



ALUMINUM ELECTROLYTIC CAPACITORS

CAT. No. E1001D

INDEX		
PRODUCT SEARCH	SERIES TABLE	➡
	GROUP CHART	➡
PRODUCTION GUIDE	PRECAUTIONS AND GUIDELINES	➡
	PART NUMBERING SYSTEM	➡
	ENVIRONMENTAL CONSIDERATION	➡
	PACKAGING	➡
	TAPING SPECIFICATIONS	➡
	AVAILABLE TERMINALS FOR SNAP-IN TYPE	➡
	RECOMMENDED REFLOW CONDITION	➡
	STANDARDIZATION	➡
	WORLD-WIDE MANUFACTURING LOCATIONS	➡
	CONDUCTIVE POLYMER TYPE	➡
	CHIP TYPE	➡
PRODUCT SPECIFICATIONS	RADIAL LEAD TYPE	➡
	SNAP-IN / SCREW TERMINAL TYPE	➡
RELIABILITY DATA		➡

Series		Features	Endurance (+R=With ripple)	Standard type	Low impedance	Solvent-proof	Terminal type	Rated voltage range (V _{dc})	Capacitance range (μF)	
Conductive Polymer Electrolyte Type	PXC (NEW!)	Vertical type, Pb-free, super low ESR	105℃ 1,000 hours		●	●	SMD	2.5 to 16	27 to 470	
	PXA (Upgrade!)	Vertical type, Pb-free, super low ESR	105℃ 2,000 hours		●	●	SMD	2.5 to 25	10 to 1,500	
	PXH (NEW!)	125℃ Vertical type (Ask Engineering Bulletin in detail)	125℃ 1,000 hours		●	●	SMD	2.5 to 25	10 to 1,000	
	PX	Horizontal type (Ask Engineering Bulletin in detail)	105℃ 2,000 hours		●	●	SMD	4 to 25	6.8 to 68	
	PSA (NEW!)	Super low ESR, high ripple, Pb-free	105℃ 2,000 hours		●	●	Radial	2.5 to 10	270 to 1,000	
	PS (Upgrade!)	Super low ESR, high ripple, Pb-free	105℃ 2,000 hours		●	●	Radial	2.5 to 25	68 to 1,500	
Surface Mount	Horizontal Type	MFS/MFA	3.5 to 4.5mm height (Ask Engineering Bulletin in detail)	85℃ 1,000 to 2,000hours			●	SMD	4 to 35	0.1 to 100
		MF	3.2 to 4.7mm max. height	85℃ 2,000 hours	●		●	SMD	4 to 50	0.1 to 150
		MFK	3.7 to 4.7mm max. height	105℃ 1,000 hours	●		●	SMD	6.3 to 50	0.1 to 100
		MFK-Large	9.2mm max. height	105℃ 2,000 hours	●		●	SMD	10 to 50	47 to 1,000
	Vertical Type	MVS	4.5mm height	85℃ 2,000 hours	●		●	SMD	4 to 50	0.1 to 220
		MVA	5.5 to 22.0mm max. height, downsized	85℃ 2,000 hours			▲	SMD	4 to 450	0.1 to 10,000
		MV	5.5 to 10.5mm max. height	85℃ 1,000 to 2,000 hours	●		●	SMD	4 to 63	0.1 to 1,000
		MVE	5.5 to 22.0mm max. height, downsized	105℃ 1,000 to 2,000 hours			▲	SMD	6.3 to 450	0.47 to 6,800
		MVK	5.5 to 10.5mm max. height	105℃ 1,000 to 2,000 hours	●		●	SMD	6.3 to 50	0.1 to 1,000
		MKA	5.5 to 10.5mm max. height, Pb-free	105℃ 1,000 to 2,000 hours	●		●	SMD	6.3 to 50	0.1 to 1,000
		MZA (NEW!)	6.1 to 10.5mm max. height, very low ESR	105℃ 2,000 hours		●	●	SMD	6.3 to 50	4.7 to 1,500
		MVZ	6.0 to 10.5mm max. height, very low ESR	105℃ 1,000 to 2,000 hours		●	●	SMD	6.3 to 25	10 to 1,500
		MVY	5.5 to 22.0mm max. height	105℃ 1,000 to 5,000 hours		●	▲	SMD	6.3 to 100	1.0 to 8,200
		MLA (NEW!)	Low Z, long life (Ask Engineering Bulletin in detail)	105℃ 3,000 hours		●	●	SMD	6.3 to 50	10 to 470
		MVJ	6.0mm max. height	105℃ 2,000 hours	●		●	SMD	6.3 to 50	0.1 to 100
		MVL	6.0 to 10.5mm max. height	105℃ 3,000 to 5,000 hours			●	SMD	6.3 to 50	0.1 to 1,000
		MVH	6.0 to 22.0mm max. height	125℃ 1,000 to 5,000 hours			▲	SMD	10 to 450	3.3 to 4,700
		MV-BP	5.5mm max. height, bi-polar	85℃ 2,000 hours			●	SMD	4 to 50	0.1 to 47
		MVK-BP	6.0mm max. height, bi-polar	105℃ 1,000 hours			●	SMD	6.3 to 50	0.1 to 47
Miniature	Low Profile	SRM	5mm height, downsized	85℃ 1,000 hours			●	Radial	4 to 50	0.1 to 330
		SRE	5mm height	85℃ 1,000 hours	●			Radial	4 to 50	0.1 to 100
		KRE	5mm height	105℃ 1,000 hours	●		●	Radial	6.3 to 50	0.1 to 100
		SRA	7mm height	85℃ 1,000 hours	●			Radial	4 to 63	0.1 to 470
		KMA	7mm height	105℃ 1,000 hours	●		●	Radial	4 to 63	0.1 to 220
		SRG	φ4×7 to φ18×25mm, low profile	85℃ 1,000 to 2,000 hours			●	Radial	4 to 50	0.1 to 10,000
		KRG	φ4×7 to φ18×25mm, low profile	105℃ 1,000 hours			●	Radial	6.3 to 50	0.1 to 10,000
	General Purpose	SMQ	Downsized	85℃ 2,000 hours	●			Radial	6.3 to 450	0.1 to 47,000
		KMQ	Downsized	105℃ 1,000 to 2,000 hours +R	●		▲	Radial	6.3 to 450	0.1 to 47,000
		SMG	General, downsized	85℃ 2,000 hours	●		▲	Radial	6.3 to 450	0.1 to 39,000
		KMG	General, downsized	105℃ 1,000 to 2,000 hours +R	●		▲	Radial	6.3 to 450	0.1 to 22,000
		SME	General (Ask Engineering Bulletin in detail)	85℃ 2,000 hours			▲	Radial	6.3 to 450	0.1 to 15,000
		KME	General	105℃ 1,000 hours +R			▲	Radial	6.3 to 400	0.1 to 15,000
		SME-BP	Bi-polar, general	85℃ 2,000 hours	●		●	Radial	6.3 to 100	0.47 to 6,800
		KME-BP	Bi-polar, general	105℃ 1,000 hours	●		●	Radial	6.3 to 100	0.47 to 6,800
	High Frequency Use	KZE (Upgrade!)	Lowest impedance, long life	105℃ 2,000 to 5,000 hours +R		●		Radial	6.3 to 100	6.8 to 6,800
		KZH (NEW!)	Lowest impedance, long life	105℃ 5,000 to 6,000 hours +R		●		Radial	6.3 to 35	47 to 8,200
		KY	Low impedance, long life	105℃ 4,000 to 10,000 hours +R		●		Radial	6.3 to 50	0.47 to 18,000
		LXZ	Low impedance, downsized	105℃ 2,000 to 8,000 hours +R		●	●	Radial	6.3 to 63	12 to 18,000
		LXY	Low impedance, high reliability	105℃ 2,000 to 8,000 hours +R	●	●	●	Radial	10 to 63	10 to 8,200
LXV		Low impedance	105℃ 2,000 to 5,000 hours +R	●	●	●	Radial	6.3 to 100	5.6 to 15,000	
KMY		Long life, general (Ask Engineering Bulletin in detail)	105℃ 4,000 to 7,000 hours +R		●		Radial	10 to 50	0.47 to 10,000	
KMF		Low impedance, high CV, general	105℃ 2,000 to 5,000 hours +R	●	●	▲	Radial	6.3 to 450	0.47 to 15,000	

: Promotional products

▲ : Some of range are solvent-proof.

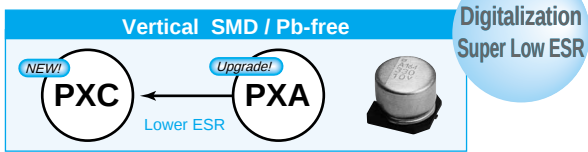
Series			Features	Endurance (+R=With ripple)	Standard type	Low impedance	Solvent-proof	Terminal type	Rated voltage range (Vdc)	Capacitance range (μF)
Miniature	High Reliability	KXG	Downsized, long life, for input filtering	105°C 8,000 to 10,000 hours +R		●		Radial	160 to 450	6.8 to 330
		KMX	Long life, for input filtering	105°C 8,000 to 10,000 hours +R		●		Radial	160 to 450	3.3 to 680
		SMH	φ20×20 to φ22×50mm	85°C 2,000 hours +R	●			Radial	160 to 450	33 to 470
		KMH	φ20×20 to φ22×50mm	105°C 2,000 hours +R	●			Radial	160 to 450	33 to 470
		PAG (NEW!)	Low profile, for input filtering	105°C 2,000 hours +R				Radial	200 to 450	18 to 560
		PA	Low profile, for input filtering	105°C 2,000 hours +R				Radial	200 & 400	10 to 150
		KLG	No sparks with DC overvoltage	105°C 2,000 hours +R				Radial	200 & 400	22 to 330
		FL	Long life	105°C 3,000 to 6,000 hours +R			●	Radial	6.3 to 50	0.47 to 1,500
		LXA	Long life (Ask Engineering Bulletin in detail)	105°C 5,000 to 7,000 hours			●	Radial	10 to 63	0.47 to 4,700
		GXE	125°C, downsize, low impedance	125°C 2,000 to 5,000 hours +R		●	▲	Radial	10 to 450	4.7 to 4,700
		GXL (NEW!)	125°C Long life	125°C 5,000/10,000 hours +R			●	Radial	10 to 50	100 to 4,700
		GHA (NEW!)	150°C (Ask Engineering Bulletin in detail)	150°C 1,000 hours			●	Radial	10 to 200	10 to 6,800
	Special Application	LBG	For airbag	105°C 5,000 hours +R		●	●	Radial	16 to 35	820 to 6,800
		KZJ (NEW!)	For PC motherboard (Ask Engineering Bulletin in detail)	105°C 2,000 hours +R		●		Radial	6.3 to 16	470 to 3,300
		KZG	For PC motherboard (Ask Engineering Bulletin in detail)	105°C 2,000 hours +R		●		Radial	6.3 to 16	470 to 3,300
		LLA	Low DC leakage, general	85°C 1,000 hours			●	Radial	6.3 to 50	0.1 to 15,000
		PH	For photo flash	55°C 5,000 times charging				Radial	300 & 330	50 to 240
Large Sized	General Purpose	SMQ	Snap-in terminal, more downsized	85°C 2,000 hours +R	●			Pin	160 to 450	82 to 3,900
		KMQ	Snap-in terminal, more downsized	105°C 2,000 hours +R	●			Pin	160 to 450	68 to 3,300
		SMM	Snap-in terminal, downsized	85°C 3,000 hours +R	●			Pin	160 to 450	47 to 3,300
		KMM	Snap-in terminal, downsized	105°C 2,000 to 3,000 hours +R	●			Pin	160 to 450	39 to 3,300
		SMH	Snap-in terminal, general	85°C 2,000 hours +R	●			Pin	6.3 to 450	56 to 100,000
		KMH	Snap-in terminal, general	105°C 2,000 hours +R	●			Pin	6.3 to 450	47 to 82,000
	Low Profile	SLM	15mm height	85°C 2,000 hours +R				Pin	160 to 400	47 to 560
		KLM	15mm height	105°C 2,000 hours +R				Pin	160 to 400	39 to 390
	High Reliability	LXM	Long life	105°C 7,000 hours +R				Pin	160 to 450	47 to 2,200
		LXQ	Long life, downsized	105°C 5,000 hours +R				Pin	160 to 450	82 to 2,700
		LXG	Long life	105°C 5,000 hours +R				Pin	10 to 100	390 to 47,000
		CHA	No sparks with DC overvoltage, downsized	105°C 2,000 hours +R				Pin	200 & 400	56 to 1,200
		LXH	No sparks with DC overvoltage	105°C 3,000/5,000 hours +R				Pin	200 & 400	68 to 1,500
		KLG	No sparks with DC overvoltage	105°C 2,000 hours +R				Pin	200 & 400	33 to 1,500
		KSL	Mechanically open mode cap	105°C 2,000 hours +R				Pin	200 & 400	180 to 1,500
		RWE-LR	For air-conditioning	85°C 3,000 hours +R				Lug	250 to 450	330 to 2,200
Screw-mount Terminal Type	General Purpose	SME	Screw terminal, general	85°C 2,000 hours +R	●			Screw	10 to 250	560 to 680,000
		KMH	Screw terminal, general	105°C 2,000 hours +R	●			Screw	10 to 400	180 to 680,000
	For Inverter	FTP	Ellips can shape, high ripple	85°C 5,000 hours +R				Screw	63 to 450	270 to 21,000
		RWE	High ripple	85°C 2,000 hours +R	●			Screw	350 to 550	100 to 12,000
		RWY	High ripple, long life, low cost	85°C 5,000 hours +R				Screw	350 to 450	500 to 14,000
		RWF	High ripple, long life	85°C 5,000 hours +R				Screw	350 to 450	1,200 to 22,000
		RWL	High ripple, long life	85°C 20,000 hours +R				Screw	350 to 450	2,200 to 12,000
		LXA	Long life	105°C 2,000/5,000 hours +R				Screw	10 to 525	330 to 390,000
		LXR	High ripple, long life	105°C 5,000 hours +R				Screw	350 to 450	2,200 to 15,000
		LWY	Low cost (Ask Technical Bulletin in detail)	105°C 5,000 hours +R				Screw	350 to 450	500 to 14,000
		KW	Low impedance	105°C 2,000 hours		●		Screw	10 to 100	1,000 to 100,000

■ : Promotional products

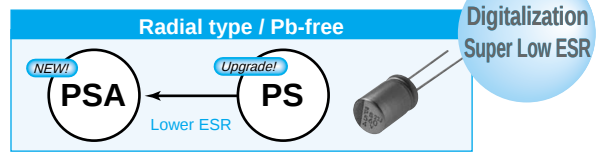
▲ : Some of range are solvent-proof.

CONDUCTIVE POLYMER ALUMINUM SOLID CAPACITORS

◆SURFACE MOUNT

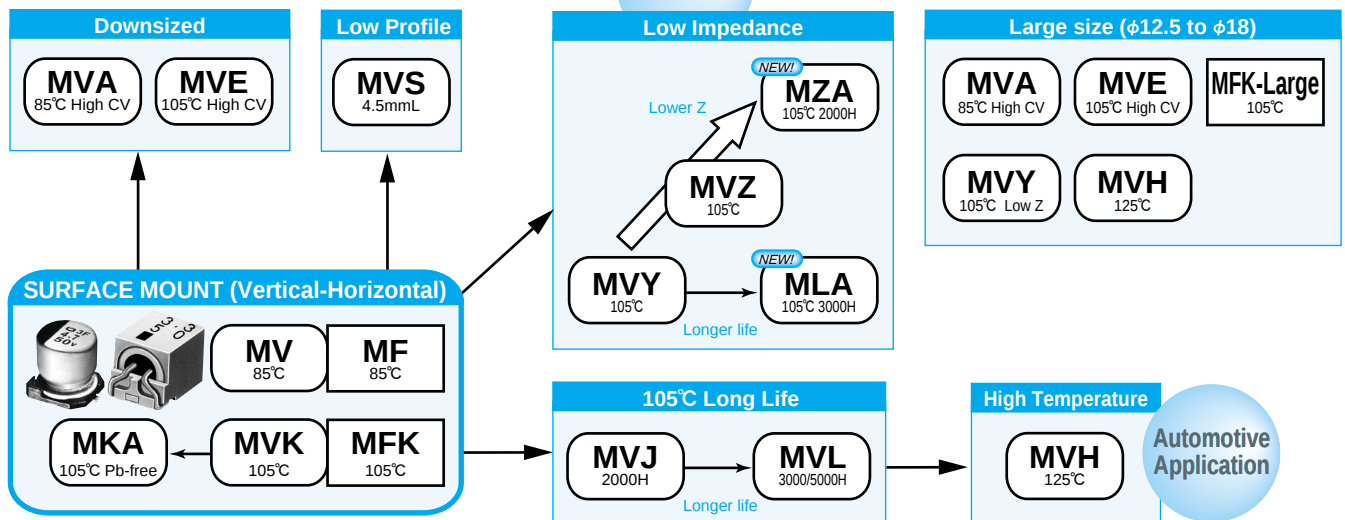


◆RADIAL LEAD

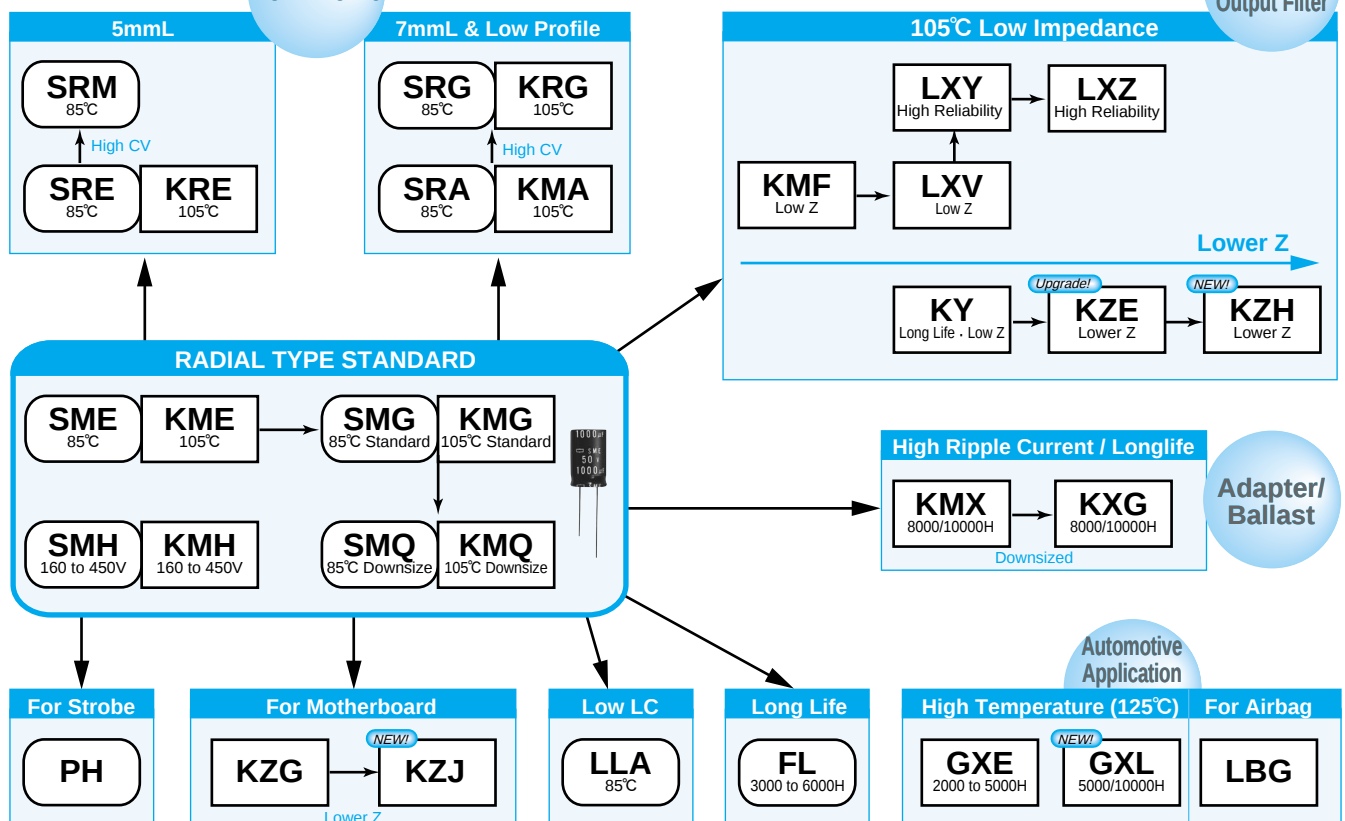


ALUMINUM ELECTROLYTIC CAPACITORS

◆SURFACE MOUNT

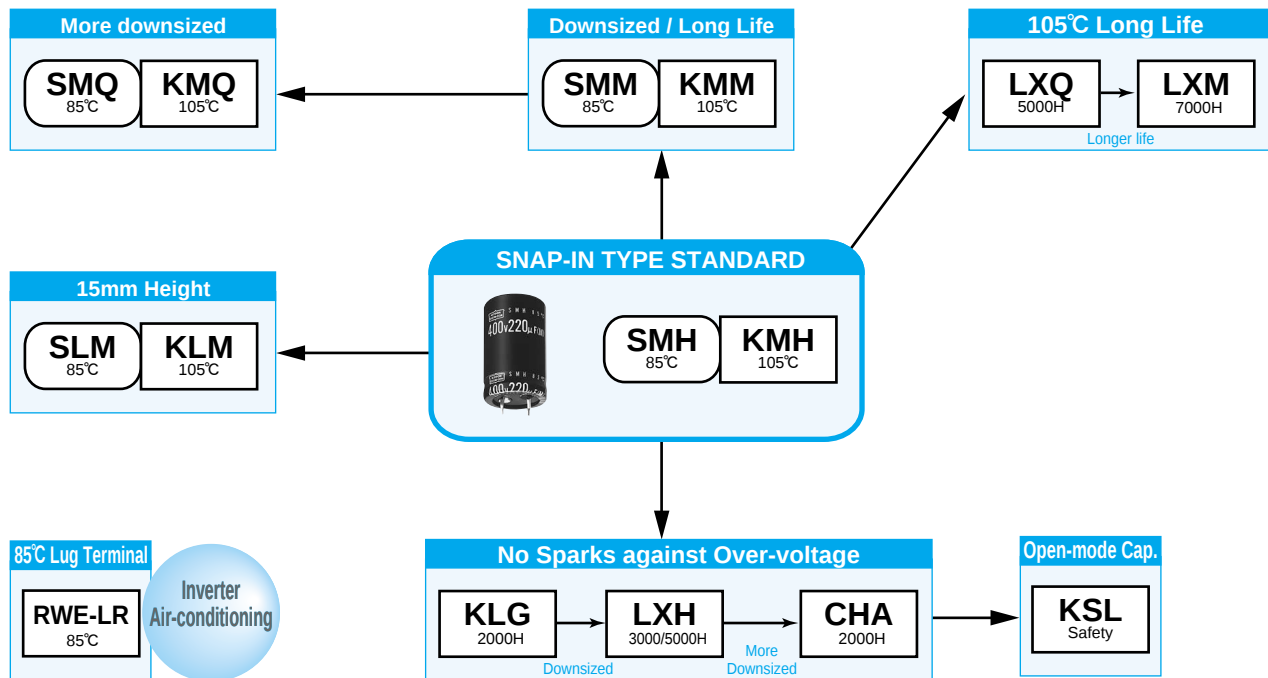


◆RADIAL LEAD

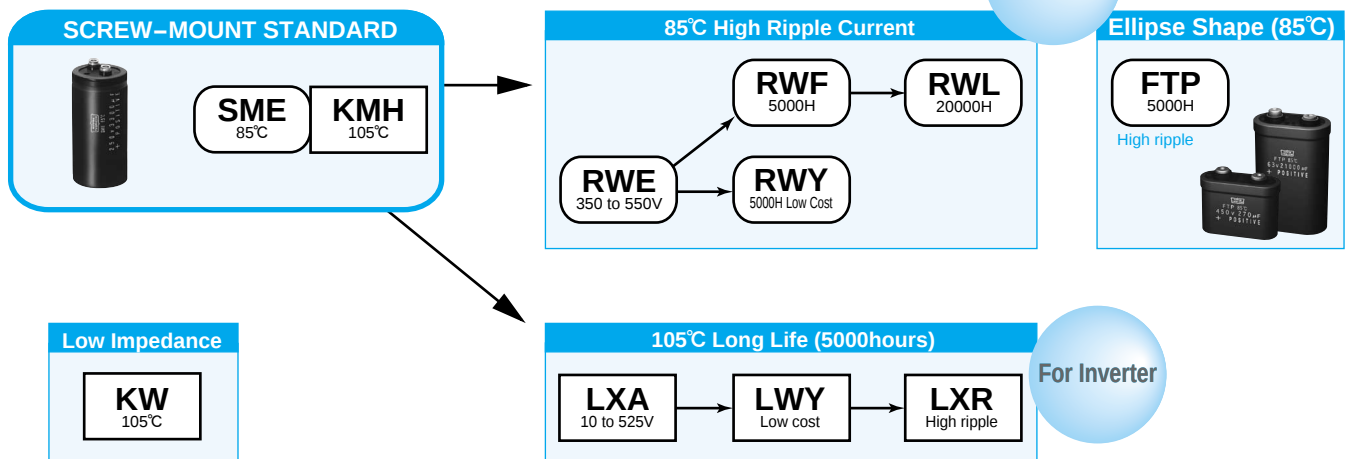


ALUMINUM ELECTROLYTIC CAPACITORS

◆SNAP-IN



◆SCREW-MOUNT TERMINAL



Designing Device Circuits

1 Select the capacitors to suit installation and operating conditions, and use the capacitors to meet the performance limits prescribed in this catalog or the product specifications.

2 Polarity

Aluminum Electrolytic Capacitors are polarized. Apply neither reverse voltage nor AC voltage to polarized capacitors. Using reversed polarity causes a short circuit or venting. Before use, refer to the catalog, product specifications or capacitor body to identify the polarity marking. (The shape of rubber seal does not represent the directional rule for polarity.) Use a bi-polar type of non-solid aluminum electrolytic capacitor for a circuit where the polarity is occasionally reversed. However, note that even a bi-polar aluminum electrolytic capacitor must not be used for AC voltage applications.

3 Operating voltage

Do not apply a DC voltage which exceeds the full rated voltage. The peak voltage of a superimposed AC voltage (ripple current) on the DC voltage must not exceed the full rated voltage. A surge voltage value, which exceeds the full rated voltage, is prescribed in the catalogs, but it is a restricted condition, for especially short periods of time.

4 Ripple current

The rated ripple current has been specified at a certain ripple frequency. The rated ripple current at several frequencies must be calculated by multiplying the rated ripple current at the original frequency using the frequency multipliers for each product series. For more details, refer to the paragraph of Life of Aluminum Electrolytic Capacitors.

5 Category temperature

The use of a capacitor outside the maximum rated category temperature will considerably shorten the life or cause the capacitor to vent.

The relation between the lifetime of aluminum electrolytic capacitors and ambient temperature follows Arrhenius' rule that the lifetime is approximately halved with each 10°C rise in ambient temperature.

6 Life expectancy

Select the capacitors to meet the service life of a device.

7 Charge and discharge

Do not use capacitors in circuits where heavy charge and discharge cycles are frequently repeated. Frequent and sharp heavy discharging cycles will result in decreasing capacitance and damage to the capacitors due to generated heat. Specified capacitors can be designed to meet the requirements of charging-discharging cycles, frequency, operating temperature, etc.

8 Failure mode of capacitors

Non-solid aluminum electrolytic capacitors, in general, have a lifetime which ends in an open circuit, the period is dependent upon temperature. Consequently, lifetime of capacitors can be extended by reducing the ambient temperature and/or ripple current.

9 Insulating

- a) Electrically isolate the following parts of a capacitor from the negative terminal, the positive terminal and the circuit traces.
- The outer can case of a non-solid aluminum capacitor.
 - The dummy terminal of a non-solid aluminum capacitor, which is designed for mounting stability.

- The dummy terminal of a surface mount type capacitor such as non-solid type MF/MFK series capacitors.
- b) The outer sleeve of a capacitor is not assured as an insulator. For applications that require an insulated outer sleeve, a custom-design capacitor is recommended to.

10 Condition

Do not use/expose capacitors to the following conditions.

- Oil, water, salty water take care to avoid storage in damp locations.
- Toxic gases such as hydrogen sulfide, sulfurous acid, nitrous acid, chlorine or its compounds, and ammonium
- Ozone, ultraviolet rays or radiation
- Severe vibration or mechanical shock conditions beyond the limits prescribed in the catalogs or the product specification.

11 Mounting

- a) The paper separators and the electrolytic-conductive electrolytes in a non-solid aluminum electrolytic capacitor are flammable.

Leaking electrolyte on a printed circuit board can gradually erode the copper traces, possibly causing smoke or burning by short-circuiting the copper traces.

Verify the following points when designing a PC board.

- Provide the appropriate hole spacing on the PC board to match the terminal spacing of the capacitor.
- Make the following open space over the vent so that the vent can operate correctly.

Case diameter	Clearance
φ6.3 to φ16mm	2mm minimum
φ18 to φ35mm	3mm minimum
φ40mm and up	5mm minimum

- Do not place any wires or copper traces over the vent of the capacitor.
 - Installing a capacitor with the vent facing the PC board needs an appropriate ventilation hole in PC board.
 - Do not pass any copper traces beneath the seal side of a capacitor. The trace must pass 1 or 2mm to the side of the capacitor.
 - Avoid placing any heat-generating objects adjacent to a capacitor or even on the reverse side of the PC board.
 - Do not pass any via holes or underneath a capacitor.
 - In designing double-sided PC boards, do not locate any copper trace under the seal side of a capacitor.
- b) Do not mount the terminal side of a screw mount capacitor downwards. If a screw terminal capacitor is mounted on its side, make sure the positive terminal is higher than the negative terminal.
- Do not fasten the screws of the terminals and the mounting clamps over the specified torque prescribed in the catalog or the production specification.
- c) For a surface mount capacitor, design the copper pads of the PC board in accordance with the catalog or the product specifications.

12 Others

- The electrical characteristics of capacitors vary in respect to temperature, frequency and service life. Design the device circuits by taking these changes into account.
- Capacitors mounted in parallel need the current to flow equally through the individual capacitors.
- Capacitors mounted in series require resistors in parallel with the individual capacitors to balance the voltage.

Installing Capacitors

1 Installing

- a) Used capacitors are not reusable, except in the case that the capacitors are detached from a device for periodic inspection to measure their electrical characteristics.
- b) If the capacitors have self charged, discharge in the capacitors through a resistor of approximately 1kΩ before use.
- c) If capacitors are stored at a temperature of 35°C or more and more than 75%RH, the leakage current may increase. In this case, they can be reformed by applying the rated voltage through a resistor of approximately 1kΩ.
- d) Verify the rated capacitance and voltages of the capacitors when installing.
- f) Verify the polarity of the capacitors.
- g) Do not use the capacitors if they have been dropped on the floor.
- h) Do not deform the cases of capacitors.
- g) Verify that the lead spacing of the capacitor fits the hole spacing in the PC board before installing the capacitors. Some standard pre-formed leads are available.
- h) For pin terminals or snap-in terminals, insert the terminals into PC board and press the capacitor downward until the bottom of the capacitor body reaches PC board surface.
- i) Do not apply any mechanical force in excess of the limits prescribed in the catalogs or the product specifications of the capacitors.

Also, note the capacitors may be damaged by mechanical shocks caused by the vacuum/insertion head, component checker or centering operation of an automatic mounting or insertion machine.

2 Soldering and Solderability

- a) When soldering with a soldering iron
 - Soldering conditions (temperature and time) should be within the limits prescribed in the catalogs or the product specifications.
 - If the terminal spacing of a capacitor does not fit the terminal hole spacing of the PC board, reform the terminals in a manner to minimize a mechanical stress into the body of the capacitor.
 - Remove the capacitors from the PC board, after the solder is completely melted, reworking by using a soldering iron minimizes the mechanical stress to the capacitors.
 - Do not touch the capacitor body with the hot tip of the soldering iron.
- b) Flow soldering
 - Do not dip the body of a capacitor into the solder bath only dip the terminals in. The soldering must be done on the reverse side of PC board.
 - Soldering conditions (preheat, solder temperature and dipping time) should be within the limits prescribed in the catalogs or the product specifications.
 - Do not apply flux to any part of capacitors other than their terminals.
 - Make sure the capacitors do not come into contact with any other components while soldering.
- c) Reflow soldering
 - Soldering conditions (preheat, solder temperature and dipping time) should be within the limits prescribed in the catalogs or the product specifications.
 - When setting the temperature infrared heaters, consider that the infrared absorption causes material to be discolored and change in appearance.
 - Do not solder capacitors more than once using reflow. If you need to twice, be sure to consult us.
 - Make sure capacitors do not come into contact with copper traces.
- d) Do not re-use surface mount capacitors which have already been soldered.

In addition, when installing a new capacitor onto the assembly board to rework, remove old residual flux from the surface of the PC board, and then use a soldering iron within the prescribed conditions.

3 Handling after soldering

Do not apply any mechanical stress to the capacitor after soldering onto the PC board.

- a) Do not lean or twist the body of the capacitor after soldering the capacitors onto the PC board.
- b) Do not use the capacitors for lifting or carrying the assembly board.
- c) Do not hit or poke the capacitor after soldering to PC board. When stacking the assembly board, be careful that other components do not touch the aluminum electrolytic capacitors.
- d) Do not drop the assembly board.

4 Cleaning PC board

- a) Do not wash capacitors by using the following cleaning agents. Solvent-proof capacitors are only suitable for washing using the cleaning conditions prescribed in the catalogs or the product specifications. In particular, ultrasonic cleaning will accelerate damaging capacitors.
 - Halogenated solvents; cause capacitors to fail due to corrosion.
 - Alkali system solvents; corrode (dissolve) an aluminum case.
 - Petroleum system solvents; cause the rubber seal material to deteriorate.
 - Xylene; causes the rubber seal material to deteriorate.
 - Acetone; erases the marking.
- b) Verify the following points when washing capacitors.
 - Monitor conductivity, pH, specific gravity, and the water content of cleaning agents. Contamination adversely affects these characteristics.
 - Be sure not to expose the capacitors under solvent rich conditions or keep capacitors inside a closed container. In addition, please dry the solvent sufficiently on the PC board and the capacitor with an air knife (temperature should be less than the maximum rated category temperature of the capacitor) over 10 minutes. Aluminum electrolytic capacitors can be characteristically and catastrophically damaged by halogen ions, particularly by chlorine ions, though the degree of the damage mainly depends upon the characteristics of the electrolyte and rubber seal material. When halogen ions come into contact with the capacitors, the foil corrodes when voltages applied. This corrosion causes ; extremely high leakage current, which causes in line with, venting, and an open circuit. Global environmental warnings (Greenhouse effects and other environmental destruction by depletion of the ozone layer), new types of cleaning agents have been developed and commercialized as substitutes for CFC-113,1,1,2-trichloroethylene and 1,1,1-trichloroethylene. The following are recommended as cleaning conditions for some of new cleaning agents.

—Higher alcohol system cleaning agents

Recommended cleaning agents:

Pine Alpha ST-100S (Arakawa Chemical)
Clean Through 750H, 750K, 750L, and 710M (Kao)
Technocare FRW-14 through 17 (Toshiba)

Cleaning conditions:

Using these cleaning agents capacitors are capable of withstanding immersion or ultrasonic cleaning for 10 minutes at a maximum liquid temperature of 60°C. Find optimum condition for washing, rinsing, and drying. Be sure not to rub the marking off the capacitor by contacting any other components

or the PC board. Note that shower cleaning adversely affects the markings on the sleeve.

–Non-Halogenated Solvent Cleaning

AK225AES (Asahi Glass)

Cleaning conditions:

Solvent-proof capacitors are capable of withstanding any one of immersion, ultrasonic or vapor cleaning for 5 minutes; exception is 2 minutes max. for KRE, and KRE-BP series capacitors and 3 minutes for SRM series capacitors. However, from a view of the global environmental problems, these types of solvent will be banned in near future. We would recommend not using them as much as possible.

Isopropyl alcohol cleaning agents

IPA (Isopropyl Alcohol) is one of the most acceptable cleaning agents; it is necessary to maintain a flux content in the cleaning liquid at a maximum limit of 2 Wt.%.

5 Precautions for using adhesives and coating materials

- a) Do not use any adhesive and coating materials containing halogenated solvent.
- b) Verify the following before using adhesive and coating material.
 - Remove flux and dust leftover between the rubber seal and the PC board before applying adhesive or coating materials to the capacitor.
 - Dry and remove any residual cleaning agents before applying adhesive and coating materials to the capacitors. Do not cover over the whole surface of the rubber seal with the adhesive or coating materials.
 - For permissible heat conditions for curing adhesives or coating materials, follow the instructions in the catalogs or the product specifications of the capacitors.
 - Covering over the whole surface of the capacitor rubber seal with resin may result in a hazardous condition because the inside pressure cannot release completely. Also, a large amount of halogen ions in resins will cause the capacitors to fail because the halogen ions penetrate into the rubber seal and the inside of the capacitor.
- c) Some of coating material cannot be cured over the capacitor.

6 Fumigation

In many cases when exporting or importing electronic devices, such as capacitors, wooden packaging is used. In order to control insects, many times, it becomes necessary to fumigate the shipments. Precautions during "Fumigation" using halogenated chemical such as Methyl Bromide must be taken. Halogen gas can penetrate packaging materials used, such as, cardboard boxes and vinyl bags. Penetration of the halogenide gas can cause corrosion of Electrolytic capacitors.

The Operation of Devices

- a) Do not touch a capacitor directly with bare hands.
- b) Do not short-circuit the terminal of a capacitor by letting it come into contact with any conductive object.
Also, do not spill electric-conductive liquid such as acid or alkaline solution over the capacitor.
- c) Do not use capacitors in circumstance where they would be subject to exposure to the following materials exist or expose.
 - Oil, water, salty water or damp location.
 - Direct sunlight.
 - Toxic gases such as hydrogen sulfide, sulfurous acid, nitrous acid, chlorine or its compounds, and ammonium.
 - Ozone, ultraviolet rays or radiation.
 - Severe vibration or mechanical shock conditions beyond the limits prescribed in the catalogs or product specification.

Maintenance Inspection

- a) Make periodic inspections of capacitors that have been used in industrial applications. Before inspection, turnoff the power supply and carefully discharge the electricity in the capacitors. Verify the polarity when measuring the capacitors with a volt-ohm meter. Also, do not apply any mechanical stress to the terminals of the capacitors.
- b) The following items should be checked during the periodic inspections.
 - Significant damage in appearance : venting and electrolyte leakage.
 - Electrical characteristics: leakage current, capacitance, $\tan\delta$ and other characteristics prescribed in the catalogs or product specifications.We recommend replacing the capacitors if the parts are out of specification.

In Case of Venting

- a) If a non-solid aluminum electrolytic capacitor expells gas when venting, it will discharge odors or smoke, or burn in the case of a short-circuit failure. Immediately turn off or unplug the main power supply of the device.
- b) When venting, a non-solid aluminum electrolytic capacitor blows out gas with a temperature of over 100°C. (A solid aluminum electrolytic capacitor discharges decomposition gas or burning gas while the outer resin case is burning.) Never expose the face close to a venting capacitor. If your eyes should inadvertently become exposed to the spouting gas or you inhale it, immediately flush the open eyes with large amounts of water and gargle with water respectively. If electrolyte is on the skin, wash the electrolyte away from the skin with soap and plenty of water. Do not lick the electrolyte of non-solid aluminum electrolytic capacitors.

Storage

We recommend the following conditions for storage.

- a) Do not store capacitors at a high temperature or in high humidity. Store the capacitors indoors at a temperature of 5 to 35°C and a humidity of less than 75%RH.
- b) Store the capacitors in places free from water, oil or salt water.
- c) Store the capacitors in places free from toxic gasses (hydrogen sulfide, sulfurous acid, chlorine, ammonium, etc.)
- d) Store the capacitors in places free from ozone, ultraviolet rays or radiation.
- e) Keep capacitors in the original package.

Disposal

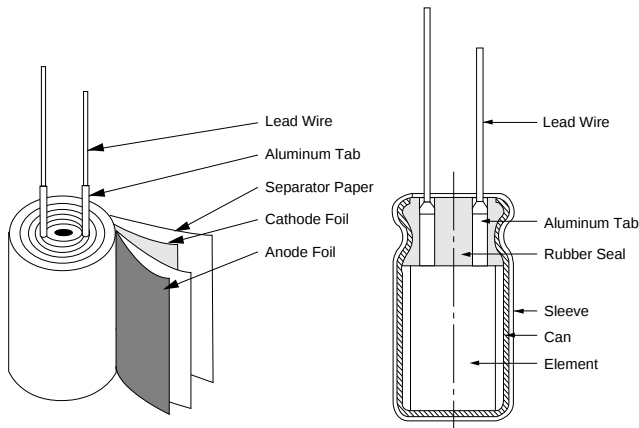
Please consult a local specialist regarding the disposal of industrial waste when disposing aluminum electrolytic capacitors.

Catalogs

Specifications in catalogs may be subject to change without notice. For more details of precautions and guidelines for aluminum electrolytic capacitors, please refer to Engineering Bulletin No. 634A.

Structure of Aluminum Electrolytic Capacitors

The aluminum electrolytic capacitor contains an internal element of an anode foil, a cathode foil and paper separator rolled together, impregnated with an electrolyte, then attached to external terminals connecting the tabs with the anode or the cathode foils, and sealed in a can case.



Among various types of capacitors, an aluminum electrolytic capacitor offers large CV to volume and features low cost. The capacitance (C) of aluminum electrolytic capacitors, as well as other capacitors, is expressed by the following equation:

$$C = 8.855 \times 10^{-8} \times \epsilon \times S / d \text{ (}\mu\text{F)}$$

Where: ϵ = Dielectric constant

S = Surface area of dielectric (cm²)

d = Thickness of dielectric (cm)

This equation shows that the capacitance increases in proportion as the dielectric constant becomes high, its surface area becomes large and the thickness of dielectric becomes thin. In aluminum electrolytic capacitors the dielectric constant of an aluminum oxide (Al₂O₃) layer is 8 to 10, which is not as high as compared with the other types of capacitors. However, the dielectric layer of the aluminum oxide is extremely thin (about 15Å per volt) and the surface area is very large. An electrochemical formed electrode foil makes the dielectric on the etched surface of aluminum electrode foil. Electrochemical etching creates 20 to 100 times more surface area as plain foil. Therefore, an aluminum electrolytic capacitor can offer a large capacitance compared with other types.

Primary of Composition Material

Anode aluminum foil:

First, the etching process is carried out electromechanically with a chloride solution which dissolves metal and increases the surface area of the foil; forming a dense network like innumerable microscopic channels. Secondly, the formation process is carried out with a solution such as ammonium borate which forms the aluminum oxide layer (Al₂O₃) as a dielectric at a thickness of 15Å / volt. The process needs to charge 140 to 200% of the rated voltage into the foil.

Cathode aluminum foil:

As in the first manufacturing process of the positive foil, the cathode foil requires etching process. Generally, it does not require the formation process; therefore, the natural oxide layer of Al₂O₃, which gives a characteristic dielectric voltage of 0.2 to 1.0 volts, is formed.

Electrolyte and separator:

In a non-solid aluminum electrolytic capacitor, the electrolyte, an electrically conductive liquid, functions as a true cathode by contacting the dielectric oxide layer. Accordingly, the "cathode foil" serves as an electrical connection between the electrolyte and terminal.

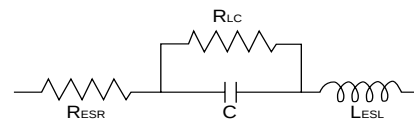
The separator functions to retain the electrolyte and prevent the anode and cathode foils from short-circuiting.

Can case and sealing materials:

The foils and separator are wound into a cylinder to make an internal element, which is impregnated with the electrolyte, inserted into an aluminum can case and sealed. During the service life of a capacitor, electrolyte slowly and naturally vaporizes by electrochemical reaction on the boundary of the aluminum foils. The gas will increase the pressure inside the case and finally cause the pressure relief vent to open or the sealing materials to bulge. The sealing material functions not only to prevent electrolyte from drying out but also to allow the gas to escape out of the can case in a controlled manner.

The Equivalent Circuit

As the equivalent circuit of an aluminum electrolytic capacitor is shown below, it forms a capacitance, a series resistance, an inductance, and a parallel resistance.

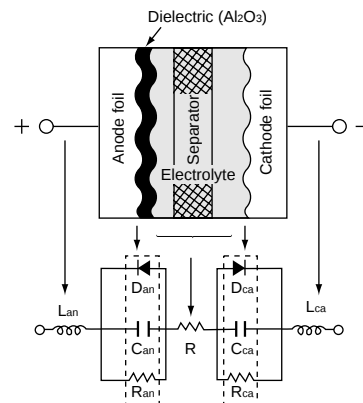


RESR = Equivalent series resistance (ESR)

RLC = Resistance due to leakage current

C = Capacitance

LESL = Equivalent series inductance



From a composition material point wise, the equivalent circuit is subdivided as follows.

Can, Cca = Capacitance due to anode and cathodes foils

R = Resistance of electrolyte and separator

Ran, Rca = Internal resistance of oxide layer on anode and cathode foils

Dan, Dca = Diode effects due to oxide layer on anode and cathode foils

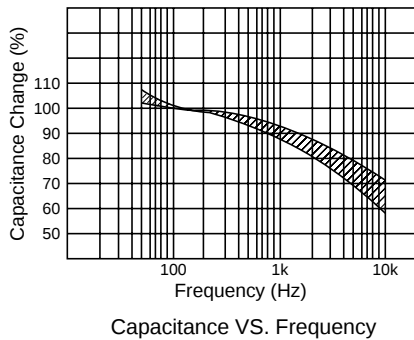
Lan, Lca = Inductance due to anode and cathode terminals

Basic Electrical Characteristics

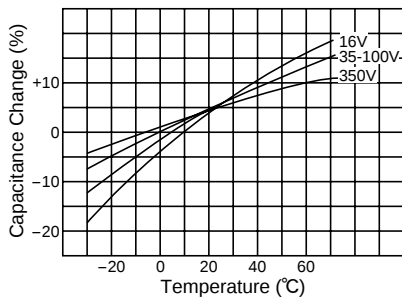
Capacitance:

The capacitance of capacitor is expressed as AC capacitance

by measuring impedance and separating factors. Also, the AC capacitance depends upon frequency, voltage and other measuring methods. In fact, JIS C 5101 prescribes that the series capacitive factor of an equivalent series(○—||— ω —○) circuit shall be the capacitance measured at a frequency of 120Hz and applying a maximum AC voltage of 0.5V rms with a DC bias voltage of 1.5 or 2.0V to aluminum electrolytic capacitors. The capacitance of an aluminum electrolytic capacitor becomes smaller with increasing frequency. See the typical behavior shown below.



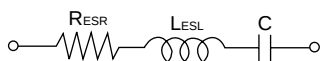
The capacitance value is highly dependent upon temperature and frequency. As the temperature decreases, the capacitance becomes smaller. See the typical behavior shown below.



On the other hand, DC capacitance, which can be measured by applying a DC voltage, shows a slightly larger value than the AC capacitance at a normal temperature and has the flatter characteristic over the temperature range.

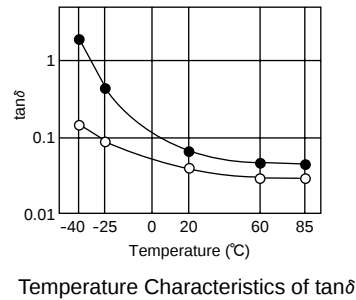
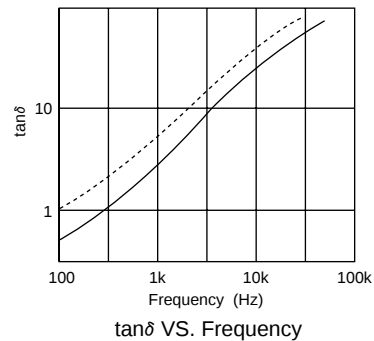
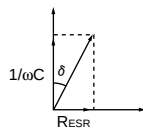
tanδ(tangent of loss angle or dissipation factor):

The tanδ is expressed as the ratio of the resistive component (RESR) to the capacitive reactance (1/ωC) in the equivalent series circuit. Its measuring conditions are the same as the capacitance.



$$\tan\delta = \text{RESR} / (1/\omega C) = \omega C \text{ RESR}$$

Where : RESR=ESR at 120Hz
 $\omega = 2\pi f$
 $f = 120\text{Hz}$



Equivalent series resistance (ESR):

The ESR is the series resistance consisting of the aluminum oxide layer, electrolyte/separator combination, and other resistance related factors, foil length, foil surface area and others. The ESR value depends upon the temperature. Decreasing the temperature makes the resistivity of the electrolyte increase and leads to increasing ESR.

As the measuring frequency increases, the ESR decreases and reaches an almost constant value that mainly dominates the frequency-independent resistance relating electrolyte/separator combination.

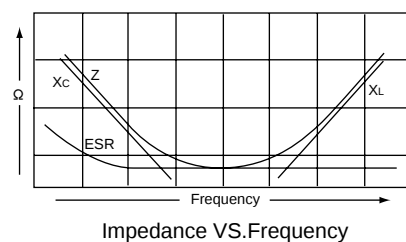
Impedance (Z):

The impedance is the resistance of the alternating current at a specific frequency. It is related to capacitance (C) and inductance (L) in terms of capacitive and inductive reactance, and also related to the ESR. It is expressed as follows:

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

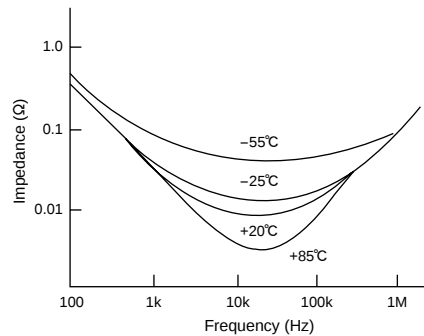
Where : $X_C = 1/\omega C = 1/2\pi f C$
 $X_L = \omega L = 2\pi f L$

As shown below, the capacitive reactance (XC) dominates at the range of low frequencies, and the impedance decreases with increasing frequency until it reaches the ESR in the middle frequency range. At the range of the higher frequencies the inductive reactance (XL) comes to dominate, so that the impedance increases when increasing the measuring frequency.



The tanδ shows higher values as the measured frequency increases and the measured temperature decreases.

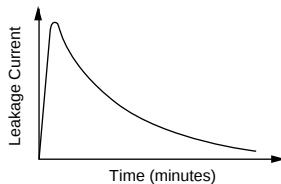
As shown at the next page, the impedance value varies with temperature because the resistance of the electrolyte is strongly affected by temperature.



Temperature Characteristics of Impedance

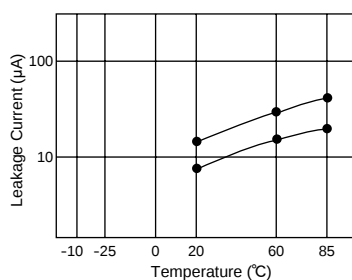
Leakage current:

The dielectric of a capacitor has a very high resistance that does not allow DC current to flow. However, due to the characteristics of the aluminum oxide layer that functions as a dielectric in contact with electrolyte, a small amount of current, called leakage current, will flow to reform and repair the oxide layer when a voltage is being applied. As shown below, a high leakage current flows to charge voltage to the capacitor for the first seconds, and then the leakage current will decrease and reach an almost steady-state value with time.



Leakage Current VS. Time

Measuring temperature and voltage influences the leakage current. The leakage current shows higher values as the temperature and voltage increase.



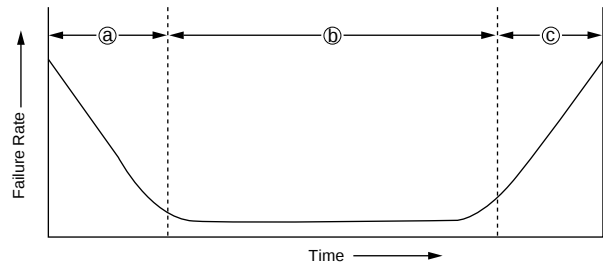
Typical Temperature Characteristics

In general, the leakage current is measured at 20°C by applying the rated voltage to capacitor through a resistor of 1000Ω in series. The leakage current is the value several minutes later after the capacitor has reached the rated voltage. The catalog prescribes the measuring temperature and time.

Reliability

The bathtub curve:

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



a) Infant failure period

This initial period accounts for the failures caused by deficiencies in design, structure, the manufacturing process or severe misapplications. In other words the initial failures occur as soon as the components are installed in a circuit. In the case of aluminum electrolytic capacitors, these failures do not occur at customers' field because aging process reforms an incomplete oxide layer, or eliminate the defective parts at the aging process and the sorting process.

Misapplication of the capacitor such as inappropriate ambient conditions, over-voltage, reverse voltage, or excessive ripple current should be avoided for proper use of the capacitor in a circuit.

b) Useful life period

This random failure period exhibits an extremely low failure rate. These failures are not related to operating time but to application conditions. During this period, non-solid aluminum electrolytic capacitors lose a small amount of electrolyte. The electrolyte loss shows as a slow decrease in capacitance and a slow increase in $\tan\delta$ and ESR. Non-solid aluminum electrolytic capacitors still exhibit lower catastrophic failures than semiconductors and solid tantalum capacitors.

c) Wear-out failure period

This period reflects a deterioration in the component properties of the capacitor; the failure rate increases with time. Non-solid aluminum electrolytic capacitors end their useful life during this period.

Failure types:

The two types of failures are classified as catastrophic failures and wear-out failures as follows.

1) Catastrophic failures

This is a failure mode that destroys the function of the capacitor like a short circuit or open circuit failure.

2) Wear-out failures

This is a failure mode where gradually deteriorates; the electrical parameters of the capacitor. The criteria of judging the failures, vary with application and design factors. Capacitance decreases and $\tan\delta$ increases are caused by the loss of electrolyte in the wear-out failure period. This is primary due to loss of electrolyte by diffusion (as vapor) through the sealing material. Gas molecules can diffuse out through the material of the end seal. High temperature increase the electrolyte vapor pressure within the capacitor and the diffusion rate is therefore increased. This increases internal pressure may cause the seal to bulge caused by elevated temperatures. This bulging may accelerate diffusion and mechanically degrade the seal. Factors that can increase the capacitor temperature, such as ambient temperature and ripple current, can accelerate the wear-out phase of a capacitor.

Failure modes:

Aluminum electrolytic capacitors show various failure modes in different applications. (See Table 1.)

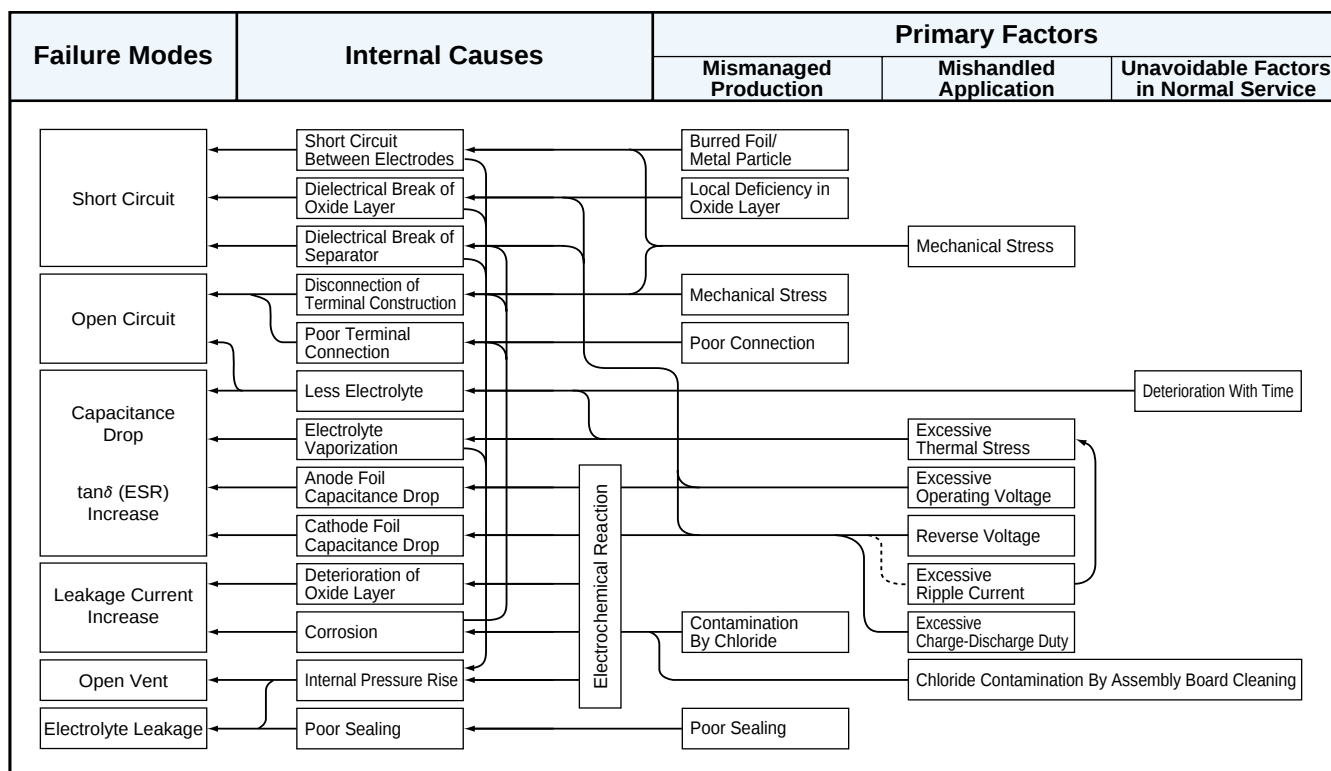


Table1

Life of Aluminum Electrolytic Capacitors

The life of aluminum electrolytic capacitors is largely dependent on environmental and electrical factors. Environmental factors include temperature, humidity, atmospheric pressure and vibration. Electrical factors include operating voltage, ripple current and charge-discharge duty cycles. The factor of temperature (ambient temperature and internal heating due to ripple current) is the most critical to the life of aluminum electrolytic capacitors.

General formula to estimate lifetime:

The lifetime of non-solid aluminum electrolytic capacitors is generally expressed by using three elements representing the effects of ambient temperature, applying voltage and ripple current, which is shown by the following equation:

$$L_x = L_0 \cdot K_{Temp} \cdot K_{Voltage} \cdot K_{Ripple}$$

Where : L_x =Lifetime of capacitor to be estimated
 L_0 =Base lifetime of capacitor
 K_{Temp} =Ambient temperature acceleration term
 $K_{Voltage}$ =Voltage acceleration term
 K_{Ripple} =Ripple current acceleration term

K_{Temp} (Effects of ambient temperature on life):

Because an aluminum electrolytic capacitor is essentially an electrochemical component, increased temperatures accelerate the chemical reaction producing gas within the capacitor which is diffused through the end seal, and consequently accelerates a gradual decrease in capacitance and a gradual increase in tanδ and ESR. The following equation has been experimentally found to express the relationship between the temperature acceleration factor and the deterioration of the capacitor.

$$L_x = L_0 \cdot K_{Temp} = L_0 \cdot B^{(T_0 - T_x) / 10}$$

$$K_{Temp} = B^{(T_0 - T_x) / 10}$$

Where : L_x =Lifetime (hour) of capacitor to be estimated
 L_0 =Base lifetime (hour) of capacitor
 T_0 =Maximum rated category temperature (°C) of capacitor shown in catalog
 T_x =Actual ambient temperature (°C) of capacitor
 B =Temperature acceleration factor (≈ 2)

This equation is similar to Arrhenius' equation that expresses a relationship between chemical reaction rates and temperature, and called Arrhenius' rule of aluminum electrolytic capacitors. The temperature acceleration factor (B) is approximately 2 over an ambient temperature range (T_x) from 40°C to the maximum rated category temperature of each capacitor. It means that the lifetime is approximately halved with every 10°C rise in ambient temperature and can be extended by using the capacitors at low temperatures. For an ambient temperature range (T_x) of 20°C to 40°C, the factor B will be close to 2, and the lifetime will actually be extended. However, operating and surrounding conditions, especially the operating conditions influence ambient temperatures mutually. The ambient temperature in this range will be very changeable; therefore, lifetime estimation under 40°C should use 40 as T_x .

$K_{Voltage}$ (Effects of applying voltage to life):

Miniature and large sized aluminum electrolytic capacitors for popular applications, such as surface mount types, radial lead types, snap-in types and block types, have little voltage effect on their life. Other factors like temperature and ripple current determine the life in comparison with voltage, as long as the capacitors are used at voltages and temperatures within the specifications prescribed in the catalog. Consequently, $K_{Voltage}=1$ is used for these capacitors. 350V and higher screw-mount terminal types of capacitors for customer-use power electronics applications allow the life time to extend by applying low voltage, relating to the characteristics of their aluminum oxide layer. RWE, RWY, RWL, RWF, LX(Screw-mount), LXA(Screw-mount) and LXR series are applicable to the method. For $K_{Voltage}$ values of these products, please contact a representative of Nippon Chemi-Con.

K_{Ripple} (Effects of ripple current to life):

Aluminum electrolytic capacitors have higher tanδ than any other types of capacitors; therefore, the ripple current gives aluminum electrolytic capacitors higher internal heat. Be sure to check the rated ripple current which is specified in the catalog for assuring the life.

The ripple current through the capacitor produces heat by dissipating power from the capacitor. This leads to temperature increase. Internal heating produced by ripple currents can be expressed by:

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

Where : W = Internal power loss
 I_{Ripple} = R.M.S. ripple current
 R_{ESR} = Internal resistance (ESR) at ripple frequency
 V = Applied voltage
 I_{Leakage} = Leakage current

Leakage current may be 5 to 10 times higher than the values measured at 20°C, but compared with ripple, the leakage current value is very small and negligible. Thus, the above equation can be simplified:

$$W = (I_{\text{Ripple}})^2 \cdot R_{\text{ESR}}$$

The following equation gives the internal heat rise; it is heat rise to stable condition. (It is necessary to input several factors.):

$$(I_{\text{Ripple}})^2 \cdot R_{\text{ESR}} = \beta \cdot A \cdot \Delta T$$

Where : β = Heat transfer constant
 A = Surface area of can case
 $A = (\pi/4) \cdot D \cdot (D + 4L)$
Where : D = Can diameter
 L = Can length
 ΔT = An increase in core temperature by internal heating due to ripple current
 $(\Delta T = \text{Core temperature} - \text{Ambient temperature})$

From the above equation, internal temperature rise (ΔT) produced by ripple current is given by:

$$\Delta T = (I_{\text{Ripple}})^2 \cdot R_{\text{ESR}} / (\beta \cdot A)$$

When the ripple frequency is 120Hz, R_{ESR} at 120Hz is expressed by
 $R_{\text{ESR}} = \tan \delta / (\omega \cdot C)$
 $\Delta T = (I_{\text{Ripple}})^2 \cdot \tan \delta / (\beta \cdot A \cdot \omega \cdot C)$
Where : $\tan \delta$ = 120Hz value
 $\omega = 2\pi \cdot f = 2\pi \cdot 120\text{Hz}$
 C = 120Hz capacitance value

As above equation, ΔT varies with frequency of ripple, frequency and temperature dependent ESR, and application dependent β (even ripple current is constant). We really recommend that customers measure ΔT with a thermocouple at the actual operating conditions of the application in lieu of using the above equation. (Another approximation of ΔT will be stated later.)

As mentioned in the paragraph of K_{Temp} , aluminum electrolytic capacitors will slowly increase in $\tan \delta$ and ESR during their service life. The application without ripple current has no influence on the life of the capacitor even though the ESR will increase during life. In other words, the application with ripple current makes ΔT increase; furthermore, a ΔT increase results in ESR increase. The ESR increase then makes ΔT increase. It is a chain reaction. Theoretically, the ripple current acceleration term (K_{Ripple}) cannot be simply expressed like the ambient temperature acceleration term (K_{Temp}). Practically, the ripple current acceleration term (K_{Ripple}) can be approximately expressed by an equation using a ΔT initially measured. The following table shows the ripple current acceleration term (K_{Ripple}) for each capacitor design group.

K _{Ripple}		Products	
		Type	Series
2 ^(-ΔT /5)		Surface mount (FC/FD/VC)	MFS, MFA, MF, MFK, MFY, MFJ, MF-BP, MFK-BP, MFK-Large, MVS, MVA, MV, MVE, MVK, MKA, MZA, MVZ, MVY, MVJ, MVL, MVH, MV-BP, MVK-BP
		Radial lead (VB)	KMA, KME-BP, KRE, KMY, KRG, LLA, LX, LXA, SME, SMQ, SME-BP, SMG, SRA, SRE, SRG, SRM, SXE
		Screw-mount terminal (LG)	KW
2 ^{(ΔT₀-ΔT) /5}	ΔT ₀ =5 deg	Radial lead (VB)	FL, GXE(T ₀ ≤105°C), KLG, KME, KMQ, KMF, KMG, KMH, KMX, KXG, LBG, LXJ, LXV, LXV, LXZ
		Pin terminal (VN/VS/VR)	KLG, KLH, KMH, KMM, KMQ, KSL, LXG, LXM, LXH, LXQ
		Screw-mount terminal (LG)	LXA (10 to 250V _{dc}), KMH
	ΔT ₀ =5 to 10 deg Contact us for details	Radial lead (VB)	SMH
		Pin terminal (VN/VS/VR/LASN)	SMH, SMM, SMQ, SLM, RWE-LR
		Screw-mount terminal (LG)	SME
2 ^[(-2+(25-ΔT) /b)]		Screw-insert terminal (LG)	LX, LXA (350 to 525V _{dc}), RWE, RWF, RWL, LXR, RWY
Note : ΔT = An increase (deg) in core temperature produced by internal heating due to actual operating ripple current. The ΔT is the difference between the core temperature and ambient temperature measured at the actual operating conditions. ΔT ₀ = An increase (deg) in core temperature by internal heating due to rated ripple current. b = Factor b varies from 5 to 10 by the conditions of ripple frequency and ΔT. Please contact a representative of Nippon Chemi-Con for the details			

Note that a ΔT over a certain maximum limit may over-heat the capacitors, though the lifetime estimation will not give you practical lifetime. For instance, the following shows a guide limit of ΔT at each ambient temperature for 105°C maximum rated products.

Ambient temperature Tx (°C)	85	105
Guide limit of ΔT (deg)	15	5
Core temperature (=Tx+ ΔT)	100	110

Approximation of ΔT

Estimation of the lifetime requires two temperature measurements; first obtain ΔT by actually measuring the core temperature, inserting the thermocouple inside the operating capacitor and secondary, the ambient temperature. A more convenient way to get the ΔT is to convert the surface temperature of the capacitor case and the ambient temperature by using a coefficient specified for each case diameter as follows:

$$\Delta T = K_c \cdot (T_s - T_x)$$

Where : K_c = Coefficient from table below
 T_s = Surface temperature (deg) of capacitor can case
 T_x = Ambient temperature (deg)

No air flow conditions.

Diameter (mm)	φ5 to φ8	φ10	φ12.5	φ16	φ18	φ22	φ25	
Kc	1.10	1.15	1.20	1.25	1.30	1.35	1.40	
Diameter (mm)	φ30	φ35	φ40	φ50	φ63.5	φ76	φ89	φ100
Kc	1.50	1.65	1.75	1.90	2.20	2.50	2.80	3.10

Also, you can roughly estimate a ΔT by using the following equation without need to measure.

$$\Delta T = \Delta T \cdot (I_x / I_o)^2$$

Where : $\Delta T = 5$ deg for 105°C maximum rated capacitors.

I_o = Rated ripple current (A_{RMS}) : if its frequency is different from operating ripple current I_x , it needs converting by using a frequency multiplier prescribed in the catalog.

I_k = Operating ripple current (A_{RMS}) actually flowing into a capacitor

Like switching power supplies, if the operating ripple current consists of commercial frequency element and switching frequency element(s), an internal power loss is expressed by the following equation.

$$W = (I_{f1})^2 \cdot ESR_{f1} + (I_{f2})^2 \cdot ESR_{f2} + \dots + (I_{fn})^2 \cdot ESR_{fn}$$

Where : W = Internal power loss

$I_{f1} \dots I_{fn}$ = Ripple currents at every frequencies $f1 \dots fn$

$ESR_{f1} \dots ESR_{fn}$ = ESR 's at every frequencies $f1 \dots fn$

The above equation can be transformed into another equation to get a ripple current value in accordance with the frequency of the rated ripple current, each of $ESR_{f1}, \dots, ESR_{fn}$ is approximately equal to ESR_{f0} divided by square value of the frequency multiplier ($F_{f1} \dots F_{fn}$). Here ESR_{f0} is the value at the frequency of the rated ripple current and $F_{f1} \dots F_{fn}$ is a conversion coefficient from one frequency to another in accordance with the frequency $f1 \dots fn$.

$$ESR_{f1} = ESR_{f0} / (F_{f1})^2$$

$$\vdots$$

$$ESR_{fn} = ESR_{f0} / (F_{fn})^2$$

Relationship of $w = (L_{\text{ripple}})^2 \cdot R_{\text{ESR}}$ leads I_x as follows:

$$I_x = \sqrt{W / ESR_{f0}}$$

The above is rewritten in the following equation:

$$I_x = \sqrt{(I_{f1}/F_{f1})^2 + (I_{f2}/F_{f2})^2 + \dots + (I_{fn}/F_{fn})^2}$$

Where : I_x = Ripple current in accordance with the frequency of the rated ripple current

$I_{f1} \dots I_{fn}$ = Operating ripple currents at every frequency $f1 \dots fn$
 $F_{f1} \dots F_{fn}$ = Frequency multipliers for every frequency $f1 \dots fn$ prescribed in the catalog, based on the fact that the internal resistance of a capacitor varies with frequency.

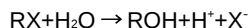
Cleaning Agents

a. Cleaning agents penetrate into a capacitor.

Solvent contacts the rubber seal of a capacitor. Some percentage of solvent does not penetrate but a percentage succeeds in entering and defusing inside the capacitor.

b. Cleaning agents decompose and release halogen ions.

In the electrolyte of the inside element, the halides in the cleaning agents become hydrolyzed and release halogen ions as follows,

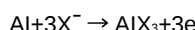


RX : Halide

X^- : Halogen ion

c. Corrosion

The halogen ions attack the aluminum foil by the following anodic half-cell reaction:



The AlX_3 further becomes hydrolyzed and release the halogen ion again:



The halogen ions release by this hydrolysis reaction further attacks the aluminum according to the previous reaction formula, and these reactions are repeated and accelerated when voltage and temperature is applied. Also, the hydrogen ions increase the local acidity which causes the oxide dielectric to dissolve. Thus, localized corrosion accelerates to corrode both the aluminum metal and the dielectric. In addition, a terpene or petroleum system cleaning solvent will be absorbed into the rubber seal of the capacitor. The rubber seal finally weakens. An alkaline saponification detergent will damage the aluminum metal and marking. In summary, recommended cleaning agents are halogen free. Terpene, petroleum, alkali detergent and any solvent making the rubber seal material deteriorate are not recommended.

Compatible cleaning agents:

In line with recent global environmental warnings (Greenhouse effect and other environmental destruction by depletion of the ozone layer), new types of cleaning agents have been commercialized and substituted as CFC-113, 1,1,2-trichloroethylene and 1,1,1-trichloroethylene. The following are recommended cleaning conditions for some of new cleaning agents.

Higher alcohol system cleaning agents

Recommended cleaning agents:

Pine Alpha ST-100S (Arakawa Chemical)

Clean Through 750H, 750K, 750L, and 710M (Kao)

Technocare FRW-14 through 17 (Toshiba)

Cleaning conditions:

- 1) Capacitors are capable of withstanding immersion or ultrasonic cleaning for 10 minutes at a maximum liquid temperature of 60°C using the above cleaning agents. Find the optimum conditions for washing, rinsing, and drying. Be sure not to rub the marking off the capacitor by contact with any other components on the PC board. Note that shower cleaning adversely affects the marking.
- 2) To rinse by water, control the conditions such as temperature and water pressure to avoid sleeve shrinkage.
- 3) Clean Through 750H and similar are weak-alkaline solvents. Do not leave the alkaline on the capacitor after cleaning process.

CFCs substitute solvents (HCFC system)

Asahi Glass AK225AES solvent is usable only with solvent-proof type capacitors, which are designed with reinforced seal constructions and modified electrolyte. This product does not penetrate the capacitor and deactivate halogen ions. However, AK225AES is one of the solvents which will have a restricted usage in future from the environmental point of view.

Non-Halogenated Solvent Cleaning

HCFC solvents: AK225AES (Asahi Glass)

Cleaning conditions:

Solvent-proof type capacitors are capable of withstanding immersion, ultrasonic or vapor cleaning for 5 minutes; exception is 2 minutes max. for KRE and KRE-BP series capacitors for 3 minutes and SRM and KRF series capacitors.

Applicable series (only for solvent-proof products):

Surface mount : MFS, MFA, MF, MFK, MFY, MFJ, MF-BP, MFK-BP, MFK-Large, MVS, MVA(4 to 63V_{dc}), MV, MVE(6.3 to 63V_{dc}), MVK, MKA, MZA, MVZ, MVY(6.3 to 63V_{dc}), MVJ, MVL, MVH(10 to 50V_{dc}), MV-BP, MVK-BP, PX, PXA, PXC

Radial lead : SRM, KRE, KMA, SRG, KRG, SMG(6.3 to 250V_{dc}), SME(6.3 to 250V_{dc}), SME-BP, KMQ(6.3 to 100V_{dc}), KMG(6.3 to 250V_{dc}), KME(6.3 to 250V_{dc}), KME-BP, LXZ, LXY, LXV, LXJ, SXE, KMF(6.3 to 100V_{dc}), FL, LXA, LX, GXE(10 to 50V_{dc}), GXL, LBG, LLA

Isopropyl alcohol cleaning agents

IPA (Isopropyl Alcohol) is one of the most acceptable cleaning agents; it is necessary to maintain a flux content in the cleaning liquid at a maximum limit of 2 Wt. %, because chlorides in flux dissolves in the cleaning liquid during the cleaning process.

Xylene -additive IPA may make the rubber seal deteriorate.

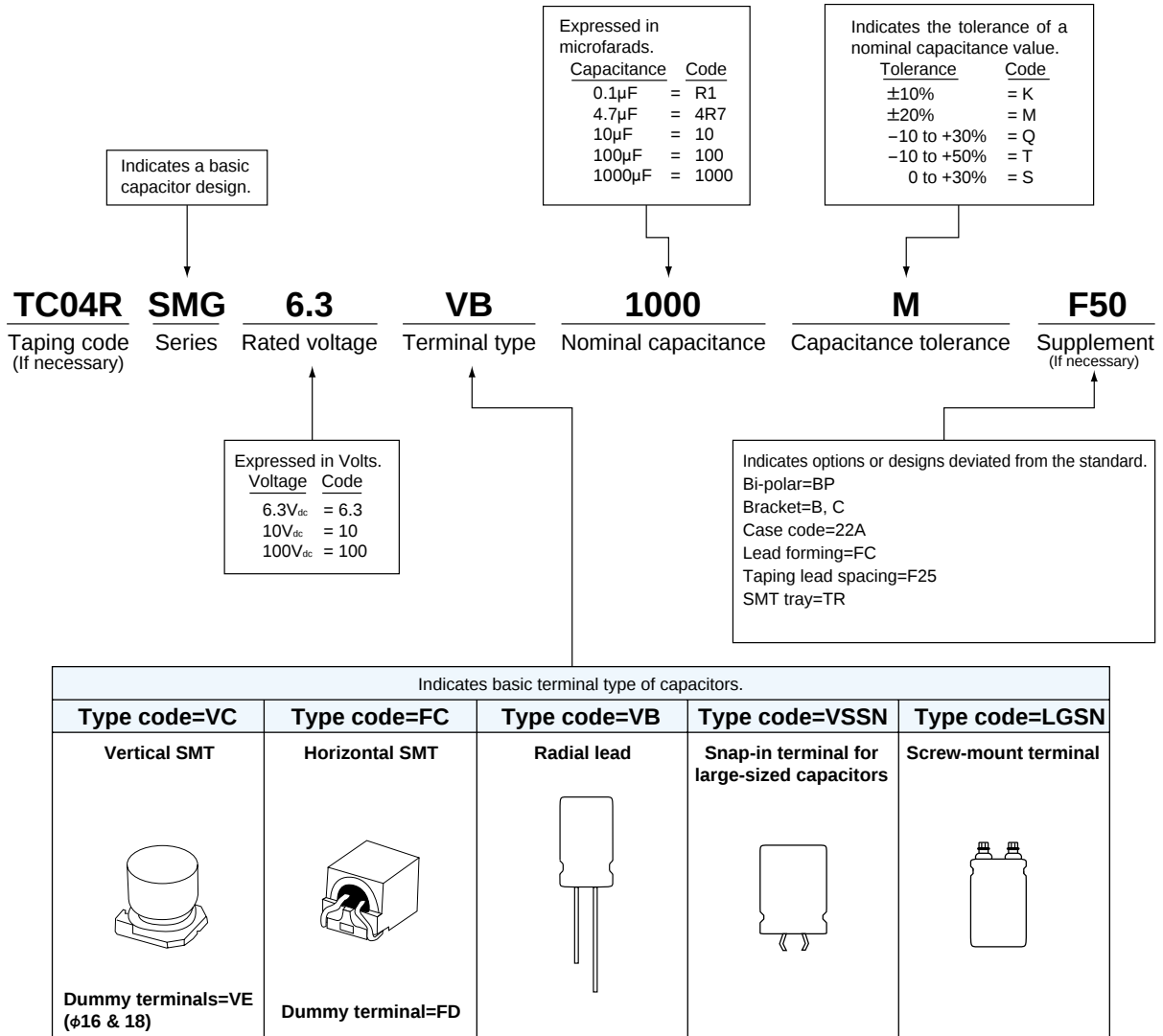
Non-clean flux

Both ionic halogen and non-ionic halogens damage the capacitor when they penetrate in through the rubber seal. Note that some of the fluxes called non-halogenated flux contains less ionic halogen activator but actually a large amount of non-ionic halogen.

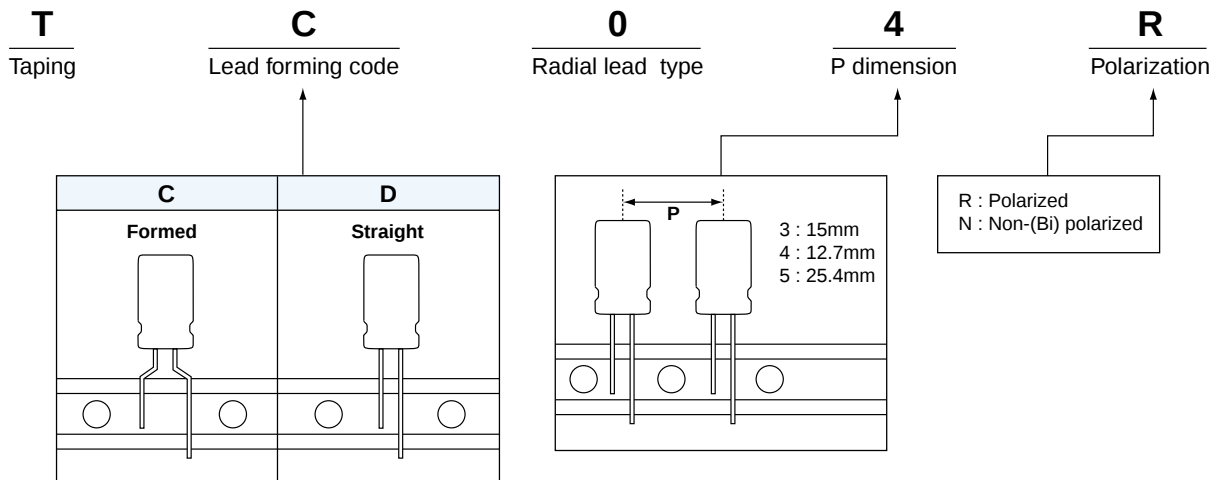
Per our analysis, AHQ3100K(Asahi) and POZ6(Senjyu) minimize ionic and non-ionic halogens.

Other Precautions to wash capacitors

- c) Monitor conductivity, pH, specific gravity and water content of cleaning agents. Contamination adversely affects the characteristics.
- d) The solvent may stay between the end seal and the PC board if the capacitor is mounted directly onto the PCB without a small gap. The residual solvent can cause defects. Also, washing for more than the specified time causes solvent residual. Therefore, wash the assembly board for at least 10 minutes at the recommended temperature. Be sure not to expose the capacitors under solvent rich conditions or keep capacitors inside a closed container.
- e) Reforming the leads of the capacitor to fit lead spacing on the PC board causes cleaning agents to get into the inside capacitor. This may result in corrosion to the foil. Therefore, use the capacitors, which fit the hole spacing on the PC board or reform the lead wires in a manner which will not cause mechanical stress to the capacitor body.



◆TAPING CODE (only applicable for radial type)



Information

Nippon Chemi-Con Corporation has decided that effective with the 2004 fiscal year we will introduce our "New Part Numbering System". We will publish the details and parameters of this new part numbering system in advance of its inception.

Environmental friendly capacitors

As you are very concerned about world-wide environmental protection, Nippon Chemi-Con also think about this issue and contribute to minimize banned materials.

Now we offer completely non-lead free products and non Polyvinyl Chloride (PVC) sleeve products. Please note that these products are commercialized as optional products.

◆Conductive polymer aluminum solid capacitor

Type	Series	Lead-Free	Non-PVC sleeve
Surface Mount	PXC, PXA	Lead free standard	Non-PVC standard
Radial Lead	PSA, PS	Lead free standard	Non-PVC standard

◆Aluminum electrolytic capacitor

Type	Series	Lead-Free	Non-PVC sleeve
Surface Mount (Type : VC)	MV, MVK, MVJ, MVA, MVE, MVY, MVZ, MV-BP, MVK-BP	Option	Non-PVC standard
	MKA, MZA	Lead free standard	Non-PVC standard
Surface Mount (Type : FC)	MF, MFK	Option	Non-PVC standard
Radial Lead (Type : VB)	SRE, KRE, SRG, KMA, SMQ, KMQ, SMG, KMG, LXV, LXY, LXZ, KY, KZE, KZH, KXG, KMX, GXE, GXL SRE-BP, KRE-BP, SRA-BP, KMA-BP, SME-BP, KME-BP	Option	Option
Snap-in (Type : VSSN, VNSN, LISN)	SMQ, KMQ, SMM, KMM, SMH, KMH	Option	Option
Screw-Mount (Type : LGSN)	SME, KMH, RWF, RWL	Lead free standard	Option

*Regarding to the other series, please consult us.

For more details of precautions and part numbering system for Environmentally friendly capacitors, please refer to Engineering Bulletin.

MINIMUM ORDER QUANTITY

Please order by units of minimum order quantity.

◆SURFACE MOUNT

●Horizontal



Series	Case code	Quantity (pcs)
Alchip® MF/MFK	A6	3,000
	B6	3,000
	C6	2,500
	D6, D8, D10, D13	2,500
	H15, H20, H25	500

●Vertical



Series	Case code	Quantity (pcs)	
		Taping	Tray
Alchip® MVS/MVA/MV/ MVK/MVY/MVJ MVH/MVE/MVL MKA/MVZ/MZA NP CAP™ PXC/PXA	B55	2,000	—
	D46, D55, D60	2,000	—
	E46, E55, E60	1,000	—
	F46, F55, F60	1,000	—
	F80	900	—
	H63, H70	1,000	—
	H10	500	—
	H12	400	—
	J80, J10	500	—
	J12	400	—
	K14	200	120
	K16	150	120
	L17, L22	*	80
	M17, M22	*	60

* Regarding to taping for L17/L22/M17/M22, please consult us.

◆RADIAL



Size	Quantity (pcs)	
	Bulk	Taping
φ3 (φ3.5)	200	3,000
φ4	200	2,000
φ5	200	2,000
φ6.3	200	2,000
φ8 (φ7)	200	1,000
φ10	Height ≤ 25mm	800
	Height ≥ 30mm	500
φ12.5	100	500
φ16	50	250
φ18	50	250

* The quantity of bulk is a typical example.

* Regarding to minimum order quantity for PSA/ PS series, please consult us.

◆SNAP-INS



200 pieces

TAPING SPECIFICATIONS

SURFACE MOUNT TYPE (TAPING)



◆CARRIER TAPE [mm]

Fig.1

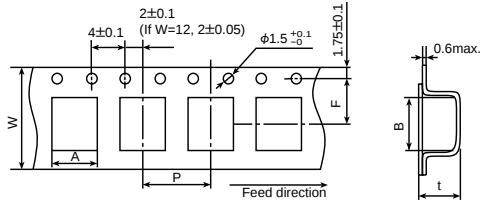


Fig.2

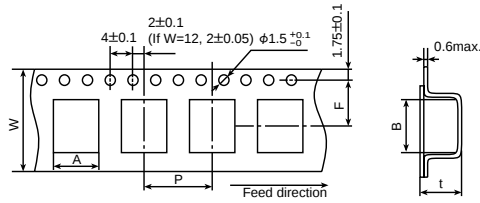


Fig.3

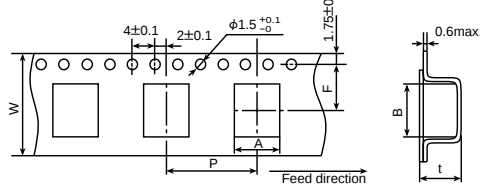


Fig.4

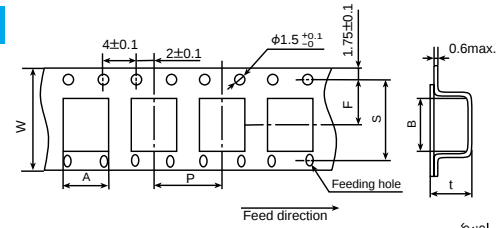
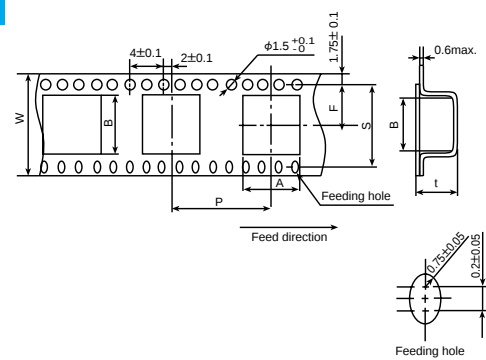


Fig.5

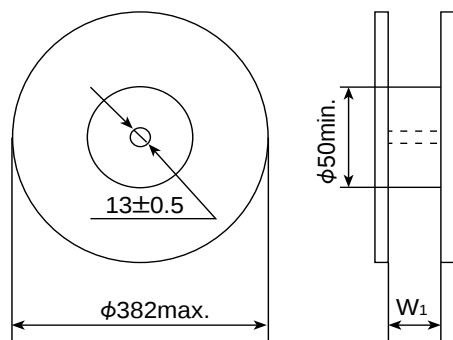


[mm]

Series	Items	W ±0.3	A ±0.2	B ±0.2	F ±0.1	P ±0.1	t ±0.2	S ±0.1	Fig.
Alchip® MF/MFK	A6	12.0	3.7	6.7	5.5	8.0	3.5	—	1
	B6	12.0	4.2	6.7	5.5	8.0	4.0	—	1
	C6	12.0	4.7	6.7	5.5	8.0	4.5	—	1
	D6	12.0	5.2	6.7	5.5	8.0	5.0	—	1
	D8	16.0	5.2	8.7	7.5	8.0	5.0	—	1
	D10	16.0	5.2	10.7	7.5	8.0	5.0	—	1
	D13	24.0	5.2	13.7	11.5	8.0	5.0	—	1
	H15	24.0	9.2	17.3	11.5	16.0	9.9	—	3
	H20	32.0	9.2	21.8	14.2	16.0	9.9	28.4	4
	H25	44.0	9.2	26.8	20.2	16.0	9.9	40.4	4
Alchip® MVS/MVA MVE/MV MVK/MVY MVJ/MVH MVL/MKA MVZ/MZA NP CAP™ PXC/PXA	B55	12.0	3.5	3.5	5.5	8.0	5.9	—	1
	D46	12.0	4.7	4.7	5.5	8.0	4.9	—	1
	D55	12.0	4.7	4.7	5.5	8.0	5.7	—	1
	D60	12.0	4.7	4.7	5.5	8.0	6.3	—	1
	E46	12.0	5.7	5.7	5.5	12.0	4.9	—	2
	E55	12.0	5.7	5.7	5.5	12.0	5.7	—	2
	E60	12.0	5.7	5.7	5.5	12.0	6.3	—	2
	F46	16.0	7.0	7.0	7.5	12.0	4.9	—	2
	F55	16.0	7.0	7.0	7.5	12.0	5.7	—	2
	F60	16.0	7.0	7.0	7.5	12.0	6.3	—	2
	F80	16.0	7.0	7.0	7.5	12.0	8.2	—	2
	H63	16.0	8.7	8.7	7.5	12.0	6.8	—	2
	H70	24.0	8.7	8.7	11.5	12.0	7.2	—	2
	H10	24.0	8.7	8.7	11.5	16.0	11.0	—	3
	H12	24.0	8.7	8.7	11.5	16.0	12.8	—	3
	J80	24.0	10.7	10.7	11.5	16.0	8.2	—	3
	J10	24.0	10.7	10.7	11.5	16.0	11.0	—	3
	J12	24.0	10.7	10.7	11.5	16.0	12.8	—	3
	K14	32.0	13.4	13.4	14.2	24.0	14.0	28.4	5
	K16	32.0	13.4	13.4	14.2	24.0	16.5	28.4	5

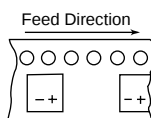
* Regarding to taping for L17/L22/M17/M22, please consult us.

