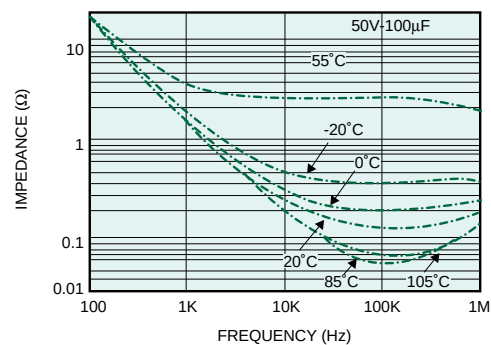
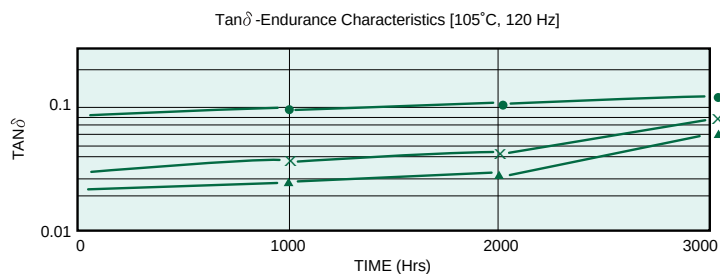
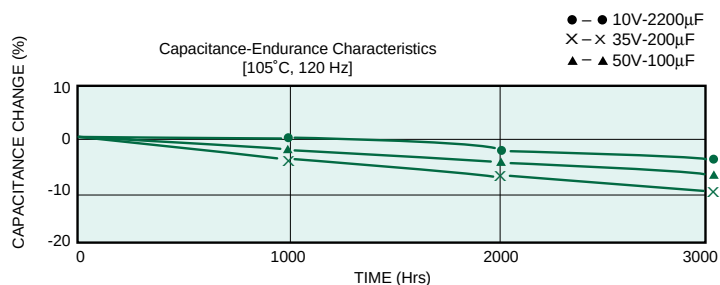
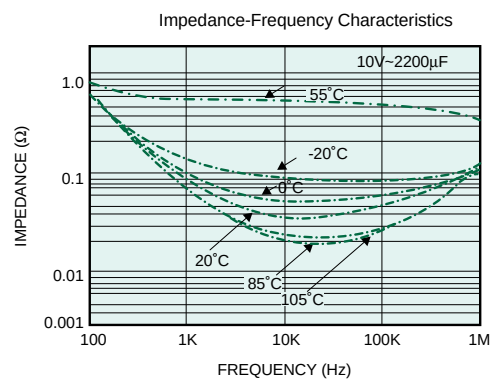
øD x L(mm)

W.V	6.3		10		16		25		35		50		63	
Cap(μF)	SIZE	I _R	SIZE	I _R	SIZE	I _R	SIZE	I _R	SIZE	I _R	SIZE	I _R	SIZE	I _R
22											10x12.5	150	10x16	200
33									10x12.5	180	10x16	220	10x16	240
47							10x12.5	200	10x12.5	210	10x16	260	10x20	310
100					10x12.5	240	10x16	310	10x20	370	13x20	450	13x25	540
220	10x12.5	250	10x16	350	10x16	400	13x20	540	13x25	650	16x25	820	16x31.5	1080
330	10x16	360	10x20	460	10x20	520	13x25	700	16x25	840	16x31.5	1030	16x35.5	1270
470	10x20	490	13x20	610	13x20	700	16x25	960	16x25	1090	16x35.5	1350		
1000	13x25	810	13x25	900	16x25	1150	16x31.5	1320						
2200	16x25	1090	16x31.5	1520	16x35.5	1780								

Max. Impedance (Ω)

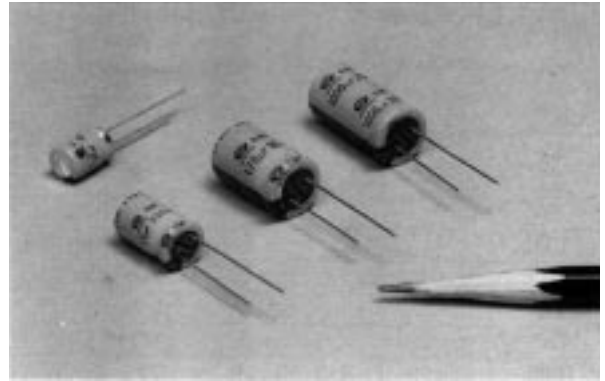
W.V	6.3		10		16		25		35		50		63	
Max-Z(Ω)	@20°C		@20°C		@20°C		@20°C		@20°C		@20°C		@20°C	
Cap(μF)	@20°C	100KHz	@20°C	100KHz	@20°C	100KHz	@20°C	100KHz	@20°C	100KHz	@20°C	100KHz	@20°C	100KHz
22	10KHz										1.35	0.60	1.35	0.60
33									0.90	0.53	0.90	0.50	0.90	0.50
47							0.70	0.42	0.80	0.53	0.80	0.50	0.80	0.50
100					0.54	0.45	0.36	0.27	0.35	0.23	0.30	0.10	0.30	0.10
220		0.45	0.45	0.38	0.29	0.26	0.15	0.14	0.15	0.10	0.14	0.08	0.14	0.08
330	0.48	0.27	0.21	0.18	0.21	0.18	0.12	0.10	0.09	0.07	0.09	0.05	0.08	0.06
470	0.35	0.23	0.15	0.14	0.12	0.11	0.08	0.07	0.08	0.05	0.06	0.05		
1000	0.26	0.14	0.11	0.11	0.09	0.09	0.06	0.06						
2200	0.15	0.07	0.05	0.05	0.05	0.05								

PERFORMANCE CURVES



■ Features

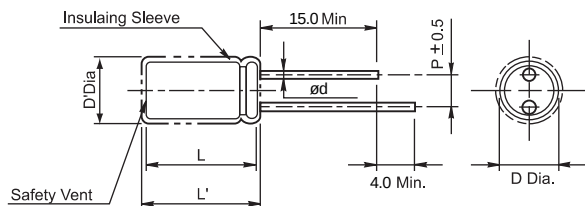
- Miniature, Radial (Smaller than RSF)
- Low impedance value at high frequency
- High performance and reliability
- Load life of 2000 hours at 105°C
- Possible cleaning by Freon TE, TES, TMS (5 min)



■ Specifications

Item	Performance Characteristics							
Operating temperature range	-55°C ~ +105°C							
Rated working voltage range	6.3V ~ 63V							
Nominal capacitance range	0.47μF ~ 6800μF, ±20% (at 20°C, 120Hz)							
D.C Leakage current(at 20°C)	The following specifications shall be satisfied when the rated voltage is applied for the required time. I ≤ 0.01CV (2 min) Where I=Leakage current(μA) C=Nominal capacitance(μF) V=Rated voltage(V)							
Tan δ (max., at 20°C, 120Hz)	W.V(V)	6.3	10	16	25	35	50	63
	Tan δ	0.22	0.19	0.16	0.14	0.12	0.10	0.08
	When capacitance is over 1000μF, Tan δ shall be added 0.02 to the listed value with increase of every each 1000μF.							
Characteristics at low temperature(max.) (impedance ratio at 120Hz)	W.V(V)		6.3~10		16		25~63	
	Z-55°C/Z20°C		3		2		2	
Load life	After applying rated working voltage for 2000 hours at +105°C and then being stabilized at +20°C, capacitors shall meet following limits.(5, 6.3, 8ø: 1000 Hours)							
	Capacitance change			Within ± 20% of initial measured value				
	Tan δ			≤ 200% of initial specified value				
	Leakage current			≤ Initial specified value				
Shelf life	After storage for 1000 hours at +105°C with no voltage applied and then being stabilized at +20°C, capacitors shall meet following limits.							
	Capacitance change			Within ± 20% of initial measured value				
	Tan δ			≤ 150% of initial specified value				
	Leakage current			≤ 200% of initial specified value				

■ Case sizes and Dimensions



• Standard lead style

øD	5.0	6.3	8.0	10.0	13.0	16.0
P	2.0	2.5	3.5	5.0	7.5	
ød	0.5		0.6		0.8	

D' = [D+0.5]Max.

L' = [L+1.0]Max. at D≤8.0

L' = [L+1.5]Max.

■ Ripple current coefficient

• Frequency

W.V	Freq(Hz)	50	120	300	1K	10K~100K
6.3~16V		0.54	0.70	0.85	0.95	1
25~35V		0.43	0.57	0.73	0.88	1
50~63V		0.39	0.55	0.71	0.86	1

• Temperature

Temperature	≤ 45°C	65°C	85°C	105°C
Factor	2.4	2.2	1.7	1.0

RMF SERIES

Standard ratings [Dimensions, Impedance, Ripple Current]

øD x L(mm)

W.V(V) Cap(μF)	6.3(0J)			10(1A)			16(1C)			25(1E)		
	SIZE	Z	I _R	SIZE	Z	I _R	SIZE	Z	I _R	SIZE	Z	I _R
33										5x11	1.67	180
47							5x11	1.40	178	6.3x11	1.25	228
68				5x11	1.72	152	6.3x11	0.98	192	6.3x11	0.78	235
100	5x11	1.8	163	6.3x11	1.20	217	6.3x11	0.77	225	8x11.5	0.55	310
150	6.3x11	1.05	225	6.3x11	0.85	277	8x11.5	0.53	337	10x12.5	0.44	440
220	6.3x11	0.75	300	8x11.5	0.56	365	10x12.5	0.37	485	10x16	0.26	620
330	8x11.5	0.48	395	10x12.5	0.38	521	10x16	0.24	670	10x20	0.21	810
470	10x12.5	0.32	580	10x16	0.25	690	10x20	0.22	850	10x20	0.14	1010
680	10x16	0.24	750	10x20	0.17	955	10x20	0.14	1080	13x20	0.13	1295
1000	10x20	0.18	795	10x20	0.14	980	13x20	0.086	1150	13x25	0.071	1410
1500	10x20	0.14	920	13x20	0.087	1100	13x25	0.072	1395	16x25	0.063	1650
2200	13x20	0.089	1170	13x25	0.073	1390	16x25	0.064	1680	16x31.5	0.053	2020
3300	13x25	0.075	1500	16x25	0.065	1750	16x31.5	0.053	1970	16x35.5	0.045	2480
4700	16x25	0.066	1820	16x31.5	0.054	2100	16x35.5	0.046	2550			
6800	16x31.5	0.055	2150	16x35.5	0.046	2550						

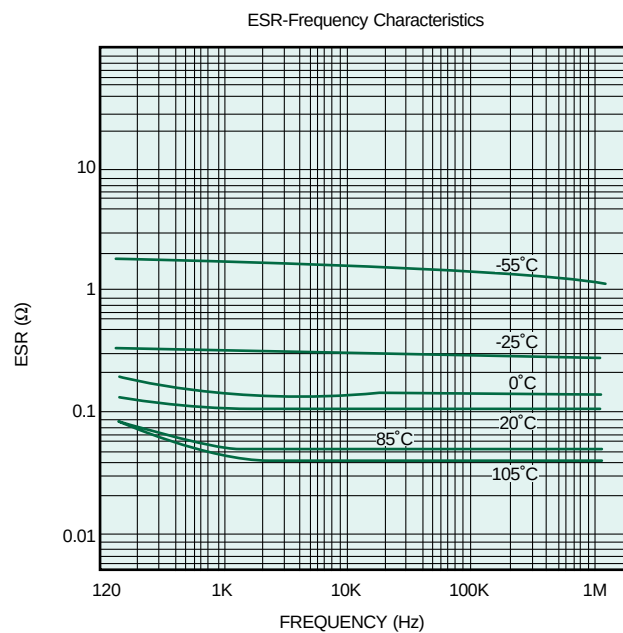
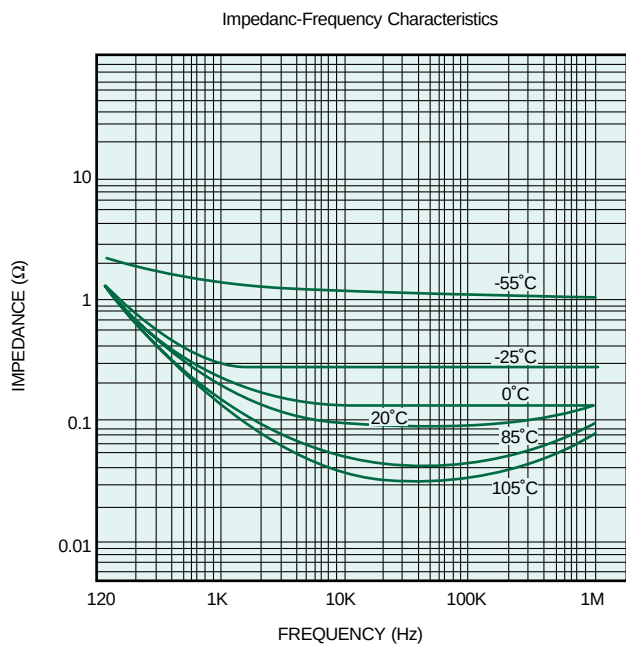
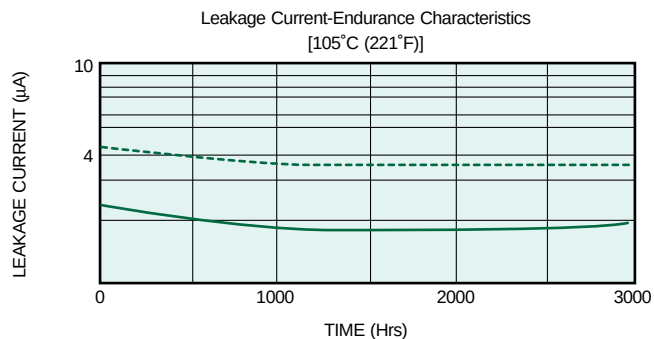
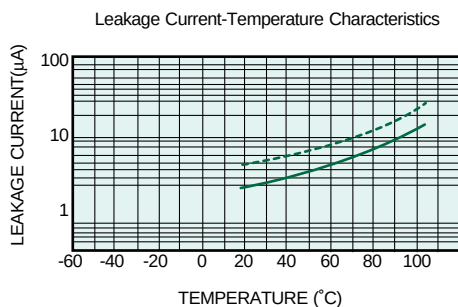
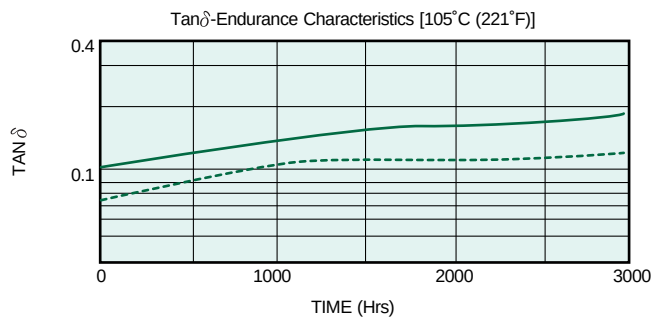
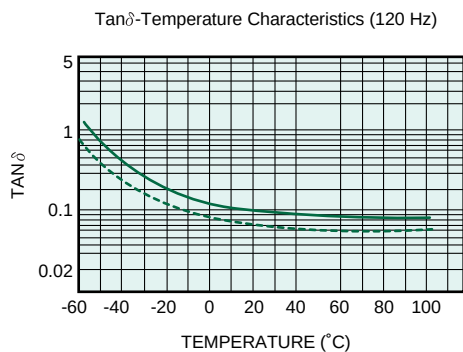
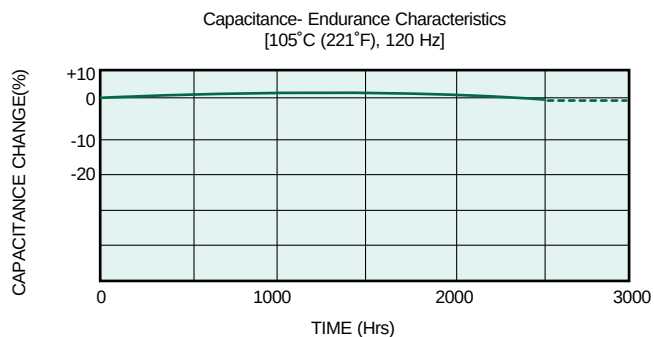
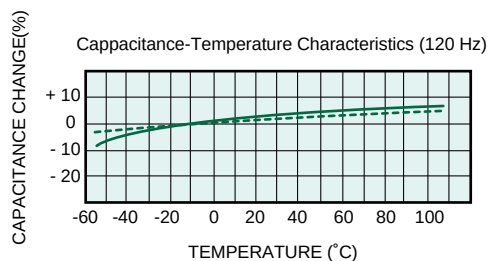
W.V(V) Cap(μF)	35(1V)			50(1H)			63(1J)		
	SIZE	Z	I _R	SIZE	Z	I _R	SIZE	Z	I _R
0.47							5x11	28	20
0.68							5x11	25	30
1.0				5x11	20.0	38	5x11	20	38
1.5				5x11	14.0	51	5x11	14	51
2.2				5x11	9.0	64	5x11	9.0	64
3.3				5x11	6.5	78	5x11	6.5	78
4.7				5x11	5.0	90	5x11	5.0	90
6.8				5x11	3.2	110	5x11	3.2	110
10				5x11	2.2	128	5x11	2.2	128
15				5x11	1.4	160	6.3x11	1.4	165
22	5x11	1.60	159	6.3x11	1.0	210	6.3x11	1.0	220
33	6.3x11	0.95	211	6.3x11	0.66	270	8x11.5	0.50	285
47	6.3x11	0.77	270	8x11.5	0.50	388	10x12.5	0.25	400
68	8x11.5	0.55	300	10x12.5	0.25	420	10x16	0.20	450
100	10x12.5	0.32	405	10x16	0.20	530	10x20	0.13	560
150	10x16	0.25	540	10x20	0.13	750	10x20	0.11	775
220	10x20	0.20	710	10x20	0.11	925	13x20	0.081	980
330	10x20	0.14	920	13x20	0.081	1250	13x25	0.068	1295
470	13x20	0.083	1250	13x25	0.068	1700	16x25	0.060	1780
680	13x25	0.070	1670	16x25	0.060	2190	16x31.5	0.050	2220
1000	16x25	0.063	1700	16x31.5	0.050	2270	16x35.5	0.048	2330
1500	16x31.5	0.052	2010	16x35.5	0.048	2490			
2200	16x31.5	0.044	2350						

I_R : Maximum permissible ripple current[mA(rms)] at 105°C,100KHz]

Z : Max. Impedance[Ω at 20°C,100KHz]

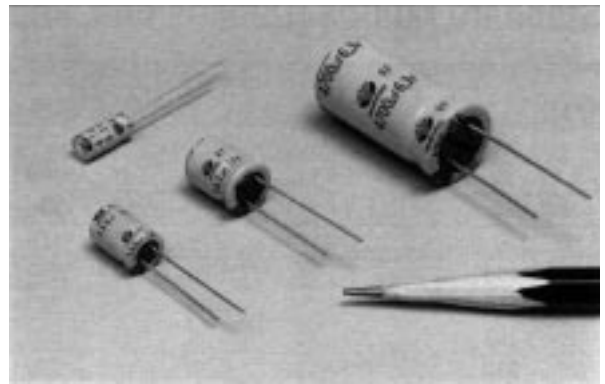
PERFORMANCE CURVES

—— 10V-1,000 μ F
 - - - - 16V-2,200 μ F



■ Features

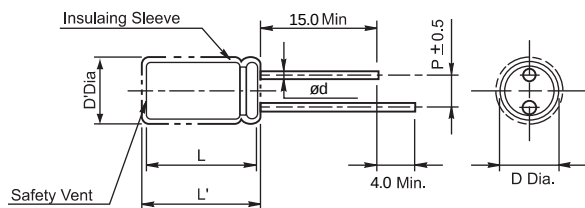
- Superminiature (Smaller than RMF)
- Low impedance at high frequency (Lower than RMF)
- For switching mode power supply
- Possible cleaning by Freon TE, TES, TMS (5 min)
- Load life of 2000 hours at 105°C



■ Specifications

Item	Performance Characteristics						
Operating temperature range	-55℃ ~ +105℃						
Rated working voltage range	6.3V ~ 50V						
Nominal capacitance range	0.47μF ~ 15000μF, ±20%(at 20℃, 120Hz)						
D.C Leakage current(at 20℃)	The following specifications shall be satisfied when the rated voltage is applied for the required time. I ≤ 0.01CV or 2μA(2 min),whichever is greater Where I =Leakage current(μA) C=Nominal capacitance(μF) V=Rated voltage(V)						
Tan δ (max., at 20℃, 120Hz)	W.V(V)	6.3	10	16	25	35	50
	Tan δ	0.24	0.20	0.16	0.14	0.12	0.10
	When capacitance is over 1000μF, Tanδ shall be added 0.02 to the listed value with increase of every each 1000μF						
Characteristics at low temperature(max.) (impedance ratio at 120Hz)	W.V(V)		6.3~10		16~35		50
	Z-55℃/Z20℃`		3		2		2
Load life	After applying rated working voltage for 2000 hours at +105℃ and then being stabilized at +20℃, capacitors shall meet following limits.						
	Capacitance change			Within ± 20% of initial measured value			
	Tan δ			≤ 200% of initial specified value			
	Leakage current			≤ Initial specified value			
Shelf life	After storage for 1000 hours at +105℃ with no voltage applied and then being stabilized at +20℃, capacitors shall meet following limits.						
	Capacitance change			Within ± 20% of initial measured value			
	Tan δ			≤ 200% of initial specified value			
	Leakage current			≤ 200% of initial specified value			

■ Case sizes and Dimensions



• Standard lead style

øD	5.0	6.3	8.0	10.0	13.0	16.0	18.0
P	2.0	2.5	3.5	5.0		7.5	
ød	0.5		0.6			0.8	

D' = [D+0.5]Max.

