



ALUMINUM ELECTROLYTIC CAPACITORS

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Series			Features	Endurance (+R=With ripple)	Standard type	Low impedance	Solvent-proof	Terminal type	Rated voltage range (V _{dc})	Capacitance range (μF)
Surface Mount	Solid Electrolyte Type	PXA (NEW)	Pb Free, Functional-polymer, super low ESR	105°C 2,000 hours		●	●	SMD	2.5 to 16	33 to 1,000
		PX	Functional-polymer, super low ESR	105°C 2,000 hours		●	●	SMD	4 to 25	6.8 to 680
		MX	Solid aluminum, high heat resistance	125°C 2,000 hours +R		●	●	SMD	4 to 16	6.8 to 56
		MFZ/MFX	Solid aluminum, low ESR, high cap.	85/105°C 1,000 hours +R		●	●	SMD	4 to 20	3.3 to 56
	Horizontal Type	MFS/MFA	3.5 to 4.5mm height, downsized	85°C 1,000 to 2,000hours			●	SMD	4 to 35	0.1 to 100
		MF	3.2 to 4.7mm max. height	85°C 2,000 hours	●		●	SMD	4 to 50	0.1 to 150
		MFK	3.7 to 4.7mm max. height	105°C 1,000 hours	●		●	SMD	6.3 to 50	0.1 to 100
		MFY	4.7mm max. height	105°C 1,000 hours		●	●	SMD	6.3 to 50	3.3 to 100
		MFJ	4.7mm max. height	105°C 2,000 hours	●		●	SMD	6.3 to 50	3.3 to 100
		MFK-Large	9.2mm max. height	105°C 2,000 hours	●		●	SMD	10 to 50	47 to 1,000
		MF-BP	3.7 to 4.7mm max. height, bi-polar	85°C 2,000 hours			●	SMD	4 to 50	0.1 to 22
		MFK-BP	3.7 to 4.7mm max. height, bi-polar	105°C 1,000 hours			●	SMD	6.3 to 50	0.1 to 10
	Vertical Type	MVS	4.5mm height	85°C 2,000 hours	●		●	SMD	4 to 50	0.1 to 220
		MVA	5.5 to 22.0mm max. height, downsized	85°C 2,000 hours			▲	SMD	4 to 450	0.1 to 10,000
		MV	5.5 to 10.5mm max. height	85°C 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°C 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°C 1,000 to 2,000 hours	●		●	SMD	6.3 to 50	0.1 to 1,000
		MKA (NEW)	5.5 to 10.5mm max. height, Pb Free	105°C 1,000 to 2,000 hours	●		●	SMD	6.3 to 50	0.1 to 1,000
		MVY	5.5 to 22.0mm max. height	105°C 1,000 to 5,000 hours		●	●	SMD	6.3 to 100	1.0 to 8,200
		MVZ (NEW)	Very low ESR (Ask Engineering Bulletin in detail)	105°C 1,000 to 2,000 hours		●	●	SMD	6.3 to 25	10 to 1,500
		MVJ	6.0mm max. height	105°C 2,000 hours	●		●	SMD	6.3 to 50	0.1 to 100
		MVL (Upgrade)	6.0mm max. height	105°C 3,000 to 5,000 hours			●	SMD	6.3 to 50	0.1 to 100
		MVH	6.0 to 22.0mm max. height	125°C 1,000 to 5,000 hours			▲	SMD	10 to 450	3.3 to 4,700
		MV-BP	5.5mm max. height, bi-polar	85°C 2,000 hours			●	SMD	4 to 50	0.1 to 47
		MVK-BP	6.0mm max. height, bi-polar	105°C 1,000 hours			●	SMD	6.3 to 50	0.1 to 47
Miniature	Low Profile	SRM	5mm height, downsized	85°C 1,000 hours			●	Radial	4 to 50	0.1 to 330
		SRE	5mm height	85°C 1,000 hours	●			Radial	4 to 50	0.1 to 100
		KRE	5mm height	105°C 1,000 hours	●		●	Radial	6.3 to 50	0.1 to 100
		SRA	7mm height	85°C 1,000 hours	●			Radial	4 to 63	0.1 to 470
		KMA	7mm height	105°C 1,000 hours	●		●	Radial	4 to 63	0.1 to 220
		SRG	φ4×7 to φ18×25mm, low profile	85°C 1,000 to 2,000 hours			●	Radial	4 to 50	0.1 to 10,000
		KRG	φ4×7 to φ18×25mm, low profile	105°C 1,000 hours			●	Radial	6.3 to 50	0.1 to 10,000
	General Purpose	SMQ (NEW)	Downsized	85°C 2,000 hours	●			Radial	6.3 to 450	0.1 to 68,000
		KMQ (NEW)	Downsized	105°C 1,000 to 2,000 hours +R	●		▲	Radial	6.3 to 450	0.1 to 68,000
		SMG	General, downsized	85°C 2,000 hours	●		▲	Radial	6.3 to 450	0.1 to 39,000
		KMG	General, downsized	105°C 1,000 to 2,000 hours +R	●		▲	Radial	6.3 to 450	0.1 to 22,000
		SME	General	85°C 2,000 hours	●		▲	Radial	6.3 to 450	0.1 to 15,000
		KME	General	105°C 1,000 hours +R	●		▲	Radial	6.3 to 400	0.1 to 15,000
		SME-BP	Bi-polar, general	85°C 2,000 hours	●		●	Radial	6.3 to 100	0.47 to 6,800
		KME-BP	Bi-polar, general	105°C 1,000 hours	●		●	Radial	6.3 to 100	0.47 to 6,800
	High Frequency Use	LXZ	Low impedance, downsized	105°C 2,000 to 8,000 hours +R		●	●	Radial	6.3 to 63	12 to 18,000
		LXY	Low impedance, high reliability	105°C 2,000 to 8,000 hours +R	●	●	●	Radial	10 to 63	10 to 8,200
		LXV	Low impedance, general	105°C 2,000 to 5,000 hours +R	●	●	●	Radial	6.3 to 100	5.6 to 15,000
		SXE	Low impedance, general	105°C 1,000 to 2,000 hours		●	●	Radial	6.3 to 100	1.5 to 15,000
		LXJ	Low impedance, general	105°C 2,000 to 5,000 hours +R	●	●	●	Radial	6.3 to 50	0.47 to 15,000
		KZE	Lowest impedance, long life	105°C 2,000 to 5,000 hours +R		●		Radial	6.3 to 50	22 to 6,800
		KY	Low impedance, long life	105°C 3,000 to 6,000 hours +R		●		Radial	6.3 to 50	22 to 18,000
		KMF	Low impedance, high CV, general	105°C 2,000 to 5,000 hours +R	●	●	▲	Radial	6.3 to 450	0.47 to 15,000

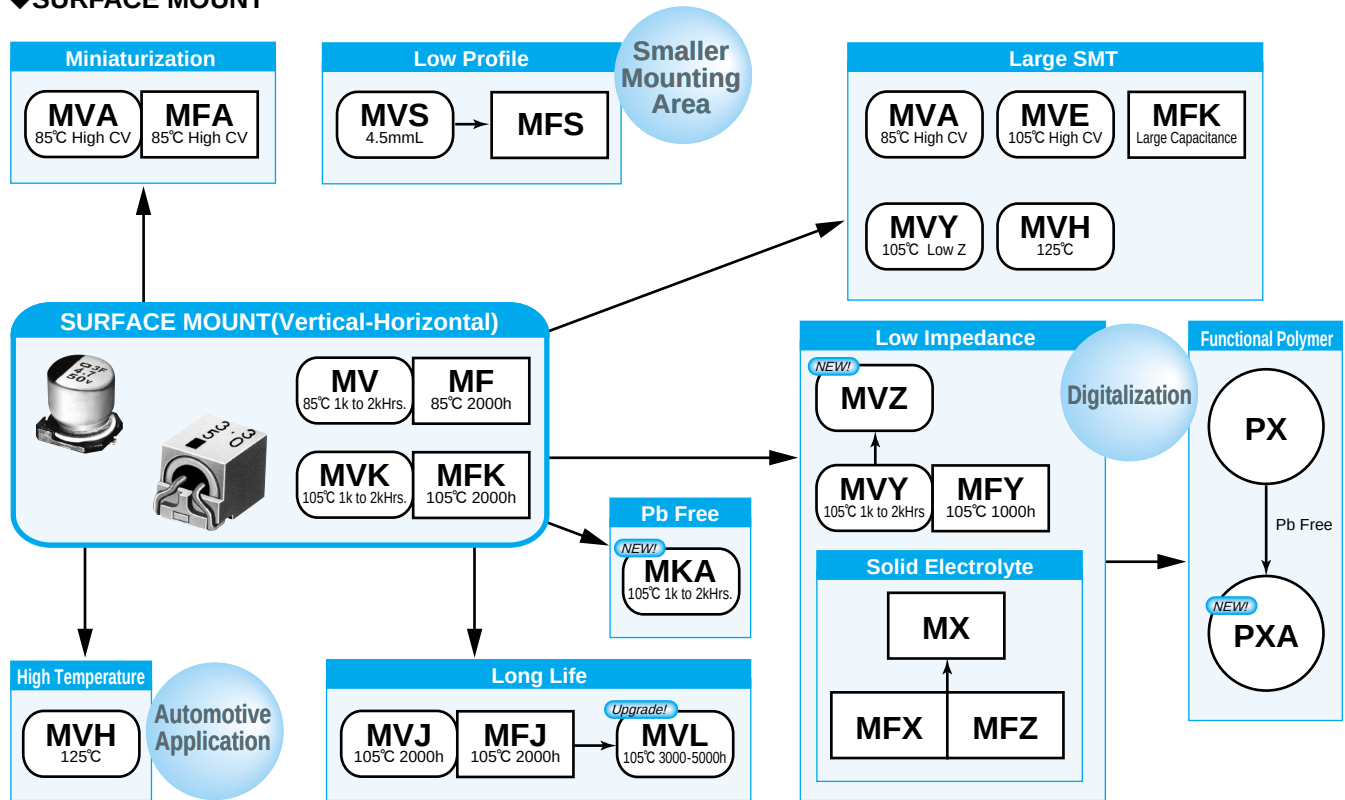
■ : Promotional products

▲ : Some of range are solvent-proof.

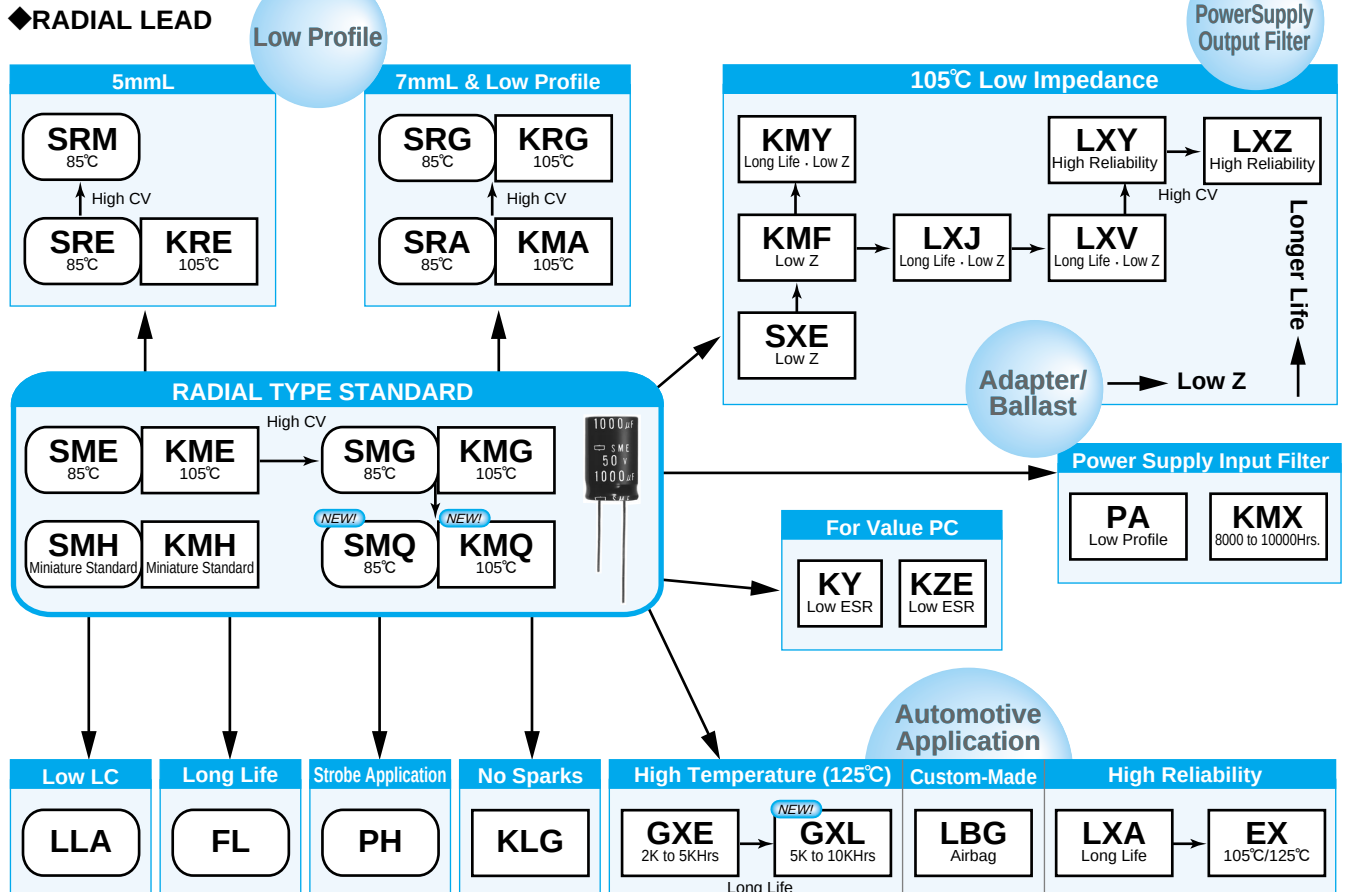
Series			Features	Endurance (+R=With ripple)	Standard type	Low impedance	Solvent-proof	Terminal type	Rated voltage range (Vdc)	Capacitance range (μF)
Miniature	High Reliability	KMX	Long life, for input filtering	105°C 8,000 to 10,000 hours +R		●		Radial	160 to 450	3.3 to 680
		SMH	φ20×20 to φ22×50mm	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
		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 220
		FL	Long life	105°C 3,000 to 6,000 hours +R		●		Radial	6.3 to 50	0.47 to 1,500
		LXA/LA	Long life	105°C 5,000 to 7,000 hours		●		Radial	10 to 250	0.47 to 4,700
		EX	(Ask Engineering Bulletin in detail)	105°C 2,000 to 5,000 hours +R		●		Radial	10 to 63	0.1 to 10,000
		GXE	125°C, downsize, low impedance	125°C 2,000 to 5,000 hours +R				Radial	10 to 450	4.7 to 4,700
		GXD	125°C (Ask Engineering Bulletin in detail)	125°C 1,000 to 2,000 hours				Radial	10 to 63	0.47 to 1,000
		GXL (NEW)	Long life (Ask Engineering Bulletin in detail)	125°C 5,000/10,000 hours +R				Radial	10 to 50	100 to 4,700
	Special Application	LBG	For airbag	105°C 5,000 hours +R		●	●	Radial	16 to 35	820 to 6,800
		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
		LXG	Long life	105°C 5,000 hours +R				Pin	10 to 450	39 to 47,000
		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	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
			LX	Long life	105°C 5,000 hours +R			Screw	350 to 450	2,200 to 12,000
			LXR	High ripple, long life	105°C 5,000 hours +R			Screw	350 to 450	2,200 to 15,000
			LWY (NEW)	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

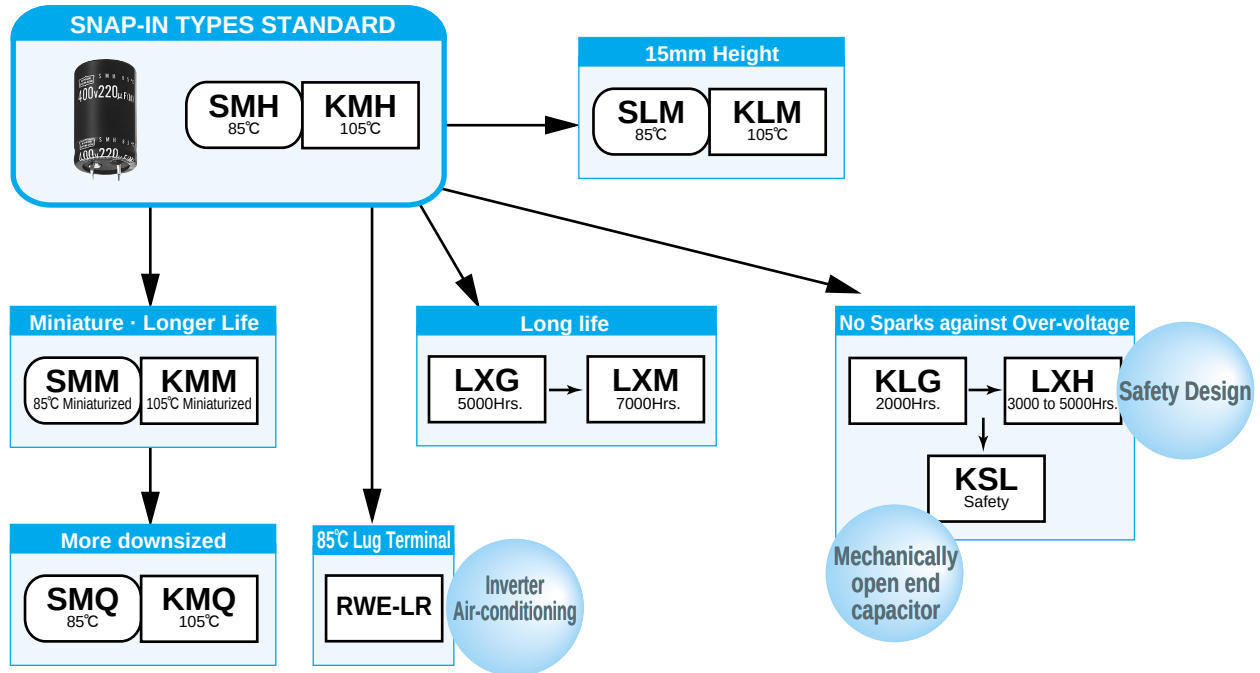
◆SURFACE MOUNT



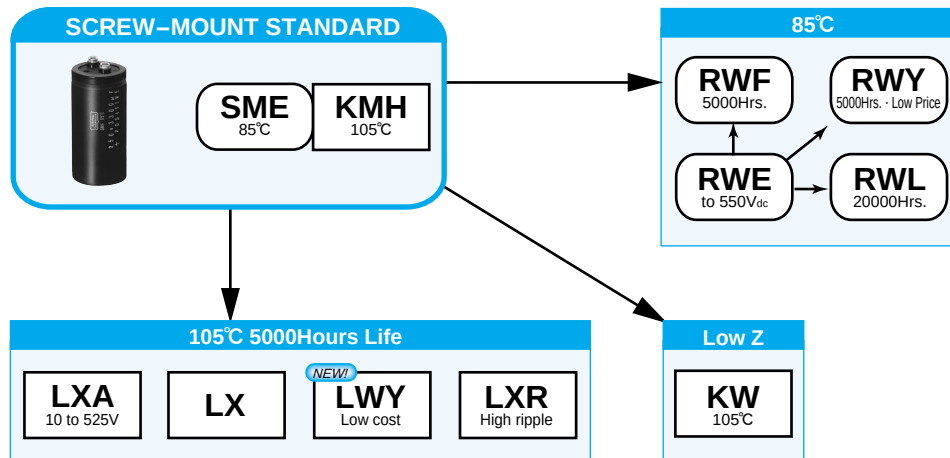
◆RADIAL LEAD



◆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. 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. (Solid electrolyte capacitors of MFX and MFZ series can withstand a maximum reverse voltage of 15% of the rated voltage for 250 hours at 85°C. MX series can do 15% of the rated voltage for 250 hours at 125°C.)

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. Also, when using MFX or MFZ series solid aluminum electrolytic capacitors at temperatures of more than 85°C, apply a low voltage in accordance with the catalogs or the product specifications.

4 Ripple current

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

a) 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.

b) Solid aluminum electrolytic capacitors, MX, MFX and MFZ series, in general, have a random failure period in that the lifetime ends with a short circuit. Take account of this failure mode in designing devices. Decreasing operating voltage, ambient temperature, and inrush current can reduce the failure rate.

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/MFY/MFJ series capacitors or solid type MX, MFX, and MFZ 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.

- a) Oil, water, salty water take care to avoid storage in damp locations.
- b) Toxic gases such as hydrogen sulfide, sulfurous acid, nitrous acid, chlorine or its compounds, and ammonium
- c) Ozone, ultraviolet rays or radiation
- d) 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

- a) The electrical characteristics of capacitors vary in respect to temperature, frequency and service life. Design the device circuits by taking these changes into account.
- b) Capacitors mounted in parallel need the current to flow equally through the individual capacitors.
- c) 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 cata-

logs 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 operating 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

- Do not use any adhesive and coating materials containing halogenated solvent.
- 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.
- Some of coating material cannot be cured over the capacitor.

6 Fumigation

Fumigation process may be required when exporting the end electrical product. The process, actually halogenated ions, may cause the aluminum electrolytic capacitor to corrode. The fumigation solvent must not directly adhere to the electrical product and the solvent must be dried completely. Please consult us if solvent adheres to the aluminum electrolytic capacitors or drying condition is not satisfaction.

The Operation of Devices

- Do not touch a capacitor directly with bare hands.
- 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.
- 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

- 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.
- 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

- 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.
- 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.

- 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.
- Store the capacitors in places free from water, oil or salt water.
- Store the capacitors in places free from toxic gasses (hydrogen sulfide, sulfurous acid, chlorine, ammonium, etc.)
- Store the capacitors in places free from ozone, ultraviolet rays or radiation.
- Keep capacitors in the original package.

Disposal

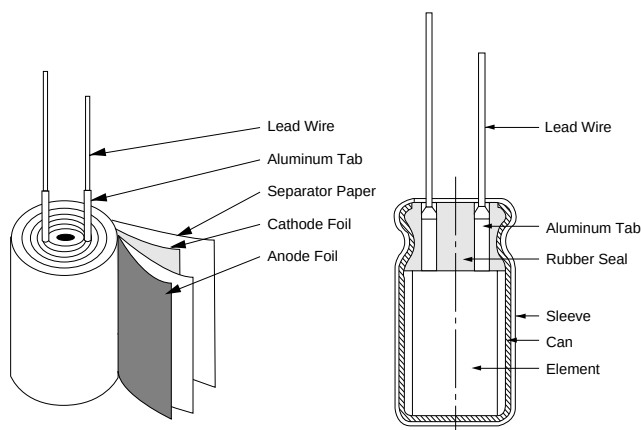
Please consult a local specialist regarding the disposal of industrial waste when disposing aluminum electrolytic capacitors.

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.

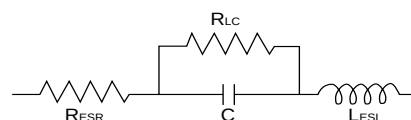
The separator functions to retain the electrolyte and prevent the anode and cathode foils from short-circuiting.

Can case and sealing materials:

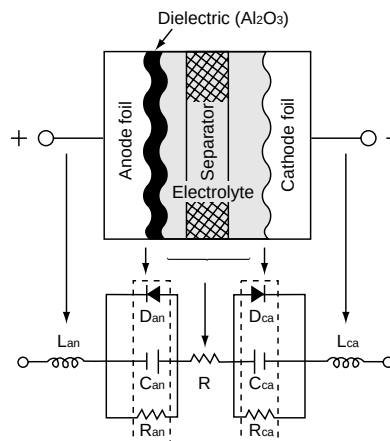
The foils and separator are wound into a cylinder to make an internal element, which is impregnated with the electrolyte, inserted into an aluminum can case and sealed. During the service life of a capacitor, electrolyte slowly and naturally vaporizes by electrochemical reaction on the boundary of the 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)
 R_{LC} = Resistance due to leakage current
 C = Capacitance
 $LESL$ = Equivalent series inductance



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

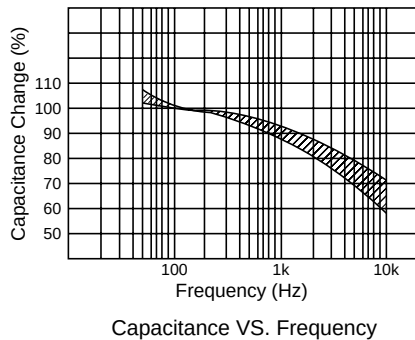
C_{an}, C_{ca} = Capacitance due to anode and cathodes foils
 R = Resistance of electrolyte and separator
 R_{an}, R_{ca} = Internal resistance of oxide layer on anode and cathode foils
 D_{an}, D_{ca} = Diode effects due to oxide layer on anode and cathode foils
 L_{an}, L_{ca} = Inductance due to anode and cathode terminals

Basic Electrical Characteristics

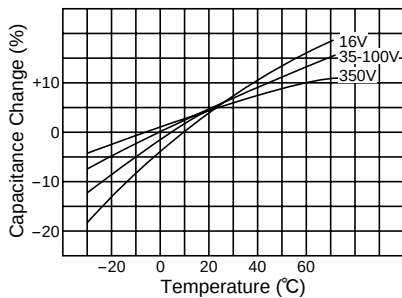
Capacitance:

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(○—||—W—○) 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.



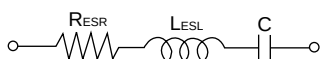
The capacitance value is highly dependent upon temperature and frequency. As the temperature decreases, the capacitance becomes smaller. See the typical behavior shown below.



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.

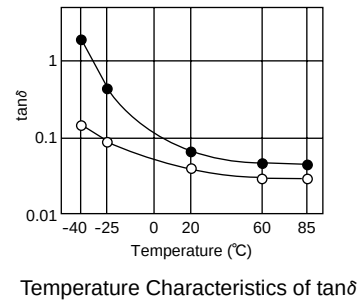
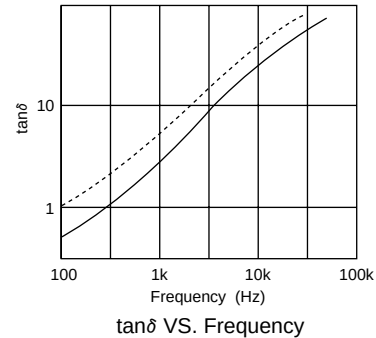
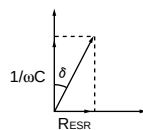
tanδ(tangent of loss angle or dissipation factor):

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.

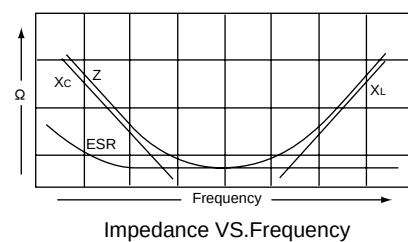
Impedance (Z):

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:

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

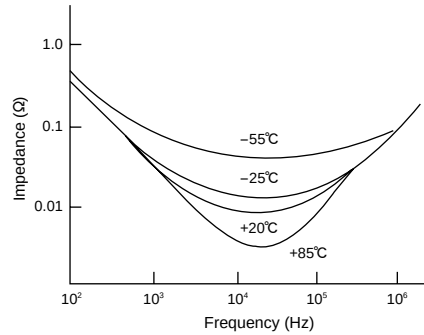
Where : $X_C = 1/\omega C = 1/2\pi f C$
 $X_L = \omega L = 2\pi f L$

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.

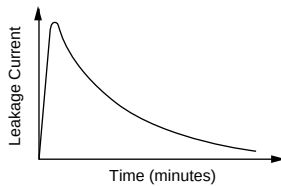
As shown at the next page, the impedance value varies with temperature because the resistance of the electrolyte is strongly affected by temperature.



Temperature Characteristics of Impedance

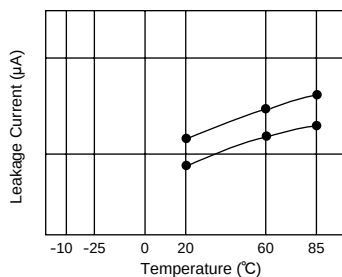
Leakage current:

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.



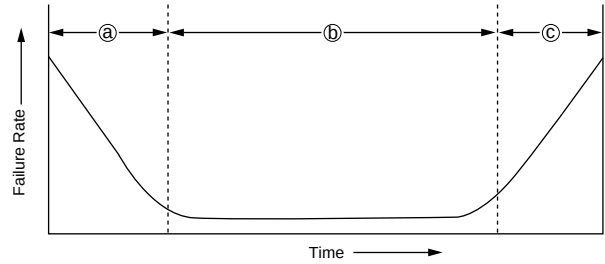
Typical Temperature Characteristics

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.)

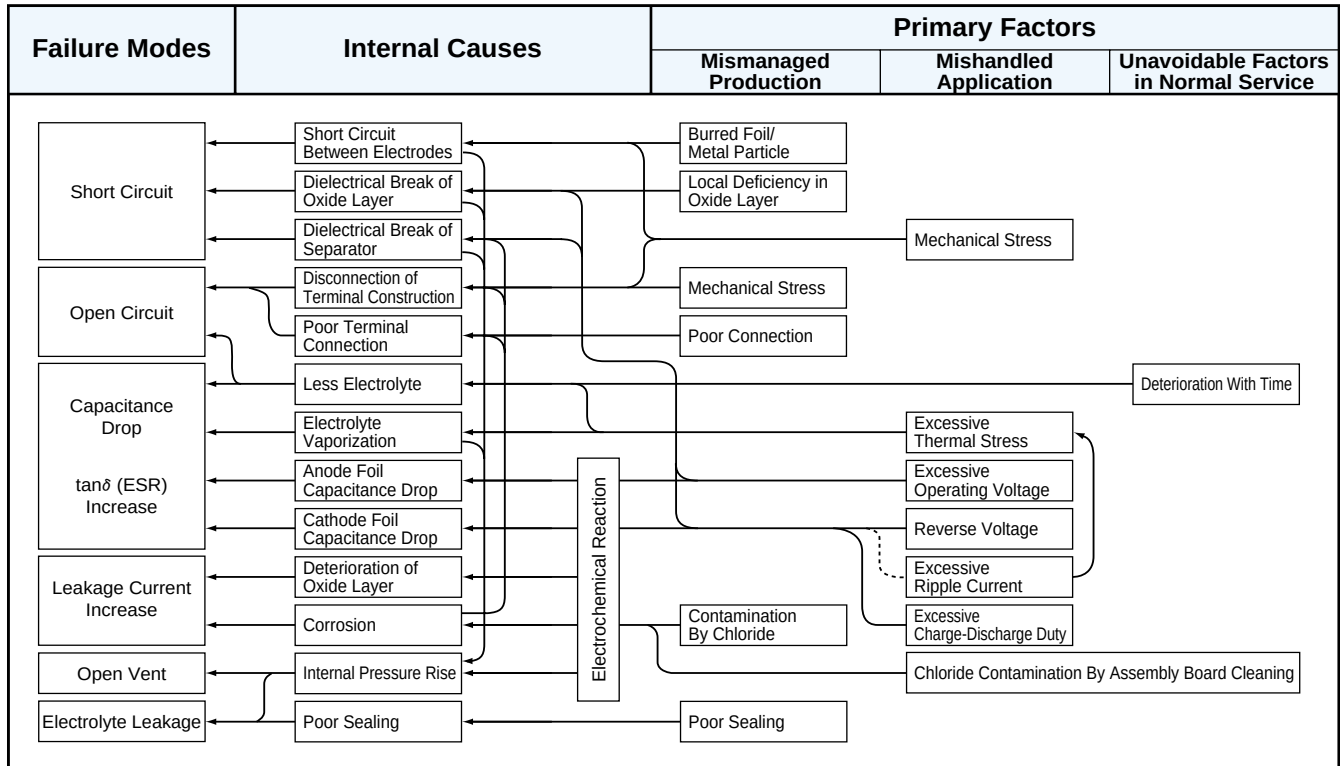


Table1

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 $\tan\delta$ 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 operating 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 operating 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 $\tan\delta$ than any other types of capacitors; therefore, the ripple current gives aluminum electrolytic capacitors higher internal heat. Be sure to check the maximum permissible 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 I_{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}	Type	Products	
		Type	Series
$2^{(-\Delta T / 5)}$	Surface mount (FC/FD/VC)		MFS/MFA, MF, MFK, MFY, MFJ, MF-BP, MFK-BP, MVA, MVS, MV, MVK, MVH, MVE, MVL, MVY, MKA, MVZ, MV-BP, MVK-BP, MVJ, MFK-large
	Radial lead (VB)		GXD, KMA, KME-BP, KRE, KMY, KRG, LLA, LX, LXA, SME, SMQ, SME-BP, SMG, SRA, SRE, SRG, SRM, SXE
	Screw-mount terminal (LG)		KW
$2^{(\Delta T_o - \Delta T) / 5}$	$\Delta T_o = 5 \text{ deg}$	Radial lead (VB)	FL, GXE ($T_o \leq 105^\circ\text{C}$), KLG, KME, KMQ, KMF, KMG, KMH, KMX, LBG, LXJ, LXV, LXZ, KY, KZE
		Pin terminal (VN/VS/VR)	KLK, KLH, KMH, KMM, KMQ, KSL, LXG, LXM, LXH
		Screw-mount terminal (LG)	LXA (10 to 250Vdc), KMH
	$\Delta T_o = 5 \text{ to } 10 \text{ deg}$ 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
$2^{[-2 + (25 - \Delta T) / b]}$		Screw-insert terminal (LG)	LX, LXA (350 to 525Vdc), 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_o = An increase (deg) in core temperature by internal heating due to rated maximum permissible 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 T_x (°C)	40	55	65	85	105
Guide limit of ΔT (deg)	30	30	25	15	5
Core temperature (= $T_x + \Delta T$)	70	85	90	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 maximum permissible 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 maximum permissible 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 maximum permissible ripple current and $F_{f1} \dots F_{fn}$ is a conversion coefficient from one frequency to another in accordance with the frequency $f1 \dots fn$.

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

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

Relationship of $w = (L_{\text{ripple}})^2 \cdot ESR$ 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 max. permissible 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.

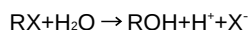
Cleaning Agents

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,

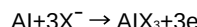


RX : Halide

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 : MF, MFK, MFJ, MFY, MFS, MFA, MF-BP, MFK-BP, MVS, MV, MVK, MVE(6.3 to 63V_{dc}), MVK-large, MVJ, MVA(4 to 63V_{dc}), MVH(10 to 50V_{dc}), MVY(6.3 to 63V_{dc}), MVL, MV-BP, MVK-BP, PX, MFX, MFZ, MX, MKA, MVZ

Radial lead : EX, KMA, KME(to 250V), KME-BP, KMF(to 100V), KMG(to 250V), KRE, KRG, KMQ(to 250V), LBG, LLA, LX, LXA, LXV, LXY, LXJ, LXZ, SME(to 250V), SME-BP, SMG(to 250V), SRG, SRM, SXE

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.

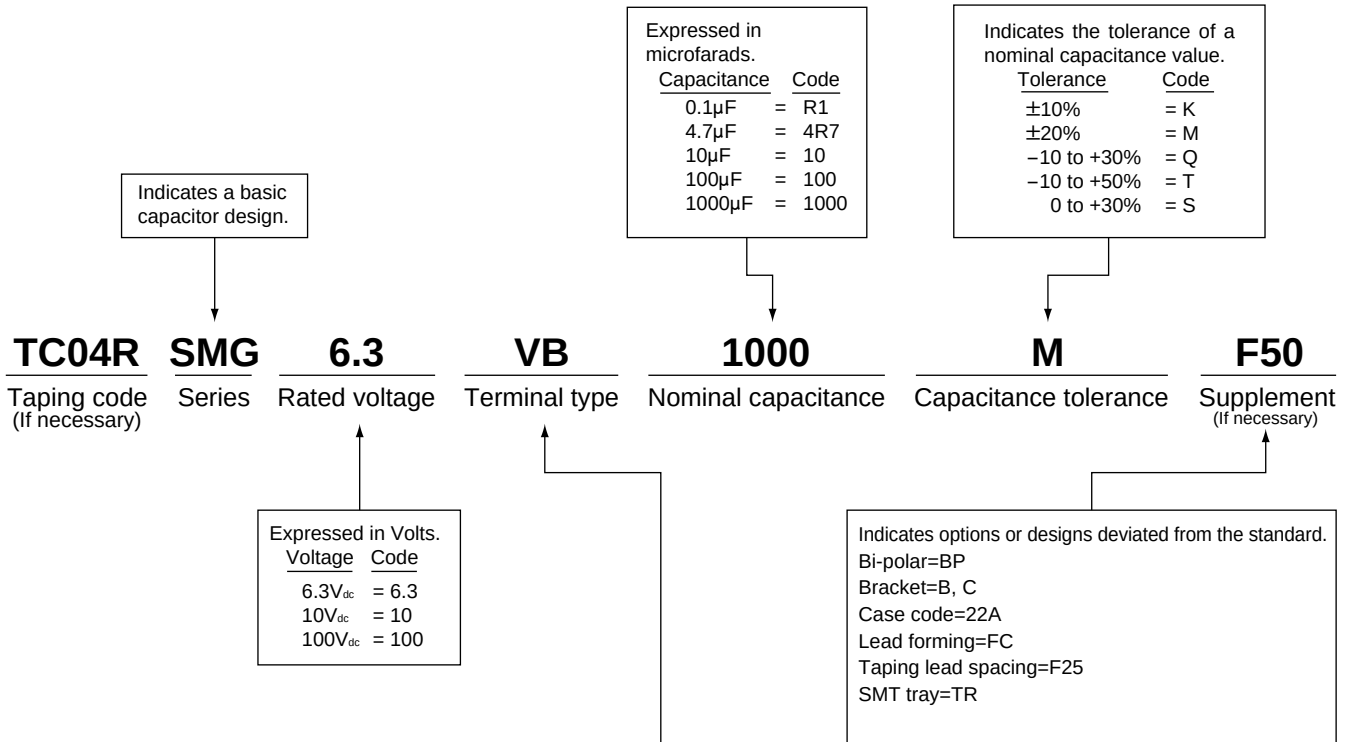
Non-clean flux

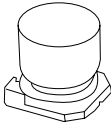
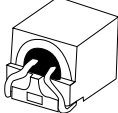
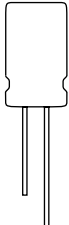
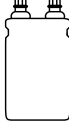
Both ionic halogen and non-ionic halogens damage the capacitor when they penetrate in through the rubber seal. Note that some of the fluxes called non-halogenated flux contains less ionic halogen activator but actually a large amount of non-ionic halogen.

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

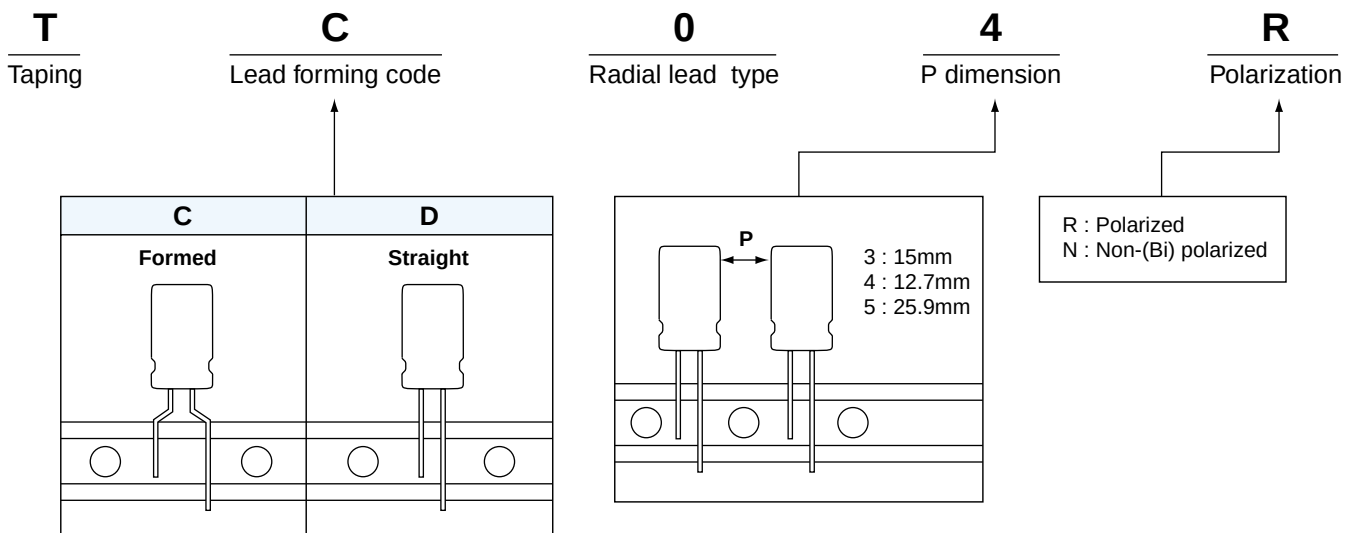
Other Precautions to wash capacitors

- 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.



Indicates basic terminal type of capacitors.				
Type code=VC	Type code=FC	Type code=VB	Type code=VSSN	Type code=LGSN
Vertical SMT	Horizontal SMT	Radial lead	Snap-in terminal for large-sized capacitors	Screw-mount terminal
	 Dummy terminal=FD			

◆TAPING CODE (only applicable for radial type)



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.

◆Functional polymer electrolyte capacitors / Solid electrolyte capacitors

Type	Series	Lead-Free	Non-PVC sleeve
Surface Mount	PXA, MFX, MFZ	Option	Non-PVC Standard

◆Aluminum electrolytec capacitor

Type	Series	Lead-Free	Non-PVC sleeve
Surface Mount (Type : VC)	MV, MVK, MKA, MV-BP, MVK-BP	Option	Non-PVC standard
Radial Lead (Type : VB)	SRE, KRE, SRG, KMA, SMQ, KMQ, SMG, KMG, LXV, LXY, LXZ, KY, KZE, KMX, GXE, SRE-BP, KRE-BP, SRA-BP, KMA-BP, SME-BP, KME-BP	Option	Option
Snap-in (Type : VSSN, VNSN, LISN)	SMH, KMH, SMM, KMM, SMQ, KMQ	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 No.710A.



PACKAGING

MINIMUM ORDER QUANTITY

Please order by units of minimum order quantity.

◆SURFACE MOUNT

●Horizontal



Series	Case code	Quantity (pcs)
Alchip® MFS/MFA/MF/MFK MFY/MFJ PX (Horizontal) MFZ/MFX	A6	3,000
	B46, B6	3,000
	C46, C6	2,500
	D46, D6, D8, D80, D10, D13	2,500
	E8	2,000
	H15, H20, H25	500

●Vertical



Series	Case code	Quantity (pcs)	
		Taping	Tray
Alchip® MVS/MVA/MV/ MVK/MVY/MVJ MVH/MVE/MVL MKA/MVZ PX(Vertical)/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	—
	J80, J10	500	—
	K14	200	120
	K16	150	120
	L17, L22	—	80
	M17, M22	—	60

◆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.