◆ REEL DIMENSIONS [mm]

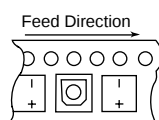


◆ POLARITY

Alchip[®] MF/MFK
(Horizontal)



Alchip[®] MVS/MV/MVK
(Vertical) MVY/MV.1/MVH/



MVE/MVL/MKA/
MVZ/MZA
NP CAP™ PXC/PXA

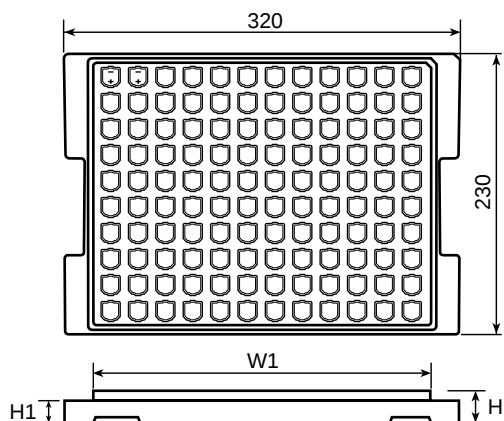
NP CAP™ PXC/PXA

◆QUANTITY PER REEL/BOX

Series	Case code	Quantity (pcs/reel)	Quantity (pcs/box)	W1 (mm)
Alchip® MF/MFK	A6	3,000	15,000	14
	B6	3,000	15,000	14
	C6	2,500	12,500	14
	D6	2,500	12,500	14
	D8, D10	2,500	12,500	18
	D13	2,500	7,500	26
	H15	500	1,500	26
	H20	500	1,000	34
	H25	500	1,000	46
Alchip® MVS/MVA MV/MVK MVY/MVJ MVH/MVE MVL/MKA MVZ/MZA NP CAP™ PXC/PXA	B55	2,000	10,000	14
	D46, D55, D60	2,000	10,000	14
	E46, E55, E60	1,000	5,000	14
	F46, F55, F60	1,000	5,000	18
	F80	900	4,500	18
	H63	1,000	5,000	18
	H70	1,000	3,000	26
	H10	500	1,500	26
	H12	400	1,200	26
	J80, J10	500	1,500	26
	J12	400	1,200	26
	K14	200	600	34
	K16	150	450	34

SURFACE MOUNT TYPE (TRAY)

◆ **DIMENSIONS [mm]**



◆ TRAY CODE

Example

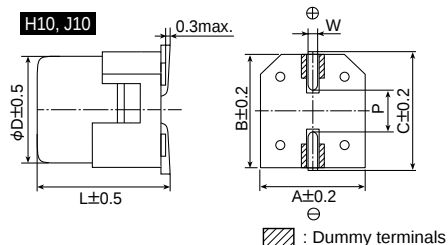
Capacitor's P/N	TR
MVE6.3VE 4700M L22	TR



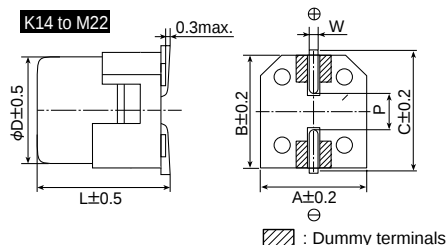
Case code	H [mm]	W1 [mm]	H1 [mm]	Quantity [pcs/tray]	Quantity [pcs/box]
K14 & K16	21.0	284	18.5	120	600
L17 & L22	28.0	284	24.0	80	400
M17 & M22	28.0	284	24.0	60	300

VIBRATION PROOF STRUCTURE (Type : VE)

◆ DIMENSIONS [mm]

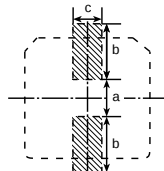


 : Dummy terminals



 : Dummy terminals

◆RECOMMENDED SOLDER LAND



 Solder land on PC board

Case code	Dimensions of products							Solder land		
	D	L	A	B	C	W	P	a	b	c
H10	8	10.0	8.3	8.3	9.0	0.7 to 1.1	3.1	3.1	4.2	2.2
J10	10	10.0	10.3	10.3	11.0	0.7 to 1.1	4.5	4.5	4.4	2.2
K14	12.5	13.5	13.0	13.0	13.7	1.0 to 1.3	4.2	3.4	6.3	9.3
K16	12.5	16.0	13.0	13.0	13.7	1.0 to 1.3	4.2	3.4	6.3	9.3
L17	16	16.5	17.0	17.0	18.0	1.0 to 1.3	6.5	4.7	7.8	9.6
L22	16	21.5	17.0	17.0	18.0	1.0 to 1.3	6.5	4.7	7.8	9.6
M17	18	16.5	19.0	19.0	20.0	1.0 to 1.3	6.5	4.7	8.8	9.6
M22	18	21.5	19.0	19.0	20.0	1.0 to 1.3	6.5	4.7	8.8	9.6

TAPING SPECIFICATIONS

RADIAL LEAD TYPE (TAPING)

◆CARRIER TAPE [mm]

Fig.1

φD=φ3 to 8

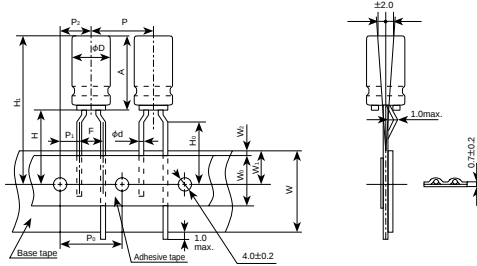


Fig.2

φD=φ5

φD×L=φ4×7

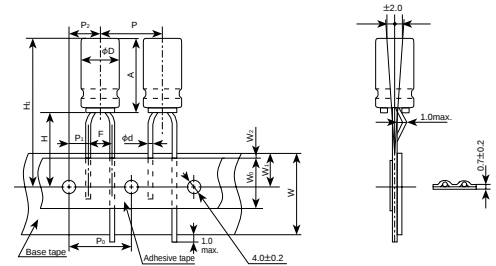


Fig.3

φD=φ6.3 to 8

φD=φ10 & 12.5

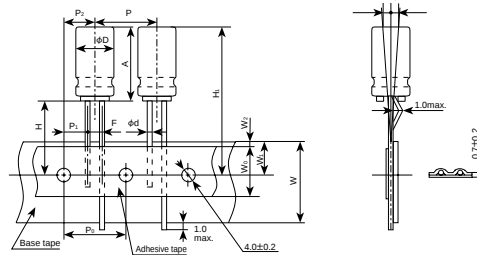
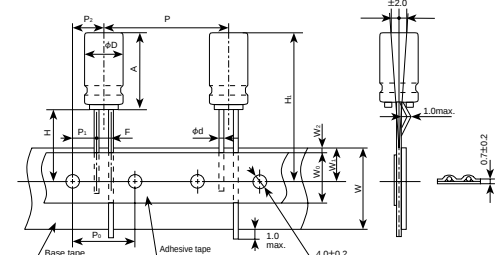


Fig.4

φD=φ12.5



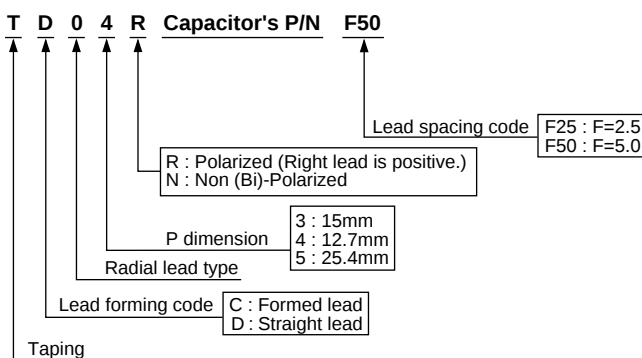
Code	Case size		φd	P	P ₀	P ₁	P ₂	F	W	W ₀	W ₁	W ₂	H	H ₀	H ₁	Fig.	Taping code
	φD	A															
tol.	—	—	±0.05	±1.0	±0.2	±0.7	±1.0	+0.8 -0.2	±0.5	min.	±0.5	max.	±0.75	±0.5	—	—	—
Nominal	3	5	0.4	12.7	12.7	5.1	6.35	2.5	18.0	6.0	9.0	1.5	17.5	16.0	—	1	TC04R F25
	3.5	5	0.4	12.7	12.7	5.1	6.35	2.5	18.0	6.0	9.0	1.5	17.5	16.0	—	1	TC04R F25
	4	5 to 7	0.45	12.7	12.7	5.1 3.85	6.35	2.5 5	18.0	6.0	9.0	1.5	17.5	16.0	—	2	TD04R F25
		9 to 11.5	0.45	12.7	12.7	5.1 3.85	6.35	2.5 5	18.0	10.0	9.0	1.5	17.5	16.0	—	1	TC04R F50
	5	5 to 7	0.45	12.7	12.7	5.1 3.85	6.35	2.5 5	18.0	6.0	9.0	1.5	17.5	16.0	—	2	TD04R F25
		9 to 15	0.5	12.7	12.7	5.1 3.85	6.35	2.5 5	18.0	10.0	9.0	1.5	18.5	16.0	—	1	TC04R F50
	6.3	5 to 7	0.45	12.7	12.7	5.1 3.85	6.35	2.5 5	18.0	6.0	9.0	1.5	17.5	16.0	—	2	TD04R F25
		9 to 15	0.5	12.7	12.7	5.1 3.85	6.35	2.5 5	18.0	10.0	9.0	1.5	18.5	16.0	—	1	TC04R F50
	7	5 to 7	0.45	12.7	12.7	5.1 3.85	6.35	2.5 5	18.0	6.0	9.0	1.5	17.5	16.0	—	3	TD04R F25
		9 to 15	0.5	12.7	12.7	5.1 3.85	6.35	2.5 5	18.0	10.0	9.0	1.5	18.5	16.0	—	1	TC04R F50
	8	5 to 7	0.45	12.7	12.7	5.1 3.85	6.35	2.5 5	18.0	6.0	9.0	1.5	17.5	16.0	—	3	TD04R F25
		9 to 20	0.6	12.7	12.7	3.85	6.35	5	18.0	10.0	9.0	1.5	20.0	16.0	—	1	TC04R F50
tol.	±0.5	max.	±0.05	±1.0	±0.3	±0.7	±1.3	+0.8 -0.2	±0.5	min.	±0.5	max.	+2.0 -0	—	—	—	—
Nominal	10	21	0.6	12.7	12.7	3.85	6.35	5	18.0	12.5	9.0	1.5	18.0	—	—	3	TD04R F50 H18
	12.5	26	0.6	15	15	5.0	7.5	5	18.0	12.5	9.0	1.5	18.0	—	—	3	TD03R F50 H18
			0.6	25.4	12.7	3.85	6.35	5	18.0	12.5	9.0	1.5	18.0	—	—	4	TD05R F50 H18

* 1 : For φ4×7 (A=7, F=25), shall be 18.5^{-0.5/+0.75} (code : TD04R F25) at Fig.2.

* 2 : P=15 taping is not standard. Use P=25.4 taping.

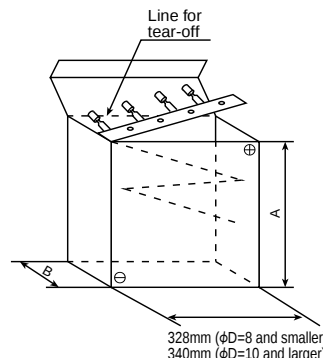
TAPING CODE

Example



QUANTITY PER AMMO PACK

Ammo pack box



Typical example

Case size φD × L (mm)	A (mm)	B (mm)	Quantity (pcs.)
φ3	216	42	3,000
φ3.5	216	42	3,000
φ4	L=5 & 7mm	183	42
	L=11.5mm	183	51
φ5	L=5 & 7mm	232	42
	L=9 to 15mm	232	51
φ6.3	L=5 & 7mm	282	42
	L=9 to 15mm	284	51
φ7	L=5 & 7mm	232	42
	L=9 to 15mm	232	51
φ8	L=5 & 7mm	232	42
	L=9 to 15mm	232	51
φ10	L=17 & 20mm	235	53
	L=25mm	308	62
φ12.5	L=30mm	308	67
	L=50mm	308	67

* Regarding to taping specifications for PSA/PS series, please consult us.

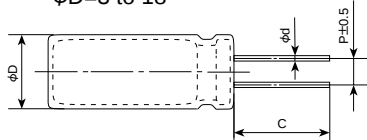
RADIAL LEAD TYPE (CUT/FORMED LEAD)

The following lead configurations are available upon request. When ordering, please indicate the type of lead configurations by using the appropriate supplement code, such as C5, FC, MC or RC in the product part number.

[mm]

●Lead Configuration : C5

$\phi D=3$ to 18



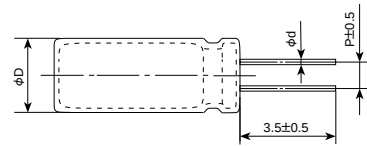
Case diameter C:Lead length

$\phi D=3$ to 8 : 5.0 ± 0.5

$\phi D=10$ to 18 : $5.0^{+1.0}_{-0}$

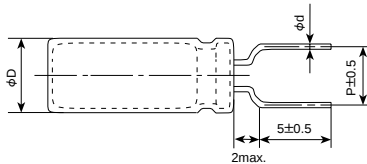
●Lead Configuration : C3.5

$\phi D=3$ to 18



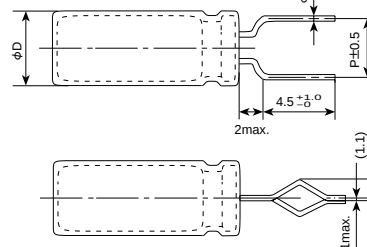
●Lead Configuration : FC

$\phi D=5$ to 8



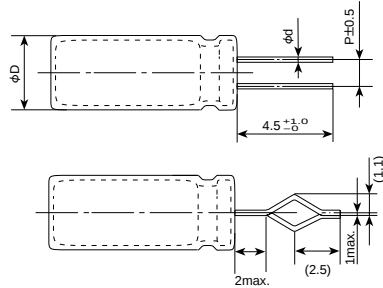
●Lead Configuration : FM

$\phi D=5$ to 8



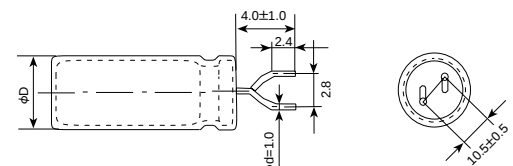
●Lead Configuration : MC

$\phi D=10$ to 18



●Lead Configuration : RC

$\phi D=20$ & 22

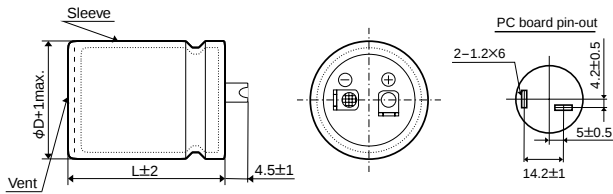


* Regarding to cut/formed lead for PSA/PS series, please consult us.

AVAILABLE TERMINALS FOR SNAP-IN TYPE [mm]

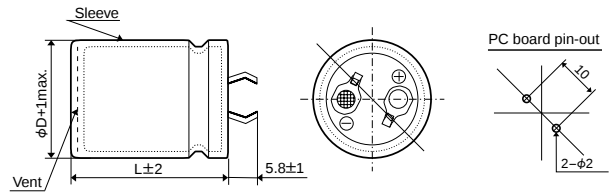
D=φ30 to φ40mm

Type : LISN



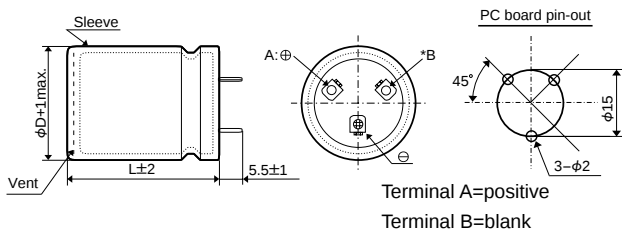
D=φ22 to φ35mm

Type : VNSN



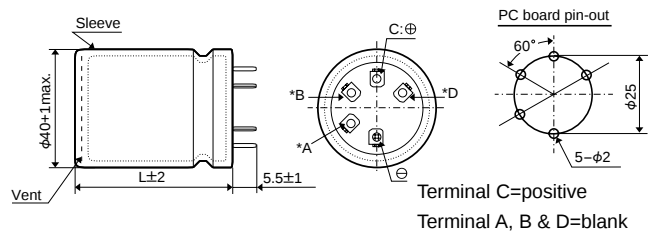
D=φ35 & φ40mm

Type : VRSS



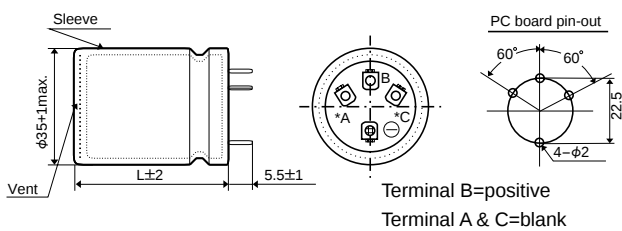
D=φ40mm

Type : VRST

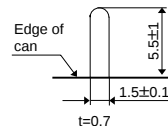


D=φ35 & φ40mm

Type : VRSD



VR pin Dimensions

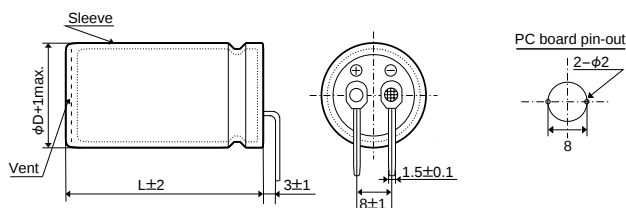


CAUTION

* Use the blank terminals for mechanical support only.
The blank terminals must not be connected to any copper trace on PC board.
Be sure to electrically isolate from the negative and the positive terminals.

D=φ20×30 to φ50 φ mm, φ22×30 to φ50 φ mm

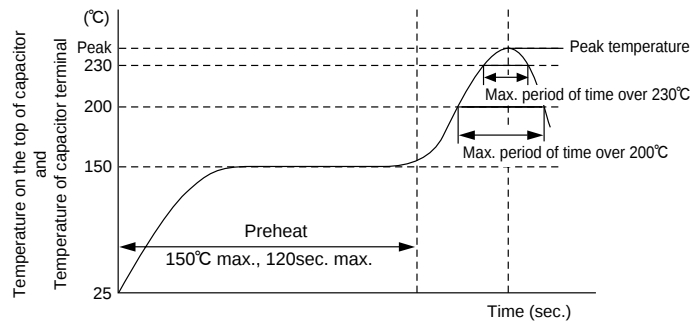
Type : LCSN



RECOMMENDED REFLOW SOLDERING CONDITION

NP CAP™-PXC/PXA Series

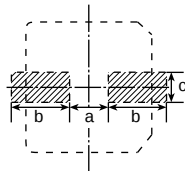
The following conditions are recommended for air or infrared reflow soldering PXC/PXA series onto a glass epoxy circuit board of 90×50×0.8mm (with resist) by cream solder. The temperatures shown are the surface temperature values on the top of the can and temperature of capacitor terminal.



Series	Peak temp.	Max.Period of time over 230°C	Max.Period of time over 200°C	Remarks
PXC	250°C (240°C)	40sec (30sec)	60sec (50sec)	The times of reflow soldering : once
PXA	250°C (240°C)	30sec	50sec	The times of reflow soldering : twice

() : Applies for 20V 82μF(J80) and 25V 39μF(J80)

●Recommended Solder Land on PC Board



Solder land on PC board

Case code	a	b	c
F55	1.9	3.5	1.6
F60	1.9	3.5	1.6
H70, H12	3.1	4.2	2.2
J80, J12	4.5	4.4	2.2

◆PRECAUTIONS FOR USERS

Soldering method

The capacitors of NP CAP™-PXC/PXA series have no capability to withstand such dip or wave soldering as totally immersing components into a solder bath.

Reflow soldering

Reflow the capacitors within Recommended Reflow Soldering Conditions. Verify no temperature stress to the capacitors because the following differences might degrade capacitors electrically and mechanically. Please consult us if other reflow conditions are employed.

- 1.Location of components ; Temperature increases at the edge of PC board more than the center.
- 2.Population of PC board ; The less the component population is, the more temperature rises.
- 3.Material of PC board ; A ceramic-made board needs more heat than a glass epoxy-made board. The heat increase may cause damage of the capacitors.
- 4.Thickness of PC board ; A thicker board needs heat than a thinner board. The heat may damage the capacitors.
- 5.Size of PC board ; A larger board needs heat than a smaller board. The heat may damage the capacitors.
- 6.Location of infrared ray lamps ; IR reflow as well as hot plate reflow applies heat only on the reverse side of the PC board to lessen heat stress to the capacitors.

Rework of soldering

Use a soldering iron for rework. Do not exceed an iron tip temperature of 300°C and an exposure time of 5 seconds.

Mechanical stress

Do not grab the capacitors to lift the PC board and give stress to the capacitor. Avoid bending the PC board. These may damage the capacitors.

Cleaning assembly board

Immediately after solvent cleaning, remove residual solvent for at least 10 minutes with an air knife. The solvent is so insufficiently dry that the capacitors may be corroded.

Coating on assembly board

- 1.Before curing coating material, remove the cleaning solvents from the assembly board.
- 2.Before conformal coating, a chloride free pre-coat material is recommended to use for lessening stress to the capacitors.

Molding with resin

Internal chemical reaction gradually produces gas in the capacitor; then, internal pressure is increasing. If the end seal of the capacitor is completely molded with a resin, the gas stays inside the capacitor. It will face dangerous situation. The chlorine in resin will penetrate into the end seal, reach the inside element, and cause damage of the capacitor.

Glue

The followings are requirements of glue.

- 1.A low curing temperature for short period of time
- 2.Strong adhesion and heat resistance after curing
- 3.Long shelf life
- 4.No corrosion

Others

Precautions for users for Aluminum Electrolytic Capacitors shall be referred.

RECOMMENDED REFLOW SOLDERING CONDITIONS

Alchip®-MF/MFK/MFK-Large

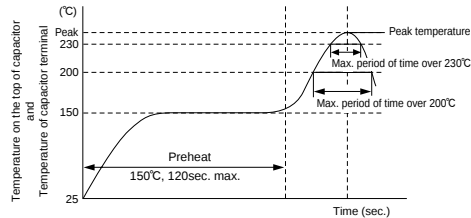
The following conditions are recommended for air or infrared reflow soldering of the surface mount capacitors onto a glass epoxy circuit board of 90X50X0.8mm (with resist) by cream solder. The temperatures shown are the surface temperature values on the top of the can and temperature of capacitor terminal.

●Reflow Profile

Method : Air or Infrared Reflow

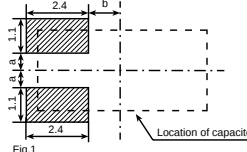
●Recommended Solder Land on PC Board

Series : MF/MFK/MFK-Large (Horizontal SMT)



Size	Peak temp.	Max. period of time over 200°C
A6~D13	240°C	20sec
	230°C	30sec
	220°C	35sec
H15~H25	230°C	20sec
	220°C	30sec

Without dummy terminal (FC)



With dummy terminal (FD)

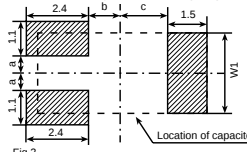
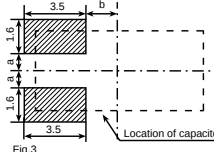


Fig.1 Fig.2
: Solder land on PC board

MFK-large



Case code	a	b	c	W1	Fig.
A6	0.75	1.2	1.65	3.1	Fig.1 or Fig.2
B6	1.0	1.2	1.65	3.6	
C6	1.3	1.2	1.65	4.1	
D6	1.5	1.2	1.65	4.6	
D8	1.5	2.2	2.65	4.6	
D10	1.5	3.2	3.65	4.6	Fig.3
D13	1.5	4.7	5.15	4.6	
H15	2.9	5.4	—	—	
H20	2.9	7.9	—	—	
H25	2.9	10.4	—	—	

◆PRECAUTIONS FOR USERS

Soldering method

The capacitors of Alchip-series have no capability to withstand such dip or wave soldering as totally immerses components into a solder bath.

Reflow soldering

Reflow the capacitors within Recommended Reflow Soldering Conditions. Verify no temperature stress to the capacitors because the following differences might degrade capacitors electrically and mechanically. Please consult us if other reflow conditions are employed.

1. Location of components ; Temperature increases at the edge of PC board more than the center.
2. Population of PC board ; The less the component population is, the more temperature rises.
3. Material of PC board ; A ceramic made board needs more heat than a glass epoxy made board. The heat increase may cause damage of the capacitors.
4. Thickness of PC board ; A thicker board needs more heat than a thinner board. The heat increase may damage the capacitors.
5. Size of PC board ; A larger board needs more heat than a smaller board. The heat increase may damage the capacitors.
6. Location of infrared ray lamps ; IR reflow as well as hot plate reflow applies heat only on the reverse side of the PC board to lessen heat stress to the capacitors.

Rework of soldering

Avoid reflow soldering more than once. Use a soldering iron for rework. Do not exceed an iron tip temperature of 300°C and an exposure time of 5 seconds.

Mechanical stress

Do not use the capacitors for lifting the PC board and give stress to the capacitor. Avoid bending the PC board. These may damage the capacitors.

Glue

Glue is recommended to fix the FC type without dummy terminal on PC board. The followings are requirements of glue.

1. A low curing temperature for short period of time
2. Strong adhesion and heat resistance after curing
3. Long shelf life
4. No corrosion

Cleaning assembly board

Immediately after solvent cleaning, remove residual solvent for at least 10 minutes with an air knife. The solvent is so insufficiently dry for a long period of time that the capacitors may be corroded.

Coating on assembly board

1. Before curing coating material, remove the cleaning solvents from the assembly board.
2. Before conformal coating, a chloride free pre-coat material is recommended to use for lessening stress to the capacitors.

Molding with resin

Internal chemical reaction gradually produces gas in the capacitor; then, internal pressure is increasing. If the end seal of the capacitor is completely molded with a resin, the gas stays inside the capacitor. It will face dangerous situation. The chlorine contained resin will penetrate into the end seal, reach the inside element, and cause damage of the capacitor.

Dummy terminal (FD type)

The dummy terminal is purpose for preventing the capacitor body from sliding or lifting up the PC board during reflow soldering.

The following mechanical stresses to the capacitor after the soldering causes peeling off the dummy terminal from the PC board or from the body of the capacitor.

1. Mechanical shock when bending or cutting a multi-board.
2. Transportation shock
3. Mechanical shock when grabbing, poking or hitting the body of the capacitor.

Others

Precautions and Guidelines for Aluminum Electrolytic Capacitors shall be referred.

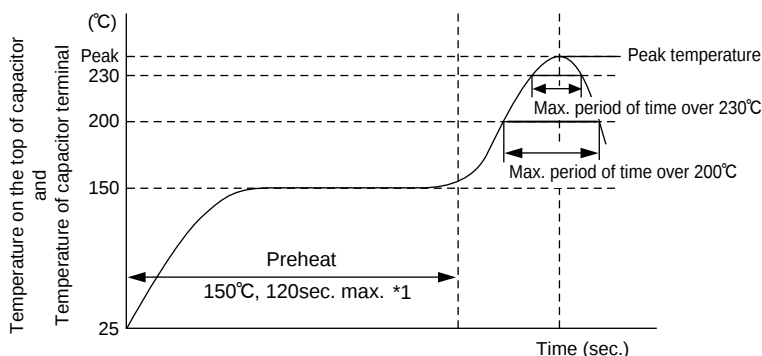
RECOMMENDED REFLOW SOLDERING CONDITIONS

Alchip[®]-MVS/MV/MVA/MVE/MVK/MVY/MVJ/MVH/MVL/MKA/MVZ/MZA

The following conditions are recommended for air or infrared reflow soldering of the surface mount capacitors onto a glass epoxy circuit board of 90×50×0.8mm (with resist) by cream solder. The temperatures shown are the surface temperature values on the top of the can and temperature of capacitor terminal.

●Reflow Profile

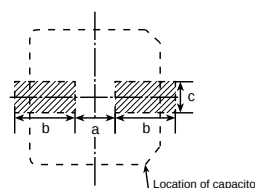
Method : Air or Infrared Reflow



*1 : MKA series : 150~180°C, 90sec. max.

●Recommended Solder Land on PC Board

Series : MVS/MVA/MV/MVE/MVK/MVY/MVJ/
MVH/MVL/MKA/MVZ/MZA (Vertical SMT)



▨ : Solder land on PC board

Series	Size	Peak temp.	Max.period of time over 230°C	Max.period of time over 200°C
MVS/MVA	B55 to F80	240°Cmax.	—	20sec
MV/MVE		230°Cmax.	—	30sec
MVK/MVY		220°Cmax.	—	35sec
MVJ/MVH	H63 to M22	230°Cmax.	—	20sec
MVL/MVZ		220°Cmax.	—	30sec
MZA	D61 to F80	250°Cmax.	30sec	60sec
	H10, J10	240°Cmax.	20sec	50sec
MKA	D55 to F80	250°Cmax.	40sec	70sec
	H63 to J10	240°Cmax.	20sec	50sec

Case code	a	b	c
B55	0.8	2.2	1.6
D46, D55, D60	1.0	2.6	1.6
E46, E55, E60	1.4	3.0	1.6
F46, F55, F60, F80	1.9	3.5	1.6
H63	2.3	4.5	1.6
H10	3.1	4.2	2.2
J10	4.5	4.4	2.2
K14, K16	4.0	5.7	2.5
L17, L22	4.7	7.8	9.6
M17, M22	4.7	8.8	9.6

◆PRECAUTIONS FOR USERS

Soldering method

The capacitors of Alchip-series have no capability to withstand such dip or wave soldering as totally immerses components into a solder bath.

Reflow soldering

Reflow the capacitors within Recommended Reflow Soldering Conditions. Verify no temperature stress to the capacitors because the following differences might degrade capacitors electrically and mechanically. Please consult us if other reflow conditions are employed.

- 1.Location of components ; Temperature increases at the edge of PC board more than the center.
- 2.Population of PC board ; The less the component population is, the more temperature rises.
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Rework of soldering

Avoid reflow soldering more than once. Use a soldering iron for rework. Do not exceed an iron tip temperature of 300°C and an exposure time of 5 seconds.

Mechanical stress

Do not use the capacitors for lifting the PC board and give stress to the capacitor. Avoid bending the PC board. These may damage the capacitors.

Cleaning assembly board

Immediately after solvent cleaning, remove residual solvent for at least 10 minutes with an air knife. The solvent is so insufficiently dry for a long period of time that the capacitors may be corroded.

Coating on assembly board

- 1.Before curing coating material, remove the cleaning solvents from the assembly board.
- 2.Before conformal coating, a chloride free pre-coat material is recommended to use for lessening stress to the capacitors.

Molding with resin

Internal chemical reaction gradually produces gas in the capacitor; then, internal pressure is increasing. If the end seal of the capacitor is completely molded with a resin, the gas stays inside the capacitor. It will face dangerous situation. The chlorine contained resin will penetrate into the end seal, reach the inside element, and cause damage of the capacitor.

Others

Precautions and Guidelines for Aluminum Electrolytic Capacitors shall be referred.

The following series are discontinued. Please use the recommended replacements in the table.

◆LEAD TYPE REPLACEMENTS



Discontinued series	Characteristics	Replacements
SL	85°C standard	SMG
SM		
SMC		
KM	105°C standard	KME
KMC		
SM-BP	85°C bi-polarized	SME-BP
KM-BP	105°C bi-polarized	KME-BP
SR	85°C low profile	SRG
SRC		
SRJ		
SX	Low impedance	LXV
SXA		
SXC		
RX		
RXC		
LXE	Low impedance Long life	LXY
SXF		
LXF		
TXF	Long life	LXA
LX (10 to 63V _{dc})		
KX	High heat resistance	GXE
KXC		
GX	High temperature performance	LXY
EU		
LL	Low leakage current	LLA
LR		
KHA	High ripple current	KMF / KMX
KXB		
BX	JIS B X-characteristics	KMG
SM (VP-type)	85°C large radial	SMG / SMH
SRF		
GX-VH	High operating temperature	*
SD	2 volt	
KRL	105°C low leakage current	
KSA	Bi-polarized high ripple	

◆SNAP-IN REPLACEMENTS



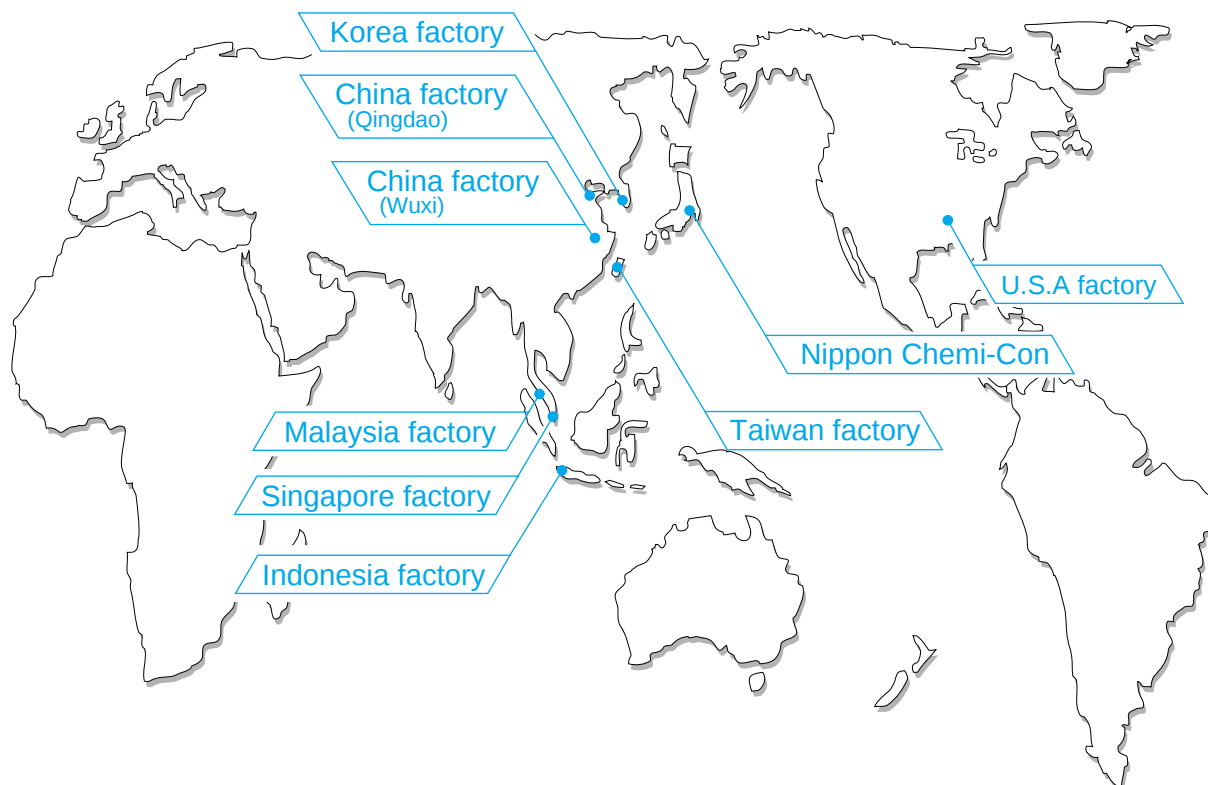
Discontinued series	Characteristics	Replacements
SM	85°C standard	SMH / SMM
SME		
SMG		
KM	105°C standard	KMH / KMM
KME		
KMG		
NM	Long case size	SMH
NMA	Long height	
BK	High ripple current	KMH / KMM
NM-HR	JIS B X-characteristics	
BX	Long life	LXG / LXQ
LX		
LXA	Low impedance	*
RZ		

◆SCREW-MOUNT TERMINAL REPLACEMENTS



Discontinued series	Characteristics	Replacements
EW	85°C standard	SME
PW		
MW		
GW		
SW	100°C	KMH
RW	For inverter	RWE / RWF
RWA		
KM	High reliability	KMH
KME	Low impedance	KW
FW		

*Please consult us GX-VH, SD, KRL, KSA, and RZ series.



◆AVAILABLE ITEMS BY MANUFACTURING LOCATIONS

Classification	Series	Korea factory	China factory (Qingdao)	China factory (Wuxi)	Singapore factory	Indonesia factory	Taiwan factory	Malaysia factory	U.S.A. factory
SMD	MV				●	●			
	MVK				●				
Low Profile	SRE				●	●			
	KRE				●				
	SRA	●	●			●	●		
	KMA	●				●	●		
	SRG	●				●			
General purpose	SMG	●	●	●	●	●	●		
	KMG	●	●	●	●	●	●		
	KME	●	●	●	●	●	●		
Bi-polar	SME-BP	●	●		●	●	●		
	KME-BP	●	●		●	●	●		
Low impedance, High ripple	KMF			●	●	●	●		
	LXV			●	●		●		
	KY			●	●	●	●		
	KZE			●	●	●	●		
	KMX			●			●		
Snap-in	SMH			●				●	●
	KMH			●				●	●
	SMM			●				●	●
	KMM			●				●	●
Screw-mount Terminal	KMH								●
	RWE								●
	RWF								●
	RWL								●
	LXA								●
	LX								●



Conductive Polymer Aluminum Solid Capacitors

New!
NP CAP™ **PXC** Series

- Super low ESR, impedance and high heat resistance have been obtained by using conductive polymer as electrolyte.
(ESR and rated ripple current values are improved from PXA series.)
- Rated voltage range : 2.5 to 16V_{dc}, Capacitance range : 27 to 470μF
- Case size range : φ5×6.0mm to φ8×7.0mm
- Suitable for DC-DC converters, voltage regulators and decoupling applications used to computer motherboards etc.

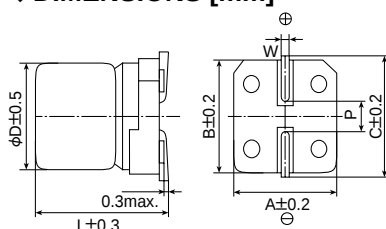


◆ SPECIFICATIONS

Items	Characteristics										
Category											
Temperature Range	−55 to +105°C										
Rated Voltage Range	2.5 to 16V _{dc}										
Capacitance Tolerance	±20% (M) (at 20°C, 120Hz)										
Surge Voltage	Rated voltage×1.15V (at 105°C)										
Leakage Current	I=0.2CV (max.) I : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V _{dc}) (at 20°C after 2 minutes)										
Dissipation Factor (tanδ)	0.12 max. (at 20°C, 120Hz)										
Low Temperature Characteristics (Max. Impedance Ratio)	Z(−25°C)/Z(+20°C)≤1.15 Z(−55°C)/Z(+20°C)≤1.25 (at 100kHz)										
Endurance	The following specifications shall be satisfied when the capacitors are restored to 20°C after the rated voltage is applied for 1000 hours at 105°C. <table border="1"> <tr> <td>Appearance</td><td>No significant damage</td></tr> <tr> <td>Capacitance change</td><td>≤±20% of the initial value</td></tr> <tr> <td>DF (tanδ)</td><td>≤150% of the initial specified value</td></tr> <tr> <td>ESR</td><td>≤150% of the initial specified value</td></tr> <tr> <td>Leakage current</td><td>≤The initial specified value</td></tr> </table>	Appearance	No significant damage	Capacitance change	≤±20% of the initial value	DF (tanδ)	≤150% of the initial specified value	ESR	≤150% of the initial specified value	Leakage current	≤The initial specified value
Appearance	No significant damage										
Capacitance change	≤±20% of the initial value										
DF (tanδ)	≤150% of the initial specified value										
ESR	≤150% of the initial specified value										
Leakage current	≤The initial specified value										
Bias Humidity	The following specifications shall be satisfied when the capacitors are restored to 20°C after subjecting them to the DC rated voltage at 60°C, 90 to 95% RH for 500 hours. <table border="1"> <tr> <td>Appearance</td><td>No significant damage</td></tr> <tr> <td>Capacitance change</td><td>≤±20% of the initial value</td></tr> <tr> <td>DF (tanδ)</td><td>≤150% of the initial specified value</td></tr> <tr> <td>ESR</td><td>≤150% of the initial specified value</td></tr> <tr> <td>Leakage current</td><td>≤The initial specified value</td></tr> </table>	Appearance	No significant damage	Capacitance change	≤±20% of the initial value	DF (tanδ)	≤150% of the initial specified value	ESR	≤150% of the initial specified value	Leakage current	≤The initial specified value
Appearance	No significant damage										
Capacitance change	≤±20% of the initial value										
DF (tanδ)	≤150% of the initial specified value										
ESR	≤150% of the initial specified value										
Leakage current	≤The initial specified value										
Surge Voltage	The capacitors shall be subjected to 1000 cycles each consisting of charge with the surge voltage specified at 105°C for 30 seconds through a protective resistor(R=1kΩ) and discharge for 5 minutes 30 seconds. <table border="1"> <tr> <td>Appearance</td><td>No significant damage</td></tr> <tr> <td>Capacitance change</td><td>≤±20% of the initial value</td></tr> <tr> <td>DF (tanδ)</td><td>≤150% of the initial specified value</td></tr> <tr> <td>ESR</td><td>≤150% of the initial specified value</td></tr> <tr> <td>Leakage current</td><td>≤The initial specified value</td></tr> </table>	Appearance	No significant damage	Capacitance change	≤±20% of the initial value	DF (tanδ)	≤150% of the initial specified value	ESR	≤150% of the initial specified value	Leakage current	≤The initial specified value
Appearance	No significant damage										
Capacitance change	≤±20% of the initial value										
DF (tanδ)	≤150% of the initial specified value										
ESR	≤150% of the initial specified value										
Leakage current	≤The initial specified value										
Failure Rate	1% per 1000 hours maximum (Confidence level 60% at 105°C)										

*Note : If any doubt arises, measure the leakage current after following voltage treatment.
Voltage treatment : DC rated voltage are applied to the capacitors for 120 minutes at 105°C.

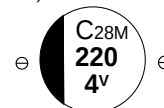
◆ DIMENSIONS [mm]



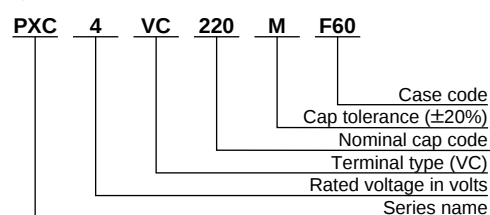
Case code	φD	L	A	B	C	W	P
E60	5	5.7	5.3	5.3	5.9	0.5 to 0.8	1.4
F60	6.3	5.7	6.6	6.6	7.2	0.5 to 0.8	1.9
H70	8	6.7	8.3	8.3	9.0	0.7 to 1.1	3.1

◆ MARKING

EX) PXC4VC220M



◆ PART NUMBERING SYSTEM



Capacitance	Code
39μF	39
100μF	100
220μF	220



◆STANDARD RATINGS

Case code	Rated voltage (V _{dc})	Nominal Capacitance (μF)	ESR (mΩmax./20°C)		Rated ripple current (mA _{rms} /100k to 300kHz) -55 to +105°C
			100kHz	300kHz**	
E60	2.5	180	30	22	2,000
	4	150	30	22	2,000
	6.3	100	35	26	1,780
	10	56	40	31	1,660
	16	27	45	35	1,570
F60	2.5	270	20	18	2,700
	4	220	21	19	2,640
	6.3	180	22	19	2,580
	10	82	23	21	2,400
	16	39	25	23	2,300
H70	2.5	470	17	16	3,420
	4	330	18	17	3,300
	6.3	220	18	17	3,300
	10	150	20	19	3,160
	16	82	25	23	2,830

** ESR(300kHz) : Reference value

Upgrade!
NP CAP™ - **PXA** Series

- Super low ESR, impedance and high heat resistance have been obtained by using conductive polymer as electrolyte
- Rated voltage range : 2.5 to 25V_{dc}, case size range : $\phi 6.3 \times 5.5\text{mm}$ to $\phi 10 \times 12.2\text{mm}$ (Case code H12 and J12 newly added)
- Suitable for DC-DC converters, voltage regulators and decoupling applications used to computer motherboards etc.
- High heat resistance to reflow soldering (See reflow soldering conditions)

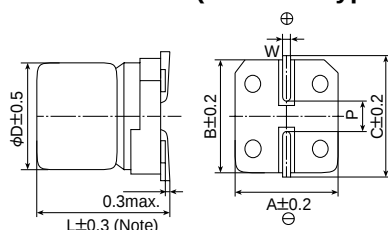


◆ SPECIFICATIONS

Items	Characteristics	
Category		
Temperature Range	-55 to +105℃	
Rated Voltage Range	2.5 to 25V _{dc}	
Capacitance Tolerance	±20% (M) (at 20℃, 120Hz)	
Surge Voltage	Rated voltage×1.15V (at 105℃)	
Leakage Current	Shall not exceed values shown in STANDARD RATINGS. (at 20℃ after 2 minutes)	
Dissipation Factor (tanδ)	0.12 max. (at 20℃, 120Hz)	
Low Temperature Characteristics (Max. Impedance Ratio)	Z(-25℃)/Z(+20℃)≤1.15 Z(-55℃)/Z(+20℃)≤1.25 (at 100kHz)	
Endurance	The following specifications shall be satisfied when the capacitors are restored to 20℃ after the rated voltage is applied for 2000 hours at 105℃.	
	Appearance	No significant damage
	Capacitance change	≤±20% of the initial value
	DF (tanδ)	≤150% of the initial specified value
	ESR	≤150% of the initial specified value
	Leakage current	≤The initial specified value
Bias Humidity	The following specifications shall be satisfied when the capacitors are restored to 20℃ after subjecting them to the DC rated voltage at 60℃, 90 to 95% RH for 500 hours.	
	Appearance	No significant damage
	Capacitance change	≤±20% of the initial value
	DF (tanδ)	≤150% of the initial specified value
	ESR	≤150% of the initial specified value
	Leakage current	≤The initial specified value
Surge Voltage	The capacitors shall be subjected to 1000 cycles each consisting of charge with the surge voltage specified at 105℃ for 30 seconds through a protective resistor(R=1kΩ) and discharge for 5 minutes 30 seconds.	
	Appearance	No significant damage
	Capacitance change	≤±20% of the initial value
	DF (tanδ)	≤150% of the initial specified value
	ESR	≤150% of the initial specified value
	Leakage current	≤The initial specified value
Failure Rate	1% per 1000 hours maximum (Confidence level 60% at 105℃)	

*Note : If any doubt arises, measure the leakage current after following voltage treatment.
Voltage treatment : DC rated voltage are applied to the capacitors for 120 minutes at 105°C.

◆ DIMENSIONS (Terminal Type=VC) [mm]

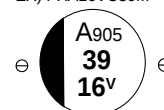


Note : L±0.5 for H12 and J12

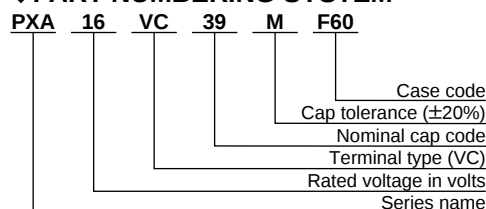
Case code	φD	L	A	B	C	W	P
F55	6.3	5.2	6.6	6.6	7.2	0.5 to 0.8	1.9
F60	6.3	5.7	6.6	6.6	7.2	0.5 to 0.8	1.9
H70	8	6.7	8.3	8.3	9.0	0.7 to 1.1	3.1
J80	10	7.7	10.3	10.3	11.0	0.7 to 1.1	4.5
H12	8	12.0	8.3	8.3	9.0	0.7 to 1.1	3.1
J12	10	12.2	10.3	10.3	11.0	0.7 to 1.1	4.5

◆ MARKING

EX) PXA16VC39M



◆ PART NUMBERING SYSTEM



Capacitance	Code
39μF	39
100μF	100
1000μF	1000

◆STANDARD RATINGS

Case code	Rated voltage (V _{dc})	Nominal Capacitance (μF)	Leakage current (μA _{max.} after 2 min.)	ESR (mΩ _{max.} / 20°C, 100kHz)	Rated ripple current (mA _{rms} /100k to 300kHz) -55 to +105°C
F55	2.5	220	110	25	2,500
	4	100	80.0	26	2,450
		150	120		
	6.3	82	103	27	2,400
		100	126		
	10	56	112	31	2,250
F60	16	39	125	37	2,050
	20	22	88.0	50	1,650
	2.5	220	110	25	2,500
	4	100	80.0	26	2,450
		150	120		
	6.3	68	85.7	27	2,400
		82	103		
		100	126		
		120	151		
	10	47	94.0	31	2,250
		56	112		
	16	33	106	37	2,050
39		125			
20	22	88.0	50	1,650	
25	10	125	65	1,500	
H70	2.5	560	280	23	3,100
	4	220	176	25	3,020
		330	264		
	6.3	150	189	25	3,020
		220	277		
	10	120	240	27	2,800
		150	300		
	16	82	262	30	2,700
		39	156		
	20	47	188	45	2,000
25	22	275	50	1,800	
J80	2.5	1,000	500	19	4,240
	4	470	376	20	4,130
		680	544		
	6.3	330	416	20	4,130
		470	592		
	10	270	540	24	3,770
		330	660		
	16	150	480	26	3,430
		180	576		
	20	82	328	40	2,500
25	39	488	45	2,100	
H12	2.5	680	340	12	4,770
	4	560	448		
		390	491		
	6.3	470	592	14	4,420
		270	540		
	10	330	660	16	4,360
J12	16	180	576		
	2.5	1,500	750	10	5,500
	4	820	656		
		1,200	960		
	6.3	680	857	12	5,300
		820	1,033		
	10	470	940		
		560	1,120		
	16	220	704		
		330	1,056		

New!
NP CAP™-PSA Series

- Super low ESR, high temperature resistance and high ripple current capability
- Rated voltage range : 2.5 to 10V_{dc}
- 2000 hours at 105°C
- Suitable for DC-DC converters, voltage regulators and decoupling applications for computer motherboards

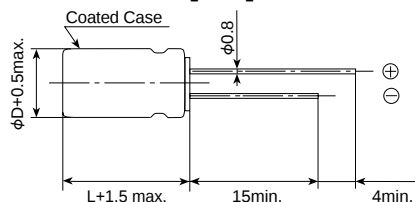


◆SPECIFICATIONS

Items	Characteristics										
Category											
Temperature Range	-55 to +105°C										
Rated Voltage Range	2.5 to 10V _{dc}										
Capacitance Tolerance	±20% (M) (at 20°C, 120Hz)										
Surge Voltage	Rated voltage×1.15V (at 105°C)										
Leakage Current	I=0.2CV (max.)										
*Note	Where, I : Leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V _{dc}) (at 20°C after 2 minutes)										
Dissipation Factor (tanδ)	0.08 max. (at 20°C, 120Hz)										
Low Temperature Characteristics	Max. impedance ratio at 100kHz to the 20°C value Z(-25°C)/Z(+20°C)≤1.15 Z(-55°C)/Z(+20°C)≤1.25										
Endurance	The following specifications shall be satisfied when the capacitors are restored to 20°C after the rated voltage is applied for 2000 hours at 105°C. <table border="1"> <tr> <td>Appearance</td><td>No significant damage</td></tr> <tr> <td>Capacitance change</td><td>≤±20% of the initial measured value</td></tr> <tr> <td>D.F. (tanδ)</td><td>≤150% of the initial specified value</td></tr> <tr> <td>ESR</td><td>≤150% of the initial specified value</td></tr> <tr> <td>Leakage current</td><td>≤The initial specified value</td></tr> </table>	Appearance	No significant damage	Capacitance change	≤±20% of the initial measured value	D.F. (tanδ)	≤150% of the initial specified value	ESR	≤150% of the initial specified value	Leakage current	≤The initial specified value
Appearance	No significant damage										
Capacitance change	≤±20% of the initial measured value										
D.F. (tanδ)	≤150% of the initial specified value										
ESR	≤150% of the initial specified value										
Leakage current	≤The initial specified value										
Bias Humidity Test	The following specifications shall be satisfied when the capacitors are restored to 20°C after subjecting them to DC voltage at 60°C, 90 to 95% RH for 1000 hours. <table border="1"> <tr> <td>Appearance</td><td>No significant damage</td></tr> <tr> <td>Capacitance change</td><td>≤±20% of the initial measured value</td></tr> <tr> <td>D.F. (tanδ)</td><td>≤150% of the initial specified value</td></tr> <tr> <td>ESR</td><td>≤150% of the initial specified value</td></tr> <tr> <td>Leakage current</td><td>≤The initial specified value</td></tr> </table>	Appearance	No significant damage	Capacitance change	≤±20% of the initial measured value	D.F. (tanδ)	≤150% of the initial specified value	ESR	≤150% of the initial specified value	Leakage current	≤The initial specified value
Appearance	No significant damage										
Capacitance change	≤±20% of the initial measured value										
D.F. (tanδ)	≤150% of the initial specified value										
ESR	≤150% of the initial specified value										
Leakage current	≤The initial specified value										
Surge Voltage Test	The capacitors shall be subjected to 1000 cycles each consisting of charge with the surge voltage specified at 105°C for 30 seconds through a protective resistor(R=1kΩ) and discharge for 5 minutes 30 seconds. <table border="1"> <tr> <td>Appearance</td><td>No significant damage</td></tr> <tr> <td>Capacitance change</td><td>≤±20% of the initial measured value</td></tr> <tr> <td>D.F. (tanδ)</td><td>≤150% of the initial specified value</td></tr> <tr> <td>ESR</td><td>≤150% of the initial specified value</td></tr> <tr> <td>Leakage current</td><td>≤The initial specified value</td></tr> </table>	Appearance	No significant damage	Capacitance change	≤±20% of the initial measured value	D.F. (tanδ)	≤150% of the initial specified value	ESR	≤150% of the initial specified value	Leakage current	≤The initial specified value
Appearance	No significant damage										
Capacitance change	≤±20% of the initial measured value										
D.F. (tanδ)	≤150% of the initial specified value										
ESR	≤150% of the initial specified value										
Leakage current	≤The initial specified value										
Failure Rate	1% per 1000 hours maximum (Confidence level 60% at 105°C)										

*Note : If any doubt arises, measure the leakage current after the following voltage treatment.
Voltage treatment : DC rated voltage is applied to the capacitors for 120 minutes at 105°C.

◆DIMENSIONS [mm]



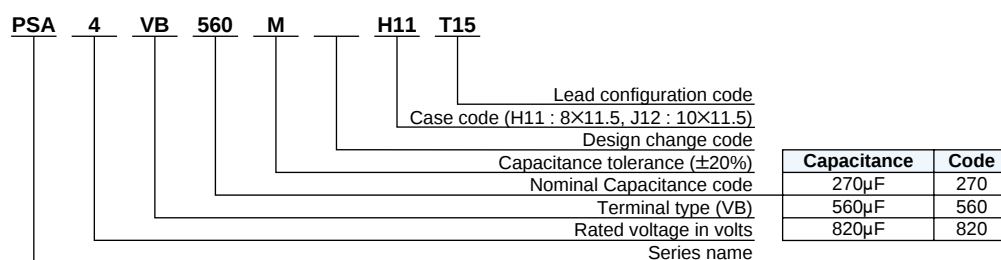
φD	8	10
L	11.5	11.5
F	3.5	5.0

◆MARKING

EX) 4V560μF



◆PART NUMBERING SYSTEM



Lead configuration code

T14: Ammo pack for $\phi 10$ (F=5.0)

T15: Ammo pack for $\phi 8$ (F=3.5)

E5 : Cut lead (Lead length C=3.5±0.5mm)

*Regarding to taping specifications and cut/formed lead, please consult us.

◆STANDARD RATINGS

Case size $\phi D \times L$ (mm)	Rated voltage (V _{dc})	Nominal Capacitance (μF) ±20%	ESR (mΩmax./20°C, 100k to 300kHz)	Ripple current (mA _{rms} max./ 105°C,100kHz)	Part Number
8×11.5	2.5	680	7	5,580	PSA2.5VB680MH11
	2.5	820	7	5,580	PSA2.5VB820MH11
	4	560	7	5,580	PSA4VB560MH11
	6.3	390	8	5,080	PSA6.3VB390MH11
	10	270	9	4,710	PSA10VB270MH11
10×11.5	2.5	1,000	6	5,860	PSA2.5VB1000MJ11
	4	820	6	5,860	PSA4VB820MJ11
	6.3	680	7	5,860	PSA6.3VB680MJ11
	10	470	8	5,650	PSA10VB470MJ11

Upgrade!
NP CAP™ **PS** Series

- Super low ESR, high temperature resistance
- Large capacitance & Improved high ripple current capability
- Rated voltage range : 2.5 to 25V_{dc} (20/25V newly added)
- 2000 hours at 105°C
- Suitable for DC-DC converters, voltage regulators and decoupling applications
For computer motherboards

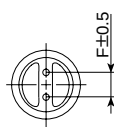
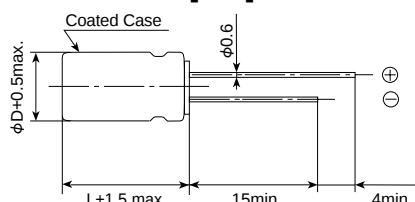


◆ SPECIFICATIONS

Items	Characteristics	
Category	Temperature Range	
	-55 to +105°C	
Rated Voltage Range	2.5 to 25V _{dc}	
Capacitance Tolerance	±20% (M)	(at 20°C, 120Hz)
Surge Voltage	Rated voltage×1.15V	(at 105°C)
Leakage Current	I=0.2CV (max.)	
*Note	Where, I : Leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V _{dc})	
	(at 20°C after 2 minutes)	
Dissipation Factor (tanδ)	0.12 max.	(at 20°C, 120Hz)
Low Temperature Characteristics	Max. impedance ratio at 100kHz to the 20°C value Z(-25°C)/Z(+20°C)≤1.15 Z(-55°C)/Z(+20°C)≤1.25	
Endurance	The following specifications shall be satisfied when the capacitors are restored to 20°C after the rated voltage is applied for 2000 hours at 105°C.	
	Appearance	No significant damage
	Capacitance change	≤±20% of the initial measured value
	D.F. (tanδ)	≤150% of the initial specified value
	ESR	≤150% of the initial specified value
	Leakage current	≤The initial specified value
Bias Humidity Test	The following specifications shall be satisfied when the capacitors are restored to 20°C after subjecting them to DC voltage at 60°C, 90 to 95% RH for 500 hours.	
	Appearance	No significant damage
	Capacitance change	≤±20% of the initial measured value
	D.F. (tanδ)	≤150% of the initial specified value
	ESR	≤150% of the initial specified value
	Leakage current	≤The initial specified value
Surge Voltage Test	The capacitors shall be subjected to 1000 cycles each consisting of charge with the surge voltage specified at 105°C for 30 seconds through a protective resistor(R=1kΩ) and discharge for 5 minutes 30 seconds.	
	Appearance	No significant damage
	Capacitance change	≤±20% of the initial measured value
	D.F. (tanδ)	≤150% of the initial specified value
	ESR	≤150% of the initial specified value
	Leakage current	≤The initial specified value
Failure Rate	1% per 1000 hours maximum (Confidence level 60% at 105°C)	

*Note : If any doubt arises, measure the leakage current after the following voltage treatment.
Voltage treatment : DC rated voltage is applied to the capacitors for 120 minutes at 105°C.

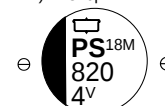
◆ DIMENSIONS [mm]



φD	8	10
L	11.5	12.5
F	3.5	5.0

◆ MARKING

EX) 4V820μF



◆PART NUMBERING SYSTEM

4 PS 820 M J12 -T14

Lead configuration code
Case code (H11 : 8×11.5, J12 : 10×12.5)
Design change number
Capacitance tolerance (±20%)
Nominal capacitance code
Series name
Rated voltage code

Capacitance	Code
270μF	270
560μF	560
820μF	820

Rated voltage	Code
2.5V	2R5
4V	4
6.3V	6
10V	10
16V	16
20V	20
25V	25

Lead configuration code

T14: Ammo pack for φ10(F=5.0)

T15: Ammo pack for φ8(F=3.5)

E5 : Cut lead (Lead length C=3.5±0.5mm)

*Regarding to taping specifications and cut/formed lead, please consult us.

◆STANDARD RATINGS

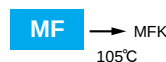
Case size φD×L(mm)	Rated voltage (V _{dc})	Nominal Capacitance (μF)	ESR (mΩmax./20°C, 100k to 300kHz)	Ripple current (mA _{rms} max./ 105°C,100kHz)	Part Number
8×11.5	2.5	680	10	5,230	2R5PS680MH11
	4	560	10	5,230	4PS560MH11
	6.3	390	12	4,770	6PS390MH11
	10	270	14	4,420	10PS270MH11
	16	180	16	4,360	16PS180MH11
	20	100	24	3,320	20PS100MH11
10×12.5	25	68	24	3,320	25PS68MH11
	2.5	1,500	8	5,500	2R5PS1500MJ12
	4	820	8	5,500	4PS820MJ12
	6.3	680	10	5,500	6PS680MJ12
	10	470	12	5,300	10PS470MJ12
	16	330	14	5,050	16PS330MJ12
	20	150	20	4,320	20PS150MJ12
	25	100	20	4,320	25PS100MJ12



Surface Mount Aluminum Electrolytic Capacitors

Alchip® MF Series

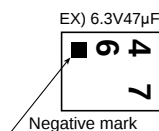
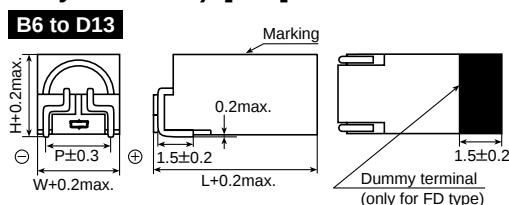
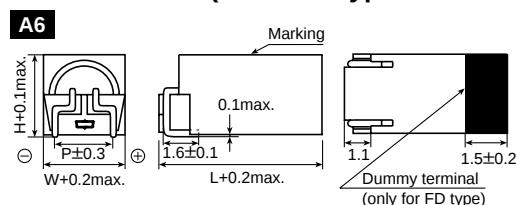
- Wide variety of case sizes (7 sizes)
- Suitable to fit for downsized equipment
- Solvent-proof type (see PRECAUTIONS AND GUIDELINES)



◆ SPECIFICATIONS

Items	Characteristics										
Category Temperature Range	-40 to +85℃										
Rated Voltage Range	4 to 50V _{dc}										
Capacitance Tolerance	±20% (M) (at 20℃, 120Hz)										
Leakage Current	I=0.01CV or 3μA, whichever is greater. Where, I : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V) (at 20℃ after 2 minutes)										
Dissipation Factor (tanδ)	See STANDARD RATINGS.										
Low Temperature Characteristics (Max. Impedance Ratio)	Rated voltage (V _{dc})		4V	6.3V	10V	16V	25V	35V	50V	(at 120Hz)	
	Z(-25℃)/Z(+20℃)	A6	10	7	5	4	3	2	2		
		B6 & C6	9	6	4	3	2	2	2		
		D6 to D13	7	4	3	2	2	2	2		
	Z(-40℃)/Z(+20℃)	A6	18	13	10	8	6	5	5		
		B6 & C6	17	12	9	7	5	4	4		
		D6 to D13	15	10	8	6	4	3	3		
Endurance	The following specifications shall be satisfied when the capacitors are restored to 20℃ after the rated voltage is applied for 2000 hours at 85℃.										
	Case code	A6				B6 & C6			D6 to D13		
	Capacitance change	≤±30% of the initial value				≤±25% of the initial value			≤±20% of the initial value		
	D.F. (tanδ)	≤200% of the initial specified value				≤200% of the initial specified value			≤200% of the initial specified value		
	Leakage current	≤The initial specified value				≤The initial specified value			≤The initial specified value		
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20℃ after exposing them for 500 hours at 85℃ without voltage applied.										
	Capacitance change	≤±15% of the initial value									
	D.F. (tanδ)	≤150% of the initial specified value									
	Leakage current	≤The initial specified value									

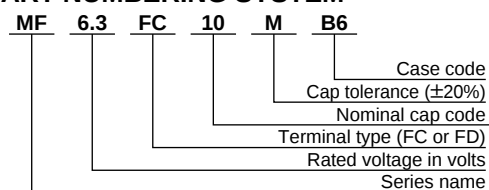
◆DIMENSIONS (Terminal Type=FC or FD <dummy terminal>) [mm]



◆ MARKING

Case code	L	W	H	P
A6	6.3	3.1	3.0	2.4
B6	6.3	3.6	3.5	3.0
C6	6.3	4.1	4.0	3.5
D6	6.3	4.6	4.5	4.0
D8	8.3	4.6	4.5	4.0
D10	10.3	4.6	4.5	4.0
D13	13.3	4.6	4.5	4.0

◆PART NUMBERING SYSTEM



Capacitance	Code
0.1μF	R1
0.47μF	R47
1.0μF	1
4.7μF	4R7
10μF	10
100μF	100

◆ STANDARD RATINGS

[illegible]

Note : $\rightarrow$ Use next higher voltage part.

Alchip® MFK Series

- Wide variety of case sizes (6 sizes)
- Suitable to fit for downsized equipment
- From 3.5mm height
- Solvent-proof type (see PRECAUTIONS AND GUIDELINES)

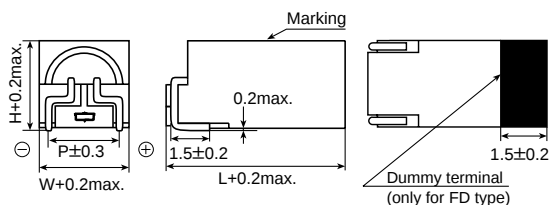
MF → MFK
105°C



SPECIFICATIONS

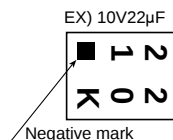
Items	Characteristics									
Category	Temperature Range									
Temperature Range	-40 to +105°C									
Rated Voltage Range	6.3 to 50V _{dc}									
Capacitance Tolerance	±20% (M) (at 20°C, 120Hz)									
Leakage Current	I=0.01CV or 3μA, whichever is greater. Where, I : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V) (at 20°C after 2 minutes)									
Dissipation Factor (tanδ)	Rated voltage (V _{dc})		6.3V	10V	16V	25V	35V	50V	(at 20°C,120Hz)	
	tanδ (Max.)	B6 & C6	0.40	0.30	0.24	0.18	0.16	0.14		
		D6 to D13	0.32	0.28	0.24	0.16	0.14	0.12		
Low Temperature Characteristics (Max. Impedance Ratio)	Rated voltage (V _{dc})		6.3V	10V	16V	25V	35V	50V	(at 120Hz)	
	Z(-25°C)/Z(+20°C)	B6 & C6	6	4	3	2	2	2		
		D6 to D13	4	3	2	2	2	2		
	Z(-40°C)/Z(+20°C)	B6 & C6	12	9	7	5	4	4		
		D6 to D13	10	8	6	4	3	3		
Endurance	The following specifications shall be satisfied when the capacitors are restored to 20°C after the rated voltage is applied for 1000 hours at 105°C.									
	Case code	B6 & C6					D6 to D13			
	Capacitance change	≤±30% of the initial value					≤±20% of the initial value			
	D.F. (tanδ)	≤200% of the initial specified value					≤200% of the initial specified value			
	Leakage current	≤The initial specified value					≤The initial specified value			
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for 500 hours at 105°C without voltage applied.									
	Case code	B6 & C6					D6 to D13			
	Capacitance change	≤±25% of the initial value					≤±15% of the initial value			
	D.F. (tanδ)	≤200% of the initial specified value					≤150% of the initial specified value			
	Leakage current	≤The initial specified value					≤The initial specified value			

DIMENSIONS (Terminal Type=FC or FD <dummy terminal>) [mm]

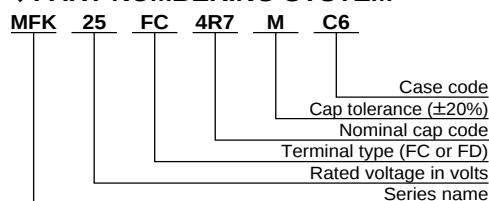


Case code	L	W	H	P
B6	6.3	3.6	3.5	3.0
C6	6.3	4.1	4.0	3.5
D6	6.3	4.6	4.5	4.0
D8	8.3	4.6	4.5	4.0
D10	10.3	4.6	4.5	4.0
D13	13.3	4.6	4.5	4.0

MARKING



PART NUMBERING SYSTEM



Capacitance	Code
0.1μF	R1
0.47μF	R47
1.0μF	1
4.7μF	4R7
10μF	10
100μF	100

STANDARD RATINGS

μF	V _{dc}	6.3	10	16	25	35	50
0.1							B6 1.3
0.15							B6 2.0
0.22							B6 2.4
0.33							B6 3.0
0.47							B6 3.5
0.68							B6 4.3
1.0							B6 5.2
1.5							B6 6.4
2.2							C6 8.4
3.3							D6 13
4.7							D8 16
6.8							D10 20
10		B6 11	B6 10	C6 12	D6 16	B6 8.3	D10 26
15		C6 15	D6 19	C6 14	D8 21	C6 9.7	D13 38
22		D6 20	D8 25	D8 23	D10 34	D6 14	
33		D8 27		D10 37	D13 51	D8 18	
47			D10 41	D13 53			
68		D10 44	D13 58				
100		D13 63					

Note : → Use next higher voltage part.

Alchip® MFK Large Capacitance

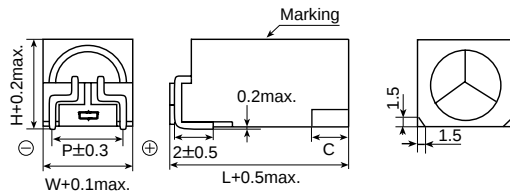
- Endurance : 105°C 2000 hours
- Solvent-proof type (see PRECAUTIONS AND GUIDELINES)



SPECIFICATIONS

Items	Characteristics									
Category	Temperature Range									
Temperature Range	-40 to +105℃									
Rated Voltage Range	10 to 50V _{dc}									
Capacitance Tolerance	±20% (M) (at 20℃, 120Hz)									
Leakage Current	I=0.01CV or 3μA, whichever is greater. Where, I : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V) (at 20℃ after 2 minutes)									
Dissipation Factor (tanδ)	Rated voltage (V _{dc})	10V	16V	25V	35V	50V	(at 20℃, 120Hz)			
	tanδ (Max.)	0.30	0.25	0.22	0.18	0.18				
Low Temperature Characteristics (Max. Impedance Ratio)	Rated voltage (V _{dc})	10V	16V	25V	35V	50V	(at 120Hz)			
	Z(-25℃)/Z(+20℃)	3	2	2	2	2				
	Z(-40℃)/Z(+20℃)	8	6	4	3	3				
Endurance	The following specifications shall be satisfied when the capacitors are restored to 20℃ after the rated voltage is applied for 2000 hours at 105℃.									
	Capacitance change	≤±20% of the initial value								
	D.F. (tanδ)	≤200% of the initial specified value								
	Leakage current	The initial specified value								
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20℃ after exposing them for 500 hours at 105℃ without voltage applied.									
	Capacitance change	≤±15% of the initial value								
	D.F. (tanδ)	≤150% of the initial specified value								
	Leakage current	≤The initial specified value								

DIMENSIONS (Terminal Type=FC) [mm]



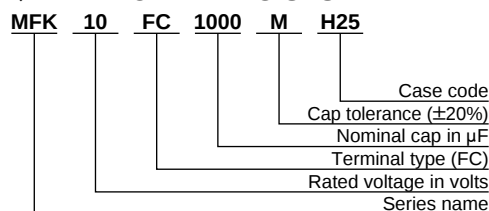
Case code	L	W	H	P	C
H15	17.1	9.0	9.0	7.4	0
H20	21.5	9.0	9.0	7.4	5
H25	26.5	9.0	9.0	7.4	10

MARKING

EX) 35V330μF



PART NUMBERING SYSTEM



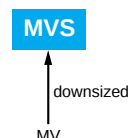
STANDARD RATINGS

μF \ V _{dc}	10			16			25			35			50		
47													H15	0.40	330
100													H15	0.40	330
180										H15	0.40	330	H20	0.27	440
220							H15	0.40	330	H20	0.27	440	H25	0.20	570
330				H15	0.40	330	H20	0.27	440	H25	0.20	570			
470	H15	0.40	330	H20	0.27	440	H25	0.20	570						
680	H20	0.27	440	H25	0.20	570									
1,000	H25	0.20	570												

Rated ripple current (mA_{rms}) at 105°C, 100kHz
Max. impedance (Ω) at 20°C, 100kHz
Case code

Alchip® MVS Series

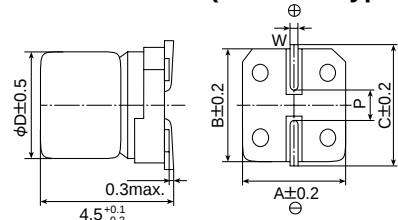
- 4.5mm height
- Endurance : 85°C 2000 hours
- Reflow capability
- Solvent-proof type (see PRECAUTIONS AND GUIDELINES)



SPECIFICATIONS

Items	Characteristics								
Category	-40 to +85°C								
Temperature Range									
Rated Voltage Range	4 to 50V _{dc}								
Capacitance Tolerance	±20% (M) (at 20°C, 120Hz)								
Leakage Current	I=0.01CV or 3μA, whichever is greater. Where, I : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V) (at 20°C after 2 minutes)								
Dissipation Factor (tanδ)	Rated voltage (V _{dc})	4V	6.3V	10V	16V	25V	35V	50V	(at 20°C, 120Hz)
	tanδ (Max.)	0.50	0.30	0.24	0.19	0.16	0.14	0.14	
Low Temperature Characteristics (Max. Impedance Ratio)	Rated voltage (V _{dc})	4V	6.3V	10V	16V	25V	35V	50V	(at 120Hz)
	Z(-25°C)/Z(+20°C)	7	4	3	2	2	2	2	
	Z(-40°C)/Z(+20°C)	15	8	8	4	4	3	3	
Endurance	The following specifications shall be satisfied when the capacitors are restored to 20°C after the rated voltage is applied for 2000 hours at 85°C.								
	Rated voltage	4 & 6.3V _{dc}					10 to 50V _{dc}		
	Capacitance change	≤±30% of the initial value					≤±25% of the initial value		
	DF (tanδ)	≤300% of the initial specified value					≤300% of the initial specified value		
	Leakage current	≤The initial specified value					≤The initial specified value		
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for 1000 hours at 85°C without voltage applied.								
	Rated voltage	4 & 6.3V _{dc}					10 to 50V _{dc}		
	Capacitance change	≤±30% of the initial value					≤±25% of the initial value		
	DF (tanδ)	≤300% of the initial specified value					≤300% of the initial specified value		
	Leakage current	≤The initial specified value					≤The initial specified value		

DIMENSIONS (Terminal Type=VC) [mm]



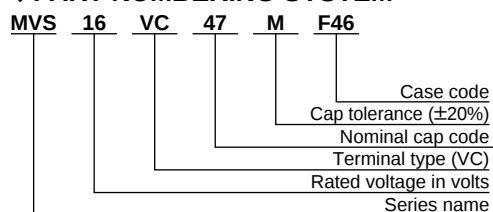
Case code	D	A	B	C	W	P
D46	4	4.3	4.3	5.1	0.5 to 0.8	1.0
E46	5	5.3	5.3	5.9	0.5 to 0.8	1.4
F46	6.3	6.6	6.6	7.2	0.5 to 0.8	1.9

MARKING

EX) 16V47μF



PART NUMBERING SYSTEM



Capacitance	Code
0.1μF	R1
0.47μF	R47
1.0μF	1
4.7μF	4R7
10μF	10
100μF	100

STANDARD RATINGS

μF \ V _{dc}	4	6.3	10	16	25	35	50
0.1							D46 1.0
0.22							D46 2.0
0.33							D46 2.8
0.47							D46 4.0
1.0							D46 8.4
2.2							D46 13
3.3							D46 17
4.7							E46 20
10							
22							
33	D46 28						
47	D46 33	E46 45					
100	E46 56	F46 70					
220	F46 96						

Case code
Rated ripple current (mA_{rms}) at 85°C, 120Hz

Note : → Use next higher voltage part.

Alchip® MVA Series

- φ4 through φ18 case sizes are fully lined up
- Endurance : 85°C 2000 hours
- Suitable to fit for downsized equipment
- Solvent-proof type except 100 to 450V_{dc} (see PRECAUTIONS AND GUIDELINES)

MVA

↓
downsized
size extended
MV

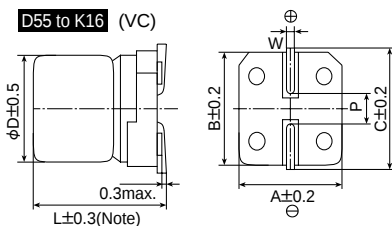


SPECIFICATIONS

Items	Characteristics													
Category	Temperature Range													
Temperature Range	-40 to +85℃													
Rated Voltage Range	4 to 450V _{dc}													
Capacitance Tolerance	±20% (M) (at 20℃, 120Hz)													
Leakage Current	Rated voltage (V _{dc})	4 to 100V						160 to 450V						(at 20℃)
	D55 to J10	I=0.01CV or 3μA, whichever is greater.(after 2 minutes)						—						
	K14 to M22	I=0.03CV or 4μA, whichever is greater.(after 1 minute)						I=0.04CV+100μA max.(after 1 minute)						
	Where, I : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V)													
Dissipation Factor (tanδ)	Rated voltage (V _{dc})	4V	6.3V	10V	16V	25V	35V	50V	63V	100V	160 to 250V	400 & 450V	(at 20℃, 120Hz)	
	tanδ (Max.)	D55 to J10	0.42	0.35	0.30	0.26	0.16	0.14	0.12	0.12	0.12	—		—
		K14 to M22	—	0.38	0.34	0.30	0.26	0.22	0.18	0.14	0.10	0.20		0.25
	When nominal capacitance exceeds 1000μF, add 0.02 to the value above for each 1000μF increase.													
Low Temperature Characteristics (Max. Impedance Ratio)	Rated voltage (V _{dc})	4V	6.3V	10V	16V	25V	35V	50V	63V	100V	160 to 250V	400 & 450V	(at 120Hz)	
	D55 to J10	Z(-25℃)/Z(+20℃)	7	4	3	2	2	2	2	2	3	—		—
		Z(-40℃)/Z(+20℃)	17	10	8	6	4	3	3	3	4	—		—
	K14 to M22	Z(-25℃)/Z(+20℃)	—	5	4	3	2	2	2	2	2	3		6
		Z(-40℃)/Z(+20℃)	—	12	10	8	5	4	3	3	3	6		10
Endurance	The following specifications shall be satisfied when the capacitors are restored to 20℃ after the rated voltage is applied for 2000 hours at 85℃.													
	Case code	D55 to J10				D55 to J10				K14 to M22				
	Rated voltage (V _{dc})	4V & 6.3V				10 to 100V				6.3 to 450V				
	Capacitance change	≤±30% of the initial value				≤±20% of the initial value								
	DF (tanδ)	≤200% of the initial specified value				≤200% of the initial specified value								
	Leakage current	≤The initial specified value				≤The initial specified value								
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20℃ after exposing them for 1000 hours at 85℃ without voltage applied.													
	Case code	D55 to J10				D55 to J10				K14 to M22				
	Rated voltage	4V & 6.3V				10 to 100V				6.3 to 450V				
	Capacitance change	≤±30% of the initial value				≤±20% of the initial value								
	DF (tanδ)	≤200% of the initial specified value				≤200% of the initial specified value								
	Leakage current	≤The initial specified value				≤The initial specified value								

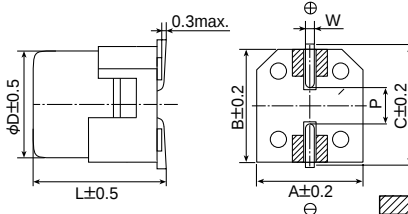
DIMENSIONS (Terminal Type=VC or VE) [mm]

D55 to K16 (VC)



Note : L±0.5 for H10, J10, K14 and K16

L17 to M22 (VE : with dummy terminals)



⊠ : Dummy terminals

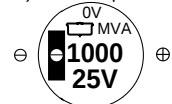
Case code	D	L	A	B	C	W	P
D55	4	5.2	4.3	4.3	5.1	0.5 to 0.8	1.0
E55	5	5.2	5.3	5.3	5.9	0.5 to 0.8	1.4
F55	6.3	5.2	6.6	6.6	7.2	0.5 to 0.8	1.9
F60	6.3	5.7	6.6	6.6	7.2	0.5 to 0.8	1.9
F80	6.3	7.7	6.6	6.6	7.2	0.5 to 0.8	1.9
H10	8	10.0	8.3	8.3	9.0	0.7 to 1.1	3.1
J10	10	10.0	10.3	10.3	11.0	0.7 to 1.1	4.5
K14	12.5	13.5	13.0	13.0	13.7	1.0 to 1.3	4.2
K16	12.5	16.0	13.0	13.0	13.7	1.0 to 1.3	4.2
L17	16	16.5	17.0	17.0	18.0	1.0 to 1.3	6.5
L22	16	21.5	17.0	17.0	18.0	1.0 to 1.3	6.5
M17	18	16.5	19.0	19.0	20.0	1.0 to 1.3	6.5
M22	18	21.5	19.0	19.0	20.0	1.0 to 1.3	6.5

MARKING

D55 to J10
EX) 16V47μF



K14 to H22
EX) 25V1000μF



PART NUMBERING SYSTEM

MVA 16 VC 47 M E55

Tray code (TR : If necessary)
Case code
Cap tolerance (±20%)
Nominal cap code
Terminal type (VC or VE)
Rated voltage in volts
Series name

Capacitance	Code
0.1μF	R1
1.0μF	1
4.7μF	4R7
10μF	10
100μF	100
1000μF	1000

◆ STANDARD RATINGS

μF \ V _{dc}	4		6.3		10		16		25		35		50	
3.3													D55	15
4.7											D55	18	D55	18
10									D55	24	D55	24	E55	30
22					D55	26	D55	26	E55	41	E55	41	F55	47
33	D55	25	D55	30	D55	30	E55	37	E55	47	F55	54	F80	70
47	D55	30	D55	33	E55	44	E55	44	F55	60	F60	64	F80	85
56									F55	66				
100	E55	50	E55	55	F55	70	F55	70	F80	120	F80	120	H10	190
150					F55	79	F80	110	H10	210	H10	210		
220	F55	80	F55	88	F80	130	F80	130	H10	260	H10	260	J10	320
330	F80	135	F80	135	H10	270	H10	270	H10	300	J10	360	K14	600
470	F80	150	H10	280	H10	280	H10	280	J10	400	K14	600	K16 L17	740 850
680			H10	290			J10	380						
820			H10	320										
1,000	H10	320	J10	430	J10	430	K14	710	K14	820	L17	1100	L22 M22	1300 1400
1,500			J10	480										
2,200			K14	890	K14	960	L17	1150	L22 M17	1450 1400	M22	1700		
3,300			K16 L17	1000 1200	L17	1300	L22 M17	1450 1450	M22	1800				
4,700			L17	1400	L22 M17	1550 1600	M22	1750						
6,800			L22 M17	1750 1700	M22	1850								
10,000			M22	2000										

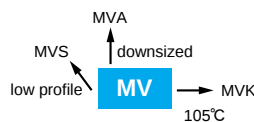
↑ Rated ripple current (mAmps) at 85°C, 120Hz
↑ Case code

Non solvent-proof														
μF \ V _{dc}	63		100		160		200		250		400		450	
0.10	D55	1.3												
0.22	D55	3												
0.33	D55	4												
0.47	D55	5												
1.0	D55	8												
2.2	D55	12												
3.3	E55	17												
4.7	E55	20									K14	120	K14	120
10	F55	32							K14	150	L17	140	L17	140
22	F80	60	H10	90			K14	240	K16	240	L22 M17	280 280	L22	280
33	H10	110	J10	120			K16	310	L17	340	M22	350	M22	350
47	H10	130			K16	370	L17	420	L22 M17	420 420				
56	J10	160												
68	J10	170	K14	380	L17	500	L22 M17	510 510	M22	490				
100	K14	380	K14	440	L22 M17	590 590	M22	590						
220	K14	580	L22 M17	850 800										
330	K16 L17	720 820	M22	1000										
470	L17 M17	950 1000												

↑ Rated ripple current (mAmps) at 85°C, 120Hz
↑ Case code

Alchip®-MV Series

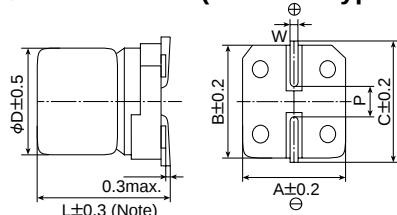
- From 5.5mm height
- Suitable to fit for downsized equipment
- Solvent-proof type (see PRECAUTIONS AND GUIDELINES)



◆ SPECIFICATIONS

Items	Characteristics											
Category Temperature Range	-40 to +85°C											
Rated Voltage Range	4 to 63V _{dc}											
Capacitance Tolerance	±20% (M) (at 20°C, 120Hz)											
Leakage Current	I=0.01CV or 3μA, whichever is greater. Where, I : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V) (at 20°C after 2 minutes)											
Dissipation Factor (tanδ)	Rated voltage (V _{dc})			4V	6.3V	10V	16V	25V	35V	50V	63V	(at 20°C,120Hz)
	tanδ (Max.)	B55	0.42	0.27	0.23	0.19	0.16	0.14	0.12	—		
		D55 to F60	0.42	0.24	0.20	0.16	0.14	0.12	0.10	0.12		
		H63 to J10	—	0.40	0.30	0.26	0.16	0.14	0.12	0.12		
Low Temperature Characteristics (Max. Impedance Ratio)	Rated voltage (V _{dc})			4V	6.3V	10V	16V	25V	35V	50V	63V	(at 120Hz)
	Z(-25°C)/Z(+20°C)			7	4	3	2	2	2	2		
	Z(-40°C)/Z(+20°C)	B55	17	10	8	6	4	3	3	—		
		D55 to F60	15	10	8	6	4	3	3	3		
H63 to J10	—	10	8	6	4	3	3	3	3			
Endurance	The following specifications shall be satisfied when the capacitors are restored to 20°C after the rated voltage is applied for 2000 hours (B55 size 1000 hours) at 85°C.											
	Capacitance change	≤±20% of the initial value										
	D.F. (tanδ)	≤200% of the initial specified value										
	Leakage current	≤The initial specified value										
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for 500 hours at 85°C without voltage applied.											
	Case code	B55					D55 to J10					
	Capacitance change	≤±20% of the initial value					≤±15% of the initial value					
	D.F. (tanδ)	≤200% of the initial specified value					≤150% of the initial specified value					
	Leakage current	≤The initial specified value					≤The initial specified value					

◆DIMENSIONS (Terminal Type=VC) [mm]

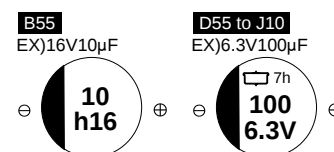


Note : $L \pm 0.5$ for H63, H10 and J10

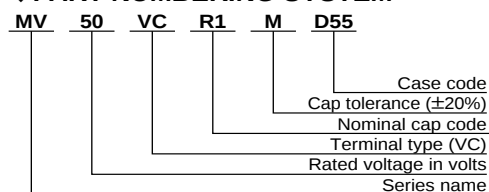
Case code	D	L	A	B	C	W	P
B55	3	5.2	3.3	3.3	3.7	0.45 to 0.75	0.8
D55 & D60	4	*5.2	4.3	4.3	5.1	0.5 to 0.8	1.0
E55 & E60	5	*5.2	5.3	5.3	5.9	0.5 to 0.8	1.4
F55 & F60	6.3	*5.2	6.6	6.6	7.2	0.5 to 0.8	1.9
H63	8	6.3	8.3	8.3	9.0	0.5 to 0.8	2.3
H10	8	10.0	8.3	8.3	9.0	0.7 to 1.1	3.1
J10	10	10.0	10.3	10.3	11.0	0.7 to 1.1	4.5

* : $L=5.7$ for D60, E60 and F60.

◆ MARKING



◆PART NUMBERING SYSTEM



Capacitance	Code
0.1μF	R1
0.47μF	R47
1.0μF	1
4.7μF	4R7
10μF	10
100μF	100
1000μF	1000

◆ STANDARD RATINGS

μF	V_{dc}	4		6.3		10		16		25		35		50		63			
0.1														B55	D55	1.0	1.3	D55	1.3
0.15														B55	D55	2.0	2.0	D55	2.0
0.22														B55	D55	2.0	2.9	D55	2.9
0.33														B55	D55	3.0	3.5	D55	3.5
0.47														B55	D55	3.8	4.2	D55	4.2
0.68														B55	D55	4.6	5.1	D55	5.1
1.0														B55	D55	5.6	6.2	D60	7.0
1.5														B55	D55	6.9	7.5	D60	8.4
2.2														B55	D55	8.3	10	D60	10
3.3														B55	D55	10.5	15	F55	18.5
4.7														B55	D55	15	20	F55	24
6.8														B55	D55	20	25	F55	29
10														B55	D55	25	33	F55	33
15														B55	D55	33	40	F55	40
22														B55	D55	40	55	H63	95
33														B55	D55	55	65	H63	105
47														B55	D55	65	78	H63	115
68														B55	D55	78	105	H63	125
100														B55	D55	105	145	H63	145
220														B55	D55	145	215	H63	215
330														B55	D55	215	270	H63	270
470														B55	D55	270	330	H63	330
1.000														B55	D55	330	400	H63	400

Note : $\rightarrow$ Use next higher voltage part.

Alchip® MVE Series

- Rated voltage range : 6.3 to 450V, capacitance range : 0.47 to 6800μF
- Endurance : 1000 to 2000 hours at 105°C
- Case size range : φ4×5.5 to φ18×21.5
- Solvent-proof type except 100 to 450V_{dc} (see PRECAUTIONS AND GUIDELINES)

MVE

↓
downsized
size extended
MVK

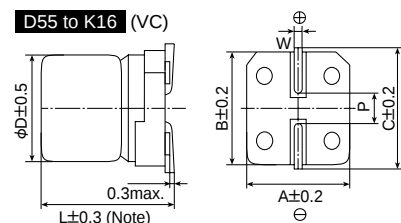


◆ SPECIFICATIONS

Items	Characteristics											
Category												
Temperature Range	-40 to +105°C											
Rated Voltage Range	6.3 to 450V _{dc}											
Capacitance Tolerance	±20%(M) (20°C, 120Hz)											
Leakage Current	Rated voltage(V _{dc})	6.3 to 100V						160 to 450V				(20°C)
	D55 to J10	I=0.01CV or 3μA, whichever is greater (2 minutes)						—				
	K14 to M22	I=0.03CV or 4μA, whichever is greater (1 minute)						I=0.04CV+100μA (1minute)				
	Where, I : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V)											
Dissipation Factor (tanδ)	See STANDARD RATINGS (20°C, 120Hz)											
Low Temperature Characteristics (Max. Impedance Ratio)	Rated voltage (V _{dc})	6.3V	10V	16V	25V	35V	50V	63V	100V	160 to 250V	400 to 450V	(120Hz)
	D55 to J10	Z(-25°C)/Z(+20°C)	4	3	2	2	2	2	3	—	—	
		Z(-40°C)/Z(+20°C)	12	8	6	4	3	3	4	—	—	
	K14 to M22	Z(-25°C)/Z(+20°C)	5	4	3	2	2	2	2	3	6	
		Z(-40°C)/Z(+20°C)	10	8	6	4	3	3	3	6	10	
Endurance	The following specifications shall be satisfied when the capacitors are restored to 20°C after the rated voltage is applied for the specified period of time at 105°C.											
	Case code	D55 to F80					H10 to M22					
	Time	1000 hours					2000 hours					
	Capacitance change	≤±30% of the initial value					≤±20% of the initial value					
	D.F. (tanδ)	≤300% of the initial specified value					≤200% of the initial specified value					
	Leakage current	≤The initial specified value					≤The initial specified value					
	Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for 1000 hours (500 hours for B55 to F80 size) at 105°C without voltage applied.										
Case code		D55 to F80					H10 to H22					
Capacitance change		≤±25% of the initial value					≤±20% of the initial value					
D.F. (tanδ)		≤200% of the initial specified value					≤200% of the initial specified value					
Leakage current		≤The initial specified value					≤The initial specified value					

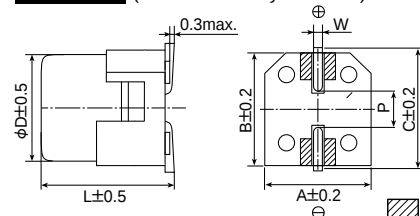
◆ DIMENSIONS (Terminal Type=VC or VE) [mm]

D55 to K16 (VC)



Note : L±0.5 for H10, J10, K14 and K16

L17 to M22 (VE : with dummy terminals)



Case code	D	L	A	B	C	W	P
D55	4	5.2	4.3	4.3	5.1	0.5 to 0.8	1.0
E55	5	5.2	5.3	5.3	5.9	0.5 to 0.8	1.4
F55	6.3	5.2	6.6	6.6	7.2	0.5 to 0.8	1.9
F60	6.3	5.7	6.6	6.6	7.2	0.5 to 0.8	1.9
F80	6.3	7.7	6.6	6.6	7.2	0.5 to 0.8	1.9
H10	8	10.0	8.3	8.3	9.0	0.7 to 1.1	3.1
J10	10	10.0	10.3	10.3	11.0	0.7 to 1.1	4.5
K14	12.5	13.5	13.0	13.0	13.7	1.0 to 1.3	4.2
K16	12.5	16.0	13.0	13.0	13.7	1.0 to 1.3	4.2
L17	16	16.5	17.0	17.0	18.0	1.0 to 1.3	6.5
L22	16	21.5	17.0	17.0	18.0	1.0 to 1.3	6.5
M17	18	16.5	19.0	19.0	20.0	1.0 to 1.3	6.5
M22	18	21.5	19.0	19.0	20.0	1.0 to 1.3	6.5

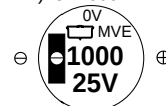
▨ : Dummy terminals

◆ MARKING

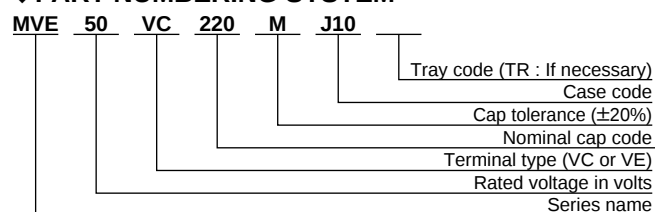
D55 to J10
Ex) 16V22MF



K14 to M22
Ex) 25V1000MF



◆ PART NUMBERING SYSTEM



Capacitance	Code
10μF	10
100μF	100
1000μF	1000

◆STANDARD RATINGS

μF \ V_{dc}	6.3			10			16			25			35			50			63		
0.47																D55	5	0.12	D55	5	0.12
1.0																D55	8	0.12	D55	8	0.12
2.2																D55	12	0.12	D55	12	0.12
3.3																D55	15	0.12	E55	17	0.12
4.7													D55	16	0.14	E55	20	0.12	F55	22	0.12
10							D55	17	0.20	E55	27	0.16	E55	27	0.14	F55	32	0.12	F55	32	0.12
22	D55	22	0.30	E55	30	0.24	E55	30	0.20	F55	44	0.16	F55	44	0.14	F60	47	0.12	F80	58	0.12
33	E55	34	0.30	E55	34	0.24	F55	45	0.20	F55	50	0.16	F60	54	0.14	F80	65	0.14	H10	140	0.12
47	E55	38	0.30	F55	48	0.24	F55	48	0.20	F55	60	0.16	F80	80	0.16	F80	80	0.14	H10	170	0.12
100	F55	69	0.30	F55	69	0.30	F55	69	0.26	F80	100	0.18	F80	100	0.16	H10	230	0.14	J10	310	0.12
150				F80	100	0.35	F80	100	0.28	H10	240	0.18	H10	260	0.16						
220	F80	120	0.45	F80	120	0.35	F80	120	0.28	H10	320	0.18	J10	375	0.16	J10	375	0.14	K14	470	0.14
																			L17	560	0.14
330	H10	290	0.40	H10	290	0.35	H10	290	0.28	J10	450	0.16	J10	450	0.16	K14	500	0.18	L17	700	0.14
																L17	600	0.18	M17	750	0.14
470	H10	320	0.45	H10	320	0.35	H10	320	0.28	J10	490	0.18	K14	520	0.22	L17	700	0.18	L22	900	0.14
													L17	650	0.22	M17	750	0.18	M17	900	0.14
680	H10	340	0.45				J10	470	0.28												
1,000	J10	410	0.40	J10	410	0.35	K14	550	0.30	L17	820	0.26	L17	750	0.22	M22	1200	0.18			
							L17	650	0.30	M17	880	0.26	M17	1000	0.22						
1,500	J10	550	0.45																		
2,200	K14	680	0.40	K16	750	0.36	L17	950	0.32	L22	1250	0.28	M22	1450	0.24						
	L17	840	0.40	L17	850	0.36	M17	1000	0.32	M22	1300	0.28									
3,300	K16	850	0.42	L17	1000	0.38	L22	1200	0.34												
	M17	1000	0.42	M17	1100	0.38	M17	1200	0.34												
4,700	L22	1200	0.44	L22	1300	0.40															
	M17	1200	0.44	M22	1350	0.40															
6,800	L22	1200	0.48																		
	M22	1350	0.48																		

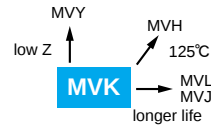
DF (tan δ at 20°C, 120Hz)
 Rated ripple current (mAmps at 105°C, 120Hz)
 Case code

Non solvent-proof																				
μF \ V_{dc}	100			160			200			250			400			450				
3.3																K14	40	0.20		
4.7										K14	65	0.15	K16	50	0.20	K16	50	0.20		
10							K14	80	0.15	K16	105	0.15	L17	85	0.20	L17	85	0.20		
22	H10	100	0.12				K16	110	0.15	L17	180	0.15	M22	130	0.20	M22	130	0.20		
33	J10	150	0.12	K14	95	0.15	L17	220	0.15	L22	230	0.15								
										M17	230	0.15								
47	K14	250	0.10	L17	260	0.15	L22	270	0.15	M22	280	0.15								
							M17	270	0.15											
68	K14	300	0.10	L22	320	0.15	M22	330	0.15											
				M17	320	0.15														
100	K14	380	0.10	L22	380	0.15														
	L17	450	0.10																	
220	L22	750	0.10																	
	M17	750	0.10																	
330	M22	980	0.10																	

DF (tan δ at 20°C, 120Hz)
 Rated ripple current (mAmps at 105°C, 120Hz)
 Case code

Alchip® MVK Series

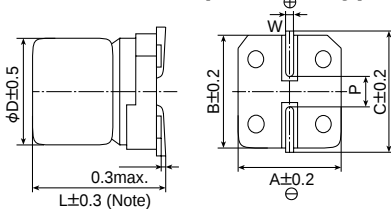
- Endurance : 105°C 1000 to 2000 hours
- Suitable to fit for downsized equipment
- Solvent-proof type (see PRECAUTIONS AND GUIDELINES)



SPECIFICATIONS

Items	Characteristics									
Category	Temperature Range									
Rated Voltage Range	-40 to +105℃									
Capacitance Tolerance	6.3 to 50V _{dc}									
Leakage Current	±20% (M) (at 20℃, 120Hz)									
Dissipation Factor (tanδ)	I=0.01CV or 3μA, whichever is greater.									
	Where, I : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V) (at 20℃ after 2 minutes)									
	Rated voltage (V _{dc})	6.3V	10V	16V	25V	35V	50V	(at 20℃,120Hz)		
tanδ (Max.)	D55 to F55	0.30	0.24	0.20	0.16	0.14	0.12			
	H63 to J10	0.40	0.30	0.26	0.16	0.14	0.12			
Low Temperature Characteristics (Max. Impedance Ratio)	Rated voltage (V _{dc})	6.3V	10V	16V	25V	35V	50V	(at 120Hz)		
	Z(-25℃)/Z(+20℃)	4	3	2	2	2	2			
	Z(-40℃)/Z(+20℃)	10	8	6	4	3	3			
Endurance	The following specifications shall be satisfied when the capacitors are restored to 20℃ after the rated voltage is applied for the specified period of time at 105℃.									
	Case code	D55 to F55					H63 to J10			
	Time	1000hours					2000hours			
	Capacitance change	≤±30% of the initial value					≤±20% of the initial value			
	D.F. (tanδ)	≤300% of the initial specified value					≤200% of the initial specified value			
	Leakage current	≤The initial specified value					≤The initial specified value			
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20℃ after exposing them for the specified time at 105℃ without voltage applied.									
	Case code	D55 to F55					H63 to J10			
	Time	500hours					1000hours			
	Capacitance change	≤±25% of the initial value					≤±20% of the initial value			
	D.F. (tanδ)	≤200% of the initial specified value					≤200% of the initial specified value			
	Leakage current	≤The initial specified value					≤The initial specified value			

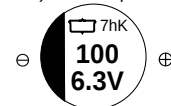
DIMENSIONS (Terminal Type=VC) [mm]



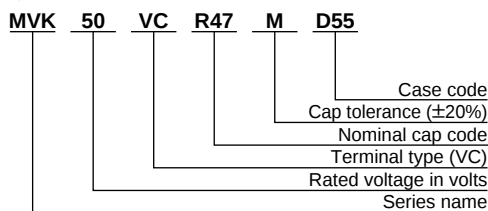
Case code	D	L	A	B	C	W	P
D55	4	5.2	4.3	4.3	5.1	0.5 to 0.8	1.0
E55	5	5.2	5.3	5.3	5.9	0.5 to 0.8	1.4
F55	6.3	5.2	6.6	6.6	7.2	0.5 to 0.8	1.9
H63	8	6.3	8.3	8.3	9.0	0.5 to 0.8	2.3
H10	8	10.0	8.3	8.3	9.0	0.7 to 1.1	3.1
J10	10	10.0	10.3	10.3	11.0	0.7 to 1.1	4.5

MARKING

EX) 6.3V100μF



PART NUMBERING SYSTEM



Capacitance	Code
0.1μF	R1
0.47μF	R47
1.0μF	1
4.7μF	4R7
10μF	10
100μF	100
1000μF	1000

STANDARD RATINGS

μF	V _{dc}	6.3	10	16	25	35	50
0.1							D55 1.3
0.22							D55 2.6
0.33							D55 3.2
0.47							D55 3.8
1.0							D55 5.6
2.2							D55 10
3.3							D55 14
4.7							E55 19
10							D55 29
22							D55 40
33							H63 80
47							H10 140
100							H10 170
220							J10 310
330							
470							
1000							

Note : → Use next higher voltage part.