L' = [L+1.0]Max. at D ≤ 8.0

L' = [L+1.5]Max. at D ≥ 10.0

■ Ripple current coefficient

• Frequency

W.V	Freq(Hz)					
	50	120	400	1K	10K	100K
Cap ≤ 4.7	0.34	0.46	0.54	0.70	0.83	1
4.7 < Cap ≤ 47	0.45	0.57	0.68	0.80	0.87	1
47 < Cap ≤ 330	0.55	0.70	0.76	0.88	0.90	1
330 < Cap ≤ 1000	0.67	0.78	0.88	0.90	0.92	1
1000 < Cap	0.82	0.84	0.90	0.94	0.97	1

• Temperature

Temperature	≤ 70°C	85°C	105°C
Factor	1.65	1.4	1.0

Standard ratings [Dimensions, Impedance, Ripple Current]

øD x L (mm)

Cap(μF) \ W.V(V)	6.3(0J)			10(1A)			16(1C)		
	SIZE	Z	I _R	SIZE	Z	I _R	SIZE	Z	I _R
10							5 x 11	0.78	180
22	5 x 11	0.78	180	5 x 11	0.78	180	5 x 11	0.78	180
33	5 x 11	0.78	180	5 x 11	0.78	180	5 x 11	0.78	180
47	5 x 11	0.78	180	5 x 11	0.78	180	5 x 11	0.78	180
100	5 x 11	0.78	180	5 x 11	0.78	180	6.3x11	0.33	280
150	6.3 x 11	0.33	280	6.3 x 11	0.33	280	6.3x11	0.33	280
220	6.3 x 11	0.33	280	6.3 x 11	0.33	280	8x11.5	0.18	450
330	6.3 x 11	0.33	280	8 x 11.5	0.18	450	8x11.5	0.18	450
470	8 x 11.5	0.18	450	8 x 11.5	0.18	450	10x12.5	0.12	660
680	10 x 12.5	0.12	660	10 x 12.5	0.12	660	10x16	0.091	850
1000	10 x 12.5	0.12	660	10 x 16	0.11	850	10x20	0.069	1100
1500	10 x 20	0.070	1100	10 x 20	0.069	1100	13x20	0.065	1400
2200	13 x 20	0.065	1400	13 x 20	0.065	1400	13x25	0.049	1700
3300	13 x 20	0.065	1400	13 x 25	0.038	1700	16x25	0.033	2100
4700	16 x 25	0.033	2100	16 x 25	0.032	2100	16x31.5	0.028	2600
6800	16 x 25	0.033	2100	16 x 31.5	0.028	2600	18x35.5	0.026	3000
10000	16 x 31.5	0.029	2600	18 x 35.5	0.023	3000	18x40	0.023	3600
15000	18 x 35.5	0.026	3000	18 x 40	0.023	3600			

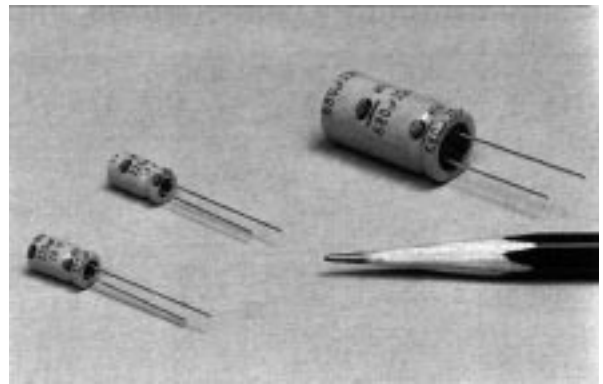
Cap(μF) \ W.V(V)	25(1E)			35(1V)			50(1H)		
	SIZE	Z	I _R	SIZE	Z	I _R	SIZE	Z	I _R
0.47							5x11	6.50	25
1.0							5x11	4.55	40
2.2							5x11	3.90	55
3.3							5x11	3.38	65
4.7	5x11	0.78	180	5x11	0.78	180	5x11	2.99	90
10	5x11	0.78	180	5x11	0.78	180	5x11	1.82	120
22	5x11	0.78	180	5x11	0.78	180	5x11	1.56	150
33	5x11	0.78	180	5x11	0.78	180	6.3x11	0.56	250
47	5x11	0.78	180	6.3x11	0.33	280	6.3x11	0.56	250
100	6.3x11	0.33	280	8x11.5	0.18	450	8x11.5	0.31	340
150	8x11.5	0.18	450	8x11.5	0.18	450	10x12.5	0.22	490
220	8x11.5	0.18	450	10x12.5	0.12	660	10x16	0.16	650
330	10x12.5	0.12	660	10x16	0.091	850	10x20	0.13	810
470	10x16	0.091	850	10x20	0.069	1100	13x20	0.11	1100
680	10x20	0.069	1100	13x20	0.065	1400	13x25	0.085	1200
1000	13x20	0.065	1400	13x25	0.049	1700	16x25	0.056	1600
1500	16x25	0.033	2100	16x25	0.033	2100	16x31.5	0.049	2000
2200	16x25	0.033	2100	16x31.5	0.028	2600	18x35.5	0.044	2300
3300	16x31.5	0.028	2600	18x35.5	0.026	3000			
4700	18x35.5	0.026	3000	18x40	0.023	3600			
6800	18x40	0.023	3600						

I_R : Maximum permissible ripple current[mA(rms) at 105°C,100KHz]

Z : Max. Impedance[Ω at 20°C,100KHz]

■ Features

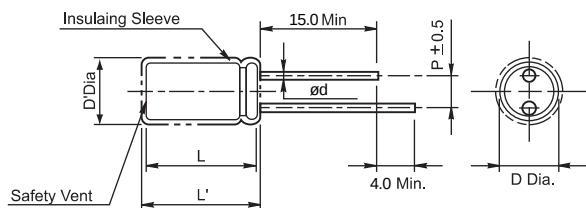
- Miniature, Radial
- Extremely low impedance at high frequency
- For switching mode power supply
- Load life of 5000 hours at 105°C



■ Specifications

Item	Performance Characteristics						
Operating temperature range	-55°C ~ +105°C						
Rated working voltage range	6.3V ~ 50V						
Nominal capacitance range	10 ~ 15000μF						
D.C Leakage current(at 20°C)	The following specifications shall be satisfied when the rated voltage is applied for the required time. I ≤ 0.03CV or 4μA (2 min),Whichever is greater Where I =Leakage current(μA) C=Nominal capacitance(μF) V=Rated voltage(V)						
Tan δ (max., at 20°C, 120Hz)	W.V(V)	6.3	10	16	25	35	50
	Tan δ	0.24	0.20	0.16	0.14	0.12	0.10
	When capacitance is over 1000μF, Tan δ shall be added 0.02 to the listed value with increase of every each 1000μF						
Characteristics at low temperature(max.) (impedance ratio at 120Hz)	W.V(V)	6.3	10	16	25	35	50
	Z-55°C/Z20°C	4	4	3	3	3	2
Load life	After applying rated working voltage for 5000 hours (ø5, 6.3 : 2000 hours, ø8 : 3000 hours) at +105°C, and then being stabilized at +20°C, capacitors shall meet following limits.						
	Capacitance change			Within ± 20% of initial measured value			
	Tan δ			≤ 200% of initial specified value			
	Leakage current			≤ Initial specified value			
Shelf life	After storage for 1000 hours at +105°C with no voltage applied and then being stabilized at +20°C, capacitors shall meet following limits.						
	Capacitance change			Within ± 20% of initial measure value			
	Tan δ			≤ 200% of initial specified value			
	Leakage current			≤ 200% of initial specified value			

■ Case sizes and Dimensions



• Standard lead style

øD	5.0	6.3	8.0	10.0	13.0	16.0	18.0
P	2.0	2.5	3.5	5.0		7.5	
ød	0.5		0.6			0.8	

D' = [D+0.5]Max.

L' = [L+1.0]Max. at D ≤ 8.0

L' = [L+1.5]Max. at D ≥ 10.0

■ Ripple current coefficient

• Frequency

Cap(μF)	Freq(Hz)	50	120	400	1K	10K	100K
Cap ≤ 4.7		0.34	0.46	0.54	0.70	0.83	1.0
4.7 < Cap ≤ 47		0.45	0.57	0.68	0.80	0.87	1.0
47 < Cap ≤ 330		0.55	0.70	0.76	0.88	0.90	1.0
330 < Cap ≤ 1000		0.67	0.78	0.88	0.90	0.92	1.0
1000 < Cap		0.82	0.84	0.90	0.94	0.97	1.0

• Temperature

Temperature	≤ 70°C	85°C	105°C
Factor	1.65	1.4	1.0

Standard ratings [Dimensions, Impedance, Ripple Current]

øD x L(mm)

Cap(μF)	W.V	6.3(OJ)			10(IA)			16(IC)		
		SIZE	I _R	Z	SIZE	I _R	Z	SIZE	I _R	Z
47								5x11	155	0.80
68					5x11	155	0.80	6.3x11	220	0.50
100		5x11	150	0.85	6.3x11	210	0.55	6.3x11	265	0.35
150		6.3x11	225	0.49	6.3x11	265	0.30	8x11.5	370	0.23
220		6.3x11	285	0.30	6.3x11	290	0.29	8x11.5	460	0.18
330		6.3x11	295	0.30	8x11.5	445	0.17	10x12.5	620	0.12
470		10x12.5	500	0.14	10x12.5	590	0.12	10x16	740	0.095
680		10x16	700	0.11	10x16	770	0.095	10x20	1010	0.065
1000		10x20	900	0.085	10x20	1010	0.065	13x20	1350	0.050
1500		10x20	1050	0.065	13x20	1370	0.048	13x25	1600	0.036
2200		13x20	1400	0.042	13x25	1650	0.034	16x25	1900	0.030
3300		13x25	1700	0.035	16x25	2180	0.026	16x31.5	2200	0.023
4700		16x25	2100	0.028	16x31.5	2400	0.023	18x31.5	2500	0.022
6800		16x31.5	2350	0.025	16x35.5	2550	0.022	18x35.5	2900	0.018
10000		18x31.5	2550	0.023	18x40	3040	0.018			
15000		18x40	2950	0.018						

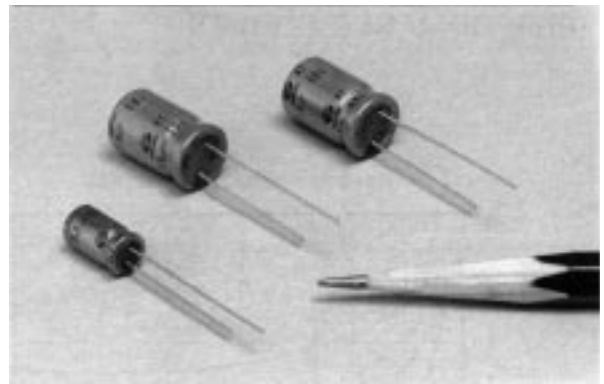
Cap(μF)	W.V	25(IE)			35(IV)			50(IH)		
		SIZE	I _R	Z	SIZE	I _R	Z	SIZE	I _R	Z
10								5x11	115	1.4
15								5x11	145	0.93
22					5x11	160	0.75	6.3x11	195	0.65
33		5x11	155	0.80	6.3x11	225	0.49	6.3x11	240	0.43
47		6.3x11	210	0.55	6.3x11	270	0.34	8x11.5	390	0.30
68		6.3x11	260	0.36	8x11.5	420	0.23	8x11.5	410	0.20
100		8x11.5	370	0.25	8x11.5	460	0.16	10x16	580	0.16
150		8x11.5	450	0.16	10x12.5	525	0.14	10x20	820	0.10
220		10x12.5	600	0.13	10x16	770	0.09	10x20	1010	0.075
330		10x16	750	0.095	10x20	1015	0.065	13x20	1300	0.055
470		10x20	1010	0.065	13x20	1400	0.050	13x25	1500	0.044
680		13x20	1400	0.046	13x25	1660	0.036	16x25	1850	0.036
1000		13x25	1650	0.036	16x25	1950	0.030	16x31.5	2120	0.030
1500		16x25	1950	0.030	16x31.5	2360	0.027	18x31.5	2220	0.028
2200		16x31.5	2350	0.025	16x35.5	2550	0.024	18x40	2560	0.024
3300		16x35.5	2550	0.022	18x40	3040	0.017			
4700		18x35.5	2960	0.018						

I_R = Max. permissible ripple current[mA(rms) at 105°C, 100KHz]

Z = Max. Impedance [Ω at 20°C, 100KHz]

■ Features

- Wide operating temperature range, Radial (-55°C ~ +105°C)
- Close capacitance tolerance.
- Excellent low temperature characteristics.
- For TV vertical circuit, O.S.C circuit, timing circuit etc.
- load life of 1000 hours at 105°C

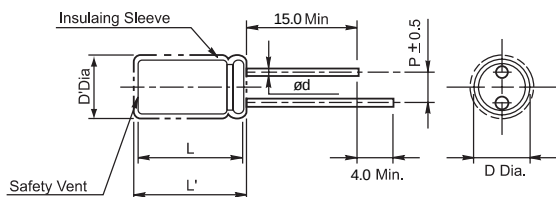


■ Specifications

Item	Performance Characteristics		
Operating temperature range	-55°C ~ +105°C		
Rated working voltage range	16V ~ 50V		
Nominal capacitance range	0.47μF ~ 470μF, ±20% or ±10%(at 20°C, 120Hz)		
D.C Leakage current(at 20°C)	The following specifications shall be satisfied when the rated voltage is applied for the required time. I ≤ 0.002CV+1μA(1 min) Where I=Leakage current(μA) C=Nominal capacitance(μF) V=Rated voltage(V)		
Tan δ (max., at 20°C, 120Hz)	0.08 Max.		
Characteristics at low and high temperature	• Impedance ratio(at 120Hz):2 Max.(Z-55°C/Z20°C)		
	• Temperature characteristic(at 120Hz)		
	Temp.	Capacitance change 20°C	Tan δ
	-40°C	-20% Max.	0.3Max.
Load life	+85°C	+15% Max.	0.08Max.
	After applying rated working voltage for 1000 hours at +105°C and then being stabilized at +20°C, capacitors shall meet following limits.		
	Capacitance change	Within ±15% of initial measured value	
	Tan δ	≤ 150% of initial specified value	
Shelf life	Leakage current	≤ Initial specified value	
	After storage for 1000 hours at +105°C with no voltage applied and then being stabilized at +20°C, capacitors shall meet following limits.		
	Capacitance change	Within ±20% of initial measured value	
	Tan δ	≤ 150% of initial specified value	
	Leakage current	≤ 200% of initial specified value	

■ Case sizes and Dimensions

■ Dimensions & Maximum permissible ripple current [mA(rms) at 85°C, 120Hz]



• Standard lead style

øD	6.3	8.0	10.0	13.0	16.0
p	2.5	3.5	5.0	7.5	
ød	0.5		0.6	0.8	

D' = [D+0.5]Max.

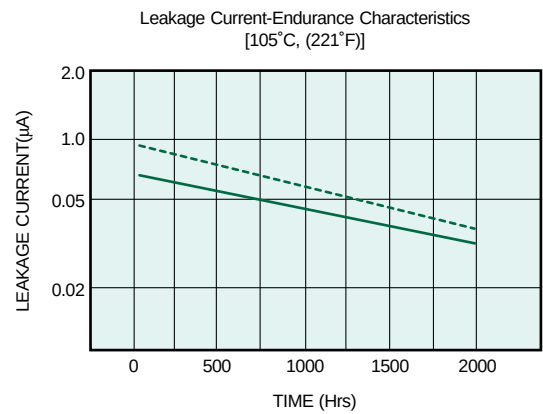
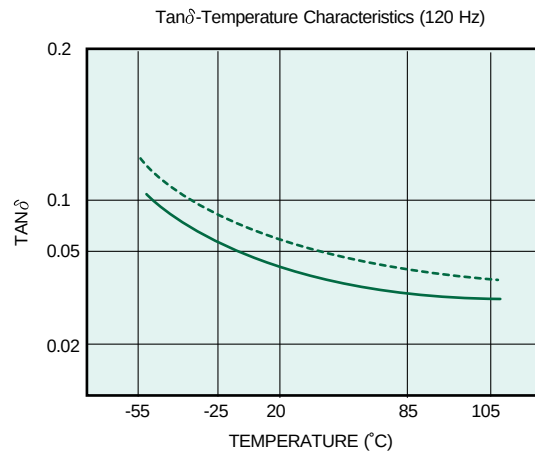
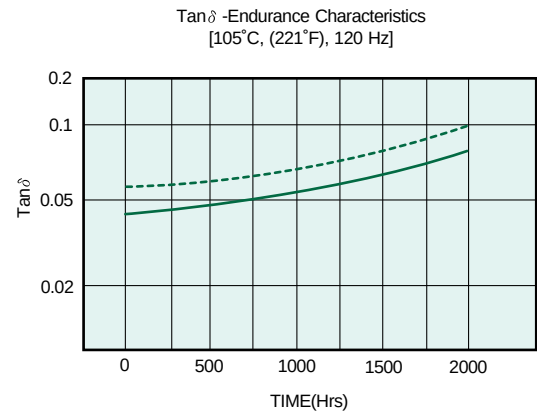
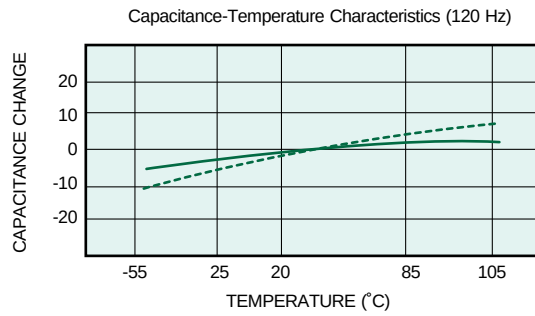
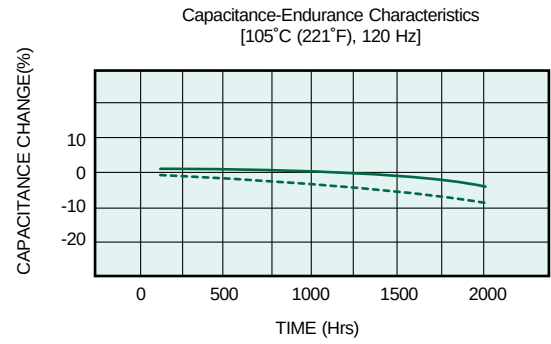
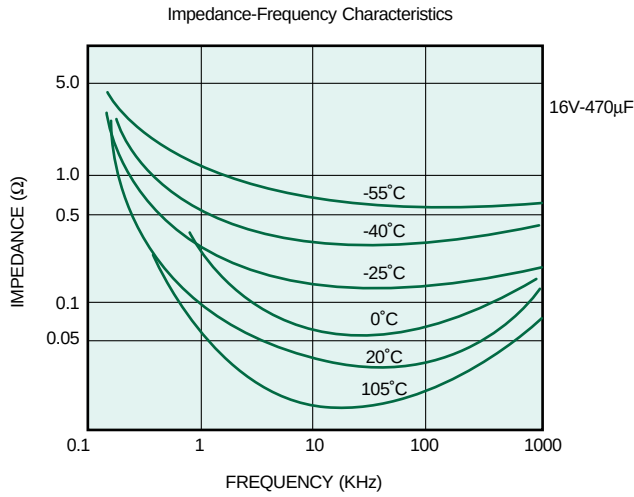
L' = [L+1.0]Max. at D ≤ 8.0

L' = [L+1.5]Max. at D ≥ 10.0

Cap(μF)	W.V(V)	øD × L(mm)					
		16		25		50	
		SIZE	I _R	SIZE	I _R	SIZE	I _R
0.47						6.3×11	9
1.0						6.3×11	16
2.2						6.3×11	21
3.3				6.3×11	22	6.3×11	30
4.7				6.3×11	35	8×11.5	35
10		8×11.5	45	10×12.5	61	10×16	61
22		10×16	80	10×16	105	10×20	120
33		10×16	115	10×20	140	13×20	155
47		10×20	145	13×20	175	13×25	210
100		13×20	250	13×25	290	16×25	340
220		13×25	400	16×25	480	16×35.5	550
330		16×25	480	16×31.5	580		
470		16×35.5	725				

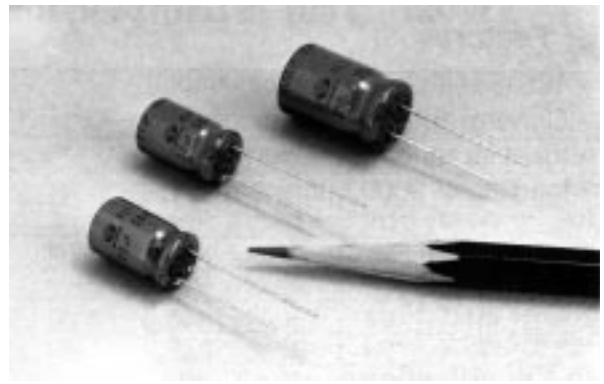
PERFORMANCE CURVES

— 50V-47 μ F
 - - - 16V-470 μ F



■ Features

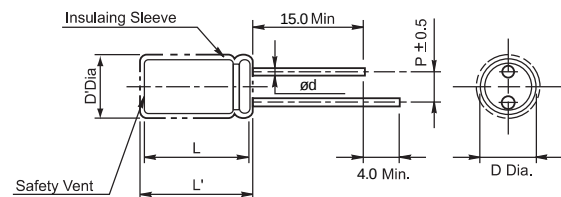
- For timing circuit, Radial
- Narrow capacitance tolerance($\pm 10\%$)
- Very low leakage current(0.001 CV)
- Excellent shelf life
- Load life of 2000 hours at 85°C



■ Specifications

Item	Performance Characteristics					
Operating temperature range	-40°C ~ +85°C					
Rated working voltage range	10V ~ 50V					
Nominal capacitance range	1μF ~ 2200μF, ±10%(at 20°C, 120Hz)					
D.C Leakage current(at 20°C)	The following specifications shall be satisfied when the rated voltage is applied for the required time. I ≤ 0.001CV or 1μA(2 min), whichever is greater Where I=Leakage current(μA) C=Nominal capacitance(μF) V=Rated voltage(V)					
Tan δ (max., at 20°C, 120Hz)	W.V(V)	10	16	25	35	50
	Tan δ	0.17	0.13	0.10	0.10	0.08
Characteristics at low temperature(max.) (impedance ratio at 120Hz)	W.V(V)	10	16	25	35	50
	Z-25°C/Z20°C	3	3	3	2	2
	Z-40°C/Z20°C	6	6	6	4	4
Load life	After applying rated working voltage for 2000 hours at +85°C and then being stabilized at +20°C , capacitors shall meet following limits.					
	Capacitance change		Within ±10% of initial measured value			
	Tan δ		≤ 150% of initial specified value			
	Leakage current		≤ Initial specified value			
Shelf life	After storage for 1000 hours at +85°C with no voltage applied and then being stabilized at +20°C, capacitors shall meet following limits.					
	Capacitance change		Within ±10% of initial measured value			
	Tan δ		≤ 150% of initial specified value			
	Leakage current		≤ 200% of initial specified value			

■ Case sizes and Dimensions



• Standard lead style

ØD	6.3	8.0	10.0	13.0	16.0	18.0
p	2.5	3.5	5.0	7.5		
Ød	0.5		0.6	0.8		

D' = [D+0.5]Max.

L' = [L+1.0]Max. at D ≤ 8.0

L' = [L+1.5]Max. at D ≥ 10.0

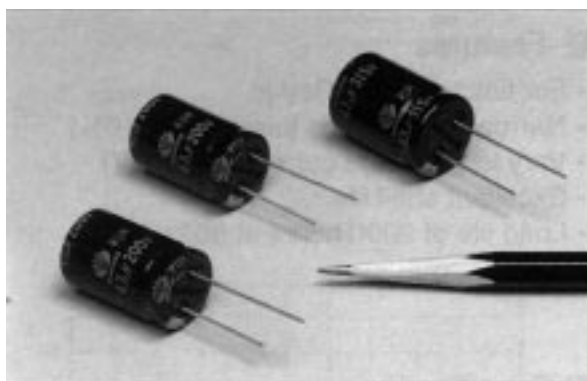
■ Dimensions & Maximum permissible ripple current [mA(rms) at 85°C, 120Hz]

ØD × L (mm)

w.v	10		16		25		35		50	
Cap(μF)	SIZE	I _r	SIZE	I _r	SIZE	I _r	SIZE	I _r	SIZE	I _r
1.0									6.3x11	17
2.2									6.3x11	27
3.3									6.3x11	44
4.7							6.3x11	45	8x11.5	50
10					6.3x11	60	8x11.5	80	10x12.5	100
22					8x11.5	120	10x12.5	135	10x16	170
33			8x11.5	150	10x12.5	155	10x16	160	10x20	210
47	8x11.5	175	10x12.5	190	10x16	210	10x20	220	13x20	320
100	10x16	290	10x20	330	13x20	340	13x20	360	13x25	470
220	10x20	480	13x20	545	13x25	550	16x25	600	16x31.5	750
330	13x20	580	13x25	630	16x25	680	16x35.5	760	18x31.5	800
470	13x25	780	16x25	700	16x31.5	850	18x40	900		
1000	16x31.5	1100	16x35.5	1150	18x40	1250				
2200	18x40	1250								

■ Features

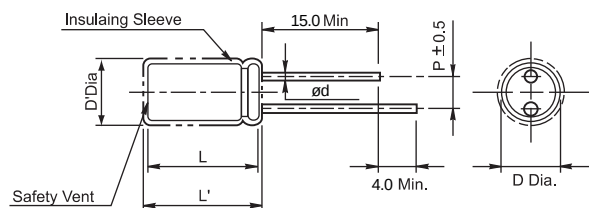
- 105°C High performance, Radial
- General and industrial application
- Ideal for automatic insertion
- load life of 3000 hours at 105°C



■ Specifications

Item	Performance Characteristics						
Operating temperature range	-40°C ~ +105°C						
Rated working voltage range	6.3V ~ 250V						
Nominal capacitance range	4.7μF ~ 10000μF, ±20%(at 20°C, 120Hz)						
D.C Leakage current(at 20°C)	The following specifications shall be satisfied when the rated voltage is applied for the required time. I ≤ 0.01CV + 3μA(2 min) Where =Leakage current(μA) C=Nominal capacitance(μF) V=Rated voltage(V)						
Tan δ(max., at 20°C, 120Hz)	W.V(V)	6.3	10	16~25	35	50~100	160~250
	Tan δ	0.28	0.24	0.20	0.17	0.15	0.12
	When capacitance is over 1000μF, Tan δ shall be added 0.02 to the listed value with increase of every each 1000μF						
Characteristics at low temperature(max.) (impedance ratio at 120Hz)	W.V(V)	6.3	10	16	25	35	50~100
	Z-25°C/Z20°C	4	3	2	2	2	2
	Z-40°C/Z20°C	8	6	4	4	4	3
Load life	After applying rated working voltage for 3000 hours at +105°C and then being stabilized at +20°C, capacitors shall meet following limits.						
	Capacitance change			Within ±20% of initial measured value			
	Tan δ			≤ 200% of initial specified value			
	Leakage current			≤ Initial specified value			
Shelf life	After storage for 1000 hours at +105°C with no voltage applied and then being stabilized at +20°C, capacitors shall meet following limits.						
	Capacitance change			Within ±20% of initial measured value			
	Tan δ			≤ 200% of initial specified value			
	Leakage current			≤ 200% of initial specified value			

■ Case sizes and Dimensions



• Standard lead style

ØD	8.0	10.0	13.0	16.0	18.0
p	3.5	5.0		7.5	
Ød		0.6		0.8	

D' = [D+0.5]Max.