◆SNAP-INS



200 pieces

TAPING SPECIFICATIONS

SURFACE MOUNT TYPE (TAPING)



◆CARRIER TAPE [mm]

Fig.1

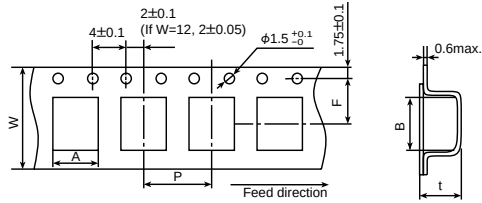


Fig.2

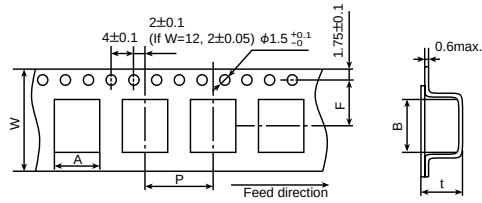


Fig.3

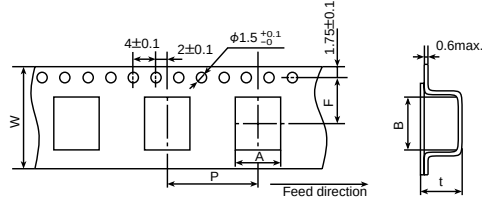


Fig.4

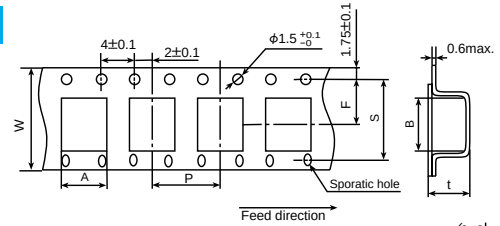
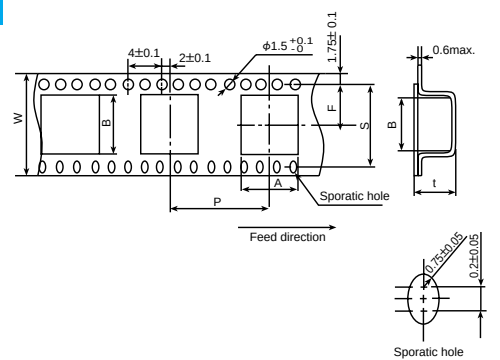


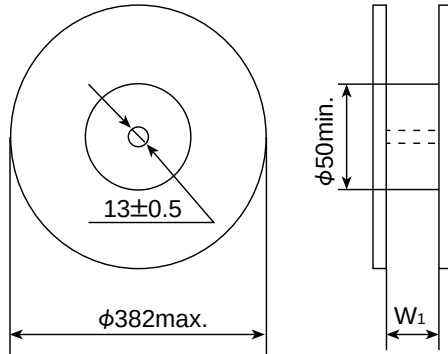
Fig.5



[mm]

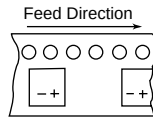
Items		W	A	B	F	P	t	S	Fig.
Series		±0.3	±0.2	±0.2	±0.1	±0.1	±0.2	±0.1	
Alchip® MFS/MFA MF/MFK MFY/MFJ PX (Horizontal) MFZ/MFX	A6	12.0	3.7	6.7	5.5	8.0	3.5	—	1
	B46	12.0	4.2	5.2	5.5	8.0	4.0	—	1
	B6	12.0	4.2	6.7	5.5	8.0	4.0	—	1
	C46	12.0	4.7	5.2	5.5	8.0	4.5	—	1
	C6	12.0	4.7	6.7	5.5	8.0	4.5	—	1
	D46	12.0	5.2	5.2	5.5	8.0	5.0	—	1
	D6	12.0	5.2	6.7	5.5	8.0	5.0	—	1
	D8 (D80)	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
	E8	16.0	7.5	8.8	7.5	8.0	6.0	—	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 PX(Vertical) 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	—	3
	H10	24.0	8.7	8.7	11.5	16.0	11.0	—	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
	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

◆REEL DIMENSIONS [mm]

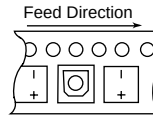


◆POLARITY

Alchip® MFS/MFA/MF
(Horizontal) MFK/MFY/MFJ
PX/MFZ/MFX



Alchip® MVS/MV/MVK
(Vertical) MVY/MVJ/MVH/
MVE/MVL/MKA/
MVZ/PX/PXA

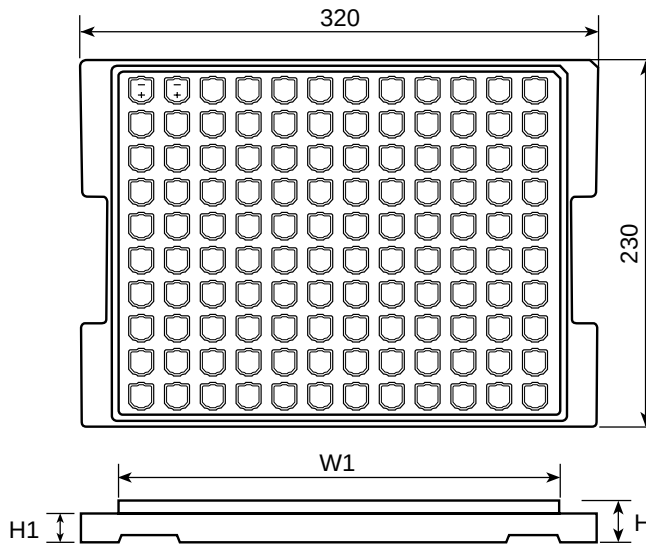


◆QUANTITY PER REEL/BOX

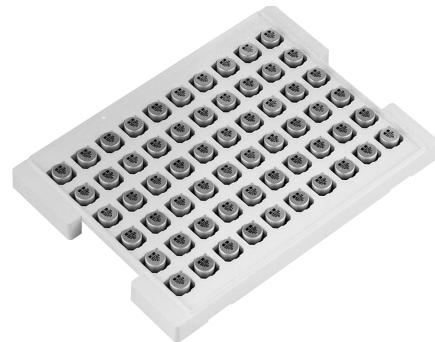
Series	Case code	Quantity (pcs/reel)	Quantity (pcs/box)	W1 (mm)
Alchip® MFS/MFA MF/MFK MFY/MFJ	A6	3,000	15,000	14
	B46, B6	3,000	15,000	14
	C46, C6	2,500	12,500	14
	D46, D6	2,500	12,500	14
	D8, D80, D10	2,500	12,500	18
	D13	2,500	7,500	26
	E8	2,000	10,000	18
	H15	500	1,500	26
	H20	500	1,000	34
	H25	500	1,000	46
PX (Horizontal) MFZ/MFX	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
	J80, J10	500	1,500	26
	K14	200	600	34
Alchip® MVS/MVA MV/MVK MVY/MVJ MVH/MVE MVL/MKA PX(Vetical) PXA	K16	150	450	34

SURFACE MOUNT TYPE (TRAY)

◆DIMENSIONS [mm]



Case code	H [mm]	W1 [mm]	H1 [mm]
K14 & K16	21.0	284	18.5
L17 & L22	28.0	284	24.0
M17 & M22	28.0	284	24.0



◆QUANTITY PER TRAY

Case code	Quantity (pcs/tray)	Quantity (pcs/box)
K14 & K16	120	600
L17 & L22	80	400
M17 & M22	60	300

◆TRAY CODE

Example

Capacitor's D/N TR
MVE6.3VC 4700M L22TR

TAPING SPECIFICATIONS

RADIAL LEAD TYPE (TAPING)

◆CARRIER TAPE [mm]

Fig.1

φD=φ3 to 8

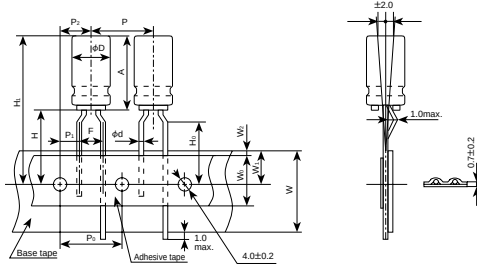


Fig.2

φD=φ5
φDXL=φ4×7

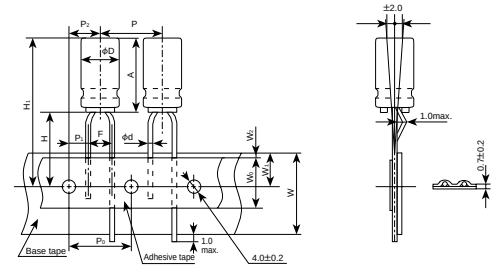


Fig.3

φD=φ6.3 to 8
φD=φ10 & 12.5

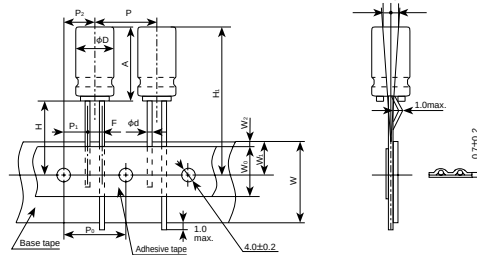
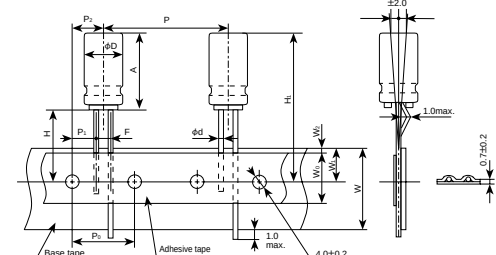


Fig.4

φD=φ12.5



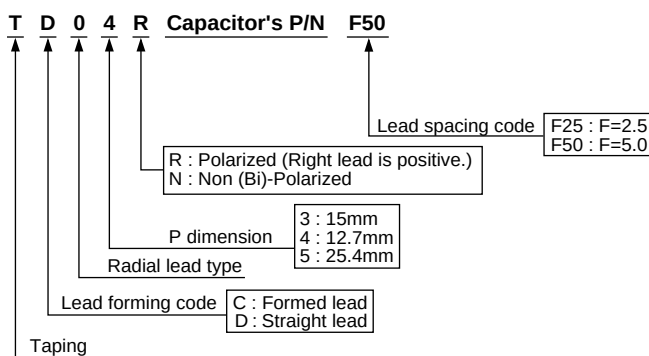
Code	Case size		φd	P	P ₀	P ₁	P ₂	F	W	W ₀	W ₁	W ₂	H	H ₀	H ₁	Fig.	Taping code
	φD	A															
tol.	—	—	±0.05	±1.0	±0.2	±0.7	±1.0	+0.8 -0.2	±0.5	min.	±0.5	max.	±0.75	±0.5	—	—	—
Nominal	3	5	0.4	12.7	12.7	5.1	6.35	2.5	18.0	6.0	9.0	1.5	17.5	16.0	—	1	TC04R F25
	3.5	5	0.4	12.7	12.7	5.1	6.35	2.5	18.0	6.0	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	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
		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	—	1	TC04R F50
		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	—	3	TD04R F25
		17 to 20	0.6	12.7	12.7	5.1 3.85	6.35	2.5 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 4×7 (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.

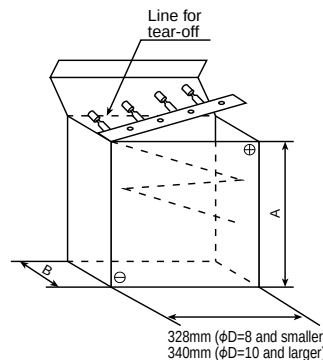
TAPING CODE

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	183	42
	L=9 to 15mm	232	42
φ8	L=5 & 7mm	232	51
	L=17 & 20mm	235	53
φ10	L≤25mm	308	62
	L≥30mm	308	67
φ12.5	308	67	500

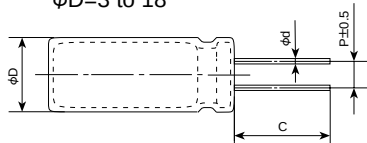
RADIAL LEAD TYPE (CUT/FORMED LEAD)

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



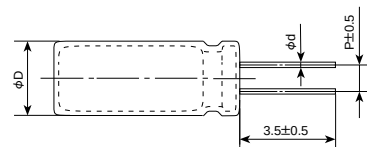
Case diameter C: Lead length

$\phi D=3$ to 8 : 5.0 ± 0.5

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

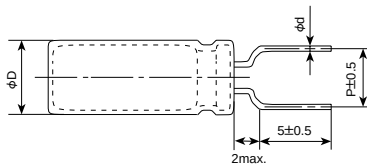
●Lead Configuration : C3.5

$\phi D=3$ to 18



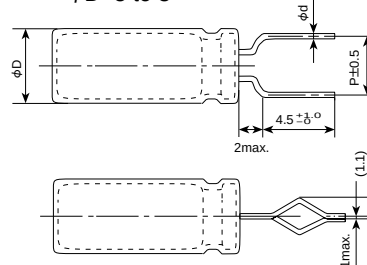
●Lead Configuration : FC

$\phi D=5$ to 8



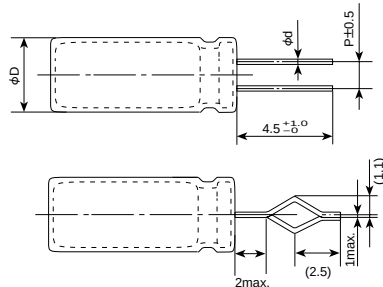
●Lead Configuration : FM

$\phi D=5$ to 8



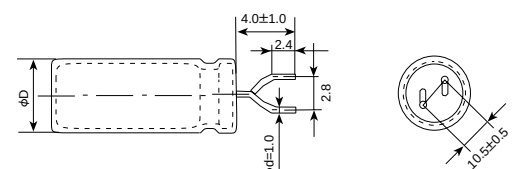
●Lead Configuration : MC

$\phi D=10$ to 18



●Lead Configuration : RC

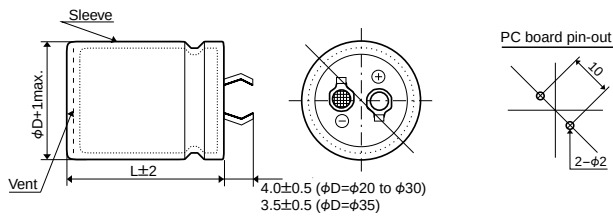
$\phi D=20$ & 22



AVAILABLE TERMINALS [mm]

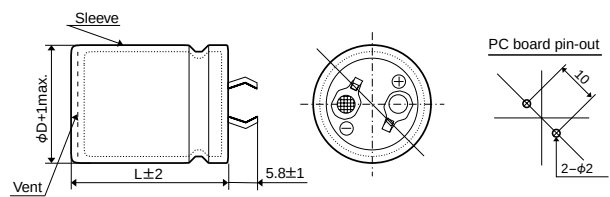
D=φ20 to φ35mm

Type : VSSN



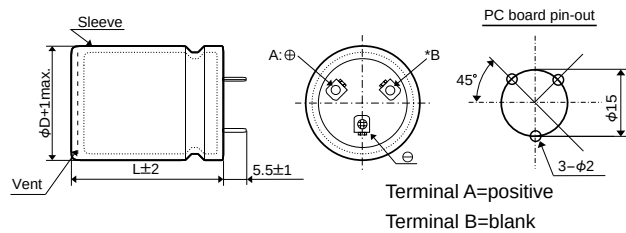
D=φ22 to φ35mm

Type : VNSN



D=φ35 & φ40mm

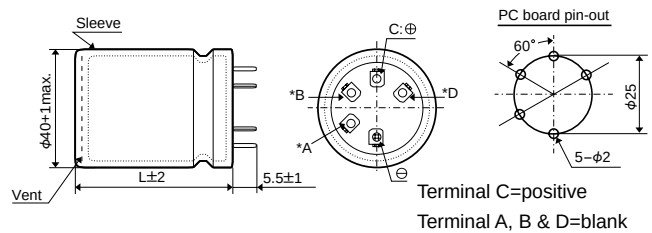
Type : VRSS



Terminal A=positive
Terminal B=blank

D=φ40mm

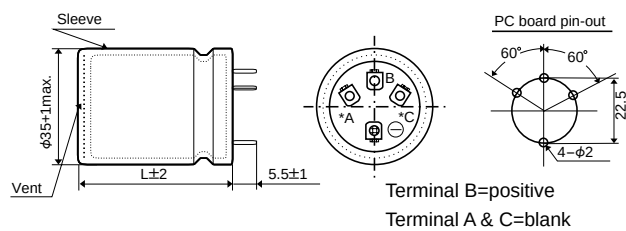
Type : VRST



Terminal C=positive
Terminal A, B & D=blank

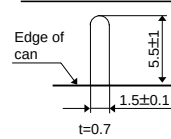
D=φ35 & φ40mm

Type : VRSD



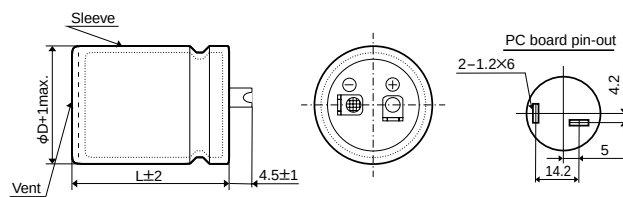
Terminal B=positive
Terminal A & C=blank

VR pin Dimensions



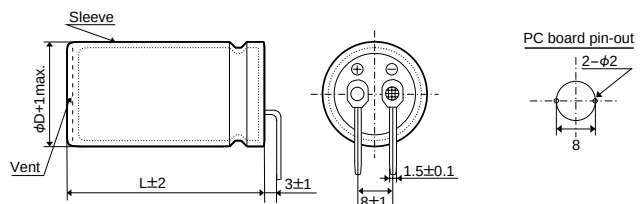
D=φ30 to φ40mm

Type : LISN



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

Type : LCSN



CAUTION

* Use the blank terminals for mechanical support only.

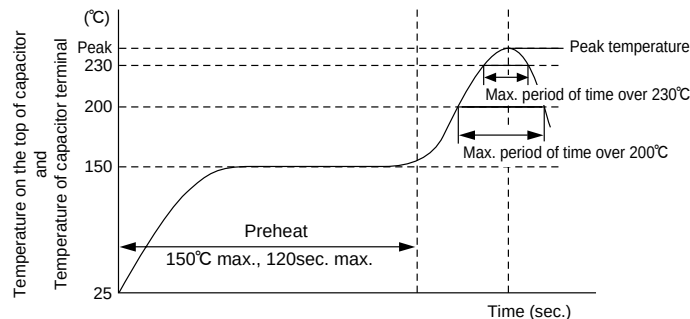
The blank terminals must not be connected to any copper trace on PC board.

Be sure to electrically isolate from the negative and the positive terminals.

RECOMMENDED REFLOW SOLDERING CONDITION

NP CAP™-PX/PXA Series

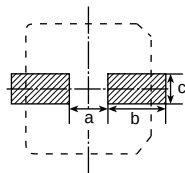
The following conditions are recommended for air or infrared reflow soldering PX/PXA series onto a glass epoxy circuit board of 90×50×0.8mm (with resist) by cream solder. The temperatures shown are the surface temperature values on the top of the can and temperature of capacitor terminal.



Series	Peak temp.	Max.Period of time over 230°C	Max.Period of time over 200°C	Remarks
PX	240°C	—	30sec	
	230°C	—	40sec	
	220°C	—	50sec	
PXA	250°C	40sec	60sec	The times of reflow soldering : once
	250°C	30sec	50sec	The times of reflow soldering : twice

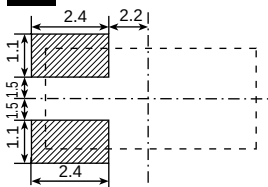
●Recommended Solder Land on PC Board

VC



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

FC



Solder land on PC board

◆PRECAUTIONS FOR USERS

Soldering method

The capacitors of NP CAP™-PX/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 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

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

Others

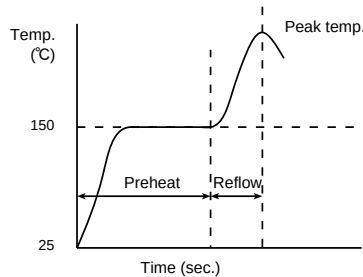
Precautions for users for Aluminum Electrolytic Capacitors shall be referred.

RECOMMENDED REFLOW SOLDERING CONDITION

Alchip® MX/MFZ/MFX Series

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 cap.

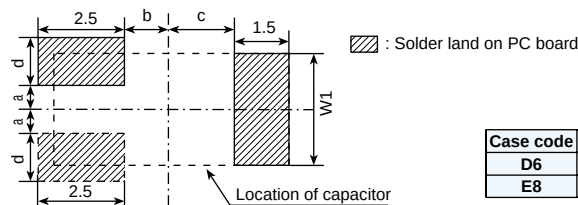
- Hot plate reflow
- Infrared reflow



Series	Peak temp.	Reflow time
MX, MFZ, MFX	260°C	15sec
	250°C	22sec
	240°C	30sec

preheat : 150°C max. within 120 seconds

● Recommended Solder Land on PC Board



	[mm]				
Case code	a	b	c	d	W1
D6	0.8	1.15	1.7	1.7	4.6
E8	0.95	2.15	2.7	2.1	5.7

◆ PRECAUTIONS FOR USERS

Failure mode

1. MX, MFX and MFZ series contain a solid electrolyte, MnO₂ (Manganese Dioxide) ; therefore, the life ends mostly due to random failure mode, mainly short circuit. The failure rate specified in the catalogue will vary by applying voltage and the ambient temperature. Designing device circuit needs to consider the failure rate under your condition.
2. Continuously a large amount of current through a capacitor results in short circuit of the capacitors. The capacitor is overheated at a higher than 500°C. The heat incurs damage of PC board. The current through capacitor is restricted to less than 5A.

Applying voltage

1. Do not apply an over-voltage exceeding the full rated operating voltage of capacitors. The over-voltage may cause increasing the leakage current and giving short circuit.
2. Reducing an applying voltage minimizes a failure rate. For instance, 50% of the full rated operating voltage can reduce failure rate at one hundredth.

Operating temperature

By applying less-full operating voltage to MX at maximum 125°C and MFZ / MFX at maximum 105°C, the capacitor exhibits stable characteristics. The temperature as well as the applying voltage is related to the failure rate. For instance, operating at maximum 60°C can reduce to approximately 1/4 failure rate.

Reverse voltage

MX, MFZ and MFX are polarized capacitors. Do not use the capacitors in wrong polarity. Both series still show stable characteristics even if the reverse voltage up to 15% of the rated voltage at 85°C, or 15% of the maximum operating voltage at 105°C is applied for 250 hours (for MX, 15% of the rated voltage at 125°C). However, this characteristics is not assured for a long period of time.

Permissible ripple current

1. Do not exceed the rated permissible ripple current of the capacitors.
2. The sum of the DC bias voltage and AC voltage must not exceed the specified full rated or maximum operating voltage of the capacitors.

Reflow soldering

High soldering temperature and long soldering time will affect the characteristics of the capacitors. Use reflow soldering conditions within the recommended range. Also, the temperature varies with the location

and population of the components, the material and the thickness of PC board.

Verify temperature profiles prior to actual production run ; then, set reflow condition within the limits prescribed in the catalogue.

MX, MFZ and MFX series might have a high leakage current, a few to 100μA, after reflow soldering. However, the applying voltage to the capacitors gradually decreases the leakage current because of dielectric stabilizing.

Cleaning conditions

As long as the cleaning agents prescribed are used, the cleaning does not give the capacitor any damages. For CFCs substitutions and other cleaning agents, consult us before actual use.

For ultrasonic cleaning, take a pretest under the customer's condition and verify that the condition cannot incur breaking terminals due to vibration.

Storage

Storage MX, MFZ and MFX without no mechanical stress to the capacitors. The storage maintains dry and low temperature, approximately 20°C, to prevent the leads and the dummy terminal from degrading.

Dummy terminal

The purpose of the dummy terminal is to prevent the capacitor body from sliding or lifting up on PC board during reflow soldering. The dummy terminal may be peeled off by the following mechanical stress.

1. Mechanical shock by bending or cutting a multi-board
2. Transportation shock
3. Mechanical stress like lifting up, poking or hitting

Terminal strength

Terminal strength is specified 10N maximum from the side for 5seconds without loosening or cutting off terminals. Do not apply any excessive force to the side of a capacitor soldered on a PC board.

RECOMMENDED REFLOW SOLDERING CONDITIONS

Alchip[®]-MFS/MFA/MF/MFK/MFK-Large/MFY/MFJ

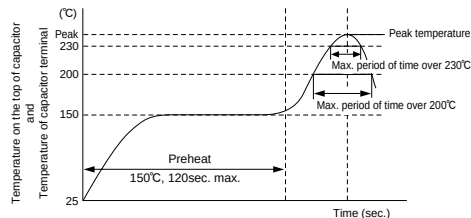
The following conditions are recommended for air or infrared reflow soldering of the surface mount capacitors onto a glass epoxy circuit board of 90X50X0.8mm (with resist) by cream solder. The temperatures shown are the surface temperature values on the top of the can and temperature of capacitor terminal.

●Reflow Profile

Method : Air or Infrared Reflow

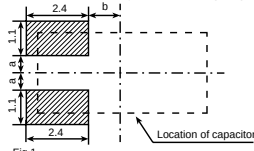
●Recommended Solder Land on PC Board

Series : MFS/MFA/MF/MFK/MFK-Large/MFY/MFJ (Horizontal SMT)

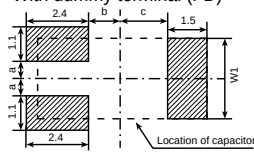


Size	Peak temp.	Max. period of time over 200°C
A6~D13	240°C	20sec
	230°C	30sec
	220°C	35sec
H15~H25	230°C	20sec
	220°C	30sec

Without dummy terminal (FC)

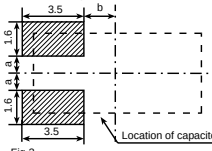


With dummy terminal (FD)



/// : 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
B46	1.0	0.45	—	—	
B6	1.0	1.2	1.65	3.6	
C46	1.3	0.45	—	—	
C6	1.3	1.2	1.65	4.1	
D46	1.5	0.45	—	—	Fig.3
D6	1.5	1.2	1.65	4.6	
D8, D80	1.5	2.2	2.65	4.6	
D10	1.5	3.2	3.65	4.6	
D13	1.5	4.7	5.15	4.6	
H15	2.9	5.4	—	—	Fig.3
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.

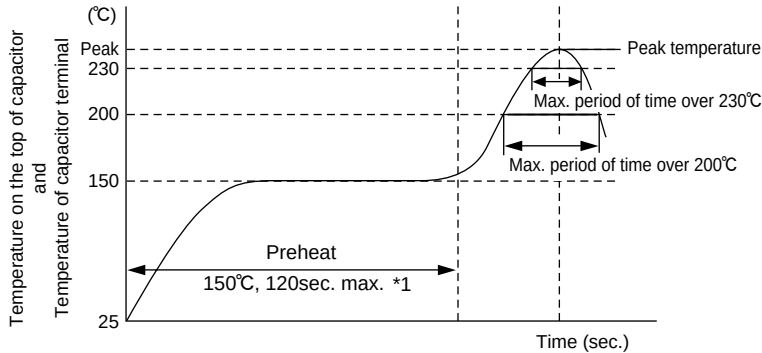
RECOMMENDED REFLOW SOLDERING CONDITIONS

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

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



*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 (Vertical SMT)

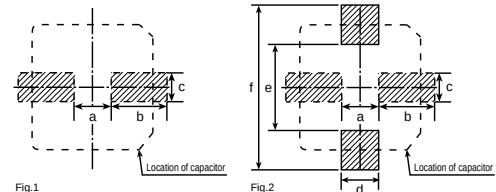


Fig.1 Fig.2 : Solder land on PC board

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

Case code	a	b	c	d	e	f	Fig.
B55	0.8	2.2	1.6	—	—	—	Fig.1
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	—	—	—	Fig.2
L17, L22	6.0	6.9	2.5	6.5	11.0	19.2	
M17, M22	6.0	7.9	2.5	6.5	13.0	21.2	

◆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.

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	SME
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	LXJ
SXA		
SXC		
RX		
RXC		
LXE	Low impedance Long life	LXY
SXF		
LXF		
TXF	Long life	LXA & EX
LX (10 to 63V _{dc})		
KX	High heat resistance	GXD & 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



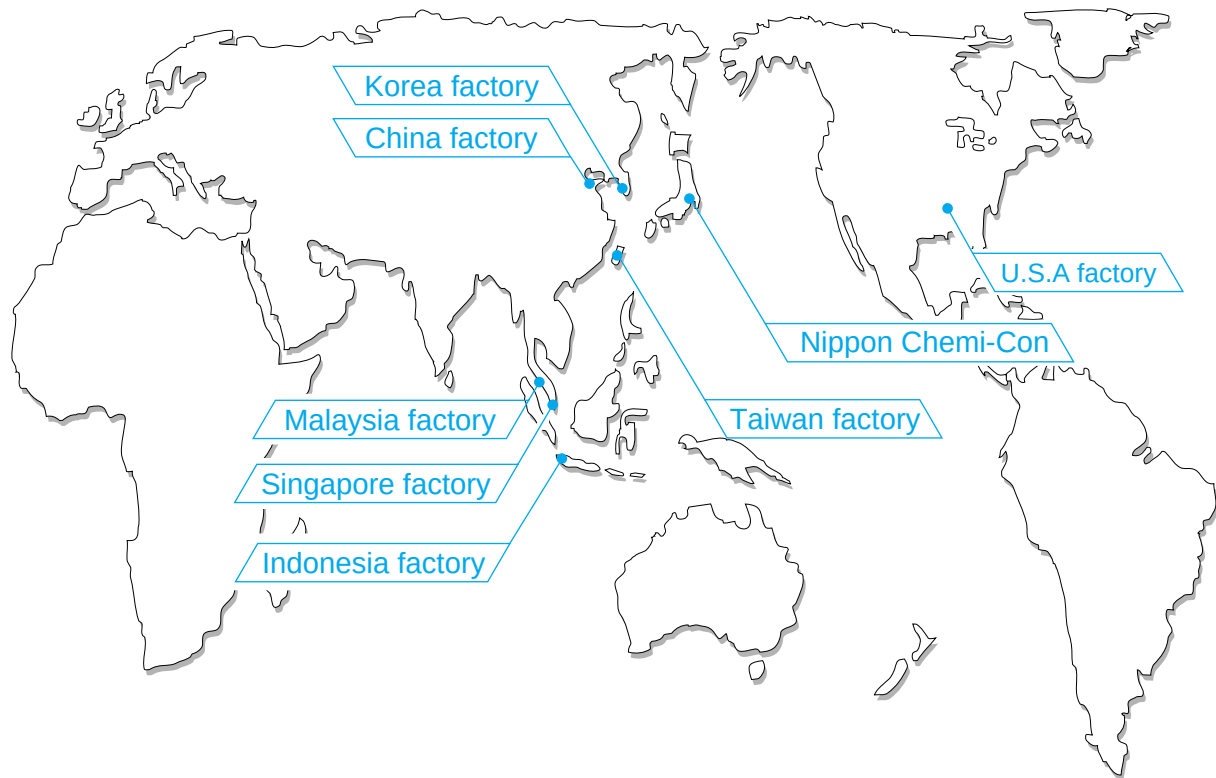
Discontinued series	Characteristics	Replacements
SM	85°C standard	SMH & SMM
SME		
SMG		
KM	105°C standard	KMH & KMM
KME		
KMG		
NM	Long case size	SMH
NMA		
BK	Long height	KMH, KMM
NM-HR	High ripple current	
BX	JIS B X-characteristics	
LX	Long life	LXG
LXA		
RZ	Low impedance	*

◆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		
FW	Low impedance	KW

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



◆AVAILABLE ITEMS BY MANUFACTURING LOCATIONS

Classification	Series	Korea factory	China factory	Singapore factory	Indonesia factory	Taiwan factory	Malaysia factory	U.S.A. factory
Low profile	SRE			●				
	SRA	●	●	●	●	●	●	
	KMA	●		●	●	●	●	
	SRG	●		●	●		●	
General purpose	SMG	●	●	●	●	●	●	
	KMG	●	●	●	●	●	●	
	SME	●	●	●	●	●	●	
	KME	●	●	●	●	●	●	
Bi-polar	SME-BP	●		●	●	●	●	
	KME-BP	●		●		●	●	
Low impedance	LXV			●				
	LXJ			●		●		
	SXE					●		
Snap-in	SMH						●	●
	KMH						●	●
	KMM						●	●
Screw-mount Terminal	KMH							●
	RWE							●
	RWF							●
	RWL							●
	LXA							●
	LX							●



Surface Mount Aluminum Electrolytic Capacitors

New!
NP CAP™-PXA Series

- Super low ESR and impedance have been obtained by using conductive functional polymer as electrolyte
- Large capacitance per case size
- Rated voltage range : 2.5 to 16Vdc, nominal capacitance range : 39 to 1,000μF
- 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)

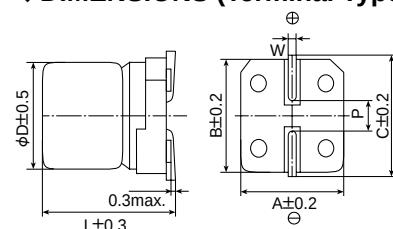


◆SPECIFICATIONS

Items	Characteristics										
Category											
Temperature Range	-55 to +105°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.) Where, 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 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 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.

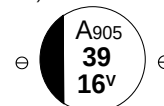
◆DIMENSIONS (Terminal Type=VC) [mm]



Case code	φD	L	A	B	C	W	P
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

◆MARKING

EX) PXA16VC39M



◆PART NUMBERING SYSTEM

PXA 16 VC 39 M F60

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

Capacitance	Code
39μF	39
100μF	100
1000μF	1000



◆STANDARD RATINGS

Case code	Rated voltage (V _{dc})	Nominal Capacitance (μF)	ESR (mΩmax./ 20°C, 100kHz)	Rated ripple current (mA _{rms} /100k to 300kHz) -55 to +105°C
F60	2.5	220	28	2,200
	4	100	32	2,200
		150		
	6.3	(68)	32	2,200
		82		
		100		
	10	(47)	40	2,100
		56		
16	(33)	45	2,000	
	39			
H70	2.5	560	25	2,700
	4	220	29	2,700
		330		
	6.3	150	29	2,600
		220		
	10	120	32	2,200
		150		
16	82	43	2,100	
J80	2.5	1,000	20	3,800
	4	470	22	3,800
		680		
	6.3	330	22	3,500
		470		
	10	270	25	3,200
		330		
	16	150	33	3,000
180				

() Sub standard

NP CAP™-PX Series

- A new conducting functional polymer is employed as electrolyte
- For digital equipment
- 4 to 25V_{dc}
- High heat reflow capability & solvent-proof type
- Solder land pad is the same as conventional electrolytics

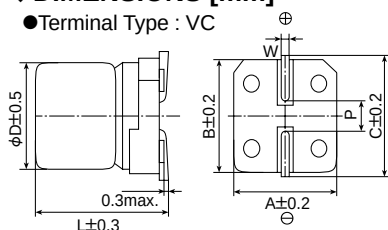


◆ SPECIFICATIONS

Items	Characteristics										
Category											
Temperature Range	-55 to +105°C										
Rated Voltage Range	4 to 25V _{dc}										
Capacitance Tolerance	±20% (M) (at 20°C, 120Hz)										
Surge Voltage	Rated voltage×1.15 (V) (at 105°C)										
Leakage Current	I=0.2CV (max.) Where, I : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V) (at 20°C after 2 minutes)										
Dissipation Factor (tanδ)	0.12max. (at 20°C, 120Hz)										
Low Temperature Characteristics (Max. Impedance Ratio)	$Z(-25^{\circ}\text{C})/Z(+20^{\circ}\text{C}) \leq 1.15$ $Z(-55^{\circ}\text{C})/Z(+20^{\circ}\text{C}) \leq 1.25$ (at 100kHz)										
Endurance	The following specifications shall be satisfied when the capacitors are restored to 20°C after the rated voltage is applied for 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 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 value	D.F. (tanδ)	≤150% of the initial specified value	ESR	≤150% of the initial specified value	Leakage current	≤The initial specified value
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Capacitance change	≤±20% of the initial 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	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>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 value	D.F. (tanδ)	≤150% of the initial specified value	ESR	≤150% of the initial specified value	Leakage current	≤The initial specified value
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Capacitance change	≤±20% of the initial 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	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>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 value	D.F. (tanδ)	≤150% of the initial specified value	ESR	≤150% of the initial specified value	Leakage current	≤The initial specified value
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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)										

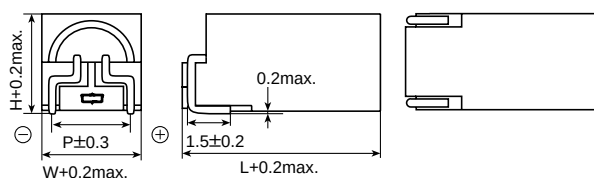
◆ DIMENSIONS [mm]

● Terminal Type : VC



Case code	φD	L	A	B	C	W	P
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

● Terminal Type : FC

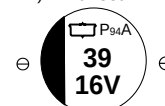


Case code	L	W	H	P
D8	8.3	4.6	4.5	4.0

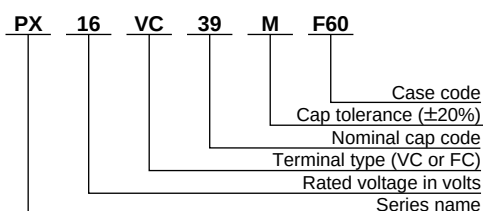
◆ MARKING

VC Type

EX) PX16VC39M



◆ PART NUMBERING SYSTEM



Capacitance	Code
6.8μF	6R8
10μF	10
33μF	33
100μF	100



◆STANDARD RATINGS

●Terminal Type : VC

Case code	Rated voltage (V _{dc})	Capacitance (μF)	ESR (mΩ _{max.} /20°C, 100kHz)	Rated ripple current (mA _{rms} /100k to 300kHz)		Part number
				-55 to +85°C	+85°C to +105°C	
F60	4	100	40	1,550	1,550	PX4VC100MF60
		150	40	1,550	1,550	PX4VC150MF60
	6.3	82	40	1,500	1,500	PX6.3VC82MF60
		100	40	1,550	1,550	PX6.3VC100MF60
	10	56	50	1,450	1,450	PX10VC56MF60
	16	39	60	1,400	1,400	PX16VC39MF60
	20	22	65	1,350	1,350	PX20VC22MF60
		27	65	1,350	1,350	PX20VC27MF60
H70	4	15	75	1,300	1,300	PX25VC15MF60
		220	35	2,400	2,000	PX4VC220MH70
	6.3	330	35	2,400	2,000	PX4VC330MH70
		150	35	2,200	1,900	PX6.3VC150MH70
	10	220	35	2,200	1,900	PX6.3VC220MH70
		120	40	2,000	1,800	PX10VC120MH70
	16	150	40	2,000	1,800	PX10VC150MH70
		82	45	1,800	1,600	PX16VC82MH70
J80	4	39	50	1,500	1,400	PX20VC39MH70
		470	25	3,500	2,500	PX4VC470MJ80
	6.3	680	25	3,500	2,500	PX4VC680MJ80
		330	25	3,100	2,400	PX6.3VC330MJ80
	10	470	25	3,100	2,400	PX6.3VC470MJ80
		270	30	2,800	2,300	PX10VC270MJ80
	16	330	30	2,800	2,300	PX10VC330MJ80
		150	35	2,500	2,000	PX16VC150MJ80
	20	180	35	2,500	2,000	PX16VC180MJ80
		82	40	2,000	1,600	PX20VC82MJ80

●Terminal Type : FC

Case code	Rated voltage (V _{dc})	Capacitance (μF)	ESR (mΩ _{max.} /20°C, 100kHz)	Rated ripple current (mA _{rms} /100k to 300kHz)		Part number
				-55 to +85°C	+85°C to +105°C	
D8	4	47	80	1,000	1,000	PX4FC47MD8
		68	80	1,000	1,000	PX4FC68MD8
	6.3	33	80	1,000	1,000	PX6.3FC33MD8
		39	80	1,000	1,000	PX6.3FC39MD8
	10	22	100	1,000	1,000	PX10FC22MD8
		33	100	1,000	1,000	PX10FC33MD8
	16	15	120	800	800	PX16FC15MD8
	25	6.8	150	720	720	PX25FC6R8MD8

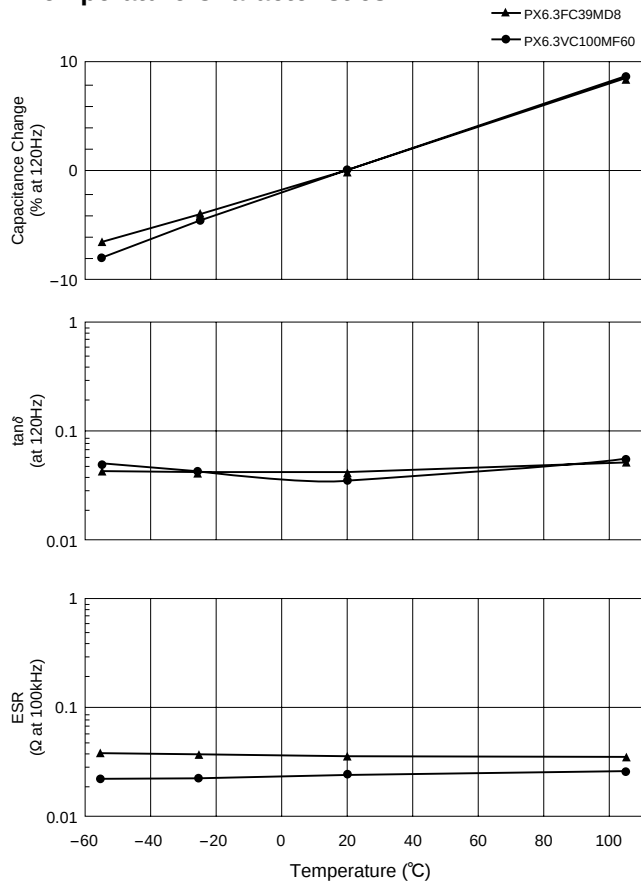
Sub standard

◆CASE CODE

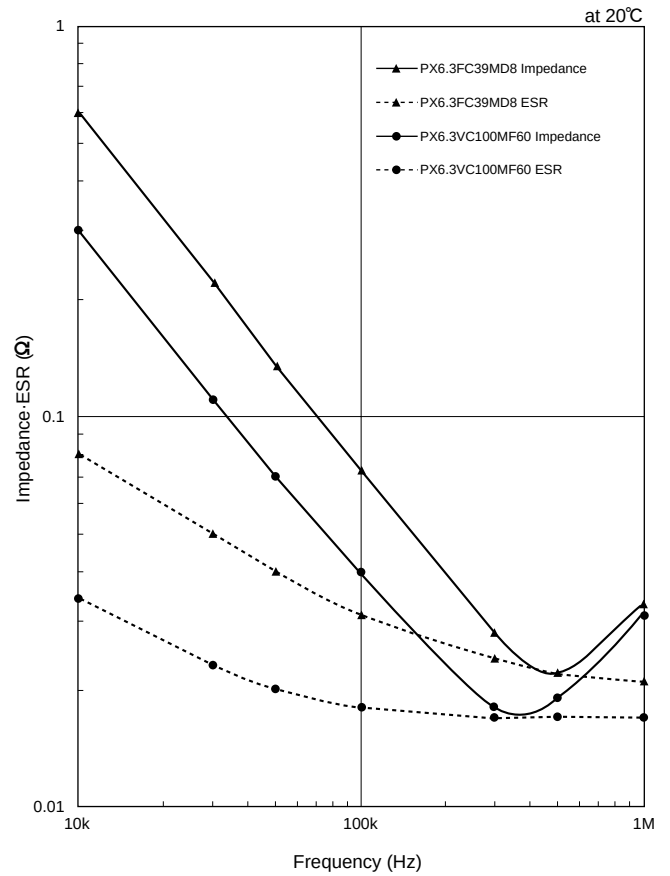
μF \ V _{dc}	4V	6.3V	10V	16V	20V	25V
6.8						D8
8.2						
10						
15				D8		F60
22			D8		F60	
27					F60	
33		D8	D8			
39		D8		F60	H70	
47	D8					
56			F60			
68	D8					
82		F60		H70	J80	
100	F60	F60				
120			H70			
150	F60	H70	H70	J80		
180				J80		
220	H70	H70				
270			J80			
330	H70	J80	J80			
390						
470	J80	J80				
560						
680	J80					

Sub standard

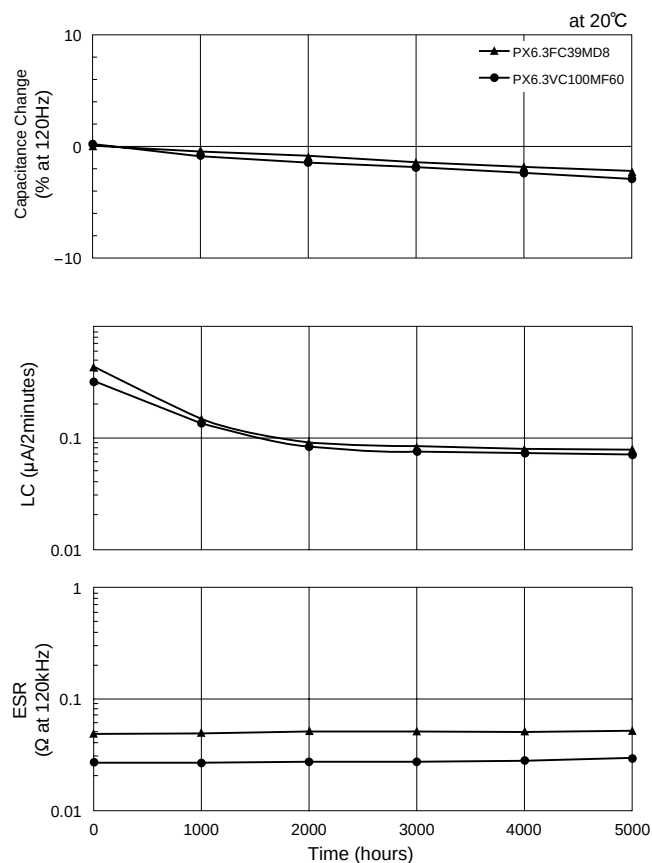
●Temperature Characteristics



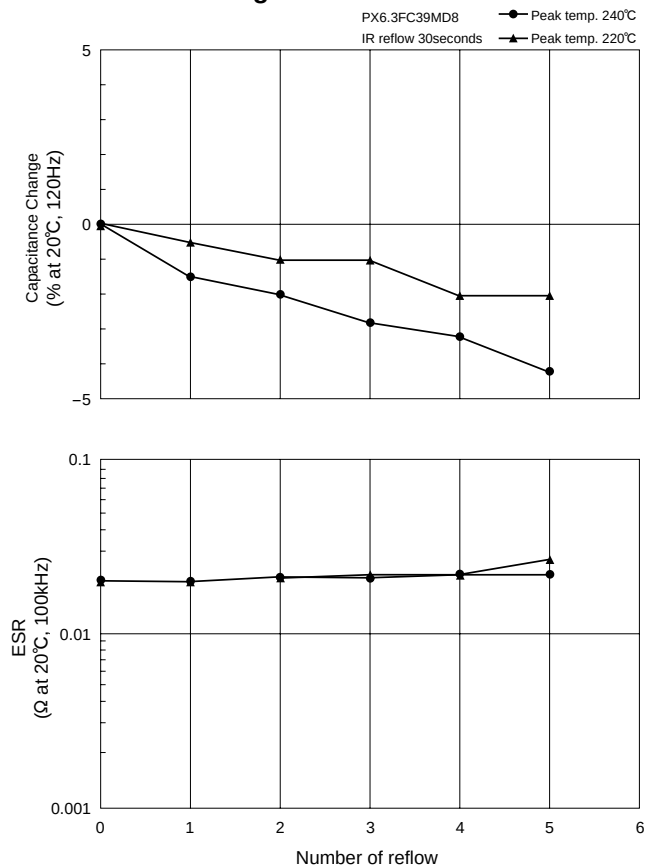
●Impedance/ESR-Frequency Characteristics



●105°C Endurance

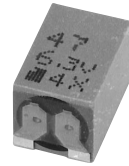
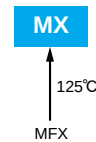


●Reflow Soldering Characteristics



Alchip®-MX Series

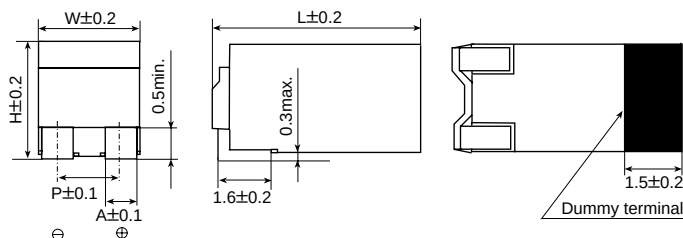
- 125°C SMT Aluminum Solid Electrolyte Capacitors
- Manganese dioxide is employed as electrolyte
- High heat reflow capability
- Solvent-proof type (see PRECAUTIONS AND GUIDELINES)