Alchip® MKA Series

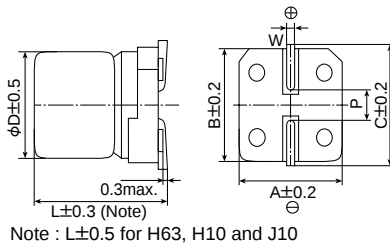
- Endurance at 105°C 1000 to 2000 hours assured
- Rated voltage : 6.3V to 50V, Nominal capacitance : 0.1 to 1000μF
- Case sizes : φ4×5.5 to φ10×10.5mm
- Solvent-proof type (see PRECAUTIONS AND GUIDELINES)



SPECIFICATIONS

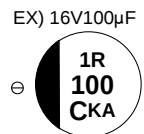
Items	Characteristics						
Category Temperature Range	-40 to +105°C						
Capacitance Tolerance	±20%(M) (at 20°C, 120Hz)						
Leakage Current	I=0.01CV or 3μA, whichever is greater (at 20°C, 2 minute) Where, I : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V)						
Dissipation Factor (tanδ)	Rated voltage(V _{dc})	6.3V	10V	16V	25V	35V	50V
	tanδ(Max.)	D55 to F55 F80 to J10	0.30 0.40	0.24 0.30	0.20 0.26	0.16 0.16	0.14 0.12
Low Temperature Characteristics (Max. Impedance Ratio)	Rated voltage(V _{dc})	6.3	10	16	25	35	50
	Z(-25°C)/Z(+20°C)	4	3	2	2	2	2
	Z(-40°C)/Z(+20°C)	10	8	6	4	3	3
Endurance	The following specifications shall be satisfied when the capacitors are restored to 20°C after the rated voltage is applied for the specified period of time at 105°C.						
	Sizes	D55 to F55			F80, H63, H10, J10		
	Time	1000 hours			2000 hours		
	Capacitance change	≤±30% of the initial measured value			≤±20% of the initial measured value		
	D.F. (tanδ)	≤300% of the initial specified value			≤200% of the initial specified value		
	Leakage current	≤The initial specified value			≤The initial specified value		

DIMENSIONS (Terminal Type = VC) [mm]



Case code	D	L	A	B	C	W	P
D55	4	5.2	4.3	4.3	5.1	0.5 to 0.8	1.0
E55	5	5.2	5.3	5.3	5.9	0.5 to 0.8	1.4
F55	6.3	5.2	6.6	6.6	7.2	0.5 to 0.8	1.9
F80	6.3	7.7	6.6	6.6	7.2	0.5 to 0.8	1.9
H63	8	6.3	8.3	8.3	9.0	0.5 to 0.8	2.3
H10	8	10.0	8.3	8.3	9.0	0.7 to 1.1	3.1
J10	10	10.0	10.3	10.3	11.0	0.7 to 1.1	4.5

MARKING



PART NUMBERING SYSTEM

MKA	35	VC	220	M	J10
Series name					
Rated voltage in volts					
Terminal type (VC)					
Nominal capacitance code					
Capacitance tolerance (±20%)					
Case code					

Capacitance	Code
0.1μF	R1
0.47μF	R47
1.0μF	1
4.7μF	4R7
10μF	10
100μF	100
1000μF	1000

RATED VOLTAGE CODE

Rated voltage (V _{dc})	Code
6.3	j
10	A
16	C
25	E
35	V
50	H

STANDARD RATINGS

μF	V _{dc}	6.3	10	16	25	35	50
0.1							D55 1.3
0.22							D55 2.6
0.33							D55 3.2
0.47							D55 3.8
1.0							D55 5.6
2.2							D55 10
3.3							D55 14
4.7							D55 19
10				D55 16		E55 25	F55 29
22	D55 21		E55 30			F55 40	F80 70
33		E55 34		F55 45		F80 80	H10 140
47	E55 36		F55 48	F80 80		H10 170	
100	F55 56	F80 90		H10 180		J10 310	
220		H10 180					
330	H10 290			J10 450			
470							
1,000	J10 410						

Note : Parenthesized capacitances are sub-standard parts.

Note : → Use next higher voltage part.

New! Alchip® MZA Series

- Very low impedance, 105°C 2000 hour-life
- Pb-free design : Sn-Bi plating terminal
- Solvent-proof type (see PRECAUTIONS AND GUIDELINES)

MZA

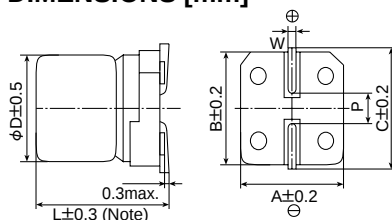
lower Z
MVZ
lower Z
MVY



◆ SPECIFICATIONS

Items	Characteristics							
Category	-55 to +105°C							
Temperature Range								
Rated Voltage Range	6.3 to 50V _{dc}							
Capacitance Tolerance	±20%(M) (20°C, 120Hz)							
Leakage Current	I=0.01CV or 3μA, whichever is greater Where, I : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V) (at 20°C after 2 minutes)							
Dissipation Factor (tanδ)	Rated voltage(V _{dc})	6.3V	10V	16V	25V	35V	50V	(20°C, 120Hz)
	tanδ (Max.)	0.26	0.19	0.16	0.14	0.12	0.10	
Low Temperature Characteristics (Max. impedance Ratio)	Rated voltage(V _{dc})	6.3V	10V	16V	25V	35V	50V	(120Hz)
	Z(-25°C)/Z(+20°C)	2	2	2	2	2	2	
	Z(-40°C)/Z(+20°C)	3	3	3	3	3	3	
	Z(-55°C)/Z(+20°C)	4	4	4	3	3	3	
Endurance	The following specifications shall be satisfied when the capacitors are restored to 20°C after the rated voltage is applied for 2000 hours at 105°C.							
	Capacitance change	≤±30% of the initial measured value						
	D.F. (tanδ)	≤200% of the initial specified value						
	Leakage current	≤The initial specified value						

◆ DIMENSIONS [mm]



Note : L±0.5 for H10 and J10

Case code	D	L	A	B	C	W	P
D61	4	5.8	4.3	4.3	5.1	0.5 to 0.8	1.0
E61	5	5.8	5.3	5.3	5.9	0.5 to 0.8	1.4
F61	6.3	5.8	6.6	6.6	7.2	0.5 to 0.8	1.9
F80	6.3	7.7	6.6	6.6	7.2	0.5 to 0.8	1.9
H10	8	10.0	8.3	8.3	9.0	0.7 to 1.1	3.1
J10	10	10.0	10.3	10.3	11.0	0.7 to 1.1	4.5

◆ MARKING

EX) 16V220μF



◆ PART NUMBERING SYSTEM

MZA 16 VC 220 M F80

Case code
Capacitance tolerance (±20%)
Nominal capacitance code
Terminal type (VC)
Rated voltage in volts
Series name

Capacitance	Code
4.7μF	4R7
10μF	10
100μF	100
1000μF	1000

◆ RATED VOLTAGE CODE

Rated voltage (V _{dc})	Code
6.3	j
10	A
16	C
25	E
35	V
50	H

◆ STANDARD RATINGS

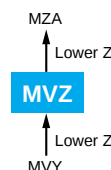
μF \ V _{dc}	6.3	10	16	25	35	50
4.7						
10			D61 1.35 90	D61 1.35 90	D61 1.35 90	D61 2.90 60
22	D61 1.35 90	D61 1.35 90	D61 1.35 90	E61 0.70 160	E61 0.70 160	F61 0.88 165
33		D61 1.35 90	E61 0.70 160	E61 0.70 160	F61 0.36 240	F80 0.68 195
47	D61 1.35 90		E61 0.70 160	F61 0.36 240	F61 0.36 240	F80 0.68 195
100	E61 0.70 160		F61 0.36 240	F80 0.34 280	F80 0.34 280	H10 0.34 350
220	F61 0.36 240	F80 0.34 280	F80 0.34 280	H10 0.16 600	H10 0.16 600	J10 0.18 670
330	F80 0.34 280	H10 0.16 600	H10 0.16 600	H10 0.16 600	J10 0.08 850	
470	H10 0.16 600	H10 0.16 600	H10 0.16 600	J10 0.08 850		
680		H10 0.16 600	J10 0.08 850			
1000	H10 0.16 600	J10 0.08 850				
1500	J10 0.08 850					

Note : → Use next higher voltage part.

Rated ripple current (mArms) at 105°C, 100kHz
Impedance (Ω max.) at 20°C, 100kHz
Case code

Alchip® MVZ Series

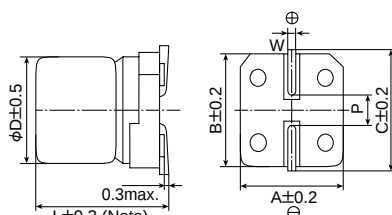
- Very low impedance, 105°C 1000-2000 hour-life
- Solvent-proof type (see PRECAUTIONS AND GUIDELINES)



SPECIFICATIONS

Items	Characteristics					
Category	-55 to +105°C					
Temperature Range						
Rated Voltage Range	6.3 to 25V _{dc}					
Capacitance Tolerance	±20%(M) (20°C, 120Hz)					
Leakage Current	I=0.01CV or 3μA, whichever is greater Where, I : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V) (at 20°C after 2 minutes)					
Dissipation Factor (tanδ)	Rated voltage(V _{dc})		6.3V	10V	16V	25V
	tanδ (Max.)	D60 to F80	0.24	0.20	0.16	0.14
		H10, J10	0.28	0.24	0.20	0.16
Low Temperature Characteristics (Max. impedance Ratio)	Rated voltage(V _{dc})		6.3V	10V	16V	25V
	Z(-25°C)/Z(+20°C)		3	2	2	2
	Z(-55°C)/Z(+20°C)		5	4	4	3
Endurance	The following specifications shall be satisfied when the capacitors are restored to 20°C after the rated voltage is applied for 1000 hours (H10/J10 sizes 2,000 hours) at 105°C.					
	Rated voltage (V _{dc})	6.3V			10 to 25V	
	Capacitance change	≤±30% of the initial value			≤±25% of the initial value	
	D.F. (tanδ)	≤200% of the initial specified value			≤200% of the initial specified value	
	Leakage current	≤The initial specified value			≤The initial specified value	

DIMENSIONS [mm]



Note : L±0.5 for H10 and J10

Case code	D	L	A	B	C	W	P
D60	4	5.7	4.3	4.3	5.1	0.5 to 0.8	1.0
E60	5	5.7	5.3	5.3	5.9	0.5 to 0.8	1.4
F60	6.3	5.7	6.6	6.6	7.2	0.5 to 0.8	1.9
F80	6.3	7.7	6.6	6.6	7.2	0.5 to 0.8	1.9
H10	8	10.0	8.3	8.3	9.0	0.7 to 1.1	3.1
J10	10	10.0	10.3	10.3	11.0	0.7 to 1.1	4.5

MARKING

EX) 16V220μF



PART NUMBERING SYSTEM

MVZ 16 VC 220 M F80

Case code
Capacitance tolerance (±20%)
Nominal capacitance code
Terminal type (VC)
Rated voltage in volts
Series name

Capacitance	Code
4.7μF	4R7
10μF	10
100μF	100
1000μF	1000

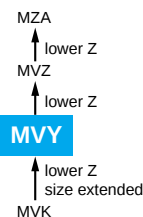
STANDARD RATINGS

μF	V _{dc}	6.3	10	16	25
1.0					
2.2					
3.3					
4.7					
10					
15					
22					
27					
33					
47					
56					
68					
100					
150					
220					
330					
470					
680					
1,000					
1,500					

Note : → Use next higher voltage part.

Alchip® MVY Series

- Expand up to $\phi 18$ case size
- Expand up to 100V_{dc}
- Low impedance, 105°C 1000 to 5000-hours-life
- For digital equipment, especially DC-DC converters and VRM
- Solvent-proof type except 80 & 100V_{dc} (see PRECAUTIONS AND GUIDELINES)

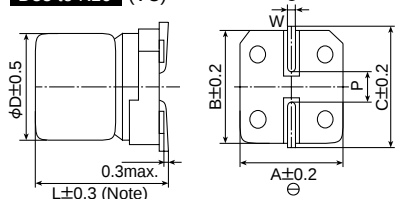


SPECIFICATIONS

Items	Characteristics											
Category												
Temperature Range	-55 to +105°C (6.3 to 63V _{dc}) -40 to +105°C (80 & 100V _{dc})											
Rated Voltage Range	6.3 to 100V _{dc}											
Capacitance Tolerance	±20% (M) (at 20°C, 120Hz)											
Leakage Current	I=0.01CV or 3μA, whichever is greater. Where, I : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V) (at 20°C after 2 minutes)											
Dissipation Factor (tanδ)	Rated voltage (V _{dc})		6.3V	10V	16V	25V	35V	50V	63V	80V	100V	When nominal capacitance exceeds 1000μF, add 0.02 to the value above for each 1000μF increase. (at 20°C, 120Hz)
	tanδ (Max.)	D55 to F80	0.24	0.20	0.16	0.14	0.12	0.12	—	—	—	
		H10 & J10	0.28	0.24	0.20	0.16	0.14	0.12	—	—	—	
		K14 to M22	0.26	0.22	0.18	0.16	0.14	0.12	0.14	0.10	0.10	
Low Temperature Characteristics (Max. Impedance Ratio)	Rated voltage (V _{dc})		6.3V	10V	16V	25V	35V	50V	63V	80V	100V	(at 120Hz)
	Z(-40°C)/Z(+20°C)	D55 to J10	3	2	2	2	2	—	—	—		
		K14 to M22	10	8	6	4	3	3	3	3	3	
Endurance	The following specifications shall be satisfied when the capacitors are restored to 20°C after the rated voltage is applied for specified time at 105°C.											
	Time	D55 to F80 : 1000 hours H10 & J10 : 2000 hours K14 to M22 : 5000 hours										
	Rated voltage	6.3V _{dc} (D55 to J10)					6.3 to 100V _{dc}					
	Capacitance change	≤±30% of the initial value					≤±20% of the initial value					
	D.F. (tanδ)	≤300% of the initial specified value					≤200% of the initial specified value					
	Leakage current	≤The initial specified value					≤The initial specified value					
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for 1000 hours at 105°C without voltage applied.											
	Rated voltage	6.3V _{dc} (D55 to J10)					6.3 to 100V _{dc}					
	Capacitance change	≤±30% of the initial value					≤±20% of the initial value					
	D.F. (tanδ)	≤300% of the initial specified value					≤200% of the initial specified value					
	Leakage current	≤The initial specified value					≤The initial specified value					

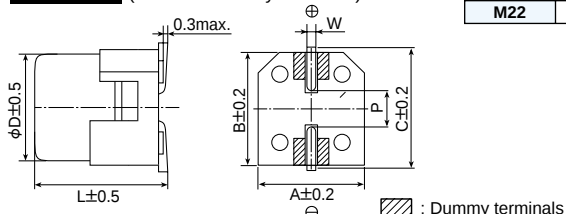
DIMENSIONS (Terminal Type=VC or VE) [mm]

D55 to K16 (VC)



Note : L±0.5 for H10, J10, K14 and K16

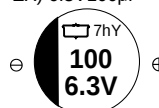
L17 to M22 (VE : with dummy terminals)



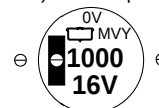
Case code	φD	L	A	B	C	W	P
D55	4	5.2	4.3	4.3	5.1	0.5 to 0.8	1.0
E55	5	5.2	5.3	5.3	5.9	0.5 to 0.8	1.4
F55	6.3	5.2	6.6	6.6	7.2	0.5 to 0.8	1.9
F80	6.3	7.7	6.6	6.6	7.2	0.5 to 0.8	1.9
H10	8	10.0	8.3	8.3	9.0	0.7 to 1.1	3.1
J10	10	10.0	10.3	10.3	11.0	0.7 to 1.1	4.5
K14	12.5	13.5	13.0	13.0	13.7	1.0 to 1.3	4.2
K16	12.5	16.0	13.0	13.0	13.7	1.0 to 1.3	4.2
L17	16	16.5	17.0	17.0	18.0	1.0 to 1.3	6.5
L22	16	21.5	17.0	17.0	18.0	1.0 to 1.3	6.5
M17	18	16.5	19.0	19.0	20.0	1.0 to 1.3	6.5
M22	18	21.5	19.0	19.0	20.0	1.0 to 1.3	6.5

MARKING

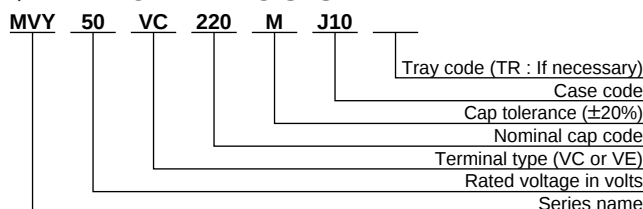
D55 to J10
EX) 6.3V100μF



K14 to M22
EX) 16V1000μF



PART NUMBERING SYSTEM



Capacitance	Code
1.0μF	1
4.7μF	4R7
10μF	10
100μF	100
1000μF	1000

◆STANDARD RATINGS

μF \ V_{dc}	6.3			10			16			25			35		
4.7													D55	3.0	60
10							D55	3.0	60	E55	1.8	95	E55	1.8	95
22	D55	3.0	60	E55	1.8	95	E55	1.8	95	F55	1.0	140	F55	1.0	140
33	E55	1.8	95	E55	1.8	95	F55	1.0	140	F55	1.0	140	F55	1.0	140
47	E55	1.8	95	F55	1.0	140	F55	1.0	140	F55	1.0	140	F55	1.0	140
68													F80	0.34	280
100	F55	1.0	140	F55	1.0	140	F55	1.0	140	F80	0.34	280	H10	0.30	450
220	F55	1.0	140	F80	0.34	280	F80	0.34	280	H10	0.30	450	H10	0.30	450
330	F80	0.34	280	H10	0.30	450	H10	0.30	450	H10	0.30	450	J10	0.15	670
470	H10	0.30	450	H10	0.30	450	H10	0.30	450	J10	0.15	670	K14 L17	0.070 0.054	820 1,260
680	H10	0.30	450	J10	0.15	670	J10	0.15	670						
1,000	H10	0.30	450	J10	0.15	670	K14 L17	0.070 0.054	820 1,260	L17 M17	0.054 0.054	1,260 1,350	L17 M17	0.054 0.054	1,260 1,350
1,500	J10	0.15	670												
2,200	K14 L17	0.070 0.054	820 1,260	K16 L17	0.060 0.054	950 1,260	L17 M17	0.054 0.054	1,260 1,350	L22 M22	0.038 0.038	1,630 1,750	M22	0.038	1,750
3,300	K16 M17	0.060 0.054	950 1,350	L17 M17	0.054 0.054	1,260 1,350	L22 M17	0.038 0.054	1,630 1,350	M22	0.038	1,750			
4,700	L22 M17	0.038 0.054	1,630 1,350	L22 M22	0.038 0.038	1,630 1,750	M22	0.038	1,750						
6,800	L22 M22	0.038 0.038	1,630 1,750	M22	0.038	1,750									
8,200	M22	0.038	1,750												

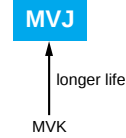
Rated ripple current (mArms) at 105°C, 100kHz
 Impedance (Ω) at 20°C, 100kHz
 Case code

Non solvent-proof												
μF \ V_{dc}	50			63			80			100		
1.0	D55	5.0	30									
2.2	D55	5.0	30									
3.3	D55	5.0	30									
4.7	E55	3.0	50									
10	F55	2.0	70									
22	F55	2.0	70									
33	F80	0.60	170									
47	F80	0.60	170									
68	H10	0.60	300	K14	0.19	500				K14	0.33	450
100	H10	0.60	300	K14	0.19	500	K14	0.33	450	K14 L17	0.33 0.24	450 650
220	J10	0.30	500	K14 L17	0.19 0.12	500 845	K16	0.26	550	L22 M17	0.16 0.24	900 700
330	K14 L17	0.11 0.087	650 900	L17 M17	0.12 0.12	845 905	L22 M17	0.16 0.24	900 700	M22	0.16	950
470	L17 M17	0.087 0.087	900 1,060	L22 M17	0.085 0.12	1,100 905	M22	0.16	950			
1,000	M22	0.050	1,520									

Case code
 Impedance (Ω) at 20°C, 100kHz
 Rated ripple current (mArms) at 105°C, 100kHz

Alchip® MVJ Series

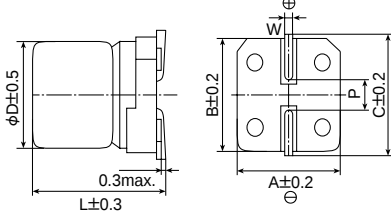
- Endurance : 105°C 2000 hours
- Solvent-proof type (see PRECAUTIONS AND GUIDELINES)



SPECIFICATIONS

Items	Characteristics							
Category								
Temperature Range	-40 to +105°C							
Rated Voltage Range	6.3 to 50V _{dc}							
Capacitance Tolerance	±20% (M) (at 20°C, 120Hz)							
Leakage Current	I=0.01CV or 3μA, whichever is greater. Where, I : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V) (at 20°C after 2 minutes)							
Dissipation Factor (tanδ)	Rated voltage (V _{dc})	6.3V	10V	16V	25V	35V	50V	(at 20°C, 120Hz)
	tanδ (Max.)	0.30	0.24	0.20	0.16	0.14	0.12	
Low Temperature Characteristics (Max. Impedance Ratio)	Rated voltage (V _{dc})	6.3V	10V	16V	25V	35V	50V	(at 120Hz)
	Z(-25°C)/Z(+20°C)	4	3	2	2	2	2	
	Z(-40°C)/Z(+20°C)	12	8	6	4	3	3	
Endurance	The following specifications shall be satisfied when the capacitors are restored to 20°C after the rated voltage is applied for 2000 hours at 105°C.							
	Rated voltage	6.3V _{dc}				10 & 16V _{dc}		25 to 50V _{dc}
	Capacitance change	≤±30% of the initial value				≤±25% of the initial value		≤±20% of the initial value
	D.F. (tanδ)	≤300% of the initial specified value				≤300% of the initial specified value		≤200% of the initial specified value
	Leakage current	The initial specified value				≤The initial specified value		≤The initial specified value
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for 1000 hours at 105°C without voltage applied.							
	Rated voltage	6.3V _{dc}				10 & 16V _{dc}		25 to 50V _{dc}
	Capacitance change	≤±30% of the initial value				≤±25% of the initial value		≤±20% of the initial value
	D.F. (tanδ)	≤300% of the initial specified value				≤300% of the initial specified value		≤200% of the initial specified value
	Leakage current	≤The initial specified value				≤The initial specified value		≤The initial specified value

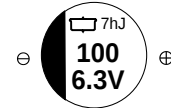
DIMENSIONS (Terminal Type=VC) [mm]



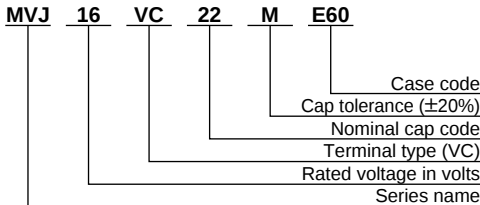
Case code	D	L	A	B	C	W	P
D60	4	5.7	4.3	4.3	5.1	0.5 to 0.8	1.0
E60	5	5.7	5.3	5.3	5.9	0.5 to 0.8	1.4
F60	6.3	5.7	6.6	6.6	7.2	0.5 to 0.8	1.9

MARKING

EX) 6.3V100μF



PART NUMBERING SYSTEM



Capacitance	Code
0.1μF	R1
1.0μF	1
4.7μF	4R7
10μF	10
100μF	100

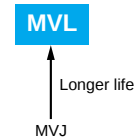
STANDARD RATINGS

μF \ V _{dc}	6.3	10	16	25	35	50
0.1						D60 1.3
0.22						D60 2.6
0.33						D60 3.2
0.47						D60 3.8
1.0						D60 5.6
2.2						D60 10
3.3						D60 14
4.7						D60 19
10						D60 29
22	D60 21		D60 16		E60 25	F60 29
33		E60 34	E60 30	F60 45	F60 40	
47	E60 36		F60 48			
100	F60 56					

Note : → Use next higher voltage part.

Alchip® MVL Series

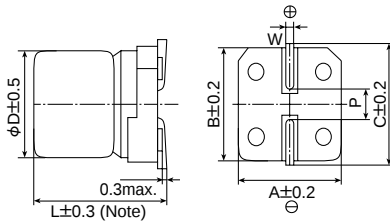
- Endurance : 105°C 3000 to 5000 hours (F80 to J10 added)
- Suitable for applications requiring long life such as continuously operating equipment, industrial applications, etc
- Solvent-proof type (see PRECAUTIONS AND GUIDELINES)



SPECIFICATIONS

Items	Characteristics									
Category										
Temperature Range	-40 to +105°C									
Rated Voltage Range	6.3 to 50V _{dc}									
Capacitance Tolerance	±20%(M) (at 20°C,120Hz)									
Leakage Current	I=0.03CV or 4μA, whichever is greater Where, I : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V) (at 20°C, after 2 minutes)									
Dissipation Factor (tanδ)	Rated voltage (V _{dc})	6.3V	10V	16V	25V	35V	50V	(at 20°C,120Hz)		
	Max. tanδ	0.28	0.24	0.20	0.16	0.13	0.12			
Low Temperature Characteristics (Max. impedance Ratio)	Rated voltage(V _{dc})	6.3V	10V	16V	25V	35V	50V	(120Hz)		
	Z(-25°C)/Z(+20°C)	4	3	2	2	2	2			
	Z(-40°C)/Z(+20°C)	10	7	5	3	3	3			
Endurance	After the capacitors are subjected to the rated DC voltage for 3000 hours (H10 & J10 sizes 5000 hours) at 105°C, the following specifications shall be satisfied when the capacitors are restored to 20°C.									
	Capacitance change	≤±30% of the initial measured value								
	D.F. (tanδ)	≤300% of the initial specified value								
	Leakage current	≤The initial specified value								
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for 1000 hours at 105°C without voltage applied.									
	Capacitance change	≤±30% of the initial measured value								
	D.F. (tanδ)	≤300% of the initial specified value								
	Leakage current	≤The initial specified value								

DIMENSIONS (Terminal Type=VC) [mm]



Note : L±0.5 for H63 to J10

Outer dimensions							
Case code	D	L	A	B	C	W	P
D60	4	5.7	4.3	4.3	5.1	0.5 to 0.8	1.0
E60	5	5.7	5.3	5.3	5.9	0.5 to 0.8	1.4
F60	6.3	5.7	6.6	6.6	7.2	0.5 to 0.8	1.9
F80	6.3	7.7	6.6	6.6	7.2	0.5 to 0.8	1.9
H63	8	6.3	8.3	8.3	9.0	0.5 to 0.8	2.3
H10	8	10.0	8.3	8.3	9.0	0.7 to 1.1	3.1
J10	10	10.0	10.3	10.3	11.0	0.7 to 1.1	4.5

MARKING

EX) 16V47μF



PART NUMBERING SYSTEM

MVL 35 VC 10 M E60

Case code
Capacitance tolerance (±20%)
Nominal capacitance code
Terminal type (VC)
Rated voltage in volts
Series name

Capacitance	Code
0.1μF	R1
2.2μF	2R2
10μF	10
100μF	100

STANDARD RATINGS

μF	V _{dc}	6.3	10	16	25	35	50
0.1							D60 1.0
0.22							D60 2.6
0.33							D60 3.2
0.47							D60 3.8
1.0							D60 6.2
2.2							D60 11
3.3							D60 14
4.7							D60 19
10				D60 18			E60 25
22	D60	22		E60 30			F60 42
33			E60 35		F60 48		F80 57
47	E60	36		F60 50	F80 63		H10 77
100	F60	60		F80 81	H10 116		H10 92
220	F80	101	H10 141			J10 216	J10 151
330	H10	160			J10 238		
470				J10 254			
1,000	J10	313					

Note : → Use a next higher voltage part.

Alchip® MVH Series

- Endurance : 125°C 1000 to 5000 hours
- Suitable to fit for automotive equipment
- Solvent-proof type (10 to 50V) (see PRECAUTIONS AND GUIDELINES)

MVH

125°C
size extended
MVK

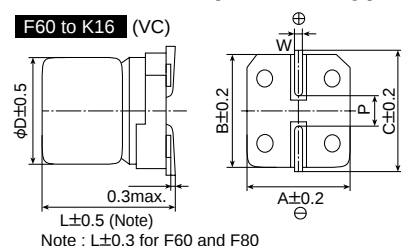


SPECIFICATIONS

Items	Characteristics											
Category	-40 to +125°C											
Temperature Range												
Rated Voltage Range	10 to 450V _{dc}											
Capacitance Tolerance	±20% (M) (at 20°C, 120Hz)											
Leakage Current	10 to 100V _{dc}					160 to 450V _{dc}						
	I=0.03CV or 4μA, whichever is greater.					I=0.04CV+100 (160 to 450V _{dc})						
	Where, I : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V) (at 20°C after 2 minutes)											
Dissipation Factor (tanδ)	Rated voltage (V _{dc})		10V	16V	25V	35V	50V	63V	100V	160 to 250V	400 & 450V	
	tanδ (Max.)	F60 to J10	0.24	0.20	0.16	0.14	0.14	0.18	0.18	—	—	
		K14 to M22	0.22	0.18	0.16	0.14	0.12	0.14	0.10	0.20	0.24	
	When nominal capacitance exceeds 1000μF, add 0.02 to the value above for each 1000μF increase. (at 20°C, 120Hz)											
Low Temperature Characteristics (Max. Impedance Ratio)	Rated voltage (V _{dc})		10V	16V	25V	35V	50V	63V	100V	160 to 250V	400 & 450V	
	F60 to J10	Z(−25°C)/Z(+20°C)	4	3	2	2	2	2	2	—	—	
		Z(−40°C)/Z(+20°C)	10	8	6	4	4	4	4	—	—	
	K14 to M22	Z(−25°C)/Z(+20°C)	4	3	2	2	2	2	2	3	6	
		Z(−40°C)/Z(+20°C)	8	6	4	3	3	3	3	6	10	
(at 120Hz)												
Endurance	The following specifications shall be satisfied when the capacitors are restored to 20°C after the rated voltage is applied for the specified time at 125°C.											
	Time	F60 to H63 (10 to 100V _{dc}) : 1000hours H10 to J10 (10 to 100V _{dc}) : 2000hours K14 to M22 (10 to 100V _{dc}) : 5000hours K14 to M22 (160 to 450V _{dc}) : 2000hours										
		Capacitance change	≤±30% of the initial value									
		D.F. (tanδ)	≤300% of the initial specified value									
		Leakage current	≤The initial specified value									
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for 1000 hours (500 hours for 350 to 450WV) at 125°C without voltage applied.											
	Rated voltage(V _{dc})		10 to 50V _{dc}					63 to 450V _{dc}				
	Capacitance change		≤±30% of the initial value					≤±30% of the initial value				
	D.F. (tanδ)		≤300% of the initial specified value					≤300% of the initial specified value				
	Leakage current		≤The initial specified value					≤500% of the initial specified value				

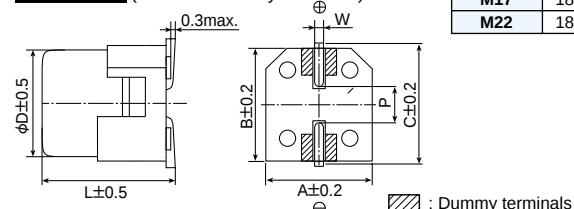
DIMENSIONS (Terminal Type=VC or VE) [mm]

F60 to K16 (VC)



Case code	D	L	A	B	C	W	P
F60	6.3	5.7	6.6	6.6	7.2	0.5 to 0.8	1.9
F80	6.3	7.7	6.6	6.6	7.2	0.5 to 0.8	1.9
H63	8	6.3	8.3	8.3	9.0	0.5 to 0.8	2.3
H10	8	10.0	8.3	8.3	9.0	0.7 to 1.1	3.1
J10	10	10.0	10.3	10.3	11.0	0.7 to 1.1	4.5
K14	12.5	13.5	13.0	13.0	13.7	1.0 to 1.3	4.2
K16	12.5	16.0	13.0	13.0	13.7	1.0 to 1.3	4.2
L17	16	16.5	17.0	17.0	18.0	1.0 to 1.3	6.5
L22	16	21.5	17.0	17.0	18.0	1.0 to 1.3	6.5
M17	18	16.5	19.0	19.0	20.0	1.0 to 1.3	6.5
M22	18	21.5	19.0	19.0	20.0	1.0 to 1.3	6.5

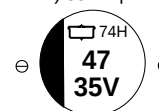
L17 to M22 (VE : with dummy terminals)



MARKING

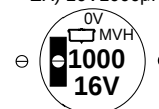
F60 to J10

EX) 35V47μF

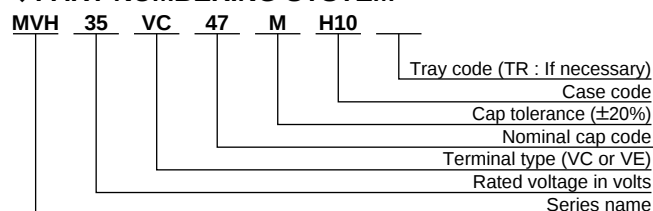


K14 to M22

EX) 16V1000μF



PART NUMBERING SYSTEM



Capacitance	Code
10μF	10
100μF	100
1000μF	1000

◆ STANDARD RATINGS

Items μF	10				16				25				35			
	Case Code	ESR (Ωmax/100kHz)		Rated ripple current (mA _{rms} /125°C, 100kHz)	Case Code	ESR (Ωmax/100kHz)		Rated ripple current (mA _{rms} /125°C, 100kHz)	Case Code	ESR (Ωmax/100kHz)		Rated ripple current (mA _{rms} /125°C, 100kHz)	Case Code	ESR (Ωmax/100kHz)		Rated ripple current (mA _{rms} /125°C, 100kHz)
		20°C	-40°C			20°C	-40°C			20°C	-40°C			20°C	-40°C	
10													F60	3.3	66.0	27
22													F60	3.3	66.0	39
33									F60	3.3	66.0	45	H63 F80	2.3 2.3	46.0 46.0	62 62
47					F60	3.3	66.0	43	H63 F80	2.3 2.3	46.0 46.0	68 68	H10	1.0	20.0	92
100	H63 F80	2.3 2.3	46.0 46.0	72 72					H10	1.0	20.0	126	J10	0.7	13.4	151
220	H10	1.0	20.0	136					J10	0.7	13.4	211				
330	J10	0.7	13.4	188					K14	0.14	2.1	750	K14 L17	0.14 0.10	2.1 1.5	750 1,000
470					K14	0.14	2.1	750	K14 L17	0.14 0.10	2.1 1.5	750 1,000	K16 L17	0.11 0.10	1.5 1.5	900 1,000
680					K14 L17	0.14 0.10	2.1 1.5	750 1,000	L17 M17	0.10 0.10	1.5 1.5	1,000 1,200	M17	0.10	1.5	1,200
1,000	K14	0.14	2.1	750	M17	0.10	1.5	1,200	M22	0.058	0.87	1,550				
2,200	L17 M17	0.10 0.10	1.5 1.5	1,000 1,200	M17	0.10	1.5	1,200								
3,300	M17	0.10	1.5	1,200												
4,700	M22	0.058	0.87	1,550												

					Non-solvent proof							
V_{dc} Items μF	50				63				100			
	Case Code	ESR (Ωmax/100kHz)		Rated ripple current (mA _{rms} / 125°C, 100kHz)	Case Code	ESR (Ωmax/100kHz)		Rated ripple current (mA _{rms} / 125°C, 100kHz)	Case Code	ESR (Ωmax/100kHz)		Rated ripple current (mA _{rms} / 125°C, 100kHz)
		20°C	-40°C			20°C	-40°C			20°C	-40°C	
10	F60	3.3	66.0	38	H63 F80	2.3 2.3	115 115	42 42	H10	1.0	50	53
22	H63 F80	2.3 2.3	46.0 46.0	50 50	H10	1.0	50.0	56	J10	0.70	35	63
33	H10	1.0	20.0	83	J10	0.7	35.0	71				
47	J10	0.7	13.4	111					K14	0.33	16.5	450
68									K16	0.26	13.0	550
100	K14	0.23	3.5	550	K14	0.25	12.5	500	L17	0.24	12.0	650
220	K14 L17	0.23 0.15	3.5 2.3	550 850	K16	0.20	10.0	600	M22	0.16	8.0	950
330	K16 L17	0.18 0.15	2.7 2.3	700 850	L17	0.18	9.0	820				
470	M17	0.15	2.3	920	L22	0.11	5.5	1,100				

		Non-solvent proof									
V_{dc} Items μF	160		200		250		400		450		
	Case Code	Rated ripple current (mA _{RMS} /125°C, 120Hz)	Case Code	Rated ripple current (mA _{RMS} /125°C, 120Hz)	Case Code	Rated ripple current (mA _{RMS} /125°C, 120Hz)	Case Code	Rated ripple current (mA _{RMS} /125°C, 120Hz)	Case Code	Rated ripple current (mA _{RMS} /125°C, 120Hz)	
3.3									K16	65	
4.7							K14	70	L17	85	
6.8							L17	100			
10	K14	100	K14	100	K16	110	L22 M17	140 135	M22	145	
22	L17	180	L17	180	L22 M17	205 200					
33	M17	245	L22 M17	250 245	M22	260					
47			M22	315							
68	M22	380									

Alchip® MV-BP Series

- Bi-polarized chip type for the circuit, of which polarity is frequently reversed
- Solvent-proof type (see PRECAUTIONS AND GUIDELINES)

MV-BP

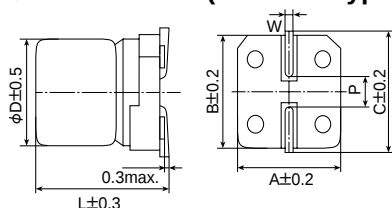
bi-polarized
MV



◆ SPECIFICATIONS

Items	Characteristics									
Category	Temperature Range									
Temperature Range	-40 to +85°C									
Rated Voltage Range	4 to 50V _{dc}									
Capacitance Tolerance	±20% (M) (at 20°C, 120Hz)									
Leakage Current	I=0.05CV or 10μA, whichever is greater. Where, I : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V) (at 20°C after 2 minutes)									
Dissipation Factor (tanδ)	Rated voltage (V _{dc})	4V	6.3V	10V	16V	25V	35V	50V	(at 20°C, 120Hz)	
	tanδ (Max.)	0.45	0.32	0.26	0.24	0.22	0.20	0.20		
Low Temperature Characteristics (Max. Impedance Ratio)	Rated voltage (V _{dc})	4V	6.3V	10V	16V	25V	35V	50V	(at 120Hz)	
	Z(-25°C)/Z(+20°C)	7	4	3	2	2	2	2		
	Z(-40°C)/Z(+20°C)	15	10	8	6	4	3	3		
Endurance	The following specifications shall be satisfied when the capacitors are restored to 20°C after the rated voltage is applied for 2000 hours at 85°C, however the polarization shall be reversed every 250 hours.									
	Capacitance change	≤±20% of the initial value								
	D.F. (tanδ)	≤200% of the initial specified value								
	Leakage current	≤The initial specified value								
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for 500 hours at 85°C without voltage applied.									
	Capacitance change	≤±15% of the initial value								
	D.F. (tanδ)	≤150% of the initial specified value								
	Leakage current	≤The initial specified value								

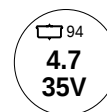
◆DIMENSIONS (Terminal Type=VC) [mm]



Case code	D	L	A	B	C	W	P
D55	4	5.2	4.3	4.3	5.1	0.5 to 0.8	1.0
E55	5	5.2	5.3	5.3	5.9	0.5 to 0.8	1.4
F55	6.3	5.2	6.6	6.6	7.2	0.5 to 0.8	1.9

◆ MARKING

EX) 35V4.7 μ F



◆PART NUMBERING SYSTEM

MV	50	VC	R47	M	BP	D55				
								Case code		
								Bi-polar type		
								Cap tolerance ($\pm 20\%$)		
								Nominal cap code		
								Terminal type (VC)		
								Rated voltage in volts		
								Series name		

Capacitance	Code
0.1 μ F	R1
0.47 μ F	R47
1.0 μ F	1
4.7 μ F	4R7
10 μ F	10

◆ STANDARD RATINGS

μF \ V_{dc}	4	6.3	10	16	25	35	50
0.1							D55 1.3
0.15							D55 1.9
0.22							D55 2.3
0.33							D55 2.8
0.47							D55 3.4
0.68							D55 4.1
1.0							D55 5.5
1.5							D55 6.5
2.2							
3.3					D55 9	D55 8	E55 9
4.7				D55 11			E55 11
6.8			D55 12		E55 15	E55 13	F55 14
10		D55 13		E55 18		F55 21	
15	D55 14		E55 21		F55 24		
22		E55 23		F55 28			
33			F55 33				
47		F55 36					

Note : $\rightarrow$ Use next higher voltage part.

Alchip® MVK-BP Series

- Bi-polarized chip type for the circuit, of which polarity is frequently reversed
- Solvent-proof type (see PRECAUTIONS AND GUIDELINES)

MVK-BP

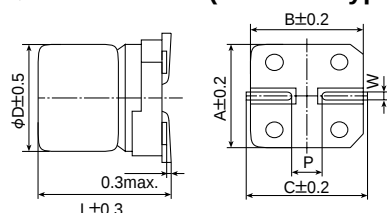
↑
bi-polarized
MVK



◆ SPECIFICATIONS

Items	Characteristics							
Category	-40 to +105°C							
Temperature Range								
Rated Voltage Range	6.3 to 50V _{dc}							
Capacitance Tolerance	±20% (M) (at 20°C, 120Hz)							
Leakage Current	I=0.05CV or 10μA, whichever is greater. Where, I : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V) (at 20°C after 2 minutes)							
Dissipation Factor (tanδ)	Rated voltage (V _{dc})	6.3V	10V	16V	25V	35V	50V	(at 20°C, 120Hz)
	tanδ (Max.)	0.35	0.26	0.24	0.20	0.18	0.18	
Low Temperature Characteristics (Max. Impedance Ratio)	Rated voltage (V _{dc})	6.3V	10V	16V	25V	35V	50V	(at 120Hz)
	Z(-25°C)/Z(+20°C)	4	3	2	2	2	2	
	Z(-40°C)/Z(+20°C)	10	8	6	4	3	3	
Endurance	The following specifications shall be satisfied when the capacitors are restored to 20°C after the rated voltage is applied for 1000 hours at 105°C, however the polarization shall be reversed every 250 hours.							
	Capacitance change	≤±30% of the initial value						
	D.F. (tanδ)	≤300% of the initial specified value						
	Leakage current	≤The initial specified value						
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for 500 hours at 105°C without voltage applied.							
	Capacitance change	≤±25% of the initial value						
	D.F. (tanδ)	≤200% of the initial specified value						
	Leakage current	≤The initial specified value						

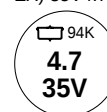
◆ DIMENSIONS (Terminal Type=VC) [mm]



Case code	D	L	A	B	C	W	P
D60	4	5.7	4.3	4.3	5.1	0.5 to 0.8	1.0
E60	5	5.7	5.3	5.3	5.9	0.5 to 0.8	1.4
F60	6.3	5.7	6.6	6.6	7.2	0.5 to 0.8	1.9

◆ MARKING

EX) 35V4.7μF



◆ PART NUMBERING SYSTEM

MVK 50 VC R1 M BP D60

Case code
Bi-polar type
Cap tolerance (±20%)
Nominal cap code
Terminal type (VC)
Rated voltage in volts
Series name

Capacitance	Code
0.1μF	R1
0.47μF	R47
1.0μF	1
4.7μF	4R7
10μF	10

◆ STANDARD RATINGS

μF \ V _{dc}	6.3	10	16	25	35	50
0.10						D60 1.3
0.15						D60 1.9
0.22						D60 2.3
0.33						D60 2.8
0.47						D60 3.4
0.68						D60 4.1
1.0						D60 5.5
1.5						D60 7.5
2.2					D60 8.8	E60 10
3.3				D60 10	E60 13	F60 16
4.7			D60 12	E60 17	F60 20	
6.8	D60 14	E60 22	F60 32			
10	D60 14	E60 22	F60 32			
15	E60 25	F60 35				
22						
33						
47						

Note : → Use next higher voltage part.



Miniature Aluminum Electrolytic Capacitors

SRM Series

- Coating case covered products are also available
- Downsized from current standard SRE series
- 5mm height, 1000-hours-life at 85°C
- Solvent-proof type (see PRECAUTIONS AND GUIDELINES)

SRM

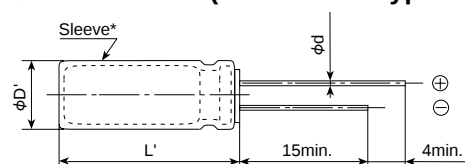
↓ downsized
SRE



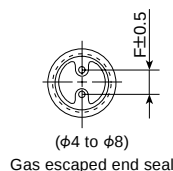
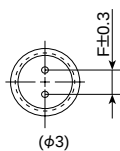
SPECIFICATIONS

Items	Characteristics							
Category	-40 to +85°C							
Temperature Range								
Rated Voltage Range	4 to 50V _{dc}							
Capacitance Tolerance	±20% (M)							
Leakage Current	I=0.01CV or 3μA, whichever is greater.							
	Where, I : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V) (at 20°C after 2 minutes)							
Dissipation Factor (tanδ)	Rated voltage (V _{dc})	4V	6.3V	10V	16V	25V	35V	50V
	tanδ (Max.)	0.40	0.38	0.30	0.23	0.17	0.15	0.13
Low Temperature Characteristics (Max. Impedance Ratio)								
	Rated voltage (V _{dc})	4V	6.3V	10V	16V	25V	35V	50V
	Z(-25°C)/Z(+20°C)	7	4	3	2	2	2	2
Endurance	Z(-40°C)/Z(+20°C)	15	8	8	6	4	3	3
	(at 120Hz)							
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after the rated voltage is applied for 1000 hours at 85°C.							
	Capacitance change	≤±20% of the initial value						
	D.F. (tanδ)	≤200% of the initial specified value						
	Leakage current	≤The initial specified value						

DIMENSIONS (Radial Lead Type=VB) [mm]



*φ8 : coating case



Gas escaped end seal

φD	3	4	5	6.3	8
φd	0.4	0.45	0.45	0.45	0.45
F	1.0	1.5	2.0	2.5	2.5
φD'	φD+0.5max.				
L'	L+1.0max.				

PART NUMBERING SYSTEM

SRM 10 VB 100 M

Cap tolerance (±20%)
Nominal cap code
Radial lead type
Rated voltage in volts
Series name

Capacitance	Code
0.1μF	R1
0.47μF	R47
1.0μF	1
4.7μF	4R7
10μF	10
100μF	100

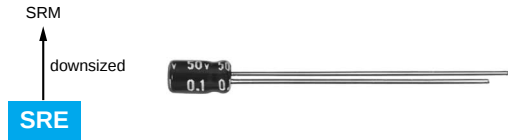
STANDARD RATINGS

μF	V _{dc}	4	6.3	10	16	25	35	50
0.1								3×5 1.3
0.22								3×5 2.9
0.33								3×5 4.2
0.47								3×5 5.0
1.0								3×5 7.2
2.2								3×5 10
3.3							3×5 12	4×5 14
4.7						3×5 13		4×5 19
10					3×5 18	4×5 25		5×5 31
22		3×5 22			4×5 33	5×5 41		6.3×5 49
33			4×5 36		5×5 47		6.3×5 56	8×5 76
47			4×5 40		5×5 55	6.3×5 63	8×5 85	
100		5×5 55		6.3×5 78		8×5 116		
220		6.3×5 88		8×5 148				
330			8×5 141					

Note : → Use next higher voltage part.

SRE Series

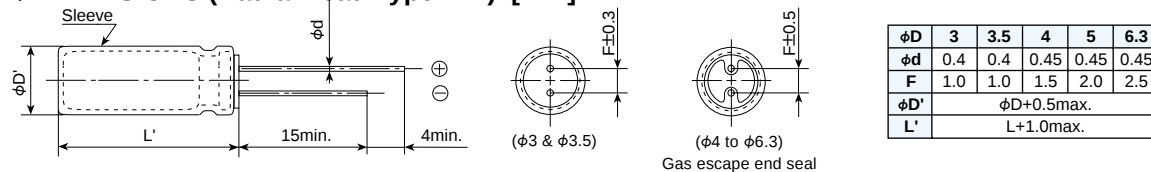
- Coating case covered products are also available
- 5mm height, 1000-hours-life at 85°C
- Non solvent-proof type



SPECIFICATIONS

Items	Characteristics								
Category	Temperature Range								
Rated Voltage Range	-40 to +85℃								
Capacitance Tolerance	4 to 50V _{dc}								
Leakage Current	±20% (M) (at 20℃, 120Hz)								
Dissipation Factor (tanδ)	I=0.01CV or 3μA, whichever is greater. Where, I : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V) (at 20℃ after 2 minutes)								
Low Temperature Characteristics (Max. Impedance Ratio)	Rated voltage (V _{dc})	4V	6.3V	10V	16V	25V	35V	50V	(at 20℃, 120Hz)
	tanδ (Max.)	0.35	0.24	0.20	0.16	0.14	0.12	0.10	
Endurance	Rated voltage (V _{dc})	4V	6.3V	10V	16V	25V	35V	50V	(at 120Hz)
	Z(-25℃)/Z(+20℃)	7	4	3	2	2	2	2	
	Z(-40℃)/Z(+20℃)	15	10	8	6	4	3	3	
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20℃ after the rated voltage is applied for 1000 hours at 85℃.								
	Capacitance change	≤±20% of the initial value							
	D.F. (tanδ)	≤200% of the initial specified value							
	Leakage current	≤The initial specified value							

DIMENSIONS (Radial Lead Type=VB) [mm]



PART NUMBERING SYSTEM

SRE	6.3	VB	100	M
				Cap tolerance (±20%)
				Nominal cap code
				Radial lead type
				Rated voltage in volts
				Series name

Capacitance	Code
0.1μF	R1
0.47μF	R47
1.0μF	1
4.7μF	4R7
10μF	10
100μF	100

STANDARD RATINGS

μF	V _{dc}	4	6.3	10	16	25	35	50
0.1								3×5 1.3
0.15								3×5 2.0
0.22								3×5 2.9
0.33								3×5 3.5
0.47								3×5 4.2
0.68								3×5 5.1
1.0								3×5 6.2
1.5								3×5 7.5
2.2								3×5 10
3.3								4×5 14
4.7								5×5 19
6.8								6.3×5 24
10								6.3×5 29
15								
22								
33								
47								
68								
100								

Case size φD×L (mm)

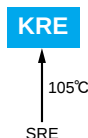
Rated ripple current (mA_{rms}) at 85°C, 120Hz

Note1 : → Use next higher voltage part.

Note2 : The parts of φ3.5×5 will be unified to φ4×5.

KRE Series

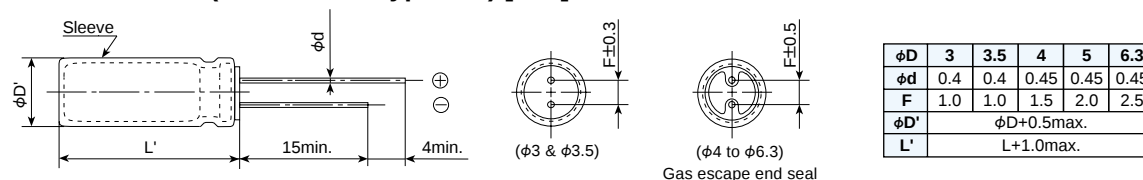
- Coating case covered products are also available
- 5mm height, 1000-hours-life at 105°C
- Solvent-proof type (see PRECAUTIONS AND GUIDELINES)



SPECIFICATIONS

Items	Characteristics							
Category	Temperature Range							
Category	Temperature Range							
Rated Voltage Range	6.3 to 50V _{dc}							
Capacitance Tolerance	±20% (M) (at 20°C, 120Hz)							
Leakage Current	I=0.01CV or 3μA, whichever is greater. Where, I : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V) (at 20°C after 2 minutes)							
Dissipation Factor (tanδ)	Rated voltage (V _{dc})	6.3V	10V	16V	25V	35V	50V	
	tanδ (Max.)	0.27	0.23	0.19	0.15	0.13	0.11	
	Add 0.02 for φ3 products. (at 20°C, 120Hz)							
Low Temperature Characteristics (Max. Impedance Ratio)	Rated voltage (V _{dc})	6.3V	10V	16V	25V	35V	50V	
	Z(−25°C)/Z(+20°C)	3	3	2	2	2	2	
	Z(−40°C)/Z(+20°C)	9	7	5	3	3	3	(at 120Hz)
Endurance	The following specifications shall be satisfied when the capacitors are restored to 20°C after the rated voltage is applied for 1000 hours at 105°C.							
	φD	φ3 & φ3.5					φ4 to φ6.3	
	Capacitance change	≤±25% of the initial value					≤±20% of the initial value	
	D.F. (tanδ)	≤200% of the initial specified value					≤200% of the initial specified value	
	Leakage current	≤The initial specified value					≤The initial specified value	
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for 500 hours at 105°C without voltage applied.							
	φD	φ3 & φ3.5					φ4 to φ6.3	
	Capacitance change	≤±25% of the initial value					≤±20% of the initial value	
	D.F. (tanδ)	≤200% of the initial specified value					≤200% of the initial specified value	
	Leakage current	≤The initial specified value					≤The initial specified value	

DIMENSIONS (Radial Lead Type=VB) [mm]



PART NUMBERING SYSTEM

KRE	16	VB	47	M
				Cap tolerance (±20%)
				Nominal cap code
				Radial lead type
				Rated voltage in volts
				Series name

Capacitance	Code
0.1μF	R1
0.47μF	R47
1.0μF	1
4.7μF	4R7
10μF	10
100μF	100

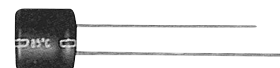
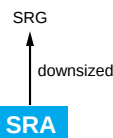
STANDARD RATINGS

μF	V _{dc}		6.3		10		16		25		35		50	
0.1													3×5	1.3
0.15													3×5	2.0
0.22													3×5	2.6
0.33													3×5	3.2
0.47													3×5	3.8
0.68													3×5	4.6
1.0													3×5	5.6
1.5													3×5	6.9
2.2													3.5×5	10
3.3													4×5	14
4.7													5×5	19
6.8													6.3×5	24
10			3×5	12	3×5	11	3.5×5	16	3×5	8.8	3.5×5	11	6.3×5	29
15			3.5×5	16	4×5	20	5×5	25	3.5×5	12	4×5	15	6.3×5	33
22			4×5	21	5×5	34	6.3×5	48	4×5	16	5×5	20	6.3×5	40
33														
47			5×5	36	6.3×5	52								
68														
100			6.3×5	56										

Note1 : → Use next higher voltage part.
Note2 : The parts of φ3.5×5 will be unified to φ4×5.

SRA Series

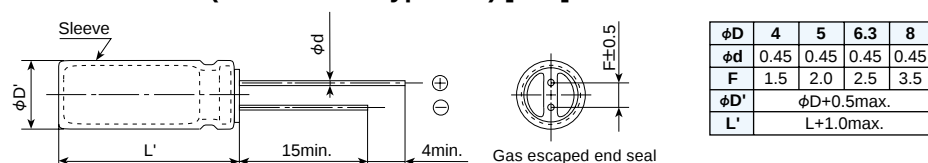
- 7mm height, 1000-hours-life at 85°C
- Non solvent-proof type



SPECIFICATIONS

Items	Characteristics									
Category	Temperature Range									
Temperature Range	-40 to +85℃									
Rated Voltage Range	4 to 63V _{dc}									
Capacitance Tolerance	±20% (M) (at 20℃, 120Hz)									
Leakage Current	I=0.01CV or 3μA, whichever is greater. Where, I : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V) (at 20℃ after 2 minutes)									
Dissipation Factor (tanδ)	Rated voltage (V _{dc})	4V	6.3V	10V	16V	25V	35V	50V	63V	(at 20℃, 120Hz)
	tanδ (Max.)	0.35	0.24	0.20	0.16	0.14	0.12	0.10	0.08	
Low Temperature Characteristics (Max. Impedance Ratio)	Rated voltage (V _{dc})	4V	6.3V	10V	16V	25V	35V	50V	63V	(at 120Hz)
	Z(-25℃)/Z(+20℃)	4	4	3	2	2	2	2	2	
	Z(-40℃)/Z(+20℃)	10	10	8	6	4	3	3	3	
Endurance	The following specifications shall be satisfied when the capacitors are restored to 20℃ after the rated voltage is applied for 1000 hours at 85℃.									
	Capacitance change	≤±20% of the initial value								
	D.F. (tanδ)	≤200% of the initial specified value								
	Leakage current	≤The initial specified value								
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20℃ after exposing them for 500 hours at 85℃ without voltage applied.									
	Capacitance change	≤±20% of the initial value								
	D.F. (tanδ)	≤200% of the initial specified value								
	Leakage current	≤The initial specified value								

DIMENSIONS (Radial Lead Type=VB) [mm]



PART NUMBERING SYSTEM

SRA	50	VB	R1	M
				Cap tolerance (±20%)
				Nominal cap code
				Radial lead type
				Rated voltage in volts
				Series name

Capacitance	Code
0.1μF	R1
0.47μF	R47
1.0μF	1
4.7μF	4R7
10μF	10
100μF	100

STANDARD RATINGS

μF	V _{dc}	4	6.3	10	16	25	35	50	63
0.1								4×7	1.3
0.22								4×7	2.9
0.33								4×7	4.4
0.47								4×7	7.9
1.0								4×7	11
2.2								4×7	17
3.3								4×7	21
4.7								4×7	26
10								4×7	47
22								4×7	57
33	4×7	26						4×7	76
47	4×7	34						4×7	
100	5×7	61						4×7	
220	6.3×7	95						4×7	
330								4×7	
470	8×7	154						4×7	

Note : → Use next higher voltage part.

KMA Series

- 7mm height, 1000-hours-life at 105°C
- Solvent-proof type (see PRECAUTIONS AND GUIDELINES)

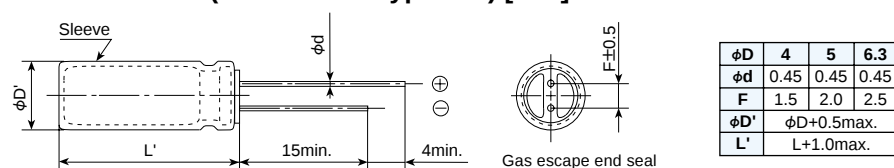
105°C
SRA



◆ SPECIFICATIONS

Items	Characteristics										
Category Temperature Range	-55 to +105°C										
Rated Voltage Range	4 to 63V _{dc}										
Capacitance Tolerance	±20% (M) (at 20°C, 120Hz)										
Leakage Current	I=0.01CV or 3μA, whichever is greater. Where, I : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V) (at 20°C after 2 minutes)										
Dissipation Factor (tanδ)	Rated voltage (V _{dc})	4V	6.3V	10V	16V	25V	35V	50V	63V	(at 20°C, 120Hz)	
	tanδ (Max.)	0.35	0.22	0.19	0.16	0.14	0.12	0.10	0.08		
Low Temperature Characteristics (Max. Impedance Ratio)	Rated voltage (V _{dc})	4V	6.3V	10V	16V	25V	35V	50V	63V	(at 120Hz)	
	Z(-25°C)/Z(+20°C)	4	3	2	2	2	2	2	2		
	Z(-40°C)/Z(+20°C)	10	6	5	3	3	3	3	3		
Endurance	The following specifications shall be satisfied when the capacitors are restored to 20°C after the rated voltage is applied for 1000 hours at 105°C.										
	Rated voltage	4 to 16V _{dc}					25 to 63V _{dc}				
	Capacitance change	≤±25% of the initial value					≤±20% of the initial value				
	D.F. (tanδ)	≤200% of the initial specified value									
	Leakage current	≤The initial specified value									
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for 1000 hours at 105°C without voltage applied.										
	Rated voltage	4 to 16V _{dc}					25 to 63V _{dc}				
	Capacitance change	≤±25% of the initial value					≤±20% of the initial value				
	D.F. (tanδ)	≤200% of the initial specified value									
	Leakage current	≤The initial specified value									

◆DIMENSIONS (Radial Lead Type=VB) [mm]



◆PART NUMBERING SYSTEM

Capacitance	Code
0.1μF	R1
0.47μF	R47
1.0μF	1
4.7μF	4R7
10μF	10
100μF	100

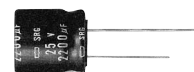
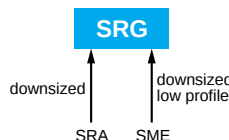
◆STANDARD RATINGS

μF	V _{dc}	4	6.3	10	16	25	35	50	63
0.1								4×7 1.3	4×7 1.3
0.15								4×7 2.0	4×7 1.9
0.22								4×7 2.9	4×7 2.9
0.33								4×7 3.5	4×7 4.4
0.47								4×7 5.0	4×7 7.9
0.68								4×7 7.1	4×7 9.2
1.0								4×7 10	4×7 11
1.5								4×7 12	4×7 13
2.2								4×7 15	4×7 17
3.3								4×7 18	5×7 21
4.7								4×7 20	5×7 26
6.8								5×7 24	6.3×7 28
10								5×7 30	6.3×7 34
15								6.3×7 37	6.3×7 43
22								6.3×7 47	6.3×7 57
33		4×7 26	→	5×7 43	→	6.3×7 53	6.3×7 64		
47		4×7 34	→	5×7 47	→	6.3×7 59	6.3×7 71		
68			→	6.3×7 63					
100		5×7 61	→	6.3×7 80	6.3×7 97				
220		6.3×7 95							

Note : $\rightarrow$ Use next higher voltage part.

SRG Series

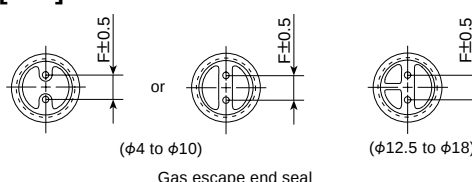
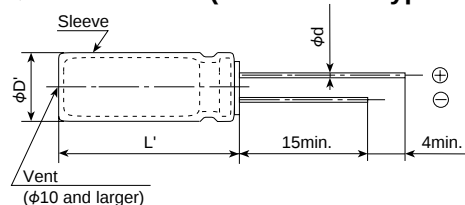
- Low profile : $\phi 4 \times 7\text{mm}$ to $\phi 18 \times 25\text{mm}$
- Endurance : 85°C 1000 to 2000 hours
- Solvent-proof type (see PRECAUTIONS AND GUIDELINES)



SPECIFICATIONS

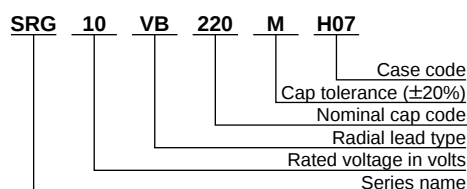
Items	Characteristics								
Category	-40 to +85℃								
Temperature Range									
Rated Voltage Range	4 to 50V _{dc}								
Capacitance Tolerance	±20% (M) (at 20℃, 120Hz)								
Leakage Current	I=0.01CV or 3μA, whichever is greater. Where, I : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V) (at 20℃ after 2 minutes)								
Dissipation Factor (tanδ)	Rated voltage (V _{dc})	4V	6.3V	10V	16V	25V	35V	50V	
	tanδ (Max.)	0.38	0.28	0.24	0.20	0.16	0.14	0.12	
	When nominal capacitance exceeds 1000μF, add 0.03 to the value above for each 1000μF increase. (at 20℃, 120Hz)								
Low Temperature Characteristics (Max. Impedance Ratio)	Rated voltage (V _{dc})	4V	6.3V	10V	16V	25V	35V	50V	
	Z(−25℃)/Z(+20℃)	6	5	4	3	2	2	2	
	Z(−40℃)/Z(+20℃)	12	12	10	8	5	4	3	(at 120Hz)
Endurance	The following specifications shall be satisfied when the capacitors are restored to 20℃ after the rated voltage is applied for 2000 hours (1000 hours for φ8 and smaller) at 85℃.								
	Capacitance change	≤±20% of the initial value							
	D.F. (tanδ)	≤200% of the initial specified value							
	Leakage current	≤The initial specified value							
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20℃ after exposing them for 1000 hours at 85℃ without voltage applied.								
	Capacitance change	≤±20% of the initial value							
	D.F. (tanδ)	≤200% of the initial specified value							
	Leakage current	≤The initial specified value							

DIMENSIONS (Radial Lead Type=VB) [mm]



ϕD	4	5	6.3	8	10 & 12.5	16 & 18
7L	0.45	0.45	0.45	0.45	—	—
ϕd	$\geq 9L$	—	0.5	0.5	0.6	0.8
F	1.5	2.0	2.5	3.5	5.0	7.5
$\phi D'$	$\phi D + 0.5\text{max.}$					
L'	L + 1.5max. (7L : L + 1.0max.)					

PART NUMBERING SYSTEM



Capacitance	Code
0.1 μ F	R1
0.47 μ F	R47
1.0 μ F	1
4.7 μ F	4R7
10 μ F	10
100 μ F	100

CASE CODE

ϕD (mm)	L (mm)	7	9	12.5	13	15	20	25
4	D07							
5	E07	E09						
6.3	F07	F09						
8	H07	H09						
10		J09	J12					
12.5				K13	K15			
16					L15			
18					M15	M20	M25	

SRG Series 9 to 25mm-length

◆STANDARD RATINGS

μF \ V _{dc}	6.3	10	16	25	35	50
1.0						5×9 13
2.2						5×9 26
3.3						5×9 32
4.7						5×9 38
10						5×9 64
22						5×9 86
33					5×9 94	6.3×9 113
47				5×9 105		6.3×9 135
100		5×9 132		6.3×9 172	8×9 220	10×9 240
220		6.3×9 218	8×9 290		10×9 335	10×12.5 415
330	6.3×9 247		8×9 355	10×9 380	10×12.5 475	12.5×13 525
470		8×9 385	10×9 410	10×12.5 525	12.5×13 585	16×15 745
1,000	10×9 505	10×12.5 625	12.5×13 715	12.5×15 830	16×15 1,010	18×20 1,160
2,200		12.5×15 970	16×15 1,160	18×15 1,360	18×20 1,560	
3,300		16×15 1,310	18×15 1,460	18×20 1,720		
4,700	16×15 1,410	18×15 1,560	18×20 1,770	18×25 2,070		
6,800	18×15 1,660	18×20 1,870	18×25 2,170			
10,000	18×20 2,020	18×25 2,370				

Rated ripple current (mA_{rms}) at 85°C, 120Hz
Case size φD×L (mm)

Note : → Use next higher voltage part.

SRG Series 7mm-length

◆STANDARD RATINGS

μF \ V _{dc}	4	6.3	10	16	25	35	50
0.1							4×7 1.3
0.22							4×7 2.9
0.33							4×7 3.5
0.47							4×7 5.0
1.0							4×7 10
2.2							4×7 15
3.3							4×7 19
4.7							4×7 24
10				4×7 42		4×7 32	5×7 42
22						5×7 57	6.3×7 64
33			4×7 46		5×7 66	6.3×7 73	8×7 93
47		4×7 50		5×7 73	6.3×7 80	8×7 101	
100		5×7 87		6.3×7 110			
220		6.3×7 133	8×7 171				
330		8×7 191					
470	8×7 154						

Rated ripple current (mA_{rms}) at 85°C, 120Hz
Case size φD×L (mm)

Note : → Use next higher voltage part.

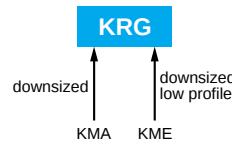
◆RATED RIPPLE CURRENT MULTIPLIERS

●Frequency Multipliers

Capacitance (μF) \ Frequency (Hz)	50	120	300	1k	10k	100k
to 4.7	0.65	1.00	1.35	1.75	2.30	2.50
10 to 47	0.75	1.00	1.25	1.50	1.75	1.80
100 to 1,000	0.80	1.00	1.15	1.30	1.40	1.50
2,200 to	0.85	1.00	1.03	1.05	1.08	1.08

KRG Series

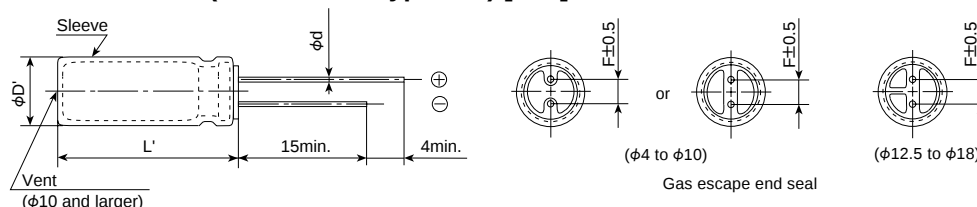
- Low profile : $\phi 4 \times 7\text{mm}$ to $\phi 18 \times 25\text{mm}$
- Endurance : 105°C 1000 hours
- Solvent-proof type (see PRECAUTIONS AND GUIDELINES)



SPECIFICATIONS

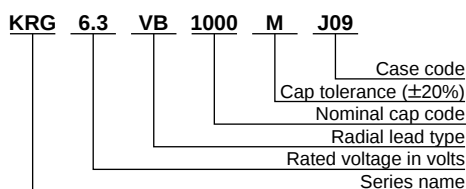
Items	Characteristics									
Category	Temperature Range									
Rated Voltage Range	6.3 to 50V _{dc}									
Capacitance Tolerance	±20% (M) (at 20°C, 120Hz)									
Leakage Current	I=0.01CV or 3μA, whichever is greater. Where, I : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V) (at 20°C after 2 minutes)									
Dissipation Factor (tanδ)	Rated voltage (V _{dc})	6.3V	10V	16V	25V	35V	50V			
	tanδ (Max.)	0.28	0.24	0.20	0.16	0.14	0.12			
	When nominal capacitance exceeds 1000μF, add 0.03 to the value above for each 1000μF increase. (at 20°C, 120Hz)									
Low Temperature Characteristics (Max. Impedance Ratio)	Rated voltage (V _{dc})	6.3V	10V	16V	25V	35V	50V			
	Z(−25°C)/Z(+20°C)	5	4	3	2	2	2			
	Z(−40°C)/Z(+20°C)	10	8	6	4	3	3	(at 120Hz)		
Endurance	The following specifications shall be satisfied when the capacitors are restored to 20°C after the rated voltage is applied for 1000 hours at 105°C.									
	Rated voltage	6.3 to 16V _{dc}					25 to 50V _{dc}			
	Capacitance change	≤±25% of the initial value					≤±20% of the initial value			
	D.F. (tanδ)	≤200% of the initial specified value					≤200% of the initial specified value			
	Leakage current	≤The initial specified value					≤The initial specified value			
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for 500 hours at 105°C without voltage applied.									
	Rated voltage	6.3 to 16V _{dc}					25 to 50V _{dc}			
	Capacitance change	≤±25% of the initial value					≤±20% of the initial value			
	D.F. (tanδ)	≤200% of the initial specified value					≤200% of the initial specified value			
	Leakage current	≤The initial specified value					≤The initial specified value			

DIMENSIONS (Radial Lead Type=VB) [mm]



φD	4	5	6.3	7	8	10 & 12.5	16 & 18
7L	0.45	0.45	0.45	0.45	-	-	-
≥9L	-	0.5	0.5	-	0.6	0.6	0.8
F	1.5	2.0	2.5	2.5	3.5	5.0	7.5
φD'	φD+0.5max.						
L'	L+1.5max. (7L : L+1.0max.)						

PART NUMBERING SYSTEM



Capacitance	Code
0.1μF	R1
0.47μF	R47
1.0μF	1
4.7μF	4R7
10μF	10
100μF	100

CASE CODE

φD (mm)	L (mm)	7	9	12.5	13	15	20	25
4		D07						
5		E07	E09					
6.3		F07	F09					
7		G07						
8			H09					
10			J09	J12				
12.5				K13	K15			
16					L15			
18					M15	M20	M25	

KRG Series 9 to 25mm-length

◆STANDARD RATINGS

μF \ V _{dc}	6.3	10	16	25	35	50
1.0						5×9 12
2.2						5×9 18
3.3						5×9 22
4.7						5×9 27
10						5×9 46
22						5×9 61
33					5×9 67	6.3×9 80
47				5×9 75		6.3×9 95
100		5×9 93		6.3×9 121	8×9 155	10×9 170
220		6.3×9 154	8×9 205		10×9 235	10×12.5 290
330	6.3×9 175		8×9 251	10×9 270	10×12.5 340	12.5×13 370
470		8×9 272	10×9 290	10×12.5 370	12.5×13 415	16×15 535
1,000	10×9 365	10×12.5 445	12.5×13 515	12.5×15 590	16×15 720	18×20 830
2,200		12.5×15 690	16×15 830	18×15 970	18×20 1,110	
3,300		16×15 940	18×15 1,050	18×20 1,220		
4,700	16×15 1,010	18×15 1,120	18×20 1,260	18×25 1,470		
6,800	18×15 1,190	18×20 1,330	18×25 1,560			
10,000	18×20 1,440	18×25 1,700				

Note : → Use next higher voltage part.

KRG Series 7mm-length

◆STANDARD RATINGS

μF \ V _{dc}	6.3	10	16	25	35	50
0.1						4×7 1.3
0.22						4×7 2.9
0.33						4×7 3.5
0.47						4×7 5
1.0						4×7 10
2.2						4×7 15
3.3						4×7 18
4.7						4×7 25
10				4×7 30	5×7 36	6.3×7 44
22		4×7 35		5×7 46	6.3×7 57	6.3×7 57
33			5×7 53	6.3×7 63	6.3×7 64	
47	5×7 50		6.3×7 68	6.3×7 71		
100		6.3×7 80	6.3×7 97			

Note : → Use next higher voltage part.

◆RATED RIPPLE CURRENT MULTIPLIERS

●Frequency Multipliers

Capacitance (μF) \ Frequency (Hz)	50	120	300	1k	10k	100k
0.1 to 4.7	0.65	1.00	1.35	1.75	2.30	2.50
10 to 47	0.75	1.00	1.25	1.50	1.75	1.80
100 to 1,000	0.80	1.00	1.15	1.30	1.40	1.50
2,200 to	0.85	1.00	1.03	1.05	1.08	1.08

SMQ Series

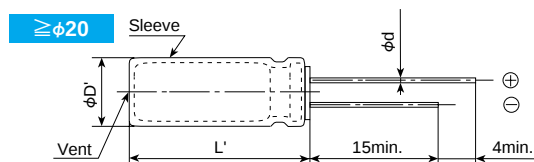
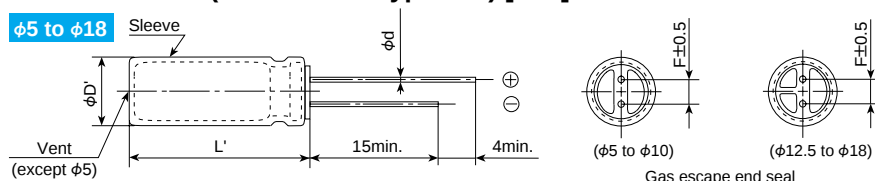
- Downsized from current standard SMG series
- Endurance : 85°C 2000 hours
- Non Solvent-proof type



SPECIFICATIONS

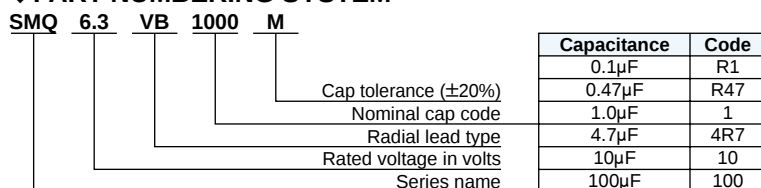
Items	Characteristics														
Category	–40 to +85°C(6.3 to 400V _{dc}) –25 to +85°C(450V _{dc})														
Temperature Range															
Rated Voltage Range	6.3 to 450V _{dc}														
Capacitance Tolerance	±20% (M) (at 20°C, 120Hz)														
Leakage Current		6.3 to 100V _{dc}						160 to 450V _{dc}							
	≤φ18	I=0.03CV or 4μA, whichever is greater.						CV Time After 1minute							
								CV≤1000		I=0.1CV+40 max.					
								CV>1000		I=0.04CV+100 max.					
		(at 20C after 1 minute)						(at 20°C)							
	≥φ20	I=0.03CV						(at 20°C after 3 minutes)							
	Where, I : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V)														
Dissipation Factor (tanδ)	Rated voltage (V _{dc})	6.3V	10V	16V	25V	35V	50V	63V	100V	160 to 250V	315 to 400V	450V			
	tanδ (Max.)	0.28	0.24	0.20	0.16	0.14	0.12	0.09	0.08	0.20	0.24	0.24			
	When nominal capacitance exceeds 1000μF, add 0.02 to the value above for each 1000μF increase. (at 20°C, 120Hz)														
Low Temperature Characteristics (Max. Impedance Ratio)	Rated voltage (V _{dc})	6.3V	10V	16V	25V	35V	50V	63V	100V	160 to 200V	250V	350V	400V	450V	
	Z(–25°C)/Z(+20°C)	≤φ8	5	4	3	2	2	2	2	2	3	3	4	4	6
		≥φ10	5	4	3	2	2	2	2	2	3	3	4	4	6
	Z(–40°C)/Z(+20°C)	≤φ8	12	10	8	5	4	3	3	3	8	10	8	8	—
		≥φ10	12	10	8	5	4	3	3	3	4	4	6	6	—
	(at 120Hz)														
Endurance	The following specifications shall be satisfied when the capacitors are restored to 20°C after the rated voltage is applied for 2000 hours at 85°C.														
	Capacitance change	≤±20% of the initial value													
	D.F. (tanδ)	≤200% of the initial specified value													
	Leakage current	≤The initial specified value													
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for 1000 hours at 85°C without voltage applied.														
	Rated voltage	6.3 to 100V _{dc}						160 to 450V _{dc}							
	Capacitance change	≤±15% of the initial value						≤±20% of the initial value							
	D.F. (tanδ)	≤200% of the initial specified value						≤200% of the initial specified value							
	Leakage current	≤The initial specified value						≤500% of the initial specified value							

DIMENSIONS (Radial Lead Type=VB) [mm]



φD	5	6.3	8	10	12.5	16	18	20	22
φd	0.5	0.5	0.6	0.6	0.6	0.8	0.8	1.0	1.0
F	2.0	2.5	3.5	5.0	5.0	7.5	7.5	10.0	10.0
φD'	φD+0.5max.							φD+0.5max.	
L'	L+1.5max.							L+2.0max.	

PART NUMBERING SYSTEM



◆STANDARD RATINGS

μF \ V_{dc}	6.3		10		16		25		35		50		63	
0.1											5×11	1.3		
0.22											5×11	2.9		
0.33											5×11	4.3		
0.47											5×11	6.2		
1.0											5×11	17		
2.2											5×11	28		
3.3											5×11	35		
4.7											5×11	41		
10											5×11	60		
22											5×11	95	5×11	100
33											5×11	125	6.3×11	140
47									5×11	130	6.3×11	155	6.3×11	170
68									6.3×11	160	6.3×11	210	8×11.5	220
100							5×11	180	6.3×11	210	8×11.5	260	8×11.5	280
220			5×11	240	6.3×11	260	6.3×11	280	8×11.5	385	10×12.5	430	10×16	490
330			6.3×11	290	6.3×11	320	8×11.5	440	10×12.5	490	10×16	590	10×20	710
470			6.3×11	350	8×11.5	440	10×12.5	550	10×16	650	10×20	760	12.5×20	900
1,000	8×11.5	540	10×12.5	650	10×12.5	700	10×16	860	12.5×20	1,150	12.5×25	1,350	16×25	1,300
2,200	10×16	890	10×16	990	10×20	1,000	12.5×25	1,550	16×25	1,800	16×31.5	1,980	18×35.5	2,300
3,300	10×20	1,190	12.5×20	1,450	12.5×25	1,700	16×25	1,980	16×31.5	2,100	18×35.5	2,500	20×40	2,700
4,700	12.5×20	1,550	12.5×25	1,800	16×25	2,100	16×25	2,200	16×35.5	2,500	20×40	2,900	22×50	3,400
6,800	12.5×25	1,920	16×25	2,250	16×25	2,250	16×35.5	2,600	18×40	2,800	22×50	3,500		
10,000	16×25	2,350	16×31.5	2,550	16×35.5	2,710	18×40	2,800	22×50	3,700				
15,000	16×31.5	2,550	16×35.5	2,880	18×40	3,100	22×50	3,800						
22,000	18×35.5	3,200	18×40	3,400	22×40	3,800								
33,000	20×40	3,500	22×50	4,500										
47,000	22×50	3,900												

Rated ripple current (mA rms) at 85°C, 120Hz
Case size $\phi \times L$ (mm)

μF \ V_{dc}	100		160		200		250		350		400		450	
0.1	5×11	2.1												
0.22	5×11	4.7												
0.33	5×11	7.0												
0.47	5×11	10									6.3×11	12		
1.0	5×11	21			6.3×11	22					6.3×11	22		
2.2	5×11	30			6.3×11	33			6.3×11	30	8×11.5	38	8×11.5	28
3.3	5×11	40			6.3×11	40	6.3×11	40	8×11.5	46	8×11.5	48	10×12.5	40
4.7	5×11	45			6.3×11	50	6.3×11	50	8×11.5	55	10×12.5	60	10×12.5	46
10	5×11	70	8×11.5	80	8×11.5	80	10×12.5	100	10×12.5	90	10×16	90	10×20	80
22	6.3×11	130	10×12.5	130	10×16	150	10×20	170	12.5×20	185	12.5×25	205	12.5×25	140
33	8×11.5	180	10×16	180	10×20	205	10×20	200	12.5×25	240	16×25	275	16×25	180
47	8×11.5	200	10×20	210	12.5×20	270	12.5×20	270	16×25	325	16×25	280	16×31.5	220
68	10×12.5	270	12.5×20	350	12.5×25	350	16×25	380	16×25	400	16×31.5	340	18×35.5	260
100	10×16	340	12.5×25	430	16×25	475	16×25	440	18×31.5	530	18×35.5	440	18×40	280
220	12.5×20	550	16×31.5	760	16×35.5	700	18×35.5	680						
330	12.5×25	760	18×35.5	995	18×40	950								
470	16×25	1,000	18×40	1,200										
1,000	18×35.5	1,350												
2,200	22×50	2,400												

Rated ripple current (mA rms) at 85°C, 120Hz
Case size $\phi \times L$ (mm)

◆RATED RIPPLE CURRENT MULTIPLIERS

●Frequency Multipliers

(φ5 to φ18)

Capacitance (μF) \ Frequency (Hz)	50	120	300	1k	10k	100k
0.1 to 4.7	0.65	1.00	1.35	1.75	2.30	2.50
10 to 68	0.75	1.00	1.25	1.50	1.75	1.80
100 to 1,000	0.80	1.00	1.15	1.30	1.40	1.50
2,200 to	0.85	1.00	1.03	1.05	1.08	1.08

(φ20 to φ22)

Rated Voltage (V_{dc}) \ Frequency (Hz)	50	120	300	1k	10k	100k
6.3 to 50	0.95	1.00	1.03	1.05	1.08	1.08
63 to 100	0.92	1.00	1.07	1.13	1.19	1.20

KMQ Series

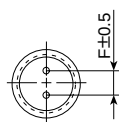
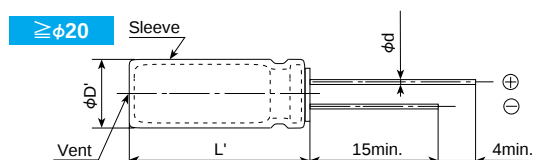
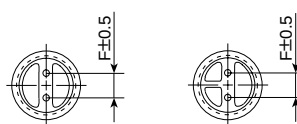
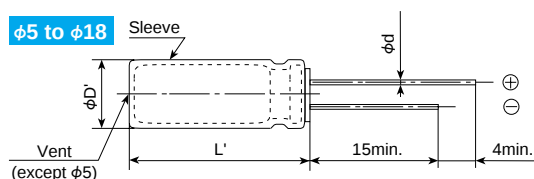
- Downsized from current standard KMG series
- Solvent-proof type except 160 to 450V_{dc}
(see PRECAUTIONS AND GUIDELINES)



SPECIFICATIONS

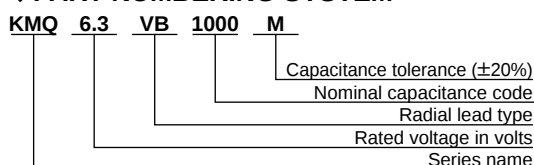
Items	Characteristics														
Category															
Temperature Range	-55 to +105°C(6.3 to 100V _{dc}) -40 to +105°C(160 to 400V _{dc}) -25 to +105°C(450V _{dc})														
Rated Voltage Range	6.3 to 450V _{dc}														
Capacitance Tolerance	±20% (M) (at 20°C, 120Hz)														
Leakage Current	6.3 to 100V _{dc}						160 to 450V _{dc}								
	≤φ18	I=0.03CV or 4μA, whichever is greater. (at 20°C after 1 minute)						CV Time After 1minute		(at 20°C)					
								CV≤1000	I=0.1CV+40 max.						
								CV>1000	I=0.04CV+100 max.						
	≥φ20	I=0.03CV max.						(at 20°C after 3 minutes)							
	Where, I : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V)														
Dissipation Factor (tanδ)	Rated voltage (V _{dc})	6.3V	10V	16V	25V	35V	50V	63V	100V	160 to 250V	350 to 400V	450V			
	tanδ (Max.)	0.28	0.24	0.20	0.16	0.14	0.12	0.10	0.08	0.20	0.24	0.24			
	When nominal capacitance exceeds 1000μF, add 0.02 to the value above for each 1000μF increase. (at 20°C, 120Hz)														
Low Temperature Characteristics (Max. Impedance Ratio)	Rated voltage (V _{dc})	6.3V	10V	16V	25V	35V	50V	63 to 100V	160 to 200V	250V	350V	400V	450V		
	Z(-25°C)/Z(+20°C)	≤φ8	5	4	3	2	2	2	2	3	3	4	4	6	(at 120Hz)
		≥φ10	5	4	3	2	2	2	2	3	3	4	4	6	
	Z(-40°C)/Z(+20°C)	≤φ8	10	8	6	4	3	3	3	8	10	8	8	—	
		≥φ10	10	8	6	4	3	3	3	4	4	6	6	—	
Endurance	The following specifications shall be satisfied when the capacitors are restored to 20°C after subjected to DC voltage with the rated ripple current is applied for 1000 hours (2000 hours for φ10 and more at 105°C).														
	Capacitance change	≤±20% of the initial value													
	D.F. (tanδ)	≤200% of the initial specified value													
	Leakage current	≤The initial specified value													
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for 1000 hours at 105°C without voltage applied.														
	Rated voltage	6.3 to 100V _{dc}						160 to 450V _{dc}							
	Capacitance change	≤±20% of the initial value						≤±20% of the initial value							
	D.F. (tanδ)	≤200% of the initial specified value						≤200% of the initial specified value							
	Leakage current	≤The initial specified value						≤500% of the initial specified value							

DIMENSIONS (Radial Lead Type=VB) [mm]



φD	5	6.3	8	10	12.5	16	18	20	22
φd	0.5	0.5	0.6	0.6	0.6	0.8	0.8	1.0	1.0
F	2.0	2.5	3.5	5.0	5.0	7.5	7.5	10.0	10.0
φD'	φD+0.5max.							φD+0.5max.	
L'	L+1.5max.							L+2.0max.	