L' = [L+1.0]Max. at D ≤ 8.0

L' = [L+1.5]Max. at D ≥ 10.0

■ Ripple current coefficient

• Frequency

Cap(μF)	Freq(Hz)	50	120	400	1K	10K	50~100K
Cap ≤ 10		0.8	1	1.30	1.45	1.65	1.70
10 < Cap ≤ 100		0.8	1	1.23	1.36	1.48	1.53
100 < Cap ≤ 1000		0.8	1	1.16	1.25	1.35	1.38
1000 < Cap		0.8	1	1.11	1.17	1.25	1.28

• Temperature

Temperature	≤ 70°C	85°C	105°C
Factor	1.65	1.40	1.0

Dimensions & Maximum permissible ripple current [mA(rms) at 105°C, 120HZ]

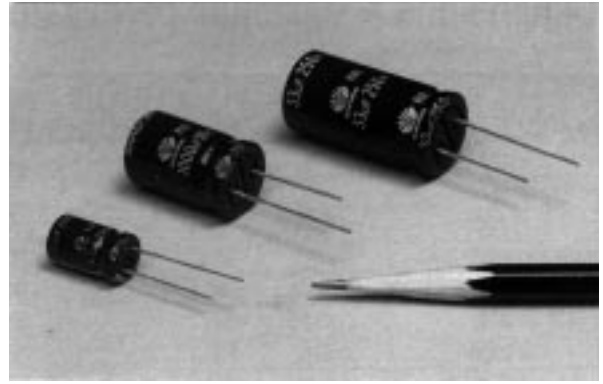
øD x L(mm)

W.V Cap(μF)	6.3		10		16		25		35		50	
	SIZE	I _R	SIZE	I _R	SIZE	I _R	SIZE	I _R	SIZE	I _R	SIZE	I _R
33											8x11.5	150
47									8x11.5	170	8x11.5	180
100					8x11.5	180	8x11.5	200	10x12.5	240	10x16	300
220	8x11.5	180	8x11.5	200	10x12.5	270	10x16	350	10x20	420	13x20	460
330	10x12.5	250	10x12.5	250	10x16	340	10x20	440	13x20	520	13x20	580
470	10x12.5	320	10x16	340	10x20	440	13x20	520	13x25	620	16x25	710
1000	10x20	520	13x20	560	13x25	780	16x25	800	16x25	870	16x31.5	1020
2200	13x25	800	16x25	900	16x25	1150	16x35.5	1230	18x35.5	1360		
3300	16x25	1030	16x31.5	1190	16x35.5	1590	18x40	1630				
4700	16x31.5	1270	16x35.5	1420	18x35.5	1890						
6800	16x35.5	1750	18x40	1850								
10000	18x40	2040										

W.V Cap(μF)	63		80		100		160		200		250	
	SIZE	I _R	SIZE	I _R	SIZE	I _R	SIZE	I _R	SIZE	I _R	SIZE	I _R
4.7											10x16	50
10					8x11.5	100	10x20	70	10x20	80	13x20	85
22	8x11.5	120			10x12.5	170	13x20	120	13x20	140	13x25	140
33	8x11.5	150	10x16	180	10x16	210	13x25	160	13x25	170	16x25	180
47	10x12.5	190	10x16	240	10x20	270	16x25	200	16x25	210	16x31.5	230
100	10x20	340	13x20	350	13x20	420	16x35.5	300	16x35.5	340	18x40	360
220	13x20	500	13x25	550	16x25	620						
330	13x25	550	16x31.5	700	16x31.5	780						
470	16x25	730	16x35.5	880	16x35.5	1000						
1000	18x35.5	1220										

■ Features

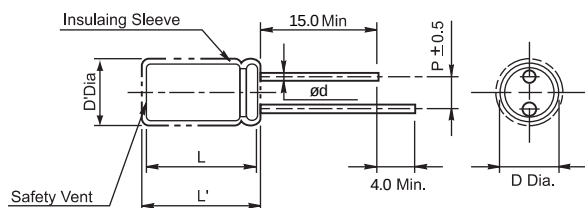
- Long life and excellent stability, Radial (equivalent to 13years at 60°C)
- No derating at high temperature
- Industrial and military applications
- load life of 5000 hours at 105°C



■ Specifications

Item	Performance Characteristics											
Operating temperature range	-40°C ~ +105°C											
Rated working voltage range	10V ~ 250V											
Nominal capacitance range	1μF ~ 2200μF, ±20%(at 20°C, 120Hz)											
D.C Leakage current(at 20°C)	The following specifications shall be satisfied when the rated voltage is applied for the required time. I ≤ 0.01CV +2μA(10~100V) (3 min) I ≤ 0.04CV +100μA(160~250V) (3 min) Where I=Leakage current(μA) C=Nominal capacitance(μF) V=Rated voltage(V)											
Tan δ (max., at 20°C, 120Hz)	W.V(V)	10	16	25	35	50	63	100	160	200	250	
	Tan δ	0.20	0.17	0.16	0.13	0.12	0.12	0.12	0.15	0.15	0.15	
	When capacitance is over 1000μF, Tan δ shall be added 0.02 to the listed value with increase of every each 1000μF											
Characteristics at low temperature(max.) (impedance ratio at 120Hz)	W.V(V)		10	16	25	35~100			160~250			
	Z-25°C/Z20°C		3	2	2	2			2			
	Z-40°C/Z20°C		6	5	4	3			3			
Load life	After applying rated working voltage for 5000 hours at +105°C and then being stabilized at +20°C, capacitors shall meet following limits.											
	Capacitance change				Within ±20% of initial measured value							
	Tan δ				≤ 200% of initial specified value							
	Leakage current				≤ Initial specified value							
Shelf life	After storage for 1000 hours at +105°C with no voltage applied and then being stabilized at +20°C, capacitors shall meet following limits.											
	Capacitance change				Within ±20% of initial measured value							
	Tan δ				≤ 200% of initial specified value							
	Leakage current				≤ 200% of initial specified value							

■ Case sizes and Dimensions



• Standard lead style

øD	10.0	13.0	16.0	18.0
p	5.0		7.5	
ød	0.6		0.8	

D' = [D+0.5]Max.

L' = [L+1.5]Max. at D≥10.0

■ Ripple current coefficient

• Frequency

Cap(μF) \ Freq(Hz)	50	120	400	1K	10K	50~100K
Cap ≤ 10	0.8	1	1.30	1.45	1.65	1.70
10 < Cap ≤ 100	0.8	1	1.23	1.36	1.48	1.53
100 < Cap ≤ 1000	0.8	1	1.16	1.25	1.35	1.38
1000 < Cap	0.8	1	1.11	1.17	1.25	1.28

• Temperature

Temperature	≤ 70°C	85°C	105°C
Factor	2.2	1.8	1.0

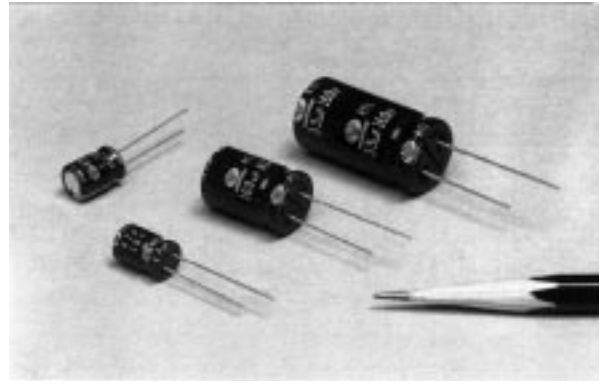
Dimensions & Maximum permissible ripple current [mA(rms) at 105°C, 120Hz]

øD x L(mm)

W.V Cap(µF)	10		16		25		35		50		63		100		160		200		250	
	SIZE	I _R	SIZE	I _R	SIZE	I _R	SIZE	I _R	SIZE	I _R	SIZE	I _R	SIZE	I _R	SIZE	I _R	SIZE	I _R	SIZE	I _R
1.0																	10x16	26	10x16	32
1.5																	10x16	34	10x16	42
2.2																	10x16	46	10x16	56
3.3																	10x16	61	10x20	77
4.7																	10x20	79	13x20	100
6.8																	13x20	105	13x25	130
10													10x20	140	13x20	125	13x25	135	16x25	175
15													10x20	205	13x25	170	16x25	185	16x31.5	235
22													13x20	295	16x25	225	16x25	240	16x35.5	310
33									10x20	190	10x20	155	13x25	430	16x31.5	295	16x35.5	315	18x35.5	420
47									10x20	245	10x20	200	16x25	610	16x35.5	390	18x35.5	410	18x40	540
68									10x20	320	13x20	265								
100			10x16	185	10x20	255	10x20	290	13x20	410	13x20	350								
150			10x20	295	13x20	345	13x20	390	13x25	540	13x25	480								
220	10x20	330	13x20	395	13x20	450	13x25	515	16x25	710	16x25	630								
330	13x20	435	13x25	530	13x25	600	16x25	690	16x31.5	930	16x35.5	860								
470	13x20	570	16x25	690	16x25	770	16x25	890												
680	13x25	750	16x25	920	16x31.5	1000														
1000	16x25	970	16x31.5	1230	16x35.5	1320														
2200	16x35.5	1720																		

■ Features

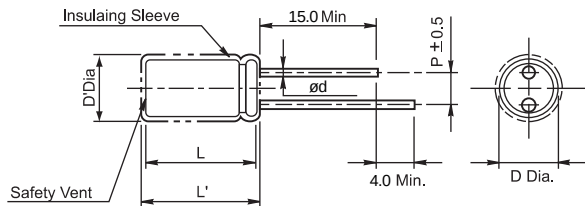
- Extended Operating temperature range
(-40°C ~ +125°C)
Radial (Equivalent to 16000 hours life at 85°C)
- very low leakage current
- Low impedance value at high frequency
- Low dissipation factor



■ Specifications

Item	Performance Characteristics						
Operating temperature range	-40°C ~ +125°C						
Rated working voltage range	10V ~ 250V						
Nominal capacitance range	0.47μF ~ 1000μF, -10%~+50%(at 20°C, 120Hz)						
D.C Leakage current(at 20°C)	The following specifications shall be satisfied when the rated voltage is applied for the required time. I =0.002CV or 2μA(5 min) at 10~100V, whichever is greater I =0.002CV + 10μA(5 min) at 160~250V Where I =Leakage current(μA) C=Nominal capacitance(μF) V=Rated voltage(V)						
Tan δ (max., at 20°C, 120Hz)	W.V(V)	10	16	25	35	50~100	160~250
	Tan δ	0.20	0.17	0.17	0.12	0.10	0.20
Characteristics at low temperature(max.) (impedance ratio at 120Hz)	W.V(V)	10	16	25	35~100	160~250	
	Z-25°C/Z20°C	2	2	2	2	2	
	Z-40°C/Z20°C	8	6	5	4	4	
Load life	After applying rated working voltage for 1000 hours at +125°C and then being stabilized at +20°C, capacitors shall meet following limits.						
	Capacitance change			Within ±15% of initial measured value			
	Tan δ			≤ 150% of initial specified value			
	Leakage current			≤ Initial specified value			
Shelf life	After storage for 1000 hours at +125°C with no voltage applied and then being stabilized at +20°C, capacitors shall meet following limits.						
	Capacitance change			Within ±15% of initial measured value			
	Tan δ			≤ 150% of initial specified value			
	Leakage current			≤ 200% of initial specified value			

■ Case sizes and Dimensions



• Standard lead style

øD	8.0	10.0	13.0	16.0	18.0
p	3.5	5.0		7.5	
ød		0.6		0.8	

D' = [D+0.5]Max.

L' = [L+1.0]Max. at D ≤ 8.0

L' = [L+1.5]Max. at D ≥ 10.0

■ Ripple current coefficient

• Frequency

Cap(μF) \ Freq(Hz)	50	120	400	1K	10K	50~100K
Cap ≤ 10	0.8	1	1.30	1.45	1.65	1.70
10 < Cap ≤ 100	0.8	1	1.23	1.36	1.48	1.53
100 < Cap ≤ 1000	0.8	1	1.16	1.25	1.35	1.38

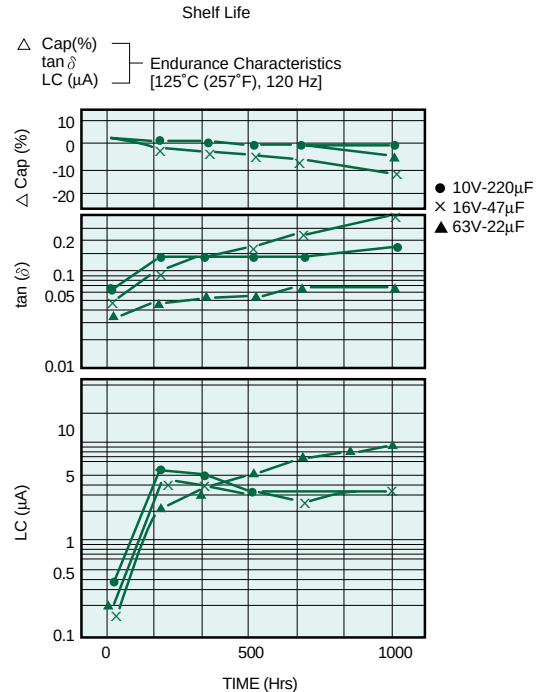
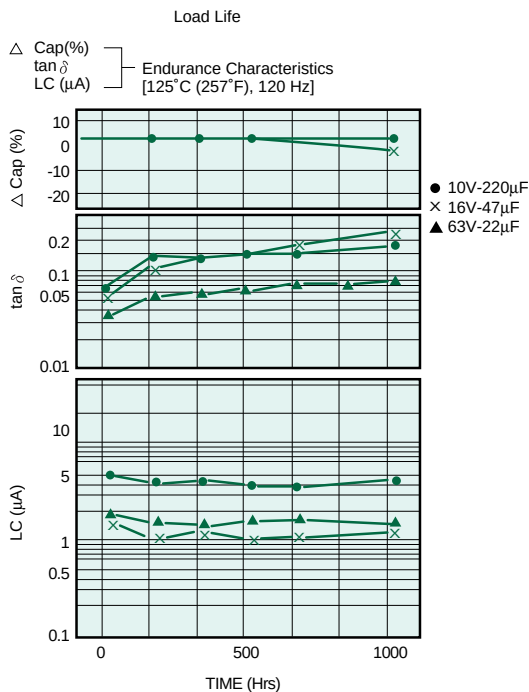
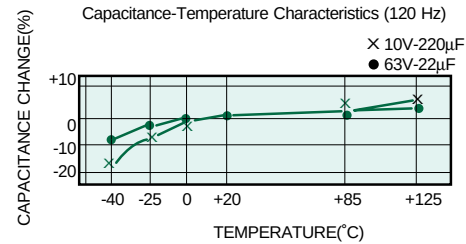
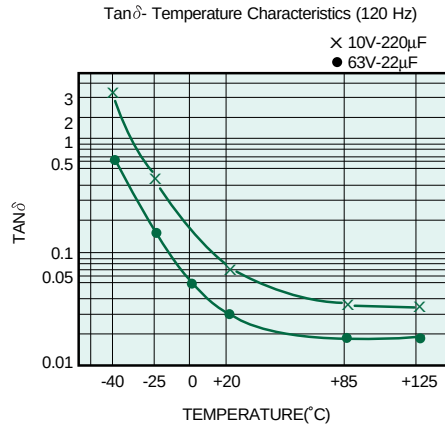
• Temperature

Temperature	≤ 85°C	105°C	125°C
Factor	2.0	1.4	1.0

Dimensions & Maximum permissible ripple current [mA(rms) at 125°C, 120Hz]

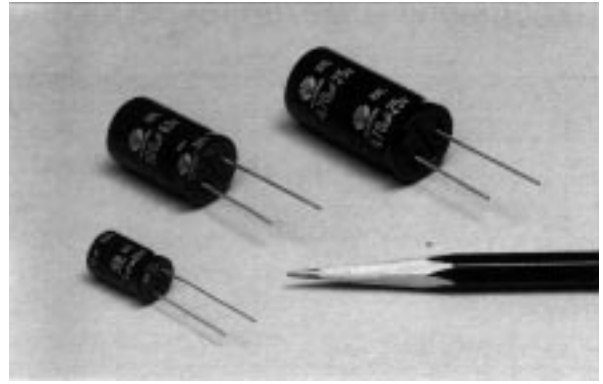
ØD x L (mm)																				
WV	10	16	25	35	50	63	100	160	200	250										
Cap(µF)	SIZE	I _R	SIZE	I _R	SIZE	I _R	SIZE	I _R	SIZE	I _R	SIZE	I _R	SIZE	I _R	SIZE	I _R	SIZE	I _R	SIZE	I _R
0.47									8 x 11.5	11	8 x 11.5	11								
1.0									8 x 11.5	17	8 x 11.5	17			8 x 11.5	20			10 x 16	30
2.2									8 x 11.5	25	8 x 11.5	25	8 x 16	32			10 x 16	38	10 x 20	45
3.3									8 x 11.5	31	8 x 11.5	31	10 x 16	39	10 x 16	43	10 x 20	54	10 x 20	67
4.7									8 x 11.5	37	8 x 11.5	37	10 x 16	51	10 x 20	60	10 x 20	75	13 x 25	93
10									8 x 11.5	59	8 x 11.5	59	10 x 20	94	13 x 20	110	13 x 25	130	16 x 25	155
22						8 x 11.5	99	10 x 16	102	10 x 16	102	13 x 25	178	16 x 25	185	16 x 31.5	200			
33					8 x 11.5	101		10 x 20	172	10 x 20	172	16 x 25	246	16 x 35.5	250					
47			8 x 11.5	136			10 x 16	187	13 x 20	240	13 x 20	240	16 x 31.5	336						
100	8 x 16	176			10 x 20	300			13 x 25	351	13 x 25	351								
220			13 x 20	473	13 x 25	513	16 x 25	590	16 x 31.5	633	16 x 31.5	633								
330	13 x 20	488	13 x 25	576	16 x 25	720	16 x 31.5	776												
470	13 x 25	576	16 x 25	790	16 x 31.5	924	16 x 35.5	1040												
1000	16 x 31.5	1034																		

PERFORMANCE CURVES



■ Features

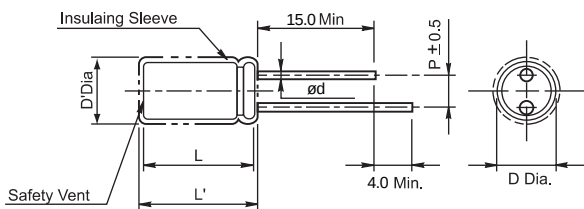
- High temperature, long life (-40°C ~ +125°C)
Radial (Equivalent to 80000 hours life at 85°C)
- Reverse voltage:5V
- Very low leakage current
- low dissipation factor
- load life of 5000 hours at 125°C



■ Specifications

Item	Performance Characteristics						
Operating temperature range	-40°C ~ +125°C						
Rated working voltage range	10V ~ 63V						
Nominal capacitance range	0.47μF ~ 1000μF, ±20%(at 20°C, 120Hz)						
D.C Leakage current(at 20°C)	The following specifications shall be satisfied when the rated voltage is applied for the required time. I ≤ 0.002CV or 2μA(5 min), whichever is greater Where I=Leakage current(μA) C=Nominal capacitance(μF) V=Rated voltage(V)						
Tan δ (max., at 20°C, 120Hz)	W.V(V)	10	16	25	35	50	63
	Tan δ	0.15	0.12	0.10	0.10	0.08	0.08
Characteristics at low temperature(max.) (impedance ratio at 120Hz)	W.V(V)	10	16	25	35	50~63	
	Z-25°C/Z20°C	2	2	2	2	2	
	Z-40°C/Z20°C	8	6	5	4	4	
Load life	After applying rated working voltage for 5000 hours at +125°C and then being stabilized at +20°C, capacitors shall meet following limits.						
	Capacitance change		Within ±20% of initial measured value				
	Tan δ		≤ 200% of initial specified value				
	Leakage current		≤ Initial specified value				
Shelf life	After storage for 1000 hours at +125°C with no voltage applied and then being stabilized at +20±, capacitors shall meet following limits.						
	Capacitance change		Within ±15% of initial measured value				
	Tan δ		≤ 150% of initial specified value				
	Leakage current		≤ 500% of initial specified value				

■ Case sizes and Dimensions



• Standard lead style

ØD	10.0	13.0	16.0	18.0
p	5.0		7.5	
Ød	0.6		0.8	

D' = [D+0.5]Max.

L' = [L+1.5]Max. at D ≥ 10.0

■ Ripple current coefficient

• Frequency

Cap(μF) \ Freq(Hz)	50	120	400	1K	10K	50-100K
Cap ≤ 10	0.8	1	1.30	1.45	1.65	1.70
10 < Cap ≤ 100	0.8	1	1.23	1.36	1.48	1.53
100 < Cap ≤ 1000	0.8	1	1.16	1.25	1.35	1.38

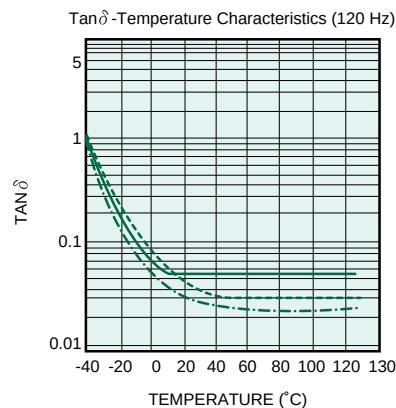
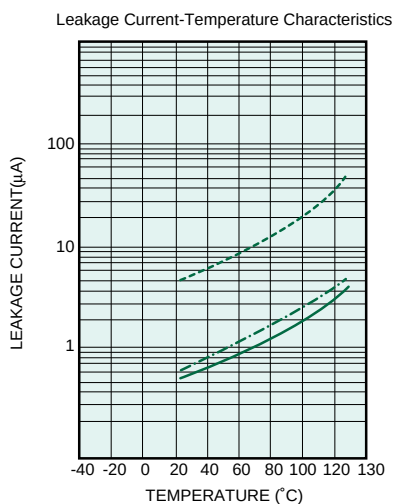
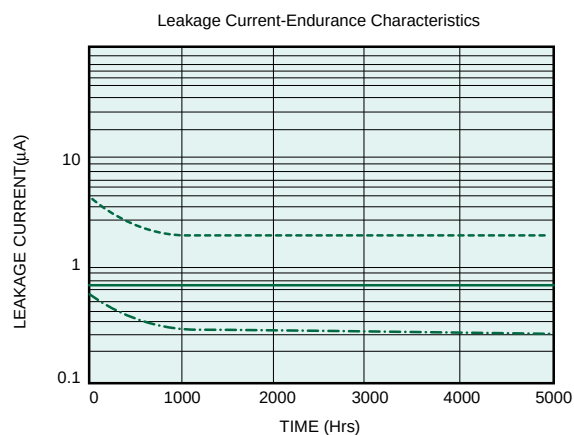
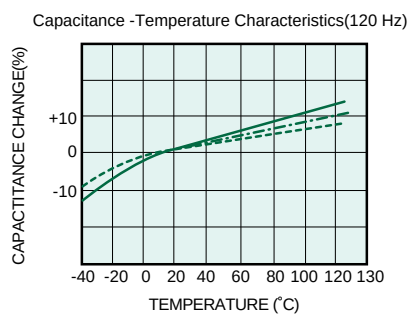
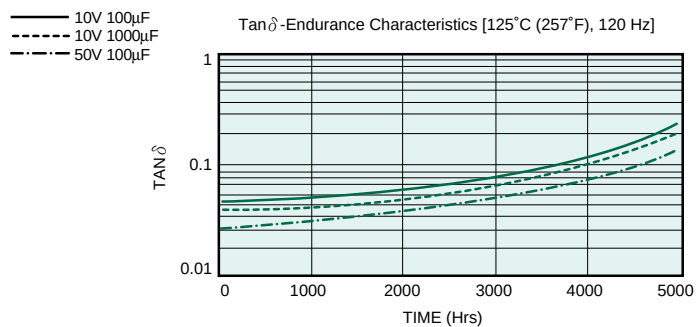
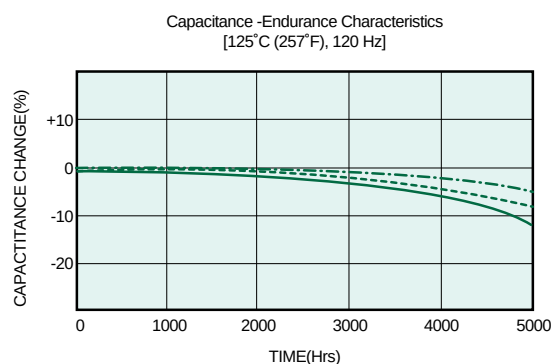
• Temperature

Temperature	≤ 85°C	105°C	125°C
Factor	2.0	1.4	1.0

Dimensions & Maximum permissible ripple current [mA(rms) at 125°C, 120Hz]

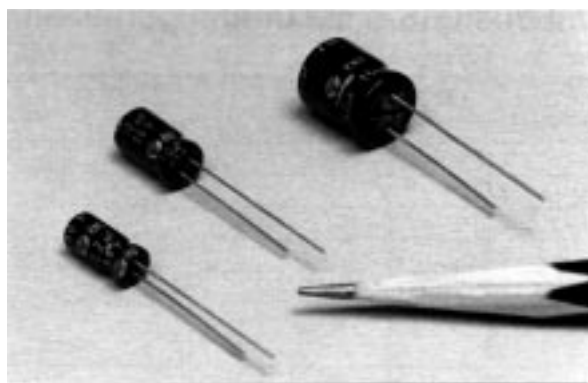
øD x L(mm)												
Cap(µF) \ W.V	10		16		25		35		50		63	
	SIZE	I _R	SIZE	I _R	SIZE	I _R	SIZE	I _R	SIZE	I _R	SIZE	I _R
0.47									10 x 16	11	10 x 16	11
1.0									10 x 16	17	10 x 16	17
2.2									10 x 16	25	10 x 16	25
3.3									10 x 16	31	10 x 16	31
4.7									10 x 16	37	10 x 16	37
10									10 x 16	59	10 x 16	59
22							10 x 16	99	10 x 16	102	10 x 16	102
33					10 x 16	101	10 x 16	130	10 x 20	172	10 x 20	172
47			10 x 16	136	10 x 16	153	10 x 20	187	13 x 20	240	13 x 20	240
100	10 x 20	176	13 x 20	240	13 x 20	300	13 x 25	330	13 x 25	351	16 x 25	351
220	13 x 25	320	13 x 25	473	16 x 25	513	16 x 25	590	16 x 31.5	633	16 x 35.5	633
330	16 x 25	488	16 x 25	576	16 x 31.5	720	16 x 35.5	776				
470	16 x 25	576	16 x 31.5	790	18 x 35.5	924	18 x 40	1040				
1000	18 x 40	1034										

PERFORMANCE CURVES



■ Features

- Bi-polar (Radial)
- Ideal for inconsistent polarity circuits
- For the compaction of equipment
- load life of 1000 hours at 85°C



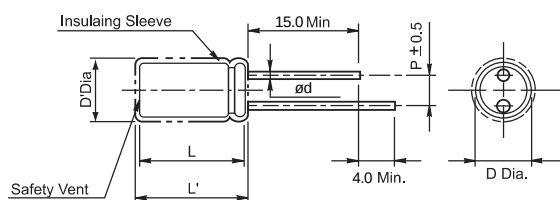
■ Specifications

Item	Performance Characteristics				
Operating temperature range	-40°C ~ +85°C				
Rated working voltage range	10V ~ 50V				
Nominal capacitance range	0.47μF ~ 1000μF, ±20%(at 20°C, 120Hz)				
D.C Leakage current(at 20°C)	The following specifications shall be satisfied when the rated voltage is applied for the required time. I ≤ 0.03CV + 3μA(3 min) Where I=Leakage current(μA) C=Nominal capacitance(μF) V=Rated voltage(V)				
Tanδ (max., at 20°C, 120Hz)	W.V(V)	10	16	25	50
	Tanδ	0.25	0.20	0.17	0.15
Characteristics at low temperature(max.) (impedance ratio at 120Hz)	W.V(V)	10	16	25	50
	Z-25°C/Z20°C	3	2	2	2
	Z-40°C/Z20°C	8	6	4	3
Load life	After applying rated working voltage for 1000 hours at +85°C with the polarity inverted every 250 hours and then being stabilized at +20°C, capacitors shall meet following limits.				
	Capacitance change		Within ± 20% of initial measured value		
	Tanδ		≤ 150% of initial specified value		
	Leakage current		≤ Initial specified value		
Shelf life	After storage for 500 hours at +85°C with no voltage applied and then being stabilized at +20°C, capacitors shall meet following limits.				
	Capacitance change		Within ± 20% of initial measured value		
	Tanδ		≤ 150% of initial specified value		
	Leakage current		≤ 200% of initial specified value		

■ Case sizes and Dimensions

■ Dimensions & Maximum permissible ripple current [mA(rms) at 85°C, 120Hz]

∅D × L(mm)



• Standard lead style

∅D	5.0	6.3	8.0	10.0	13.0	16.0
p	2.0	2.5	3.5	5.0		7.5
∅d	0.5		0.6		0.8	

D' = [D+0.5]Max.