◆SPECIFICATIONS

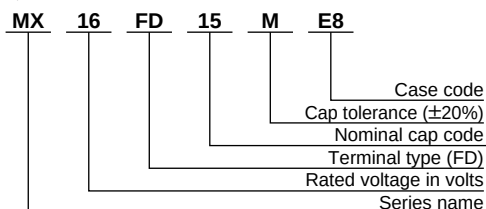
Items	Characteristics										
Category	–55 to +125°C										
Temperature Range											
Rated Voltage Range	4 to 16V _{dc}										
Capacitance Tolerance	±20% (M) (at 20°C, 120Hz)										
Surge Voltage	Rated voltage×1.15 (V)										
Leakage Current	I=0.1CV Where, I : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V) (at 20°C after 2 minutes)										
Dissipation Factor (tanδ)	0.12max. (at 20°C, 120Hz)										
Low Temperature Characteristics	Z(–25°C)/Z(+20°C)≤1.5 Z(–55°C)/Z(+20°C)≤2.0 (at 500kHz)										
Endurance	The following specifications shall be satisfied after the capacitors are subjected to DC voltage at 125°C for 2000 hours with the rated ripple current applied. <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>D.F. (tanδ)</td><td>≤200% of the initial specified value</td></tr> <tr> <td>ESR</td><td>≤200% of the initial specified value*</td></tr> <tr> <td>Leakage current</td><td>≤The initial specified value</td></tr> </table> * : 300% for MX16FD6R8MD6	Appearance	No significant damage	Capacitance change	≤±20% of the initial value	D.F. (tanδ)	≤200% of the initial specified value	ESR	≤200% of the initial specified value*	Leakage current	≤The initial specified value
Appearance	No significant damage										
Capacitance change	≤±20% of the initial value										
D.F. (tanδ)	≤200% of the initial specified value										
ESR	≤200% 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>≤±10% of the initial 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	≤±10% of the initial 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	≤±10% of the initial 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 to charge the surge voltage specified at 125°C for 30 seconds through a protective resistor (R=1kΩ), then discharge for 5-1/2 minutes through a resistor with the same value. <table border="1"> <tr> <td>Appearance</td><td>No significant damage</td></tr> <tr> <td>Capacitance change</td><td>≤±5% of the initial value</td></tr> <tr> <td>D.F. (tanδ)</td><td>≤The initial specified value</td></tr> <tr> <td>ESR</td><td>≤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	≤±5% of the initial value	D.F. (tanδ)	≤The initial specified value	ESR	≤The initial specified value	Leakage current	≤The initial specified value
Appearance	No significant damage										
Capacitance change	≤±5% of the initial value										
D.F. (tanδ)	≤The initial specified value										
ESR	≤The initial specified value										
Leakage current	≤The initial specified value										
Reverse Voltage	The capacitors shall be subjected to 15% of the rated voltage at 125°C, in the reverse polarity direction for 125 hours, and shall be subjected to the rated voltage at 125°C, in the forward polarity direction for 125 hours. <table border="1"> <tr> <td>Appearance</td><td>No significant damage</td></tr> <tr> <td>Capacitance change</td><td>≤±10% of the initial value</td></tr> <tr> <td>D.F. (tanδ)</td><td>≤The initial specified value</td></tr> <tr> <td>ESR</td><td>≤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	≤±10% of the initial value	D.F. (tanδ)	≤The initial specified value	ESR	≤The initial specified value	Leakage current	≤The initial specified value
Appearance	No significant damage										
Capacitance change	≤±10% of the initial value										
D.F. (tanδ)	≤The initial specified value										
ESR	≤The initial specified value										
Leakage current	≤The initial specified value										
Thermal Shock	After the capacitors are subjected to –55°C for 30 minutes and +125°C for 30 minutes for 5 cycles, they shall be conducted in accordance with the endurance test or the bias humidity test specified above.										
Failure Rate	1% per 1000 hours maximum (Confidence level 60% at 105°C)										
Others	IEC 384-18-1 (Fixed Aluminum Electrolytic Chip Capacitors with Solid Electrolyte)										

◆DIMENSIONS (Terminal Type=FD) [mm]



Case code	L	W	H	P	A
D6	6.4	4.6	4.6	3.3	1.1
E8	8.4	5.7	5.7	4.0	1.5

◆PART NUMBERING SYSTEM



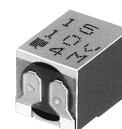
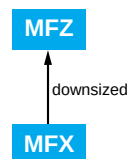
Capacitance	Code
6.8μF	6R8
10μF	10
33μF	33

◆STANDARD RATINGS

Rated voltage (V _{dc})	Capacitance (μF)	Case code	ESR (mΩ) [20°C/500kHz]	Temperature (°C)	Rated ripple current (mA _{rms})		
					Frequency		
					500kHz	300kHz	100kHz
4	27	D6	270	125	320	300	270
				105	500	480	440
				85	570	540	490
				60	660	630	570
	56	E8	180	125	390	370	350
				105	580	550	530
				85	700	660	630
				60	810	770	740
6.3	22	D6	270	125	320	300	270
				105	500	480	440
				85	570	540	490
				60	660	630	570
	47	E8	180	125	390	370	350
				105	580	550	530
				85	700	660	630
				60	810	770	740
10	15	D6	270	125	320	300	270
				105	500	480	440
				85	570	540	490
				60	660	630	570
	33	E8	180	125	390	370	350
				105	580	550	530
				85	700	660	630
				60	810	770	740
16	6.8	D6	425	125	130	110	100
				105	190	170	150
				85	220	200	180
				60	250	230	200
	15	E8	270	125	320	300	270
				105	500	480	440
				85	570	540	490
				60	660	630	570

Alchip® MFZ/MFX Series

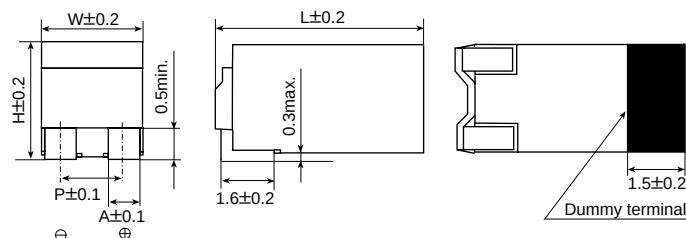
- Manganese dioxide is employed as electrolyte
- For digital equipment
- High heat reflow capability
- Solvent-proof type (see PRECAUTIONS AND GUIDELINES)



SPECIFICATIONS

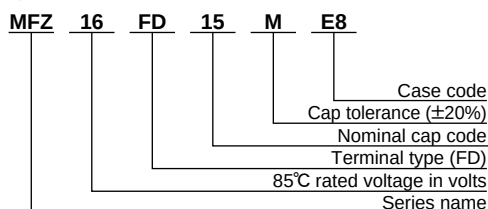
Items	Characteristics										
Category	–55 to +105°C										
Temperature Range											
Rated Voltage Range	4 to 20V _{dc} ±20% of the initial value (For the maximum operating voltage at 105°C, see STANDARD RATINGS)										
Capacitance Tolerance	±20% (M) (at 20°C, 120Hz)										
Surge Voltage	105°C : (value at 105°C in STANDARD RATINGS) ×1.15 85°C and below : Rated voltage×1.15 (V)										
Leakage Current	I=0.1CV Where, I : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V) (at 20°C after 2 minutes)										
Dissipation Factor (tanδ)	0.12max. (at 20°C, 120Hz)										
Low Temperature Characteristics	Z(–25°C)/Z(+20°C)≤1.5 Z(–55°C)/Z(+20°C)≤2.0 (at 500kHz)										
Endurance	The following specifications shall be satisfied after the capacitors are subjected to DC voltage at 85°C or 105°C for 1000 hours with the specified rated ripple current applied. <table border="1"> <tr><td>Appearance</td><td>No significant damage</td></tr> <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>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	≤±10% of the initial 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	≤±10% of the initial 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	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>≤±10% of the initial 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	≤±10% of the initial 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	≤±10% of the initial 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 to charge the surge voltage specified at 85°C or 105°C for 30 seconds through a protective resistor (R=1kΩ), then discharge for 5-1/2 minutes through a resistor with the same value. <table border="1"> <tr><td>Appearance</td><td>No significant damage</td></tr> <tr><td>Capacitance change</td><td>≤±5% of the initial value</td></tr> <tr><td>D.F. (tanδ)</td><td>≤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	≤±5% of the initial value	D.F. (tanδ)	≤The initial specified value	ESR	≤150% of the initial specified value	Leakage current	≤The initial specified value
Appearance	No significant damage										
Capacitance change	≤±5% of the initial value										
D.F. (tanδ)	≤The initial specified value										
ESR	≤150% of the initial specified value										
Leakage current	≤The initial specified value										
Reverse Voltage	The capacitors shall be subjected to 15% of the rated voltage at 85°C, or 15% of the maximum operating voltage at 105°C, in the reverse polarity direction for 125 hours, and shall be subjected to the rated voltage at 85°C, or the maximum operating voltage at 105°C, in the forward polarity direction for 125 hours. <table border="1"> <tr><td>Appearance</td><td>No significant damage</td></tr> <tr><td>Capacitance change</td><td>≤±10% of the initial value</td></tr> <tr><td>D.F. (tanδ)</td><td>≤The initial specified value</td></tr> <tr><td>ESR</td><td>≤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	≤±10% of the initial value	D.F. (tanδ)	≤The initial specified value	ESR	≤The initial specified value	Leakage current	≤The initial specified value
Appearance	No significant damage										
Capacitance change	≤±10% of the initial value										
D.F. (tanδ)	≤The initial specified value										
ESR	≤The initial specified value										
Leakage current	≤The initial specified value										
Thermal Shock	After the capacitors are subjected to –55°C, for 30 minutes and +125°C for 30 minutes for 5 cycles, they shall be conducted in accordance with the endurance test or the bias humidity test specified above.										
Failure Rate	1% per 1000 hours maximum (Confidence level 60% at 105°C)										
Others	IEC 384-18-1 (Fixed Aluminum Electrolytic Chip Capacitors with Solid Electrolyte)										

DIMENSIONS (Terminal Type=FD) [mm]



Case code	L	W	H	P	A
D6	6.4	4.6	4.6	3.3	1.1
E8	8.4	5.7	5.7	4.0	1.5

PART NUMBERING SYSTEM



Capacitance	Code
6.8μF	6R8
10μF	10
33μF	33

◆STANDARD RATINGS

MFZ

Case code	Rated voltage (V _{dc})	Cap (μF)	ESR (mΩ) [20°C/500kHz]	Temp. (°C)	Max operating voltage (V _{dc})	Rated ripple (mArms)			Case code	Rated voltage (V _{dc})	Cap (μF)	ESR (mΩ) [20°C/500kHz]	Temp. (°C)	Max operating voltage (V _{dc})	Rated ripple (mArms)		
						500kHz	300kHz	100kHz							500kHz	300kHz	100kHz
D6	4	27	270	105	3.2	320	300	270	E8	4	56	180	105	3.2	390	370	350
				85	4	500	480	440					85	4	580	550	530
				60	4	570	540	490					60	4	700	660	630
				45	4	660	630	570					45	4	810	770	740
	6.3	22	270	105	5	320	300	270		6.3	47	180	105	5	390	370	350
				85	6.3	500	480	440					85	6.3	580	550	530
				60	6.3	570	540	490					60	6.3	700	660	630
				45	6.3	660	630	570					45	6.3	810	770	740
	10	15	270	105	8	320	300	270		10	33	180	105	8	390	370	350
				85	10	500	480	440					85	10	580	550	530
				60	10	570	540	490					60	10	700	660	630
				45	10	660	630	570					45	10	810	770	740
	16	6.8	425	105	13	130	110	100		16	15	270	105	13	320	300	270
				85	16	190	170	150					85	16	500	480	440
				60	16	220	200	180					60	16	570	540	490
				45	16	250	230	200					45	16	660	630	570
				105	16	320	300	270		20	3.3	270	105	16	320	300	270
				85	20	500	480	440					85	20	500	480	440
				60	20	570	540	490					60	20	570	540	490
				45	20	660	630	570					45	20	660	630	570

MFX

Case code	Rated voltage (V _{dc})	Cap (μF)	ESR (mΩ) [20°C/500kHz]	Temp. (°C)	Max operating voltage (V _{dc})	Rated ripple (mArms)			Case code	Rated voltage (V _{dc})	Cap (μF)	ESR (mΩ) [20°C/500kHz]	Temp. (°C)	Max operating voltage (V _{dc})	Rated ripple (mArms)		
						500kHz	300kHz	100kHz							500kHz	300kHz	100kHz
D6	4	22	270	105	3.2	320	300	270	E8	4	47	180	105	3.2	390	370	350
				85	4	500	480	440					85	4	580	550	530
				60	4	570	540	490					60	4	700	660	630
				45	4	660	630	570					45	4	810	770	740
	6.3	15	270	105	5	320	300	270		6.3	33	180	105	5	390	370	350
				85	6.3	500	480	440					85	6.3	580	550	530
				60	6.3	570	540	490					60	6.3	700	660	630
				45	6.3	660	630	570					45	6.3	810	770	740
	10	10	270	105	8	320	300	270		10	22	180	105	8	390	370	350
				85	10	500	480	440					85	10	580	550	530
				60	10	570	540	490					60	10	700	660	630
				45	10	660	630	570					45	10	810	770	740
	16	4.7	425	105	13	130	110	100		16	10	270	105	13	320	300	270
				85	16	190	170	150					85	16	500	480	440
				60	16	220	200	180					60	16	570	540	490
				45	16	250	230	200					45	16	660	630	570

Alchip® MFS/MFA Series

- Downsized from current standard MF series
- 3.5 to 4.5 mm height
- MFS : case code B46 to D46, MFA : case code D80
- Capable of reducing mounting area on PC board

MFS
MFA

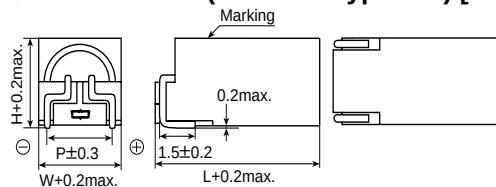
↓
downsized
MF



SPECIFICATIONS

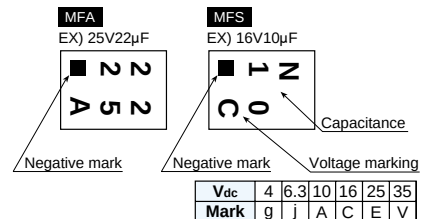
Items	Characteristics									
Category	Temperature Range									
Temperature Range	-40 to +85℃									
Rated Voltage Range	4 to 35V _{dc}									
Capacitance Tolerance	±20% (M) (at 20℃, 120Hz)									
Leakage Current	I=0.01CV or 3μA, whichever is greater. Where, I : Max. leakage current (μA), C : 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	(at 20℃, 120Hz)
	tanδ (Max.)			0.65	0.55	0.45	0.35	0.20	0.18	
Low Temperature Characteristics (Max. Impedance Ratio)	Rated voltage (V _{dc})			4V	6.3V	10V	16V	25V	35V	(at 120Hz)
	Z(-25℃)/Z(+20℃)	MFS	B46 & C46	9	6	4	3	2	2	
			D46	7	4	3	2	2	2	
		MFA	D80	7	4	3	2	2	2	
			Z(-40℃)/Z(+20℃)	MFS	B46 & C46	17	12	9	7	
	D46	15			10	8	6	4	3	
	MFA	D80	15	10	8	6	4	3		
Endurance	The following specifications shall be satisfied when the capacitors are restored to 20℃ after the rated voltage is applied for 2000 hours (B46 & C46 sizes 1000 hours) at 85℃.									
	Case code	B46 & C46				D46 & D80			D46 & D80	
	Rated Voltage	4 to 35V _{dc}				4 to 6.3V _{dc}			10 to 35V _{dc}	
	Capacitance change	≤±25% of the initial value				≤±30% of the initial value			≤±25% of the initial value	
	D.F. (tanδ)	≤200% of the initial specified value				≤300% of the initial specified value			≤300% 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	≤±20% of the initial value								
	D.F. (tanδ)	≤200% of the initial specified value								
	Leakage current	≤The initial specified value								

DIMENSIONS (Terminal Type=FC) [mm]

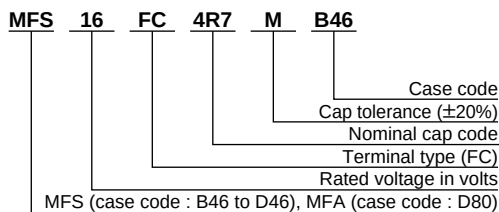


Series	Case code	L	W	H	P
MFS	B46	4.8	3.6	3.5	3.0
	C46	4.8	4.1	4.0	3.5
	D46	4.8	4.6	4.5	4.0
MFA	D80	8.3	4.6	4.5	4.0

MARKING



PART NUMBERING SYSTEM



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

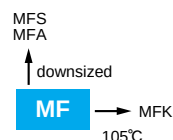
STANDARD RATINGS

Represent MFA series

μF	V _{dc}	4	6.3	10	16	25	35
0.1							B46 0.9
0.22							B46 2.0
0.33							B46 2.6
0.47							B46 3.2
1.0							B46 4.6
2.2							B46 6.5
3.3							B46 8.3
4.7				B46 6.0	B46 5.5	B46 7.5	B46 12
10		B46 7.5	B46 8.2	B46 8.5	B46 10	B46 15	D80 20
22		B46 11	C46 16	D46 18	D46 20	D80 27	D80 29
33		C46 14	D46 19	D46 20	D80 25	D80 34	
47		D46 21	D46 22	D80 27	D80 35		
100		D80 32	D80 35				

Alchip® MF Series

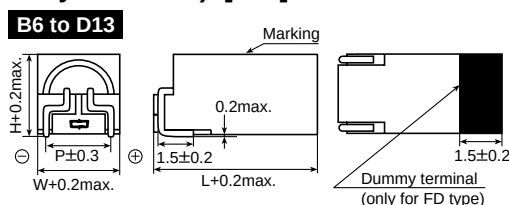
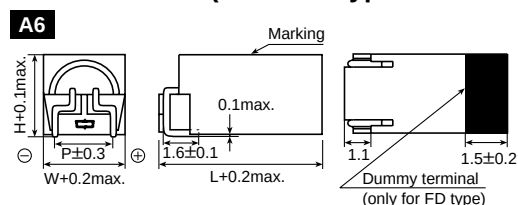
- Wide variety of case sizes (7 sizes)
- Suitable to fit for downsized equipment
- Solvent-proof type (see PRECAUTIONS AND GUIDELINES)



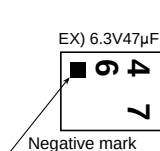
◆ SPECIFICATIONS

Items	Characteristics									
Category	Temperature Range									
Temperature Range	-40 to +85°C									
Rated Voltage Range	4 to 50V _{dc}									
Capacitance Tolerance	±20% (M) (at 20°C, 120Hz)									
Leakage Current	I=0.01CV 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)	See STANDARD RATINGS.									
Low Temperature Characteristics (Max. Impedance Ratio)	Rated voltage (V _{dc})		4V	6.3V	10V	16V	25V	35V	50V	
	Z(-25°C)/Z(+20°C)	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°C)/Z(+20°C)	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	(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.								
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°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=FC or FD <dummy terminal>) [mm]

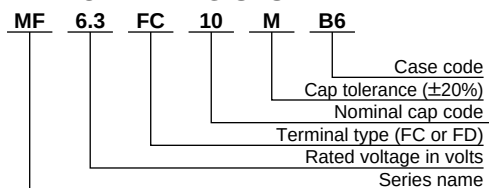


◆ MARKING



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

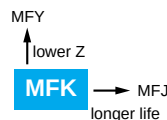
μF	V _{dc}	4	6.3	10	16	25	35	50
0.1								A6 0.16
0.22								B6 0.14
0.33								A6 0.16
0.47								B6 0.14
1.0								A6 0.16
1.5								B6 0.14
2.2								A6 0.16
3.3								B6 0.14
4.7								A6 0.16
6.8								B6 0.14
10								A6 0.16
15								B6 0.14
22								A6 0.16
33								B6 0.14
47								A6 0.16
68								B6 0.14
100								A6 0.16
150								B6 0.14

Case code
Max. tanδ at 20°C, 120Hz
Rated ripple current (mA_{rms}) at 85°C, 120Hz

Note : → Use next higher voltage part.

Alchip® MFK Series

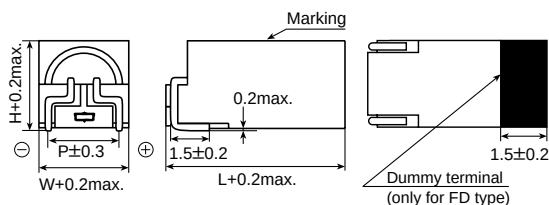
- Wide variety of case sizes (6 sizes)
- Suitable to fit for downsized equipment
- From 3.5mm height
- Solvent-proof type (see PRECAUTIONS AND GUIDELINES)



SPECIFICATIONS

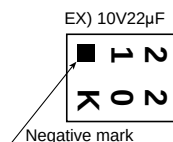
Items	Characteristics									
Category	Temperature Range									
Temperature Range	-40 to +105℃									
Rated Voltage Range	6.3 to 50V _{dc}									
Capacitance Tolerance	±20% (M) (at 20℃, 120Hz)									
Leakage Current	I=0.01CV or 3μA, whichever is greater. Where, I : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V) (at 20℃ after 2 minutes)									
Dissipation Factor (tanδ)	Rated voltage (V _{dc})		6.3V	10V	16V	25V	35V	50V	(at 20℃,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℃)/Z(+20℃)	B6 & C6	6	4	3	2	2	2		
		D6 to D13	4	3	2	2	2	2		
	Z(-40℃)/Z(+20℃)	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℃ after the rated voltage is applied for 1000 hours at 105℃.									
	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℃ after exposing them for 500 hours at 105℃ 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]

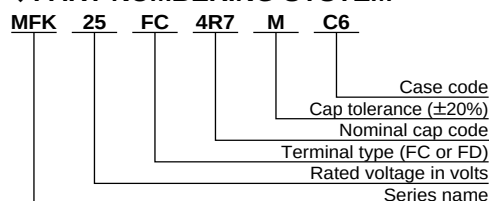


Case code	L	W	H	P
B6	6.3	3.6	3.5	3.0
C6	6.3	4.1	4.0	3.5
D6	6.3	4.6	4.5	4.0
D8	8.3	4.6	4.5	4.0
D10	10.3	4.6	4.5	4.0
D13	13.3	4.6	4.5	4.0

MARKING



PART NUMBERING SYSTEM



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

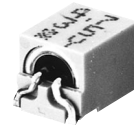
STANDARD RATINGS

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		D10 26
15		C6 15	D6 19	D8 23			D13 38
22		D6 20					
33		D8 27					
47			D10 41	D13 53			
68		D10 44					
100		D13 63					

Note : → Use next higher voltage part.

Alchip® MFY Series

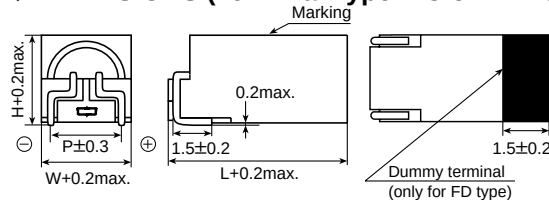
- Chose 4 case sizes, from 4.5mm height
- Low impedance, 105°C 1000-hours-life
- Solvent-proof type (see PRECAUTIONS AND GUIDELINES)



SPECIFICATIONS

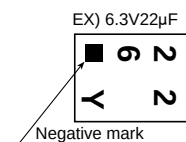
Items	Characteristics							
Category	Temperature Range							
Rated Voltage Range	6.3 to 50V _{dc}							
Capacitance Tolerance	±20% (M) (at 20°C, 120Hz)							
Leakage Current	I=0.01CV or 3μA, whichever is greater. Where, I : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V) (at 20°C after 2 minutes)							
Dissipation Factor (tanδ)	Rated voltage (V _{dc})	6.3V	10V	16V	25V	35V	50V	(at 20°C, 120Hz)
	tanδ (Max.)	0.24	0.20	0.16	0.14	0.12	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)	2	2	2	2	2	2	
	Z(−40°C)/Z(+20°C)	3	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	6.3V _{dc}					10 to 50V _{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}					10 to 50V _{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=FC or FD <dummy terminal>)[mm]

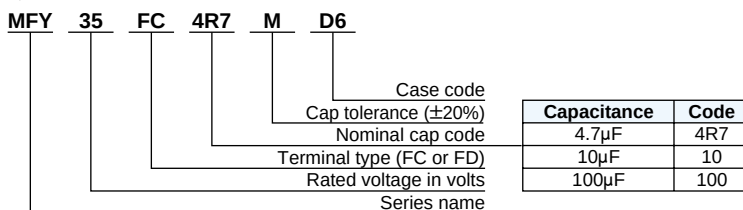


Case code	L	W	H	P
D6	6.3	4.6	4.5	4.0
D8	8.3	4.6	4.5	4.0
D10	10.3	4.6	4.5	4.0
D13	13.3	4.6	4.5	4.0

MARKING



PART NUMBERING SYSTEM



STANDARD RATINGS

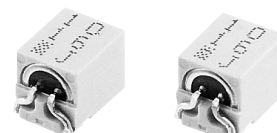
μF \ V _{dc}	6.3	10	16	25	35	50
3.3	Case code					
4.7	Max. impedance (Ω) at 20°C, 100kHz					
6.8	Rated ripple current (mA _{rms}) at 105°C, 100kHz					
10			D6 2.8 51	D6 2.8 51	D6 2.8 51	D6 4.6 40
15			D8 2.4 61	D8 2.4 61	D8 2.4 61	D8 3.9 48
22	D6 2.8 51	D8 2.4 61	D8 2.4 61	D10 1.3 87	D10 1.3 87	D10 2.1 69
33	D8 2.4 61		D10 1.3 87	D13 0.9 133	D13 0.9 133	D13 1.5 103
47		D10 1.3 87	D13 0.9 133			
68		D13 0.9 133				
100	D13 0.9 133					

Note : → Use next higher voltage part.

Alchip-MFJ Series

- Chose 4 case sizes from 4.5mm height
- Endurance : 105°C 2000 hours
- Solvent-proof type (see PRECAUTIONS AND GUIDELINES)

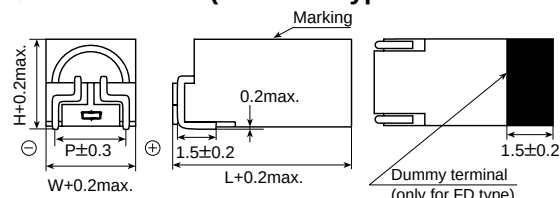
MFJ
↑
longer life
MFK



SPECIFICATIONS

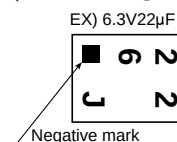
Items	Characteristics									
Category	-40 to +105°C									
Temperature Range										
Rated Voltage Range	6.3 to 50V _{dc}									
Capacitance Tolerance	±20% (M) (at 20°C, 120Hz)									
Leakage Current	I=0.01CV or 3μA, whichever is greater. Where, I : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V) (at 20°C after 2 minutes)									
Dissipation Factor (tan δ)	Rated voltage (V _{dc})	6.3V	10V	16V	25V	35V	50V	(at 20°C, 120Hz)		
	tanδ (Max.)	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)	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=FC or FD <dummy terminal>) [mm]

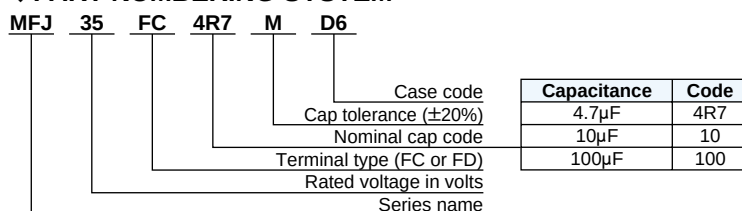


Case code	L	W	H	P
D6	6.3	4.6	4.5	4.0
D8	8.3	4.6	4.5	4.0
D10	10.3	4.6	4.5	4.0
D13	13.3	4.6	4.5	4.0

MARKING



PART NUMBERING SYSTEM



STANDARD RATINGS

μF	V _{dc}	6.3	10	16	25	35	50
3.3		Case code					
4.7		Rated ripple current (mA _{rms}) at 105°C, 120Hz					
6.8							
10							
15							
22							
33							
47							
68							
100							

Note : → Use next higher voltage part.

Alchip® MFK Large Capacitance

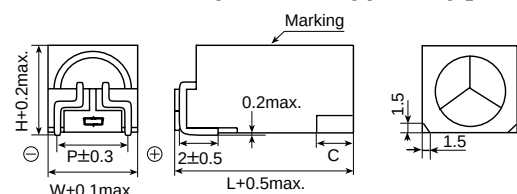
- Endurance : 105°C 2000 hours
- Solvent-proof type (see PRECAUTIONS AND GUIDELINES)



SPECIFICATIONS

Items	Characteristics						
Category							
Temperature Range	-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]



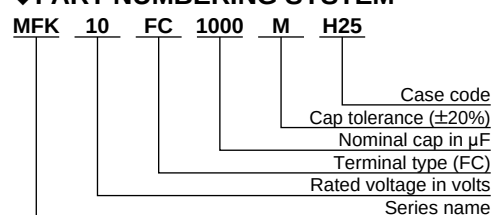
Case code	L	W	H	P	C
H15	17.1	9.0	9.0	7.4	0
H20	21.5	9.0	9.0	7.4	5
H25	26.5	9.0	9.0	7.4	10

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	0.47	330	H20	0.27	440	H25	0.20	570						
680	H20	0.27	440	H25	0.20	570									
1,000	H25	0.20	570												

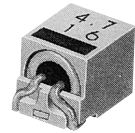
Rated ripple current (mA_{rms}) at 105°C, 100kHz
Max. impedance (Ω) at 20°C, 100kHz
Case code

Alchip® MF-BP Series

- 3.5 to 4.5mm height
- Bi-polarized chip type for the circuit, of which polarity is frequently reversed
- Solvent-proof type (see PRECAUTIONS AND GUIDELINES)

MF-BP

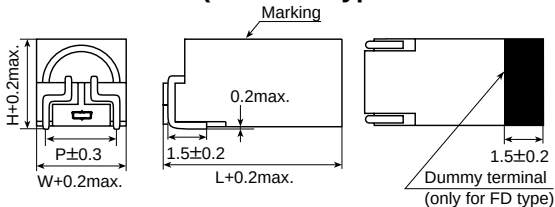
↑
bi-polarized
MF



SPECIFICATIONS

Items	Characteristics									
Category										
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.)	B6 & C6	0.50	0.35	0.30	0.26	0.24	0.22	0.22	
		D6 & D8	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)	B6 & C6	9	6	4	3	2	2	2	
		D6 & D8	7	4	3	2	2	2	2	
	Z(-40°C)/Z(+20°C)	B6 & C6	17	12	9	7	5	4	4	
		D6 & D8	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.								
Case code		B6 & C6				D6 & D8				
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 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								

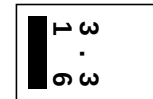
DIMENSIONS (Terminal Type=FC or FD <dummy terminal>) [mm]



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

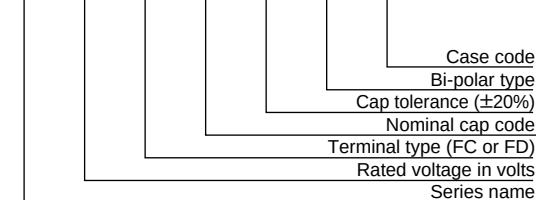
MARKING

EX) 16V3.3μF



PART NUMBERING SYSTEM

MF 6.3 FC 10 M BP D6



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

STANDARD RATINGS

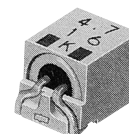
μF \ V _{dc}	4	6.3	10	16	25	35	50
0.1							B6 1.3
0.22							B6 2.3
0.33							B6 2.8
0.47							B6 3.3
1.0							
2.2							
3.3							
4.7							
10	C6 9.5	D6 14	D8 16	B6 6.1	C6 7.0	B6 4.6	C6 5.3
22	D8 19			C6 8.2	D6 10	D8 12	D8 10

Alchip® MFK-BP Series

- 3.5 to 4.5mm height
- Bi-polarized chip type for the circuit, of which polarity is frequently reversed
- Solvent-proof type (see PRECAUTIONS AND GUIDELINES)

MFK-BP

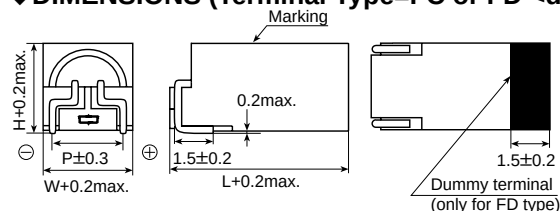
↑
bi-polarized
MFK



◆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	0.30	0.26	0.24	0.22	0.22	
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)	6	4	3	2	2	2	
	Z(-40°C)/Z(+20°C)	12	9	7	5	4	4	
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.							
	Case code	B6 & C6					D6 & D8	
	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 & D8	
	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	

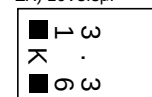
◆DIMENSIONS (Terminal Type=FC or FD <dummy terminal>) [mm]



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

◆MARKING

EX) 16V3.3μF



◆PART NUMBERING SYSTEM

MFK	6.3	FC	10	M	BP	D6	
							Case code
							Bi-polar type
							Cap tolerance (±20%)
							Nominal cap code
							Terminal type (FC or FD)
							Rated voltage in volts
							Series name

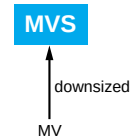
Capacitance	Code
0.1μF	R1
0.47μF	R47
1.0μF	1
4.7μF	4R7
10μF	10

◆STANDARD RATINGS

μF \ V _{dc}	6.3	10	16	25	35	50
0.1						B6 1.3
0.22						B6 1.9
0.33						B6 2.4
0.47						B6 2.8
1.0						B6 4.5
2.2						D8 8.2
3.3	B6 6.2	B6 6.4	C6 7.6	D6 8.8	D8 10.1	
4.7	B6 7.1	C6 8.4	D6 10.1	D8 11.5		
10	D6 12.7	D8 15				

Alchip-MVS Series

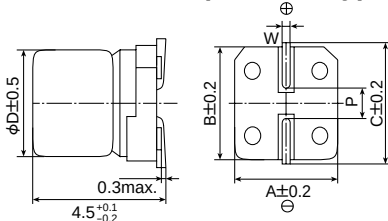
- 4.5mm height
- Endurance : 85°C 2000 hours
- Reflow capability
- Solvent-proof type (see PRECAUTIONS AND GUIDELINES)



SPECIFICATIONS

Items	Characteristics								
Category	Temperature Range								
Rated Voltage Range	-40 to +85°C								
Capacitance Tolerance	4 to 50V _{dc}								
Leakage Current	±20% (M) (at 20°C, 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°C after 2 minutes)								
Low Temperature Characteristics (Max. Impedance Ratio)	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	
Endurance	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	
Shelf Life	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		

DIMENSIONS (Terminal Type=VC) [mm]



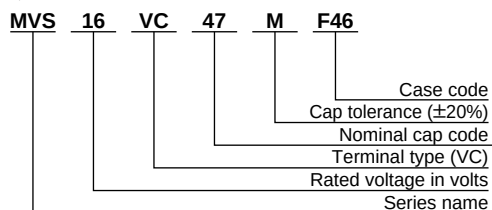
Case code	D	A	B	C	W	P
D46	4	4.3	4.3	5.1	0.5 to 0.8	1.0
E46	5	5.3	5.3	5.9	0.5 to 0.8	1.4
F46	6.3	6.6	6.6	7.2	0.5 to 0.8	1.9

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				D46 23		D46 18	
22				E46 37		E46 29	F46 33
33	D46 28					F46 46	
47	D46 33	E46 45		F46 58	F46 52		
100	E46 56	F46 70					
220	F46 96						

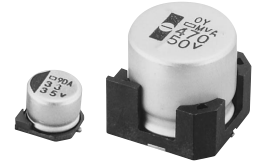
Note : → Use next higher voltage part.

Alchip® MVA Series

- $\phi 4$ through $\phi 18$ 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

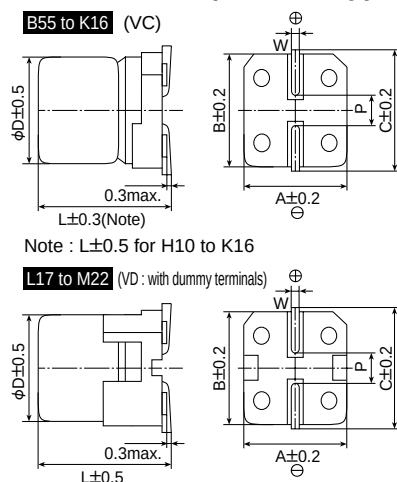
↓
downsized
size extended
MV



SPECIFICATIONS

Items	Characteristics													
Category	Temperature Range													
Temperature Range	-40 to +85°C													
Rated Voltage Range	4 to 450V _{dc}													
Capacitance Tolerance	±20% (M)												(at 20°C, 120Hz)	
Leakage Current	Rated voltage (V _{dc})	4 to 100V						160 to 450V						
	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) (at 20°C)													
Dissipation Factor (tanδ)	Rated voltage (V _{dc})		4V	6.3V	10V	16V	25V	35V	50V	63V	100V	160 to 250V	400 & 450V	
	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. (at 20°C, 120Hz)													
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	
	D55 to J10	Z(-25°C)/Z(+20°C)	7	4	3	2	2	2	2	2	3	—	—	
		Z(-40°C)/Z(+20°C)	17	10	8	6	4	3	3	3	4	—	—	
	K14 to M22	Z(-25°C)/Z(+20°C)	—	5	4	3	2	2	2	2	2	3	6	
		Z(-40°C)/Z(+20°C)	—	12	10	8	5	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 2000 hours at 85°C.													
	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°C after exposing them for 1000 hours at 85°C 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 VD) [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
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



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 VD)
						Rated voltage in volts
						Series name
						Capacitance
						Code
						0.1μF
						1.0μF
						4.7μF
						10μF
						100μF
						1000μF

◆ 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										

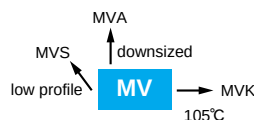
Rated ripple current (mArms) at 85°C, 120Hz
 Case code

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 (mArms) at 85°C, 120Hz
 Case code

Alchip®-MV Series

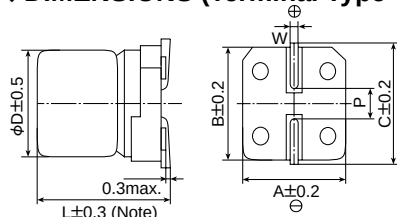
- From 5.5mm height
- Suitable to fit for downsized equipment
- Solvent-proof type (see PRECAUTIONS AND GUIDELINES)



◆ 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	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		
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]

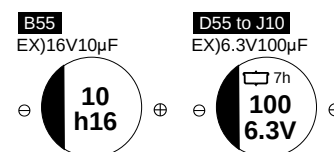


Note : $L \pm 0.5$ for $\phi 8 \times 6$ (H63), $\phi 8 \times 10$ (H10) & $\phi 10 \times 10$ (J10).

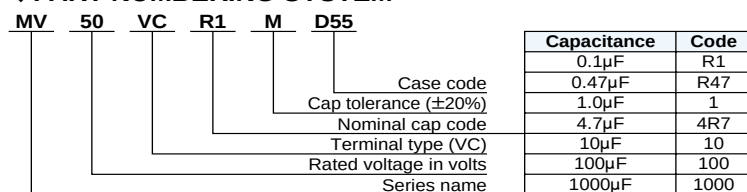
Case code	D	L	A	B	C	W	P
B55	3	5.2	3.3	3.3	3.7	0.45 to 0.75	0.8
D55 & D60	4	*5.2	4.3	4.3	5.1	0.5 to 0.8	1.0
E55	5	5.2	5.3	5.3	5.9	0.5 to 0.8	1.4
F55 & F60	6.3	*5.2	6.6	6.6	7.2	0.5 to 0.8	1.9
H63	8	6.3	8.3	8.3	9.0	0.5 to 0.8	2.3
H10	8	10.0	8.3	8.3	9.0	0.7 to 1.1	3.1
J10	10	10.0	10.3	10.3	11.0	0.7 to 1.1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

* : L=5.7 for D60 and F60.

◆ MARKING



◆PART NUMBERING SYSTEM



◆ 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	8.3	10	D60	10
4.7														B55	D55	8.3	10	D60	10
6.8														B55	D55	8.3	10	D60	10
10														B55	D55	8.3	10	D60	10
15														B55	D55	8.3	10	D60	10
22														B55	D55	8.3	10	D60	10
33														B55	D55	8.3	10	D60	10
47														B55	D55	8.3	10	D60	10
68														B55	D55	8.3	10	D60	10
100														B55	D55	8.3	10	D60	10
220														B55	D55	8.3	10	D60	10
330														B55	D55	8.3	10	D60	10
470														B55	D55	8.3	10	D60	10
1000														B55	D55	8.3	10	D60	10

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
MV

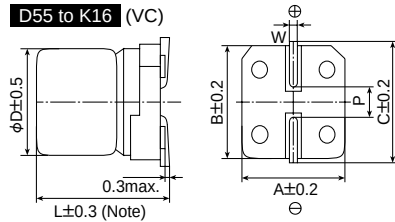


◆ SPECIFICATIONS

Items	Characteristics											
Category	-40 to +105°C											
Temperature Range												
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		
	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) (20°C)											
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					

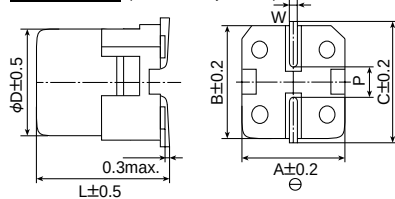
◆ DIMENSIONS (Terminal Type=VC or VD) [mm]

D55 to K16 (VC)



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

L17 to M22 (VD : with dummy terminals)



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

◆ MARKING

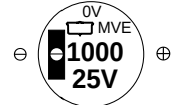
D55 to J10

Ex) 16V22MF

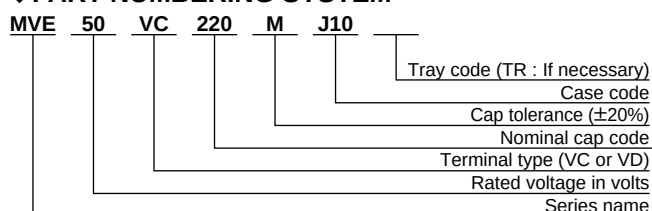


K14 to M22

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																		

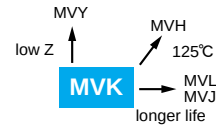
DF (tan δ at 20°C, 120Hz)
Rated ripple current (mA rms at 105°C, 120Hz)
Case code

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	270	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 (mA rms at 105°C, 120Hz)
Case code

Alchip® MVK Series

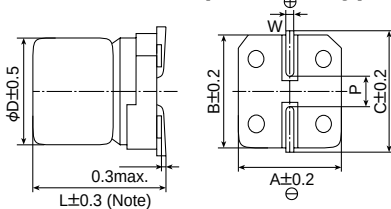
- Endurance : 105°C 1000 to 2000 hours
- Suitable to fit for downsized equipment
- Solvent-proof type (see PRECAUTIONS AND GUIDELINES)



SPECIFICATIONS

Items	Characteristics								
Category	Temperature Range								
Rated Voltage Range	-40 to +105°C								
Capacitance Tolerance	6.3 to 50V _{dc}								
Leakage Current	±20% (M) (at 20°C, 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°C after 2 minutes)								
Low Temperature Characteristics (Max. Impedance Ratio)	Rated voltage (V _{dc})	6.3V	10V	16V	25V	35V	50V	(at 20°C,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
Endurance	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		
Shelf Life	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 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			

DIMENSIONS (Terminal Type=VC) [mm]

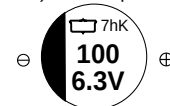


Note : $L \pm 0.5$ for $\phi 8 \times 6$ (H63), $\phi 8 \times 10$ (H10), and $\phi 10 \times 10$ (J10) .

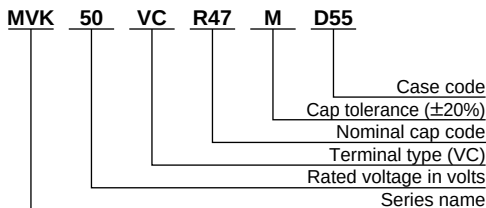
Case code	D	L	A	B	C	W	P
D55	4	5.2	4.3	4.3	5.1	0.5 to 0.8	1.0
E55	5	5.2	5.3	5.3	5.9	0.5 to 0.8	1.4
F55	6.3	5.2	6.6	6.6	7.2	0.5 to 0.8	1.9
H63	8	6.3	8.3	8.3	9.0	0.5 to 0.8	2.3
H10	8	10.0	8.3	8.3	9.0	0.7 to 1.1	3.1
J10	10	10.0	10.3	10.3	11.0	0.7 to 1.1	4.5

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 21		D55 30		E55 25	F55 29
33			E55 34		F55 40	H63 40	H63 70
47		E55 36		F55 48		H63 80	H10 140
100		F55 56	H63 90		H10 180		H10 170
220			H10 180				J10 310
330		H10 290			J10 450		
470				J10 460			
1000		J10 410					

Note : → Use next higher voltage part.

New!
Alchip® MKA Series

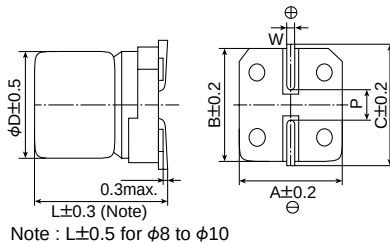
- Load life at 105°C 1000~2000 hours assured
- Rated voltage : 6.3V to 50V, Nominal capacitance : 0.1 to 1000μF
- Case sizes : φ4×5.5 to φ10×10.5mm
- Solvent-proof type (see PRECAUTIONS AND GUIDELINES)



◆ SPECIFICATIONS

Items	Characteristics										
Category											
Temperature Range	-40 to +105℃										
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℃, 2 minute)										
Dissipation Factor (tanδ)	Rated voltage(V _{dc})	6.3V	10V	16V	25V	35V	50V				
	tanδ(Max.)	D55 to F55	0.30	0.24	0.20	0.16	0.14				0.12
		F80/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})	6.3	10	16	25	35	50				
	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℃.										
	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

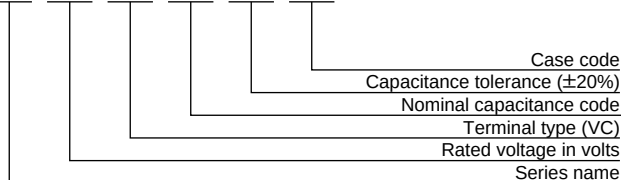
◆ MARKING

EX) 16V100μF



◆ PART NUMBERING SYSTEM

MKA 35 VC 220 M J10



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

◆ STANDARD RATINGS

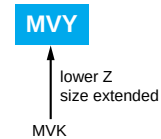
μF	V _{dc}	6.3	10	16	25	35	50
0.10							D55 1.3
0.22							D55 2.6
0.33							D55 3.2
0.47							D55 3.8
1.0							D55 5.6
2.2							D55 10
3.3							D55 14
4.7							D55 19
10				D55 16		E55 25	F55 29
22	D55 21		E55 30			F55 40	F80 70
33		E55 34		F55 45		F80 (H63) 80	H10 140
47	E55 36		F55 48	F80 (H63) 80			H10 170
100	F55 56	F80 (H63) 90		H10 180			J10 310
220		H10 180				J10 375	
330	H10 290			J10 450			
470							
1,000	J10 410						

Note : Parenthesized capacitances are sub-standard parts.

