

Electronic Components

# High Quality CAPACITORS



## Chip Type, Miniature and Large Capacitance Aluminum Electrolytic Capacitors

**NOTE**

Design, Specifications are subject to change without notice.  
Ask factory for technical specifications before purchase and/or use.

## ■ Cautions for Using Aluminum Electrolytic Capacitors

Please read product specifications before using ELNA products.

The following cautions should be observed when using our aluminum electrolytic capacitors to assure their maximum stability and performance. When your application design conditions or operating conditions exceed the limit of the product specification, please contact us. If used under conditions beyond the limit of our specifications, it may cause defects such as short circuit, open circuit, leakage, explosion or combustion.

### ■ Cautions for usage

#### 1. DC electrolytic capacitors are polarized.

- If used with a wrong polarity, it creates an abnormal current resulting in a short circuit or damage to itself. Use DC bipolar electrolytic capacitors for use with uncertain or unknown polarity. DC capacitors cannot be used in AC circuits.

#### 2. Use within the rated voltage.

- If a voltage exceeding the rated voltage is applied, it may cause characteristic deterioration or damage due to the increased leakage current.
- When ripple current is loaded, make sure that the peak value of the ripple voltage does not exceed the rated voltage.

#### 3. Using for power supply circuit.

- While aluminum electrolytic capacitors are operated electrolyte liquid inside dries up and E.S.R. (Equivalent Series Resistance) of the capacitor increases. In case operated longer than rated life time, the capacitance much decreases, tangent of loss angle and E.S.R. much increases. Therefore for some case the sum of bias direct voltage and the peak of ripple voltage is over the rated voltage of the capacitor.
- For any type of circuit, in case the sum of bias direct voltage and the peak of ripple voltage is over the rated voltage of the capacitors or in case the minimum voltage is lower than 0 (zero) volt, the voltage control for the capacitors shall be provided.

#### 4. Do not use in a circuit which requires rapid charging or discharging.

- If used in a circuit requiring rapid charging or discharging, it may cause characteristic deterioration or damage to itself due to the heat generated inside the capacitor. In such cases, contact us for our rapid charging/discharging capacitors.

#### 5. Use within the rated ripple current.

- If applied ripple current exceeds rated ripple current, the life of the capacitor may be shortened, or in an extreme case it gets destroyed due to its internal heat. Use high-ripple type capacitors for such circuits.

#### 6. Changes in characteristics due to operating temperature.

- The characteristics of an electrolytic capacitor will change with a change in the temperature. Such changes are temporary and the original characteristics will be restored at the original temperature (if

the characteristics are not deteriorated by remaining at a high temperature for a long time). If used at a temperature exceeding the guaranteed temperature range, the capacitor may be damaged due to the increased leakage current. Pay attention to the capacitor temperature being affected by the ambient temperature of the unit, the temperature inside the appliance, the heat radiated by another hot component in the unit and the heat inside the capacitor itself due to the ripple current.

- (1)The electrostatic capacitance is normally shown as the value at 20°C-120Hz. It increases as the temperature raises and decreases as it lowers.
- (2)The tangent of loss angle ( $\tan\delta$ ) is normally shown as the value at 20°C-120Hz. It decreases as the ambient temperature gets high and increases as it gets low.
- (3)The leakage current increases as the temperature gets high and decreases as it gets low.

#### 7. Changes in the characteristics due to frequency.

- The characteristics of an electrolytic capacitor will change according to the change in the operating frequency.
- (1)The electrostatic capacity is normally shown as the value at 20°C-120Hz. It decreases as the frequency increases.
  - (2)The tangent of loss angle ( $\tan\delta$ ) is normally shown as the value at 20°C-120Hz. It increases as the frequency gets high.
  - (3)The impedance is normally shown as the value at 100kHz 20°C. It increases as the frequency lowers.

#### 8. Aluminum electrolytic capacitor life.

- The life of an aluminum electrolytic capacitor terminates when it fails due to the deterioration in its electronic characteristics. Temperature and the ripple current since they especially affect the life. See chart on page.

#### 9. Changes in aluminum electrolytic capacitors during storage.

- After storage for a long period, whether unused of mounted on the appliance, the leakage current of an aluminum electrolytic capacitor will increase. This tendency is more prominent when the ambient temperature is high. If a capacitor has been stored for more than 2 years under normal temperature (shorter if high temperature) and it shows increased leakage current, a treatment by voltage application is recommended. Addition of a protective circuit in



the design of the appliance is also recommended, considering the effect of the initial increased current.

#### 10. Insulation between the capacitor case and the cathode terminal.

- The capacitor case and the cathode terminal are connected through the electrolyte which has uncertain resistance. If a complete insulation of the case is necessary, add an insulator at assembly.

#### 11. External sleeve.

- During a preheating or a hardening of mounting adhesive may cause a sleeve cracked. The capacitors are usually sleeved with poly vinyl chloride or poly ethylene terephthalate for the indication purpose only. Please do not consider it as an insulation.

#### 12. Fumigation Process

- When exporting electronic equipment abroad, fumigation process may be performed on wooden packaging material with a halogen (compound) gas such as methyl bromide. Exercise care as this halogen gas may corrode capacitors. Also, use caution to epidemic preventive agent as corrosive component such as halogen may be contained.

#### 13. Specific Operating Environments

- Capacitors may corrode when stored or used in a place filled with acidic toxic gases (such as hydrogen sulfide, sulfurous acid, nitrous acid, chlorine, bromine, methyl bromide, etc.) If capacitors are used or stored in such environments, please let us know.

#### 14. Use at a high altitude

- The use of capacitors at high altitudes such as on an airplane causes a large difference between the internal pressure of the capacitors and the atmospheric pressure. However, there is no problem in use under atmospheric pressure up to about an altitude of 10,000 meters. Please check the operation of electronic equipment at the operating environmental temperature because the temperature lowers with increased altitude.

#### 15. Hole pitch adjustment of the PCB to the capacitors.

- Set the hole pitch of the PCB to the lead pitch (the "F" distance in the catalog) of the capacitor. Be careful since a short circuit, a cut or an increase in the leakage current etc. may be caused by the stress given to the lead wire terminals due to the difference between the hole pitch and the lead pitch.

#### 16. Capacitors with pressure valves.

- A part of the capacitor case is made thin to have the function as the pressure valve in order to pre-

vent explosion due to the rise of inside pressure when a reverse or excessive voltage is applied to the capacitor. Once it has worked as a valve, the whole capacitor needs to be replaced since the valve will not restore.

- When you use a capacitor with pressure valve, provide certain space above the pressure valve as below to prevent an interference when it works as a valve.

Diameter of the capacitor (mm)	18 to less	20 to 40
Required space above the valve (mm)	2.0	3.0

#### 17. Double-sided PCB's

- When you use electrolytic capacitors on a double sided PCB, be careful not to have the circuit pattern run under where the capacitor is mounted. Otherwise it may cause a short circuit on the PCB depending on the condition of mounting.

#### 18. Regarding to connection of capacitors

- Aluminum electrolytic capacitor has electrolyte liquid so that the most portion of electric loss characteristics came from E.S.R(Equivalent Series Resistance) of electrolyte liquid. Therefore the capacitor is an electronic devise which can flow high ripple current in case the temperature increases and it decreases E.S.R.

In case connecting two capacitors or more, E.S.R. of the capacitors is close to the resistance of the circuit. Therefore in case current is unbalanced and some capacitors has high ripple current, temperature increase, it makes more high current and finally it is over the rated ripple current.

For parallel connection of capacitors the proper design of electric circuit such as balancing of each capacitors resistance or control of total ripple current shall be provided to avoid excess ripple current and voltage.

- When two or more capacitors are arranged in series, the voltage given to each capacitors shall be kept below the rated voltage level, by also giving consideration to the balance of the voltage impressed on the capacitors. Further, partial pressure resistor which considers leakage current shall be provided parallel to each condenser not to have over-voltage impressed on. Balance resistance are explained on p.106 of our Catalog.

#### ■Cautions for Mounting

##### 1. Cautions for mounting.

- Check the ratings (electrostatic capacitance and rated voltage) of the capacitor before mounting.
- Check the polarity of the capacitor to the chassis.
- Do not drop the capacitor to the floor. Do not use

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the dropped capacitor.

- Do not deform the capacitor for mounting.

## 2. Do not apply excessive pressure to the capacitor, its terminals or lead wires.

- Make sure that the contact path of the capacitor meets the hole pitch of the PCB before mounting.
- Transient recovery voltage may be generated in the capacitor due to dielectric absorption. If required, this voltage can be discharged with a resistor with a value of about 1 kΩ.
- A PCB self-standing (snap-in) type capacitor should be pushed to the end (till there is no space) to the PCB for mounting.
- Do not set the automatic insertion machine to clinch the capacitor lead wires too strong.
- Pay attention to the impact given by the component receptacles of the automatic insertion/mounting machines and the product checker, and from the centering operation.

## 3. Soldering.

- Do not dip the capacitor into melted solder.
- The soldering conditions  
Chip type : Please refer to 11 page.  
small and large type : 260°C, 10 s (max.)  
The preliminary heating and other conditions described in the catalog or product specifications.
- Do not flux other part than the terminals.
- If there is a direct contact between the sleeve of the capacitor and the printed circuit pattern or a metal part of another component such as a lead wire, it may cause shrinkage of crack.
- When you use the capacitor with its sleeve touching directly to the PCB, excessive solder temperature or excessive soldering time may cause the sleeve to shrink or crack during the heat.
- If the application is for extended use, understand and manage the soldering characteristics to avoid abnormal current caused by a contact failure between the capacitor and the PCB.

## 4. Handling after soldering.

- After soldering, do not tilt, push down or twist the capacitor.
- After soldering, do not hold the capacitor as a handle to carry the PCB.
- After soldering, do not hit the capacitor with any obstacle. If PCB's are piled up for storage, the capacitor should not touch another PCB or component.

## 5. Cleaning after Soldering

- Recommended cleaning method  
(1)cleaning solutions:  
(a) CLEANTHROUGH 710M, 750H, 750L  
(b) PINEALPHA ST-100S  
(c) Techno Care FRW-4~17  
(d) Isopropyl alcohol (2-propanol)

(2)Cleaning conditions:

- (a) The temperature of cleaning solution shall be less than 60°C.
- (b) Use immersion or ultrasonic waves within two minutes.
- (c) After cleaning, capacitors and PCB's shall thoroughly be rinsed and dried with hot blast for more than 10 minutes. The temperature of such breeze should be less than the upper category temperature.
- (d) After cleaning, do not keep capacitors in cleaning solution atmosphere or airtight containers.
- During cleaning, control the cleaning solution against contamination.

## 6. Fixing adhesives and coating materials.

- Do not use fixing adhesive or coating material containing halogen-based solvent.
- Before applying the fixing adhesive or the coating material, make sure that there is no remaining flux or stains between the PCB and the sealed part of the capacitor.
- Before applying the fixing adhesive or the coating material, make sure that the detergent etc. has dried up.
- Do not cover the whole surface of the sealed part (terminal side) of the capacitor with the fixing adhesive or the coating material.
- Observe the description in the catalog or the product specifications concerning the thermal stiffening conditions of the fixing adhesive or the coating material. (If there is no such description, contact us.) When both discrete and SMT components are on the same PCB, the fixing material for the SMT components may cause crack, tear or shrinkage on the external sleeve depending on the thermal stiffening condition.
- Recommended fixing adhesives and coating materials  
Fixing adhesives : Cemedine 210, 501, 540, 545N, Diabond DN83K, DA3288, Bond G103  
Coating materials : Taffy TF1159, HumiSeal 1B66, 1A27NS

## ■Other Cautions

### 1. Do not touch capacitor terminals with bare hands.

You may get electric shock or your hand may be burnt. Discharge it with a 1 KΩ resistance before use if necessary.

### 2. Do not short the capacitor terminals with a conductor.

Do not spill conductive solution including acid or alkaline solution on the capacitor.

### 3. Periodical inspections should be established for the capacitors used in industrial appliances.

- The following items should be checked:

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- (1) Appearance : Check if there is any open valve or leakage.
- (2) Electronic performance : Check the leakage current, the electrostatic capacitance, the tangent of loss angle and other items described in the catalog or the product specifications.

#### 4. Take the following measures in case of emergency.

- If you see gas coming out of the capacitor valve when the set is in operation, turn off the power switch of the unit or unplug the power cord from the outlet.
- Keep your face away from the capacitor pressure valve, since the high temperature gas at over 100°C bursts out when the valve works. If the gas gets into your eyes or your mouth, wash your eyes or your mouth. Do not ingest the capacitor electrolyte. If the electrolyte gets on your skin, wash it out with soap.

#### 5. Storing conditions.

- Avoid high temperature or high humidity when storing capacitors. Keep the storing temperature at 5°C to 35°C and the relative humidity not more than 75%.
- The leakage current of an aluminum electrolytic capacitor tends to increase when stored for a long time. This tendency becomes more prominent if the ambient temperature is high. The leakage current will be decreased by voltage application. If necessary, treatment by voltage application should

be made on the capacitors which have been stored for a long period (more than 2 years after production).

- Do not store capacitors at a place where there is a possibility that they may get water, salt or oil spill.
- Do not store capacitors at a place where the air contains dense hazardous gas (hydrogen sulfide, sulfuric acid, nitrous acid, chlorine, ammonia, etc.).
- Fumigation treatment with toxic gas covering the whole wooden container frames as moth proofing during shipment may leave residual toxic gas.
- Do not store capacitors at a place where it gets ultraviolet or radioactive rays.

#### 6. Disposing of capacitors.

- Punch a hole or crush the capacitors (to prevent explosion) before incineration at approved facility.
- If they are not to be incinerated, bring them to a professional industrial waste disposal company.

#### 7. Other notes.

- Please refer to the following literature for anything not described in the product specifications or the catalog.

(Technical report of Japan Electronics and Information Technology Industries Association, EIAJ RCR-2367B "Guideline of notabilia for fixed aluminum electrolytic capacitors for use in electronic equipment")

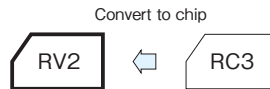
## ChipType Standard Capacitors (height:5.5mm)

GREEN  
CAP

SMD

Anti-  
cleaning  
solvent

- Compatible with surface mounting for 5.5mm high capacitors.
- Supplied with carrier taping.
- Guarantees 2000 hours at 85°C.



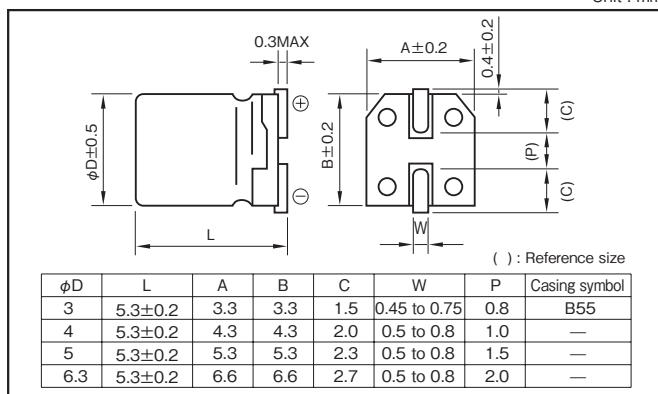
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## Specifications

Item	Performance									
Category temperature range (°C)	-40 to +85									
Tolerance at rated capacitance (%)	±20 (20°C,120Hz)									
Leakage current (μA)	Less than 0.01CV or 3 whichever is larger (after 2 minutes) C : Rated capacitance (μF) ; V : Rated voltage (V) (20°C)									
Tangent of loss angle (tanδ)	Rated voltage (V)		4	6.3	10	16	25	35	50	
	tanδ (max.)	φ3	0.42	0.30	0.24	0.22	0.16	0.14	0.12	
		φ4 to φ6.3	0.42	0.28	0.24	0.20	0.14	0.12	0.10	
Characteristics at high and low temperature	Rated voltage(V)		4	6.3	10	16	25	35	50	
	Impedance ratio (max.)	φ3	Z-25°C/Z+20°C	7	4	3	2	2	2	
			Z-40°C/Z+20°C	17	10	8	6	4	3	3
		φ4 to φ6.3	Z-25°C/Z+20°C	7	3	3	2	2	2	2
			Z-40°C/Z+20°C	15	8	5	4	3	3	3
	Endurance (85°C) (Applied ripple current)	Test time		2000 hours (φ3 : 1000 hours)						
Leakage current		The initial specified value or less								
Percentage of capacitance change		Within ±20% of initial value (4WV : ±30%)								
Tangent of the loss angle		200% or less of the initial specified value (4WV : 300%)								
Shelf life (85°C)	Test time : 1000hours ; other items are the same as those for the endurance. Voltage application treatment : According to JIS C5101-1									
Applicable standards	JIS C5101-1, -18 1998 (IEC 60384-1 1992, -18 1993)									

## Outline Drawing

Unit : mm



## Coefficient of Frequency for Rated Ripple Current

Rated voltage (V)	Frequency (Hz)			
	50 · 60	120	1k	10k · 100k
4 to 16	0.80	1	1.15	1.25
25 to 35	0.80	1	1.25	1.40
50	0.80	1	1.35	1.50

## Part numbering system

- φ3 (example : 16V10μF)

RV2	—	16	V	100	M	B55	□	U—	□
Series code		Rated voltage symbol		Rated capacitance symbol	Capacitance tolerance symbol	Casing symbol	Additional symbol		Taping symbol

- φ4 to φ6.3 (example : 16V47μF)

RV2	—	16	V	470	M	□	U—	□
Series code		Rated voltage symbol		Rated capacitance symbol	Capacitance tolerance symbol	Additional symbol		Taping symbol

- Soldering conditions are described on page 11.
- Land pattern size are described on page 12.
- The taping specifications are described on page 13.

## Standard Ratings

Rated voltage (V)	4				6.3				10				16				25				35				50			
Item	Case	Casing	ESR	Rated ripple current	Case	Casing	ESR	Rated ripple current	Case	Casing	ESR	Rated ripple current	Case	Casing	ESR	Rated ripple current	Case	Casing	ESR	Rated ripple current	Case	Casing	ESR	Rated ripple current	Case	Casing	ESR	Rated ripple current
Rated capacitance (μF)	φD (mm)	Symbol	Ω	mArms	φD (mm)	Symbol	Ω	mArms	φD (mm)	Symbol	Ω	mArms	φD (mm)	Symbol	Ω	mArms	φD (mm)	Symbol	Ω	mArms	φD (mm)	Symbol	Ω	mArms	φD (mm)	Symbol	Ω	mArms
0.1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3	B55	1990	1
0.22	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4	—	1660	3
0.33	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3	B55	905	2
0.47	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4	—	754	5
1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3	B55	603	3
2.2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4	—	503	6
3.3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3	B55	424	4
4.7	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4	—	353	7
10	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3	B55	199	6
22	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4	—	166	10
33	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
47	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
100	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
220	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

(Note) Rated ripple current : 85°C, 120Hz ; ESR : 20°C, 120Hz

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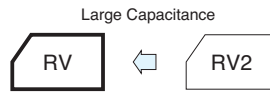
## Chip Type Large Capacitance Capacitors

GREEN  
CAP

SMD

Anti-  
cleaning  
solvent

- Compatible with surface mounting.
- Supplied with carrier taping.
- Guarantees 2000 hours at 85°C.