PART NUMBERING SYSTEM



Capacitance	Code
0.1µF	R1
0.47µF	R47
1.0µF	1
4.7µF	4R7
10µF	10
100µF	100

◆STANDARD RATINGS

$\mu F \backslash V_{dc}$	6.3		10		16		25		35		50		63	
0.1											5×11	1.3		
0.22											5×11	2.9		
0.33											5×11	4.3		
0.47											5×11	7.0		
1.0											5×11	13		
2.2											5×11	20		
3.3											5×11	25		
4.7											5×11	30		
10											5×11	46		
22											5×11	68	5×11	71
33											5×11	90	6.3×11	100
47									5×11	93	6.3×11	115	6.3×11	120
68									6.3×11	110	6.3×11	150	8×11.5	155
100							5×11	125	6.3×11	150	8×11.5	190	8×11.5	200
220			5×11	155	6.3×11	190	6.3×11	200	8×11.5	270	10×12.5	300	10×16	335
330			6.3×11	210	6.3×11	225	8×11.5	310	10×12.5	350	10×16	410	10×20	510
470			6.3×11	250	8×11.5	315	10×12.5	380	10×16	460	10×20	540	12.5×20	640
1,000	8×11.5	390	10×12.5	460	10×12.5	500	10×16	610	12.5×20	810	12.5×25	950	16×25	930
2,200	10×16	635	10×16	705	10×20	710	12.5×25	1,090	16×25	1,260	16×31.5	1,410	18×35.5	1,650
3,300	10×20	840	12.5×20	1,000	12.5×25	1,170	16×25	1,400	16×31.5	1,500	18×35.5	1,770	20×40	1,950
4,700	12.5×20	1,090	12.5×25	1,260	16×25	1,500	16×25	1,570	16×35.5	1,780	20×40	2,100	22×50	2,450
6,800	12.5×25	1,350	16×25	1,570	16×25	1,600	16×35.5	1,850	18×40	2,000	22×50	2,500		
10,000	16×25	1,650	16×31.5	1,820	16×35.5	1,930	18×40	2,000	22×50	2,650				
15,000	16×31.5	1,820	16×35.5	2,050	18×40	2,210	22×50	2,750						
22,000	18×35.5	2,280	18×40	2,420	22×40	2,710								
33,000	20×40	2,500	22×50	3,210										
47,000	22×50	2,780												

Rated ripple current (mAmps) at 105°C, 120Hz
 Case size $\phi D \times L$ (mm)

Non solvent-proof														
$\mu F \backslash V_{dc}$	100		160		200		250		350		400		450	
0.1	5×11	1.5												
0.22	5×11	3.4												
0.33	5×11	5.0												
0.47	5×11	7.1									6.3×11	8.5		
1.0	5×11	15			6.3×11	16					6.3×11	15		
2.2	5×11	21			6.3×11	25			6.3×11	21	8×11.5	27	8×11.5	20
3.3	5×11	29			6.3×11	30	6.3×11	28	8×11.5	30	8×11.5	34	10×12.5	28
4.7	5×11	32			6.3×11	35	6.3×11	35	8×11.5	39	10×12.5	42	10×12.5	32
10	5×11	50	8×11.5	41	8×11.5	57	10×12.5	71	10×12.5	64	10×16	64	10×20	56
22	6.3×11	93	10×12.5	92	10×16	105	10×20	105	12.5×20	130	12.5×25	145	12.5×25	100
33	8×11.5	130	10×16	125	10×20	140	10×20	140	12.5×25	170	16×25	195	16×25	125
47	8×11.5	140	10×20	150	12.5×20	195	12.5×20	190	16×25	230	16×25	200	16×31.5	155
68	10×12.5	190	12.5×20	250	12.5×25	250	16×25	270	16×25	285	16×31.5	240	18×35.5	185
100	10×16	240	12.5×25	310	16×25	335	16×25	310	18×31.5	375	18×35.5	310	18×40	200
220	12.5×20	390	16×31.5	540	16×35.5	500	18×35.5	485						
330	12.5×25	540	18×35.5	705	18×40	675								
470	16×25	715	18×40	855										
1,000	18×35.5	960												
2,200	22×50	1,750												

Rated ripple current (mAmps) at 105°C, 120Hz
 Case size $\phi D \times L$ (mm)

◆RATED RIPPLE CURRENT MULTIPLIERS

●Frequency Multipliers

($\phi 5$ to $\phi 18$)

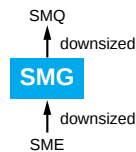
Capacitance (μF)	50	120	300	1k	10k	100k
0.1 to 4.7	0.65	1.00	1.35	1.75	2.30	2.50
10 to 68	0.75	1.00	1.25	1.50	1.75	1.80
100 to 1,000	0.80	1.00	1.15	1.30	1.40	1.50
2,200 to	0.85	1.00	1.03	1.05	1.08	1.08

($\phi 20$ to $\phi 22$)

Rated Voltage (V_{dc})	50	120	300	1k	10k	100k
6.3 to 50	0.95	1.00	1.03	1.05	1.08	1.08
63 to 100	0.92	1.00	1.07	1.13	1.19	1.20

SMG Series

- Downsized from current standard SME series
- Endurance : 85°C 2000 hours
- Solvent-proof type except 315 to 450V_{dc}
(see PRECAUTIONS AND GUIDELINES)



SPECIFICATIONS

Items	Characteristics													
Category														
Temperature Range	-40 to +85°C(6.3 to 400V _{dc}) -25 to +85°C(450V _{dc})													
Rated Voltage Range	6.3 to 450V _{dc}													
Capacitance Tolerance	±20% (M) (at 20°C, 120Hz)													
Leakage Current		6.3 to 100V _{dc}					160 to 450V _{dc}							
	≤φ18	I=0.03CV or 4μA, whichever is greater. (at 20°C after 1 minute)					CV		Time	After 1minute		After 5minutes		
							CV≤1000		I=0.1CV+40		I=0.03CV+15			
							CV>1000		I=0.04CV+100		I=0.02CV+25			
	≥φ20	I=0.03CV					(at 20°C after 3 minutes)							
	Where, I : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V)													
Dissipation Factor (tanδ)	Rated voltage (V _{dc})		6.3V	10V	16V	25V	35V	50V	63V	100V	160 to 250V	315 to 400V	450V	
	tanδ (Max.)	≤φ18	0.34	0.24	0.20	0.16	0.14	0.12	0.09	0.08	0.20	0.24	0.24	
		≥φ20	0.28	0.24	0.20	0.16	0.14	0.12	0.09	0.08	0.15	0.15	0.20	
When nominal capacitance exceeds 1000μF, add 0.02 to the value above for each 1000μF increase. (at 20°C, 120Hz)														
Low Temperature Characteristics (Max. Impedance Ratio)	Rated voltage (V _{dc})		6.3V	10V	16V	25V	35V	50V	63V	100V	160 to 250V	315 to 400V	450V	
	Z(-25°C)/Z(+20°C)	≤φ18	5	4	3	2	2	2	2	2	3	6	6	
		≥φ20	5	4	3	2	2	2	2	2	4	6	6	
Z(-40°C)/Z(+20°C)		≤φ18	12	10	8	5	4	3	3	3	4	6	— (at 120Hz)	
Endurance	The following specifications shall be satisfied when the capacitors are restored to 20°C after the rated voltage is applied for 2000 hours at 85°C.													
	Capacitance change		≤±20% of the initial value											
	D.F. (tanδ)		≤200% of the initial specified value											
	Leakage current		≤The initial specified value											
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for 1000 hours at 85°C without voltage applied.													
	Rated voltage		6.3 to 100V _{dc}					160 to 450V _{dc}						
	Capacitance change		≤±20% of the initial value					≤±20% of the initial value						
	D.F. (tanδ)		≤200% of the initial specified value					≤200% of the initial specified value						
	Leakage current		≤The initial specified value					≤500% of the initial specified value						

PART NUMBERING SYSTEM

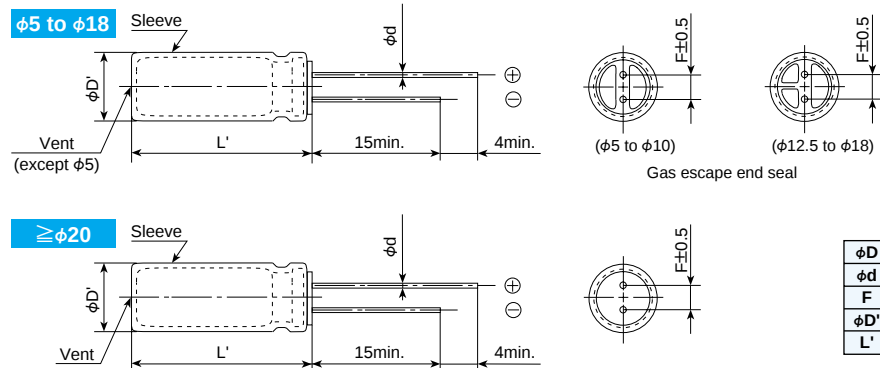
SMG	6.3	VB	1000	M	
					Case code (≥φ20)
					Cap tolerance (±20%)
					Nominal cap code
					Radial lead type
					Rated voltage in volts
					Series name

Capacitance	Code
0.1μF	R1
0.47μF	R47
1.0μF	1
4.7μF	4R7
10μF	10
100μF	100

CASE CODE [mm]

Case code	Case size φD×L	Case code	Case size φD×L	Case code	Case size φD×L
20S	20×20	—	—	—	—
20A	20×25	—	—	—	—
20B	20×30	22B	22×30	—	—
20C	20×35	22C	22×35	—	—
20D	20×40	22D	22×40	25D	25.4×40

◆DIMENSIONS (Radial Lead Type=VB) [mm]



◆RATED RIPPLE CURRENT MULTIPLIERS

●Frequency Multipliers

(φ5 to φ18)

Capacitance (μF)	Frequency (Hz)					
	50	120	300	1k	10k	100k
0.1 to 4.7	0.65	1.00	1.35	1.75	2.30	2.50
10 to 47	0.75	1.00	1.25	1.50	1.75	1.80
100 to 1,000	0.80	1.00	1.15	1.30	1.40	1.50
2,200 to	0.85	1.00	1.03	1.05	1.08	1.08

(φ20 to φ25.4)

Rated Voltage (V _{DC})	Frequency (Hz)					
	50	120	300	1k	10k	100k
6.3 to 50	0.95	1.00	1.03	1.05	1.08	1.08
63 to 100	0.92	1.00	1.07	1.13	1.19	1.20
160 to 250	0.81	1.00	1.17	1.32	1.45	1.50
315 to 450	0.77	1.00	1.16	1.30	1.41	1.43

◆STANDARD RATINGS

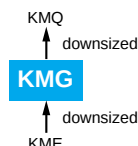
μF \ V_{dc}	6.3		10		16		25		35		50		63		100	
0.1											5×11	1.3			5×11	2.1
0.22											5×11	2.9			5×11	4.7
0.33											5×11	4.3			5×11	7
0.47											5×11	6.2			5×11	10
1.0											5×11	17			5×11	21
2.2											5×11	28			5×11	30
3.3											5×11	35			5×11	40
4.7											5×11	41			5×11	45
10											5×11	60	5×11	65	6.3×11	75
22											5×11	95	5×11	100	8×11.5	130
33											5×11	125	6.3×11	140	8×11.5	180
47							5×11	115	5×11	130	6.3×11	155	6.3×11	170	10×12.5	230
100					5×11	160	6.3×11	190	6.3×11	210	8×11.5	260	10×12.5	300	10×20	370
220	5×11	200	5×11	240	6.3×11	260	8×11.5	330	8×11.5	385	10×12.5	430	10×16	490	12.5×25	620
330	6.3×11	270	6.3×11	290	8×11.5	370	8×11.5	440	10×12.5	490	10×16	585	10×20	710	12.5×25	760
470	6.3×11	320	6.3×11	350	8×11.5	440	10×12.5	545	10×16	645	10×20	755	12.5×20	900	16×25	1,000
680															20×30	1,360
820													20×20	1,370	22×30	1,540
1,000	8×11.5	540	10×12.5	650	10×16	785	10×20	955	12.5×20	1,145	12.5×25	1,340	16×25	1,300	18×40	1,380
1,200													20×25	1,600	20×35	1,720
1,500															22×40	1,980
1,800											20×20	1,570	20×30	1,850		
2,200	10×20	1,000	10×20	1,070	12.5×20	1,295	12.5×25	1,540	16×25	1,785	16×35.5	2,075	20×35	2,330		
2,700									20×20	1,670	20×25	1,880	22×30	2,190		
											20×30	2,150	20×40	2,640		
3,300	10×20	1,185	12.5×20	1,420	12.5×25	1,655	16×25	1,975	16×35.5	2,275	18×35.5	2,500				
							20×20	1,850	20×25	2,050	20×35	2,420				
											22×30	2,420	22×40	2,810		
3,900											20×40	2,590				
									20×30	2,310	22×35	2,590	25.4×40	3,100		
4,700	12.5×20	1,545	12.5×25	1,780	16×25	2,090	16×31.5	2,420	18×35.5	2,700						
					20×20	1,960	20×25	2,420	20×35	2,510						
									22×30	2,380	22×40	2,960				
5,600							20×30	2,430	20×40	2,690						
									22×35	2,690						
6,800	12.5×25	1,915	16×25	2,220	16×31.5	2,520	18×35.5	2,880								
			20×20	2,080	20×25	2,330	20×35	2,680								
							22×30	2,510	22×40	3,090	25.4×40	3,360				
8,200					20×30	2,500	20×40	2,810								
							22×35	2,810								
10,000	16×25	2,330	16×35.5	2,670	18×35.5	2,920										
	20×25	2,310	20×25	2,410	20×35	2,720										
					22×30	2,660	22×40	3,240	25.4×40	3,480						
12,000			20×30	2,620	20×40	2,900										
					22×35	2,900	22×40	3,240								
15,000	16×35.5	2,845	18×35.5	3,080												
	20×30	2,660	20×35	2,870												
			22×30	2,660	22×40	3,380	25.4×40	3,610								
18,000	20×35	2,890														
	22×30	2,860	22×35	3,050												
22,000	18×40	3,320														
	20×40	3,130														
	22×35	3,130	22×40	3,480	25.4×40	3,720										
27,000	22×40	3,280														
33,000			25.4×40	3,560												
39,000	25.4×40	3,560														

◆STANDARD RATINGS

STANDARD RATINGS							Non solvent-proof							
μF \ V _{dc}	160		200		250		315		350		400		450	
0.47	Case size ϕD×L (mm) Rated ripple current (mA_{rms}) at 85°C, 120Hz								6.3×11	15			10×12.5	13
1.0									6.3×11	22	6.3×11	22	10×12.5	19
2.2									8×11.5	38	8×11.5	38	10×12.5	32
3.3	6.3×11	40	6.3×11	40	8×11.5	46			8×11.5	46	10×12.5	54	10×16	44
4.7	6.3×11	48	8×11.5	55	8×11.5	55			10×12.5	65	10×16	71	10×20	56
10	10×12.5	94	10×12.5	94	10×16	105			10×20	115	10×20	115	12.5×20	91
22	10×20	170	10×20	170	10×20	170			12.5×20	185	12.5×25	205	16×25	165
33	10×20	205	10×20	205	12.5×20	230			16×25	275	16×25	275	16×31.5	215
47	12.5×20	270	12.5×20	270	12.5×25	295	20×20	310	16×25	325	16×31.5	350	16×35.5	265
56									20×20	310			20×25	290
68							20×25	400	20×25	400	20×30	420	20×35	370
82					20×20	420	20×25	440					22×30	370
100	12.5×25	430	16×25	475	16×31.5	515			18×31.5	530			20×40	420
120			20×20	460	20×25	490	20×30	500	20×30	500	20×35	520	22×40	470
180					20×25	530	20×30	550	20×35	560	20×40	580	25.4×40	520
220			20×25	660	20×30	680	20×40	720			25.4×40	790		
270					18×40	825	22×35	720						
330	16×31.5	760	20×30	750	20×35	780	22×40	810	25.4×40	890				
390	20×25	730	18×35.5	810	22×30	820								
470			20×30	830	20×40	880	25.4×40	920						
560					22×35	880								
680	18×35.5	995	20×35	1,070	22×40	1,060								
	20×30	920	22×30	1,070										
	20×35	1,160	20×40	1,190	25.4×40	1,200								
	22×30	1,160	22×30	1,160										
	20×40	1,340	22×40	1,350										
	22×35	1,340												
	22×40	1,470	22×40	1,430										
	25.4×40	1,570	25.4×40	1,620										

KMG Series

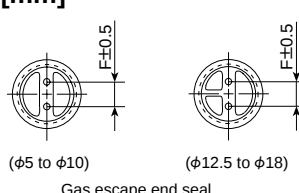
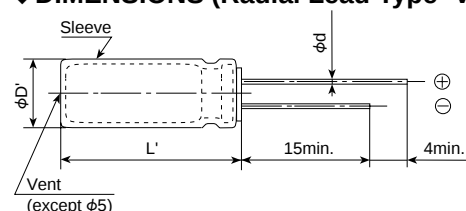
- Downsized from current standard KME series
- Solvent-proof type except 350 to 450V_{dc}
(see PRECAUTIONS AND GUIDELINES)



SPECIFICATIONS

Items	Characteristics												
Category	Standard												
Temperature Range	-55 to +105°C(6.3 to 100V _{dc}) -40 to +105°C(160 to 400V _{dc}) -25 to +105°C(450V _{dc})												
Rated Voltage Range	6.3 to 450V _{dc}												
Capacitance Tolerance	±20% (M) (at 20°C, 120Hz)												
Leakage Current	6.3 to 100V _{dc}							160 to 450V _{dc}					
	I=0.03CV or 4μA, whichever is greater.							CV \ Time		After 1minute		After 5minutes	
								CV≤1000		I=0.1CV+40		I=0.03CV+15	
								CV>1000		I=0.04CV+100		I=0.02CV+25	
	(at 20°C after 1 minute)							(at 20°C)					
	Where, I : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V)												
Dissipation Factor (tanδ)	Rated voltage (V _{dc})	6.3V	10V	16V	25V	35V	50V	63V	100V	160 to 250V	350 to 400V	450V	(at 20°C, 120Hz)
	tanδ (Max.)	0.34	0.24	0.20	0.16	0.14	0.12	0.10	0.08	0.20	0.24	0.24	
	When nominal capacitance exceeds 1000μF, add 0.02 to the value above for each 1000μF increase.												
Low Temperature Characteristics (Max. Impedance Ratio)	Rated voltage (V _{dc})	6.3V	10V	16V	25V	35V	50V	63V	100V	160 to 250V	350 to 400V	450V	(at 120Hz)
	Z(-25°C)/Z(+20°C)	5	4	3	2	2	2	2	2	3	6	6	
	Z(-40°C)/Z(+20°C)	12	10	8	5	4	3	3	3	4	6	—	
Endurance	The following specifications shall be satisfied when the capacitors are restored to 20°C after subjected to DC voltage with the rated ripple current is applied for 1000 hours (2000 hours to meet the following two conditions 1) : 160V _{dc} and larger, 2) : φ12.5 and larger) at 105°C.												
	Capacitance change	≤±20% of the initial value											
	D.F. (tanδ)	≤200% of the initial specified value											
	Leakage current	≤The initial specified value											
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for 1000 hours at 105°C without voltage applied.												
	Rated voltage	6.3 to 100V _{dc}						160 to 450V _{dc}					
	Capacitance change	≤±20% of the initial value						≤±20% of the initial value					
	D.F. (tanδ)	≤200% of the initial specified value						≤200% of the initial specified value					
	Leakage current	≤The initial specified value						≤500% of the initial specified value					

DIMENSIONS (Radial Lead Type=VB) [mm]



Gas escape end seal

φD	5	6.3	8	10	12.5	16	18
φd	0.5	0.5	0.6	0.6	0.6	0.8	0.8
F	2.0	2.5	3.5	5.0	5.0	7.5	7.5
φD'	φD+0.5max.						
L'	L+1.5max						

PART NUMBERING SYSTEM

KMG 6.3 VB 1000 M

Capacitance tolerance (±20%)
Nominal capacitance code
Radial lead type
Rated voltage in volts
Series name

Capacitance	Code
0.1μF	R1
0.47μF	R47
1.0μF	1
4.7μF	4R7
10μF	10
100μF	100

◆STANDARD RATINGS

μF \ V _{dc}	6.3	10	16	25	35	50	63	100
0.1						5×11	1.3	5×11 1.5
0.22						5×11	2.9	5×11 3.4
0.33						5×11	4.3	5×11 5.0
0.47						5×11	6.2	5×11 7.1
1.0						5×11	13	5×11 15
2.2						5×11	20	5×11 21
3.3						5×11	25	5×11 29
4.7						5×11	30	5×11 32
10						5×11	40	5×11 46
22						5×11	65	5×11 71
33						5×11	90	5×11 100
47						5×11	110	5×11 120
100						5×11	180	5×11 215
220	5×11 140	6.3×11 170	6.3×11 180	8×11.5 230	8×11.5 270	10×12.5 300	10×16 335	12.5×25 440
330	6.3×11 190	6.3×11 200	8×11.5 260	8×11.5 310	10×12.5 350	10×16 410	10×20 510	16×25 540
470	6.3×11 230	8×11.5 250	8×11.5 310	10×12.5 380	10×16 460	10×20 530	12.5×20 640	16×31.5 715
1,000	8×11.5 380	10×12.5 460	10×16 560	10×20 680	12.5×20 810	12.5×25 950	16×25 930	18×40 985
2,200	10×20 710	10×20 760	12.5×20 920	12.5×25 1,090	16×25 1,260	16×35.5 1,470		
3,300	10×20 840	12.5×20 1,000	12.5×25 1,170	16×25 1,400	16×35.5 1,610	18×35.5 1,770		
4,700	12.5×20 1,090	12.5×25 1,260	16×25 1,480	16×31.5 1,710	18×35.5 1,910			
6,800	12.5×25 1,350	16×25 1,570	16×31.5 1,780	18×35.5 2,040				
10,000	16×25 1,650	16×35.5 1,890	18×35.5 2,060					
15,000	16×35.5 2,010	18×35.5 2,180						
22,000	18×40 2,350							

							Non solvent-proof					
μF \ V _{dc}	160		200		250		350		400		450	
0.47							6.3×11	11			10×12.5	9
1.0							6.3×11	15	6.3×11	15	10×12.5	13
2.2					6.3×11	23	8×11.5	26	8×11.5	26	10×12.5	23
3.3	6.3×11	28	6.3×11	28	8×11.5	32	10×12.5	38	10×12.5	38	10×16	31
4.7	6.3×11	34	8×11.5	39	8×11.5	39	10×16	50	10×16	50	10×20	40
10	10×12.5	67	10×16	74	10×16	74	10×20	80	10×20	80	12.5×20	65
22	10×20	120	10×20	120	12.5×20	130	12.5×20	130	12.5×25	145	16×25	115
33	10×20	145	12.5×20	160	12.5×20	160	16×25	195	16×25	195	16×31.5	155
47	12.5×20	195	12.5×20	195	12.5×25	210	16×25	230	16×31.5	250	16×35.5	185
100	16×25	335	16×25	335	16×31.5	365	18×31.5	375	16×40	350		
220	16×31.5	540	18×35.5	575	18×40	585						
330	18×35.5	705										

◆RATED RIPPLE CURRENT MULTIPLIERS

●Frequency Multipliers

Capacitance (μF) \ Frequency (Hz)	50	120	300	1k	10k	100k
0.1 to 4.7	0.65	1.00	1.35	1.75	2.30	2.50
10 to 47	0.75	1.00	1.25	1.50	1.75	1.80
100 to 1,000	0.80	1.00	1.15	1.30	1.40	1.50
2,200 to	0.85	1.00	1.03	1.05	1.08	1.08

KME Series

- Endurance with ripple current : 105°C 1000 hours
- Solvent-proof type except 350 to 400V_{dc}
(see PRECAUTIONS AND GUIDELINES)

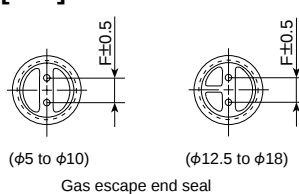
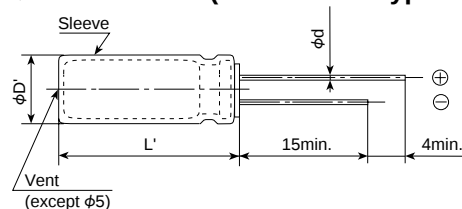
KMG ← KME
downsized



SPECIFICATIONS

Items	Characteristics											
Category												
Temperature Range	-55 to +105°C(6.3 to 100V _{dc}) -40 to +105°C(160 to 400V _{dc})											
Rated Voltage Range	6.3 to 400V _{dc}											
Capacitance Tolerance	±20% (M) (at 20°C, 120Hz)											
Leakage Current	6.3 to 100V _{dc}								160 to 400V _{dc}			
	I=0.03CV or 4μA, whichever is greater. (at 20°C after 1 minute)								CV		Time	
	I=0.01CV or 3μA, whichever is greater. (at 20°C after 2 minutes)								CV≤1000		After 1minute	
									CV>1000		After 5minutes	
											I=0.1CV+40	
											I=0.03CV+15	
										I=0.04CV+100		
										I=0.02CV+25		
										(at 20°C)		
Where, I : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V)												
Dissipation Factor (tanδ)	Rated voltage (V _{dc})	6.3V	10V	16V	25V	35V	50V	63V	100V	160 to 250V	350 to 400V	
	tanδ (Max.)	0.22	0.19	0.16	0.14	0.12	0.10	0.09	0.08	0.20	0.24	
	When nominal capacitance exceeds 1000μF, add 0.02 to the value above for each 1000μF increase. (at 20°C, 120Hz)											
Low Temperature Characteristics (Max. Impedance Ratio)	Rated voltage (V _{dc})	6.3V	10V	16V	25V	35V	50V	63V	100V	160 to 250V	350 to 400V	
	Z(-25°C)/Z(+20°C)	4	3	2	2	2	2	2	2	3	6	
	Z(-40°C)/Z(+20°C)	8	6	4	3	3	3	3	3	4	6 (at 120Hz)	
Endurance	The following specifications shall be satisfied when the capacitors are restored to 20°C after subjected to DC voltage with the rated ripple current is applied for 1000 hours at 105°C.											
	Capacitance change	≤±20% of the initial value										
	D.F. (tanδ)	≤200% of the initial specified value										
	Leakage current	≤The initial specified value										
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for 1000 hours at 105°C without voltage applied.											
	Rated voltage	6.3 to 100V _{dc}						160 to 400V _{dc}				
	Capacitance change	≤±20% of the initial value						≤±20% of the initial value				
	D.F. (tanδ)	≤200% of the initial specified value						≤200% of the initial specified value				
	Leakage current	≤The initial specified value						≤500% of the initial specified value				

DIMENSIONS (Radial Lead Type=VB) [mm]



φD	5	6.3	8	10	12.5	16	18
φd	0.5	0.5	0.6	0.6	0.6	0.8	0.8
F	2.0	2.5	3.5	5.0	5.0	7.5	7.5
φD'	φD+0.5max.						
L'	L+1.5max						

PART NUMBERING SYSTEM

KME	50	VB	R1	M
				Cap tolerance (±20%)
				Nominal cap code
				Radial lead type
				Rated voltage in volts
				Series name

Capacitance	Code
0.1μF	R1
0.47μF	R47
1.0μF	1
4.7μF	4R7
10μF	10
100μF	100

RATED RIPPLE CURRENT MULTIPLIERS

Frequency Multipliers

Capacitance (μF)	50	120	300	1k	10k	100k
0.1 to 4.7	0.65	1.00	1.35	1.75	2.30	2.50
10 to 47	0.75	1.00	1.25	1.50	1.75	1.80
100 to 1,000	0.80	1.00	1.15	1.30	1.40	1.50
2,200 to	0.85	1.00	1.03	1.05	1.08	1.08

◆STANDARD RATINGS

μF \ V_{dc}	6.3		10		16		25		35		50		63		100	
0.1											5×11	1.3			5×11	2.6
0.22											5×11	2.9			5×11	5.8
0.33											5×11	4.4			5×11	7.8
0.47											5×11	7			5×11	10
1.0											5×11	13			5×11	15
2.2											5×11	20			5×11	23
3.3											5×11	25			5×11	29
4.7											5×11	30	5×11	32	5×11	34
10											5×11	46	5×11	50	6.3×11	56
22											5×11	68	6.3×11	82	8×11.5	96
33									5×11	75	6.3×11	90	6.3×11	100	10×12.5	140
47					5×11	77	5×11	82	6.3×11	100	6.3×11	110	8×11.5	135	10×16	180
100	5×11	95	5×11	105	6.3×11	125	6.3×11	135	8×11.5	170	8×11.5	180	10×12.5	225	12.5×20	320
220	6.3×11	160	6.3×11	175	8×11.5	215	8×11.5	230	10×12.5	300	10×16	345	10×20	400	16×25	570
330	6.3×11	195	8×11.5	245	8×11.5	260	10×12.5	335	10×16	400	10×20	460	12.5×20	540	16×25	700
470	8×11.5	270	8×11.5	290	10×12.5	370	10×16	440	10×20	520	12.5×20	610	12.5×25	700	16×31.5	880
1,000	10×12.5	460	10×16	550	10×20	640	12.5×20	770	12.5×25	920	16×25	1,080	16×31.5	1,210		
2,200	12.5×20	810	12.5×20	860	12.5×25	1,000	16×25	1,170	16×31.5	1,340	18×35.5	1,530				
3,300	12.5×20	960	12.5×25	1,100	16×25	1,300	16×31.5	1,460	18×35.5	1,650						
4,700	16×25	1,330	16×25	1,400	16×31.5	1,600	18×35.5	1,780	18×40	1,900						
6,800	16×25	1,500	16×31.5	1,690	18×35.5	1,900	18×40	1,950								
10,000	16×31.5	1,765	18×35.5	1,950	18×40	2,060										
15,000	18×35.5	2,075														

Non solvent-proof										
μF \ V_{dc}	160		200		250		350		400	
0.47	6.3×11	9	6.3×11	9	6.3×11	9	8×11.5	10		
1.0	6.3×11	12	6.3×11	12	6.3×11	12	10×12.5	18	10×12.5	18
2.2	6.3×11	19	6.3×11	19	8×11.5	21	10×16	30	10×16	30
3.3	8×11.5	26	8×11.5	26	10×12.5	30	10×16	37	10×20	40
4.7	8×11.5	31	10×12.5	36	10×12.5	36	10×20	48	10×25	52
10	10×16	59	10×16	59	10×20	64	12.5×20	79	12.5×25	79
22	10×20	95	10×20	95	12.5×25	110	16×20	130	16×25	145
33	12.5×20	125	12.5×25	140	12.5×25	140	16×25	175	16×31.5	185
47	12.5×25	165	12.5×25	165	16×25	180	16×35.5	230	18×31.5	230
100	16×25	270	16×31.5	285	18×35.5	310	18×40	330		
220	18×35.5	450	18×40	470						

◆MAXIMUM ESR

(Ω) at 20°C, 120Hz										
μF \ V_{dc}	6.3	10	16	25	35	50	63	100	160 to 250	350 to 400
0.1						1,660		1,330		
0.22						754		603		
0.33						503		402		
0.47						353		282	706	847
1.0						166		133	332	398
2.2						75.4		60.3	151	181
3.3						50.3		40.3	101	121
4.7						35.3	31.8	28.2	70.6	84.7
10						16.6	14.9	13.3	33.2	39.8
22						7.54	6.79	6.03	15.1	18.1
33					6.03	5.03	4.52	4.02	10.1	12.1
47			5.65	4.94	4.23	3.53	3.18	2.82	7.06	8.47
100	3.70	3.15	2.65	2.32	1.99	1.66	1.49	1.33	3.32	3.98
220	1.66	1.43	1.21	1.06	0.905	0.754	0.679	0.603	1.51	
330	1.11	0.955	0.804	0.704	0.603	0.503	0.452	0.402		
470	0.776	0.671	0.565	0.494	0.423	0.353	0.318	0.282		
1,000	0.370	0.315	0.265	0.232	0.199	0.166	0.149			
2,200	0.181	0.158	0.136	0.121	0.106	0.0905				
3,300	0.131	0.116	0.101	0.0905	0.0804					
4,700	0.0988	0.0882	0.0776	0.0706	0.0635					
6,800	0.0781	0.0707	0.0634	0.0585						
10,000	0.0630	0.0581	0.0531							
15,000	0.0531									

SME-BP Series

- Standard Bi-polarized type
- Endurance : 85°C 2000 hours
- Solvent-proof type (see PRECAUTIONS AND GUIDELINES)

SME-BP

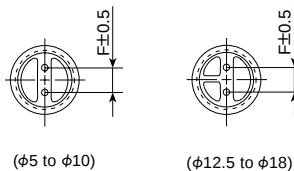
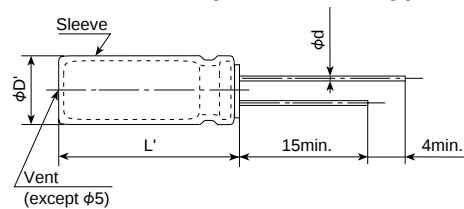
bi-polarized
SME



SPECIFICATIONS

Items	Characteristics										
Category	-40 to +85°C										
Temperature Range											
Rated Voltage Range	6.3 to 100V _{dc}										
Capacitance Tolerance	±20% (M) (at 20°C, 120Hz)										
Leakage Current	I=0.06CV or 10μA, whichever is greater. (at 20°C after 2 minutes) I=0.03CV or 3μA, whichever is greater. (at 20°C after 5 minutes) Where, I : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V)										
Dissipation Factor (tanδ)	Rated voltage (V _{dc})	6.3V	10V	16V	25V	35V	50V	63V	80V	100V	
	tanδ (Max.)	0.24	0.24	0.20	0.20	0.16	0.14	0.12	0.12	0.10	
	When nominal capacitance exceeds 1000μF, add 0.02 to the value above for each 1000μF increase. (at 20°C, 120Hz)										
Low Temperature Characteristics (Max. Impedance Ratio)	Rated voltage (V _{dc})	6.3V	10V	16V	25V	35V	50V	63V	80V	100V	
	Z(-25°C)/Z(+20°C)	4	3	2	2	2	2	2	2	2	
	Z(-40°C)/Z(+20°C)	10	8	6	4	3	3	3	3	3	
Endurance	The following specifications shall be satisfied when the capacitors are restored to 20°C after the rated voltage is applied for 2000 hours at 85°C, however the polarization shall be reversed every 250 hours.										
	Rated voltage	6.3 to 16V _{dc}					25 to 100V _{dc}				
	Capacitance change	≤±25% of the initial value					≤±20% of the initial value				
	D.F. (tanδ)	≤150% of the initial specified value									
	Leakage current	≤The initial specified value									
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for 1000 hours at 85°C without voltage applied.										
	Rated voltage	6.3 to 16V _{dc}					25 to 100V _{dc}				
	Capacitance change	≤±25% of the initial value					≤±20% of the initial value				
	D.F. (tanδ)	≤150% of the initial specified value									
	Leakage current	≤The initial specified value									

DIMENSIONS (Radial Lead Type=VB) [mm]



Gas escape end seal

φD	5	6.3	8	10	12.5	16	18
φd	0.5	0.5	0.6	0.6	0.6	0.8	0.8
F	2.0	2.5	3.5	5.0	5.0	7.5	7.5
φD'	φD+0.5max.						
L'	L+1.5max.						

PART NUMBERING SYSTEM

SME 6.3 VB 1000 M BP

Bi-polar type
Cap tolerance (±20%)
Nominal cap code
Radial lead type
Rated voltage in volts
Series name

Capacitance	Code
0.47μF	R47
1.0μF	1
4.7μF	4R7
10μF	10
100μF	100

STANDARD RATINGS

μF \ V _{dc}	6.3	10	16	25	35	50	63	80	100
0.47						5X11	11		5X11
1.0						5X11	17		5X11
2.2						5X11	25	5X11	29
3.3						5X11	27	5X11	28
4.7						5X11	34	6.3X11	34
10						5X11	43	6.3X11	52
22			5X11	57	6.3X11	65	6.3X11	73	8X11.5
33			5X11	70	6.3X11	80	8X11.5	100	8X11.5
47			5X11	76	6.3X11	95	8X11.5	120	10X12.5
100	6.3X11	125	6.3X11	125	8X11.5	160	10X16	230	265
220	8X11.5	215	8X11.5	215	10X12.5	275	10X16	305	410
330	8X11.5	265	10X16	345	10X16	375	12.5X20	450	505
470	10X12.5	370	10X16	410	10X20	485	12.5X20	540	655
1,000	10X20	650	12.5X20	720	12.5X25	855	16X25	950	1,140
2,200	12.5X25	1,160	16X25	1,280	16X31.5	1,510	18X35.5	1,620	
3,300	16X25	1,570	16X31.5	1,690	18X35.5	1,980			
4,700	16X31.5	2,020	18X35.5	2,160					
6,800	18X35.5	2,600							

KME-BP Series

- Standard Bi-polarized type
- Endurance : 105°C 1000 hours
- Solvent-proof type (see PRECAUTIONS AND GUIDELINES)

KME-BP

bi-polarized

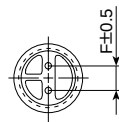
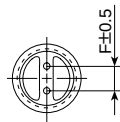
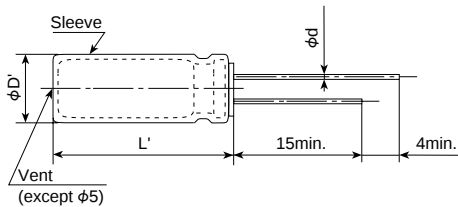
KME



SPECIFICATIONS

Items	Characteristics										
Category	-55 to +105°C										
Temperature Range											
Rated Voltage Range	6.3 to 100V _{dc}										
Capacitance Tolerance	±20% (M) (at 20°C, 120Hz)										
Leakage Current	I=0.06CV or 10μA, whichever is greater. (at 20°C after 2 minutes) I=0.03CV or 3μA, whichever is greater. (at 20°C after 5 minutes) Where, I : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V)										
Dissipation Factor (tanδ)	Rated voltage (V _{dc})	6.3V	10V	16V	25V	35V	50V	63V	80V	100V	
	tanδ (Max.)	0.24	0.24	0.20	0.20	0.16	0.14	0.12	0.12	0.10	
	When nominal capacitance exceeds 1000μF, add 0.02 to the value above for each 1000μF increase. (at 20°C, 120Hz)										
Low Temperature Characteristics (Max. Impedance Ratio)	Rated voltage (V _{dc})	6.3V	10V	16V	25V	35V	50V	63V	80V	100V	
	Z(-25°C)/Z(+20°C)	4	3	2	2	2	2	2	2	2	
	Z(-40°C)/Z(+20°C)	10	8	6	4	3	3	3	3	3	
Endurance	The following specifications shall be satisfied when the capacitors are restored to 20°C after the rated voltage is applied for 1000 hours at 105°C, however the polarization shall be reversed every 250 hours.										
	Rated voltage	6.3 to 16V _{dc}					25 to 100V _{dc}				
	Capacitance change	≤±25% of the initial value					≤±20% of the initial value				
	D.F. (tanδ)	≤150% of the initial specified value									
	Leakage current	≤The initial specified value									
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for 500 hours at 105°C without voltage applied.										
	Rated voltage	6.3 to 16V _{dc}					25 to 100V _{dc}				
	Capacitance change	≤±25% of the initial value					≤±20% of the initial value				
	D.F. (tanδ)	≤150% of the initial specified value									
	Leakage current	≤The initial specified value									

DIMENSIONS (Radial Lead Type=VB) [mm]



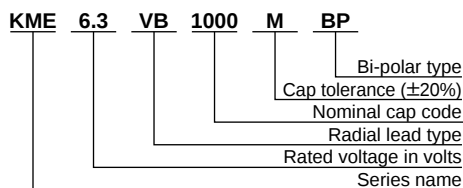
(φ5 to φ10)

(φ12.5 to φ18)

Gas escape end seal

φD	5	6.3	8	10	12.5	16	18
φd	0.5	0.5	0.6	0.6	0.6	0.8	0.8
F	2.0	2.5	3.5	5.0	5.0	7.5	7.5
φD'	φD+0.5max.						
L'	L+1.5max.						

PART NUMBERING SYSTEM



Capacitance	Code
0.47µF	R47
1.0µF	1
4.7µF	4R7
10µF	10
100µF	100

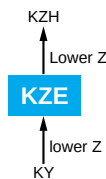
STANDARD RATINGS

µF \ V _{dc}	6.3	10	16	25	35	50	63	80	100
0.47						5X11	7		5X11
1.0						5X11	10		5X11
2.2						5X11	15		5X11
3.3						5X11	18	5X11	20
4.7						5X11	22	6.3X11	25
10					5X11	30	6.3X11	37	6.3X11
22			5X11	40	6.3X11	46	6.3X11	40	8X11.5
33			5X11	49	6.3X11	56	8X11.5	63	8X11.5
47			5X11	54	6.3X11	67	8X11.5	77	10X12.5
100	6.3X11	90	6.3X11	90	8X11.5	110	10X16	160	10X20
220	8X11.5	150	8X11.5	150	10X12.5	195	10X16	215	12.5X20
330	8X11.5	185	10X16	240	10X16	265	12.5X20	320	12.5X20
470	10X12.5	260	10X16	290	10X20	345	12.5X20	380	12.5X25
1,000	10X20	460	12.5X20	510	12.5X25	605	16X25	670	16X31.5
2,200	12.5X25	820	16X25	910	16X31.5	1,070	18X35.5	1,140	
3,300	16X25	1,110	16X31.5	1,200	18X35.5	1,400			
4,700	16X31.5	1,430	18X35.5	1,520					
6,800	18X35.5	1,830							

Upgrade!

KZE Series

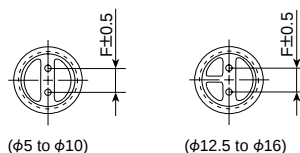
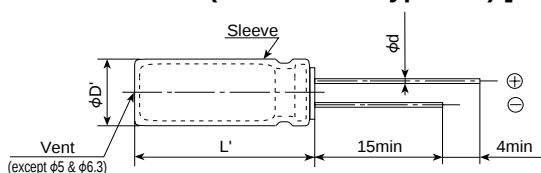
- Ultra Low impedance for Personal Computer and Storage Equipment
- Rated voltage 63 to 100V newly added [Upgrade!](#)
- Endurance with ripple current: 105°C 2000 to 5000 hours
- Non solvent-proof type



SPECIFICATIONS

Items	Characteristics										
Category	Temperature Range										
Temperature Range	-40 to +105°C										
Rated Voltage Range	6.3 to 100V _{dc}										
Capacitance Tolerance	±20% (M) (at 20°C, 120Hz)										
Leakage Current	I=0.01CV or 3μA, whichever is greater. Where, I : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V) (at 20°C after 2 minutes)										
Dissipation Factor (tanδ)	Rated voltage (V _{dc})	6.3V	10V	16V	25V	35V	50V	63V	80V	100V	
	tanδ (Max.)	0.22	0.19	0.16	0.14	0.12	0.10	0.09	0.09	0.08	
	When nominal capacitance exceeds 1000μF, add 0.02 to the value above for each 1000μF increase. (at 20°C, 120Hz)										
Low Temperature Characteristics (Max. Impedance Ratio)	Z (-25°C) / Z (+20°C)	2max.									
	Z (-40°C) / Z (+20°C)	3max.									
	(at 120Hz)										
Endurance	The following specifications shall be satisfied when the capacitors are restored to 20°C after subjected to DC voltage with the rated ripple current is applied for the specified period of time at 105°C.										
	Time	φ5 & φ6.3 : 2000hours φ8 : 3000hours φ10 : 4000hours φ12.5 & φ16 : 5000hours									
	Capacitance change	≤±25% of the initial value									
	D.F. (tanδ)	≤200% of the initial specified value									
	Leakage current	≤The initial specified value									
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for 500 hours at 105°C without voltage applied.										
	Capacitance change	≤±25% of the initial value									
	D.F. (tanδ)	≤200% of the initial specified value									
	Leakage current	≤The initial specified value									

DIMENSIONS (Radial Lead Type=VB) [mm]



φD	5	6.3	8	10	12.5	16
φd	0.5	0.5	0.6	0.6	0.6	0.8
F	2.0	2.5	3.5	5.0	5.0	7.5
φD'	φD+0.5max.					
L'	L+1.5max.					

Gas escaped end seal

PART NUMBERING SYSTEM

KZE	6.3	VB	1500	M	J20
					Case code
					Cap tolerance (±20%)
					Nominal cap code
					Radial lead type
					Rated voltage in volts
					Series name

Capacitance	Code
4.7μF	4R7
10μF	10
100μF	100
2200μF	2200

RATED RIPPLE CURRENT MULTIPLIERS

- Frequency Multipliers

Capacitance(μF)	Frequency (Hz)			
	120	1k	10k	100k
6.8 to 180	0.40	0.75	0.90	1.00
220 to 560	0.50	0.85	0.94	1.00
680 to 1,800	0.60	0.87	0.95	1.00
2,200 to 3,900	0.75	0.90	0.95	1.00
4,700 to	0.85	0.95	0.98	1.00

◆STANDARD RATINGS

Case size φD×L (mm)	V _{dc} Case code	6.3				10				16			
		Capacitance (μF)	Impedance (Ω _{max} /100kHz)		Rated ripple current (mA _{rms} /105°C 100kHz)	Capacitance (μF)	Impedance (Ω _{max} /100kHz)		Rated ripple current (mA _{rms} /105°C 100kHz)	Capacitance (μF)	Impedance (Ω _{max} /100kHz)		Rated ripple current (mA _{rms} /105°C 100kHz)
			20°C	-10°C			20°C	-10°C			20°C	-10°C	
5×11	E11	150	0.30	1.0	250	100	0.30	1.0	250	56	0.30	1.0	250
6.3×11	F11	330	0.13	0.41	405	220	0.13	0.41	405	120	0.13	0.41	405
8×11.5	H11	560	0.072	0.22	760	470	0.072	0.22	760	330	0.072	0.22	760
8×15	H15	820	0.056	0.17	995	680	0.056	0.17	995	470	0.056	0.17	995
8×20	H20	1,200	0.041	0.13	1,250	1,000	0.041	0.13	1,250	680	0.041	0.13	1,250
10×12.5	J12	1,000	0.053	0.16	1,030	680	0.053	0.16	1,030	470	0.053	0.16	1,030
10×16	J16	1,200	0.038	0.12	1,430	1,000	0.038	0.12	1,430	680	0.038	0.12	1,430
10×20	J20	1,500	0.023	0.069	1,820	1,200	0.023	0.069	1,820	1,000	0.023	0.069	1,820
10×25	J25	2,200	0.022	0.066	2,150	1,500	0.022	0.066	2,150	1,200	0.022	0.066	2,150
12.5×20	K20	3,300	0.021	0.053	2,360	2,200	0.021	0.053	2,360	1,500	0.021	0.053	2,360
12.5×25	K25	3,900	0.018	0.045	2,770	3,300	0.018	0.045	2,770	2,200	0.018	0.045	2,770
12.5×30	K30	4,700	0.016	0.041	3,290	3,900	0.016	0.041	3,290	2,700	0.016	0.041	3,290
12.5×35	K35	5,600	0.015	0.039	3,400	4,700	0.015	0.039	3,400	3,300	0.015	0.039	3,400
16×20	L20	5,600	0.018	0.045	3,140	3,900	0.018	0.045	3,140	2,700	0.018	0.045	3,140
16×25	L25	6,800	0.016	0.043	3,460	5,600	0.016	0.043	3,460	3,900	0.016	0.043	3,460

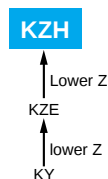
Case size φD×L (mm)	V _{dc} Case code	25				35				50			
		Capacitance (μF)	Impedance (Ω _{max} /100kHz)		Rated ripple current (mA _{rms} /105°C 100kHz)	Capacitance (μF)	Impedance (Ω _{max} /100kHz)		Rated ripple current (mA _{rms} /105°C 100kHz)	Capacitance (μF)	Impedance (Ω _{max} /100kHz)		Rated ripple current (mA _{rms} /105°C 100kHz)
			20°C	-10°C			20°C	-10°C			20°C	-10°C	
5×11	E11	47	0.30	1.0	250	33	0.30	1.0	250	22	0.34	1.18	238
6.3×11	F11	100	0.13	0.41	405	56	0.13	0.41	405	56	0.14	0.50	385
8×11.5	H11	220	0.072	0.22	760	150	0.072	0.22	760	100	0.074	0.22	724
8×15	H15	330	0.056	0.17	995	220	0.056	0.17	995	120	0.061	0.18	950
8×20	H20	470	0.041	0.13	1,250	270	0.041	0.13	1,250	180	0.046	0.14	1,190
10×12.5	J12	330	0.053	0.16	1,030	220	0.053	0.16	1,030	150	0.061	0.18	979
10×16	J16	470	0.038	0.12	1,430	330	0.038	0.12	1,430	220	0.042	0.12	1,370
10×20	J20	680	0.023	0.069	1,820	470	0.023	0.069	1,820	270	0.030	0.090	1,580
10×25	J25	820	0.022	0.066	2,150	560	0.022	0.066	2,150	330	0.028	0.085	1,870
12.5×20	K20	1,000	0.021	0.053	2,360	680	0.021	0.053	2,360	470	0.027	0.068	2,050
12.5×25	K25	1,500	0.018	0.045	2,770	1,000	0.018	0.045	2,770	560	0.023	0.059	2,410
12.5×30	K30	1,800	0.016	0.041	3,290	1,200	0.016	0.041	3,290	680	0.021	0.052	2,860
12.5×35	K35	2,200	0.015	0.039	3,400	1,500	0.015	0.039	3,400	820	0.019	0.051	2,960
16×20	L20	1,800	0.018	0.045	3,140	1,200	0.018	0.045	3,140	820	0.023	0.059	2,730
16×25	L25	2,700	0.016	0.043	3,460	1,800	0.016	0.043	3,460	1,000	0.021	0.056	3,010

Case size φD×L (mm)	V _{dc} Case code	63				80				100			
		Capacitance (μF)	Impedance (Ω _{max} /100kHz)		Rated ripple current (mA _{rms} /105°C 100kHz)	Capacitance (μF)	Impedance (Ω _{max} /100kHz)		Rated ripple current (mA _{rms} /105°C 100kHz)	Capacitance (μF)	Impedance (Ω _{max} /100kHz)		Rated ripple current (mA _{rms} /105°C 100kHz)
			20°C	-10°C			20°C	-10°C			20°C	-10°C	
5×11	E11	15	0.88	3.5	165					6.8	1.4	5.6	125
6.3×11	F11	33	0.35	1.4	265					15	0.57	2.3	205
8×11.5	H11	56	0.22	0.88	500					27	0.36	1.4	355
8×15	H15	82	0.16	0.64	665					39	0.25	1.0	450
8×20	H20	120	0.12	0.48	820					56	0.19	0.76	565
10×12.5	J12	82	0.11	0.44	690	68	0.17	0.66	480	47	0.17	0.66	480
10×16	J16	120	0.076	0.31	950	100	0.11	0.47	600	68	0.11	0.47	600
10×20	J20	180	0.056	0.23	1,150	120	0.084	0.34	800	82	0.084	0.34	800
10×25	J25	220	0.046	0.19	1,350	150	0.069	0.28	900	120	0.069	0.28	900
12.5×16	K16	180	0.072	0.29	1,150	150	0.11	0.34	750	100	0.11	0.34	750
12.5×20	K20	270	0.041	0.13	1,500	220	0.062	0.18	1,100	150	0.062	0.18	1,100
12.5×25	K25	390	0.031	0.093	1,900	330	0.047	0.14	1,250	220	0.047	0.14	1,250
12.5×30	K30	470	0.028	0.084	2,300	390	0.042	0.13	1,500	270	0.042	0.13	1,500
12.5×35	K35	560	0.024	0.072	2,500	470	0.036	0.11	1,650	330	0.036	0.11	1,650
12.5×40	K40	680	0.021	0.063	2,800	560	0.032	0.095	1,800	390	0.032	0.095	1,800
16×20	L20	470	0.032	0.096	2,000	330	0.048	0.15	1,350	220	0.048	0.15	1,350
16×25	L25	680	0.025	0.075	2,600	470	0.038	0.12	1,700	330	0.038	0.12	1,700
16×31.5	L31	820	0.021	0.063	2,850	680	0.032	0.095	1,850	470	0.032	0.095	1,850
16×35.5	L35	1,000	0.019	0.057	2,900	820	0.029	0.086	2,000	560	0.029	0.086	2,000
16×40	L40	1,200	0.018	0.054	3,400	1,000	0.027	0.081	2,200	680	0.027	0.081	2,200
18×20	M20	680	0.030	0.090	2,500	470	0.045	0.14	1,500	330	0.045	0.14	1,500
18×25	M25	820	0.024	0.072	2,800	680	0.036	0.11	1,750	470	0.036	0.11	1,750
18×31.5	M31	1,200	0.020	0.060	3,300	820	0.030	0.090	1,900	560	0.030	0.090	1,900
18×35.5	M35	1,500	0.018	0.054	3,400	1,000	0.027	0.081	2,200	680	0.027	0.081	2,200
18×40	M40	1,800	0.017	0.051	3,500	1,200	0.026	0.077	2,700	820	0.026	0.077	2,700

New!

KZH Series

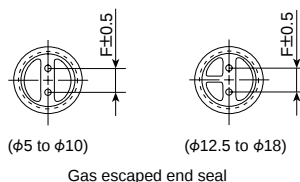
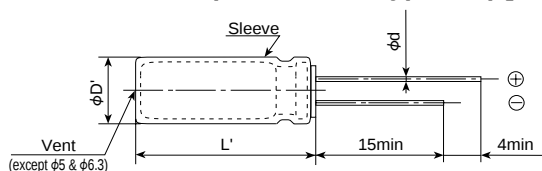
- Ultra Low impedance for Personal Computer and Storage Equipment
- Endurance with ripple current: 105°C 5000 to 6000 hours
- Non solvent-proof type



SPECIFICATIONS

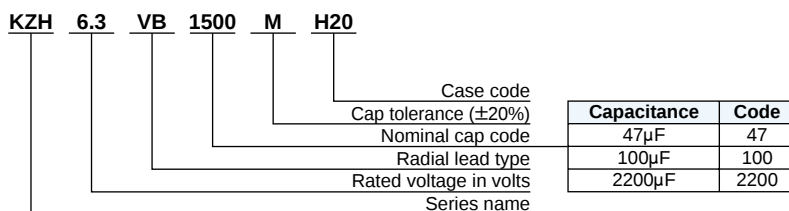
Items	Characteristics						
Category	-40 to +105°C						
Temperature Range							
Rated Voltage Range	6.3 to 35V _{dc}						
Capacitance Tolerance	±20% (M) (at 20°C, 120Hz)						
Leakage Current	I=0.01CV or 3μA, whichever is greater. Where, I : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V) (at 20°C after 2 minutes)						
Dissipation Factor (tanδ)	Rated voltage (V _{dc})	6.3V	10V	16V	25V	35V	
	tanδ (Max.)	0.22	0.19	0.16	0.14	0.12	
	When nominal capacitance exceeds 1000μF, add 0.02 to the value above for each 1000μF increase.						(at 20°C, 120Hz)
Low Temperature Characteristics (Max. Impedance Ratio)	Z (-25°C) / Z (+20°C)	2max.					
	Z (-40°C) / Z (+20°C)	3max.					
	(at 120Hz)						
Endurance	The following specifications shall be satisfied when the capacitors are restored to 20°C after subjected to DC voltage with the rated ripple current is applied for the specified period of time at 105°C.						
	Time	φ5 & φ6.3 : 5000hours φ8 to φ16 : 6000hours					
	Capacitance change	≤±25% of the initial value (6.3, 10V : ≤±30%)					
	D.F. (tanδ)	≤200% of the initial specified value					
	Leakage current	≤The initial specified value					
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for 500 hours at 105°C without voltage applied.						
	Capacitance change	≤±25% of the initial value (6.3, 10V : ≤±30%)					
	D.F. (tanδ)	≤200% of the initial specified value					
	Leakage current	≤The initial specified value					

DIMENSIONS (Radial Lead Type=VB) [mm]



φD	5	6.3	8	10	12.5	16
φd	0.5	0.5	0.6	0.6	0.6	0.8
F	2.0	2.5	3.5	5.0	5.0	7.5
φD'	φD+0.5max.					
L'	L+1.5max.					

PART NUMBERING SYSTEM



RATED RIPPLE CURRENT MULTIPLIERS

- Frequency Multipliers

Capacitance(µF)	Frequency (Hz)			
	120	1k	10k	100k
0.47 to 150	0.40	0.75	0.90	1.00
220 to 560	0.50	0.85	0.94	1.00
680 to 1,800	0.60	0.87	0.95	1.00
2,200 to 3,900	0.75	0.90	0.95	1.00
4,700 to 8,200	0.85	0.95	0.98	1.00

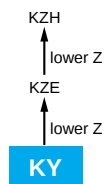
◆STANDARD RATINGS

Case size φD×L(mm)	V _{dc} Case code	6.3				10				16			
		Capacitance (μF)	Impedance (Ω _{max} /100kHz)		Rated ripple current (mA _{rms} /105°C 100kHz)	Capacitance (μF)	Impedance (Ω _{max} /100kHz)		Rated ripple current (mA _{rms} /105°C 100kHz)	Capacitance (μF)	Impedance (Ω _{max} /100kHz)		Rated ripple current (mA _{rms} /105°C 100kHz)
			20°C	-10°C			20°C	-10°C			20°C	-10°C	
5X11	E11	220	0.24	0.80	330	150	0.24	0.80	330	100	0.24	0.80	330
6.3X11	F11	470	0.11	0.35	500	330	0.11	0.35	500	220	0.11	0.35	500
8X11.5	H11	820	0.062	0.19	900	680	0.062	0.19	900	470	0.062	0.19	900
8X15	H15	1,200	0.048	0.15	1,210	1,000	0.048	0.15	1,210	680	0.048	0.15	1,210
8X20	H20	1,500	0.033	0.11	1,410	1,500	0.033	0.11	1,410	1,000	0.033	0.11	1,410
10X12.5	J12	1,200	0.045	0.14	1,240	1,000	0.045	0.14	1,240	680	0.045	0.14	1,240
10X16	J16	1,800	0.032	0.10	1,650	1,500	0.032	0.10	1,650	1,000	0.032	0.10	1,650
10X20	J20	2,200	0.020	0.060	1,960	1,800	0.020	0.060	1,960	1,500	0.020	0.060	1,960
10X25	J25	2,700	0.018	0.054	2,250	2,200	0.018	0.054	2,250	1,800	0.018	0.054	2,250
12.5X20	K20	3,900	0.017	0.043	2,480	3,300	0.017	0.043	2,480	2,200	0.017	0.043	2,480
12.5X25	K25	4,700	0.015	0.038	2,900	3,900	0.015	0.038	2,900	2,700	0.015	0.038	2,900
12.5X30	K30	5,600	0.013	0.033	3,450	4,700	0.013	0.033	3,450	3,300	0.013	0.033	3,450
12.5X35	K35	6,800	0.012	0.031	3,570	5,600	0.012	0.031	3,570	3,900	0.012	0.031	3,570
16X20	L20	6,800	0.015	0.038	3,250	4,700	0.015	0.038	3,250	3,300	0.015	0.038	3,250
16X25	L25	8,200	0.013	0.035	3,630	6,800	0.013	0.035	3,630	4,700	0.013	0.035	3,630

Case size φD×L (mm)	Case code	V _{dc}		25			35		
		Capacitance (μF)	Impedance (Ω _{max} /100kHz)		Rated ripple current (mA _{rms} /105°C 100kHz)	Capacitance (μF)	Impedance (Ω _{max} /100kHz)		Rated ripple current (mA _{rms} /105°C 100kHz)
			20°C	-10°C			20°C	-10°C	
5X11	E11	68	0.24	0.80	330	47	0.24	0.80	330
6.3X11	F11	150	0.11	0.35	500	100	0.11	0.35	500
8X11.5	H11	330	0.062	0.19	900	220	0.062	0.19	900
8X15	H15	390	0.048	0.15	1,210	270	0.048	0.15	1,210
8X20	H20	560	0.033	0.11	1,410	390	0.033	0.11	1,410
10X12.5	J12	470	0.045	0.14	1,240	330	0.045	0.14	1,240
10X16	J16	680	0.032	0.10	1,650	470	0.032	0.10	1,650
10X20	J20	820	0.020	0.060	1,960	560	0.020	0.060	1,960
10X25	J25	1,000	0.018	0.054	2,250	680	0.018	0.054	2,250
12.5X20	K20	1,500	0.017	0.043	2,480	1,000	0.017	0.043	2,480
12.5X25	K25	1,800	0.015	0.038	2,900	1,200	0.015	0.038	2,900
12.5X30	K30	2,200	0.013	0.033	3,450	1,500	0.013	0.033	3,450
12.5X35	K35	2,700	0.012	0.031	3,570	1,800	0.012	0.031	3,570
16X20	L20	2,200	0.015	0.038	3,250	1,500	0.015	0.038	3,250
16X25	L25	3,300	0.013	0.035	3,630	2,200	0.013	0.035	3,630

KY Series

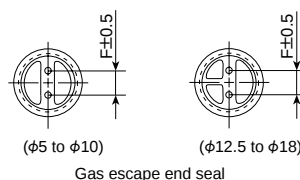
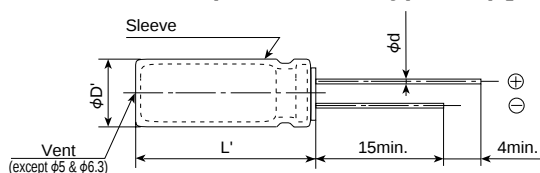
- Newly innovative electrolyte is employed to minimize ESR
- Endurance with ripple current : 4000 to 10000 hours at 105°C
- Non solvent-proof type



SPECIFICATIONS

Items	Characteristics						
Category	-40 to +105°C						
Temperature Range							
Rated Voltage Range	6.3 to 50V _{dc}						
Capacitance Tolerance	±20% (M) (at 20°C, 120Hz)						
Leakage Current	I=0.01CV or 3μA, whichever is greater. Where, I : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V) (at 20°C after 2 minutes)						
Dissipation Factor (tanδ)	Rated voltage (V _{dc})	6.3V	10V	16V	25V	35V	50V
	tanδ (Max.)	0.22	0.19	0.16	0.14	0.12	0.10
	When nominal capacitance exceeds 1000μF, add 0.02 to the value above for each 1000μF increase.						(at 20°C, 120Hz)
Low Temperature Characteristics (Max. Impedance Ratio)	Rated voltage (V _{dc})	6.3V	10V	16V	25V	35V	50V
	Z(-25°C)/Z(+20°C)	4	3	2	2	2	2
	Z(-40°C)/Z(+20°C)	8	6	4	3	3	3
Endurance	The following specifications shall be satisfied when the capacitors are restored to 20°C after subjected to DC voltage with the rated ripple current is applied for the specified period of time at 105°C.						
	Time	6.3 to 10V _{dc}	φ5 & 6.3 : 4000hours		φ8 & 10 : 6000hours		φ12.5 to 18 : 8000hours
		16 to 50V _{dc}	φ5 & 6.3 : 5000hours		φ8 & 10 : 7000hours		φ12.5 to 18 : 10000hours
	Capacitance change	≤±25% of the initial value					
	D.F. (tanδ)	≤200% of the initial specified value					
	Leakage current	≤The initial specified value					
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for 500 hours at 105°C without voltage applied.						
	Capacitance change	≤±25% of the initial value					
	D.F. (tanδ)	≤200% of the initial specified value					
	Leakage current	≤The initial specified value					

DIMENSIONS (Radial Lead Type=VB) [mm]



φD	5	6.3	8	10	12.5	16	18
φd	0.5	0.5	0.6	0.6	0.6	0.8	0.8
F	2.0	2.5	3.5	5.0	5.0	7.5	7.5
φD'	φD+0.5max.						
L'	L+1.5max.						

PART NUMBERING SYSTEM

KY	10	VB	1000	M	H20
					Case code
					Capacitance tolerance (±20%)
					Nominal capacitance code
					Radial lead type
					Rated voltage in volts
					Series name

Capacitance	Code
4.7μF	4R7
10μF	10
100μF	100
2200μF	2200

RATED RIPPLE CURRENT MULTIPLIERS

- Frequency Multipliers

Capacitance (μF)	Frequency (Hz)	120	1k	10k	100k
22 to 180		0.40	0.75	0.90	1.00
220 to 560		0.50	0.85	0.94	1.00
680 to 1,800		0.60	0.87	0.95	1.00
2,200 to 3,900		0.75	0.90	0.95	1.00
4,700 to		0.85	0.95	0.98	1.00

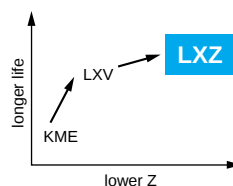
◆STANDARD RATINGS

Case size φDXL (mm)	Case code	V _{dc}	6.3				10				16			
			Capacitance (μF)	Impedance (Ωmax/100kHz)		Rated ripple current (mArms/ 105°C 100kHz)	Capacitance (μF)	Impedance (Ωmax/100kHz)		Rated ripple current (mArms/ 105°C 100kHz)	Capacitance (μF)	Impedance (Ωmax/100kHz)		Rated ripple current (mArms/ 105°C 100kHz)
				20°C	-10°C			20°C	-10°C			20°C	-10°C	
5×11	E11		150	0.58	2.3	210	100	0.58	2.3	210	56	0.58	2.3	210
6.3×11	F11		330	0.22	0.87	340	220	0.22	0.87	340	120	0.22	0.87	340
8×11.5	H11		680	0.13	0.52	640	470	0.13	0.52	640	330	0.13	0.52	640
8×15	H15		1,000	0.087	0.35	840	680	0.087	0.35	840	470	0.087	0.35	840
8×20	H20		1,200	0.069	0.27	1,050	1,000	0.069	0.27	1,050	680	0.069	0.27	1,050
10×12.5	J12		820	0.080	0.32	865	680	0.080	0.32	865	470	0.080	0.32	865
10×16	J16		1,200	0.060	0.24	1,210	1,000	0.060	0.24	1,210	680	0.060	0.24	1,210
10×20	J20		1,500	0.046	0.18	1,400	1,200	0.046	0.18	1,400	1,000	0.046	0.18	1,400
10×25	J25		2,200	0.042	0.17	1,650	1,500	0.042	0.17	1,650	1,200	0.042	0.17	1,650
10×30	J30		2,700	0.031	0.12	1,910	2,200	0.031	0.12	1,910	1,500	0.031	0.12	1,910
12.5×15	K15		1,800	0.049	0.16	1,450	1,500	0.049	0.16	1,450	1,000	0.049	0.16	1,450
12.5×20	K20		3,300	0.035	0.12	1,900	2,200	0.035	0.12	1,900	1,500	0.035	0.12	1,900
12.5×25	K25		3,900	0.027	0.089	2,230	3,300	0.027	0.089	2,230	2,200	0.027	0.089	2,230
12.5×30	K30		4,700	0.024	0.078	2,650	3,900	0.024	0.078	2,650	2,700	0.024	0.078	2,650
12.5×35	K35		5,600	0.020	0.065	2,880	4,700	0.020	0.065	2,880	3,300	0.020	0.065	2,880
12.5×40	K40		6,800	0.017	0.056	3,350	5,600	0.017	0.056	3,350	3,900	0.017	0.056	3,350
16×15	L15		2,700	0.042	0.12	1,940	2,200	0.042	0.12	1,940	1,500	0.042	0.12	1,940
16×20	L20		5,600	0.027	0.078	2,530	3,900	0.027	0.078	2,530	2,700	0.027	0.078	2,530
16×25	L25		6,800	0.021	0.060	2,930	5,600	0.021	0.060	2,930	3,900	0.021	0.060	2,930
16×31.5	L31		8,200	0.017	0.050	3,450	6,800	0.017	0.050	3,450	4,700	0.017	0.050	3,450
16×35.5	L35		10,000	0.015	0.044	3,610	8,200	0.015	0.044	3,610	5,600	0.015	0.044	3,610
16×40	L40		12,000	0.013	0.038	4,080	10,000	0.013	0.038	4,080	6,800	0.013	0.038	4,080
18×15	M15		3,900	0.043	0.11	2,210	2,700	0.043	0.11	2,210	2,200	0.043	0.11	2,210
18×20	M20		6,800	0.026	0.067	2,860	5,600	0.026	0.067	2,860	3,900	0.026	0.067	2,860
18×25	M25		10,000	0.019	0.049	3,140	6,800	0.019	0.049	3,140	4,700	0.019	0.049	3,140
18×31.5	M31		12,000	0.015	0.040	4,170	8,200	0.015	0.040	4,170	5,600	0.015	0.040	4,170
18×35.5	M35		15,000	0.014	0.038	4,220	10,000	0.014	0.038	4,220	8,200	0.014	0.038	4,220
18×40	M40		18,000	0.012	0.032	4,280	12,000	0.012	0.032	4,280	10,000	0.012	0.032	4,280

Case size φD×L (mm)	V _{dc} Case code	25				35				50			
		Capacitance (μF)	Impedance (Ωmax/100kHz)		Rated ripple current (mA _{RMS} /105°C 100kHz)	Capacitance (μF)	Impedance (Ωmax/100kHz)		Rated ripple current (mA _{RMS} /105°C 100kHz)	Capacitance (μF)	Impedance (Ωmax/100kHz)		Rated ripple current (mA _{RMS} /105°C 100kHz)
			20°C	-10°C			20°C	-10°C			20°C	-10°C	
5×11	H11									0.47	5.5	22.0	17
5×11	H11									1.0	4.0	16.0	30
5×11	H11									2.2	2.5	10.0	43
5×11	H11									3.3	2.2	8.8	53
5×11	H11									4.7	1.9	7.6	88
5×11	H11									10	1.5	6.0	100
5×11	H11	47	0.58	2.3	210	33	0.58	2.3	210	22	0.70	2.8	180
6.3×11	F11	100	0.22	0.87	340	56	0.22	0.87	340	56	0.30	1.2	295
8×11.5	H11	220	0.13	0.52	640	150	0.13	0.52	640	100	0.17	0.68	555
8×15	H15	330	0.087	0.35	840	220	0.087	0.35	840	120	0.12	0.48	730
8×20	H20	470	0.069	0.27	1,050	270	0.069	0.27	1,050	180	0.091	0.36	910
10×12.5	J12	330	0.080	0.32	865	220	0.080	0.32	865	150	0.12	0.48	760
10×16	J16	470	0.060	0.24	1,210	330	0.060	0.24	1,210	220	0.084	0.34	1,050
10×20	J20	680	0.046	0.18	1,400	470	0.046	0.18	1,400	270	0.060	0.24	1,220
10×25	J25	820	0.042	0.17	1,650	560	0.042	0.17	1,650	330	0.055	0.22	1,440
10×30	J30	1,000	0.031	0.12	1,910	680	0.031	0.12	1,910	470	0.043	0.17	1,690
12.5×15	K15	680	0.049	0.16	1,450	470	0.049	0.16	1,450	270	0.061	0.20	1,260
12.5×20	K20	1,000	0.035	0.12	1,900	680	0.035	0.12	1,900	470	0.045	0.15	1,660
12.5×25	K25	1,500	0.027	0.089	2,230	1,000	0.027	0.089	2,230	560	0.034	0.11	1,950
12.5×30	K30	1,800	0.024	0.078	2,650	1,200	0.024	0.078	2,650	680	0.030	0.10	2,310
12.5×35	K35	2,200	0.020	0.065	2,880	1,500	0.020	0.065	2,880	820	0.025	0.083	2,510
12.5×40	K40	2,700	0.017	0.056	3,350	1,800	0.017	0.056	3,350	1,000	0.021	0.069	2,920
16×15	L15	1,000	0.042	0.12	1,940	680	0.042	0.12	1,940	470	0.055	0.17	1,690
16×20	L20	1,800	0.027	0.078	2,530	1,200	0.027	0.078	2,530	820	0.034	0.10	2,210
16×25	L25	2,700	0.021	0.060	2,930	1,800	0.021	0.060	2,930	1,000	0.025	0.075	2,555
16×31.5	L31	3,300	0.017	0.050	3,450	2,200	0.017	0.050	3,450	1,200	0.022	0.066	3,010
16×35.5	L35	3,900	0.015	0.044	3,610	2,700	0.015	0.044	3,610	1,500	0.019	0.057	3,150
16×40	L40	4,700	0.013	0.038	4,080	3,300	0.013	0.038	4,080	1,800	0.016	0.048	3,710
18×15	M15	1,200	0.043	0.11	2,210	1,000	0.043	0.11	2,210	560	0.054	0.15	1,930
18×20	M20	2,200	0.026	0.067	2,860	1,800	0.026	0.067	2,860	1,000	0.036	0.097	2,490
18×25	M25	3,300	0.019	0.049	3,140	2,200	0.019	0.049	3,140	1,200	0.026	0.070	2,740
18×31.5	M31	3,900	0.015	0.040	4,170	2,700	0.015	0.040	4,170	1,800	0.021	0.057	3,635
18×35.5	M35	4,700	0.014	0.038	4,220	3,300	0.014	0.038	4,220	2,200	0.017	0.046	3,680
18×40	M40	5,600	0.012	0.032	4,280	3,900	0.012	0.032	4,280	2,700	0.014	0.038	3,800

LXZ Series

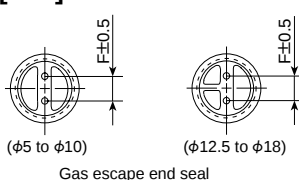
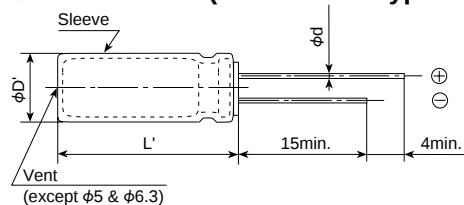
- Newly innovative electrolyte and internal architecture are employed
- Very low impedance at high frequency range
- Endurance with ripple current: 105°C 2000 to 8000 hours
- Solvent-proof type (see PRECAUTIONS AND GUIDELINES)



SPECIFICATIONS

Items	Characteristics
Category	
Temperature Range	-55 to +105°C
Rated Voltage Range	6.3 to 63V _{dc}
Capacitance Tolerance	±20% (M) (at 20°C, 120Hz)
Leakage Current	I=0.01CV or 3µA, whichever is greater. Where, I : Max. leakage current (µA), C : Nominal capacitance (µF), V : Rated voltage (V) (at 20°C after 2 minutes)
Dissipation Factor (tanδ)	Rated voltage (V _{dc})
	6.3V 10V 16V 25V 35V 50V 63V
	tanδ (Max.) 0.22 0.19 0.16 0.14 0.12 0.10 0.08 When nominal capacitance exceeds 1000µF, add 0.02 to the value above for each 1000µF increase. (at 20°C, 120Hz)
Endurance	The following specifications shall be satisfied when the capacitors are restored to 20°C after subjected to DC voltage with the rated ripple current is applied for the specified period of time at 105°C.
	Time
	Capacitance change
	D.F. (tanδ)
	Leakage current
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for 1000 hours at 105°C without voltage applied.
	Capacitance change
	D.F. (tanδ)
	Leakage current

DIMENSIONS (Radial Lead Type=VB) [mm]



φD	5	6.3	8	10	12.5	16	18
φd	0.5	0.5	0.6	0.6	0.6	0.8	0.8
F	2.0	2.5	3.5	5.0	5.0	7.5	7.5
φD'	φD+0.5max.						
L'	L+1.5max.						

PART NUMBERING SYSTEM

LXZ	16	VB	2200	M	K25	
						Case code
						Capacitance tolerance (±20%)
						Nominal capacitance code
						Radial lead type
						Rated voltage in volts
						Series name

Capacitance	Code
4.7µF	4R7
10µF	10
100µF	100
2200µF	2200

◆STANDARD RATINGS

ΦD×L	V _{dc} Case code	6.3				10				16				25			
		Capacitance (μF)	Impedance (Ω _{max} /100kHz)		Rated ripple current (mA _{Rms} /105°C 100kHz)	Capacitance (μF)	Impedance (Ω _{max} /100kHz)		Rated ripple current (mA _{Rms} /105°C 100kHz)	Capacitance (μF)	Impedance (Ω _{max} /100kHz)		Rated ripple current (mA _{Rms} /105°C 100kHz)	Capacitance (μF)	Impedance (Ω _{max} /100kHz)		Rated ripple current (mA _{Rms} /105°C 100kHz)
			20°C	-10°C			20°C	-10°C			20°C	-10°C			20°C	-10°C	
5X11.5	E11	150	0.50	1.0	175	100	0.50	1.0	175	47	0.50	1.0	175	47	0.50	1.0	175
6.3X11.5	F11	330	0.25	0.50	290	220	0.25	0.50	290	100	0.25	0.50	290	100	0.25	0.50	290
6.3X15	F15	470	0.18	0.36	400	330	0.18	0.36	400	220	0.18	0.36	400	150	0.18	0.36	400
8X12	H12	680	0.12	0.24	555	470	0.12	0.24	555	330	0.12	0.24	555	220	0.12	0.24	555
8X15	H15	1,000	0.090	0.18	730	680	0.090	0.18	730	470	0.090	0.18	730	330	0.090	0.18	730
8X20	H20	1,200	0.080	0.16	810	1,000	0.080	0.16	810	560	0.080	0.16	810	390	0.080	0.16	810
10X12.5	J12	820	0.090	0.18	760	680	0.090	0.18	760	470	0.090	0.18	760	330	0.090	0.18	760
10X16	J16	1,200	0.068	0.136	1,050	1,000	0.068	0.136	1,050	680	0.068	0.136	1,050	470	0.068	0.136	1,050
10X20	J20	1,500	0.052	0.104	1,220	1,200	0.052	0.104	1,220	1,000	0.052	0.104	1,220	680	0.052	0.104	1,220
10X25	J25	2,200	0.045	0.090	1,440	1,500	0.045	0.090	1,440	1,200	0.045	0.090	1,440	820	0.045	0.090	1,440
10X30	J30	2,700	0.037	0.074	1,690	1,800	0.037	0.074	1,690	1,500	0.037	0.074	1,690	1,000	0.037	0.074	1,690
12.5X20	K20	3,300	0.038	0.076	1,660	2,200	0.038	0.076	1,660	1,500	0.038	0.076	1,660	1,000	0.038	0.076	1,660
12.5X25	K25	3,900	0.030	0.060	1,950	3,300	0.030	0.060	1,950	2,200	0.030	0.060	1,950	1,500	0.030	0.060	1,950
12.5X30	K30	4,700	0.025	0.050	2,310	3,900	0.025	0.050	2,310	2,700	0.025	0.050	2,310	1,800	0.025	0.050	2,310
12.5X35	K35	5,600	0.022	0.044	2,510	4,700	0.022	0.044	2,510	3,300	0.022	0.044	2,510	2,200	0.022	0.044	2,510
12.5X40	K40	6,800	0.017	0.034	2,870	5,600	0.017	0.034	2,870	3,900	0.017	0.034	2,870	2,700	0.017	0.034	2,870
16X20	L20	5,600	0.029	0.058	2,210	3,900	0.029	0.058	2,210	2,700	0.029	0.058	2,210	1,800	0.029	0.058	2,210
16X25	L25	6,800	0.022	0.044	2,560	5,600	0.022	0.044	2,560	3,900	0.022	0.044	2,560	2,700	0.022	0.044	2,560
16X30	L30	8,200	0.019	0.038	3,010	6,800	0.019	0.038	3,010	4,700	0.019	0.038	3,010	3,300	0.019	0.038	3,010
16X35	L35	10,000	0.017	0.034	3,150	8,200	0.017	0.034	3,150	5,600	0.017	0.034	3,150	3,900	0.017	0.034	3,150
16X40	L40	12,000	0.015	0.030	3,710	10,000	0.015	0.030	3,710	6,800	0.015	0.030	3,710	4,700	0.015	0.030	3,710
18X20	M20	6,800	0.028	0.056	2,490	5,600	0.028	0.056	2,490	3,900	0.028	0.056	2,490	2,200	0.028	0.056	2,490
18X25	M25	10,000	0.020	0.040	2,740	6,800	0.020	0.040	2,740	4,700	0.020	0.040	2,740	3,300	0.020	0.040	2,740
18X30	M30	12,000	0.018	0.036	3,330	8,200	0.018	0.036	3,330	5,600	0.018	0.036	3,330	3,900	0.018	0.036	3,330
18X35	M35	15,000	0.016	0.032	3,680	10,000	0.016	0.032	3,680	8,200	0.016	0.032	3,680	4,700	0.016	0.032	3,680
18X40	M40	18,000	0.015	0.030	3,800	12,000	0.015	0.030	3,800	10,000	0.015	0.030	3,800	5,600	0.015	0.030	3,800

φD×L	Case code	V _{dc}			35			50			63		
		Capacitance (μF)	Impedance (Ω _{max} /100kHz)		Rated ripple current (mA _{rms} /105°C/100kHz)	Capacitance (μF)	Impedance (Ω _{max} /100kHz)		Rated ripple current (mA _{rms} /105°C/100kHz)	Capacitance (μF)	Impedance (Ω _{max} /100kHz)		Rated ripple current (mA _{rms} /105°C/100kHz)
			20°C	-10°C			20°C	-10°C			20°C	-10°C	
5×11.5	E11	33	0.50	1.0	175	22	0.90	1.8	155	12	1.9	4.0	145
6.3×11.5	F11	56	0.25	0.50	290	47	0.45	0.90	260	22	1.0	2.0	240
6.3×15	F15	100	0.18	0.36	400	68	0.31	0.62	360	39	0.61	1.4	330
8×12	H12	150	0.12	0.24	555	100	0.22	0.44	485	68	0.34	0.75	405
8×15	H15	220	0.090	0.18	730	120	0.16	0.32	635	100	0.27	0.65	535
8×20	H20	270	0.080	0.16	810	180	0.12	0.24	730	150	0.21	0.52	690
10×12.5	J12	220	0.090	0.18	760	120	0.16	0.32	620	100	0.255	0.510	540
10×16	J16	330	0.068	0.136	1,050	180	0.13	0.26	850	120	0.190	0.380	600
10×20	J20	470	0.052	0.104	1,220	220	0.088	0.18	1,050	180	0.145	0.290	890
10×25	J25	560	0.045	0.090	1,440	330	0.073	0.15	1,250	220	0.130	0.260	1,050
10×30	J30	680	0.037	0.074	1,690	390	0.054	0.11	1,500	330	0.090	0.180	1,300
12.5×20	K20	680	0.038	0.076	1,660	390	0.059	0.12	1,480	330	0.085	0.170	1,290
12.5×25	K25	1,000	0.030	0.060	1,950	560	0.044	0.088	1,840	390	0.070	0.140	1,720
12.5×30	K30	1,200	0.025	0.050	2,310	680	0.039	0.078	2,220	470	0.055	0.110	2,090
12.5×35	K35	1,500	0.022	0.044	2,510	820	0.033	0.066	2,290	680	0.047	0.094	2,270
12.5×40	K40	1,800	0.017	0.034	2,870	1,000	0.029	0.058	2,500	820	0.042	0.084	2,560
16×20	L20	1,200	0.029	0.058	2,210	680	0.048	0.096	1,840	470	0.059	0.120	1,770
16×25	L25	1,800	0.022	0.044	2,560	1,000	0.034	0.068	2,240	680	0.050	0.100	2,160
16×30	L30	2,200	0.019	0.038	3,010	1,200	0.028	0.056	2,700	820	0.043	0.086	2,670
16×35	L35	2,700	0.017	0.034	3,150	1,500	0.025	0.050	2,800	1,000	0.036	0.072	2,770
16×40	L40	3,300	0.015	0.030	3,710	1,800	0.021	0.042	3,200	1,200	0.030	0.060	2,850
18×20	M20	1,800	0.028	0.056	2,490	820	0.042	0.084	1,980	680	0.055	0.110	2,290
18×25	M25	2,200	0.020	0.040	2,740	1,200	0.029	0.058	2,610	820	0.043	0.086	2,590
18×30	M30	2,700	0.018	0.036	3,330	1,800	0.025	0.050	3,000	1,200	0.032	0.064	2,950
18×35	M35	3,300	0.016	0.032	3,680	2,200	0.023	0.046	3,100	1,500	0.030	0.060	3,100
18×40	M40	3,900	0.015	0.030	3,800	2,700	0.020	0.040	3,400	1,800	0.025	0.050	3,210

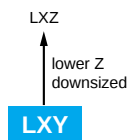
◆RATED RIPPLE CURRENT MULTIPLIERS

●Frequency Multipliers

Capacitance (μF)	Frequency (Hz)			
	120	1k	10k	100k
12 to 180	0.40	0.75	0.90	1.00
220 to 560	0.50	0.85	0.94	1.00
680 to 1,800	0.60	0.87	0.95	1.00
2,200 to 3,900	0.75	0.90	0.95	1.00
4,700 to 18,000	0.85	0.95	0.98	1.00

LXY Series

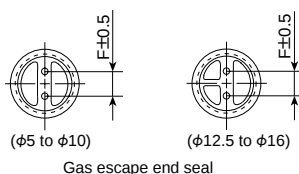
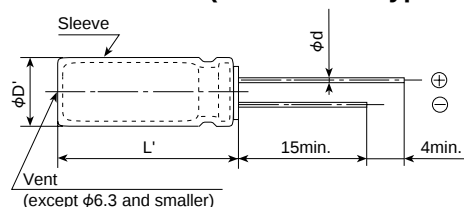
- Newly innovative electrolyte and internal architecture are employed
- Endurance with ripple current : 105°C 2000 to 8000 hours
- Solvent-proof type (see PRECAUTIONS AND GUIDELINES)



SPECIFICATIONS

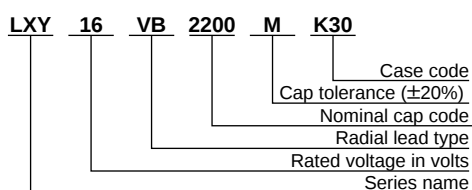
Items	Characteristics						
Category	Temperature Range						
Temperature Range	-55 to +105℃						
Rated Voltage Range	10 to 63V _{dc}						
Capacitance Tolerance	±20% (M) (at 20℃, 120Hz)						
Leakage Current	I=0.01CV or 3μA, whichever is greater. Where, I : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V) (at 20℃ after 2 minutes)						
Dissipation Factor (tanδ)	Rated voltage (V _{dc})	10V	16V	25V	35V	50V	63V
	tanδ (Max.)	0.19	0.16	0.14	0.12	0.10	0.10
	When nominal capacitance exceeds 1000μF, add 0.02 to the value above for each 1000μF increase. (at 20℃, 120Hz)						
Low Temperature Characteristics (Max. Impedance Ratio)	Z(-55℃)/Z(+20℃)	10V _{dc} to 50V _{dc} : 3max.					(at 120Hz)
		63V _{dc} : 6max.					
Endurance	The following specifications shall be satisfied when the capacitors are restored to 20℃ after subjected to DC voltage with the rated ripple current is applied for the specified period of time at 105℃.						
	Time	φ5 & 6.3 : 2000hours φ8 : 3000hours φ10 : 5000hours φ12.5 : 7000hours φ16 & 18 : 8000hours					
	Capacitance change	≤±20% of the initial value					
	D.F. (tanδ)	≤200% of the initial specified value					
	Leakage current	≤The initial specified value					
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20℃ after exposing them for 1000 hours at 105℃ without voltage applied.						
	Capacitance change	≤±20% of the initial value					
	D.F. (tanδ)	≤200% of the initial specified value					
	Leakage current	≤The initial specified value					

DIMENSIONS (Radial Lead Type=VB) [mm]



φD	5	6.3	8	10	12.5	16
φd	0.5	0.5	0.6	0.6	0.6	0.8
F	2.0	2.5	3.5	5.0	5.0	7.5
φD'	φD+0.5max.					
L'	L+1.5max.					

PART NUMBERING SYSTEM



Capacitance	Code
4.7μF	4R7
10μF	10
100μF	100
2200μF	2200

◆STANDARD RATINGS

V_{dc} Items Case code		10			16			25			35		
		Capacitance (μF)	Impedance (Ω _{max} /100kHz)		Capacitance (μF)	Impedance (Ω _{max} /100kHz)		Capacitance (μF)	Impedance (Ω _{max} /100kHz)		Capacitance (μF)	Impedance (Ω _{max} /100kHz)	
			20°C	-10°C		20°C	-10°C		20°C	-10°C		20°C	-10°C
φDXL (mm)													
5X11.5	E11	82	0.75	1.5	163	56	0.75	1.5	163	39	0.75	1.5	163
6.3X11.5	F11	180	0.35	0.70	273	120	0.35	0.70	273	82	0.35	0.70	273
6.3X15	F15	220	0.25	0.50	390	180	0.25	0.50	390	120	0.25	0.50	390
8X12	H12	330	0.17	0.34	445	270	0.17	0.34	445	150	0.17	0.34	445
8X15	H15	470	0.13	0.26	555	330	0.13	0.26	555	220	0.13	0.26	555
8X20	H20	680	0.095	0.19	740	470	0.095	0.19	740	330	0.095	0.19	740
10X12.5	J12	390	0.12	0.24	625	270	0.12	0.24	625	180	0.12	0.24	625
10X16	J16	680	0.084	0.17	825	470	0.084	0.17	825	330	0.084	0.17	825
10X20	J20	1,000	0.062	0.13	1,040	680	0.062	0.13	1,040	470	0.062	0.13	1,040
10X25	J25	1,200	0.052	0.11	1,260	820	0.052	0.11	1,260	560	0.052	0.11	1,260
10X30	J30	1,500	0.044	0.088	1,440	1,200	0.044	0.088	1,440	820	0.044	0.088	1,440
12.5X20	K20	1,800	0.046	0.092	1,340	1,200	0.046	0.092	1,340	820	0.046	0.092	1,340
12.5X25	K25	2,200	0.034	0.068	1,690	1,500	0.034	0.068	1,690	1,000	0.034	0.068	1,690
12.5X30	K30	2,700	0.030	0.060	1,950	2,200	0.030	0.060	1,950	1,500	0.030	0.060	1,950
12.5X35	K35	3,300	0.024	0.048	2,220	2,700	0.024	0.048	2,220	1,800	0.024	0.048	2,220
12.5X40	K40	3,900	0.022	0.044	2,390	3,300	0.022	0.044	2,390	2,200	0.022	0.044	2,390
16X20	L20	3,300	0.038	0.076	1,630	2,200	0.038	0.076	1,630	1,500	0.038	0.076	1,630
16X25	L25	3,900	0.028	0.056	2,070	2,700	0.028	0.056	2,070	1,800	0.028	0.056	2,070
16X30	L30	5,600	0.025	0.050	2,350	3,900	0.025	0.050	2,350	2,700	0.025	0.050	2,350
16X35	L35	6,800	0.022	0.044	2,550	4,700	0.022	0.044	2,550	3,300	0.022	0.044	2,550
16X40	L40	8,200	0.018	0.036	2,900	5,600	0.018	0.036	2,900	3,900	0.018	0.036	2,900

V_{dc} Items Case code		50			63		
		Capacitance (μF)	Impedance (Ω _{max} /100kHz)		Capacitance (μF)	Impedance (Ω _{max} /100kHz)	
			20°C	-10°C		20°C	-10°C
φDXL (mm)							
5X11.5	E11	18	1.2	2.4	129	10	1.9
6.3X11.5	F11	39	0.54	1.1	219	18	1.0
6.3X15	F15	56	0.34	0.68	310	33	0.61
8X12	H12	68	0.30	0.60	340	47	0.47
8X15	H15	82	0.20	0.40	470	68	0.34
8X20	H20	120	0.14	0.28	610	82	0.21
10X12.5	J12	82	0.20	0.40	480	56	0.27
10X16	J16	120	0.13	0.26	755	68	0.21
10X20	J20	180	0.088	0.18	945	120	0.16
10X25	J25	220	0.073	0.15	1,150	150	0.13
10X30	J30	330	0.054	0.11	1,260	180	0.10
12.5X20	K20	330	0.059	0.12	1,190	220	0.11
12.5X25	K25	470	0.044	0.088	1,490	270	0.074
12.5X30	K30	560	0.039	0.078	1,720	390	0.068
12.5X35	K35	680	0.033	0.066	1,890	470	0.063
12.5X40	K40	820	0.029	0.058	2,030	560	0.051
16X20	L20	680	0.050	0.10	1,420	330	0.085
16X25	L25	820	0.034	0.068	1,880	470	0.055
16X30	L30	1,000	0.030	0.060	2,150	680	0.046
16X35	L35	1,200	0.027	0.054	2,320	820	0.040
16X40	L40	1,500	0.024	0.048	2,540	1,000	0.036

◆RATED RIPPLE CURRENT MULTIPLIERS

●Frequency Multipliers

Capacitance (μF)	Frequency (Hz)	120	1k	10k	100k
10 to 180		0.40	0.75	0.90	1.00
220 to 560		0.50	0.85	0.94	1.00
680 to 1800		0.60	0.87	0.95	1.00
2200 to 3900		0.75	0.90	0.95	1.00
4700 to 8200		0.85	0.95	0.98	1.00

The following case sizes are also available upon request : φ4×7mm, φ5×7mm, φ5×15mm, φ6.3×7mm φ12.5×15mm, φ16×15mm, and φ18×15mm.