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

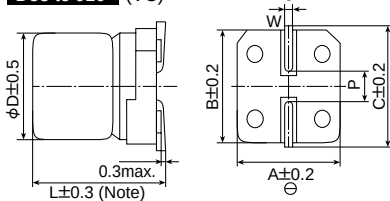


SPECIFICATIONS

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 50V _{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					

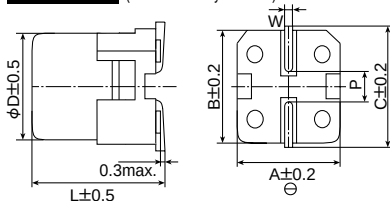
DIMENSIONS (Terminal Type=VC or VD) [mm]

D55 to J10 (VC)



Note : L ± 0.5 for H10 to K16

K14 to M22 (VD : with dummy terminals)



Case code	ϕD	L	A	B	C	W	P
D55	4.0	5.2	4.3	4.3	5.1	0.5 to 0.8	1.0
E55	5.0	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

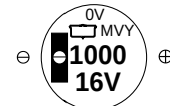
D55 to J10

EX) 6.3V100 μ F

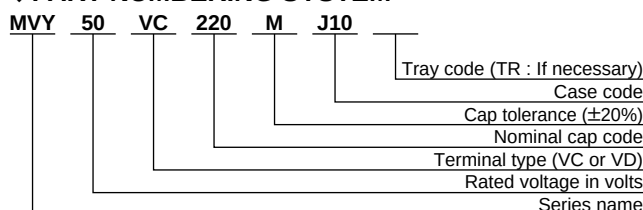


K14 to M22

EX) 16V1000 μ F



PART NUMBERING SYSTEM



Capacitance	Code
1.0 μ F	1
4.7 μ F	4R7
10 μ F	10
100 μ F	100
1000 μ F	1000

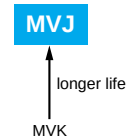
◆STANDARD RATINGS

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	Rated ripple current (mArms) at 105°C, 100kHz Impedance (Ω) at 20°C, 100kHz Case code					
6,800	L22 M22	0.038 0.038	1,630 1,750	M22	0.038	1,750									
8,200	M22	0.038	1,750												

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							K14	0.33	450
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									

Alchip® MVJ Series

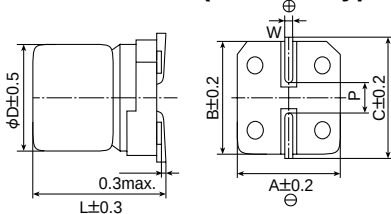
- Endurance : 105°C 2000 hours
- Solvent-proof type (see PRECAUTIONS AND GUIDELINES)



SPECIFICATIONS

Items	Characteristics									
Category	Temperature Range									
Rated Voltage Range	-40 to +105°C									
Capacitance Tolerance	6.3 to 50V _{dc}									
Leakage Current	±20% (M) (at 20°C, 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°C after 2 minutes)									
Low Temperature Characteristics (Max. Impedance Ratio)	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			
Endurance	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			
Shelf Life	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	

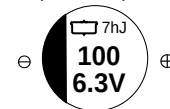
DIMENSIONS (Terminal Type=VC) [mm]



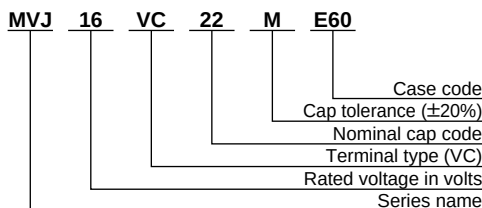
Case code	D	L	A	B	C	W	P
D60	4	5.7	4.3	4.3	5.1	0.5 to 0.8	1.0
E60	5	5.7	5.3	5.3	5.9	0.5 to 0.8	1.4
F60	6.3	5.7	6.6	6.6	7.2	0.5 to 0.8	1.9

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						E60 19
10						F60 29
22	D60 21		D60 16		E60 25	
33		E60 34	E60 30	F60 45	F60 40	
47	E60 36		F60 48			
100	F60 56					

Case code

Rated ripple current (mA_{rms}) at 105°C, 120Hz

Note : → Use next higher voltage part.

Upgrade!

Alchip® MVL Series

- Load life : 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)

MVL

Longer life

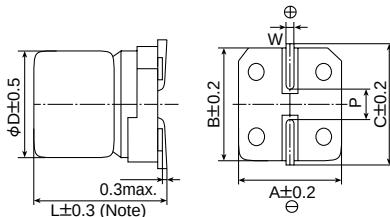
MVJ



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=0.03CV 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
	Max. tanδ	0.28	0.24	0.20	0.16	0.13	0.12 (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)	10	7	5	3	3	3 (120Hz)
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. The rated voltage shall be applied to the capacitors for a minimum of 30 minutes, at least 24 hours and not more than 48 hours before the measurements.						
	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 H10 to J10

Outer dimensions							
Case code	D	L	A	B	C	W	P
D60	4.0	5.7	4.3	4.3	5.1	0.5 - 0.8	1.0
E60	5.0	5.7	5.3	5.3	5.9	0.5 - 0.8	1.4
F60	6.3	5.7	6.6	6.6	7.2	0.5 - 0.8	1.9
F80	6.3	7.7	6.6	6.6	7.2	0.5 - 0.8	1.9
H63	8	6.3	8.3	8.3	9.0	0.5 - 0.8	2.3
H10	8	10.0	8.3	8.3	9.0	0.7 - 1.1	3.1
J10	10	10.0	10.3	10.3	11.0	0.7 - 1.1	4.5

MARKING

EX) 16V47μF



PART NUMBERING SYSTEM

MVL 35 VC 10 M E60

Case code
Capacitance tolerance (M = P20%)
Capacitance code
Terminal type
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 capacitor.



SURFACE MOUNT ALUMINUM ELECTROLYTIC CAPACITORS

High heat resistance, 125°C

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

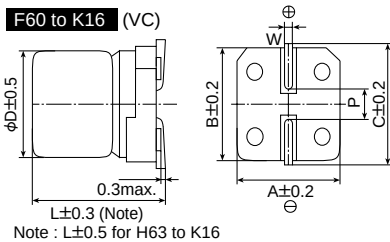


SPECIFICATIONS

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	(at 120Hz)	
	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		
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						

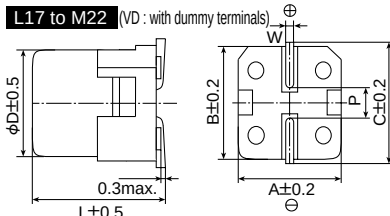
DIMENSIONS (Terminal Type=VC or VD) [mm]

F60 to K16 (VC)



Note : L±0.5 for H63 to K16

L17 to M22 (VD : with dummy terminals)

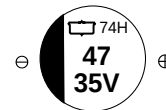


Case code	D	L	A	B	C	W	P
F60	6.3	5.7	6.6	6.6	7.2	0.5 to 0.8	1.9
F80	6.3	7.7	6.6	6.6	7.2	0.5 to 0.8	1.9
H63	8	6.3	8.3	8.3	9.0	0.5 to 0.8	2.3
H10	8	10.0	8.3	8.3	9.0	0.7 to 1.1	3.1
J10	10	10.0	10.3	10.3	11.0	0.7 to 1.1	4.5
K14	12.5	13.5	13.0	13.0	13.7	1.0 to 1.3	4.2
K16	12.5	16.0	13.0	13.0	13.7	1.0 to 1.3	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

MARKING

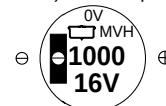
F60 to J10

EX) 35V47μF



K14 to M22

EX) 16V1000μF



PART NUMBERING SYSTEM

MVH 35 VC 47 M H10

Tray code (TR : If necessary)

Case code

Cap tolerance (±20%)

Nominal cap code

Terminal type (VC or VD)

Rated voltage in volts

Series name

Capacitance	Code
10μF	10
100μF	100
1000μF	1000

◆STANDARD RATINGS

μF \ V_{dc}	10				16				25				35			
10													F60	27	3.3	66.0
22													F60	39	3.3	66.0
33									F60	45	3.3	66.0	H63 F80	62 62	2.3 2.3	46.0 46.0
47					F60	43	3.3	66.0	H63 F80	68 68	2.3 2.3	46.0 46.0	H10	92	1.0	20.0
100	H63 F80	72 72	2.3 2.3	46.0 46.0					H10	126	1.0	20.0	J10	151	0.7	13.4
220	H10	136	1.0	20.0					J10	211	0.7	13.4				
330	J10	188	0.7	13.4					K14	750	0.14	2.1	K14 L17	750 1,000	0.14 0.10	2.1 1.5
470					K14	750	0.14	2.1	K14 L17	750 1,000	0.14 0.10	2.1 1.5	K16 L17	900 1,000	0.11 0.10	1.5 1.5
680					K14 L17	750 1,000	0.14 0.10	2.1 1.5	M17	1,200	0.10	1.5	M17	1,200	0.10	1.5
1,000	K14	750	0.14	2.1	M17	1,200	0.10	1.5	M22	1,550	0.058	0.87				
2,200	L17 M17	1,000 1,200	0.10 0.10	1.5 1.5	M17	1,200	0.10	1.5								
3,300	M17	1,200	0.10	1.5												
4,700	M22	1,550	0.058	0.87												

ESR (Ω max.) at -40°C, 100kHz
 ESR (Ω max.) at 20°C, 100kHz
 Rated Ripple current (mA) at 125°C, 100kHz
 Case code

Non-solvent proof																
μF \ V_{dc}	50				63				100							
10	F60	38	3.3	66.0	H63 F80	42 42	2.3 2.3	115 115	H10	53	1.0	50				
22	H63 F80	50 50	2.3 2.3	46.0 46.0	H10	56	1.0	50.0	J10	63	0.70	35				
33	H10	83	1.0	20.0	J10	71	0.7	35.0								
47	J10	111	0.7	13.4					K14	450	0.33	16.5				
68									K16	550	0.26	13.0				
100	K14	550	0.23	3.5	K14	500	0.25	12.5	L17	650	0.24	12.0				
220	K14 L17	550 850	0.23 0.15	3.5 2.3	K16	600	0.20	10.0	M22	950	0.16	8.0				
330	K16 L17	700 850	0.18 0.15	2.7 2.3	L17	820	0.18	9.0								
470	M17	920	0.15	2.3	L22	1,100	0.11	5.5								

ESR (Ω max.) at -40°C, 100kHz
 ESR (Ω max.) at 20°C, 100kHz
 Rated Ripple current (mA) at 125°C, 100kHz
 Case code

Non-solvent proof																
μF \ V_{dc}	160				200				250				400			
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														

Rated Ripple current (mA) at 125°C, 120Hz
 Case code

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

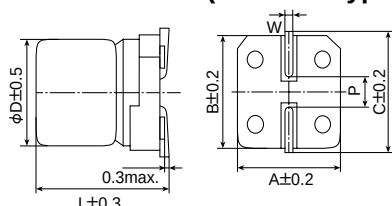
↑
bi-polarized
MV



◆ SPECIFICATIONS

Items	Characteristics									
Category	Temperature									
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		
	tanδ (Max.)	0.45	0.32	0.26	0.24	0.22	0.20	0.20	(at 20°C, 120Hz)	
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		
	Z(-40°C)/Z(+20°C)	15	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 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								

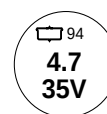
◆DIMENSIONS (Terminal Type=VC) [mm]



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

[illegible]

◆ 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							
4.7							
6.8							
10							
15							
22							
33							
47							

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

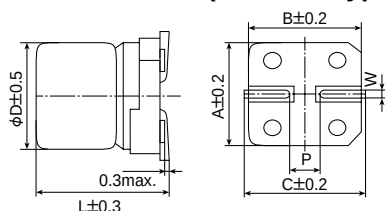
MVK



◆ SPECIFICATIONS

Items	Characteristics									
Category	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=0.05CV 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								

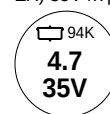
◆DIMENSIONS (Terminal Type=VC) [mm]



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

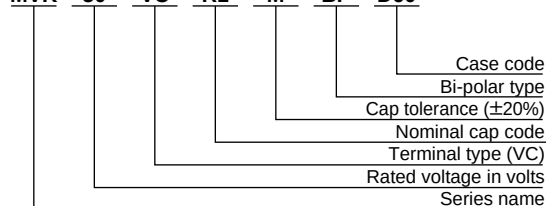
◆ MARKING

EX) 35V4.7 μ F



◆PART NUMBERING SYSTEM

MVK 50 VC R1 M BP D60



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

◆ STANDARD RATINGS

[illegible]

Note : $\rightarrow$ 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

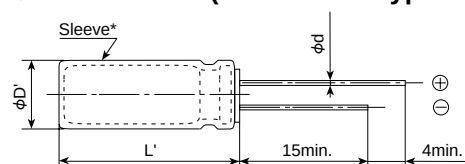
downsized
SRE



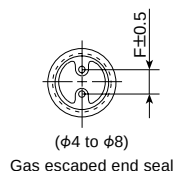
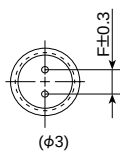
SPECIFICATIONS

Items	Characteristics								
Category	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.)	0.40	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	(at 120Hz)
	Z(−25°C)/Z(+20°C)	7	4	3	2	2	2	2	
	Z(−40°C)/Z(+20°C)	15	8	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 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	≤The initial specified value							

DIMENSIONS (Radial Lead Type=VB) [mm]



*φ8 : coating case



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

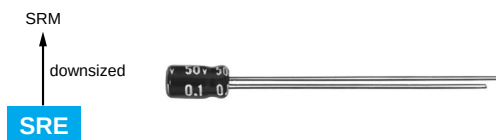
STANDARD RATINGS

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

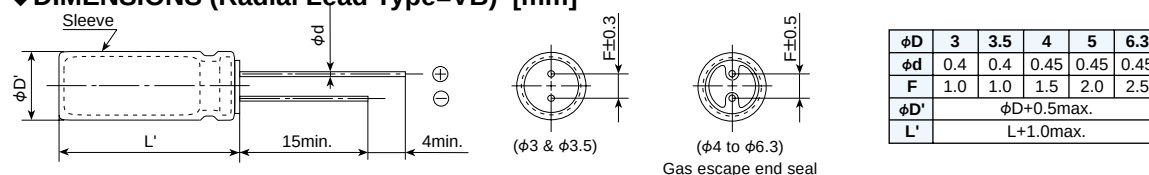
- Coating case covered products are also available
- 5mm height, 1000-hours-life at 85°C
- Non solvent-proof



◆ SPECIFICATIONS

Items	Characteristics									
Category	Temperature Range									
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)	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		
Low Temperature Characteristics (Max. Impedance Ratio)	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		
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 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]



◆PART NUMBERING SYSTEM

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

◆ STANDARD RATINGS

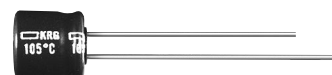
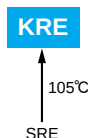
μF \ V_{dc}	4	6.3	10	16	25	35	50
0.1							3×5 1.3
0.15							3×5 2.0
0.22							3×5 2.9
0.33							3×5 3.5
0.47							3×5 4.2
0.68							3×5 5.1
1.0							3×5 6.2
1.5							3×5 7.5
2.2						3×5 8.3	3.5×5 10
3.3					3×5 9.3	3.5×5 11	4×5 14
4.7				3×5 10	3.5×5 12	4×5 15	5×5 19
6.8			3×5 11	3.5×5 14	4×5 16	5×5 20	6.3×5 24
10		3×5 12	4×5 17	3.5×5 17	5×5 25	6.3×5 29	
15	3.5×5 17	4×5 20	5×5 26	6.3×5 33			
22	4×5 23	5×5 32	6.3×5 40				
33	4×5 23	5×5 35	6.3×5 45				
47	5×5 38	6.3×5 50					
68	6.3×5 40						
100	6.3×5 60						

Note1 : $\rightarrow$ Use next higher voltage part.

Note2 : The parts of $\phi 3.5 \times 5$ will be unified to $\phi 4 \times 5$.

KRE Series

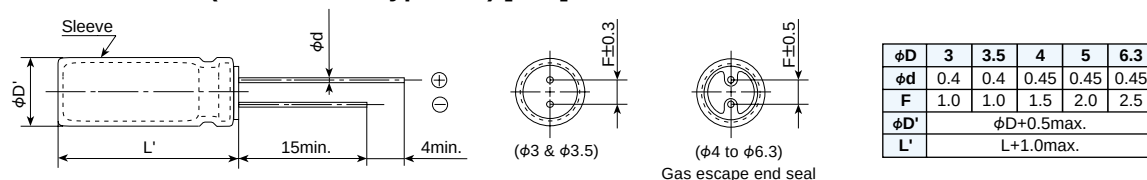
- Coating case covered products are also available
- 5mm height, 1000-hours-life at 105°C
- Solvent-proof type (see PRECAUTIONS AND GUIDELINES)



SPECIFICATIONS

Items	Characteristics						
Category	-55 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.)	0.27	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
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

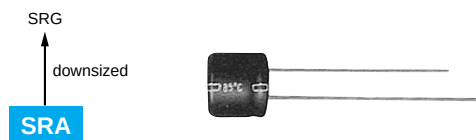
μF	V _{dc}		6.3		10		16		25		35		50	
0.1													3×5	1.3
0.15													3×5	2.0
0.22													3×5	2.6
0.33													3×5	3.2
0.47													3×5	3.8
0.68													3×5	4.6
1.0													3×5	5.6
1.5													3×5	6.9
2.2													3×5	10
3.3													4×5	14
4.7													5×5	19
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														
68														
100			6.3×5	56										

Case size φD×L (mm)
Rated ripple current (mA_{rms}) at 105°C, 120Hz

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

SRA_{Series}

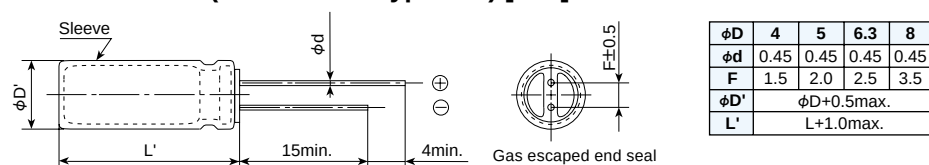
- Coating case covered products are also available
- 7mm height, 1000-hours-life at 85°C
- Non solvent-proof



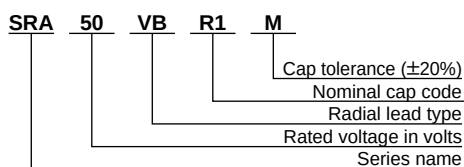
◆ SPECIFICATIONS

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.)	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°C)/Z(+20°C)	4	4	3	2	2	2	2	2	
	Z(-40°C)/Z(+20°C)	10	10	8	6	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 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.									
	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



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.

KMA Series

- Coating case covered products are also available
- 7mm height, 1000-hours-life at 105°C
- Solvent-proof type (see PRECAUTIONS AND GUIDELINES)

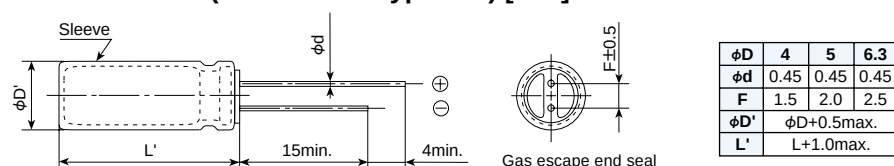
KMA

105°C
SRA


SPECIFICATIONS

Items	Characteristics									
Category	Temperature Range									
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

KMA	6.3	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

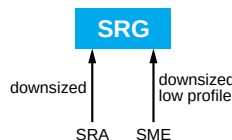
STANDARD RATINGS

μF	V _{dc}	4	6.3	10	16	25	35	50	63
0.1								4X7 1.3	4X7 1.3
0.15								4X7 2.0	4X7 1.9
0.22								4X7 2.9	4X7 2.9
0.33								4X7 3.5	4X7 4.4
0.47								4X7 5.0	4X7 7.9
0.68								4X7 7.1	4X7 9.2
1.0								4X7 10	4X7 11
1.5								4X7 12	4X7 13
2.2								4X7 15	4X7 17
3.3								4X7 18	5X7 21
4.7								4X7 20	6.3X7 26
6.8					4X7 20			5X7 24	6.3X7 28
10					4X7 25			5X7 30	6.3X7 34
15					5X7 31			6.3X7 37	6.3X7 43
22					5X7 39			6.3X7 47	6.3X7 57
33	4X7	26	4X7 31	5X7 43	6.3X7 59	6.3X7 53	6.3X7 64		
47	4X7	34	5X7 47	6.3X7 63					
68			6.3X7 63	80	6.3X7 97				
100	5X7	61	6.3X7 80						
220	6.3X7	95							

Note : → Use next higher voltage part.

SRG Series

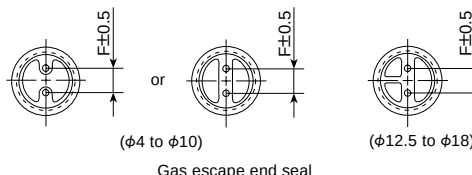
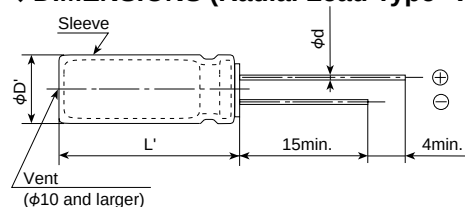
- Low Profile : $\phi 4 \times 7\text{mm}$ to $\phi 18 \times 25\text{mm}$
- Endurance : 85°C 1000 to 2000 hours
- Solvent-proof type (see PRECAUTIONS AND GUIDELINES)



SPECIFICATIONS

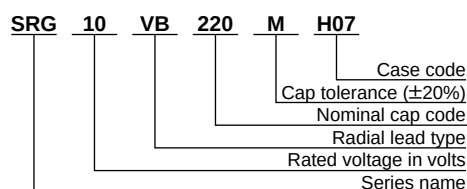
Items	Characteristics								
Category	-40 to +85°C								
Temperature Range									
Rated Voltage Range	4 to 50V _{dc}								
Capacitance Tolerance	±20% (M) (at 20°C, 120Hz)								
Leakage Current	I=0.01CV or 3μA, whichever is greater. Where, I : Max. leakage current (μA), C : Nominal capacitance (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	
	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°C, 120Hz)								
Low Temperature Characteristics (Max. Impedance Ratio)	Rated voltage (V _{dc})	4V	6.3V	10V	16V	25V	35V	50V	
	Z(−25°C)/Z(+20°C)	6	5	4	3	2	2	2	
	Z(−40°C)/Z(+20°C)	12	12	10	8	5	4	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 2000 hours (1000 hours for φ8 and smaller) 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	≤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	0.6
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				

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						

Note : → Use next higher voltage part.

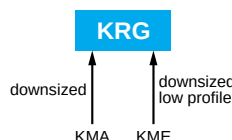
◆RATED RIPPLE CURRENT MULTIPLIERS

●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

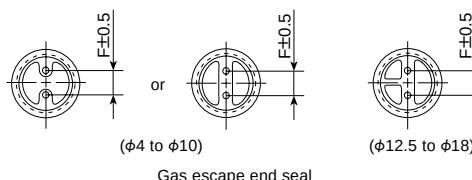
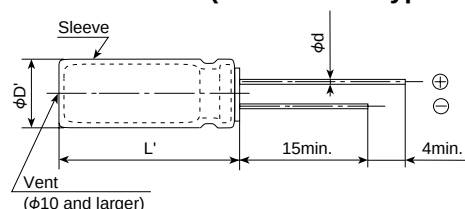
- Low profile : $\phi 4 \times 7\text{mm}$ to $\phi 18 \times 25\text{mm}$
- Endurance : 105°C 1000 hours
- Solvent-proof type (see PRECAUTIONS AND GUIDELINES)



SPECIFICATIONS

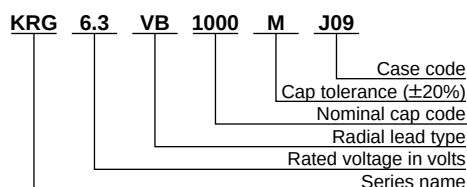
Items	Characteristics							
Category	Temperature Range							
Rated Voltage Range	6.3 to 50V _{dc}							
Capacitance Tolerance	±20% (M) (at 20°C, 120Hz)							
Leakage Current	I=0.01CV or 3μA, whichever is greater. Where, I : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V) (at 20°C after 2 minutes)							
Dissipation Factor (tanδ)	Rated voltage (V _{dc})	6.3V	10V	16V	25V	35V	50V	(at 20°C, 120Hz)
	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.							
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)	5	4	3	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.							
	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

New!

SMQ Series

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

SMQ

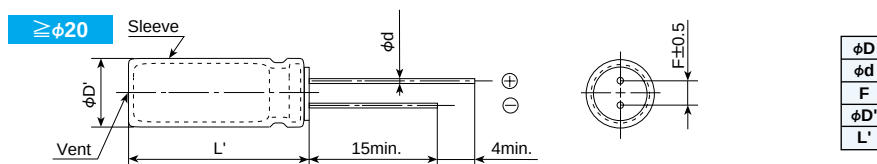
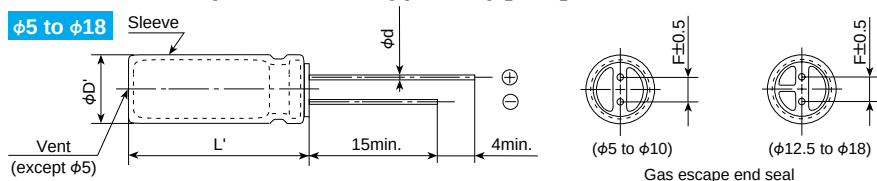
↑ downsized
SMG



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	2	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	25.4
φd	0.5	0.5	0.6	0.6	0.6	0.8	0.8	1.0	1.0	1.0
F	2.0	2.5	3.5	5.0	5.0	7.5	7.5	10.0	10.0	12.5
φD'	φD+0.5max.							φD+0.5max.		
L'	L+1.5max.							L+2.0max.		

PART NUMBERING SYSTEM

SMQ 6.3 VB 1000 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		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	25.4×50	3,900
10,000	16×25	2,350	16×31.5	2,550	16×35.5	2,710	18×40	2,800	22×50	3,700	25.4×50	4,000		
15,000	16×31.5	2,550	16×35.5	2,880	18×40	3,100	22×50	3,800	25.4×50	4,300				
22,000	18×35.5	3,200	18×40	3,400	22×40	3,800	25.4×50	4,500						
33,000	20×40	3,500	22×50	4,500	25.4×50	4,800								
47,000	22×50	3,900	25.4×50	5,000										
68,000	25.4×50	4,300												

Rated ripple current (mA rms) at 85°C, 120Hz
Case size φD×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												
3,300	25.4×50	2,900												

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

◆RATED RIPPLE CURRENT MULTIPLIERS

●Frequency Multipliers

(φ5 to φ18)

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

(φ20 to φ25.4)

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

New!

KMQ Series

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

KMQ

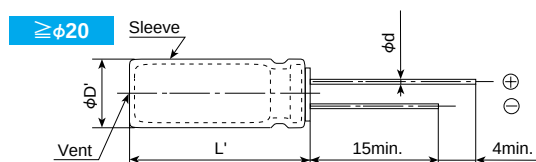
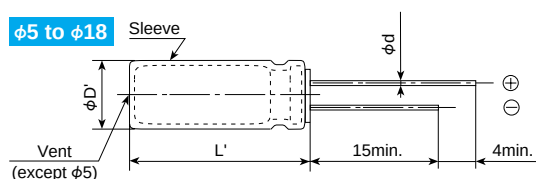
↑ downsized
KMG



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
		≥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	—
(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 (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	25.4
φd	0.5	0.5	0.6	0.6	0.6	0.8	0.8	1.0	1.0	1.0
F	2.0	2.5	3.5	5.0	5.0	7.5	7.5	10.0	10.0	12.5
φD'	φD+0.5max.							φD+0.5max.		
L'	L+1.5max.							L+2.0max.		

PART NUMBERING SYSTEM

KMQ 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

$\mu\text{F} \backslash V_{\text{dc}}$	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	25.4×50	2,800
10,000	16×25	1,650	16×31.5	1,820	16×35.5	1,930	18×40	2,000	22×50	2,650	25.4×50	2,850		
15,000	16×31.5	1,820	16×35.5	2,050	18×40	2,210	22×50	2,750	25.4×50	3,100				
22,000	18×35.5	2,280	18×40	2,420	22×40	2,710	25.4×50	3,250						
33,000	20×40	2,500	22×50	3,210	25.4×50	3,450								
47,000	22×50	2,780	25.4×50	3,570										
68,000	25.4×50	3,070												

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

Non solvent-proof														
$\mu\text{F} \backslash V_{\text{dc}}$	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												
3,300	25.4×50	2,070												

Rated ripple current (mA rms) at 105°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 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

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		
			≥φ20	0.28	0.24	0.20	0.16	0.14	0.12	0.09	0.08	0.15	0.15		
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	3	6	6		
			≥φ20	5	4	3	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

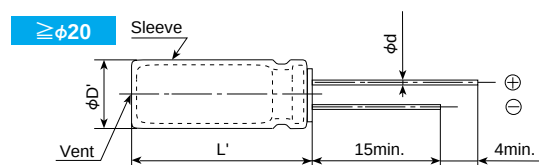
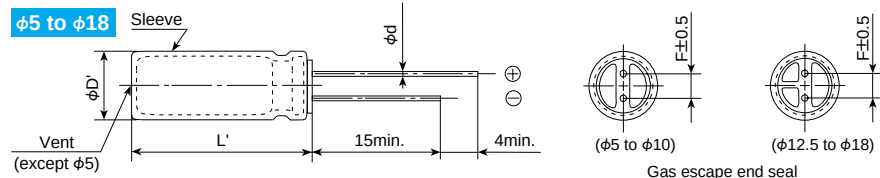
SMG	6.3	VB	1000	M	
					Case code (≥φ20)
					Cap tolerance (±20%)
					Nominal cap code
					Radial lead type
					Rated voltage in volts
					Series name

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]



φD	5	6.3	8	10	12.5	16	18	20	22	25.4
φd	0.5	0.5	0.6	0.6	0.6	0.8	0.8	1.0	1.0	1.0
F	2.0	2.5	3.5	5.0	5.0	7.5	7.5	10.0	10.0	12.5
φD'	φD+0.5max.							φD+0.5max.		
L'	L+1.5max.							L+2.0max.		

◆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											20×20	1,570	20×30	1,850		
1,800															25.4×40	2,490
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		
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				
3,900							20×20	1,850	20×25	2,050	20×35	2,420	22×40	2,810		
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	20×30	2,310	22×35	2,590	25.4×40	3,100
5,600							20×30	2,430	20×40	2,690	22×35	2,590				
6,800	12.5×25	1,915	16×25	2,220	16×31.5	2,520	18×35.5	2,880								
8,200			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		
10,000	16×25	2,330	16×35.5	2,670	18×35.5	2,920										
12,000	20×25	2,310	20×25	2,410	20×35	2,720										
15,000			20×30	2,620	20×40	2,900	22×40	3,240	25.4×40	3,480						
18,000	16×35.5	2,845	18×35.5	3,080												
22,000	20×30	2,660	20×35	2,870												
27,000	20×35	2,890	22×35	3,050												
33,000	18×40	3,320														
39,000	20×40	3,130	22×40	3,480	25.4×40	3,720										
	22×35	3,130														
	22×40	3,280														
	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							6.3×11 32				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		
											20×20	260	20×25	240		
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		
													20×40	420		
100	12.5×25	430	16×25	475	16×31.5	515			18×31.5	530			22×35	420		
			20×20	460	20×25	490	20×30	500	20×30	500	20×35	520	22×40	470		
120					20×25	530	20×30	550	20×35	560	20×40	580	25.4×40	520		
											22×35	580				
180			20×25	660	20×30	680	20×40	720			25.4×40	790				
220					18×40	825	22×35	720								
	16×31.5	760	20×30	750	20×35	780	22×40	810	25.4×40	890						
270	20×25	730	18×35.5	810	22×30	820										
			20×30	830	20×40	880	25.4×40	920								
330					22×35	880										
	18×35.5	995	20×35	1,070	22×40	1,060										
390	20×30	920	22×30	1,070												
	20×35	1,160	20×40	1,190	25.4×40	1,200										
470	22×30	1,160	22×30	1,160												
	20×40	1,340	22×40	1,350												
560	22×35	1,340														
	22×40	1,470	22×40	1,430												
680	25.4×40	1,570	25.4×40	1,620												

KMG Series

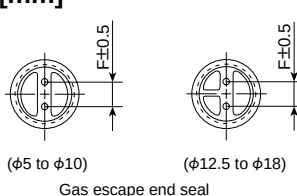
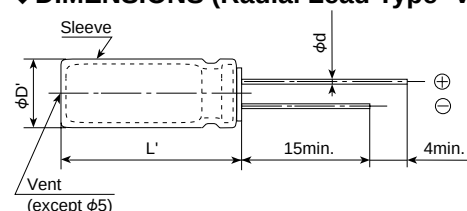
- Downsized from current standard KME series
- Solvent-proof type except 350 to 450V_{dc}
(see PRECAUTIONS AND GUIDELINES)



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				
	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. (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	450V				
	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	—	(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 (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]



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
0.22						5×11	2.9	5×11
0.33						5×11	4.3	5×11
0.47						5×11	6.2	5×11
1.0						5×11	13	5×11
2.2						5×11	20	5×11
3.3						5×11	25	5×11
4.7						5×11	30	5×11
10						5×11	40	5×11
22						5×11	65	5×11
33						5×11	90	5×11
47						5×11	110	5×11
100						5×11	180	5×11
220	5×11	140	6.3×11	170	6.3×11	180	8×11.5	230
330	6.3×11	190	6.3×11	200	8×11.5	260	8×11.5	310
470	6.3×11	230	8×11.5	250	8×11.5	310	10×12.5	380
1,000	8×11.5	380	10×12.5	460	10×16	560	10×20	680
2,200	10×20	710	10×20	760	12.5×20	920	12.5×25	1,090
3,300	10×20	840	12.5×20	1,000	12.5×25	1,170	16×25	1,400
4,700	12.5×20	1,090	12.5×25	1,260	16×25	1,480	16×31.5	1,710
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
4.7	6.3×11	34	8×11.5	39	8×11.5	39	10×16	50	10×16	50	10×20
10	10×12.5	67	10×16	74	10×16	74	10×20	80	10×20	80	12.5×20
22	10×20	120	10×20	120	12.5×20	130	12.5×20	130	12.5×25	145	16×25
33	10×20	145	12.5×20	160	12.5×20	160	16×25	195	16×25	195	16×31.5
47	12.5×20	195	12.5×20	195	12.5×25	210	16×25	230	16×31.5	250	16×35.5
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

SME Series

- Endurance : 85°C 2000 hours
- Solvent-proof type except 350 to 450V_{dc}
(see PRECAUTIONS AND GUIDELINES)

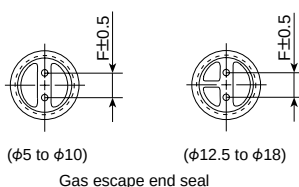
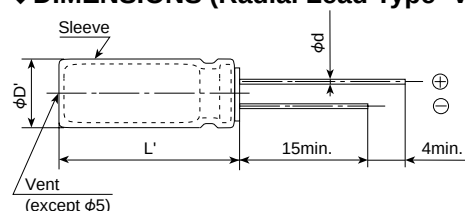
SMG ← SME
downsized



SPECIFICATIONS

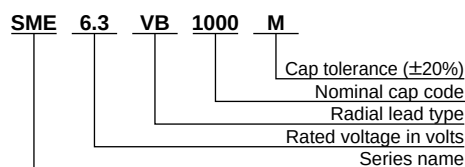
Items	Characteristics														
Category	Temperature Range														
Rated Voltage Range	6.3 to 450V _{dc}														
Capacitance Tolerance	±20% (M) (at 20°C, 120Hz)														
Leakage Current	6.3 to 100V _{dc}							160 to 450V _{dc}							
	I=0.03CV or 4μA, whichever is greater. (at 20°C 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			
	(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			
	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	350 to 400V	450V			
	Z(−25°C)/Z(+20°C)	4	3	2	2	2	2	2	2	3	6	16			
	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 the rated voltage is applied for 2000 hours at 85°C.														
	Rated voltage	6.3 to 100V _{dc}						160 to 400V _{dc}			450V _{dc}				
	Capacitance change	≤±20% of the initial value						≤±20% of the initial value			≤±20% of the initial value				
	D.F. (tanδ)	≤150% of the initial specified value						≤200% of the initial specified value			≤150% 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 85°C without voltage applied.														
	Rated voltage	6.3 to 100V _{dc}						160 to 400V _{dc}			450V _{dc}				
	Capacitance change	≤±20% of the initial value						≤±20% of the initial value			≤±20% of the initial value				
	D.F. (tanδ)	≤150% of the initial specified value						≤200% of the initial specified value			≤200% of the initial specified value				
	Leakage current	≤The initial specified value						≤500% of 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



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	8.8
0.47											5×11	7			5×11	12
1.0											5×11	13			5×11	22
2.2											5×11	29			5×11	33
3.3											5×11	35			5×11	40
4.7											5×11	42	5×11	45	5×11	48
10											5×11	65	5×11	70	6.3×11	80
22											5×11	95	6.3×11	115	8×11.5	135
33									5×11	105	6.3×11	125	6.3×11	140	10×12.5	195
47					5×11	110	5×11	115	6.3×11	145	6.3×11	150	8×11.5	190	10×16	255
100	5×11	130	5×11	145	6.3×11	180	6.3×11	190	8×11.5	240	8×11.5	255	10×12.5	320	12.5×20	450
220	6.3×11	230	6.3×11	250	8×11.5	300	8×11.5	320	10×12.5	420	10×16	490	10×20	565	16×25	810
330	6.3×11	280	8×11.5	350	8×11.5	370	10×12.5	470	10×16	570	10×20	650	12.5×20	765	16×25	990
470	8×11.5	380	8×11.5	415	10×12.5	520	10×16	620	10×20	740	12.5×20	860	12.5×25	990	16×31.5	1,250
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	16×31.5	1,700		
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														

Non solvent-proof												
μF \ V_{dc}	160		200		250		350		400		450	
0.47	6.3×11	12	6.3×11	12	6.3×11	12	8×11.5	15				
1.0	6.3×11	17	6.3×11	17	6.3×11	17	8×11.5	22	8×11.5	22	10×12.5	25
2.2	6.3×11	26	6.3×11	26	8×11.5	30	10×12.5	39	10×12.5	39	10×16	42
3.3	8×11.5	36	8×11.5	36	10×12.5	43	10×16	53	10×16	53	10×20	56
4.7	8×11.5	44	10×12.5	51	10×12.5	51	10×16	63	10×20	69	12.5×20	75
10	10×16	83	10×16	83	10×20	90	12.5×20	115	12.5×20	115	12.5×25	120
22	10×20	130	10×20	130	12.5×25	160	12.5×25	180	16×25	200	16×31.5	210
33	12.5×20	180	12.5×25	190	12.5×25	190	16×25	245	16×31.5	265	18×35.5	275
47	12.5×25	230	12.5×25	230	16×25	260	16×31.5	315	16×35.5	325		
100	16×25	380	16×31.5	400	18×35.5	440	18×40	500				
220	18×35.5	640	18×40	660								

◆MAXIMUM ESR

(Ω) at 20°C, 120Hz

μF \ V_{dc}	6.3	10	16	25	35	50	63	100	160 to 250	350 to 450
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									

KME Series

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

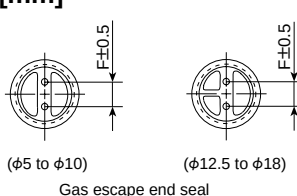
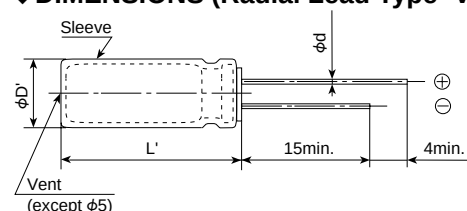
KMG ← KME
downsized



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	After 1minute		After 5minutes	
	I=0.01CV or 3μA, whichever is greater. (at 20°C after 2 minutes)									CV≤1000		I=0.1CV+40	
								CV>1000		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

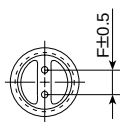
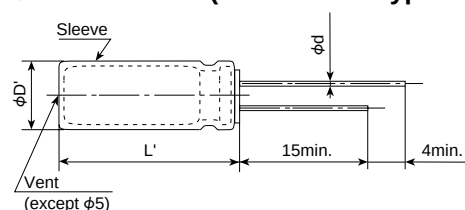
bi-polarized
SME



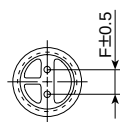
SPECIFICATIONS

Items	Characteristics									
Category	Temperature Range									
Rated Voltage Range	-40 to +85°C									
Capacitance Tolerance	6.3 to 100V _{dc}									
Leakage Current	±20% (M) (at 20°C, 120Hz)									
Dissipation Factor (tanδ)	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)									
	Rated voltage (V _{dc}) 6.3V 10V 16V 25V 35V 50V 63V 80V 100V									
Low Temperature Characteristics (Max. Impedance Ratio)	tanδ (Max.) 0.24 0.24 0.20 0.20 0.16 0.14 0.12 0.12 0.10 0.10									
	When nominal capacitance exceeds 1000μF, add 0.02 to the value above for each 1000μF increase. (at 20°C, 120Hz)									
	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 2									
Endurance	Z(-40°C)/Z(+20°C) 10 8 6 4 3 3 3 3 3 3									
	(at 120Hz)									
	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}									
Shelf Life	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									
	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.									
Shelf Life	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

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
3.3							5X11	27	5X11	28
4.7							5X11	34	6.3X11	34
10							5X11	43	6.3X11	52
22							6.3X11	57	6.3X11	65
33							8X11.5	73	8X11.5	89
47							8X11.5	100	8X11.5	105
100							8X11.5	120	10X12.5	150
220							10X16	230	10X20	265
330							12.5X20	410	12.5X25	480
470							12.5X25	505	16X25	650
1,000							16X31.5	835	18X35.5	965
2,200										
3,300										
4,700										
6,800										

KME-BP Series

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

KME-BP

bi-polarized

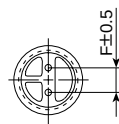
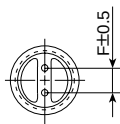
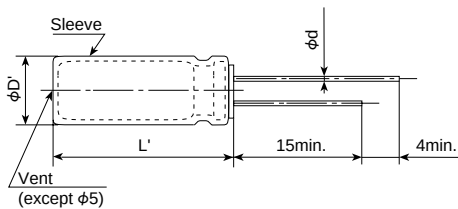
KME



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									

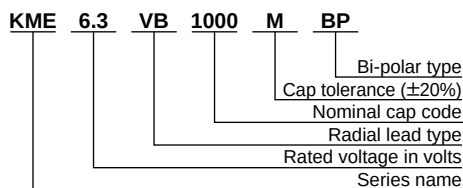
DIMENSIONS (Radial Lead Type=VB) [mm]



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



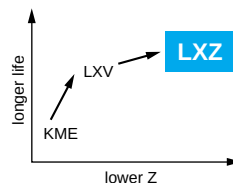
Capacitance	Code
0.47μF	R47
1.0μF	1
4.7μF	4R7
10μF	10
100μF	100

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	6.3X11
4.7						5X11	22	6.3X11	6.3X11
10					5X11	30	6.3X11	37	8X11.5
22			5X11	40	6.3X11	46	6.3X11	51	8X11.5
33			5X11	49	6.3X11	56	8X11.5	72	8X11.5
47			5X11	54	6.3X11	67	8X11.5	86	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							

LXZ Series

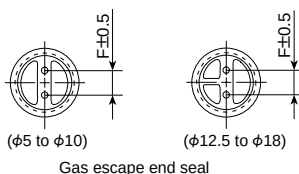
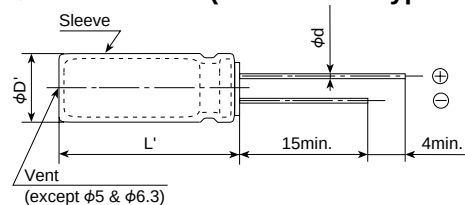
- Newly innovative electrolyte and internal architecture are employed
- Lowest impedance at high frequency range
- Endurance with ripple current: 105°C 2000 to 8000 hours
- Solvent-proof type (see PRECAUTIONS AND GUIDELINES)



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 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°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]



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)		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
5×11.5	E11		150	0.50	1.0	175	0.50	1.0	175	47	0.50	1.0	175	175
6.3×11.5	F11		330	0.25	0.50	290	0.25	0.50	290	100	0.25	0.50	290	290
6.3×15	F15		470	0.18	0.36	400	0.18	0.36	400	220	0.18	0.36	400	400
8×12	H12		680	0.12	0.24	555	0.12	0.24	555	330	0.12	0.24	555	555
8×15	H15		1,000	0.090	0.18	730	0.090	0.18	730	470	0.090	0.18	730	730
8×20	H20		1,200	0.080	0.16	810	0.080	0.16	810	560	0.080	0.16	810	810
10×12.5	J12		820	0.090	0.18	760	0.090	0.18	760	470	0.090	0.18	760	760
10×16	J16		1,200	0.068	0.136	1,050	0.068	0.136	1,050	680	0.068	0.136	1,050	1,050
10×20	J20		1,500	0.052	0.104	1,220	0.052	0.104	1,220	1,000	0.052	0.104	1,220	1,220
10×25	J25		2,200	0.045	0.090	1,440	0.045	0.090	1,440	1,200	0.045	0.090	1,440	1,440
10×30	J30		2,700	0.037	0.074	1,690	0.037	0.074	1,690	1,500	0.037	0.074	1,690	1,690
12.5×20	K20		3,300	0.038	0.076	1,660	0.038	0.076	1,660	1,500	0.038	0.076	1,660	1,660
12.5×25	K25		3,900	0.030	0.060	1,950	0.030	0.060	1,950	2,200	0.030	0.060	1,950	1,950
12.5×30	K30		4,700	0.025	0.050	2,310	0.025	0.050	2,310	2,700	0.025	0.050	2,310	2,310
12.5×35	K35		5,600	0.022	0.044	2,510	0.022	0.044	2,510	3,300	0.022	0.044	2,510	2,510
12.5×40	K40		6,800	0.017	0.034	2,870	0.017	0.034	2,870	3,900	0.017	0.034	2,870	2,870
16×20	L20		5,600	0.029	0.058	2,210	0.029	0.058	2,210	2,700	0.029	0.058	2,210	2,210
16×25	L25		6,800	0.022	0.044	2,560	0.022	0.044	2,560	3,900	0.022	0.044	2,560	2,560
16×30	L30		8,200	0.019	0.038	3,010	0.019	0.038	3,010	4,700	0.019	0.038	3,010	3,010
16×35	L35		10,000	0.017	0.034	3,150	0.017	0.034	3,150	5,600	0.017	0.034	3,150	3,150
16×40	L40		12,000	0.015	0.030	3,710	0.015	0.030	3,710	6,800	0.015	0.030	3,710	3,710
18×20	M20		6,800	0.028	0.056	2,490	0.028	0.056	2,490	3,900	0.028	0.056	2,490	2,490
18×25	M25		10,000	0.020	0.040	2,740	0.020	0.040	2,740	4,700	0.020	0.040	2,740	2,740
18×30	M30		12,000	0.018	0.036	3,330	0.018	0.036	3,330	5,600	0.018	0.036	3,330	3,330
18×35	M35		15,000	0.016	0.032	3,680	0.016	0.032	3,680	8,200	0.016	0.032	3,680	3,680
18×40	M40		18,000	0.015	0.030	3,800	0.015	0.030	3,800	10,000	0.015	0.030	3,800	3,800