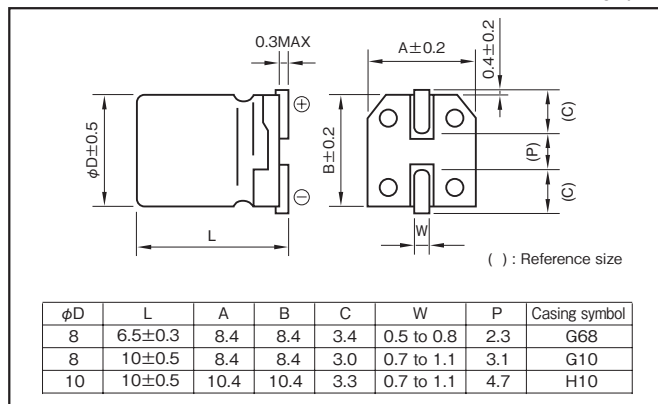
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White print on a brown sleeve (φ8×10L · φ10×10L)

## Specifications

Item	Performance									
Category temperature range (°C)	-40 to +85									
Tolerance at rated capacitance (%)	±20 (20°C,120Hz)									
Leakage current (μA)	Less than 0.01CV or 3 whichever is larger (after 2 minutes) C : Rated capacitance (μF) ; V : Rated voltage (V) (20°C)									
Tangent of loss angle (tanδ)	Rated voltage (V)		6.3	10	16	25	35	50	63	100
	tanδ (max.)		0.28	0.24	0.20	0.14	0.12	0.10	0.10	0.10
	(20°C,120Hz)									
Characteristics at high and low temperature	Rated voltage (V)		6.3	10	16	25	35	50	63	100
	Impedance ratio (max.)	Z-25°C/Z+20°C	4	3	2	2	2	2	2	2
		Z-40°C/Z+20°C	8	5	4	3	3	3	3	3
(120Hz)										
Endurance (85°C) (Applied ripple current)	Test time		2000 hours							
	Leakage current		The initial specified value or less							
	Percentage of capacitance change		Within ±20% of initial value							
	Tangent of the loss angle		200% or less of the initial specified value							
Shelf life (85°C)	Test time : 1000hours; other items are the same as those for the endurance. Voltage application treatment : According to JIS C5101-1									
Applicable standards	JIS C5101-1, -18 1998 (IEC 60384-1 1992, -18 1993)									

## Outline Drawing

Unit: mm



## Coefficient of Frequency for Rated Ripple Current

Frequency (Hz)	50 · 60	120	1k	10k · 100k
Rated voltage (V)				
6.3 to 16	0.80	1	1.15	1.25
25 to 35	0.80	1	1.25	1.40
50 to 63	0.80	1	1.35	1.50
100	0.70	1	1.35	1.50

## Part numbering system (example : 10V1000μF)

RV	—	10	V	102	M	H10	□	U	—	□
Series code		Rated voltage symbol		Rated capacitance symbol	Capacitance tolerance symbol	Casing symbol	Additional symbol			Taping symbol

- Soldering conditions are described on page 11.
- Land pattern size are described on page 12.
- The taping specifications are described on page 13.

## Standard Ratings

Rated voltage (V)	6.3				10				16				25				35				50				63				100			
	Case	Casing symbol	ESR	Rated ripple current	Case	Casing symbol	ESR	Rated ripple current	Case	Casing symbol	ESR	Rated ripple current	Case	Casing symbol	ESR	Rated ripple current	Case	Casing symbol	ESR	Rated ripple current	Case	Casing symbol	ESR	Rated ripple current	Case	Casing symbol	ESR	Rated ripple current	Case	Casing symbol	ESR	Rated ripple current
Rated capacitance (μF)	φD (mm)		Ω	mA	φD (mm)		Ω	mA	φD (mm)		Ω	mA	φD (mm)		Ω	mA	φD (mm)		Ω	mA	φD (mm)		Ω	mA	φD (mm)		Ω	mA	φD (mm)		Ω	mA
10	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
22	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	8×6.5	G68	7.5	155	8×10	G10	7.5	139	10×10	H10	7.5	189
33	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	8×6.5	G68	6.0	155	8×6.5	G68	5.0	155	8×10	G10	5.0	139	10×10	H10	5.0	189
47	—	—	—	—	—	—	—	—	—	—	—	—	8×6.5	G68	4.9	155	8×6.5	G68	4.2	155	8×10	G10	3.5	252	10×10	H10	3.5	226	—	—	—	—
68	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	10×10	H10	2.4	226	—	—	—	—
100	—	—	—	—	8×6.5	G68	4.0	155	8×6.5	G68	3.3	155	8×6.5	G68	2.3	155	8×10	G10	2.0	252	10×10	H10	1.7	458	10×10	H10	1.7	226	—	—	—	—
220	8×6.5	G68	2.1	155	8×6.5	G68	1.8	155	8×10	G10	1.5	252	8×10	G10	1.1	252	10×10	H10	0.91	458	—	—	—	—	—	—	—	—	—	—	—	—
330	8×6.5	G68	1.4	155	8×10	G10	1.2	252	8×10	G10	1.0	252	10×10	H10	0.70	458	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
470	8×10	G10	0.99	252	10×10	H10	0.85	458	8×10	G10	0.71	252	10×10	H10	0.49	458	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1000	10×10	H10	0.46	458	10×10	H10	0.34	458	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

(Note) Rated ripple current : 85°C, 120Hz ; ESR : 20°C, 120Hz

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Ask factory for technical specifications before purchase and/or use.



## Chip Type, 85°C Use, Large Capacitance Capacitors

SMD

Anti-cleaning solvent

- Surface mount device.
- Supplied with taping.
- Guarantees 2000 hours at 85°C.

RV  
(large)

Large capacitance

RV



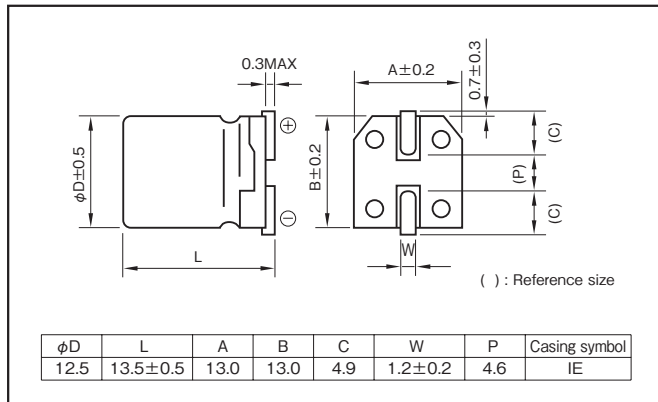
Marking color : White print on a brown sleeve

### Specifications

Item	Performance									
Category temperature range (°C)	-40 to +85									
Tolerance at rated capacitance (%)	±20 (20°C,120Hz)									
Leakage current (μA)	Less than 0.01CV (after 2 minutes) C : Rated capacitance (μF) ; V : Rated voltage (V) (20°C)									
Tangent of loss angle (tanδ)	Rated voltage (V)		6.3	10	16	25	35	50	63	100
	tanδ (max.)		0.30	0.26	0.22	0.16	0.13	0.12	0.11	0.10
	0.02 is added to every 1000μF increase over 1000μF. (20°C,120Hz)									
Characteristics at high and low temperature	Rated voltage (V)		6.3	10	16	25	35	50	63	100
	Impedance ratio (max.)	Z-25°C/Z+20°C	4	3	2	2	2	2	2	2
		Z-40°C/Z+20°C	8	5	4	3	3	3	3	3
(120Hz)										
Endurance (85°C) (Applied ripple current)	Test time		2000 hours							
	Leakage current		The initial specified value or less							
	Percentage of capacitance change		Within ±20% of initial value							
	Tangent of the loss angle		200% or less of the initial specified value							
Shelf life (85°C)	Test time : 1000hours ; other items are the same as those for the endurance. Voltage application treatment : According to JIS C5101-1									
Applicable standards	JIS C5101-1, -18 1998 (IEC 60384-1 1992, -18 1993)									

### Outline Drawing

Unit : mm



- Soldering conditions are described on page 11.
- Land pattern size are described on page 12.
- The taping specifications are described on page 13.

### Coefficient of Frequency for Rated Ripple Current

Frequency(Hz)	120	1k	10k	100k
Rated capacitance (μF)				
100 to 220	1	1.21	1.29	1.43
330 to 1000	1	1.16	1.23	1.25
1500 to 2200	1	1.06	1.11	1.11

### Part numbering system (example : 10V1500μF)

RV	—	10	V	152	M	IE	□	T	—	R5
Series code		Rated voltage symbol		Rated capacitance symbol	Capacitance tolerance symbol	Casing symbol	Additional symbol			Taping symbol

### Standard Ratings

Rated capacitance (μF)	6.3				10				16				25				35				50				63				100			
	Case	Casing symbol	ESR	Rated ripple current	Case	Casing symbol	ESR	Rated ripple current	Case	Casing symbol	ESR	Rated ripple current	Case	Casing symbol	ESR	Rated ripple current	Case	Casing symbol	ESR	Rated ripple current	Case	Casing symbol	ESR	Rated ripple current	Case	Casing symbol	ESR	Rated ripple current	Case	Casing symbol	ESR	Rated ripple current
	φD (mm)		Ω	mArms	φD (mm)		Ω	mArms	φD (mm)		Ω	mArms	φD (mm)		Ω	mArms	φD (mm)		Ω	mArms	φD (mm)		Ω	mArms	φD (mm)		Ω	mArms	φD (mm)		Ω	mArms
100	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
220	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
330	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
470	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
820	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2200	12.5×13.5	IE	0.23	651	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

(Note) Rated ripple current : 85°C, 120Hz ; ESR : 20°C, 120Hz

### NOTE

Design, Specifications are subject to change without notice.  
Ask factory for technical specifications before purchase and/or use.

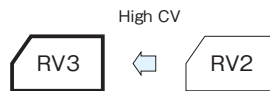
## Chip Type 85°C Capacitors (height:5.5mm,8.0mm)

GREEN  
CAP

SMD

Anti-  
cleaning  
solvent

- Compatible with surface mounting for 5.5mm, 8.0mm high capacitors.
- Supplied with carrier taping.
- Guarantees 2000 hours at 85°C.



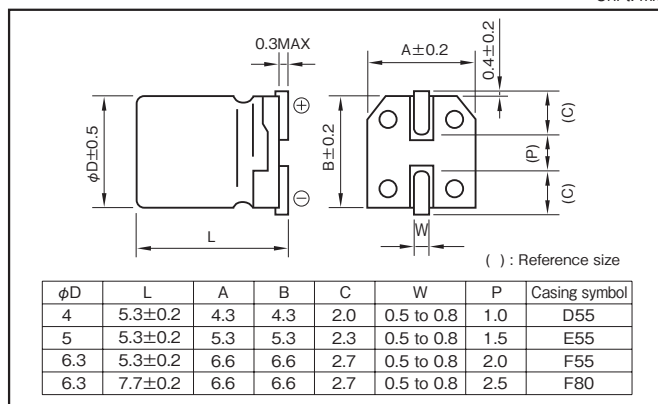
Marking color : Black print

## Specifications

Item	Performance						
Category temperature range (°C)	-40 to +85						
Tolerance at rated capacitance (%)	±20 (20°C,120Hz)						
Leakage current (μA)	Less than 0.01CV or 3 whichever is larger (after 2 minutes) C : Rated capacitance (μF) ; V : Rated voltage (V) (20°C)						
Tangent of loss angle (tanδ)	Rated voltage (V)	6.3	10	16	25	35	50
	tanδ (max.)	0.42	0.32	0.26	0.18	0.14	0.12
(20°C, 120Hz)							
Characteristics at high and low temperature	Rated voltage (V)	6.3	10	16	25	35	50
	Impedance ratio (max.)	Z-25°C/Z+20°C	4	3	2	2	2
		Z-40°C/Z+20°C	8	8	5	5	4
(120Hz)							
Endurance (85°C) (Applied ripple current)	Test time	2000 hours					
	Leakage current	The initial specified value or less					
	Percentage of capacitance change	Within ±30% of initial value					
	Tangent of the loss angle	300% or less of the initial specified value					
Shelf life (85°C)	Test time : 1000 hours ; other items are the same as those for the endurance. Voltage application treatment : According to JIS C5101-1						
Applicable standards	JIS C5101-1, -18 1998 (IEC 60384-1 1992, -18 1993)						

## Outline Drawing

Unit: mm



- Soldering conditions are described on page 11.
- Land pattern size are described on page 12.
- The taping specifications are described on page 13.

## Coefficient of Frequency for Rated Ripple Current

Rated voltage (V)	Frequency (Hz)			
	50	120	1k	10k~100k
6.3 to 16	0.80	1	1.15	1.25
25 to 35	0.80	1	1.25	1.40
50	0.70	1	1.35	1.50

## Part numbering system (example : 16V220μF)

RV3	—	16	V	221	M	F80	□	U	□
Series code		Rated voltage symbol		Rated capacitance symbol	Capacitance tolerance symbol	Casing symbol	Additional symbol		Taping symbol

## Standard Ratings

Rated voltage (V)	6.3			10			16			25			35			50		
	Case	ESR	Rated ripple current	Case	ESR	Rated ripple current	Case	ESR	Rated ripple current	Case	ESR	Rated ripple current	Case	ESR	Rated ripple current	Case	ESR	Rated ripple current
Rated capacitance (μF)	φD (mm)	Ω	mArms	φD (mm)	Ω	mArms	φD (mm)	Ω	mArms	φD (mm)	Ω	mArms	φD (mm)	Ω	mArms	φD (mm)	Ω	mArms
4.7	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4×5.3	42	20
10	—	—	—	—	—	—	—	—	—	4×5.3	30	23	4×5.3	23	27	5×5.3	20	34
22	—	—	—	4×5.3	24	26	4×5.3	20	30	5×5.3	14	43	5×5.3	11	47	6.3×5.3	9.0	59
33	4×5.3	21	28	4×5.3	16	33	5×5.3	13	44	5×5.3	9.0	54	6.3×5.3	7.0	67	6.3×7.7	6.0	82
47	4×5.3	15	34	5×5.3	11	45	5×5.3	9.2	50	6.3×5.3	6.4	75	6.3×7.7	4.9	90	6.3×7.7	4.2	98
68	5×5.3	10	47	5×5.3	7.8	54	6.3×5.3	6.3	74	6.3×5.3	4.4	90	6.3×7.7	3.4	109	—	—	—
100	5×5.3	7.0	58	—	—	—	6.3×5.3	4.3	103	6.3×7.7	3.0	124	—	—	—	—	—	—
150	6.3×5.3	4.6	83	6.3×7.7	3.5	98	6.3×7.7	2.9	109	—	—	—	—	—	—	—	—	—
220	6.3×7.7	3.2	113	6.3×7.7	2.4	130	6.3×7.7	2.0	144	—	—	—	—	—	—	—	—	—
330	6.3×7.7	2.1	139	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

(Note) Rated ripple current : 85°C, 120Hz ; ESR : 20°C, 120Hz

## NOTE

Design, Specifications are subject to change without notice.  
Ask factory for technical specifications before purchase and/or use.

## Chip Type 85°C Capacitors (height:4.5mm)

GREEN  
CAP

SMD

Anti-  
cleaning  
solvent

- Compatible with surface mounting for 4.5mm high capacitors.
- Supplied with carrier taping.
- Guarantees 2000 hours at 85°C.

RV4

Low Profile

RV2



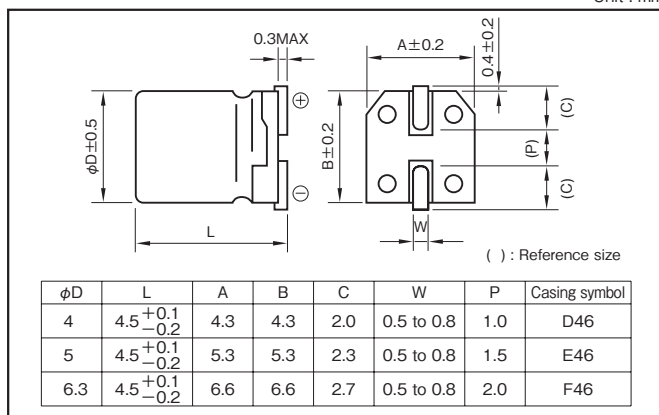
Marking color : Black print

## Specifications

Item	Performance						
Category temperature range (°C)	-40 to +85						
Tolerance at rated capacitance (%)	±20 (20°C,120Hz)						
Leakage current (μA)	Less than 0.01CV or 3 whichever is larger (after 2 minutes) C : Rated capacitance (μF) ; V : Rated voltage (V) (20°C)						
Tangent of loss angle (tanδ)	Rated voltage (V)	6.3	10	16	25	35	50
	tanδ (max.)	0.30	0.24	0.19	0.16	0.14	0.12
Characteristics at high and low temperature	(20°C,120Hz)						
	Rated voltage (V)	6.3	10	16	25	35	50
	Impedance ratio (max.)	Z-25°C/Z+20°C	4	3	2	2	2
		Z-40°C/Z+20°C	8	8	4	4	3
Endurance (85°C) (Applied ripple current)	(120Hz)						
	Test time	2000 hours					
	Leakage current	The initial specified value or less					
	Percentage of capacitance change	Within ±20% of initial value					
Shelf life (85°C)	Tangent of the loss angle	300% or less of the initial specified value					
	Test time : 1000 hours ; other items are the same as those for the endurance. Voltage application treatment : According to JIS C5101-1						
Applicable standards	JIS C5101-1, -18 1998 (IEC 60384-1 1992, -18 1993)						

## Outline Drawing

Unit : mm



## Coefficient of Frequency for Rated Ripple Current

Frequency (Hz)	50 · 60	120	1k	10k · 100k
Rated voltage (V)				
6.3 to 16	0.80	1	1.15	1.25
25 to 35	0.70	1	1.25	1.40
50	0.1 to 3.3µF	0.50	1	1.35
	4.7 to 10µF	0.70	1	1.35

## Part numbering system (example : 6.3V47µF)

RV4	—	6	V	470	M	E46	□	U	□
Series code	Rated voltage symbol	Rated capacitance symbol	Capacitance tolerance symbol	Casing symbol	Additional symbol	Taping symbol			

- Soldering conditions are described on page 11.
- Land pattern size are described on page 12.
- The taping specifications are described on page 13.

## Standard Ratings

Rated capacitance (µF)	6.3			10			16			25			35			50		
	Case	ESR	Rated ripple current	Case	ESR	Rated ripple current	Case	ESR	Rated ripple current	Case	ESR	Rated ripple current	Case	ESR	Rated ripple current	Case	ESR	Rated ripple current
0.1	φD (mm)	Ω	mArms	φD (mm)	Ω	mArms	φD (mm)	Ω	mArms	φD (mm)	Ω	mArms	φD (mm)	Ω	mArms	φD (mm)	Ω	mArms
0.22	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4	1990	3
0.33	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4	905	4
0.47	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4	603	5
1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4	423	6
2.2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4	199	8
3.3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4	90	12
4.7	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4	60	15
10	—	—	—	—	—	—	—	—	—	4	56	17	4	49	18	5	42	21
22	4	23	26	5	18	34	5	32	22	5	27	28	5	23	30	6.3	20	35
33	5	15	37	5	12	42	6.3	10	55	6.3	12	49	6.3	11	52	—	—	—
47	5	11	45	6.3	8	59	6.3	7	76	—	—	—	—	—	—	—	—	—
100	6.3	5	76	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

(Note) Rated ripple current : 85°C, 120Hz ; ESR : 20°C, 120Hz

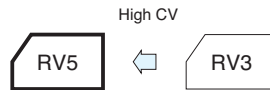
Chip Type Large Capacitance Capacitors

GREEN  
CAP

SMD

Anti-  
cleaning  
solvent

- Compatible with surface mounting.
- Supplied with carrier taping.
- Guarantees 2000 hours at 85°C.



