SERIES CHART

■ Green-Cap (ELECTRIC DOUBLE LAYER CAPACITORS)

EDLC (Green-Cap)

- **DM** 21 — Green-Cap Module
- **DP** 22 — 60℃ 1000h, Screw Type, High Power Density
- **DE** 23 — 60℃ 1000h, Screw Type, High Energy Density
- **DB** 24 — 70℃ 1000h, Snap-in Type
- **DS** 25 — 70℃ 1000h, Radial Type

■ ALUMINUM ELECTROLYTIC CAPACITORS

● SOLID TYPES

Conductive Polymer (Hi-CAP)

- **FA** 32 — SMD Type (Vertical) → **FH** 34 — SMD Type, Large Capacitance, Low ESR
- **FB** 42 — Lead Type → **FZ** 37 — SMD Type, 5000h, Long Life
- **FJ** 40 — Lead Type, Large Capacitance, Low ESR → **FT** 36 — SMD Type, 125°C 1000h, High Temp.
- **FC** 44 — SMD Type, 1000h → **FN** 39 — SMD Type, 4.5mmL

● CHIP TYPES

85°C Product

- **SC** 49 — 2000h, Standard

Non-Polarized

- **NC** 67 — 85°C 2000h, 5.5mmL, Non-polarized
- **CN** 68 — 105°C 2000h, 5.5mmL, Non-polarized

105°C Product

- **RC** 52 — 5.5mmL, 1000h, Standard → **ZC** 56 — 5.5mmL, 1000h, Low Impedance
- **JC** 54 — 2000h, High CV → **CK** 57 — 2000h, Low Impedance
- **CB** 53 — 5.5mmL, 5000h, Long Life → **CD** 59 — 2000h, Low Impedance
- **CA** 63 — 5000h, Long Life, High CV → **CM** 61 — 5000h, Low Impedance, Long Life

High Reliability

- **CF** 64 — 130°C, High Temp.
- **CT** 65 — 130°C, High Temp., Low Impedance
- **CW** 66 — 150°C, High Temp.

● MINIATURE RADIAL LEAD TYPES

85°C General Use

- **SD** 75 — 2000h, Standard
- **SS** 78 — 7mmL, 2000h
- **SE** 79 — 5mmL, 2000h

105°C General Use

- **RD** 80 — 2000h, Standard
- **RM** 83 — 2000h, Miniature
- **RK** 85 — 7mmL, 1000h
- **RE** 86 — 5mmL, 1000h

105°C Special Type

- **ZS** 87 — 7mmL, 2000h, Low Imp., High Ripple
- **ZE** 88 — 5mmL, 2000h, Low Imp., High Ripple

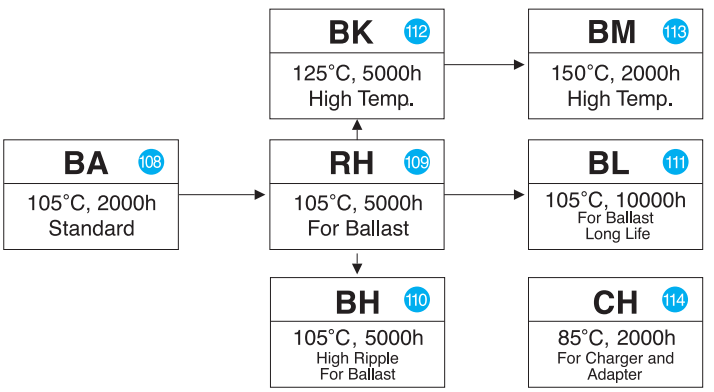
Low Impedance

- **LZ** 104 — 105°C, 10000h, Ultra Low Impedance, Long Life
- **WF** 96 — 105°C, 10000h, Low Impedance, Long Life
- **RP** 94 — 105°C, 10000h, Extremely Low Impedance, Long Life
- **LK** 98 — 105°C, 5000h, Ultra Low Impedance
- UPGRADE **WL** 91 — 105°C, 5000h, Low Impedance, Wide Voltage
- **RZ** 89 — 105°C, 5000h, Extremely Low Impedance, Standard
- UPGRADE **MK** 100 — 105°C, 5000h, Ultra Low Impedance, Miniature, High Ripple
- NEW **MZ** 102 — 105°C, 5000h, Ultra Low Impedance, Miniature, High Ripple
- NEW **ML** 106 — 105°C, 10000h, Ultra Low Impedance, Long Life

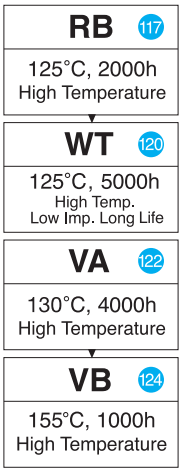
■ ALUMINUM ELECTROLYTIC CAPACITORS

● MINIATURE RADIAL LEAD TYPES

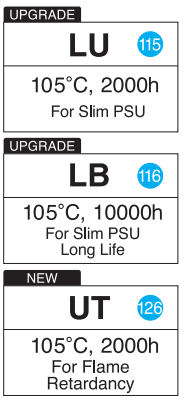
Ballast, Charger, Adapter



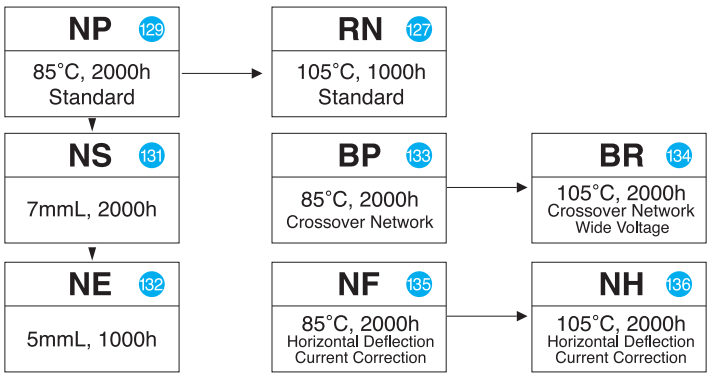
High Reliability



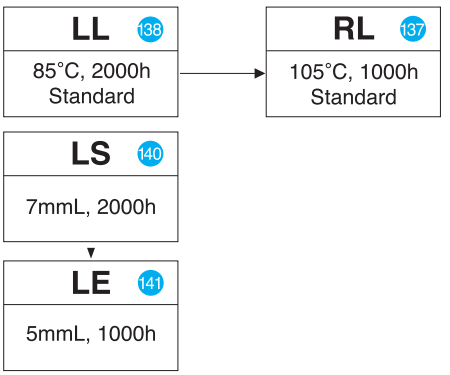
High Reliability



Non-Polarized

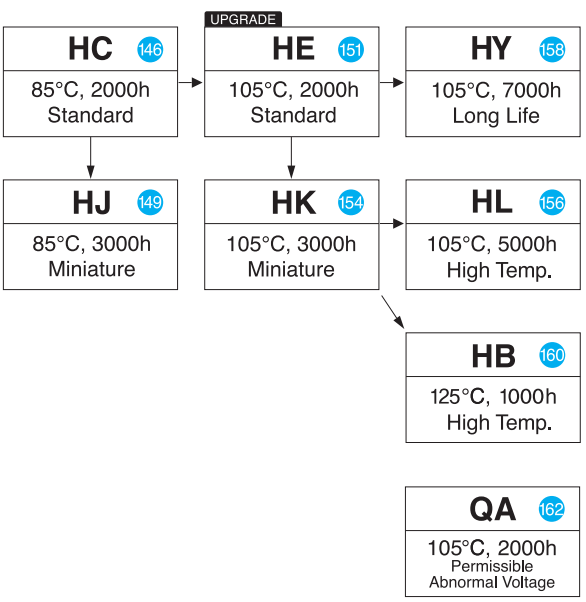


Low Leakage Current

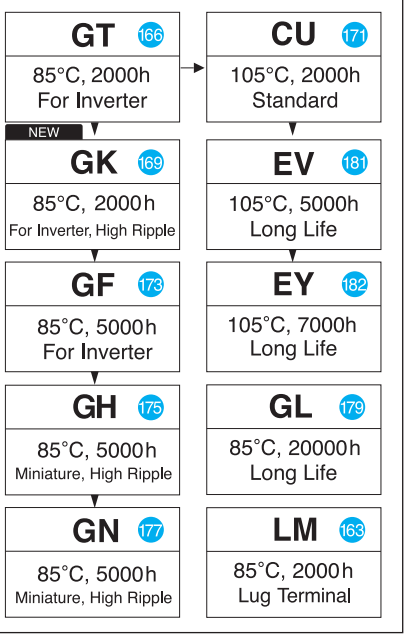


● LARGE TYPES

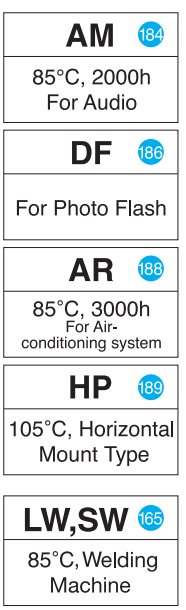
Snap-in Terminal



Screw, Lug Terminal



Special Application



CONTENTS

① Green-Cap (Electric Double Layer Capacitors)

★ New series
☆ Upgrade series

② Polymer Aluminum Electrolytic Capacitors

③ Surface Mount Aluminum Electrolytic Capacitors

④ Miniature Aluminum Electrolytic Capacitors

CONTENTS

★ New series
☆ Upgrade series

⑤ Large Aluminum Electrolytic Capacitors

LIST OF SUBSTITUTE FOR DISCONTINUED SERIES

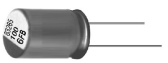
· Production discontinuation of old series at Samwha is implemented as planned.
· Technical documents and samples are available upon the request to study alternative products.

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

Type	Discontinued Series	Characteristics	Obsolete Year	Substitute Series	Page
CHIP TYPE	MC	85˚C miniature	Year 2004	SC	49
	GC	85˚C high CV	Year 2004		
	TC	105˚C high CV	Year 2006	JC	54
	UC	125˚C high CV	Year 2007	CF	64
MINIATURE RADIAL LEAD TYPE	SA	85˚C standard	Year 1996	SD	75
	SG	85˚C standard, 2000 hours	Year 2004		
	GA	85˚C high Voltage	Year 1994		
	SV	85˚C low profile	Year 2006		
	SK	Height 7mm, high CV	Year 1996	SS	78
	RA	105˚C standard	Year 1994	RD	80
	RG	105˚C standard	Year 2004		
	RV	105˚C low profile	Year 2006		
	RX	Low impedance	Year 2002	WL	91
	RT	105˚C 3000 hours	Year 1996		
	RF	105˚C 5000 hours	Year 2000		
	RW	125˚C 2000 hours, standard	Year 2006	BK	112
	WD	Extremely low Impedance, standard	Year 2006	RZ	89
	WA	Extremely low Impedance, miniature	Year 2009		
	RQ	Extremely low Impedance, long life	Year 2006	RP	94
	WB	Ultra low Impedance	Year 2009	MZ	102
	WK	Ultra low Impedance, miniature	Year 2009		
	WH	Extremely ultra low Impedance	Year 2009		
	WN	Ultra low Impedance	Year 2009	ML	106
LARGE TYPE	HM	85˚C standard, snap-in 2000 hours	Year 1999	HC	146
	KL	85˚C standard, snap-in 2000 hours	Year 1996		
	HS	85˚C standard, snap-in 2000 hours	Year 1994		
	HQ	85˚C miniature, snap-in 2000 hours	Year 1996		
	HA	105˚C standard, snap-in 1000 hours	Year 1999	HE	151
	HD	105˚C miniature, snap-in 2000 hours	Year 1996		
	HU	105˚C snap-in, long life	Year 2006	HY	158
	QB	105˚C withstanding overvoltage	Year 2006	QA	162
	SX	Non inductive type, screw terminal	Year 1994	GT	166
	SM	85˚C standard, screw terminal	Year 2006		
	SF	For photo flash	Year 1996	DF	186

· As you are very concerned about world-wide environmental protection, Samwha Electric contributes to minimize banned materials of RoHS law.
· Now we offer completely Lead-free products and non Polyvinyl Chloride(PVC) sleeve products.

Corresponding to RoHS Directive

ITEM	Aluminum electrolytic capacitors		
	SMD type (Solid type)	Lead terminal type (Solid type)	Snap-in(Lug) terminal type
Product Pictures			
Corresponding to RoHS Directive	Complied	Complied	Complied
Cadmium(Cd)	Does not contain.	Does not contain.	Does not contain.
Lead(Pb)			
Mercury(Hg)			
Hexavalent chromium(Cr+6)			
Brominated flame retardants (PBBs, PBDEs)			
Identification for RoHS compliance parts	Parts numbers are not changed.		
Insulating sleeves	Not used	Replaced with P.E.T. Marking “PET” or “P” is indicated on sleeve materials.	
Bottom plate	–	–	Replaced with P.P.

Lead Free Capacitor(terminal plating & soldering heat resistance)

ITEM	Aluminum electrolytic capacitors		
	SMD type (Solid type)	Lead terminal type (Solid type)	Snap-in(Lug) terminal type
Construction of terminals.	Fe / Cu / Sn(Fe / Cu / Ag). ( ) Solid type.		
Plating on terminal	Changed plating from Sn-Pb to Sn(Ag)100%. ( ) Solid type.		
Heat resistance of soldering (Please contact us for detail.)	Recommended reflow soldering ØD 3~10:250˚C, 10 sec. Max. ØD=12.5:240˚C, 10 sec. Max. ØD≧16:230˚C, 10 sec. Max.	Recommended flow soldering condition : 260˚C, 10 sec. Max.	
Whisker	60˚C / RH 90% 2,000 hours, -55 / +85˚C 2,000 cycle, room temp. 2,000 hours. No difference with Sn-Pb.(Whisker is not observed.). ( ) Snap-in(Lug) type.		
Lead(Pb) - free marking	Add “Lead-free” marking as left side on inner and outer carton box.		
Solderability tensile strength	No difference with Sn-Pb		
Identification for Lead(Pb) free compliance parts	Parts numbers are not changed.		

ENVIRONMENTAL FRIENDLY CAPACITORS

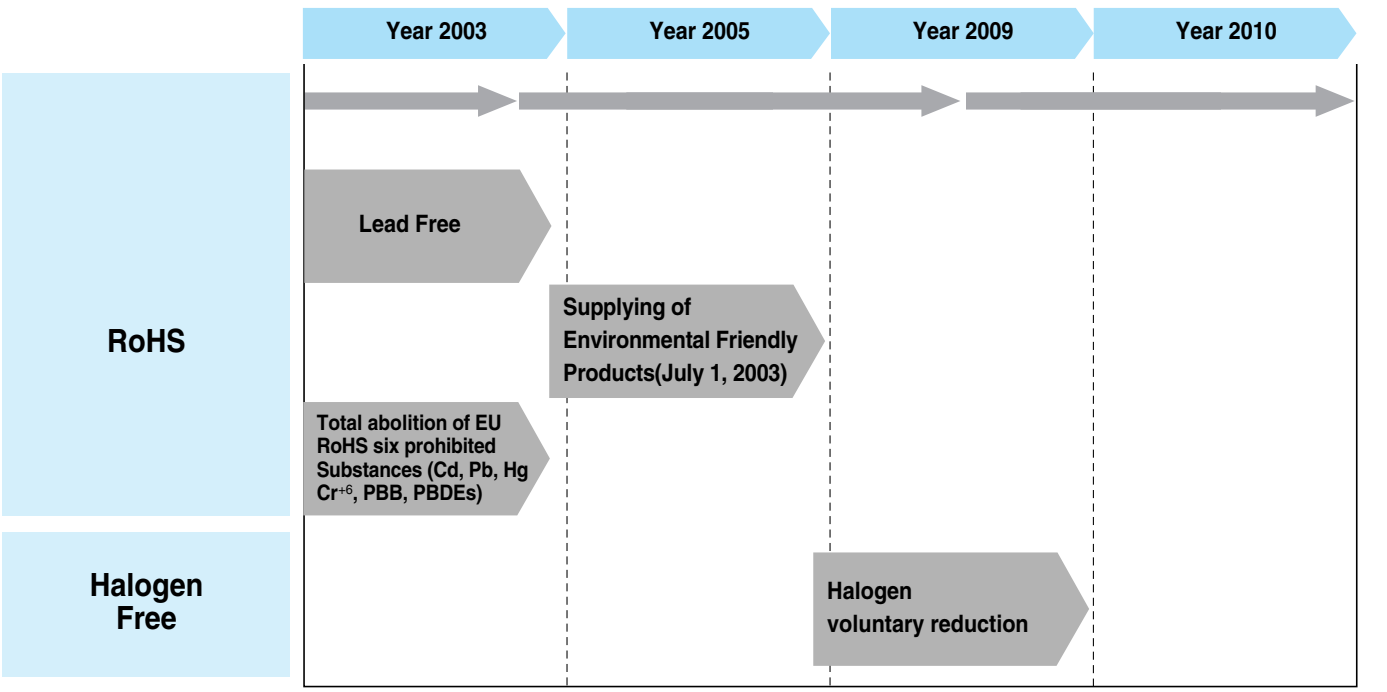
Background

EU declared RoHS law to restrict the using of six hazardous substances. (February, 2003)
(Pb, Cd, Cr^{6+}, Hg, PBBs, PBDEs)

Law	Contents	Enforcement date
RoHS	The using restriction of six hazardous substances. (Pb, Cd, Cr^{6+}, Hg, PBBs, PBDEs)	July 1, 2006.
WEEE	Restriction of Recovery / Recycle rate	January 1, 2007.
EuE	Environmental Friendly Design	Enacting

- RoHS : Restriction of Hazardous Substances
- EuE : Ecodesign of End Use Equipment
- PBBs : Polybrominated Biphenyls
- WEEE : Waste Electrical and Electronic Equipment
- PBDEs : Polybrominated Diphenyl Ethers

Road map of Environmental Friendly Products & Status



Application guidelines

Correct application and strict adherence to the important information listed below, will be ensure optimum performance of the capacitors over their entire specified life.

전해 커패시터를 사용할 때 다음 사항에 주의하시기 바랍니다.