φD×L	V _{dc}	Case code	35			50			63		
			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
5×11.5	E11		33	0.50	1.0	175	0.90	1.8	155	12	1.9
6.3×11.5	F11		56	0.25	0.50	290	0.45	0.90	260	22	1.0
6.3×15	F15		100	0.18	0.36	400	0.31	0.62	360	39	0.61
8×12	H12		150	0.12	0.24	555	0.22	0.44	485	68	0.34
8×15	H15		220	0.090	0.18	730	0.16	0.32	635	100	0.27
8×20	H20		270	0.080	0.16	810	0.12	0.24	730	150	0.21
10×12.5	J12		220	0.090	0.18	760	0.16	0.32	620	100	0.255
10×16	J16		330	0.068	0.136	1,050	0.13	0.26	850	120	0.190
10×20	J20		470	0.052	0.104	1,220	0.088	0.18	1,050	180	0.145
10×25	J25		560	0.045	0.090	1,440	0.073	0.15	1,250	220	0.130
10×30	J30		680	0.037	0.074	1,690	0.054	0.11	1,500	330	0.090
12.5×20	K20		680	0.038	0.076	1,660	0.059	0.12	1,480	330	0.085
12.5×25	K25		1,000	0.030	0.060	1,950	0.044	0.088	1,840	390	0.070
12.5×30	K30		1,200	0.025	0.050	2,310	0.039	0.078	2,220	470	0.055
12.5×35	K35		1,500	0.022	0.044	2,510	0.033	0.066	2,290	680	0.047
12.5×40	K40		1,800	0.017	0.034	2,870	0.029	0.058	2,500	820	0.042
16×20	L20		1,200	0.029	0.058	2,210	0.048	0.096	1,840	470	0.059
16×25	L25		1,800	0.022	0.044	2,560	0.034	0.068	2,240	680	0.050
16×30	L30		2,200	0.019	0.038	3,010	0.028	0.056	2,700	820	0.043
16×35	L35		2,700	0.017	0.034	3,150	0.025	0.050	2,800	1,000	0.036
16×40	L40		3,300	0.015	0.030	3,710	0.021	0.042	3,200	1,200	0.030
18×20	M20		1,800	0.028	0.056	2,490	0.042	0.084	1,980	680	0.055
18×25	M25		2,200	0.020	0.040	2,740	0.029	0.058	2,610	820	0.043
18×30	M30		2,700	0.018	0.036	3,330	0.025	0.050	3,000	1,200	0.032
18×35	M35		3,300	0.016	0.032	3,680	0.023	0.046	3,100	1,500	0.030
18×40	M40		3,900	0.015	0.030	3,800	0.020	0.040	3,400	1,800	0.025

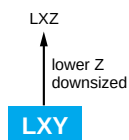
◆RATED RIPPLE CURRENT MULTIPLIERS

●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

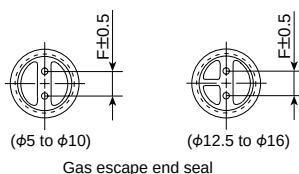
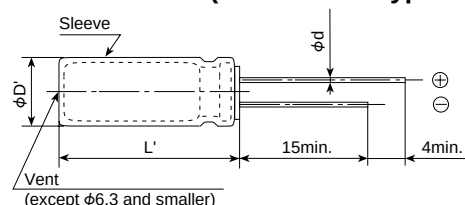
- Newly innovative electrolyte and internal architecture are employed
- Endurance with ripple current : 105°C 2000 to 8000 hours
- Solvent-proof type (see PRECAUTIONS AND GUIDELINES)



SPECIFICATIONS

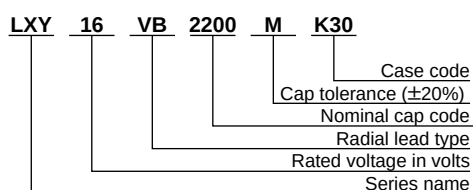
Items	Characteristics						
Category	-55 to +105°C						
Temperature Range							
Rated Voltage Range	10 to 63V _{dc}						
Capacitance Tolerance	±20% (M) (at 20°C, 120Hz)						
Leakage Current	I=0.01CV or 3μA, whichever is greater. Where, I : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V) (at 20°C after 2 minutes)						
Dissipation Factor (tanδ)	Rated voltage (V _{dc})	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°C, 120Hz)
Low Temperature Characteristics (Max. Impedance Ratio)	Z(-55°C)/Z(+20°C)	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°C after subjected to DC voltage with the rated ripple current is applied for the specified period of time at 105°C.						
	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°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]



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 φDXL (mm)		10				16				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)	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	82	0.75	1.5	163	56	0.75	1.5	163	39	0.75	1.5	163	27	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	56	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	82	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	120	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	180	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	220	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	120	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	220	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	330	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	390	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	560	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	560	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	680	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	1,000	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	1,200	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	1,500	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	1,000	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	1,200	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	1,800	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	2,200	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	2,700	0.018	0.036	2,900

V_{dc} Items Case code φDXL (mm)		50				63			
		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	
5X11.5	E11	18	1.2	2.4	129	10	1.9	4.8	103
6.3X11.5	F11	39	0.54	1.1	219	18	1.0	2.5	161
6.3X15	F15	56	0.34	0.68	310	33	0.61	1.6	233
8X12	H12	68	0.30	0.60	340	47	0.47	1.2	274
8X15	H15	82	0.20	0.40	470	68	0.34	0.85	360
8X20	H20	120	0.14	0.28	610	82	0.21	0.53	500
10X12.5	J12	82	0.20	0.40	480	56	0.27	0.68	418
10X16	J16	120	0.13	0.26	755	68	0.21	0.53	525
10X20	J20	180	0.088	0.18	945	120	0.16	0.40	650
10X25	J25	220	0.073	0.15	1,150	150	0.13	0.33	783
10X30	J30	330	0.054	0.11	1,260	180	0.10	0.25	960
12.5X20	K20	330	0.059	0.12	1,190	220	0.11	0.28	870
12.5X25	K25	470	0.044	0.088	1,490	270	0.074	0.19	1,150
12.5X30	K30	560	0.039	0.078	1,720	390	0.068	0.17	1,280
12.5X35	K35	680	0.033	0.066	1,890	470	0.063	0.16	1,390
12.5X40	K40	820	0.029	0.058	2,030	560	0.051	0.13	1,530
16X20	L20	680	0.050	0.10	1,420	330	0.085	0.22	1,100
16X25	L25	820	0.034	0.068	1,880	470	0.055	0.14	1,480
16X30	L30	1,000	0.030	0.060	2,150	680	0.046	0.12	1,720
16X35	L35	1,200	0.027	0.054	2,320	820	0.040	0.10	1,910
16X40	L40	1,500	0.024	0.048	2,540	1,000	0.036	0.090	2,070

◆RATED RIPPLE CURRENT MULTIPLIERS

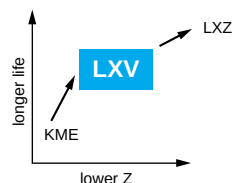
●Frequency Multipliers

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

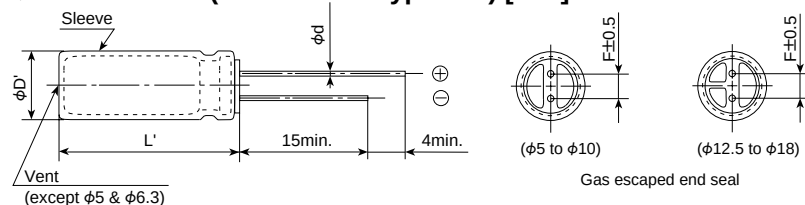
- Low impedance
- Endurance with ripple current: 105°C 2000 to 5000 hours
- Solvent-proof type (see PRECAUTIONS AND GUIDELINES)



SPECIFICATIONS

Items	Characteristics										
Category	Temperature Range										
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]



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

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	

φDXL	Case code	V _{dc}	25			Rated ripple current (mA _{rms} / 105°C 100kHz)	35			Rated ripple current (mA _{rms} / 105°C 100kHz)	50			Rated ripple current (mA _{rms} / 105°C 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	
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

SXE Series

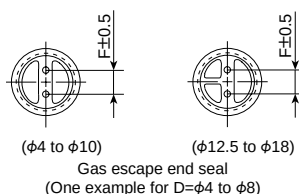
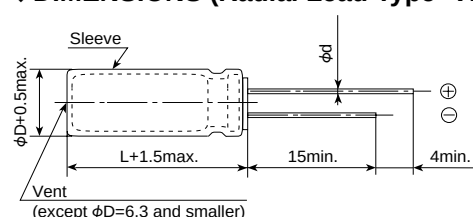
- Low impedance capacitors, operating temperature range from -55 to 105°C
- Solvent-proof type (see PRECAUTIONS AND GUIDELINES)



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=0.03CV (after 1 minute at 20°C) Where: I:Max. leakage current (μA), C:Nominal capacitance (μF), V:Rated voltage (V) I=0.01CV (after 2 minutes at 20°C)									
Dissipation factor (tanδ)	Rated voltage(V _{dc})	6.3	10	16	25	35	50	63	80	100
	tanδ (Max.)	0.22	0.19	0.16	0.14	0.12	0.10	0.08	0.08	0.07
	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 the rated voltage is applied for the specified period of lifetime at 105°C.									
	Lifetime	1,000 hours (φ4 to 8)					2,000 hours (φ10 to 18)			
	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					≤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)	≤150% 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
φd	0.45	0.5*	0.5*	0.6	0.6	0.8
F	1.5	2.0	2.5	3.5	5.0	7.5

*For L=7mm, φd is 0.45

PART NUMBERING SYSTEM

SXE	10	VB	1000	M	K15
					Case code
					Cap tolerance (±20%)
					Nominal cap code
					Radial lead type
					Rated voltage in volts
					Series name

Capacitance	Code
3.3µF	3R3
10µF	10
100µF	100
470µF	470
1000µF	1000

CASE CODE

L(mm) \ φD(mm)	7	11.5	12	12.5	15	20	25	30	35	40
4	D07	D11								
5	E07	E11			E15					
6.3	F07	F11			F15					
8			H12		H15	H20				
10				J12	J15	J20	J25	J30		
12.5					K15	K20	K25	K30	K35	K40
16					L15	L20	L25	L30	L35	L40
18					M15	M20	M25	M30	M35	M40

◆STANDARD RATINGS

Case size φDXL (mm)	Items	6.3					10					16				
		Capacitance (μF)	Impedance (Ωmax)		Rated ripple current (mA)		Capacitance (μF)	Impedance (Ωmax)		Rated ripple current (mA)		Capacitance (μF)	Impedance (Ωmax)		Rated ripple current (mA)	
			(20°C/100kHz)	(-10°C/100kHz)	(105°C/100kHz)	(105°C/120Hz)		(20°C/100kHz)	(-10°C/100kHz)	(105°C/100kHz)	(105°C/120Hz)		(20°C/100kHz)	(-10°C/100kHz)	(105°C/100kHz)	(105°C/120Hz)
4X7		27	5.5	14.3	50	25	22	5.4	14.0	50	25	15	5.3	13.8	50	25
4X11.5		68	2.2	5.7	102	74	47	2.2	5.6	102	74	33	2.1	5.5	102	51
5X7		56	3.4	8.8	75	68	39	3.3	8.6	75	68	27	3.3	8.6	75	49
5X11.5		120	1.3	3.4	154	108	82	1.3	3.4	154	108	56	1.3	3.4	154	108
5X15		150	0.92	2.4	210	147	120	0.91	2.4	210	147	82	0.89	2.3	210	147
6.3X7		120	1.4	3.6	140	98	82	1.4	3.6	140	98	56	1.4	3.6	140	98
6.3X11.5		220	0.61	1.6	260	182	180	0.59	1.5	260	182	120	0.58	1.5	260	182
6.3X15		330	0.40	1.0	350	245	270	0.39	1.0	350	245	180	0.38	0.99	350	245
8X12		390	0.34	0.88	400	320	330	0.33	0.86	400	280	220	0.33	0.86	400	280
8X15		560	0.24	0.62	500	400	470	0.24	0.62	500	400	330	0.23	0.60	500	350
8X20		820	0.19	0.49	650	520	560	0.18	0.47	650	520	470	0.18	0.47	650	520
10X12.5		470	0.28	0.73	510	410	390	0.27	0.70	510	410	270	0.27	0.70	510	360
10X15		680	0.22	0.57	635	510	560	0.22	0.57	635	510	390	0.21	0.55	635	510
10X20		1,200	0.14	0.36	860	775	820	0.14	0.36	860	690	680	0.14	0.36	860	690
10X25		1,500	0.12	0.31	1,030	930	1,200	0.12	0.31	1,030	930	820	0.12	0.31	1,030	825
10X30		2,200	0.095	0.25	1,150	1,035	1,500	0.093	0.24	1,150	1,035	1,000	0.091	0.24	1,150	920
12.5X15		1,200	0.12	0.31	970	875	1,000	0.12	0.31	970	780	680	0.12	0.31	970	780
12.5X20		2,200	0.089	0.23	1,120	1,010	1,800	0.087	0.23	1,120	1,010	1,200	0.086	0.22	1,120	1,010
12.5X25		2,700	0.075	0.20	1,320	1,190	2,200	0.073	0.19	1,320	1,190	1,500	0.072	0.19	1,320	1,190
12.5X30		3,900	0.065	0.17	1,540	1,390	2,700	0.064	0.17	1,540	1,390	2,200	0.063	0.16	1,540	1,390
12.5X35		4,700	0.053	0.14	1,770	1,595	3,300	0.052	0.14	1,770	1,595	2,700	0.051	0.13	1,770	1,595
12.5X40		5,600	0.046	0.12	1,980	1,785	3,900	0.045	0.12	1,980	1,785	3,300	0.045	0.12	1,980	1,785
16X15		2,200	0.10	0.26	1,100	990	1,500	0.10	0.26	1,100	990	1,200	0.099	0.26	1,100	990
16X20		3,900	0.076	0.20	1,370	1,235	3,300	0.075	0.20	1,370	1,235	2,200	0.073	0.19	1,370	1,235
16X25		5,600	0.066	0.17	1,570	1,415	3,900	0.065	0.17	1,570	1,415	2,700	0.064	0.17	1,570	1,415
16X30		6,800	0.055	0.14	1,810	1,630	4,700	0.054	0.14	1,810	1,630	3,900	0.053	0.14	1,810	1,630
16X35		8,200	0.047	0.12	2,030	1,830	6,800	0.046	0.12	2,030	1,830	4,700	0.046	0.12	2,030	1,830
16X40		10,000	0.039	0.10	2,320	2,090	8,200	0.038	0.099	2,320	2,090	5,600	0.037	0.096	2,320	2,090
18X15		3,300	0.081	0.21	1,280	1,155	2,200	0.080	0.21	1,280	1,150	1,500	0.078	0.20	1,280	1,155
18X20		5,600	0.063	0.16	1,580	1,425	3,900	0.062	0.16	1,580	1,425	3,300	0.060	0.16	1,580	1,425
18X25		6,800	0.054	0.14	1,830	1,650	4,700	0.053	0.14	1,830	1,650	3,900	0.052	0.14	1,830	1,650
18X30		10,000	0.047	0.12	2,030	1,830	6,800	0.046	0.12	2,030	1,830	4,700	0.046	0.12	2,030	1,830
18X35		12,000	0.042	0.11	2,240	2,020	8,200	0.041	0.11	2,240	2,020	6,800	0.040	0.10	2,240	2,020
18X40		15,000	0.037	0.096	2,460	2,215	10,000	0.037	0.096	2,460	2,215	8,200	0.036	0.094	2,460	2,215

Case size φDXL (mm)	Items	25					35					50				
		Capacitance (μF)	Impedance (Ωmax)		Rated ripple current (mA)		Capacitance (μF)	Impedance (Ωmax)		Rated ripple current (mA)		Capacitance (μF)	Impedance (Ωmax)		Rated ripple current (mA)	
			(20°C/100kHz)	(-10°C/100kHz)	(105°C/100kHz)	(105°C/120Hz)		(20°C/100kHz)	(-10°C/100kHz)	(105°C/100kHz)	(105°C/120Hz)		(20°C/100kHz)	(-10°C/100kHz)	(105°C/100kHz)	(105°C/120Hz)
4X7		10	5.3	13.7	50	25	6.8	5.2	13.4	50	25	4.7	5.0	13.0	50	20
4X11.5		22	2.1	5.5	102	51	15	2.1	5.4	102	51	10	2.0	5.2	102	51
5X7		22	3.3	8.6	75	45	12	3.2	8.3	75	38	8.2	3.1	8.1	75	38
5X11.5		39	1.3	3.3	154	108	27	1.2	3.1	154	77	18	1.2	3.1	154	77
5X15		56	0.88	2.3	210	147	39	0.87	2.3	210	147	27	0.84	2.2	210	105
6.3X7		39	1.4	3.6	140	98	27	1.3	3.4	140	70	18	1.3	3.4	140	70
6.3X11.5		82	0.58	1.5	260	182	56	0.57	1.5	260	182	39	0.55	1.4	260	182
6.3X15		120	0.38	0.99	350	245	82	0.37	0.96	350	245	56	0.36	0.94	350	245
8X12		150	0.33	0.86	400	280	100	0.32	0.83	400	280	68	0.31	0.81	400	280
8X15		220	0.23	0.60	500	350	150	0.23	0.60	500	350	82	0.22	0.57	500	350
8X20		270	0.18	0.47	650	455	220	0.18	0.47	650	455	120	0.17	0.44	650	455
10X12.5		180	0.26	0.68	510	360	120	0.26	0.68	510	360	82	0.25	0.65	510	360
10X15		270	0.21	0.55	635	445	180	0.21	0.55	635	445	100	0.20	0.52	635	445
10X20		470	0.14	0.36	860	690	330	0.13	0.34	860	605	180	0.13	0.34	860	605
10X25		560	0.12	0.31	1,030	825	390	0.11	0.29	1,030	825	220	0.11	0.29	1,030	725
10X30		680	0.090	0.23	1,150	920	470	0.089	0.23	1,150	920	330	0.086	0.22	1,150	805
12.5X15		470	0.12	0.31	970	780	330	0.11	0.29	970	680	180	0.11	0.29	970	680
12.5X20		820	0.085	0.22	1,120	900	560	0.083	0.22	1,120	900	330	0.081	0.22	1,120	785
12.5X25		1,000	0.071	0.18	1,320	1,060	680	0.070	0.18	1,320	1,060	470	0.068	0.19	1,320	1,060
12.5X30		1,500	0.062	0.16	1,540	1,390	1,000	0.061	0.16	1,540	1,390	560	0.059	0.16	1,540	1,235
12.5X35		1,800	0.050	0.13	1,770	1,595	1,200	0.049	0.13	1,770	1,595	680	0.048	0.14	1,770	1,420
12.5X40		2,200	0.044	0.11	1,980	1,785	1,500	0.043	0.11	1,980	1,785	820	0.042	0.12	1,980	1,585
16X15		820	0.098	0.25	1,100	880	560	0.096	0.25	1,100	880	330	0.093	0.20	1,100	770
16X20		1,500	0.072	0.19	1,370	1,235	1,000	0.071	0.18	1,370	1,100	680	0.069	0.15	1,370	1,100
16X25		1,800	0.063	0.16	1,570	1,415	1,200	0.062	0.16	1,570	1,415	820	0.060	0.13	1,570	1,260
16X30		2,700	0.053	0.14	1,810	1,630	1,800	0.052	0.14	1,810	1,630	1,000	0.050	0.13	1,810	1,450
16X35		3,300	0.045	0.12	2,030	1,830	2,200	0.044	0.11	2,030	1,830	1,200	0.043	0.11	2,030	1,830
16X40		3,900	0.037	0.096	2,320	2,090	2,700	0.036	0.094	2,320	2,090	1,500	0.035	0.091	2,320	2,090
18X15		1,200	0.078	0.20	1,280	1,155	820	0.076	0.20	1,280	1,155	470	0.074	0.19	1,280	1,025
18X20		2,200	0.060	0.16	1,580	1,425	1,500	0.059	0.15	1,580	1,425	820	0.057	0.15	1,580	1,265
18X25		2,700	0.051	0.13	1,830	1,650	1,800	0.050	0.13	1,830	1,650	1,000	0.049	0.13	1,830	1,465
18X30		3,300	0.045	0.12	2,030	1,830	2,200	0.044	0.11	2,030	1,830	1,500	0.043	0.11	2,030	1,830
18X35		3,900	0.040	0.10	2,240	2,020	2,700	0.039	0.10	2,240	2,020	1,800	0.038	0.099	2,240	2,020
18X40		4,700	0.036	0.094	2,460	2,215	3,300	0.035	0.091	2,460	2,215	2,200	0.034	0.088	2,460	2,215

◆STANDARD RATINGS

Case size φD×L (mm)	Items	63					80					100				
		Capacitance (μF)	Impedance (Ωmax)		Rated ripple current (mA rms)		Capacitance (μF)	Impedance (Ωmax)		Rated ripple current (mA rms)		Capacitance (μF)	Impedance (Ωmax)		Rated ripple current (mA rms)	
			20°C/100kHz	105°C/100kHz	105°C/120Hz	105°C/120Hz		20°C/100kHz	105°C/100kHz	105°C/120Hz	105°C/120Hz		20°C/100kHz	105°C/100kHz	105°C/120Hz	105°C/120Hz
4×7		3.3	11.2	30.2	38	15	2.2	11.0	29.7	38	15	1.5	10.8	29.2	38	15
4×11.5		6.8	4.3	11.6	73	37	4.7	4.2	11.3	73	29	3.3	4.1	11.1	73	29
5×7		5.6	5.1	13.8	61	31	3.9	5.0	13.5	61	24	2.7	4.9	13.2	61	24
5×11.5		12	2.0	5.4	124	62	8.2	1.9	5.2	124	62	5.6	1.9	5.1	124	62
5×15		18	1.4	3.8	170	85	12	1.4	3.7	170	85	8.2	1.3	3.6	170	85
6.3×7		12	3.0	8.1	95	48	8.2	2.9	7.8	95	48	5.6	2.8	7.6	95	48
6.3×11.5		27	1.2	3.2	180	90	18	1.1	3.0	180	90	12	1.1	3.0	180	90
6.3×15		39	0.66	1.8	270	190	27	0.64	1.7	270	135	18	0.62	1.7	270	135
8×12		47	0.56	1.5	305	215	33	0.54	1.5	305	155	22	0.53	1.4	305	155
8×15		68	0.36	0.97	410	290	47	0.36	0.97	410	290	33	0.35	0.95	410	205
8×20		82	0.22	0.57	605	425	56	0.28	0.74	605	425	39	0.27	0.73	605	425
10×12.5		56	0.50	1.4	380	270	39	0.49	1.3	380	270	27	0.48	1.3	380	190
10×15		68	0.35	0.95	500	350	56	0.34	0.90	500	350	33	0.33	0.89	500	250
10×20		120	0.27	0.74	620	435	82	0.26	0.71	620	435	56	0.26	0.70	620	435
10×25		150	0.20	0.53	795	560	100	0.19	0.51	795	560	68	0.19	0.50	795	560
10×30		180	0.16	0.42	955	670	150	0.15	0.41	955	670	100	0.15	0.40	955	670
12.5×15		150	0.25	0.67	640	450	100	0.24	0.64	640	450	68	0.23	0.63	640	450
12.5×20		220	0.16	0.42	890	625	150	0.15	0.41	890	625	100	0.15	0.40	890	625
12.5×25		270	0.14	0.38	1,040	730	180	0.14	0.37	1,040	730	120	0.13	0.36	1,040	730
12.5×30		390	0.11	0.29	1,270	1,020	270	0.10	0.28	1,270	890	180	0.10	0.27	1,270	890
12.5×35		470	0.091	0.25	1,450	1,160	330	0.088	0.24	1,450	1,015	220	0.087	0.23	1,450	1,015
12.5×40		560	0.080	0.22	1,610	1,290	390	0.076	0.21	1,610	1,290	270	0.074	0.20	1,610	1,130
16×15		220	0.15	0.41	960	675	180	0.14	0.38	960	675	120	0.14	0.38	960	675
16×20		390	0.12	0.32	1,240	995	270	0.11	0.31	1,240	870	180	0.11	0.30	1,240	870
16×25		470	0.091	0.25	1,440	1,155	330	0.088	0.24	1,440	1,010	220	0.086	0.23	1,440	1,010
16×30		680	0.065	0.18	1,790	1,435	470	0.063	0.17	1,790	1,435	330	0.062	0.17	1,790	1,255
16×35		820	0.056	0.15	2,000	1,600	560	0.054	0.15	2,000	1,600	390	0.059	0.16	1,990	1,595
16×40		1,000	0.049	0.13	2,200	1,780	680	0.048	0.13	2,200	1,780	470	0.047	0.13	2,200	1,780
18×15		330	0.13	0.35	1,130	795	220	0.13	0.34	1,130	795	150	0.12	0.33	1,130	795
18×20		560	0.091	0.25	1,450	1,160	390	0.088	0.24	1,450	1,160	270	0.086	0.23	1,450	1,015
18×25		680	0.078	0.21	1,650	1,320	470	0.075	0.20	1,650	1,320	330	0.074	0.20	1,650	1,155
18×30		820	0.065	0.18	1,850	1,480	680	0.063	0.17	1,850	1,480	390	0.062	0.17	1,850	1,480
18×35		1,000	0.061	0.16	1,990	1,595	820	0.060	0.16	1,990	1,595	560	0.053	0.14	2,000	1,600
18×40		1,200	0.046	0.12	2,370	2,135	1,000	0.044	0.12	2,370	1,900	680	0.043	0.12	2,370	1,900

◆RATED RIPPLE CURRENT MULTIPLIERS

●Frequency Multipliers

Capacitance (μF)	Frequency (Hz)					
	50	120	300	1k	10k	100k
1.5 to 4.7	0.30	0.40	0.50	0.70	0.80	1.00
5.6 to 33	0.40	0.50	0.60	0.80	0.90	1.00
39 to 330	0.60	0.70	0.80	0.90	0.95	1.00
390 to 1,000	0.65	0.80	0.90	0.98	1.00	1.00
1,200	0.80	0.90	0.95	0.98	1.00	1.00

LXJ Series

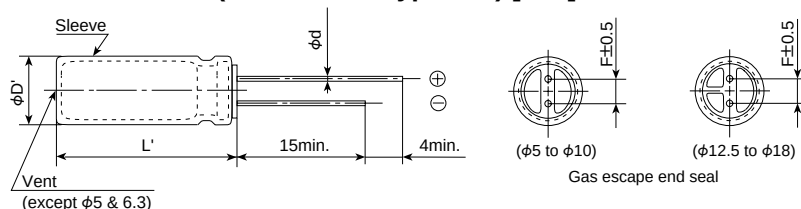
- Low impedance
- Endurance with ripple current: 105°C 2000 to 5000 hours
- Solvent-proof type (see PRECAUTIONS AND GUIDELINES)



SPECIFICATIONS

Items	Characteristics						
Category	-55 to +105°C						
Temperature Range							
Rated Voltage Range	6.3 to 50V _{dc}						
Capacitance Tolerance	±20% (M) (at 20°C, 120Hz)						
Leakage Current	I=0.03CV or 4μA, whichever is greater. (at 20°C after 1 minute) I=0.01CV or 3μA, whichever is greater. (at 20°C after 2 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
	tanδ	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	Capacitance change ΔC(−55°C/20°C)	0.7min.					
	Max. impedance ratio(−55°C/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 & φ10 : 3000hours φ12.5 and larger : 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]



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
$\phi D'$	$\phi D+0.5\text{max.}$						
L'	$L+1.5\text{max.}$						

PART NUMBERING SYSTEM

LXJ	16	VB	2200	M	K30	
						Case code
						Cap tolerance ($\pm 20\%$)
						Nominal cap code
						Radial lead type
						Rated voltage in volts
						Series name

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

◆STANDARD RATINGS

V_{dc} Items Case code φDXL (mm) 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		
5×11.5	E11	120	1.1	3.3	165		82	1.1	3.3	165		56	1.1	3.3	165		39	1.1	3.3	165	
5×15	E15	150	1.0	3.0	180		120	1.0	3.0	180		82	1.0	3.0	180		56	1.0	3.0	180	
6.3×11.5	F11	220	0.55	1.6	255		180	0.55	1.6	255		120	0.55	1.6	255		82	0.55	1.6	255	
6.3×15	F15	330	0.41	1.2	330		270	0.41	1.2	330		180	0.41	1.2	330		120	0.41	1.2	330	
8×12	H12	390	0.29	0.84	415		330	0.29	0.84	415		270	0.29	0.84	415		150	0.29	0.84	415	
8×15	H15	560	0.25	0.75	495		470	0.25	0.75	495		330	0.25	0.75	495		220	0.25	0.75	495	
8×20	H20	820	0.18	0.52	640		680	0.18	0.52	640		470	0.18	0.52	640		330	0.18	0.52	640	
10×12.5	J12	470	0.16	0.40	635		390	0.16	0.40	635		270	0.16	0.40	635		180	0.16	0.40	635	
10×16	J16	680	0.12	0.30	795		680	0.12	0.30	795		470	0.12	0.30	795		330	0.12	0.30	795	
10×20	J20	1,200	0.088	0.22	1,060		1,000	0.088	0.22	1,060		680	0.088	0.22	1,060		470	0.088	0.22	1,060	
10×25	J25	1,500	0.068	0.17	1,240		1,200	0.068	0.17	1,240		820	0.068	0.17	1,240		560	0.068	0.17	1,240	
10×30	J30	2,200	0.059	0.15	1,450		1,500	0.059	0.15	1,450		1,200	0.059	0.15	1,450		820	0.059	0.15	1,450	
12.5×20	K20	2,200	0.059	0.15	1,360		1,800	0.059	0.15	1,360		1,200	0.059	0.15	1,360		820	0.059	0.15	1,360	
12.5×25	K25	2,700	0.045	0.11	1,700		2,200	0.045	0.11	1,700		1,500	0.045	0.11	1,700		1,000	0.045	0.11	1,700	
12.5×30	K30	3,900	0.039	0.098	1,980		2,700	0.039	0.098	1,980		2,200	0.039	0.098	1,980		1,500	0.039	0.098	1,980	
12.5×35	K35	4,700	0.033	0.083	2,230		3,300	0.033	0.083	2,230		2,700	0.033	0.083	2,230		1,800	0.033	0.083	2,230	
12.5×40	K40	5,600	0.029	0.073	2,460		3,900	0.029	0.073	2,460		3,300	0.029	0.073	2,460		2,200	0.029	0.073	2,460	
16×20	L20	3,900	0.043	0.11	1,770		3,300	0.043	0.11	1,770		2,200	0.043	0.11	1,770		1,500	0.043	0.11	1,770	
16×25	L25	5,600	0.033	0.083	2,190		3,900	0.033	0.083	2,190		2,700	0.033	0.083	2,190		1,800	0.033	0.083	2,190	
16×30	L30	6,800	0.029	0.073	2,510		4,700	0.029	0.073	2,510		3,900	0.029	0.073	2,510		2,700	0.029	0.073	2,510	
16×35	L35	8,200	0.025	0.063	2,770		6,800	0.025	0.063	2,770		4,700	0.025	0.063	2,770		3,300	0.025	0.063	2,770	
16×40	L40	10,000	0.021	0.053	3,110		8,200	0.021	0.053	3,110		5,600	0.021	0.053	3,110		3,900	0.021	0.053	3,110	
18×20	M20	5,600	0.039	0.098	1,940		3,900	0.039	0.098	1,940		3,300	0.039	0.098	1,940		2,200	0.039	0.098	1,940	
18×25	M25	6,800	0.030	0.075	2,350		4,700	0.030	0.075	2,350		3,900	0.030	0.075	2,350		2,700	0.030	0.075	2,350	
18×30	M30	10,000	0.026	0.065	2,720		6,800	0.026	0.065	2,720		4,700	0.026	0.065	2,720		3,300	0.026	0.065	2,720	
18×35	M35	12,000	0.023	0.058	3,050		8,200	0.023	0.058	3,050		6,800	0.023	0.058	3,050		3,900	0.023	0.058	3,050	
18×40	M40	15,000	0.020	0.050	3,300		10,000	0.020	0.050	3,300		8,200	0.020	0.050	3,300		4,700	0.020	0.050	3,300	

V_{dc} Items Case code φDXL (mm) Case code		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)	
			20°C	-10°C				20°C	-10°C		
5×11.5	E11	27	1.1	3.3	165		18	1.2	3.6	165	
5×15	E15	39	1.0	3.0	180		27	1.0	3.0	170	
6.3×11.5	F11	56	0.55	1.6	255		39	0.57	1.7	255	
6.3×15	F15	82	0.41	1.2	330		56	0.46	1.4	310	
8×12	H12	120	0.29	0.84	415		68	0.29	0.90	415	
8×15	H15	180	0.25	0.75	495		82	0.24	0.72	505	
8×20	H20	220	0.18	0.52	640		120	0.20	0.58	605	
10×12.5	J12	120	0.16	0.40	635		82	0.23	0.58	530	
10×16	J16	220	0.12	0.30	795		120	0.17	0.43	675	
10×20	J20	330	0.088	0.22	1,060		180	0.13	0.33	860	
10×25	J25	390	0.068	0.17	1,240		220	0.096	0.24	1,060	
10×30	J30	560	0.059	0.15	1,450		330	0.083	0.21	1,230	
12.5×20	K20	560	0.059	0.15	1,360		330	0.083	0.21	1,170	
12.5×25	K25	680	0.045	0.11	1,700		470	0.061	0.16	1,500	
12.5×30	K30	1,000	0.039	0.098	1,980		560	0.056	0.14	1,680	
12.5×35	K35	1,200	0.033	0.083	2,230		680	0.046	0.12	1,900	
12.5×40	K40	1,500	0.029	0.073	2,460		820	0.041	0.10	2,120	
16×20	L20	1,000	0.043	0.11	1,770		680	0.061	0.16	1,500	
16×25	L25	1,200	0.033	0.083	2,190		820	0.046	0.12	1,880	
16×30	L30	1,800	0.029	0.073	2,510		1,000	0.041	0.10	2,150	
16×35	L35	2,200	0.025	0.063	2,770		1,200	0.037	0.093	2,320	
16×40	L40	2,700	0.021	0.053	3,110		1,500	0.030	0.075	2,650	
18×20	M20	1,500	0.039	0.098	1,940		820	0.056	0.14	1,660	
18×25	M25	1,800	0.030	0.075	2,350		1,000	0.042	0.11	2,020	
18×30	M30	2,200	0.026	0.065	2,720		1,500	0.037	0.093	2,340	
18×35	M35	2,700	0.023	0.058	3,050		1,800	0.031	0.078	2,620	
18×40	M40	3,300	0.020	0.050	3,300		2,200	0.029	0.073	2,790	

50V _{dc} φ5×11.50 (E11)			
Capacitance (μF)	Impedance (Ω _{max} /100kHz)		Rated ripple current (mA _{rms} /105°C 100kHz)
	20°C	-10°C	
0.47	7.0	21.0	65
1.0	5.0	15.0	80
2.2	4.0	12.0	90
3.3	3.5	11.0	95
4.7	3.0	9.0	100
10	2.0	6.0	125

◆RATED RIPPLE CURRENT MULTIPLIERS

●Frequency Multipliers

Rated Voltage (V _{dc})	Case size φD (mm)	Frequency (Hz)			
		120	1k	10k	100k
6.3 to 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 to 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 to 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
50V _{dc} (0.47 to 3.3μF)		0.20	0.66	0.90	1.00
50V _{dc} (4.7 to 10μF)		0.40	0.76	0.93	1.00

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

KZE Series

- Ultra Low impedance for Personal Computer and Storage Equipment
- Endurance with ripple current: 105°C 2000 to 5000 hours
- Non solvent-proof

KZE

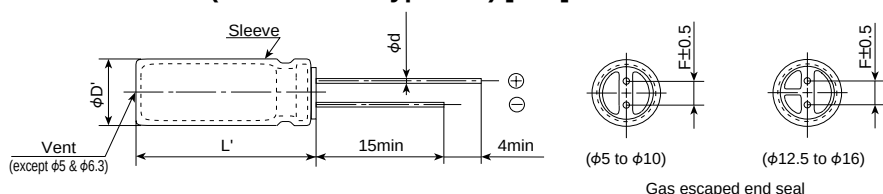
↑ lower Z
KY
↑ Lower Z
KMY



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
	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)	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.					

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

◆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	150	0.30	1.0	250	100	0.30	1.0	250	56	0.30	1.0	250
6.3X11	F11	330	0.13	0.41	405	220	0.13	0.41	405	120	0.13	0.41	405
8X11.5	H11	560	0.072	0.22	760	470	0.072	0.22	760	330	0.072	0.22	760
8X15	H15	820	0.056	0.17	995	680	0.056	0.17	995	470	0.056	0.17	995
8X20	H20	1,200	0.041	0.13	1,250	1,000	0.041	0.13	1,250	680	0.041	0.13	1,250
10X12.5	J12	1,000	0.053	0.16	1,030	680	0.053	0.16	1,030	470	0.053	0.16	1,030
10X16	J16	1,200	0.038	0.12	1,430	1,000	0.038	0.12	1,430	680	0.038	0.12	1,430
10X20	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
10X25	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
12.5X20	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
12.5X25	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
12.5X30	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
12.5X35	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
16X20	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
16X25	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	
5X11	E11	47	0.30	1.0	250	33	0.30	1.0	250	22	0.34	1.18	238
6.3X11	F11	100	0.13	0.41	405	56	0.13	0.41	405	56	0.14	0.50	385
8X11.5	H11	220	0.072	0.22	760	150	0.072	0.22	760	100	0.074	0.22	724
8X15	H15	330	0.056	0.17	995	220	0.056	0.17	995	120	0.061	0.18	950
8X20	H20	470	0.041	0.13	1,250	270	0.041	0.13	1,250	180	0.046	0.14	1,190
10X12.5	J12	330	0.053	0.16	1,030	220	0.053	0.16	1,030	150	0.061	0.18	979
10X16	J16	470	0.038	0.12	1,430	330	0.038	0.12	1,430	220	0.042	0.12	1,370
10X20	J20	680	0.023	0.069	1,820	470	0.023	0.069	1,820	270	0.030	0.090	1,580
10X25	J25	820	0.022	0.066	2,150	560	0.022	0.066	2,150	330	0.028	0.085	1,870
12.5X20	K20	1,000	0.021	0.053	2,360	680	0.021	0.053	2,360	470	0.027	0.068	2,050
12.5X25	K25	1,500	0.018	0.045	2,770	1,000	0.018	0.045	2,770	560	0.023	0.059	2,410
12.5X30	K30	1,800	0.016	0.041	3,290	1,200	0.016	0.041	3,290	680	0.021	0.052	2,860
12.5X35	K35	2,200	0.015	0.039	3,400	1,500	0.015	0.039	3,400	820	0.019	0.051	2,960
16X20	L20	1,800	0.018	0.045	3,140	1,200	0.018	0.045	3,140	820	0.023	0.059	2,730
16X25	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

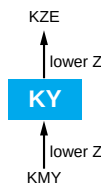
◆RATED RIPPLE CURRENT MULTIPLIERS

●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

KY Series

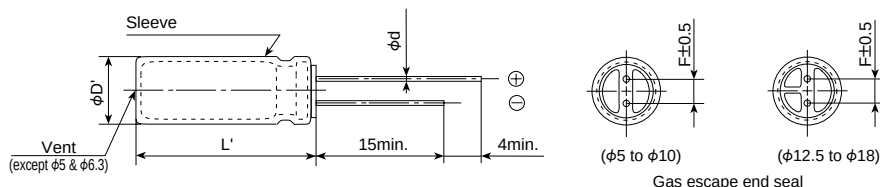
- Newly innovative electrolyte is employed to minimize ESR
- Endurance with ripple current : 3000 to 6000 hours at 105°C
- Non solvent-proof type



SPECIFICATIONS

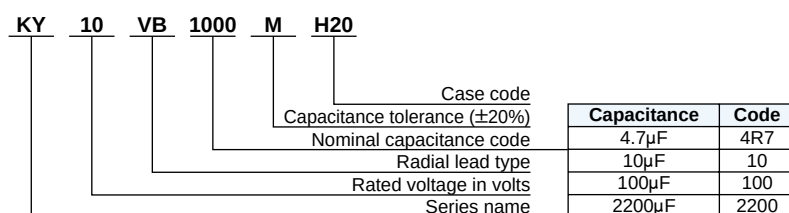
Items	Characteristics						
Category	-40 to +105°C						
Temperature Range							
Rated Voltage Range	6.3 to 50V _{dc}						
Capacitance Tolerance	±20% (M) (at 20°C, 120Hz)						
Leakage Current	I=0.01CV or 3μA, whichever is greater. Where, I : Max. leakage current (μA), C : Nominal capacitance (μF), 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
							(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 & 6.3 : 3000hours φ8 : 4000hours φ10 : 5000hours φ12.5 to 18 : 6000hours					
	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



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 φD×L (mm)	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)	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	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)	Case code	V _{dc}				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)	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	E11	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				

KMY Series

- Endurance : 105°C 4000 to 7000 hours
- Long life and impedance specified version of KME series
- Non solvent-proof

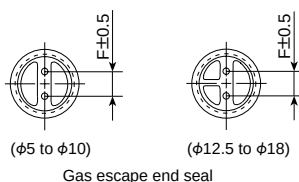
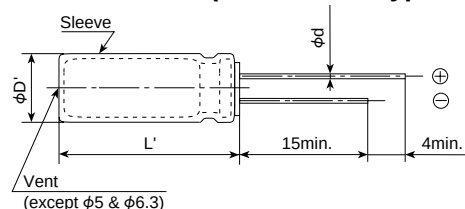
KMY ← KME
longer life



SPECIFICATIONS

Items	Characteristics						
Category	-40 to +105°C						
Temperature Range							
Rated Voltage Range	10 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})	10V	16V	25V	35V	50V	
	tanδ (Max.)	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})	10V	16V	25V	35V	50V	
	Z(-25°C)/Z(+20°C)	3	2	2	2	2	
	Z(-40°C)/Z(+20°C)	6	4	3	3	3	(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 & 6.3 : 4000hours φ8 & 10 : 5000hours φ12.5 and larger : 7000hours					
	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 1000 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

KMY 50 VB 1000 M

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

V_{dc} Items μF	10				16			
	Case size φDXL (mm)	Impedance (Ω _{max} /100kHz)		Rated ripple current (mArms/105°C, 100kHz)	Case size φDXL (mm)	Impedance (Ω _{max} /100kHz)		Rated ripple current (mArms/105°C, 100kHz)
		20°C	−10°C			20°C	−10°C	
47					5×11.5	0.9	3.6	150
100	5×11.5	0.9	3.6	150	6.3×11.5	0.4	1.6	245
220	6.3×11.5	0.4	1.6	245	8×12	0.25	1.0	395
330	8×12	0.25	1.0	395	8×12	0.25	1.0	395
470	8×12	0.25	1.0	395	10×12.5	0.16	0.65	580
1,000	10×16	0.12	0.46	765	10×20	0.078	0.30	1,010
2,200	12.5×20	0.062	0.21	1,300	12.5×25	0.048	0.16	1,650
3,300	12.5×25	0.048	0.16	1,650	16×25	0.034	0.096	1,850
4,700	16×25	0.034	0.096	1,850	16×31.5	0.029	0.087	2,000
6,800	16×31.5	0.029	0.087	2,000	18×35.5	0.025	0.058	2,200
10,000	18×35.5	0.025	0.058	2,200				

V_{dc} Items μF	25				35			
	Case size ϕD×L (mm)	Impedance (Ω _{max} /100kHz)		Rated ripple current (mArms/105°C, 100kHz)	Case size ϕD×L (mm)	Impedance (Ω _{max} /100kHz)		Rated ripple current (mArms/105°C, 100kHz)
		20°C	−10°C			20°C	−10°C	
33	5×11.5	0.9	3.6	150	5×11.5	0.9	3.6	150
47	5×11.5	0.9	3.6	150	6.3×11.5	0.4	1.6	245
100	6.3×11.5	0.4	1.6	245	8×12	0.25	1.0	395
220	8×12	0.25	1.0	395	10×12.5	0.16	0.65	580
330	10×12.5	0.16	0.65	580	10×16	0.12	0.46	765
470	10×16	0.12	0.46	765	10×20	0.078	0.30	1,010
1,000	12.5×20	0.062	0.21	1,300	12.5×25	0.048	0.16	1,650
2,200	16×25	0.034	0.096	1,850	16×31.5	0.029	0.087	2,000
3,300	16×31.5	0.029	0.087	2,000	18×35.5	0.025	0.058	2,200
4,700	18×35.5	0.025	0.058	2,200				

V_{dc} Items μF	50			
	Case size ϕD×L (mm)	Impedance (Ω _{max} /100kHz)		Rated ripple current (mA _{rms} /105°C, 100kHz)
		20°C	−10°C	
0.47	5×11.5	5.5	22.0	17
1.0	5×11.5	4.0	16.0	30
2.2	5×11.5	2.5	10.0	43
3.3	5×11.5	2.2	8.8	53
4.7	5×11.5	1.9	7.6	88
10	5×11.5	1.5	6.0	100
22	5×11.5	0.9	3.6	150
33	6.3×11.5	0.4	1.6	245
47	6.3×11.5	0.4	1.6	245
100	8×12	0.25	1.0	395
220	10×16	0.12	0.46	765
330	10×20	0.088	0.34	1,010
470	12.5×20	0.062	0.21	1,300
1,000	16×25	0.034	0.096	1,850
2,200	18×35.5	0.025	0.058	2,200

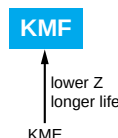
◆RATED RIPPLE CURRENT MULTIPLIERS

●Frequency Multipliers

Capacitance (μF)	Frequency (Hz)			
	120	1k	10k	100k
0.47 to 4.7	0.40	0.70	0.90	1.00
10 to 330	0.55	0.80	0.95	1.00
470 to 1,000	0.70	0.85	0.95	1.00
2,200 to 10,000	0.80	0.95	1.00	1.00

KMF Series

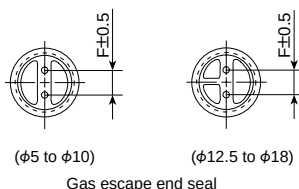
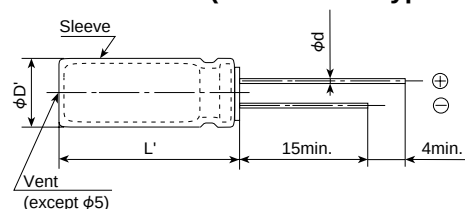
- Endurance with ripple current: 105°C 2000 to 5000 hours
- Solvent-proof (6.3 to 100V_{dc}) (see PRECAUTIONS AND GUIDELINES)



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 1 minute		After 5 minutes	
	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	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
2.2					10×16	7.9
3.3		10×20	2.9	195	10×20	6.2
4.7		10×25	2.3	220	12.5×20	3.7
10		12.5×25	1.2	360	12.5×25	2.6
22		16×25	0.61	570	16×31.5	1.0
33		16×31.5	0.46	700	18×35.5	0.62
47		18×31.5	0.33	860		

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

KMX Series

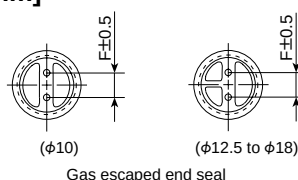
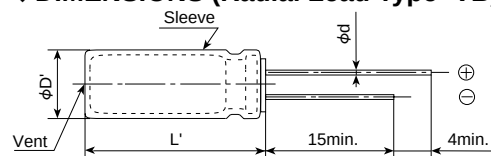
- Slender case sizes are lined up for laying down small places on PC board
- For electronic ballast circuits and other long life required applications
- Endurance with ripple current : 105°C 8000 to 10000 hours
- Non solvent-proof type



SPECIFICATIONS

Items	Characteristics				
Category	—40 to +105°C (160 to 400V _{dc}) —25 to+105°C (450V _{dc})				
Temperature Range					
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	(at 20°C, 120Hz)
	tanδ (Max.)	0.20	0.24	0.24	
Low Temperature Characteristics (Max. Impedance Ratio)	Rated voltage (V _{dc})	160 to 250V	350 & 400V	450V	(at 120Hz)
	Z(−25°C)/Z(+20°C)	3	5	6	
	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 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			

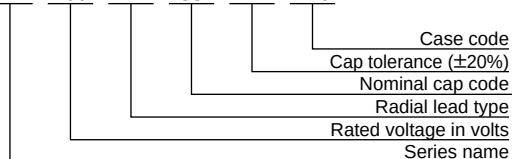
DIMENSIONS (Radial Lead Type=VB) [mm]



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.			