LXV Series

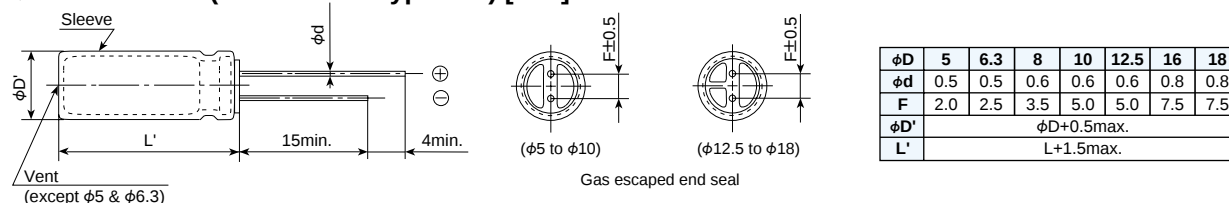
- Low impedance
- Endurance with ripple current: 105°C 2000 to 5000 hours
- Solvent-proof type (see PRECAUTIONS AND GUIDELINES)



SPECIFICATIONS

Items	Characteristics									
Category										
Temperature Range	-55 to +105°C									
Rated Voltage Range	6.3 to 100V _{dc}									
Capacitance Tolerance	±20% (M) (at 20°C, 120Hz)									
Leakage Current	I=0.01CV or 3μA, whichever is greater. Where, I : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V) (at 20°C after 2 minutes)									
Dissipation Factor (tanδ)	Rated voltage (V _{dc})	6.3V	10V	16V	25V	35V	50V	63V	80V	100V
	tanδ (Max.)	0.22	0.19	0.16	0.14	0.12	0.10	0.10	0.09	0.08
	When nominal capacitance exceeds 1000μF, add 0.02 to the value above for each 1000μF increase. (at 20°C, 120Hz)									
Low Temperature Characteristics	Capacitance change ΔC (-55°C /+20°C)			0.7min.			(at 120Hz)			
	Max. impedance ratio (-55°C /+20°C)			3max.(6.3V _{dc} : 4max.)						
Endurance	The following specifications shall be satisfied when the capacitors are restored to 20°C after subjected to DC voltage with the rated ripple current is applied for the specified period of time at 105°C.									
	Time	φ5 to 6.3 : 2000hours φ8 & 10 : 3000hours φ12.5 to φ18 : 5000hours								
	Capacitance change	≤±20% of the initial value								
	D.F. (tanδ)	≤200% of the initial specified value								
	Leakage current	≤The initial specified value								
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for 1000 hours at 105°C without voltage applied.									
	Capacitance change	≤±20% of the initial value								
	D.F. (tanδ)	≤200% of the initial specified value								
	Leakage current	≤The initial specified value								

DIMENSIONS (Radial Lead Type=VB) [mm]



PART NUMBERING SYSTEM

LXV	6.3	VB	1200	M	J20	
						Case code
						Cap tolerance (±20%)
						Nominal cap code
						Radial lead type
						Rated voltage in volts
						Series name

Capacitance	Code
4.7µF	4R7
10µF	10
100µF	100
2200µF	2200

◆STANDARD RATINGS

φD×L	Case code	V _{dc}	6.3			10			16					
			Capacitance (μF)	Impedance (Ω _{max} /100kHz)		Rated ripple current (mA _{rms} / 105°C 100kHz)	Capacitance (μF)	Impedance (Ω _{max} /100kHz)		Rated ripple current (mA _{rms} / 105°C 100kHz)	Capacitance (μF)	Impedance (Ω _{max} /100kHz)		Rated ripple current (mA _{rms} / 105°C 100kHz)
				20°C	−10°C			20°C	−10°C			20°C	−10°C	
5×11.5	E11	120	0.72	1.8	165	82	0.72	1.8	165	56	0.72	1.8	165	
6.3×11.5	F11	220	0.38	0.95	255	180	0.38	0.95	255	120	0.38	0.95	255	
6.3×15	F15	330	0.27	0.68	330	270	0.27	0.68	330	180	0.27	0.68	330	
8×12	H12	390	0.20	0.50	415	330	0.20	0.50	415	270	0.20	0.50	415	
8×15	H15	560	0.16	0.40	495	470	0.16	0.40	495	330	0.16	0.40	495	
8×20	H20	820	0.11	0.28	640	680	0.11	0.28	640	470	0.11	0.28	640	
10×12.5	J12	470	0.12	0.30	635	390	0.12	0.30	635	270	0.12	0.30	635	
10×16	J16	680	0.084	0.21	825	680	0.084	0.21	825	470	0.084	0.21	825	
10×20	J20	1,200	0.062	0.16	1,060	1,000	0.062	0.16	1,060	680	0.062	0.16	1,060	
10×25	J25	1,500	0.052	0.13	1,260	1,200	0.052	0.13	1,260	820	0.052	0.13	1,260	
10×30	J30	2,200	0.044	0.11	1,450	1,500	0.044	0.11	1,450	1,200	0.044	0.11	1,450	
12.5×20	K20	2,200	0.046	0.12	1,360	1,800	0.046	0.12	1,360	1,200	0.046	0.12	1,360	
12.5×25	K25	2,700	0.034	0.085	1,700	2,200	0.034	0.085	1,700	1,500	0.034	0.085	1,700	
12.5×30	K30	3,900	0.030	0.075	1,980	2,700	0.030	0.075	1,980	2,200	0.030	0.075	1,980	
12.5×35	K35	4,700	0.027	0.068	2,230	3,300	0.027	0.068	2,230	2,700	0.027	0.068	2,230	
12.5×40	K40	5,600	0.024	0.060	2,460	3,900	0.024	0.060	2,460	3,300	0.024	0.060	2,460	
16×20	L20	3,900	0.038	0.095	1,770	3,300	0.038	0.095	1,770	2,200	0.038	0.095	1,770	
16×25	L25	5,600	0.028	0.070	2,190	3,900	0.028	0.070	2,190	2,700	0.028	0.070	2,190	
16×30	L30	6,800	0.025	0.063	2,510	5,600	0.025	0.063	2,510	3,900	0.025	0.063	2,510	
16×35	L35	8,200	0.022	0.055	2,770	6,800	0.022	0.055	2,770	4,700	0.022	0.055	2,770	
16×40	L40	10,000	0.018	0.045	3,110	8,200	0.018	0.045	3,110	5,600	0.018	0.045	3,110	
18×20	M20	5,600	0.036	0.090	1,940	3,900	0.036	0.090	1,940	3,300	0.036	0.090	1,940	
18×25	M25	6,800	0.027	0.068	2,350	4,700	0.027	0.068	2,350	3,900	0.027	0.068	2,350	
18×30	M30	10,000	0.024	0.060	2,720	6,800	0.024	0.060	2,720	4,700	0.024	0.060	2,720	
18×35	M35	12,000	0.021	0.053	3,050	8,200	0.021	0.053	3,050	6,800	0.021	0.053	3,050	
18×40	M40	15,000	0.017	0.043	3,300	10,000	0.017	0.043	3,300	8,200	0.017	0.043	3,300	

φD×L	V _{dc} Case code	25				35				50			
		Capacitance (μF)	Impedance (Ω _{max} /100kHz)		Rated ripple current (mA _{Rms} / 105°C 100kHz)	Capacitance (μF)	Impedance (Ω _{max} /100kHz)		Rated ripple current (mA _{Rms} / 105°C 100kHz)	Capacitance (μF)	Impedance (Ω _{max} /100kHz)		Rated ripple current (mA _{Rms} / 105°C 100kHz)
			20°C	-10°C			20°C	-10°C			20°C	-10°C	
5X11.5	E11	39	0.72	1.8	165	27	0.72	1.8	165	18	1.1	3.3	165
6.3X11.5	F11	82	0.38	0.95	255	56	0.38	0.95	255	39	0.56	1.6	255
6.3X15	F15	120	0.27	0.68	330	82	0.27	0.68	330	56	0.41	1.2	310
8X12	H12	150	0.20	0.50	415	120	0.20	0.50	415	68	0.29	0.84	415
8X15	H15	220	0.16	0.40	495	180	0.16	0.40	495	82	0.24	0.72	505
8X20	H20	330	0.11	0.28	640	220	0.11	0.28	640	120	0.18	0.52	610
10X12.5	J12	180	0.12	0.30	635	120	0.12	0.30	635	82	0.16	0.40	530
10X16	J16	330	0.084	0.21	825	220	0.084	0.21	825	120	0.12	0.30	755
10X20	J20	470	0.062	0.16	1,060	330	0.062	0.16	1,060	180	0.088	0.22	945
10X25	J25	560	0.052	0.13	1,260	390	0.052	0.13	1,260	220	0.068	0.17	1,150
10X30	J30	820	0.044	0.11	1,450	560	0.044	0.11	1,450	330	0.059	0.15	1,260
12.5X20	K20	820	0.046	0.12	1,360	560	0.046	0.12	1,360	330	0.059	0.15	1,190
12.5X25	K25	1,000	0.034	0.085	1,700	680	0.034	0.085	1,700	470	0.045	0.11	1,500
12.5X30	K30	1,500	0.030	0.075	1,980	1,000	0.030	0.075	1,980	560	0.039	0.098	1,720
12.5X35	K35	1,800	0.027	0.068	2,230	1,200	0.027	0.068	2,230	680	0.033	0.083	1,900
12.5X40	K40	2,200	0.024	0.060	2,460	1,500	0.024	0.060	2,460	820	0.029	0.073	2,120
16X20	L20	1,500	0.038	0.095	1,770	1,000	0.038	0.095	1,770	680	0.043	0.11	1,500
16X25	L25	1,800	0.028	0.070	2,190	1,200	0.028	0.070	2,190	820	0.033	0.083	1,880
16X30	L30	2,700	0.025	0.063	2,510	1,800	0.025	0.063	2,510	1,000	0.029	0.073	2,150
16X35	L35	3,300	0.022	0.055	2,770	2,200	0.022	0.055	2,770	1,200	0.025	0.063	2,320
16X40	L40	3,900	0.018	0.045	3,110	2,700	0.018	0.045	3,110	1,500	0.021	0.053	2,650
18X20	M20	2,200	0.036	0.090	1,940	1,500	0.036	0.090	1,940	820	0.039	0.098	1,660
18X25	M25	2,700	0.027	0.068	2,350	1,800	0.027	0.068	2,350	1,000	0.030	0.075	2,020
18X30	M30	3,300	0.024	0.060	2,720	2,200	0.024	0.060	2,720	1,500	0.026	0.065	2,340
18X35	M35	3,900	0.021	0.053	3,050	2,700	0.021	0.053	3,050	1,800	0.023	0.058	2,620
18X40	M40	4,700	0.017	0.043	3,300	3,300	0.017	0.043	3,300	2,200	0.020	0.050	2,790

◆STANDARD RATINGS

φD×L	Case code	V _{dc}				63				80				100			
		Capacitance (μF)	Impedance (Ω _{max} /100kHz)		Rated ripple current (mA _{rms} / 105°C 100kHz)	Capacitance (μF)	Impedance (Ω _{max} /100kHz)		Rated ripple current (mA _{rms} / 105°C 100kHz)	Capacitance (μF)	Impedance (Ω _{max} /100kHz)		Rated ripple current (mA _{rms} / 105°C 100kHz)	Capacitance (μF)	Impedance (Ω _{max} /100kHz)		Rated ripple current (mA _{rms} / 105°C 100kHz)
			20°C	-10°C			20°C	-10°C			20°C	-10°C			20°C	-10°C	
5×11.5	E11	12	1.9	4.8	100	8.2	1.9	5.1	100	5.6	1.9	5.1	100	5.6	1.9	5.1	100
6.3×11.5	F11	27	1.1	2.8	160	18	1.1	3.0	150	12	1.1	3.0	150	12	1.1	3.0	150
6.3×15	F15	39	0.62	1.6	230	27	0.62	1.7	220	18	0.62	1.7	220	18	0.62	1.7	220
8×12	H12	47	0.49	1.3	275	33	0.53	1.5	275	22	0.53	1.5	275	22	0.53	1.5	275
8×15	H15	68	0.34	0.85	360	47	0.35	0.97	360	33	0.35	0.97	360	33	0.35	0.97	360
8×20	H20	82	0.21	0.53	500	56	0.27	0.74	490	39	0.27	0.74	490	39	0.27	0.74	490
10×12.5	J12	56	0.27	0.68	420	39	0.47	1.3	380	27	0.47	1.3	380	27	0.47	1.3	380
10×16	J16	68	0.21	0.53	523	56	0.33	0.90	500	33	0.33	0.90	500	33	0.33	0.90	500
10×20	J20	120	0.16	0.40	650	82	0.26	0.70	620	56	0.26	0.70	620	56	0.26	0.70	620
10×25	J25	150	0.13	0.33	780	100	0.19	0.52	795	68	0.19	0.52	795	68	0.19	0.52	795
10×30	J30	180	0.10	0.25	960	150	0.15	0.41	955	100	0.15	0.41	955	100	0.15	0.41	955
12.5×20	K20	220	0.11	0.28	870	150	0.15	0.41	890	100	0.15	0.41	890	100	0.15	0.41	890
12.5×25	K25	270	0.074	0.19	1,150	180	0.11	0.30	1,040	120	0.11	0.30	1,040	120	0.11	0.30	1,040
12.5×30	K30	390	0.068	0.17	1,280	270	0.094	0.26	1,270	180	0.094	0.26	1,270	180	0.094	0.26	1,270
12.5×35	K35	470	0.063	0.16	1,390	330	0.087	0.24	1,450	220	0.087	0.24	1,450	220	0.087	0.24	1,450
12.5×40	K40	560	0.051	0.13	1,530	390	0.060	0.17	1,610	270	0.060	0.17	1,610	270	0.060	0.17	1,610
16×20	L20	390	0.085	0.22	1,100	270	0.11	0.30	1,240	180	0.11	0.30	1,240	180	0.11	0.30	1,240
16×25	L25	470	0.055	0.14	1,480	330	0.081	0.22	1,440	220	0.081	0.22	1,440	220	0.081	0.22	1,440
16×30	L30	680	0.046	0.12	1,720	470	0.058	0.16	1,790	330	0.058	0.16	1,790	330	0.058	0.16	1,790
16×35	L35	820	0.040	0.10	1,910	560	0.052	0.14	2,000	390	0.052	0.14	2,000	390	0.052	0.14	2,000
16×40	L40	1,000	0.036	0.090	2,070	680	0.041	0.11	2,200	470	0.041	0.11	2,200	470	0.041	0.11	2,200
18×20	M20	560	0.085	0.22	1,170	390	0.085	0.23	1,450	270	0.085	0.23	1,450	270	0.085	0.23	1,450
18×25	M25	680	0.055	0.14	1,520	470	0.070	0.19	1,650	330	0.070	0.19	1,650	330	0.070	0.19	1,650
18×30	M30	820	0.046	0.12	1,770	680	0.058	0.16	1,850	390	0.058	0.16	1,850	390	0.058	0.16	1,850
18×35	M35	1,000	0.040	0.10	1,970	820	0.052	0.14	1,990	560	0.052	0.14	1,990	560	0.052	0.14	1,990
18×40	M40	1,200	0.036	0.090	2,130	1,000	0.041	0.11	2,370	680	0.041	0.11	2,370	680	0.041	0.11	2,370

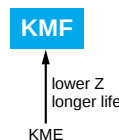
◆RATED RIPPLE CURRENT MULTIPLIERS

●Frequency Multipliers

Rated voltage (V _{dc})	Case size φD (mm)	Frequency (Hz)			
		120	1k	10k	100k
6.3 & 10	5 to 8	0.65	0.83	0.95	1.00
	10 & 12.5	0.70	0.85	0.96	1.00
	16 & 18	0.85	0.92	0.97	1.00
16 & 25	5 to 8	0.55	0.76	0.91	1.00
	10 & 12.5	0.65	0.83	0.93	1.00
	16 & 18	0.70	0.87	0.96	1.00
35 & 50	5 to 8	0.40	0.66	0.85	1.00
	10 & 12.5	0.50	0.73	0.89	1.00
	16 & 18	0.60	0.81	0.94	1.00
63 to 100	5 to 8	0.20	0.55	0.80	1.00
	10 & 12.5	0.35	0.65	0.85	1.00
	16 & 18	0.50	0.75	0.90	1.00

KMF Series

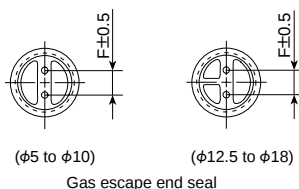
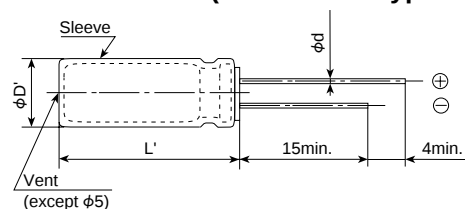
- Endurance with ripple current: 105°C 2000 to 5000 hours
- Solvent-proof type except 160 to 450V_{dc}
(see PRECAUTIONS AND GUIDELINES)



SPECIFICATIONS

Items	Characteristics														
Category															
Temperature Range	-55 to +105°C(6.3 to 100V _{dc}) -40 to +105°C(160 to 400V _{dc}) -25 to +105°C(450V _{dc})														
Rated Voltage Range	6.3 to 450V _{dc}														
Capacitance Tolerance	±20% (M) (at 20°C, 120Hz)														
Leakage Current	6.3 to 100V _{dc}							160 to 450V _{dc}							
	I=0.03CV or 4μA, whichever is greater. (at 20°C after 1 minute)							CV		Time		After 1minute		After 5minutes	
	I=0.01CV or 3μA, whichever is greater. (at 20°C after 2 minutes)							CV≤1000		I=0.1CV+40		I=0.03CV+15			
								CV>1000		I=0.04CV+100		I=0.02CV+25			
	Where, I : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V) (at 20°C)														
Dissipation Factor (tanδ)	Rated voltage (V _{dc})	6.3V	10V	16V	25V	35V	50V	63V	100V	160 to 250V	400V	450V			
	tanδ (Max.)	0.22	0.19	0.16	0.14	0.12	0.10	0.09	0.08	0.20	0.24	0.24			
	When nominal capacitance exceeds 1000μF, add 0.02 to the value above for each 1000μF increase. (at 20°C, 120Hz)														
Low Temperature Characteristics (Max. Impedance Ratio)	Rated voltage (V _{dc})	6.3V	10V	16V	25V	35V	50V	63V	100V	160 to 250V	400V	450V			
	Z(-25°C)/Z(+20°C)	4	3	2	2	2	2	2	2	3	5	6			
	Z(-40°C)/Z(+20°C)	8	6	4	3	3	3	3	3	6	6	-	(at 120Hz)		
Endurance	The following specifications shall be satisfied when the capacitors are restored to 20°C after subjected to DC voltage with the rated ripple current is applied for the specified period of time at 105°C.														
	Time for 6.3 to 100V _{dc}	φ5 & 6.3 : 2000 hours φ8 & 10 : 3000 hours φ12.5 and larger : 5000 hours													
	Time for 160 to 450V _{dc}	2000 hours													
	Capacitance change	≤±20% of the initial value													
	D.F. (tanδ)	≤200% of the initial specified value													
	Leakage current	≤The initial specified value													
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for 1000 hours at 105°C without voltage applied.														
	Rated voltage	6.3 to 100V _{dc}						160 to 450V _{dc}							
	Capacitance change	≤±20% of the initial value						≤±20% of the initial value							
	D.F. (tanδ)	≤200% of the initial specified value						≤200% of the initial specified value							
	Leakage current	≤The initial specified value						≤500% of the initial specified value							

DIMENSIONS (Radial Lead Type=VB) [mm]



φD	5	6.3	8	10	12.5	16	18
φd	0.5	0.5	0.6	0.6	0.6	0.8	0.8
F	2.0	2.5	3.5	5.0	5.0	7.5	7.5
φD'	φD+0.5max.						
L'	L+1.5max.						

PART NUMBERING SYSTEM

KMF 6.3 VB 1000 M

Cap tolerance (±20%)
Nominal cap code
Radial lead type
Rated voltage in volts
Series name

Capacitance	Code
0.47μF	R47
4.7μF	4R7
10μF	10
100μF	100
470μF	470

RATED RIPPLE CURRENT MULTIPLIERS

- Frequency Multipliers

Rated Voltage(V _{dc})	Case code	Frequency(Hz)	120	1k	10k	100k
6.3 10	φ5 (to 47μF)	φ5 (100μF), φ6.3, φ8	0.40	0.75	0.93	1.00
		φ10 to φ18	0.70	0.86	0.96	1.00
		φ10 to φ18	0.85	0.95	0.98	1.00
16 to 35	φ5 (to 22μF)	φ5 (33μF to), φ6.3, φ8	0.30	0.68	0.91	1.00
		φ10 to φ18	0.50	0.80	0.94	1.00
		φ10 to φ18	0.70	0.88	0.97	1.00
50 63	φ5 (to 3.3μF)	φ5 (4.7μF to), φ6.3, φ8	0.20	0.66	0.90	1.00
		φ10 to φ18	0.40	0.76	0.93	1.00
		φ10 to φ18	0.60	0.84	0.96	1.00
100	φ5 (to 1μF)	φ5 (2.2μF to), φ6.3, φ8	0.20	0.60	0.88	1.00
		φ10 to φ18	0.30	0.65	0.90	1.00
		φ10 to φ18	0.40	0.75	0.93	1.00
160 to 450	φ10	φ10	0.25	0.61	0.88	1.00
		φ12.5 to φ18	0.35	0.66	0.89	1.00

◆STANDARD RATINGS

Cap (μF)	V _{dc} Items	6.3			10			16			25		
		Case size	Impedance	Rated ripple	Case size	Impedance	Rated ripple	Case size	Impedance	Rated ripple	Case size	Impedance	Rated ripple
4.7											5×11	3.0	9.0
10								5×11	2.0	6.0	5×11	2.0	6.0
22					5×11	1.3	3.9	5×11	1.3	3.9	5×11	1.3	3.9
33		5×11	1.3	3.9	5×11	1.3	3.9	5×11	1.3	3.9	5×11	1.3	3.9
47		5×11	1.3	3.9	5×11	1.3	3.9	5×11	1.3	3.9	5×11	1.3	3.9
100		5×11	1.3	3.9	5×11	1.3	3.9	6.3×11	0.60	1.8	6.3×11	0.60	1.8
220		6.3×11	0.60	1.8	6.3×11	0.60	1.8	8×11.5	0.33	0.99	8×11.5	0.33	0.99
330		6.3×11	0.60	1.8	8×11.5	0.33	0.99	8×11.5	0.33	0.99	10×12.5	0.25	0.75
470		8×11.5	0.33	0.99	8×11.5	0.33	0.99	10×12.5	0.25	0.75	10×16	0.19	0.57
1,000		10×12.5	0.25	0.75	10×16	0.19	0.57	10×20	0.14	0.42	12.5×20	0.085	0.26
2,200		12.5×20	0.085	0.26	12.5×20	0.085	0.26	12.5×25	0.070	0.21	16×25	0.060	0.18
3,300		12.5×20	0.085	0.26	12.5×25	0.070	0.21	16×25	0.060	0.18	16×31.5	0.048	0.14
4,700		16×25	0.060	0.18	16×25	0.060	0.18	16×31.5	0.048	0.14	18×35.5	0.037	0.11
6,800		16×25	0.060	0.18	16×31.5	0.048	0.14	18×35.5	0.037	0.11	18×40	0.034	0.10
10,000		16×31.5	0.048	0.14	18×35.5	0.037	0.11	18×40	0.034	0.10			
15,000		18×35.5	0.037	0.11	2,240								

Cap (μF)	V _{dc} Items	35			50			63			100		
		Case size	Impedance	Rated ripple	Case size	Impedance	Rated ripple	Case size	Impedance	Rated ripple	Case size	Impedance	Rated ripple
0.47					5×11	7.0	21.0				5×11	10.0	35.0
1.0					5×11	5.0	15.0				5×11	7.0	25.0
2.2					5×11	4.0	12.0				5×11	6.0	21.0
3.3					5×11	3.5	11.0				5×11	5.0	18.0
4.7		5×11	3.0	9.0	5×11	3.0	9.0	5×11	4.0	14.0	5×11	4.0	14.0
10		5×11	2.0	6.0	5×11	2.0	6.0	5×11	2.5	8.8	6.3×11	1.2	4.2
22		5×11	1.3	3.9	5×11	1.3	3.9	6.3×11	1.2	4.2	8×11.5	0.66	2.3
33		5×11	1.3	3.9	6.3×11	0.60	1.8	6.3×11	1.2	4.2	10×12.5	0.50	1.8
47		6.3×11	0.60	1.8	6.3×11	0.60	1.8	8×11.5	0.56	2.0	10×16	0.32	1.1
100		8×11.5	0.33	0.99	8×11.5	0.33	0.99	10×12.5	0.50	1.8	12.5×20	0.16	0.56
220		10×12.5	0.25	0.75	10×16	0.19	0.57	10×20	0.27	0.95	16×25	0.090	0.32
330		10×16	0.19	0.57	10×20	0.14	0.42	12.5×20	0.16	0.56	16×25	0.090	0.32
470		10×20	0.14	0.42	12.5×20	0.085	0.26	12.5×25	0.14	0.49	16×31.5	0.060	0.21
1,000		12.5×25	0.070	0.21	16×25	0.060	0.18	16×31.5	0.060	0.21			
2,200		16×31.5	0.048	0.14	18×35.5	0.037	0.11						
3,300		18×35.5	0.037	0.11	2,240								
4,700		18×40	0.034	0.10	2,460								
6,800													

(mArms/105°C, 100kHz)
(Ω_{max}/-10°C, 100kHz)
(Ω_{max}/20°C, 100kHz)
φD×L (mm)

		Non solvent-proof								
Cap (μF)	V _{dc} Items	160			200			250		
		Case size	Impedance	Rated ripple	Case size	Impedance	Rated ripple	Case size	Impedance	Rated ripple
4.7								10×16	3.5	165
10		10×16	1.5	250	10×16	1.5	250	10×20	2.8	230
22		10×20	1.1	350	10×20	1.1	350	12.5×25	1.2	360
33		12.5×20	0.71	440	12.5×20	0.71	440	12.5×25	1.2	360
47		12.5×25	0.46	600	12.5×25	0.46	600	16×25	0.60	570
100		16×25	0.24	910	16×31.5	0.17	1,160	18×35.5	0.30	935
220		18×35.5	0.14	1,370	18×35.5	0.14	1,370	18×40	0.27	1,000

		Non solvent-proof					
Cap (μF)	V _{dc} Items	400			450		
		Case size	Impedance	Rated ripple	Case size	Impedance	Rated ripple
2.2					10×16	7.9	110
3.3		10×20	2.9	195	10×20	6.2	135
4.7		10×25	2.3	220	12.5×20	3.7	190
10		12.5×25	1.2	360	12.5×25	2.6	250
22		16×25	0.61	570	16×31.5	1.0	480
33		16×31.5	0.46	700	18×35.5	0.62	650
47		18×31.5	0.33	860	↑	↑	↑

(mArms/105°C, 100kHz)
(Ω_{max}/20°C, 100kHz)
φD×L (mm)

KXG Series

- Downsized from current KMX series
- For electronic ballast circuits and other long life required applications
- Endurance with ripple current : 105°C 8000 to 10000hours
- Non solvent-proof type

KXG

downsized

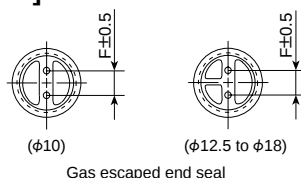
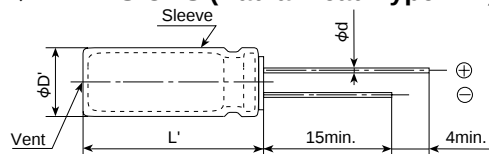
KMX



SPECIFICATIONS

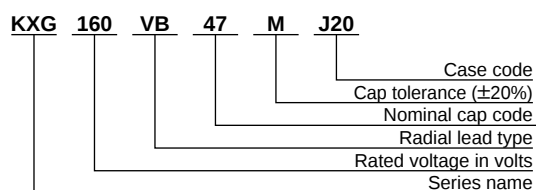
Items	Characteristics			
Category	—40 to +105℃ (160 to 400V _{dc}) —25 to+105℃ (450V _{dc})			
Temperature Range				
Rated Voltage Range	160 to 450V _{dc}			
Capacitance Tolerance	±20% (M) (at 20℃, 120Hz)			
Leakage Current		After 1 minute	After 5 minutes	
	CV≤1000	I=0.1CV+40	I=0.03CV+15	
	CV>1000	I=0.04CV+100	I=0.02CV+25	
	Where, I : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V)			(at 20℃)
Dissipation Factor (tanδ)	Rated voltage (V _{dc})	160 to 250V	350 & 400V	450V
	tanδ (Max.)	0.20	0.24	0.24 (at 20℃, 120Hz)
Low Temperature Characteristics (Max. Impedance Ratio)	Rated voltage (V _{dc})	160 to 250V	350 & 400V	450V
	Z(−25℃)/Z(+20℃)	3	5	6
	Z(−40℃)/Z(+20℃)	6	6	— (at 120Hz)
Endurance	The following specifications shall be satisfied when the capacitors are restored to 20℃ after subjected to DC voltage with the rated ripple current is applied for 10000 hours (8000 hours for φ10) at 105℃.			
	Capacitance change	≤±20% of the initial value		
	D.F. (tanδ)	≤200% of the initial specified value		
	Leakage current	≤The initial specified value		
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20℃ after exposing them for 1000 hours at 105℃ without voltage applied.			
	Capacitance change	≤±20% of the initial value		
	D.F. (tanδ)	≤200% of the initial specified value		
	Leakage current	≤500% of the initial specified value		

DIMENSIONS (Radial Lead Type=VB) [mm]



φD	10	12.5	16	18
φd	0.6	0.6	0.8	0.8
F	5.0	5.0	7.5	7.5
φD'	φD+0.5max.			
L'	L+1.5max.			

PART NUMBERING SYSTEM



Capacitance	Code
6.8µF	6R8
10µF	10
100µF	100

RATED RIPPLE CURRENT MULTIPLIERS

- Frequency Multipliers

Capacitance (µF)	Frequency (Hz)			
	120	1k	10k	100k
6.8 to 82	1.0	1.75	2.25	2.50
100 to 330	1.0	1.67	1.75	2.25

◆STANDARD RATINGS

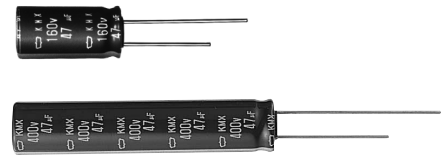
V _{dc} Items (μF)	160				200				250			
	Case size φD×L (mm)	Case code	Rated ripple current (mArms/105°C)		Case size φD×L (mm)	Case code	Rated ripple current (mArms/105°C)		Case size φD×L (mm)	Case code	Rated ripple current (mArms/105°C)	
			120Hz	100kHz			120Hz	100kHz			120Hz	100kHz
10	10×16	J16	125	315	10×16	J16	125	315	10×20	J20	140	350
22	10×20	J20	200	500	10×20	J20	200	500	10×20	J20	200	500
33	10×20	J20	250	625	10×20	J20	260	650	12.5×20	K20	320	800
47	10×20	J20	300	750	12.5×20	K20	390	975	12.5×20	K20	390	975
68	12.5×20	K20	470	1,175	12.5×20	K20	470	1,175	16×20	L20	520	1,300
82	12.5×20	K20	510	1,275	16×20	L20	550	1,375	16×20	L20	550	1,375
100	12.5×25	K25	620	1,395	16×20	L20	630	1,420	16×25	L25	680	1,530
	16×20	L20	630	1,420								
150	16×20	L20	770	1,735	16×25	L25	840	1,890	18×25	M25	860	1,935
220	16×25	L25	1,020	2,295	18×25	M25	1,050	2,365	18×31.5	M31	1,130	2,545
330	18×31.5	M31	1,390	3,130	18×35.5	M35	1,430	3,220				

V _{dc} Items (μF)	350				400				450			
	Case size φD×L (mm)	Case code	Rated ripple current (mArms/105°C)		Case size φD×L (mm)	Case code	Rated ripple current (mArms/105°C)		Case size φD×L (mm)	Case code	Rated ripple current (mArms/105°C)	
			120Hz	100kHz			120Hz	100kHz			120Hz	100kHz
6.8	10×16	J16	110	275	10×16	J16	110	275	10×20	J20	110	275
10	10×20	J20	140	350	10×20	J20	140	350	12.5×20	K20	180	450
15					12.5×20	K20	220	550	12.5×25	K25	240	600
22	12.5×20	K20	260	650	12.5×20	K20	260	650	16×20	L20	290	725
33	16×20	L20	360	900	16×20	L20	360	900	16×25	L25	390	975
									18×20	M20	380	950
47	16×20	L20	430	1,075	16×25	L25	470	1,175	18×25	M25	480	1,200
					18×20	M20	450	1,125				
68	16×25	L25	560	1,400	18×25	M25	585	1,465	18×31.5	M31	630	1,575
	18×20	M20	550	1,375								
82	18×25	M25	610	1,525	18×25	M25	610	1,525	18×35.5	M35	715	1,785
100	18×25	M25	700	1,575	18×31.5	M31	765	1,720	18×40	M40	800	1,800
120	18×31.5	M31	830	1,865	18×35.5	M35	865	1,945				
150	18×35.5	M35	960	2,160	18×40	M40	985	2,215				

KMX Series

- Slender case sizes are lined up for laying down small places on PC board
- For electronic ballast circuits and other long life required applications
- Endurance with ripple current : 105°C 8000 to 10000 hours
- Non solvent-proof type

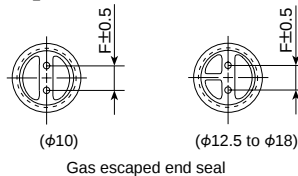
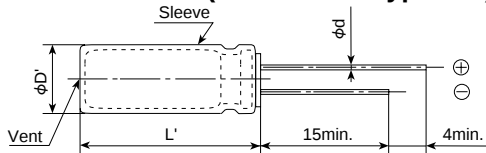
KXG
↑
downsized
KMX



SPECIFICATIONS

Items	Characteristics			
Category				
Temperature Range	−40 to +105°C (160 to 400V _{dc}) −25 to +105°C (450V _{dc})			
Rated Voltage Range	160 to 450V _{dc}			
Capacitance Tolerance	±20% (M) (at 20°C, 120Hz)			
Leakage Current	CV	time	After 1 minute	After 5 minutes
	CV≤1000		I=0.1CV+40	I=0.03CV+15
	CV>1000		I=0.04CV+100	I=0.02CV+25
	Where, I : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V) (at 20°C)			
Dissipation Factor (tanδ)	Rated voltage (V _{dc})	160 to 250V	350 & 400V	450V
	tanδ (Max.)	0.20	0.24	0.24 (at 20°C, 120Hz)
Low Temperature Characteristics (Max. Impedance Ratio)	Rated voltage (V _{dc})	160 to 250V	350 & 400V	450V
	Z(−25°C)/Z(+20°C)	3	5	6
	Z(−40°C)/Z(+20°C)	6	6	— (at 120Hz)
Endurance	The following specifications shall be satisfied when the capacitors are restored to 20°C after subjected to DC voltage with the rated ripple current is applied for 10000 hours (8000 hours for φ10) at 105°C.			
	Capacitance change	≤±20% of the initial value		
	D.F. (tanδ)	≤200% of the initial specified value		
	Leakage current	≤The initial specified value		
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for 1000 hours at 105°C without voltage applied.			
	Capacitance change	≤±20% of the initial value		
	D.F. (tanδ)	≤200% of the initial specified value		
	Leakage current	≤500% of the initial specified value		

DIMENSIONS (Radial Lead Type=VB) [mm]

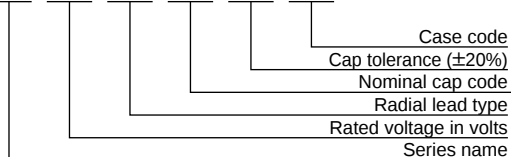


φD	10	12.5	16	18
φd	0.6	0.6	0.8	0.8
F	5.0	5.0	7.5	7.5
φD'	φD+0.5max.			
L'	L+1.5max.			

Gas escaped end seal

PART NUMBERING SYSTEM

KMX 400 VB 33 M L20



Capacitance	Code
4.7µF	4R7
10µF	10
100µF	100
220µF	220

◆STANDARD RATINGS

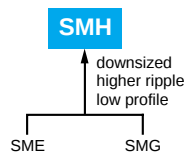
V _{dc}		160					200				
Cap (μF)	Items	Case size φDXL (mm)	Case code	Impedance (Ω _{max./} 20°C, 100kHz)	Rated ripple current		Case size φDXL (mm)	Case code	Impedance (Ω _{max./} 20°C, 100kHz)	Rated ripple current	
					120Hz	100kHz				120Hz	100kHz
22							10×20	J20	1.5	165	440
33		10×20	J20	1.3	210	565	12.5×20	K20	0.91	230	590
47		12.5×20	K20	0.91	270	725	12.5×20	K20	0.91	270	780
68		12.5×25	K25	0.63	350	950	12.5×25	K25	0.63	350	950
		16×20	L20	0.47	430	970	16×20	L20	0.47	430	970
100							10×50	J50	0.73	430	930
		16×25	L25	0.27	475	1,280	16×25	L25	0.27	425	1,280
		18×20	M20	0.31	465	1,180	18×20	M20	0.31	465	1,180
150		10×50	J50	0.77	545	1,020	12.5×40	K40	0.56	615	1,200
		16×25	L25	0.27	580	1,300	16×25	L25	0.27	580	1,300
220		12.5×45	K45	0.52	740	1,200	12.5×55	K55	0.39	790	1,420
		16×31.5	L31	0.22	750	1,300					
		18×25	M25	0.23	725	1,300	18×31.5	M31	0.22	780	1,700
330		16×40	L40	0.35	990	1,540					
		18×31.5	M31	0.22	960	1,700	16×50	L50	0.28	1,020	1,870
470		16×55	L55	0.25	1,220	1,870	18×50	M50	0.23	1,230	2,180
560		16×60	L60	0.23	1,350	2,140	18×60	M60	0.18	1,330	2,390
680		18×55	M55	0.20	1,480	2,330					

V _{dc}		250					350				
Cap (μF)	Items	Case size φDXL (mm)	Case code	Impedance (Ω _{max./} 20°C, 100kHz)	Rated ripple current		Case size φDXL (mm)	Case code	Impedance (Ω _{max./} 20°C, 100kHz)	Rated ripple current	
					120Hz	100kHz				120Hz	100kHz
10		10×20	J20	3.5	110	300	Use KMX400VB10MJ20				
22		12.5×20	K20	2.3	185	480	12.5×20	K20	2.1	185	270
33		12.5×25	K25	1.7	250	630	16×20	L20	0.91	250	600
47		12.5×25	K25	1.7	295	630	10×50	J50	1.2	270	705
		16×20	L20	1.1	300	750	16×25	L25	0.73	325	700
							18×20	M20	0.75	350	750
68		10×50	J50	0.73	340	840	12.5×40	K40	1.1	335	895
		16×25	L25	0.78	390	1,000	16×31.5	L31	0.49	420	1,100
		18×20	M20	0.90	385	900	18×25	M25	0.53	400	875
100		12.5×40	K40	0.56	500	1,200	12.5×55	K55	0.71	435	1,050
		16×31.5	L31	0.63	520	1,400					
		18×25	M25	0.63	500	1,345	18×31.5	M31	0.40	530	1,170
150		12.5×55	K55	0.39	650	1,420					
		18×31.5	M31	0.42	640	1,450	16×50	L50	0.51	690	1,400
220		16×50	L50	0.28	820	1,710					
		18×40	M40	0.35	820	1,485	18×55	M55	0.32	840	1,610
330		18×50	M50	0.23	1,030	2,140					

V _{dc}		400					450				
Cap (μF)	Items	Case size φDXL (mm)	Case code	Impedance (Ω _{max./} 20°C, 100kHz)	Rated ripple current		Case size φDXL (mm)	Case code	Impedance (Ω _{max./} 20°C, 100kHz)	Rated ripple current	
					120Hz	100kHz				120Hz	100kHz
3.3							10×20	J20	6.5	60	150
4.7							12.5×20	K20	3.6	80	200
10		10×20	J20	2.9	110	180	12.5×25	K25	2.5	125	315
22							10×45	J45	2.3	185	520
		12.5×25	K25	1.3	200	300	16×25	L25	1.7	210	570
		16×20	L20	0.91	200	600	18×20	M20	2.1	200	550
33		10×40	J40	1.7	215	640	12.5×40	K40	1.3	235	710
		16×20	L20	0.91	250	600	16×31.5	L31	1.1	275	620
							18×25	M25	1.1	280	590
47		12.5×40	K40	1.1	280	775	12.5×50	K50	0.95	300	845
		16×25	L25	0.73	325	700					
		18×20	M20	0.75	350	750	18×31.5	M31	0.93	340	900
68		12.5×50	K50	0.81	335	895					
		16×31.5	L31	0.49	420	1,100	16×40	L40	0.71	445	985
		18×25	M25	0.53	400	875	18×35.5	M35	0.71	420	980
100		16×40	L40	0.63	540	1,210	16×60	L60	0.45	570	1,300
		18×35.5	M35	0.34	545	1,250					
150		16×60	L60	0.41	695	1,490	18×60	M60	0.41	690	1,510

SMH Series

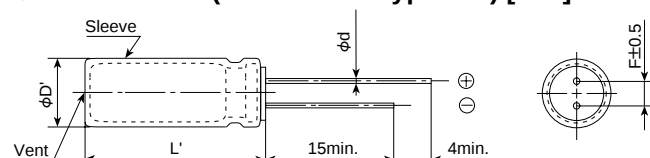
- Downsized from current standard SMG series
- Endurance with ripple current : 85°C 2000 hours
- For input filtering of power supplies
- Non solvent-proof type



SPECIFICATIONS

Items	Characteristics		
Category	-25 to +85°C		
Temperature Range			
Rated Voltage Range	160 to 450V _{dc}		
Capacitance Tolerance	±20% (M) (at 20°C, 120Hz)		
Leakage Current	I=0.03CV or 3 mA, whichever is smaller. Where, I : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V) (at 20°C after 5 minutes)		
Dissipation Factor (tanδ)	0.15max. (at 20°C, 120Hz)		
Low Temperature Characteristics (Max. Impedance Ratio)	Rated voltage (V _{dc})	160 to 250V	400 & 450V
	Z(-25°C)/Z(+20°C)	4	6
	(at 120Hz)		
Endurance	The following specifications shall be satisfied when the capacitors are restored to 20°C after subjected to DC voltage with the rated ripple current is applied for 2000 hours at 85°C.		
	Capacitance change	≤±20% of the initial value	
	D.F. (tanδ)	≤200% of the initial specified value	
	Leakage current	≤The initial specified value	
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for 1000 hours at 85°C without voltage applied.		
	Capacitance change	≤±20% of the initial value	
	D.F. (tanδ)	≤200% of the initial specified value	
	Leakage current	≤500% of the initial specified value	

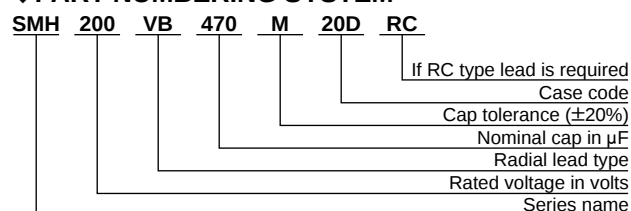
DIMENSIONS (Radial Lead Type=VB) [mm]



φD	20	22
φd	1.0	
F	10.0	
φD'	φD+0.5max.	
L'	L+2.0max.	

*Note : The snap-in forming type, RC-type, is available upon request, RC-type fits two φ2mm holes and 10.5mm spacing.

PART NUMBERING SYSTEM



CASE CODE [mm]

Case code	Case size φDXL	Case code	Case size φDXL
20S	20×20	22S	22×20
20A	20×25	22A	22×25
20B	20×30	22B	22×30
20C	20×35	22C	22×35
20D	20×40	22D	22×40
20E	20×45	22E	22×45
20F	20×50	22F	22×50

RATED RIPPLE CURRENT MULTIPLIERS

- Frequency Multipliers

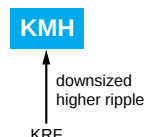
Frequency (Hz)	50	120	300	1k	10k	50k
160 to 250V _{dc}	0.81	1.00	1.17	1.32	1.45	1.50
400 & 450V _{dc}	0.77	1.00	1.16	1.30	1.41	1.43

◆STANDARD RATINGS

μF	V _{dc} φD		160		200		250		400		450	
			20	22	20	22	20	22	20	22	20	22
33											20×20 0.40	
47									20×20 0.48		20×25 0.52	22×25 0.57
56									20×25 0.57	22×25 0.62	20×30 0.62	22×25 0.65
68									20×25 0.64	22×25 0.69	20×35 0.72	22×30 0.69
82									20×30 0.75	22×25 0.78	20×35 0.79	22×30 0.80
100							20×20 0.67		20×35 0.87	22×30 0.90	20×40 0.92	22×35 0.94
120							20×25 0.85	22×20 0.83	20×40 1.02	22×35 1.03	20×45 1.07	22×40 1.11
150				20×20 0.82	22×20 0.87		20×25 0.94	22×25 1.03	20×45 1.20	22×40 1.24	20×50 1.24	22×45 1.29
180			20×20 0.90	22×20 0.95	20×25 0.97	22×25 1.05	20×30 1.12	22×25 1.12	20×50 1.36	22×45 1.41		22×50 1.44
220			20×25 1.07	22×25 1.16	20×25 1.07	22×25 1.16	20×30 1.24	22×30 1.33		22×50 1.59		
270			20×30 1.29	22×25 1.29	20×30 1.29	22×30 1.39	20×35 1.44	22×30 1.47				
330			20×30 1.43	22×30 1.53	20×35 1.49	22×30 1.53	20×40 1.70	22×35 1.71				
390			20×30 1.55	22×30 1.67	20×35 1.62	22×30 1.67	20×45 1.93	22×40 2.00	← Upper : Case size φD×L (mm) ← Lower : Rated ripple current (Arms) at 85°C, 120Hz			
470			20×35 1.78	22×30 1.83	20×40 1.90	22×35 1.92	20×50 2.19	22×45 2.29				

KMH Series

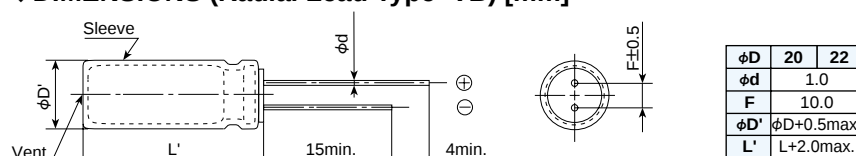
- Radial lead type ranging from φ20×20 to φ22×50mm
- For input filtering of power supplies
- Endurance with ripple current : 105°C 2000 hours
- Non solvent-proof type



SPECIFICATIONS

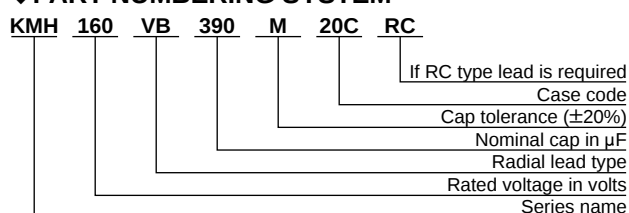
Items	Characteristics			
Category	-25 to +105°C			
Temperature Range				
Rated Voltage Range	160 to 450V _{dc}			
Capacitance Tolerance	±20% (M)			(at 20°C, 120Hz)
Leakage Current	I=0.03CV or 3 mA, whichever is smaller. Where, I : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V) (at 20°C after 5 minutes)			
Dissipation Factor (tanδ)	0.15max.			(at 20°C, 120Hz)
Low Temperature Characteristics (Max. Impedance Ratio)	Rated voltage (V _{dc})	160 to 250V	400 & 450V	
	Z(-25°C)/Z(+20°C)	4	6	
				(at 120Hz)
Endurance	The following specifications shall be satisfied when the capacitors are restored to 20°C after subjected to DC voltage with the rated ripple current is applied for 2000 hours at 105°C.			
	Capacitance change	≤±20% of the initial value		
	D.F. (tanδ)	≤200% of the initial specified value		
	Leakage current	≤The initial specified value		
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for 1000 hours at 105°C without voltage applied.			
	Capacitance change	≤±20% of the initial value		
	D.F. (tanδ)	≤200% of the initial specified value		
	Leakage current	≤500% of the initial specified value		

DIMENSIONS (Radial Lead Type=VB) [mm]



*Note : The snap-in forming type, RC-type, is available upon request, RC-type fits two φ2mm holes and 10.5mm spacing.

PART NUMBERING SYSTEM



CASE CODE [mm]

Case code	Case size φDXL	Case code	Case size φDXL
20S	20×20	22S	22×20
20A	20×25	22A	22×25
20B	20×30	22B	22×30
20C	20×35	22C	22×35
20D	20×40	22D	22×40
20E	20×45	22E	22×45
20F	20×50	22F	22×50

RATED RIPPLE CURRENT MULTIPLIERS

- Frequency Multipliers

Frequency (Hz)	50	120	300	1k	10k	50k
160 to 250V _{dc}	0.81	1.00	1.17	1.32	1.45	1.50
400 & 450V _{dc}	0.77	1.00	1.16	1.30	1.41	1.43

◆STANDARD RATINGS

μF	V _{dc} φD		160		200		250		400		450	
			20	22	20	22	20	22	20	22	20	22
33									20×20 0.29		20×25 0.31	
47										22×20 0.37		22×25 0.42
56									20×25 0.41		20×30 0.44	
68									20×30 0.49	22×25 0.51	20×35 0.51	22×30 0.52
82							20×20 0.46				20×40 0.60	22×35 0.60
100									20×35 0.62	22×30 0.64	20×45 0.69	22×40 0.71
120					20×20 0.52		20×25 0.60	22×20 0.59	20×40 0.72	22×35 0.73	20×50 0.78	22×45 0.81
150			20×20 0.58		20×25 0.63	22×20 0.62			20×45 0.85	22×40 0.88		22×50 0.93
180			20×25 0.69	22×20 0.68	20×25 0.69	22×25 0.75	20×30 0.79	22×25 0.79	20×50 0.96	22×45 0.99		
220			20×25 0.76	22×25 0.82	20×30 0.82	22×25 0.82	20×35 0.92	22×30 0.95		22×50 1.13		
270			20×30 0.91	22×25 0.91	20×30 0.91	22×30 0.98	20×40 1.09	22×35 1.14				
330			20×30 1.01	22×30 1.16	20×35 1.05	22×35 1.20	20×45 1.26	22×40 1.30				
390			20×35 1.15	22×30 1.27	20×40 1.22	22×35 1.31	20×50 1.41	22×45 1.49	← Upper : Case size φD×L (mm) ← Lower : Rated ripple current (Arms) at 105°C, 120Hz			
470			20×40 1.34	22×35 1.40	20×45 1.34	22×40 1.45		22×50 1.65				

New!

PAG Series

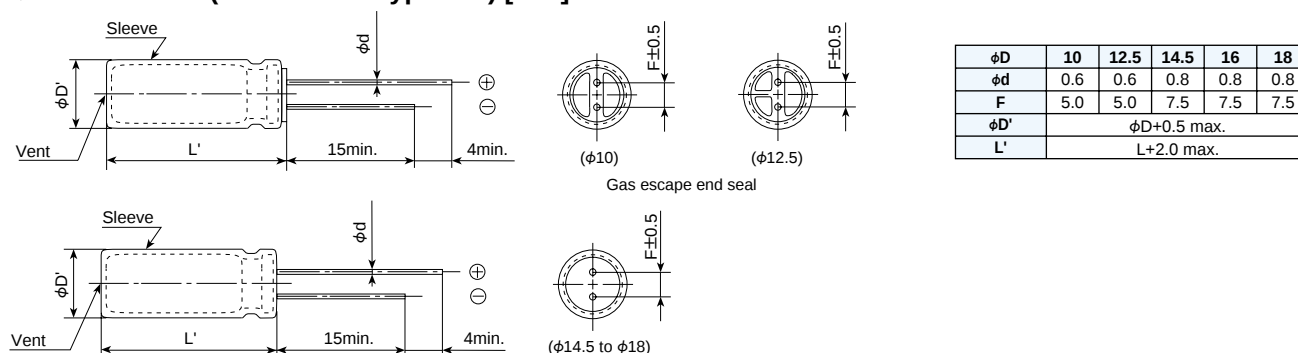
- Downsize, high ripple design (φ10 to 18)
- Rated voltage range : 200 to 450V_{dc}, Capacitance range : 18 to 560μF
- Endurance with ripple current : 105°C 2000 hours
- Ideal for low profile power supply application
- Non solvent-proof type



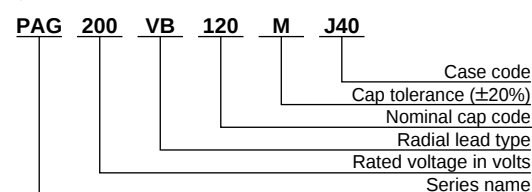
SPECIFICATIONS

Items	Characteristics				
Category					
Temperature Range	−40 to +105℃ (200, 400V _{dc}) −25 to+105℃ (420, 450V _{dc})				
Rated Voltage Range	200 to 450V _{dc}				
Capacitance Tolerance	±20% (M) (at 20℃, 120Hz)				
Leakage Current		After 1 minute	After 5 minutes		
	CV≤1000	I=0.1CV+40	I=0.03CV+15		
	CV>1000	I=0.04CV+100	I=0.02CV+25		
	Where, I : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V) (at 20℃)				
Dissipation Factor (tanδ)	Rated voltage (V _{dc})	200V	400V	420V	450V
	tanδ (Max.)	0.12	0.15	0.20	0.20 (at 20℃, 120Hz)
Low Temperature Characteristics (Max. Impedance Ratio)	Rated voltage (V _{dc})	200V	400V	420V	450V
	Z(−25℃)/Z(+20℃)	3	5	6	6
	Z(−40℃)/Z(+20℃)	6	6	—	— (at 120Hz)
Endurance	The following specifications shall be satisfied when the capacitors are restored to 20℃ after subjected to DC voltage with the rated ripple current is applied for 2000 hours at 105℃.				
	Capacitance change	≤±20% of the initial value			
	D.F. (tanδ)	≤200% of the initial specified value			
	Leakage current	≤The initial specified value			
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20℃ after exposing them for 1000 hours at 105℃ without voltage applied.				
	Capacitance change	≤±20% of the initial value			
	D.F. (tanδ)	≤200% of the initial specified value			
	Leakage current	≤500% of the initial specified value			

DIMENSIONS (Radial Lead Type=VB) [mm]



PART NUMBERING SYSTEM



Capacitance	Code
10μF	10
100μF	100

CASE CODE [mm]

Case code	Case size φDXL	Case code	Case size φDXL
J30	10×30	L30	16×30
J35	10×35	L35	16×35
J40	10×40	L40	16×40
K30	12.5×30	M30	18×30
K35	12.5×35	M35	18×35
K40	12.5×40	M40	18×40
U30	14.5×30	M45	18×45
U35	14.5×35		
U40	14.5×40		

RATED RIPPLE CURRENT MULTIPLIERS

- Frequency Multipliers

Capacitance (μF)	Frequency (Hz)			
	120	1k	10k	100k
18 to 82	1.0	1.50	1.75	1.80
100 to 560	1.0	1.30	1.40	1.50

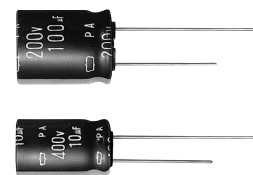
◆STANDARD RATINGS

V_{dc} Items μF	200		400	
	Case size φDXL (mm)	Rated ripple current (Arms/105°C, 120Hz)	Case size φDXL (mm)	Rated ripple current (Arms/105°C, 120Hz)
27			10×30	0.26
33			10×35	0.30
39			10×40	0.34
47			12.5×30	0.37
56			12.5×35	0.42
68			12.5×40	0.48
			14.5×30	
82	10×30	0.44	14.5×35	0.53
100	10×35	0.51	14.5×40	0.58
			16×30	
120	10×40	0.59	16×35	0.67
			18×30	
150	12.5×30	0.65	16×40	0.77
			18×35	
180	12.5×35	0.75	18×40	0.88
220	12.5×40	0.83	18×45	1.00
	14.5×30			
270	14.5×35	0.96		
	16×30			
330	16×35	1.10		
	18×30			
390	16×40	1.24		
	18×35			
470	18×40	1.39		
560	18×45	1.56		

V_{dc} Items μF	420		450	
	Case size φDXL (mm)	Rated ripple current (Arms/105°C, 120Hz)	Case size φDXL (mm)	Rated ripple current (Arms/105°C, 120Hz)
18			10×30	0.21
22	10×30	0.23	10×35	0.24
27	10×35	0.27	10×40	0.28
33	10×40	0.31	12.5×30	0.31
39	12.5×30	0.33	12.5×35	0.35
47	12.5×35	0.39	12.5×40	0.39
			14.5×30	
56	12.5×40	0.43	14.5×35	0.44
	14.5×30		16×30	
68	14.5×35	0.51	14.5×40	0.50
	16×30		16×35	
82	14.5×40	0.57	16×40	0.55
	16×35		18×30	
100	16×40	0.61	18×35	0.65
	18×30			
120	18×35	0.69	18×40	0.74
150	18×40	0.79	18×45	0.81

PA Series

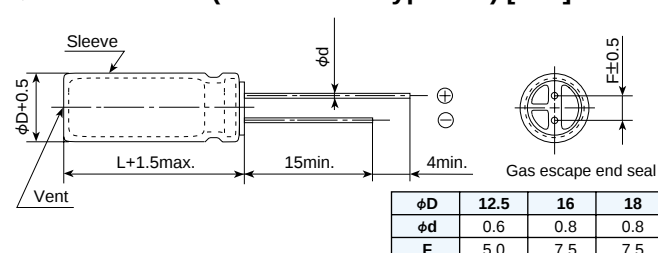
- Endurance with ripple current : 105°C 2,000 hours
- Higher ripple current than KMG, general purpose series
- Suitable for low profile equipment such as AC adaptors
- Non solvent-proof type



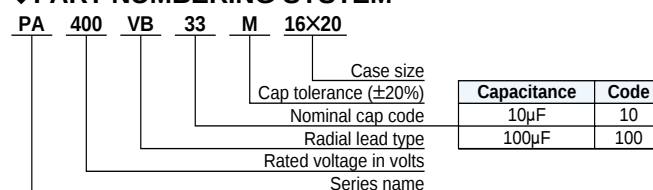
SPECIFICATIONS

Items	Characteristics			
Category Temperature Range	-40 to 105°C			
Rated Voltage Range	200 & 400V _{dc}			
Capacitance Tolerance	±20%(M) (at 20°C, 120Hz)			
Leakage Current	I=0.04CV+100(after 1 minute at 20°C) I=0.02CV+25(after 5 minutes at 20°C) Where: I : Max. leakage current(μA), C : Nominal capacitance(μF), V : Rated voltage(V)			
Dissipation factor (tanδ)	Rated voltage(V _{dc})	200	400	(at 20°C, 120Hz)
	tanδ(Max.)	0.20	0.24	
Low Temperature Characteristics	Rated voltage(V _{dc})	200	400	(at 20°C, 120Hz)
	Z(-25°C)/Z(20°C)	3	5	
	Z(-40°C)/Z(20°C)	6	6	
Endurance	The following specifications shall be satisfied when the capacitors are restored to 20°C after subjected to DC voltage with the rated ripple current is applied for 2,000 hours at 105°C.			
	Capacitance change	≤±20% of the initial value		
	D.F.(tanδ)	≤200% of the initial specified value		
	Leakage current	≤The initial specified value		
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for 1,000 hours at 105°C without voltage applied.			
	Capacitance change	≤±20% of the initial value		
	D.F.(tanδ)	≤200% of the initial specified value		
	Leakage current	≤500% of the initial specified value		

DIMENSIONS (Radial Lead Type=VB) [mm]



PART NUMBERING SYSTEM



STANDARD RATINGS

Nominal capacitance (µF)	200V _{dc}		
	Case size φD×L (mm)	Part number	Rated ripple current (mA _{rms}) at 105°C, 120Hz
33	12.5×20	PA200VB33M12.5×20	203
47	12.5×20	PA200VB47M12.5×20	242
56	12.5×25	PA200VB56M12.5×25	288
68	12.5×25	PA200VB68M12.5×25	317
	16×20	PA200VB68RM16×20	323
82	16×20	PA200VB82M16×20	355
100	16×20	PA200VB100M16×20	392
120	16×25	PA200VB120M16×25	465
	18×20	PA200VB120M18×20	446
150	18×25	PA200VB150M18×25	536

Nominal capacitance (µF)	400V _{dc}		
	Case size φD×L (mm)	Part number	Rated ripple current (mA _{rms}) at 105°C, 120Hz
10	12.5×20	PA400VB10M12.5×20	110
22	12.5×25	PA400VB22M12.5×25	180
	16×20	PA400VB22M16×20	183
33	16×20	PA400VB33M16×20	225
47	16×25	PA400VB47M16×25	291
	18×20	PA400VB47M18×20	279
56	18×25	PA400VB56M18×25	327
68	18×25	PA400VB68M18×25	360

RATED RIPPLE CURRENT MULTIPLIERS

Frequency (Hz)	50	120	300	1k	10k	100k
10 to 47µF	0.45	1.00	1.25	1.50	1.75	1.80
56 to 150µF	0.50	1.00	1.15	1.30	1.40	1.50

KLG Series

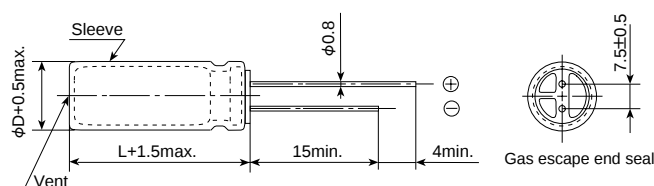
- No sparks against DC over-voltage
- Endurance with ripple current : 105°C 2000 hours
- Non solvent-proof type



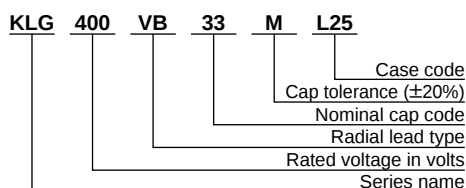
SPECIFICATIONS

Items	Characteristics				
Category	Temperature Range				
Temperature Range	-25 to +105°C				
Rated Voltage Range	200 & 400V _{dc}				
Capacitance Tolerance	±20% (M) (at 20°C, 120Hz)				
Leakage Current	I=0.04CV+100 Where, I : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V) (at 20°C after 1 minute)				
Dissipation Factor (tanδ)	Rated voltage (V _{dc})	200V	400V	(at 20°C, 120Hz)	
	tanδ (Max.)	0.20	0.24		
Low Temperature Characteristics (Max. Impedance Ratio)	Rated voltage (V _{dc})	200V	400V	(at 120Hz)	
	Z(-25°C)/Z(+20°C)	4	6		
Endurance	The following specifications shall be satisfied when the capacitors are restored to 20°C after subjected to DC voltage with the rated ripple current is applied for 2000 hours at 105°C.				
	Capacitance change	≤±20% of the initial value			
	D.F. (tanδ)	≤200% of the initial specified value			
	Leakage current	≤The initial specified value			
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for 1000 hours at 105°C without voltage applied.				
	Capacitance change	≤±20% of the initial value			
	D.F. (tanδ)	≤200% of the initial specified value			
	Leakage current	≤500% of the initial specified value			

DIMENSIONS (Radial Lead Type=VB) [mm]



PART NUMBERING SYSTEM



STANDARD RATINGS

$\frac{V_{dc}}{\mu F}$	Items	200			
		Case size ϕ DXL (mm)	Case code	Rated ripple current (mA _{rms} / 105°C, 120Hz)	Part number
82	16×20	L20	230	KLG200VB82ML20	
100	16×25	L25	425	KLG200VB100ML25	
	18×20	M20	250	KLG200VB100MM20	
120	16×31.5	L31	500	KLG200VB120ML31	
	18×25	M25	475	KLG200VB120MM25	
130	18×20	M20	285	KLG200VB130MM20	
150	16×31.5	L31	560	KLG200VB150ML31	
	18×20	M20	315	KLG200VB150MM20	
	18×25	M25	530	KLG200VB150MM25	
180	16×40	L40	645	KLG200VB180ML40	
	18×31.5	M31	630	KLG200VB180MM31	
220	18×35.5	M35	725	KLG200VB220MM35	
	18×40	M40	735	KLG200VB220MM40	
270	18×45	M45	830	KLG200VB270MM45	
330	18×45	M45	920	KLG200VB330MM45	

$\frac{V_{dc}}{\mu F}$	Items	400		
		Case size ϕ DXL (mm)	Case code	Rated ripple current (mA _{rms} / 105°C, 120Hz)
22	16×20	L20	145	KLG400VB22ML20
	16×25	L25	200	KLG400VBML25
33	16×25	L25	220	KLG400VB33ML25
	18×20	M20	225	KLG400VB33MM20
39	16×31.5	L31	245	KLG400VB39MML31
	18×25	M25	250	KLG400VB39MM25
47	16×31.5	L31	275	KLG400VB47ML31
	18×25	M25	280	KLG400VB47MM25
56	16×40	L40	350	KLG400VB56ML40
	18×31.5	M31	315	KLG400VB56MM31
68	18×35.5	M35	350	KLG400VB68MM35
82	18×40	M40	395	KLG400VB82MM40
100	18×40	M40	450	KLG400VB100MM40

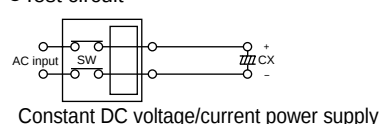
DC OVERVOLTAGE TEST CONDITIONS

The vent will be operated and the capacitor shall become an open circuit without burning materials when the following excess DC voltage is applied.

Test DC voltage

Rated voltage	Current limit	Test DC voltage
200V _{dc}	4A	300/375V _{dc}
400V _{dc}	2A	500/600V _{dc}

Test circuit



RATED RIPPLE CURRENT MULTIPLIERS

Frequency (Hz)	50	120	300	1k	10k	50k	100k
22 to 47µF	0.75	1.00	1.25	1.50	1.75	1.80	1.85
56 to 220µF	0.80	1.00	1.15	1.30	1.40	1.50	1.60

FL Series

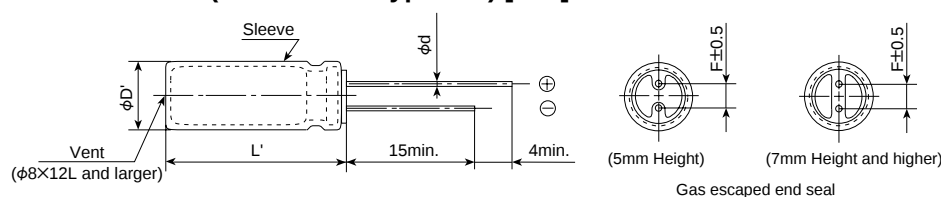
- Long life and high reliability for $\phi 4 \times 5$ to $\phi 8 \times 20$ mm range
- Endurance with ripple current : 105°C 3000 to 6000hours
- Suitable for long life and high reliability required products
- Solvent-proof type (see PRECAUTIONS AND GUIDELINES)



SPECIFICATIONS

Items	Characteristics	
Category	-40 to +105°C	
Temperature Range		
Rated Voltage Range	6.3 to 50V _{dc}	
Capacitance Tolerance	$\pm 20\%$ (M) (at 20°C, 120Hz)	
Leakage Current	I = 0.03CV or 3 μ A, whichever is greater. Where, I : Max. leakage current (μ A), C : Nominal capacitance (μ F), V : Rated voltage (V) (at 20°C after 2 minutes)	
Dissipation Factor (tan δ)	Rated voltage (V _{dc})	6.3V 10V 16V 25V 35V 50V (at 20°C, 120Hz)
	tan δ (Max.)	0.50 0.40 0.35 0.30 0.25 0.25
Endurance	The following specifications shall be satisfied when the capacitors are restored to 20°C after subjected to DC voltage with the rated ripple current is applied for the specified period of time at 105°C.	
	Time	See STANDARD RATINGS
	Capacitance change	$\leq \pm 30\%$ of the initial value
	D.F. (tan δ)	$\leq 300\%$ of the initial specified value
	Leakage current	$\leq$ The initial specified value
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for 1000 hours at 105°C without voltage applied.	
	Capacitance change	$\leq \pm 20\%$ of the initial value
	D.F. (tan δ)	$\leq 200\%$ of the initial specified value
	Leakage current	$\leq$ The initial specified value

DIMENSIONS (Radial Lead Type=VB) [mm]



5mm Height

ϕD	4	5	6.3	8
ϕd	0.45	0.45	0.45	0.45
F	1.5	2.0	2.5	2.5
$\phi D'$	$\phi D + 0.5 \text{ max.}$			
L'	L + 1.0 max.			

7mm Height

ϕD	4	5	6.3	8
ϕd	0.45	0.45	0.45	0.45
F	1.5	2.0	2.5	3.5
$\phi D'$	$\phi D + 0.5 \text{ max.}$			
L'	L + 1.0 max.			

11.5mm and larger

ϕD	4	5	6.3	8
ϕd	0.45	0.5	0.5	0.6
F	1.5	2.0	2.5	3.5
$\phi D'$	$\phi D + 0.5 \text{ max.}$			
L'	L + 1.5 max.			

PART NUMBERING SYSTEM

FL	10	VB	33	M	E05	
						Case code
						Cap tolerance ($\pm 20\%$)
						Nominal cap code
						Radial lead type
						Rated voltage in volts
						Series name

Capacitance	Code
4.7 μ F	4R7
10 μ F	10
100 μ F	100
2200 μ F	2200

◆STANDARD RATINGS

V_{dc} Items Case code ϕDXL(mm)		6.3				10				16				25			
		Capacitance (μ F)	Impedance 20°C, 100kHz (Ω max.)	Rated ripple current (mA _{rms} /105°C, 100kHz)	Endurance 105°C (hours)	Capacitance (μ F)	Impedance 20°C, 100kHz (Ω max.)	Rated ripple current (mA _{rms} /105°C, 100kHz)	Endurance 105°C (hours)	Capacitance (μ F)	Impedance 20°C, 100kHz (Ω max.)	Rated ripple current (mA _{rms} /105°C, 100kHz)	Endurance 105°C (hours)	Capacitance (μ F)	Impedance 20°C, 100kHz (Ω max.)	Rated ripple current (mA _{rms} /105°C, 100kHz)	Endurance 105°C (hours)
4×5	D05	33	5.4	37	3,000	22	5.4	37	3,000	15	5.4	37	3,000	10	5.4	37	3,000
4×7	D07	47	4.5	44	3,000	33	4.5	44	3,000	22	4.5	44	3,000	15	4.5	44	3,000
4×11.5	D11	120	2.2	83	5,000	100	2.2	83	5,000	68	2.2	83	5,000	39	2.2	83	5,000
5×5	E05	56	3.1	57	3,000	33	3.1	57	3,000	22	3.1	57	3,000	15	3.1	57	3,000
5×7	E07	82	2.5	70	3,000	47	2.5	70	3,000	33	2.5	70	3,000	22	2.5	70	3,000
5×11.5	E11	220	1.5	115	5,000	180	1.5	115	5,000	120	1.5	115	5,000	68	1.5	115	5,000
5×15	E15	270	1.2	149	6,000	220	1.2	149	6,000	180	1.2	149	6,000	100	1.2	149	6,000
6.3×5	F05	100	1.7	82	3,000	68	1.7	82	3,000	47	1.7	82	3,000	33	1.7	82	3,000
6.3×7	F07	150	1.3	116	3,000	100	1.3	116	3,000	68	1.3	116	3,000	56	1.3	116	3,000
6.3×11.5	F11	470	0.72	190	5,000	390	0.72	190	5,000	270	0.72	190	5,000	120	0.72	190	5,000
6.3×15	F15	560	0.53	245	6,000	470	0.53	245	6,000	390	0.53	245	6,000	180	0.53	245	6,000
8×5	H05	220	1.5	110	3,000	150	1.5	110	3,000	100	1.5	110	3,000	68	1.5	110	3,000
8×7	H07	270	0.90	162	3,000	220	0.90	162	3,000	150	0.90	162	3,000	100	0.90	162	3,000
8×12	H12	1,000	0.41	287	6,000	680	0.41	287	6,000	470	0.41	287	6,000	270	0.41	287	6,000
8×15	H15	1,200	0.30	365	6,000	1,000	0.30	365	6,000	680	0.30	365	6,000	390	0.30	365	6,000
8×20	H20	1,500	0.23	417	6,000	1,200	0.23	417	6,000	820	0.23	417	6,000	470	0.23	417	6,000

V_{dc} Items Case code ϕDXL(mm)		35				50			
		Capacitance (μ F)	Impedance 20°C, 100kHz (Ω max.)	Rated ripple current (mA _{rms} /105°C, 100kHz)	Endurance 105°C (hours)	Capacitance (μ F)	Impedance 20°C, 100kHz (Ω max.)	Rated ripple current (mA _{rms} /105°C, 100kHz)	Endurance 105°C (hours)
4×5	D05	4.7	5.4	37	3,000	3.3	11	26	3,000
4×7	D07	6.8	4.5	44	3,000	4.7	9.0	30	3,000
4×11.5	D11	22	2.2	83	5,000	12	3.7	67	5,000
5×5	E05	10	3.1	57	3,000	4.7	6.0	40	3,000
5×7	E07	10	2.5	70	3,000	6.8	4.8	50	3,000
5×11.5	E11	47	1.5	115	5,000	27	2.6	87	5,000
5×15	E15	56	1.2	149	6,000	33	2.0	115	6,000
6.3×5	F05	22	1.7	82	3,000	10	2.9	63	3,000
6.3×7	F07	22	1.3	116	3,000	15	2.2	90	3,000
6.3×11.5	F11	100	0.72	190	5,000	47	1.2	147	5,000
6.3×15	F15	120	0.53	245	6,000	68	0.89	189	6,000
8×5	H05	33	1.5	110	3,000	22	2.6	84	3,000
8×7	H07	47	0.90	162	3,000	22	1.6	120	3,000
8×12	H12	180	0.41	287	6,000	100	0.68	223	6,000
8×15	H15	220	0.30	365	6,000	120	0.51	280	6,000
8×20	H20	330	0.23	417	6,000	180	0.38	371	6,000

V_{dc} Items Case code ϕDXL(mm)		50 (Small capacitance)			
		Capacitance (μ F)	Impedance 20°C, 100kHz (Ω max.)	Rated ripple current (mA _{rms} /105°C, 100kHz)	Endurance 105°C (hours)
4×5	D05	0.47	34	14	3,000
		1.0	19	18	3,000
		2.2	14	22	3,000
5×11.5	E11	0.47	14	36	5,000
		1.0	8.0	48	5,000
		2.2	6.0	56	5,000
		3.3	5.0	62	5,000
		4.7	4.0	68	5,000
		10	2.5	90	5,000

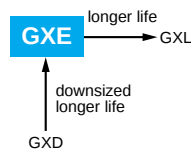
◆RATED RIPPLE CURRENT MULTIPLIERS

●Frequency Multipliers

Capacitance(μ F)	Frequency(Hz)			
	120	1k	10k	100k
to 3.3 (and 50V (Small capacitance) items)	0.20	0.66	0.90	1.00
4.7 to 6.8	0.35	0.70	0.90	1.00
10 to 180	0.40	0.75	0.90	1.00
220 to 560	0.50	0.85	0.94	1.00
680 to 1500	0.60	0.87	0.95	1.00

GXE Series

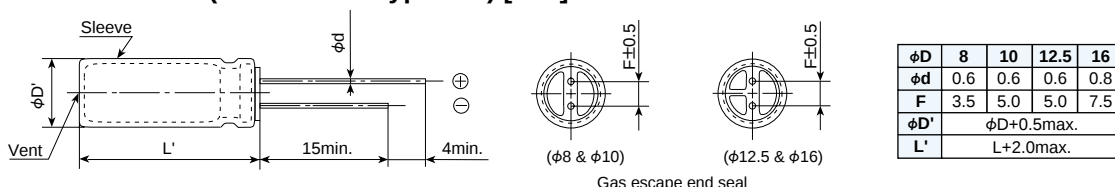
- For automobile modules and other high temperature applications
- Downsize, long life, low impedance and better low temperature characteristics
- Endurance with ripple current : 125°C 2000 to 5000 hours
- Solvent-proof type except 63 to 450V (see PRECAUTIONS AND GUIDELINES)



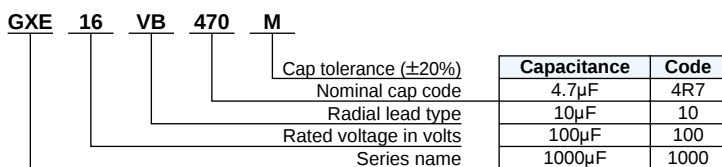
SPECIFICATIONS

Items	Characteristics											
Category												
Temperature Range	-40 to +125°C (10 to 250V _{dc}) -25 to +125°C (350 to 450V _{dc})											
Rated Voltage Range	10 to 450V _{dc}											
Capacitance Tolerance	±20% (M) (at 20°C, 120Hz)											
Leakage Current	10 to 100V _{dc}					160 to 450V _{dc}						
	I=0.03CV or 4μA, whichever is greater.					CV≤1000		I=0.1CV+40				
						CV>1000		I=0.04CV+100				
	Where, I : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V) (at 20°C, 1 minute)											
Dissipation Factor (tanδ)	Rated voltage (V _{dc})	10V	16V	25V	35V	50V	63V	80V	100V	160 to 250V	350 to 450V	
	tanδ (Max.)	0.20	0.16	0.14	0.12	0.10	0.10	0.08	0.08	0.20	0.24	
	When nominal capacitance exceeds 1000μF, add 0.02 to the above value for each 1000μF increase. (at 20°C, 120Hz)											
Low Temperature Characteristics (Max. Impedance Ratio)	Rated voltage (V _{dc})	10V	16V	25V	35V	50V	63V	80V	100V	160 to 250V	350 to 450V	
	Z(-25°C)/Z(+20°C)	3	2	2	2	2	2	2	2	3	6	
	Z(-40°C)/Z(+20°C)	6	4	4	4	4	4	4	4	6	—	
Endurance	The following specifications shall be satisfied when the capacitors are restored to 20°C after subjected to DC voltage with the rated ripple current is applied for the specified time at 125°C.											
		10 to 100V _{dc}								160 to 450V _{dc}		
	Time	φ8 : 2000hours φ10 : 3000hours φ12.5 & φ16 : 5000hours								2000hours		
	Capacitance change	≤±30% of the initial value								≤±20% of the initial value		
	D.F. (tanδ)	≤300% of the initial specified value								≤200% of the initial specified value		
	Leakage current	≤The initial specified value								≤The initial specified value		
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for 1000 hours (500 hours for 350 to 450WV) at 125°C without voltage applied.											
		10 to 100V _{dc}					160 to 450V _{dc}					
	Capacitance change	≤±30% of the initial value					≤±20% of the initial value					
	D.F. (tanδ)	≤300% of the initial specified value					≤200% of the initial specified value					
	Leakage current	≤The initial specified value					≤500% of the initial specified value					

DIMENSIONS (Radial Lead Type=VB) [mm]



PART NUMBERING SYSTEM



RATED RIPPLE CURRENT MULTIPLIERS

(10 to 100V_{dc}) Frequency Multipliers

Capacitance (μF)	Frequency (Hz)	120	1k	10k	100k
4.7 to 100		0.40	0.75	0.90	1.00
220 to 470		0.50	0.85	0.94	1.00
1000		0.60	0.87	0.95	1.00
2200 to 3300		0.75	0.90	0.95	1.00
4700		0.85	0.95	0.98	1.00

(160 to 450V_{dc}) Frequency Multipliers

Capacitance (μF)	Frequency (Hz)	50	120	300	1k	10k	100k
4.7 to 33		0.75	1.00	1.25	1.50	1.75	1.80
47 to 150		0.80	1.00	1.15	1.30	1.40	1.50

◆STANDARD RATINGS

V _{dc} Items Capacitance (μF)	10			16			25			35		
	Case size φD×L (mm)	Impedance (Ω _{max} ./ 20°C, 100kHz)	Rated ripple (mA _{rms} /125°C, 100kHz)	Case size φD×L (mm)	Impedance (Ω _{max} ./ 20°C, 100kHz)	Rated ripple (mA _{rms} /125°C, 100kHz)	Case size φD×L (mm)	Impedance (Ω _{max} ./ 20°C, 100kHz)	Rated ripple (mA _{rms} /125°C, 100kHz)	Case size φD×L (mm)	Impedance (Ω _{max} ./ 20°C, 100kHz)	Rated ripple (mA _{rms} /125°C, 100kHz)
100				8×12	0.32	340	8×12	0.32	340	8×12	0.32	340
220	8×12	0.32	340	10×12.5	0.15	620	10×12.5	0.15	620	10×12.5	0.15	620
330	10×12.5	0.15	620	10×12.5	0.15	620	10×16	0.094	790	10×16	0.094	790
470	10×12.5	0.15	620	10×16	0.094	790	10×20	0.075	950	10×20	0.075	950
1,000	10×20	0.075	950	12.5×20	0.058	1,080	12.5×25	0.040	1,350	12.5×20	0.058	1,080
2,200	12.5×25	0.040	1,350	16×25	0.031	1,620	16×31.5	0.025	1,860	16×25	0.031	1,620
3,300	16×25	0.031	1,620	16×31.5	0.025	1,860						
4,700	16×31.5	0.025	1,860									

V _{dc} Items Capacitance (μF)	50			63			80			100		
	Case size φD×L (mm)	Impedance (Ω _{max} ./ 20°C, 100kHz)	Rated ripple (mA _{rms} /125°C, 100kHz)	Case size φD×L (mm)	Impedance (Ω _{max} ./ 20°C, 100kHz)	Rated ripple (mA _{rms} /125°C, 100kHz)	Case size φD×L (mm)	Impedance (Ω _{max} ./ 20°C, 100kHz)	Rated ripple (mA _{rms} /125°C, 100kHz)	Case size φD×L (mm)	Impedance (Ω _{max} ./ 20°C, 100kHz)	Rated ripple (mA _{rms} /125°C, 100kHz)
4.7										8×12	2.0	130
10	8×12	0.75	180							8×12	1.5	150
22	8×12	0.50	250				8×12	1.50	150	10×12.5	0.80	480
33	8×12	0.50	280	8×12	1.5	150	10×12.5	0.80	480	10×12.5	0.80	480
47	8×12	0.50	280	10×12.5	0.59	530	10×12.5	0.80	480	10×16	0.55	630
100	10×12.5	0.20	520	10×16	0.41	690	10×20	0.39	790	12.5×20	0.25	990
220	10×20	0.098	880	12.5×20	0.16	1,050	12.5×25	0.18	1,240	16×25	0.11	1,500
330	12.5×20	0.081	990	12.5×25	0.12	1,290	12.5×30	0.16	1,390	16×31.5	0.079	1,790
470	12.5×25	0.059	1,150	12.5×30	0.097	1,460	16×25	0.11	1,500			
1,000	16×31.5	0.032	1,590	16×31.5	0.059	1,850						

V _{dc} Items Capacitance (μF)	160		200		250		350		400		450	
	Case size φD×L (mm)	Rated ripple (mA _{rms} /125°C, 120Hz)	Case size φD×L (mm)	Rated ripple (mA _{rms} /125°C, 120Hz)	Case size φD×L (mm)	Rated ripple (mA _{rms} /125°C, 120Hz)	Case size φD×L (mm)	Rated ripple (mA _{rms} /125°C, 120Hz)	Case size φD×L (mm)	Rated ripple (mA _{rms} /125°C, 120Hz)	Case size φD×L (mm)	Rated ripple (mA _{rms} /125°C, 120Hz)
4.7							10×20	53	10×20	53	10×25	58
10			10×20	78	10×20	78	10×25	85	10×25	86	12.5×20	86
22	10×20	115	10×25	126	12.5×20	128	12.5×25	139	12.5×30	142	16×25	154
33	10×25	154	12.5×20	157	12.5×25	171	16×25	189	16×25	189	16×31.5	203
47	12.5×20	187	12.5×25	204	16×25	225	16×31.5	243	16×31.5	243		
68	12.5×25	245	16×20	250	16×31.5	292						
100	16×25	329	16×25	329								
150	16×31.5	434										

New!

GXL Series

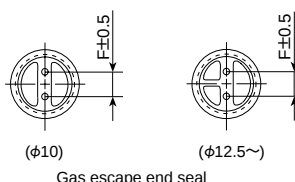
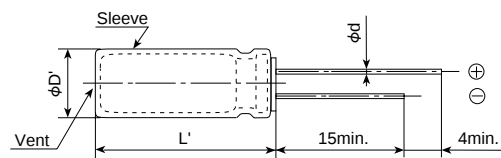
- Long-Life version of GXE series
- For automobile modules and other high temperature applications
- Endurance with ripple current : 125°C 5000 to 10000 hours
- Solvent-proof type (see PRECAUTIONS AND GUIDELINES)



SPECIFICATIONS

Items	Characteristics					
Category	-40 to +125°C					
Temperature Range						
Rated Voltage Range	10 to 50V _{dc}					
Capacitance Tolerance	±20% (M) (at 20°C, 120Hz)					
Leakage Current	I=0.03CV or 4μA, whichever is greater. Where, I : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V) (at 20°C, 1 minute)					
Dissipation Factor (tanδ)	Rated voltage (V _{dc})	10V	16V	25V	35V	50V
	tanδ (Max.)	0.20	0.16	0.14	0.12	0.10
	When nominal capacitance exceeds 1000μF, add 0.02 to the above value for each 1000μF increase. (at 20°C, 120Hz)					
Low Temperature Characteristics (Max. Impedance Ratio)	Rated voltage (V _{dc})	10V	16V	25V	35V	50V
	Z(-25°C)/Z(+20°C)	3	2	2	2	2
	Z(-40°C)/Z(+20°C)	6	4	4	4	4 (at 120Hz)
Endurance	The following specifications shall be satisfied when the capacitors are restored to 20°C after subjected to DC voltage with the rated ripple current is applied for 10000 hours (5000 hours for φ10) at 125°C.					
	Capacitance change	≤±30% of the initial value				
	D.F. (tanδ)	≤±300% of the initial specified value				
	Leakage current	≤The initial specified value				
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for 1000 hours at 125°C without voltage applied.					
	Capacitance change	≤±30% of the initial value				
	D.F. (tanδ)	≤±300% of the initial specified value				
	Leakage current	≤The initial specified value				

DIMENSIONS (Radial Lead Type=VB) [mm]



φD	10	12.5	16
φd	0.6	0.6	0.8
F	5.0	5.0	7.5
φD'	φD+0.5max.		
L'	L+1.5max.		

PART NUMBERING SYSTEM

GXL 10 VB 3300 M

Cap tolerance (±20%)
Nominal cap code
Radial lead type
Rated voltage in volts
Series name

Capacitance	Code
100μF	100
470μF	470
1000μF	1000

RATED RIPPLE CURRENT MULTIPLIERS

Frequency Multipliers

Capacitance(μF)	Frequency(Hz)	120	1k	10k	100k
100		0.40	0.75	0.90	1.00
220~470		0.50	0.85	0.94	1.00
1000		0.60	0.87	0.95	1.00
2200~3300		0.75	0.90	0.95	1.00
4700		0.85	0.95	0.98	1.00

◆STANDARD RATINGS

V _{dc} Items Capacitance (μF)	10			16		
	Case size φD×L (mm)	Impedance (Ω _{max.} /20°C, 100kHz)	Rated ripple current (mA _{rms} /125°C, 100kHz)	Case size φD×L (mm)	Impedance (Ω _{max.} /20°C, 100kHz)	Rated ripple current (mA _{rms} /125°C, 100kHz)
220	—	—	—	10×12.5	0.17	800
330	10×12.5	0.17	800	10×12.5	0.17	800
470	10×12.5	0.17	800	10×16	0.12	1,050
1,000	10×20	0.094	1,300	12.5×20	0.067	1,650
2,200	12.5×25	0.055	2,050	16×25	0.035	2,500
3,300	16×25	0.035	2,500	16×31.5	0.027	3,000
4,700	16×31.5	0.027	3,000	—	—	—

V _{dc} Items Capacitance (μF)	25			35		
	Case size φD×L (mm)	Impedance (Ω _{max.} /20°C, 100kHz)	Rated ripple current (mA _{rms} /125°C, 100kHz)	Case size φD×L (mm)	Impedance (Ω _{max.} /20°C, 100kHz)	Rated ripple current (mA _{rms} /125°C, 100kHz)
100	—	—	—	10×12.5	0.17	800
220	10×12.5	0.17	800	10×16	0.12	1,050
330	10×16	0.12	1,050	10×20	0.094	1,300
470	10×20	0.094	1,300	12.5×20	0.067	1,650
1,000	12.5×25	0.055	2,050	16×25	0.035	2,500
2,200	16×31.5	0.027	3,000	—	—	—

V _{dc} Items Capacitance (μF)	50		
	Case size φD×L (mm)	Impedance (Ω _{max.} /20°C, 100kHz)	Rated ripple current (mA _{rms} /125°C, 100kHz)
100	10×12.5	0.30	590
220	10×20	0.19	970
330	12.5×20	0.11	1,380
470	12.5×25	0.085	1,700
1,000	16×31.5	0.043	2,490

LBG Series

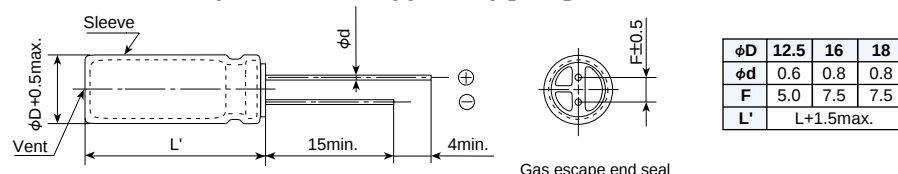
- For airbag application
- High capacitance, low impedance, and good low temperature behavior
- Endurance with ripple current : 105°C 5000 hours
- Solvent-proof type (see PRECAUTIONS AND GUIDELINES)



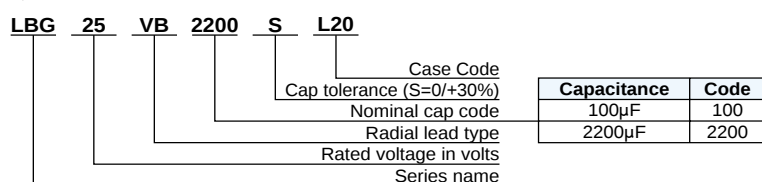
SPECIFICATIONS

Items	Characteristics			
Category				
Temperature Range	-55 to +105℃			
Rated Voltage Range	16 to 35V _{dc}			
Capacitance Range	820 to 6800μF (at 20℃, 120Hz)			
Capacitance Tolerance	0 to +30% (S) (at 20℃, 120Hz)			
Leakage Current	I=0.01CV Where, I : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V) (at 20℃ after 2 minutes)			
Dissipation Factor (tanδ)	Rated voltage (V _{dc})	16V	25V	35V
	tanδ (Max.)	0.16	0.14	0.12
	When nominal capacitance exceeds 1000μF, add 0.02 to the value above for each 1000μF increase. (at 20℃, 120Hz)			
Low Temperature Characteristics (Max. Impedance Ratio)	Rated voltage (V _{dc})	16V	25V	35V
	Z(-55℃)/Z(+20℃)	3	3	3
	Impedance at -10℃ and 20℃ 100kHz in the STANDARD RATINGS (at 120Hz)			
Endurance	The following specifications shall be satisfied when the capacitors are restored to 20℃ after subjected to DC voltage with the rated ripple current is applied for 5000 hours at 105℃.			
	Capacitance change	≤±20% of the initial value		
	D.F. (tanδ)	≤200% of the initial specified value		
	Leakage current	≤The initial specified value		
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20℃ after exposing them for 1000 hours at 105℃ without voltage applied.			
	Capacitance change	≤±20% of the initial value		
	D.F. (tanδ)	≤200% of the initial specified value		
	Leakage current	≤The initial specified value		

DIMENSIONS (Radial Lead Type=VB) [mm]



PART NUMBERING SYSTEM



STANDARD RATINGS

V _{dc}		16				25				35			
φD×L	Case Code	Capacitance (µF)	Impedance (Ω _{max} /100kHz)		Rated ripple current (mA _{rms} /105°C, 100kHz)	Capacitance (µF)	Impedance (Ω _{max} /100kHz)		Rated ripple current (mA _{rms} /105°C, 100kHz)	Capacitance (µF)	Impedance (Ω _{max} /100kHz)		Rated ripple current (mA _{rms} /105°C, 100kHz)
			20°C	–10°C			20°C	–10°C			20°C	–10°C	
12.5×20	K20	2,200	0.038	0.076	1,660	1,200	0.038	0.076	1,660	820	0.038	0.076	1,660
12.5×25	K25	2,700	0.030	0.060	1,950	1,800	0.030	0.060	1,950	1,200	0.030	0.060	1,950
16×20	L20	3,300	0.029	0.058	2,210	2,200	0.029	0.058	2,210	1,500	0.029	0.058	2,210
16×25	L25	4,700	0.022	0.044	2,560	3,300	0.022	0.044	2,560	1,800	0.022	0.044	2,560
18×20	M20	4,700	0.028	0.056	2,490	2,700	0.028	0.056	2,490	1,800	0.028	0.056	2,490
18×25	M25	6,800	0.020	0.040	2,740	3,900	0.020	0.040	2,740	2,700	0.020	0.040	2,740

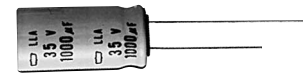
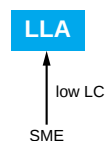
RATED RIPPLE CURRENT MULTIPLIERS

- Frequency Multipliers

Capacitance (µF)	Frequency (Hz)	120	1k	10k	100k
820 to 1800		0.60	0.87	0.95	1.00
2200 to 3900		0.75	0.90	0.95	1.00
4700 to 6800		0.85	0.95	0.98	1.00

LLA Series

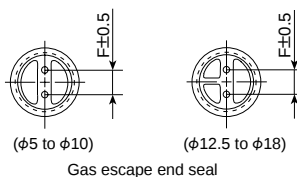
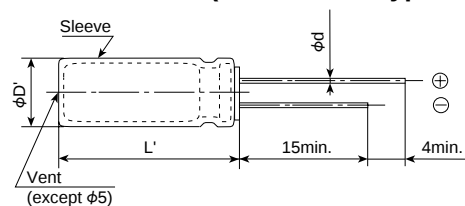
- Endurance : 85°C 1000 hours
- Solvent-proof (see PRECAUTIONS AND GUIDELINES)



◆SPECIFICATIONS

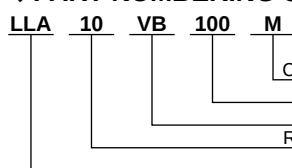
Items	Characteristics
Category	
Temperature Range	-40 to +85°C
Rated Voltage Range	6.3 to 50V _{dc}
Capacitance Tolerance	±20% (M) (at 20°C, 120Hz)
Leakage Current	I=0.002CV or 0.2µA, whichever is greater. Where, I : Max. leakage current (µA), C : Nominal capacitance (µF), V : Rated voltage (V) (at 20°C after 1 minute)
Dissipation Factor (tanδ)	Rated voltage (V _{dc}) 6.3V 10V 16V 25V 35V 50V tanδ (Max.) 0.24 0.20 0.16 0.14 0.12 0.10 When nominal capacitance exceeds 1000µF, add 0.02 to the value above for each 1000µF increase. (at 20°C, 120Hz)
Low Temperature Characteristics	○ Leakage current Leakage current at 85°C : ≤10 times of the 20°C specified value ○ Max. Impedance Ratio (at 120Hz) Z(-25°C)/Z(+20°C)≤4, Z(-40°C)/Z(+20°C)≤8
Endurance	The following specifications shall be satisfied when the capacitors are restored to 20°C after the rated voltage is applied for 1000 hours at 85°C. Capacitance change ≤±20% of the initial value D.F. (tanδ) ≤150% of the initial specified value Leakage current ≤The initial specified value
Shelf Life	The same specifications as "Endurance" shall be satisfied when the capacitors are restored to 20°C after exposing them for 500 hours at 85°C without voltage applied.
Shelf Test	The following specifications shall be satisfied when the capacitors are restored to 20°C after leaving them for 6 months at a nominal temperature (-10 to +40°C) without voltage applied. Capacitance change ≤±20% of the initial value D.F. (tanδ) ≤150% of the initial specified value Leakage current ≤The initial specified value

◆DIMENSIONS (Radial Lead Type=VB) [mm]



	5	6.3	8	10	12.5	16	18
φD	0.5	0.5	0.6	0.6	0.6	0.8	0.8
F	2.0	2.5	3.5	5.0	5.0	7.5	7.5
φD'	φD+0.5max.						
L'	L+1.5max.						