1. POLARITY

If you should reverse the polarities of a aluminum electrolytic capacitor, it would lead to short-circuited circuitry and may further result in an explosion if the unit is kept energized. SAMWHA offers unit of ∅6.3 or more with safety vent design as the standard type in order to prevent possible accidents that may take place if the unit should be connected with its polarities reversed.
It is advisable to use non-polar capacitors for a DC circuit where the polarity is to be reversed.

1. 극성

알루미늄 전해 커패시터의 극성을 逆으로 사용하면 회로가 短絡되거나 커패시터가 폭발할 수 있습니다. 극성이 逆으로 사용될 경우 발생 가능한 사고를 방지하기 위하여 ∅6.3이상의 표준품은 防爆 구조를 갖도록 설계됩니다.
극성이 불분명하거나, 때때로 극성이 반전되는 DC 회로에는 무극성 전해 커패시터를 사용하십시오.

2. OVERVOLTAGE

Do not apply overvoltage. When overvoltage is applied to the capacitor, leakage current increase drastically, causing heat generation, short-circuit or breakage.

2. 과전압

과전압을 인가하지 마십시오.
과전압이 커패시터에 인가되면 누설전류가 급격히 증가하며, 이것은 發熱이나 회로 短絡의 원인이 됩니다.

3. RIPPLE LOAD

The rated ripple current given for certain conditions(Temperature, Frequency) shall not be exceeded. If so, early failure may result.
The sum of DC-bias and maximum amplitude of ripple voltage shall be within rated voltage and 0V. Electrolytic capacitors are not normally designed for AC application.

3. 리플 부하

정해진 조건(온도, 주파수)에 맞는 정격 리플전류를 초과하지 마십시오. 정격치 이상의 리플전류가 커패시터에 흐르게 되면 초기 고장이 발생할 수 있습니다.
직류 바이어스 전압과 리플전압의 합은 0V에서부터 정격전압 以內이어야 합니다.
전해 커패시터는 AC 응용을 할 수 없습니다.

4. TEMPERATURE RANGE

Use the electrolytic capacitors according to the specified operating temperature range. Usage at room temperature will ensure longer life.

4. 온도 범위

알루미늄 전해 커패시터는 정격사용온도범위 內에서 사용해야 합니다. 常溫에서 사용하면 수명을 연장시키는 효과를 얻을 수 있습니다.

5. CHARGE/DISCHARGE

If used in circuits in which charge and discharge are frequently repeated, the capacitance value may drop, or the capacitor may be damaged. Please consult our technical department for assistance in these applications.

5. 충방전

충방전이 계속 반복되는 회로에 사용하면 정전용량이 감소하고 커패시터가 폭파될 수 있습니다. 이러한 회로에 제품을 적용시킬 경우 저희 회사 기술연구소로 연락 바랍니다.

6. FOR SERIES CONNECTION

Aluminum electrolytic capacitors may be connected in series, but when doing so it should be noted that the voltage distribution will be according to their leakage currents. This phenomenon may induce irregularities in voltage load and cause maximum ratings to be exceeded, this could have drastic consequences especially with high voltage capacitors. Series connected electrolytic capacitors should therefore be supplied the voltages shall be proportionally distributed by balancing resistors.

6. 직렬 연결

알루미늄 전해 커패시터는 직렬로 연결하여 사용할 수 있습니다. 그러나 직렬 연결 사용시 누설전류에 의한 전압의 배분에 주의하시기 바랍니다. 누설전류에 의한 전압의 배분은 불규칙한 부하전압을 유발할 수 있으며, 정격전압의 최고치를 초과할 수도 있습니다. 직렬로 연결된 커패시터에는 전위차조정저항(balancing resistor)으로 적절히 배분된 전압을 인가하십시오.

7. FOR PARALLEL CONNECTION

When you install more than 2 capacitors in parallel, consider the balance of current flowing into the capacitors.

7. 병렬 연결

두 개 이상의 커패시터를 병렬로 연결할 때 커패시터에 흐르는 전류의 배분을 고려하여 주십시오.

8. LEAD STRESS

Do not apply excessive force to the lead wires or terminals. If excessive force is applied to the lead wires and/or terminals, they may break and cause an open circuit. After mounting, avoid holding or applying force to the capacitor. Do not twist or carry the PC board by grasping the capacitor body after the capacitor are soldered to the PC board.

8. 리드 스트레스

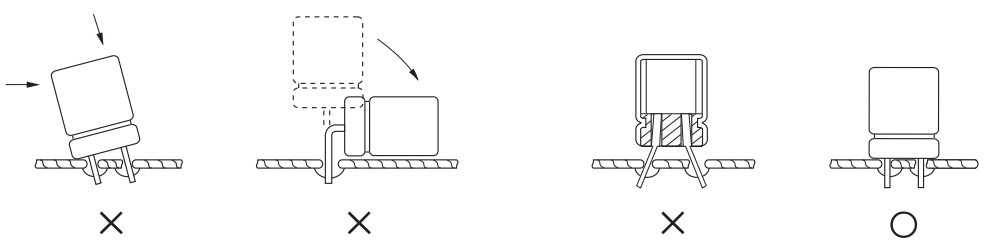
커패시터의 리드선이나 단자에 무리한 힘을 가하지 마십시오.
리드선이나 단자의 단선 및 회로의 開放을 초래할 수 있습니다.
기판 장착 후에도 커패시터에 무리한 힘을 가하지 마십시오.
회로기판에 장착 후 커패시터를 잡고 이동하거나 비틀지 마십시오.

9. MOUNTING

The distance between the terminal holes on the circuit board should be the same as that between the lead wires or terminals of the capacitor. Excessive force in mounting on circuit boards should be avoided.
Improper insertion of the lead wires in circuit board may cause electrolyte leakage, break the lead wires or impair their connection with the internal elements.
When the distance between the two terminal holes on the circuit board cannot be reduced to that between the lead wires, lead formed capacitors are recommended.

9. 기판 장착

회로기판에서 단자 홀(hole) 간격은 커패시터의 리드선이나 단자간의 간격과 같아야 합니다.
회로기판에 장착시 무리한 힘을 가하지 마십시오.
회로기판에 리드선을 무리하게 삽입할 경우 전해액의 누설, 리드선의 손상, 내부 요소와의 接續부위의 파손 등이 발생할 수 있습니다.
회로기판의 홀(hole) 간격과 리드선의 간격이 맞지 않을 때에는 리드선이 가공된 커패시터를 사용하십시오.



The main chemical solution of the electrolyte and the separator paper used in the capacitors are combustible. The electrolyte is conductive. When it comes in contact with the PC board, there is a possibility of pattern corrosion or short circuit between the circuit pattern which could in result smoking or catching fire. Do not locate any circuit pattern beneath the capacitor end seal.

커패시터에 사용된 전해액의 주 용매와 전해지는 가연성이며 전해액은 전도성 재질입니다.
회로기판에 전해액이 묻을 경우 패턴이 부식되거나 회로 패턴사이에 쇼트되어 발화될 수도 있으므로 커패시터 봉입구 밑에는 어떠한 회로 패턴도 설치하지 말아주십시오.

In order to prevent possible damage by vibration on the circuit board, kindly bond our capacitors on the circuit board or use any fastening devices.

진동으로 문제시되는 회로기판에 장착하는 경우에는 반드시 기판과 제품 바닥면을 접착시키거나 별도의 고정 장치를 사용하십시오.

RADIAL TYPE	over Ø12.5 or 25mmL
SNAP-IN TYPE	over Ø22 or 40mmL

RADIAL TYPE	Ø12.5, L치수 25mmL 이상 제품
SNAP-IN TYPE	Ø22, L치수 40mmL 이상 제품

There should not be any circuit pattern or circuit wire above the capacitor safety vent.

커패시터의 안전 변 위에 회로 패턴이나 배선이 없도록 하여 주십시오.

Unless otherwise specified, following space should be made above the capacitor safety vent.

Case diameter	Ø6.3~Ø16	Ø18~Ø35	Ø40~
Space	2mm min.	3mm min.	5mm min

If the capacitor safety vent is placed toward circuit board, the hole should be made to match the capacitor vent position.

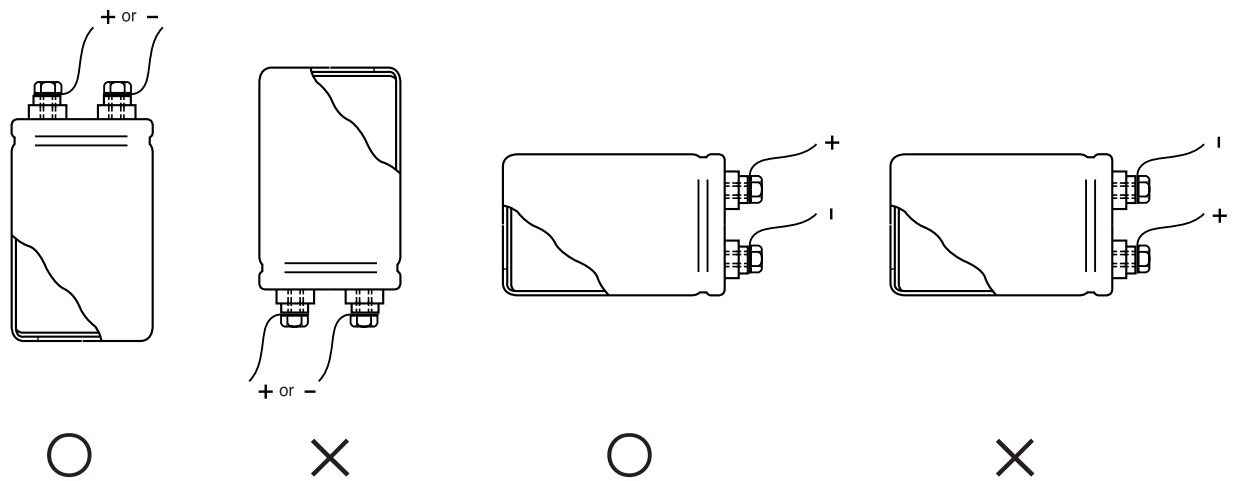
Do not install screw terminal capacitor with end seal side down. When you install a screw terminal capacitor in a horizontal mount, the positive terminal must be in the upper position.

만약 그렇지 못하면 다음과 같이 안전 변이 작동할 수 있는 공간이 있어야 합니다.

Case diameter	Ø6.3~Ø16	Ø18~Ø35	Ø40~
Space	2mm 이상	3mm 이상	5mm 이상

만약 커패시터의 안전 변이 회로 기판으로 향한다면, 커패시터 안전 변 위치의 기판에 구멍을 설치해야 합니다.

Screw 단자형 커패시터의 봉입구를 아래로 향하게 하지 말아 주십시오. 제품을 옆으로 눕혀 사용할 경우에는 양극 단자를 위로 향하도록 하여 주십시오.



10. SOLDERING

In the dip soldering process of PC board with aluminum electrolytic capacitors mounted, secondary shrinking or crack of the sleeve may be observed when solder temperature is too high and/or dipping time is too long.
If the lead wire of other components or pattern of bothsided PC board is close to the capacitor terminal the similar failure may be also originated.

Please avoid having flux adhere to any portion except the terminal. Solder iron does not touch any portion of capacitor body.

10. 납땜

알루미늄 전해 커패시터가 裝着된 인쇄회로기판의 침적납땜 공정에서 납땜 온도가 너무 높거나, 지나치게 오랫동안 침적할 경우 슬리브의 2차 수축이나 갈라짐이 발생할 수 있습니다. 양면 인쇄회로기판의 패턴이나 다른 부품의 리드선과 커패시터의 단자가 아주 근접할 경우에도 위와 같은 슬리브의 이상이 발생할 수 있습니다.

단자이외의 부분에 플럭스가 묻지 않도록 하여 주시고 커패시터에 납땜 인두가 닿지 않도록 하여 주십시오.

11. Cleaning, Mounting of the PCB after soldering

1)When you clean a PCB, halogen cleaning agents can cause corrosion of aluminum foil and lead tab. If you need to clean, please replace Isopropyl Alcohol(IPA), Water as halogenated cleaning atents.

2)5minutes either by ultrasonic, vapor or immersion cleaning method.(chip type : 2minutes) Becareful not to apply mechanical stress to the terminals or lead wires

11. 납땜 후 회로기판 세정

1)인쇄회로기판 세정시 할로겐계의 세정제가 커패시터의 내부에 침투하게 되면 알루미늄 호일과 리드에 부식의 원인이 될 수 있습니다. 세척이 필요한 경우에는 할로겐계 세정제 대신 이소프로필 알콜이나 물을 사용하십시오.

2)세정조건은 초음파, 증기, 침적 등의 세척 방법에 대하여 5분(단 chip type은 2분) 단자나 리드선에 기계적인 힘이 가해지지 않도록 주의 하십시오.

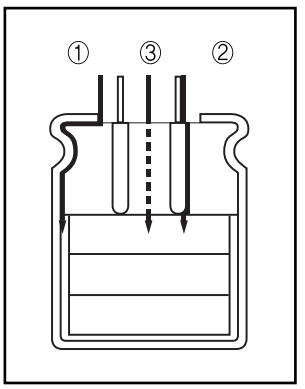
3)Common type of halogenated cleaning agents are listed below

Chemical Name	Structural Formula	Representatice Brand Name
Trichlorotrifluoroethane	$C_2 Cl_3 F_3$	Freon TF, Daiflon S-3
Fluorotrichloromethane	$CCl_3 F$	Freon-11, Daiflon S-1
1,1,1-Trichloroethane	$C_2 H_3 Cl_3$	Cholroethene
Trichloroethylene	$C_2 HCl_3$	Trichlene
Methyl Chloride	$CH_3 Cl$	MC

Don't use the solvents listed above as clearning solvent agents even for solvents proof capacitors, because it has strong chemical reaction.

4)When using a latex-based adhesive on the capacitor's rubber end seal for adhesion to a PCB, corrosion may occur depending on the kind of solvent in the adhesive. Select an adhesive as an organic solvent with dissolved polymer that is not halogenated hydrocarbon.

5)Penetration Channel of Solvent and Corrosion Mechanism



①Penetration between the rubber and the aluminum case
②Penetration between the rubber and the lead wires
③Penetration through the rubber
Cl-gotten inside a capacitor reacts with aluminum.
$Al + 3Cl^- \rightarrow AlCl_3 + 3e^-$
Then, $AlCl_3$ resolves in water
$AlCl_3 + 3H_2O \rightarrow Al(OH)_3 + 3H^+ + 3Cl^-$
Thus, the Cl^- ion is freed again and repeats the corrosion of aluminum.

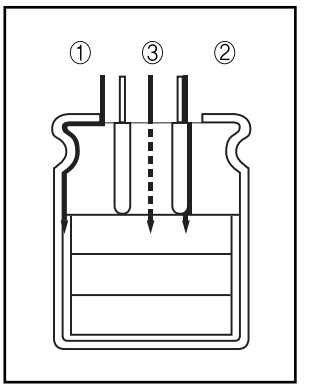
3)할로겐계의 세정제의 일반적 유형은 아래의 표와 같다.

화 학 명	구조식	대표 상품명
Trichlorotrifluoroethane	$C_2 Cl_3 F_3$	Freon TF, Daiflon S-3
Fluorotrichloromethane	$CCl_3 F$	Freon-11, Daiflon S-1
1,1,1-Trichloroethane	$C_2 H_3 Cl_3$	Cholroethene
Trichloroethylene	$C_2 HCl_3$	Trichlene
Methyl Chloride	$CH_3 Cl$	MC

위의 표에 열거한 물질들은 반응성이 매우 강하므로 내세척용 커패시터의 경우에도 세정제로 사용해선 안됩니다.

4)커패시터의 밀폐용 고무에 고무계의 접착제를 사용하여 인쇄 회로 기판에 접착할 경우, 접착제의 종류에 따라 커패시터의 부식이 발생할 수 있습니다. 접착제로서는 할로겐화되지 않는 유용성 폴리머로 구성된 유기용제를 선택하십시오. 코팅(coating)을 행할 경우 제품과 기판간에 세정액이 남지 않도록 세정 직후 50~80℃에서 열풍 건조하여 주시기 바랍니다.

5)용제의 침투경로 및 반응 메커니즘



①밀폐용 고무와 알루미늄 케이스 사이로 침투
②밀폐용 고무와 리드선 사이로 침투
③밀폐용 고무를 통과하여 침투
커패시터의 내부로 침투한 염소 이온은 아래와 같이 알루미늄과 반응을 한다.
$Al + 3Cl^- \rightarrow AlCl_3 + 3e^-$
이때 $AlCl_3$는 물에 녹아 아래와 같이 된다.
$AlCl_3 + 3H_2O \rightarrow Al(OH)_3 + 3H^+ + 3Cl^-$
그래서 염소이온(Cl^-)은 다시 자유전자가 되어 알루미늄을 부식시킨다.

12. INSULATION MATERIAL

Sleeve material
The standard sleeve material is P.V.C or P.E.T if exposed to xylene, toluene, etc. and then subjected to high heat, the sleeve may crack.

Case and cathode terminal
The case of capacitor is not insulated from the cathode terminal.

Dummy terminals for snap-in type
Dummy terminals are not insulated from the element.
Dummy terminals are for added stability only, and should never be electrically connected to either the positive or negative terminal.

12. 절연

슬리브 재질
표준 슬리브의 재질은 P.V.C 또는 P.E.T이며, 크실렌이나 톨루엔에 노출되거나, 커패시터가 高熱의 환경에서 사용된다면 슬리브가 갈라질 수 있습니다.

케이스와 음극단자
커패시터의 케이스와 음극단자는 절연이 되지 않습니다.

SNAP-IN 단자형 제품의 보조단자
보조단자는 내부요소와 절연이 되지 않습니다.
보조단자는 커패시터를 견고하게 고정시키기 위한 것이므로 양극단자나 음극단자와 전기적인 연결이 없어야 합니다.

13. STORAGE

Do not store the capacitors in high temperature and high humidity conditions. Avoid direct sunlight.
(Recommendable conditions : 5 to 35℃, 75% or below RH)
Store the capacitors in the package.
Capacitors should not be direct contact with water, brine or oil. Capacitors must not be exposed to toxic gases such as hydrogen sulfide, sulfurous acid, nitrous acid, chlorine, or ammonium.