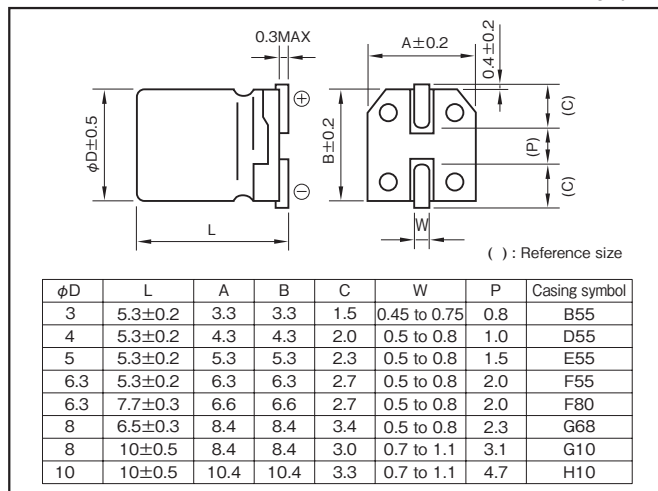
Marking color : Black print (φ3×5.3L—φ8×10L)  
White print on a brown sleeve (φ10×10L)

Specifications

Item	Performance									
Category temperature range (°C)	-40 to +85									
Tolerance at rated capacitance (%)	±20 (20°C,120Hz)									
Leakage current (μA)	Less than 0.01CV or 3 whichever is larger (after 2 minutes) C : Rated capacitance (μF) ; V : Rated voltage (V) (20°C)									
Tangent of loss angle (tanδ)	Rated voltage (V)		6.3	10	16	25	35	50	63	100
	tanδ (max.)		0.35	0.32	0.28	0.18	0.14	0.12	0.12	0.12
	(20°C,120Hz)									
Characteristics at high and low temperature	Rated voltage (V)		6.3	10	16	25	35	50	63	100
	Impedance ratio (max.)	Z-25°C/Z+20°C	4	3	2	2	2	2	2	2
		Z-40°C/Z+20°C	10	8	6	4	3	3	3	3
(120Hz)										
Endurance (85°C) (Applied ripple current)	Test time		2000 hours (φ3 : 1000 hours)							
	Leakage current		The initial specified value or less							
	Percentage of capacitance change		Within ±30% of initial value							
	Tangent of the loss angle		300% or less of the initial specified value							
Shelf life (85°C)	Test time : 1000 hours; other items are the same as those for the endurance. Voltage application treatment : According to JIS C5101-1									
Applicable standards	JIS C5101-1, -18 1998 (IEC 60384-1 1992, -18 1993)									

Outline Drawing

Unit : mm



- Soldering conditions are described on page 11.
- Land pattern size are described on page 12.
- The taping specifications are described on page 13.

Coefficient of Frequency for Rated Ripple Current

Frequency (Hz)	50 · 60	120	1k	10k · 100k
Rated voltage (V)				
6.3 to 16	0.80	1	1.15	1.25
25 to 35	0.80	1	1.25	1.40
50 to 63	0.80	1	1.35	1.50
100	0.70	1	1.35	1.50

Part numbering system (example : 16V470μF)

RV5	—	16	V	471	M	G10	□	U—	□
Series code		Rated voltage symbol		Rated capacitance symbol	Capacitance tolerance symbol	Casing symbol	Additional symbol		Taping symbol

- The standard ratings are described on the next page.

NOTE

Design, Specifications are subject to change without notice.  
Ask factory for technical specifications before purchase and/or use.



## Standard Ratings

Rated voltage (V)	Item	6.3			10			16			25			35			50			63			100		
		Case	Casing symbol	Rated ripple current mA <sub>RMS</sub>	Case	Casing symbol	Rated ripple current mA <sub>RMS</sub>	Case	Casing symbol	Rated ripple current mA <sub>RMS</sub>	Case	Casing symbol	Rated ripple current mA <sub>RMS</sub>	Case	Casing symbol	Rated ripple current mA <sub>RMS</sub>	Case	Casing symbol	Rated ripple current mA <sub>RMS</sub>	Case	Casing symbol	Rated ripple current mA <sub>RMS</sub>	Case	Casing symbol	Rated ripple current mA <sub>RMS</sub>
		φD (mm)			φD (mm)			φD (mm)			φD (mm)			φD (mm)			φD (mm)			φD (mm)			φD (mm)		
Rated capacitance (μF)																									
2.2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3×5.3	B55	7	—	—	—	
3.3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3×5.3	B55	10	4×5.3	D55	12	—	—	—
4.7	—	—	—	—	—	—	—	—	—	—	—	—	3×5.3	B55	13	4×5.3	D55	18	5×5.3	E55	20	—	—	—	
10	—	—	—	—	—	—	3×5.3	B55	18	3×5.3	B55	16	4×5.3	D55	24	5×5.3	E55	30	6.3×5.3	F55	32	—	—	—	
22	3×5.3	B55	21	3×5.3	B55	20	—	—	—	4×5.3	D55	24	5×5.3	E55	41	6.3×5.3	F55	47	6.3×7.7	F80	60	—	—	—	
																			8×6.5	G68	62				
33	—	—	—	—	—	—	4×5.3	D55	32	5×5.3	E55	47	—	—	—	8×6.5	G68	83	—	—	—	8×10	G10	94	
47	4×5.3	D55	34	4×5.3	D55	33	5×5.3	E55	52	—	—	—	6.3×5.3	F55	54	6.3×7.7	F80	85	8×10	G10	139	10×10	H10	189	
100	5×5.3	E55	55	5×5.3	E55	54	6.3×5.3	F55	70	6.3×7.7	F80	120	6.3×7.7	F80	120	8×10	G10	252	10×10	H10	226	—	—	—	
										8×6.5	G68	118													
150	—	—	—	6.3×5.3	F55	79	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
220	6.3×5.3	F55	88	6.3×7.7	F80	173	6.3×7.7	F80	162	—	—	—	8×10	G10	260	—	—	—	—	—	—	—	—	—	
				8×6.5	G68	175																			
330	6.3×7.7	F80	188	—	—	—	—	—	—	8×10	G10	300	10×10	H10	360	—	—	—	—	—	—	—	—	—	
	8×6.5	G68	190																						
470	—	—	—	8×10	G10	310	8×10	G10	307	10×10	H10	400	—	—	—	—	—	—	—	—	—	—	—	—	
680	—	—	—	—	—	—	10×10	H10	380	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
820	8×10	G10	320	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
1000	—	—	—	10×10	H10	454	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
1500	10×10	H10	489	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	

(Note) Rated ripple current : 85°C, 120Hz

## NOTE

Design, Specifications are subject to change without notice.  
Ask factory for technical specifications before purchase and/or use.

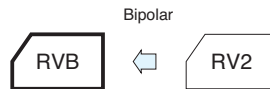
## Chip Type Bipolar Capacitors (height:5.5mm)

GREEN  
CAP

SMD

Anti-  
cleaning  
solvent

- Compatible with surface mounting for 5.5mm high capacitors.
- Supplied with carrier taping.
- Guarantees 2000 hours at 85°C.



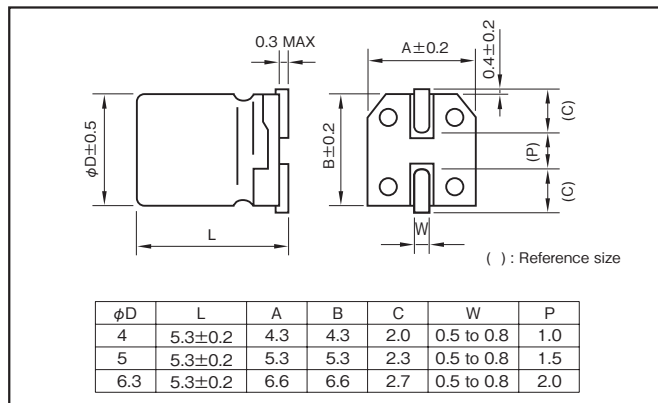
Marking color : Black print

## Specifications

Item	Performance							
Category temperature range (°C)	-40 to +85							
Tolerance at rated capacitance (%)	±20 (20°C,120Hz)							
Leakage current (μA)	Less than 0.01CV or 3 whichever is larger (after 2 minutes) C : Rated capacitance (μF) ; V : Rated voltage (V) (20°C)							
Tangent of loss angle (tanδ)	Rated voltage (V)		6.3	10	16	25	35	50
	tanδ (max.)	φ4	0.35	0.30	0.25	0.25	0.25	0.25
		φ5, 6.3	0.30	0.25	0.20	0.15	0.15	0.15
(20°C,120Hz)								
Characteristics at high and low temperature	Rated voltage (V)		6.3	10	16	25	35	50
	Impedance ratio (max.)	Z-25°C/Z+20°C	3	3	2	2	2	2
		Z-40°C/Z+20°C	8	5	4	3	3	3
(120Hz)								
Endurance (85°C) (Applied ripple current)	Test time		2000 hours (with the polarity inverted every 250 hours)					
	Leakage current		The initial specified value or less					
	Percentage of capacitance change		Within ±20% of initial value					
	Tangent of the loss angle		200% or less of the initial specified value					
Shelf life (85°C)	Test time : 1000hours; other items are the same as those for the endurance. Voltage application treatment : According to JIS C5101-1							
Applicable standards	JIS C5101-1, -18 1998 (IEC 60384-1 1992, -18 1993)							

## Outline Drawing

Unit : mm



- Soldering conditions are described on page 11.
- Land pattern size are described on page 12.
- The taping specifications are described on page 13.

## Coefficient of Frequency for Rated Ripple Current

Frequency (Hz)	50	120	1k	10k-100k
Rated voltage (V)				
6.3 to 16	0.80	1	1.15	1.25
25 to 35	0.80	1	1.25	1.40
50	0.80	1	1.35	1.50

## Part numbering system (example : 6.3V47μF)

RVB	—	6	V	470	M	□	U	□
Series code		Rated voltage symbol		Rated capacitance symbol	Capacitance tolerance symbol	Additional symbol		Taping symbol

## Standard Ratings

Rated capacitance (μF)	6.3			10			16			25			35			50		
	Case	ESR	Rated ripple current	Case	ESR	Rated ripple current	Case	ESR	Rated ripple current	Case	ESR	Rated ripple current	Case	ESR	Rated ripple current	Case	ESR	Rated ripple current
Item	φD (mm)	Ω	mArms	φD (mm)	Ω	mArms	φD (mm)	Ω	mArms	φD (mm)	Ω	mArms	φD (mm)	Ω	mArms	φD (mm)	Ω	mArms
0.1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4	3320	2.3
0.22	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4	1510	3.3
0.33	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4	1010	4.1
0.47	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4	706	4.9
1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4	332	7.2
2.2	—	—	—	—	—	—	—	—	—	—	—	—	4	151	10	5	113	14
3.3	—	—	—	—	—	—	—	—	—	—	—	—	5	75	17	5	75	17
4.7	—	—	—	—	—	—	—	—	—	4	101	13	5	53	21	6.3	53	24
10	—	—	—	4	50	18	5	33	26	6.3	25	35	6.3	25	35	—	—	—
22	5	23	27	6.3	19	40	6.3	15	45	—	—	—	—	—	—	—	—	—
33	6.3	15	45	6.3	13	50	6.3	10	55	—	—	—	—	—	—	—	—	—
47	6.3	11	54	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

(Note) Rated ripple current : 85°C, 120Hz ; ESR : 20°C, 120Hz

## NOTE

Design, Specifications are subject to change without notice.  
Ask factory for technical specifications before purchase and/or use.

### Chip Type 105°C Capacitors (height:5.5mm)

GREEN  
CAP

SMD

105°C  
1000hours

Anti-  
cleaning  
solvent

- Compatible with surface mounting for 5.5mm high capacitors.
- Supplied with carrier taping.
- Guarantees 1000 hours at 105°C.

RVS

High temperature

RV2



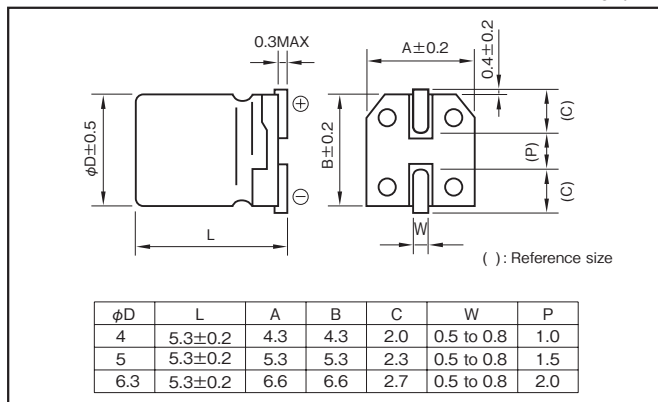
Marking color : Black print

### Specifications

Item	Performance						
Category temperature range (°C)	-55 to +105						
Tolerance at rated capacitance (%)	±20 (20°C,120Hz)						
Leakage current (μA)	Less than 0.01CV or 3 whichever is larger (after 2 minutes) C : Rated capacitance (μF) ; V : Rated voltage (V) (20°C)						
Tangent of loss angle (tanδ)	Rated voltage (V)	6.3	10	16	25	35	50
	tanδ (max.)	0.30	0.26	0.22	0.16	0.13	0.12
(20°C,120Hz)							
Characteristics at high and low temperature	Rated voltage (V)	6.3	10	16	25	35	50
	Impedance ratio (max.)	Z-25°C/Z+20°C	4	3	2	2	2
		Z-40°C/Z+20°C	8	5	4	3	3
(120Hz)							
Endurance (105°C) (Applied ripple current)	Test time	1000 hours					
	Leakage current	The initial specified value or less					
	Percentage of capacitance change	Within ±20% of initial value					
	Tangent of the loss angle	200% or less of the initial specified value					
Shelf life (105°C)	Test time : 1000 hours; other items are the same as those for the endurance. Voltage application treatment : According to JIS C5101-1						
Applicable standards	JIS C5101-1, -18 1998 (IEC 60384-1 1992, -18 1993)						

### Outline Drawing

Unit : mm



- Soldering conditions are described on page 11.
- Land pattern size are described on page 12.
- The taping specifications are described on page 13.

### Coefficient of Frequency for Rated Ripple Current

Frequency (Hz)	50-60	120	1k	10k-100k
Rated voltage (V)				
6.3 to 16	0.80	1	1.15	1.25
25 to 35	0.80	1	1.25	1.40
50	0.80	1	1.35	1.50

### Part numbering system (example : 16V47μF)

RVS	—	16	V	470	M	□	U	□
Series code		Rated voltage symbol		Rated capacitance symbol	Capacitance tolerance symbol	Additional symbol		Taping symbol

### Standard Ratings

Rated voltage (V)	6.3			10			16			25			35			50		
	Case	ESR	Rated ripple current	Case	ESR	Rated ripple current	Case	ESR	Rated ripple current	Case	ESR	Rated ripple current	Case	ESR	Rated ripple current	Case	ESR	Rated ripple current
Rated capacitance (μF)	φD (mm)	Ω	mArms	φD (mm)	Ω	mArms	φD (mm)	Ω	mArms	φD (mm)	Ω	mArms	φD (mm)	Ω	mArms	φD (mm)	Ω	mArms
0.1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4	1990	2
0.22	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4	905	3
0.33	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4	603	4
0.47	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4	424	5
1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4	199	7
2.2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4	91	10
3.3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4	60	12
4.7	—	—	—	—	—	—	—	—	—	4	57	12	4	46	14	5	42	17
10	—	—	—	4	43	15	4	36	16	5	27	21	5	22	23	6.3	20	26
22	4	23	21	5	20	25	5	17	28	6.3	12	36	6.3	10	50	—	—	—
33	5	15	30	5	13	31	6.3	11	40	6.3	8.0	44	—	—	—	—	—	—
47	5	11	36	6.3	9.2	43	6.3	7.8	47	—	—	—	—	—	—	—	—	—
100	6.3	5.0	61	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

(Note) Rated ripple current : 105°C, 120Hz ; ESR : 20°C, 120Hz

Chip Type 105°C Capacitors (height:6.0mm)

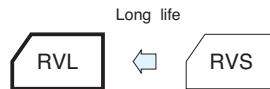
GREEN  
CAP

SMD

105°C  
2000hours

Anti-  
cleaning  
solvent

- Compatible with surface mounting for 6.0mm high capacitors.
- Supplied with carrier taping.
- Guarantees 2000 hours at 105°C.

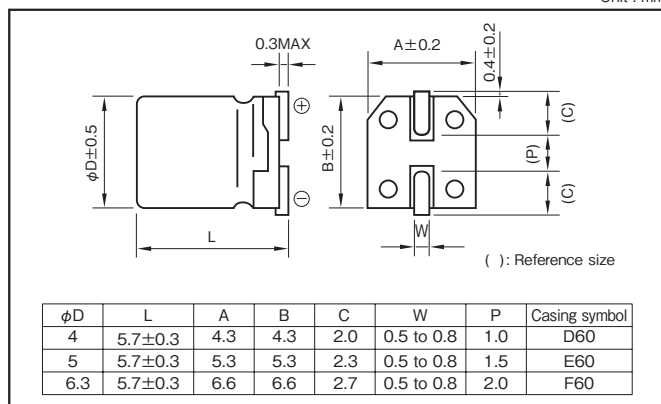


Marking color : Black print

Specifications

Item	Performance							
Category temperature range (°C)	-55 to +105							
Tolerance at rated capacitance (%)	±20 (20°C,120Hz)							
Leakage current (μA)	Less than 0.01CV or 3 whichever is larger (after 2 minutes) C : Rated capacitance (μF) ; V : Rated voltage (V) (20°C)							
Tangent of loss angle (tanδ)	Rated voltage (V)	6.3	10	16	25	35	50	
	tanδ (max.)	0.32	0.28	0.24	0.18	0.15	0.14	
Characteristics at high and low temperature	(20°C,120Hz)							
	Rated voltage (V)	6.3	10	16	25	35	50	
	Impedance ratio (max.)	Z-25°C/Z+20°C	4	3	2	2	2	2
		Z-40°C/Z+20°C	8	5	4	3	3	3
Endurance (105°C) (Applied ripple current)	(120Hz)							
	Test time	2000 hours						
	Leakage current	The initial specified value or less						
	Percentage of capacitance change	Within ±30% of initial value						
Shelf life (105°C)	Tangent of the loss angle	300% or less of the initial specified value						
	Test time : 1000hours ; other items are the same as those for the endurance. Voltage application treatment : According to JIS C5101-1							
Applicable standards	JIS C5101-1, -18 1998 (IEC 60384-1 1992, -18 1993)							

Outline Drawing



Coefficient of Frequency for Rated Ripple Current

Frequency (Hz)		50・60	120	1k	10k・100k
Rated voltage (V)	6.3 to 16	0.8	1	1.15	1.25
	25・35	0.8	1	1.25	1.40
	0.1 to 3.3μF	0.5	1	1.35	1.50
	4.7 to 10μF	0.7	1	1.35	1.50

Part numbering system (example : 16V470 M F60 □ U □)

RVL	—	16	V	470	M	F60	□	U	□
Series code		Rated voltage symbol		Rated capacitance symbol	Capacitance tolerance symbol	Casing symbol	Additional symbol		Taping symbol

- Soldering conditions are described on page 11.
- Land pattern size are described on page 12.
- The taping specifications are described on page 13.

Standard Ratings

Rated capacitance (μF)	Rated voltage (V) 6.3				10				16				25				35				50			
	Case	ESR	Rated ripple current		Case	ESR	Rated ripple current		Case	ESR	Rated ripple current		Case	ESR	Rated ripple current		Case	ESR	Rated ripple current		Case	ESR	Rated ripple current	
	φD (mm)	Ω	mArms		φD (mm)	Ω	mArms		φD (mm)	Ω	mArms		φD (mm)	Ω	mArms		φD (mm)	Ω	mArms		φD (mm)	Ω	mArms	
0.1	—	—	—		—	—	—		—	—	—		—	—	—		—	—	—		4	2321	4	
0.22	—	—	—		—	—	—		—	—	—		—	—	—		—	—	—		4	1055	5	
0.33	—	—	—		—	—	—		—	—	—		—	—	—		—	—	—		4	703	6	
0.47	—	—	—		—	—	—		—	—	—		—	—	—		—	—	—		4	494	7	
1	—	—	—		—	—	—		—	—	—		—	—	—		—	—	—		4	232	12	
2.2	—	—	—		—	—	—		—	—	—		—	—	—		—	—	—		4	105	19	
3.3	—	—	—		—	—	—		—	—	—		—	—	—		—	—	—		4	70	22	
4.7	—	—	—		—	—	—		—	—	—		—	—	—		—	—	—		4	49	29	
10	—	—	—		—	—	—		4	40	27		5	30	36		5	25	39		6.3	23	47	
22	—	—	—		—	—	—		5	18	46		6.3	14	62		6.3	11	65		—	—	—	
33	—	—	—		—	—	—		6.3	12	66		6.3	9.0	76		—	—	—		—	—	—	
47	—	—	—		6.3	9.9	74		6.3	8.5	78		—	—	—		—	—	—		—	—	—	
100	6.3	5.3	99		—	—	—		—	—	—		—	—	—		—	—	—		—	—	—	

(Note) Rated ripple current : 105°C, 120Hz ; ESR : 20°C, 120Hz

NOTE

Design, Specifications are subject to change without notice.  
Ask factory for technical specifications before purchase and/or use.



## Chip Type, 105°C Use, Large Capacitance Capacitors

GREEN  
CAP

SMD

105°C  
2000hours

Anti-  
cleaning  
solvent

- Compatible with surface mounting.
- Supplied with carrier taping.
- Guarantees 2000 hours at 105°C.