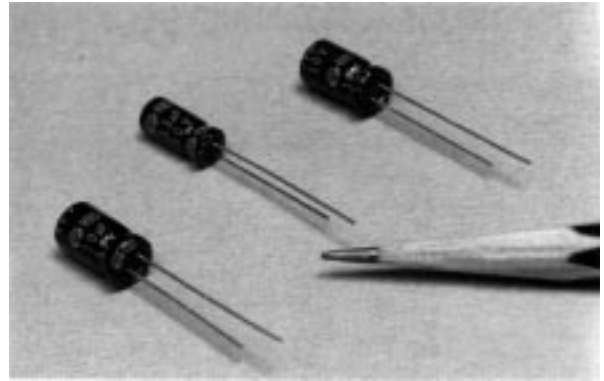
L' = [L+1.0]Max. at D ≤ 8.0

L' = [L+1.5]Max. at D ≥ 10.0

W.V Cap(μF)	10(1A)		16(1C)		25(1E)		50(1H)	
	SIZE	I _R	SIZE	I _R	SIZE	I _R	SIZE	I _R
0.47							5 × 11	10
1.0							5 × 11	16
2.2							5 × 11	26
3.3							5 × 11	33
4.7					5 × 11	27	6.3 × 11	42
10					5 × 11	50	8 × 11.5	70
22	5 × 11	62	6.3 × 11	75	6.3 × 11	90	10 × 12.5	120
33	6.3 × 11	82	6.3 × 11	100	8 × 11.5	115	10 × 16	160
47	6.3 × 11	105	8 × 11.5	125	10 × 12.5	150	10 × 20	200
100	8 × 11.5	165	10 × 12.5	200	10 × 16	260	13 × 20	340
220	10 × 16	270	10 × 20	340	13 × 20	420		
330	10 × 20	340	13 × 20	430				
470	13 × 20	440	13 × 25	550				
1000	16 × 25	700	16 × 25	900				

■ Features

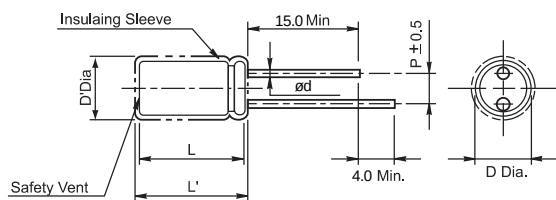
- Bi-polar, subminiature, radial leads
- Ideal for inconsistent polarity circuits
- For the compaction of equipment
- load life of 1000 hours at 85°C



■ Specifications

Item	Performance Characteristics								
Operating temperature range	-40°C ~ +85°C								
Rated working voltage range	6.3V ~ 100V								
Nominal capacitance range	0.47μF ~ 6800μF, ±20%(at 20°C, 120μA)								
D.C Leakage current(at 20°C)	The following specifications shall be satisfied when the rated voltage is applied for the required time. I ≤ 0.03CV + 3μA(5 min) Where I=Leakage current(μA) C=Nominal capacitance(μF) V=Rated voltage(V)								
Tan δ(max., at 20°C, 120Hz)	W.V(V)	6.3	10	16	25	35	50	63	100
	Tan δ	0.28	0.26	0.22	0.20	0.16	0.14	0.12	0.10
	when capacitance is over 1000μF, Tan δ shall be added 0.02 to the listed value with increase of every each 1000μF								
Characteristics at low temperature(max.) (impedance ratio at 120Hz)	W.V(V)	6.3	10	16	25	35	50	63	100
	Z-25°C/Z20°C	4	3	2	2	2	2	2	2
	Z-40°C/Z20°C	10	8	6	5	4	4	3	3
Load life	After applying rated working voltage for 1000 hours at +85°C with the polarity inverted every 250 hours and then being stabilized at +20°C, capacitors shall meet following limits.								
	Capacitance change			Within ±20% of initial measured value					
	Tan δ			≤ 200% of initial specified value					
	Leakage current			≤ Initial specified value					
Shelf life	After storage for 500 hours at +85°C with no voltage applied and then being stabilized at +20°C, capacitors shall meet following limits.								
	Capacitance change			Within ±20% of initial measured value					
	Tan δ			≤ 200% of initial specified value					
	Leakage current			≤ 200% of initial specified value					

■ Case sizes and Dimensions



• Standard lead style

ØD	5.0	6.3	8.0	10.0	13.0	16.0	18.0
p	2.0	2.5	3.5	5.0		7.5	
ød	0.5		0.6			0.8	

D' = [D+0.5]Max.

L' = [L+1.0]Max. at D ≤ 8.0

L' = [L+1.5]Max. at D ≥ 10.0

■ Ripple current coefficient

• Frequency

Cap(μF) \ Freq(Hz)	50	120	300	1K	10K	50~100K
Cap ≤ 10	0.72	1	1.25	1.45	1.65	1.70
10 < Cap ≤ 100	0.75	1	1.19	1.36	1.53	1.57
100 < Cap ≤ 1000	0.79	1	1.15	1.30	1.45	1.49
1000 < Cap	0.81	1	1.12	1.21	1.28	1.33

• Temperature

Temperature	≤ 45°C	60°C	70°C	85°C
Factor	1.4	1.25	1.15	1.0

Dimensions & Maximum permissible ripple current [mA(rms) at 85°C, 120Hz]

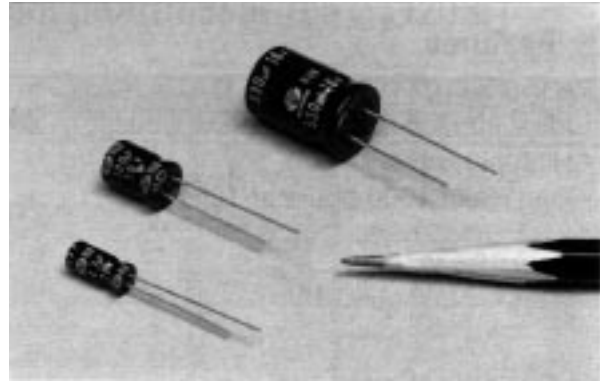
øD x L(mm)

Cap(μF) \ W.V	6.3		10		16		25	
	SIZE	I _R	SIZE	I _R	SIZE	I _R	SIZE	I _R
10					5x11	42	5x11	42
22			5x11	58	5x11	58	6.3x11	60
33	5x11	66	5x11	67	5x11	70	6.3x11	75
47	5x11	77	5x11	77	6.3x11	90	6.3x11	95
100	6.3x11	125	6.3x11	125	8x11.5	150	8x11.5	165
220	8x11.5	210	8x11.5	210	10x12.5	250	10x16	285
330	10x12.5	270	10x12.5	330	10x16	350	10x20	390
470	10x12.5	360	10x16	410	10x20	460	13x20	510
1000	10x20	640	13x20	720	13x25	810	16x25	870
2200	13x25	1050	16x25	1170	16x31.5	1420	18x35.5	1580
3300	16x25	1470	16x31.5	1600	18x35.5	1780		
4700	16x31.5	1890	18x35.5	1960				
6800	18x35.5	2460						

Cap(μF) \ W.V	35		50		63		100	
	SIZE	I _R	SIZE	I _R	SIZE	I _R	SIZE	I _R
0.47			5x11	10			5x11	12
1.0			5x11	16			5x11	19
2.2			5x11	23			6.3x11	26
3.3			5x11	27	5x11	28	6.3x11	33
4.7	5x11	34	5x11	31	6.3x11	32	6.3x11	42
10	5x11	43	6.3x11	50	6.3x11	55	8x11.5	70
22	6.3x11	70	8x11.5	80	8x11.5	90	10x16	120
33	8x11.5	88	8x11.5	96	10x12.5	120	10x20	180
47	8x11.5	105	10x12.5	135	10x16	160	13x20	210
100	10x16	190	10x20	250	13x20	300	16x25	370
220	13x20	370	13x25	440	16x25	540	18x35.5	630
330	13x20	480	16x25	610	16x31.5	630		
470	13x25	610	16x31.5	800	18x35.5	900		
1000	16x31.5	1040						

■ Features

- Bi-polar, Radial
- Ideal for inconsistent polarity circuits
- High performance
- load life of 1000 hours at 105°C



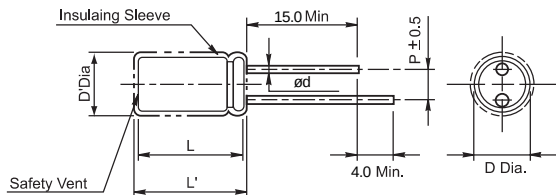
■ Specifications

Item	Performance Characteristics				
Operating temperature range	-40°C ~ +105°C				
Rated working voltage range	10V ~ 50V				
Nominal capacitance range	0.47μF ~ 1000μF, ±20%(at 20°C, 120Hz)				
D.C Leakage current(at 20°C)	The following specifications shall be satisfied when the rated voltage is applied for the required time. I ≤ 0.03CV or 3μA(5 min), whichever is greater Where I=Leakage current(μA) C=Nominal capacitance(μF) V=Rated voltage(V)				
Tan δ (max., at 20°C, 120Hz)	W.V(V)	10	16	25	50
	Tan δ	0.20	0.17	0.16	0.12
Characteristics at low temperature(max.) (impedance ratio at 120Hz)	W.V(V)	10	16	25	50
	Z-25°C/Z20°C	3	2	2	2
	Z-40°C/Z20°C	6	4	3	3
Load life	After applying rated working voltage for 1000 hours at +105°C with the polarity inverted every 250 hours and then being stabilized at +20°C, capacitors shall meet following limits.				
	Capacitance change		Within ±20% of initial measured value		
	Tan δ		≤ 200% of initial specified value		
	Leakage current		≤ Intial specified value		
Shelf life	After storage for 500 hours at +105°C with no voltage applied and then being stabilized at +20°C, capacitors shall meet following limits.				
	Capacitance change		Within ±20% of initial measured value		
	Tan δ		≤ 150% of initial specified value		
	Leakage current		≤ 200% of initial specified value		

■ Case sizes and Dimensions

■ Dimensions & Maximum permissible ripple current [mA(rms) at 105°C, 120Hz]

øD x L(mm)



• Standard lead style

øD	5.0	6.3	8.0	10.0	13.0	16.0
p	2.0	2.5	3.5	5.0		7.5
ød	0.5		0.6			0.8

D' = [D+0.5]Max.

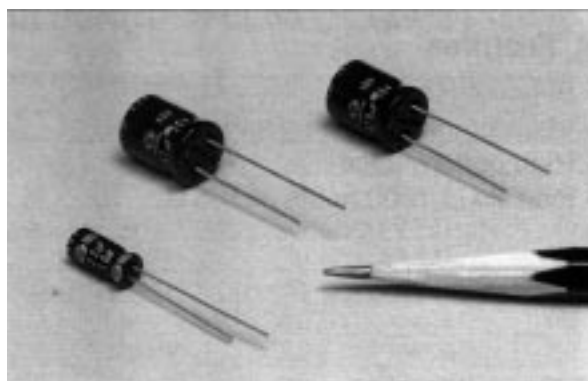
L' = [L+1.0]Max. at D ≤ 8.0

L' = [L+1.5]Max. at D ≥ 10.0

W.V Cap(μF)	10		16		25		50	
	SIZE	I _R	SIZE	I _R	SIZE	I _R	SIZE	I _R
0.47							5x11	8
1.0							5x11	11
2.2							5x11	18
3.3							5x11	22
4.7					5x11	21	6.3x11	29
10					5x11	35	8x11.5	50
22	5x11	44	6.3x11	55	6.3x11	62	10x12.5	85
33	6.3x11	58	6.3x11	70	8x11.5	80	10x16	110
47	6.3x11	75	8x11.5	89	10x12.5	105	10x20	143
100	8x11.5	118	10x12.5	135	10x16	171	13x20	243
220	10x16	190	10x20	252	13x20	310		
330	10x20	245	13x20	320				
470	13x20	330	13x25	410				
1000	16x25	570	16x25	670				

Features

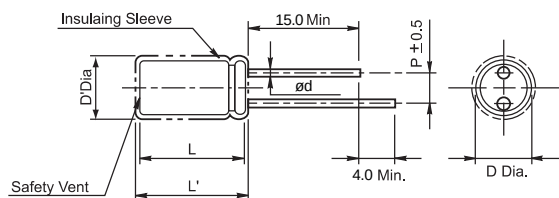
- Bi-polar, 105°C Miniature, Radial leads
- Ideal for inconsistent polarity circuits
- High performance
- load life of 1000 hours at 105°C



Specifications

Item	Performance Characteristics								
Operating temperature range	-40°C ~ +105°C								
Rated working voltage range	6.3V ~ 100V								
Nominal capacitance range	0.47μF ~ 1000μF, ±20%(at 20°C, 120Hz)								
D.C Leakage current(at 20°C)	The following specifications shall be satisfied when the rated voltage is applied for the required time. I ≤ 0.03CV or 3μA(5 min), whichever is greater Where I=Leakage current(μA) C=Nominal capacitance(μF) V=Rated voltage(V)								
Tan δ (max., at 20°C, 120Hz)	W.V(V)	6.3	10	16	25	35	50	63	100
	Tan δ	0.24	0.20	0.17	0.16	0.14	0.12	0.10	0.09
Characteristics at low temperature(max.) (impedance ratio at 120Hz)	W.V(V)	6.3	10	16	25	35	50	63	100
	Z-25°C/Z20°C	4	3	2	2	2	2	2	2
	Z-40°C/Z20°C	8	6	4	4	3	3	3	3
Load life	After applying rated working voltage for 1000 hours at +105°C with the polarity inverted every 250 hours and then being stabilized at +20°C, capacitors shall meet following limits.								
	Capacitance change			Within ±20% of initial measured value					
	Tan δ			≤ 200% of initial specified value					
	Leakage current			≤ Initial specified value					
Shelf life	After storage for 500 hours at +105°C with no voltage applied and then being stabilized at +20°C, capacitors shall meet following limits.								
	Capacitance change			Within ±20% of initial measured value					
	Tan δ			≤ 200% of initial specified value					
	Leakage current			≤ 200% of initial specified value					

Case sizes and Dimensions



Standard lead style

øD	5.0	6.3	8.0	10.0	13.0	16.0
p	2.0	2.5	3.5	5.0		7.5
ød	0.5		0.6		0.8	

D' = [D+0.5]Max.

L' = [L+1.0]Max. at D ≤ 8.0

L' = [L+1.5]Max. at D ≥ 10.0

Ripple current coefficient

Frequency

Cap(μF) \ Freq(Hz)	50	120	300	1K	10K	50~100K
Cap ≤ 10	0.72	1	1.25	1.45	1.65	1.70
10 < Cap ≤ 100	0.75	1	1.19	1.36	1.53	1.57
100 < Cap ≤ 1000	0.79	1	1.15	1.30	1.45	1.49

Temperature

Temperature	≤ 70°C	85°C	105°C
Factor	1.50	1.35	1.0

Dimensions & Maximum permissible ripple current [mA(rms) at 105°C, 120Hz]

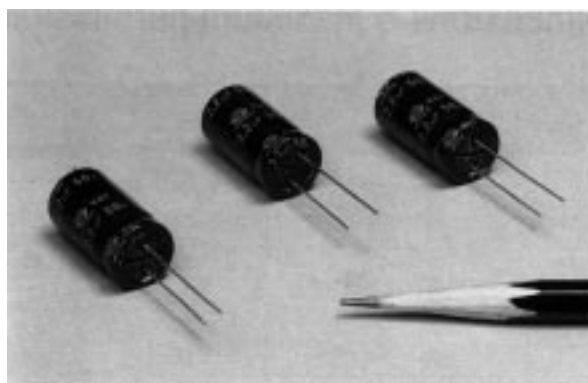
ØD x L(mm)

Cap(µF) \ W.V	6.3		10		16		25	
	SIZE	I _R	SIZE	I _R	SIZE	I _R	SIZE	I _R
4.7							5x11	23
10					5x11	30	5x11	32
22			5x11	42	6.3x11	52	6.3x11	55
33	5x11	46	6.3x11	55	6.3x11	65	8x11.5	72
47	6.3x11	61	6.3x11	66	8x11.5	88	10x12.5	96
100	8x11.5	100	10x12.5	125	10x12.5	130	10x16	143
220	10x12.5	160	10x16	190	10x20	250	13x20	310
330	10x16	220	10x20	265	13x20	310	13x25	380
470	10x20	290	13x20	350	13x25	420	16x25	500
1000	13x25	530	16x25	640	16x25	700	16x31.5	795

Cap(µF) \ W.V	35		50		63		100	
	SIZE	I _R	SIZE	I _R	SIZE	I _R	SIZE	I _R
0.47			5x11	8			5x11	9
1.0			5x11	12			5x11	14
2.2			5x11	18			6.3x11	22
3.3			5x11	22	5x11	25	8x11.5	30
4.7	5x11	25	5x11	27	6.3x11	31	8x11.5	37
10	6.3x11	38	8x11.5	49	8x11.5	51	10x12.5	60
22	8x11.5	65	10x12.5	70	10x16	86	10x20	105
33	10x12.5	84	10x16	90	10x20	110	13x20	150
47	10x12.5	100	10x20	126	10x20	145	13x25	185
100	10x20	175	13x20	248	13x25	261	16x25	273
220	13x25	350	16x25	410	16x31.5	460		
330	16x25	460	16x31.5	550				
470	16x25	535						

■ Features

- Bi-polar, Radial
- For speaker crossover networks, Hi-fi audio.
- Excellent frequency characteristics
- Low dissipation factor
- load life of 1000 hours at 85°C

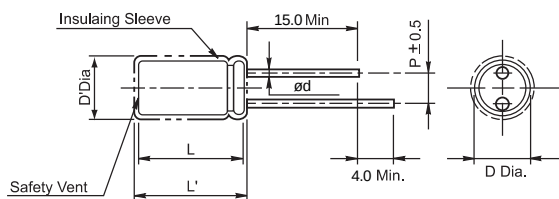


■ Specifications

Item	Performance Characteristics		
Operating temperature range	-40°C ~ +85°C		
Rated working voltage range	25V ~ 50V		
Nominal capacitance range	1.0μF ~ 100μF, ±20% or ±10%(at 20°C, 120Hz)		
D.C Leakage current(at 20°C)	The following specifications shall be satisfied when the rated voltage is applied for the required time. I ≤ 0.04CV + 10μA(5 min) Where I=Leakage current(μA) C=Nominal capacitance(μF) V=Rated voltage(V)		
Tanδ (max., at 20°C, 120Hz)	W.V(V)	25	50
	120Hz	0.1	0.075
	10KHz(10μF ≥)	0.2	0.1
	1KHz(10μF <)	0.2	0.1
Characteristics of impedance	W.V(V)	25	50
	Impedance constant(Ω-μF)	15	12
	*Impedance(Ω) at 20KHz x Nominal capacitance(μF)		
Load life	After applying rated working voltage for 1000 hours at +85°C with the polarity inverted every 250 hours and then being stabilized at +20°C, capacitors shall meet following limits.		
	Capacitance change	Within ±20% of initial measured value	
	Tan δ	≤ 200% of initial specified value	
	Leakage current	≤ Initial specified value	
Shelf life	After storage for 500hours at +85°C with no voltage applied and then being stabilized at +20°C, capacitors shall meet following limits.		
	Capacitance change	Within ±20% of initial measured value	
	Tan δ	≤ 150% of initial specified value	
	Leakage current	≤ 200% of initial specified value	

■ Case sizes and Dimensions

■ Dimensions & Maximum permissible ripple current [mA(rms) at 85°C, 120Hz]



- Standard lead style

øD	10.0	13.0	16.0	18.0
p	5.0		7.5	
ød	0.6		0.8	

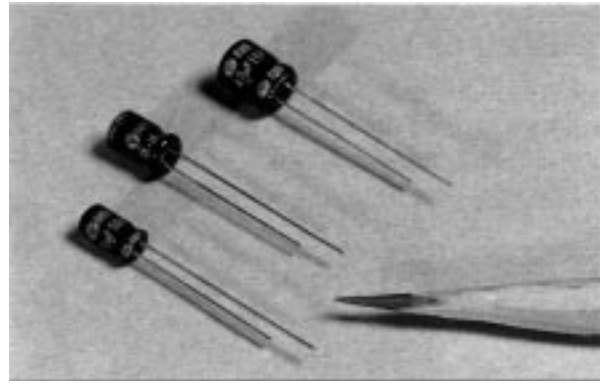
D' = [D+0.5]Max.