Capacitors should be stored sealed in bag until they are actually used.
Once the sealed bag is cut open, all the parts should be used at one time. If not, then the remaining parts should be places in a bag and sealed with tape.
In order to maintain a good solderability of the parts, shelf life of parts should not exceed 1 year.

When the capacitor is stored for a long time without applying voltage, leakage current tends to increase, due to deterioration of aluminum oxide film. This returns to normal by applying voltage. Apply voltage(Aging) before use if the capacitor is stored long time.
It is recommended to apply DC working voltage to the capacitor for 30 minutes through 1kΩ of protective series resistor.

13. 보관

커패시터를 고온, 다습 또는 직사광선의 환경에서 저장하지 마십시오.
(적정 조건 : 5~35℃, 75% 이하의 상대습도)
커패시터를 포장된 상태로 보관하여 주십시오. 커패시터에 물, 소금물 또는 기름이 직접 닿지 않도록 주의하여 주십시오.
커패시터를 유화수소, 아황산, 질산 염소, 암모늄 등의 유해한 가스에 노출된 환경에서 보관하지 말아 주십시오.

커패시터를 실제 사용하기 전까지 밀봉된 Bag에 넣어 보관하세요. 밀봉된 포장을 뜯은 후 모든 부품을 즉시 사용하세요. 전부 사용하지 않는다면, 남은 부품은 Bag에 넣어 테이프로 밀봉해 보관하세요.
부품들의 수명과 우수한 납땜성을 유지하기 위해서는 방치 후 1년을 초과하지 않아야 합니다.

전압을 인가하지 않은 상태에서 장기간 보관된 커패시터는 누설전류가 증가하는 경향이 있습니다.
그러나 커패시터에 전압을 인가하면 정상으로 환원됩니다. 장기간 보관되었던 커패시터는 전압처리 후 사용하여 주십시오.
전압처리는 1kΩ 의 보호저항을 통해 직류 정격전압을 30분 동안 인가해야 합니다.

14. EMERGENCY ACTION

When the safety vent is Open and some gas blows out from the capacitor, please turn the main swich of the equipment off or pull out the plug the power outlet immediately.

14. 응급 조치

커패시터 사용 중 커패시터 안전 변이 열려 Gas가 분출될 경우 SET의 전원 장치의 스위치를 끄거나 플러그를 즉시 뽑아 주십시요.

During vent operation, extremly hot gas(over 100℃) and electrolyte may blow out from the capacitors. Do not stand close to the capacitors. In case of eye contact, flush the poen eyes with large amout or clean water immediately, do not swallow. do not touch electrlyte but wash skin with soap and water in case of skin contact.

커패시터의 안전변 동작시 +100℃를 초과하는 Gas 분출 및 전해액이 흘러 내릴 수 있으므로 가까이 다가가지 마십시요. 분출한 Gas가 눈에 들어가거나 흡입한 경우에는 즉시 물로 눈을 씻거나 삼키지 말고 입안을 닦아주시기 바랍니다. 전해액은 만지지 말고 만약 피부에 묻었을 경우 물이나 비누로 닦아 주십시요.

15. DESTRUCTING CAPACITORS & OTHERS

In case of destructing our capacitors, Burn capacitors up after making holeson them or scrapping. When you try to destrory them by fire, you may expect explosion in the capacitors.

15. 커패시터 폐기 및 기타

커패시터를 폐기할 경우에는 구멍을 내거나 충분히 부순 후에 소각하여 주십시요. 소각시 커패시터가 폭발하는 경우도 있습니다.

In order to prevent hazardous gas like chlorine gas, burn our capacitors on high temperature range. Burning sleeve on low temperature may cause producting chlorine gas.

커패시터는 외장 슬리브(폴리염화비닐)가 씌여져 있기 때문에 고온 소각을 하여 주십시요. 저온 소각을 하면 염소 Gas 등의 유해 Gas가 발생하는 원인이 됩니다.

When you do not have burning facilities, please contact special industrial wastes processing companies.

커패시터를 소각하지 않은 경우에는 전문 산업폐기물 처리업체에 의뢰하여 주십시요.

Capacitors may accumulate charge maturally during long storage time. In this case, the capacitors should be subject to voltage treatment through about 1kΩ resistor before use.

커패시터는 재기 전압이 발생할 경우가 있습니다. 이런 경우에는 사용 전에 약 1kΩ의 저항을 통해 방전 처리 후 사용하여 주십시요.

since it has possibilities for electric shock or burns, kindly, discharge it at the level of 1kΩ in advance.(sufficient and safe resistance values should be considered before applying)

감전 및 화상의 우려가 있으므로 사용전에 1kΩ(전압, 용량에 따라 충분히 여유를 고려한 저항 선택)의 저항을 통해서 방전처리를 해 주십시요.

Capacitors case size and other product standards specified in this catalog may be changed or modified without notice for improvement of quality.

카다로그에 규정된 제품 사이즈 및 제품 기준은 품질 개선의 필요성으로 인하여 귀사에 통지없이 변경될 수 있습니다.

General introduction

Rated capacitance
The capacitance value for which the capacitor has been designed and which is usually indicated upon it.

Tolerance on rated capacitance
Preferred values of tolerance on rated capacitance are:
-20/+20%, -10/+20%, -10/+30%, -10/+50%, -10/+10%

Rated voltage
The maximum direct voltage, or peak value of pulse voltage which may be applied continuously to a capacitor at any temperature within operating temperature range.

Ripple voltage
An alternating voltage may be applied, provided that the peak voltage resulting from the alternating voltage, when superimposed on the direct voltage, does not exceed the value of rated voltage or fall under 0V and that the ripple current is not exceeded.

Surge voltage
The maximum instantaneous voltage which may be applied to the terminations of the capacitor for a specified time at any temperature with the operating temperature range.

Rated voltage (VDC)	4	6.3	10	16	25	35
Surge voltage (VDC)	5	8	13	20	32	44

Rated voltage (VDC)	40	50	63	80	100	160
Surge voltage (VDC)	50	63	79	100	125	200

Rated voltage (VDC)	200	250	315	350	400	450
Surge voltage (VDC)	250	300	365	400	450	500

Equivalent series resistance (ESR)
The ESR of an equivalent circuit having capacitance, inductance and resistance in series measured with alternating current of approximately sinusoidal waveform at a specified frequency.

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

where,
f = measurement frequency (120Hz)
C = measurement capacitance (F)

Dissipation factor (tanδ)
The power loss of the capacitor divided by the reactive power of the capacitor at a sinusoidal voltage of specified frequency.

Leakage current
Leakage current flows through a capacitor when DC voltage is applied in correct polarity. It is dependent on voltage, temperature and time.

Ripple current
Any pulsating voltage (or ripple voltage superimposed on DC bias) across a capacitor results in an alternating current through the capacitor. Because of ohmic and dielectric losses in the capacitor, this alternating current produced an increase of temperature in the capacitor cell. The capacitor should be used within specified permissible ripple current in each standard products table.
In other condition of ambient temperature and frequency, ripple current multiplied by following multiplier can be applied as maximum permissible ripple current.

*frequency coefficient

1. SMD type aluminum electrolytic capacitors

Frequency	50Hz	120Hz	300Hz	1kHz	10kHz~
Coefficient	0.70	1.00	1.17	1.36	1.50

2. Miniature aluminum electrolytic capacitors

WV	μF \ Frequency	50Hz	120Hz	300Hz	1kHz	10kHz~
6.3~100	~ 47	0.75	1.00	1.35	1.55	2.00
	68 ~ 680	0.80	1.00	1.25	1.35	1.50
	1000 ~	0.85	1.00	1.10	1.15	1.15
160~500	0.47 ~ 220	0.80	1.00	1.25	1.40	1.60
	330 ~	0.90	1.00	1.10	1.13	1.15

3. Large aluminum electrolytic capacitors

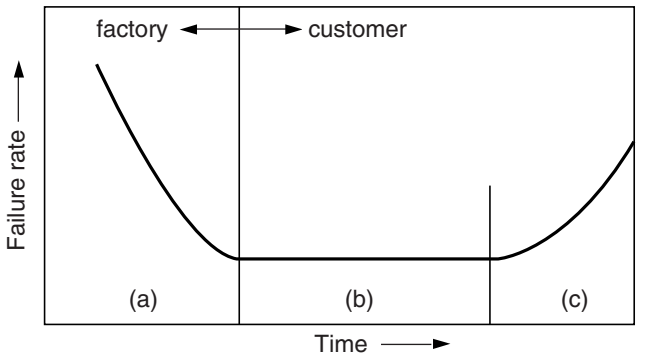
WV \ Frequency	50Hz	120Hz	300Hz	1kHz	10kHz~
~ 100	0.85	1.00	1.06	1.15	1.20
160 ~ 250	0.85	1.00	1.20	1.25	1.45
300 ~	0.85	1.00	1.15	1.20	1.40

4. Large aluminum electrolytic capacitors (Screw terminal type)

WV \ Frequency	50Hz	120Hz	300Hz	1kHz	10kHz~
~ 100	0.80	1.00	1.10	1.15	1.20
160 ~ 250	0.80	1.00	1.15	1.20	1.30
300 ~	0.82	1.00	1.20	1.35	1.40

Failure rate

The failure rate of an aluminum electrolytic capacitor follows a bathtub curve.



(a) initial failure period (infant mortility)
(b) random failure period (useful life period)
(c) wear-out failure period

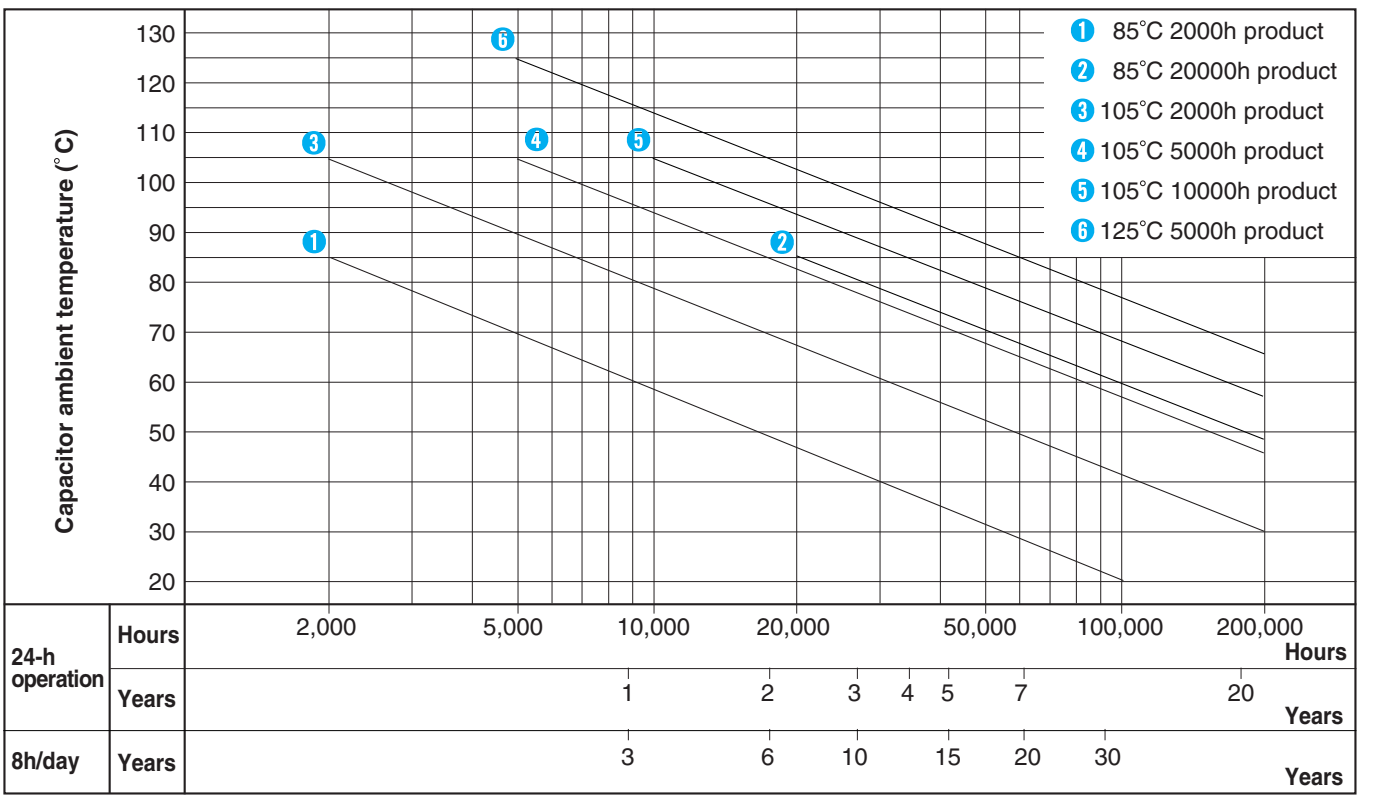
Expected life - ***(*for reference)***

Temperature, humidity, ripple current and atmospheric pressure etc. have influence on the life of aluminum electrolytic capacitors. Among them, temperature has the greatest effect on life of capacitors. The relationship between ambient temperature and life of capacitor can be explained to so-called ARRHENIUS´ equation, generally the life of capacitor is reduced approximately by one-half for each temperature increase of 10˚C. The life acceleration equation computes as shown below.

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

L : Expected life at operating temperature T˚C (h)
L_0 : Load life at maximum operating temperature T_0˚C (h)

Expected life chart - ***(*for reference)***



1 Green-Cap(ELECTRIC DOUBLE LAYER CAPACITORS)

Green-Cap (Electric Double Layer Capacitors)

1. Polarity

Be sure verity the polarity of the capacitor before use. If a reverse voltage is applied for a long time, capacitor lifetime is shortened and serious damage such as electrolyte leakage may occur.
Further more,there may be leftover electric charge from capacitor testing that could damage other circuit components such as the low-withstanding voltage parts of semiconductors, etc.

2. Voltage

If a Green-Cap is used at a voltage exceeding its rated voltage, not only is its life shortened, but depending on the actual voltage, gas generated by electrochemical reactions inside the capacitor may cause it to leak or rupture

3. Ambient Temperature

(1) Capaciator life is affected by operating temperature. In general, lowering ambient temperature by 10˚C will double the life of a capacitor. Use the capacitor at the lowest possible temperature under the maximum guaranteed temperature.

(2) Operation above the maximum specified temperature not only shortens capacitor life, but can also cause serious damage such as electrolyte leakage.
Verify the operating temperature of the capacitor by taking into consideration not only the ambient temperature and temperature inside the unit, but also the radiation from heat generating elements inside the unit(power transistors, IC's, resistors, etc.) and self-heating due to ripple current.
Be careful not to place heat-generating elements across from the capacitor on the opposite of the PCB.

4. Ripple Current

Green-Cap has a higher internal resistance than do electrolytic capacitors and are more susceptible to internal heat generation when exposed to ripple current. When the temperature of the element rises, a reacting current flows inside the Green-Cap, generating reaction products and raising internal resistance even further. This makes it difficult to maintain capacitance. Set the allowable limit for the ripple current-induced rise in capacitor temperature to 3˚C measured at the surface of the capacitor

5. Heat Stress During Soldering

Excessive heat stress may result in the deterioration of the electrical characteristics of the capacitor, loss of air-tightness, and electrolyte leakage due to the rise in internal pressure

(1) If the tip of the soldering iron touches the capacitor's external sleeve, the sleeve will melt or break.
(2) Use the general reference chart bellow to set soldering temperature and time.
(3) When soldering with a soldering iron, do not touch the tip to the body of the capacitor.
Minimize the time that soldering iron is in contact with the capacitor terminals.
(4) When using equipment such as a UV curing oven for pre-heating and adhesive hardening, do not set the temperature above 150˚C .
If the temperature is higher than this, the external sleeve may crack and the end seal may suffer reduced performance.
(5) Never perform reflow soldering on Green-Cap using infrared or atmospheric methods.

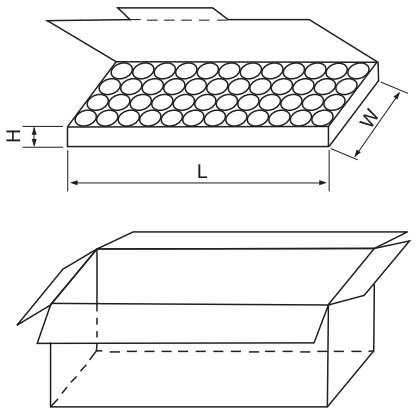
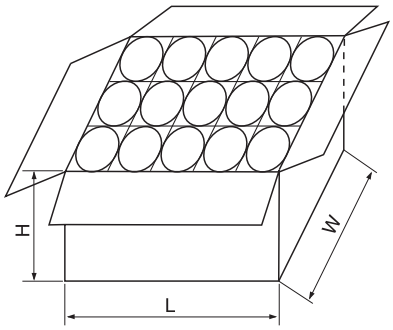
6. Circuit Board Cleaning

Circuit board can be immersed or ultrasonically cleaned using suitable cleaning solvents for up to 5 minutes and up to 60˚C maximum temperature. The board should be thoroughly rinsed and dried. Recommended cleaning solvent include. Pine Alpha ST-100S, Sunelec B-12, DK beclear CW-5790, Aqua Cleaner 210SEP, Cold Cleaner P3-375, Telpen Cleaner EC 7R, Clean-thru 750H, Clean-thru 750L Clean-thru 710M, Techno Cleaner 219, Techno Care FRV-1

- Consult with us if you are using a solvent other than any of those listed above
- The use of ozone depelting cleaning agents are not recommended in the interest of protecting the environment

PACKING

BLUCK TYPE PACKING

FIGURE 1	FIGURE 2
SNAP-IN TYPE INNER, MIDDLE BOX	SCREW TYPE BOX
	

● SNAP-IN TYPE(DB, DH series) PACKING Quantity (pcs) / BOX (FIGURE 1)

SIZE		SNAP-IN(QUANTITY)	
ØD	L	INNER BOX	MIDDLE BOX
22	35, 45	150	450
30	45	50	200
	60	50	150
35	50 ~ 60	50	150

● SCREW TYPE(DE, DP series) PACKING Quantity (pcs) / BOX (FIGURE 2)

SIZE		SCREW(QUANTITY)
ØD	L	
35	68 ~ 120	60
51	100, 130	30
64	120, 130	25
76	150	16

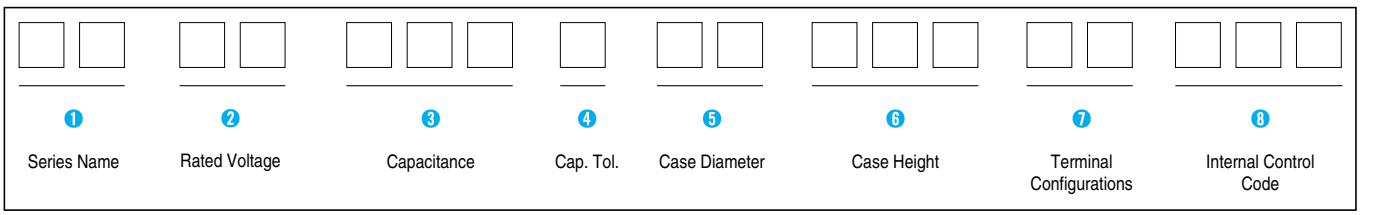
RADIAL TYPE PACKING

● DS series BULK PACKING QUANTITY (pcs) / BOX

SIZE		BULK(QUANTITY)		
ØD	L	V-Bag	INNER BOX	MIDDLE BOX
8	20	300	2400	9600
10	20	200	1600	6400
	30	200	1200	4800
16	25	50	500	2000
18	40	50	300	1200

PART NUMBER SYSTEM

● Single Cell Part Number System



❶ Series Name
See page 4.