RVJ

High temperature

RV



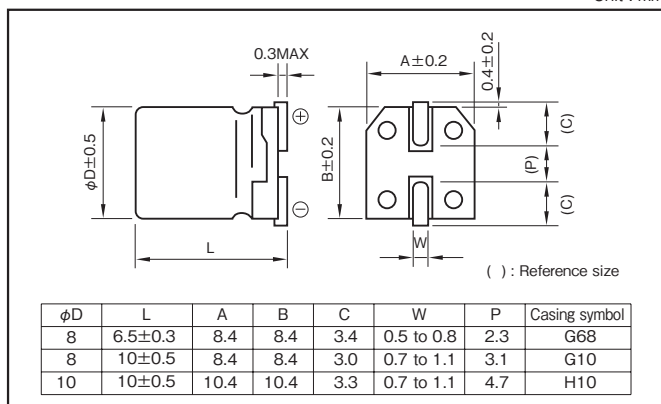
Marking color : Black print (φ8×6.5L)  
White print on a brown sleeve (φ8×10L . φ10×10L)

## Specifications

Item	Performance								
Category temperature range (°C)	-55 to +105								
Tolerance at rated capacitance (%)	±20 (20°C,120Hz)								
Leakage current (μA)	Less than 0.01CV or 3 whichever is larger (after 2 minutes) C : Rated capacitance (μF) ; V : Rated voltage (V) (20°C)								
Tangent of loss angle (tanδ)	Rated voltage (V)	6.3	10	16	25	35	50	63	100
	tanδ (max.)	0.30	0.24	0.22	0.16	0.13	0.12	0.11	0.10 (20°C,120Hz)
Characteristics at high and low temperature	Rated voltage (V)	6.3	10	16	25	35	50	63	100
	Impedance ratio (max.)	Z-25°C/Z+20°C	4	3	2	2	2	2	2
		Z-40°C/Z+20°C	8	5	4	3	3	3	3
Endurance (105°C) (Applied ripple current)	Test time	2000 hours							
	Leakage current	The initial specified value or less							
	Percentage of capacitance change	Within ±20% of initial value							
	Tangent of the loss angle	200% or less of the initial specified value							
Shelf life (105°C)	Test time : 1000 hours ; other items are the same as those for the endurance. Voltage application treatment : According to JIS C5101-1								
Applicable standards	JIS C5101-1, -18 1998 (IEC 60384-1 1992, -18 1993)								

## Outline Drawing

Unit : mm



## Coefficient of Frequency for Rated Ripple Current

Frequency (Hz) Rated voltage (V)	50・60	120	1k	10k・100k
6.3 to 16	0.80	1	1.15	1.25
25 to 35	0.80	1	1.25	1.40
50 to 63	0.80	1	1.35	1.50
100	0.70	1	1.35	1.50

## Part numbering system (example : 16V470μF)

RVJ	—	16	V	471	M	H10	□	U	□
Series code		Rated voltage symbol		Rated capacitance symbol	Capacitance tolerance symbol	Casing symbol	Additional symbol		Taping symbol

- Soldering conditions are described on page 11.
- Land pattern size are described on page 12.
- The taping specifications are described on page 13.

## Standard Ratings

Rated voltage (V)	6.3				10				16				25				35				50				63				100			
	Case	Casing symbol	ESR	Rated ripple current	Case	Casing symbol	ESR	Rated ripple current	Case	Casing symbol	ESR	Rated ripple current	Case	Casing symbol	ESR	Rated ripple current	Case	Casing symbol	ESR	Rated ripple current	Case	Casing symbol	ESR	Rated ripple current	Case	Casing symbol	ESR	Rated ripple current	Case	Casing symbol	ESR	Rated ripple current
Rated capacitance (μF)	φD (mm)		Ω	mArms	φD (mm)		Ω	mArms	φD (mm)		Ω	mArms	φD (mm)		Ω	mArms	φD (mm)		Ω	mArms	φD (mm)		Ω	mArms	φD (mm)		Ω	mArms	φD (mm)		Ω	mArms
10	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
22	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	8×6.5	G68	9.1	110	8×10	G10	8.3	99	10×10	H10	7.5	133
33	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	8×6.5	G68	6.5	110	8×10	G10	6.0	178	10×10	H10	5.5	160	10×10	H10	5.0	133
47	—	—	—	—	—	—	—	—	—	—	—	—	8×6.5	G68	5.7	110	8×6.5	G68	4.6	110	8×10	G10	4.2	178	10×10	H10	3.9	160	—	—	—	—
100	—	—	—	—	8×6.5	G68	4.3	110	8×6.5	G68	3.6	110	8×10	G10	2.7	178	10×10	H10	2.2	324	8×10	G10	2.0	178	10×10	H10	2.0	324	—	—	—	—
220	8×10	G10	2.3	178	8×10	G10	2.0	178	10×10	H10	1.7	324	10×10	H10	1.2	324	10×10	H10	0.98	324	—	—	—	—	—	—	—	—	—	—	—	—
330	8×10	G10	1.5	178	10×10	H10	1.3	324	10×10	H10	1.1	324	10×10	H10	0.80	324	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
470	10×10	H10	1.0	324	10×10	H10	0.92	324	10×10	H10	0.78	324	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1000	10×10	H10	0.50	324	10×10	H10	0.40	324	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

(Note) Rated ripple current : 105°C, 120Hz ; ESR : 20°C, 120Hz

Chip Type, 105°C Use, Large Capacitance Capacitors

SMD

105°C  
5000hours

Anti-  
cleaning  
solvent

- Surface mount device.
- Supplied with taping.
- Guarantees 5000 hours at 105°C.

RVJ  
(large)

High temperature

RV  
(large)



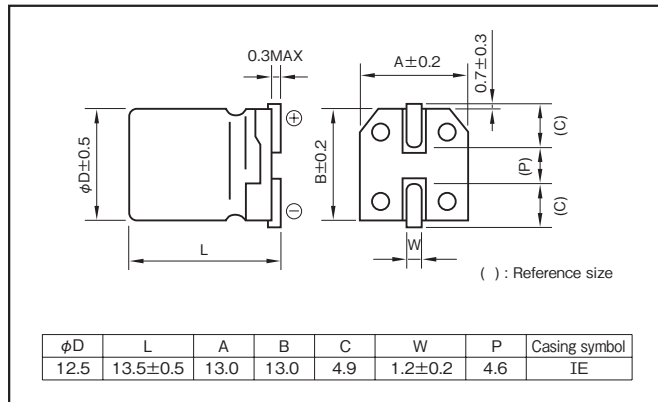
Marking color : White print on a brown sleeve

Specifications

Item	Performance									
Category temperature range (°C)	-55 to +105									
Tolerance at rated capacitance (%)	±20 (20°C,120Hz)									
Leakage current (μA)	Less than 0.01CV (after 2 minutes) C : Rated capacitance (μF) ; V : Rated voltage (V) (20°C)									
Tangent of loss angle (tanδ)	Rated voltage (V)		6.3	10	16	25	35	50	63	100
	tanδ (max.)		0.30	0.26	0.22	0.16	0.13	0.12	0.11	0.10
	0.02 is added to every 1000μF increase over 1000μF. (20°C,120Hz)									
Characteristics at high and low temperature	Rated voltage (V)		6.3	10	16	25	35	50	63	100
	Impedance ratio (max.)	Z-25°C/Z+20°C	4	3	2	2	2	2	2	2
		Z-40°C/Z+20°C	8	5	4	3	3	3	3	3
(120Hz)										
Endurance (105°C) (Applied ripple current)	Test time		5000 hours							
	Leakage current		The initial specified value or less							
	Percentage of capacitance change		Within ±20% of initial value							
	Tangent of the loss angle		200% or less of the initial specified value							
Shelf life (105°C)	Test time : 1000 hours ; other items are the same as those for the endurance. Voltage application treatment : According to JIS C5101-1									
Applicable standards	JIS C5101-1, -18 1998 (IEC 60384-1 1992, -18 1993)									

Outline Drawing

Unit : mm



- Soldering conditions are described on page 11.
- Land pattern size are described on page 12.
- The taping specifications are described on page 13.

Coefficient of Frequency for Rated Ripple Current

Frequency (Hz)	120	1k	10k	100k
Rated capacitance (μF)				
47	0.50	0.76	0.87	1
100 to 220	0.70	0.85	0.90	1
330 to 1000	0.80	0.93	0.98	1

Part numbering system (example : 10V1000μF)

RVJ	—	10	V	102	M	IE	□	T	—	R5
Series code		Rated voltage symbol		Rated capacitance symbol	Capacitance tolerance symbol	Casing symbol	Additional symbol			Taping symbol

Standard Ratings

Rated voltage (V)	Item	6.3				10				16				25				35				50				63				100			
		Case	Casing symbol	Imp.	Rated ripple current	Case	Casing symbol	Imp.	Rated ripple current	Case	Casing symbol	Imp.	Rated ripple current	Case	Casing symbol	Imp.	Rated ripple current	Case	Casing symbol	Imp.	Rated ripple current	Case	Casing symbol	Imp.	Rated ripple current	Case	Casing symbol	Imp.	Rated ripple current				
		φD (mm)		Ω	mArms	φD (mm)		Ω	mArms	φD (mm)		Ω	mArms	φD (mm)		Ω	mArms	φD (mm)		Ω	mArms	φD (mm)		Ω	mArms	φD (mm)		Ω	mArms				
Rated capacitance (μF)	47	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—				
	100	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	12.5×13.5	IE	0.176	577	—	—	—	—				
	220	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—				
	330	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—				
	470	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—				
	1000	12.5×13.5	IE	0.105	747	12.5×13.5	IE	0.105	747	12.5×13.5	IE	0.105	747	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—			

(Note) Rated ripple current : 105°C, 100kHz ; Impedance(Imp.) : 20°C, 100kHz

NOTE

Design, Specifications are subject to change without notice.  
Ask factory for technical specifications before purchase and/or use.

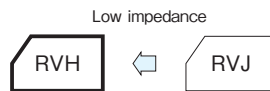
## Chip Type, 105°C Use, Low Impedance Capacitors

GREEN  
CAP

SMD

Low  
Impedance105°C  
2000hoursAnti-  
cleaning  
solvent

- Compatible with surface mounting.
- Supplied with carrier taping.
- Guarantees 2000 hours at 105°C.



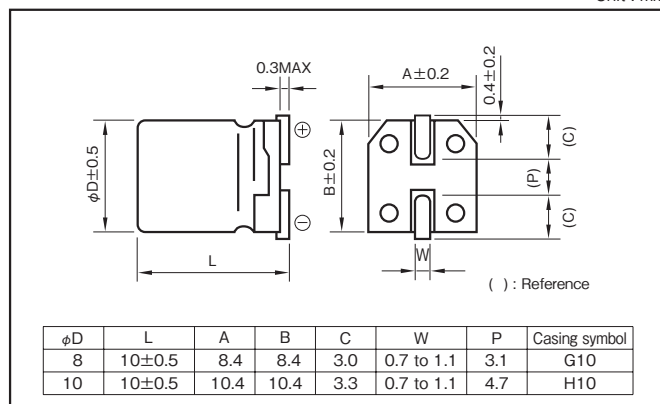
Marking color : White print on a brown sleeve

## Specifications

Item	Performance					
Category temperature range (°C)	-55 to +105					
Tolerance at rated capacitance (%)	±20 (20°C,120Hz)					
Leakage current (μA)	Less than 0.01CV or 3 whichever is larger (after 2 minutes) C : Rated capacitance (μF) ; V : Rated voltage (V) (20°C)					
Tangent of loss angle (tanδ)	Rated voltage (V)	6.3	10	16	25	35
	tanδ (max.)	0.30	0.26	0.22	0.16	0.13
(20°C,120Hz)						
Characteristics at high and low temperature	Rated voltage (V)	6.3	10	16	25	35
	Impedance ratio (max.)	Z-25°C/Z+20°C	4	3	2	2
		Z-40°C/Z+20°C	8	5	4	3
(120Hz)						
Endurance (105°C) (Applied ripple current)	Test time	2000 hours				
	Leakage current	The initial specified value or less				
	Percentage of capacitance change	Within ±20% of initial value				
	Tangent of the loss angle	200% or less of the initial specified value				
Shelf life (105°C)	Test time : 1000 hours ; other items are the same as those for the endurance. Voltage application treatment : According to JIS C5101-1					
Applicable standards	JIS C5101-1, -18 1998 (IEC 60384-1 1992, -18 1993)					

## Outline Drawing

Unit : mm



- Soldering conditions are described on page 11.
- Land pattern size are described on page 12.
- The taping specifications are described on page 13.

## Coefficient of Frequency for Rated Ripple Current

Frequency (Hz)	50 · 60	120	1k	10k · 100k
Coefficient	0.64	0.8	0.93	1

## Part numbering system (example : 16V330μF)

RVH	—	16	V	331	M	H10	□	U	□
Series code		Rated voltage symbol		Rated capacitance symbol	Capacitance tolerance symbol	Casing symbol	Additional symbol		Taping symbol

## Standard Ratings

Item	6.3				10				16				25				35			
	Case	Casing symbol	Impedance	Rated ripple current	Case	Casing symbol	Impedance	Rated ripple current	Case	Casing symbol	Impedance	Rated ripple current	Case	Casing symbol	Impedance	Rated ripple current	Case	Casing symbol	Impedance	Rated ripple current
47	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	8×10	G10	0.45	369
100	—	—	—	—	—	—	—	—	—	—	—	—	8×10	G10	0.45	369	10×10	H10	0.25	553
220	—	—	—	—	8×10	G10	0.45	369	—	—	—	—	10×10	H10	0.25	553	—	—	—	—
330	8×10	G10	0.45	369	—	—	—	—	10×10	H10	0.25	553	—	—	—	—	—	—	—	—
470	—	—	—	—	10×10	H10	0.25	553	—	—	—	—	—	—	—	—	—	—	—	—

(Note) Rated ripple current : 105°C, 100kHz ; Impedance : 20°C, 100kHz

## NOTE

Design, Specifications are subject to change without notice.  
Ask factory for technical specifications before purchase and/or use.

Chip Type, 105°C Use, Long Life Capacitors

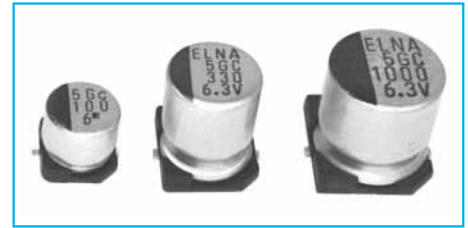
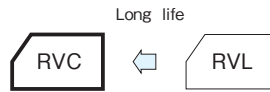
GREEN  
CAP

SMD

105°C  
3000hours

Anti-  
cleaning  
solvent

- Compatible with surface mounting.
- Supplied with carrier taping.
- Guarantees 3000 hours at 105°C.  
(10L:5000 hours).



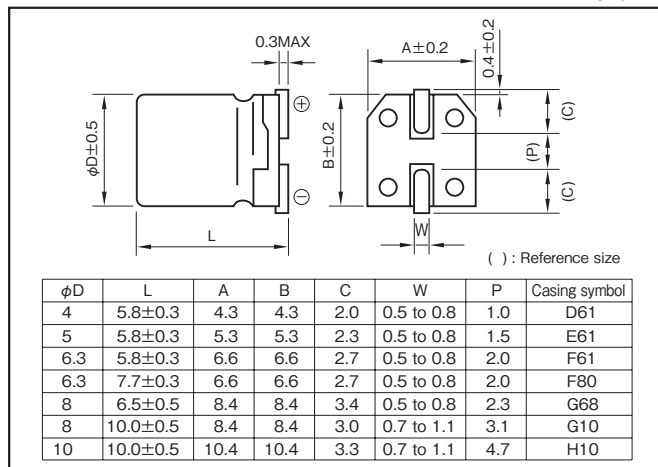
Marking color : Black print

Specifications

Item	Performance						
Category temperature range (°C)	-40 to +105						
Tolerance at rated capacitance (%)	±20 (20°C,120Hz)						
Leakage current (μA)	Less than 0.01CV or 3 whichever is larger (after 2 minutes) C : Rated capacitance (mF), V : Rated voltage (V) (20°C)						
Tangent of loss angle (tanδ)	Rated voltage (V)	6.3	10	16	25	35	50
	tanδ (max.)	0.28	0.24	0.20	0.16	0.13	0.12
Characteristics at high and low temperature	Rated voltage (V)	6.3	10	16	25	35	50
	Impedance ratio (max.)	Z-25°C/Z+20°C	4	3	2	2	2
		Z-40°C/Z+20°C	10	7	5	3	3
	Endurance (105°C)	Test time	3000 hours (10L : 5000 hours)				
	Leakage current	The initial specified value or less					
	Percentage of capacitance change	Within ±30% of initial value					
	Tangent of the loss angle	300% or less of initial specified value					
Shelf life (105°C)	Test time : 1000 hours ; other items are the same as those for the endurance. Voltage application treatment : According to JIS C5101-1						
Applicable standards	JIS C5101-1, -18 1998(IEC 60384-1 1992, -18 1993)						

Outline Drawing

Unit : mm



- Soldering conditions are described on page 11.
- Land pattern size are described on page 12.
- The taping specifications are described on page 13.

Coefficient of Frequency for Rated Ripple Current

Frequency (Hz)	50	120	1k	10k~100k
Rated voltage (V)				
6.3 to 16	0.8	1	1.15	1.25
25 to 35	0.8	1	1.25	1.40
50	0.1 to 3.3μF	0.5	1	1.35
	4.7μF to	0.7	1	1.35

Part numbering system (example : 16V470M F61 U)

RVC	16	V	470	M	F61	U	
Series code	Rated voltage symbol	Rated capacitance symbol	Capacitance tolerance symbol	Casing symbol	Additional symbol	Taping symbol	

- The standard ratings are described on the next page.

NOTE

Design, Specifications are subject to change without notice.  
Ask factory for technical specifications before purchase and/or use.



### Standard Ratings

Rated voltage (V) Rated capacitance (μF)	Item	6.3			10			16			25			35			50		
		Case	Casing	Rated ripple	Case	Casing	Rated ripple	Case	Casing	Rated ripple	Case	Casing	Rated ripple	Case	Casing	Rated ripple	Case	Casing	Rated ripple
		φD (mm)	symbol	mArms	φD (mm)	symbol	mArms	φD (mm)	symbol	mArms	φD (mm)	symbol	mArms	φD (mm)	symbol	mArms	φD (mm)	symbol	mArms
0.1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4×5.8	D61	1.0
0.22	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4×5.8	D61	2.6
0.33	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4×5.8	D61	3.2
0.47	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4×5.8	D61	5.0
1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4×5.8	D61	10
2.2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4×5.8	D61	16
3.3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4×5.8	D61	17
4.7	—	—	—	—	—	—	—	—	—	—	—	—	—	4×5.8	D61	16	5×5.8	E61	23
10	—	—	—	—	—	—	—	4×5.8	D61	28	—	—	—	5×5.8	E61	28	6.3×5.8	F61	35
22	4×5.8	D61	26	—	—	—	—	5×5.8	E61	39	—	—	—	6.3×5.8	F61	55	6.3×7.7	F80	58
33	—	—	—	—	5×5.8	E61	43	—	—	—	6.3×5.8	F61	60	6.3×7.7	F80	57	8×10	G10	91
47	5×5.8	E61	46	—	—	—	—	6.3×5.8	F61	70	6.3×7.7	F80	65	—	—	—	8×10	G10	100
100	6.3×5.8	F61	71	—	—	—	—	6.3×7.7	F80	81	8×10	G10	130	—	—	—	10×10	H10	160
220	6.3×7.7	F80	101	8×10	G10	160	—	—	—	—	—	—	—	10×10	H10	220	—	—	—
330	8×10	G10	230	—	—	—	—	—	—	—	10×10	H10	238	—	—	—	—	—	—
470	—	—	—	—	—	—	—	10×10	H10	340	—	—	—	—	—	—	—	—	—
1000	10×10	H10	313	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

(Note) Rated ripple current : 105°C, 120Hz

### NOTE

Design, Specifications are subject to change without notice.  
Ask factory for technical specifications before purchase and/or use.