L' = [L+1.5]Max. at D ≥ 10.0

W.V Cap(μF)		25		50	
		Case Size	I _R	Case Size	I _R
10		10x16	33	10x20	38
15		10x20	40	10x20	46
22		10x20	48	13x25	71
3.3		10x20	59	13x25	88
4.7		13x20	82	13x25	104
6.8		13x20	98	13x25	126
10		13x20	121	13x25	153
15		13x20	150	13x25	187
22		13x20	180	13x25	226
33		13x25	237	16x25	312
47		13x25	290	16x25	373
68		13x25	340	16x25	441
100		16x25	474	18x31.5	638

■ Features

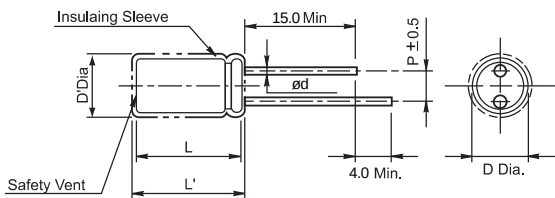
- Bi-polar, Miniature
- Lengths are all 7mm, Radial
- Micro cassette, VTR, video camera, car stereo etc.
- load life of 1000 hours at 85°C



■ Specifications

Item	Performance Characteristics						
Operating temperature range	- 40°C ~ +85°C						
Rated working voltage range	6.3V ~ 50V						
Nominal capacitance range	0.1μF ~ 47μF, ±20%(at 20°C, 120Hz)						
D.C Leakage current(at 20°C)	The following specifications shall be satisfied when the rated voltage is applied for the required time. I ≤ 0.05CV or 10μF(2 min), whichever is greater Where I=Leakage current(μA) C=Nominal capacitance(μF) V=Rated voltage(V)						
Tan δ (max., at 20°C, 120Hz)	W.V(V)	6.3	10	16	25	35	50
	Tan δ	0.28	0.25	0.20	0.16	0.15	0.14
Characteristics at low temperature(max.) (impedance ratio at 120Hz)	W.V(V)	6.3	10	16	25	35	50
	Z-25°C/Z20°C	4	3	2	2	2	2
	Z-40°C/Z20°C	10	8	6	4	4	4
Load life	After applying rated working voltage for 1000 hours at +85°C with the polarity inverted every 500 hours and then being stabilized at +20°C, capacitors shall meet following limits.						
	Capacitance change		Within ±20% of initial measured value				
	Tan δ		≤ 200% of initial specified value				
	Leakage current		≤ Initial specified value				
Shelf life	After storage for 500 hours at +85°C with no voltage applied and then being stabilized at +20°C, capacitors shall meet following limits.						
	Capacitance change		Within ±20% of initial measured value				
	Tan δ		≤ 150% of initial specified value				
	Leakage current		≤ 200% of initial specified value				

■ Case sizes and Dimensions



• Standard lead style

øD	4.0	5.0	6.3
p	1.5	2.0	2.5
ød	0.45		

D' = [D+0.5]Max.

L' = [L+1.0]Max.

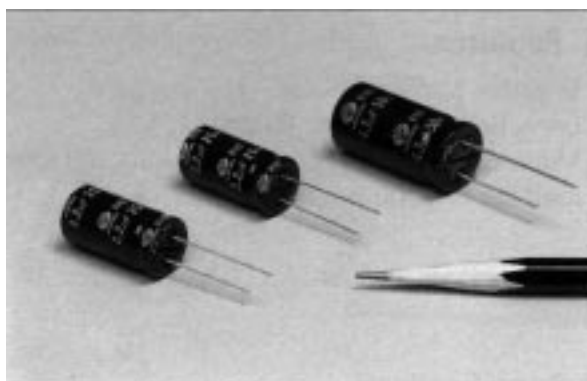
■ Dimensions & Maximum permissible ripple current [mA(rms) at 85°C, 120Hz]

øD x L (mm)

W.V	6.3		10		16		25		35		50	
	SIZE	I _r	SIZE	I _r	SIZE	I _r	SIZE	I _r	SIZE	I _r	SIZE	I _r
Cap(μF)												
0.1											4x7	2.0
0.22											4x7	3.0
0.33											4x7	5.0
0.47											4x7	7.0
1.0											4x7	10
2.2									4x7	12	4x7	15
3.3							4x7	15	4x7	16	5x7	20
4.7					4x7	15	5x7	20	5x7	25	6.3x7	30
10			4x7	25	5x7	30	6.3x7	35	6.3x7	40		
22	5x7	30	5x7	40	6.3x7	50	6.3x7	55				
33	5x7	45	6.3x7	55	6.3x7	60						
47	6.3x7	65	6.3x7	70								

■ Features

- For horizontal deflection correction circuit
- Large permissible ripple current
- High and stable quality
- Load life of 1000 hours at 85°C



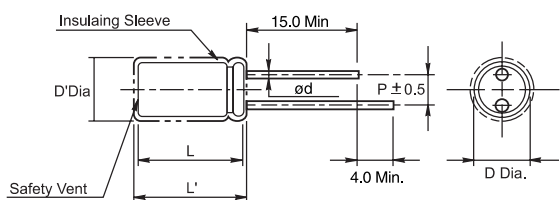
■ Specifications

Item	Performance Characteristics	
Operating temperature range	-25°C ~ +85°C	
Rated working voltage range	25V, 50V	
Nominal capacitance range	1.0μF ~ 10μF, ±20%(at 20°C, 120Hz)	
D.C Leakage current(at 20°C)	The following specifications shall be satisfied when the rated voltage is applied for the required time. $I \leq 100\mu A(5 \text{ min})$	
Tan δ (max., at 20°C, 120Hz)	0.05Max	
Load life	After applying DC12V on which the specified allowable ripple current is superimposed for 1000hours at 70≤ and then being stabilized at +20°C, capacitors shall meet following limits.	
	Capacitance change	Within ±15% of initial measured value
	Tan δ	≤ 200% of initial specified value
	Leakage current	≤ Initial specified value
Shelf life	After storage for 500 hours at + 85°C with no voltage applied and then being stabilized at +20°C, capacitors shall meet following limits.	
	Capacitance change	Within ±15% of initial measured value
	Tan δ	≤ 200% of initial specified value
	Leakage current	≤ 200% of initial specified value

■ Case sizes and Dimensions

■ Dimensions & Maximum permissible ripple current [Ap-p at 70°C, 15.75KHz]

∅ D x L (mm)



• Standard lead style

∅D	13.0	16.0	18.0
p	5.0	7.5	
∅d	0.6	0.8	

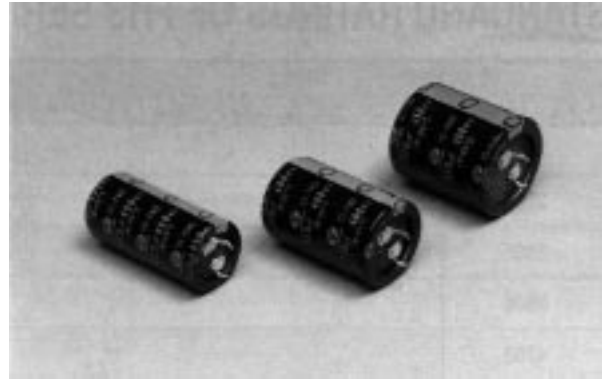
D' = [D+0.5]Max.

L' = [L+1.5]Max.

Cap(μF)	W.V	25		50	
		SIZE	I _R	SIZE	I _R
1.0		13 x 20	1.8	13 x 20	1.8
1.5		13 x 20	2.4	13 x 20	2.4
2.2		13 x 25	3.3	13 x 25	3.3
3.3		16 x 25	4.5	16 x 25	4.5
4.7		16 x 31.5	6.0	16 x 31.5	6.0
5.6		16 x 35.5	7.5	16 x 35.5	7.5
6.8		16 x 35.5	8.0	16 x 35.5	8.0
8.2		18 x 35.5	9.0	18 x 35.5	9.0
10		18 x 40	10.0	18 x 40	10.0

■ Features

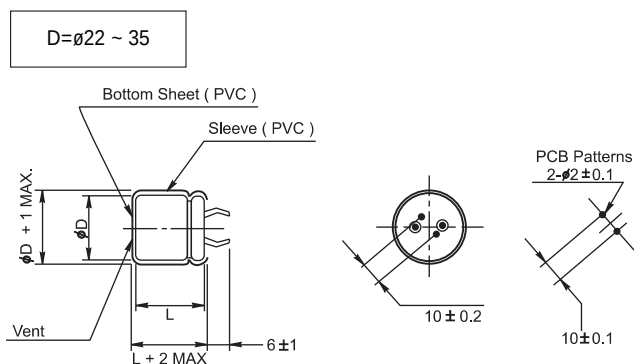
- 85°C Standard, snap-in terminal
- Ideal for switching power supplies
- Low ESR, Low Dissipation
- High and stable quality
- Load life of 2000 hours at 85°C



■ Specifications

Item	Performance Characteristics					
Operating temperature range	16V ~ 250V : -40°C ~ +85°C 315 ~ 450V : -25°C ~ +85°C					
Rated working voltage range	16V ~ 450V					
Nominal capacitance range	47μF ~ 47000μF, ±20%(at 20°C, 120Hz)					
D.C Leakage current(at 20°C)	The following specifications shall be satisfied when the rated voltage is applied for the required time. I ≤ 0.02CV or 2mA(3 min), whichever is less. Where I=Leakage current(μA) C=Nominal capacitance(μF) V=Rated voltage(V)					
Tan δ (max., at 20°C, 120Hz)	W.V(V)	16~25	35~50	63~100	160~250	315~450
	47~2200μF	—	0.20	0.15	0.10	0.20
	2700~6800μF	0.30	0.25	0.20	—	—
	8200V	0.35	0.30	0.25	—	—
	10000~33000μF	0.50	0.40	0.30	—	—
	39000~47000μF	0.70	—	—	—	—
Characteristics at low temperature(max.) (impedance ratio at 120Hz)	W.V(V)	16		25~100	160~250	315~450
	Z-25°C/Z20°C	4		3	3	6
	Z-40°C/Z20°C	8		6	6	—
Load life	After applying rated working voltage for 2000 hours at +85°C and then being stabilized at +20°C, capacitors shall meet following limits.					
	Capacitance change		Within ±20% of initial measured value			
	Tan δ		≤ 200% of initial specified value			
	Leakage current		≤ Initial specified value			
Shelf life	After storage for 1000 hours at +85°C with no voltage applied and then being stabilized at +20°C, capacitors shall meet following limits.					
	Capacitance change		Within ±20% of initial measured value			
	Tan δ		≤ 150% of initial specified value			
	Leakage current		≤ 200% of initial specified value			

■ Case sizes and Dimensions



■ Ripple current coefficient

• Frequency

W.V	Freq(Hz)					
	50	120	500	1K	10K	100K
16 ~ 100V	0.9	1	1.10	1.15	1.25	1.25
160 ~ 250V	0.8	1	1.25	1.40	1.45	1.50
315 ~ 450V	0.8	1	1.20	1.25	1.35	1.40

• Temperature

Temperature	≤ 45°C	60°C	70°C	85°C
Factor	1.48	1.30	1.15	1.0

STANDARD RATINGS OF FHS SERIES

W.V Cap(μF)	16(IC)				25(IE)				35(IV)				50(IH)			
	22 ø	25 ø	30 ø	35 ø	22 ø	25 ø	30 ø	35 ø	22 ø	25 ø	30 ø	35 ø	22 ø	25 ø	30 ø	35 ø
2200													22x25 1.90			
2700													22x30 2.10	25x25 2.10		
3300									22x25 2.20				22x30 2.25	25x25 2.25		
3900									22x30 2.25	25x25 2.25			22x35 2.50	25x30 2.50	30x25 2.50	
4700					22x25 2.20				22x30 2.35	25x25 2.35			22x40 2.65	25x35 2.65	30x25 2.65	
5600					22x30 2.40	25x25 2.40			22x35 2.55	25x30 2.50	30x25 2.55		22x45 2.95	25x40 3.00	30x30 3.00	
6800					22x35 2.55	25x25 2.55			22x40 2.80	25x35 2.82	30x25 2.80		22x50 3.30	25x45 3.30	30x35 3.30	35x30 3.30
8200	22x25 2.50				22x40 2.80	25x30 2.70	30x25 2.80		22x45 3.04	25x40 3.10	30x30 3.10			25x50 3.80	30x40 3.80	35x30 3.80
10000	22x30 2.65	25x25 2.65			22x40 3.10	25x35 3.10	30x25 3.10		22x50 3.65	25x40 3.65	30x30 3.65				30x45 4.20	35x35 4.20
12000	22x35 3.10	25x25 3.10			22x45 3.57	25x40 3.65	30x30 3.65			25x45 4.00	30x35 4.10	35x30 4.00			30x50 4.80	35x40 4.80
15000	22x40 3.55	25x30 3.38	30x25 3.55		22x50 3.88	25x45 4.00	30x35 4.00	35x30 4.00			30x40 4.45	35x35 4.45				35x45 5.20
18000	22x45 4.10	25x35 4.10	30x30 4.10			25x50 4.45	30x40 4.45	35x35 4.45			30x45 5.20	35x40 5.20				35x50 6.10
22000	22x50 4.50	25x40 4.35	30x30 4.35				30x45 5.20	35x40 5.20				35x45 6.10				
27000		25x45 4.70	30x35 4.60	35x30 4.70			30x50 6.10	35x40 6.10				35x50 6.40				
33000			30x40 5.25	35x35 5.25				35x50 6.45								
39000			30x45 5.60	35x35 5.60												
47000			30x50 5.85	35x40 5.85												

W.V Cap(μF)	63(IJ)				80(IK)				100(2A)			
	22 ø	25 ø	30 ø	35 ø	22 ø	25 ø	30 ø	35 ø	22 ø	25 ø	30 ø	35 ø
820									22x25 1.50			
1000					22x25 1.50				22x30 1.70	25x25 1.70		
1200					22x30 1.65	25x25 1.65			22x35 1.85	25x25 1.80	30x25 1.85	
1500	22x25 1.70				22x30 1.80	25x25 1.80			22x40 2.30	25x30 2.20	30x25 2.30	
1800	22x30 1.90	25x25 1.90			22x35 2.20	25x30 2.20	30x25 2.20		22x45 2.50	25x40 2.50	30x30 2.50	
2200	22x30 2.20	25x25 2.20			22x40 2.50	25x35 2.50	30x25 2.50		22x50 2.80	25x45 2.80	30x30 2.80	
2700	22x35 2.40	25x30 2.40	30x25 2.40		22x45 2.60	25x40 2.70	30x30 2.70			25x50 3.20	30x35 3.10	35x30 3.10
3300	22x40 2.70	25x35 2.70	30x25 2.70		22x50 2.90	25x45 3.00	30x35 3.00	35x30 3.00			30x40 3.40	35x35 3.40
3900	22x45 2.90	25x40 2.90	30x30 2.90			25x50 3.20	30x40 3.20	35x30 3.20			30x50 3.80	35x40 3.80
4700	22x50 3.04	25x45 3.10	30x30 3.10				30x45 3.50	35x35 3.50				35x45 4.00
5600		25x50 3.40	30x40 3.40	35x30 3.40			30x50 3.90	35x40 3.90				35x50 4.30
6800			30x45 3.90	35x35 3.90				35x45 4.30				
8200			30x50 4.40	35x35 4.40				35x50 4.90				
10000				35x40 4.90								
12000				35x45 5.40								

STANDARD RATINGS OF FHS SERIES

W.V Cap(μF)	160(2C)				180(2S)				200(2D)				250(2E)			
	22 ø	25 ø	30 ø	35 ø	22 ø	25 ø	30 ø	35 ø	22 ø	25 ø	30 ø	35 ø	22 ø	25 ø	30 ø	35 ø
180													22x25 1.00			
220									22x25 1.15				22x30 1.25	25x25 1.25		
270					22x25 1.30				22x30 1.35	25x25 1.35			22x35 1.40	25x30 1.45	30x25 1.40	
330	22x25 1.43				22x30 1.45	25x25 1.45			22x30 1.50	25x25 1.50			22x40 1.50	25x30 1.45	30x25 1.50	
390	22x30 1.55	25x25 1.55			22x35 1.60	25x25 1.60			22x35 1.70	25x30 1.75	30x25 1.70		22x45 1.80	25x35 1.80	30x30 1.80	
470	22x30 1.95	25x25 1.95			22x35 1.98	25x30 1.98	30x25 1.98		22x40 2.05	25x35 2.05	30x25 2.05		22x50 2.10	25x40 2.10	30x30 2.10	
560	22x35 2.01	25x30 2.01	30x25 2.01		22x40 2.05	25x35 2.05	30x25 2.05		22x45 2.10	25x35 2.10	30x30 2.10			25x45 2.20	30x35 2.20	35x30 2.20
680	22x40 2.22	25x35 2.22	30x30 2.22		22x50 2.30	25x40 2.30	30x30 2.30			25x40 2.40	30x30 2.40			25x50 2.50	30x40 2.50	35x30 2.50
820	22x50 2.60	25x40 2.60	30x30 2.60			25x45 2.65	30x35 2.65	35x30 2.65		25x50 2.70	30x40 2.75	35x30 2.70			30x45 2.80	35x35 2.80
1000		25x45 3.02	30x35 3.02	35x30 3.02		25x50 3.05	30x40 3.05	35x35 3.05			30x45 3.15	35x35 3.10			30x50 3.25	35x40 3.25
1200		25x50 3.29	30x40 3.29	35x35 3.29			30x45 3.35	35x35 3.30			30x50 3.40	35x40 3.40				35x50 3.50
1500			30x45 3.80	35x40 3.80			30x50 3.90	35x40 3.95				35x50 4.10				
1800			30x50 4.27	35x40 4.27				35x50 4.30								
2200				35x50 4.50												

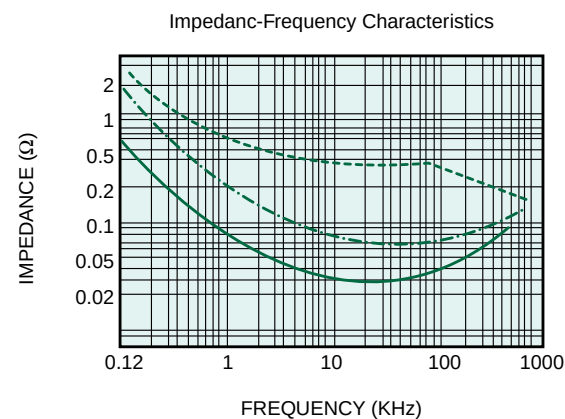
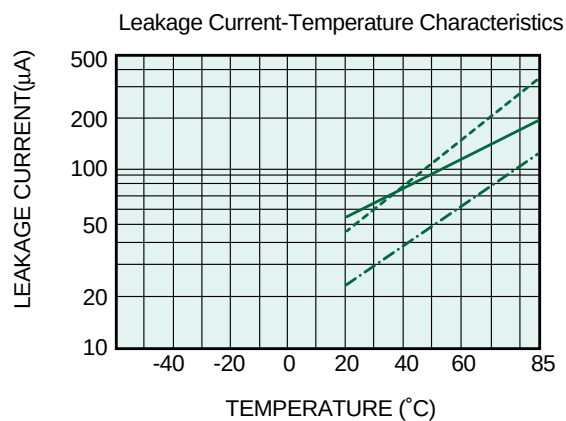
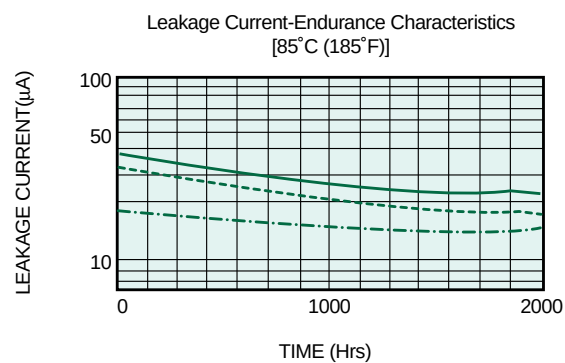
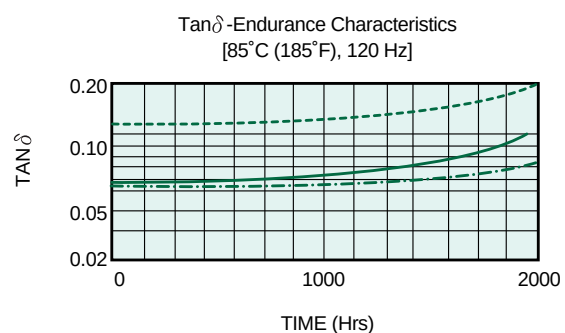
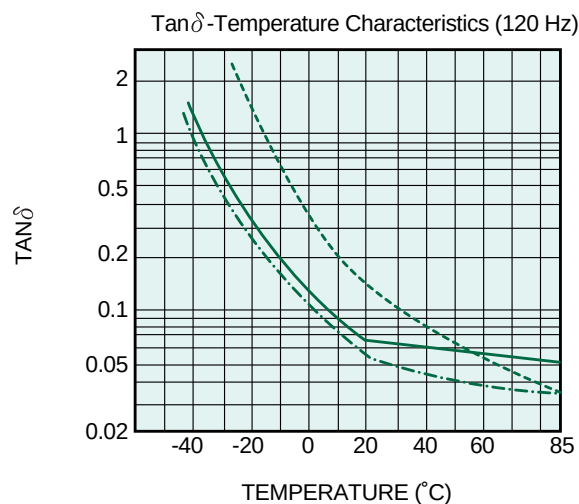
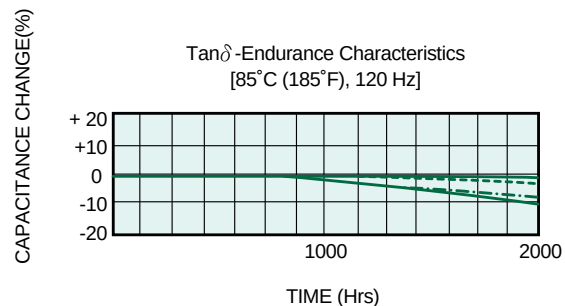
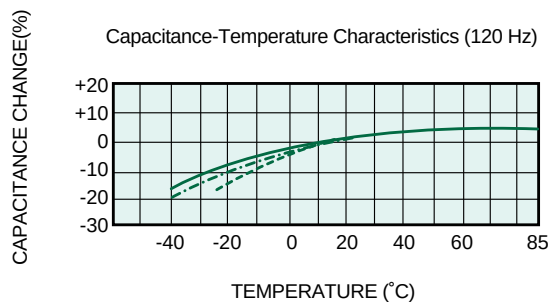
W.V Cap(μF)	315(2F)				350(2V)				400(2G)				450(2W)			
	22 ø	25 ø	30 ø	35 ø	22 ø	25 ø	30 ø	35 ø	22 ø	25 ø	30 ø	35 ø	22 ø	25 ø	30 ø	35 ø
47													22x25 0.45			
56									22x25 0.50				22x25 0.50			
68									22x25 0.60				22x30 0.60	25x25 0.60		
82					22x25 0.65				22x30 0.65	25x25 0.65			22x30 0.65	25x25 0.65		
100	22x25 0.65				22x30 0.68	25x25 0.68			22x30 0.75	25x25 0.75			22x35 0.75	25x30 0.75	30x25 0.75	
120	22x30 0.75	25x25 0.75			22x30 0.85	25x25 0.85			22x35 0.90	25x30 0.92	30x25 0.92		22x40 0.92	25x35 0.92	30x25 0.92	
150	22x35 0.85	25x25 0.85			22x35 1.00	25x30 1.00	30x25 1.00		22x40 1.05	25x30 1.07	30x25 1.05		22x50 1.10	25x40 1.10	30x30 1.10	
180	22x35 1.00	25x30 1.00	30x25 1.05		22x40 1.10	25x35 1.10	30x25 1.10		22x45 1.20	25x35 1.20	30x30 1.20			25x45 1.20	30x35 1.20	35x30 1.20
220	22x40 1.20	25x35 1.15	30x25 1.15		22x45 1.30	25x40 1.30	30x30 1.30		22x50 1.35	25x40 1.35	30x35 1.35	35x30 1.35		25x50 1.40	30x40 1.40	35x30 1.40
270	22x45 1.30	25x40 1.32	30x30 1.30			25x45 1.53	30x35 1.50	35x30 1.50		25x45 1.60	30x40 1.62	35x30 1.60			30x45 1.65	35x35 1.65
330	22x50 1.50	25x45 1.55	30x35 1.55	35x30 1.55		25x50 1.70	30x40 1.70	35x30 1.70			30x45 1.85	35x35 1.85			30x50 1.90	35x40 1.90
390		25x50 1.70	30x40 1.70	35x35 1.70			30x45 1.90	35x35 1.90			30x50 2.08	35x40 2.08				35x45 2.10
470			30x45 1.90	35x35 1.90			30x50 2.20	35x40 2.20				35x45 2.38				35x50 2.50
560			30x50 2.20	35x40 2.20				35x45 2.50				35x50 2.65				
680				35x45 2.50				35x50 2.90								
820				35x50 2.80												

Max. permissible ripple current [A(rms) at 85°C, 120Hz]

Case size [ø DxL(mm)]

PERFORMANCE CURVES

— 80V 2200 μ F
 - · - · - 200V 680 μ F
 - - - - - 400V 390 μ F



■ Features

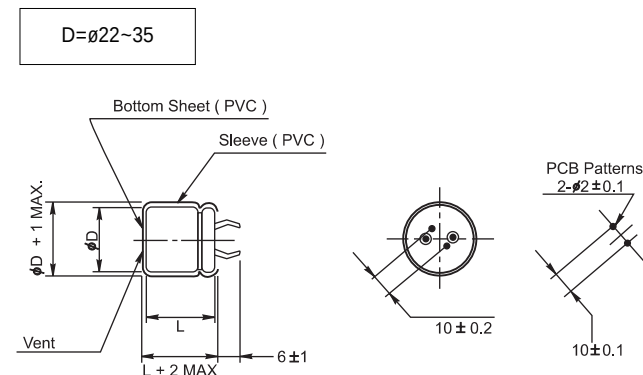
- 105°C Standard, snap-in terminal
- PCB Mounting
- High CV density
- Load life of 2000 hours at 105°C