❷ Rated Working Voltage

WV	2.5	2.7	3.0
CODE	0E	5U	0U

❸ Capacitance

ex) 1F 105
10F 106
100F 107
1000F 108

❹ Capacitance Tolerance

Tolerance (%)	±20
Code	M

❺ Case Diameter

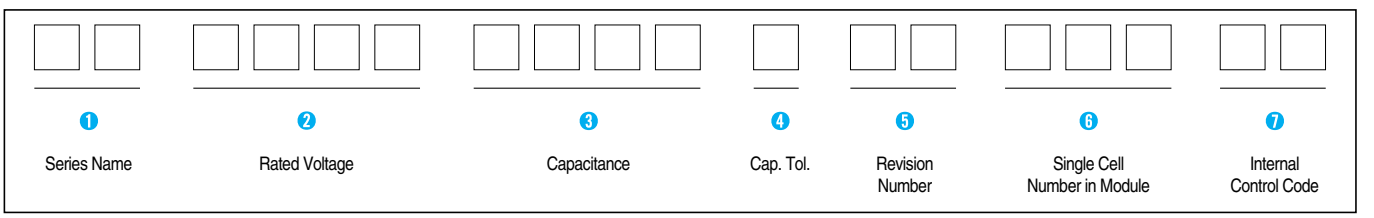
ex) Ø10 10
Ø16 16
Ø18 18

❻ Case Height

ex) 20mm 020
25mm 025
30mm 030

❼ Terminal Configurations
See pages 19, 70 ~ 73.

● Module Part Number System



❶ Series Name
See page 4.

❷ Rated Working Voltage

ex) 5.0V 0050
13.5V 0135
135V 1350

❸ Capacitance

ex) 1.6F 0016
16F 0160
160F 1600

❹ Capacitance Tolerance

Tolerance (%)	0 ~ +20
Code	W

❺ Revision Number

ex) 01, 02

❻ Single Cell Number in Module

ex) 10ea 010

DM Green-Cap Module

- Low internal resistance
- Balancing and overvoltage protection of individual cell
- Efficient heat Transfer to outside
- Compliant with RoHS requirement

Application

- Next Generation Vehicle(FCEV, HEV) & Heavy Duty Transportation
- Short term UPS and telecommunications
- Portable Power Tool
- Wind Turbine Pitch System
- Electric Scooter
- Heavy Duty Transportation
- Golf Car

Product & Spec.

Item	Characteristics	
Capacitance tolerance	0% ~ +20% at 20°C	
Operating temperature range	-40 ~ 60°C	
Storage Temperature Range	-40 ~ 70°C	
Low temperature characteristics	Capacitance change	Within ±5% of initial value at +20°C
	Internal resistance	Within 150% of initial value at +20°C
Endurance(60°C)	Test time	1000 hours
	Capacitance change	Within ±30% of initial specified value
	Internal resistance	Within 100% of initial specified value
Shelf life (60°C)	After 1000 hours no load test same as endurance	
Life Time at RT(1)	10 years	(1) I△CI < 30% and △ESR < 200% of initially specified value, respectively and LC < specified value
Cycle Life (25°C)(1)(2)	500,000 cycles	(2) Cycle : between rated voltage and half rated voltage under constant current at 25°C

Part Number	Rated Voltage	Max. Operating Voltage	Capacitance (F)	ESR, 1KHz (mΩ)	ESR, DC (mΩ)	Max. Continuous Current (A)	Max. Peak Current (A)	Stored Energy (Wh)	Specific Energy (Wh/kg)	Cell Composition ITEM	Cell Composition EA	Dimension(mm) L	Dimension(mm) W	Dimension(mm) T	Weight (kg)
DM00500015W01002	5	5.4	1.5	110	143	0.2	3.1	0.005	1.47	2.7V 3F	2	23	10	18	0.0034
DM00500025W01002	5	5.4	2.5	53	69	0.3	5.3	0.009	1.80	2.7V 5F	2	23	12	22	0.005
DM01500666W01006	15	16.2	66.6	18	30	20	167	2.43	4.05	2.7V 400F	6	117	81	80	0.6
DM01502883W01006	15	16.2	288.3	9	10	85	571	10.33	3.03	2.7V 1700F	6	205	113	176	5
DM02501700W01010	25	27	170	15	16	85	571	17.21	2.06	2.7V 1700F	10	263	108	198	8.2
DM04501666W01018	45	48.6	166.6	14.5	18	150	938	54.68	3.90	2.7V 3000F	18	446	195	198	14
DM10000025W01040	100	108	2.5	400	520	5	54	4.05	4.70	2.7V 100F	40	200	140	52	0.86
DM35000214W01140	350	378	21.4	112	140	150	938	425.20	2.83	2.7V 3000F	140	1000	684	230	150

Note: Other Green-Cap modules are supplied on custom-made basis. Dimension and Weight could be changed without notice.

Green-Cap (ELECTRIC DOUBLE LAYER CAPACITORS)

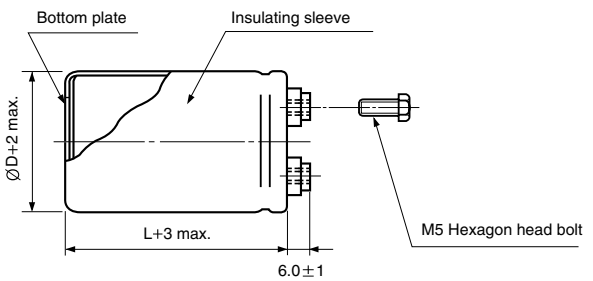
DP Screw Terminal Type, High Power Density Type

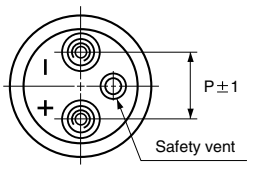
· High Power Density
· Rapid charge and discharge
· Charge and discharge efficiency are higher than in batteries

Item	Characteristics	
Operating temperature range	-40 ~ 60˚C	
Rated Voltage	2.7 VDC	
Capacitance tolerance	-20 ~ +20% or 0% ~ 20% at 20˚C	
Low temperature characteristics	Capacitance change	Within ±5% of initial value at +20˚C
	Internal resistance	Within 150% of initial value at +20˚C
Endurance (60˚C)	Test time	1000 hours
	Capacitance change	Within ±30% of initial specified value
	Internal resistance	Less than 100% of initial specified value
Shelf life (60˚C)	After 1000 hours no load test same as endurance	
Life Time at RT(1)	10 years	(1) I△CI＜30% and △ESR＜200% of initially specified value, respectively and LC＜specified value
Cycle Life (25˚C)(1)(2)	500,000 cycles	(2) Cycle : between rated voltage and half rated voltage under constant current at 25˚C

● DRAWING

Unit : mm





ØD	P	Bolt
35	12.7	M5
51	22	M5
63.5	28.6	M6

● ANGLE DRAWING & SIZE TABLE(See Page 166)

● CHARACTERISTIC LIST & DIMENSIONS

Rated Voltage	Capacitance (F)	ESR, 1KHz (mΩ)	ESR, DC (mΩ)	LC (72hr) (mA)	Max Continuous Current(A)	Max Peak Current(A)	Specific Energy (Wh/kg)	Specific Energy (Wh/L)	Weight (g)	Volume (ml)	Dimension ØD×L(mm)
2.7	400	3.0	5.0	1.08	22	180	5.79	6.19	70	65	35×68
	700	2.5	4.5	1.89	37	228	6.01	4.14	120	115	35×120
	1700	1.5	1.6	4.59	90	617	6.62	6.48	260	266	51×130
	3000	0.8	1.0	8.10	150	1012	7.02	7.38	435	412	63.5×130

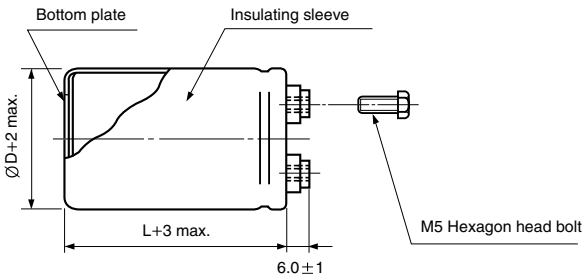
DE Screw Terminal Type, High Energy Density Type

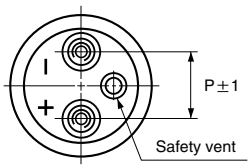
· High Energy Density
· Suitable for electric power storage
· Charge and discharge efficiency are higher than in batteries

Item	Characteristics	
Operating temperature range	-40 ~ 60˚C	
Rated Voltage	2.5 VDC	
Capacitance tolerance	-20 ~ +20% or 0% ~ 20% at 20˚C	
Low temperature characteristics	Capacitance change	Within ±5% of initial value at +20˚C
	Internal resistance	Within 150% of initial value at +20˚C
Endurance (60˚C)	Test time	1000 hours
	Capacitance change	Within ±30% of initial specified value
	Internal resistance	Less than 100% of initial specified value
Shelf life (60˚C)	After 1000 hours no load test same as endurance	
Life Time at RT[1]	10 years	(1) I△CI＜30% and △ESR＜200% of initially specified value, respectively and LC＜specified value
Cycle Life (25˚C)[1][2]	500,000 cycles	(2) Cycle : between rated voltage and half rated voltage under constant current at 25˚C

● DRAWING

Unit : mm





ØD	P	Bolt
35	12.7	M5
51	22	M5
63.5	28.6	M6
76.2	31.8	M6

● ANGLE DRAWING & SIZE TABLE(See Page 166)

● CHARACTERISTIC LIST & DIMENSIONS

Rated Voltage	Capacitance (F)	ESR, 1KHz (mΩ)	ESR, DC (mΩ)	LC (72hr) (mA)	Max Continuous Current(A)	Max Peak Current(A)	Specific Energy (Wh/kg)	Specific Energy (Wh/L)	Weight (g)	Volume (ml)	Dimension ØD×L(mm)
2.5	700	4.0	7.0	1.75	35	148	5.96	6.32	105	96	35×100
	1400	2.0	2.2	3.50	70	429	6.17	5.95	197	204	51×100
	3000	1.0	1.3	7.50	150	765	6.51	6.85	400	380	63.5×120
	5000	0.8	1.0	12.50	250	1042	6.89	6.34	630	684	76.2×150
	6500	0.7	0.9	17.55	343	1186	7.60	7.05	866	933	89×150

Green-Cap (ELECTRIC DOUBLE LAYER CAPACITORS)

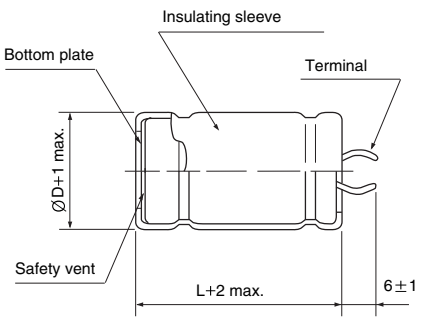
DB Snap-in Terminal Type, Standard Series

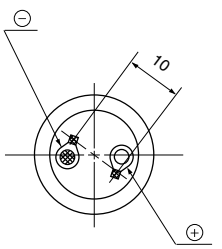
· Endurance : 2.5V 70˚C 1000 hours, 2.7V 60˚C 1000 hours
· The middle size and high capacitance, low resistance
· Charge and discharge efficiency are higher than in batteries

Item	Characteristics	
Operating temperature range	-25 ~ +70˚C	-40 ~ +60˚C
Rated Voltage	2.5 VDC	2.7 VDC
Capacitance tolerance	-20 ~ +20% or 0% ~ +20% at 20˚C	
Low temperature characteristics	Capacitance change: Within ±30% of initial value at +20˚C Internal resistance: Within 150% of initial value at +20˚C	
Endurance (2.5V:70˚C, 2.7V:60˚C)	Test time: 1000 hours Capacitance change: Within ±30% of initial specified value Internal resistance: Less than 100% of initial specified value	
Shelf life (2.5V:70˚C, 2.7V:60˚C)	After 1000 hours no load test same as endurance	
Life Time at RT (1)	10 years	(1) I△CI < 30% and △ESR < 200% of initially specified value, respectively and LC < specified value (2) Cycle : between rated voltage and half rated voltage under constant current at 25˚C
Cycle Life (25˚C) (1)(2)	500,000 cycles	

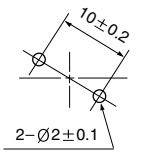
DRAWING

Unit : mm

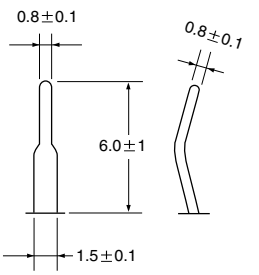




PC Board Mounting Holes



Terminal

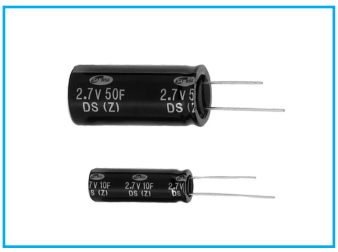


CHARACTERISTIC LIST & DIMENSIONS

Rated Voltage	Capacitance (F)	ESR, 1KHz (mΩ)	ESR, DC (mΩ)	LC (72hr) (mA Max.)	Max Continuous Current(A)	Max Peak Current(A)	Specific Energy (Wh/kg)	Specific Energy (Wh/L)	Weight (g)	Volume (ml)	Dimension ØD×L(mm)
2.5	100	15	35	0.25	5	27.7	4.11	5.07	21	17	22×45
	200	10	20	0.50	10	50.0	4.54	5.46	38	32	30×45
	300	6	15	0.75	15	68.2	4.49	5.41	58	48	35×50
	360	6	12	0.90	18	84.6	4.81	5.41	65	58	35×60
	400	6	10	1	20	100.0	4.96	6.01	70	58	35×60
2.7	100	10	13	0.27	5.3	58.7	5.50	5.92	18	17	22×45
	200	8	9	0.54	10.5	96.4	6.03	6.37	34	32	30×45
	300	3.5	5	0.81	15.8	162.0	5.73	6.31	53	48	35×50
	360	3.5	5	0.97	18.9	173.6	6.08	6.31	60	58	35×60
	400	3.5	5	1.08	21.1	180.0	6.23	7.02	65	58	35×60

※ Ø35 4 pin type terminal drawing is same see pages 146.

DS Radial Type, Standard Series

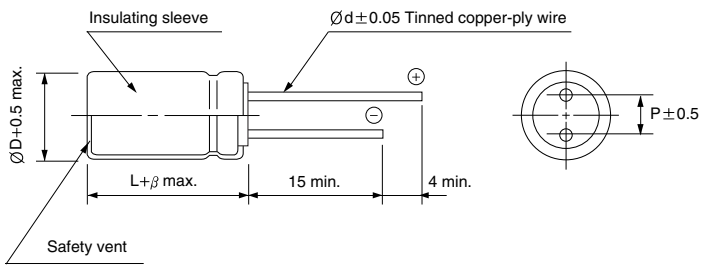


· Endurance : 2.5V 70˚C 1000 hours, 2.7V 60˚C 1000 hours
· The small size and high capacitance, low resistance
· Can be charge and discharge more times than secondary batteries

Item	Characteristics	
Operating temperature range	-25 ~ +70˚C	-40 ~ +60˚C
Rated Voltage	2.5 VDC	2.7 VDC
Capacitance tolerance	-20 ~ +20% at 20˚C	
Low temperature characteristics	Capacitance change: Within ±30% of initial value at +20˚C Internal resistance: Within 150% of initial value at +20˚C	
Endurance (2.5V:70˚C, 2.7V:60˚C)	Test time: 1000 hours Capacitance change: Within ±30% of initial specified value Internal resistance: Less than 100% of initial specified value	
Shelf life (2.5V:70˚C, 2.7V:60˚C)	After 1000 hours no load test same as endurance	
Life Time at RT[1]	10 years	(1) I△CI < 30% and △ESR < 200% of initially specified value, respectively and LC < specified value
Cycle Life (25˚C)[1][2]	500,000 cycles	(2) Cycle : between rated voltage and half rated voltage under constant current at 25˚C

DRAWING

Unit : mm

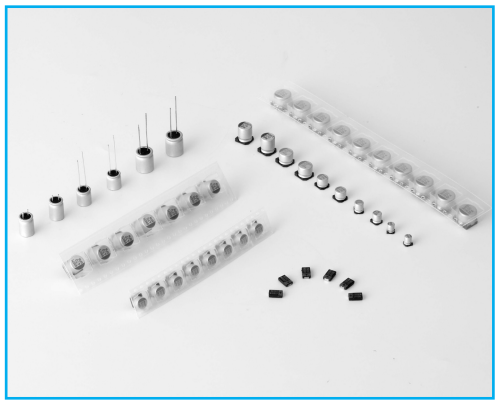


ØD	8	10	16	18
P	3.5	5	7.5	7.5
Ød	0.6	0.6	0.8	0.8
β	1.5	2.0		

CHARACTERISTIC LIST & DIMENSIONS

Rated Voltage	Capacitance (F)	ESR, 1KHz (mΩ)	ESR, DC (mΩ)	LC (72hr) (mA Max.)	Specific Energy		Specific Power		Weight (g)	Volume (ml)	Dimension ØD×L(mm)
					(Wh/kg)	(Wh/L)	(W/kg)	(W/L)			
2.5	3	140	350	0.008	1.63	2.59	1,339	2,132	1.6	1.0	8×20
	5	110	250	0.013	1.97	2.76	1,364	1,910	2.2	1.6	10×20
	10	65	120	0.025	2.48	3.68	1,786	2,653	3.5	2.4	10×30
	25	35	65	0.063	2.89	4.32	1,538	2,296	7.5	5.0	16×25
	60	20	30	0.150	3.77	5.12	1,812	2,456	13.8	10.2	18×40
2.7	3	60	90	0.008	2.17	3.02	6,943	9,669	1.4	1.0	8×20
	5	50	70	0.014	2.41	3.22	5,951	7,956	2.1	1.6	10×20
	10	30	50	0.027	3.49	4.30	6,033	7,426	2.9	2.4	10×30
	25	20	35	0.068	3.78	5.04	3,730	4,972	6.7	5.0	16×25
	50	10	20	0.140	4.40	4.97	3,803	4,297	11.5	10.2	18×40

2 POLYMER ALUMINUM ELECTROLYTIC CAPACITORS



Hi-CAP (Conductive Polymer Aluminum Electrolytic Capacitor)

Hi-CAP is an electrolytic capacitor that uses a highly electric conductive polymer as it's electrolyte.
Hi-CAP has excellent temperature and load life characteristics due to adoption of stable polymer in high temperature.
Compared to other electrolytic capacitors, the **Hi-CAP** is a low impedance capacitor suitable for high frequency making it ideal for digital circuit.