PART NUMBERING SYSTEM

KMX 400 VB 33 M L20



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

◆STANDARD RATINGS

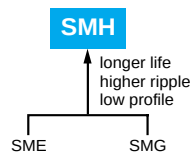
V _{dc} Cap (μF)	Items	160					200				
		Case size φD×L (mm)	Case code	Impedance (Ω _{max.} /20°C, 100kHz)	Rated ripple current		Case size φD×L (mm)	Case code	Impedance (Ω _{max.} /20°C, 100kHz)	Rated ripple current	
					120Hz	100kHz				120Hz	100kHz
22							10×20	J20	1.5	165	440
33		10×20	J20	1.3	210	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
		16×31.5	L31	0.22	625	1,300	16×25	L25	0.27	580	1,300
		18×25	M25	0.23	600	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	16×50	L50	0.28	1,020	1,870
		18×31.5	M31	0.22	960	1,700					
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)	Case size φD×L (mm)	Case code	Impedance (Ω _{max./} 20°C, 100kHz)	Rated ripple current		Case size φD×L (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
68						18×20	M20	0.75	350	750
	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
100	18×20	M20	0.90	385	900	18×25	M25	0.53	400	875
	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					
150	18×25	M25	0.63	500	1,345	18×31.5	M31	0.40	530	1,170
	12.5×55	K55	0.39	650	1,420	16×50	L50	0.51	690	1,400
	18×31.5	M31	0.42	640	1,450					
220	16×50	L50	0.28	820	1,710	18×55	M55	0.32	840	1,610
	18×40	M40	0.35	820	1,485					
330	18×50	M50	0.23	1,030	2,140					

V _{dc} Cap (μF)	Items	400					450				
		Case size φD×L (mm)	Case code	Impedance (Ω _{max.} /20°C, 100kHz)	Rated ripple current		Case size φD×L (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	16×40	L40	0.71	445	985
		16×31.5	L31	0.49	420	1,100	18×35.5	M35	0.71	420	980
		18×25	M25	0.53	400	875					
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

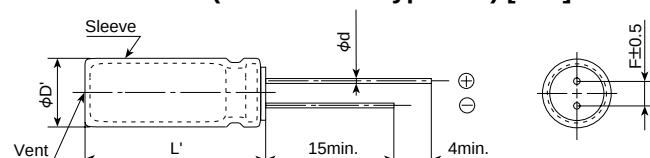
- Downsized from current standard SMG series
- Endurance with ripple current : 85°C 2000 hours
- For input filtering of power supplies
- Non solvent-proof



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	

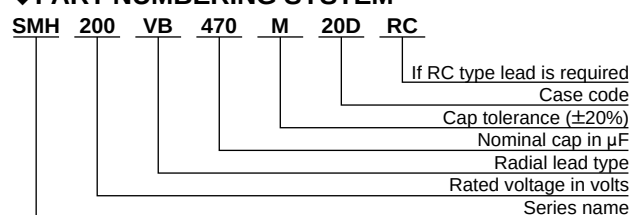
DIMENSIONS (Radial Lead Type=VB) [mm]



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 10mm spacing. See page 23.

PART NUMBERING SYSTEM



CASE CODE [mm]

Case code	Case size φD×L	Case code	Case size φD×L
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

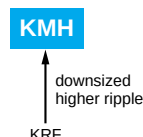
Frequency (Hz)	50	120	300	1k	10k	50k
160 to 250V _{dc}	0.81	1.00	1.17	1.32	1.45	1.50
400 & 450V _{dc}	0.77	1.00	1.16	1.30	1.41	1.43

◆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

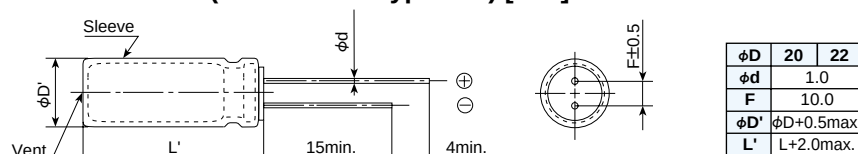
- Radial lead type ranging from φ20×20 to φ22×50mm
- For input filtering of power supplies
- Endurance with ripple current : 105°C 2000 hours
- Non solvent-proof



SPECIFICATIONS

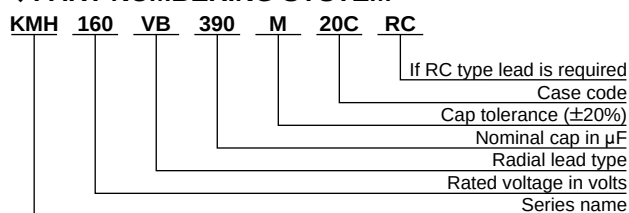
Items	Characteristics		
Category	-25 to +105°C		
Temperature Range			
Rated Voltage Range	160 to 450V _{dc}		
Capacitance Tolerance	±20% (M) (at 20°C, 120Hz)		
Leakage Current	I=0.03CV or 3 mA, whichever is smaller. Where, I : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (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 10mm spacing. See page 23.

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

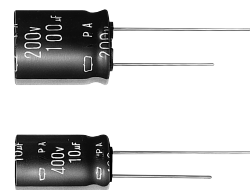
Frequency (Hz)	50	120	300	1k	10k	50k
160 to 250V _{dc}	0.81	1.00	1.17	1.32	1.45	1.50
400 & 450V _{dc}	0.77	1.00	1.16	1.30	1.41	1.43

◆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				

PA Series

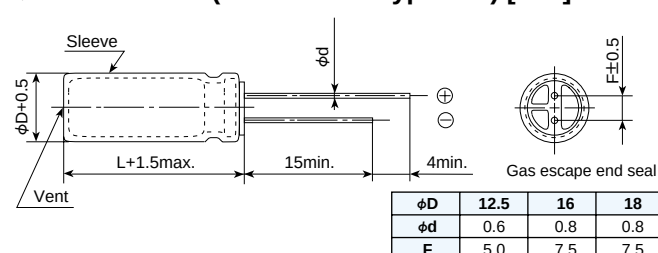
- Endurance with ripple current : 105°C 2,000 hours
- Higher ripple current than KMG, general purpose series
- KMG equivalent or even lower profile case sizes
- Suitable for low profile equipment such as AC adaptors



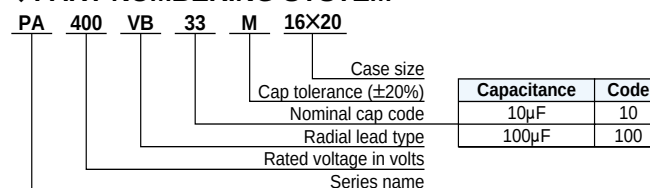
SPECIFICATIONS

Items	Characteristics			
Category Temperature Range	-40 to 105℃			
Rated Voltage Range	200 & 400V _{dc}			
Capacitance Tolerance	±20%(M) (at 20℃, 120Hz)			
Leakage Current	I=0.04CV+100(after 1 minute at 20℃) I=0.02CV+25(after 5 minutes at 20℃) 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℃, 120Hz)
	tanδ(Max.)	0.20	0.24	
Low Temperature Characteristics	Rated voltage(V _{dc})	200	400	(at 20℃, 120Hz)
	Z(-25℃)/Z(20℃)	3	5	
	Z(-40℃)/Z(20℃)	6	6	
Endurance	The following specifications shall be satisfied when the capacitors are restored to 20℃ after subjected to the rated voltage with the rated ripple current is applied for 2,000 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 1,000 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



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

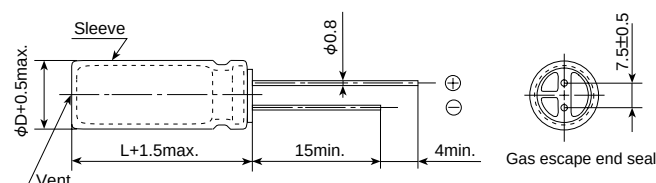
- No sparks against DC over-voltage
- Endurance with ripple current : 105°C 2000 hours
- Non solvent-proof



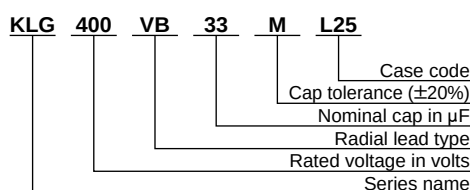
SPECIFICATIONS

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

Items	200			
	Case size φDXL (mm)	Case code	Rated ripple current (mA _{RMS} /105°C, 120Hz)	Part number
100	16×25	L25	425	KL G200VB100ML25
120	16×31.5	L31	500	KL G200VB120ML31
	18×25	M25	475	KL G200VB120MM25
150	16×31.5	L31	560	KL G200VB150ML31
	18×25	M25	530	KL G200VB150MM25
180	16×40	L40	645	KL G200VB180ML40
	18×31.5	M31	630	KL G200VB180MM31
220	18×35.5	M35	725	KL G200VB220MM35
	18×40	M40	735	KL G200VB220MM40

Items	400			
	Case size φDXL (mm)	Case code	Rated ripple current (mA _{RMS} /105°C, 120Hz)	Part number
22	16×25	L25	200	KL G400VB22ML25
33	16×25	L25	220	KL G400VB33ML25
39	16×31.5	L31	245	KL G400VB39ML31
	18×25	M25	250	KL G400VB39MM25
47	16×31.5	L31	275	KL G400VB47ML31
56	16×40	L40	350	KL G400VB56ML40
	18×31.5	M31	315	KL G400VB56MM31
68	18×35.5	M35	350	KL G400VB68MM35
82	18×40	M40	395	KL G400VB82MM40

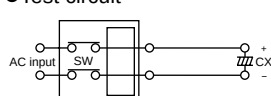
DC OVERVOLTAGE TEST CONDITIONS

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



Constant DC voltage/current power supply

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

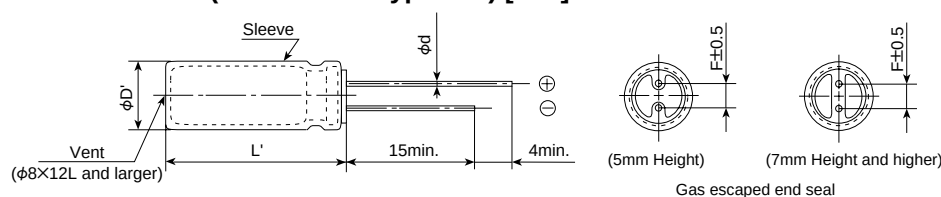
- Long life and high reliability for $\phi 4 \times 5$ to $\phi 8 \times 20$ mm range
- Endurance with ripple current : 105°C 3000 to 6000hours
- Suitable for long life and high reliability required products
- Solvent-proof type (see PRECAUTIONS AND GUIDELINES)



SPECIFICATIONS

Items	Characteristics	
Category	-40 to +105°C	
Temperature Range		
Rated Voltage Range	6.3 to 50V _{dc}	
Capacitance Tolerance	±20% (M) (at 20°C, 120Hz)	
Leakage Current	I=0.03CV 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.)	0.50 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	≤±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 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]



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
φD'	φD+0.5max.			
L'	L+1.0max.			

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
φD'	φD+0.5max.			
L'	L+1.0max.			

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
φD'	φD+0.5max.			
L'	L+1.5max.			

PART NUMBERING SYSTEM

FL	10	VB	33	M	E05	
						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

V_{dc} Items Case code		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)
ϕ DXL(mm)																	
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		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)
ϕ DXL(mm)									
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		50 (Small capacitance)			
		Capacitance (μ F)	Impedance 20°C, 100kHz (Ω max.)	Rated ripple current (mA _{RMS} /105°C, 100kHz)	Endurance 105°C (hours)
ϕ DXL(mm)					
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 50WV (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

LXA/LX Series

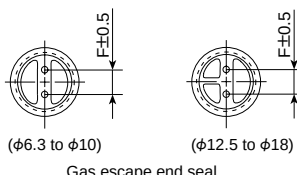
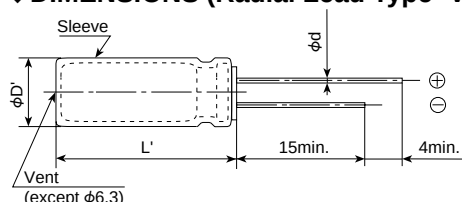
- Endurance : 105°C 5000 to 7000 hours
- Solvent-proof type (see PRECAUTIONS AND GUIDELINES)



SPECIFICATIONS

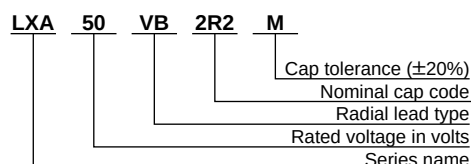
Items	Characteristics												
Series	LXA							LX					
Category													
Temperature Range	-55 to +105℃							-40 to +105℃					
Rated Voltage Range	10 to 63V _{dc}							100 to 250V _{dc}					
Capacitance Tolerance	±20% (M) (at 20℃, 120Hz)							±20% (M) (at 20℃, 120Hz)					
Leakage Current	I=0.01CV or 3μA, whichever is greater. (at 20℃ after 2 minutes)							I=0.01CV+2μA (100V _{dc}) (at 20℃ after 2 minutes)					
	Where, I : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V)							I=0.04CV+100μA (160 to 250V _{dc}) (at 20℃ after 2 minutes)					
Dissipation Factor (tanδ)	Rated Voltage (V _{dc})	10V	16V	25V	35V	50V	63V	100V	160V	200V	250V		
	tanδ (Max.)	0.30	0.25	0.22	0.18	0.15	0.12	0.12	0.15	0.15	0.15		
	When nominal capacitance exceeds 1000μF, add 0.02 to the value above for each 1000μF increase. (at 20℃, 120Hz)												
Low Temperature Characteristics								Capacitance change ΔC (-10℃/+20℃)≥0.8 (at 120Hz)					
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℃.												
	Series	LXA							LX				
	Time	7000 hours (φ12.5 and larger)					5000hours	5000 hours					
	Capacitance change	≤±30% of the initial value							≤±30% of the initial value				
	D.F. (tanδ)	≤300% of the initial specified value							≤250% 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 105℃ without voltage applied.												
	Series	LXA							LX				
	Capacitance change	≤±15% of the initial value							≤±20% of the initial value				
	D.F. (tanδ)	≤150% of the initial specified value							≤150% of the initial specified value				
	Leakage current	≤The initial specified value							≤The initial specified value				

DIMENSIONS (Radial Lead Type=VB) [mm]



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

PART NUMBERING SYSTEM



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

◆STANDARD RATINGS 10 to 63V_{dc}

Items	10			16			25			35		
	Case size	Impedance	Rated ripple	Case size	Impedance	Rated ripple	Case size	Impedance	Rated ripple	Case size	Impedance	Rated ripple
	φDXL (mm)	(Q _{max.} / 100kHz / 20°C)	(Arms / 105°C / 100kHz)	φDXL (mm)	(Q _{max.} / 100kHz / 20°C)	(Arms / 105°C / 100kHz)	φDXL (mm)	(Q _{max.} / 100kHz / 20°C)	(Arms / 105°C / 100kHz)	φDXL (mm)	(Q _{max.} / 100kHz / 20°C)	(Arms / 105°C / 100kHz)
4.7										6.3×15	1.65	0.14
10										6.3×15	1.65	0.14
22							6.3×15	1.65	0.14	6.3×15	1.65	0.14
33				6.3×15	1.65	0.14	6.3×15	1.65	0.14	6.3×15	1.65	0.14
47	6.3×15	1.65	0.14	6.3×15	1.65	0.14	6.3×15	1.65	0.14	6.3×15	1.65	0.14
100	6.3×15	1.65	0.14	6.3×15	1.65	0.14	8×15	0.90	0.21	8×15	0.90	0.21
220	8×15	0.90	0.21	8×15	0.90	0.21	10×16	0.42	0.37	10×20	0.28	0.49
330	10×16	0.42	0.37	10×16	0.42	0.37	10×20	0.28	0.49	12.5×20	0.16	0.72
470	10×16	0.42	0.37	10×20	0.28	0.49	12.5×20	0.16	0.72	12.5×20	0.16	0.72
1,000	12.5×20	0.16	0.72	12.5×25	0.13	0.78	16×25	0.08	1.22	16×25	0.08	1.22
2,200	16×25	0.08	1.22	16×25	0.08	1.22	16×35.5	0.06	1.55	18×35.5	0.055	1.69
3,300	16×31.5	0.07	1.40	16×35.5	0.06	1.55	18×40	0.05	1.80			
4,700	16×35.5	0.06	1.55	18×35.5	0.055	1.69						

► LXA-series

Items	50			63		
	Case size	Impedance	Rated ripple	Case size	Impedance	Rated ripple
	φDXL (mm)	(Q _{max.} / 100kHz / 20°C)	(Arms / 105°C / 100kHz)	φDXL (mm)	(Q _{max.} / 100kHz / 20°C)	(Arms / 105°C / 100kHz)
0.47	6.3×15	4.5	0.14			
1.0	6.3×15	2.6	0.14			
2.2	6.3×15	1.8	0.14			
3.3	6.3×15	1.8	0.14			
4.7	6.3×15	1.65	0.14	6.3×15	1.65	0.14
10	6.3×15	1.65	0.14	6.3×15	1.65	0.14
22	6.3×15	1.65	0.14	6.3×15	1.65	0.14
33	8×15	0.90	0.21	8×15	0.90	0.21
47	8×15	0.90	0.21	8×15	0.90	0.21
100	10×16	0.55	0.32	10×20	0.37	0.42
220	12.5×20	0.20	0.64	12.5×20	0.20	0.64
330	12.5×20	0.20	0.64	12.5×25	0.16	0.72
470	16×25	0.09	1.15	16×25	0.09	1.15
1,000	16×31.5	0.07	1.40	18×35.5	0.055	1.69

◆STANDARD RATINGS 100 to 250V_{dc}

Items	100		
	Case size	Impedance	Rated ripple
	φDXL (mm)	(Q _{max.} / 100kHz / 20°C)	(Q _{max.} / 100kHz / -10°C)
0.47	8×15	35.0	105.0
1.0	8×15	18.0	54.0
2.2	8×15	9.62	28.8
3.3	8×15	8.57	25.7
4.7	8×15	6.43	19.3
10	10×20	2.99	8.97
22	12.5×20	1.47	4.41
33	12.5×25	1.00	3.00
47	16×25	0.69	2.07

◁ LX-series

Items	160			200			250		
	Case size	Impedance	Rated ripple	Case size	Impedance	Rated ripple	Case size	Impedance	Rated ripple
	φDXL (mm)	(Q _{max.} / 100kHz / 20°C)	(Q _{max.} / 100kHz / -10°C)	φDXL (mm)	(Q _{max.} / 100kHz / 20°C)	(Q _{max.} / 100kHz / -10°C)	φDXL (mm)	(Q _{max.} / 100kHz / 20°C)	(Q _{max.} / 100kHz / -10°C)
1.0				10×16	18.0	70.0	10×16	20.0	80.0
2.2				10×16	16.0	65.0	10×16	18.0	70.0
3.3				10×16	9.2	32.0	10×20	9.0	27.0
4.7				10×20	4.7	14.0	12.5×20	5.0	15.0
10	12.5×20	3.5	10.0	12.5×20	2.6	7.6	12.5×25	2.5	7.0
22	16×25	1.8	4.8	16×25	1.9	5.0	16×31.5	1.8	4.8
33	16×25	1.7	4.5	16×31.5	1.2	3.0	16×35.5	1.0	2.8
47	16×31.5	1.1	2.9	18×35.5	1.0	2.5	18×40	0.8	2.0
68	18×35.5	0.9	1.9	18×40	0.7	1.8			

◆RATED RIPPLE CURRENT MULTIPLIERS

●LXA-series : Frequency Multipliers

Capacitance (μF)	50	120	300	1k	10k
0.47 to 4.7	0.1	0.2	0.3	0.5	1.0
10 to 22	0.2	0.3	0.4	0.6	1.0
33 to 47	0.3	0.4	0.5	0.7	1.0
100 to 330	0.4	0.5	0.6	0.8	1.0
470 to	0.6	0.7	0.8	0.9	1.0

●LX-series : Frequency Multipliers

Capacitance (μF)	50	120	300	1k	10k
0.47 to 3.3	0.3	0.4	0.5	0.7	1.0
4.7 to 33	0.4	0.5	0.6	0.8	1.0
47 to	0.6	0.7	0.8	0.9	1.0

GXE Series

- For automobile modules and other high temperature applications
- Downsize, longer life, lower impedance, and better low temperature characteristics version of GXD series
- Endurance with ripple current : 125°C 2000 to 5000 hours

GXE

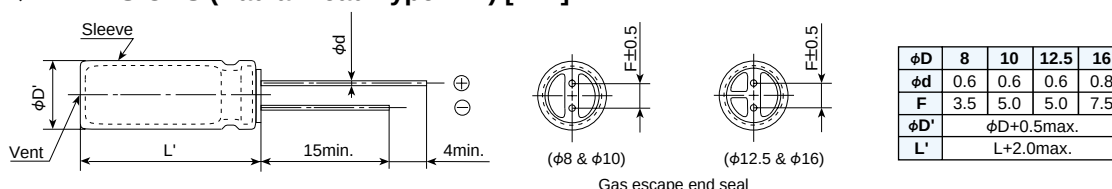
↓
downsized
longer life
GXD



SPECIFICATIONS

Items	Characteristics												
Category	–40 to +125℃ (10 to 250V _{dc}) –25 to +125℃ (350 to 450V _{dc})												
Temperature Range													
Rated Voltage Range	10 to 450V _{dc}												
Capacitance Tolerance	±20% (M) (at 20℃, 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℃, 1 minute)												
Dissipation Factor (tanδ)	Rated voltage (V _{dc})	10V	16V	25V	35V	50V	63V	80V	100V	160 to 250V	350 to 450V	(at 20℃, 120Hz)	
	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 exceed 1000μF, 0.02 shall be added each 1000μF increase. (at 20℃, 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	(at 120Hz)	
	Z(–25℃)/Z(+20℃)	3	2	2	2	2	2	2	2	3	6		
	Z(–40℃)/Z(+20℃)	6	4	4	4	4	4	4	4	6	—		
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 time at 125℃.												
		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℃ after exposing them for 1000 hours (500 hours for 350 to 450V _{dc}) at 125℃ 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

GXE	16	VB	470	M
				Cap tolerance (±20%)
				Nominal cap code
				Radial lead type
				Rated voltage in volts
				Series name

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

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 (mArms/125°C, 100kHz)	Case size φD×L (mm)	Impedance (Ω _{max.} /20°C, 100kHz)	Rated ripple (mArms/125°C, 100kHz)	Case size φD×L (mm)	Impedance (Ω _{max.} /20°C, 100kHz)	Rated ripple (mArms/125°C, 100kHz)	Case size φD×L (mm)	Impedance (Ω _{max.} /20°C, 100kHz)	Rated ripple (mArms/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 (mArms/125°C, 100kHz)	Case size φD×L (mm)	Impedance (Ω _{max.} /20°C, 100kHz)	Rated ripple (mArms/125°C, 100kHz)	Case size φD×L (mm)	Impedance (Ω _{max.} /20°C, 100kHz)	Rated ripple (mArms/125°C, 100kHz)	Case size φD×L (mm)	Impedance (Ω _{max.} /20°C, 100kHz)	Rated ripple (mArms/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		
	Case size φD×L (mm)	Impedance (Ω _{max.} /20°C, 100kHz)	Rated ripple (mArms/125°C, 120Hz)	Case size φD×L (mm)	Impedance (Ω _{max.} /20°C, 100kHz)	Rated ripple (mArms/125°C, 120Hz)	Case size φD×L (mm)	Impedance (Ω _{max.} /20°C, 100kHz)	Rated ripple (mArms/125°C, 120Hz)	Case size φD×L (mm)	Impedance (Ω _{max.} /20°C, 100kHz)	Rated ripple (mArms/125°C, 120Hz)
4.7										10×20	4.7	53
10				10×20	3.3	78	10×20	3.3	78	10×25	3.4	85
22	10×20	4.0	115	10×25	2.3	126	12.5×20	1.8	128	12.5×25	1.9	139
33	10×25	2.6	154	12.5×20	1.8	157	12.5×25	1.2	171	16×25	1.1	189
47	12.5×20	1.8	187	12.5×25	1.2	204	16×25	0.76	225	16×31.5	0.81	243
68	12.5×25	1.3	245	16×20	1.1	250	16×31.5	0.54	292			
100	16×25	0.90	329	16×25	0.74	329						
150	16×31.5	0.59	434									

V _{dc} Items Capacitance (μF)	400			450		
	Case size φD×L (mm)	Impedance (Ω _{max.} /20°C, 100kHz)	Rated ripple (mArms/125°C, 120Hz)	Case size φD×L (mm)	Impedance (Ω _{max.} /20°C, 100kHz)	Rated ripple (mArms/125°C, 120Hz)
4.7	10×20	5.5	53	10×25	5.5	58
10	10×25	3.5	86	12.5×20	4.0	86
22	12.5×30	1.6	142	16×25	1.9	154
33	16×25	1.2	189	16×31.5	1.3	203
47	16×31.5	0.85	243			

LBG Series

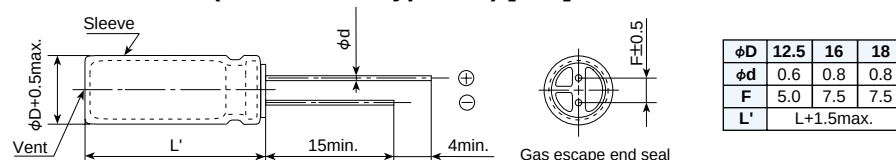
- For airbag application
- High capacitance, low impedance, and good low temperature behavior
- Endurance with ripple current : 105°C 5000 hours



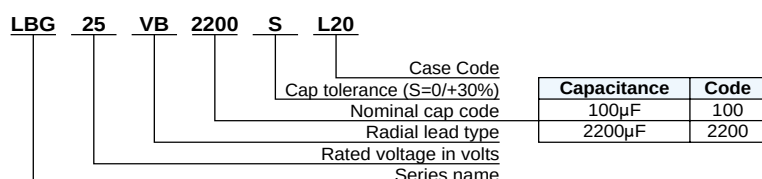
SPECIFICATIONS

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

φDXL	V _{dc} Case Code	16				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)	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	
12.5X20	K20	2,200	0.038	0.076	1,660	1,200	0.038	0.076	1,660	820	0.038	0.076	1,660
12.5X25	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
16X20	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
16X25	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
18X20	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
18X25	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

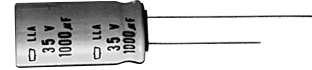
Capacitance (µF)	Frequency (Hz)			
	120	1k	10k	100k
820 to 1800	0.60	0.87	0.95	1.00
2200 to 3900	0.75	0.90	0.95	1.00
4700 to 6800	0.85	0.95	0.98	1.00

LLA Series

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

LLA

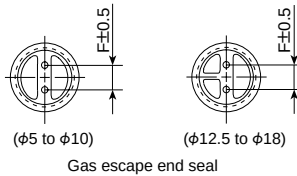
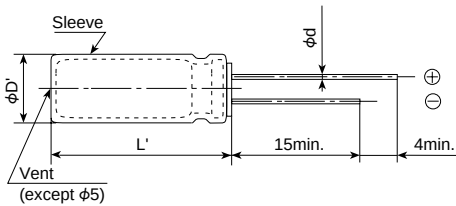
low LC
SME



SPECIFICATIONS

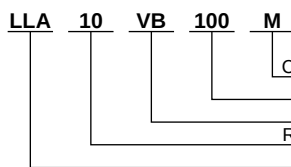
Items	Characteristics
Category	Temperature Range
Temperature Range	-40 to +85°C
Rated Voltage Range	6.3 to 50V _{dc}
Capacitance Tolerance	±20% (M) (at 20°C, 120Hz)
Leakage Current	I=0.002CV or 0.2μA, whichever is greater. Where, I : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated 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										

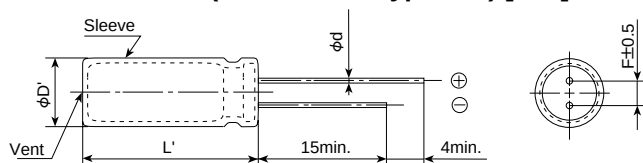
Items	50	
	Case size	Rated ripple
μF	φDXL (mm)	(mAmps/ 85°C 120Hz)
0.1	5×11	1.3
0.22	5×11	2.9
0.33	5×11	4.4
0.47	5×11	11



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 contact our local office or representative.



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
SMM

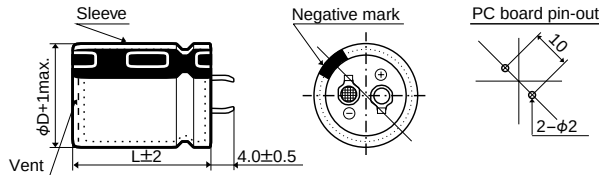


SPECIFICATIONS

Items	Characteristics				
Category	-25 to +85℃				
Temperature Range					
Rated Voltage Range	160 to 450V _{dc}				
Capacitance Tolerance	±20% (M) (at 20℃, 120Hz)				
Leakage Current	$I \leq 3\sqrt{CV}$ 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	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	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 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	≤±15% of the initial value			
	D.F. (tanδ)	≤150% of the initial specified value			
	Leakage current	≤The initial specified value			

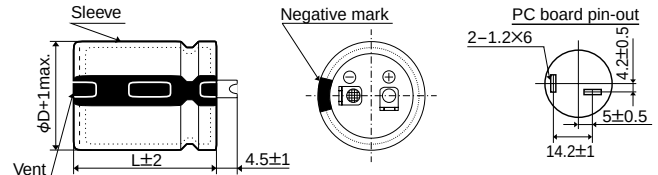
DIMENSIONS [mm]

Standard Terminal Type : VSSN (φ22 to φ35)

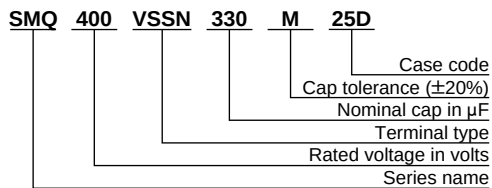


* No plastic disk is the standard design.

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 1.68			
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				450			
	22	25	30	35	22	25	30	35	
82					22×25 0.83				
100					22×25 0.93				
120	22×25 1.02				22×30 1.04				
150	22×30 1.16				22×35 1.19	25.4×25 1.19			
180	22×35 1.44				22×40 1.35	25.4×30 1.35			
220	22×40 1.49	25.4×30 1.49			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 1.78	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		25.4×50 2.01	30×40 2.01	35×30 2.01	
390		25.4×45 2.13	30×35 2.13	35×30 2.13			30×40 2.24	35×35 2.24	
470		25.4×50 2.39	30×40 2.39	35×30 2.39			30×45 2.53	35×40 2.53	
560			30×45 2.69	35×35 2.69			30×50 2.82	35×45 2.82	
680			30×50 2.96	35×40 2.96					
820				35×45 3.25	← Upper : Case size ϕDXL (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
KMM

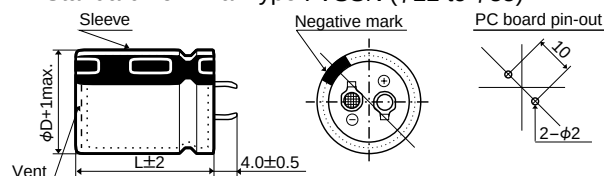


SPECIFICATIONS

Items	Characteristics				
Category	–25 to +105℃				
Temperature Range					
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	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	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			

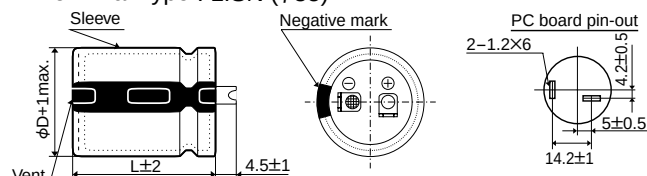
DIMENSIONS [mm]

Standard Terminal Type : VSSN (φ22 to φ35)

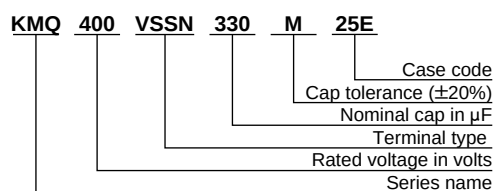


* No plastic disk is the standard design.

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 φD×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 φD×L (mm) ← Lower : Rated ripple current (Arms) at 105°C, 120Hz							

◆STANDARD RATINGS

μF	V _{dc} φD	400				450			
		22	25	30	35	22	25	30	35
68						22×25 0.50			
82						22×30 0.56			
100		22×25 0.70				22×30 0.64	25.4×25 0.64		
120		22×30 0.75				22×35 0.72	25.4×30 0.72		
150		22×30 0.88	25.4×25 0.88			22×40 0.79	25.4×30 0.79	30×25 0.79	
180		22×35 0.95	25.4×30 0.95			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			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		25.4×50 1.19	30×40 1.19	35×30 1.19
330			25.4×45 1.44	30×35 1.44	35×30 1.44			30×45 1.38	35×35 1.38
390			25.4×50 1.55	30×40 1.55	35×30 1.55			30×50 1.55	35×40 1.55
470				30×45 1.68	35×35 1.68				35×45 1.74
560				30×50 1.90	35×40 1.90				35×50 1.90
680					35×45 2.12	← Upper : Case size φDXL (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

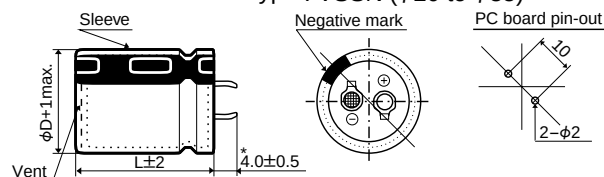


SPECIFICATIONS

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
	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 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	

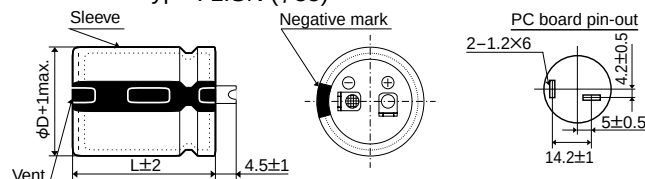
DIMENSIONS [mm]

Standard Terminal Type : VSSN (φ20 to φ35)

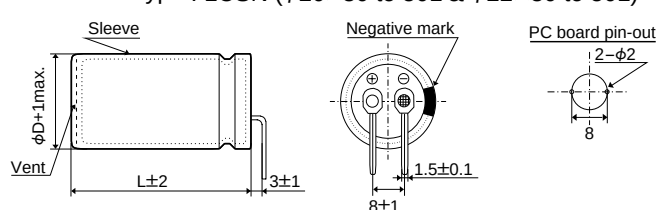


*φD=35mm : 3.5±0.5mm

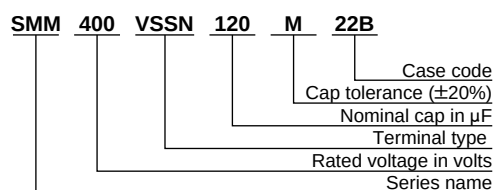
Terminal Type : LISN (φ35)



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 1.47	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

KMM
↑
downsized
longer life
KMH

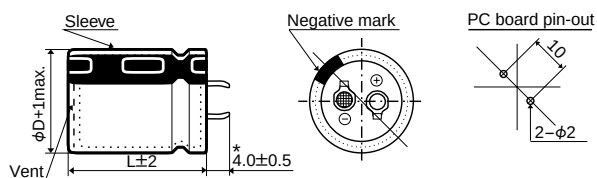


SPECIFICATIONS

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
	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 ϕ20mm 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	

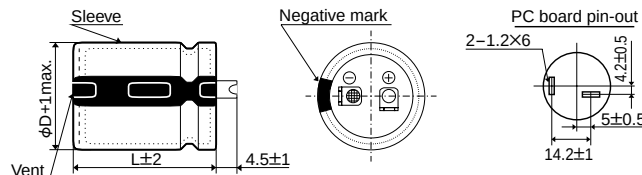
DIMENSIONS [mm]

- Standard Terminal Type : VSSN (φ20 to φ35)

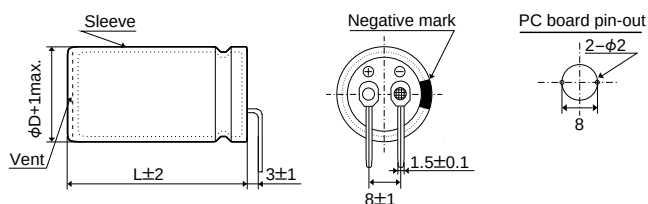


*φD=35mm : 3.5±0.5mm

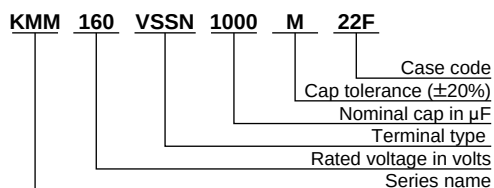
- Terminal Type : LISN (φ35)



- 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

μF	V _{dc} 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

μF	V _{dc} 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					

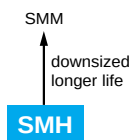
◆STANDARD RATINGS

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 1.18	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

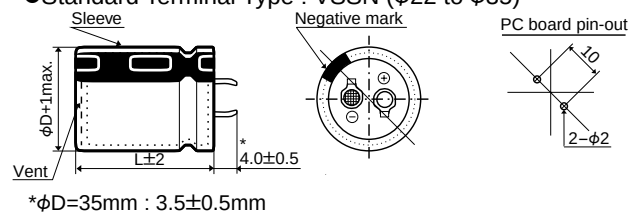


◆SPECIFICATIONS

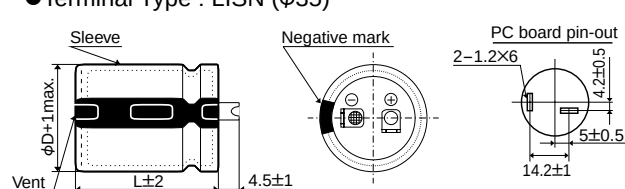
Items	Characteristics													
Category														
Temperature Range	-40 to +85℃ (6.3 to 100V _{dc}) -25 to +85℃ (160 to 450V _{dc})													
Rated Voltage Range	6.3 to 450V _{dc}													
Capacitance Tolerance	±20% (M) (at 20℃, 120Hz)													
Leakage Current	I=0.02CV or 3mA, whichever is smaller. Where, I : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V) (at 20℃ 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℃, 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℃)/Z(+20℃)	4	4	4	3	3	2	2	2	2	4	4	8	
	Z(-40℃)/Z(+20℃)	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℃ after subjected to DC voltage with the rated ripple current is applied for 2000 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 1000 hours at 85℃ 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]

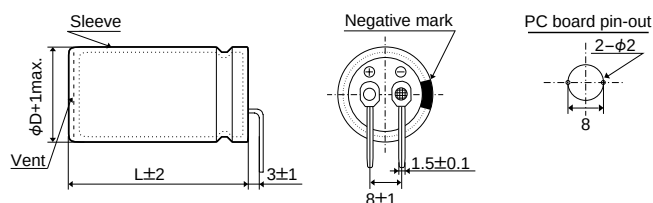
●Standard Terminal Type : VSSN (φ22 to φ35)



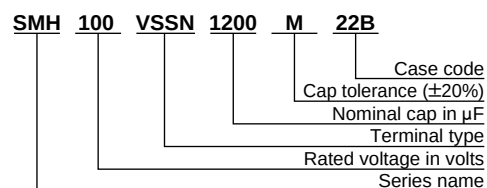
●Terminal Type : LISN (φ35)



●Terminal Type : LCSN (φ22×30 to 50L)



◆PART NUMBERING SYSTEM



◆STANDARD RATINGS

μF	V _{dc}	6.3				10				16				
	φD	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	V _{dc} 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							

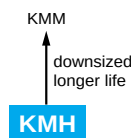
◆STANDARD RATINGS

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

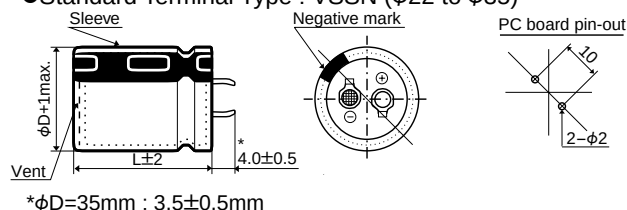


SPECIFICATIONS

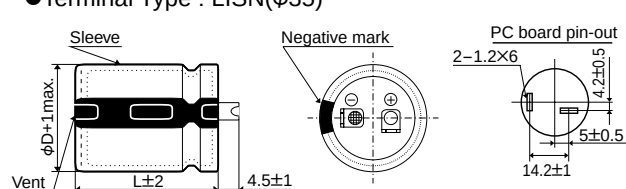
Items	Characteristics													
Category														
Temperature Range	-40 to +105°C (6.3 to 100V _{dc}) -25 to +105°C (160 to 450V _{dc})													
Rated Voltage Range	6.3 to 450V _{dc}													
Capacitance Tolerance	±20% (M) (at 20°C, 120Hz)													
Leakage Current	I=0.02CV (0.03CV 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]

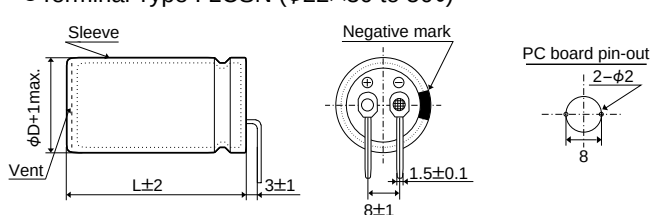
Standard Terminal Type : VSSN (φ22 to φ35)



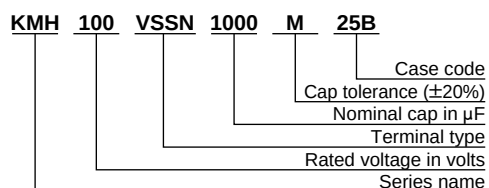
Terminal Type : LISN(φ35)



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 $\phi D \times L$ (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

SLM

low profile
SMH

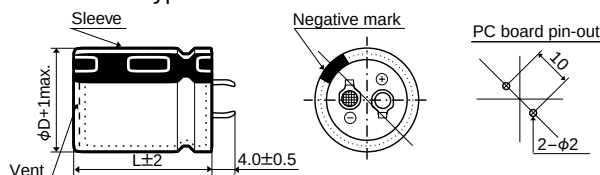


SPECIFICATIONS

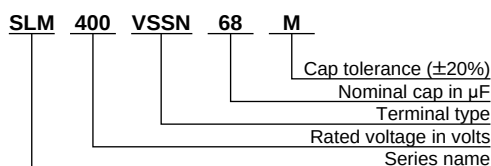
Items	Characteristics	
Category	-25 to +85°C	
Temperature Range		
Rated Voltage Range	160 to 400V _{dc}	
Capacitance Tolerance	±20% (M) (at 20°C, 120Hz)	
Leakage Current	$I \leq 3\sqrt{CV}$ Where, I : Max. leakage current (µA), C : Nominal capacitance (µF), V : Rated voltage (V) (at 20°C after 5 minutes)	
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



PART NUMBERING SYSTEM



STANDARD RATINGS

Items φD×L (mm)	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

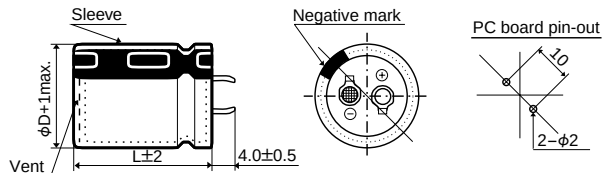


SPECIFICATIONS

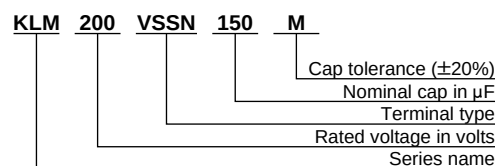
Items	Characteristics	
Category	-25 to +105°C	
Temperature Range		
Rated Voltage Range	160 to 400V _{dc}	
Capacitance Tolerance	±20% (M) (at 20°C, 120Hz)	
Leakage Current	$I \leq 3\sqrt{CV}$ Where, I : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V) (at 20°C after 5 minutes)	
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



PART NUMBERING SYSTEM



STANDARD RATINGS

Items	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)
22×15	150	0.68	120	0.61	120	0.61	82	0.50	39	0.35
25.4×15	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
30×15	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
35×15	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

- Downsized and extended life from current long life snap-ins LXC series
- Endurance with ripple current : 105°C 7000 hours
- Non solvent-proof type

LXM

↓
downsized
longer life
LXC

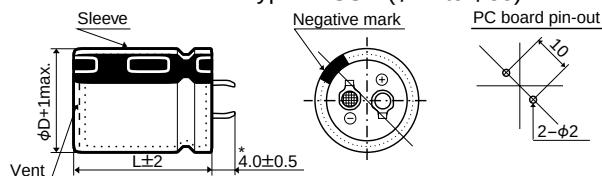


SPECIFICATIONS

Items	Characteristics				
Category	Temperature Range				
Temperature Range	-25 to +85℃				
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 400V	420 & 450V	(at 20℃, 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℃)/Z(+20℃)	4	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 7000 hours at 105℃.				
	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℃ 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			

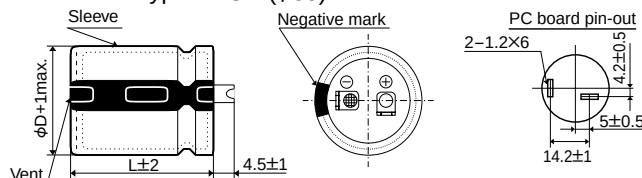
DIMENSIONS [mm]

- Standard Terminal Type : VSSN (φ22 to φ35)



*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 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			
		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 $\phi\text{D}\times\text{L}$ (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 $\phi\text{D}\times\text{L}$ (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 φD×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 φD×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			