■ Specifications

Item	Performance Characteristics					
Operating temperature range	10V ~ 250V:-40°C ~ +105°C 315 ~ 450V:-25°C ~ +105°C					
Rated working voltage range	10V ~ 450V					
Nominal capacitance range	47μF ~ 47000μF, ±20%(at 20°C, 120Hz)					
D.C Leakage current(at 20°C)	The following specifications shall be satisfied when the rated voltage is applied for the required time. I ≤ 0.02CV or 2mA (5 min), whichever is less. Where I=Leakage current(μA) C=Nominal capacitance(μF) V=Rated voltage(V)					
Tanδ (max., at 20°C, 120Hz)	W.V(V)	10~25	35~50	63~100	160~250	315~450
	47~2200μF	—	0.20	0.15	0.10	0.20
	2700~6800μF	0.30	0.25	0.20	—	—
	8200μF	0.35	0.30	0.25	—	—
	10000~33000μF	0.60	0.45	0.30	—	—
	39000~47000μF	0.80	—	—	—	—
Characteristics at low temperature(max.) (impedance ratio at 120Hz)	W.V(V)	10~16	25~100	160~250	315~450	
	Z-25°C/Z20°C	4	3	3	8	
	Z-40°C/Z20°C	12	6	6	—	
Load life	After applying rated working voltage for 2000 hours at +105°C and then being stabilized at +20°C, capacitors shall meet following limits.					
	Capacitance change		Within ± 20% of initial measured value			
	Tan δ		≤ 200% of initial specified value			
	Leakage current		≤ Initial specified value			
Shelf life	After storage for 1000 hours at +105°C with no voltage applied and then being stabilized at +20°C, capacitors shall meet following limits.					
	Capacitance change		Within ± 15% of initial measured value			
	Tan δ		≤ 150% of initial specified value			
	Leakage current		≤ Initial specified value			

■ Case sizes and Dimensions



■ Ripple current coefficient

• Frequency

W.V	Freq(Hz)	50	120	1K	10K	100K
10 ~ 100V		0.9	1.0	1.10	1.15	1.25
160 ~ 250V		0.8	1.0	1.25	1.40	1.50
315 ~ 450V		0.84	1.0	1.15	1.20	1.32

• Temperature

Temperature	≤ 45°C	60°C	85°C	105°C
Factor	2.40	2.20	1.65	1.00

STANDARD RATINGS OF FUH SERIES

Cap(μF)	W.V	10				16				25				35			
		22 ø	25 ø	30 ø	35 ø	22 ø	25 ø	30 ø	35 ø	22 ø	25 ø	30 ø	35 ø	22 ø	25 ø	30 ø	35 ø
3300														22x25 1.40			
3900														22x30 1.57	25x25 1.57		
4700										22x25 1.50				22x35 1.80	25x25 1.76		
5600										22x30 1.70	25x25 1.70			22x40 2.05	25x30 2.00	30x25 2.00	
6800						22x25 1.57				22x35 2.05	25x25 2.05			22x45 2.24	25x35 2.20	30x25 2.20	
8200						22x30 1.85	25x25 1.85			22x40 2.20	25x30 2.15	30x25 2.20		22x50 2.80	25x40 2.75	30x30 2.75	
10000	22x25 1.55					22x35 1.95	25x25 1.95			22x45 2.55	25x35 2.60	30x30 2.60			25x45 2.91	30x35 2.87	35x30 2.87
12000	22x30 1.77	25x25 1.77				22x35 2.30	25x30 2.30	30x25 2.30		22x50 2.70	25x40 2.70	30x30 2.70			25x50 3.20	30x40 3.20	35x30 3.20
15000	22x35 1.96	25x25 1.90				22x40 2.65	25x35 2.65	30x30 2.65			25x45 2.95	30x35 2.95	35x30 2.95			30x45 3.65	35x35 3.65
18000	22x35 2.21	25x30 2.21	30x25 2.21			22x45 2.75	25x40 2.75	30x30 2.75			25x50 3.20	30x40 3.20	35x35 3.20			30x50 4.30	35x40 4.30
22000	22x45 2.35	25x35 2.40	30x25 2.35				25x45 2.82	30x35 2.82	35x30 2.82				30x45 3.64	35x35 3.64			35x50 4.95
27000		25x40 2.75	30x30 2.75				25x50 3.10	30x40 3.10	35x30 3.10				35x45 4.20				
33000		25x50 2.90	30x35 2.90	35x30 2.90				30x45 3.80	35x35 3.80				35x50 4.75				
39000			30x40 3.10	35x30 3.10				30x50 3.95	35x40 3.95								
47000			30x45 3.50	35x35 3.50					35x45 4.10								

Cap(μF)	W.V	50				63				80				100			
		22 ø	25 ø	30 ø	35 ø	22 ø	25 ø	30 ø	35 ø	22 ø	25 ø	30 ø	35 ø	22 ø	25 ø	30 ø	35 ø
560														22x25 1.05			
680														22x30 1.15	25x25 1.15		
820										22x25 1.05				22x30 1.35	25x25 1.35		
1000										22x30 1.15	25x25 1.15			22x35 1.50	25x30 1.50	30x25 1.50	
1200						22x25 1.10				22x30 1.32	25x25 1.32			22x40 1.70	25x35 1.70	30x25 1.70	
1500						22x30 1.20	25x25 1.20			22x35 1.55	25x30 1.55	30x25 1.55		22x45 2.05	25x40 2.05	30x30 2.05	
1800	22x25 1.20					22x30 1.45	25x25 1.45			22x40 1.80	25x30 1.80	30x25 1.80			25x45 2.50	30x35 2.50	35x30 2.50
2200	22x30 1.35	25x25 1.35				22x35 1.65	25x30 1.65	30x25 1.65		22x45 2.03	25x35 2.03	30x30 2.03			25x50 2.70	30x40 2.70	35x30 2.70
2700	22x30 1.60	25x25 1.60				22x40 1.83	25x35 1.83	30x25 1.83			25x45 2.25	30x35 2.25	35x30 2.25			30x45 2.85	35x35 2.85
3300	22x35 1.85	25x30 1.85	30x25 1.85			22x45 2.07	25x40 2.10	30x30 2.10			25x50 2.40	30x40 2.40	35x30 2.40			30x50 3.00	35x40 3.00
3900	22x40 1.95	25x35 1.95	30x25 1.95				25x45 2.50	30x35 2.50	35x30 2.50			30x45 2.70	35x35 2.70				35x45 3.20
4700	22x45 2.25	25x40 2.30	30x30 2.30				25x50 2.79	30x40 2.79	35x30 2.79			30x50 3.10	35x40 3.10				35x50 3.40
5600	22x50 2.65	25x45 2.65	30x35 2.65	35x30 2.65				30x45 3.15	35x35 3.15				35x45 3.50				
6800		25x50 2.80	30x40 2.80	35x30 2.80				30x50 3.50	35x40 3.50				35x50 3.80				
8200			30x45 3.50	35x35 3.50					35x45 3.90								
10000			30x50 3.80	35x40 3.80					35x50 4.40								
12000				35x45 4.05													

STANDARD RATINGS OF FUH SERIES

Cap(μF)	W.V	160(2C)				180(2S)				200(2D)				250(2E)			
		22 ø	25 ø	30 ø	35 ø	22 ø	25 ø	30 ø	35 ø	22 ø	25 ø	30 ø	35 ø	22 ø	25 ø	30 ø	35 ø
150														22X25 0.90			
180														22X30 1.00	25X25 1.00		
220						22X25 0.80				22X25 0.80				22X35 1.10	25X25 1.10		
270		22X25 0.90				22X30 0.95	25X25 0.95			22X30 1.00	25X25 1.00			22X35 1.20	25X30 1.20	30X25 1.20	
330		22X30 1.05	25X25 1.05			22X30 1.07	25X25 1.07			22X35 1.20	25X30 1.20	30X25 1.20		22X45 1.25	25X35 1.25	30X25 1.25	
390		22X35 1.22	25X25 1.20			22X35 1.22	25X30 1.25	30X25 1.22		22X40 1.32	25X30 1.30	30X25 1.30		22X50 1.50	25X40 1.50	30X30 1.50	
470		22X40 1.30	25X30 1.35	30X25 1.30		22X40 1.35	25X35 1.35	30X25 1.35		22X45 1.45	25X35 1.45	30X30 1.45			25X45 1.75	30X35 1.75	35X30 1.75
560		22X45 1.45	25X35 1.45	30X25 1.45		22X45 1.45	25X35 1.45	30X30 1.45		22X50 1.55	25X40 1.55	30X30 1.55			25X50 2.00	30X40 2.00	35X30 2.00
680		22X50 1.65	25X40 1.65	30X30 1.65		22X50 1.60	25X40 1.62	30X30 1.62			25X50 1.75	30X35 1.75	35X30 1.75			30X45 2.10	35X35 2.10
820			25X45 1.95	30X35 1.95	35X30 2.00		25X50 1.80	30X35 1.80	35X30 1.85			30X40 2.10	35X35 2.10			30X50 2.25	35X40 2.25
1000			25X50 2.10	30X40 2.15	35X30 2.20			30X40 2.10	35X35 2.10			30X45 2.25	35X35 2.25				35X45 2.40
1200				30X45 2.35	35X35 2.30			30X45 2.35	35X40 2.35			30X50 2.65	35X40 2.65				
1500				30X50 2.70	35X40 2.65				35X45 2.70				35X50 3.10				
1800					35X45 3.10				35X50 3.15								

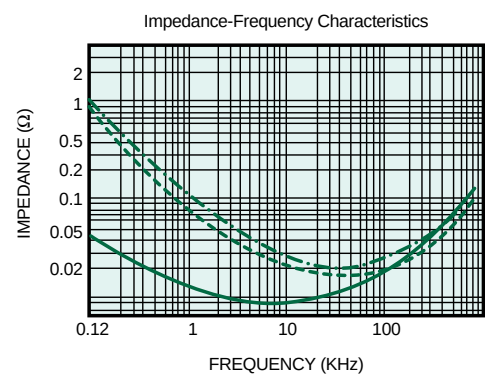
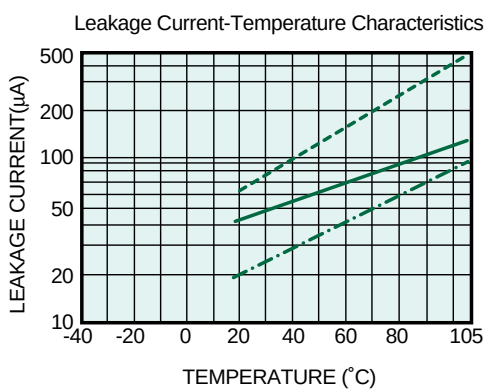
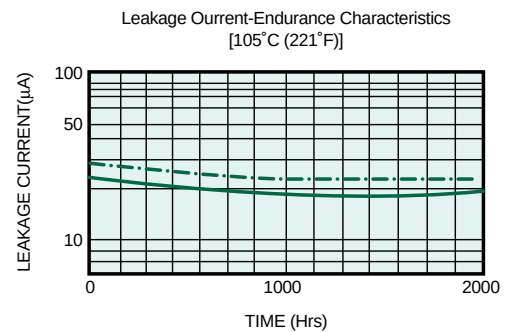
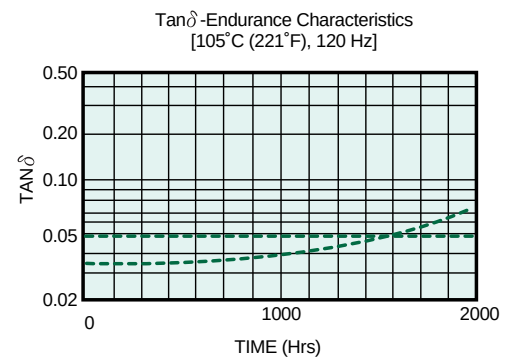
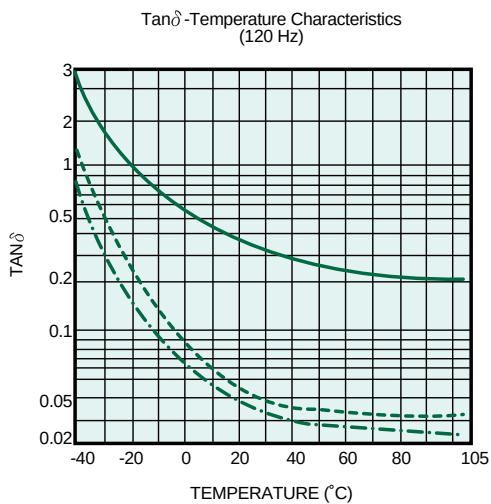
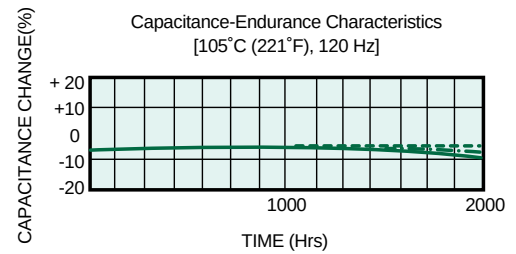
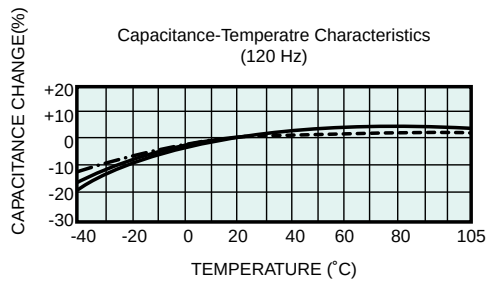
Cap(μF)	W.V	315(2F)				350(2V)				400(2G)				450(2W)			
		22 ø	25 ø	30 ø	35 ø	22 ø	25 ø	30 ø	35 ø	22 ø	25 ø	30 ø	35 ø	22 ø	25 ø	30 ø	35 ø
47														22X25 0.37			
56														22X30 0.40	25X25 0.40		
68										22X25 0.52				22X35 0.52	25X30 0.52		
82		22X25 0.53				22X25 0.54				22X30 0.58	25X25 0.58			22X40 0.60	25X35 0.60	30X25 0.60	
100		22X25 0.59				22X30 0.63	25X25 0.63			22X35 0.65	25X30 0.65			22X45 0.65	25X35 0.65	30X30 0.65	
120		22X30 0.68	25X25 0.68			22X35 0.72	25X25 0.72			22X40 0.74	25X35 0.75	30X25 0.74		22X50 0.74	25X40 0.74	30X30 0.74	
150		22X35 0.78	25X30 0.78	30X25 0.78		22X40 0.79	25X30 0.79	30X25 0.80		22X50 0.82	25X40 0.82	30X30 0.82			25X45 0.82	30X35 0.82	35X30 0.82
180		22X40 0.88	25X35 0.88	30X25 0.85		22X45 0.88	25X35 0.88	30X30 0.90			25X45 0.95	30X35 0.95	35X30 0.95		25X50 0.97	30X40 0.97	35X30 0.95
220		22X50 0.95	25X40 0.95	30X30 0.95		22X50 0.97	25X40 0.97	30X30 0.95			25X50 1.05	30X40 1.05	35X35 1.05			30X45 1.08	35X35 1.08
270			25X45 1.10	30X35 1.10	35X30 1.10		25X50 1.15	30X35 1.12	35X30 1.15			30X45 1.22	35X35 1.22			30X50 1.25	35X40 1.25
330			25X50 1.22	30X40 1.22	35X30 1.20			30X45 1.23	35X35 1.23			30X50 1.40	35X40 1.40				35X45 1.42
390				30X45 1.32	35X35 1.30			30X50 1.32	35X40 1.32				35X45 1.55				35X50 1.55
470				30X50 1.42	35X40 1.40				35X45 1.40				35X50 1.63				
560					35X50 1.52				35X50 1.52								

Max. permissible ripple current [A(rms) at 105°C, 120Hz]

Case size [øDxL(mm)]

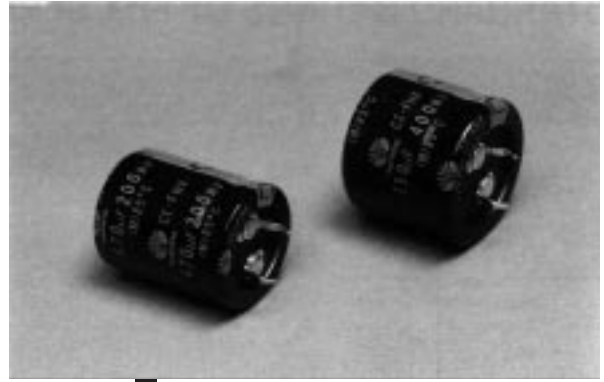
PERFORMANCE CURVES

— FUH 16V 33000 μ F
 - · - · - FUH 100V 1200 μ F
 - - - - - FUH 200V 1500 μ F



■ Features

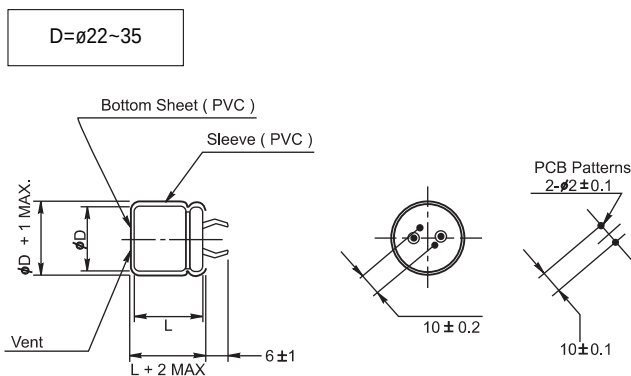
- PCB Mounting, Low profile
- Very compact size (Smaller than FHS series)
- High CV density
- Load life of 2000 hours at 85°C



■ Specifications

Item	Performance Characteristics		
Operating temperature range	160V ~ 250V : -40°C ~ +85°C 315 ~ 450V : -25°C ~ +85°C		
Rated working voltage range	160V ~ 450V		
Nominal capacitance range	56μF ~ 2700μF, (Standard value, 120Hz)		
D.C Leakage current(at 20°C)	The following specifications shall be satisfied when the rated voltage is applied for the required time. I ≤ 0.02CV or 2mA (5 min), whichever is less. Where I =Leakage current(μA) C=Nominal capacitance(μF) V=Rated voltage(V)		
Tan δ(max., at 20°C, 120Hz)	W.V(V)	160~250	315~450
	Tan δ	0.15	0.20
Characteristics at low temperature(max.) (impedance ratio at 120Hz)	W.V(V)	160~250	315~450
	Z-25°C/Z20°C	4	8
	Z-40°C/Z20°C	12	—
Load life	After applying rated working voltage for 2000 hours at + 85°C and then being stabilized at +20°C, capacitors shall meet following limits.		
	Capacitance change	Within ± 20% of initial measured value	
	Tan δ	≤ 200% of initial specified value	
	Leakage current	≤ Initial specified value	
Shelf life	After storage for 1000 hours at +85°C with no voltage applied and then being stabilized at +20°C, capacitors shall meet following limits.		
	Capacitance change	Within ± 15% of initial measured value	
	Tan δ	≤ 150% of initial specified value	
	Leakage current	≤ Initial specified value	

■ Case sizes and Dimensions



■ Ripple current coefficient

• Frequency

W.V	Freq(Hz)					
	50	120	500	1K	10K	100K
160~250V	0.82	1	1.20	1.37	1.45	1.50
315~450V	0.82	1	1.18	1.23	1.35	1.40

• Temperature

Temperature	≤45°C	60°C	70°C	85°C
Factor	1.45	1.30	1.15	1.0

STANDARD RATINGS OF FHX SERIES

Cap(μF)	W.V	160(2C)				180(2S)				200(2D)				250(2E)			
		22 ø	25 ø	30 ø	35 ø	22 ø	25 ø	30 ø	35 ø	22 ø	25 ø	30 ø	35 ø	22 ø	25 ø	30 ø	35 ø
180														22X25 1.00			
220														22X25 1.10			
270										22X25 1.25				22X30 1.28	25X25 1.30		
330						22X25 1.25				22X30 1.45	25X25 1.45			22X35 1.48	25X30 1.48		
390	22X25 1.35					22X30 1.50				22X30 1.60	25X25 1.60			22X40 1.70	25X30 1.70	30X25 1.68	
470	22X30 1.65	25X25 1.68				22X35 1.75	25X25 1.75			22X35 1.85	25X30 1.85			22X45 1.95	25X35 1.95	30X30 1.98	
560	22X35 1.95	25X30 1.95	30X25 1.95			22X40 2.00	25X30 2.00	30X25 2.05		22X40 2.00	25X35 2.05	30X25 2.05			25X40 2.15	30X30 2.10	35X25 2.15
680	22X40 2.15	25X30 2.15	30X25 2.15			22X45 2.25	25X35 2.25	30X25 2.20		22X45 2.30	25X40 2.35	30X30 2.30			25X45 2.45	30X35 2.45	35X30 2.45
820	22X45 2.52	25X35 2.50	30X30 2.52			22X50 2.65	25X40 2.65	30X30 2.60	35X25 2.60	22X50 2.65	25X45 2.70	30X35 2.70	35X25 2.65			30X40 2.75	35X35 2.75
1000	22X50 2.80	25X40 2.80	30X35 2.82	35X25 2.82			25X45 2.95	30X35 2.95	35X30 2.95		25X50 3.02	30X40 3.02	35X30 3.00			30X45 3.30	35X40 3.30
1200		25X45 3.20	30X35 3.25	35X30 3.25			25X50 3.30	30X40 3.35	35X30 3.35			30X45 3.45	35X35 3.45				35X45 3.50
1500			30X40 3.65	35X35 3.70				30X45 3.80	35X35 3.80			30X50 3.90	35X40 3.90				35X50 4.00
1800			30X50 4.20	35X40 4.20					35X45 4.25				35X45 4.45				
2200				35X45 4.75				35X50 4.90					35X50 4.95				
2700				35X50 5.40													

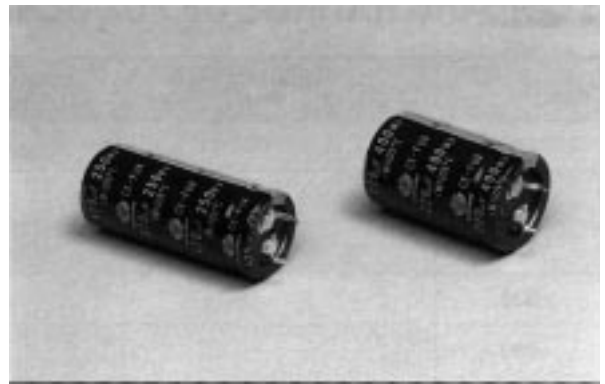
Cap(μF)	W.V	315(2F)				350(2V)				400(2G)				450(2W)			
		22 ø	25 ø	30 ø	35 ø	22 ø	25 ø	30 ø	35 ø	22 ø	25 ø	30 ø	35 ø	22 ø	25 ø	30 ø	35 ø
56														22X25 0.56			
68														22X30 0.62			
82										22X25 0.65				22X30 0.72	25X25 0.72		
100						22X25 0.70				22X30 0.80	25X25 0.80			22X35 0.83	25X30 0.83	30X25 0.83	
120	22X25 0.75					22X30 0.85	25X25 0.85			22X30 1.03	25X25 1.03			22X40 1.05	25X30 1.05	30X25 1.05	
150	22X30 0.95	25X25 0.95				22X35 1.00	25X25 1.00			22X35 1.10	25X30 1.10	30X25 1.10		22X45 1.12	25X35 1.10	30X30 1.12	
180	22X30 1.05	25X25 1.05				22X35 1.15	25X30 1.15	30X25 1.15		22X40 1.20	25X35 1.20	30X25 1.20			25X40 1.24	30X35 1.22	
220	22X35 1.18	25X30 1.18	30X25 1.20			22X40 1.30	25X35 1.30	30X30 1.30		22X45 1.35	25X40 1.33	30X30 1.35			25X50 1.40	30X40 1.40	35X30 1.38
270	22X40 1.40	25X35 1.40	30X25 1.35			22X50 1.55	25X40 1.55	30X30 1.55			25X45 1.58	30X35 1.55	35X30 1.58			30X45 1.68	35X35 1.68
330	22X45 1.55	25X40 1.55	30X30 1.60				25X45 1.70	30X35 1.70	35X30 1.70		25X50 1.76	30X40 1.76	35X30 1.75			30X50 1.90	35X40 1.90
390		25X45 1.80	30X35 1.80				25X50 1.95	30X40 1.95	35X35 1.95			30X45 2.00	35X35 2.00				35X45 2.10
470		25X50 2.05	30X40 2.05	35X30 2.05				30X45 2.30	35X35 2.30			30X50 2.32	35X40 2.32				35X50 2.40
560			30X45 2.35	35X35 2.35				30X50 2.55	35X40 2.55				35X45 2.60				
680				35X40 2.50				35X45 2.80					35X50 2.90				
820				35X45 3.00													
1000				35X50 3.15													

Max. permissible ripple current [A(rms) at 85°C, 120Hz]

Case size [øDxL(mm)]