1. Circuit design

(1) The conducting polymer capacitor cannot be used in circuits that undergo frequent charging and discharging because the resulting internal heat buildup can cause capacitor failure.
(2) Do not use the capacitor in time-constant or coupling circuits. In these type of circuit, electrical characteristics such as capacitance can change under certain environmental conditions.

2. Capacitor handling techniques

(1) Capacitor insertion

Incorrect land size may cause problems with capacitor placement and mountability.
Refer to the land size table for appropriate design dimensions.

(2) Soldering

When using a soldering iron, set the tip temperature to no more than 300˚C, and work in as short a time as possible under 10 seconds. While soldering, do not apply strong force to the capacitor.

Reflow soldering

The conducting polymer capacitor is designed specifically for reflow soldering.
Maintain soldering conditions (pre-heating, reflow temperature, time) within the range indicated in the product specifications. If soldering time is lengthened or temperature is higher, the heat can damage the capacitor element and / or the molded case.
Do not perform reflow soldering more than twice.

(3) Circuit board cleaning

Capacitors can withstand immersion in solvent at 60˚C or under for up to 5 minutes.
Be sure to sufficiently wash (about 3 min. with water) and dry (20 min. at 100˚C) the board afterward.

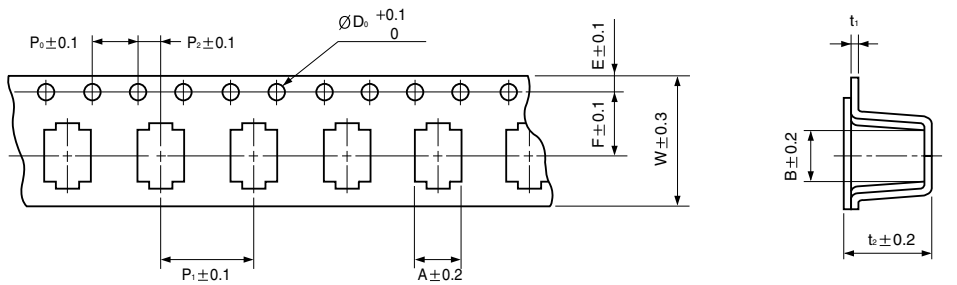
3. Electrical characteristics comparison of Capacitors

Species	High Frequency	Temperature	Allowable ripple	Miniaturized
Al Electrolytic capacitor	○	○	⊙	●
MLCC	●	○	–	⊙
Film Capacitor	●	●	–	○
Tantal Capacitor	⊙	⊙	○	⊙
Hi-CAP	●	●	●	⊙

※ ● Superior ⊙ Ordinary ○ Inferior

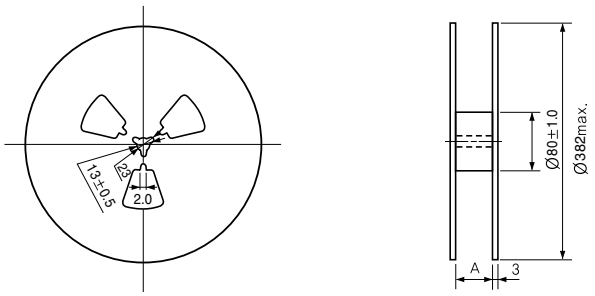
Taping Specifications for SMD Type Polymer Capacitors (Vertical type)

Carrier Tape



ØD×L	A	B	ØD₀	E	F	P₀	P₁	P₂	t₁	t₂	W
4×5.4	4.7	4.7	1.5	1.75	5.5	4	8	2	0.4	5.7	12
5×5.9	5.6	5.6	1.5	1.75	5.5	4	8	2	0.4	6.3	16
6.3×4.5	6.9	6.9	1.5	1.75	7.5	4	12	2	0.4	5.7	16
6.3×5.9	6.9	6.9	1.5	1.75	7.5	4	12	2	0.4	6.3	16
8×6.9	8.6	8.6	1.5	1.75	11.5	4	12	2	0.4	7.2	24
8×11.9	8.6	8.6	1.5	1.75	11.5	4	16	2	0.4	12.3	24
10×7.9	10.7	10.7	1.5	1.75	11.5	4	16	2	0.4	8.2	24
10×12.6	10.7	10.7	1.5	1.75	11.5	4	16	2	0.4	13	24

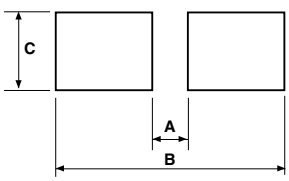
Reel(Taping Code : VR)



ØD×L	A
4×5.4	14
5×5.9	18
6.3×4.5	18
6.3×5.9	18
8×6.9	26
8×11.9	26
10×7.9	26
10×12.6	26

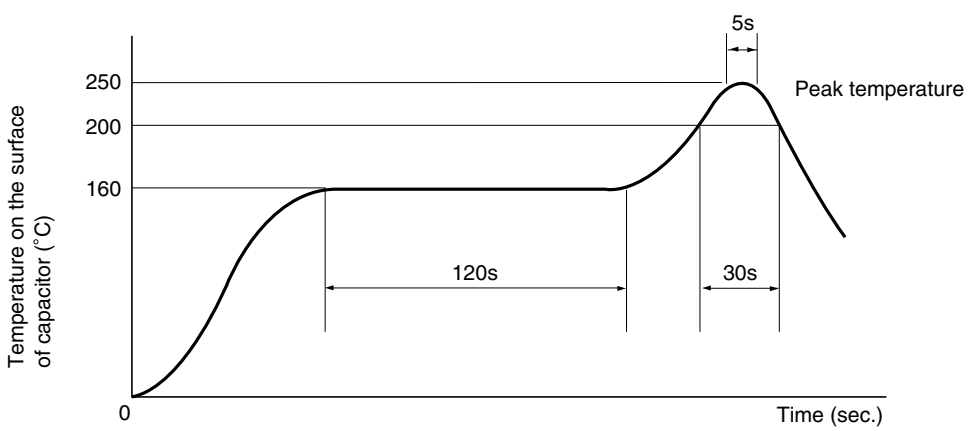
ØD×L	Q'ty/Reel(pcs)	Q'ty/Box(pcs)
4×5.4	2000	20000
5×5.9	1500	15000
6.3×4.5	1000	10000
6.3×5.9	1000	10000
8×6.9	1000	10000
8×11.9	400	4000
10×7.9	500	5000
10×12.6	400	4000

Recommended Land Size



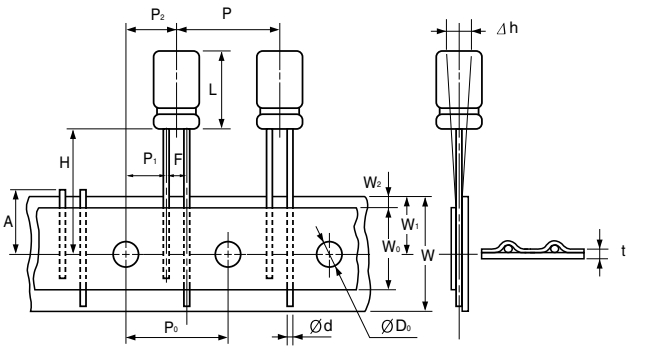
ØD×L	A	B	C
4×5.4	1.0	6.2	1.6
5×5.9	1.4	7.4	1.6
6.3×4.5	2.1	9.1	1.6
6.3×5.9	2.1	9.1	1.6
8×6.9	2.8	11.1	1.9
10×7.9	4.3	13.1	1.9
8×11.9	2.8	11.1	1.9
10×12.6	4.3	13.1	1.9

Recommendable reflow soldering temperature



Taping Specifications for Lead Type Polymer Capacitors

DRAWING I

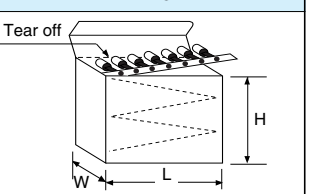


Applicable Drawing No.			I			
Description	Symbol	Tolerance	Ø6.3	Ø8		Ø10
Body Height	L	+1	6	9	12	13
Lead Dia.	Ød	±0.05	0.45	0.60	0.60	0.6
Body Pitch	P	±1.0	12.7			
Feeding Hole Pitch	P_0	±0.2	12.7			
Feeding Hole Alignment	P_1	±0.7	5.1			3.85
Feeding Hole Alignment	P_2	±1.0	6.35			
Lead Center Spacing	F	+0.6/-0.2	2.5	3.5		5.0
Body Inclination	Δh	±2.0	0			
Tape Width	W	±0.5	18.0			
Adhesive Tape Width	W_0	min.	7.0			
Feeding Hole Alignment	W_1	±0.5	9.0			
Adhesive Tape Margin	W_2	max.	2.0			
Length from Seating Plane	H	±0.5	17.5	20		18.5
Feeding Hole Dia.	$ØD_0$	±0.2	4.0			
Total Tape Thickness	t	±0.2	0.7			
Cut Lead Height	A	max.	11.0			
Taping Code / Ammo	⊕ leader		PC	PF		PA

PACKAGING Q'ty(pcs.) / BOX

Size		Ammo			
ØD	Case Height	L	H	W	Q'ty
6.3	6	332	230	42	1500
	8	332	230	49	1500
8	9	332	230	49	1000
	12	332	230	49	1000
10	13	332	190	51	500

Ammo



BULK PACKING QUANTITY(PCS) / BOX

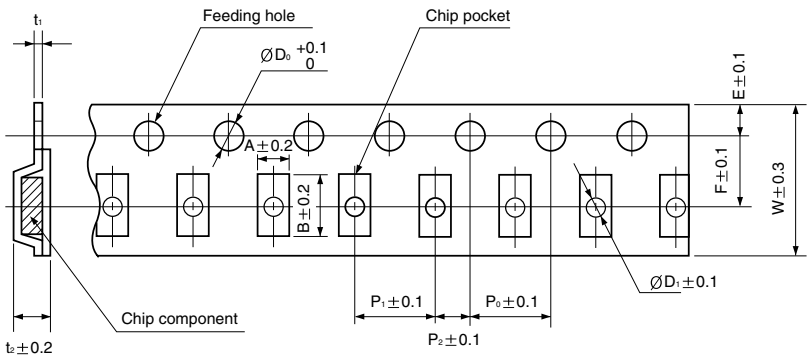
Size		V-BAG	INNER BOX	MIDDLE BOX
D	L			
6.3	6	750	6000	24000
	8	750	6000	24000
8	9	400	3200	12800
	12	400	3200	12800
10	13	250	1500	6000

CUTTING PACKING QUANTITY(PCS) / BOX

Size		V-BAG	INNER BOX	MIDDLE BOX
D	L			
6.3	6	750	6000	24000
	8	750	6000	24000
8	9	500	4000	16000
	12	400	3200	12800
10	13	250	1500	6000

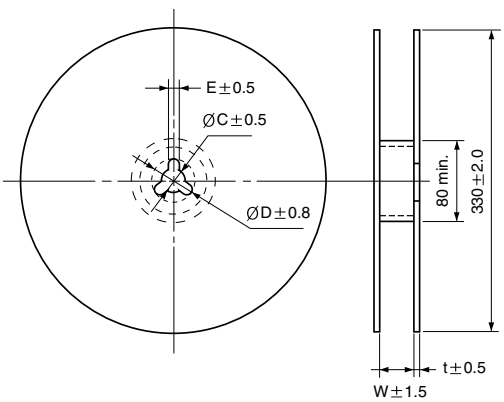
Taping Specifications for SMD type Polymer Capacitors (Horizontal type)

Carrier Tape



Size code	A	B	ØD0	ØD1	E	F	P0	P1	P2	t1	t2	W
A	4.7	7.7	1.5	1.6	1.75	5.5	4.0	8.0	2.0	0.3	2.2	12.0
C	4.7	7.7	1.5	1.6	1.75	5.5	4.0	8.0	2.0	0.3	3.4	12.0
D	4.7	7.7	1.5	1.6	1.75	5.5	4.0	8.0	2.0	0.3	4.5	12.0

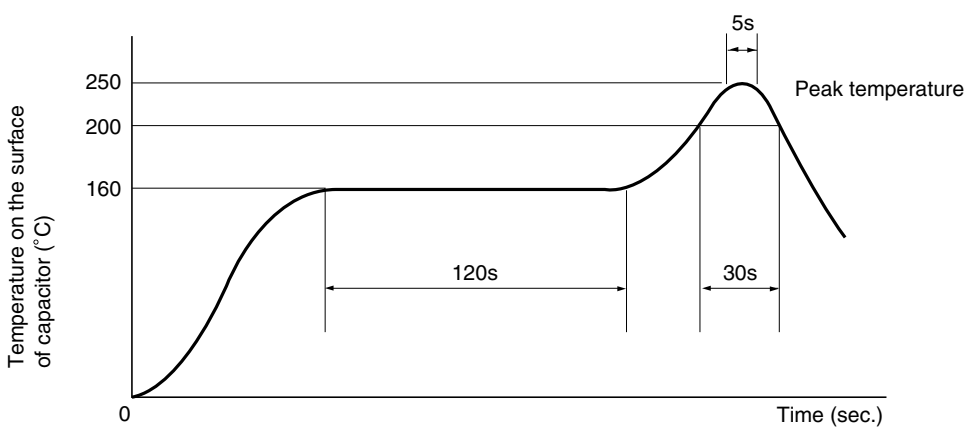
Packaging Specifications



Size code	Q'ty / Reel
A	3000 pcs.
C	2000 pcs.
D	2000 pcs.

ØC	ØD	E	W	t
13.0	21.0	2.0	14.0	2.0

Recommendable reflow soldering temperature



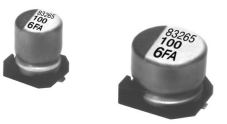
CONDUCTIVE POLYMER ALUMINUM ELECTROLYTIC CAPACITORS

FA Chip type, With Conductive Polymer Series

Hi-CAP

- Low ESR, high ripple current
- Designed for surface mounting on high density PC board
- Load life for 2000 hours at 105˚C
- Complied to the RoHS directive

FT ⇦ Wide Temp. **FA** ⇨ FH Large Capacitance

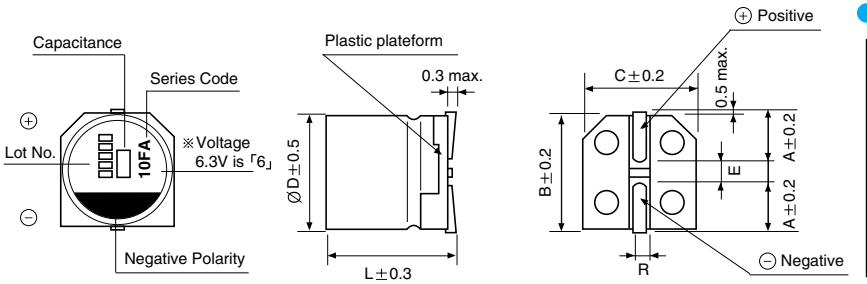


Item	Characteristics	
Operating temperature range	-55 ~ +105˚C	
Leakage current max.*	Less than or equal to the value of Table1	
Capacitance tolerance	±20% at 120Hz, 20˚C	
Dissipation factor max.	Less than or equal to the value of Table1	
ESR	Less than or equal to the value of Table1	
Temperature characteristics (Impedance ratio at 100kHz)	Z-55˚C / Z+20˚C	Z+105˚C / Z+20˚C
	0.75~1.25	0.75~1.25
Load life (after application of the rated voltage for 2000 hours at 105˚C, In case of 25WV is applied 20V)	Leakage current	Less than specified value
	Capacitance change	Within ±20% of initial value
	tanδ	Less than 150% of specified value
Resistance to soldering heat (Refer to Page 25 for soldering recommendation)	Leakage current	Less than specified value
	Capacitance change	Within ±10% of initial value
	tanδ	Less than 130% of specified value

* In case of some problems for measured values, measure after applying rated voltage for 2.5 to 20V products or 20V derating voltage for 25V products for 120 minutes at 105˚C.