◆PART NUMBERING SYSTEM



Capacitance	Code
0.1µF	R1
0.47µF	R47
1.0µF	1
4.7µF	4R7
10µF	10
100µF	100

◆STANDARD RATINGS

Items	6.3		10		16		25		35		50	
	Case size	Rated ripple	Case size	Rated ripple	Case size	Rated ripple	Case size	Rated ripple	Case size	Rated ripple	Case size	Rated ripple
µF	φDXL (mm)	(mAmps/ 85°C 120Hz)	φDXL (mm)	(mAmps/ 85°C 120Hz)	φDXL (mm)	(mAmps/ 85°C 120Hz)	φDXL (mm)	(mAmps/ 85°C 120Hz)	φDXL (mm)	(mAmps/ 85°C 120Hz)	φDXL (mm)	(mAmps/ 85°C 120Hz)
1.0												
2.2												
3.3												
4.7												
10					5×11	44	5×11	54	5×11	58	5×11	65
22			5×11	59	5×11	75	5×11	80	5×11	87	5×11	95
33	5×11	55	5×11	84	5×11	90	5×11	97	5×11	105	6.3×11	125
47	5×11	79	5×11	100	5×11	110	5×11	115	6.3×11	145	6.3×11	150
100	5×11	130	5×11	145	6.3×11	180	6.3×11	190	8×11.5	240	8×11.5	255
220	6.3×11	230	6.3×11	250	8×11.5	300	8×11.5	320	10×12.5	420	10×16	490
330	6.3×11	280	8×11.5	350	8×11.5	370	10×12.5	470	10×16	570	10×20	650
470	8×11.5	380	8×11.5	415	10×12.5	520	10×16	620	10×20	740	12.5×20	860
1,000	10×12.5	650	10×16	790	10×20	910	12.5×20	1,090	12.5×25	1,300	16×25	1,530
2,200	12.5×20	1,150	12.5×20	1,240	12.5×25	1,420	16×25	1,660	16×31.5	1,890	18×35.5	2,160
3,300	12.5×20	1,380	12.5×25	1,590	16×25	1,840	16×31.5	2,070	18×35.5	2,340		
4,700	16×25	1,880	16×25	1,980	16×31.5	2,260	18×35.5	2,520	18×40	2,690		
6,800	16×25	2,120	16×31.5	2,390	18×35.5	2,690	18×40	2,830				
10,000	16×31.5	2,500	18×35.5	2,840	18×40	2,920						
15,000	18×35.5	2,990										

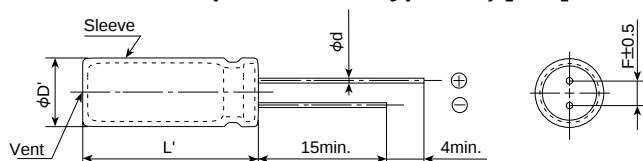
Items	50	
	Case size	Rated ripple
µF	φDXL (mm)	(mAmps/ 85°C 120Hz)
0.1	5×11	1.3
0.22	5×11	2.9
0.33	5×11	4.4
0.47	5×11	11



SPECIFICATIONS

Items	Characteristics						
Category							
Temperature Range	-20 to +55°C						
Rated Voltage Range	300 & 330V _{dc}						
Capacitance Tolerance	-10 to +20% (V) (at 20°C, 120Hz)						
Leakage Current	I=1XC Where, I : Max. leakage current (μA), C : Nominal capacitance (μF) (at 20°C after 5 minutes)						
Dissipation Factor (tanδ)	0.06max. (at 20°C, 120Hz)						
Charge and Discharge Characteristics	The following specifications shall be satisfied when the capacitors are restored to 20°C after charge and discharge are repeated 5000 times at room temperature (5 to 35°C). Discharge resistance or Xenon tube : 0.7 to 1.0Ω. <table border="1"> <tr> <td>Capacitance change</td><td>≤±10% of the initial value</td></tr> <tr> <td>D.F. (tanδ)</td><td>≤150% of the initial specified value</td></tr> <tr> <td>Leakage current</td><td>≤150% of the initial specified value</td></tr> </table>	Capacitance change	≤±10% of the initial value	D.F. (tanδ)	≤150% of the initial specified value	Leakage current	≤150% of the initial specified value
Capacitance change	≤±10% of the initial value						
D.F. (tanδ)	≤150% of the initial specified value						
Leakage current	≤150% of the initial specified value						
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for 1000 hours at 55°C without voltage applied. <table border="1"> <tr> <td>Capacitance change</td><td>≤±10% of the initial value</td></tr> <tr> <td>D.F. (tanδ)</td><td>≤150% of the initial specified value</td></tr> <tr> <td>Leakage current</td><td>≤150% of the initial specified value</td></tr> </table>	Capacitance change	≤±10% of the initial value	D.F. (tanδ)	≤150% of the initial specified value	Leakage current	≤150% of the initial specified value
Capacitance change	≤±10% of the initial value						
D.F. (tanδ)	≤150% of the initial specified value						
Leakage current	≤150% of the initial specified value						

DIMENSIONS (Radial Lead Type=VB) [mm]



φD	10	12.5	14.5	16	18
φd	0.6	0.6	0.8	0.8	0.8
F	5.0	5.0	7.5	7.5	7.5
φD'	φD+0.5max.				
L'	L+1.0max.				

PART NUMBERING SYSTEM

PH	330	VB	140	V	14.5X30
					Case size
					Cap tolerance (-10/+20%)
					Nominal cap in μF
					Radial lead type
					Rated voltage in volts
					Series name

STANDARD RATINGS

Case size φD×L (mm)

μF	V _{dc}	300V					330V				
50		10×26					10×27				
70		10×33	12.5×23				10×35	12.5×24			
100		10×43	12.5×28	14.5×23				12.5×30	14.5×24		
120			12.5×32	14.5×26	16×24			12.5×34	14.5×27	16×26	
140			12.5×36	14.5×28	16×27			12.5×39	14.5×30	16×28	18×24
160			12.5×40	14.5×31	16×28	18×24		12.5×43	14.5×33	16×30	18×26
180			12.5×44	14.5×34	16×30	18×26			14.5×36	16×33	18×28
200				14.5×37	16×33	18×28			14.5×39	16×35	18×29
220				14.5×39	16×35	18×29			14.5×43	16×38	18×31
240				14.5×42	16×37	18×31				16×40	18×33

Custom-made products are available upon requests, please consult us.



Snap-in/Screw Terminal Aluminum Electrolytic Capacitors (Large Capacitor)

SMQ Series

- Downsized from current downsized snap-ins SMM series
- Endurance with ripple current : 85°C 2000 hours
- Non solvent-proof type

SMQ

↓
downsized
SMH

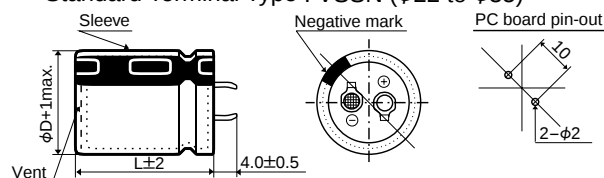


SPECIFICATIONS

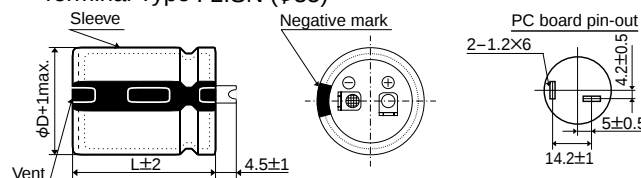
Items	Characteristics				
Category	–25 to +85°C				
Temperature Range					
Rated Voltage Range	160 to 450V _{dc}				
Capacitance Tolerance	±20% (M) (at 20°C, 120Hz)				
Leakage Current	I≤3√CV Where, I : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V) (at 20°C after 5 minutes)				
Dissipation Factor (tanδ)	Rated voltage (V _{dc})	160 to 250V	315 to 400V	420 & 450V	(at 20°C, 120Hz)
	tanδ (Max.)	0.15	0.15	0.20	
Low Temperature Characteristics (Max. Impedance Ratio)	Rated voltage (V _{dc})	160 to 250V	315 to 400V	420 & 450V	(at 120Hz)
	Z(–25°C)/Z(+20°C)	4	8	8	
Endurance	The following specifications shall be satisfied when the capacitors are restored to 20°C after subjected to DC voltage with the rated ripple current is applied for 2000 hours at 85°C.				
	Capacitance change	≤±20% of the initial value			
	D.F. (tanδ)	≤200% of the initial specified value			
	Leakage current	≤The initial specified value			
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for 1000 hours at 85°C without voltage applied.				
	Capacitance change	≤±15% of the initial value			
	D.F. (tanδ)	≤150% of the initial specified value			
	Leakage current	≤The initial specified value			

DIMENSIONS [mm]

Standard Terminal Type : VSSN (φ22 to φ35)

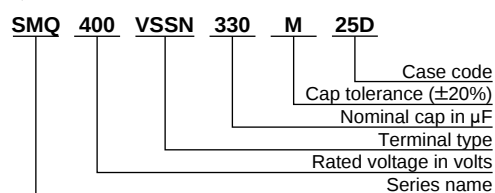


Terminal Type : LISN (φ35)



* No plastic disk is the standard design.

PART NUMBERING SYSTEM



CASE CODE [mm]

Case code	Case size φDXL	Case code	Case size φDXL	Case code	Case size φDXL	Case code	Case size φDXL
22A	22×25	25A	25.4×25	30A	30×25	35A	35×25
22B	22×30	25B	25.4×30	30B	30×30	35B	35×30
22C	22×35	25C	25.4×35	30C	30×35	35C	35×35
22D	22×40	25D	25.4×40	30D	30×40	35D	35×40
22E	22×45	25E	25.4×45	30E	30×45	35E	35×45
22F	22×50	25F	25.4×50	30F	30×50	35F	35×50

◆STANDARD RATINGS

μF	V _{dc} φD	160				180				200			
		22	25	30	35	22	25	30	35	22	25	30	35
390										22×25 1.68			
470						22×25 2.08				22×30 1.85			
560		22×25 2.25				22×30 2.25				22×30 2.43	25.4×25 2.43		
680		22×30 2.50				22×30 2.50	25.4×25 2.50			22×35 2.68	25.4×30 2.68		
820		22×35 2.75				22×35 2.75	25.4×30 2.75			22×40 2.93	25.4×30 2.93	30×25 2.93	
1,000		22×40 3.00	25.4×30 3.00			22×45 3.00	25.4×35 3.00	30×25 3.00		22×45 3.25	25.4×35 3.25	30×30 3.25	35×25 3.25
1,200		22×45 3.25	25.4×35 3.25	30×25 3.25		22×50 3.31	25.4×40 3.31	30×30 3.31	35×25 3.31		25.4×40 3.50	30×30 3.50	35×30 3.50
1,500		22×50 3.73	25.4×40 3.73	30×30 3.73	35×25 3.73		25.4×45 3.83	30×35 3.83	35×30 3.83		25.4×50 3.87	30×35 3.87	35×30 3.87
1,800			25.4×45 4.20	30×35 4.20	35×30 4.20		25.4×50 4.32	30×40 4.32	35×30 4.32			30×45 4.32	35×35 4.32
2,200				30×40 4.78	35×35 4.78			30×45 4.92	35×40 4.92			30×50 4.92	35×40 4.92
2,700					35×40 5.45				35×45 5.52				35×50 5.45
3,300					35×45 5.75				35×50 5.75				
3,900					35×50 6.00	← Upper : Case size φDXL (mm) ← Lower : Rated ripple current (Arms) at 85°C, 120Hz							

μF	V _{dc} φD	250				315				350			
		22	25	30	35	22	25	30	35	22	25	30	35
150										22×25 1.12			
180						22×25 1.21				22×30 1.22			
220						22×30 1.41				22×35 1.44			
270		22×25 1.31				22×30 1.60				22×40 1.66	25.4×30 1.66		
330		22×30 1.75				22×40 1.82	25.4×30 1.82	30×25 1.82		22×45 1.88	25.4×35 1.88		
390		22×30 1.91	25.4×25 1.91			22×45 2.01	25.4×35 2.01	30×30 2.01		22×50 2.06	25.4×40 2.06	30×30 2.06	35×25 2.06
470		22×35 2.11	25.4×30 2.11			22×50 2.27	25.4×40 2.27	30×30 2.27	35×25 2.27		25.4×45 2.40	30×35 2.40	35×30 2.40
560		22×40 2.25	25.4×30 2.25	30×25 2.25			25.4×45 2.56	30×35 2.56	35×30 2.56		25.4×50 2.60	30×40 2.60	35×30 2.60
680		22×45 2.50	25.4×35 2.50	30×30 2.50				30×40 2.87	35×35 2.87			30×45 2.96	35×35 2.96
820		22×50 2.77	25.4×40 2.77	30×30 2.77	35×25 2.77			30×45 3.25	35×40 3.25			30×50 3.25	35×45 3.25
1,000			25.4×45 3.32	30×35 3.32	35×30 3.32			30×50 3.63	35×45 3.63				35×50 3.54
1,200				30×40 3.53	35×35 3.53								
1,500				30×50 4.04	35×40 4.04								
1,800					35×45 4.55	← Upper : Case size φDXL (mm) ← Lower : Rated ripple current (Arms) at 85°C, 120Hz							

◆STANDARD RATINGS

μF	V _{dc} φD	400				420				450			
		22	25	30	35	22	25	30	35	22	25	30	35
82										22×25 0.83			
100						22×25 0.97				22×25 0.93			
120		22×25 1.02				22×25 1.08				22×30 1.04			
150		22×30 1.16				22×30 1.30	25.4×25 1.30			22×35 1.19	25.4×25 1.19		
180		22×35 1.44				22×35 1.48	25.4×30 1.48			22×40 1.35	25.4×30 1.35		
220		22×40 1.49	25.4×30 1.49			22×40 1.65	25.4×35 1.65	30×25 1.65		22×45 1.55	25.4×40 1.55	30×30 1.55	35×25 1.55
270		22×45 1.67	25.4×35 1.67	30×25 1.67		22×50 1.94	25.4×35 1.94	30×30 1.94		22×50 1.78	25.4×40 1.78	30×30 1.78	
330		22×50 1.90	25.4×40 1.90	30×30 1.90	35×25 1.90		25.4×45 2.17	30×35 2.17	35×30 2.17		25.4×50 2.01	30×40 2.01	35×30 2.01
390			25.4×45 2.13	30×35 2.13	35×30 2.13		25.4×50 2.27	30×35 2.27	35×30 2.27			30×40 2.24	35×35 2.24
470			25.4×50 2.39	30×40 2.39	35×30 2.39			30×40 2.61	35×35 2.61			30×45 2.53	35×40 2.53
560				30×45 2.69	35×35 2.69			30×50 2.82	35×40 2.82			30×50 2.82	35×45 2.82
680				30×50 2.96	35×40 2.96				35×45 3.11				
820					35×45 3.25	← Upper : Case size φD×L (mm) ← Lower : Rated ripple current (Arms) at 85°C, 120Hz							

◆RATED RIPPLE CURRENT MULTIPLIERS

●Frequency Multipliers

Frequency(Hz)	50	120	300	1k	10k	50k
160 to 250V _{dc}	0.81	1.00	1.17	1.32	1.45	1.50
315 to 450V _{dc}	0.77	1.00	1.16	1.30	1.41	1.43

KMQ Series

- Downsized from current downsized snap-ins KMM series
- Endurance with ripple current : 105°C 2000 hours
- Non solvent-proof type

KMQ

↓
downsized
KMH

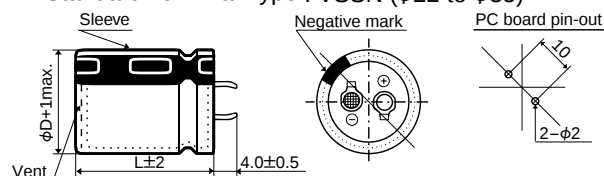


SPECIFICATIONS

Items	Characteristics				
Category					
Temperature Range	-25 to +105℃				
Rated Voltage Range	160 to 450V _{dc}				
Capacitance Tolerance	±20% (M) (at 20℃, 120Hz)				
Leakage Current	I≤3√CV Where, I : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V) (at 20℃ after 5 minutes)				
Dissipation Factor (tanδ)	Rated voltage (V _{dc})	160 to 250V	315 to 400V	420 & 450V	(at 20℃, 120Hz)
	tanδ (Max.)	0.15	0.15	0.20	
Low Temperature Characteristics (Max. Impedance Ratio)	Rated voltage (V _{dc})	160 to 250V	315 to 400V	420 & 450V	(at 120Hz)
	Z(-25℃)/Z(+20℃)	4	8	8	
Endurance	The following specifications shall be satisfied when the capacitors are restored to 20℃ after subjected to DC voltage with the rated ripple current is applied for 2000 hours at 105℃.				
	Capacitance change	≤±20% of the initial value			
	D.F. (tanδ)	≤200% of the initial specified value			
	Leakage current	≤The initial specified value			
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20℃ after exposing them for 1000 hours at 105℃ without voltage applied.				
	Capacitance change	≤±15% of the initial value			
	D.F. (tanδ)	≤150% of the initial specified value			
	Leakage current	≤The initial specified value			

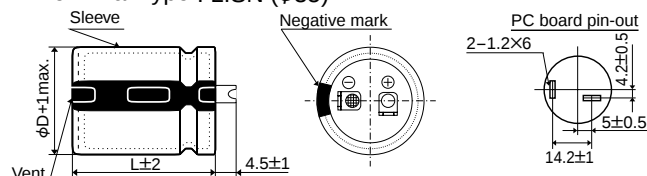
DIMENSIONS [mm]

Standard Terminal Type : VSSN (φ22 to φ35)

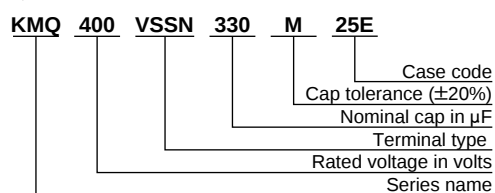


* No plastic disk is the standard design.

Terminal Type : LISN (φ35)



PART NUMBERING SYSTEM



CASE CODE [mm]

Case code	Case size φDXL	Case code	Case size φDXL	Case code	Case size φDXL	Case code	Case size φDXL
22A	22×25	25A	25.4×25	30A	30×25	35A	35×25
22B	22×30	25B	25.4×30	30B	30×30	35B	35×30
22C	22×35	25C	25.4×35	30C	30×35	35C	35×35
22D	22×40	25D	25.4×40	30D	30×40	35D	35×40
22E	22×45	25E	25.4×45	30E	30×45	35E	35×45
22F	22×50	25F	25.4×50	30F	30×50	35F	35×50

◆STANDARD RATINGS

μF	V_{dc} ϕD	160				180				200			
		22	25	30	35	22	25	30	35	22	25	30	35
390						22×25 1.30				22×25 1.31			
470		22×25 1.40				22×30 1.40				22×30 1.45			
560		22×30 1.50				22×30 1.50	25.4×25 1.50			22×30 1.67	25.4×25 1.67		
680		22×30 1.70	25.4×25 1.70			22×35 1.70	25.4×30 1.70			22×40 1.75	25.4×30 1.75		
820		22×35 2.00	25.4×30 2.00	30×25 2.00		22×40 2.00	25.4×30 2.00	30×25 2.00		22×45 2.04	25.4×35 2.04	30×25 2.04	
1,000		22×40 2.20	25.4×35 2.20	30×25 2.20		22×45 2.20	25.4×40 2.20	30×30 2.20	35×25 2.20	22×50 2.30	25.4×45 2.30	30×30 2.30	35×25 2.30
1,200			25.4×40 2.30	30×30 2.30	35×25 2.30		25.4×45 2.30	30×35 2.30	35×30 2.30		25.4×50 2.65	30×35 2.65	35×30 2.65
1,500			25.4×45 2.50	30×35 2.50	35×30 2.50		25.4×50 2.50	30×40 2.50	35×30 2.50			30×40 2.80	35×30 2.80
1,800			25.4×50 2.70	30×40 2.70	35×30 2.70			30×45 2.70	35×35 2.70			30×45 3.08	35×40 3.08
2,200				30×45 2.90	35×35 2.90			30×50 2.90	35×40 2.90				35×45 3.48
2,700				30×50 3.10	35×40 3.10				35×50 3.10				
3,300				35×50 3.30		← Upper : Case size $\phi\text{D}\times\text{L}$ (mm) ← Lower : Rated ripple current (Arms) at 105°C, 120Hz							

μF	V_{dc} ϕD	250				315				350			
		22	25	30	35	22	25	30	35	22	25	30	35
120										22×25 0.75			
150						22×25 0.82				22×30 0.82			
180						22×30 0.90				22×30 0.90	25.4×25 0.90		
220		22×25 1.00				22×30 1.00	25.4×25 1.00			22×35 1.00	25.4×30 1.00		
270		22×25 1.10				22×35 1.10	25.4×30 1.10			22×40 1.10	25.4×30 1.10	30×25 1.10	
330		22×30 1.20	25.4×25 1.20			22×45 1.20	25.4×35 1.20	30×25 1.20		22×45 1.20	25.4×40 1.20	30×30 1.20	
390		22×35 1.30	25.4×25 1.30			22×45 1.30	25.4×40 1.30	30×30 1.30	35×25 1.30		25.4×45 1.30	30×35 1.30	
470		22×40 1.40	25.4×30 1.40	30×25 1.40			25.4×45 1.40	30×35 1.40	35×25 1.40		25.4×50 1.40	30×35 1.40	35×30 1.40
560		22×45 1.50	25.4×35 1.50	30×25 1.50			25.4×50 1.50	30×40 1.50	35×30 1.50			30×45 1.50	35×35 1.50
680		22×50 1.70	25.4×40 1.70	30×30 1.70	35×25 1.70			30×45 1.70	35×35 1.70			30×50 1.70	35×40 1.70
820			25.4×45 2.00	30×35 2.00	35×30 2.00			30×50 2.00	35×40 2.00				35×45 1.90
1,000				30×40 2.20	35×30 2.20				35×45 2.30				
1,200				30×45 2.30	35×35 2.30								
1,500					35×45 2.50								
1,800					35×50 2.70	← Upper : Case size $\phi\text{D}\times\text{L}$ (mm) ← Lower : Rated ripple current (Arms) at 105°C, 120Hz							

◆STANDARD RATINGS

μF	V _{dc} φD	400				420				450			
		22	25	30	35	22	25	30	35	22	25	30	35
68										22×25 0.50			
82						22×25 0.64				22×30 0.56			
100		22×25 0.70				22×25 0.66	25.4×25 0.66			22×30 0.64	25.4×25 0.64		
120		22×30 0.75				22×30 0.81	25.4×25 0.81			22×35 0.72	25.4×30 0.72		
150		22×30 0.88	25.4×25 0.88			22×35 0.84	25.4×30 0.84	30×25 0.84		22×40 0.79	25.4×30 0.79	30×25 0.79	
180		22×35 0.95	25.4×30 0.95			22×40 0.91	25.4×30 0.91	30×25 0.91		22×45 0.87	25.4×40 0.87	30×30 0.87	
220		22×45 1.10	25.4×35 1.10	30×25 1.10		22×45 1.05	25.4×35 1.05	30×30 1.05	35×25 1.05		25.4×45 1.00	30×30 1.00	35×25 1.00
270		22×50 1.22	25.4×40 1.22	30×30 1.22	35×25 1.22		25.4×40 1.25	30×30 1.25	35×25 1.25		25.4×50 1.19	30×40 1.19	35×30 1.19
330			25.4×45 1.44	30×35 1.44	35×30 1.44		25.4×50 1.42	30×35 1.42	35×30 1.42			30×45 1.38	35×35 1.38
390			25.4×50 1.55	30×40 1.55	35×30 1.55			30×40 1.61	35×35 1.61			30×50 1.55	35×40 1.55
470				30×45 1.68	35×35 1.68			30×45 1.86	35×40 1.86				35×45 1.74
560				30×50 1.90	35×40 1.90				35×45 2.10				35×50 1.90
680					35×45 2.12				35×50 2.20	← Upper : Case size φD×L (mm) ← Lower : Rated ripple current (Arms) at 105°C, 120Hz			

◆RATED RIPPLE CURRENT MULTIPLIERS

●Frequency Multipliers

Frequency(Hz)	50	120	300	1k	10k	50k
160 to 250V _{dc}	0.81	1.00	1.17	1.32	1.45	1.50
315 to 450V _{dc}	0.77	1.00	1.16	1.30	1.41	1.43

SMM Series

- Downsize, longer life, and high ripple version of SMH series
- Endurance with ripple current : 85°C 3000 hours
- Non solvent-proof type

SMM

↓
downsized
longer life
higher ripple
SMH

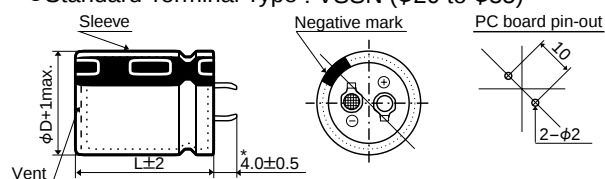


SPECIFICATIONS

Items	Characteristics				
Category	-25 to +85°C				
Temperature Range					
Rated Voltage Range	160 to 450V _{dc}				
Capacitance Tolerance	±20% (M)			(at 20°C, 120Hz)	
Leakage Current	I≤3√CV Where, I : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V) (at 20°C after 5 minutes)				
Dissipation Factor (tanδ)	Rated voltage (V _{dc})	160 to 400V	420 & 450V	(at 20°C, 120Hz)	
	tanδ (Max.)	0.15	0.20		
Low Temperature Characteristics (Max. Impedance Ratio)	Rated voltage (V _{dc})	160 to 400V	420 & 450V	(at 120Hz)	
	Z(-25°C)/Z(+20°C)	4	8		
Endurance	The following specifications shall be satisfied when the capacitors are restored to 20°C after subjected to DC voltage with the rated ripple current is applied for 3000 hours at 85°C.				
	Capacitance change	≤±20% of the initial value			
	D.F. (tanδ)	≤200% of the initial specified value			
	Leakage current	≤The initial specified value			
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for 1000 hours at 85°C without voltage applied.				
	Capacitance change	≤±15% of the initial value			
	D.F. (tanδ)	≤150% of the initial specified value			
	Leakage current	≤The initial specified value			

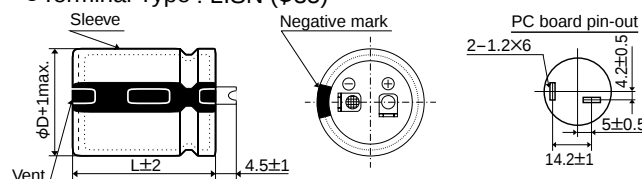
DIMENSIONS [mm]

Standard Terminal Type : VSSN (φ20 to φ35)

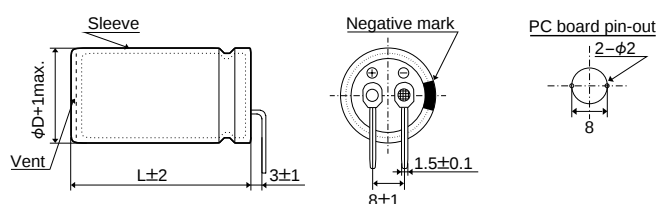


*φD=35mm : 3.5±0.5mm

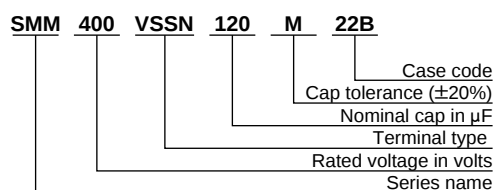
Terminal Type : LISN (φ35)



Terminal type : LCSN (φ20×30 to 50L & φ22×30 to 50L)



PART NUMBERING SYSTEM



CASE CODE [mm]

Case code	Case size φDXL	Case code	Case size φDXL	Case code	Case size φDXL	Case code	Case size φDXL	Case code	Case size φDXL
—	—	22S	22×20	25S	25.4×20	30S	30×20	35S	35×20
20A	20×25	22A	22×25	25A	25.4×25	30A	30×25	35A	35×25
20B	20×30	22B	22×30	25B	25.4×30	30B	30×30	35B	35×30
20C	20×35	22C	22×35	25C	25.4×35	30C	30×35	35C	35×35
20D	20×40	22D	22×40	25D	25.4×40	30D	30×40	35D	35×40
20E	20×45	22E	22×45	25E	25.4×45	30E	30×45	35E	35×45
20F	20×50	22F	22×50	25F	25.4×50	30F	30×50	35F	35×50

◆STANDARD RATINGS

μF \ V _{dc} \ φD	160					180				
	20	22	25.4	30	35	20	22	25.4	30	35
220							22×20 1.18			
270	20×25 1.28	22×20 1.30				20×25 1.29				
330	20×25 1.55					20×30 1.77	22×25 1.77	25.4×20 1.49		
390	20×30 1.63	22×25 1.63	25.4×20 1.62			20×30 1.84	22×25 1.84			
470	20×30 1.90	22×30 1.86	25.4×25 1.86			20×35 1.91	22×30 1.91	25.4×25 2.08	30×20 1.88	
560	20×35 2.14	22×30 2.15	25.4×25 2.15	30×20 2.05		20×40 2.15	22×35 2.25	25.4×25 2.25		
680	20×40 2.35	22×35 2.35	25.4×30 2.33	30×25 2.33	35×20 2.26	20×45 2.41	22×35 2.48	25.4×30 2.50	30×25 2.46	35×20 2.26
820	20×45 2.64	22×40 2.68	25.4×30 2.65	30×25 2.64	35×20 2.49	20×50 2.72	22×40 2.86	25.4×35 2.75	30×25 2.69	
1,000		22×45 3.02	25.4×35 3.00	30×30 2.96	35×25 3.13		22×50 3.10	25.4×40 3.06	30×30 3.10	35×25 2.98
1,200		22×50 3.47	25.4×40 3.43	30×30 3.41	35×25 3.40			25.4×45 3.63	30×35 3.55	35×30 3.49
1,500			25.4×50 3.96	30×35 3.96	35×30 3.94				30×40 4.10	35×35 4.02
1,800				30×40 4.31	35×35 4.28				30×45 4.55	35×35 4.54
2,200				30×50 4.96	35×40 4.96					35×40 4.83
2,700					35×45 5.57	Upper : Case size φD×L (mm) Lower : Rated ripple current (Arms) at 85°C, 120Hz				35×50 5.30
3,300					35×50 6.21					

◆RATED RIPPLE CURRENT MULTIPLIERS

●Frequency Multipliers

Frequency(Hz)	50	120	300	1k	10k	50k
160 to 250V _{dc}	0.81	1.00	1.17	1.32	1.45	1.50
315 to 450V _{dc}	0.77	1.00	1.16	1.30	1.41	1.43

◆ STANDARD RATINGS

μF	V _{dc}		200					220				
	φD		20	22	25.4	30	35	20	22	25.4	30	35
180									22×20 1.06			
220			20×25 1.19	22×20 1.18				20×25 1.25				
270			20×25 1.39	22×25 1.37	25.4×20 1.35			20×30 1.46	22×25 1.47	25.4×20 1.35		
330			20×30 1.56	22×25 1.51	25.4×20 1.49			20×35 1.64	22×30 1.70	25.4×25 1.69	30×20 1.58	
390			20×35 1.74	22×30 1.73	25.4×25 1.71	30×20 1.71		20×35 1.84	22×30 1.89	25.4×25 1.84	30×20 1.71	
470			20×35 2.03	22×30 1.97	25.4×25 1.95	30×20 1.88		20×40 2.12	22×35 2.08	25.4×30 2.08	30×25 2.12	35×20 1.88
560			20×40 2.18	22×35 2.18	25.4×30 2.15	30×25 2.15	35×20 2.05	20×50 2.33	22×40 2.33	25.4×35 2.38	30×25 2.31	35×20 2.14
680			20×50 2.48	22×40 2.48	25.4×30 2.48	30×25 2.48	35×20 2.36		22×45 2.63	25.4×35 2.68	30×30 2.62	35×25 2.58
820				22×45 2.81	25.4×35 2.79	30×30 2.80	35×25 2.83			25.4×45 3.01	30×35 2.99	35×30 2.79
1,000				22×50 3.28	25.4×40 3.28	30×35 3.15	35×30 3.26			25.4×50 3.40	30×35 3.42	35×30 3.29
1,200					25.4×45 3.61	30×35 3.61	35×30 3.57				30×40 3.88	35×35 3.68
1,500						30×45 4.13	35×35 4.06				30×50 4.44	35×40 4.10
1,800						30×50 4.60	35×40 4.59	← Upper : Case size φD×L (mm) ← Lower : Rated ripple current (Arms) at 85°C, 120Hz				
2,200							35×45 5.25					

μF	V _{dc}		250					315				
	φD		20	22	25.4	30	35	20	22	25.4	30	35
100									22×20 0.79			
120								20×25 0.89		25.4×20 0.90		
150				22×20 0.97				20×30 1.05	22×25 1.06	25.4×20 1.00		
180			20×25 1.20	22×20 1.06				20×35 1.18	22×30 1.29	25.4×25 1.38	30×20 1.16	
220			20×25 1.26	22×25 1.24	25.4×20 1.22			20×35 1.30	22×30 1.41	25.4×25 1.47	30×20 1.28	
270			20×30 1.42	22×25 1.50				20×45 1.52	22×35 1.68	25.4×30 1.70	30×25 1.55	35×20 1.43
330			20×35 1.68	22×30 1.66	25.4×25 1.61	30×20 1.58		20×50 1.73	22×40 1.91	25.4×35 1.94	30×25 1.98	
390			20×40 1.92	22×35 1.88	25.4×30 1.88	30×25 1.86	35×20 1.71		22×45 2.07	25.4×40 2.11	30×30 2.15	35×25 1.95
470			20×50 2.06	22×35 2.15	25.4×35 2.15	30×25 2.05	35×20 1.88			25.4×45 2.31	30×35 2.38	35×30 2.46
560				22×40 2.48	25.4×35 2.35	30×25 2.35				25.4×50 2.46	30×35 2.63	35×30 2.69
680				22×50 2.61	25.4×40 2.67	30×30 2.71	35×25 2.58				30×45 2.82	35×35 3.05
820					25.4×45 3.01	30×35 2.98	35×30 2.96				30×50 3.28	35×40 3.45
1,000						30×40 3.56	35×35 3.48					35×45 3.59
1,200						30×45 3.99	35×35 3.84					
1,500							35×40 4.33	← Upper : Case size φD×L (mm) ← Lower : Rated ripple current (Arms) at 85°C, 120Hz				
1,800							35×50 4.54					

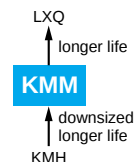
◆STANDARD RATINGS

μF	V_{dc} ϕD	350					400				
		20	22	25.4	30	35	20	22	25.4	30	35
68							20×25 0.75	22×20 0.65			
82			22×20 0.72				20×25 0.82	22×25 0.84	25.4×20 0.74		
100		20×25 0.81					20×30 0.95	22×25 0.99	25.4×20 0.82		
120		20×30 0.96	22×25 1.04	25.4×20 0.90			20×35 1.07	22×30 1.09	25.4×25 1.13	30×20 0.95	
150		20×30 1.10	22×30 1.20	25.4×25 1.22	30×20 1.06		20×40 1.22	22×35 1.24	25.4×30 1.27	30×25 1.20	
180		20×35 1.24	22×30 1.34	25.4×25 1.37	30×20 1.16		20×45 1.28	22×40 1.41	25.4×30 1.44	30×25 1.52	35×20 1.16
220		20×45 1.37	22×35 1.47	25.4×30 1.53	30×25 1.54	35×20 1.29	20×50 1.41	22×45 1.58	25.4×35 1.64	30×30 1.66	35×25 1.47
270		20×50 1.56	22×40 1.70	25.4×35 1.73	30×25 1.80	35×20 1.49		22×50 1.65	25.4×40 1.79	30×30 1.82	35×25 1.63
330			22×45 1.87	25.4×35 1.97	30×30 2.03	35×25 1.80			25.4×45 2.00	30×35 2.05	35×30 2.05
390				25.4×40 2.14	30×35 2.23	35×30 2.30			25.4×50 2.12	30×40 2.26	35×35 2.28
470				25.4×50 2.55	30×35 2.53	35×30 2.55				30×45 2.51	35×35 2.54
560					30×40 2.73	35×35 2.75				30×50 2.85	35×40 2.85
680					30×50 3.15	35×40 3.15					35×50 3.10
820						35×45 3.47	← Upper : Case size $\phi\text{D}\times\text{L}$ (mm) ← Lower : Rated ripple current (Arms) at 85°C, 120Hz				
1,000						35×50 3.60					

μF	V_{dc} ϕD	420					450				
		20	22	25.4	30	35	20	22	25.4	30	35
47			22×20 0.54					22×20 0.54			
56		20×25 0.58	22×20 0.59				20×25 0.61	22×20 0.59			
68		20×25 0.70		25.4×20 0.68			20×30 0.71	22×25 0.71	25.4×20 0.68		
82		20×30 0.80	22×25 0.85	25.4×20 0.74			20×35 0.80	22×25 0.86	25.4×20 0.74	30×20 0.79	
100		20×35 0.90	22×30 0.97	25.4×25 0.98	30×20 0.87		20×35 0.88	22×30 0.95	25.4×25 0.97	30×20 0.87	
120		20×35 1.04	22×30 1.07	25.4×25 1.08	30×20 0.95		20×40 0.99	22×35 1.07	25.4×30 1.09	30×25 1.12	35×20 0.99
150		20×40 1.17	22×35 1.21	25.4×30 1.26	30×25 1.30	35×20 1.11	20×45 1.13	22×40 1.18	25.4×30 1.25	30×25 1.29	35×20 1.06
180		20×50 1.27	22×40 1.33	25.4×35 1.42	30×25 1.48	35×20 1.16		22×45 1.32	25.4×35 1.40	30×30 1.45	35×25 1.33
220			22×45 1.55	25.4×35 1.58	30×30 1.65	35×25 1.47		22×50 1.48	25.4×40 1.59	30×30 1.64	35×25 1.66
270				25.4×40 1.74	30×35 1.90	35×30 1.94			25.4×45 1.73	30×35 1.89	35×30 1.90
330				25.4×50 2.20	30×35 1.98	35×35 2.17			25.4×50 2.12	30×40 2.12	35×35 2.15
390					30×40 2.22	35×35 2.27				30×45 2.35	35×40 2.38
470					30×45 2.50	35×40 2.61				30×50 2.65	35×45 2.68
560						35×45 2.95	← Upper : Case size $\phi\text{D}\times\text{L}$ (mm) ← Lower : Rated ripple current (Arms) at 85°C, 120Hz				
680						35×50 3.15					35×50 2.88

KMM Series

- Downsize, longer life, and high ripple version of KMH series
- Endurance with ripple current : 105°C 2000 to 3000 hours
- Non solvent-proof type

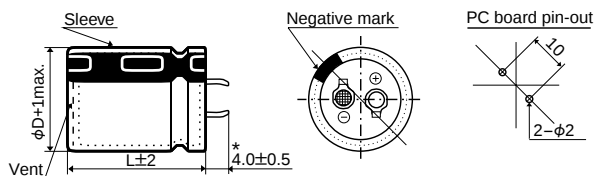


SPECIFICATIONS

Items	Characteristics		
Category	Temperature Range		
Temperature Range	-25 to +105°C		
Rated Voltage Range	160 to 450V _{dc}		
Capacitance Tolerance	±20% (M)		(at 20°C, 120Hz)
Leakage Current	I≤3√CV Where, I : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V) (at 20°C after 5 minutes)		
Dissipation Factor (tanδ)	Rated voltage (V _{dc})	160 to 400V	420 & 450V
	tanδ (Max.)	0.15	0.20 (at 20°C, 120Hz)
Low Temperature Characteristics (Max. Impedance Ratio)	Rated voltage (V _{dc})	160 to 400V	420 & 450V
	Z(-25°C)/Z(+20°C)	4	8 (at 120Hz)
Endurance	The following specifications shall be satisfied when the capacitors are restored to 20°C after subjected to DC voltage with the rated ripple current is applied for 3000 hours (2000 hours for φ20×20L products) at 105°C.		
	Capacitance change	≤±20% of the initial value	
	D.F. (tanδ)	≤200% of the initial specified value	
	Leakage current	≤The initial specified value	
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for 1000 hours at 105°C without voltage applied.		
	Capacitance change	≤±15% of the initial value	
	D.F. (tanδ)	≤150% of the initial specified value	
	Leakage current	≤The initial specified value	

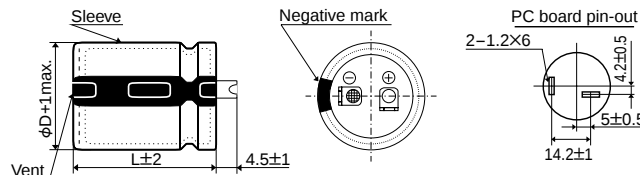
DIMENSIONS [mm]

- Standard Terminal Type : VSSN (φ20 to φ35)

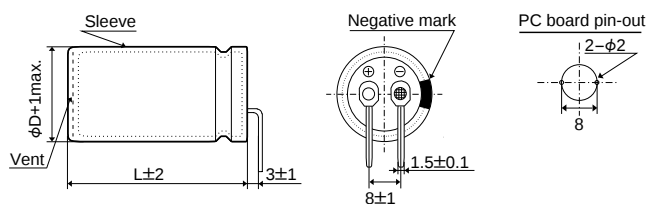


*φD=35mm : 3.5±0.5mm

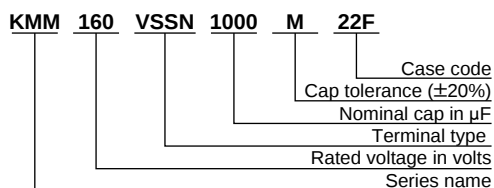
- Terminal Type : LISN (φ35)



- Terminal Type : LCSN (φ20×30 to 50L, φ22×30 to 50L)



PART NUMBERING SYSTEM



◆STANDARD RATINGS

μF	V _{dc}		160					180				
	φD		20	22	25.4	30	35	20	22	25.4	30	35
150								20×20 0.62				
180			20×20 0.68					20×25 0.77	22×20 0.80			
220			20×25 0.85	22×20 0.81				20×25 1.00		25.4×20 0.90		
270			20×25 1.10		25.4×20 0.98			20×30 1.10	22×25 1.00	25.4×20 0.95		
330			20×30 1.20	22×25 1.20	25.4×20 1.02			20×30 1.20	22×25 1.20	25.4×25 1.16	30×20 1.15	
390			20×30 1.30	22×25 1.30	25.4×25 1.26	30×20 1.25		20×35 1.30	22×30 1.35	25.4×25 1.35	30×20 1.20	
470			20×35 1.34	22×30 1.55	25.4×25 1.55	30×20 1.30		20×40 1.40	22×35 1.50	25.4×30 1.50	30×25 1.50	35×20 1.36
560			20×40 1.50	22×35 1.67	25.4×30 1.67	30×25 1.67	35×20 1.46	20×45 1.55	22×40 1.67	25.4×30 1.67	30×25 1.67	35×20 1.43
680			20×45 1.70	22×40 1.82	25.4×30 1.82	30×25 1.82	35×20 1.51	20×50 1.75	22×45 1.78	25.4×35 1.78	30×30 1.78	35×25 1.83
820				22×45 2.04	25.4×35 2.04	30×30 2.04	35×25 2.04		22×50 2.04	25.4×40 2.04	30×30 2.04	35×25 2.04
1,000				22×50 2.25	25.4×40 2.25	30×30 2.25	35×25 2.25			25.4×45 2.30	30×35 2.30	35×30 2.30
1,200					25.4×45 2.49	30×35 2.49	35×30 2.49			25.4×50 2.55	30×40 2.55	35×30 2.55
1,500					25.4×60 2.97	30×40 2.84	35×30 2.84				30×45 2.90	35×35 2.90
1,800						30×45 3.32	35×35 3.00				30×60 3.49	35×40 3.30
2,200						30×60 3.86	35×45 3.50					35×50 3.65
2,700							35×50 4.00	Upper : Case size φD×L (mm) Lower : Rated ripple current (Arms) at 105°C, 120Hz				35×60 4.19
3,300							35×60 4.63					

◆CASE CODE

Case code	Case size φD×L	Case code	Case size φD×L	Case code	Case size φD×L	Case code	Case size φD×L	Case code	Case size φD×L
20S	20×20	22S	22×20	25S	25.4×20	30S	30×20	35S	35×20
20A	20×25	22A	22×25	25A	25.4×25	30A	30×25	35A	35×25
20B	20×30	22B	22×30	25B	25.4×30	30B	30×30	35B	35×30
20C	20×35	22C	22×35	25C	25.4×35	30C	30×35	35C	35×35
20D	20×40	22D	22×40	25D	25.4×40	30D	30×40	35D	35×40
20E	20×45	22E	22×45	25E	25.4×45	30E	30×45	35E	35×45
20F	20×50	22F	22×50	25F	25.4×50	30F	30×50	35F	35×50
—	—	—	—	25H	25.4×60	30H	30×60	35H	35×60

◆RATED RIPPLE CURRENT MULTIPLIERS

●Frequency Multipliers

Frequency (Hz)	50	120	300	1k	10k	50k
160 to 250V _{dc}	0.81	1.00	1.17	1.32	1.45	1.50
315 to 450V _{dc}	0.77	1.00	1.16	1.30	1.41	1.43

◆STANDARD RATINGS

V_{dc} μF φD	200					220				
	20	22	25.4	30	35	20	22	25.4	30	35
120	20×20 0.56					20×20 0.56				
150	20×25 0.71	22×20 0.73				20×25 0.73	22×20 0.67			
180	20×25 0.77	22×20 0.80				20×25 0.90		25.4×20 0.76		
220	20×25 1.00		25.4×20 0.85			20×30 1.00	22×25 1.00	25.4×20 0.84		
270	20×30 1.10	22×25 1.10		30×20 1.05		20×35 1.15	22×30 1.15	25.4×25 1.08	30×20 0.98	
330	20×35 1.20	22×30 1.25	25.4×25 1.25	30×20 1.10		20×40 1.25	22×35 1.25	25.4×25 1.25		35×20 1.13
390	20×40 1.31	22×30 1.35	25.4×25 1.35		35×20 1.30	20×45 1.40	22×35 1.40	25.4×30 1.40	30×25 1.36	35×20 1.23
470	20×45 1.45	22×35 1.50	25.4×30 1.50	30×25 1.50	35×20 1.41	20×50 1.51	22×40 1.51	25.4×35 1.54	30×25 1.50	
560	20×50 1.58	22×40 1.67	25.4×30 1.67	30×25 1.67			22×45 1.70	25.4×40 1.72	30×30 1.70	35×25 1.71
680		22×45 1.78	25.4×35 1.78	30×30 1.78	35×25 1.78			25.4×45 1.94	30×35 1.93	35×25 1.89
820			25.4×45 2.04	30×30 2.04	35×25 2.04			25.4×50 2.18	30×40 2.19	35×30 2.16
1,000			25.4×50 2.30	30×35 2.30	35×30 2.30			25.4×60 2.54	30×45 2.50	35×35 2.44
1,200			25.4×60 2.66	30×40 2.65	35×35 2.65				30×50 2.81	35×40 2.79
1,500				30×50 3.08	35×40 3.08				30×60 3.30	35×45 3.22
1,800				30×60 3.49	35×45 3.48	Upper : Case size φD×L (mm) Lower : Rated ripple current (Arms) at 105°C, 120Hz				35×50 3.63
2,200					35×50 3.78					35×60 4.23

V_{dc} μF φD	250					315				
	20	22	25.4	30	35	20	22	25.4	30	35
56						20×20 0.38				
68						20×25 0.47	22×20 0.45			
82						20×25 0.64	22×20 0.47			
100	20×20 0.51					20×30 0.69	22×25 0.61	25.4×20 0.56		
120	20×25 0.58	22×20 0.60				20×30 0.75	22×25 0.75	25.4×20 0.62	30×20 0.65	
150	20×25 0.79		25.4×20 0.74			20×35 0.82	22×30 0.82	25.4×25 0.82	30×20 0.70	35×20 0.76
180	20×30 0.90	22×25 0.78	25.4×20 0.75			20×40 0.90	22×35 0.92	25.4×25 0.92	30×25 0.90	35×20 0.85
220	20×30 1.00	22×25 1.00	25.4×25 0.95	30×20 0.95		20×50 1.00	22×40 1.04	25.4×30 1.04	30×25 1.04	35×20 0.90
270	20×35 1.10	22×30 1.18	25.4×25 1.18	30×20 1.00			22×45 1.16	25.4×35 1.16	30×25 1.16	35×25 1.15
330	20×40 1.20	22×35 1.30	25.4×30 1.30	30×25 1.30	35×20 1.16		22×50 1.33	25.4×40 1.33	30×30 1.33	35×25 1.33
390	20×50 1.45	22×40 1.49	25.4×35 1.49	30×25 1.49				25.4×45 1.47	30×35 1.47	35×30 1.47
470		22×45 1.65	25.4×35 1.65	30×30 1.65	35×25 1.65			25.4×50 1.70	30×40 1.70	35×30 1.70
560		22×50 1.67	25.4×40 1.80	30×30 1.80	35×25 1.80				30×45 2.05	35×35 2.05
680			25.4×50 2.00	30×35 2.00	35×30 2.00				30×50 2.17	35×40 2.17
820			25.4×60 2.20	30×40 2.30	35×35 2.30					35×45 2.20
1,000				30×50 2.47	35×40 2.47					35×60 2.55
1,200				30×60 2.85	35×45 2.60					
1,500					35×50 3.00	Upper : Case size φD×L (mm) Lower : Rated ripple current (Arms) at 105°C, 120Hz				
1,800					35×60 3.42					

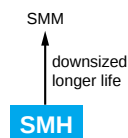
◆STANDARD RATINGS

μF	V _{dc} φD	350					400				
		20	22	25.4	30	35	20	22	25.4	30	35
39							20×20 0.32				
47		20×20 0.35					20×25 0.39	22×20 0.37			
56		20×25 0.43	22×20 0.41				20×25 0.51		25.4×20 0.42		
68		20×25 0.47		25.4×20 0.46			20×30 0.56	22×25 0.50	25.4×20 0.46		
82		20×30 0.54	22×25 0.55	25.4×20 0.51			20×30 0.64	22×25 0.64		30×20 0.55	
100		20×30 0.60	22×25 0.69		30×20 0.60		20×35 0.70	22×30 0.70	25.4×25 0.70	30×20 0.60	
120		20×35 0.68	22×30 0.75	25.4×25 0.75	30×20 0.65		20×40 0.75	22×35 0.75	25.4×25 0.75	30×25 0.73	35×20 0.75
150		20×40 0.78	22×35 0.82	25.4×30 0.83	30×25 0.82	35×20 0.76	20×45 0.83	22×40 0.88	25.4×30 0.88	30×25 0.88	35×20 0.80
180		20×45 0.87	22×40 0.92	25.4×30 0.92	30×25 0.90			22×45 0.98	25.4×35 0.98	30×30 0.98	35×25 0.98
220		20×50 1.00	22×45 1.05	25.4×35 1.04	30×30 1.02	35×25 1.04		22×50 1.10	25.4×40 1.10	30×30 1.10	35×25 1.10
270			22×50 1.16	25.4×40 1.17	30×30 1.17	35×25 1.20			25.4×45 1.22	30×35 1.22	35×30 1.22
330				25.4×45 1.29	30×35 1.34	35×30 1.22			25.4×50 1.44	30×40 1.44	35×30 1.44
390				25.4×50 1.51	30×40 1.51	35×35 1.47			25.4×60 1.51	30×45 1.60	35×35 1.60
470				25.4×60 1.66	30×45 1.65	35×35 1.69				30×50 1.90	35×40 1.90
560					30×50 1.85	35×40 1.90				30×60 2.10	35×45 2.12
680					30×60 2.15	35×50 1.99	Upper : Case size φD×L (mm) Lower : Rated ripple current (Arms) at 105°C, 120Hz				35×60 2.27
820						35×60 2.31					

μF	V _{dc} φD	420					450				
		20	22	25.4	30	35	20	22	25.4	30	35
39		20×20 0.32					20×25 0.34				
47		20×25 0.39	22×20 0.37				20×25 0.39				
56		20×25 0.51		25.4×20 0.42			20×30 0.51	22×25 0.40			
68		20×30 0.56	22×25 0.50	25.4×20 0.46			20×35 0.56	22×30 0.53	25.4×25 0.50		
82		20×35 0.64	22×25 0.64	25.4×25 0.58	30×20 0.53		20×35 0.64	22×30 0.64	25.4×25 0.64		
100		20×35 0.70	22×30 0.70	25.4×25 0.70	30×20 0.59		20×45 0.69	22×35 0.69	25.4×30 0.69	30×25 0.64	
120		20×40 0.75	22×35 0.75	25.4×30 0.75	30×25 0.73	35×20 0.67	20×50 0.75	22×40 0.80	25.4×30 0.80	30×25 0.80	35×25 0.73
150		20×50 0.88	22×40 0.88	25.4×35 0.88	30×25 0.88			22×45 0.88	25.4×35 0.88	30×30 0.88	35×25 0.75
180			22×45 0.95	25.4×35 0.95	30×30 0.95	35×25 0.94		22×50 1.00	25.4×40 1.00	30×30 1.00	
220			22×50 1.10	25.4×45 1.10	30×35 1.10	35×25 1.10			25.4×45 1.12	30×35 1.12	35×30 1.12
270				25.4×50 1.22	30×40 1.22	35×30 1.22			25.4×60 1.18	30×40 1.28	35×35 1.28
330				25.4×60 1.41	30×45 1.45	35×35 1.45				30×50 1.45	35×40 1.45
390					30×50 1.55	35×40 1.55				30×60 1.51	35×40 1.55
470					30×60 1.79	35×45 1.90					35×50 1.85
560						35×50 2.15	Upper : Case size φD×L (mm) Lower : Rated ripple current (Arms) at 105°C, 120Hz				35×60 1.91
680						35×60 2.27					

SMH Series

- Endurance with ripple current : 85°C 2000 hours
- Non solvent-proof type

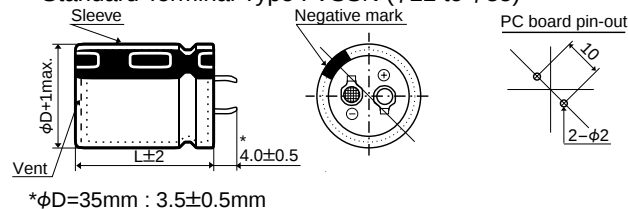


◆SPECIFICATIONS

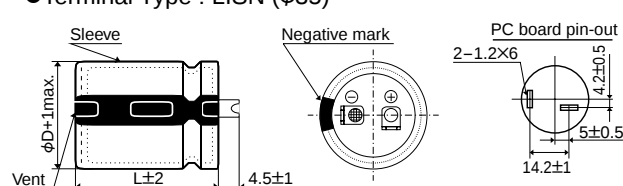
Items	Characteristics													
Category	Standard snap-ins, 85°C													
Temperature Range	-40 to +85°C (6.3 to 100V _{dc}) -25 to +85°C (160 to 450V _{dc})													
Rated Voltage Range	6.3 to 450V _{dc}													
Capacitance Tolerance	±20% (M) (at 20°C, 120Hz)													
Leakage Current	I=0.02CV or 3mA, whichever is smaller. Where, I : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V) (at 20°C after 5 minutes)													
Dissipation Factor (tanδ)	Rated voltage (V _{dc})	6.3V	10V	16V	25V	35V	50V	63V	80V	100V	160 to 250V	315 to 400V	450V	
	tanδ (Max.)	0.60	0.50	0.40	0.30	0.25	0.20	0.15	0.15	0.15	0.10*	0.15	0.15	
	* : 0.15 for φD=35mm (at 20°C, 120Hz)													
Low Temperature Characteristics (Max. Impedance Ratio)	Rated voltage (V _{dc})	6.3V	10V	16V	25V	35V	50V	63V	80V	100V	160 to 250V	315 to 400V	450V	
	Z(-25°C)/Z(+20°C)	4	4	4	3	3	2	2	2	2	4	4	8	
	Z(-40°C)/Z(+20°C)	15	15	15	10	8	6	6	5	5	—	—	—	(at 120Hz)
Endurance	The following specifications shall be satisfied when the capacitors are restored to 20°C after subjected to DC voltage with the rated ripple current is applied for 2000 hours at 85°C.													
	Capacitance change	≤±20% of the initial value												
	D.F. (tanδ)	≤200% of the initial specified value												
	Leakage current	≤The initial specified value												
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for 1000 hours at 85°C without voltage applied.													
	Capacitance change	≤±20% of the initial value												
	D.F. (tanδ)	≤150% of the initial specified value												
	Leakage current	≤The initial specified value												

◆DIMENSIONS [mm]

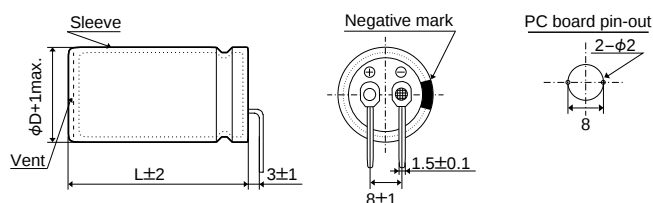
●Standard Terminal Type : VSSN (φ22 to φ35)



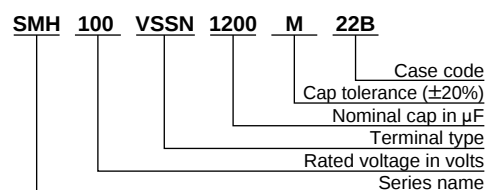
●Terminal Type : LISN (φ35)



●Terminal Type : LCSN (φ22×30 to 50L)



◆PART NUMBERING SYSTEM



◆STANDARD RATINGS

μF	V _{dc} φD	6.3				10				16			
	22	25.4	30	35	22	25.4	30	35	22	25.4	30	35	
8,200									22×25 2.51				
10,000									22×25 2.77				
12,000					22×25 2.39				22×30 2.86	25.4×25 2.95			
15,000	22×25 2.44				22×30 2.76	25.4×25 2.77			22×35 3.29	25.4×30 3.46	30×25 3.66		
18,000	22×30 2.67	25.4×25 2.70			22×35 3.12	25.4×25 3.04			22×40 3.72	25.4×35 3.98	30×25 4.00		
22,000	22×30 3.06	25.4×25 3.07			22×40 3.55	25.4×30 3.48	30×25 3.53		22×50 4.37	25.4×40 4.26	30×30 4.21	35×25 4.15	
27,000	22×35 3.49	25.4×30 3.52	30×25 3.57		22×45 4.04	25.4×35 3.98	30×30 3.73	35×25 3.73		25.4×45 4.72	30×35 4.82	35×30 4.65	
33,000	22×40 3.97	25.4×35 4.02	30×25 3.95		22×50 4.58	25.4×40 4.54	30×30 4.13	35×25 4.13		25.4×50 5.33	30×40 5.36	35×30 5.15	
39,000	22×50 4.55	25.4×40 4.50	30×30 4.45	35×25 4.51		25.4×45 5.08	30×35 5.05	35×30 4.80			30×45 6.01	35×35 5.95	
47,000		25.4×45 5.09	30×35 5.06	35×30 5.01		25.4×50 5.73	30×40 5.72	35×30 5.27			30×50 6.79	35×40 6.76	
56,000		25.4×50 5.71	30×40 5.70	35×30 5.77			30×45 6.44	35×35 6.38				35×45 7.62	
68,000			30×45 6.48	35×35 6.42			30×50 7.27	35×40 7.27				35×50 8.63	
82,000			30×50 7.32	35×40 7.29				35×50 8.49					
100,000				35×45 8.31	← Upper : Case size φDXL (mm) ← Lower : Rated ripple current (Arms) at 85°C, 120Hz								

μF	Vdc φD	25				35				50			
		22	25.4	30	35	22	25.4	30	35	22	25.4	30	35
2,200										22×25 1.91			
3,300										22×30 2.37	25.4×25 2.38		
3,900					22×25 2.22					22×35 2.65	25.4×30 2.68	30×25 2.55	
4,700					22×30 2.41	25.4×25 2.42				22×40 2.99	25.4×35 3.03	30×25 2.81	
5,600	22×25 2.21				22×35 2.75	25.4×25 2.64				22×45 3.36	25.4×35 3.31	30×30 3.37	35×25 3.42
6,800	22×30 2.40	25.4×25 2.56			22×40 2.80	25.4×30 2.74	30×25 2.97			22×50 3.81	25.4×40 3.81	30×35 3.85	35×30 3.85
8,200	22×35 2.72	25.4×25 2.80			22×45 3.47	25.4×35 3.10	30×30 3.13	35×25 2.73		25.4×50 4.37	30×40 4.36	35×30 4.41	
10,000	22×40 3.09	25.4×30 3.12	30×25 3.21		22×50 3.57	25.4×40 3.53	30×30 3.46	35×25 3.02			30×45 4.97	35×35 4.92	
12,000	22×45 3.48	25.4×35 3.43	30×30 3.86	35×25 3.54		25.4×45 3.98	30×35 4.01	35×30 4.42			30×50 5.60	35×40 5.58	
15,000	22×50 4.00	25.4×40 3.95	30×30 4.00	35×25 3.95		25.4×50 4.54	30×40 4.52	35×35 5.01				35×45 6.44	
18,000		25.4×45 4.45	30×35 4.46	35×30 4.63			30×45 4.71	35×40 5.54				35×50 6.71	
22,000		25.4×50 5.02	30×45 5.21	35×35 5.16			30×50 5.33	35×45 6.04					
27,000			30×50 5.94	35×40 5.92				35×50 6.89					
33,000				35×45 6.75	← Upper : Case size φDXL (mm) ← Lower : Rated ripple current (Arms) at 85°C, 120Hz								
39,000				35×50 7.56									

◆CASE CODE [mm]

Case code	Case size φDXL	Case code	Case size φDXL	Case code	Case size φDXL	Case code	Case size φDXL
22A	22×25	25A	25.4×25	30A	30×25	35A	35×25
22B	22×30	25B	25.4×30	30B	30×30	35B	35×30
22C	22×35	25C	25.4×35	30C	30×35	35C	35×35
22D	22×40	25D	25.4×40	30D	30×40	35D	35×40
22E	22×45	25E	25.4×45	30E	30×45	35E	35×45
22F	22×50	25F	25.4×50	30F	30×50	35F	35×50

◆RATED RIPPLE CURRENT MULTIPLIERS

●Frequency Multipliers

Frequency (Hz)	50	120	300	1k	10k	50k
6.3 to 50V _{dc}	0.95	1.00	1.03	1.05	1.08	1.08
63 to 100V _{dc}	0.92	1.00	1.07	1.13	1.19	1.20
160 to 250V _{dc}	0.81	1.00	1.17	1.32	1.45	1.50
315 to 450V _{dc}	0.77	1.00	1.16	1.30	1.41	1.43

◆STANDARD RATINGS

μF	V _{dc} φD	63				80				100			
		22	25.4	30	35	22	25.4	30	35	22	25.4	30	35
820										22×25 1.86			
1,200						22×25 1.69				22×30 2.09	25.4×25 2.10		
1,500						22×25 1.88				22×35 2.41	25.4×30 2.43	30×25 2.46	
1,800		22×25 1.82				22×30 2.14	25.4×25 2.26			22×40 2.71	25.4×35 2.75	30×25 2.72	
2,200		22×30 2.31	25.4×25 2.30			22×35 2.44	25.4×30 2.46	30×25 2.49		22×45 3.08	25.4×40 3.13	30×30 3.09	35×25 3.14
2,700		22×35 2.40	25.4×25 2.40			22×40 2.78	25.4×35 2.81	30×25 2.75		22×50 3.53	25.4×45 3.57	30×35 3.55	35×30 3.71
3,300		22×35 2.62	25.4×30 2.64	30×25 2.78		22×45 3.16	25.4×40 3.21	30×30 3.17	35×25 3.21		25.4×50 4.06	30×40 4.05	35×30 4.05
3,900		22×40 2.93	25.4×35 2.97	30×30 3.00	35×25 3.00	22×50 3.52	25.4×45 3.59	30×35 3.57	35×25 3.50			30×45 4.54	35×35 4.49
4,700		22×50 3.39	25.4×40 3.36	30×30 3.32	35×25 3.36		25.4×50 4.05	30×40 4.05	35×30 4.09			30×50 5.13	35×40 5.11
5,600			25.4×45 3.77	30×35 3.75	35×30 3.76			30×45 4.55	35×35 4.51				35×45 5.75
6,800			25.4×50 4.27	30×40 4.15	35×30 4.15			30×50 5.16	35×40 5.14				35×50 6.50
8,200				30×45 4.83	35×35 4.79				35×45 5.83				
10,000				30×50 5.49	35×40 5.47				35×50 6.63				
12,000					35×45 6.19	← Upper : Case size φD×L (mm) ← Lower : Rated ripple current (Arms) at 85°C, 120Hz							

μF	V _{dc} φD	160				180				200			
		22	25.4	30	35	22	25.4	30	35	22	25.4	30	35
270						22×25 1.27				22×25 1.27			
330		22×25 1.40				22×25 1.40				22×30 1.45	25.4×25 1.45		
390		22×25 1.52				22×30 1.58	25.4×25 1.58			22×30 1.58	25.4×25 1.58		
470		22×30 1.73	25.4×25 1.74			22×35 1.79	25.4×25 1.79			22×35 1.78	25.4×30 1.80	30×25 1.80	
560		22×35 1.95	25.4×25 1.95			22×40 2.00	25.4×30 1.96	30×25 1.99		22×40 2.00	25.4×35 2.03	30×25 2.00	
680		22×40 2.21	25.4×30 2.16	30×25 2.19		22×45 2.27	25.4×35 2.23	30×25 2.25		22×50 2.33	25.4×40 2.30	30×30 2.28	35×25 2.31
820		22×45 2.49	25.4×35 2.45	30×30 2.50	35×25 2.50	22×50 2.55	25.4×40 2.53	30×30 2.70	35×25 2.53		25.4×45 2.60	30×35 2.59	35×25 2.60
1,000		22×50 2.82	25.4×40 2.79	30×30 2.80	35×25 2.80		25.4×45 2.87	30×35 2.86	35×30 2.99		25.4×50 2.95	30×40 2.95	35×30 2.95
1,200			25.4×45 3.15	30×35 3.13	35×30 3.27		25.4×50 3.30	30×40 3.23	35×35 3.31			30×45 3.31	35×35 3.31
1,500			25.4×50 3.72	30×45 3.73	35×35 3.69			30×50 3.83	35×40 3.82			30×50 3.82	35×40 3.82
1,800				30×50 4.20	35×40 4.18				35×45 4.32				35×45 4.32
2,200					35×45 4.78				35×50 4.92				35×50 4.92
2,700					35×50 5.45	← Upper : Case size φD×L (mm) ← Lower : Rated ripple current (Arms) at 85°C, 120Hz							

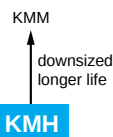
◆STANDARD RATINGS

μF	V _{dc} φD	250				315				350			
		22	25.4	30	35	22	25.4	30	35	22	25.4	30	35
82													
100										22×25 0.86			
120						22×25 0.94				22×30 0.99	25.4×25 0.99		
150						22×30 1.11	25.4×25 1.10			22×35 1.14	25.4×25 1.10		
180		22×25 1.04				22×35 1.20	25.4×25 1.20			22×40 1.28	25.4×30 1.24	30×25 1.27	
220		22×25 1.15				22×40 1.41	25.4×30 1.38	30×25 1.40		22×45 1.44	25.4×35 1.44	30×30 1.44	35×25 1.44
270		22×30 1.31	25.4×25 1.32			22×45 1.60	25.4×35 1.59	30×30 1.59	35×25 1.59	22×50 1.64	25.4×40 1.63	30×35 1.66	35×25 1.63
330		22×35 1.49	25.4×30 1.51	30×25 1.52		22×50 1.82	25.4×40 1.80	30×30 1.80	35×25 1.80		25.4×50 1.88	30×35 1.83	35×30 1.87
390		22×40 1.67	25.4×30 1.66	30×25 1.66			25.4×45 2.01	30×35 1.99	35×30 2.00			30×40 2.06	35×30 2.03
470		22×45 1.88	25.4×35 1.86	30×30 1.89	35×25 1.88		25.4×45 2.20	30×40 2.27	35×30 2.23			30×50 2.40	35×35 2.33
560		22×50 2.10	25.4×40 2.09	30×35 2.14	35×25 2.06			30×45 2.56	35×35 2.49				35×40 2.60
680			25.4×50 2.44	30×40 2.43	35×30 2.46			30×50 2.88	35×40 2.87				35×45 2.96
820				30×45 2.75	35×35 2.77				35×45 3.25				35×50 3.04
1,000				30×50 3.31	35×40 3.32				35×50 3.69				
1,200					35×45 3.53	← Upper : Case size φDXL (mm) ← Lower : Rated ripple current (Arms) at 85°C, 120Hz							
1,500					35×50 4.04								

μF	V _{dc} φD	400				450			
		22	25.4	30	35	22	25.4	30	35
56						22×25 0.65			
68						22×25 0.71			
82		22×25 0.78				22×30 0.82	25.4×25 0.82		
100		22×30 0.90	25.4×25 0.90			22×35 0.93	25.4×25 0.90		
120		22×35 1.02	25.4×25 0.98			22×40 1.04	25.4×30 1.02	30×25 1.03	
150		22×40 1.16	25.4×30 1.14	30×25 1.16		22×45 1.19	25.4×35 1.19	30×30 1.19	35×25 1.19
180		22×45 1.31	25.4×35 1.30	30×30 1.44	35×25 1.32	22×50 1.34	25.4×40 1.33	30×35 1.35	35×25 1.33
220		22×45 1.49	25.4×40 1.47	30×30 1.47	35×25 1.47		25.4×50 1.54	30×40 1.55	35×30 1.53
270		22×50 1.64	25.4×45 1.67	30×35 1.66	35×30 1.69			30×45 1.78	35×35 1.73
330			25.4×50 1.88	30×40 1.90	35×30 1.87			30×50 2.01	35×40 2.00
390				30×45 2.13	35×35 2.08				35×45 2.24
470				30×50 2.40	35×40 2.39				35×50 2.53
560					35×45 2.69	← Upper : Case size φDXL (mm) ← Lower : Rated ripple current (Arms) at 85°C, 120Hz			
680					35×50 3.04				

KMH Series

- Endurance with ripple current : 105°C 2000 hours
- Non solvent-proof type

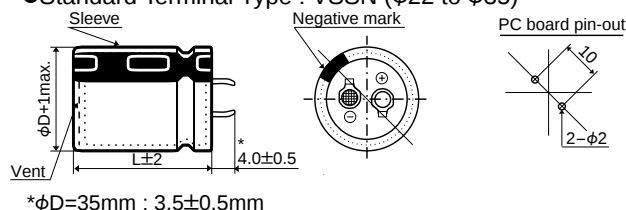


SPECIFICATIONS

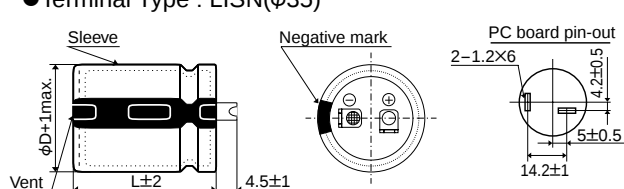
Items	Characteristics													
Category	-40 to +105°C (6.3 to 100V _{dc}) -25 to +105°C (160 to 450V _{dc})													
Temperature Range														
Rated Voltage Range	6.3 to 450V _{dc}													
Capacitance Tolerance	±20% (M) (at 20°C, 120Hz)													
Leakage Current	I=0.02CV (0.03CV for L=20mm) or 3mA, whichever is smaller Where, I : Max. leakage current (µA), C : Nominal capacitance (µF), V : Rated voltage (V) (at 20°C after 5 minutes)													
Dissipation Factor (tanδ)	Rated voltage (V _{dc})	6.3V	10V	16V	25V	35V	50V	63V	80V	100V	160 to 250V	315 to 400V	450V	
	tanδ (Max.)	0.60	0.50	0.40	0.30	0.25	0.20	0.15	0.15	0.15	0.10*	0.15	0.15	
	* : 0.15 for D=35mm or L=20mm (at 20°C, 120Hz)													
Low Temperature Characteristics (Max. Impedance Ratio)	Rated voltage (V _{dc})	6.3V	10V	16V	25V	35V	50V	63V	80V	100V	160 to 250V	315 to 400V	450V	
	Z(-25°C)/Z(+20°C)	4	4	4	3	3	2	2	2	2	4	4	8	
	Z(-40°C)/Z(+20°C)	15	15	15	10	8	6	6	5	5	—	—	—	(at 120Hz)
Endurance	The following specifications shall be satisfied when the capacitors are restored to 20°C after subjected to DC voltage with the rated ripple current is applied for 2000 hours at 105°C.													
	Capacitance change	≤±20% of the initial value												
	D.F. (tanδ)	≤200% of the initial specified value												
	Leakage current	≤The initial specified value												
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for 1000 hours at 105°C without voltage applied.													
	Capacitance change	≤±20% of the initial value												
	D.F. (tanδ)	≤150% of the initial specified value												
	Leakage current	≤The initial specified value												

DIMENSIONS [mm]

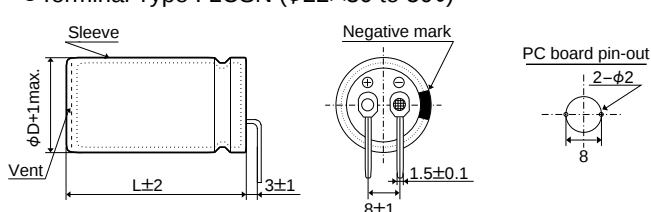
Standard Terminal Type : VSSN (φ22 to φ35)



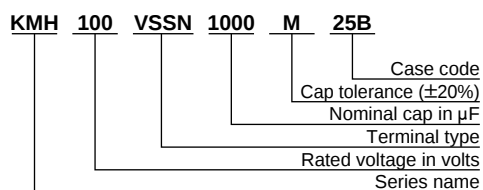
Terminal Type : LISN(φ35)



Terminal Type : LCSN (φ22×30 to 50φ)



PART NUMBERING SYSTEM



◆STANDARD RATINGS

μF	V _{dc} φD	6.3				10				16			
		22	25.4	30	35	22	25.4	30	35	22	25.4	30	35
6,800										22×25 1.57			
10,000						22×25 1.55				22×30 1.97	25.4×25 1.97		
12,000		22×25 1.54				22×30 1.77				22×35 2.22	25.4×30 2.24	30×25 2.45	
15,000		22×25 1.72				22×30 1.97	25.4×25 1.96			22×40 2.55	25.4×35 2.58	30×25 2.52	
18,000		22×30 1.95	25.4×25 1.96			22×35 2.21	25.4×30 2.23			22×45 2.87	25.4×40 2.92	30×30 2.88	35×25 2.92
22,000		22×35 2.23	25.4×30 2.25	30×25 2.28		22×40 2.51	25.4×35 2.54	30×25 2.40			25.4×45 3.32	30×35 3.29	35×25 3.23
27,000		22×40 2.54	25.4×35 2.57	30×25 2.52		22×50 2.93	25.4×40 2.90	30×30 2.87	35×25 2.73		25.4×50 3.78	30×40 3.77	35×30 3.45
33,000		22×45 2.88	25.4×40 2.93	30×30 2.89	35×25 2.93		25.4×45 3.30	30×35 3.28	35×30 3.16			30×45 4.30	35×35 4.26
39,000			25.4×40 3.18	30×35 3.26	35×30 3.40		25.4×50 3.68	30×40 3.69	35×30 3.43			30×50 4.81	35×40 4.79
47,000			25.4×50 3.69	30×40 3.69	35×30 3.73			30×45 4.17	35×35 3.76				35×45 5.43
56,000				30×45 4.16	35×35 4.12			30×50 4.68	35×40 4.67				
68,000				30×50 4.71	35×40 4.69				35×50 5.46				
82,000					35×45 5.32	← Upper : Case size φD×L (mm) ← Lower : Rated ripple current (Arms) at 105°C, 120Hz							

μF	V _{dc} φD	25				35				50			
		22	25.4	30	35	22	25.4	30	35	22	25.4	30	35
1,800										22×25 1.33			
2,700										22×30 1.69	25.4×25 1.70		
3,300						22×25 1.40				22×35 1.93	25.4×30 1.85		
3,900						22×30 1.57				22×40 2.16	25.4×35 2.18	30×25 1.95	
4,700		22×25 1.50				22×30 1.72	25.4×25 1.80			22×45 2.43	25.4×35 2.39	30×30 2.25	35×25 2.48
5,600		22×25 1.63				22×35 1.95	25.4×30 1.96	30×25 1.99		22×50 2.75	25.4×40 2.70	30×35 2.76	35×25 2.70
6,800		22×30 1.86	25.4×25 1.87			22×40 2.20	25.4×35 2.23	30×25 2.19			25.4×50 3.30	30×40 3.30	35×30 3.25
8,200		22×35 2.11	25.4×30 2.12	30×25 2.15		22×50 2.55	25.4×40 2.53	30×30 2.75	35×25 2.75			30×45 3.60	35×35 3.55
10,000		22×40 2.39	25.4×35 2.42	30×25 2.37			25.4×45 2.87	30×35 2.90	35×30 2.91			30×50 4.04	35×40 4.03
12,000		22×45 2.69	25.4×40 2.74	30×30 2.70	35×25 2.74		25.4×50 3.24	30×40 3.23	35×30 2.99				35×45 4.55
15,000			25.4×45 3.15	30×35 3.13	35×30 3.27			30×45 3.72	35×35 3.67				
18,000			25.4×50 3.54	30×40 3.54	35×30 3.58				35×40 4.37				
22,000				30×45 4.04	35×35 3.64				35×50 4.92				
27,000					35×45 4.73	← Upper : Case size φD×L (mm) ← Lower : Rated ripple current (Arms) at 105°C, 120Hz							
33,000					35×50 5.39								

◆CASE CODE [mm]

Case code	Case size φD×L	Case code	Case size φD×L	Case code	Case size φD×L	Case code	Case size φD×L
22S	22×20	25S	25.4×20	30S	30×20	35S	35×20
22A	22×25	25A	25.4×25	30A	30×25	35A	35×25
22B	22×30	25B	25.4×30	30B	30×30	35B	35×30
22C	22×35	25C	25.4×35	30C	30×35	35C	35×35
22D	22×40	25D	25.4×40	30D	30×40	35D	35×40
22E	22×45	25E	25.4×45	30E	30×45	35E	35×45
22F	22×50	25F	25.4×50	30F	30×50	35F	35×50

◆RATED RIPPLE CURRENT MULTIPLIERS

●Frequency Multipliers

Frequency (Hz)	50	120	300	1k	10k	50k
6.3 to 50V _{dc}	0.95	1.00	1.03	1.05	1.08	1.08
63 to 100V _{dc}	0.92	1.00	1.07	1.13	1.19	1.20
160 to 250V _{dc}	0.81	1.00	1.17	1.32	1.45	1.50
315 to 450V _{dc}	0.77	1.00	1.16	1.30	1.41	1.43

◆STANDARD RATINGS

μF	V _{dc} φD	63				80				100			
		22	25.4	30	35	22	25.4	30	35	22	25.4	30	35
560										22×25 1.05			
820						22×25 1.11				22×30 1.32	25.4×25 1.33		
1,000						22×25 1.22				22×35 1.50	25.4×30 1.51		
1,200		22×25 1.19				22×30 1.38	25.4×25 1.39			22×40 1.69	25.4×35 1.71	30×25 1.68	
1,500		22×25 1.33				22×35 1.59	25.4×30 1.61			22×45 1.94	25.4×40 1.98	30×30 1.95	35×25 1.98
1,800		22×30 1.51	25.4×25 1.52			22×40 1.80	25.4×30 1.76	30×25 1.65			25.4×45 2.23	30×35 2.50	35×25 2.17
2,200		22×35 1.73	25.4×30 1.74			22×45 2.04	25.4×35 2.01	30×30 2.05	35×25 2.07		25.4×50 2.53	30×40 2.70	35×30 2.50
2,700		22×40 1.97	25.4×35 1.99	30×25 1.76			25.4×45 2.36	30×35 2.35	35×25 2.29			30×45 2.88	35×35 2.86
3,300		22×50 2.29	25.4×40 2.27	30×30 2.24	35×25 2.06		25.4×50 2.68	30×40 2.68	35×30 2.45			30×50 3.28	35×40 3.27
3,900			25.4×45 2.54	30×35 2.55	35×25 2.24			30×45 3.00	35×35 2.98				35×45 3.67
4,700			25.4×50 2.86	30×40 2.86	35×30 2.79			30×50 3.39	35×40 3.38				35×50 3.80
5,600				30×45 3.22	35×35 3.19				35×45 3.80				
6,800				30×50 3.65	35×40 3.64				35×50 3.90				
8,200					35×45 3.90	← Upper : Case size φD×L (mm) ← Lower : Rated ripple current (Arms) at 105°C, 120Hz							
10,000					35×50 4.40								

μF	V _{dc} φD	160				180				200			
		22	25.4	30	35	22	25.4	30	35	22	25.4	30	35
150										22×20 0.66			
180						22×20 0.73				22×20 0.72			
220		22×20 0.80				22×20 0.80				22×25 0.79	25.4×20 0.83		
270		22×25 1.09				22×25 0.96	25.4×20 0.92			22×25 0.87	25.4×25 1.09		
330		22×25 1.20	25.4×20 1.02			22×25 1.06	25.4×25 1.20			22×30 1.20	25.4×25 1.21	30×20 1.08	
390		22×30 1.30	25.4×25 1.28	30×20 1.17		22×30 1.30	25.4×25 1.30	30×20 1.17		22×35 1.31	25.4×25 1.31	30×25 1.37	
470		22×35 1.40	25.4×25 1.41	30×20 1.28		22×35 1.35	25.4×30 1.40	30×25 1.38	35×20 1.41	22×40 1.40	25.4×30 1.41	30×25 1.50	35×20 1.41
560		22×40 1.50	25.4×30 1.51	30×25 1.56	35×20 1.54	22×40 1.51	25.4×35 1.53	30×25 1.51	35×20 1.53	22×45 1.56	25.4×35 1.53	30×25 1.63	35×25 1.56
680		22×45 1.71	25.4×35 1.70	30×25 1.72	35×20 1.70	22×45 1.71	25.4×40 1.74	30×30 1.72	35×25 1.74	22×50 1.74	25.4×40 1.74	30×30 1.74	35×25 1.72
820		22×50 1.93	25.4×40 2.01	30×30 2.00	35×25 1.91	22×50 1.97	25.4×45 1.97	30×35 2.00	35×25 1.91		25.4×50 2.04	30×35 2.00	35×30 2.04
1,000			25.4×45 2.20	30×35 2.22	35×25 2.11		25.4×50 2.23	30×40 2.24	35×30 2.26			30×45 2.30	35×35 2.30
1,200			25.4×50 2.45	30×40 2.44	35×30 2.44			30×45 2.52	35×35 2.50			30×50 2.60	35×40 2.65
1,500				30×45 2.82	35×35 2.50			30×50 2.89	35×40 2.89				35×45 3.08
1,800				30×50 3.31	35×45 3.31				35×40 3.17				35×50 3.47
2,200					35×50 3.77				35×50 3.60	← Upper : Case size φD×L (mm) ← Lower : Rated ripple current (Arms) at 105°C, 120Hz			

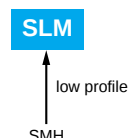
◆STANDARD RATINGS

μF	V _{dc} φD	250				315				350			
		22	25.4	30	35	22	25.4	30	35	22	25.4	30	35
56										22×20 0.40			
68						22×20 0.44				22×25 0.51			
82						22×25 0.64				22×25 0.56	25.4×20 0.51		
100						22×30 0.68	25.4×20 0.56			22×30 0.69	25.4×25 0.69	30×20 0.59	
120		22×20 0.59				22×30 0.75	25.4×25 0.76	30×20 0.65		22×35 0.75	25.4×25 0.75	30×20 0.64	
150		22×25 0.71				22×35 0.82	25.4×30 0.80	30×25 0.82		22×40 0.82	25.4×30 0.83	30×25 0.83	35×20 0.76
180		22×25 0.78	25.4×20 0.75			22×40 0.91	25.4×30 0.88	30×25 0.90	35×20 0.83	22×45 0.92	25.4×35 0.92	30×25 0.91	35×25 0.94
220		22×30 0.95	25.4×25 0.95	30×20 0.88		22×45 1.02	25.4×35 1.02	30×30 1.02	35×25 1.03	22×50 1.05	25.4×40 1.04	30×30 1.02	35×25 1.04
270		22×35 1.14	25.4×25 1.05	30×20 0.97		22×50 1.16	25.4×40 1.15	30×35 1.17	35×25 1.15		25.4×45 1.18	30×35 1.17	35×30 1.20
330		22×40 1.26	25.4×30 1.20	30×25 1.26	35×20 1.18		25.4×50 1.33	30×35 1.30	35×30 1.32			30×40 1.34	35×30 1.33
390		22×45 1.49	25.4×35 1.49	30×25 1.37	35×25 1.43			30×40 1.46	35×35 1.47			30×45 1.51	35×35 1.47
470		22×50 1.57	25.4×40 1.57	30×30 1.57	35×25 1.57			30×50 1.70	35×40 1.69				35×40 1.69
560			25.4×45 1.79	30×35 1.79	35×30 1.79				35×45 1.90				35×45 1.90
680			25.4×50 1.84	30×40 2.00	35×30 1.97				35×50 2.15				
820				30×45 2.16	35×35 1.98								
1,000					35×40 2.30	Upper : Case size φD×L (mm) Lower : Rated ripple current (Arms) at 105°C, 120Hz							
1,200					35×45 2.43								

μF	V _{dc} φD	400				450			
		22	25.4	30	35	22	25.4	30	35
47		22×20 0.37							
56		22×20 0.40				22×25 0.40			
68		22×25 0.51	25.4×20 0.46			22×30 0.50	25.4×25 0.50		
82		22×30 0.58	25.4×25 0.64			22×35 0.56	25.4×25 0.55		
100		22×30 0.64	25.4×25 0.67	30×20 0.59		22×40 0.64	25.4×30 0.57	30×25 0.64	
120		22×35 0.72	25.4×30 0.72	30×25 0.76		22×45 0.72	25.4×35 0.71	30×25 0.70	
150		22×40 0.82	25.4×35 0.84	30×25 0.84	35×20 0.76	22×50 0.79	25.4×40 0.75	30×30 0.74	35×25 0.75
180		22×50 0.95	25.4×40 0.94	30×30 0.92	35×25 0.94		25.4×45 0.84	30×35 0.87	35×30 0.90
220			25.4×45 1.07	30×35 1.06	35×30 1.08		25.4×50 0.98	30×40 0.98	35×30 1.00
270			25.4×50 1.21	30×40 1.21	35×30 1.20			30×45 1.15	35×35 1.17
330				30×45 1.39	35×35 1.35			30×50 1.38	35×40 1.38
390				30×50 1.55	35×40 1.54				35×45 1.55
470					35×45 1.74				35×50 1.72

SLM Series

- 15mm height snap-ins
- Endurance with ripple current : 85°C 2000 hours
- Non solvent-proof type

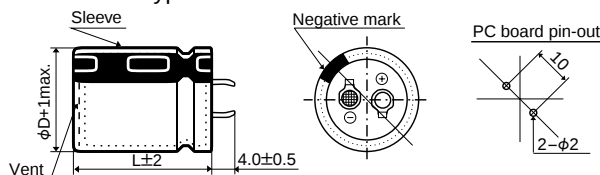


SPECIFICATIONS

Items	Characteristics	
Category	-25 to +85°C	
Temperature Range		
Rated Voltage Range	160 to 400V _{dc}	
Capacitance Tolerance	±20% (M) (at 20°C, 120Hz)	
Leakage Current	$I \leq 3\sqrt{CV}$ Where, I : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V) (at 20°C after 5 minutes)	
Dissipation Factor (tanδ)	Rated voltage (V _{dc})	160 to 400V
	tanδ (Max.)	0.20 (at 20°C, 120Hz)
Low Temperature Characteristics (Max. Impedance Ratio)	Rated voltage (V _{dc})	160 to 400V
	Z (-25°C) / Z (+20°C)	4 (at 120Hz)
Endurance	The following specifications shall be satisfied when the capacitors are restored to 20°C after subjected to DC voltage with the rated ripple current is applied for 2000 hours at 85°C.	
	Capacitance change	≤±20% of the initial value
	D.F. (tanδ)	≤200% of the initial specified value
	Leakage current	≤The initial specified value
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for 1000 hours at 85°C without voltage applied.	
	Capacitance change	≤±15% of the initial value
	D.F. (tanδ)	≤150% of the initial specified value
	Leakage current	≤The initial specified value

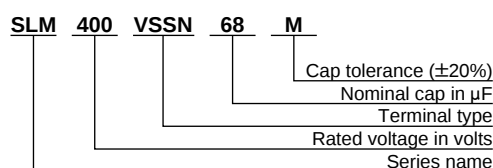
DIMENSIONS [mm]

- Terminal Type : VSSN



*No plastic disk is the standard design.

PART NUMBERING SYSTEM



STANDARD RATINGS

Items	160		180		200		250		400	
	Capacitance (μF)	Rated ripple (Arms/85°C 120Hz)	Capacitance (μF)	Rated ripple (Arms/85°C 120Hz)	Capacitance (μF)	Rated ripple (Arms/85°C 120Hz)	Capacitance (μF)	Rated ripple (Arms/85°C 120Hz)	Capacitance (μF)	Rated ripple (Arms/85°C 120Hz)
22×15	180	0.99	150	0.90	150	0.90	100	0.73	47	0.50
25.4×15	270	1.29	220	1.16	220	1.16	150	0.96	68	0.65
30×15	390	1.47	330	1.35	270	1.22	220	1.10	100	0.74
35×15	560	1.74	470	1.60	390	1.46	330	1.34	120	0.81

RATED RIPPLE CURRENT MULTIPLIERS

- Frequency Multipliers

Frequency (Hz)	50	120	300	1k	10k	50k
160 to 250V _{dc}	0.81	1.00	1.17	1.32	1.45	1.50
400V _{dc}	0.77	1.00	1.16	1.30	1.41	1.43

KLM Series

- 15mm height snap-ins
- Endurance with ripple current : 105°C 2000 hours
- Non solvent-proof type

KLM

low profile
KMH

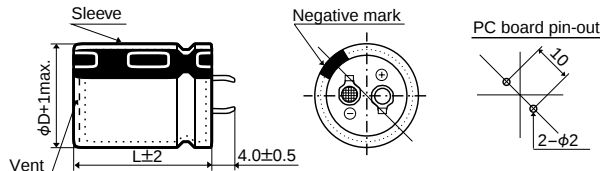


SPECIFICATIONS

Items	Characteristics	
Category	-25 to +105°C	
Temperature Range		
Rated Voltage Range	160 to 400V _{dc}	
Capacitance Tolerance	±20% (M) (at 20°C, 120Hz)	
Leakage Current	$I \leq 3\sqrt{CV}$ Where, I : Max. leakage current (µA), C : Nominal capacitance (µF), V : Rated voltage (V) (at 20°C after 5 minutes)	
Dissipation Factor (tanδ)	Rated voltage (V _{dc})	160 to 400V
	tanδ (Max.)	0.20 (at 20°C, 120Hz)
Low Temperature Characteristics (Max. Impedance Ratio)	Rated voltage (V _{dc})	160 to 400V
	Z (-25°C) / Z (+20°C)	4 (at 120Hz)
Endurance	The following specifications shall be satisfied when the capacitors are restored to 20°C after subjected to DC voltage with the rated ripple current is applied for 2000 hours at 105°C.	
	Capacitance change	≤±20% of the initial value
	D.F. (tanδ)	≤200% of the initial specified value
	Leakage current	≤The initial specified value
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for 1000 hours at 105°C without voltage applied.	
	Capacitance change	≤±15% of the initial value
	D.F. (tanδ)	≤150% of the initial specified value
	Leakage current	≤The initial specified value

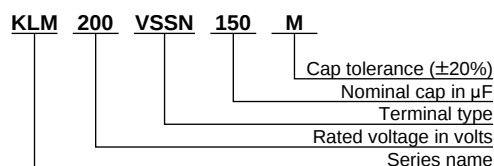
DIMENSIONS [mm]

- Terminal Type : VSSN



*No plastic disk is the standard design.