■ Features

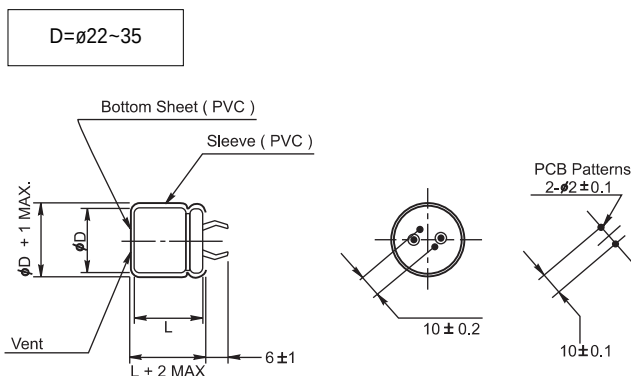
- PCB Mounting
- Super Low profile (smaller than FUH)
- More compact electronic equipment
- High CV density
- Load life of 2000 hours at 105°C



■ Specifications

Item	Performance Characteristics		
Operating temperature range	160V ~ 250V:-40°C ~ +105°C 315 ~ 450V:-25°C ~ +105°C		
Rated working voltage range	160V ~ 450V		
Nominal capacitance range	56μF ~ 2200μF, ±20%(at 20°C, 120Hz)		
D.C Leakage current(at 20°C)	The following specifications shall be satisfied when the rated voltage is applied for the required time. I ≤ 0.02CV or 2mA (5 min), whichever is less. Where I =Leakage current(μA) C=Nominal capacitance(μF) V=Rated voltage(V)		
Tan δ(max., at 20°C, 120Hz)	W.V(V)	160~250	315~450
	Tan δ	0.15	0.20
Characteristics at low temperature(max.) (impedance ratio at 120Hz)	W.V(V)	160~250	315~450
	Z-25°C/Z20°C	4	8
	Z-40°C/Z20°C	12	—
Load life	After applying rated working voltage for 2000hours at +105°C and then being stabilized at +20°C, capacitors shall meet following limits.		
	Capacitance change	Within ± 20% of initial measured value	
	Tan δ	≤ 200% of initial specified value	
	Leakage current	≤ Initial specified value	
Shelf life	After storage for 1000 hours at +105°C with no voltage applied and then being stabilized at +20°C, capacitors shall meet following limits.		
	Capacitance change	Within ± 20% of initial measured value	
	Tan δ	≤ 150% of initial specified value	
	Leakage current	≤ Initial specified value	

■ Case sizes and Dimensions



■ Ripple current coefficient

• Frequency

W.V	Freq(Hz)	50	120	1K	10K	100K
160~250V		0.80	1.00	1.25	1.40	1.50
315~450V		0.84	1.00	1.15	1.20	1.32

• Temperature

Temperature	≤45°C	60°C	85°C	105°C
Factor	2.40	2.20	1.65	1.00

STANDARD RATINGS OF FUX SERIES

Cap(μF)	W.V	160(2C)				180(2S)				200(2D)				250(2E)			
		22 ø	25 ø	30 ø	35 ø	22 ø	25 ø	30 ø	35 ø	22 ø	25 ø	30 ø	35 ø	22 ø	25 ø	30 ø	35 ø
180														22X25 0.75			
220														22X30 0.95	25X25 0.95		
270						22X25 0.95				22X25 0.95				22X35 1.20	25X30 1.20		
330		22X25 1.15				22X30 1.17				22X30 1.20	25X25 1.20			22X40 1.25	25X30 1.25	30X25 1.25	
390		22X30 1.27				22X30 1.30	25X25 1.30			22X35 1.37	25X30 1.37			22X45 1.45	25X35 1.45	30X30 1.45	
470		22X35 1.40	25X25 1.40			22X35 1.42	25X30 1.42			22X40 1.48	25X30 1.48	30X25 1.48		22X50 1.55	25X40 1.55	30X30 1.55	35X25 1.55
560		22X40 1.52	25X30 1.52			22X40 1.53	25X35 1.53	30X25 1.52		22X45 1.57	25X35 1.57	30X30 1.60			25X45 1.80	30X35 1.78	35X30 1.80
680		22X45 1.72	25X35 1.70	30X30 1.70		22X45 1.73	25X40 1.75	30X30 1.75		22X50 1.80	25X40 1.80	30X30 1.80	35X25 1.78		25X50 2.05	30X40 2.05	35X35 2.08
820		22X50 2.05	25X40 2.05	30X30 2.00	35X25 2.00	22X50 2.08	25X45 2.08	30X35 2.05	35X25 2.05		25X50 2.15	30X35 2.10	35X30 2.15			30X45 2.20	35X35 2.20
1000			25X45 2.25	30X35 2.25	35X30 2.25		25X50 2.30	30X40 2.30	35X30 2.25			30X45 2.40	35X35 2.40			30X50 2.45	35X40 2.45
1200			25X50 2.50	30X40 2.50	35X30 2.45			30X45 2.52	35X35 2.52			30X50 2.58	35X40 2.58				35X45 2.60
1500				30X45 2.80	35X35 2.80			30X50 2.90	35X40 2.90				35X45 3.05				
1800				30X50 3.30	35X45 3.30				35X45 3.35				35X50 3.40				
2200					35X50 3.75				35X50 3.75								

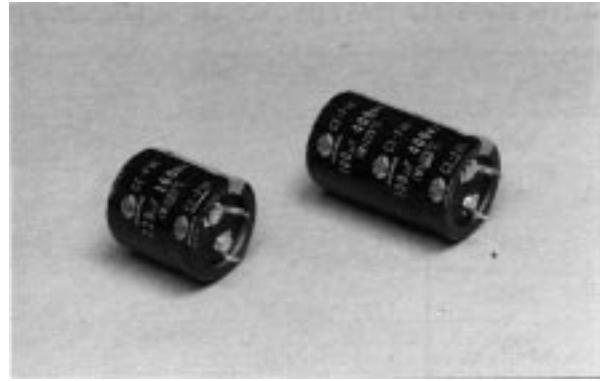
Cap(μF)	W.V	315(2F)				350(2V)				400(2G)				450(2W)			
		22 ø	25 ø	30 ø	35 ø	22 ø	25 ø	30 ø	35 ø	22 ø	25 ø	30 ø	35 ø	22 ø	25 ø	30 ø	35 ø
56														22X25 0.44			
68										22X25 0.50				22X30 0.50	25X25 0.50		
82										22X30 0.57	25X25 0.57			22X35 0.57	25X30 0.57		
100		22X25 0.68				22X25 0.69				22X35 0.70	25X30 0.70			22X40 0.72	25X30 0.72	30X25 0.72	
120		22X30 0.75	25X25 0.75			22X30 0.75	25X25 0.75			22X40 0.77	25X30 0.76	30X25 0.76		22X45 0.77	25X35 0.77	30X30 0.77	
150		22X35 0.80	25X30 0.80			22X35 0.82	25X30 0.82			22X45 0.84	25X35 0.84	30X30 0.84		22X50 0.85	25X40 0.85	30X30 0.85	
180		22X40 0.91	25X30 0.91	30X25 0.90		22X45 0.94	25X35 0.92	30X25 0.92		22X50 0.94	25X40 0.94	30X30 0.94	35X25 0.94		25X45 0.95	30X35 0.94	
220		22X45 1.00	25X35 1.00	30X30 1.02		22X50 1.04	25X40 1.04	30X30 1.02	35X25 1.02		25X45 1.08	30X35 1.08	35X30 1.08		25X50 1.10	30X40 1.10	35X30 1.10
270		22X50 1.12	25X40 1.12	30X35 1.12	35X25 1.12		25X45 1.15	30X35 1.15	35X30 1.15		25X50 1.22	30X40 1.22	35X30 1.22			30X45 1.25	35X35 1.25
330			25X45 1.32	30X35 1.32	35X30 1.32		25X50 1.35	30X40 1.35	35X35 1.35			30X45 1.40	35X35 1.40			30X50 1.43	35X40 1.43
390				30X40 1.44	35X35 1.44			30X45 1.50	35X40 1.50			30X50 1.55	35X40 1.55				35X45 1.60
470				30X45 1.65	35X40 1.65				35X45 1.72				35X45 1.75				35X50 1.75
560				30X50 1.85	35X45 1.85				35X50 1.95				35X50 2.00				
680					35X50 2.10												

Max. permissible ripple current [A(rms) at 105°C, 120Hz]

Case size [øDxL(mm)]

■ Features

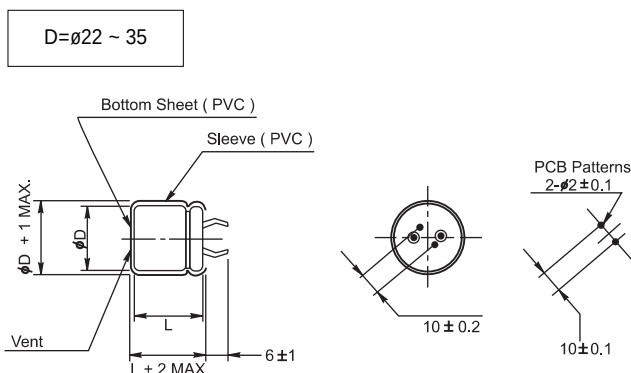
- PCB Mounting
- Long life and excellent stability (equivalent to 13 years at 60°C)
- No derating at high temperature
- For industrial and commercial applications.
- High ripple current capability
- Load life of 5000 hours at 105°C



■ Specifications

Item	Performance Characteristics		
Operating temperature range	160V ~ 250V : -40°C ~ +105°C 400V : -25°C ~ +105°C		
Rated working voltage range	160V ~ 250V, 400V		
Nominal capacitance range	39μF ~ 1200μF, ±20%(at 20°C, 120Hz)		
D.C Leakage current(at 20°C)	The following specifications shall be satisfied when the rated voltage is applied for the required time. I ≤ 0.02CV or 2mA (5 min), whichever is less. Where I =Leakage current(μA) C=Nominal capacitance(μF) V=Rated voltage(V)		
Tan δ(max., at 20°C, 120Hz)	W.V(V)	160~250	400
	Tan δ	0.10	0.20
Characteristics at low temperature(max.) (impedance ratio at 120Hz)	W.V(V)	160~250	400
	Z-25°C/Z20°C	3	8
	Z-40°C/Z20°C	6	—
Load life	After applying rated working voltage for 5000 hours at +105°C and then being stabilized at +20°C, capacitors shall meet following limits.		
	Capacitance change	Within ± 20% of initial measured value	
	Tan δ	≤ 300% of initial specified value	
	Leakage current	≤ Initial specified value	
Shelf life	After storage for 1000 hours at +105°C with no voltage applied and then being stabilized at +20°C, capacitors shall meet following limits.		
	Capacitance change	Within ± 15% of initial measured value	
	Tan δ	≤ 150% of initial specified value	
	Leakage current	≤ Initial specified value	

■ Case sizes and Dimensions



■ Ripple current coefficient

• Frequency

W.V	Freq(Hz)	50	120	1K	10K	100K
160~250V		0.80	1.0	1.25	1.40	1.50
400V		0.82	1.0	1.15	1.20	1.32

• Temperature

Temperature	≤45°C	60°C	85°C	105°C
Factor	2.40	2.20	1.65	1.00

STANDARD RATINGS OF FUL SERIES

Cap(μF)	W.V	160				180				200			
		22 ø	25 ø	30 ø	35 ø	22 ø	25 ø	30 ø	35 ø	22 ø	25 ø	30 ø	35 ø
120										22X25 0.75			
150						25X25 0.80				22X30 0.80	25X25 0.80		
180		22X25 0.80				22X30 0.90	25X25 0.90			22X30 0.90	25X25 0.90		
220		22X30 1.00	25X25 1.00			22X35 1.00	25X25 1.00	30X25 1.00		22X35 1.00	25X30 1.00	30X25 1.00	
270		22X35 1.10	25X25 1.05	30X25 1.10		22X40 1.15	25X30 1.10	30X25 1.10		22X40 1.15	25X35 1.15	30X25 1.10	
330		22X40 1.20	25X30 1.15	30X25 1.20		22X45 1.25	25X35 1.20	30X30 1.20		22X50 1.30	25X40 1.25	30X30 1.25	
390		22X45 1.33	25X35 1.30	30X30 1.30		22X50 1.35	25X40 1.30	30X30 1.30			25X45 1.40	30X35 1.40	35X25 1.40
470		22X50 1.47	25X40 1.45	30X30 1.47			25X45 1.52	30X35 1.50	35X30 1.50		25X50 1.62	30X40 1.60	35X30 1.60
560			25X45 1.60	30X35 1.60	35X30 1.60		25X50 1.73	30X40 1.70	35X30 1.70			30X45 1.80	35X35 1.80
680			25X50 1.80	30X40 1.80	35X30 1.78			30X45 1.95	35X35 1.95			30X50 2.10	35X40 2.10
820				30X45 2.15	35X35 2.15			30X50 2.20	35X40 2.20				35X45 2.40
1000				30X50 2.55	35X40 2.55				35X45 2.65				35X50 2.80
1200					35X45 2.90				35X50 2.95				

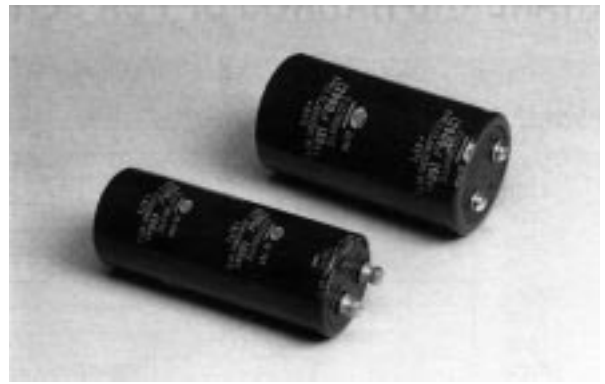
Cap(μF)	W.V	250				400			
		22 ø	25 ø	30 ø	35 ø	22 ø	25 ø	30 ø	35 ø
39						22X25 0.40			
47						22X30 0.47			
56						22X35 0.52	25X25 0.52		
68						22X40 0.59	25X30 0.59		
82						22X45 0.64	25X35 0.62	30X25 0.64	
100		22X25 0.65				22X50 0.72	25X40 0.70	30X30 0.70	
120		22X30 0.80	25X25 0.80				25X45 0.77	30X35 0.75	35X25 0.75
150		22X35 0.90	25X30 0.90	30X25 0.90			25X50 0.85	30X40 0.85	35X30 0.85
180		22X40 1.00	25X30 1.00	30X25 1.00				30X45 0.90	35X35 0.90
220		22X45 1.10	25X35 1.10	30X30 1.10				30X50 1.00	35X40 1.00
270		22X50 1.22	25X40 1.20	30X30 1.20					35X50 1.20
330			25X45 1.37	30X35 1.35	35X30 1.35				
390			25X50 1.53	30X40 1.50	35X30 1.50				
470				30X45 1.70	35X35 1.70				
560				30X50 2.10	35X40 2.10				
680					35X45 2.40				
820					35X50 2.60				

Max. permissible ripple current [A(rms) at 105°C, 120Hz]

Case size [øDxL(mm)]

■ Features

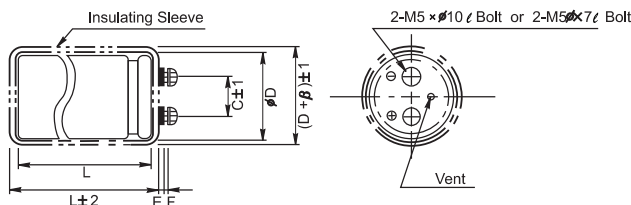
- Screw terminal type
- Smaller dimensions and large capacity
- Ideal for inverter, computer
- Large allowable ripple current
- Load life of 2000 hours at 85°C



■ Specifications

Item	Performance Characteristics				
Operating temperature range	10V ~ 250V : -40°C ~ +85°C 315 ~ 450V : -25°C ~ +85°C				
Rated working voltage range	10V ~ 450V				
Nominal capacitance range	270μF ~ 680000μF, ±20%(at 20°C, 120Hz)				
D.C Leakage current(at 20°C)	The following specifications shall be satisfied when the rated voltage is applied for the required time. I ≤ 0.02CV(μA) or 5mA (5 min), whichever is less. Where I =Leakage current(μA) C=Nominal capacitance(μF) V=Rated voltage(V)				
Tanδ(max., at 20°C, 120Hz)	W.V(V)		Tanδ		
	10		0.8 until 50000μF		
	16		0.7 until 50000μF		
	25, 35		0.5 until 50000μF		
	50~100		0.3 until 30000μF		
	160~250		0.15 until 10000μF		
	315~450		0.20 until 10000μF		
	when capacitance is over 10000μF, Tanδ shall be added 0.025 to the listed value with increase of every each 10000μF				
Characteristics at low temperature(max.) (impedance ratio at 120Hz)	W.V(V)	10~16	25~100	160~250	315~450
	Z-25°C/Z20°C	4	3	3	8
	Z-40°C/Z20°C	12	6	8	—
Load life	After applying rated working voltage for 2000hours at +85°C and then being stabilized at +20°C, capacitors shall meet following limits.				
	Capacitance change		Within ± 15% of initial measured value		
	Tanδ		≤ 175% of initial specified value		
	Leakage current		≤ Initial specified value		
Shelf life	After storage for 1000hours at + 85°C with no voltage applied and then being stabilized at +20°C, capacitors shall meet following limits.				
	Capacitance change		Within ± 15% of initial measured value		
	Tanδ		≤ 175% of initial specified value		
	Leakage current		≤ Initial specified value		

■ Case sizes and Dimensions



øD	C	E	F	β
35	128	3.0	5.0	1.0
51	21.7	3.0	4.0	1.5
63.5	28.3	3.0	4.0	1.5
76	31.6	3.0	4.0	1.5
89	32.0	3.0	4.0	1.5

■ Ripple current coefficient

• Temperature

W.V	Temp	20°C	40°C	70°C	85°C
10~100V		3.00	2.40	1.45	1.00
160~450V		3.30	2.65	1.65	1.00

• Frequency

W.V	Freq(Hz)	50	120	400	1K	10K
10~100		0.8	1.0	1.1	1.2	1.3
160~450		0.8	1.0	1.2	1.3	1.4

PSA SERIES

STANDARD RATINGS OF PSA SERIES

øDXL(mm)

W.V Cap(μF)	10		16		25		35		50		63		80		100	
	SIZE	I _r	SIZE	I _r	SIZE	I _r	SIZE	I _r	SIZE	I _r	SIZE	I _r	SIZE	I _r	SIZE	I _r
3300															35X50	3.0
3900															35X60	3.4
4700															35X70	3.8
5600													35X50	3.3	35X80	4.2
6800											35X50	3.1	35X60	3.7	35X90	4.5
8200											35X60	3.7	35X70	4.3	35X110	5.0
10000									35X60	3.9	35X70	4.2	35X80	4.9	35X120	5.5
12000							35X50	3.4	35X70	4.4	35X80	5.0	35X90	5.6	51X70	6.2
15000							35X60	4.0	35X80	5.4	35X90	5.8	35X110	6.5	51X80	7.4
18000					35X50	4.8	35X70	4.6	35X90	5.9	35X100	6.4	51X70	7.5	51X90	8.6
22000					35X60	5.5	35X80	5.5	35X100	6.4	35X120	7.2	51X80	8.2	51X100	11.0
27000			35X50	4.2	35X70	6.4	35X90	6.2	35X120	7.7	51X80	8.4	51X100	9.6	51X120	12.4
33000			35X60	5.0	35X80	7.2	35X100	7.2	51X70	8.2	51X80	9.2	51X110	10.4	63.5X100	14.0
39000			35X60	5.5	35X90	8.4	35X110	8.0	51X80	9.4	51X100	10.0	51X120	11.2	63.5X120	15.6
47000	35X50	4.6	35X70	6.4	35X100	9.4	51X80	8.8	51X90	10.5	51X120	11.5	63.5X100	12.0	63.5X140	16.8
56000	35X60	5.4	35X80	7.0	35X110	10.2	51X90	9.6	51X100	11.4	63.5X90	12.6	63.5X120	13.8	76X120	18.2
68000	35X70	6.2	35X90	8.0	35X120	10.8	51X100	11.0	51X120	12.8	63.5X100	14.6	63.5X130	15.6	76X140	21.0
82000	35X80	7.4	35X100	9.1	51X80	12.2	51X110	12.2	63.5X100	13.9	63.5X130	16.8	76X120	18.0		
100000	35X90	8.0	35X120	10.5	51X100	13.5	51X120	13.6	63.5X120	14.8	63.5X140	17.4	76X130	21.3		
120000	35X100	9.2	51X80	11.2	51X120	14.2	63.5X100	14.8	63.5X140	16.0	76X130	20.0	89X130	23.6		
150000	51X80	10.2	51X90	12.0	51X120	15.0	63.5X120	15.6	76X120	18.2	76X140	22.0				
180000	51X90	12.0	51X110	13.5	63.5X100	16.2	63.5X140	17.2	76X140	20.2	89X140	24.2				
220000	51X100	13.2	51X120	14.6	63.5X120	17.6	76X130	19.0	89X140	22.4						
270000	63.5X80	13.6	63.5X100	15.5	76X100	18.5	89X120	20.4								
330000	63.5X90	15.0	63.5X110	17.1	76X120	20.5	89X140	22.5								
390000	63.5X100	16.3	76X100	18.4	76X140	22.1										
470000	63.5X110	17.0	76X120	19.5	89X140	23.0										
560000	76X100	18.2	76X130	20.5												
680000	76X120	20.5														

W.V Cap(μF)	160		180		200		250		315		350		400		450	
	SIZE	I _r	SIZE	I _r	SIZE	I _r	SIZE	I _r	SIZE	I _r	SIZE	I _r	SIZE	I _r	SIZE	I _r
270													35X50	1.4	35X50	1.4
330													35X60	1.6	35X60	1.6
390											35X50	1.7	35X70	1.9	35X70	1.8
470									35X50	1.2	35X60	1.9	35X80	2.2	35X80	2.0
560									35X60	1.4	35X70	2.2	35X90	2.5	35X100	2.4
680							35X50	1.6	35X70	1.7	35X80	2.5	35X100	2.8	35X120	2.8
820							35X60	2.0	35X80	1.9	35X90	3.0	35X110	3.3	51X70	3.0
1000			35X50	2.2	35X50	2.4	35X70	2.4	35X90	2.2	35X100	3.4	51X70	3.5	51X80	3.8
1200			35X60	2.7	35X60	2.8	35X80	2.7	35X100	2.6	35X120	4.0	51X90	4.4	51X100	4.4
1500			35X70	3.1	35X70	3.4	35X100	3.3	35X110	3.2	51X80	4.6	51X100	5.0	51X110	5.2
1800			35X80	3.6	35X80	4.0	35X120	4.0	35X120	4.0	51X90	5.2	51X110	5.6	51X130	5.7
2200	35X80	4.0	35X90	4.2	35X100	4.6	51X80	4.8	51X80	4.8	51X110	6.0	51X130	6.5	63.5X110	6.6
2700	35X100	5.0	35X100	5.0	35X120	5.0	51X90	5.5	51X100	5.8	51X120	6.7	63.5X110	7.6	63.5X130	7.8
3300	35X120	6.2	51X70	5.8	51X80	5.6	51X100	6.2	51X120	7.0	63.5X100	8.0	63.5X130	9.0	76X110	8.6
3900	51X70	6.8	51X80	6.8	51X90	6.4	51X120	7.0	63.5X100	8.0	63.5X120	9.0	63.5X140	9.8	76X130	10.0
4700	51X80	7.6	51X90	7.6	51X100	7.2	63.5X100	8.1	63.5X110	9.2	76X100	9.9	76X130	11.5	76X140	11.4
5600	51X90	8.6	51X110	8.6	51X120	8.2	63.5X110	9.2	63.5X120	10.4	76X120	12.0	76X140	12.6	89X120	12.4
6800	51X100	9.8	51X120	9.4	63.5X90	9.0	63.5X120	10.2	76X100	11.2	76X130	13.5	89X120	13.8	89X140	14.6
8200	51X120	11.0	63.5X100	10.6	63.5X100	10.4	76X100	11.4	76X120	12.8	89X120	14.8	89X140	15.6		
10000	63.5X100	12.4	63.5X120	11.5	63.5X120	11.6	76X120	12.5	89X120	15.0	89X140	16.4				
12000	63.5X120	13.6	76X100	13.2	76X100	12.9	76X140	14.0	89X140	17.2						
15000	76X100	15.0	76X120	15.4	76X120	14.0	89X140	16.4								
18000	76X120	16.8	89X120	16.9	76X140	15.6										
22000	76X140	18.6	89X140	19.0												
27000	89X120	21.2														
33000	89X140	23.8														

Max. permissible ripple current [A(rms) at 85°C, 120Hz]

Case size [øDXL(mm)]

■ Features

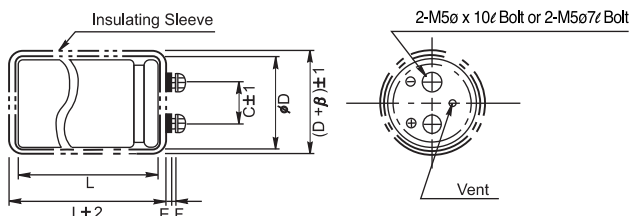
- Screw terminal type
- Ideal for inverter, computer
- Large allowable ripple current
- High reliability for continuous operation
- Computer grade, Large capacity.
- Load life of 2000 hours at 105°C