DRAWING

Unit : mm



PART NUMBER SYSTEM (See Page 46)

Size	ØD	L	B	C	E	A	R
4×5.4	4	5.4	4.3	4.3	1.0	1.9	0.5~0.8
5×5.9	5	5.9	5.3	5.3	1.4	2.2	0.5~0.8
6.3×5.9	6.3	5.9	6.6	6.6	2.2	2.45	0.5~0.8
8×6.9	8	6.9	8.3	8.3	3.2	2.9	0.5~0.8
8×11.9	8	11.9	8.3	8.3	3.2	2.9	0.8~1.1
10×7.9	10	7.9	10.3	10.3	4.6	3.2	0.8~1.1
10×12.6	10	12.6	10.3	10.3	4.6	3.2	0.8~1.1

DIMENSIONS

μF \ WV(SV)	2.5(3.3)	4(5.2)	6.3(8.2)	10(11.5)	16(18.4)	20(23)	25(25)
3.3					4 × 5.4		
4.7				4 × 5.4			
6.8				4 × 5.4			6.3 × 5.9
10				4 × 5.4		5 × 5.9	8 × 6.9
15				4 × 5.4	5 × 5.9		
22			4 × 5.4		5 × 5.9	6.3 × 5.9	10 × 7.9
27						6.3 × 5.9	
33		4 × 5.4		5 × 5.9		8 × 6.9	8 × 11.9
39		5 × 5.9			6.3 × 5.9		
47			5 × 5.9	6.3 × 5.9		8 × 6.9	
56				6.3 × 5.9	8 × 6.9	10 × 7.9	10 × 12.6
68		5 × 5.9				10 × 7.9	
82			6.3 × 5.9		8 × 6.9		
100			6.3 × 5.9		10 × 7.9	8 × 11.9	
120			6.3 × 5.9	8 × 6.9			
150		★ 8 × 6.9		○ 10 × 7.9	10 × 7.9	10 × 12.6	
180					● 8 × 11.9		
220	6.3 × 5.9		○ 10 × 7.9				
270				10 × 7.9			
330		8 × 6.9	10 × 7.9	● 8 × 11.9	10 × 12.6		
470			● 8 × 11.9				
560		8 × 11.9		10 × 12.6	← Case size ØD×L(mm)		
680	8 × 11.9	10 × 7.9	10 × 12.6				
820							
1200		10 × 12.6					
1500	10 × 12.6						

★Size Ø6.3×5.9 is available ○Size Ø8×6.9 is available ●Size Ø10×7.9 is available

FA Series

● Table1. FA(SMD type) Series Characteristics List

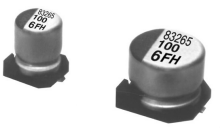
WV	μF	ØD(mm)	L(mm)	ESR(mΩ)max. 100~300kHz	Ripple current (mA rms)at 105°C 100kHz	Dissipation factor 120Hz	Leakage Current (μA)(max.) after 2 minutes
2.5	220	6.3	5.9	23	2390	0.12	110
2.5	680	8	11.9	13	4520	0.15	340
2.5	1500	10	12.6	12	5440	0.18	750
4	33	4	5.4	200	740	0.15	66
4	39	5	5.9	70	1100	0.12	78
4	68	5	5.9	60	1400	0.12	136
4	150	6.3	5.9	40	1810	0.12	120
4	150	8	6.9	35	2560	0.12	120
4	330	8	6.9	35	2560	0.12	264
4	680	10	7.9	25	3700	0.12	544
4	560	8	11.9	13	4520	0.15	448
4	1200	10	12.6	12	5440	0.18	960
6.3	22	4	5.4	200	740	0.12	69.3
6.3	47	5	5.9	70	1100	0.12	148
6.3	82	6.3	5.9	45	1700	0.12	103
6.3	100	6.3	5.9	40	1810	0.12	126
6.3	120	6.3	5.9	17	2780	0.12	151
6.3	220	8	6.9	35	2560	0.12	277
6.3	220	10	7.9	25	3700	0.12	277
6.3	330	10	7.9	25	3700	0.12	416
6.3	470	10	7.9	25	3700	0.12	592
6.3	470	8	11.9	15	4210	0.12	592
6.3	820	10	12.6	12	5440	0.15	775
10	4.7	4	5.4	240	670	0.08	23.5
10	6.8	4	5.4	240	670	0.08	34
10	10	4	5.4	220	700	0.09	50
10	15	4	5.4	200	740	0.10	75
10	33	5	5.9	70	1100	0.10	165
10	47	6.3	5.9	50	1620	0.12	94
10	56	6.3	5.9	45	1700	0.12	112
10	120	8	6.9	35	2560	0.12	240
10	150	8	6.9	35	2560	0.12	300
10	150	10	7.9	30	3020	0.12	300
10	270	10	7.9	25	3700	0.12	540
10	330	10	7.9	25	3700	0.12	660
10	330	8	11.9	17	3950	0.15	660
10	560	10	12.6	13	5230	0.15	840
16	3.3	4	5.4	260	660	0.07	26.4
16	15	5	5.9	120	1020	0.10	120
16	22	5	5.9	90	1060	0.10	176
16	39	6.3	5.9	50	1620	0.10	125
16	56	8	6.9	45	1890	0.12	179
16	82	8	6.9	40	2120	0.12	262
16	100	10	7.9	35	2670	0.12	320
16	150	10	7.9	30	3020	0.12	480
16	180	10	7.9	30	3020	0.12	576
16	180	8	11.9	20	3640	0.15	576
16	330	10	12.6	16	4720	0.15	792
20	10	5	5.9	120	1020	0.10	100
20	22	6.3	5.9	60	1450	0.10	88
20	27	6.3	5.9	60	1450	0.10	108
20	33	8	6.9	45	1890	0.12	132
20	47	8	6.9	45	1890	0.12	188
20	56	10	7.9	40	2400	0.12	224
20	68	10	7.9	40	2400	0.12	272
20	100	8	11.9	24	3320	0.15	400
20	150	10	12.6	20	4320	0.15	600
25	6.8	6.3	5.9	80	1200	0.10	85
25	10	8	6.9	60	1500	0.10	125
25	22	10	7.9	50	2000	0.10	275
25	33	8	11.9	30	2980	0.12	413
25	56	10	12.6	28	3800	0.12	700

CONDUCTIVE POLYMER ALUMINUM ELECTROLYTIC CAPACITORS

FH Chip type, Large Capacitance, Low ESR Series

Hi-CAP

FA ⇨ FH
Large Capacitance



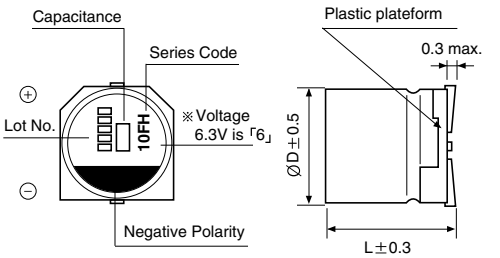
· Large capacitance, Low ESR than FA Series
· Complied to the RoHS directive

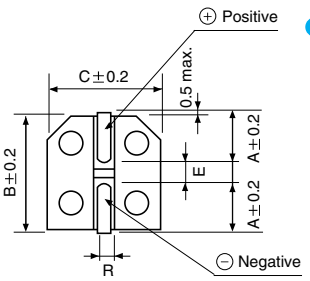
Item	Characteristics	
Operating temperature range	-55 ~ +105˚C	
Leakage current max.*	Less than or equal to the value of Table1	
Capacitance tolerance	±20% at 120Hz, 20˚C	
Dissipation factor max.	Less than or equal to the value of Table1	
ESR	Less than or equal to the value of Table1	
Temperature characteristics (Impedance ratio at 100kHz)	Z-55˚C / Z+20˚C	Z+105˚C / Z+20˚C
	0.75~1.25	0.75~1.25
Load life (after application of the rated voltage for 2000 hours at 105˚C)	Leakage current	Less than specified value
	Capacitance change	Within ±20% of initial value
	ESR	Less than 150% of specified value
	tanδ	Less than 150% of specified value
Resistance to soldering heat (Refer to Page 25 for soldering recommendation)	Leakage current	Less than specified value
	Capacitance change	Within ±10% of initial value
	tanδ	Less than 130% of specified value

* In case of some problems for measured values, measure after applying rated voltage for 120 minutes at 105˚C.

DRAWING

Unit : mm





PART NUMBER SYSTEM (See Page 46)

Size	ØD	L	B	C	E	A	R
5×5.9	5	5.9	5.3	5.3	1.4	2.2	0.5~0.8
6.3×5.9	6.3	5.9	6.6	6.6	2.2	2.45	0.5~0.8
8×6.9	8	6.9	8.3	8.3	3.2	2.9	0.5~0.8
8×11.9	8	11.9	8.3	8.3	3.2	2.9	0.8~1.1
10×12.6	10	12.6	10.3	10.3	4.6	3.2	0.8~1.1

DIMENSIONS

μF \ WV(SV)	2.5(3.3)	4(5.2)	6.3(8.2)	10(11.5)	16(18.4)
39					5 × 5.9
68				5 × 5.9	6.3 × 5.9
100			5 × 5.9		
120				6.3 × 5.9	8 × 6.9
150		5 × 5.9			
180	5 × 5.9				
220			6.3 × 5.9		
270				8 × 6.9	
330		6.3 × 5.9			
390	6.3 × 5.9		8 × 6.9		
470					10 × 12.6
560		8 × 6.9 8 × 11.9		10 × 12.6	
680	8 × 6.9				
820	8 × 11.9		8 × 11.9	← Case size ØD×L(mm)	
1200		8 × 11.9			
1500	8 × 11.9	8 × 11.9			
2700	10 × 12.6				
3300	10 × 12.6				

FH Series

● Table 1. FH(SMD type) Series Characteristics List

WV	μF	ØD(mm)	L(mm)	ESR(mΩ)max. 100~300kHz	Ripple current (mA rms)at 105°C 100kHz	Dissipation factor 120Hz	Leakage Current (μA)(max.) after 2 minutes
2.5	180	5	5.9	24	2200	0.12	300
2.5	390	6.3	5.9	25	2410	0.12	300
2.5	390	6.3	5.9	10	3900	0.12	500
2.5	680	8	6.9	20	3370	0.12	500
2.5	680	8	6.9	9	4500	0.12	500
2.5	820	8	11.9	9	5380	0.15	500
2.5	1500	8	11.9	10	5150	0.15	750
2.5	2700	10	12.6	12	5080	0.15	1350
2.5	3300	10	12.6	8	6650	0.15	1650
4	150	5	5.9	23	2240	0.12	300
4	330	6.3	5.9	21	2630	0.12	300
4	330	6.3	5.9	10	3900	0.12	500
4	560	8	6.9	22	3220	0.12	500
4	560	8	6.9	9	4500	0.12	672
4	560	8	11.9	9	5380	0.15	500
4	1200	8	11.9	12	4700	0.15	960
4	1500	8	11.9	12	4700	0.15	1200
6.3	100	5	5.9	25	2150	0.12	300
6.3	220	6.3	5.9	15	3110	0.12	300
6.3	220	6.3	5.9	10	3900	0.12	500
6.3	390	8	6.9	22	3220	0.12	491
6.3	390	8	6.9	9	4500	0.12	737
6.3	820	8	11.9	12	4700	0.15	1033
10	68	5	5.9	30	1970	0.12	300
10	120	6.3	5.9	27	2320	0.12	300
10	270	8	6.9	22	3220	0.12	500
10	560	10	12.6	10	5650	0.10	1120
16	39	5	5.9	35	1820	0.12	300
16	68	6.3	5.9	30	2200	0.12	300
16	120	8	6.9	27	2900	0.12	500
16	470	10	12.6	10	6100	0.10	1504

CONDUCTIVE POLYMER ALUMINUM ELECTROLYTIC CAPACITORS

FT Chip type, Guaranteed at 125˚C Series

Hi-CAP

FA ⇨ FT
Wide Temp

· The FT Series is very reliable, guaranteeing performance
· Suitable for use in smoothing circuits of vehicle-mounted equipment, industrial equipment, etc
· Complied to the RoHS directive

Item	Characteristics
Operating temperature range	-55 ~ +125˚C
Leakage current max.*	Less than or equal to the value of Table1
Capacitance tolerance	±20% at 120Hz, 20˚C
Dissipation factor max.	Less than or equal to the value of Table1
ESR	Less than or equal to the value of Table1
Temperature characteristics (Impedance ratio at 100kHz)	Z-55˚C / Z+20˚C: 0.75~1.25 ; Z+125˚C / Z+20˚C: 0.75~1.25
Load life (after application of the rated voltage for 2000 hours at 125˚C)	Leakage current: Less than specified value ; Capacitance change: Within ±20% of initial value ; ESR: Less than 200% of specified value ; tanδ: Less than 200% of specified value
Resistance to soldering heat (Refer to Page 25 for soldering recommendation)	Leakage current: Less than specified value ; Capacitance change: Within ±10% of initial value ; tanδ: Less than 130% of specified value

* In case of some problems for measured values, measure after applying rated voltage for 120 minutes at 125˚C.

● DRAWING (See Page 32)

Unit : mm

● DIMENSIONS

μF \ WV(SV)	10(11.5)	16(18.4)	25(29)	35(40)
8.2				8 × 6.9
10			6.3 × 5.9	
18				10 × 7.9
22			8 × 6.9	8 × 11.9
39			10 × 7.9	
47			8 × 11.9	10 × 12.6
56	6.3 × 5.9			
82		8 × 6.9	10 × 12.6	← Case size ØD×L(mm)

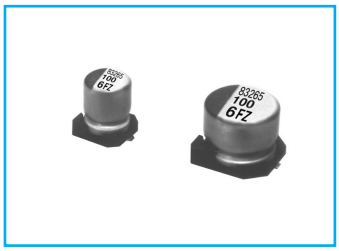
● Table 1. FT(SMD type) Series Characteristics List

WV	μF	ØD (mm)	L(mm)	ESR(mΩ)max. 100~300kHz	Rated ripple current (100kHz)(mArms) 105°C＜Tx≦125°C	Allowable ripple current (100kHz)(mArms) Tx≦105°C	Dissipation factor 120Hz	Leakage Current (μA)(max.) after 2 minutes
10	56	6.3	5.9	45	538	1700	0.12	112
16	82	8	6.9	40	670	2120	0.12	262
25	10	6.3	5.9	65	474	1500	0.10	50
25	22	8	6.9	48	580	1835	0.10	110
25	39	10	7.9	45	664	2100	0.10	195
25	47	8	11.9	30	943	2980	0.12	235
25	82	10	12.6	28	1202	3800	0.12	410
35	8.2	8	6.9	70	400	1300	0.10	57
35	18	10	7.9	60	550	1800	0.10	126
35	22	8	11.9	50	700	2300	0.12	154
35	47	10	12.6	30	1150	3650	0.12	329

FZ Chip type, Guaranteed at 105˚C 5000hrs Series

Hi-CAP

FA ⇨ FZ
Long life



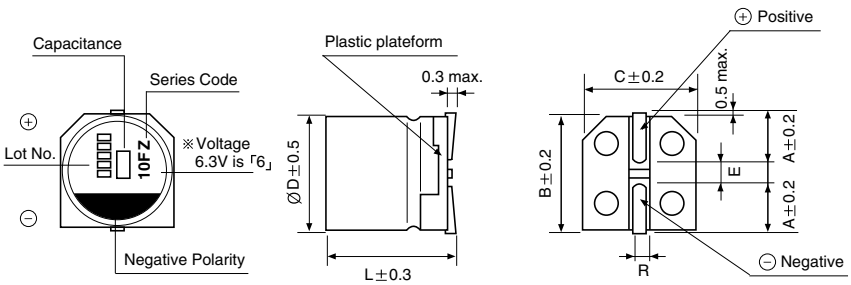
- Series has long life time than the FA Series
- Suitable for use in flat panel TV set(PDP,LCD) and the others industrial equipments, etc
- Complied to the RoHS directive

Item	Characteristics
Operating temperature range	-55 ~ +105˚C
Leakage current max.*	Less than or equal to the value of Table1
Capacitance tolerance	±20% at 120Hz, 20˚C
Dissipation factor max.	Less than or equal to the value of Table1
ESR	Less than or equal to the value of Table1
Temperature characteristics (Impedance ratio at 100kHz)	Z-55˚C / Z+20˚C: 0.75~1.25 ; Z+105˚C / Z+20˚C: 0.75~1.25
Load life (after application of the rated voltage for 5000 hours at 105˚C)	Leakage current: Less than specified value; Capacitance change: Within ±20% of initial value; ESR: Less than 200% of specified value; tanδ: Less than 200% of specified value
Resistance to soldering heat (Refer to page 25 for soldering recommendation)	Leakage current: Less than specified value; Capacitance change: Within ±10% of initial value; tanδ: Less than 130% of specified value

* In case of some problems for measured values, measure after applying rated voltage for 4 to 20V products or 20V derating voltage for 25V products for 120 minutes at 105˚C.