PART NUMBERING SYSTEM



STANDARD RATINGS

V _{dc} Items φDXL (mm)	160		180		200		250		400	
	Capacitance (µF)	Rated ripple (Arms/105°C 120Hz)	Capacitance (µF)	Rated ripple (Arms/105°C 120Hz)	Capacitance (µF)	Rated ripple (Arms/105°C 120Hz)	Capacitance (µF)	Rated ripple (Arms/105°C 120Hz)	Capacitance (µF)	Rated ripple (Arms/105°C 120Hz)
22X15	150	0.68	120	0.61	120	0.61	82	0.50	39	0.35
25.4X15	180	0.79	150	0.73	150	0.73	100	0.59	47	0.40
	220	0.88	180	0.79			120	0.65	56	0.44
30X15	270	0.96	220	0.86	180	0.79	150	0.71	68	0.46
	330	1.06	270	0.96	220	0.90	180	0.79	82	0.51
35X15	390	1.20	330	1.10	270	1.00	220	0.90	100	0.56
			390	1.17	330	1.07			120	0.62

RATED RIPPLE CURRENT MULTIPLIERS

- Frequency Multipliers

Frequency (Hz)	50	120	300	1k	10k	50k
160 to 250V _{dc}	0.81	1.00	1.17	1.32	1.45	1.50
400V _{dc}	0.77	1.00	1.16	1.30	1.41	1.43

LXM Series

- Endurance with ripple current : 105°C 7000 hours
- Non solvent-proof type

LXM

longer life
LXQ

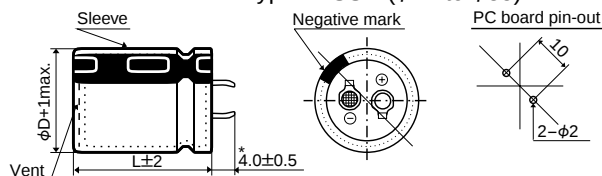


SPECIFICATIONS

Items	Characteristics				
Category					
Temperature Range	-25 to +105°C				
Rated Voltage Range	160 to 450V _{dc}				
Capacitance Tolerance	±20% (M) (at 20°C, 120Hz)				
Leakage Current	I≤3√CV Where, I : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V) (at 20°C after 5 minutes)				
Dissipation Factor (tanδ)	Rated voltage (V _{dc})	160 to 400V	420 & 450V	(at 20°C, 120Hz)	
	tanδ (Max.)	0.15	0.20		
Low Temperature Characteristics (Max. Impedance Ratio)	Rated voltage (V _{dc})	160 to 400V	420 & 450V	(at 120Hz)	
	Z(-25°C)/Z(+20°C)	4	8		
Endurance	The following specifications shall be satisfied when the capacitors are restored to 20°C after subjected to DC voltage with the rated ripple current is applied for 7000 hours at 105°C.				
	Capacitance change	≤±20% of the initial value			
	D.F. (tanδ)	≤250% of the initial specified value			
	Leakage current	≤The initial specified value			
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for 1000 hours at 105°C without voltage applied.				
	Capacitance change	≤±15% of the initial value			
	D.F. (tanδ)	≤150% of the initial specified value			
	Leakage current	≤The initial specified value			

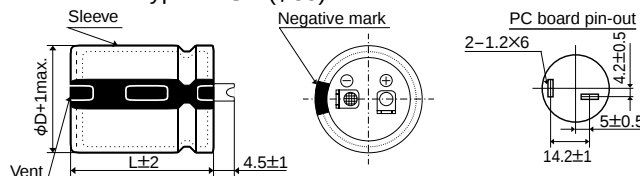
DIMENSIONS [mm]

- Standard Terminal Type : VSSN (φ22 to φ35)



*φD=35mm : 3.5±0.5mm

- Terminal Type : LISN (φ35)



PART NUMBERING SYSTEM

LXM	400	VSSN	120	M	22C	
						Case code
						Cap tolerance (±20%)
						Nominal cap in μF
						Terminal type
						Rated voltage in volts
						Series name

CASE CODE [mm]

Case code	Case size φD×L	Case code	Case size φD×L	Case code	Case size φD×L	Case code	Case size φD×L
22A	22×25	25A	25.4×25	30A	30×25	35A	35×25
22B	22×30	25B	25.4×30	30B	30×30	35B	35×30
22C	22×35	25C	25.4×35	30C	30×35	35C	35×35
22D	22×40	25D	25.4×40	30D	30×40	35D	35×40
22E	22×45	25E	25.4×45	30E	30×45	35E	35×45
22F	22×50	25F	25.4×50	30F	30×50	35F	35×50

◆STANDARD RATINGS

μF	V _{dc} φD	160				180			
		22	25	30	35	22	25	30	35
270						22×25 1.00			
330		22×25 1.11				22×30 1.16			
390		22×30 1.26				22×30 1.26	25.4×25 1.26		
470		22×30 1.39	25.4×25 1.38			22×35 1.42	25.4×30 1.42		
560		22×35 1.55	25.4×30 1.55			22×40 1.59	25.4×30 1.55	30×25 1.58	
680		22×40 1.75	25.4×35 1.78	30×25 1.74		22×45 1.79	25.4×35 1.78	30×30 1.79	
820		22×50 1.97	25.4×40 2.01	30×30 1.96			25.4×40 2.01	30×35 2.04	
1,000			25.4×45 2.27	30×35 2.26			25.4×50 2.32	30×35 2.26	35×30 2.30
1,200			25.4×50 2.54	30×40 2.56	35×30 2.52			30×45 2.65	35×35 2.58
1,500				30×45 2.96	35×35 2.89			30×50 3.03	35×40 3.01
1,800				30×50 3.32	35×40 3.30				35×45 3.41
2,200					35×50 3.87	← Upper : Case size φD×L (mm) ← Lower : Rated ripple current (Arms) at 105°C, 120Hz			

μF	V _{dc} φD	200				220			
		22	25	30	35	22	25	30	35
220		22×25 0.90				22×25 0.90			
270		22×30 1.05				22×30 1.05			
330		22×30 1.16	25.4×25 1.16			22×35 1.19	25.4×25 1.16		
390		22×35 1.29	25.4×30 1.29			22×40 1.33	25.4×30 1.29		
470		22×40 1.46	25.4×30 1.42	30×25 1.45		22×45 1.49	25.4×35 1.48	30×25 1.45	
560		22×45 1.63	25.4×35 1.62	30×30 1.62		22×50 1.63	25.4×40 1.71	30×30 1.62	
680			25.4×40 1.83	30×30 1.79			25.4×45 1.87	30×35 1.86	
820			25.4×45 2.06	30×35 2.04			25.4×50 2.10	30×40 2.12	35×30 2.08
1,000				30×45 2.42	35×30 2.30			30×50 2.48	35×40 2.46
1,200				30×50 2.71	35×40 2.70				35×45 2.78
1,500					35×45 3.11				35×50 3.20
1,800					35×50 3.50	← Upper : Case size φD×L (mm) ← Lower : Rated ripple current (Arms) at 105°C, 120Hz			

◆STANDARD RATINGS

μF	V_{dc} ϕD	250				315			
		22	25	30	35	22	25	30	35
100						22×25 0.67			
120						22×30 0.77			
150						22×30 0.86	25.4×25 0.85		
180		22×25 0.82				22×35 0.96	25.4×30 0.96		
220		22×30 0.95				22×40 1.09	25.4×30 1.06	30×25 1.08	
270		22×35 1.08	25.4×25 1.05			22×45 1.24	25.4×35 1.23	30×30 1.23	
330		22×40 1.22	25.4×30 1.19				25.4×40 1.40	30×35 1.42	35×30 1.45
390		22×45 1.36	25.4×35 1.35	30×25 1.32			25.4×50 1.59	30×35 1.54	35×30 1.57
470		22×50 1.49	25.4×40 1.52	30×30 1.49				30×45 1.81	35×35 1.77
560			25.4×45 1.70	30×35 1.69				30×50 2.03	35×40 2.02
680			25.4×50 1.91	30×40 1.93	35×30 1.90				35×45 2.29
820				30×45 2.19	35×35 2.13				35×50 2.59
1,000					35×40 2.46				
1,200					35×50 2.86	← Upper : Case size $\phi\text{D}\times\text{L}$ (mm) ← Lower : Rated ripple current (Arms) at 105°C, 120Hz			

μF	V_{dc} ϕD	350				400			
		22	25	30	35	22	25	30	35
68						22×25 0.55			
82						22×30 0.63			
100		22×25 0.67				22×30 0.70	25.4×25 0.70		
120		22×30 0.77	25.4×25 0.76			22×35 0.79	25.4×30 0.79		
150		22×35 0.88	25.4×30 0.88			22×40 0.90	25.4×30 0.88	30×25 0.90	
180		22×40 0.99	25.4×30 0.96	30×25 0.98		22×45 0.99	25.4×35 1.01	30×30 1.01	
220		22×45 1.12	25.4×35 1.11	30×30 1.11			25.4×40 1.14	30×35 1.16	
270			25.4×40 1.26	30×35 1.28			25.4×50 1.32	30×40 1.33	35×30 1.31
330			25.4×45 1.40	30×35 1.42	35×30 1.45			30×45 1.52	35×35 1.48
390				30×40 1.60	35×35 1.61			30×50 1.69	35×40 1.68
470				30×50 1.86	35×40 1.85				35×45 1.91
560					35×40 2.02				35×50 2.14
680					35×50 2.36	← Upper : Case size $\phi\text{D}\times\text{L}$ (mm) ← Lower : Rated ripple current (Arms) at 105°C, 120Hz			

◆STANDARD RATINGS

μF	V _{dc} φD	420				450			
		22	25	30	35	22	25	30	35
47						22×25 0.46			
56		22×25 0.50				22×30 0.52			
68		22×30 0.58				22×30 0.58	25.4×25 0.58		
82		22×30 0.63	25.4×25 0.63			22×35 0.65	25.4×30 0.65		
100		22×35 0.72	25.4×30 0.72			22×40 0.74	25.4×30 0.72	30×25 0.73	
120		22×40 0.81	25.4×30 0.79	30×25 0.80		22×45 0.83	25.4×35 0.82	30×30 0.82	
150		22×45 0.92	25.4×35 0.92	30×30 0.92			25.4×40 0.94	30×35 0.96	
180			25.4×40 1.03	30×35 1.05			25.4×45 1.06	30×35 1.05	35×30 1.07
220			25.4×50 1.19	30×35 1.16	35×30 1.18			30×40 1.20	35×35 1.21
270				30×45 1.38	35×35 1.34			30×50 1.41	35×40 1.40
330				30×50 1.56	35×40 1.55				35×45 1.60
390					35×45 1.74				35×50 1.79
470					35×50 1.96	← Upper : Case size φD×L (mm) ← Lower : Rated ripple current (Arms) at 105°C, 120Hz			

◆RATED RIPPLE CURRENT MULTIPLIERS

●Frequency Multipliers

Frequency(Hz)	50	120	300	1k	10k	50k
160 to 250V _{dc}	0.81	1.00	1.17	1.32	1.45	1.50
315 to 450V _{dc}	0.77	1.00	1.16	1.30	1.41	1.43

LXQ Series

- Endurance with ripple current : 105°C 5000 hours
- Downsized and higher ripple version of LXG series
- Non solvent-proof type

LXM
↑ longer life
LXQ
↑ longer life
KMM

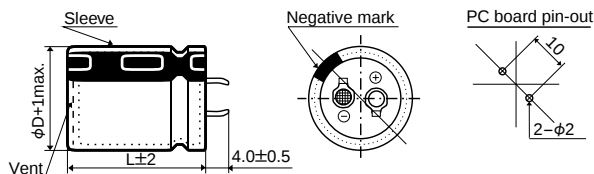


SPECIFICATIONS

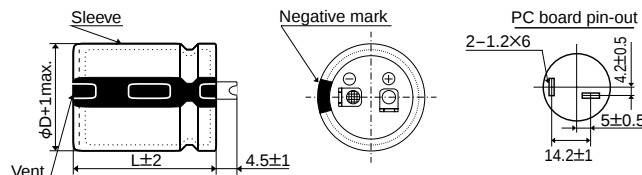
Items	Characteristics				
Category	-25 to +105°C				
Temperature Range					
Rated Voltage Range	160 to 450V _{dc}				
Capacitance Tolerance	±20% (M) (at 20°C, 120Hz)				
Leakage Current	I≤3√CV Where, I : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V) (at 20°C after 5 minutes)				
Dissipation Factor (tanδ)	Rated voltage (V _{dc})	160 to 400V	420 & 450V	(at 20°C, 120Hz)	
	tanδ (Max.)	0.15	0.20		
Low Temperature Characteristics (Max. Impedance Ratio)	Rated voltage (V _{dc})	160 to 400V	420 & 450V	(at 120Hz)	
	Z(-25°C)/Z(+20°C)	4	8		
Endurance	The following specifications shall be satisfied when the capacitors are restored to 20°C after subjected to DC voltage with the rated ripple current is applied for 5000 hours at 105°C.				
	Capacitance change	≤±20% of the initial value			
	D.F. (tanδ)	≤200% of the initial specified value			
	Leakage current	≤The initial specified value			
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for 1000 hours at 105°C without voltage applied.				
	Capacitance change	≤±15% of the initial value			
	D.F. (tanδ)	≤150% of the initial specified value			
	Leakage current	≤The initial specified value			

DIMENSIONS [mm]

- Standard Terminal Type : VSSN (φ22 to φ35)

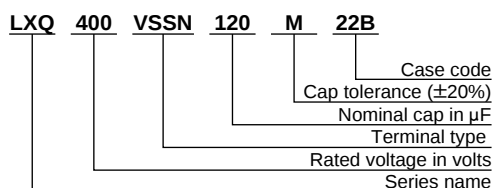


- Terminal Type : LISN (φ30, φ35)



*No plastic disk is the standard design.

PART NUMBERING SYSTEM



CASE CODE [mm]

Case code	Case size φDXL	Case code	Case size φDXL	Case code	Case size φDXL	Case code	Case size φDXL
22A	22×25	25A	25.4×25	30A	30×25	35A	35×25
22B	22×30	25B	25.4×30	30B	30×30	35B	35×30
22C	22×35	25C	25.4×35	30C	30×35	35C	35×35
22D	22×40	25D	25.4×40	30D	30×40	35D	35×40
22E	22×45	25E	25.4×45	30E	30×45	35E	35×45
22F	22×50	25F	25.4×50	30F	30×50	35F	35×50

◆STANDARD RATINGS

μF	V _{dc} φD		160				180				200			
			22	25	30	35	22	25	30	35	22	25	30	35
270											22×25 1.10			
330							22×25 1.21							
390		22×25 1.32									22×30 1.38	25.4×25 1.39		
470							22×30 1.52	25.4×25 1.52			22×35 1.55			
560		22×30 1.66	25.4×25 1.68				22×35 1.70		30×25 1.78		22×40 1.73	25.4×30 1.71	30×25 1.78	
680		22×35 1.87	25.4×30 1.88	30×25 1.96			22×40 1.91	25.4×30 1.88			22×45 1.81	25.4×35 1.87	30×30 1.98	35×25 2.10
820		22×40 2.09					22×45 1.99	25.4×35 2.16	30×30 2.17	35×25 2.31	22×50 2.18	25.4×40 2.09	30×35 2.22	
1,000		22×45(50) 2.36(2.41)	25.4×35 2.38	30×30 2.40	35×25 2.55		22×50 2.25	25.4×40(45) 2.43(2.47)	30×35 2.46			25.4×45(50) 2.35(2.39)	30×40 2.53	35×30 2.61
1,200			25.4×40(45) 2.66(2.71)	30×35(40) 2.69(2.77)	35×30 2.86			25.4×50 2.75	30×40 2.77	35×30 2.86			30×45(50) 2.84(2.88)	35×35 2.88
1,500			25.4×50 3.08	30×45 3.17	35×35 3.22				30×45(50) 3.17(3.22)	35×35 3.22				35×40 3.34
1,800				30×50 3.53	35×40 3.66					35×40(45) 3.66(3.74)				35×45(50) 3.74(3.82)
2,200					35×45 4.14					35×50 4.22				
2,700					35×50 4.68	← Upper : Case size φD×L (mm) ← Lower : Rated ripple current (Arms) at 105°C, 120Hz								

μF	V _{dc} φD		220				250				315			
			22	25	30	35	22	25	30	35	22	25	30	35
150											22×25 0.80			
180											22×30 0.92	25.4×25 0.94		
220							22×25 1.01				22×35 1.04		30×25 1.17	
270		22×25 1.10					22×30 1.20				22×40 1.18	25.4×30 1.19		
330		22×30 1.19						25.4×25 1.32			22×45 1.33	25.4×35 1.37	30×30 1.40	35×25 1.49
390			25.4×25 1.39				22×35 1.44	25.4×30 1.43	30×25 1.51		22×50 1.48	25.4×40 1.52		
470		22×35 1.55	25.4×30 1.56	30×25 1.63			22×40 1.62					25.4×45 1.70	30×35 1.71	35×30 1.82
560		22×40 1.73		30×30 1.79			22×45(50) 1.80(1.84)	25.4×35 1.78	30×30 1.83	35×25 1.91		25.4×50 1.88	30×40(45) 1.92(1.97)	35×35 2.00
680		22×45(50) 1.94(1.99)	25.4×35 1.96	30×35 2.02	35×25 2.10			25.4×40(45) 2.00(2.04)	30×35 2.06	35×30 2.15			30×50 2.21	35×40 2.29
820			25.4×40(45) 2.20(2.24)	30×40 2.29	35×30 2.36			25.4×50 2.28	30×40(45) 2.33(2.39)	35×35 2.38				35×45 2.57
1,000			25.4×50 2.51	30×45 2.59	35×35 2.63				30×50 2.68	35×40 2.72				35×50 2.89
1,200				30×50 2.88	35×40 2.98					35×45 3.05				
1,500					35×45 3.41					35×50 3.49				
1,800					35×50 3.82	← Upper : Case size φD×L (mm) ← Lower : Rated ripple current (Arms) at 105°C, 120Hz								

◆STANDARD RATINGS

μF	V _{dc} φD	350				400				420			
		22	25	30	35	22	25	30	35	22	25	30	35
100						22×25 0.66				22×25 0.66			
120		22×25 0.72				22×30 0.75				22×30 0.75	25.4×25 0.77		
150		22×30 0.84				22×35 0.86	25.4×25 0.86			22×35 0.86			
180			25.4×25 0.94			22×40 0.96	25.4×30 0.97	30×25 1.02		22×40(45) 0.96(0.98)	25.4×30(35) 0.97(1.01)	30×25 1.02	
220		22×35(40) 1.04(1.06)	25.4×30 1.07	30×25 1.13		22×45 1.09	25.4×35 1.12		35×25 1.22	22×50 1.11	25.4×40 1.14	30×30 1.14	35×25 1.22
270		22×45 1.20	25.4×35 1.24	30×30 1.27	35×25 1.35	22×50 1.23	25.4×40(45) 1.26(1.29)	30×30 1.27			25.4×45 1.29	30×35 1.30	35×30 1.38
330		22×50 1.36	25.4×40 1.39	30×35 1.43			25.4×50 1.44	30×35 1.43	35×30 1.52		25.4×50 1.44	30×40 1.48	35×35 1.54
390			25.4×45 1.55	30×40 1.60	35×30 1.66			30×40 1.60	35×35 1.67			30×45 1.64	35×40 1.73
470			25.4×50 1.72	30×45 1.81	35×35 1.83			30×45(50) 1.81(1.84)	35×40 1.90			30×50 1.84	35×45 1.94
560				30×50 2.00	35×40 2.07				35×45 2.12				35×50 2.17
680					35×45 2.34				35×50 2.39				
820					35×50 2.62	← Upper : Case size φD×L (mm) ← Lower : Rated ripple current (Arms) at 105°C, 120Hz							

μF	V _{dc} φD	450			
		22	25	30	35
82		22×25 0.59			
100		22×30 0.69	25.4×25 0.70		
120		22×35 0.77			
150		22×40(45) 0.88(0.90)	25.4×30(35) 0.88(0.92)	30×25 0.93	
180		22×50 1.01	25.4×40 1.03	30×30 1.03	35×25 1.10
220			25.4×45 1.16	30×35 1.17	35×30 1.24
270			25.4×50 1.31	30×40 1.33	35×35 1.39
330				30×45 1.51	
390				30×50 1.67	35×40(45) 1.73(1.77)
470					35×50 1.98

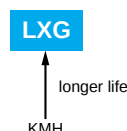
◆RATED RIPPLE CURRENT MULTIPLIERS

●Frequency Multipliers

Frequency (Hz)	50	120	300	1k	10k	50k
160 to 250V _{dc}	0.81	1.00	1.17	1.32	1.45	1.50
315 to 450V _{dc}	0.77	1.00	1.16	1.30	1.41	1.43

LXG Series

- Endurance with ripple current : 105°C 5000 hours
- Non solvent-proof type

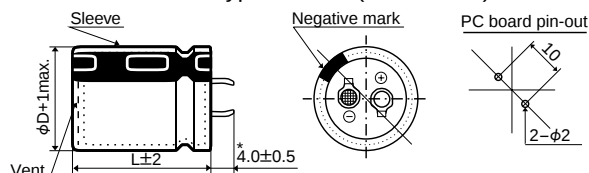


SPECIFICATIONS

Items	Characteristics								
Category	Temperature Range								
Rated Voltage Range	10 to 100V _{dc} (at 20°C, 120Hz)								
Capacitance Tolerance	±20% (M)								
Leakage Current	I=0.02CV or 3mA, whichever is smaller. Where, I : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V) (at 20°C after 5 minutes)								
Dissipation Factor (tanδ)	Rated voltage (V _{dc})	10V	16V	25V	35V	50V	63V	80 & 100V	
	tanδ (Max.)	0.60	0.45	0.30	0.25	0.20	0.15	0.15	(at 20°C, 120Hz)
Low Temperature Characteristics (Max. Impedance Ratio)	Capacitance change : Capacitance at the lowest operating temperature shall not be less than 70% of the 20°C value.								
	Rated voltage (V _{dc})	10V	16V	25V	35V	50V	63V	80 & 100V	
	Z(−25°C)/Z(+20°C)	4	4	3	3	2	2	2	
	Z(−40°C)/Z(+20°C)	15	15	10	8	6	6	5	(at 120Hz)
Endurance	The following specifications shall be satisfied when the capacitors are restored to 20°C after subjected to DC voltage with rated ripple current is applied for 5000 hours at 105°C.								
	Capacitance change	≤±25% of the initial value							
	D.F. (tanδ)	≤250% of the initial specified value							
	Leakage current	≤The initial specified value							
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for 500 hours at 105°C without voltage applied.								
	Capacitance change	≤±20% of the initial value							
	D.F. (tanδ)	≤150% of the initial specified value							
	Leakage current	≤The initial specified value							

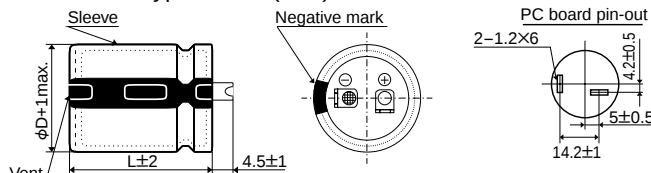
DIMENSIONS [mm]

- Standard Terminal Type : VSSN (φ22 to φ35)

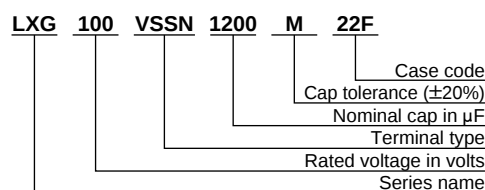


*φD=35mm : 3.5±0.5mm

- Terminal Type : LISN (φ35)



PART NUMBERING SYSTEM



RATED RIPPLE CURRENT MULTIPLIERS

- Frequency Multipliers

Frequency (Hz)	50	120	300	1k	10k	50k
10 to 50V _{dc}	0.95	1.00	1.03	1.05	1.08	1.08
63 to 100V _{dc}	0.92	1.00	1.07	1.13	1.19	1.20

CASE CODE [mm]

Case code	Case size φD×L	Case code	Case size φD×L	Case code	Case size φD×L	Case code	Case size φD×L
22A	22×25	25A	25.4×25	30A	30×25	35A	35×25
22B	22×30	25B	25.4×30	30B	30×30	35B	35×30
22C	22×35	25C	25.4×35	30C	30×35	35C	35×35
22D	22×40	25D	25.4×40	30D	30×40	35D	35×40
22F	22×50	25F	25.4×50	30F	30×50	35F	35×50

◆STANDARD RATINGS

μF	V _{dc} φD	10				16				25			
		22	25.4	30	35	22	25.4	30	35	22	25.4	30	35
3,900										22×25 1.31			
4,700										22×30 1.51	25.4×25 1.51		
5,600						22×25 1.44				22×35 1.70			
6,800		22×25 1.30				22×30 1.66	25.4×25 1.66			22×40 1.92	25.4×30 1.87	30×25 1.90	
8,200						22×35 1.87					25.4×35 2.14	30×30 2.15	35×25 2.19
10,000		22×30 1.65	25.4×25 1.64			22×40 2.12	25.4×30 2.07	30×25 2.11		22×50 2.45	25.4×40 2.43		
12,000		22×35 1.85	25.4×30 1.85	30×25 1.89			25.4×35 2.37	30×30 2.37	35×25 2.42		25.4×50 2.78	30×35 2.70	35×30 2.76
15,000		22×40 2.12	25.4×35 2.16			22×50 2.74	25.4×40 2.71					30×40 3.13	35×35 3.16
18,000		22×50 2.45	25.4×40 2.43	30×30 2.37	35×25 2.42		25.4×50 3.11	30×35 3.02	35×30 3.09			30×50 3.64	35×40 3.61
22,000				30×35 2.73	35×30 2.79			30×40 3.46	35×35 3.49				
27,000			25.4×50 3.11	30×40 3.13				30×50 4.07	35×40 4.04				35×50 4.70
33,000					35×35 3.49								
39,000				30×50 3.99	35×40 3.96				35×50 5.16				
47,000					35×50 4.62	← Upper : Case size φD×L (mm) ← Lower : Rated ripple current (Arms) at 105°C, 120Hz							

μF	V _{dc} φD	35				50				63			
		22	25.4	30	35	22	25.4	30	35	22	25.4	30	35
1,000										22×25 1.00			
1,200										22×30 1.15	25.4×25 1.15		
1,500						22×25 1.02				22×35 1.32			
1,800						22×30 1.17	25.4×25 1.17			22×40 1.49	25.4×30 1.45	30×25 1.48	
2,200		22×25 1.10				22×35 1.33					25.4×35 1.67	30×30 1.68	35×25 1.71
2,700						22×40 1.51	25.4×30 1.47	30×25 1.50		22×50 1.92	25.4×40 1.90	30×35 1.93	
3,300		22×30 1.42	25.4×25 1.41				25.4×35 1.70	30×30 1.70	35×25 1.74		25.4×50 2.20		35×30 2.18
3,900		22×35 1.58	25.4×30 1.58			22×50 1.91	25.4×40 1.89					30×40 2.41	35×35 2.43
4,700		22×40 1.78		30×25 1.77				30×35 2.11	35×30 2.16			30×50 2.80	35×40 2.78
5,600			25.4×35 1.98	30×30 1.98	35×25 2.03		25.4×50 2.38	30×40 2.39	35×35 2.41				
6,800		22×50 2.26	25.4×40 2.24					30×50 2.79	35×40 2.78				35×50 3.55
8,200			25.4×50 2.57	30×35 2.50	35×30 2.55								
10,000				30×40 2.86	35×35 2.88				35×50 3.57				
12,000				30×50 3.32	35×40 3.30	← Upper : Case size φD×L (mm) ← Lower : Rated ripple current (Arms) at 105°C, 120Hz							
18,000					35×50 4.29								

◆STANDARD RATINGS

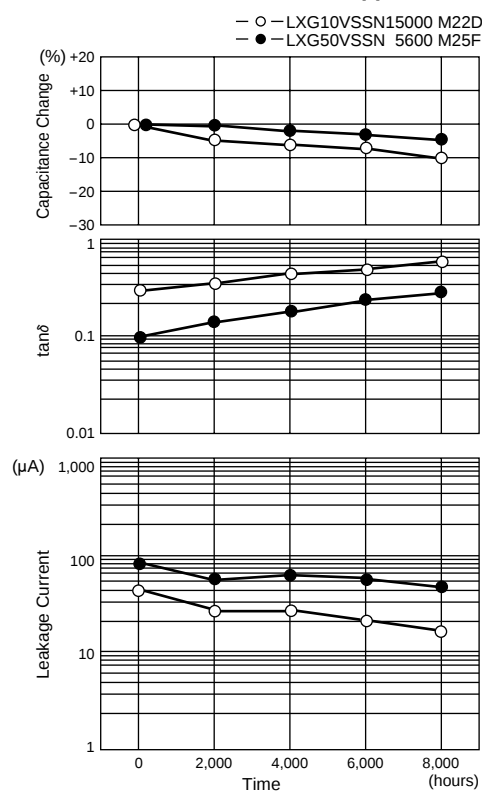
μF	V_{dc} ϕD	80				100			
		22	25.4	30	35	22	25.4	30	35
390						22×25 0.78			
470									
560						22×30 0.99	25.4×25 0.98		
680		22×25 0.97				22×35 1.12			
820		22×30 1.12				22×40 1.26	25.4×30 1.23	30×25 1.25	
1,000		22×35 1.27	25.4×25 1.23				25.4×35 1.41	30×30 1.42	35×25 1.45
1,200		22×40 1.42	25.4×30 1.39	30×25 1.41		22×50 1.60	25.4×40 1.59	30×35 1.61	
1,500			25.4×35 1.62				25.4×50 1.86	30×40 1.87	35×30 1.85
1,800		22×50 1.84	25.4×40 1.82	30×30 1.78	35×25 1.82				35×35 2.07
2,200			25.4×50 2.11	30×35 2.05	35×30 2.09			30×50 2.40	35×40 2.39
2,700				30×40 2.35	35×35 2.37				35×50 2.81
3,300				30×50 2.75	35×40 2.73				
4,700					35×50 3.46				

Upper : Case size $\phi\text{D}\times\text{L}$ (mm)
Lower : Rated ripple current (Arms) at 105°C, 120Hz

◆MAXIMUM IMPEDANCE [$\text{m}\Omega/20^\circ\text{C}$, 30kHz]

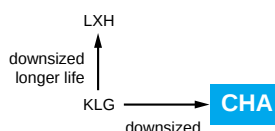
Case size $\phi\text{D}\times\text{L}$ (mm)	Case code	V_{dc}		
		10 to 63	80	100
22×25	22A	120		150
22×30	22B	100		120
22×35	22C	80		95
22×40	22D	70		80
22×50	22F	50		60
25.4×25	25A	90		110
25.4×30	25B	70		85
25.4×35	25C	60		70
25.4×40	25D	50		60
25.4×50	25F	40		45
30×25	30A	70		80
30×30	30B	50		60
30×35	30C	40		50
30×40	30D	35		40
30×50	30F	25		30
35×25	35A	65		70
35×30	35B	45		50
35×35	35C	38		40
35×40	35D	30		30
35×50	35F	23		25

●105°C Endurance with Rated Ripple Current



CHA Series

- No sparks against DC over-voltage
- Downsized from current KLG series
- Endurance with ripple current : 105°C, 2000hours
- Non solvent-proof type

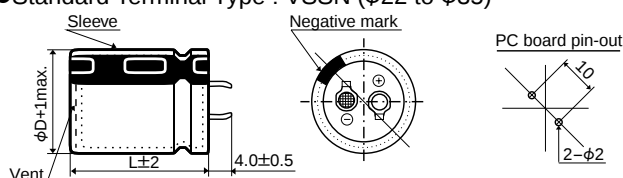


◆SPECIFICATIONS

Items	Characteristics			
Category	-25 to +105°C			
Temperature Range				
Rated Voltage Range	200 & 400V _{dc}			
Capacitance Tolerance	±20% (M) (at 20°C, 120Hz)			
Leakage Current	I=3√CV Where, I : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V _{dc}) (at 20°C after 5 minutes)			
Dissipation Factor (tanδ)	200V _{dc} : 0.15 max. (0.20 max. for ϕD=35mm) 400V _{dc} : 0.15 max. (at 20°C, 120Hz)			
Low Temperature Characteristics (Max.Impedance Ratio)	Rated Voltage (V _{dc})	200V	400V	(at 120Hz)
	Z(-25°C) / Z(+20°C)	4	4	
ESL	50nH max. (at 20°C, 1MHz)			
Endurance	The following specifications shall be satisfied when the capacitors are restored to 20°C after subjected to DC voltage with the rated ripple current is applied for 2000 hours at 105°C.			
	Capacitance change	≤±20% of the initial value		
	D.F. (tanδ)	≤200% of the initial specified value		
	Leakage current	≤The initial specified value		
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for 1000 hours at 105°C without voltage applied.			
	Capacitance change	≤±15% of the initial value		
	D.F. (tanδ)	≤150% of the initial specified value		
	Leakage current	≤The initial specified value		

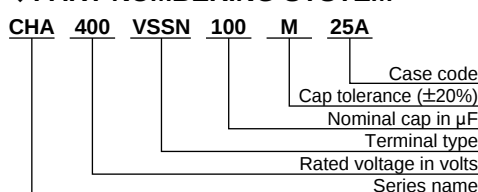
◆DIMENSIONS [mm]

- Standard Terminal Type : VSSN (φ22 to φ35)



*No plastic disk is the standard design.

◆PART NUMBERING SYSTEM



◆CASE CODE [mm]

Case code	Case size φD×L	Case code	Case size φD×L	Case code	Case size φD×L	Case code	Case size φD×L
22S	22×20						
22A	22×25	25A	25.4×25	30A	30×25	35A	35×25
22B	22×30	25B	25.4×30	30B	30×30	35B	35×30
22C	22×35	25C	25.4×35	30C	30×35	35C	35×35
22D	22×40	25D	25.4×40	30D	30×40		
		25E	25.4×45	30E	30×45		

◆RATED RIPPLE CURRENT MULTIPLIERS

- Frequency Multipliers

Frequency (Hz)	50	120	300	1k	10k	50k
200 & 400V _{dc}	0.77	1.00	1.16	1.30	1.41	1.43

◆STANDARD RATINGS

μF	V _{dc} φD	200			
		22	25.4	30	35
180	22×20 0.82	← Upper : Case size φDXL (mm) ← Lower : Rated ripple current (Arms) at 105°C, 120Hz			
220	22×20 0.90				
270	22×25 1.02				
330	22×30 1.20	25.4×25 1.20			
390	22×30 1.35	25.4×25 1.35			
470	22×35 1.45	25.4×30 1.45	30×25 1.47		
560	22×40 1.62	25.4×30 1.60	30×25 1.60		
680		25.4×35 1.82	30×30 1.81	35×25 1.86	
820		25.4×45 2.11	30×35 2.11	35×25 2.11	
1,000			30×35 2.40	35×30 2.40	
1,200			30×45 2.69	35×35 2.65	

μF	V _{dc} φD	400			
		22	25.4	30	35
56	22×20 0.45	← Upper : Case size φDXL (mm) ← Lower : Rated ripple current (Arms) at 105°C, 120Hz			
68	22×20 0.51				
82	22×25 0.58				
100	22×25 0.66	25.4×25 0.66			
120	22×30 0.76	25.4×25 0.76			
150	22×35 0.85	25.4×30 0.85	30×25 0.85		
180	22×40 0.94	25.4×35 0.95	30×25 0.95		
220		25.4×35 1.24	30×30 1.24		
270		25.4×45 1.30	30×35 1.30	35×25 1.30	
330			30×40 1.47	35×30 1.47	

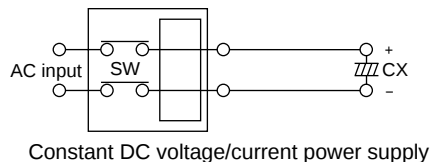
◆DC OVERVOLTAGE TEST CONDITIONS

The vent will operate and the capacitor shall become an open circuit without burning materials when the following excess DC voltage is applied.

●Test DC voltage

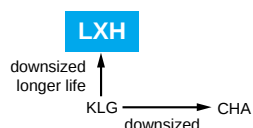
Rated Voltage	Nominal Capacitance	Current Limit	Test Voltage
200V _{dc}	<330μF	4A	300/375V _{dc}
	330≤C<470μF	5A	
	≥470μF	7A	
400V _{dc}	<100μF	2A	500/600V _{dc}
	100≤C<220μF	4A	
	≥220μF	7A	

●Test Circuit



LXH Series

- No sparks against DC over-voltage
- Same case sizes of KMH
- Endurance with ripple current : 105°C 5000 hours
- Non solvent-proof type

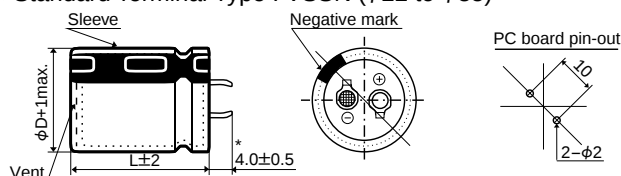


SPECIFICATIONS

Items	Characteristics						
Category							
Temperature Range	-25 to +105°C						
Rated Voltage	200 & 400V _{dc}						
Capacitance Tolerance	±20% (M) (at 20°C, 120Hz)						
Leakage Current	I=0.02CV or 3mA, whichever is smaller. Where, I : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V) (at 20°C after 5 minutes)						
Dissipation Factor (tanδ)	0.15 max. (at 20°C, 120Hz)						
Low Temperature Characteristics	Z(-25°C) / Z(+20°C) ≤ 4 (at 120Hz)						
ESL	50nH max. (at 20°C, 1MHz)						
DC Overvoltage Test	When an excessive DC voltage is applied to the capacitors under the test conditions on next page, the vent shall operate and then the capacitors shall become open-circuit without burning materials.						
Endurance	The following specifications shall be satisfied when the capacitors are restored to 20°C after subjected to DC voltage with the rated ripple current is applied for 3000 or 5000 hours at 105°C. <table border="1"> <tr> <td>Capacitance change</td><td>≤ ±20% of the initial value</td></tr> <tr> <td>D.F. (tanδ)</td><td>≤ 200% of the initial specified value</td></tr> <tr> <td>Leakage current</td><td>≤ The initial specified value</td></tr> </table>	Capacitance change	≤ ±20% of the initial value	D.F. (tanδ)	≤ 200% of the initial specified value	Leakage current	≤ The initial specified value
Capacitance change	≤ ±20% of the initial value						
D.F. (tanδ)	≤ 200% of the initial specified value						
Leakage current	≤ The initial specified value						
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for 1000 hours at 105°C without voltage applied. <table border="1"> <tr> <td>Capacitance change</td><td>≤ ±15% of the initial value</td></tr> <tr> <td>D.F. (tanδ)</td><td>≤ 150% of the initial specified value</td></tr> <tr> <td>Leakage current</td><td>≤ The initial specified value</td></tr> </table>	Capacitance change	≤ ±15% of the initial value	D.F. (tanδ)	≤ 150% of the initial specified value	Leakage current	≤ The initial specified value
Capacitance change	≤ ±15% of the initial value						
D.F. (tanδ)	≤ 150% of the initial specified value						
Leakage current	≤ The initial specified value						

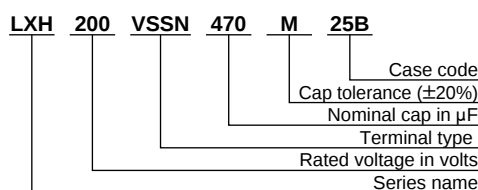
DIMENSIONS [mm]

- Standard Terminal Type : VSSN (φ22 to φ35)



* : φD=35mm : 3.5±0.5mm

PART NUMBERING SYSTEM



CASE CODE [mm]

Case code	Case size φDXL	Case code	Case size φDXL	Case code	Case size φDXL	Case code	Case size φDXL
22A	22×25	25A	25.4×25	30A	30×25	35A	35×25
22B	22×30	25B	25.4×30	30B	30×30	35B	35×30
22C	22×35	25C	25.4×35	30C	30×35	35C	35×35
22D	22×40	25D	25.4×40	30D	30×40	35D	35×40
22E	22×45	25E	25.4×45	30E	30×45	35E	35×45
22F	22×50	25F	25.4×50	30F	30×50	—	—

RATED RIPPLE CURRENT MULTIPLIERS

- Frequency Multipliers

Frequency (Hz)	50	120	300	1k	10k	50k
200V _{dc}	0.81	1.00	1.17	1.32	1.45	1.50
400V _{dc}	0.77	1.00	1.16	1.30	1.41	1.43

◆STANDARD RATINGS

μF	V _{dc} φ		200							
	22		25.4		30		35			
270	22×25		← Upper : Case size φD×L (mm)							
	0.45	0.87								
330	22×30		25.4×25							
	0.62	1.20	0.62	1.21						
390	22×35		25.4×30							
	0.67	1.31	0.66	1.28						
470	22×40		25.4×30		30×25					
	0.72	1.40	0.72	1.41	0.77	1.50				
560	22×45		25.4×35		30×30					
	0.80	1.56	0.78	1.53	0.81	1.57				
680	22×50		25.4×40		30×30		35×25			
	0.89	1.74	0.89	1.74	0.89	1.74	0.88	1.72		
820	↑ ↑		25.4×50		30×35		35×30			
			1.05	2.04	1.03	2.00	1.05	2.04		
1,000					30×45		35×35			
					1.18	2.30	1.18	2.30		
1,200					30×50		35×40			
					1.33	2.60	1.36	2.65		
1,500							35×45			
							1.57	3.08		

Rated ripple current for 3000 hours at 105°C (Arms, 120Hz)
Rated ripple current for 5000 hours at 105°C (Arms, 120Hz)

μF	V _{dc} φ	400							
		22		25.4		30		35	
68		22×25		25.4×20		← Upper : Case size φDXL (mm)			
		0.26	0.51	0.24	0.46				
82		22×30		25.4×25					
		0.30	0.58	0.30	0.58				
100		22×35		25.4×30					
		0.34	0.66	0.34	0.66				
120		22×40		25.4×30		30×25			
		0.37	0.72	0.37	0.72	0.39	0.76		
150		22×45		25.4×35		30×30			
		0.42	0.82	0.43	0.84	0.43	0.84		
180		22×50		25.4×40		30×30		35×25	
		0.49	0.95	0.48	0.94	0.47	0.92	0.48	0.94
220		↑	↑	25.4×45		30×35		35×30	
				0.55	1.07	0.54	1.06	0.55	1.08
270				25.4×50		30×40		35×30	
				0.62	1.21	0.62	1.21	0.59	1.15
330						30×45		35×35	
						0.71	1.39	0.69	1.35
390						30×50		35×40	
						0.80	1.55	0.79	1.54
470								35×45	
								0.89	1.74

Rated ripple current for 3000 hours at 105°C (Arms, 120Hz)
Rated ripple current for 5000 hours at 105°C (Arms, 120Hz)

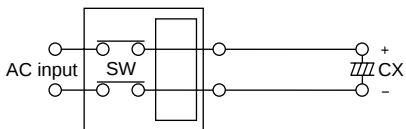
◆DC OVERVOLTAGE TEST CONDITIONS

The vent will operate and the capacitor shall become an open circuit without burning materials when the following excess DC voltage is applied.

●Test DC voltage

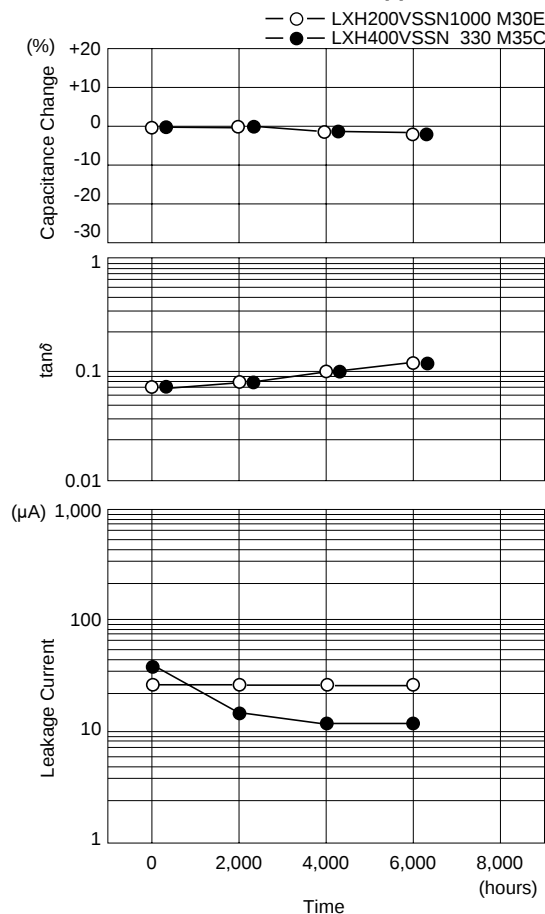
Rated Voltage	Capacitance	Current limit	Test DC voltage
200V _{dc}	<330μF	4A	300/375V _{dc}
	330≤C<470μF	5A	
	≥470μF	7A	
400V _{dc}	<100μF	2A	500/600V _{dc}
	100≤C<220μF	4A	
	≥220μF	7A	

●Test Circuit



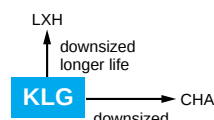
Constant DC voltage/current power supply

●105°C Endurance with Rated Ripple Current



KLG Series

- No sparks against DC over-voltage
- Same case sizes of KMG
- Endurance with ripple current : 105°C 2000 hours
- Non solvent-proof type

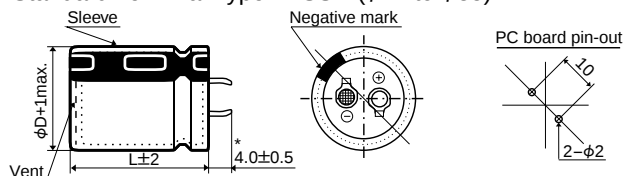


◆SPECIFICATIONS

Items	Characteristics						
Category	–25 to +105°C						
Temperature Range							
Rated Voltage Range	200 & 400V _{dc}						
Capacitance Tolerance	±20% (M) (at 20°C, 120Hz)						
Leakage Current	I=0.02CV or 3mA, whichever is smaller. Where, I : Max. leakage current (µA), C : Nominal capacitance (µF), V : Rated voltage (V) (at 20°C after 5 minutes)						
Dissipation Factor (tanδ)	200V _{dc} : 0.10 max. (0.15 max. for φD=35mm) 400V _{dc} : 0.15 max. (at 20°C, 120Hz)						
Low Temperature Characteristics	Max. Impedance Ratio : Z(–25°C)/Z(+20°C)≤4 (at 120Hz)						
ESL	50nH max. (at 20°C, 1MHz)						
DC Overvoltage Test	When an excessive DC voltage is applied to the capacitors under the test conditions on next page, the vent shall operate and then the capacitors shall become open-circuit without burning materials.						
Endurance	The following specifications shall be satisfied when the capacitors are restored to 20°C after subjected to DC voltage with the rated ripple current is applied for 2000 hours at 105°C. <table border="1"> <tr> <td>Capacitance change</td><td>≤±20% of the initial value</td></tr> <tr> <td>D.F. (tanδ)</td><td>≤200% of the initial specified value</td></tr> <tr> <td>Leakage current</td><td>≤The initial specified value</td></tr> </table>	Capacitance change	≤±20% of the initial value	D.F. (tanδ)	≤200% of the initial specified value	Leakage current	≤The initial specified value
Capacitance change	≤±20% of the initial value						
D.F. (tanδ)	≤200% of the initial specified value						
Leakage current	≤The initial specified value						
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for 1000 hours at 105°C without voltage applied. <table border="1"> <tr> <td>Capacitance change</td><td>≤±20% of the initial value</td></tr> <tr> <td>D.F. (tanδ)</td><td>≤150% of the initial specified value</td></tr> <tr> <td>Leakage current</td><td>≤The initial specified value</td></tr> </table>	Capacitance change	≤±20% of the initial value	D.F. (tanδ)	≤150% of the initial specified value	Leakage current	≤The initial specified value
Capacitance change	≤±20% of the initial value						
D.F. (tanδ)	≤150% of the initial specified value						
Leakage current	≤The initial specified value						

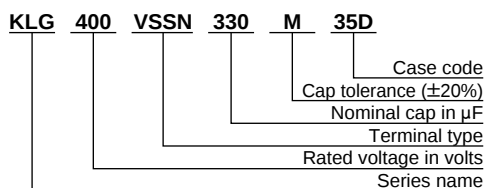
◆DIMENSIONS [mm]

- Standard Terminal Type : VSSN (φ22 to φ35)



* : φD=35mm : 3.5±0.5mm

◆PART NUMBERING SYSTEM



◆CASE CODE [mm]

Case code	Case size φDXL	Case code	Case size φDXL	Case code	Case size φDXL	Case code	Case size φDXL
22S	22×20	25S	25.4×20	—	—	—	—
22A	22×25	25A	25.4×25	30A	30×25	35A	35×25
22B	22×30	25B	25.4×30	30B	30×30	35B	35×30
22C	22×35	25C	25.4×35	30C	30×35	35C	35×35
22D	22×40	25D	25.4×40	30D	30×40	35D	35×40
22E	22×45	25E	25.4×45	30E	30×45	35E	35×45
22F	22×50	25F	25.4×50	30F	30×50	35F	35×50

◆RATED RIPPLE CURRENT MULTIPLIERS

- Frequency Multipliers

Frequency (Hz)	50	120	300	1k	10k	50k
200V _{dc}	0.81	1.00	1.17	1.32	1.45	1.50
400V _{dc}	0.77	1.00	1.16	1.30	1.41	1.43

◆STANDARD RATINGS

μF	200			
	22	25.4	30	35
100	22×20 0.50	Upper : Case size φD×L (mm) Lower : Rated ripple current (Arms) at 105°C, 120Hz		
120	22×20 0.56			
150	22×20 0.66	25.4×20 0.65		
180	22×25 0.80	25.4×20 0.70		
220	22×25 0.92	25.4×20 0.77		
270	22×30 1.00	25.4×25 1.00	30×20 1.00	
330	22×35 1.13	25.4×30 1.13		
390	22×40 1.25	25.4×30 1.18	30×25 1.20	
470	22×45 1.32	25.4×35 1.32	30×30 1.32	
560	22×50 1.52	25.4×40 1.50	30×30 1.52	35×25 1.43
680		25.4×50 1.70	30×35 1.73	35×30 1.73
820			30×40 1.93	35×35 1.93
1,000			30×50 2.20	35×40 2.20
1,200				35×45 2.41
1,500				35×50 2.82

μF	400			
	22	25.4	30	35
33	22×20 0.29	Upper : Case size φD×L (mm) Lower : Rated ripple current (Arms) at 105°C, 120Hz		
39	22×20 0.30			
47	22×25 0.36	25.4×20 0.35		
56	22×25 0.39	25.4×20 0.44		
68	22×30 0.51	25.4×25 0.49		
82	22×35 0.56	25.4×30 0.53		
100	22×40 0.61	25.4×30 0.64	30×25 0.62	
120	22×45 0.67	25.4×35 0.69	30×30 0.68	
150	22×50 0.77	25.4×40 0.78	30×30 0.76	35×25 0.74
180		25.4×45 0.83	30×35 0.82	35×30 0.90
220		25.4×50 0.93	30×40 0.91	35×35 0.99
270			30×45 1.10	35×35 1.12
330			30×50 1.24	35×40 1.25
390				35×45 1.37
470				35×50 1.50

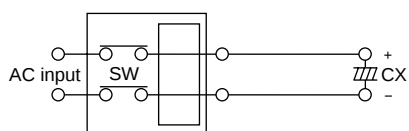
◆DC OVERVOLTAGE TEST CONDITIONS

The vent will operate and the capacitor shall become an open circuit without burning materials when the following excess DC voltage is applied.

●Test DC voltage

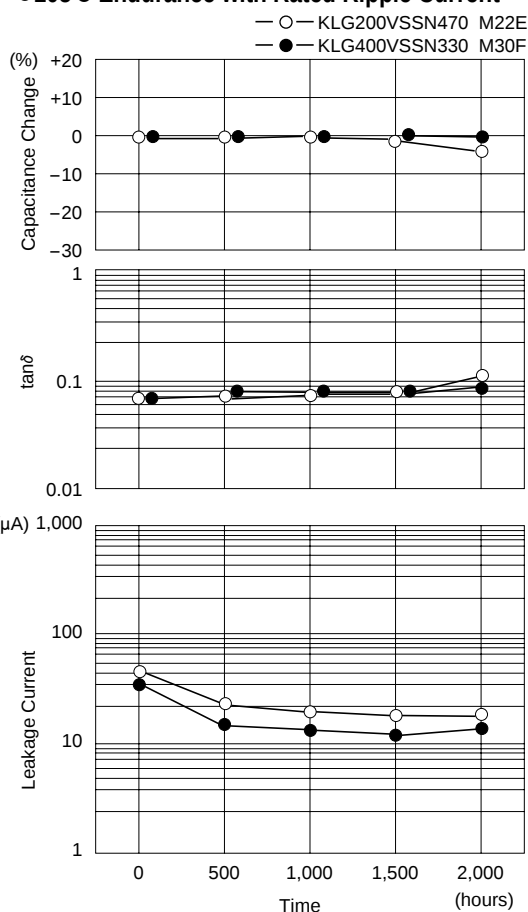
Rated Voltage	Capacitance	Current limit	Test DC voltage
200V _{dc}	<330μF	4A	300/375V _{dc}
	330≤C<470μF	5A	
	≥470μF	7A	
400V _{dc}	<100μF	2A	500/600V _{dc}
	100≤C<220μF	4A	
	≥220μF	7A	

●Test Circuit



Constant DC voltage/current power supply

●105°C Endurance with Rated Ripple Current



KSL Series

- Mechanically open-mode capacitor (no fire, smoke and electrolyte outside)
- Endurance with ripple current : 105°C 2000 hours
- Non Solvent-proof

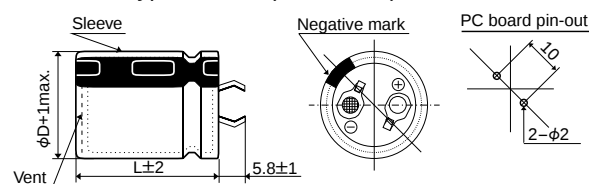


◆SPECIFICATIONS

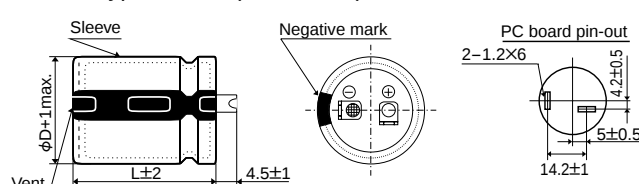
Items	Characteristics						
Category							
Temperature Range	-25 to +105°C						
Rated Voltage	200 & 400V _{dc}						
Capacitance Tolerance	±20% (M) (at 20°C, 120Hz)						
Leakage Current	$I \leq 3\sqrt{CV}$ Where, I : Max. leakage current (µA), C : Nominal capacitance (µF), V : Rated voltage (V) (at 20°C after 5 minute)						
Dissipation Factor (tanδ)	0.15max. (200V _{dc}), 0.10max. (400V _{dc}) (at 20°C, 120Hz)						
Endurance	The following specifications shall be satisfied when the capacitors are restored to 20°C after DC voltage with rated ripple current is applied for 2000 hours at 105°C. <table border="1"> <tr> <td>Capacitance change</td><td>≤±20% of the initial value</td></tr> <tr> <td>D.F. (tanδ)</td><td>≤200% of the initial specified value</td></tr> <tr> <td>Leakage current</td><td>≤The initial specified value</td></tr> </table>	Capacitance change	≤±20% of the initial value	D.F. (tanδ)	≤200% of the initial specified value	Leakage current	≤The initial specified value
Capacitance change	≤±20% of the initial value						
D.F. (tanδ)	≤200% of the initial specified value						
Leakage current	≤The initial specified value						
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for 1000 hours at 105°C without voltage applied. <table border="1"> <tr> <td>Capacitance change</td><td>≤±15% of the initial value</td></tr> <tr> <td>D.F. (tanδ)</td><td>≤150% of the initial specified value</td></tr> <tr> <td>Leakage current</td><td>≤The initial specified value</td></tr> </table>	Capacitance change	≤±15% of the initial value	D.F. (tanδ)	≤150% of the initial specified value	Leakage current	≤The initial specified value
Capacitance change	≤±15% of the initial value						
D.F. (tanδ)	≤150% of the initial specified value						
Leakage current	≤The initial specified value						

◆DIMENSIONS [mm]

- Terminal Type : VKSN (φ30 & φ35)



- Terminal Type : LTSN (φ30 & φ35)



◆PART NUMBERING SYSTEM

KSL	400	VKSN	470	M	35	
						Diameter
						Cap tolerance (±20%)
						Nominal cap in µF
						Terminal type
						Rated voltage in volts
						Series name

◆RATED RIPPLE CURRENT MULTIPLIERS

- Frequency Multipliers

Frequency (Hz)	50	120	300	1k	10k	50k
200V _{dc}	0.81	1.00	1.17	1.32	1.45	1.50
400V _{dc}	0.77	1.00	1.16	1.30	1.41	1.43

◆STANDARD RATINGS

μF	V _{dc} φD	200			400			
		30		35	30		35	
180					30×34	0.92		
220					30×39	1.06		
270					30×44	1.21	35×34	1.18
330					30×49	1.39	35×39	1.30
390					30×54	1.55	35×44	1.54
470							35×49	1.74
560		30×34	1.57				35×54	1.95
680		30×39	1.80					
820		30×44	2.00	35×34	2.04			
1,000		30×49	2.30	35×39	2.30			
1,200		30×54	2.60	35×44	2.65			
1,500				35×49	3.08			

Rated ripple current (Arms) at 105°C, 120Hz
case size φD×L (mm)

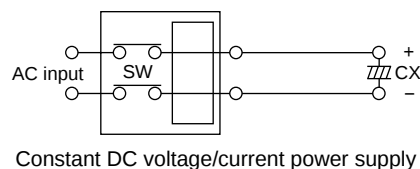
◆DC OVERVOLTAGE TEST CONDITIONS

The safety function will be operated and the capacitor shall become an open circuit without fire, smoke and electrolyte outside when the following excess DC voltage is applied.

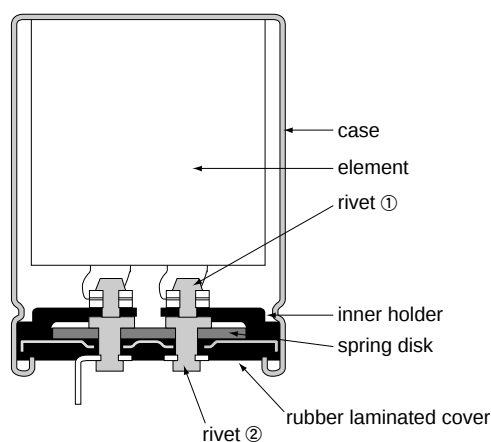
●DC voltage test

Rated Voltage	Capacitance	Current limit	Test DC voltage
200V _{dc}	< 330μF	4A	300/375V _{dc}
	330 ≤ C < 470μF	5A	
	≥ 470μF	7A	
400V _{dc}	< 100μF	2A	500/600V _{dc}
	100 ≤ C < 220μF	4A	
	≥ 220μF	7A	

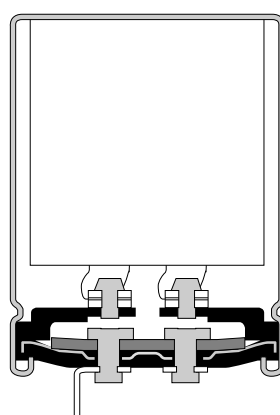
●Test circuit



◆INSIDE STRUCTURE



Before function



After function

Note : Conformal coating between the cover of the capacitors and the PC board should be avoided.

RWE-LR Series

- For high ripple current application such as air conditioning system
- Endurance with ripple current : 85°C 3000 hours
- Custom-made parts are also available upon requests

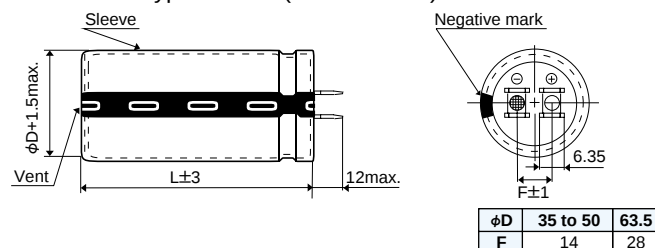


SPECIFICATIONS

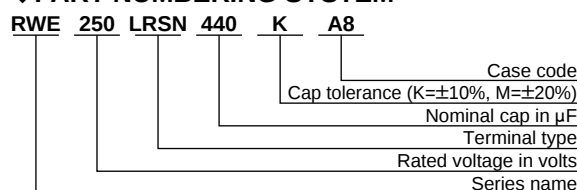
Items	Characteristics						
Category	–25 to +85°C						
Temperature Range							
Rated Voltage Range	250V _{dc} 330 to 450V _{dc}						
Capacitance Tolerance	±10% (K) (250V _{dc}) ±20% (M) (330 to 450V _{dc}) (at 20°C, 120Hz)						
Leakage Current	I=0.02CV or 3mA, whichever is smaller. Where, I : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V) (at 20°C after 5 minutes)						
Dissipation Factor (tanδ)	0.02 max. (250V _{dc}) 0.25 max. (330 to 450V _{dc}) (at 20°C, 120Hz)						
Low Temperature Characteristics	Z(–25°C)/Z(+20°C)≤4 (at 120Hz)						
Insulation Resistance	When measured between the terminals shorted each other and the mounting clamp on the insulating sleeve covering the case by using an insulation resistance meter of 500V _{dc} , the insulation shall not be less than 100MΩ.						
Insulation Withstanding Voltage	When a voltage of 1500V _{ac} is applied for 1 minute between the terminals shorted each other and the mounting clamp on the insulating sleeve covering the case, there shall not be electrical damage.						
Endurance	The following specifications shall be satisfied when the capacitors are restored to 20°C after subjected to DC voltage with the rated ripple current is applied for 3000 hours at 85°C. <table border="1"> <tr> <td>Capacitance change</td><td>≤±20% of the initial value</td></tr> <tr> <td>D.F. (tanδ)</td><td>≤200% of the initial specified value</td></tr> <tr> <td>Leakage current</td><td>≤The initial specified value</td></tr> </table>	Capacitance change	≤±20% of the initial value	D.F. (tanδ)	≤200% of the initial specified value	Leakage current	≤The initial specified value
Capacitance change	≤±20% of the initial value						
D.F. (tanδ)	≤200% of the initial specified value						
Leakage current	≤The initial specified value						
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for 1000 hours at 85°C without voltage applied. <table border="1"> <tr> <td>Capacitance change</td><td>≤±15% of the initial value</td></tr> <tr> <td>D.F. (tanδ)</td><td>≤150% of the initial specified value</td></tr> <tr> <td>Leakage current</td><td>≤The initial specified value</td></tr> </table>	Capacitance change	≤±15% of the initial value	D.F. (tanδ)	≤150% of the initial specified value	Leakage current	≤The initial specified value
Capacitance change	≤±15% of the initial value						
D.F. (tanδ)	≤150% of the initial specified value						
Leakage current	≤The initial specified value						

DIMENSIONS [mm]

- Terminal Type : LRSN (φ35 to φ63.5)



PART NUMBERING SYSTEM



STANDARD RATINGS

V_{dc} Items		250		
		Case size	Case code	Rated ripple (Arms/85°C, 60Hz)
μF	330	35×70	A7	4.5
	360	35×70	A7	4.7
	390	35×70	A7	4.9
	440	35×80	A8	5.4
	470	35×80	A8	5.6
	500	35×90	A9	6.0

V _{dc} μF Items	330			350			400		
	Case size	Case code	Rated ripple (Arms/85°C, 120Hz)	Case size	Case code	Rated ripple (Arms/85°C, 120Hz)	Case size	Case code	Rated ripple (Arms/85°C, 120Hz)
1,000	35×80	A8	3.9	35×80	A8	3.9	35×100	A10	4.2
1,300	35×100	A10	4.8	35×100	A10	4.8	40×100	B10	5.2
1,500	35×100	A10	5.2	35×110	A11	5.4	40×110	B11	5.8
	40×90	B9	5.3	40×100	B10	5.5	50×90	C9	6.0
1,800	40×100	B10	6.1	40×110	B11	6.3	50×100	C10	6.9
				50×80	C8	6.2			
2,200	40×110	B11	7.0	50×90	C9	7.3	50×110	C11	7.9

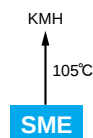
V _{dc} μF Items	420			450		
	Case size	Case code	Rated ripple (Arms/85°C, 120Hz)	Case size	Case code	Rated ripple (Arms/85°C, 120Hz)
1,000	35×110	A11	4.4	40×100	B10	4.5
1,300	40×110	B11	5.4	50×90	C9	5.6
1,500	50×90	C9	6.0	50×100	C10	6.3
1,800	50×100	C10	6.9	50×120	C12	7.5
2,200	50×120	C12	8.3	63.5×100	D10	8.7



LARGE CAPACITANCE ALUMINUM ELECTROLYTIC CAPACITORS Standard screw terminals, 85°C

SME Series

●Endurance with ripple current : 85°C 2000 hours



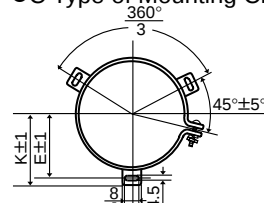
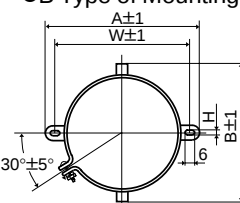
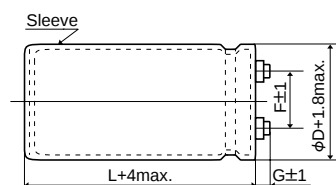
SPECIFICATIONS

Items	Characteristics						
Category							
Temperature Range	−40 to +85°C (10 to 100V _{dc}) −25 to +85°C (160 to 250V _{dc})						
Rated Voltage Range	10 to 250V _{dc}						
Capacitance Tolerance	±20% (M) (at 20°C, 120Hz)						
Leakage Current	I=0.02CV or 5mA, whichever is smaller. Where, I : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V) (at 20°C after 5 minutes)						
Dissipation Factor (tanδ)	Shall not exceed the values shown in the STANDARD RATINGS (at 20°C, 120Hz)						
Low Temperature Characteristics	Capacitance change $C(-25^{\circ}\text{C})/C(+20^{\circ}\text{C}) \geq 0.7$ (at 120Hz)						
Insulation Resistance	When measured between the terminals shorted each other and the mounting clamp on the insulating sleeve covering the case by using an insulation resistance meter of 500V _{dc} , the insulation resistance shall not be less than 100MΩ.						
Insulation Withstanding Voltage	When a voltage of 2000Vac is applied for 1 minute between the terminals shorted each other and the mounting clamp on the insulating sleeve covering the case, there shall not be electrical damage.						
Endurance	The following specifications shall be satisfied when the capacitors are restored to 20°C after subjected to DC voltage with the rated ripple current is applied for 2000 hours at 85°C. <table border="1"> <tr> <td>Capacitance change</td><td>≤±20% of the initial value</td></tr> <tr> <td>D.F. (tanδ)</td><td>≤200% of the initial specified value</td></tr> <tr> <td>Leakage current</td><td>≤The initial specified value</td></tr> </table>	Capacitance change	≤±20% of the initial value	D.F. (tanδ)	≤200% of the initial specified value	Leakage current	≤The initial specified value
Capacitance change	≤±20% of the initial value						
D.F. (tanδ)	≤200% of the initial specified value						
Leakage current	≤The initial specified value						
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for 500 hours at 85°C without voltage applied. <table border="1"> <tr> <td>Capacitance change</td><td>≤±20% of the initial value</td></tr> <tr> <td>D.F. (tanδ)</td><td>≤150% of the initial specified value</td></tr> <tr> <td>Leakage current</td><td>≤The initial specified value</td></tr> </table>	Capacitance change	≤±20% of the initial value	D.F. (tanδ)	≤150% of the initial specified value	Leakage current	≤The initial specified value
Capacitance change	≤±20% of the initial value						
D.F. (tanδ)	≤150% of the initial specified value						
Leakage current	≤The initial specified value						

DIMENSIONS (Terminal Type=LGSN) [mm]

●B Type of Mounting Clamp

●C Type of Mounting Clamp



φD	A	B	W	H	F
35	58	44	48	3.5	12.7
50	78	64	68	4.5	22.4
63.5	90	76	80	4.5	28.0
76	104.5	90	93.5	4.5	31.5

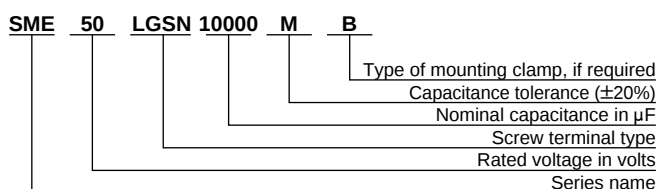
φD	E	K	J	F
50	32.5	37.0	14.0	22.4
63.5	38.1	43.5	14.0	28.0
76	44.5	50.0	14.0	31.5
89	50.8	56.5	16.0	31.5

φ35 to φ63.5 : G=6
φ76 & φ89 : G=5

<Screw specifications>
Plus hexagon-headed screw:
M5×0.8×10
Maximum screw tightening torque:
3.23Nm

* The screw and the mounting clamp are separately supplied and not attached to the product.

PART NUMBERING SYSTEM



CASE CODE

φD (mm)	50	80	100	120	140
35	A5	A8	A10	A12	—
50	—	C8	C10	C12	—
63.5	—	—	D10	D12	—
76	—	—	E10	E12	E14
89	—	—	—	—	F14

RATED RIPPLE CURRENT MULTIPLIERS

●Frequency Multipliers

Rated voltage (V _{dc})	Case diameter (mm)	Frequency (Hz)					
		50	120	300	1k	10k	50k
10 to 50	φ35 to φ89	0.95	1.00	1.03	1.05	1.09	1.12
	φ35	0.90	1.00	1.06	1.10	1.18	1.22
63 & 80	φ50 to φ89	0.95	1.00	1.03	1.05	1.09	1.12
	φ35	0.82	1.00	1.12	1.22	1.30	1.33
100	φ50	0.90	1.00	1.06	1.10	1.18	1.22
	φ63.5 to φ89	0.95	1.00	1.03	1.05	1.09	1.12
160 to 250	φ35	0.80	1.00	1.19	1.34	1.46	1.52
	φ50 & φ63.5	0.81	1.00	1.14	1.26	1.36	1.41
	φ76 & φ89	0.82	1.00	1.12	1.22	1.30	1.33

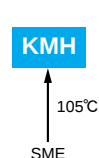
◆STANDARD RATINGS

μF	V _{dc} SV			10			16			25			35			50			63			80		
				13			20			32			44			63			79			100		
3,300																						A 5	2.5	0.15
3,900																								
4,700																								
5,600																			A 5	3.0	0.20			
6,800																						A 8	3.7	0.20
8,200																								
10,000																A 5	4.1	0.25	A 8	4.0	0.25	A10	4.9	0.20
12,000																						A12	5.4	0.20
15,000													A 5	3.9	0.30				A10	5.3	0.25	C 8	6.0	0.25
18,000																A 8	5.2	0.25	A12	6.2	0.25			
22,000																A10	5.9	0.30	C 8	6.5	0.30	C10	7.1	0.30
27,000							A 5	4.2	0.45							A12	6.6	0.35				C12	8.6	0.30
33,000													A 8	6.0	0.40				C10	8.1	0.35	D10	9.3	0.35
39,000	A 5	4.7	0.60							A 8	6.2	0.40	A10	7.0	0.40	C 8	7.4	0.40	C12	9.6	0.35			
47,000										A10	7.4	0.40	A12	8.0	0.45				D10	10.2	0.40	D12	12.0	0.35
56,000							A 8	6.5	0.60	A12	8.3	0.45				C10	9.8	0.40						
68,000													C 8	9.0	0.50	C12	11.1	0.45	D12	13.3	0.40	E12	15.4	0.35
82,000	A 8	7.4	0.60	A10	8.0	0.70	C 8	9.7	0.50	C10	10.3	0.55	D10	12.2	0.50							E14	18.1	0.35
100,000	A10	8.0	0.70	A12	9.6	0.70	C10	10.8	0.60	C12	12.8	0.60	D10	14.0	0.70	E12	16.0	0.50	E14	19.0	0.50			
120,000	A12	9.4	0.70	C 8	9.6	0.80	C12	12.8	0.60				D10	14.0	0.70	E12	18.1	0.60	F14	22.0	0.55			
150,000	C 8	9.8	0.90	C10	11.2	0.90																		
180,000										D10	14.7	0.75	D12	16.6	0.70	E14	19.5	0.70						
220,000	C10	12.1	1.00	C12	14.2	1.00	D12	16.8	0.80	E10	17.3	0.75												
270,000	C12	13.6	1.20	D10	15.3	1.20	E10	18.3	0.90	E12	19.8	0.80	F14	24.6	0.80									
330,000							D12	17.1	1.30	E12	20.7	1.00	E14	22.5	0.90									
390,000	D10	15.3	1.50	E10	18.0	1.60	E14	22.1	1.20															
470,000	D12	16.0	2.00	E12	19.3	1.80							F14	28.3	1.00									
560,000	E10	17.3	2.50	E14	20.7	2.00	F14	25.8	1.50															
680,000	E12	18.7	3.00																					

μF	V _{dc} SV			100			160			200			250		
				125			200			250			300		
560										A 5	1.3	0.15			
680															
820										A 5	1.6	0.15			
1,000															
1,200							A 5	2.0	0.15				A 8	2.3	0.15
1,500													A10	3.0	0.15
1,800										A 8	2.8	0.15	A12	3.3	0.15
2,200	A 5	2.5	0.10	A 8	3.4	0.15	A10	3.6	0.15	C 8	3.7	0.15			
2,700				A10	3.7	0.15	A12	4.0	0.15						
3,300				A12	4.5	0.15	C 8	4.5	0.15	C10	5.1	0.15			
3,900										C12	5.9	0.15			
4,700	A 8	3.4	0.15	C 8	5.6	0.20	C10	7.1	0.15	D10	6.9	0.20			
5,600										C12	8.2	0.15			
6,800	A10	4.2	0.15	C10	7.5	0.20							D12	8.7	0.20
8,200	A12	5.0	0.15	C12	8.1	0.20	D10	10.0	0.20						
10,000	C 8	5.2	0.20	D10	9.8	0.20	D12	11.0	0.20	E12	11.1	0.20			
12,000							D12	10.8	0.20	E10	11.5	0.20	E14	13.0	0.20
15,000							E10	12.7	0.20	E12	12.8	0.20	F14	14.9	0.20
18,000	C12	8.1	0.20	E12	14.0	0.20	E14	15.0	0.20						
22,000	D10	8.6	0.25	E14	16.6	0.20	F14	15.6	0.25						
27,000	D12	10.3	0.25												
33,000	E10	11.1	0.25	F14	18.9	0.25									
39,000	E12	12.4	0.25												
47,000	E14	14.3	0.25												
68,000	F14	18.0	0.30												

KMH Series

- Downsized from KME series
- Endurance with ripple current : 105°C 2000 hours



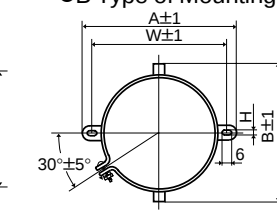
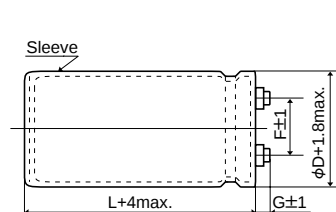
SPECIFICATIONS

Items	Characteristics						
Category	–40 to +105°C (10 to 100V _{dc}) –25 to +105°C (160 to 400V _{dc})						
Temperature Range							
Rated Voltage Range	10 to 400V _{dc}						
Capacitance Tolerance	±20% (M) (at 20°C, 120Hz)						
Leakage Current	I=0.02CV or 5mA, whichever is smaller. Where, I : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V) (at 20°C after 5 minutes)						
Dissipation Factor (tanδ)	Shall not exceed the values shown in the STANDARD RATINGS (at 20°C, 120Hz)						
Low Temperature Characteristics	Capacitance change 10 to 100V _{dc} : C(–40°C)/C(+20°C)≥0.6 160 to 400V _{dc} : C(–25°C)/C(+20°C)≥0.7 (at 120Hz)						
Insulation Resistance	When measured between the terminals shorted each other and the mounting clamp on the insulating sleeve covering the case by using an insulation resistance meter of 500V _{dc} , the insulation resistance shall not be less than 100MΩ.						
Insulation Withstanding Voltage	When a voltage of 2000Vac is applied for 1 minute between the terminals shorted each other and the mounting clamp on the insulating sleeve covering the case, there shall not be electrical damage.						
Endurance	The following specifications shall be satisfied when the capacitors are restored to 20°C after subjected to DC voltage with the rated ripple current is applied for 2000 hours at 105°C. <table border="1"> <tr> <td>Capacitance change</td><td>≤±20% of the initial value</td></tr> <tr> <td>D.F. (tanδ)</td><td>≤200% of the initial specified value</td></tr> <tr> <td>Leakage current</td><td>≤The initial specified value</td></tr> </table>	Capacitance change	≤±20% of the initial value	D.F. (tanδ)	≤200% of the initial specified value	Leakage current	≤The initial specified value
Capacitance change	≤±20% of the initial value						
D.F. (tanδ)	≤200% of the initial specified value						
Leakage current	≤The initial specified value						
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for 500 hours at 105°C without voltage applied. <table border="1"> <tr> <td>Capacitance change</td><td>≤±20% of the initial value</td></tr> <tr> <td>D.F. (tanδ)</td><td>≤200% of the initial specified value</td></tr> <tr> <td>Leakage current</td><td>≤The initial specified value</td></tr> </table>	Capacitance change	≤±20% of the initial value	D.F. (tanδ)	≤200% of the initial specified value	Leakage current	≤The initial specified value
Capacitance change	≤±20% of the initial value						
D.F. (tanδ)	≤200% of the initial specified value						
Leakage current	≤The initial specified value						

DIMENSIONS (Terminal Type=LGSN) [mm]

●B Type of Mounting Clamp

●C Type of Mounting Clamp



φ35 to φ63.5 : G=6
φ76 & φ89 : G=5

φD	A	B	W	H	F
35	58	44	48	3.5	12.7
50	78	64	68	4.5	22.4
63.5	90	76	80	4.5	28.0
76	104.5	90	93.5	4.5	31.5

φD	E	K	J	F
50	32.5	37.0	14.0	22.4
63.5	38.1	43.5	14.0	28.0
76	44.5	50.0	14.0	31.5
89	50.8	56.5	16.0	31.5

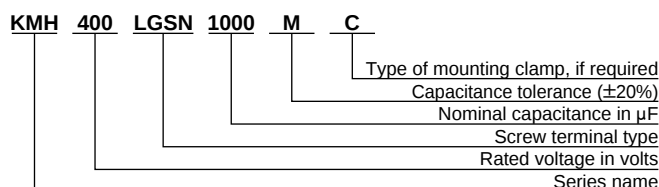
<Screw specifications>

Plus hexagon-headed screw:
M5×0.8×10

Maximum screw tightening torque:
3.23Nm

* The screw and the mounting clamp are separately supplied and not attached to the product.

PART NUMBERING SYSTEM



CASE CODE

φD (mm)	L (mm)	50	60	80	100	120	130	140
35	A5	A6	A8	A10	A12	—	—	—
50	—	—	C8	C10	C12	—	—	—
63.5	—	—	—	D10	D12	—	—	—
76	—	—	—	E10	E12	E13	E14	—
89	—	—	—	—	—	—	—	F14

RATED RIPPLE CURRENT MULTIPLIERS

●Frequency Multipliers

Rated voltage (V _{dc})	Case diameter (mm)	Frequency (Hz)					
		50	120	300	1k	10k	50k
10 to 50	φ35 to φ89	0.95	1.00	1.03	1.05	1.09	1.12
	φ35	0.90	1.00	1.06	1.10	1.18	1.22
63 & 80	φ50 to φ89	0.95	1.00	1.03	1.05	1.09	1.12
	φ35	0.82	1.00	1.12	1.22	1.30	1.33
100	φ50	0.90	1.00	1.06	1.10	1.18	1.22
	φ63.5 to φ89	0.95	1.00	1.03	1.05	1.09	1.12
160 to 250	φ35	0.80	1.00	1.19	1.34	1.46	1.52
	φ50 & φ63.5	0.81	1.00	1.14	1.26	1.36	1.41
315 to 400	φ76 & φ89	0.82	1.00	1.12	1.22	1.30	1.33
	φ35 to φ89	0.80	1.00	1.19	1.34	1.46	1.52

◆STANDARD RATINGS

V_{dc} SV μF	10			16			25			35			50			63			80				
	13			20			32			44			63			79			100				
2,200																		A 5	2.4	0.15			
2,700																		A 5	2.3	0.20	A 5	2.7	0.15
3,300																		A 5	2.5	0.20	A 5	3.0	0.15
3,900																		A 5	2.8	0.20	A 6	3.4	0.15
4,700																		A 5	3.1	0.20	A 6	3.7	0.15
5,600																		A 5	3.3	0.20	A 6	4.5	0.15
6,800																		A 5	3.3	0.25	A 6	4.9	0.15
8,200																		A 6	3.8	0.25	A 8	5.1	0.20
10,000																		A 8	4.6	0.25	A 8	6.1	0.20
12,000																		A 10	5.5	0.25	C 8	6.7	0.20
15,000																		A 12	6.6	0.25	C 10	8.3	0.20
18,000																		C 8	7.4	0.25	C 12	9.9	0.20
22,000																		C 10	9.0	0.25	C 12	11.0	0.20
27,000	A 5	4.9	0.45	A 6	5.5	0.40	A 8	6.4	0.35	A 10	7.5	0.30	C 8	9.1	0.25	C 12	10.9	0.25	D 10	11.4	0.25		
33,000	A 5	5.1	0.50	A 6	5.7	0.45	A 8	6.7	0.40	A 12	9.0	0.30	C 10	11.1	0.25	C 12	12.0	0.25	E 10	13.9	0.25		
39,000	A 6	5.9	0.50	A 8	6.8	0.45	A 10	7.8	0.40	C 8	9.2	0.35	C 12	13.1	0.25	D 10	12.5	0.30	E 10	13.9	0.30		
47,000	A 8	7.1	0.50	A 8	7.1	0.50	A 12	9.3	0.40	C 10	11.2	0.35	C 12	13.9	0.30	D 12	14.9	0.30	E 12	16.5	0.30		
56,000	A 8	7.1	0.60	A 10	8.4	0.50	C 8	9.7	0.45	C 10	11.4	0.40	D 10	13.9	0.35	D 12	16.3	0.30	E 12	18.1	0.30		
68,000	A 10	8.5	0.60	A 10	8.8	0.55	C 10	11.2	0.45	C 12	13.6	0.40	D 12	16.6	0.35	E 12	18.4	0.35	E 14	19.7	0.35		
82,000	A 10	8.9	0.65	C 8	10.7	0.55	C 10	11.2	0.50	D 10	14.8	0.45	E 12	18.9	0.40	E 14	20.0	0.40	F 14	22.1	0.40		
100,000	A 12	10.7	0.65	C 8	10.8	0.65	C 12	14.8	0.50	D 12	17.6	0.45	E 12	19.5	0.45	E 14	20.0	0.50					
120,000	C 8	11.0	0.75	C 10	13.1	0.65	D 10	14.9	0.65	D 12	17.6	0.55	E 12	19.5	0.55	F 14	21.8	0.60					
150,000	C 10	13.2	0.80	C 12	15.3	0.70	D 12	17.9	0.65	E 12	19.8	0.65	F 14	23.9	0.60								
180,000	C 12	15.7	0.80	C 12	15.7	0.80	D 12	17.9	0.80	E 12	19.8	0.80	F 14	23.9	0.75								
220,000	C 12	16.8	0.85	D 12	19.2	0.85	E 12	21.3	0.85	E 14	23.4	0.80											
270,000	D 12	19.6	1.00	D 12	19.6	1.00	E 12	21.7	1.00	F 14	25.5	1.00											
330,000	D 12	19.7	1.20	E 12	21.1	1.30	E 14	23.4	1.20														
390,000	E 12	21.3	1.50	E 12	21.3	1.50	F 14	24.9	1.50														
470,000	E 12	21.4	1.80	E 14	24.2	1.60																	
560,000	E 14	23.6	2.00	F 14	28.1	2.00																	
680,000	F 14	26.0	2.40	F 14	28.5	2.40																	

V _{dc} SV	100			160			200			250			315			350			400		
	125			200			250			300			365			400			450		
μF																					
180													A 5	0.8	0.10	A 5	0.8	0.10	A 5	0.8	0.10
220													A 5	0.9	0.10	A 5	0.9	0.10	A 5	0.9	0.10
270													A 5	1.0	0.10	A 5	1.0	0.10	A 5	1.0	0.10
330													A 5	1.1	0.10	A 5	1.1	0.10	A 6	1.2	0.10
390													A 5	1.2	0.10	A 6	1.3	0.10	A 6	1.3	0.10
470													A 5	1.1	0.15	A 6	1.4	0.10	A 8	1.4	0.10
560				A 5	1.2	0.15	A 5	1.2	0.15	A 5	1.2	0.15	A 6	1.5	0.10	A 8	1.6	0.10	A 8	1.4	0.15
680				A 5	1.3	0.15	A 5	1.3	0.15	A 6	1.4	0.15	A 8	1.7	0.10	A 8	1.6	0.15	A 10	1.7	0.15
820				A 5	1.4	0.15	A 5	1.4	0.15	A 8	1.6	0.15	A 8	1.7	0.15	A 10	1.8	0.15	A 12	2.0	0.15
1,000				A 5	1.6	0.15	A 6	1.7	0.15	A 8	1.6	0.20	A 10	2.0	0.15	A 12	2.2	0.15	C 8	2.2	0.15
1,200				A 6	1.9	0.15	A 6	1.9	0.15	A 8	1.8	0.20	A 12	2.4	0.15	C 8	2.4	0.15	C 10	2.7	0.15
1,500				A 6	2.1	0.15	A 8	2.3	0.15	A 10	2.1	0.20	C 8	2.7	0.15	C 10	3.0	0.15	C 12	3.3	0.15
1,800	A 5	2.7	0.10	A 8	2.5	0.15	A 8	2.5	0.15	A 12	2.5	0.20	C 10	3.3	0.15	C 12	3.6	0.15			
2,200	A 5	3.0	0.10	A 8	2.8	0.15	A 10	3.0	0.15	C 8	2.9	0.20	C 12	4.0	0.15	C 12	4.0	0.15	D 10	4.2	0.15
2,700	A 6	3.5	0.10	A 10	3.3	0.15	A 12	3.6	0.15	C 10	3.5	0.20	C 12	4.4	0.15	D 10	4.6	0.15			
3,300	A 8	4.2	0.10	A 12	3.8	0.15	C 8	4.1	0.15	C 12	4.2	0.20	D 10	5.1	0.15				D 12	5.5	0.15
3,900	A 8	4.2	0.12	C 8	3.8	0.20	C 10	4.9	0.15	C 12	4.6	0.20	D 12	6.0	0.15	E 12	6.7	0.15			
4,700	A 10	5.0	0.12	C 10	4.6	0.20	D 10	5.3	0.20	D 12	5.7	0.20	E 10	6.8	0.15				E 13	7.6	0.15
5,600	A 10	5.4	0.12	C 10	5.1	0.20	D 10	5.8	0.20	D 12	6.3	0.20	E 12	8.0	0.15	E 13	8.3	0.15	F 14	9.4	0.15
6,800	A 12	5.8	0.15	C 12	6.1	0.20	D 12	6.9	0.20	E 12	7.7	0.20	E 13	9.2	0.15	E 14	9.5	0.15	F 14	10.4	0.15
8,200	C 8	6.4	0.15	D 10	7.0	0.20	D 12	7.6	0.20	E 12	8.4	0.20	F 14	11.4	0.15	F 14	11.4	0.15			
10,000	C 10	7.8	0.15	D 12	8.4	0.20	E 12	9.3	0.20	E 14	10.0	0.20	F 14	12.6	0.15						
12,000	C 12	9.3	0.15	E 10	9.4	0.20	E 12	10.2	0.20	F 14	11.9	0.20									
15,000	C 12	10.4	0.15	E 12	11.4	0.20	E 14	12.2	0.20												
18,000	D 10	10.4	0.20	E 14	13.4	0.20	F 14	13.1	0.25												
22,000	D 12	12.5	0.20	F 14	14.5	0.25															
27,000	E 12	13.7	0.25	F 14	16.0	0.25															
33,000	E 12	15.2	0.25																		
39,000	E 14	16.1	0.30																		
47,000	F 14	19.3	0.30																		
56,000	F 14	21.1	0.30																		

FTP Series

- Ideal for inverter smoothing capacitors such as Electric Vehicle, Hybrid Car, etc.
- Endurance with ripple current : 85°C 5000 hours
- Rated voltage range : 63 to 450V_{dc}
- Lower profile offers drastic space saving comparing to conventional cylindrical type
- Superior heat radiation realizes higher ripple current

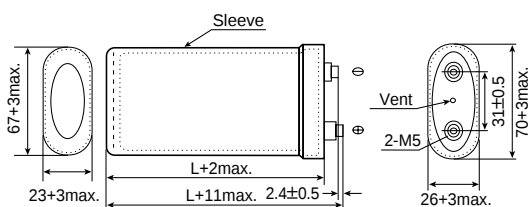


SPECIFICATIONS

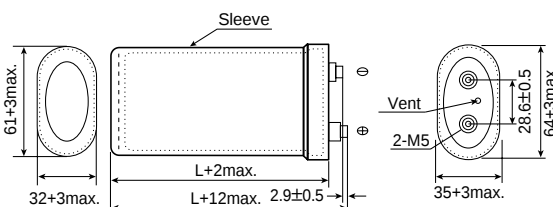
Items	Characteristics						
Category							
Temperature Range	-40 to +85°C (63~100V _{dc}), -25 to +85°C (350~450V _{dc})						
Rated Voltage Range	63 to 450V _{dc}						
Capacitance Tolerance	±20% (M) (at 20°C, 120Hz)						
Leakage Current	I=0.02CV or 5mA, whichever is smaller. Where, I : Max. leakage current (µA), C : Nominal capacitance (µF), V : Rated voltage (V) (at 20°C after 5 minutes)						
Dissipation Factor (tanδ)	0.25 max. (at 20°C, 120Hz)						
Low Temperature Characteristics	Capacitance change 63 to 100V _{dc} : C(-40°C)/C(+20°C)≥0.6 350 to 450V _{dc} : C(-25°C)/C(+20°C)≥0.7 (at 120Hz)						
Endurance	The following specifications shall be satisfied when the capacitors are restored to 20°C after subjected to DC voltage with the rated ripple current is applied for 5000 hours at 85°C. <table border="1"> <tr> <td>Capacitance change</td><td>≤±20% of the initial value</td></tr> <tr> <td>D.F. (tanδ)</td><td>≤200% of the initial specified value</td></tr> <tr> <td>Leakage current</td><td>≤The initial specified value</td></tr> </table>	Capacitance change	≤±20% of the initial value	D.F. (tanδ)	≤200% of the initial specified value	Leakage current	≤The initial specified value
Capacitance change	≤±20% of the initial value						
D.F. (tanδ)	≤200% of the initial specified value						
Leakage current	≤The initial specified value						
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for 1000 hours at 85°C without voltage applied. <table border="1"> <tr> <td>Capacitance change</td><td>≤±20% of the initial value</td></tr> <tr> <td>D.F. (tanδ)</td><td>≤200% of the initial specified value</td></tr> <tr> <td>Leakage current</td><td>≤The initial specified value</td></tr> </table>	Capacitance change	≤±20% of the initial value	D.F. (tanδ)	≤200% of the initial specified value	Leakage current	≤The initial specified value
Capacitance change	≤±20% of the initial value						
D.F. (tanδ)	≤200% of the initial specified value						
Leakage current	≤The initial specified value						

DIMENSIONS (Terminal Type=LGSN) [mm]

●26×70 size



●35×64 size

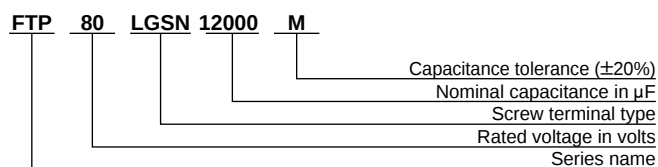


<Screw specifications>

Plus hexagon-headed screw: M5×0.8

Maximum screw tightening torque: 3.23Nm

PART NUMBERING SYSTEM



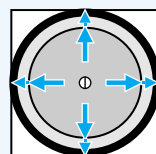
◆STANDARD RATINGS

Case size S.Dia×L.Dia×L(mm)	Vdc	63		80		100	
	SV	79		100		125	
	Items	Capacitance (μF) 20°C, 120Hz	Rated ripple current (Arms) 85°C, 10kHz	Capacitance (μF) 20°C, 120Hz	Rated ripple current (Arms) 85°C, 10kHz	Capacitance (μF) 20°C, 120Hz	Rated ripple current (Arms) 85°C, 10kHz
26×70×50		6,000	14.0	4,300	14.0	2,900	14.0
26×70×75		12,000	19.0	8,600	19.0	5,700	19.0
26×70×95		17,000	22.0	12,000	22.0	8,100	22.0
35×64×50		7,400	16.1	5,300	16.1	3,600	16.1
35×64×75		15,000	21.7	10,000	21.7	7,100	21.7
35×64×95		21,000	25.3	15,000	25.3	10,000	25.3

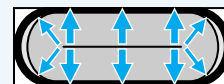
Case size S.Dia×L.Dia×L(mm)	Vdc	350		400		450	
	SV	400		450		500	
	Items	Capacitance (μF) 20°C, 120Hz	Rated ripple current (Arms) 85°C, 10kHz	Capacitance (μF) 20°C, 120Hz	Rated ripple current (Arms) 85°C, 10kHz	Capacitance (μF) 20°C, 120Hz	Rated ripple current (Arms) 85°C, 10kHz
26×70×50		400	10.6	330	10.6	270	10.1
26×70×75		800	15.7	660	15.7	540	15.0
26×70×95		1,100	18.7	930	18.7	760	18.0
35×64×50		490	11.9	400	11.9	330	11.4
35×64×75		970	17.6	800	17.6	660	16.7
35×64×95		1,400	21.0	1,100	21.0	930	20.1

◆Improvement of space factor and heat radiation

Dead spaces are found for the conventional cylindrical shape. But lower profile offers small dead spaces, and makes the equipments smaller in size. Moreover, the internal element of the lower profile capacitor is widely touched to the can. This largely improves the heat radiation compared to the cylindrical shape.