■ Specifications

Item	Performance Characteristics						
Operating temperature range	-40°C ~ +105°C						
Rated working voltage range	10V ~ 250V						
Nominal capacitance range	220μF ~ 470000μF, -10 ~ +50%(at 20°C, 120Hz)						
D.C Leakage current(at 20°C)	The following specifications shall be satisfied when the rated voltage is applied for the required time. I ≤ 0.02CV or 5mA (5 min), whichever is less. Where I=Leakage current(μA) C=Nominal capacitance(μF) V=Rated voltage(V)						
Tan δ(max., at 20°C, 120Hz)	W.V(V)	10~16	25	35	50	63~100	160~
	220~10000	—	0.35	0.30	0.25	0.15	0.15
	15000~47000	0.50	0.40	0.40	0.35	0.30	—
	68000~100000	0.75	0.50	0.50	0.40	—	—
	150000~220000	1.00	1.00	—	—	—	—
	330000~	1.50	—	—	—	—	—
Characteristics at low temperature(max.) (impedance ratio at 120Hz)	W.V(V)	10~16	25~35	50~100	160~250		
	Z-25°C/Z20°C	4	3	2	2		
	Z-40°C/Z20°C	12	6	4	8		
Load life	After applying rated working voltage for 2000 hours at +105°C and then being stabilized at +20°C, capacitors shall meet following limits.						
	Capacitance change		Within ± 20% of initial measured value				
	Tan δ		≤ 200% of initial specified value				
	Leakage current		≤ Initial specified value				
Shelf life	After storage for 1000 hours at +105°C with no voltage applied and then being stabilized at +20°C, capacitors shall meet following limits.						
	Capacitance change		Within ± 20% of initial measured value				
	Tan δ		≤ 150% of initial specified value				
	Leakage current		≤ Initial specified value				

■ Case sizes and Dimensions



øD	C	E	F	β
35	12.8	3.0	5.0	1.0
51	21.7	3.0	4.0	1.5
63.5	28.3	3.0	4.0	1.5
76	31.6	3.0	4.0	1.5
89	32.0	3.0	4.0	1.5

■ Ripple current coefficient

• Frequency

Freq(Hz)	50	120	400	1K	10K
Factor	0.8	1.0	1.2	1.3	1.4

• Temperature

Temperature	≤45°C	65°C	85°C	105°C
Factor	3.0	2.6	2.0	1.0

STANDARD RATINGS OF PU SERIES

W.V Cap(μF)	10(1A)		16(1C)		25(1E)		35(1V)		50(1H)		63(1J)	
	Case Size	I _R (A)	Case Size	I _R (A)	Case Size	I _R (A)	Case Size	I _R (A)	Case Size	I _R (A)	Case Size	I _R (A)
3300											35X50	2.8
4700									35X50	3.0	35X60	3.6
6800							35X50	3.7	35X70	4.1	35X80	4.8
10000					35X50	4.3	35X70	4.9	35X90	5.2	35X100	6.2
15000			35X50	4.0	35X70	5.9	35X90	6.5	35X100	6.2	51X90	8.1
22000	35X50	4.3	35X70	6.0	35X90	6.9	35X120	7.9	51X90	8.1	63.5X100	10.4
33000	35X70	6.4	35X90	7.2	35X120	8.3	51X100	9.6	63.5X100	11.0	63.5X120	13.2
47000	35X90	7.2	35X120	8.0	51X90	9.8	51X120	11.9	63.5X120	13.8	76X120	16.8
68000	35X100	7.7	51X90	10.4	51X120	10.6	63.5X100	13.8	76X120	16.9		
100000	51X90	9.6	51X120	12.4	63.5X100	12.5	76X120	16.9				
150000	51X120	12.0	63.5X100	13.4	76X120	16.9						
220000	63.5X100	14.2	76X100	16.2								
330000	76X100	18.8										
470000	76X140	20.8										

W.V Cap(μF)	80(1K)		100(2A)		160(2A)		200(2D)		250(2E)	
	Case Size	I _R (A)	Case Size	I _R (A)	Case Size	I _R (A)	Case Size	I _R (A)	Case Size	I _R (A)
220									35X50	1.1
330							35X50	1.2	35X60	1.3
470					35X50	1.5	35X60	1.6	35X70	1.8
680					35X60	1.8	35X70	2.0	35X100	2.1
1000					35X80	2.3	35X100	2.5	35X120	2.7
1500			35X50	2.2	35X100	2.8	35X120	3.2	51X100	3.3
2200	35X50	2.8	35X60	2.4	51X80	3.5	51X100	4.3	63.5X100	4.7
3300	35X60	3.6	35X80	3.6	51X100	4.7	63.5X100	5.2	63.5X120	5.6
4700	35X80	4.8	35X100	4.8	63.5X100	5.9	63.5X120	6.6	76X120	7.0
6800	35X100	5.2	51X80	5.9	63.5X120	7.0	76X120	7.4		
10000	51X80	6.9	51X100	7.2	76X120	8.3				
15000	51X110	8.8	63.5X100	8.8						
22000	63.5X120	12.9	76X120	11.4						
33000	76X120	16.2								

Max. permissible ripple current [A(rms) at 105°C, 120Hz]

Case size [øDxL(mm)]

■ Features

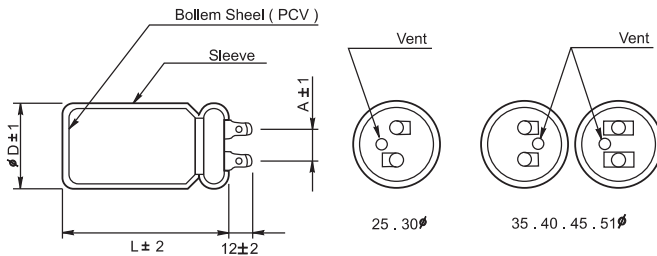
- Lug terminal
- For motor starting
 - compressor starter of a refrigerator,
 - air conditioner and water pump.



■ Specifications

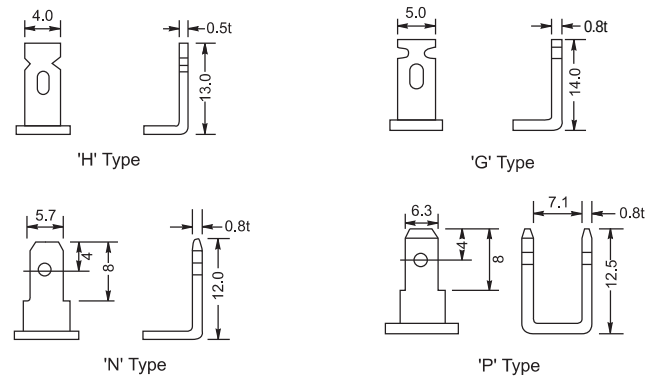
Item	Performance Characteristics
Operating temperature range	-25°C ~ +70°C
Rated working voltage range	110V ~ 300V
Nominal capacitance range	25μF ~ 500μF
Capacitance tolerance	0% ~ +20% (at 20°C, 60Hz)
Power factor	0.08 Max. (at 20°C, 60Hz)
Over voltage test	1. The capacitor should withstand 1.4 times of the rated voltage, applied for 30 sec. 2. The capacitor should withstand 1.2 times of the rated voltage, applied for 2 min.

■ Case sizes and Dimensions



øD	A	Terminal Type
25	10	H
30	10	G, N
35	12	G, N, P
40, 45	16	G, N, P
51	20	G, N, P

■ Terminal type(H, G, N, P)

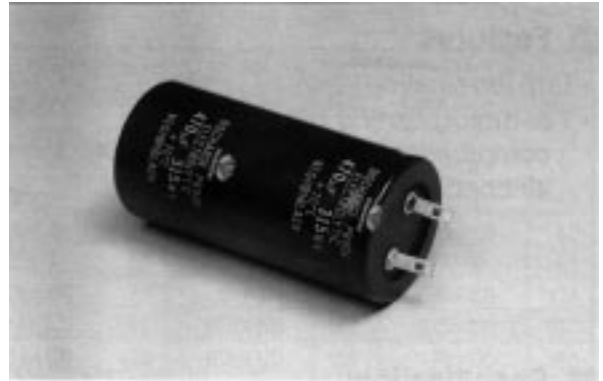


■ STANDARD RATINGS OF MS SERIES

		ø D x L (mm)								
Cap(μF) \ W.V	110	125	140	160	180	200	220	250	280	300
25						30X70	30X80	35X60	35X70	35X80
30					25X60	30X80	35X60	35X70	35X80	35X100
40	25X40	25X50	25X50	25X60	25X70	35X60	35X70	35X80	35X100	40X100
50	25X50	25X50	25X60	25X70	30X70	35X70	35X80	35X100	40X100	45X100
63	25X50	25X60	30X60	30X70	30X80	35X80	35X100	40X100	45X100	45X100
80	25X60	30X60	30X70	35X60	35X70	35X100	40X100	45X100	51X100	
100	25X60	30X70	35X60	35X70	35X80	40X100	45X100	51X100		
125	30X60	35X60	35X70	35X80	35X100	45X100	51X100			
160	30X70	35X70	35X80	35X100	40X100	51X100				
200	35X60	35X80	35X100	40X100	45X100					
250	35X70	35X100	40X100	45X100						
315	35X80	40X100	45X100							
400	35X100	45X100								
500	40X100									

■ Features

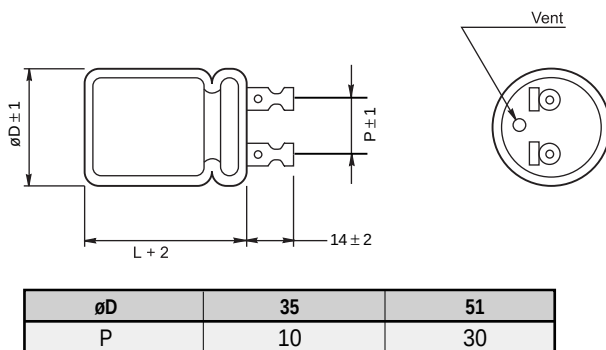
- For the circuit where frequent charging - discharging
- Life time of continuous 1 million cycles for 1 cycle/sec.
(0.8 sec. charging and 0.2 sec. time constant discharging)



■ Specifications

Item	Performance Characteristics				
Operating temperature range	-25°C ~ +70°C				
Rated working voltage range	150V ~ 450V				
Nominal capacitance range	100μF ~ 1000μF				
Capacitance tolerance	-10% ~ +50%(at 20°C, 120Hz)				
D.C Leakage current(at 20°C)	The following specifications shall be satisfied when the rated voltage is applied for the required time. $I \leq 0.06CV$ or 3mA (5 min), whichever is less. Where I=Leakage current(μA) C=Nominal capacitance(μF) V=Rated voltage(V)				
Tan δ(max., at 20°C, 120Hz)	W.V(V)	150	250	350	450
	Tan δ	0.15	0.15	0.10	0.10
Load life	After the test of 1000000 cycles with charging and discharging 1 cycle of which time is 1 sec.(charge:0.8 sec., discharge:0.2 sec.)at 40°C and then being stabilized at 20°C, capacitors shall meet following limits.				
	Capacitance change	Within ± 20% of initial measured value			
	Tan δ	≤ 200% of initial specified value			
	Leakage current	≤ 200% of initial specified value			

■ Case sizes and Dimensions



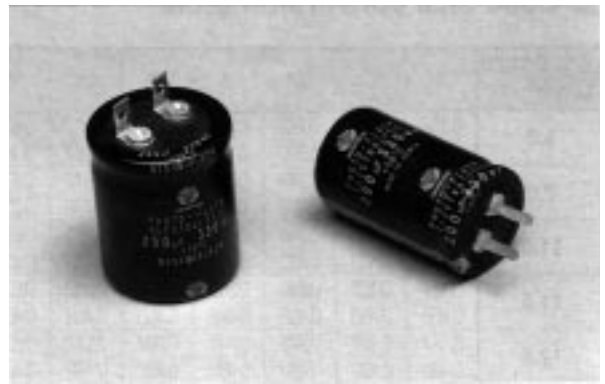
■ STANDARD RATINGS OF ES SERIES

ø D x L(mm)

TYPE	CASE SIZE
ES 150L 560	35X100
ES 150L 1000	51X100
ES 250L 270	35X100
ES 250L 560	51X100
ES 350L 150	35X100
ES 350L 330	51X100
ES 450L 100	35X100
ES 450L 220	51X100

■ Features

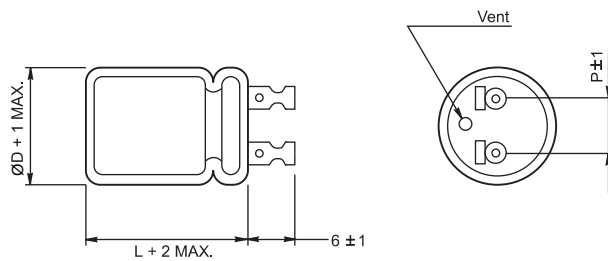
- For the photo flash
- Extremely low leakage current



■ Specifications

Item	Performance Characteristics		
Operating temperature range	-10°C ~ +50°C		
Rated working voltage range	330V		
Nominal capacitance range	60μF ~ 1500μF		
Capacitance tolerance	-10% ~ +30%(at 20°C, 120Hz)		
D.C Leakage current(at 20°C)	The following specifications shall be satisfied when the rated voltage is applied for the required time. $I \leq 0.003CV$ (5 min) Where I =Leakage current(μA) C=Nominal capacitance(μF) V=Rated voltage(V)		
Tan δ(max., at 20°C, 120Hz)	Cap	≤600μF	>600μF
	Tan δ	0.1	0.12
Surge voltage	350V		
Load life	After charge and discharge are repeated 10000 cycles as following conditions at room temperature (5~35°C) and then being stabilized at 20°C, capacitors shall meet following limits. ● Test condition Charge voltage : Rated voltage Time:Charge 20 sec, Discharge :10 sec Resistance:Charge 1KΩ, Discharge :1Ω		
	Capacitance change	Within ± 15% of initial measured value	
	Tan δ	≤ 150% of initial specified value	
	Leakage current	≤ 150% of initial specified value	

■ Case sizes and Dimensions



øD	18	20	22	25	30	35
P	7	7	8	10	10	15

■ STANDARD RATINGS OF ES SERIES

ø D × L(mm)

W.V Cap(μF)	60	100	150	200	250	320	400	500	600	700	800	900	1000	1500
330	18X30	18X40	20X35	22X35	25X30	25X40	25X50	30X50	30X50	30X60	35X50	35X50	35X50	35X115

Metric conversion table

■ Case size conversion table

Dia(inch)

Length(inch)

D(mm) L(mm)	4	5	6.3	8	10	13	16	18	22	25	30	35	40	45	51	63.5	76	89
5.0	0.157	0.197	0.248	0.315	0.394	0.512	0.630	0.709	0.866	0.984	1.181	1.378	1.575	1.772	2.001	2.500	2.992	3.504
	0.197	0.197	0.197	0.197	0.197	0.197	0.197	0.197	0.197	0.197	0.197	0.197	0.197	0.197	0.197	0.197	0.197	0.197
7.0	0.157	0.197	0.248	0.315	0.394	0.512	0.630	0.709	0.866	0.984	1.181	1.378	1.575	1.772	2.001	2.500	2.992	3.504
	0.276	0.276	0.276	0.276	0.276	0.276	0.276	0.276	0.276	0.276	0.276	0.276	0.276	0.276	0.276	0.276	0.276	0.276
11.0	0.157	0.197	0.248	0.315	0.394	0.512	0.630	0.709	0.866	0.984	1.181	1.378	1.575	1.772	2.001	2.500	2.992	3.504
	0.433	0.433	0.433	0.433	0.433	0.433	0.433	0.433	0.433	0.433	0.433	0.433	0.433	0.433	0.433	0.433	0.433	0.433
11.5	0.157	0.197	0.248	0.315	0.394	0.512	0.630	0.709	0.866	0.984	1.181	1.378	1.575	1.772	2.001	2.500	2.992	3.504
	0.453	0.453	0.453	0.453	0.453	0.453	0.453	0.453	0.453	0.453	0.453	0.453	0.453	0.453	0.453	0.453	0.453	0.453
12.5	0.157	0.197	0.248	0.315	0.394	0.512	0.630	0.709	0.866	0.984	1.181	1.378	1.575	1.772	2.001	2.500	2.992	3.504
	0.492	0.492	0.492	0.492	0.492	0.492	0.492	0.492	0.492	0.492	0.492	0.492	0.492	0.492	0.492	0.492	0.492	0.492
16.0	0.157	0.197	0.248	0.315	0.394	0.512	0.630	0.709	0.866	0.984	1.181	1.378	1.575	1.772	2.001	2.500	2.992	3.504
	0.630	0.630	0.630	0.630	0.630	0.630	0.630	0.630	0.630	0.630	0.630	0.630	0.630	0.630	0.630	0.630	0.630	0.630
20.0	0.157	0.197	0.248	0.315	0.394	0.512	0.630	0.709	0.866	0.984	1.181	1.378	1.575	1.772	2.001	2.500	2.992	3.504
	0.787	0.787	0.787	0.787	0.787	0.787	0.787	0.787	0.787	0.787	0.787	0.787	0.787	0.787	0.787	0.787	0.787	0.787
25.0	0.157	0.197	0.248	0.315	0.394	0.512	0.630	0.709	0.866	0.984	1.181	1.378	1.575	1.772	2.001	2.500	2.992	3.504
	0.984	0.984	0.984	0.984	0.984	0.984	0.984	0.984	0.984	0.984	0.984	0.984	0.984	0.984	0.984	0.984	0.984	0.984
30.0	0.157	0.197	0.248	0.315	0.394	0.512	0.630	0.709	0.866	0.984	1.181	1.378	1.575	1.772	2.001	2.500	2.992	3.504
	1.181	1.181	1.181	1.181	1.181	1.181	1.181	1.181	1.181	1.181	1.181	1.181	1.181	1.181	1.181	1.181	1.181	1.181
31.5	0.157	0.197	0.248	0.315	0.394	0.512	0.630	0.709	0.866	0.984	1.181	1.378	1.575	1.772	2.001	2.500	2.992	3.504
	1.240	1.240	1.240	1.240	1.240	1.240	1.240	1.240	1.240	1.240	1.240	1.240	1.240	1.240	1.240	1.240	1.240	1.240
35.0	0.157	0.197	0.248	0.315	0.394	0.512	0.630	0.709	0.866	0.984	1.181	1.378	1.575	1.772	2.001	2.500	2.992	3.504
	1.378	1.378	1.378	1.378	1.378	1.378	1.378	1.378	1.378	1.378	1.378	1.378	1.378	1.378	1.378	1.378	1.378	1.378
35.5	0.157	0.197	0.248	0.315	0.394	0.512	0.630	0.709	0.866	0.984	1.181	1.378	1.575	1.772	2.001	2.500	2.992	3.504
	1.398	1.398	1.398	1.398	1.398	1.398	1.398	1.398	1.398	1.398	1.398	1.398	1.398	1.398	1.398	1.398	1.398	1.398
40.0	0.157	0.197	0.248	0.315	0.394	0.512	0.630	0.709	0.866	0.984	1.181	1.378	1.575	1.772	2.001	2.500	2.992	3.504
	1.575	1.575	1.575	1.575	1.575	1.575	1.575	1.575	1.575	1.575	1.575	1.575	1.575	1.575	1.575	1.575	1.575	1.575
45.0	0.157	0.197	0.248	0.315	0.394	0.512	0.630	0.709	0.866	0.984	1.181	1.378	1.575	1.772	2.001	2.500	2.992	3.504
	1.771	1.771	1.771	1.771	1.771	1.771	1.771	1.771	1.771	1.771	1.771	1.771	1.771	1.771	1.771	1.771	1.771	1.771
50.0	0.157	0.197	0.248	0.315	0.394	0.512	0.630	0.709	0.866	0.984	1.181	1.378	1.575	1.772	2.001	2.500	2.992	3.504
	1.969	1.969	1.969	1.969	1.969	1.969	1.969	1.969	1.969	1.969	1.969	1.969	1.969	1.969	1.969	1.969	1.969	1.969
55.0	0.157	0.197	0.248	0.315	0.394	0.512	0.630	0.709	0.866	0.984	1.181	1.378	1.575	1.772	2.001	2.500	2.992	3.504
	2.165	2.165	2.165	2.165	2.165	2.165	2.165	2.165	2.165	2.165	2.165	2.165	2.165	2.165	2.165	2.165	2.165	2.165
60.0	0.157	0.197	0.248	0.315	0.394	0.512	0.630	0.709	0.866	0.984	1.181	1.378	1.575	1.772	2.001	2.500	2.992	3.504
	2.362	2.362	2.362	2.362	2.362	2.362	2.362	2.362	2.362	2.362	2.362	2.362	2.362	2.362	2.362	2.362	2.362	2.362
70.0	0.157	0.197	0.248	0.315	0.394	0.512	0.630	0.709	0.866	0.984	1.181	1.378	1.575	1.772	2.001	2.500	2.992	3.504
	2.756	2.756	2.756	2.756	2.756	2.756	2.756	2.756	2.756	2.756	2.756	2.756	2.756	2.756	2.756	2.756	2.756	2.756
80.0	0.157	0.197	0.248	0.315	0.394	0.512	0.630	0.709	0.866	0.984	1.181	1.378	1.575	1.772	2.001	2.500	2.992	3.504
	3.149	3.149	3.149	3.149	3.149	3.149	3.149	3.149	3.149	3.149	3.149	3.149	3.149	3.149	3.149	3.149	3.149	3.149
90.0	0.157	0.197	0.248	0.315	0.394	0.512	0.630	0.709	0.866	0.984	1.181	1.378	1.575	1.772	2.001	2.500	2.992	3.504
	3.543	3.543	3.543	3.543	3.543	3.543	3.543	3.543	3.543	3.543	3.543	3.543	3.543	3.543	3.543	3.543	3.543	3.543
100.0	0.157	0.197	0.248	0.315	0.394	0.512	0.630	0.709	0.866	0.984	1.181	1.378	1.575	1.772	2.001	2.500	2.992	3.504
	3.937	3.937	3.937	3.937	3.937	3.937	3.937	3.937	3.937	3.937	3.937	3.937	3.937	3.937	3.937	3.937	3.937	3.937
110.0	0.157	0.197	0.248	0.315	0.394	0.512	0.630	0.709	0.866	0.984	1.181	1.378	1.575	1.772	2.001	2.500	2.992	3.504
	4.331	4.331	4.331	4.331	4.331	4.331	4.331	4.331	4.331	4.331	4.331	4.331	4.331	4.331	4.331	4.331	4.331	4.331
120.0	0.157	0.197	0.248	0.315	0.394	0.512	0.630	0.709	0.866	0.984	1.181	1.378	1.575	1.772	2.001	2.500	2.992	3.504
	4.724	4.724	4.724	4.724	4.724	4.724	4.724	4.724	4.724	4.724	4.724	4.724	4.724	4.724	4.724	4.724	4.724	4.724
130.0	0.157	0.197	0.248	0.315	0.394	0.512	0.630	0.709	0.866	0.984	1.181	1.378	1.575	1.772	2.001	2.500	2.992	3.504
	5.118	5.118	5.118	5.118	5.118	5.118	5.118	5.118	5.118	5.118	5.118	5.118	5.118	5.118	5.118	5.118	5.118	5.118
140.0	0.157	0.197	0.248	0.315	0.394	0.512	0.630	0.709	0.866	0.984	1.181	1.378	1.575	1.772	2.001	2.500	2.992	3.504
	5.512	5.512	5.512	5.512	5.512	5.512	5.512	5.512	5.512	5.512	5.512	5.512	5.512	5.512	5.512	5.512	5.512	5.512
150.0	0.157	0.197	0.248	0.315	0.394	0.512	0.630	0.709	0.866	0.984	1.181	1.378	1.575	1.772	2.001	2.500	2.992	3.504
	5.906	5.906	5.906	5.906	5.906	5.906	5.906	5.906	5.906	5.906	5.906	5.906	5.906	5.906	5.906	5.906	5.906	5.906
160.0	0.157	0.197	0.248	0.315	0.394	0.512	0.630	0.709	0.866	0.984	1.181	1.378	1.575	1.772	2.001	2.500	2.992	3.504
	6.299	6.299	6.299	6.299	6.299	6.299	6.299	6.299	6.299	6.299	6.299	6.299	6.299	6.299	6.299	6.299	6.299	6.299
170.0	0.157	0.197	0.248	0.315	0.394	0.512	0.630	0.709	0.866	0.984	1.181	1.378	1.575	1.772	2.001	2.500	2.992	3.504
	6.693	6.693	6.693	6.693	6.693	6.693	6.693	6.693	6.693	6.693	6.693	6.693	6.693	6.693	6.693	6.693	6.693	6.693

■ Temperature conversion

°C	-55	-25	-10	0	20	40	50	70	85	105	125
°F	-67	-13	14	32	68	104	122	158	185	221	257

$$^{\circ}\text{C} = (^{\circ}\text{F} - 32) \times 5/9, \quad ^{\circ}\text{F} = (^{\circ}\text{C} \times 9/5) + 32$$

DAEWOO

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Aluminum Electrolytic Capacitors

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