DRAWING

Unit : mm



PART NUMBER SYSTEM (See Page 46)

Size	ØD	L	B	C	E	A	R
4×5.4	4	5.4	4.3	4.3	1	1.9	0.5~0.8
5×5.9	5	5.9	5.3	5.3	1.4	2.2	0.5~0.8
6.3×5.9	6.3	5.9	6.6	6.6	2.2	2.45	0.5~0.8
8×6.9	8	6.9	8.3	8.3	3.0	2.9	0.5~0.8
10×7.9	10	7.9	10.3	10.3	4.6	3.2	0.8~1.1

DIMENSIONS

μF \ WV(SV)	4(5.2)	6.3(8.2)	10(11.5)	16(18.4)	20(23)	25(25)
10			4×5.4			8×6.9
15			4×5.4			
22		4×5.4		5×5.9	6.3×5.9	
33	4×5.4		5×5.9			
39				6.3×5.9		
47		5×5.9			8×6.9	
68	5×5.9		6.3×5.9			
82				8×6.9		
100				10×7.9		
120		6.3×5.9				
150	6.3×5.9		8×6.9			
150			10×7.9			
180				10×7.9		
220		8×6.9				
270	8×6.9					
330			10×7.9	← Case size ØD×L(mm)		
470		10×7.9				
680	10×7.9					

FZ Series

● Table 1. FZ(SMD type) Series Characteristics List

WV	μF	ØD(mm)	L(mm)	ESR(mΩ)max. 100~300kHz	Ripple current (mA rms)at 105°C 100kHz	Dissipation factor 120Hz	Leakage Current (μA)(max.) after 2 minutes
4	33	4	5.4	200	740	0.15	66
4	68	5	5.9	30	1970	0.12	300
4	150	6.3	5.9	22	2570	0.12	300
4	270	8	6.9	22	3220	0.12	500
4	680	10	7.9	20	4130	0.12	544
6.3	22	4	5.4	200	740	0.12	69.3
6.3	47	5	5.9	30	1970	0.12	300
6.3	120	6.3	5.9	22	2570	0.12	300
6.3	220	8	6.9	22	3220	0.12	500
6.3	470	10	7.9	20	4130	0.12	592
10	10	4	5.4	220	700	0.1	50
10	15	4	5.4	200	740	0.1	75
10	33	5	5.9	70	1100	0.12	165
10	68	6.3	5.9	30	2200	0.12	300
10	150	8	6.9	30	2760	0.12	500
10	150	10	7.9	30	3020	0.12	300
10	330	10	7.9	24	3770	0.12	660
16	22	5	5.9	90	1060	0.1	176
16	39	6.3	5.9	24	2460	0.12	300
16	82	8	6.9	30	2760	0.12	262
16	100	10	7.9	35	2670	0.12	320
16	180	10	7.9	29	3430	0.12	576
20	22	6.3	5.9	60	1450	0.1	88
20	47	8	6.9	45	1890	0.12	188
25	10	8	6.9	60	1500	0.1	125

FN Chip type, Height 4.5mmL Series

Hi-CAP

FA ⇨ FN
Height 4.5mmL

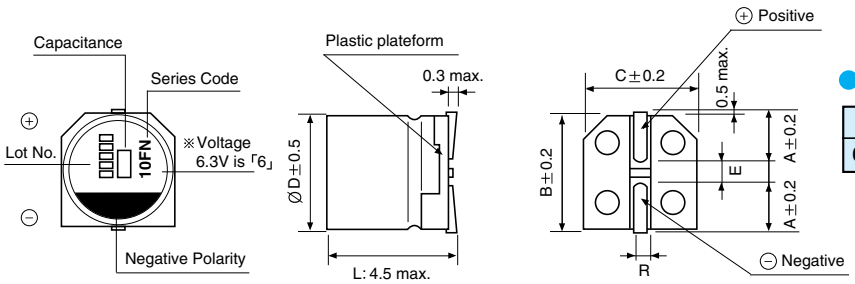
- Low ESR, high ripple current
- Designed for surface mounting on Notebook PC
- Complied to the RoHS directive

Item	Characteristics
Operating temperature range	-55 ~ +105˚C
Leakage current max.*	Less than or equal to the value of Table1
Capacitance tolerance	±20% at 120Hz, 20˚C
Dissipation factor max.	Less than or equal to the value of Table1
ESR	Less than or equal to the value of Table1
Temperature characteristics (Impedance ratio at 100kHz)	Z-55˚C / Z+20˚C: 0.75~1.25 ; Z+105˚C / Z+20˚C: 0.75~1.25
Load life (after application of the rated voltage for 1000 hours at 105˚C. In case 25WV is applied 20V)	Leakage current: Less than specified value; Capacitance change: Within ±20% of initial value; ESR: Less than 150% of specified value; tanδ: Less than 150% of specified value
Resistance to soldering heat (Refer to Page 25 for soldering recommendation)	Leakage current: Less than specified value; Capacitance change: Within ±10% of initial value; tanδ: Less than 130% of specified value

* In case of some problems for measured values, measure after applying rated voltage for 120 minutes at 105˚C.

DRAWING

Unit : mm



PART NUMBER SYSTEM (See Page 46)

Size	ØD	L	B	C	E	A	R
6.3×4.5	6.3	4.5	6.6	6.6	2.2	2.45	0.5~0.8

DIMENSIONS

μF \ WV(SV)	2.5(3.3)	4(5.2)	6.3(8.2)	10(11.5)	16(18.4)	20(23)	25(25)
15						6.3 × 4.5	6.3 × 4.5
22					6.3 × 4.5		
47				6.3 × 4.5			
100			6.3 × 4.5				
120		6.3 × 4.5					
150	6.3 × 4.5						

Table 1. FN(Chip type) Series Characteristics List

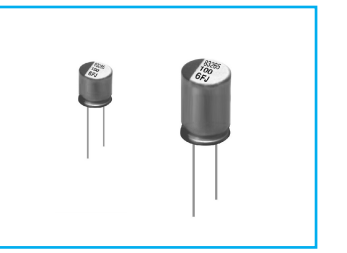
WV	μF	ØD (mm)	L(mm)	ESR(mΩ)max. 100~300kHz	Ripple current (mA rms) at 105˚C 100kHz	Dissipation factor 120Hz	Leakage Current (μA)(max.) after 2 minutes
2.5	150	6.3	4.5	38	1710	0.12	188
4	120	6.3	4.5	38	1710	0.12	240
6.3	100	6.3	4.5	40	1670	0.12	315
10	47	6.3	4.5	41	1560	0.12	235
16	22	6.3	4.5	45	1490	0.12	176
20	15	6.3	4.5	55	1650	0.12	150
25	15	6.3	4.5	55	1650	0.12	188

CONDUCTIVE POLYMER ALUMINUM ELECTROLYTIC CAPACITORS

FJ Lead type, With Conductive Polymer Series

Hi-CAP

FB ⇨ FJ
Low ESR
High Cap.



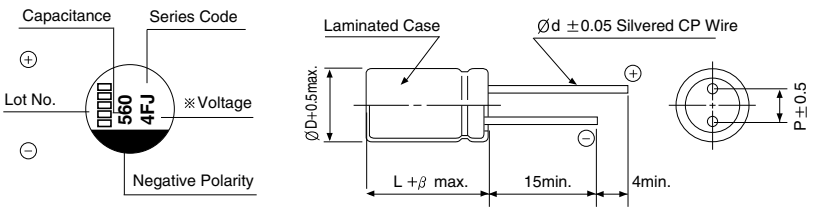
· Low ESR, high ripple current
· Load life for 2000 hours at 105˚C
· Complied to the RoHS directive

Item	Characteristics	
Operating temperature range	-55 ~ +105˚C	
Leakage current max.*	Less than or equal to the value of Table1	
Capacitance tolerance	±20% at 120Hz, 20˚C	
Dissipation factor max.	Less than or equal to the value of Table1	
ESR	Less than or equal to the value of Table1	
Temperature characteristics (Impedance ratio at 100kHz)	Z-55˚C / Z+20˚C	Z+105˚C / Z+20˚C
	0.75~1.25	0.75~1.25
Load life (after application of the rated voltage for 2000 hours at 105˚C)	Leakage current	Less than specified value
	Capacitance change	Within ±20% of initial value
	ESR	Less than 150% of specified value
	tanδ	Less than 150% of specified value

* In case of some problems for measured values, measure after applying rated voltage for 120 minutes at 105˚C.

DRAWING

Unit : mm



PART NUMBER SYSTEM (See Page 74)

Size	ØD	L	P	Ød	β
6.3×8	6.3	8.0	2.5	0.45	0.5
8×9	8	9.0	3.5	0.6	0.5
8×12	8	12.0	3.5	0.6	0.5
10×13	10	13.0	5.0	0.6	0.5

DIMENSIONS

μF \ WV(SV)	2.5(3.3)	4(5.2)	6.3(8.2)	16(18.4)
100				6.3 × 8
180				8 × 12
270				8 × 12
330	6.3 × 8			
470			8 × 9	
			8 × 12	10 × 13
560	6.3 × 8	6.3 × 8		
	8 × 9	8 × 9	8 × 9	
		8 × 12		
680		8 × 12	10 × 13	
820	6.3 × 8			
	8 × 9			
	8 × 12	10 × 13		
1000	8 × 12			
1500			10 × 13	
2700	10 × 13	← Case size ØD×L(mm)		

FJ Series

● Table 1. FJ(Lead type) Series Characteristics List

WV	μF	ØD(mm)	L(mm)	ESR(mΩ)max. 100~300kHz	Ripple current (mA rms)at 105°C 100kHz	Dissipation factor 120Hz	Leakage Current (μA)(max.) after 2 minutes
2.5	330	6.3	8	7	5600	0.10	500
2.5	560	6.3	8	7	5600	0.10	500
2.5	560	8	9	8	4700	0.10	280
2.5	820	6.3	8	7	5600	0.10	513
2.5	820	8	9	5	7200	0.10	500
2.5	1000	8	9	7	6100	0.10	500
2.5	820	8	12	5	7200	0.10	500
2.5	2700	10	13	10	5560	0.10	1350
4	560	6.3	8	7	5600	0.10	560
4	560	8	9	5	7200	0.10	500
4	560	8	12	5	7200	0.10	500
4	680	8	12	5	7200	0.10	544
4	820	10	13	7	6640	0.10	656
6.3	470	8	9	8	5700	0.10	592
6.3	470	8	12	8	5700	0.10	592
6.3	560	8	9	7	6100	0.10	706
6.3	680	10	13	7	6640	0.10	857
6.3	1500	10	13	10	5560	0.10	1890
16	100	6.3	8	10	4680	0.10	500
16	180	8	12	16	4360	0.10	576
16	270	8	12	11	5000	0.10	864
16	470	10	13	10	6100	0.10	1504

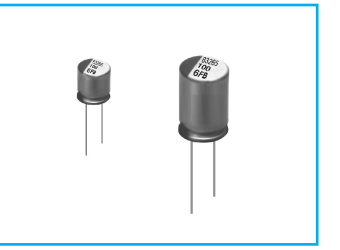
CONDUCTIVE POLYMER ALUMINUM ELECTROLYTIC CAPACITORS

FB Lead type, With Conductive Polymer Series

Hi-CAP

- Low ESR, high ripple current
- Load life for 2000 hours at 105˚C
- Complied to the RoHS directive

FB ⇨ FJ
Low ESR
High Cap.

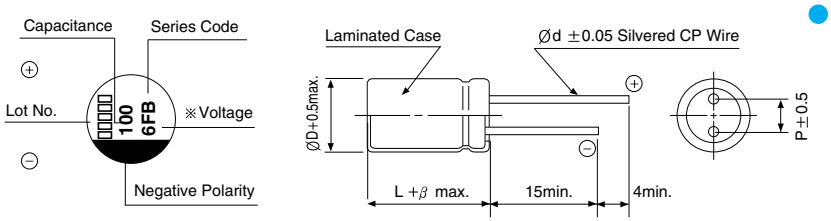


Item	Characteristics
Operating temperature range	-55 ~ +105˚C
Leakage current max.*	Less than or equal to the value of Table1
Capacitance tolerance	±20% at 120Hz, 20˚C
Dissipation factor max.	Less than or equal to the value of Table1
ESR	Less than or equal to the value of Table1
Temperature characteristics (Impedance ratio at 100kHz)	Z-55˚C / Z+20˚C: 0.75~1.25 ; Z+105˚C / Z+20˚C: 0.75~1.25
Load life (after application of the rated voltage for 2000 hours at 105˚C, In case of 25WV is applied 20V)	Leakage current: Less than specified value ; Capacitance change: Within ±20% of initial value ; tanδ: Less than 150% of specified value

* In case of some problems for measured values, measure the after applying rated voltage for 2.5 to 20V products or 20V derating voltage for 25V products for 120 minutes at 105˚C.

DRAWING

Unit : mm



PART NUMBER SYSTEM (See Page 74)

Size	ØD	L	P	Ød	β
6.3×6	6.3	6.0	2.5	0.45	0.5
6.3×8	6.3	8.0	2.5	0.45	0.5
8×9	8	9.0	3.5	0.6	0.5
8×12	8	12.0	3.5	0.6	0.5
10×13	10	13.0	5.0	0.6	0.5

DIMENSIONS

μF \ WV(SV)	2.5(3.3)	4(5.2)	6.3(8.2)	10(11.5)	16(18.4)	20(23)	25(25)
6.8							6.3×6
10							6.3×8
18							6.3×8
22						6.3×6	8×12
33							8×12
39					6.3×6		
47				6.3×6		6.3×8	
56				6.3×6		6.3×8	8×12
68				6.3×6		6.3×8	8×12
82			6.3×6		6.3×8		
100		6.3×6		6.3×8	6.3×8	8×12	8×12
120				6.3×8			
150		6.3×6	6.3×8	6.3×8		10×13	
180					8×12		
220		6.3×8	6.3×8				
270		6.3×8		8×12	8×12		
330		6.3×8	8×9	8×12	10×13		
390	6.3×8	6.3×8		8×12			
470		8×9	8×9	8×12	10×13		
560	8×9	8×9		10×13			
680	8×9	8×9	8×9	10×13			
820	8×9		8×12				
1000	8×9		8×12				
1200		8×12	10×13				
1500	8×12		10×13	← Case size ØD×L(mm)			
2700	10×13						
3300	10×13						

FB Series

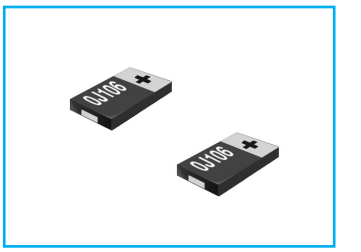
● Table 1. FB(Lead type) Series Characteristics List

WV	μF	ØD(mm)	L(mm)	ESR(mΩ)max. 100~300kHz	Ripple current (mA rms)at 105°C 100kHz	Dissipation factor 120Hz	Leakage Current (μA)(max.) after 2 minutes
2.5	390	6.3	8	20	3160	0.10	195
2.5	560	8	9	7	6100	0.10	280
2.5	680	8	9	7	6100	0.10	340
2.5	820	8	9	7	6100	0.10	410
2.5	1000	8	9	7	6100	0.10	500
2.5	1500	8	12	8	5500	0.10	750
2.5	2700	10	13	8	5560	0.10	1350
2.5	3300	10	13	8	6650	0.10	1650
4	100	6.3	6	40	1810	0.10	80
4	150	6.3	6	40	1810	0.10	120
4	220	6.3	8	35	2560	0.10	176
4	270	6.3	8	20	3160	0.10	216
4	330	6.3	8	24	3300	0.10	264
4	390	6.3	8	24	3300	0.10	312
4	470	8	9	8	5700	0.10	376
4	560	8	9	7	6100	0.10	448
4	680	8	9	7	6100	0.10	544
4	1200	8	12	8	5700	0.10	960
6.3	82	6.3	6	45	1700	0.10	103
6.3	150	6.3	8	35	2560	0.10	189
6.3	220	6.3	8	20	3160	0.10	277
6.3	330	8	9	28	3190	0.10	416
6.3	470	8	9	8	5700	0.10	592
6.3	680	8	9	7	6640	0.10	857
6.3	820	8	12	7	6640	0.10	1033
6.3	1000	8	12	8	6100	0.10	1260
6.3	1200	10	13	10	5560	0.10	1520
6.3	1500	10	13	10	5560	0.10	1890
10	47	6.3	6	25	2820	0.10	94
10	56	6.3	6	25	2820	0.10	112
10	68	6.3	6	25	2820	0.10	136
10	100	6.3	8	25	2820	0.10	200
10	120	6.3	8	35	2560	0.10	240
10	150	6.3	8	25	2820	0.10	300
10	270	8	12	9	4710	0.10	540
10	330	8	12	9	4710	0.10	660
10	390	8	12	9	5650	0.10	780
10	470	8	12	8	5650	0.10	940
10	560	10	13	8	5650	0.10	1120
10	680	10	13	7	6100	0.10	1360
16	39	6.3	6	50	1620	0.10	124
16	82	6.3	8	25	2120	0.10	262
16	100	6.3	8	25	2820	0.10	320
16	180	8	12	16	4360	0.10	576
16	270	8	12	11	5000	0.10	864
16	330	10	13	10	6100	0.10	1056
16	470	10	13	10	6100	0.10	1504
20	22	6.3	6	60	1450	0.12	88
20	47	6.3	8	25	2820	0.12	188
20	56	6.3	8	25	2820	0.12	224
20	68	6.3	8	25	2820	0.12	272
20	100	8	12	24	3320	0.12	400
20	150	10	13	20	4320	0.12	600
25	6.8	6.3	6	80	1200	0.12	85
25	10	6.3	8	60	1500	0.12	125
25	18	6.3	8	40	2230	0.12	225
25	22	8	12	40	2230	0.12	275
25	33	8	12	30	2980	0.12	413
25	56	8	12	30	3800	0.12	700
25	68	8	12	25	3320	0.12	850
25	100	8	12	20	4320	0.12	1250

CONDUCTIVE POLYMER ALUMINUM ELECTROLYTIC CAPACITORS

FC Chip type, With Conductive Polymer Series

Hi-CAP

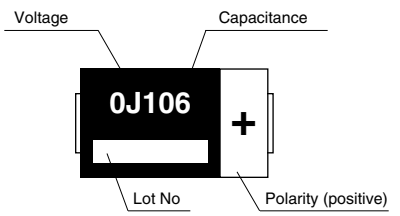


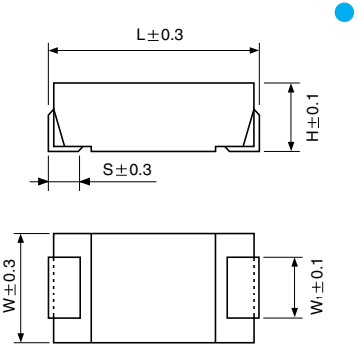
- Low ESR, high ripple current
- Excellent noise-absorbent characteristics
- Very stable capacitance, impedance and ESR against temperature
- Designed for use smoothing circuit of power supplies and noise limiter
- Complied to the RoHS directive