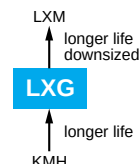
◆RATED RIPPLE CURRENT MULTIPLIERS

●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

LXG Series

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

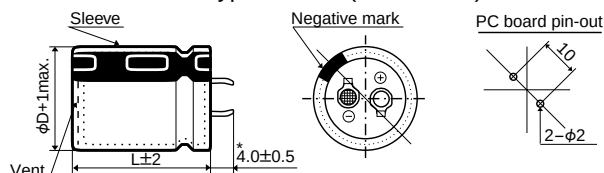


◆SPECIFICATIONS

Items	Characteristics										
Category											
Temperature Range	-40 to +105°C (10 to 100V _{dc}) -25 to 105°C (200 to 450V _{dc})										
Rated Voltage Range	10 to 450V _{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	200 to 400V	450V	
	tanδ (Max.)	0.60	0.45	0.30	0.25	0.20	0.15	0.15	0.15	0.20	(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	200 to 400V	450V	
	Z(-25°C)/Z(+20°C)	4	4	3	3	2	2	2	4	8	
	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									

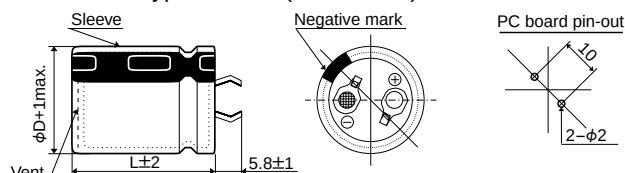
◆DIMENSIONS [mm]

●Standard Terminal Type : VSSN (φ22 to φ35)

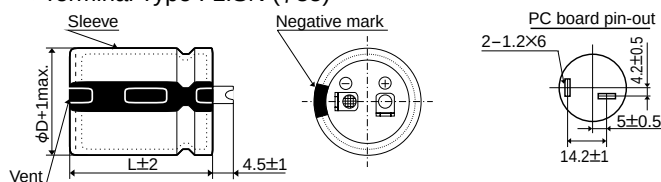


*φD=35mm : 3.5±0.5mm

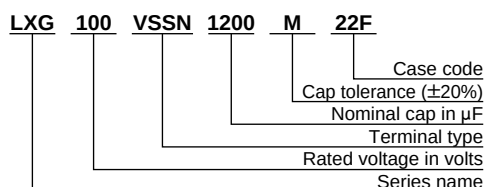
●Terminal Type : VNSN (φ22 to φ35)



●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	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				200			
		22	25.4	30	35	22	25.4	30	35	22	25.4	30	35
180										22×25 0.63			
270										22×30 0.81	25.4×25 0.81		
330										22×35 0.92	25.4×30 0.92	30×25 0.94	
390						22×25 0.78				22×40 1.02			
470										22×50 1.17	25.4×35 1.15	30×30 1.15	35×25 1.22
560						22×30 0.99	25.4×25 0.98				25.4×40 1.28	30×35 1.30	
680		22×25 0.97				22×35 1.12					25.4×50 1.48	30×40 1.49	35×30 1.47
820		22×30 1.12				22×40 1.26	25.4×30 1.23	30×25 1.25					35×35 1.65
1,000		22×35 1.27	25.4×25 1.23				25.4×35 1.41	30×30 1.42	35×25 1.45			30×50 1.91	35×40 1.90
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					35×50 2.21
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	← Upper : Case size φD×L (mm) ← Lower : Rated ripple current (Arms) at 105°C, 120Hz							
4,700					35×50 3.46								

μF	V _{dc} φD	250				350				400			
		22	25.4	30	35	22	25.4	30	35	22	25.4	30	35
56										22×25 0.34			
68						22×25 0.39				22×30 0.44	25.4×25 0.40		
82						22×30 0.49				22×35 0.50			
100						22×35 0.55	25.4×25 0.49				25.4×30 0.50	30×25 0.51	
120						22×40 0.63	25.4×30 0.55	30×25 0.56		22×40 0.57	25.4×35 0.58		35×25 0.61
150		22×25 0.57					25.4×35 0.60		35×25 0.69	22×50 0.67	25.4×40 0.66	30×30 0.65	
180		22×30 0.66	25.4×25 0.66			22×50 0.73	25.4×40 0.72	30×30 0.71				30×35 0.74	35×30 0.83
220		22×35 0.75					25.4×50 0.93	30×35 0.82	35×30 0.83		25.4×50 0.84	30×40 0.84	35×35 0.94
270		22×40 0.85	25.4×30 0.83	30×25 0.85				30×40 0.94	35×35 1.04			30×50 1.10	35×40 1.09
330			25.4×35 0.96	30×30 0.96	35×25 1.02			30×50 1.19	35×40 1.19				
390		22×50 1.08	25.4×40 1.07										35×50 1.26
470			25.4×50 1.22	30×35 1.19	35×30 1.22				35×50 1.38				
560				30×40 1.35	35×35 1.36								
680				30×50 1.58	35×40 1.57	← Upper : Case size φD×L (mm) ← Lower : Rated ripple current (Arms) at 105°C, 120Hz							
1,000					35×50 2.02								

◆STANDARD RATINGS

μF	V _{dc} φD	450			
		22	25.4	30	35
39	22×25 0.37	Upper : Case size φD×L (mm) Lower : Rated ripple current (Arms) at 105°C, 120Hz			
47	22×30 0.41				
56	22×30 0.44	25.4×25 0.47			
68	22×35 0.50	25.4×30 0.53			
82	22×40 0.56	25.4×30 0.55	30×25 0.57		
100	22×45 0.64	25.4×35 0.63	30×30 0.64		
120	22×50 0.72	25.4×40 0.71	30×30 0.71	35×25 0.71	
150		25.4×45 0.81	30×35 0.81	35×30 0.83	
180		25.4×50 0.91	30×40 0.92	35×35 0.93	
220			30×45 1.05	35×40 1.07	
270				35×45 1.22	
330				35×50 1.39	

◆MAXIMUM IMPEDANCE [mΩ/20°C, 30kHz]

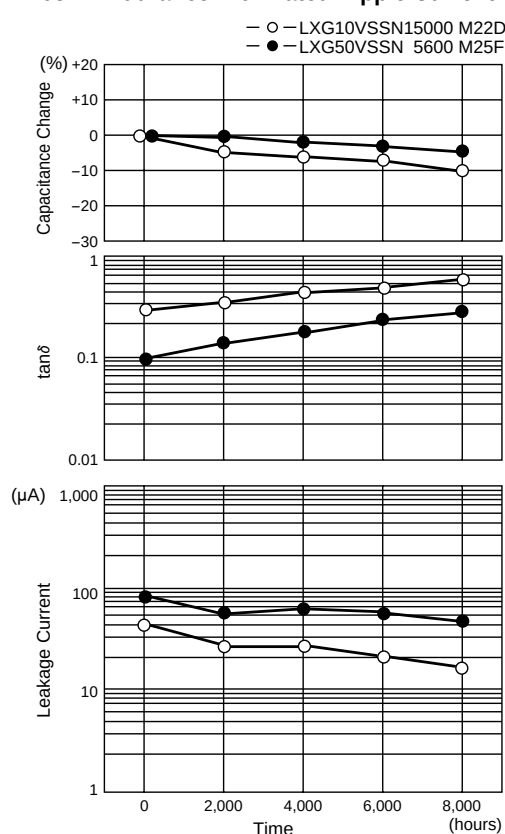
Case size φD×L (mm)	Case code	V _{dc}	10 to 63	80	100	200	250	350	400	450
			10 to 63	80	100	200	250	350	400	450
22×25	22A		120	150	640	800	1,000			
22×30	22B		100	120	560	700	900			
22×35	22C		80	95	450	560	720			
22×40	22D		70	80	400	500	650			
22×45	22E		—	—	—	—	590			
22×50	22F		50	60	320	390	500			
25.4×25	25A		90	110	530	660	850			
25.4×30	25B		70	85	420	520	670			
25.4×35	25C		60	70	360	440	570			
25.4×40	25D		50	60	310	380	490			
25.4×45	25E		—	—	—	—	460			
25.4×50	25F		40	45	240	300	390			
30×25	30A		70	80	400	500	650			
30×30	30B		50	60	320	400	520			
30×35	30C		40	50	260	320	410			
30×40	30D		35	40	240	290	370			
30×45	30E		—	—	—	—	340			
30×50	30F		25	30	180	220	280			
35×25	35A		65	70	340	420	540			
35×30	35B		45	50	260	320	410			
35×35	35C		38	40	210	260	330			
35×40	35D		30	30	180	220	280			
35×45	35E		—	—	—	—	260			
35×50	35F		23	25	140	170	220			

◆RATED RIPPLE CURRENT MULTIPLIERS

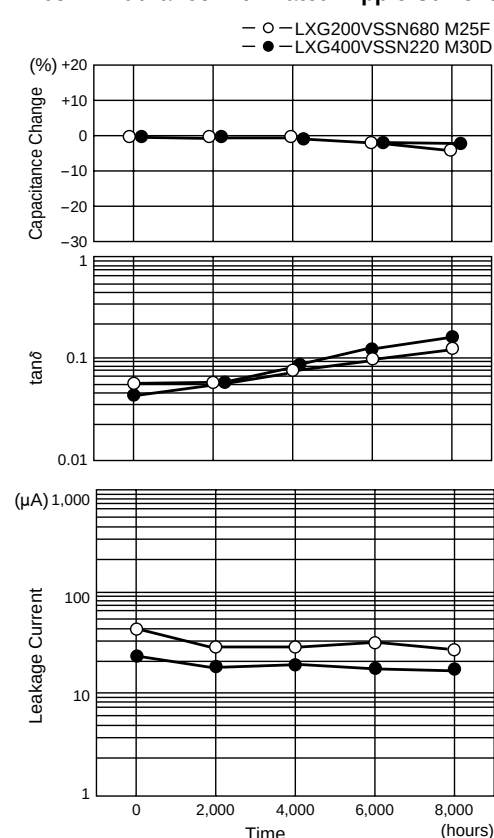
●Frequency Multipliers

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
200 & 250V _{dc}	0.81	1.00	1.17	1.32	1.45	1.50
350 to 450V _{dc}	0.77	1.00	1.16	1.30	1.41	1.43

●105°C Endurance with Rated Ripple Current

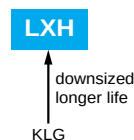


●105°C Endurance with Rated Ripple Current



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

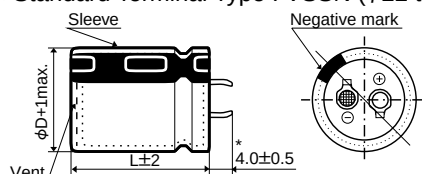


SPECIFICATIONS

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						

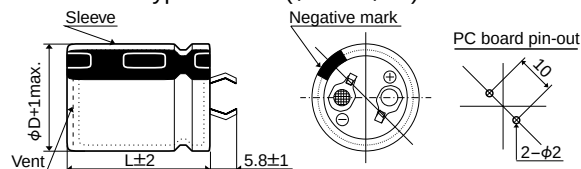
DIMENSIONS [mm]

- Standard Terminal Type : VSSN (φ22 to φ35)



* : φD=35mm : 3.5±0.5mm

- Terminal Type : VNSN (φ22 to φ35)



PART NUMBERING SYSTEM

LXH	200	VSSN	470	M	25B
					Case code
					Cap tolerance (±20%)
					Nominal cap in μF
					Terminal type
					Rated voltage in volts
					Series name

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}		200							
	φ		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 ← Upper : Case size φD×L (mm)										
	0.26	0.51									
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)

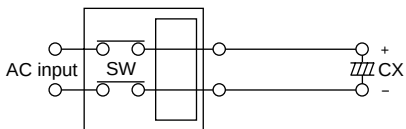
◆DC OVERVOLTAGE TEST CONDITIONS

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

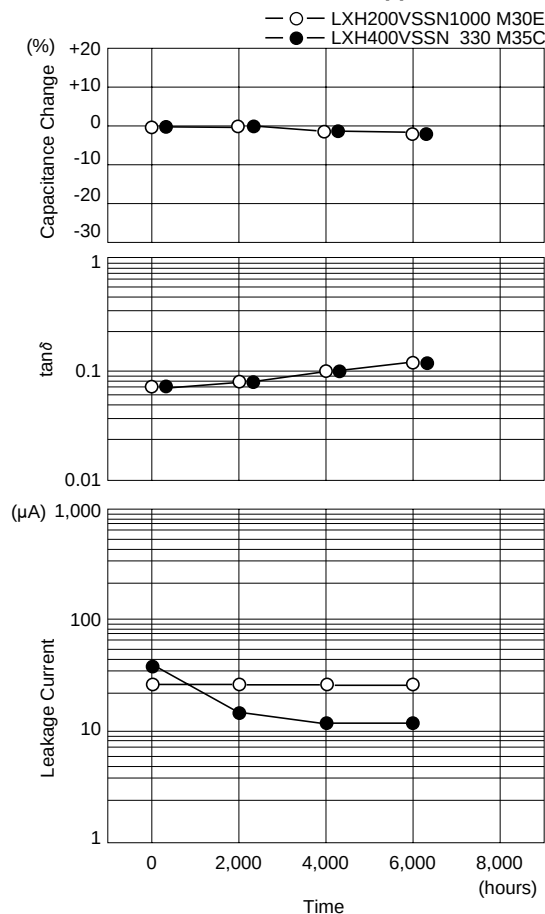
Rated Voltage	Capacitance	Current limit	Test DC voltage
200V _{dc}	<330μF	4A	300/375V _{dc}
	330≤C<470μF	5A	
	≥470μF	7A	
400V _{dc}	<100μF	2A	500/600V _{dc}
	100≤C<220μF	4A	
	≥220μF	7A	

●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

LXH
↑
downsized
longer life
KLG

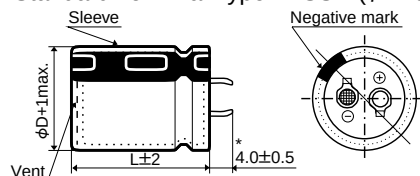


◆SPECIFICATIONS

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						

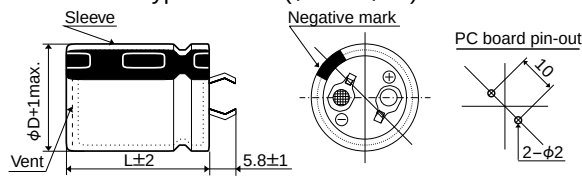
◆DIMENSIONS [mm]

● Standard Terminal Type : VSSN (φ22 to φ35)

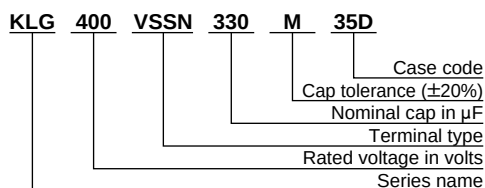


* : φD=35mm : 3.5±0.5mm

● Terminal Type : VNSN (φ22 to 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
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	V _{dc} φD	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				
270	22×30 1.00	25.4×25 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	V _{dc} φD	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				
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	

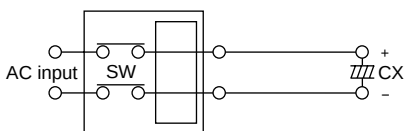
◆DC OVERVOLTAGE TEST CONDITIONS

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

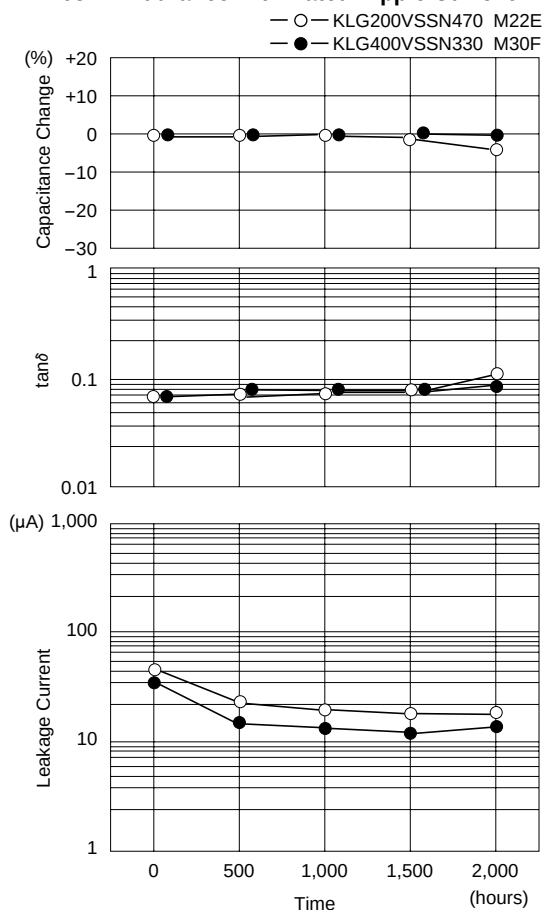
●Test DC voltage

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



●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

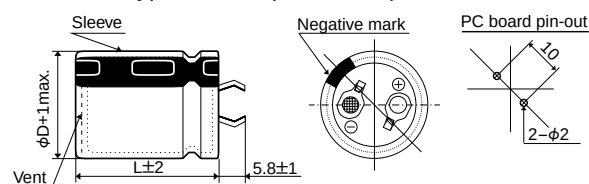


◆SPECIFICATIONS

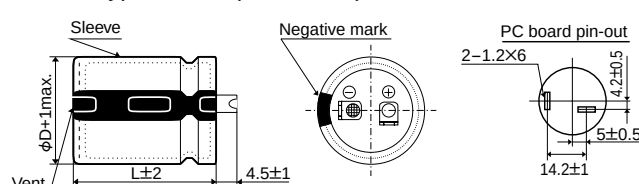
Items	Characteristics						
Category							
Temperature Range	-25 to +105°C						
Rated Voltage	200 & 400V _{dc}						
Capacitance Tolerance	±20% (M) (at 20°C, 120Hz)						
Leakage Current	$I \leq 3\sqrt{CV}$ Where, I : Max. leakage current (µA), C : Nominal capacitance (µF), V : Rated voltage (V) (at 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)

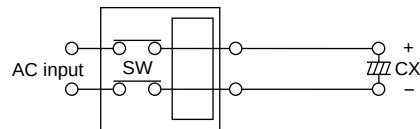
◆DC OVERVOLTAGE TEST CONDITIONS

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

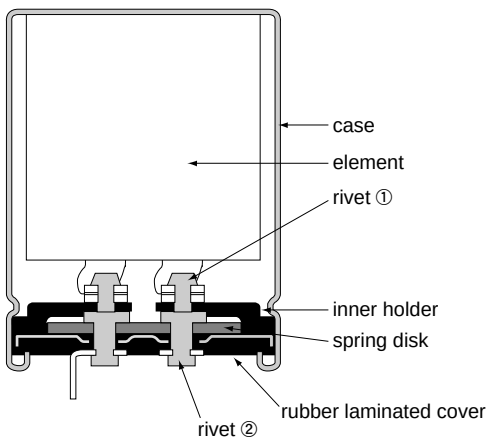
Rated Voltage	Capacitance	Current limit	Test DC voltage
200V _{dc}	< 330μF	4A	300/375V _{dc}
	330 ≤ C < 470μF	5A	
	≥ 470μF	7A	
400V _{dc}	< 100μF	2A	500/600V _{dc}
	100 ≤ C < 220μF	4A	
	≥ 220μF	7A	

●Test circuit

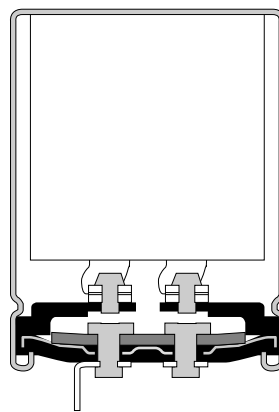


Constant DC voltage/current power supply

◆INSIDE STRUCTURE



Before function



After function

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



LARGE CAPACITANCE ALUMINUM ELECTROLYTIC CAPACITORS For inverter air-conditionings, 85°C

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

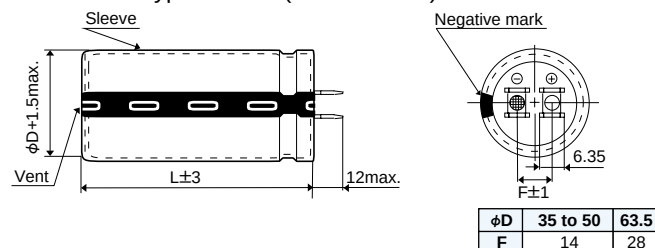


◆ SPECIFICATIONS

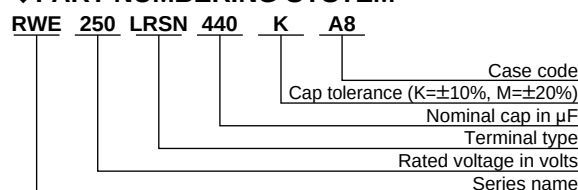
Items	Characteristics	
Category	-25 to +85°C	
Temperature Range		
Rated Voltage Range	250V _{dc} 330 to 450V _{dc}	
Capacitance Tolerance	±10% (K) (250V _{dc}) ±20% (M) (330 to 450V _{dc}) (at 20°C, 120Hz)	
Leakage Current	I=0.02CV or 3mA, whichever is smaller. Where, I : Max. leakage current (μA), C : 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.	
	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 : LRSN (φ35 to φ63.5)



◆ PART NUMBERING SYSTEM



◆ STANDARD RATINGS

μF	V _{dc}		Rated ripple (Arms/85°C, 120Hz)
	Items	Case size	
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

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

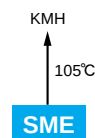
μF	V _{dc}		Rated ripple (Arms/85°C, 120Hz)	420		Rated ripple (Arms/85°C, 120Hz)	450		Rated ripple (Arms/85°C, 120Hz)
	Items	Case size		Case size	Case code		Case size	Case code	
1,000		35×110	A11 4.4	40×100	B10 4.5		40×100	B10 4.5	
1,300		40×110	B11 5.4	50×90	C9 5.6		50×90	C9 5.6	
1,500		50×90	C9 6.0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



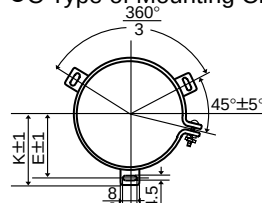
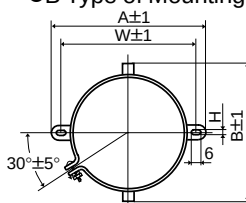
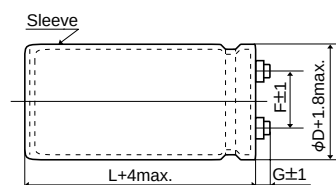
◆SPECIFICATIONS

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

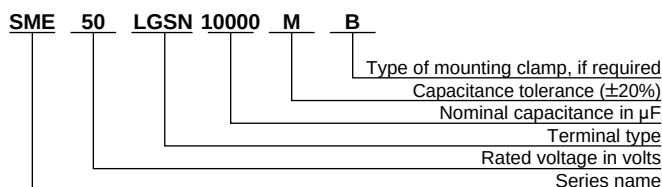
φD	E	K	J	F
50	32.5	37.0	14.0	22.4
63.5	38.1	43.5	14.0	28.0
76	44.5	50.0	14.0	31.5
89	50.8	56.5	16.0	31.5

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)	L (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



SMESeries

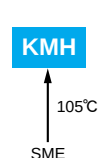
◆STANDARD RATINGS

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																								
6,800																								
8,200																								
10,000																								
12,000																								
15,000																								
18,000																								
22,000																								
27,000																								
33,000																								
39,000																								
47,000																								
56,000																								
68,000																								
82,000																								
100,000																								
120,000																								
150,000																								
180,000																								
220,000																								
270,000																								
330,000																								
390,000																								
470,000																								
560,000																								
680,000																								

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															
1,500															
1,800															
2,200															
2,700															
3,300															
3,900															
4,700															
5,600															
6,800															
8,200															
10,000															
12,000															
15,000															
18,000															
22,000															
27,000															
33,000															
39,000															
47,000															
68,000															

KMHSeries

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

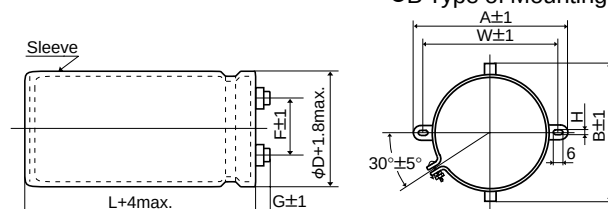


◆SPECIFICATIONS

Items	Characteristics						
Category							
Temperature Range	-40 to +105°C (10 to 100V _{dc}) -25 to +105°C (160 to 400V _{dc})						
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]

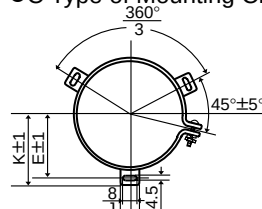
●B Type of Mounting Clamp



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	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

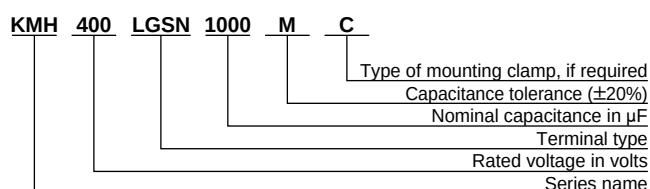
<Screw specifications>

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



LARGE CAPACITANCE ALUMINUM ELECTROLYTIC CAPACITORS Standard screw terminals, 105°C

KMH Series

◆STANDARD RATINGS

Vdc 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	2.7	0.15
3,300																			A 5	3.0	0.15
3,900																			A 6	3.4	0.15
4,700																			A 6	3.7	0.15
5,600																			A 8	4.5	0.15
6,800																			A 8	4.9	0.15
8,200																			A10	5.1	0.20
10,000																			A12	6.1	0.20
12,000																			C 8	6.7	0.20
15,000																			C10	8.3	0.20
18,000																			C12	9.9	0.20
22,000																			C12	11.0	0.20
27,000	A 5	4.9	0.45	A 6	5.5	0.40	A 8	6.4	0.35	A10	7.5	0.30	C 8	9.1	0.25	C12	10.9	0.25	D10	11.4	0.25
33,000	A 5	5.1	0.50	A 6	5.7	0.45	A 8	6.7	0.40	A12	9.0	0.30	C10	11.1	0.25	C12	12.0	0.25	E10	13.9	0.25
39,000	A 6	5.9	0.50	A 8	6.8	0.45	A10	7.8	0.40	C 8	9.2	0.35	C12	13.1	0.25	D10	12.5	0.30	E10	13.9	0.30
47,000	A 8	7.1	0.50	A 8	7.1	0.50	A12	9.3	0.40	C10	11.2	0.35	C12	13.9	0.30	D12	14.9	0.30	E12	16.5	0.30
56,000	A 8	7.1	0.60	A10	8.4	0.50	C 8	9.7	0.45	C10	11.4	0.40	D10	13.9	0.35	D12	16.3	0.30	E12	18.1	0.30
68,000	A10	8.5	0.60	A10	8.8	0.55	C10	11.2	0.45	C12	13.6	0.40	D12	16.6	0.35	E12	18.4	0.35	E14	19.7	0.35
82,000	A10	8.9	0.65	C 8	10.7	0.55	C10	11.2	0.50	D10	14.8	0.45	E12	18.9	0.40	E14	20.0	0.40	F14	22.1	0.40
100,000	A12	10.7	0.65	C 8	10.8	0.65	C12	14.8	0.50	D12	17.6	0.45	E12	19.5	0.45	E14	20.0	0.50			
120,000	C 8	11.0	0.75	C10	13.1	0.65	D10	14.9	0.65	D12	17.6	0.55	E12	19.5	0.55	F14	21.8	0.60			
150,000	C10	13.2	0.80	C12	15.3	0.70	D12	17.9	0.65	E12	19.8	0.65	F14	23.9	0.60						
180,000	C12	15.7	0.80	C12	15.7	0.80	D12	17.9	0.80	E12	19.8	0.80	F14	23.9	0.75						
220,000	C12	16.8	0.85	D12	19.2	0.85	E12	21.3	0.85	E14	23.4	0.80									
270,000	D12	19.6	1.00	D12	19.6	1.00	E12	21.7	1.00	F14	25.5	1.00									
330,000	D12	19.7	1.20	E12	21.1	1.30	E14	23.4	1.20												
390,000	E12	21.3	1.50	E12	21.3	1.50	F14	24.9	1.50												
470,000	E12	21.4	1.80	E14	24.2	1.60															
560,000	E14	23.6	2.00	F14	28.1	2.00															
680,000	F14	26.0	2.40	F14	28.5	2.40															

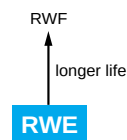
Vdc SV μF	100			160			200			250			315			350			400		
	125			200			250			300			365			400			450		
180													A 5	0.8	0.10	A 5	0.8	0.10	A 5	0.8	0.10
220													A 5	0.9	0.10	A 5	0.9	0.10	A 5	0.9	0.10
270										A 5	0.8	0.15	A 5	1.0	0.10	A 5	1.0	0.10	A 5	1.0	0.10
330										A 5	0.9	0.15	A 5	1.1	0.10	A 5	1.1	0.10	A 6	1.2	0.10
390										A 5	1.0	0.15	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 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	A10	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	A10	1.8	0.15	A12	2.0	0.15
1,000				A 5	1.6	0.15	A 6	1.7	0.15	A 8	1.6	0.20	A10	2.0	0.15	A12	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	A12	2.4	0.15	C 8	2.4	0.15	C10	2.7	0.15
1,500				A 6	2.1	0.15	A 8	2.3	0.15	A10	2.1	0.20	C 8	2.7	0.15	C10	3.0	0.15	C12	3.3	0.15
1,800	A 5	2.7	0.10	A 8	2.5	0.15	A 8	2.5	0.15	A12	2.5	0.20	C10	3.3	0.15	C12	3.6	0.15			
2,200	A 5	3.0	0.10	A 8	2.8	0.15	A10	3.0	0.15	C 8	2.9	0.20	C12	4.0	0.15	C12	4.0	0.15	D10	4.2	0.15
2,700	A 6	3.5	0.10	A10	3.3	0.15	A12	3.6	0.15	C10	3.5	0.20	C12	4.4	0.15	D10	4.6	0.15			
3,300	A 8	4.2	0.10	A12	3.8	0.15	C 8	4.1	0.15	C12	4.2	0.20	D10	5.1	0.15				D12	5.5	0.15
3,900	A 8	4.2	0.12	C 8	3.8	0.20	C10	4.9	0.15	C12	4.6	0.20	D12	6.0	0.15	E12	6.7	0.15			
4,700	A10	5.0	0.12	C10	4.6	0.20	D10	5.3	0.20	D12	5.7	0.20	E10	6.8	0.15				E13	7.6	0.15
5,600	A10	5.4	0.12	C10	5.1	0.20	D10	5.8	0.20	D12	6.3	0.20	E12	8.0	0.15	E13	8.3	0.15	F14	9.4	0.15
6,800	A12	5.8	0.15	C12	6.1	0.20	D12	6.9	0.20	E12	7.7	0.20	E13	9.2	0.15	E14	9.5	0.15	F14	10.4	0.15
8,200	C 8	6.4	0.15	D10	7.0	0.20	D12	7.6	0.20	E12	8.4	0.20	F14	11.4	0.15	F14	11.4	0.15			
10,000	C10	7.8	0.15	D12	8.4	0.20	E12	9.3	0.20	E14	10.0	0.20	F14	12.6	0.15						
12,000	C12	9.3	0.15	E10	9.4	0.20	E12	10.2	0.20	F14	11.9	0.20									
15,000	C12	10.4	0.15	E12	11.4	0.20	E14	12.2	0.20												
18,000	D10	10.4	0.20	E14	13.4	0.20	F14	13.1	0.25												
22,000	D12	12.5	0.20	F14	14.5	0.25															
27,000	E12	13.7	0.25	F14	16.0	0.25															
33,000	E12	15.2	0.25																		
39,000	E14	16.1	0.30																		
47,000	F14	19.3	0.30																		
56,000	F14	21.1	0.30																		



LARGE CAPACITANCE ALUMINUM ELECTROLYTIC CAPACITORS Inverter-use screw terminal, 85°C

RWE Series

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

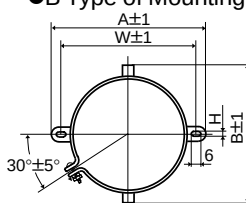
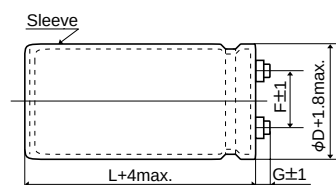


◆SPECIFICATIONS

Items	Characteristics				
Category	-25 to +85℃				
Temperature Range					
Rated Voltage Range	350 to 550V _{dc}				
Capacitance Tolerance	±20% (M) (at 20℃, 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℃ after 5 minutes)				
Dissipation Factor (tanδ)	0.25 max. (at 20℃, 120Hz)				
Low Temperature Characteristics	Capacitance change	Rated Voltage (V _{dc})	350 to 450V	500 & 550V	(at 120Hz)
		C(-25℃)/C(+20℃)	≥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 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.				
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 85℃.				
	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℃ after exposing them for 500 hours at 85℃ 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]

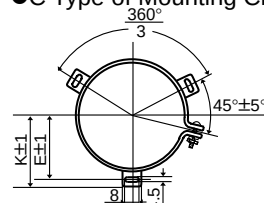
●B Type of Mounting Clamp



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

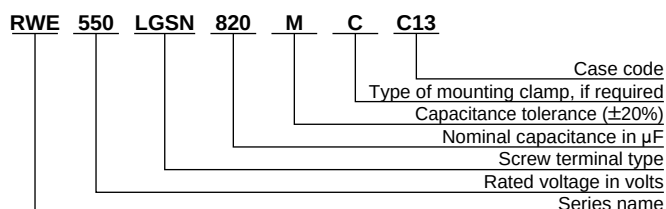


φD	E	K	F	J
50	32.5	37.0	22.4	14.0
63.5	38.1	43.5	28.0	14.0
76	44.5	50.0	31.5	14.0
89	50.8	56.5	31.5	16.0

<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



◆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					
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

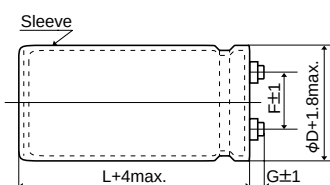


SPECIFICATIONS

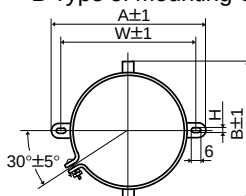
Items	Characteristics						
Category							
Temperature Range	-25 to +85°C						
Rated Voltage Range	350 to 450V _{dc}						
Capacitance Tolerance	±20% (M) (at 20°C, 120Hz)						
Leakage Current	I=0.02CV or 5mA, whichever is smaller. Where, I : Max. leakage current (μA), C : Nominal capacitance (μF), 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

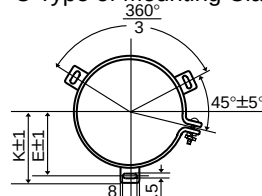


φ50 to φ76 : G=6
φ89 : G=4
φ100 : G=10



φD	A	B	W	H	F
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	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 :
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

RWY	400	LGSN	5700	M	C
				Type of mounting clamp, if required	
				Capacitance tolerance (±20%)	
				Nominal capacitance in μF	
				Screw terminal type	
				Rated voltage in volts	
				Series name	

◆STANDARD RATINGS

Case size φDXL (mm)	V _{dc}	350		400		450	
	SV	400		450		500	
	Items	Capacitance (μF) 20°C, 120Hz	Rated ripple current (Arms) 85°C, 300Hz	Capacitance (μF) 20°C, 120Hz	Rated ripple current (Arms) 85°C, 300Hz	Capacitance (μF) 20°C, 120Hz	Rated ripple current (Arms) 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

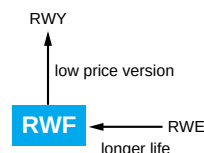
●Frequency Multipliers

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 $\phi 100$



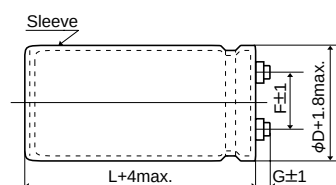
SPECIFICATIONS

Items	Characteristics						
Category							
Temperature Range	-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 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 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>≤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						

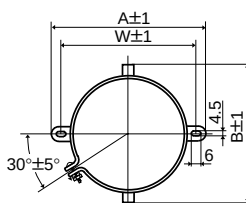
DIMENSIONS (Terminal Type=LGSN) [mm]

●B Type of Mounting Clamp

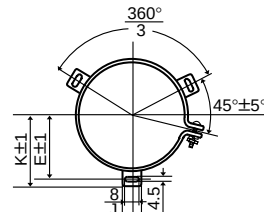
●C Type of Mounting Clamp



$\phi 50$ & $\phi 63.5$: 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>

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

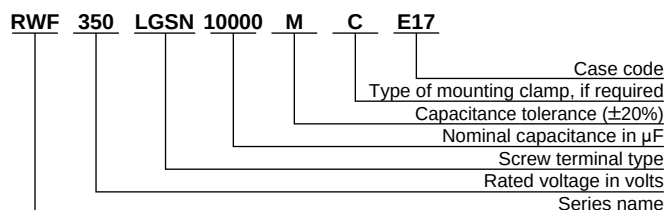
Washer

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 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

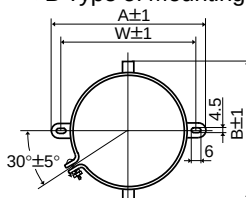
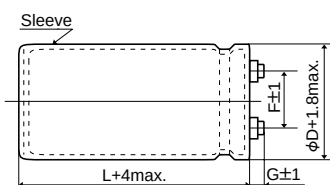


◆SPECIFICATIONS

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						

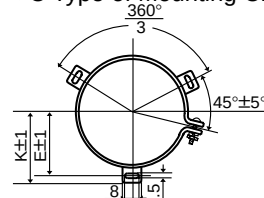
◆DIMENSIONS (Terminal Type=LGSN) [mm]

●B Type of Mounting Clamp



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:

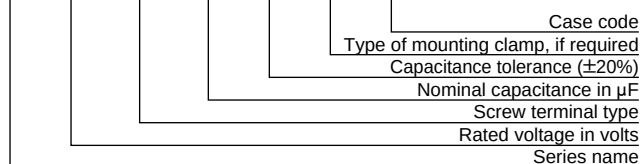
3.23Nm

φ63.5 : G=6
φ76 & φ89 : G=5

* 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

V_{dc} SV φD μF	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 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 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}
- Load life with ripple current : 105°C 5000 hours (2000 hours for 500V_{dc} & 525V_{dc})
- High reliability products



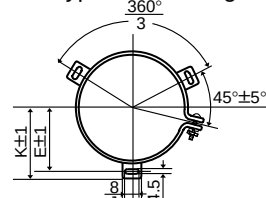
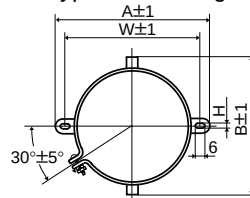
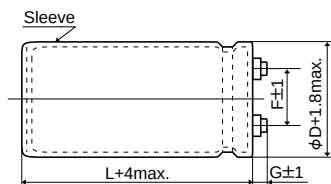
SPECIFICATIONS

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

●C 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

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											D10	2.8	0.15
2,700											D12	3.3	0.15
3,300											E10	4.0	0.15
3,900											E12	4.4	0.15
4,700											F14	5.2	0.15
5,600													
6,800													
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	8.6	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

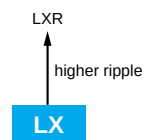
Note : The endurance of capacitors is shortened with internal heating produced by ripple currents at the rate of halving the lifetime with every 5 to 10°C rise. When long life performance is requested in actual use, the rms ripple current has to be reduced. Also, for the LXA series capacitors (350 to 525V_{dc} products), using them at operating voltage can extend their lifetime. For the detail, please contact a representative of Nippon Chemi-con.



LARGE CAPACITANCE ALUMINUM ELECTROLYTIC CAPACITORS Inverter-use screw terminal, 105°C

LX Series

●Endurance with ripple current : 105°C 5000 hours

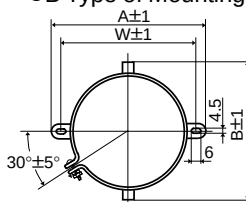
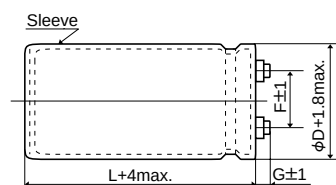


◆SPECIFICATIONS

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)	0.25 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 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.						
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>≤±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 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>≤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						

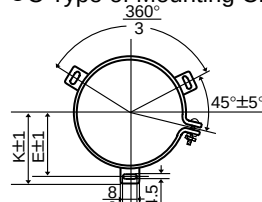
◆DIMENSIONS (Terminal Type=LGSN) [mm]

●B Type of Mounting Clamp



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	J	F
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

φ63.5 : G=6

φ76 & φ89 : G=5

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

◆PART NUMBERING SYSTEM

LX	350	LGSN	10000	M	C	F15	
							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

μF	350			400			450		
	400			450			500		
	63.5	76	89	63.5	76	89	63.5	76	89
2,200							63.5×115 7.0		
2,700				63.5×115 7.8			63.5×130 8.2	76×115 8.6	
3,300	63.5×115 8.5			63.5×130 9.0			63.5×155 9.8	76×130 10.0	
3,900	63.5×130 9.8			63.5×155 10.6	76×115 11.7		63.5×170 11.1		
4,700	63.5×155 11.7	76×115 11.3		63.5×170 12.2	76×130 11.9			76×155 12.8	
5,600	63.5×170 13.3	76×130 13.0		63.5×190 14.0	76×155 14.0			76×190 15.4	89×155 15.3
6,800	63.5×190 15.4	76×155 15.5			76×170 16.2				89×170 17.7
8,200		76×170 17.8				89×155 18.5			89×190 20.3
10,000			89×155 20.5			89×190 22.4			
12,000			89×190 24.6	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
63.5		D11	D13	D15	D17	D19
76		E11	E13	E15	E17	E19
89		—	—	F15	F17	F19

◆RATED RIPPLE CURRENT MULTIPLIERS

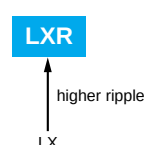
●Frequency Multipliers

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 the LX 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.