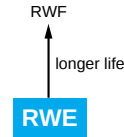
Cylindrical shape



FTP series

RWE Series

- Rated voltage range : 350 to 550V_{dc}
- Endurance with ripple current : 85°C 2000 hours

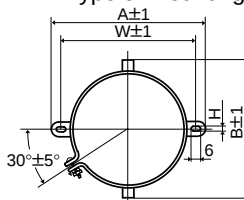
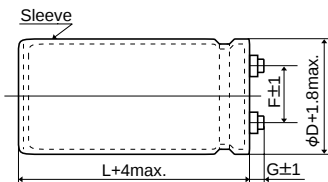


SPECIFICATIONS

Items	Characteristics				
Category	Temperature Range				
Rated Voltage Range	350 to 550V _{dc}				
Capacitance Tolerance	±20% (M) (at 20°C, 120Hz)				
Leakage Current	I=0.02CV or 5mA, whichever is smaller. Where, I : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V) (at 20°C after 5 minutes)				
Dissipation Factor (tanδ)	0.25 max. (at 20°C, 120Hz)				
Low Temperature Characteristics	Capacitance change	Rated Voltage (V _{dc})	350 to 450V	500 & 550V	(at 120Hz)
		C(−25°C)/C(+20°C)	≥0.7	≥0.6	
Insulation Resistance	When measured between the terminals shorted each other and the mounting clamp on the insulating sleeve covering the case by using an insulation resistance meter of 500V _{dc} , the insulation resistance shall not be less than 100MΩ.				
Insulation Withstanding Voltage	When a voltage of 2000Vac is applied for 1 minute between the terminals shorted each other and the mounting clamp on the insulating sleeve covering the case, there shall not be electrical damage.				
Endurance	The following specifications shall be satisfied when the capacitors are restored to 20°C after subjected to DC voltage with the rated ripple current is applied for 2000 hours at 85°C.				
	Capacitance change	≤±20% of the initial value			
	D.F. (tanδ)	≤300% of the initial specified value			
	Leakage current	≤The initial specified value			
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for 500 hours at 85°C without voltage applied.				
	Capacitance change	≤±20% of the initial value			
	D.F. (tanδ)	≤300% of the initial specified value			
	Leakage current	≤The initial specified value			

DIMENSIONS (Terminal Type=LGSN) [mm]

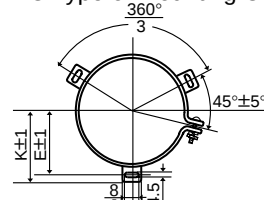
●B Type of Mounting Clamp



φD	A	B	W	H	F
35	58	44	48	3.5	12.7
50	78	64	68	4.5	22.4
63.5	90	76	80	4.5	28.0
76	104.5	90	93.5	4.5	31.5

φ35 to φ63.5 : G=6
φ76 & φ89 : G=5

●C Type of Mounting Clamp



φD	E	K	F	J
50	32.5	37.0	22.4	14.0
63.5	38.1	43.5	28.0	14.0
76	44.5	50.0	31.5	14.0
89	50.8	56.5	31.5	16.0

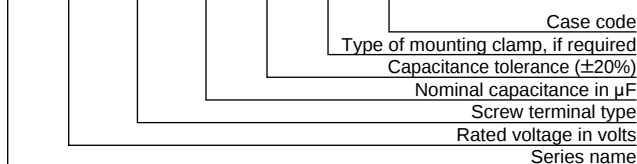
<Screw specifications>

Plus hexagon-headed screw:
M5×0.8×10
Maximum screw tightening torque:
3.23Nm

* The screw and the mounting clamp are separately supplied and not attached to the product.

PART NUMBERING SYSTEM

RWE 550 LGSN 820 M C C13



◆STANDARD RATINGS

μF \ V_{dc}	350				400				450				500				550									
100	Case code Rated ripple current (Arms) at 85°C, 120Hz																A5		0.6							
120													A5		0.7											
180																	A8		1.0							
270													A5		1.6		A8		1.2		A10		1.3			
330											A5		1.7				A10		1.4		A12		1.6			
390	A5		1.9								A12		1.7		C7		1.7									
470							A8		2.4		C7		1.8													
560					A8		2.7								C9		D9		2.1		2.5					
680	A8		2.9						A10		3.1		C9		2.5		C11		D11		2.7		3.0			
820					A10		3.4		A12		3.5		C11		2.9		C13		D13		3.1		3.5			
1,000	A10		3.8		A12		3.9		C7		3.9		C13		D9		3.4		3.4							
1,200	A12		4.2		C7		4.2		C9		4.7								E9		4.2					
1,500	C7		4.7						C11		5.6		D11		E9		4.5		4.6		E11		5.0			
1,800					C9		5.7		C13		6.5		D13		5.2				E13		5.8					
2,200	C9		6.3		C13		7.2		D9		7.2		E11		6.1				E15		7.0					
2,700					D9		7.9		D11		8.6		E15		7.7											
3,300	C13		D9		8.8		8.8		D11		9.5		D13		E9		10.0		9.8				F15		9.3	
3,900	D11		10.3		D13		E9		10.9		10.6		E11		11.5		F15		10.1							
4,700	D13		E9		12.0		11.7		E11		12.6		E13		13.3											
5,600	E11		12.6		E13		14.5		E15		15.7															
6,800	E13		15.9		E15		17.3																			
8,200	E15		19.0						F15		18.6															
10,000					F15		20.5																			
12,000	F15		22.5																							

◆CASE CODE

φD (mm) \ L (mm)	50	75	80	96	100	115	120	130	155
35	A5	—	A8	—	A10	—	A12	—	—
50	—	C7	—	C9	—	C11	—	C13	—
63.5	—	—	—	D9	—	D11	—	D13	—
76	—	—	—	E9	—	E11	—	E13	E15
89	—	—	—	—	—	—	—	—	F15

◆RATED RIPPLE CURRENT MULTIPLIERS
●Frequency Multipliers

Frequency (Hz)	50	120	300	1k	3k
Coefficient	0.8	1.0	1.1	1.3	1.4

Note : The endurance of capacitors is shorted with internal heating produced by ripple current at the rate of halving the lifetime with every 5 to 10°C rise. When long life performance is required in actual use, the rms ripple current has to be reduced. Also, for the RWE series capacitors, using them at operating voltage less than their rated voltage can extend their lifetime. For the details, please contact a representative of Nippon Chemi-Con.

RWY Series

- High ripple capability
- Endurance with ripple current : 85°C 5000 hours
- Cost-down design for three-phase input inverters

RWY

low price version
RWF

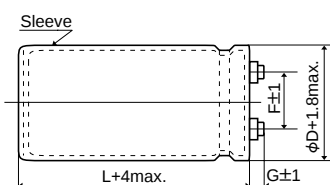


SPECIFICATIONS

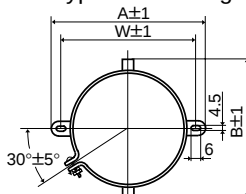
Items	Characteristics						
Category							
Temperature Range	-25 to +85°C						
Rated Voltage Range	350 to 450V _{dc}						
Capacitance Tolerance	±20% (M) (at 20°C, 120Hz)						
Leakage Current	I=0.02CV or 5mA, whichever is smaller. Where, I : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V) (at 20°C after 5 minutes)						
Dissipation Factor (tanδ)	0.12 max. (at 20°C, 120Hz)						
Low Temperature Characteristics	Capacitance change $C(-25^{\circ}\text{C})/C(+20^{\circ}\text{C}) \geq 0.7$ (at 120Hz)						
Insulation Resistance	When it is measured between the terminals shorted each other and the mounting clamp on the insulating sleeve covering the case by using an insulation resistance meter of 500V _{dc} , the insulation resistance shall not be less than 100MΩ.						
Insulation Withstanding Voltage	When a voltage of 2000Vac is applied for 1 minute between the terminals shorted each other and the mounting clamp on the insulating sleeve covering the case, there shall not be electrical damage.						
Endurance	The following specifications shall be satisfied when the capacitors are restored to 20°C after subjected to DC voltage with the rated ripple current is applied for 5000 hours at 85°C. <table border="1"> <tr> <td>Capacitance change</td><td>≤±20% of the initial value</td></tr> <tr> <td>D.F. (tanδ)</td><td>≤200% of the initial specified value</td></tr> <tr> <td>Leakage current</td><td>≤The initial specified value</td></tr> </table>	Capacitance change	≤±20% of the initial value	D.F. (tanδ)	≤200% of the initial specified value	Leakage current	≤The initial specified value
Capacitance change	≤±20% of the initial value						
D.F. (tanδ)	≤200% of the initial specified value						
Leakage current	≤The initial specified value						
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for 1000 hours at 85°C without voltage applied. <table border="1"> <tr> <td>Capacitance change</td><td>≤±20% of the initial value</td></tr> <tr> <td>D.F. (tanδ)</td><td>≤200% of the initial specified value</td></tr> <tr> <td>Leakage current</td><td>≤The initial specified value</td></tr> </table>	Capacitance change	≤±20% of the initial value	D.F. (tanδ)	≤200% of the initial specified value	Leakage current	≤The initial specified value
Capacitance change	≤±20% of the initial value						
D.F. (tanδ)	≤200% of the initial specified value						
Leakage current	≤The initial specified value						

DIMENSIONS (Terminal Type=LGSN) [mm]

●B Type of Mounting Clamp

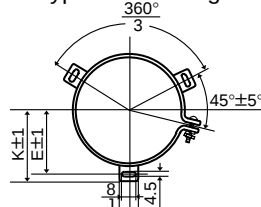


φ50 to φ76 : G=6
φ89 : G=4
φ100 : G=10



φD	A	B	W	F
50	78	64	68	22.4
63.5	90	76	80	28.0
76	104.5	90	93.5	31.5

●C Type of Mounting Clamp



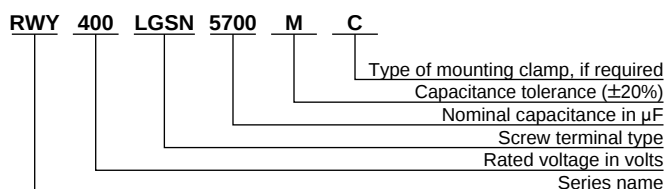
φD	E	K	F	J
63.5	38.1	43.5	28.0	14.0
76	44.5	50.0	31.5	14.0
89	50.8	56.5	31.5	16.0
100	56.5	63.4	41.5	18.0

<Screw specifications>

φ50 to φ89
Plus hexagon-headed screw :
M5X0.8X10
Maximum screw tightening torque :
3.23Nm
φ100
Cross-recessed head (Phillips)
screw : M8X1.25X16
Spring washer
Washer
Maximum screw tightening torque :
6.31Nm

* The screw and the mounting clamp are separately supplied and not attached to the product.

PART NUMBERING SYSTEM



◆STANDARD RATINGS

Case size φDXL (mm)	V _{dc}	350		400		450	
	SV	400		450		500	
	Items	Capacitance (μF)	Rated ripple current (Arms)	Capacitance (μF)	Rated ripple current (Arms)	Capacitance (μF)	Rated ripple current (Arms)
		20°C, 120Hz	85°C, 300Hz	20°C, 120Hz	85°C, 300Hz	20°C, 120Hz	85°C, 300Hz
50×75		750	5.1	620	4.6	500	4.0
50×96		1,100	6.9	880	6.1	710	5.2
50×105		1,300	7.8	1,000	6.8	840	5.9
50×130		1,600	9.5	1,400	8.9	1,100	7.5
50×145		1,900	10.7	1,600	9.9	1,300	8.4
63.5×96		1,800	10.0	1,500	9.1	1,200	7.8
63.5×115		2,400	12.6	2,000	11.5	1,600	9.8
63.5×130		2,800	14.3	2,300	13.0	1,800	10.9
63.5×155		3,400	17.1	2,800	15.5	2,300	13.3
63.5×170		3,800	18.8	3,200	17.3	2,500	14.5
76×115		3,500	16.9	2,900	15.4	2,300	13.0
76×130		4,000	19.0	3,400	17.5	2,700	14.8
76×155		5,000	23.0	4,200	21.1	3,300	17.7
76×170		5,600	25.3	4,600	23.0	3,700	19.5
89×155		6,900	27.2	5,700	24.7	4,600	22.2
89×170		7,700	29.6	6,400	27.0	5,100	24.1
89×190		8,400	32.9	7,000	30.0	5,700	27.1
100×190		9,500	37.3	7,900	34.0	6,400	30.6
100×220		11,000	42.9	9,400	39.6	7,600	35.6
100×270		14,000	53.1	12,000	49.2	9,500	43.7

◆RATED RIPPLE CURRENT MULTIPLIERS

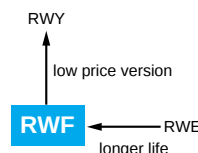
●Frequency Multipliers

Frequency (Hz)	120	300	1k	3k
Coefficient	0.83	1.0	1.25	1.33

Note : The endurance of capacitors is shortened with internal heating produced by ripple currents at the rate of halving the lifetime with every 5 to 10°C rise. When long life performance is required in actual use, the rms ripple current has to be reduced. Also, for RWY series capacitors, using them at operating voltage less than their rated voltage can extend their lifetime. For the details, please contact a representative of Nippon Chemi-Con.

RWF Series

- High ripple capability
- Endurance with ripple current : 85°C 5000 hours
- Wide variety case sizes from $\phi 50$ to $\phi 100$



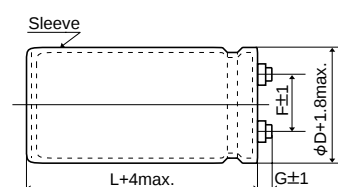
SPECIFICATIONS

Items	Characteristics
Category	Temperature Range
Rated Voltage Range	-25 to +85°C
Capacitance Tolerance	350 to 450V _{dc}
Leakage Current	$\pm 20\%$ (M) (at 20°C, 120Hz)
Dissipation Factor (tan δ)	$I=0.02CV$ or 5mA, whichever is smaller. Where, I : Max. leakage current (μ A), C : Nominal capacitance (μ F), V : Rated voltage (V) (at 20°C after 5 minutes)
Low Temperature Characteristics	0.25 max. (at 20°C, 120Hz)
Insulation Resistance	Capacitance change $C(-25^{\circ}\text{C})/C(+20^{\circ}\text{C}) \geq 0.7$ (at 120Hz)
Insulation Withstanding Voltage	When measured between the terminals shorted each other and the mounting clamp on the insulating sleeve covering the case by using an insulation resistance meter of 500V _{dc} , the insulation resistance shall not be less than 100M Ω .
Endurance	When a voltage of 2000V _{ac} is applied for 1 minute between the terminals shorted each other and the mounting clamp on the insulating sleeve covering the case, there shall not be electrical damage.
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after subjected to DC voltage with the rated ripple current is applied for 5000 hours at 85°C.
	Capacitance change $\leq \pm 20\%$ of the initial value
	D.F. (tan δ) $\leq 200\%$ of the initial specified value
	Leakage current $\leq$ The initial specified value
	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for 500 hours at 85°C without voltage applied.
	Capacitance change $\leq \pm 20\%$ of the initial value
	D.F. (tan δ) $\leq 200\%$ of the initial specified value
	Leakage current $\leq$ The initial specified value

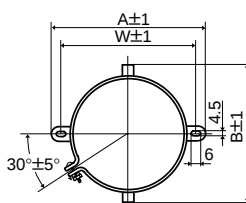
DIMENSIONS (Terminal Type=LGSN) [mm]

● B Type of Mounting Clamp

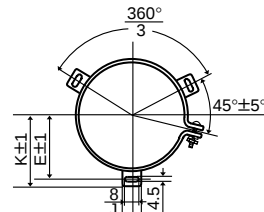
● C Type of Mounting Clamp



$\phi 50$ & $\phi 63.5$: G=6
 $\phi 76$ & $\phi 89$: G=5
 $\phi 100$: G=10



ϕD	A	B	W	F
50	78	64	68	22.4
63.5	90	76	80	28.0
76	104.5	90	93.5	31.5



ϕD	E	K	F	J
50	32.5	37.0	22.4	14.0
63.5	38.1	43.5	28.0	14.0
76	44.5	50.0	31.5	14.0
89	50.8	56.5	31.5	16.0
100	56.5	63.4	41.5	18.0

<Screw specifications>

$\phi 50$ to $\phi 89$

Plus hexagon-headed screw :

M5×0.8×10

Maximum screw tightening torque :

3.23Nm

$\phi 100$

Cross-recessed head (Phillips)

screw : M8×1.25×16

Spring washer

Washer

Maximum screw tightening torque :

6.31Nm

* The screw and the mounting clamp are separately supplied and not attached to the product.

PART NUMBERING SYSTEM

RWF	350	LGSN	10000	M	C	E17
						Case code
						Type of mounting clamp, if required
						Capacitance tolerance ($\pm 20\%$)
						Nominal capacitance in μ F
						Screw terminal type
						Rated voltage in volts
						Series name

◆STANDARD RATINGS

Case size φD×L (mm)	V _{dc}	350		400		450	
	SV	400		450		500	
	Items	Capacitance (μF) 20°C, 120Hz	Rated ripple current (Arms) 85°C, 120Hz	Capacitance (μF) 20°C, 120Hz	Rated ripple current (Arms) 85°C, 120Hz	Capacitance (μF) 20°C, 120Hz	Rated ripple current (Arms) 85°C, 120Hz
50×96		2,200	7.7	1,800	7.0	1,200	5.7
50×105				2,200	8.0	1,500	6.3
50×115		2,700	9.3			1,800	7.6
50×130		3,300	10.8	2,700	9.8	2,200	8.8
63.5×115		3,900	12.1	3,300	11.1	2,700	10.1
63.5×130		4,700	14.0	3,900	12.7	3,300	11.7
63.5×155		5,600	16.6	4,700	15.2	3,900	13.8
63.5×190		6,800	20.0	5,600	18.2	4,700	16.7
76×115		5,600	16.1	4,700	14.7	3,900	13.4
76×130		6,800	18.6	5,600	16.9	4,700	15.5
76×155		8,200	22.2	6,800	20.2	5,600	18.3
76×170		10,000	25.2	8,200	22.8	6,800	20.7
89×155		12,000	29.1	10,000	26.6	8,200	24.1
89×170				12,000	30.0	10,000	27.8
89×190		15,000	35.7				
100×190		18,000	36.9	15,000	33.7	12,000	29.3
100×220				18,000	37.4		
100×250		22,000	46.1			15,000	37.0

◆CASE CODE

φD (mm) \ L (mm)	96	105	115	130	155	170	190	220	250
50	C9	C10R	C11	C13	—	—	—	—	—
63.5	—	—	D11	D13	D15	—	D19	—	—
76	—	—	E11	E13	E15	E17	—	—	—
89	—	—	—	—	F15	F17	F19	—	—
100	—	—	—	—	—	—	G19	G22	G25

◆RATED RIPPLE CURRENT MULTIPLIERS

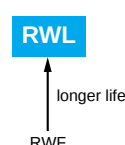
●Frequency Multipliers

Frequency (Hz)	50	120	300	1k	3k
Coefficient	0.8	1.0	1.1	1.3	1.4

Note : The endurance of capacitors is shortened with internal heating produced by ripple currents at the rate of halving the lifetime with every 5 to 10°C rise. When long life performance is required in actual use, the rms ripple current has to be reduced. Also, for the RWF series capacitors, using them at operating voltage less than their rated voltage can extend their lifetime. For the details, please contact a representative of Nippon Chemi-Con.

RWL Series

- High ripple capability
- For train systems and high power consumed inverter circuits
- Endurance with ripple current : 85°C 20000 hours

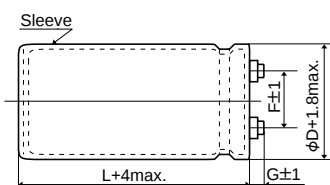


SPECIFICATIONS

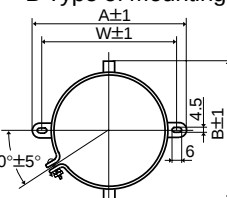
Items	Characteristics						
Category							
Temperature Range	-25 to +85°C						
Rated Voltage Range	350 to 450V _{dc}						
Capacitance Tolerance	±20% (M) (at 20°C, 120Hz)						
Leakage Current	I=0.02CV or 5mA, whichever is smaller. Where, I : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V) (at 20°C after 5 minutes)						
Dissipation Factor (tanδ)	0.25 max. (at 20°C, 120Hz)						
Low Temperature Characteristics	Capacitance change $C(-25^{\circ}\text{C})/C(+20^{\circ}\text{C}) \geq 0.7$ (at 120Hz)						
Insulation Resistance	When measured between the terminals shorted each other and the mounting clamp on the insulating sleeve covering the case by using an insulation resistance meter of 500V _{dc} , the insulation resistance shall not be less than 100MΩ.						
Insulation Withstanding Voltage	When a voltage of 2000Vac is applied for 1 minute between the terminals shorted each other and the mounting clamp on the insulating sleeve covering the case, there shall not be electrical damage.						
Endurance	The following specifications shall be satisfied when the capacitors are restored to 20°C after subjected to DC voltage with the rated ripple current is applied 20000 hours at 85°C. <table border="1"> <tr> <td>Capacitance change</td><td>≤±30% of the initial value</td></tr> <tr> <td>D.F. (tanδ)</td><td>≤300% of the initial specified value</td></tr> <tr> <td>Leakage current</td><td>≤The initial specified value</td></tr> </table>	Capacitance change	≤±30% of the initial value	D.F. (tanδ)	≤300% of the initial specified value	Leakage current	≤The initial specified value
Capacitance change	≤±30% of the initial value						
D.F. (tanδ)	≤300% of the initial specified value						
Leakage current	≤The initial specified value						
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for 500 hours at 85°C without voltage applied. <table border="1"> <tr> <td>Capacitance change</td><td>≤±20% of the initial value</td></tr> <tr> <td>D.F. (tanδ)</td><td>≤300% of the initial specified value</td></tr> <tr> <td>Leakage current</td><td>≤The initial specified value</td></tr> </table>	Capacitance change	≤±20% of the initial value	D.F. (tanδ)	≤300% of the initial specified value	Leakage current	≤The initial specified value
Capacitance change	≤±20% of the initial value						
D.F. (tanδ)	≤300% of the initial specified value						
Leakage current	≤The initial specified value						

DIMENSIONS (Terminal Type=LGSN) [mm]

● B Type of Mounting Clamp

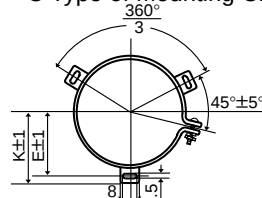


φ63.5 : G=6
φ76 & φ89 : G=5



φD	A	B	W	F
63.5	90	76	80	28.0
76	104.5	90	93.5	31.5

● C Type of Mounting Clamp



φD	E	K	F	J
63.5	38.1	43.5	28.0	14.0
76	44.5	50.0	31.5	14.0
89	50.8	56.5	31.5	16.0

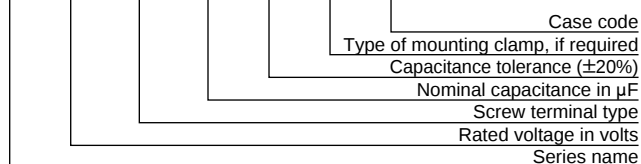
<Screw specifications>

Plus hexagon-headed screw:
M5×0.8×10
Maximum screw tightening torque:
3.23Nm

* The screw and the mounting clamp are separately supplied and not attached to the product.

PART NUMBERING SYSTEM

RWL 400 LGSN 10000 M C F19



◆STANDARD RATINGS

μF	V _{dc} SV φD	350			400			450		
		400			450			500		
		63.5	76	89	63.5	76	89	63.5	76	89
2,200								63.5×115 9.1		
2,700					63.5×115 10.1			63.5×130 10.6	76×115 11.2	
3,300		63.5×115 11.1			63.5×130 11.7			63.5×155 12.7	76×130 13.0	
3,900		63.5×130 12.8			63.5×155 13.8	76×115 14.7		63.5×170 14.4		
4,700		63.5×155 15.2	76×115 14.7		63.5×170 15.8	76×130 15.5			76×155 16.7	
5,600		63.5×170 17.3	76×130 16.9		63.5×190 18.2	76×155 18.3			76×190 20.1	89×155 19.9
6,800		63.5×190 20.0	76×155 20.2			76×170 21.0				89×170 23.0
8,200			76×170 23.1				89×155 24.1			89×190 26.4
10,000				89×155 26.6			89×190 29.1	Upper : Case size φD×L (mm) Lower : Rated ripple current (Arms) at 85°C, 120Hz		
12,000				89×190 32.0						

◆CASE CODE

φD (mm)	L (mm)	115	130	155	170	190
63.5		D11	D13	D15	D17	D19
76		E11	E13	E15	E17	E19
89		—	—	F15	F17	F19

◆RATED RIPPLE CURRENT MULTIPLIERS

●Frequency Multipliers

Frequency (Hz)	50	120	300	1k	3k
Coefficient	0.8	1.0	1.1	1.3	1.4

Note : The endurance of capacitors is shorted with internal heating produced by ripple currents at the rate of halving the lifetime with every 5 to 10°C rise. When long life performance is required in actual use, the rms ripple current has to be reduced. Also, for RWL series capacitors, using them at operating voltage less than their rated voltage can extend their lifetime. For the details, please contact a representative of Nippon Chemi-Con.

LXA Series

- Rated voltage range up to 525V_{dc}
- Endurance with ripple current : 105°C 5000 hours (2000 hours for 500V_{dc} & 525V_{dc})
- High reliability products

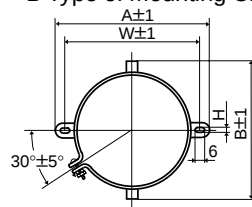
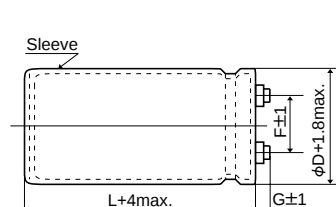


SPECIFICATIONS

Items	Characteristics		
Category	–40 to +105°C (10 to 100V _{dc}) –25 to +105°C (160 to 525V _{dc})		
Temperature Range			
Rated Voltage Range	10 to 525V _{dc}		
Capacitance Tolerance	–10 to +50% (T) (10 to 250V _{dc}) ±20% (M) (350 to 525V _{dc}) (at 20°C, 120Hz)		
Leakage Current	I=0.02CV or 5mA, whichever is smaller. Where, I : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V) (at 20°C after 5 minutes)		
Dissipation Factor (tanδ)	See STANDARD RATINGS (10 to 250V _{dc}) 0.20max (350 to 525V _{dc}) (at 20°C, 120Hz)		
Low Temperature Characteristics	Capacitance change C(-40°C)/C(+20°C)≥0.6(10 to 100V _{dc}) C(-25°C)/C(+20°C)≥0.7(160 to 250V _{dc}) C(-25°C)/C(+20°C)≥0.65(350 to 525V _{dc}) (at 120Hz)		
Insulation Resistance	When measured between the terminals shorted each other and the mounting clamp on the insulating sleeve covering the case by using an insulation resistance meter of 500V _{dc} , the insulation resistance shall not be less than 100MΩ.		
Insulation Withstanding Voltage	When a voltage of 2000Vac is applied for 1 minute between the terminals shorted each other and the mounting clamp on the insulating sleeve covering the case, there shall not be electrical damage.		
Endurance	The following specifications shall be satisfied when the capacitors are restored to 20°C after DC voltage with the rated ripple current is applied for 5000 hours (2000 hours for 500 & 525V _{dc} products) at 105°C.		
	Capacitance change	≤±20% of the initial value	
	D.F. (tanδ)	≤200% of the initial specified value	
	Leakage current	≤The initial specified value	
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for 1000 hours at 105°C without voltage applied.		
	Rated voltage	10 to 250V _{dc}	350 to 525V _{dc}
	Capacitance change	≤±15% of the initial value	≤±20% of the initial value
	D.F. (tanδ)	≤150% of the initial specified value	≤200% of the initial specified value
	Leakage current	≤The initial specified value	≤The initial specified value

DIMENSIONS (Terminal Type=LGSN) [mm]

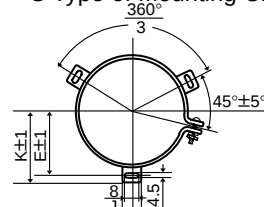
●B Type of Mounting Clamp



φD	G	
	10 to 250V _{dc}	350 to 525V _{dc}
~φ63.5	6	6
φ76	5	6
φ89	5	4

φD	A	B	W	H	F
35	58	44	48	3.5	12.7
50	78	64	68	4.5	22.4
63.5	90	76	80	4.5	28.0
76	104.5	90	93.5	4.5	31.5

●C Type of Mounting Clamp



φD	E	K	J	F
50	32.5	37.0	14.0	22.4
63.5	38.1	43.5	14.0	28.0
76	44.5	50.0	14.0	31.5
89	50.8	56.5	16.0	31.5

<Screw specifications>
 Plus hexagon-headed screw:
 M5×0.8×10
 Maximum screw tightening torque:
 3.23Nm

* The screw and the mounting clamp are separately supplied and not attached to the product.

PART NUMBERING SYSTEM

LXA	450	LGSN	3300	M	C	E10R
						Case code
						Type of mounting clamp, if required
						Capacitance tolerance
						Nominal capacitance in μF
						Screw terminal type
						Rated voltage in volts
						Series name

*Capacitance tolerance
 T : 10 to 250V_{dc}
 M : 350 to 525V_{dc}

CASE CODE

φD (mm)	L (mm)	50	60	80	85	100	105	120	125	140	145	190	270
35	A5	—	A8	—	A10	—	A12	—	—	—	—	—	—
50	—	C6	C8	C8R	C10	C10R	C12	C12R	—	C14R	—	—	—
63.5	—	—	—	D8R	D10	D10R	D12	D12R	—	D14R	—	—	—
76	—	—	—	E8R	E10	E10R	E12	E12R	E14	E14R	E19	—	—
89	—	—	—	—	—	—	—	F12R	F14	F14R	F19	F27	—

◆STANDARD RATINGS

μF	V _{dc} SV	10			16			25			35			50			63			80		
		13			20			32			44			63			79			100		
2,200																				A 5	1.9	0.15
2,700																				A 5	1.9	0.15
3,300																				A 5	2.1	0.15
3,900																				A 8	2.7	0.20
4,700																				A 8	2.9	0.20
5,600																				A10	3.1	0.15
6,800																				A10	3.5	0.15
8,200																				A12	4.1	0.20
10,000																				C 8	4.8	0.20
12,000																				C10	5.6	0.20
15,000																				C10	6.1	0.20
18,000																				C12	7.4	0.20
22,000																				D12	8.0	0.25
27,000																				E10	9.1	0.25
33,000																				E12	9.7	0.30
39,000																				E14	11.5	0.30
47,000																				F14	12.5	0.35
56,000																						
68,000																						
82,000																						
100,000																						
120,000																						
150,000																						
180,000																						
220,000																						
270,000																						
330,000																						
390,000																						

μF	V _{dc} SV	100			160			200			250		
		125			200			250			300		
330											A 5	0.7	0.15
390											A 8	0.8	0.15
470											A 8	0.9	0.15
560											A 8	1.0	0.15
680											A10	1.2	0.15
820											A10	1.4	0.15
1,000											A12	1.6	0.15
1,200											C 8	1.8	0.15
1,500											C10	2.2	0.15
1,800											C12	2.6	0.15
2,200											C12	2.8	0.15
2,700											D10	3.3	0.15
3,300											D12	4.0	0.15
3,900											E10	4.4	0.15
4,700											E12	5.2	0.15
5,600											E14	6.1	0.15
6,800											F14	7.4	0.15
8,200													
10,000													
12,000													
15,000													
18,000													
22,000													
27,000													

Max. tanδ at 20°C, 120Hz
Rated ripple current (Arms) at 105°C, 120Hz
Case code

◆STANDARD RATINGS

Case size φD×L (mm)	V _{dc}	350		400		450	
	SV	400		450		500	
	Items	Capacitance (μF) 20°C, 120Hz	Rated ripple current (Arms) 105°C, 120Hz	Capacitance (μF) 20°C, 120Hz	Rated ripple current (Arms) 105°C, 120Hz	Capacitance (μF) 20°C, 120Hz	Rated ripple current (Arms) 105°C, 120Hz
50×60		820	3.3	680	3.0	560	2.6
50×85		1,500	5.2	1,200	4.7	1,000	4.0
50×105		2,200	7.0	1,800	6.3	1,200	4.8
50×125		2,700	8.4	2,200	7.5	1,800	6.4
50×145		3,300	9.9	2,700	8.9	2,200	7.6
63.5×85		2,700	8.1	2,200	7.3	1,800	6.2
63.5×105		3,300	9.8	2,700	8.8	2,200	7.5
63.5×125		3,900	11.5	3,300	10.5	2,700	8.9
63.5×145		5,600	14.7	4,700	13.4	3,300	10.6
76×85		3,900	10.8	3,300	9.9	2,700	8.4
76×105						3,300	10.2
76×125		6,800	16.8	4,700	13.9	3,900	11.9
76×145		8,200	19.6	6,800	17.9	4,700	14.0
76×190		10,000	23.0	8,200	20.8	6,800	17.3
89×125		8,200	18.9	6,800	17.2	5,600	14.2
89×145		10,000	22.2	8,200	20.1	6,800	16.7
89×190		15,000	30.6	12,000	27.4	10,000	22.8
89×270		22,000	43.5	18,000	39.4	15,000	32.8

Case size φD×L (mm)	V _{dc}	500		525	
	SV	550		575	
	Items	Capacitance (μF) 20°C, 120Hz	Rated ripple current (Arms) 105°C, 120Hz	Capacitance (μF) 20°C, 120Hz	Rated ripple current (Arms) 105°C, 120Hz
50×60		470	2.4	390	2.2
50×85		820	3.6	680	3.3
50×105		1,000	4.4		
50×125		1,200	5.2	1,000	4.8
50×145		1,500	6.3		
63.5×85		1,200	5.0		
63.5×105		1,800	6.8	1,500	6.2
63.5×125				1,800	7.3
63.5×145		2,700	9.6	2,200	8.6
76×85					
76×105		2,700	9.2	2,200	8.3
76×125				2,700	9.9
76×145		3,900	12.7	3,300	11.7
76×190				4,700	14.4
89×125		3,900	11.9		
89×145				4,700	13.9
89×190		6,800	18.8	5,600	17.1
89×270		10,000	26.8		



LXA Series

◆RATED RIPPLE CURRENT MULTIPLIERS

●Frequency Multipliers (10 to 250V_{dc})

Frequency (Hz)	50	120	300	1k	10k	50k
10 to 50V _{dc}	0.95	1.00	1.03	1.05	1.09	1.12
63 to 80V _{dc}	0.90	1.00	1.06	1.10	1.18	1.22
100 to 250V _{dc}	0.80	1.00	1.12	1.22	1.30	1.33

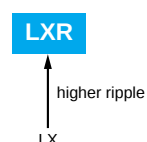
(350 to 525V_{dc})

Frequency (Hz)	50	120	300	1k	3k
Coefficient	0.8	1.0	1.2	1.5	1.6

Note : The endurance of capacitors is shortened with internal heating produced by ripple currents at the rate of halving the lifetime with every 5 to 10°C rise. When long life performance is requested in actual use, the rms ripple current has to be reduced. Also, for the LXA series capacitors (350 to 525V_{dc} products), using them at operating voltage can extend their lifetime. For the detail, please contact a representative of Nippon Chemi-con.

LXR Series

- Higher ripple capability than LX series
- Endurance with ripple current : 105°C 5000 hours

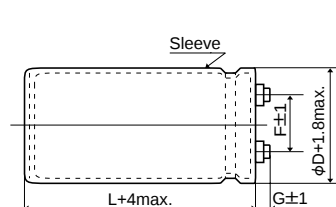


SPECIFICATIONS

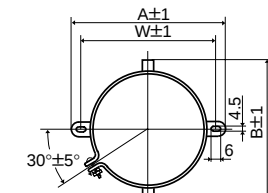
Items	Characteristics						
Category							
Temperature Range	-25 to +105°C						
Rated Voltage Range	350 to 450V _{dc}						
Capacitance Tolerance	±20% (M) (at 20°C, 120Hz)						
Leakage Current	I=0.02CV or 5mA, whichever is smaller. Where, I : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V) (at 20°C after 5 minutes)						
Dissipation Factor (tanδ)	0.15max. (at 20°C, 120Hz)						
Low Temperature Characteristics	Capacitance change $C(-25^{\circ}\text{C})/C(+20^{\circ}\text{C}) \geq 0.7$ (at 120Hz)						
Insulation Resistance	When measured between the terminals shorted each other and the mounting clamp on the insulating sleeve covering the case by using an insulation resistance meter of 500V _{dc} , the insulation shall not be less than 100MΩ.						
Insulation Withstanding Voltage	When a voltage of 2000Vac is applied for 1 minute between the terminals shorted each other and the mounting clamp on the insulating sleeve covering the case, there shall not be electrical damage.						
Endurance	The following specifications shall be satisfied when the capacitors are restored to 20°C after subjected to DC voltage with the rated ripple current is applied for 5000 hours at 105°C. <table border="1"> <tr> <td>Capacitance change</td><td>≤±20% of the initial value</td></tr> <tr> <td>D.F. (tanδ)</td><td>≤200% of the initial specified value</td></tr> <tr> <td>Leakage current</td><td>≤The initial specified value</td></tr> </table>	Capacitance change	≤±20% of the initial value	D.F. (tanδ)	≤200% of the initial specified value	Leakage current	≤The initial specified value
Capacitance change	≤±20% of the initial value						
D.F. (tanδ)	≤200% of the initial specified value						
Leakage current	≤The initial specified value						
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for 1000 hours at 105°C without voltage applied. <table border="1"> <tr> <td>Capacitance change</td><td>≤±20% of the initial value</td></tr> <tr> <td>D.F. (tanδ)</td><td>≤200% of the initial specified value</td></tr> <tr> <td>Leakage current</td><td>≤The initial specified value</td></tr> </table>	Capacitance change	≤±20% of the initial value	D.F. (tanδ)	≤200% of the initial specified value	Leakage current	≤The initial specified value
Capacitance change	≤±20% of the initial value						
D.F. (tanδ)	≤200% of the initial specified value						
Leakage current	≤The initial specified value						

DIMENSIONS (Terminal Type=LGSN) [mm]

●B Type of Mounting Clamp

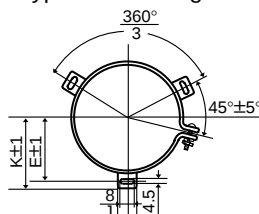


φ63.5 & φ76 : G=6
φ89 : G=4
φ100 : G=10



φD	A	B	W	F
63.5	90	76	80	28.0
76	104.5	90	93.5	31.5

●C Type of Mounting Clamp



φD	E	K	F	J
63.5	38.1	43.5	28.0	14.0
76	44.5	50.0	31.5	14.0
89	50.8	56.5	31.5	16.0
100	56.5	63.4	41.5	18.0

<Screw specifications>

φ63.5 to φ89
Plus hexagon-headed screw :
M5×0.8×10
Maximum screw tightening torque :
3.23Nm
φ100
Cross-recessed head (Phillips) screw :
M8×1.25×16
Spring washer
Washer
Maximum screw tightening torque :
6.31Nm

* The screw and the mounting clamp are separately supplied and not attached to the product.

PART NUMBERING SYSTEM

LXR	400	LGSN	10000	M	C	G19	
							Case code
							Type of mounting clamp, if required
							Capacitance tolerance (±20%)
							Nominal capacitance in μF
							Screw terminal type
							Rated voltage in volts
							Series name

◆STANDARD RATINGS

V_{dc} SV φD μF	350				400				450			
	400				450				500			
	63.5	76	89	100	63.5	76	89	100	63.5	76	89	100
2,200									63.5×115 11.8			
2,700					63.5×115 13.1				63.5×130 13.7	76×115 14.5		
3,300	63.5×115 14.4				63.5×130 15.2				63.5×155 16.5	76×130 16.9		
3,900	63.5×130 16.6				63.5×155 17.9	76×115 18.2			63.5×170 18.7			
4,700	63.5×155 19.8	76×115 19.1			63.5×170 20.5	76×130 20.1				76×155 21.7		
5,600	63.5×170 22.5	76×130 21.9				76×155 23.8				76×190 26.1	89×155 24.1	
6,800		76×155 26.2				76×170 27.3	89×155 26.6				89×170 27.8	
8,200		76×170 30.0	89×155 29.2				89×170 30.5				89×190 32.0	
10,000			89×170 33.7					100×190 34.5				100×220 36.8
12,000				100×190 37.8				100×220 40.2				100×250 42.7
15,000				100×250 47.7	Upper : Case size φD×L (mm) Lower : Rated ripple current (Arms) at 105°C, 120Hz							

◆CASE CODE

φD (mm) \ L (mm)	115	130	155	170	190	220	250
63.5	D11	D13	D15	D17	—	—	—
76	E11	E13	E15	E17	E19	—	—
89	—	—	F15	F17	F19	—	—
100	—	—	—	—	G19	G22	G25

◆RATED RIPPLE CURRENT MULTIPLIERS

●Frequency Multipliers

Frequency (Hz)	120	300	1k	3k
Coefficient	1.0	1.1	1.3	1.4

The endurance of capacitors is shortened with internal heating produced by ripple current at the rate of halving the lifetime with every 5 to 10°C rise. When long life performance is required in actual use, the rms ripple current has to be reduced. Also, for the LXR series capacitors, using them at operating voltage less than their rated voltage can extend their lifetime. For the details, please contact a representative of Nippon Chemi-Con.

KW Series

- Low ESR and impedance at high frequency (10k to 50kHz)
- Endurance : 105°C 2000 hours



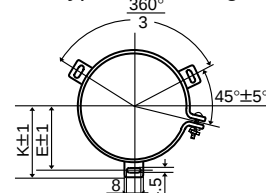
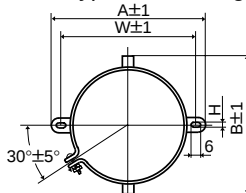
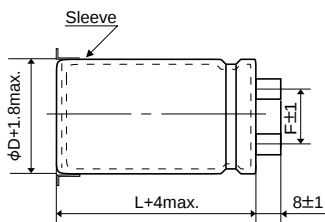
SPECIFICATIONS

Items	Characteristics						
Category							
Temperature Range	-40 to +105°C						
Rated Voltage Range	10 to 100V _{dc}						
Capacitance Tolerance	-10 to +50% (T) (at 20°C, 120Hz)						
Leakage Current	I=0.02CV or 5mA, whichever is smaller. Where, I : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V) (at 20°C after 5 minutes)						
Dissipation Factor (tanδ)	Shall not exceed the values shown in the STANDARD RATINGS (at 20°C, 120Hz)						
Low Temperature Characteristics	Capacitance change : $C(-40^{\circ}\text{C})/C(+20^{\circ}\text{C}) \geq 0.6$ (at 120Hz) Z(-10°C)/Z(+20°C) <table border="1"> <tr> <td>10 & 16V_{dc}</td><td>≤8</td></tr> <tr> <td>25 to 100V_{dc}</td><td>≤6</td></tr> </table> (at 20kHz)	10 & 16V _{dc}	≤8	25 to 100V _{dc}	≤6		
10 & 16V _{dc}	≤8						
25 to 100V _{dc}	≤6						
Insulation Resistance	When measured between the terminals shorted each other and the mounting clamp on the insulating sleeve covering the case by using an insulation resistance meter of 500V _{dc} , the insulation resistance shall not be less than 100MΩ.						
Insulation Withstanding Voltage	When a voltage of 2000Vac is applied for 1 minute between the terminals shorted each other and the mounting clamp on the insulating sleeve covering the case, there shall not be electrical damage.						
Endurance	The following specifications shall be satisfied when the capacitors are restored to 20°C after the rated voltage is applied for 2000 hours at 105°C. <table border="1"> <tr> <td>Capacitance change</td><td>≤±20% of the initial value</td></tr> <tr> <td>D.F. (tanδ)</td><td>≤200% of the initial specified value</td></tr> <tr> <td>Leakage current</td><td>≤The initial specified value</td></tr> </table>	Capacitance change	≤±20% of the initial value	D.F. (tanδ)	≤200% of the initial specified value	Leakage current	≤The initial specified value
Capacitance change	≤±20% of the initial value						
D.F. (tanδ)	≤200% of the initial specified value						
Leakage current	≤The initial specified value						
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for 500 hours at 105°C without voltage applied. <table border="1"> <tr> <td>Capacitance change</td><td>≤±15% of the initial value</td></tr> <tr> <td>D.F. (tanδ)</td><td>≤175% of the initial specified value</td></tr> <tr> <td>Leakage current</td><td>≤The initial specified value</td></tr> </table>	Capacitance change	≤±15% of the initial value	D.F. (tanδ)	≤175% of the initial specified value	Leakage current	≤The initial specified value
Capacitance change	≤±15% of the initial value						
D.F. (tanδ)	≤175% of the initial specified value						
Leakage current	≤The initial specified value						

DIMENSIONS (Terminal Type=LGSN) [mm]

●B Type of Mounting Clamp

●C Type of Mounting Clamp



φD	A	B	W	H	F
35	58	44	48	3.5	14.0
50	78	64	68	4.5	22.4

φD	E	K	J	F
50	32.5	37.0	14.0	22.4

<Screw specifications>
 Plus hexagon-headed screw:
 M5×0.8×10
 Maximum screw tightening torque:
 3.23Nm

* The screw and the mounting clamp are separately supplied and not attached to the product.

PART NUMBERING SYSTEM

KW	100	LGSN	1000	T	B
				Type of mounting clamp, if required	Capacitance tolerance (-10%/+50%)
					Nominal capacitance in μF
					Screw terminal type
					Rated voltage in volts
					Series name

◆STANDARD RATINGS

Rated voltage (V _{dc})	Surge voltage (V _{dc})	Capacitance (μF)	Part number	Case size φD×L (mm)	Rated ripple (Arms/85°C, 20kHz)	Impedance (mΩ/20°C, 20kHz)	Dissipation factor
10	13	10,000	KW10LGSN10000T	35×50	10.2	12	0.20
		22,000	KW10LGSN22000T	35×80	14.0	8	0.20
		33,000	KW10LGSN33000T	35×80	17.1	7	0.25
		47,000	KW10LGSN47000T	35×100	19.9	6	0.25
		100,000	KW10LGSN100000T	50×120	28.9	5	0.30
16	20	10,000	KW16LGSN10000T	35×50	10.2	12	0.20
		22,000	KW16LGSN22000T	35×80	14.0	8	0.20
		33,000	KW16LGSN33000T	35×100	18.6	8	0.20
		47,000	KW16LGSN47000T	50×80	23.2	6	0.25
25	32	10,000	KW25LGSN10000T	35×80	12.9	10	0.17
		22,000	KW25LGSN22000T	35×100	15.2	8	0.17
		33,000	KW25LGSN33000T	50×80	21.7	6	0.20
35	44	4,700	KW35LGSN4700T	35×50	8.4	16	0.15
		10,000	KW35LGSN10000T	35×80	12.9	10	0.15
		22,000	KW35LGSN22000T	50×80	19.4	7	0.15
50	63	3,300	KW50LGSN3300T	35×50	8.4	15	0.13
		4,700	KW50LGSN4700T	35×80	12.1	10	0.13
		10,000	KW50LGSN10000T	35×100	15.2	8	0.13
63	79	2,200	KW63LGSN2200T	35×50	7.7	18	0.12
		3,300	KW63LGSN3300T	35×80	10.8	12	0.12
		4,700	KW63LGSN4700T	35×80	12.1	10	0.12
		10,000	KW63LGSN10000T	50×80	17.7	7	0.12
80	100	2,200	KW80LGSN2200T	35×80	9.9	14	0.10
		3,300	KW80LGSN3300T	35×80	11.4	12	0.10
		4,700	KW80LGSN4700T	35×100	14.0	8	0.10
100	125	1,000	KW100LGSN1000T	35×50	7.2	22	0.10
		2,200	KW100LGSN2200T	35×80	9.9	14	0.10
		3,300	KW100LGSN3300T	35×100	12.4	11	0.10

◆RATED RIPPLE CURRENT MULTIPLIERS

●Frequency Multipliers

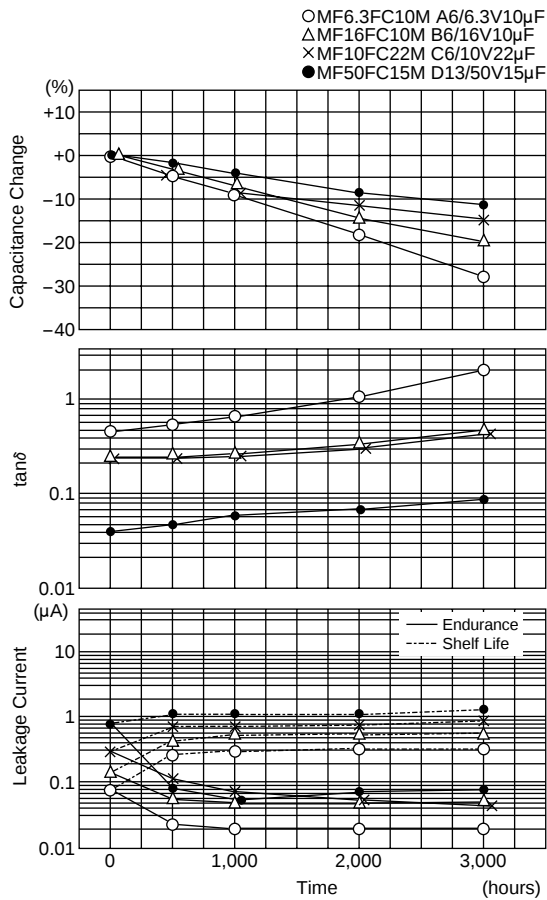
Rated Voltage (V _{dc})	Case size	Frequency (Hz)				
		50	120	1k	20k	50k
10 & 16	φ35 & φ50	0.75	0.84	0.96	1.00	1.01
25 to 50	φ35	0.68	0.81	0.95	1.00	1.01
25 to 63	φ50					
63 to 100	φ35	0.56	0.75	0.94	1.00	1.01

●Temperature Multipliers

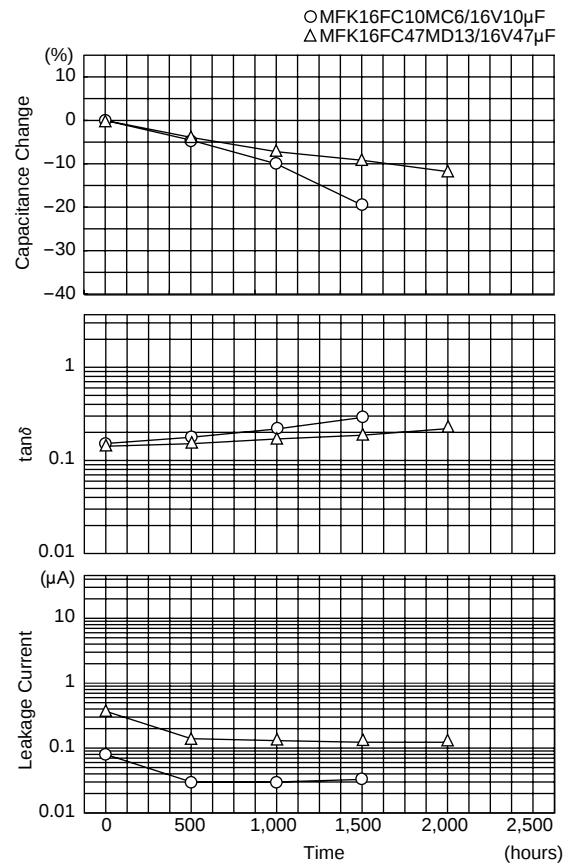
Temperature (°C)	85	105
Coefficient	1.00	0.57

Alchip® **MF/MFK** Series

●MF series 85°C Endurance/Shelf Life



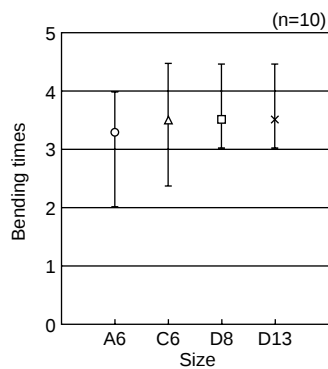
●MFK series 105°C Endurance



◆MF Series Terminal Strength Test

●Without Dummy Terminal : Type FC

①Bent Test <Fig-1>



②Mechanical Force to Lead Facing Side <Fig-2>

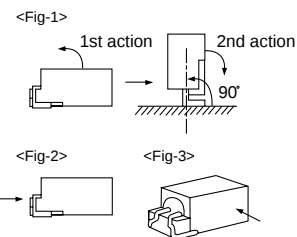
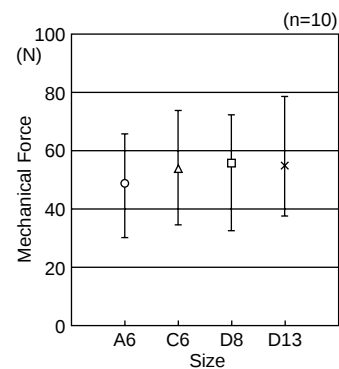
(n=10)

Size	Mechanical Force
A6	≥5N
C6	≥5N
D8	≥5N
D13	≥5N

*No peeling off terminal.

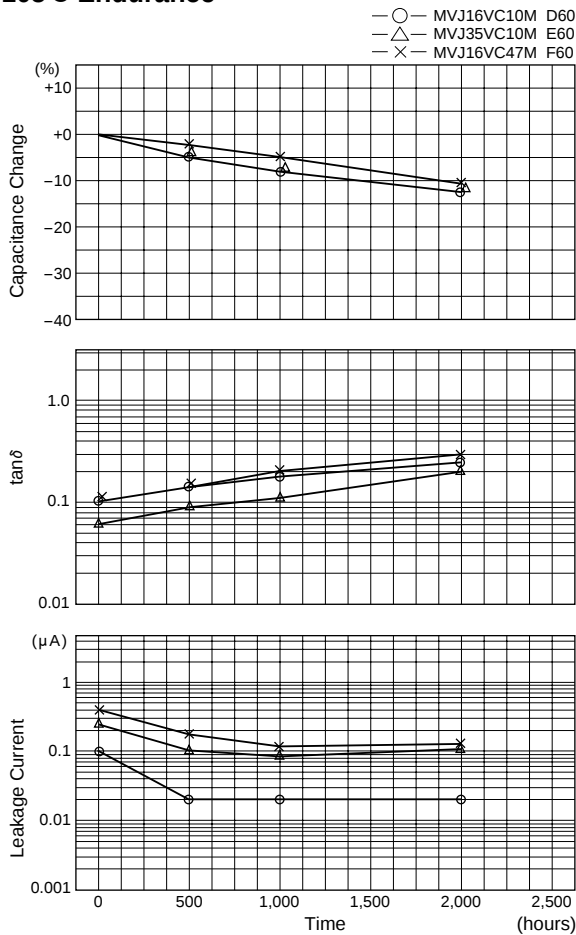
●With Dummy Terminal : Type FD

①Mechanical Force to Side <Fig-3>



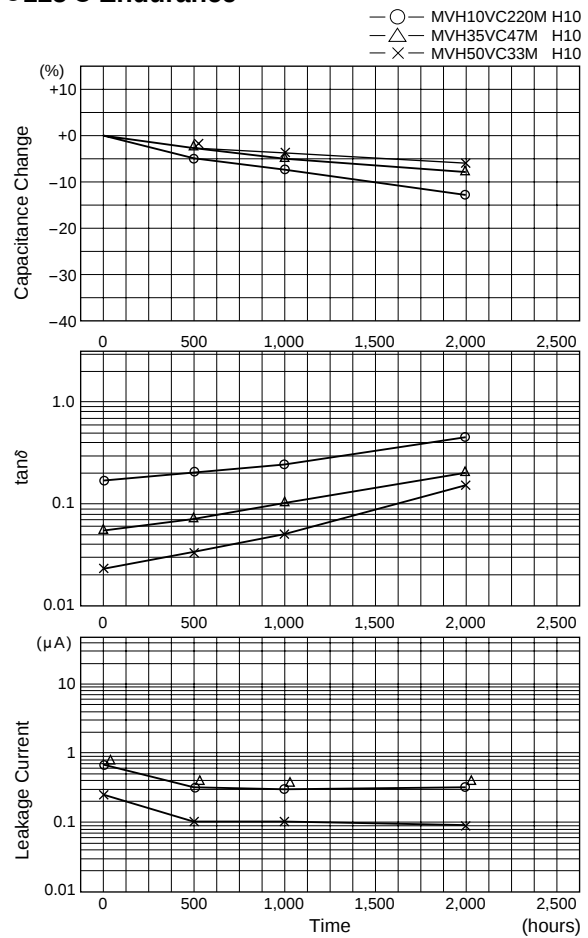
MVJ Series

●105°C Endurance



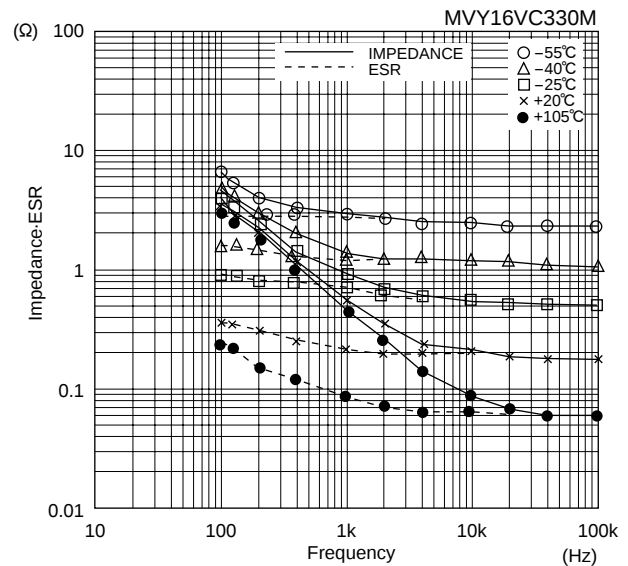
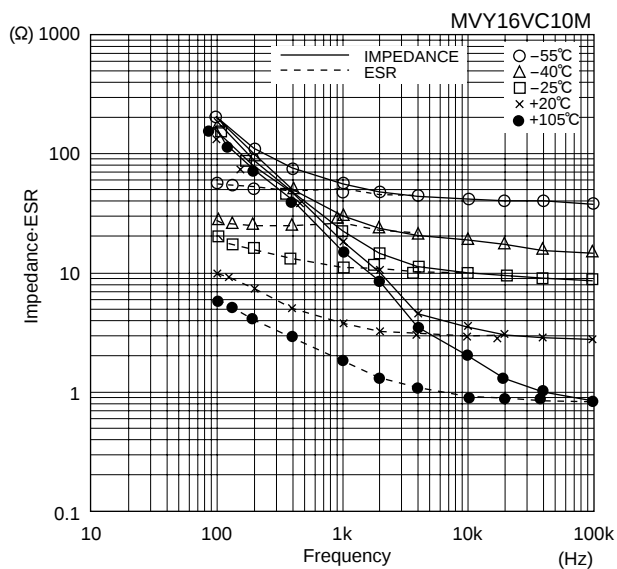
MVH Series

●125°C Endurance



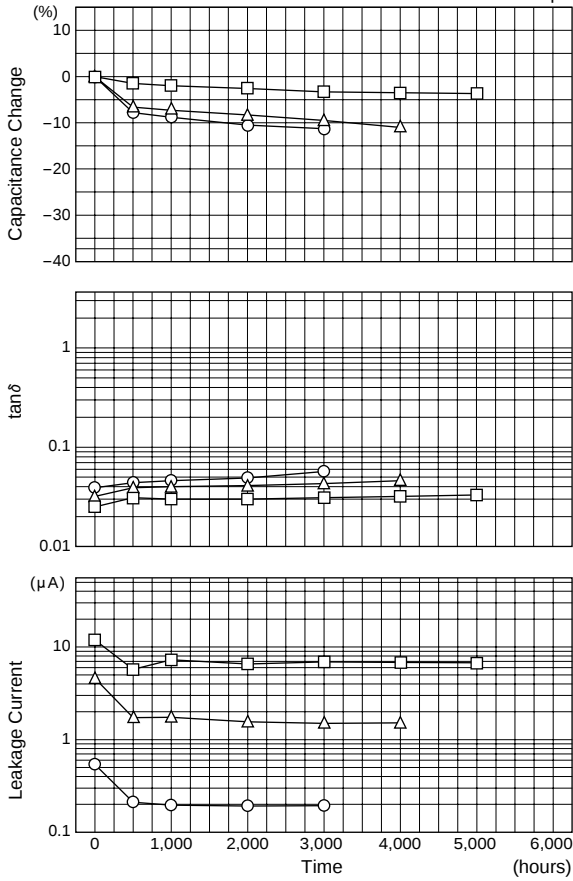
MVY Series

●Impedance/ESR vs Frequency



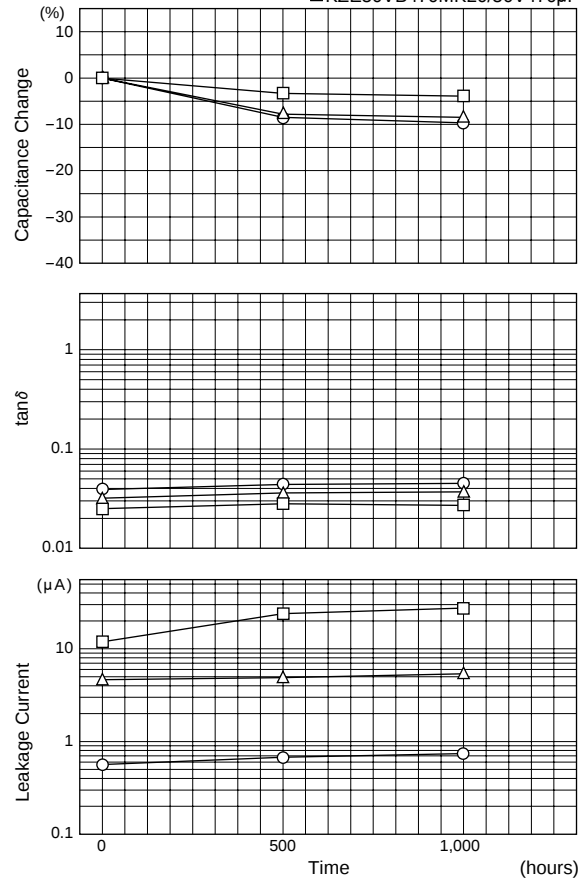
●105°C Endurance with Rated Ripple Current

○KZE10VB220MF11/10V220μF
△KZE16VB680MJ16/16V680μF
□KZE50VB470MK20/50V470μF



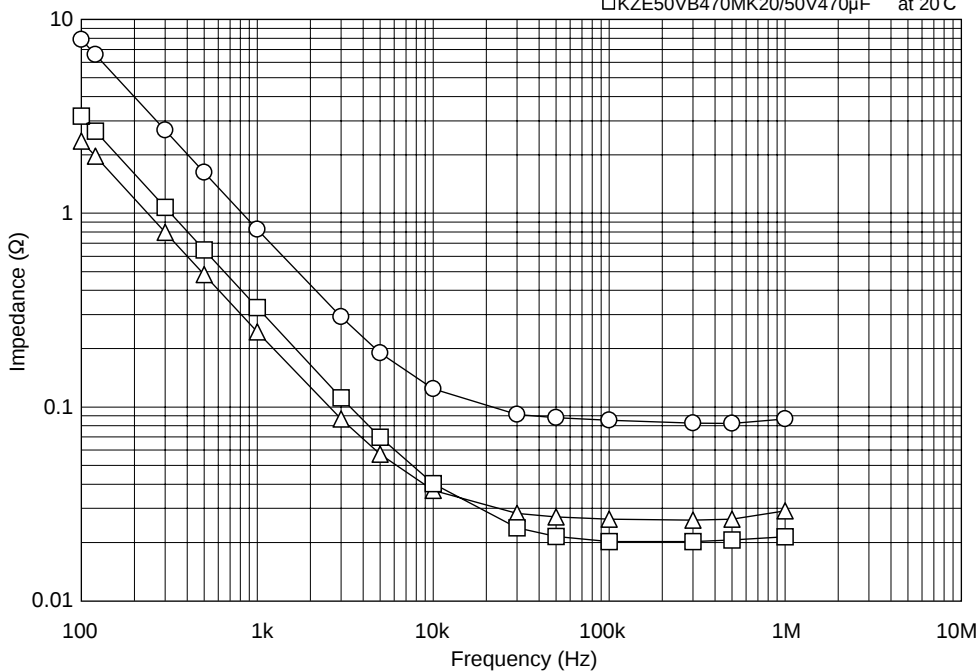
●105°C Shelf Life

○KZE10VB220MF11/10V220μF
△KZE16VB680MJ16/16V680μF
□KZE50VB470MK20/50V470μF



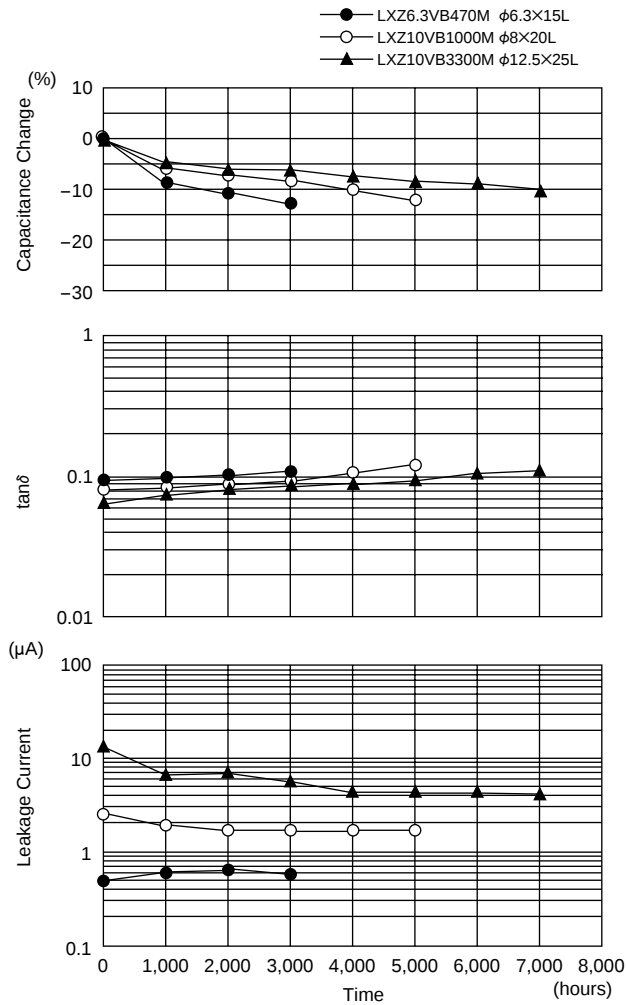
●Impedance-Frequency Characteristics

○KZE10VB220MF11/10V220μF
△KZE16VB680MJ16/16V680μF
□KZE50VB470MK20/50V470μF at 20°C

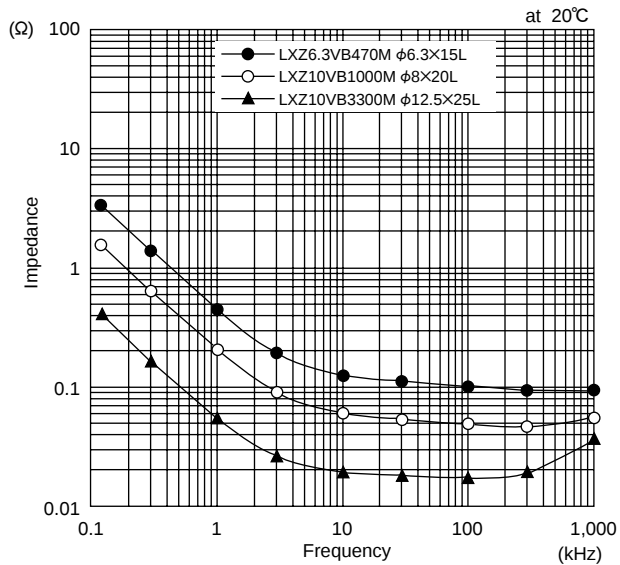


LXZ Series

●105°C Endurance with Rated Ripple Current

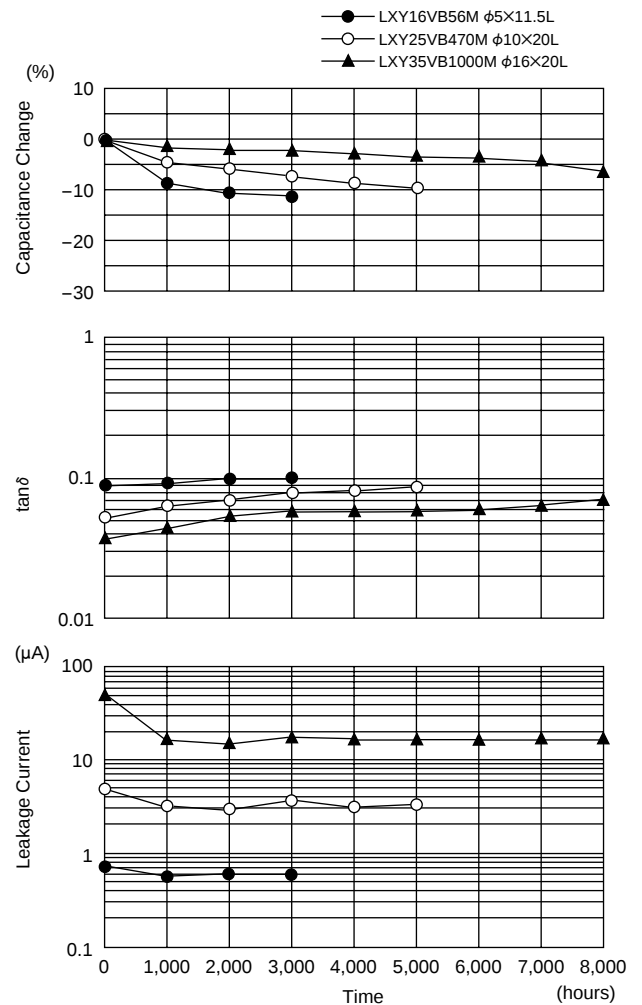


●Impedance-Frequency Characteristics

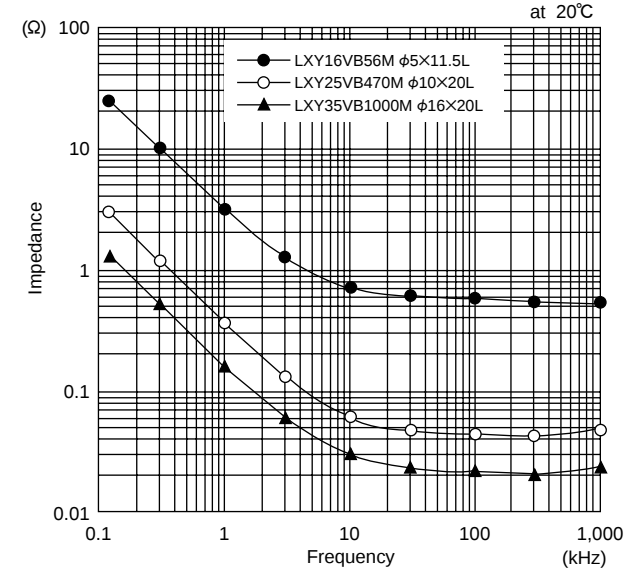


LXY Series

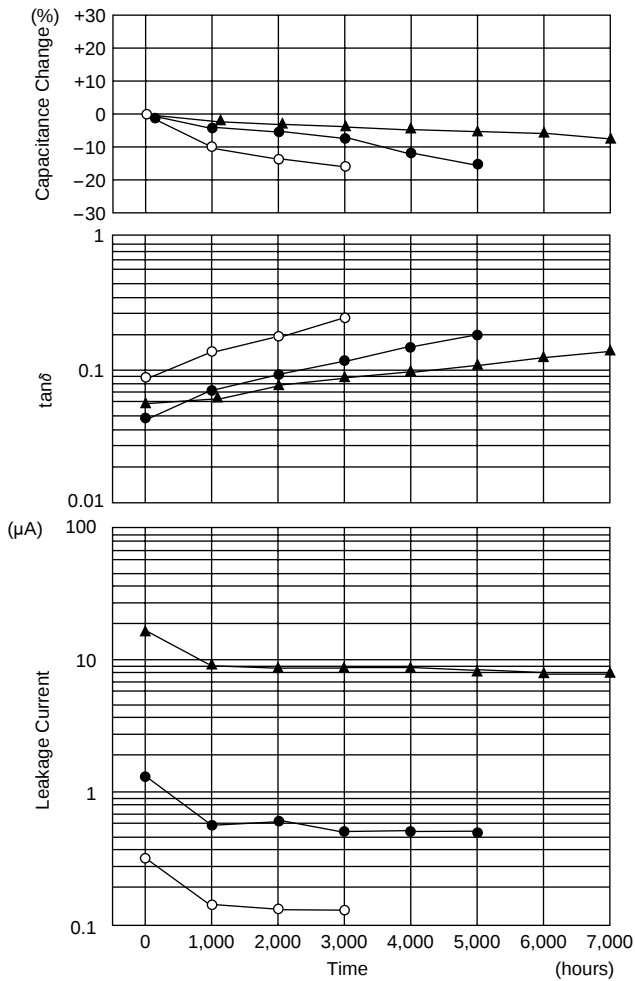
●105°C Endurance with Rated Ripple Current



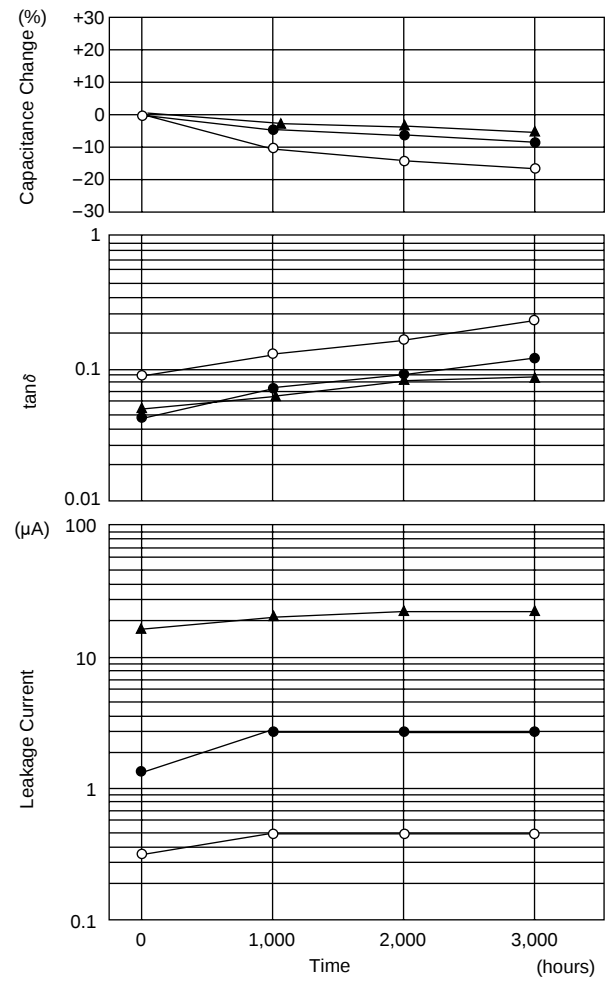
●Impedance-Frequency Characteristics



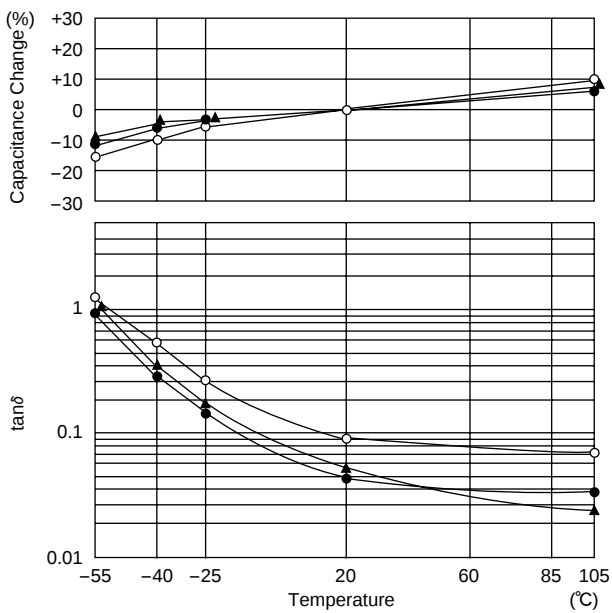
●105°C Endurance with Rated Ripple Current



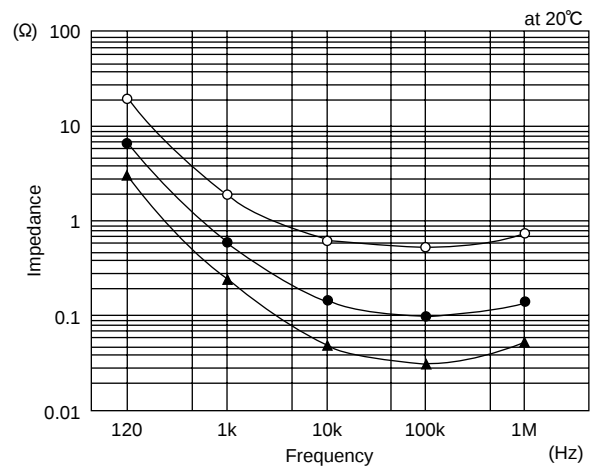
●105°C Shelf Life test



●Temperature Characteristics

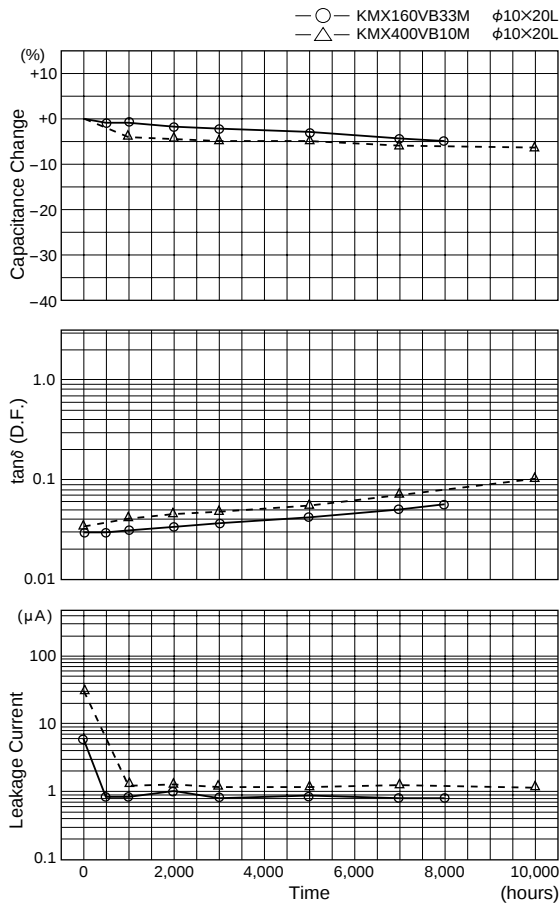


●Impedance-Frequency Characteristics

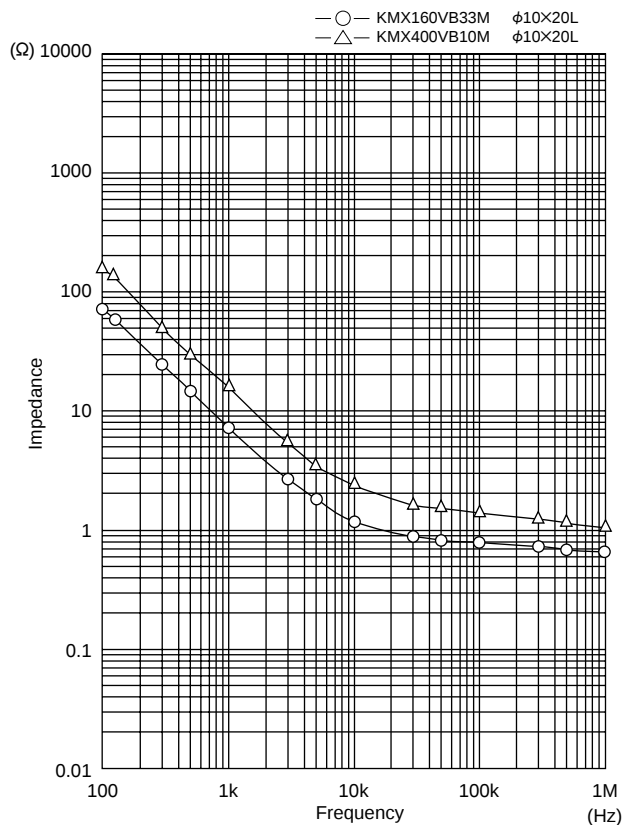


KMX Series

●105°C Endurance with Rated Ripple Current

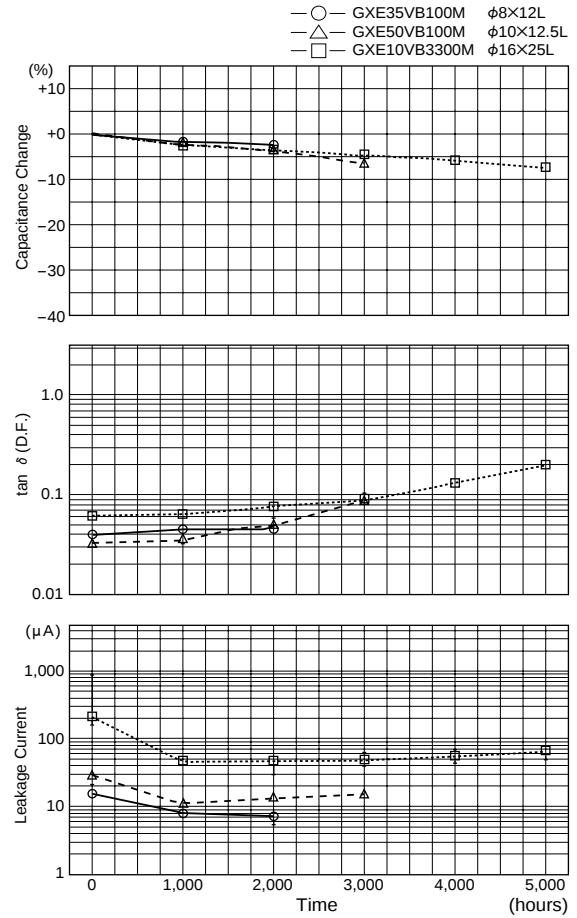


●Impedance-Frequency Characteristics at 20°C

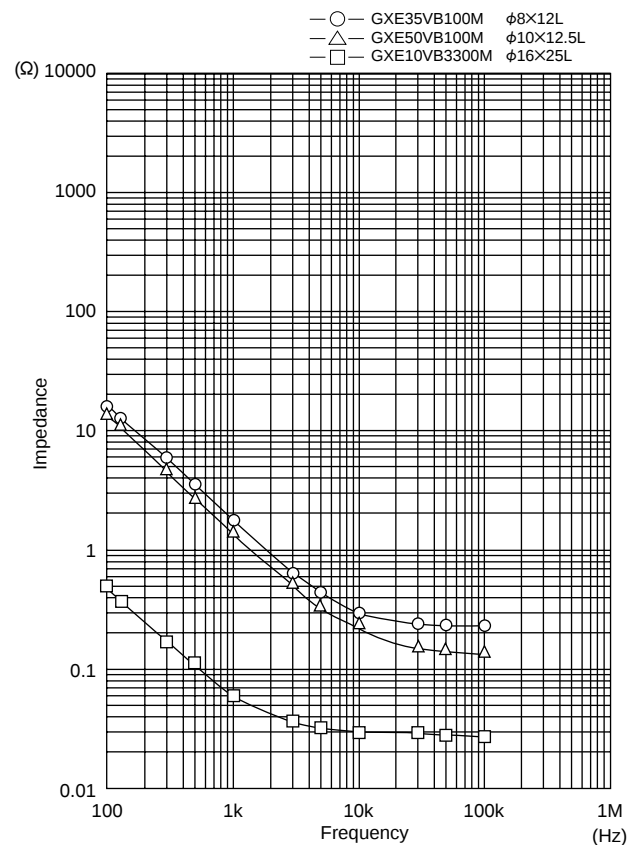


GXE Series

●125°C Endurance with Rated Ripple Current



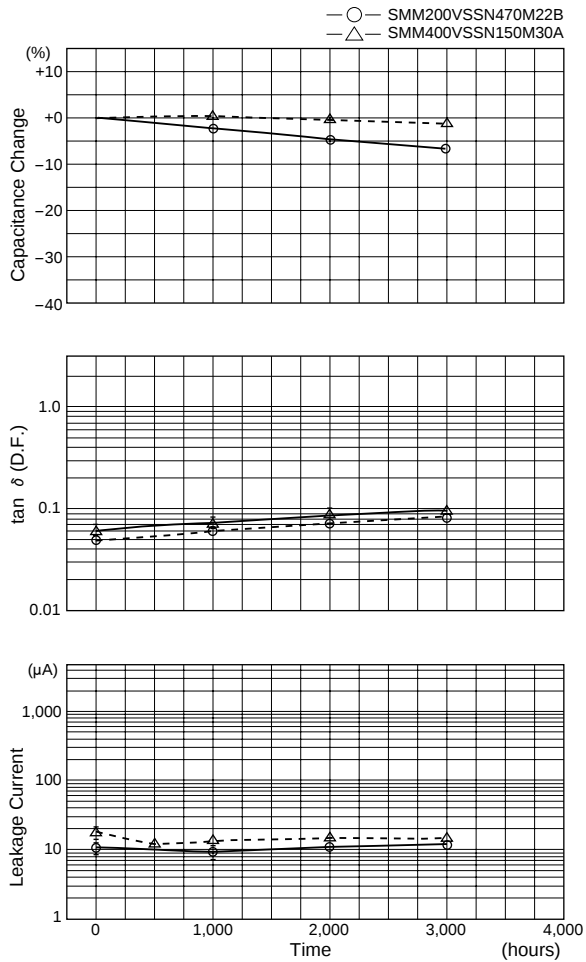
●Impedance-Frequency Characteristics at 20°C



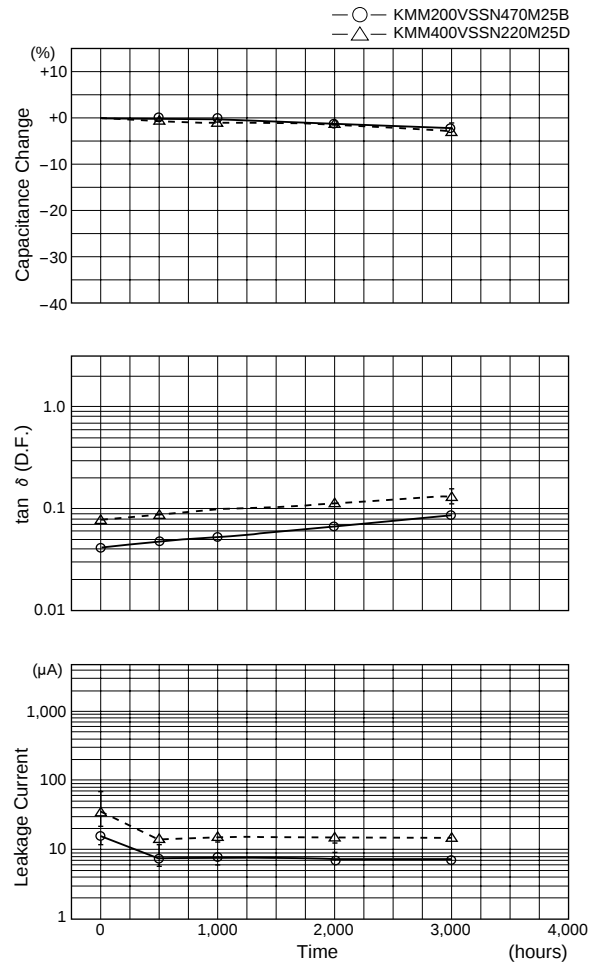
SMMSeries

KMMSeries

●85°C Endurance with Rated Ripple Current



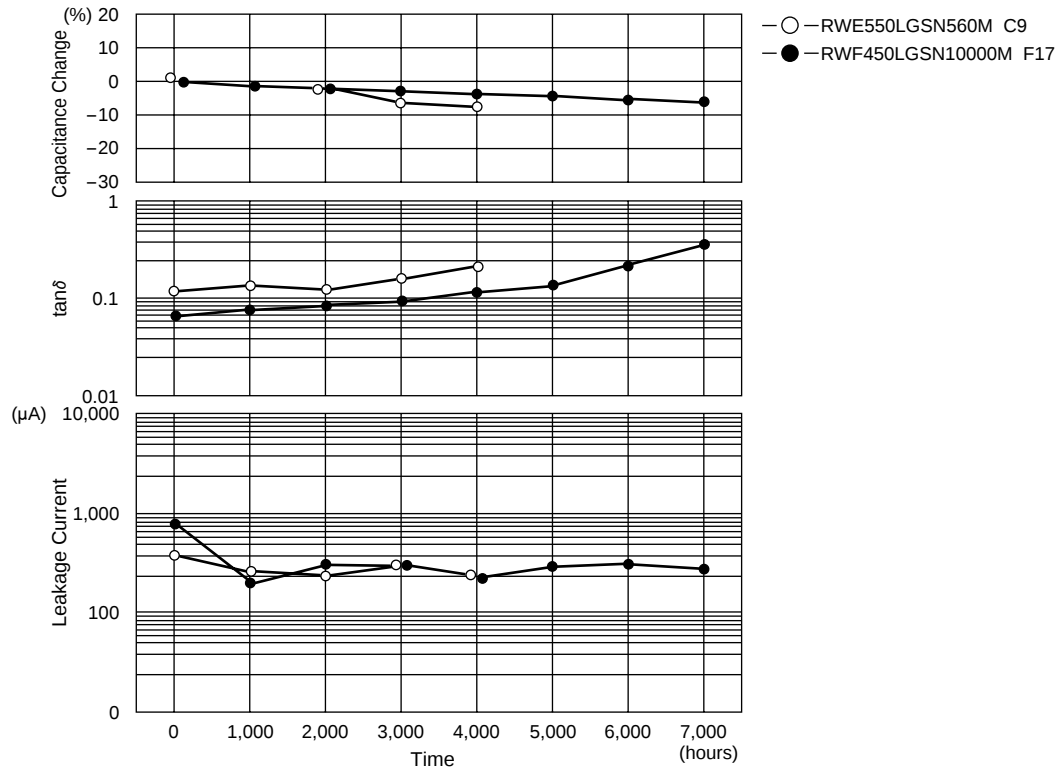
●105°C Endurance with Rated Ripple Current



RWE/RWF/RWL Series

RWE/RWF series

●85°C Endurance with Rated Ripple Current



RWL series

●85°C Endurance with Rated Ripple Current