## Chip Type, 105°C Use, Long Life Capacitors

GREEN  
CAP

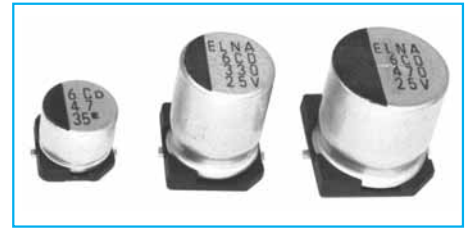
SMD

Low Z

105°C  
2000hoursAnti-  
cleaning  
solvent

- Compatible with surface mounting.
- Supplied with carrier taping.
- Guarantees 2000 hours at 105°C.  
(10.5L:5000 hours).

Low Z, Long life



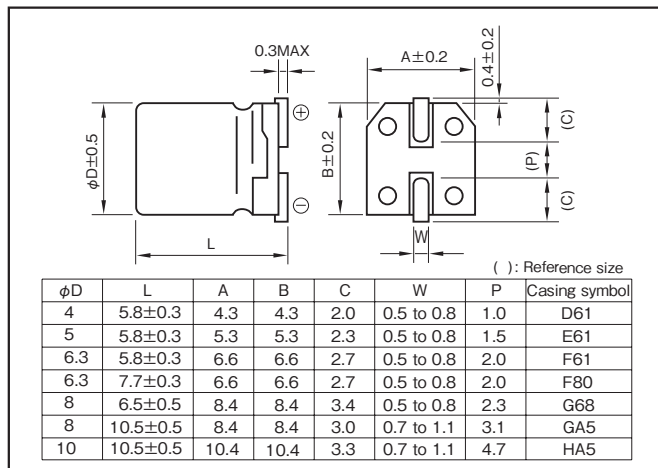
Marking color : Black print

## Specifications

Item	Performance						
Category temperature range (°C)	-55 to +105						
Tolerance at rated capacitance (%)	±20 (20°C,120Hz)						
Leakage current (μA)	Less than 0.01CV or 3 whichever is larger (after 2 minutes) C : Rated capacitance (mF) , V : Rated voltage (V) (20°C)						
Tangent of loss angle (tanδ)	Rated voltage (V)	6.3	10	16	25	35	50
	tanδ (max.)	0.26	0.19	0.16	0.14	0.12	0.10
(20°C,120Hz)							
Characteristics at high and low temperature	Rated voltage (V)	6.3	10	16	25	35	50
	Impedance ratio (max.)	Z-25°C/Z+20°C	2	2	2	2	2
		Z-40°C/Z+20°C	3	3	3	3	3
		Z-55°C/Z+20°C	8	4	4	3	3
(120Hz)							
Endurance (105°C)	Test time	2000 hours (10.5L : 5000 hours)					
	Leakage current	The initial specified value or less					
	Percentage of capacitance change	Within ±30% of initial value					
	Tangent of the loss angle	200% or less of initial specified value					
Shelf life (105°C)	Test time : 1000 hours ; other items are the same as those for the endurance. Voltage application treatment : According to JIS C5101-1						
Applicable standards	JIS C5101-1, -18 1998(IEC 60384-1 1992, -18 1993)						

## Outline Drawing

Unit : mm



- Soldering conditions are described on page 11.
- Land pattern size are described on page 12.
- The taping specifications are described on page 13.

## Coefficient of Frequency for Rated Ripple Current

Frequency (Hz)	50	120	1k	10k~100k
Rated voltage (V)				
6.3~50	0.5	0.5	0.75	1

## Part numbering system (example : 16V100μF)

RVD	—	16	V	101	M	F61	□	U	□
Series code		Rated voltage symbol		Rated capacitance symbol	Capacitance tolerance symbol	Casing symbol	Additional symbol		Taping symbol

- The standard ratings are described on the next page.

## NOTE

Design, Specifications are subject to change without notice.  
Ask factory for technical specifications before purchase and/or use.

### Standard Ratings

Rated voltage (V)	Item	6.3				10				16				25				35				50			
		Case	Casing symbol	Impedance	Rated ripple current	Case	Casing symbol	Impedance	Rated ripple current	Case	Casing symbol	Impedance	Rated ripple current	Case	Casing symbol	Impedance	Rated ripple current	Case	Casing symbol	Impedance	Rated ripple current	Case	Casing symbol	Impedance	Rated ripple current
		φD×L (mm)		Ω	mArms	φD×L (mm)		Ω	mArms	φD×L (mm)		Ω	mArms	φD×L (mm)		Ω	mArms	φD×L (mm)		Ω	mArms	φD×L (mm)		Ω	mArms
4.7	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4×5.8	D61	1.35	90	4×5.8	D61	2.7	60
10	—	—	—	—	—	—	—	—	4×5.8	D61	1.35	90	4×5.8	D61	1.35	90	4×5.8	D61	1.35	90	5×5.8	E61	1.5	90	
22	4×5.8	D61	1.35	90	4×5.8	D61	1.35	90	4×5.8	D61	1.35	90	5×5.8	E61	0.70	170	5×5.8	E61	0.70	170	5×5.8	E61	0.86	170	
33	—	—	—	—	4×5.8	D61	1.35	90	—	—	—	—	5×5.8	E61	0.70	170	6.3×5.8	F61	0.36	250	6.3×7.7	F80	0.66	195	
47	4×5.8	D61	1.35	90	5×5.8	E61	0.70	170	—	—	—	—	5×5.8	E61	0.70	170	6.3×5.8	F61	0.36	250	6.3×7.7	F80	0.66	195	
100	5×5.8	E61	0.70	170	—	—	—	—	6.3×5.8	F61	0.36	250	6.3×5.8	F61	0.36	250	6.3×7.7	F80	0.30	300	8×6.5	G68	0.63	200	
	6.3×5.8	F61	0.36	250	—	—	—	—	6.3×5.8	F61	0.36	250	8×6.5	G68	0.30	300	8×10.5	GA5	0.16	600	8×10.5	GA5	0.32	350	
220	6.3×5.8	F61	0.36	250	6.3×7.7	F80	0.30	300	8×6.5	G68	0.30	300	8×10.5	GA5	0.16	600	8×10.5	GA5	0.16	600	10×10.5	HA5	0.18	700	
330	6.3×7.7	F80	0.30	300	8×10.5	GA5	0.16	600	8×10.5	GA5	0.16	600	8×10.5	GA5	0.16	600	10×10.5	HA5	0.08	850	—	—	—	—	
470	8×10.5	GA5	0.16	600	8×10.5	GA5	0.16	600	8×10.5	GA5	0.16	600	10×10.5	HA5	0.08	850	—	—	—	—	—	—	—	—	
680	—	—	—	—	8×10.5	GA5	0.16	600	10×10.5	HA5	0.08	850	—	—	—	—	—	—	—	—	—	—	—	—	
1000	8×10.5	GA5	0.16	600	10×10.5	HA5	0.08	850	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
1500	10×10.5	HA5	0.08	850	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		

(Note) Impedance : 20°C, 100kHz  
Rated ripple current : 105°C, 100kHz

Chip Type, 105°C Use, Low Impedance Capacitors

GREEN  
CAP

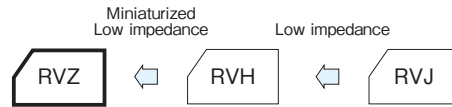
SMD

Low  
Impedance

105°C  
2000hours

Anti-  
cleaning  
solvent

- Compatible with surface mounting.
- Supplied with carrier taping.
- Guarantees 2000 hours at 105°C.



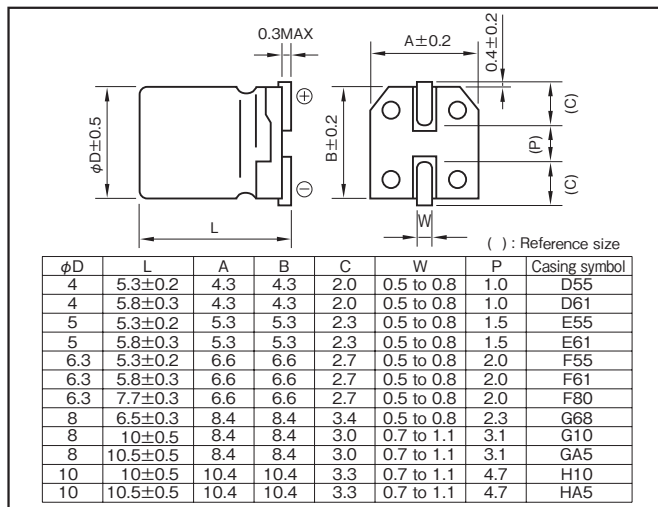
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White print on a brown sleeve (φ8×10L·φ10×10L)

Specifications

Item	Performance					
Category temperature range (°C)	-55 to +105					
Tolerance at rated capacitance (%)	±20 (20°C,120Hz)					
Leakage current (μA)	Less than 0.01CV or 3 whichever is larger (after 2 minutes) C : Rated capacitance (μF) ; V : Rated voltage (V) (20°C)					
Tangent of loss angle (tanδ)	Rated voltage (V)	6.3	10	16	25	35
	tanδ (max.)	0.28	0.24	0.20	0.16	0.14
Characteristics at high and low temperature	(20°C,120Hz)					
	Rated voltage (V)	6.3	10	16	25	35
	Impedance ratio (max.)	Z-25°C/Z+20°C	4	3	2	2
		Z-55°C/Z+20°C	8	5	4	3
Endurance (105°C) (Applied ripple current)	(120Hz)					
	Test time	2000 hours (8×6.5 or Smaller : 1000 hours)				
	Leakage current	The initial specified value or less				
	Percentage of capacitance change	Within ±25% of initial value				
Shelf life (105°C)	Tangent of the loss angle	200% or less of the initial specified value				
	Test time : 1000hours ; other items are the same as those for the endurance. Voltage application treatment : According to JIS C5101-1					
Applicable standards	JIS C5101-1, -18 1998 (IEC 60384-1 1992, -18 1993)					

Outline Drawing

Unit : mm



- Soldering conditions are described on page 11.
- Land pattern size are described on page 12.
- The taping specifications are described on page 13.

Coefficient of Frequency for Rated Ripple Current

Frequency (Hz)	120	1k	10k	100k
Rated voltage (V)				
6.3 to 35	0.5	0.75	0.9	1.0

Part numbering system (example : 6.3V1500μF)

RVZ	—	6	V	152	M	HA5	□	U—	□
Series code		Rated voltage symbol		Rated capacitance symbol	Capacitance tolerance symbol	Casing symbol	Additional symbol		Taping symbol

- The standard ratings are described on the next page.

NOTE

Design, Specifications are subject to change without notice.  
Ask factory for technical specifications before purchase and/or use.

## Standard Ratings

Rated voltage (V)	Item	6.3				10				16				25				35			
		Case φD (mm)	Casing symbol	Impedance Ω	Rated ripple current mA rms	Case φD (mm)	Casing symbol	Impedance Ω	Rated ripple current mA rms	Case φD (mm)	Casing symbol	Impedance Ω	Rated ripple current mA rms	Case φD (mm)	Casing symbol	Impedance Ω	Rated ripple current mA rms	Case φD (mm)	Casing symbol	Impedance Ω	Rated ripple current mA rms
4.7	—	—	—	—	—	—	—	—	—	—	—	—	—	4×5.3	D55	3.20	65	4×5.3	D55	3.20	65
10	—	—	—	—	—	4×5.3	D55	3.20	65	4×5.3	D55	3.20	65	4×5.8	D61	1.80	80	5×5.3	E55	1.50	110
														5×5.3	E55	1.50	110	5×5.8	E61	0.76	150
15	—	—	—	—	—	—	—	—	—	4×5.8	D61	1.80	80	5×5.8	E61	0.76	150	5×5.8	E61	0.76	150
22	—	4×5.3	D55	3.20	65	4×5.8	D61	1.80	80	5×5.3	E55	1.50	110	5×5.8	E61	0.76	150	6.3×5.3	F55	0.85	170
		4×5.8	D61	1.80	80	5×5.3	E55	1.50	110	5×5.8	E61	0.76	150	6.3×5.3	F55	0.85	170	6.3×5.3	F55	0.85	170
33	—	5×5.3	E55	1.50	110	5×5.3	E55	1.50	110	6.3×5.3	F55	0.85	170	6.3×5.3	F55	0.85	170	6.3×5.3	F55	0.85	170
		5×5.8	E61	0.76	150	5×5.8	E61	0.76	150	6.3×5.8	F61	0.44	230	6.3×5.8	F61	0.44	230	6.3×5.8	F61	0.44	230
47	—	5×5.3	E55	1.50	110	6.3×5.3	F55	0.85	170	6.3×5.3	F55	0.85	170	6.3×5.3	F55	0.85	170	6.3×5.8	F61	0.44	230
		5×5.8	E61	0.76	150	6.3×5.8	F61	0.44	230	6.3×5.8	F61	0.44	230	6.3×5.8	F61	0.44	230	6.3×7.7	F80	0.34	280
68	—	6.3×5.8	F61	0.44	230	6.3×5.8	F61	0.44	230	6.3×5.8	F61	0.44	230	6.3×5.8	F61	0.44	230	8×6.5	G68	0.34	280
																		6.3×7.7	F80	0.34	280
100	—	6.3×5.3	F55	0.85	170	6.3×5.3	F55	0.85	170	6.3×5.3	F55	0.85	170	6.3×7.7	F80	0.34	280	8×10	G10	0.20	450
		6.3×5.8	F61	0.44	230	6.3×5.8	F61	0.44	230	6.3×5.8	F61	0.44	230	8×6.5	G68	0.34	280	8×10.5	GA5	0.17	450
150	—	6.3×5.8	F61	0.44	230	6.3×5.8	F61	0.44	230	6.3×7.7	F80	0.34	280	8×10	G10	0.20	450	8×10.5	GA5	0.17	450
														8×6.5	G68	0.34	280	10×10	H10	0.10	670
220	—	6.3×5.8	F61	0.44	230	6.3×7.7	F80	0.34	280	6.3×7.7	F80	0.34	280	8×10.5	GA5	0.17	450	8×10.5	GA5	0.17	450
		6.3×7.7	F80	0.34	280	8×6.5	G68	0.34	280	8×10	G10	0.20	450	10×10	H10	0.10	670	10×10	H10	0.10	670
330	—	6.3×7.7	F80	0.34	280	8×10.5	GA5	0.17	450	8×10.5	GA5	0.17	450	8×10.5	GA5	0.17	450	10×10.5	HA5	0.09	670
		8×6.5	G68	0.34	200	10×10	H10	0.10	670	10×10	H10	0.10	670	10×10	H10	0.10	670	—	—	—	—
470	—	8×10.5	GA5	0.17	450	8×10.5	GA5	0.17	450	8×10.5	GA5	0.17	450	10×10.5	HA5	0.09	670	—	—	—	—
		10×10	H10	0.10	670	10×10	H10	0.10	670	10×10	H10	0.10	670	—	—	—	—	—	—	—	—
680	—	8×10.5	GA5	0.17	450	10×10.5	HA5	0.09	670	10×10.5	HA5	0.09	670	—	—	—	—	—	—	—	—
1000	—	8×10.5	GA5	0.17	450	10×10.5	HA5	0.09	670	—	—	—	—	—	—	—	—	—	—	—	—
		10×10	H10	0.10	670					—	—	—	—	—	—	—	—	—	—	—	—
1500	—	10×10.5	HA5	0.09	670	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

(Note) Rated ripple current : 105°C, 100kHz ; Impedance : 20°C, 100kHz

## NOTE

Design, Specifications are subject to change without notice.  
Ask factory for technical specifications before purchase and/or use.

## Chip Type 125°C Capacitors

GREEN  
CAP

SMD

125°C  
1250hours105°C  
5000hoursAnti-  
cleaning  
solvent

- Compatible with surface mounting.
- Supplied with carrier taping.
- Guarantees 1250 hours at 125°C.  
( $\phi 8$  : 1000 hours)
- Guarantees 5000 hours at 105°C.  
( $\phi 8$  : 4000 hours)



High temperature



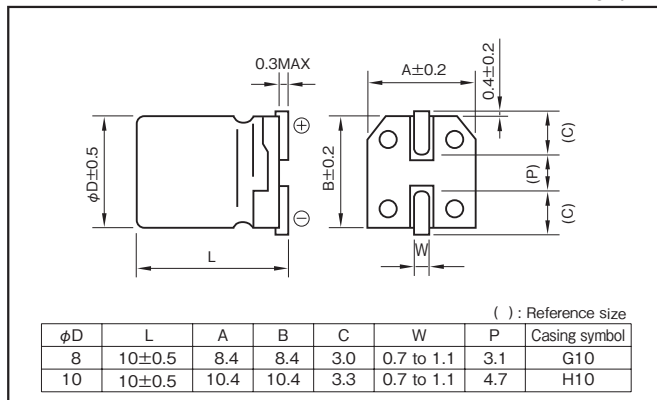
Marking color : Gold print on a brown sleeve

## Specifications

Item	Performance							
Category temperature range (°C)	-40 to +125							
Tolerance at rated capacitance (%)	±20 (20°C,120Hz)							
Leakage current (μA)	Less than 0.02CV or 3 whichever is larger (after 2 minutes) C : Rated capacitance (μF) ; V : Rated voltage (V) (20°C)							
Tangent of loss angle (tanδ)								
	Rated voltage (V)	10	16	25	35	50	63	
	tanδ (max.)	0.28	0.26	0.24	0.20	0.19	0.18	
	(20°C,120Hz)							
Characteristics at high and low temperature								
	Rated voltage (V)		10	16	25	35	50	63
	Impedance ratio (max.)	Z-25°C/Z+20°C	3	3	3	3	3	3
		Z-40°C/Z+20°C	5	5	5	5	5	5
	(120Hz)							
Endurance (Applied ripple current)	Test temp.		125°C		105°C			
	Test time		φ10 : 1250h, φ8 : 1000h		φ10 : 5000h, φ8 : 4000h			
	Percentage of capacitance change		Within ±30% of initial value					
	Tangent of the loss angle		300% or less of the initial specified value					
	Leakage current		The initial specified value or less					
Shelf life	Test temp.		125°C		105°C			
	Test time		500 h		1000h			
	Percentage of capacitance change		Within ±20% of initial value					
	Tangent of the loss angle		200% or less of the initial specified value					
	Leakage current		The initial specified value or less					
Applicable standards	JIS C5101-1, -18 1998 (IEC 60384-1 1992, -18 1993)							

## Outline Drawing

Unit : mm



- Soldering conditions are described on page 11.
- Land pattern size are described on page 12.
- The taping specifications are described on page 13.

## Coefficient of Frequency for Rated Ripple Current

Frequency (Hz)	120	1k	10k	100k
Rated voltage (V)				
10 to 63	0.77	0.88	0.96	1

## Part numbering system (example : 16V220µF)

RVK	16	V	221	M	H10	□	U	□
Series code	Rated voltage symbol	Rated capacitance symbol	Capacitance tolerance symbol	Casing symbol	Additional symbol	Taping symbol		

## Standard Ratings

Rated voltage (V)	10				16				25				35				50				63			
	Case	ESR	Impedance	Rated ripple current	Case	ESR	Impedance	Rated ripple current	Case	ESR	Impedance	Rated ripple current	Case	ESR	Impedance	Rated ripple current	Case	ESR	Impedance	Rated ripple current	Case	ESR	Impedance	Rated ripple current
Rated capacitance (µF)	φD (mm)	Ω	Ω	mArms	φD (mm)	Ω	Ω	mArms	φD (mm)	Ω	Ω	mArms	φD (mm)	Ω	Ω	mArms	φD (mm)	Ω	Ω	mArms	φD (mm)	Ω	Ω	mArms
10	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	8×10	32	0.80	38	—	—	—	—
22	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	10×10	32	0.65	45	—	—	—	—
33	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	8×10	14	0.80	38	8×10	14	1.00	33
47	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	10×10	14	0.65	48	10×10	14	0.67	48
100	—	—	—	—	—	—	—	—	—	—	—	—	8×10	10	0.80	40	—	—	—	—	—	—	—	—
220	8×10	2.1	0.68	60	10×10	2.0	0.55	107	—	—	—	—	10×10	7.1	0.58	70	—	—	—	—	—	—	—	—
330	10×10	1.4	0.55	111	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

(Note) Impedance : 20°C, 100kHz : Rated ripple current : 125°C, 100kHz ; ESR : 20°C, 120Hz

## NOTE

Design, Specifications are subject to change without notice.  
Ask factory for technical specifications before purchase and/or use.