LXR Series

- Higher ripple capability than LX series
- Endurance with ripple current : 105°C 5000 hours

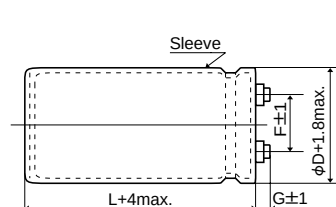


SPECIFICATIONS

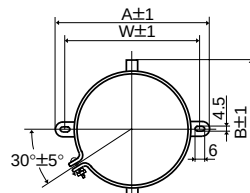
Items	Characteristics						
Category							
Temperature Range	-25 to +105°C						
Rated Voltage Range	350 to 450V _{dc}						
Capacitance Tolerance	±20% (M) (at 20°C, 120Hz)						
Leakage Current	I=0.02CV or 5mA, whichever is smaller. Where, I : Max. leakage current (μA), C : Nominal capacitance (μF), 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

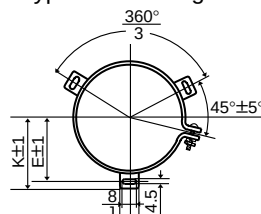


φ63.5 & φ76 : G=6
φ89 : G=4
φ100 : G=10



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



LXR Series

◆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



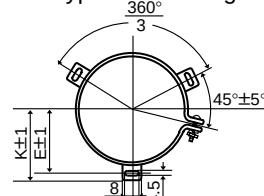
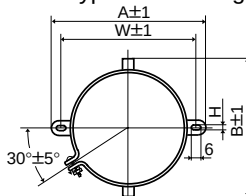
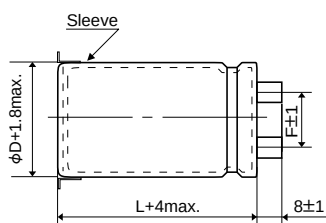
SPECIFICATIONS

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) $Z(-10^{\circ}\text{C})/Z(+20^{\circ}\text{C})$ <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 (Arms85°C, 20kHz)	Impedance (mΩ20°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

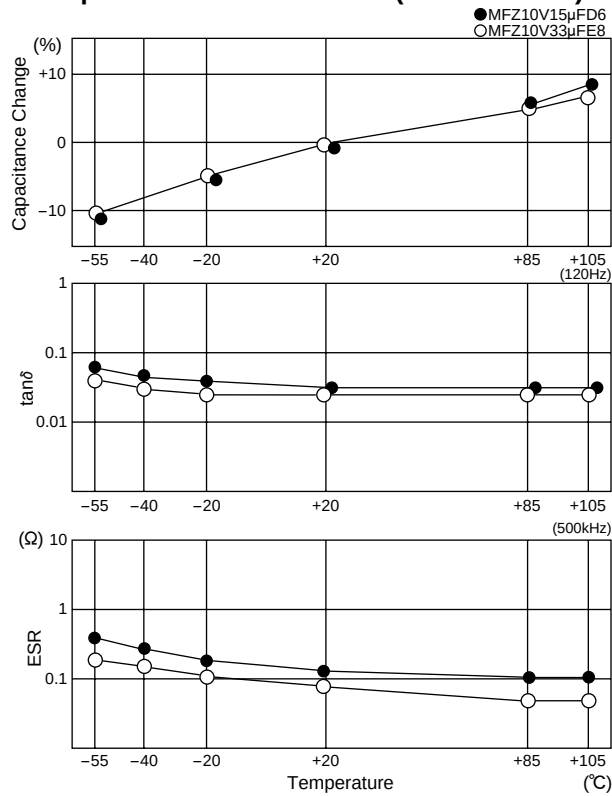
●Frequency Multipliers

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

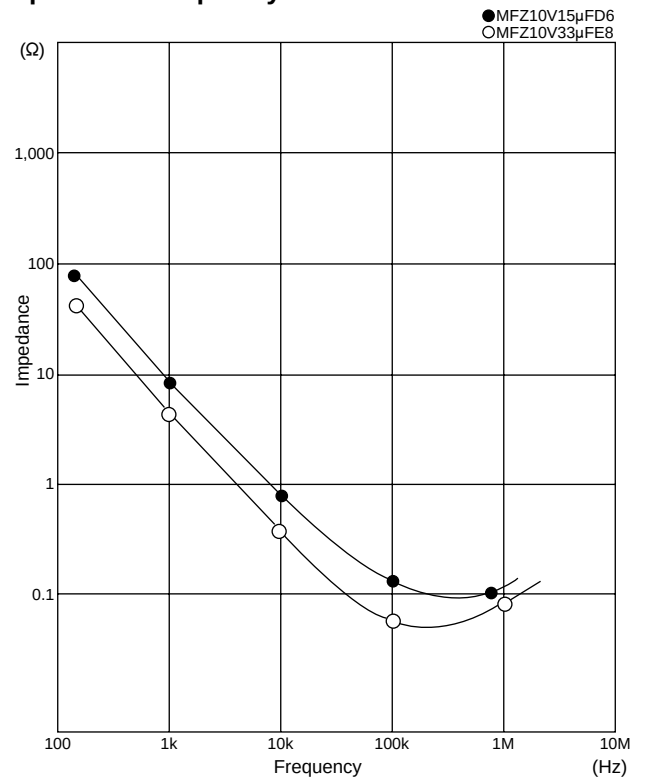
●Temperature Multipliers

Temperature (°C)	85	105
Coefficient	1.00	0.57

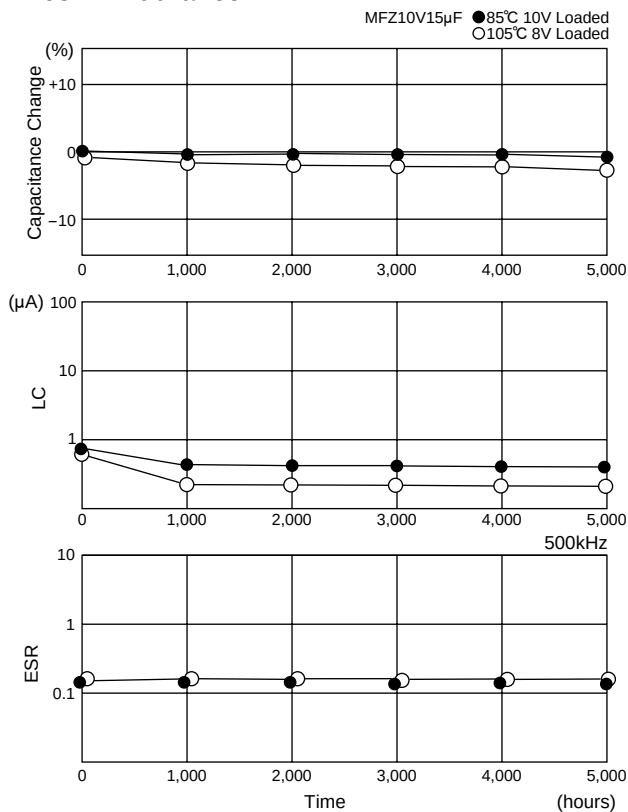
● Temperature Characteristics (−55 to +105°C)



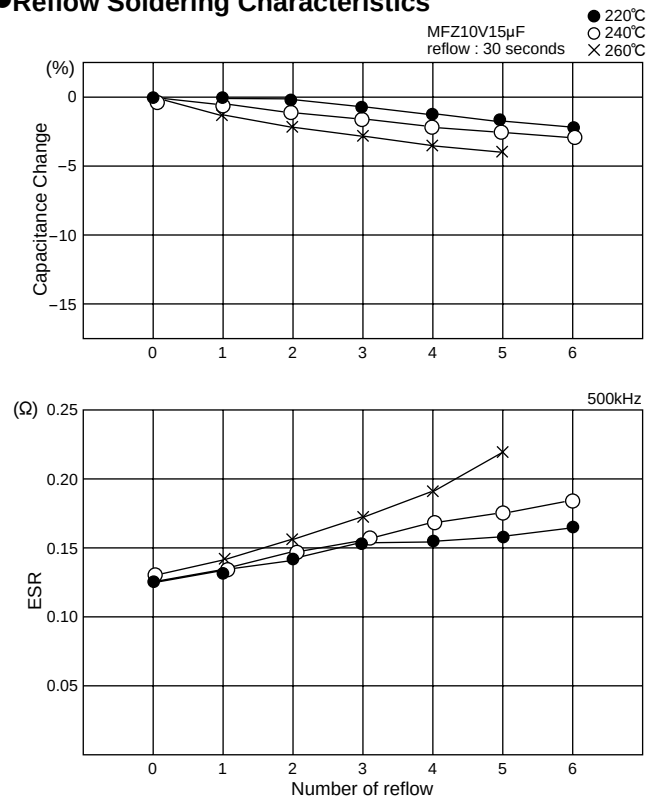
● Impedance-Frequency Characteristics



● 105°C Endurance

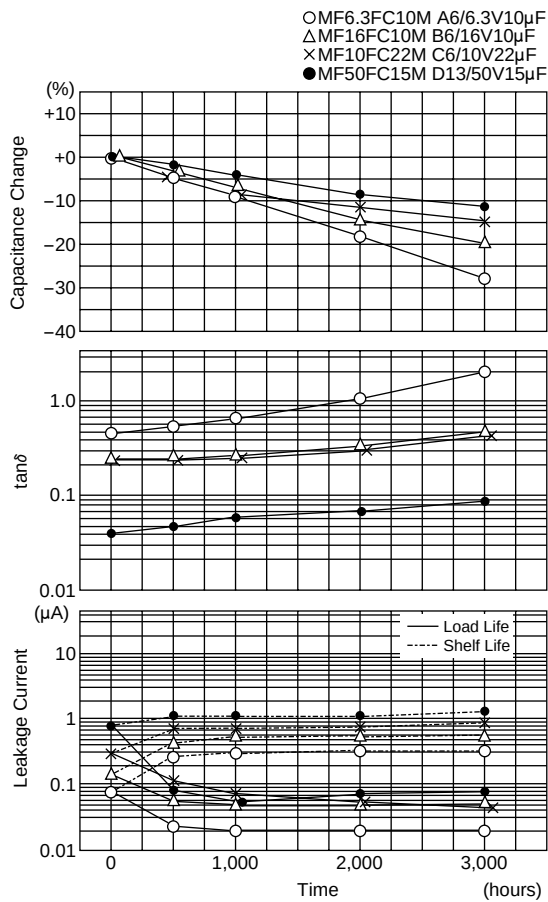


● Reflow Soldering Characteristics

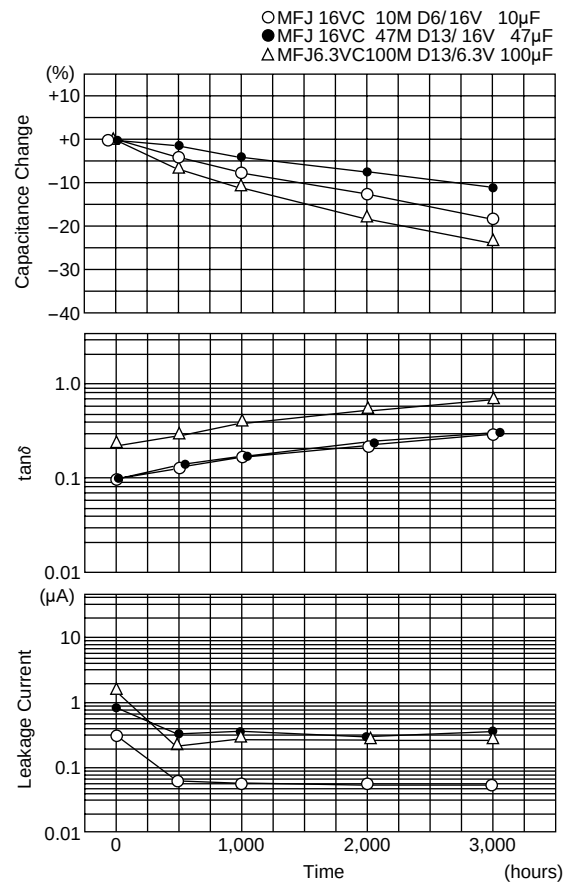


Alchip® **MF/MFJ** Series

●MF series 85°C Endurance/Shelf Life



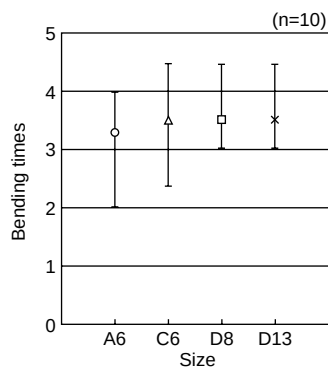
●MFJ series 105°C Endurance



◆MF Series Terminal Strength Test

●Without Dummy Terminal : Type FC

①Bent Test <Fig-1>



②Mechanical Force to Lead Facing Side <Fig-2>

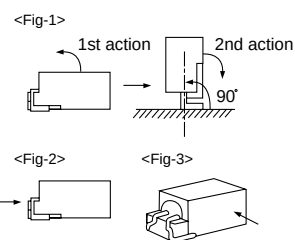
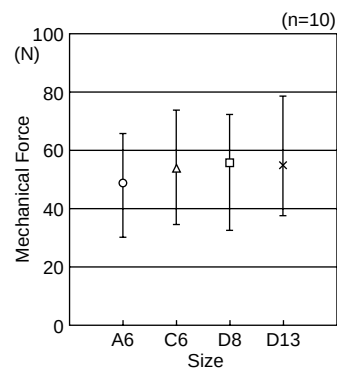
(n=10)

Size	Mechanical Force
A6	≥5N
C6	≥5N
D8	≥5N
D13	≥5N

*No peeling off terminal.

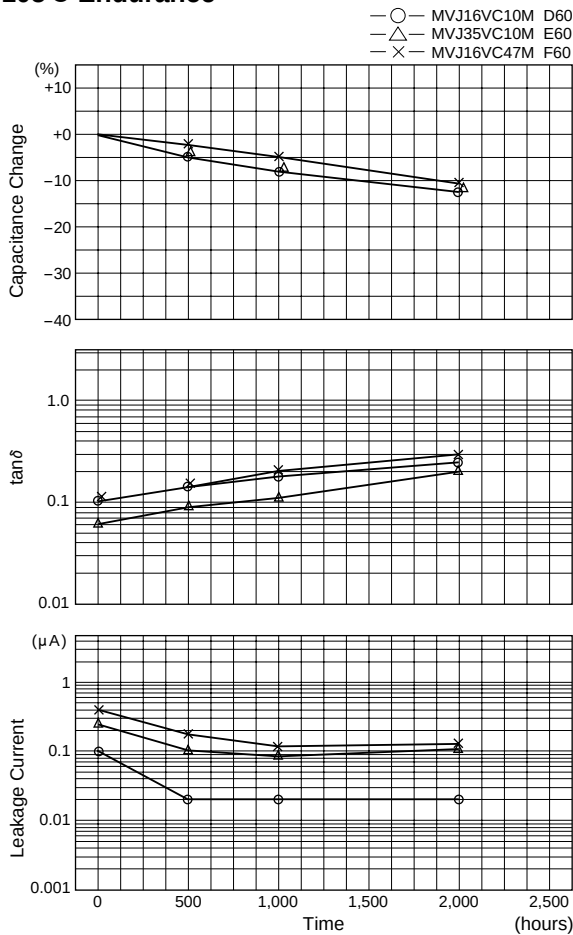
●With Dummy Terminal : Type FD

①Mechanical Force to Side <Fig-3>



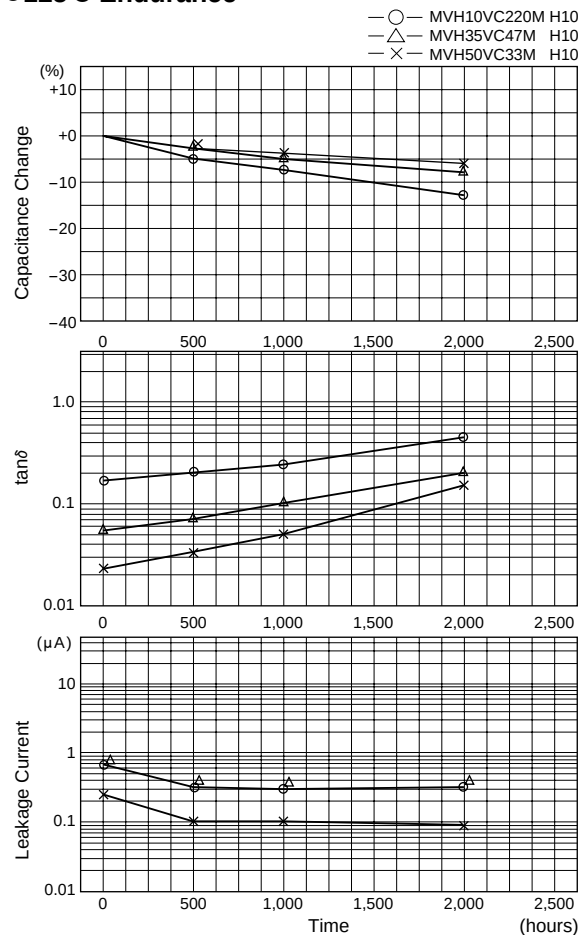
MVJ Series

●105°C Endurance



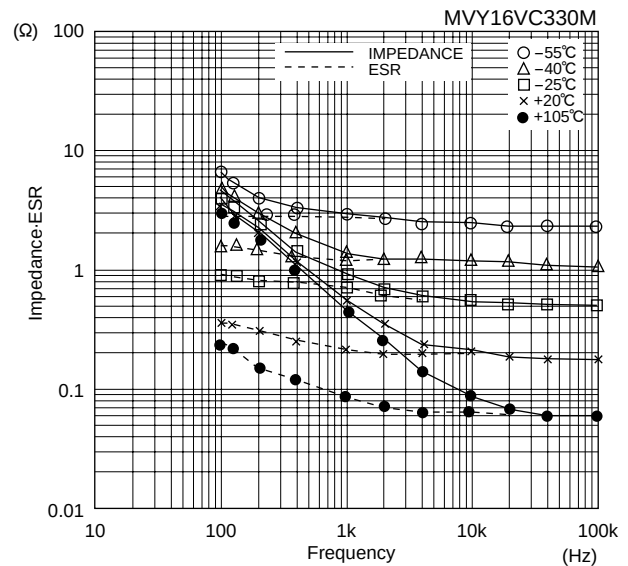
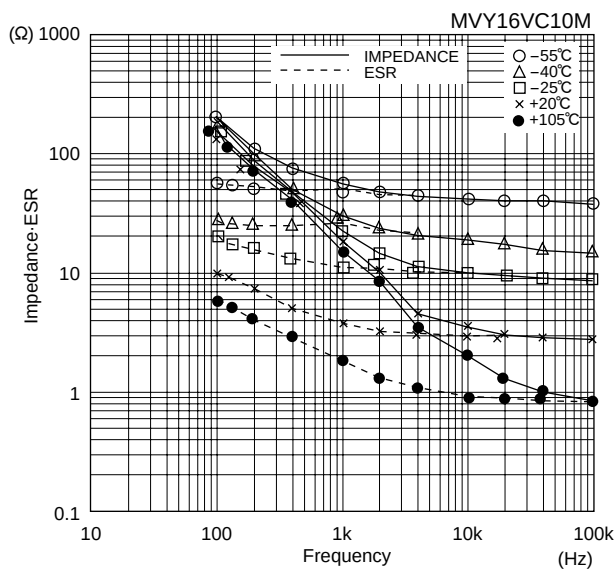
MVH Series

●125°C Endurance



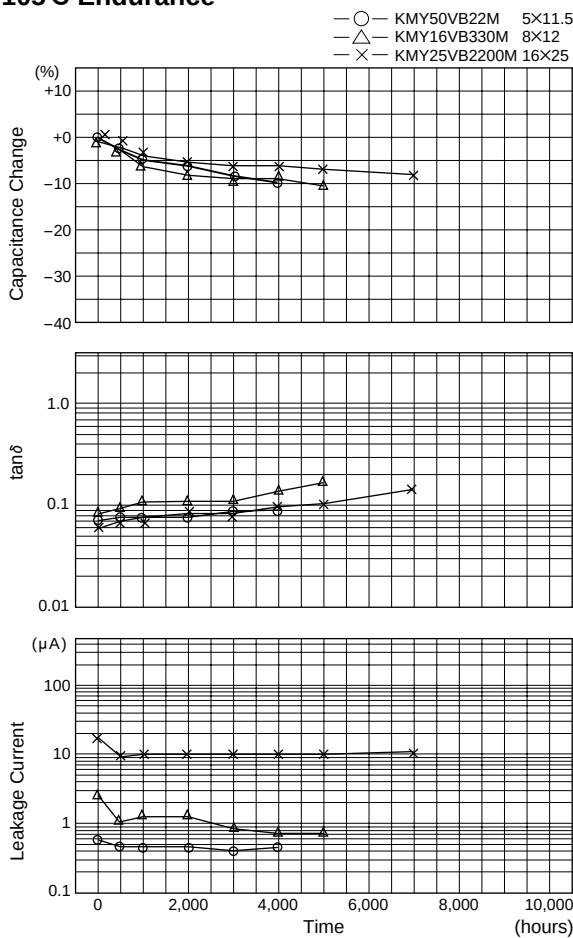
MVY Series

●Impedance/ESR vs Frequency

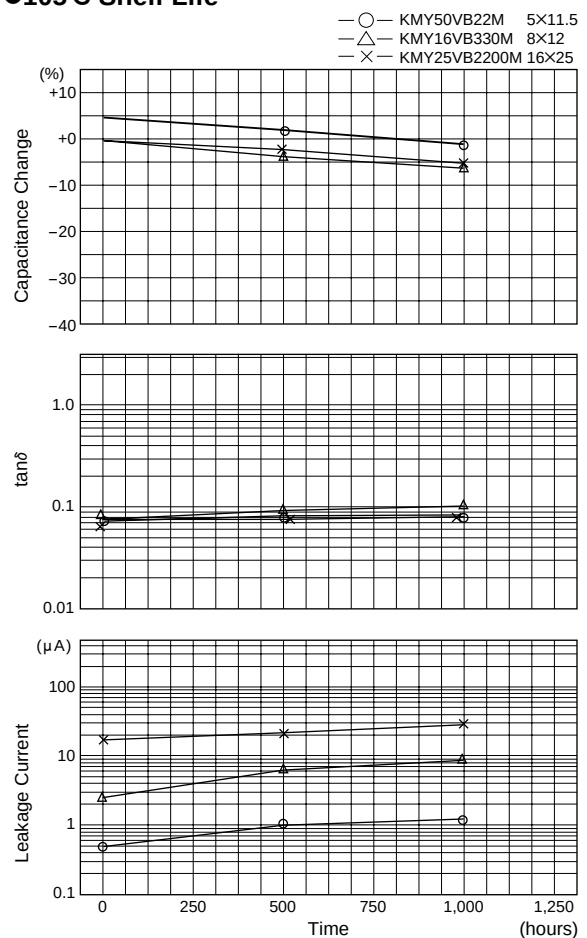


KMY Series

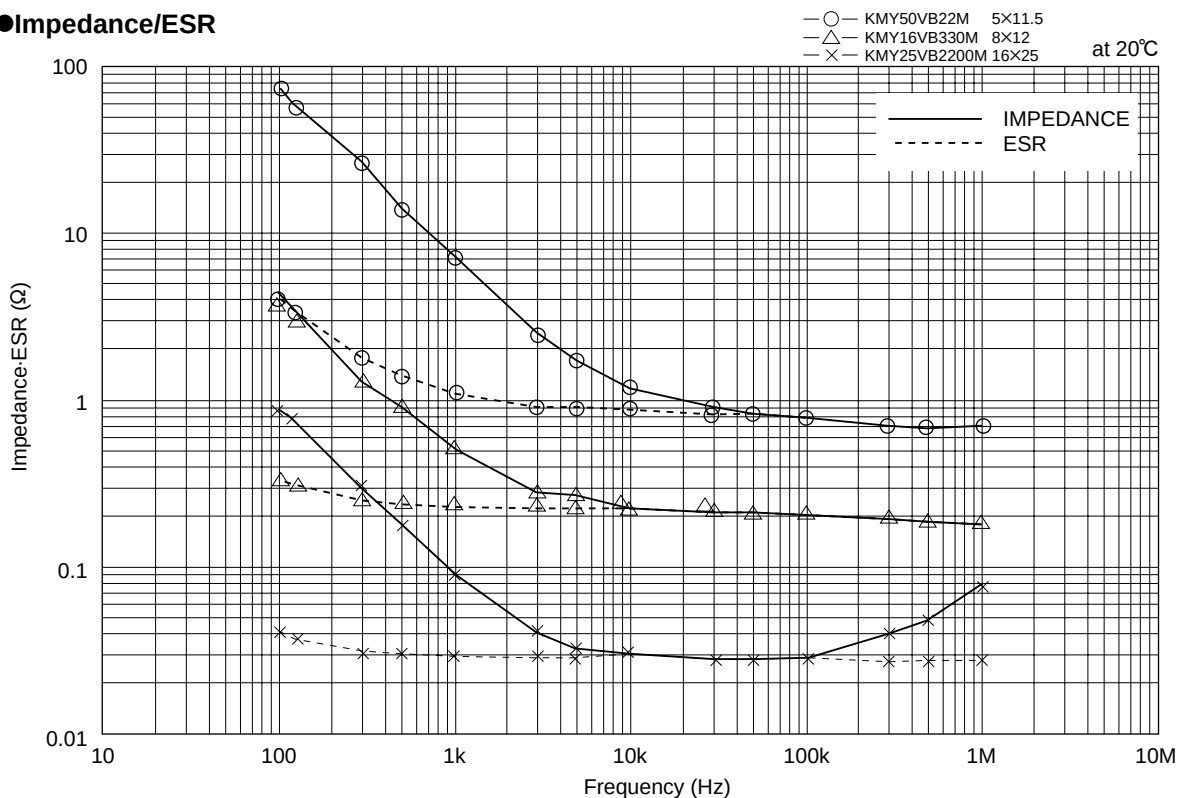
●105°C Endurance



●105°C Shelf Life



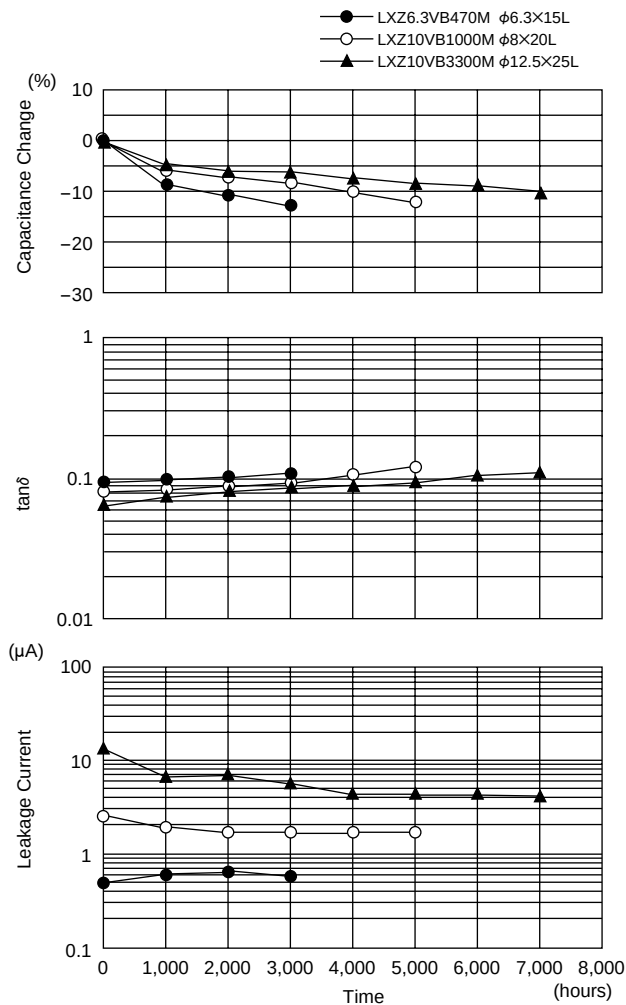
●Impedance/ESR



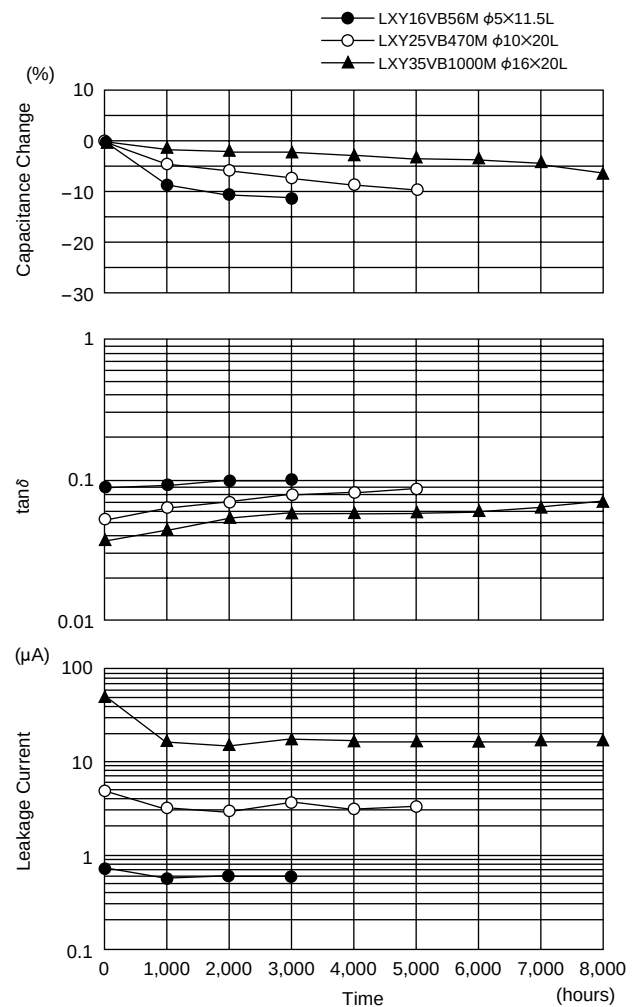
LXZ Series

LXY Series

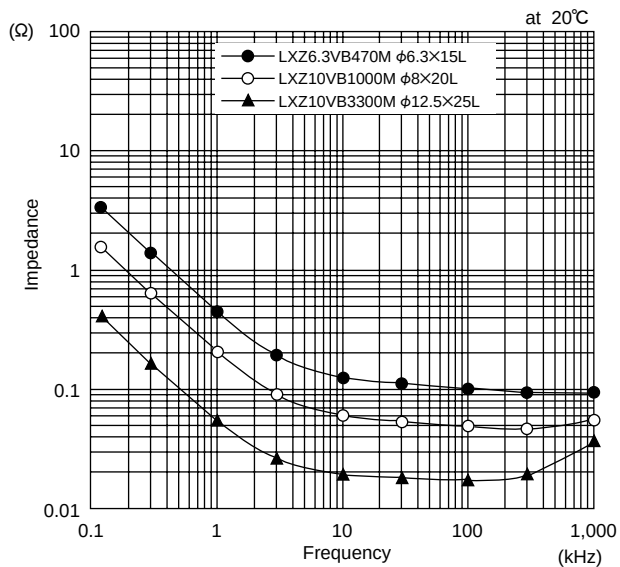
●105°C Endurance with Rated Ripple Current



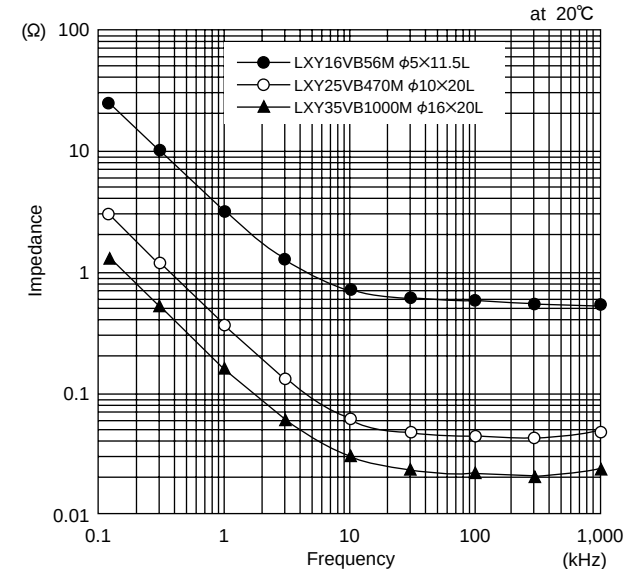
●105°C Endurance with Rated Ripple Current



●Impedance-Frequency Characteristics

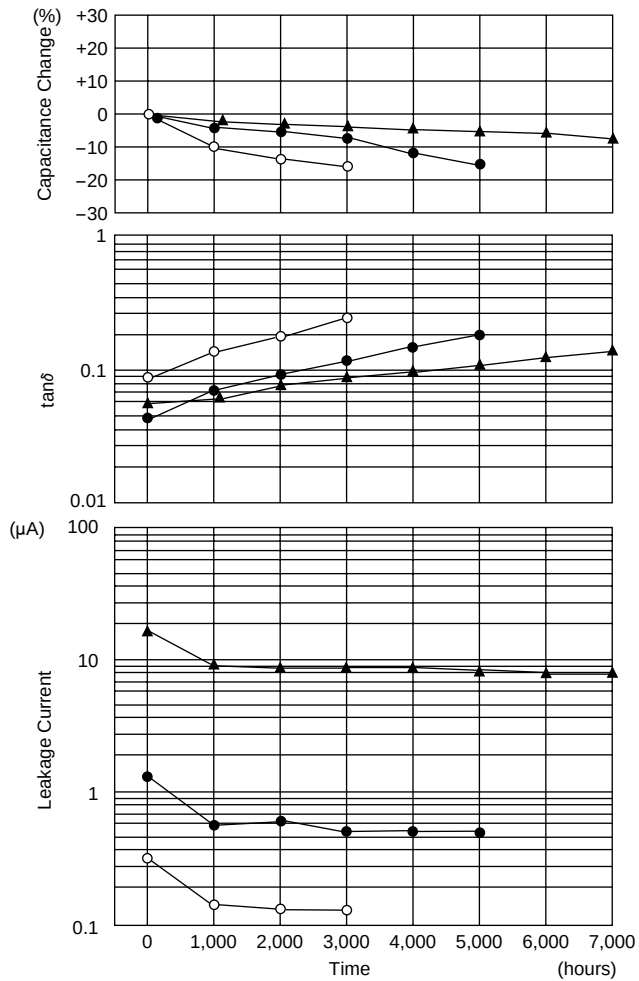


●Impedance-Frequency Characteristics

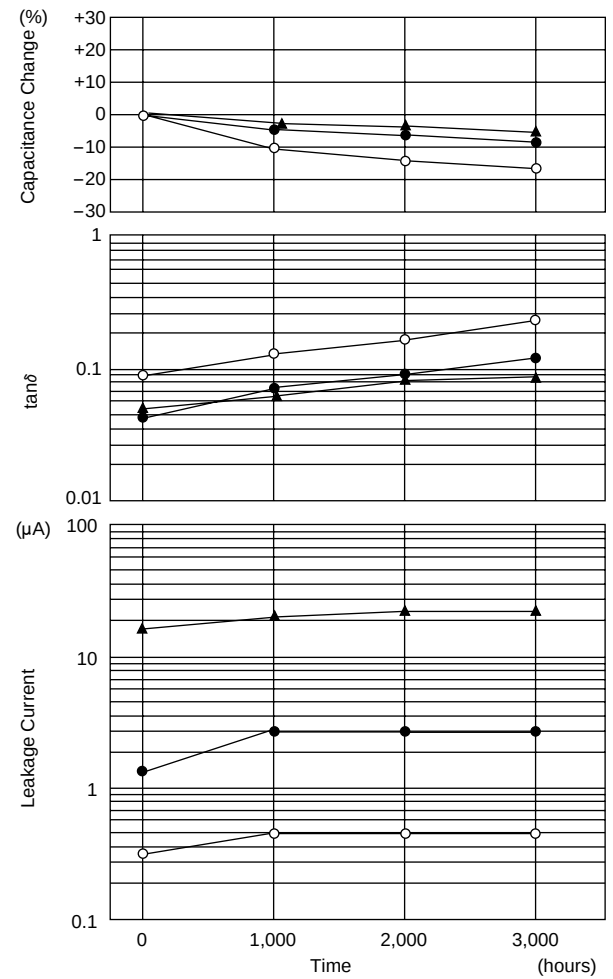


- LXV10VB82M $\phi 5 \times 11.5L$
- LXV25VB220M $\phi 8 \times 15L$
- ▲— LXV35VB560M $\phi 12.5 \times 20L$

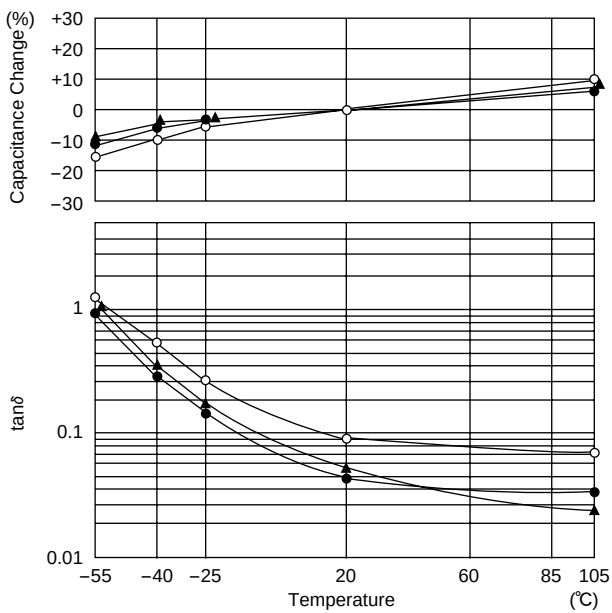
●105°C Endurance with Rated Ripple Current



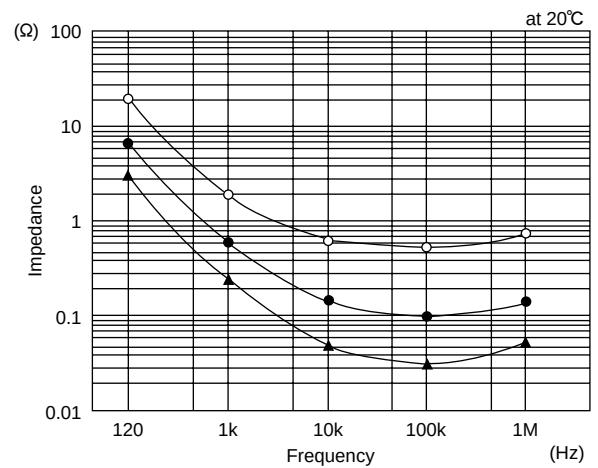
●105°C Shelf Life test



●Temperature Characteristics



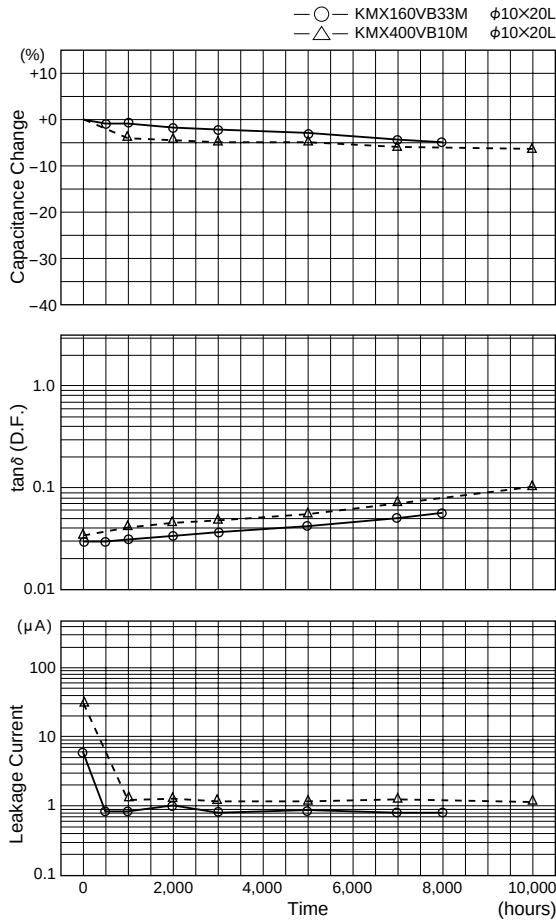
●Impedance-Frequency Characteristics



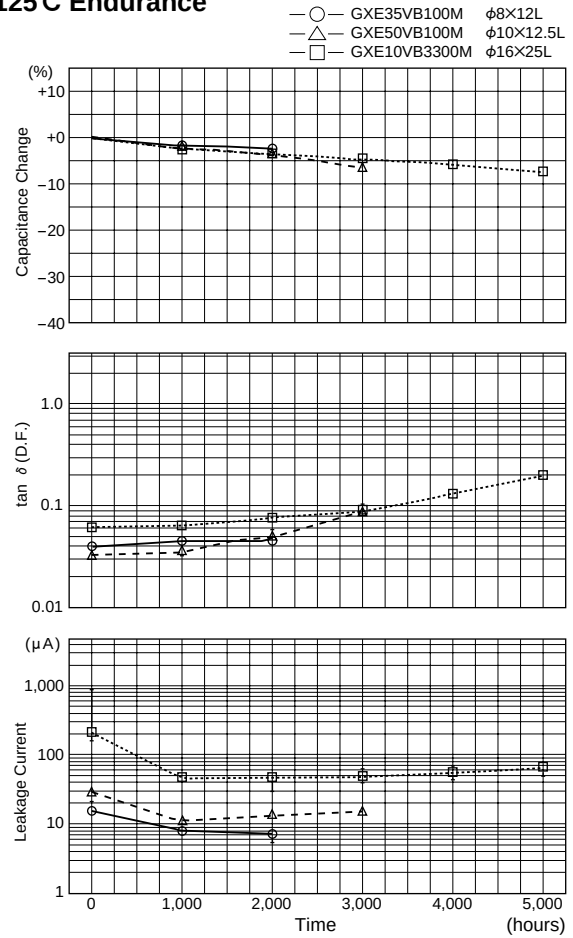
KMX Series

GXE Series

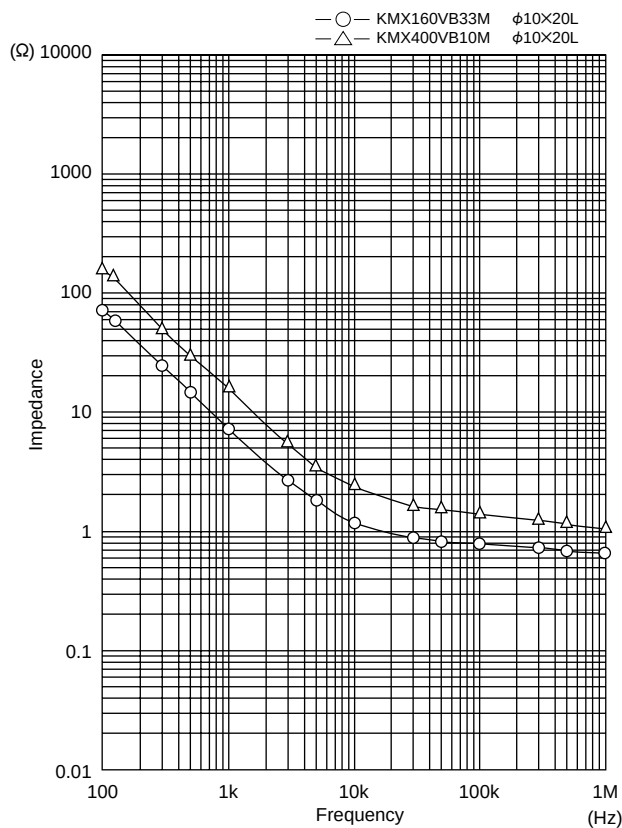
●105°C Endurance with Ripple Current



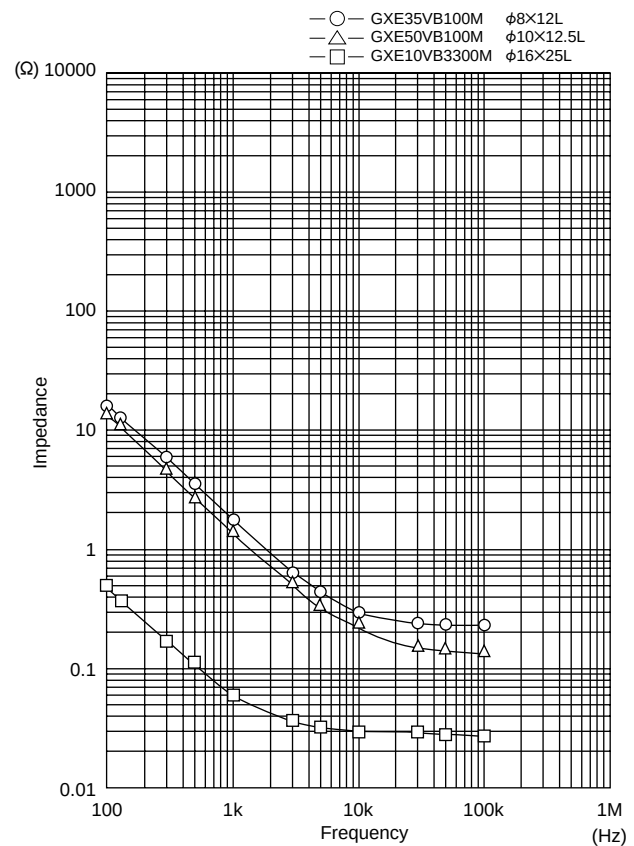
●125°C Endurance



●Impedance-Frequency Characteristics at 20°C



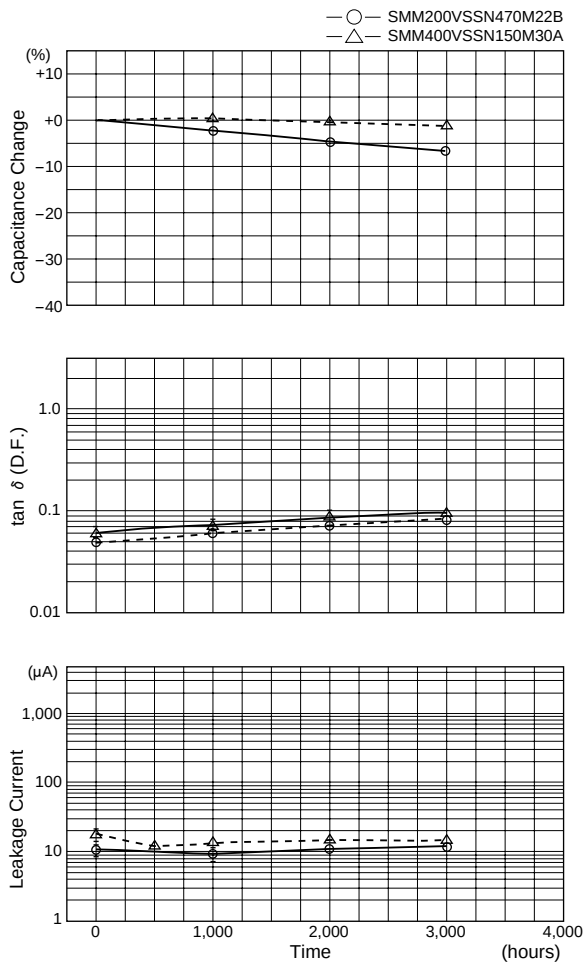
●Impedance-Frequency Characteristics at 20°C



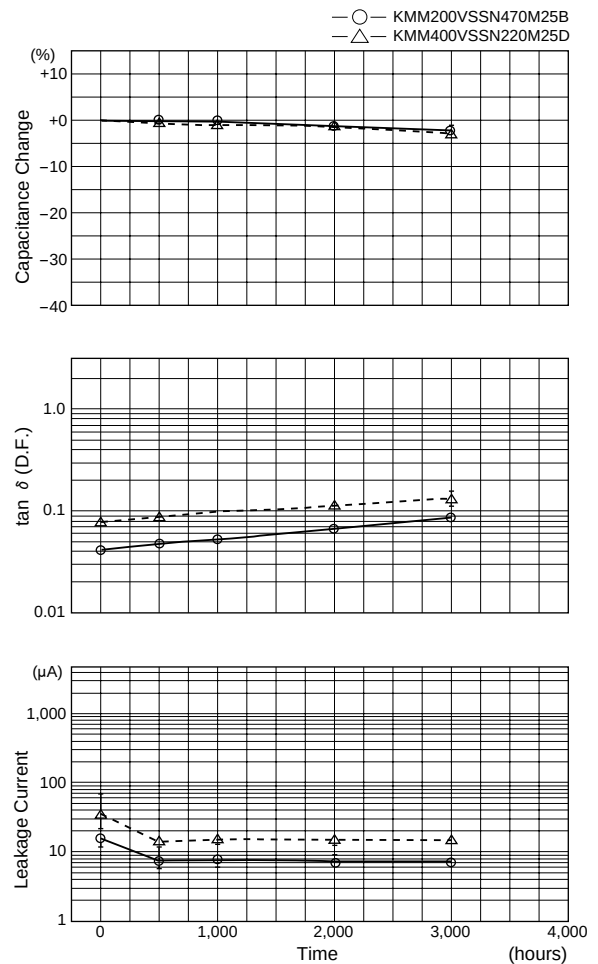
SMMSeries

KMMSeries

●85°C Endurance with Rated Ripple Current



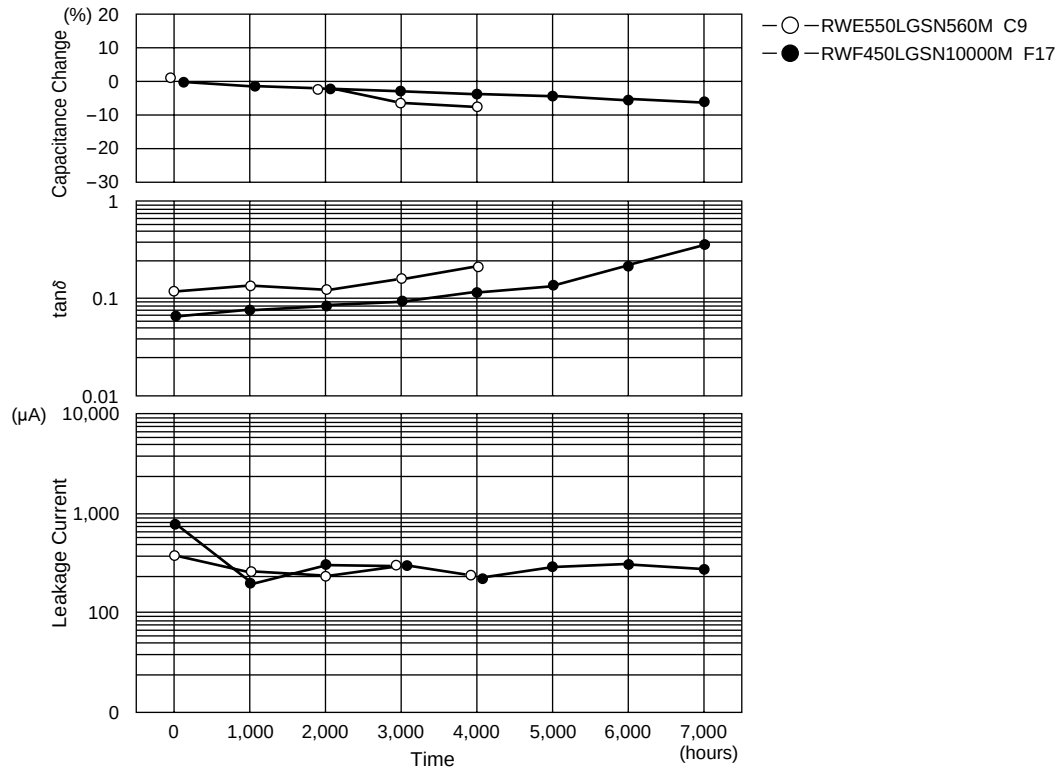
●105°C Endurance with Rated Ripple Current



RWE/RWF/RWL Series

RWE/RWF series

●85°C Endurance with Rated Ripple Current



RWL series

●85°C Endurance with Rated Ripple Current