## Chip Type, 125°C Use, Large Capacitance Capacitors

SMD

125°C  
5000hours

Anti-  
cleaning  
solvent

- Surface mount device.
- Supplied with taping.
- Guarantees 5000 hours at 125°C.

RVK  
(large)

High temperature

RVJ  
(large)



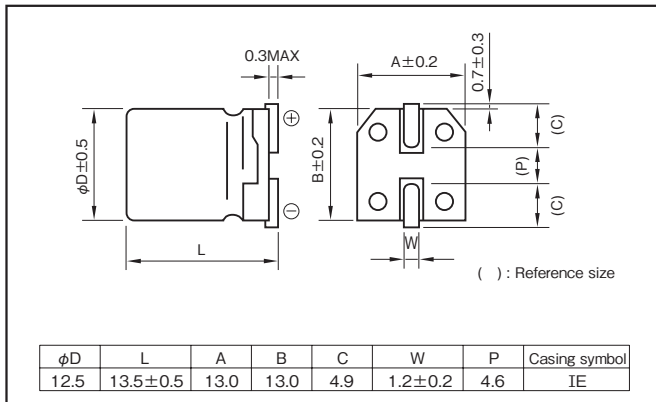
Marking color : White print on a brown sleeve

### Specifications

Item	Performance							
Category temperature range (°C)	-40 to +125							
Tolerance at rated capacitance (%)	±20 (20°C,120Hz)							
Leakage current (μA)	Less than 0.02CV (after 2 minutes) C : Rated capacitance (μF) ; V : Rated voltage (V) (20°C)							
Tangent of loss angle (tanδ)	Rated voltage (V)		10	16	25	35	50	63
	tanδ (max.)		0.26	0.22	0.16	0.13	0.12	0.11
	0.02 is added to each 1000μF (20°C,120Hz)							
Characteristics at high and low temperature	Rated voltage (V)		10	16	25	35	50	63
	Impedance ratio (max.)	Z-25°C/Z+20°C	3	2	2	2	2	2
		Z-40°C/Z+20°C	5	4	3	3	3	3
(120Hz)								
Endurance (125°C) (Applied ripple current)	Test time		5000 hours					
	Leakage current		The initial specified value or less					
	Percentage of capacitance change		Within ±30% of initial value					
	Tangent of the loss angle		300% or less of the initial specified value					
Shelf life (125°C)	Test time : 1000 hours; other items are the same as those for the endurance. Voltage application treatment : According to JIS C5101-1							
Applicable standards	JIS C5101-1, -18 1998 (IEC 60384-1 1992, -18 1993)							

### Outline Drawing

Unit : mm



- Soldering conditions are described on page 11.
- Land pattern size are described on page 12.
- The taping specifications are described on page 13.

### Coefficient of Frequency for Rated Ripple Current

Frequency (Hz)	120	1k	10k	100k
Rated capacitance (μF)				
100	0.40	0.75	0.90	1
220 to 330	0.50	0.85	0.95	1
470	0.60	0.88	0.96	1

### Part numbering system (example : 10V470μF)

RVK	—	10	V	471	M	IE	T	—	R5
Series code		Rated voltage symbol		Rated capacitance symbol	Capacitance tolerance symbol	Casing symbol	Additional symbol		Taping symbol

### Standard Ratings

Rated voltage (V)	10				16				25				35				50				63			
	Case	Casing symbol	Imp.	Rated ripple current	Case	Casing symbol	Imp.	Rated ripple current	Case	Casing symbol	Imp.	Rated ripple current	Case	Casing symbol	Imp.	Rated ripple current	Case	Casing symbol	Imp.	Rated ripple current	Case	Casing symbol	Imp.	Rated ripple current
Rated capacitance (μF)	φD (mm)		Ω	mArms	φD (mm)		Ω	mArms	φD (mm)		Ω	mArms	φD (mm)		Ω	mArms	φD (mm)		Ω	mArms	φD (mm)		Ω	mArms
100	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	12.5×13.5	IE	0.136	509	12.5×13.5	IE	0.176	447
220	—	—	—	—	—	—	—	—	—	—	—	—	12.5×13.5	IE	0.105	579	—	—	—	—	—	—	—	—
330	—	—	—	—	—	—	—	—	12.5×13.5	IE	0.105	579	—	—	—	—	—	—	—	—	—	—	—	—
470	12.5×13.5	IE	0.105	579	12.5×13.5	IE	0.105	579	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

(Note) Rated ripple current : 125°C, 100kHz ; Impedance(Imp.) : 20°C, 100kHz

### NOTE

Design, Specifications are subject to change without notice.  
Ask factory for technical specifications before purchase and/or use.

## Chip Type, 105°C Use, Large Capacitance Capacitors

SMD

Vibration  
Resistance105°C  
2000hoursAnti-  
cleaning  
solvent

- Compatible with surface mounting.
- For Vibration resistance.
- Supplied with carrier taping.
- Guarantees 2000 hours at 105°C.

RTJ

Vibration resistance

RVJ



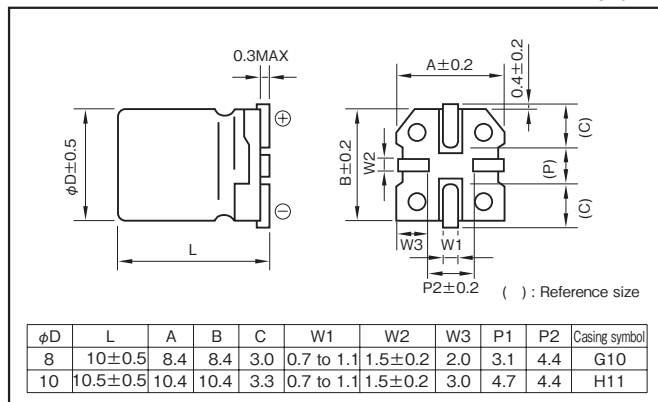
Marking color : White print on a brown sleeve

## Specifications

Item	Performance									
Category temperature range (°C)	-55 to +105									
Tolerance at rated capacitance (%)	±20 (20°C, 120Hz)									
Leakage current (μA)	Less than 0.01CV or 3 whichever is larger (after 2 minutes) C : Rated capacitance (μF) ; V : Rated voltage (V) (20°C)									
Tangent of loss angle (tanδ)										
	Rated voltage (V)	6.3	10	16	25	35	50	63	100	
	tanδ (max.)	0.30	0.26	0.22	0.16	0.13	0.12	0.11	0.10	
	(20°C, 120Hz)									
Characteristics at high and low temperature										
	Impedance ratio (max.)	Rated voltage (V)	6.3	10	16	25	35	50	63	100
		Z-25°C/Z+20°C	4	3	2	2	2	2	2	2
		Z-40°C/Z+20°C	8	5	4	3	3	3	3	3
	(120Hz)									
Endurance (105°C) (Applied ripple current)										
	Test time		2000 hours							
	Leakage current		The initial specified value or less							
	Percentage of capacitance change		Within ±20% of initial value							
	Tangent of the loss angle		200% or less of the initial specified value							
Shelf life (105°C)	Test time : 1000 hours; other items are the same as those for the endurance. Voltage application treatment : According to JIS C5101-1									
Applicable standards	JIS C5101-1, -18 1998 (IEC 60384-1 1992, -18 1993)									

## Outline Drawing

Unit : mm



- Soldering conditions are described on page 11.
- Land pattern size are described on page 12.
- The taping specifications are described on page 13.

## Coefficient of Frequency for Rated Ripple Current

Frequency (Hz)	50 · 60	120	1k	10k · 100k
Rated voltage (V)				
6.3 to 16	0.80	1	1.15	1.25
25 to 35	0.80	1	1.25	1.40
50 to 63	0.80	1	1.35	1.50
100	0.70	1	1.35	1.50

## Part numbering system (example: 25V220µF)

RTJ	—	25	V	221	M	H11	□	U	□
Series code		Rated voltage symbol		Rated capacitance symbol	Capacitance tolerance symbol	Casing symbol	Additional symbol		Taping symbol

## Standard Ratings

Rated voltage (V)	6.3				10				16				25				35				50				63				100			
	Case	Casing symbol	ESR	Rated ripple current	Case	Casing symbol	ESR	Rated ripple current	Case	Casing symbol	ESR	Rated ripple current	Case	Casing symbol	ESR	Rated ripple current	Case	Casing symbol	ESR	Rated ripple current	Case	Casing symbol	ESR	Rated ripple current	Case	Casing symbol	ESR	Rated ripple current	Case	Casing symbol	ESR	Rated ripple current
Rated capacitance (µF)	φD (mm)		Ω	mA	φD (mm)		Ω	mA	φD (mm)		Ω	mA	φD (mm)		Ω	mA	φD (mm)		Ω	mA	φD (mm)		Ω	mA	φD (mm)		Ω	mA	φD (mm)		Ω	mA
10	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
22	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
33	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
47	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
100	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
220	8×10	G10	2.3	178	8×10	G10	2.0	178	10×10.5	H11	1.7	324	10×10.5	H11	1.2	324	10×10.5	H11	0.98	324	—	—	—	—	—	—	—	—	—	—	—	—
330	8×10	G10	1.5	178	10×10.5	H11	1.3	324	10×10.5	H11	1.1	324	10×10.5	H11	0.80	324	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
470	10×10.5	H11	1.0	324	10×10.5	H11	0.92	324	10×10.5	H11	0.78	324	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

(Note) Rated ripple current : 105°C, 120Hz ; ESR : 20°C, 120Hz

## NOTE

Design, Specifications are subject to change without notice.  
Ask factory for technical specifications before purchase and/or use.

### Chip Type, 105°C Use, Low Impedance Capacitors

SMD

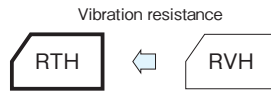
Vibration  
Resistance

Low  
Impedance

105°C  
2000hours

Anti-  
cleaning  
solvent

- Compatible with surface mounting.
- For Vibration resistance.
- Supplied with carrier taping.
- Guarantees 2000 hours at 105°C.



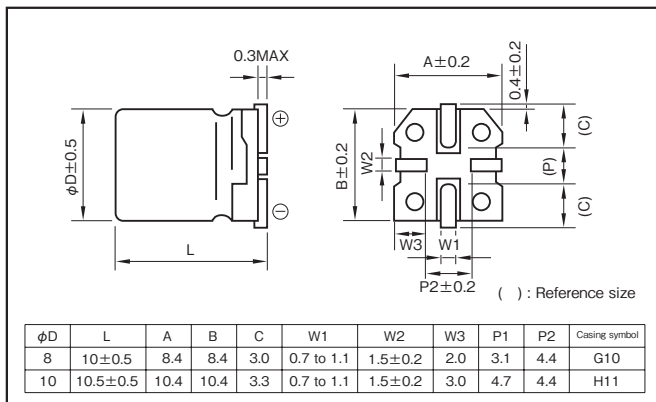
Marking color : White print on a brown sleeve

### Specifications

Item	Performance						
Category temperature range (°C)	-55 to +105						
Tolerance at rated capacitance (%)	±20 (20°C,120Hz)						
Leakage current (μA)	Less than 0.01CV or 3 whichever is larger (after 2 minutes) C : Rated capacitance (μF) ; V : Rated voltage (V) (20°C)						
Tangent of loss angle (tanδ)	Rated voltage (V)		6.3	10	16	25	35
	tanδ (max.)		0.30	0.26	0.22	0.16	0.13
							(20°C,120Hz)
Characteristics at high and low temperature	Rated voltage (V)		6.3	10	16	25	35
	Impedance ratio (max.)	Z-25°C/Z+20°C	4	3	2	2	2
		Z-40°C/Z+20°C	8	5	4	3	3
							(120Hz)
Endurance (105°C) (Applied ripple current)	Test time		2000 hours				
	Leakage current		The initial specified value or less				
	Percentage of capacitance change		Within ±20% of initial value				
	Tangent of the loss angle		200% or less of the initial specified value				
Shelf life (105°C)	Test time : 1000 hours ; other items are the same as those for the endurance. Voltage application treatment : According to JIS C5102						
Applicable standards	JIS C5101-1, -18 1998 (IEC 60384-1 1992, -18 1993)						

### Outline Drawing

Unit : mm



### Coefficient of Frequency for Rated Ripple Current

Frequency (Hz)	50・60	120	1k	10k・100k
Coefficient	0.64	0.8	0.93	1

### Part numbering system (example : 25V100µF)

RTH	—	25	V	101	M	G10	□	U	□
Series code		Rated voltage symbol		Rated capacitance symbol	Capacitance tolerance symbol	Casing symbol	Additional symbol	Taping symbol	

- Soldering conditions are described on page 11.
- Land pattern size are described on page 12.
- The taping specifications are described on page 13.

### Standard Ratings

Item	6.3				10				16				25				35			
	Case φD (mm)	Casing symbol	Impedance Ω	Rated ripple current mA	Case φD (mm)	Casing symbol	Impedance Ω	Rated ripple current mA	Case φD (mm)	Casing symbol	Impedance Ω	Rated ripple current mA	Case φD (mm)	Casing symbol	Impedance Ω	Rated ripple current mA	Case φD (mm)	Casing symbol	Impedance Ω	Rated ripple current mA
47	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	8×10	G10	0.45	369
100	—	—	—	—	—	—	—	—	—	—	—	—	8×10	G10	0.45	369	10×10.5	H11	0.25	553
220	—	—	—	—	8×10	G10	0.45	369	—	—	—	—	10×10.5	H11	0.25	553	—	—	—	—
330	8×10	G10	0.45	369	—	—	—	—	10×10.5	H11	0.25	553	—	—	—	—	—	—	—	—
470	—	—	—	—	10×10.5	H11	0.25	553	—	—	—	—	—	—	—	—	—	—	—	—

(Note) Rated ripple current : 105°C, 100kHz ; Impedance : 20°C, 100kHz

## Chip Type 125°C Capacitors

SMD

Vibration  
Resistance125°C  
1250hours105°C  
5000hoursAnti-  
cleaning  
solvent

- Compatible with surface mounting.
- For Vibration resistance.
- Supplied with carrier taping.
- Guarantees 1250 hours at 125°C.  
(φ8 : 1000 hours)
- Guarantees 5000 hours at 105°C.  
(φ8 : 4000 hours)

RTK



Vibration resistance

RVK



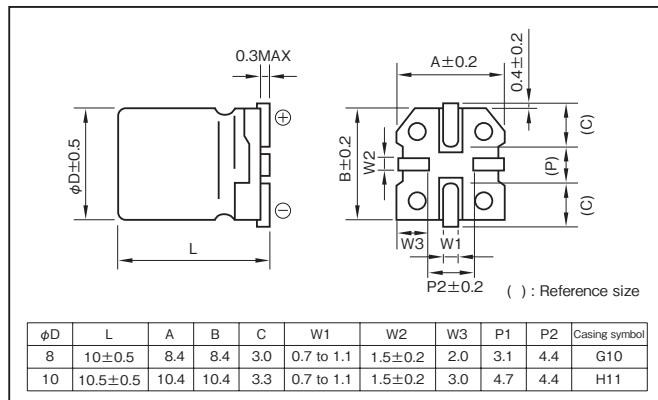
Marking color : Gold print on a brown sleeve

## Specifications

Item	Performance							
Category temperature range (°C)	-40 to +125							
Tolerance at rated capacitance (%)	±20 (20°C,120Hz)							
Leakage current (μA)	Less than 0.02CV or 3 whichever is larger (after 2 minutes) C : Rated capacitance (μF) ; V : Rated voltage (V) (20°C)							
Tangent of loss angle (tanδ)								
	Rated voltage (V)	10	16	25	35	50	63	
	tanδ (max.)	0.28	0.26	0.24	0.20	0.19	0.18	
	(20°C,120Hz)							
Characteristics at high and low temperature								
	Rated voltage (V)		10	16	25	35	50	63
	Impedance ratio (max.)	Z-25°C/Z+20°C	3	3	3	3	3	3
		Z-40°C/Z+20°C	5	5	5	5	5	5
	(120Hz)							
Endurance (Applied ripple current)								
	Test temp.	125°C			105°C			
	Test time	φ10 : 1250h, φ8 : 1000h			φ10 : 5000h, φ8 : 4000h			
	Percentage of capacitance change	Within ±30% of initial value						
	Tangent of the loss angle	300% or less of the initial specified value						
	Leakage current	The initial specified value or less						
Shelf life								
	Test temp.	125°C			105°C			
	Test time	500 h			1000h			
	Percentage of capacitance change	Within ±20% of initial value						
	Tangent of the loss angle	200% or less of the initial specified value						
	Leakage current	The initial specified value or less						
Applicable standards	JIS C5101-1, -18 1998 (IEC 60384-1 1992, -18 1993)							

## Outline Drawing

Unit : mm



- Soldering conditions are described on page 11.
- Land pattern size are described on page 12.
- The taping specifications are described on page 13.

## Coefficient of Frequency for Rated Ripple Current

Frequency (Hz)	120	1k	10k	100k
Rated voltage (V)				
10 to 63	0.77	0.88	0.96	1

## Part numbering system (example : 16V220μF)

RTK	—	16	V	221	M	H11	□	U	□
Series code		Rated voltage symbol		Rated capacitance symbol	Capacitance tolerance symbol	Casing symbol	Additional symbol		Taping symbol

## Standard Ratings

Rated voltage (V)	10				16				25				35				50				63			
	Case	ESR	Impedance	Rated ripple current	Case	ESR	Impedance	Rated ripple current	Case	ESR	Impedance	Rated ripple current	Case	ESR	Impedance	Rated ripple current	Case	ESR	Impedance	Rated ripple current	Case	ESR	Impedance	Rated ripple current
Rated capacitance (μF)	φD (mm)	Ω	Ω	mArms	φD (mm)	Ω	Ω	mArms	φD (mm)	Ω	Ω	mArms	φD (mm)	Ω	Ω	mArms	φD (mm)	Ω	Ω	mArms	φD (mm)	Ω	Ω	mArms
10	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	8×10	32	0.80	38	—	—	—	—
22	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	10×10.5	32	0.65	45	—	—	—	—
33	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	8×10	14	0.80	38	8×10	14	1.00	33
47	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	10×10.5	14	0.65	48	10×10.5	14	0.67	48
100	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	8×10	10	0.80	40	—	—	—	—
220	8×10	2.1	0.68	60	10×10.5	2.0	0.55	107	—	—	—	—	—	—	—	—	10×10.5	10	0.60	58	—	—	—	—
330	10×10.5	1.4	0.55	111	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

(Note) Impedance : 20°C, 100kHz : Rated ripple current : 125°C, 100kHz ; ESR : 20°C, 120Hz

## NOTE

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## 1 General Description of Aluminum Electrolytic Capacitors

### 1-1 The Principle of Capacitor

The principle of capacitor can be presented by the principle drawing as in Fig.1-1.

When a voltage is applied between the metal electrodes placed opposite on both surfaces of a dielectric, electric charge can be stored proportional to the voltage.

$$Q = C \cdot V$$

Q : Quantity of electricity (C)

V : Voltage (V)

C : Capacitance (F)

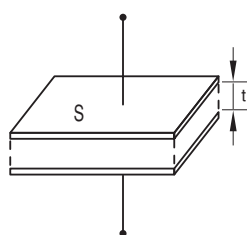


Fig.1-1

C, called the capacitance of capacitor, is expressed by the following expression with the electrode area  $S[m^2]$ , the electrode spacing  $t[m]$  and the dielectric constant of dielectric " $\epsilon$ ":

$$C[F] = \epsilon_0 \cdot \epsilon \cdot \frac{S}{t}$$

$\epsilon_0$  : Dielectric constant in vacuum ( $=8.85 \times 10^{-12} F/m$ )

The dielectric constant of an aluminum oxide film is 7 to 8. Larger capacitances can be obtained by enlarging the electrode area  $S$  or reducing  $t$ .

Table 1-1 shows the dielectric constants of typical dielectrics used in the capacitor. In many cases, capacitor names are determined by the dielectric material used, for example, aluminum electrolytic capacitor, tantalum capacitor, etc.

Table 1

Dielectric	Dielectric Constant	Dielectric	Dielectric Constant
Aluminum oxide film	7 to 8	Porcelain (ceramic)	10 to 120
Mylar	3.2	Polystyrene	2.5
Mica	6 to 8	Tantalum oxide film	10 to 20

Although the aluminum electrolytic capacitor is small, it has a large capacitance. It is because the electrode area is roughened by electrochemical etching, enlarging the electrode area and also because the dielectric is very thin.

The schematic cross section of the aluminum electrolytic capacitor is as in Fig.1-2.

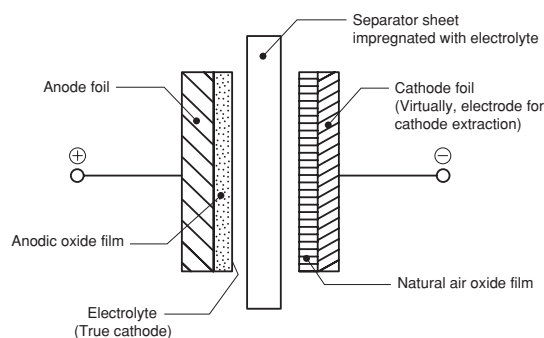
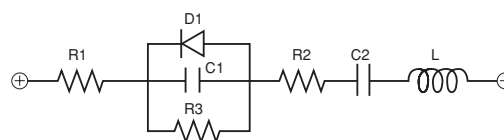


Fig.1-2

### 1-2 Equivalent Circuit of the Capacitor

The electrical equivalent circuit of the aluminum electrolytic capacitor is as presented in Fig. 2.



R1 : Resistance of terminal and electrode

R2 : Resistances of anodic oxide film and electrolyte

R3 : Insulation resistance because of defective anodic oxide film

D1 : Oxide semiconductor of anode foil

C1 : Capacity of anode foil

C2 : Capacity of cathode foil

L : Inductance caused by terminals, electrodes, etc.

## 2 About the Life of an Aluminum Electrolytic Capacitor

### 2-1 Estimation of life with minimal ripple current (negligible).

Generally, the life of an aluminum electrolytic capacitor is closely related with its ambient temperature and the life will be approximately the same as the one obtained by Arrhenius' equation.

$$L = L_0 \times 2^{\left(\frac{T_0 - T}{10}\right)} \dots \dots \dots (1)$$

Where L : Life at temperature T

$L_0$  : Life at temperature  $T_0$

The effects to the life by derating of the applied voltage etc. are neglected because they are small compared to that by the temperature.

**2-2 Estimation of life considering the ripple current.**

The ripple current affects the life of a capacitor because the internal loss (ESR) generates heat. The generated heat will be :

$$P = I^2 R \dots \dots \dots (2)$$

Where I : Ripple current (Arms)

R : ESR ( $\Omega$ )

With increase in the temperature of the capacitor:

$$\Delta T = \frac{I^2 \cdot R}{A \cdot H} \dots \dots \dots (3)$$

Where  $\Delta T$  : Temperature increase in the capacitor core(deg.)

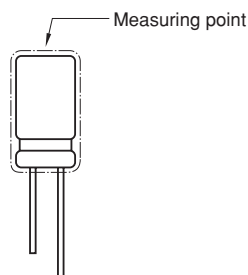
I : Ripple current (Arms)

R : ESR ( $\Omega$ )

A : Surface area of the capacitor ( $\text{cm}^2$ )

H : Radiation coefficient (Approx.  $1.5 \sim 2.0 \times 10^{-3} \text{W/cm}^2 \times ^\circ\text{C}$ )

The above equation (3) shows that the temperature of a capacitor increases in proportion to the square of the applied ripple current and ESR, and in inverse proportion to the surface area. Therefore, the amount of the ripple current determines the heat generation, which affects the life. The value of  $\Delta T$  varies depending on the capacitor types and operating conditions. The usage is generally desirable if  $\Delta T$  remains less than  $5^\circ\text{C}$ . The measuring point for temperature increase due to ripple current is shown below ;



Test results:

(1) The life equation considering the ambient temperature and the ripple current will be :

$$L = L_d \times 2^{\left(\frac{T_0 - T}{10}\right)} \times K^{\left(\frac{-\Delta T}{10}\right)} \dots \dots \dots (4)$$

Where  $L_d$  : Life at DC operation (h)

K : Ripple acceleration factor

( $K=2$ , within allowable ripple current)

$T_0$  : Upper category temperature ( $^\circ\text{C}$ )

T : Operating temperature ( $^\circ\text{C}$ )

$\Delta T$  : Temperature increase at capacitor core (deg.)

(2) The life equation based on the life with the rated ripple current applied under the maximum guaranteed temperature will be a conversion of the above equation (4), as below :

$$L = L_r \times 2^{\left(\frac{T_0 - T}{10}\right)} \times K^{\left(\frac{\Delta T_0 - \Delta T}{10}\right)} \dots \dots \dots (5)$$

Where  $L_r$  : Life at the upper category temperature with the rated ripple current (h)

$\Delta T_0$  : Temperature increase at capacitor core, at the upper category temperature (deg.)

(3) The life equation considering the ambient temperature and the ripple current will be a conversion of the above equation (5), as below :

$$L = L_r \times 2^{\left(\frac{T_0 - T}{10}\right)} \times K^{\left\{1 - \left(\frac{I}{I_0}\right)^2\right\}} \times \frac{\Delta T_0}{10} \dots \dots \dots (6)$$

Where  $I_0$  : Rated ripple current at the upper category temperature (Arms)

I : Applied ripple current (Arms)

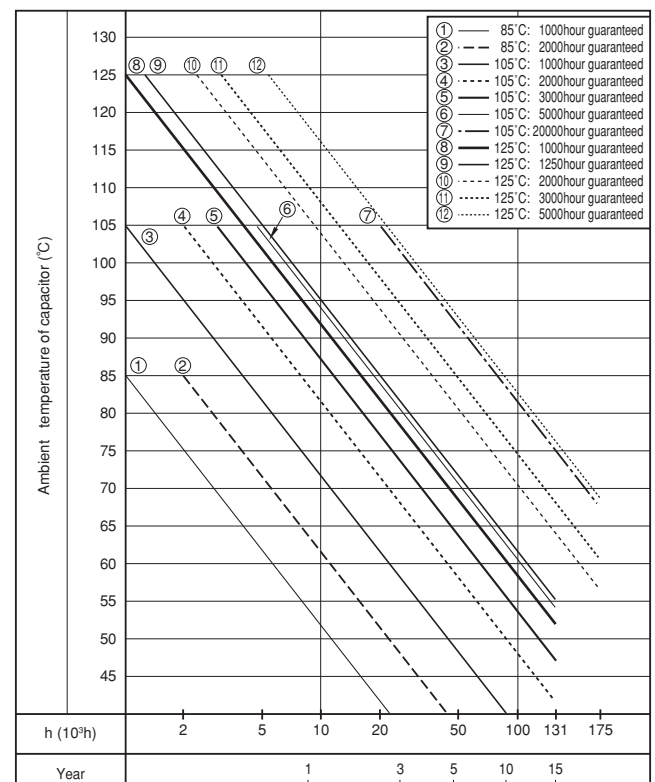
Since it is actually difficult to measure the temperature increase at the capacitor core, the following table is provided for conversion from the surface temperature increase to the core temperature increase.

Table 2-1

Case diameter	~10	12.5~16	18	22	25	30	35
Core / Surface	1.1	1.2	1.25	1.3	1.4	1.6	1.65

The life expectancy formula shall in principle be applied to the temperature range between the ambient temperature of  $+40^\circ\text{C}$  and upper category temperature. The expected life time shall be about fifteen years at maximum as a guide in terms of deterioration of the sealant.

(Table 2-1 Life Expectancy Chart)

**NOTE**

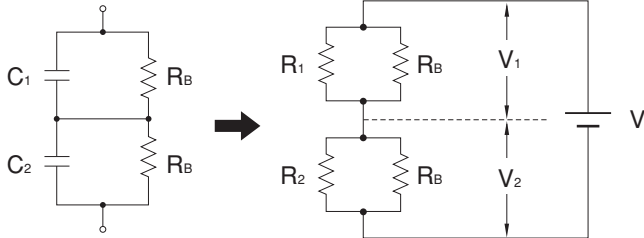
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### 3 To calculate Balance when connecting in series

#### 3-1 Circuit layout

Circuit for connecting two capacitors (C1, C2) in series and equivalent circuit can be illustrated as below figure. Formula to calculate a balance resistance  $R_B$  of below figure is shown as follows.



Following are the preconditions of the circuit.

- ①  $V_2$  shall be the rated voltage ( $=V_0$ ). ( $V_1 < V_2$ )
- ②  $V$  shall be a times  $V_0 \times 2$ .  $V = 2aV_0$  ( $a < 1$ )
- ③  $R_2$  shall equal  $R_1 \times b$ . ( $b < 1$ ) (1)

#### 3-2 Formulas to calculate $[R_B]$

3-2-1 Following formula can be established from balanced condition.

$$V_1 \left[ \frac{1}{R_1} + \frac{1}{R_B} \right] = V_2 \left[ \frac{1}{R_2} + \frac{1}{R_B} \right] \quad (2)$$

3-2-2 Following formula can be established from preconditions.

$$V_2 \leq V_0 \quad (3)$$

$$V_1 = V - V_2 \quad (4)$$

$$= 2aV_0 - V_2 \quad (4')$$

3-2-3 Put formulas (1), (3) and (4') in formula (2).

$$(2aV_0 - V_2) \left[ \frac{R_1 + R_B}{R_1 \cdot R_B} \right] = V_2 \left[ \frac{bR_1 + R_B}{bR_1 \cdot R_B} \right]$$

$$2abV_0(R_1 + R_B) = V_2 \{b(R_1 + R_B) + bR_1 + R_B\}$$

$$2ab(R_1 + R_B) \leq 2bR_1 + (1+b)R_B$$

Accordingly, balance resistance  $R$  shall be the following formula.

$$R_B \leq 2bR_1 \frac{(1-a)}{(2a-1) \cdot b-1} \quad (5)$$

#### 3-3 Calculation Example.

Calculate the value of the balance resistance in the case of connecting two 400V 470 $\mu$ F ( LC standard value : 1.88mA) capacitors in series.

$$R_1 = \frac{400(V)}{1.88(mA)} = 213(k\Omega)$$

If  $a=0.8$ ,  $400(V) \times 2 \times 0.8 = 640(V)$  as an impressed voltage.

If  $b=2$ ,  $R_2 = b R_1 = 426(k\Omega)$ ,  $LC = 0.94(mA)$ .

Balance resistance  $R_B$  will be.

$$R_B \leq 2 \times 2 \times 213(k\Omega) \frac{(1-0.8)}{(2 \times 0.8) \times 2 - 1} = 852(k\Omega)$$

### 4 Regarding Recovery Voltage

• After charging and then discharging the aluminum electrolytic capacitor, and further causing short-circuit to the terminals and leave them alone, the voltage between the two terminals will rise again after some interval. Voltage caused in such case is called recovery voltage. Following is the process that causes this phenomenon :

• When the voltage is impressed on a dielectric, electrical transformation will be caused inside the dielectric due to dielectric action, and electrification will occur in positive-negative opposite to the voltage impressed on the surface of the dielectric. This phenomenon is called polarization action.

• After the voltage is impressed with this polarization action, and if the terminals are discharged till the terminal voltage reaches 0 and are left open for a while, an electric potential will arise between the two terminals and thus causes recovery voltage.

• Recovery voltage comes to a peak around 10 to 20 days after the two terminals are left open, and then gradually declines. Recovery voltage has a tendency to become bigger as the component (stand-alone base type) becomes bigger.

• If the two terminals are short-circuited after the recovery voltage is generated, a spark may scare the workers working in the assembly line, and may put low-voltage driven components (CPU, memory, etc.) in danger of being destroyed. Measures to prevent this is to discharge the accumulated electric charge with resistor of about 100 to 1k $\Omega$  before using, or ship out by making the terminals in short-circuit condition by covering them with an aluminum foil at the production stage. Please consult us for adequate procedures.

## 5 Electrode Foil Development Technology

### 5-1 Corrosion inhibition of cathode foil

Inactive treatment is implemented to ensure long life by inhibiting natural corrosion of the cathode foil. Fig. 3-1 shows its effects with values of the polarization resistance inversely proportional to the corrosion rate using the AC impedance method (FRA). This indicates that the cathode foil used in the High reliability capacitors has the polarization resistance higher than that of the conventional capacitors owing to corrosion inhibition.

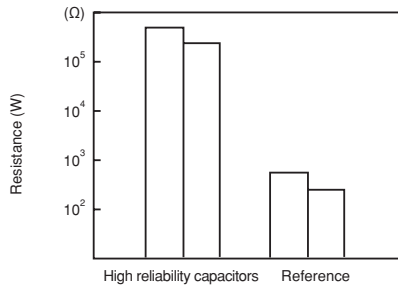


Fig. 3-1

### 5-2 Sealing material permeability of electrolyte

To ensure long life, a low permeable lactone solvent for the sealing material is used as the main solvent of the electrolyte of the High reliability capacitor. Fig. 3-2 shows the test results on the permeability obtained by changing the weight of the capacitors produced with different types of electrolytes at a high temperature.

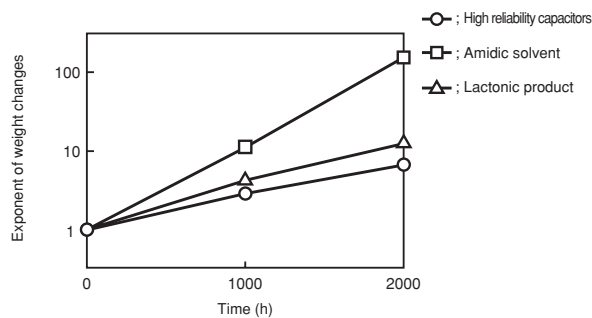


Fig. 3-2

### 5-3 Airtightness of sealing material

Since the electrolyte is stable for hours, the key element for capacitor's life is the sealing material. By optimizing the crosslinking density of the sealing material polymer, the sealing material of the High reliability capacitor attains its long life with electrolyte permeability less than that of the conventional capacitors.

Fig. 3-3 shows the test results on the airtightness of the sealing material obtained by changing the weight of the capacitors at a high temperature, producing capacitors with the conventional sealing material and improved one both containing the electrolyte used in the High reliability capacitor.

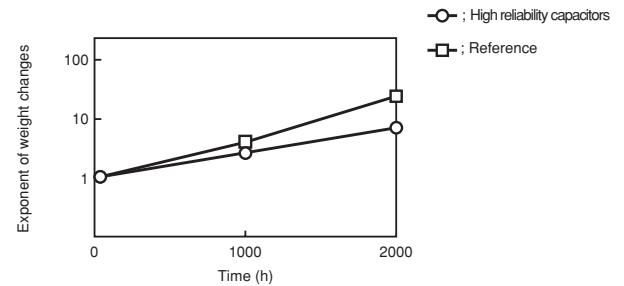


Fig. 3-3

### 5-4 Long-time stability of electrolyte

The electrolyte used in the High reliability capacitor is stable with low initial resistivity and small secular changes at a high temperature. Fig. 3-4 shows change in resistivity at 105°C.

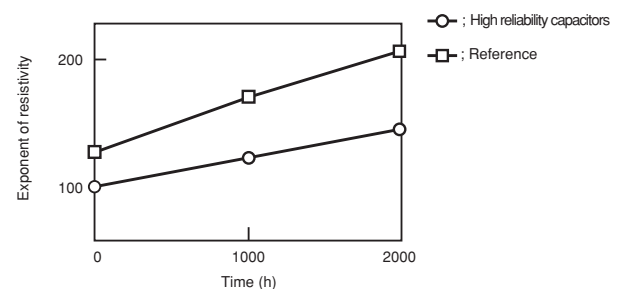


Fig. 3-4

### 5-5 Dielectric formation voltage and leakage current characteristics of anode foil

To increase the operating life by controlling the gas generation inside capacitor because of 1.5 to 2 times the rated voltage, while that of the previous capacitor is about 1.3 times the rated voltage.

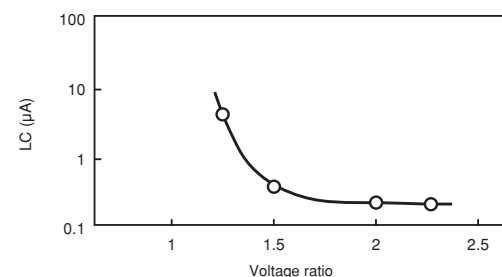


Fig. 3-5

### 5-6 Lowered ESR of Electrode Foil

To reduce the ESR of electrolytic capacitor, we have improved our chemical conversion technology for anode foil to develop lower ESR electrode foil compared to the conventional product as shown in Fig. 3-6

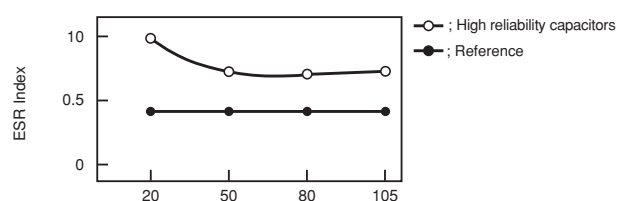


Fig. 3-6 ESR Index of Anode Foil

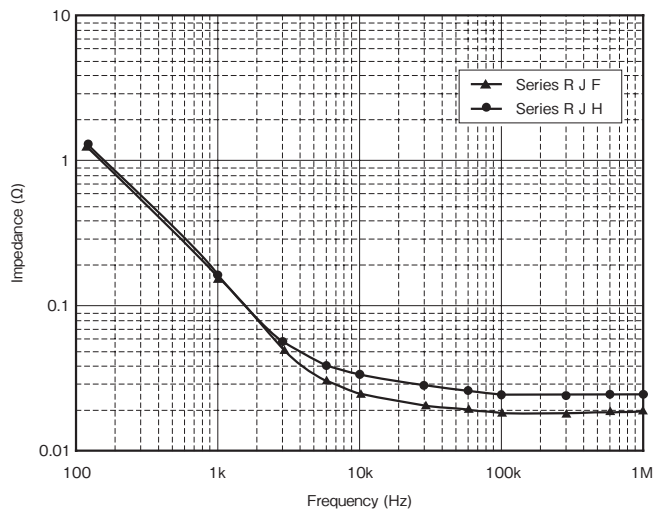
#### NOTE

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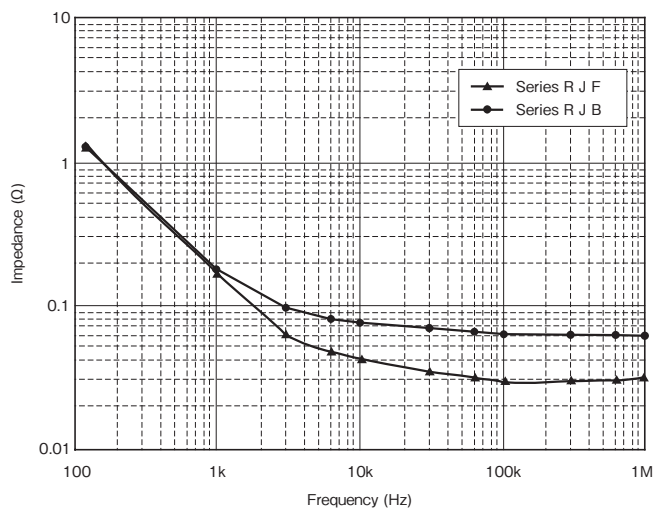
### 6. Electric Characteristics Data

#### 6-1 Series RJF, RJB, RJH

##### Frequency characteristics at 20°C

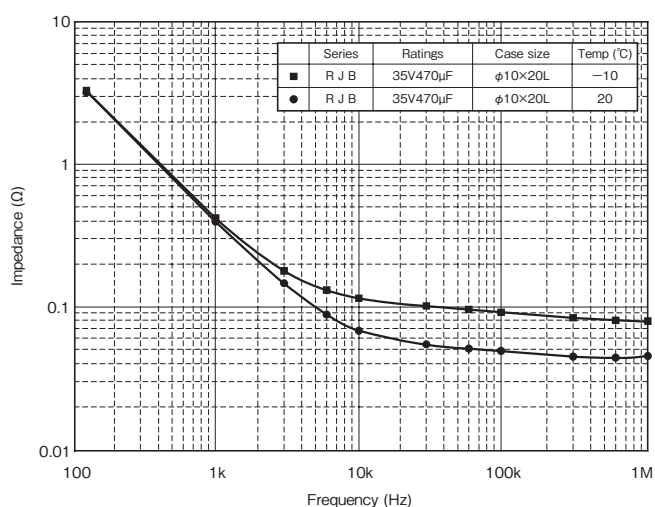


Performanse \ Series	R J F	R J H
Rated Voltage	25V	25V
Capacitance	1000μF	1000μF
Size (φ×L)	12.5×20	12.5×25
Impedance Spec. (20°C, 100kHz)	0.021Ω	0.034Ω



Performanse \ Series	R J F	R J B
Rated Voltage	10V	10V
Capacitance	1000μF	1000μF
Size (φ×L)	10×16	10×16
Impedance Spec. (20°C, 100kHz)	0.038Ω	0.080Ω

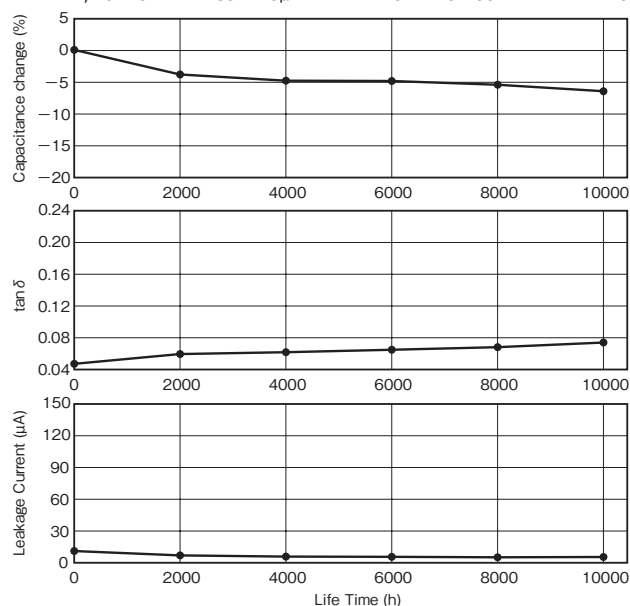
##### Frequency characteristics at 20°C, -10°C



##### Endurance (Applied ripple current) at 105°C

###### Series R J B

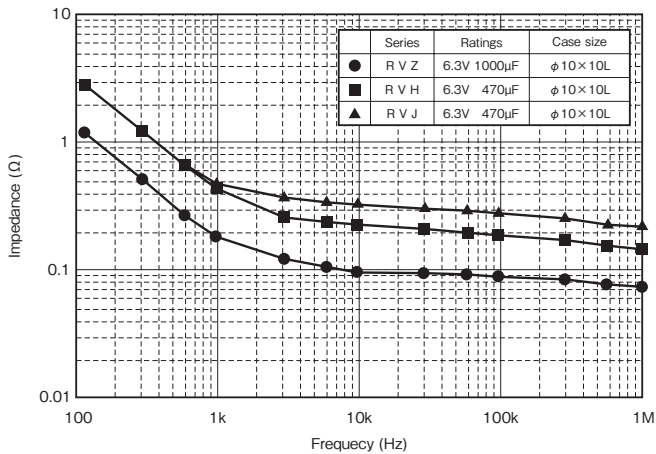
φ10×20L 35V470μF 1440mArms/100kHz n=10



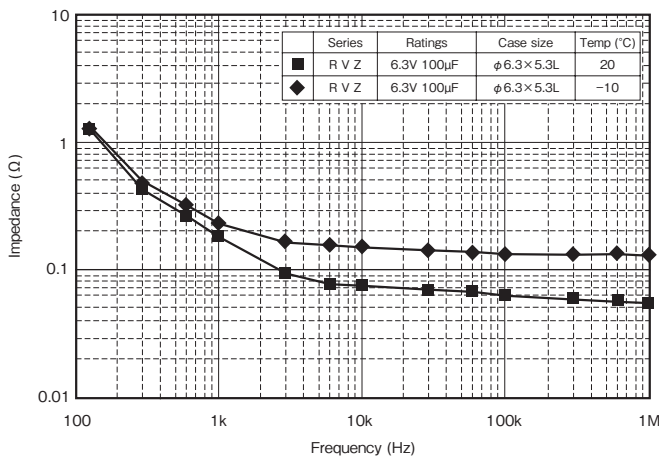
Notice : The mesurment values are not guaranteed values, but measurements.

## 6-2 Series RVZ

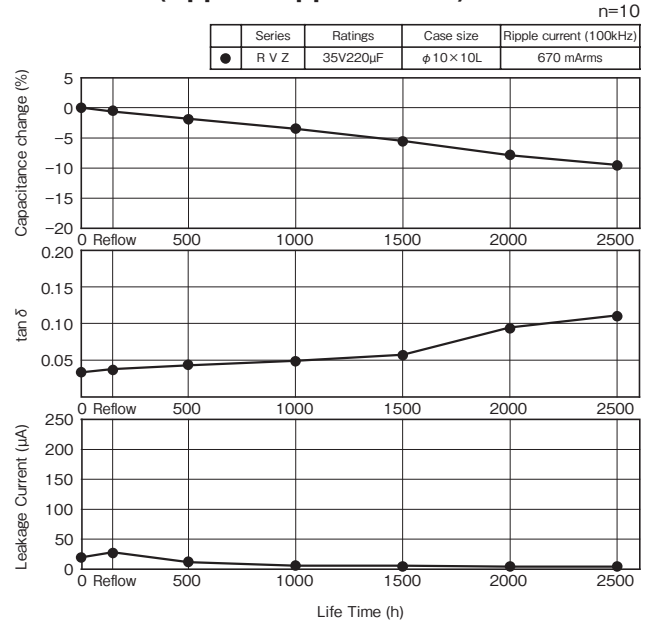
### Frequency characteristics at 20°C



### Frequency characteristics at 20°C, -10°C

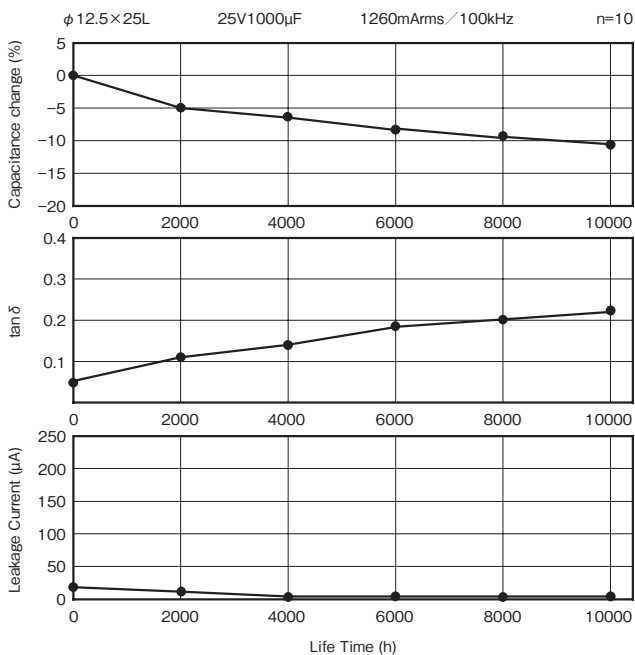


### Endurance (Applied ripple current) at 105°C

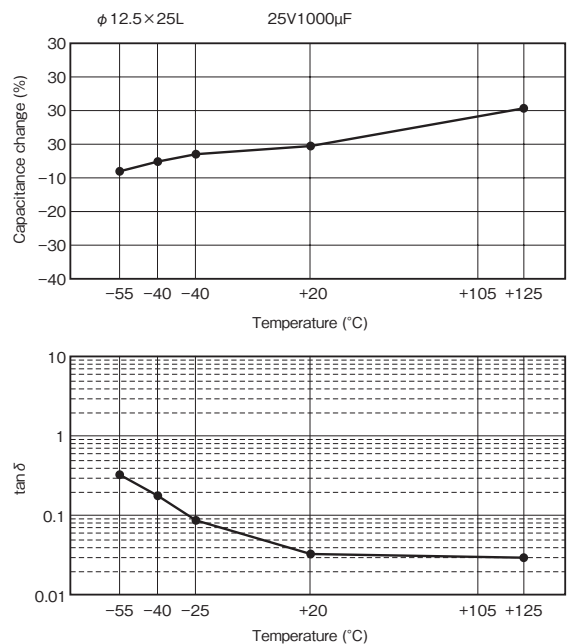


## 6-3 Series RK

### Endurance (Applied ripple current) at 125°C



### Temperature Characteristics



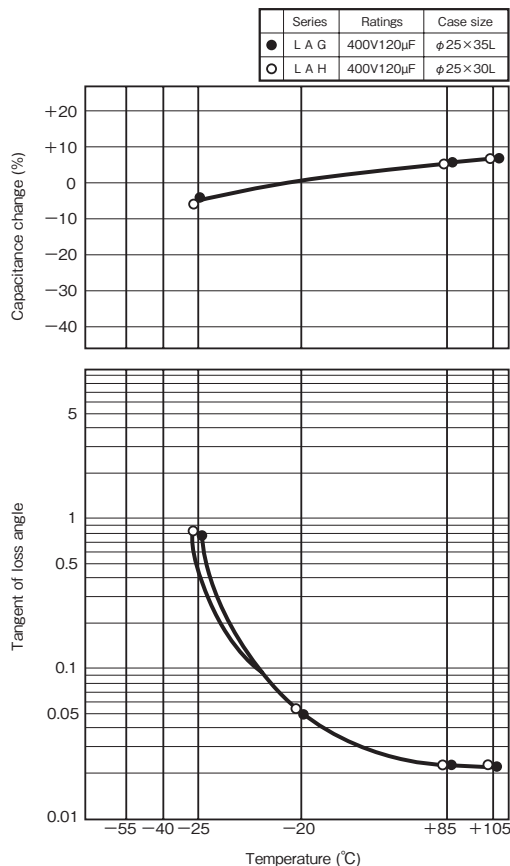
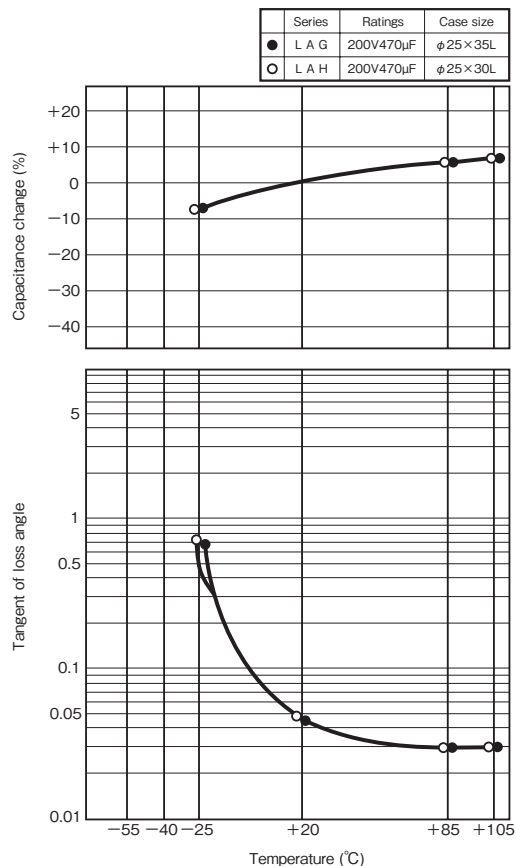
Notice : The measurement values are not guaranteed values, but measurements.

#### NOTE

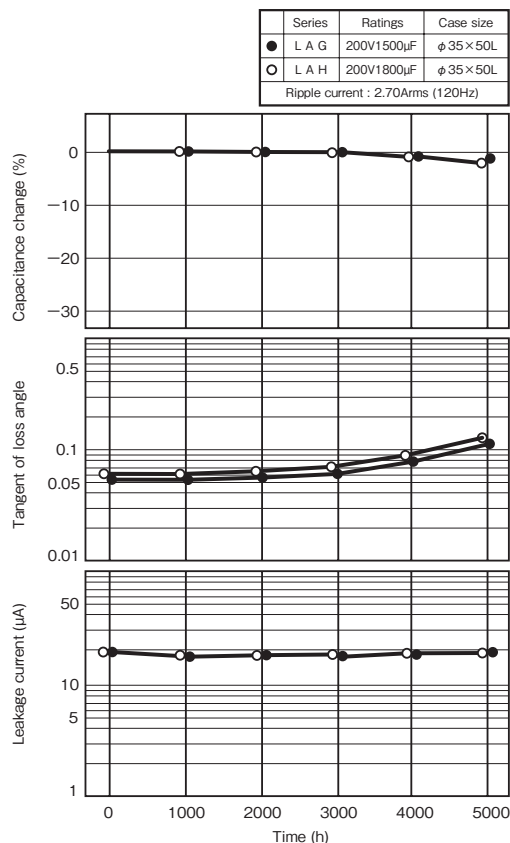
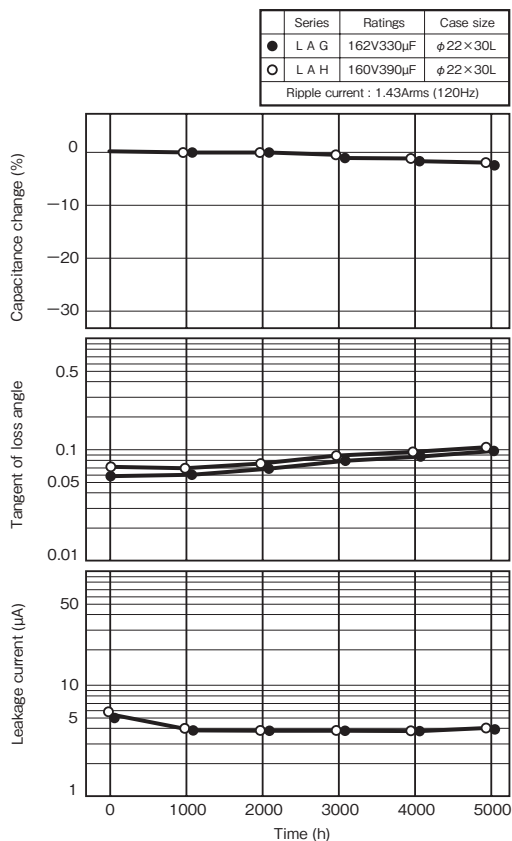
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### 6-4 Series LAG • LAH

#### Temperature characteristics, Series LAG • LAH



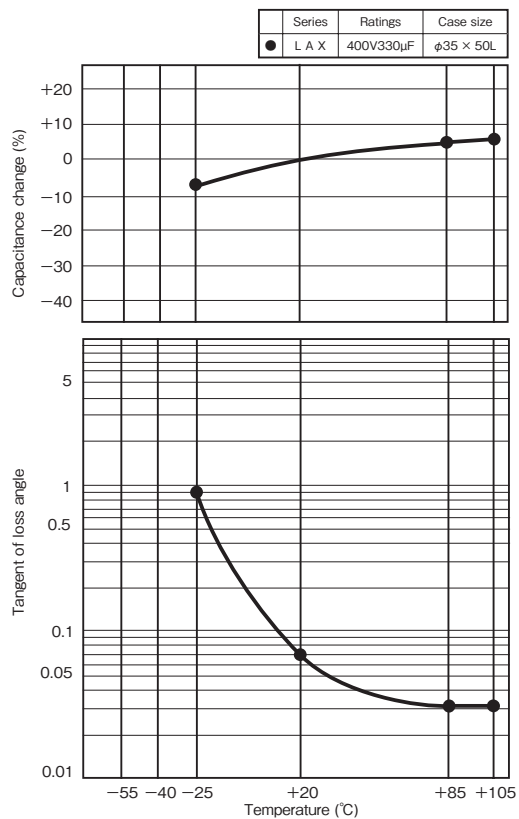
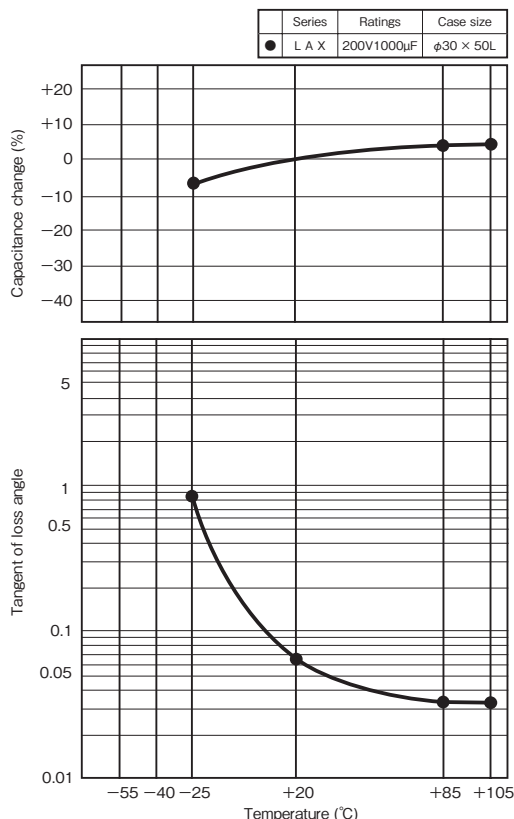
#### Endurance (Applied ripple current) at 105°C of Series LAG • LAH



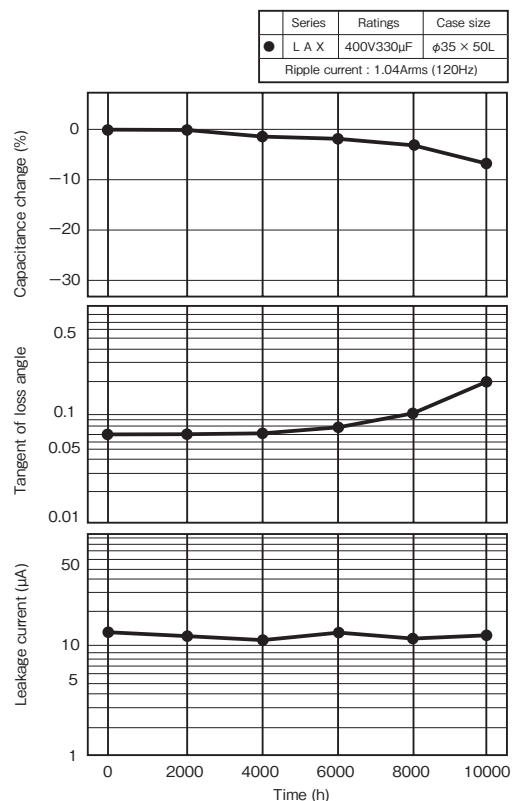
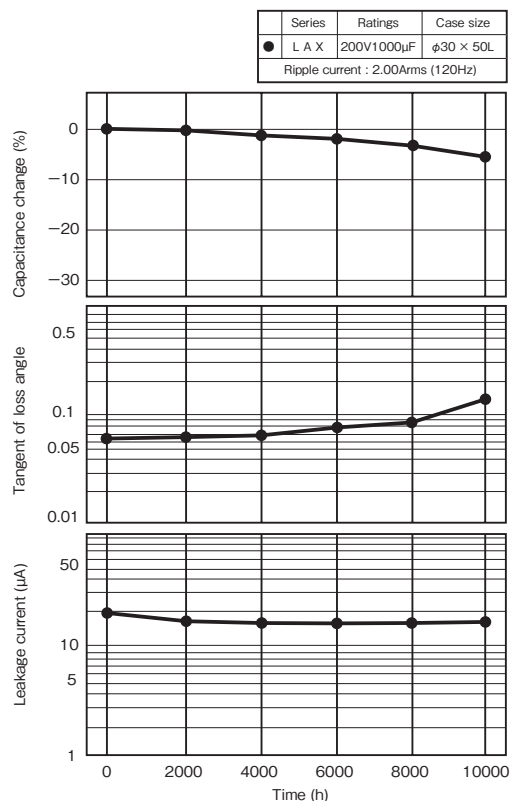
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## 6-5 Series LAX

### Temperature characteristics, Series LAX



### Endurance (Applied ripple current) at 105°C of Series LAX



Notice : The mesurment values are not guaranteed values, but measurements.

#### NOTE

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