Item	Characteristics				
Operating temperature range	-40 ~ +105˚C				
Leakage current max.	I = 0.04CV or 3μA whichever is greater (after 2 minutes)				
Capacitance tolerance	±20% at 120Hz, 20˚C				
Dissipation factor max.	0.06 max. at 120Hz, 20˚C				
ESR	ESR at 20˚C 100kHz, as per table below				
Load life (after application of the rated voltage for 1000 hours at 105˚C)	Leakage current	Less than specified value			
	Capacitance change	Within ±20% of initial value			
	tanδ	Less than 150% of specified value			
Moisture resistance (after leaving capacitors under no load at 60˚C for 500 hours 90% R.H.)	Leakage current	Less than 300% of specified value			
	Capacitance change of Initial value	2, 2.5V.DC	4V.DC	6.3V.DC	8~16V.DC
		+70, -20%	+60, -20%	+50, -20%	+40, -20%
	tanδ	Less than 150% of specified value			

DRAWING

Unit : mm





Size Code	L	W	W_1	H	S
A	7.3	4.3	2.4	1.8	1.3
C	7.3	4.3	2.4	2.8	1.3
D	7.3	4.3	2.4	4.2	1.3

PART NUMBER SYSTEM (See page 46)

(Example : 6.3V 10μF)

FC 0J 106 M 7343A VR □□□

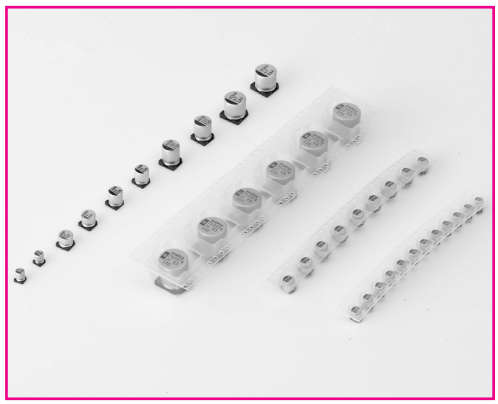
- Internal control code
- Taping
- Size(L:7.3, W:4.3, H:1.8)
- Capacitance tolerance(±20%)
- Capacitance(10μF)
- Rated voltage(6.3V)
- Series name

DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

μF \ WV	2			2.5			4			6.3			8			12.5			16		
2.2																			110	1000	A
4.7																80	1000	A	80	1000	A
6.8																			70	1000	A
8.2													55	1400	A				45	1300	A
10										55	1400	A				60	1000	A			
15							55	1400	A				40	1600	A	50	1300	A			
22				55	1400	A				40	1600	A	28	2000	A	30	1600	A			
33	55	1400	A				40	1600	A	28	2000	A	18	2500	A						
47				40	1600	A	28	2000	A	18	2500	A									
56	40	1600	A																		
68				28	2000	A	18	2500	A												
82	28	2000	A	18	2500	A															
100	18	2500	A							10	3500	C	18	2500	D						
120																					
150							10	3500	C	10	3500	D	15	3000	D						
180							7	3700	D	7	3700	D									
220	10	3500	C	10	3500	C	7	3700	D												
330	10	3500	C	7	3700	D															
390	7	3700	D	7	3700	D															
470	7	3700	D																		

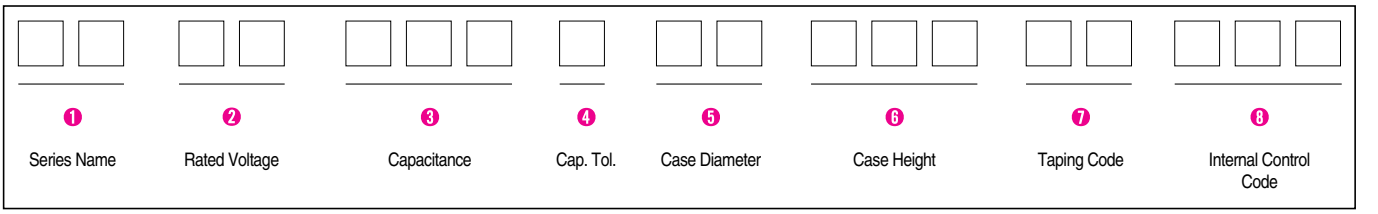
Size code
Ripple current (mA rms) at 105˚C, 100kHz
ESR (mΩ) max. at 20˚C, 100kHz

3 SURFACE MOUNT ALUMINUM ELECTROLYTIC CAPACITORS



PART NUMBER SYSTEM

● Part Number System



❶ Series Name

See page 4.

❷ Rated Working Voltage

WV	4	6.3	10	16	25	35	50
Code	0G	0J	1A	1C	1E	1V	1H

WV	63	100	160	200	250	400	450
Code	1J	2A	2C	2D	2E	2G	2W

❸ Capacitance

ex)	0.47μF	474
	4.7μF	475
	47μF	476
	470μF	477
	4700μF	478

❹ Capacitance Tolerance

Tolerance (%)	±20
Code	M

❺ Case Diameter

ex)	Ø4	04
	Ø5	05
	Ø6.3	6L
	Ø8	08
	Ø10	10
	Ø12.5	12

❻ Case Height

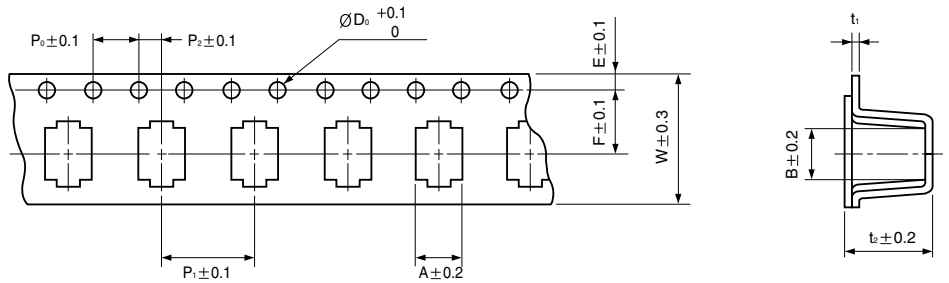
ex)	5.3mm	005
	5.8mm	006
	6.2mm	06B
	7.7mm	07K
	10mm	010
	13.5mm	13M

❼ VR (Reel Type)

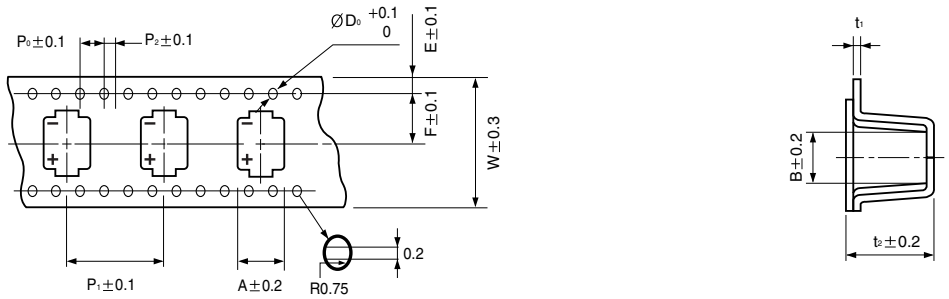
Taping Specifications for Chip Type Capacitors

Carrier Tape

· **Fig.1**

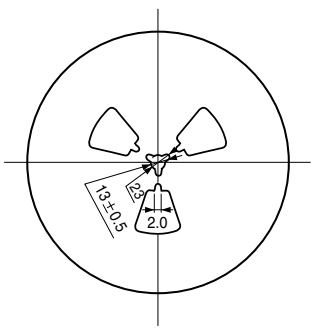


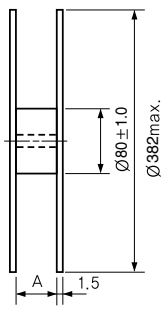
· **Fig.2**



ØD×L	A	B	ØD₀	E	F	P₀	P₁	P₂	t₁	t₂	W	Fig.
4 × 5.3	4.7	4.7	1.5	1.75	5.5	4.0	8.0	2.0	0.4	5.7	12.0	1
5 × 5.3	5.7	5.7	1.5	1.75	5.5	4.0	12.0	2.0	0.4	5.7	12.0	
6.3× 5.3	7.0	7.0	1.5	1.75	7.5	4.0	12.0	2.0	0.4	5.7	16.0	
6.3× 5.8	7.0	7.0	1.5	1.75	7.5	4.0	12.0	2.0	0.4	6.3	16.0	
6.3× 7.7	7.0	7.0	1.5	1.75	7.5	4.0	12.0	2.0	0.4	8.2	16.0	
8 × 6.2	8.7	8.7	1.5	1.75	7.5	4.0	12.0	2.0	0.4	6.8	16.0	
8 × 10	8.7	8.7	1.5	1.75	11.5	4.0	16.0	2.0	0.4	11.0	24.0	
10 × 10	10.7	10.7	1.5	1.75	11.5	4.0	16.0	2.0	0.4	11.0	24.0	
12.5×13.5	14.0	14.0	1.5	1.75	14.2	4.0	24.0	2.0	0.5	14.0	32.0	2

Reel (Taping code : VR)

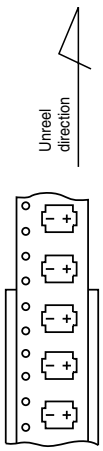




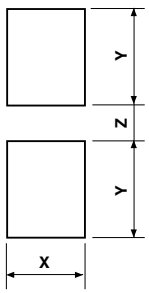
ØD×L	A
4 × 5.3	14
5 × 5.3	14
6.3 × 5.3	18
6.3 × 5.8	18
6.3 × 7.7	18
8 × 6.2	18
8 × 10	26
10 × 10	26
12.5×13.5	34

ØD×L	Q'ty/Reel(pcs.)	Q'ty/Box(pcs.)
4 × 5.3	2000	20000
5 × 5.3	1000	10000
6.3 × 5.3	1000	10000
6.3 × 5.8	1000	10000
6.3 × 7.7	900	9000
8 × 6.2	1000	10000
8 × 10	500	3000
10 × 10	500	3000
12.5×13.5	200	1000

Polarity



Recommended Land Size



ØD×L	X	Y	Z
4 × 5.3	1.6	2.6	1.0
5 × 5.3	1.6	3.0	1.4
6.3 × 5.3	1.6	3.5	2.0
6.3 × 5.8	1.6	3.5	2.0
6.3 × 7.7	1.6	3.5	2.0
8 × 6.2	2.5	4.0	2.0
8 × 10	2.5	3.5	3.0
10 × 10	2.5	4.0	4.0
12.5×13.5	4.0	7.5	7.0

Reflow soldering method for the chip aluminum electrolytic capacitor

1. Recommended conditions for reflow soldering

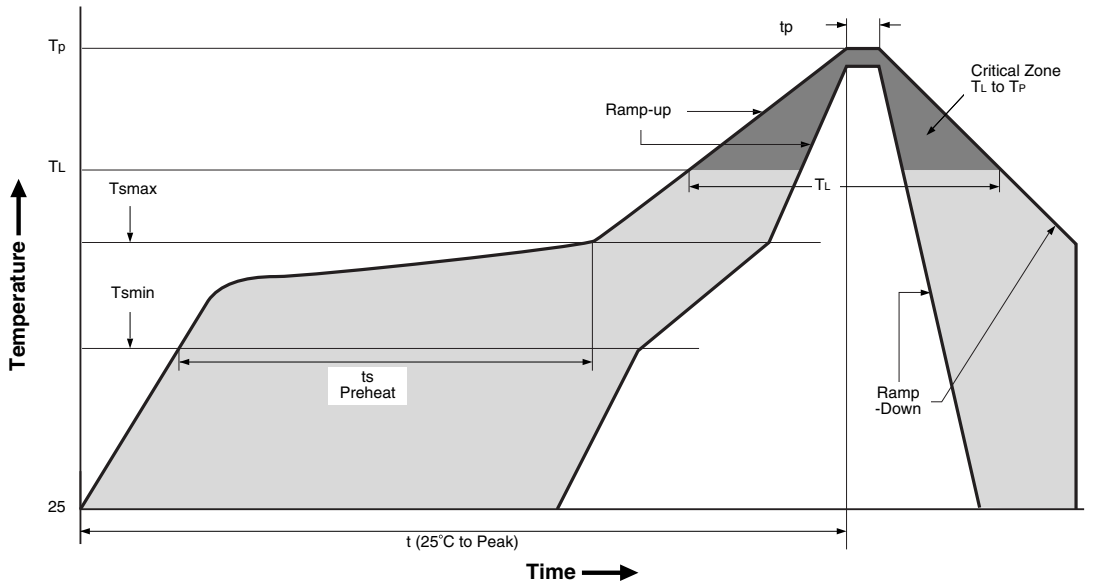
The chip aluminum electrolytic capacitor is subjected to soldering by reflow method.
Temperature and time conditions of reflow soldering shall be set as per each temperature profile shown below as a standard. The following are recommended conditions in the case of reflow soldering method for the chip aluminum electrolytic capacitor.

(1) The capacitor shall not be subjected to either flow or dip soldering method.

(2) Avoid soldering twice by reflow. The number of reflow time for chip aluminum electrolytic capacitor shall be once basically. If this type of capacitor has to be inevitably subjected to the reflow twice, enough cooling time between the first and the second reflow (at least more than 30 minutes) shall be taken to avoid the consecutive reflows by all means.

(3) The touch up work with a soldering iron is allowed after the reflow soldering (Temperature of soldering iron : MAX 400˚C, Time : 5 sec.), provided that carefully attention shall be paid lest a soldering iron should directly touch the capacitor body or its resin bottom base.

2. RECOMMENDED REFLOW SOLDERING CONDITIONS

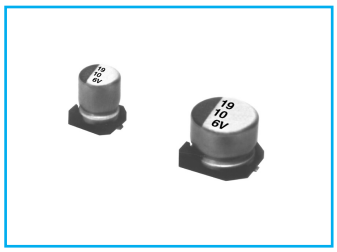


Profile Feature		Soldering condition	
		Ø4 ~ Ø10	Ø12.5
Average Ramp-up Rate (T_L to T_P)		3˚C / second max.	3˚C / second max.
Preheat	Temperature Min. (T_S min)	150˚C	150˚C
	Temperature Max. (T_S max)	200˚C	200˚C
	Time (T_S min to T_S max)	60 ~ 150 seconds	40~120 seconds
T_S max to T_L -Ramp-up Rate		3˚C / second max.	3˚C / second max.
Time maintained above	Time (T_L)	217˚C	217˚C
	Time (t_L)	60 ~ 90 seconds	40 ~ 60 seconds
Peak/classification Temperatrue (T_P)		250˚C	240˚C
Time within 5˚C of actual peak temperature(T_P)		10 seconds max.	10 seconds max.
Ramp-Down rate		3˚C / second max.	3˚C / second max.
Time 25˚C to peak temperature		8 minute max.	8 minute max.

SC Chip type, Standard Series

Solvent Proof
WV≦100V

NC ⇦ SC ⇨ RC
Non-polar / Wide temp



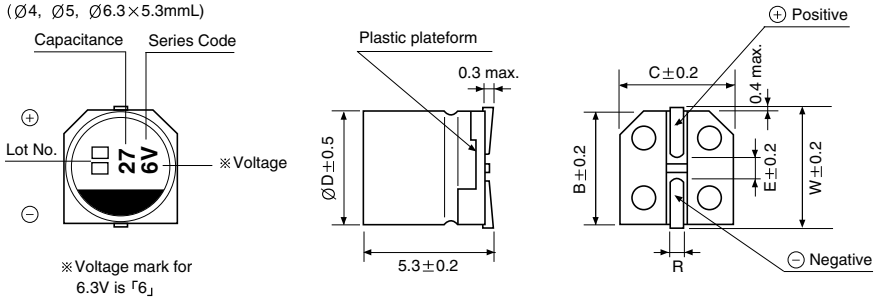
- Chip type higher capacitance in larger case size
- Designed for surface mounting on high density PC board
- Applicable to automatic insertion machine using carrier tape
- Complied to the RoHS directive

Item	Characteristics
Operating temperature range	-40 ~ +85˚C
Leakage current max.	WV≦100 I = 0.01CV or 3μA whichever is greater (after 2 minutes) WV≧160 I = 0.04CV + 100μA(after 1 minutes)
Capacitance tolerance	±20% at 120Hz, 20˚C
Dissipation factor max. (at 120Hz, 20˚C)	WV: 4 / 6.3 / 10 / 16 / 25 / 35 / 50 / 63 / 100 / 160 / 200 / 250 / 400 / 450 tanδ: 0.40 / 0.35 / 0.24 / 0.20 / 0.16 / 0.15 / 0.12 / 0.12 / 0.12 / 0.20 / 0.20 / 0.20 / 0.25 / 0.25
Low temperature characteristics (Impedance ratio at 120Hz)	WV: 4 / 6.3 / 10 / 16 / 25 / 35 ~ 100 / 160 ~ 250 / 400 ~ 450 Z-25˚C/Z+20˚C: 6 / 5 / 4 / 3 / 2 / 2 / 3 / 6 Z-40˚C/Z+20˚C: 12 / 10 / 8 / 6 / 4 / 3 / 6 / 10
Load life (after application of the rated voltage for 2000 hours at 85˚C)	Leakage current: Less than specified value Capacitance change: Within ±20% of initial value (Small size : ±25%) tanδ: Less than 200% of the specified value
Shelf life(at 85˚C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value.
Resistance to soldering heat	The following specifications shall be satisfied when the capacitors are restored to 20˚C after exposing them at 250˚C for 30 seconds. Leakage current: Less than specified value Capacitance change: Within ±10% of initial value tanδ: Less than specified value

DRAWING

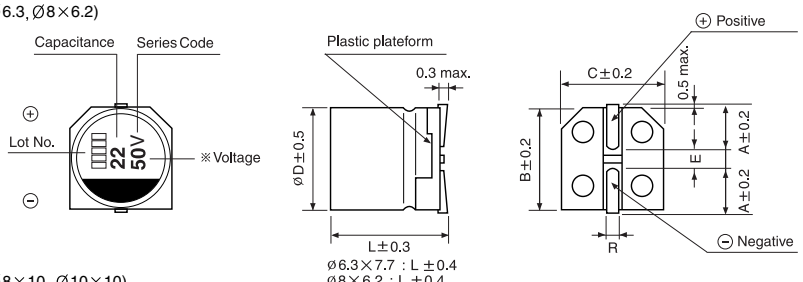
Unit : mm

(Ø4, Ø5, Ø6.3×5.3mmL)

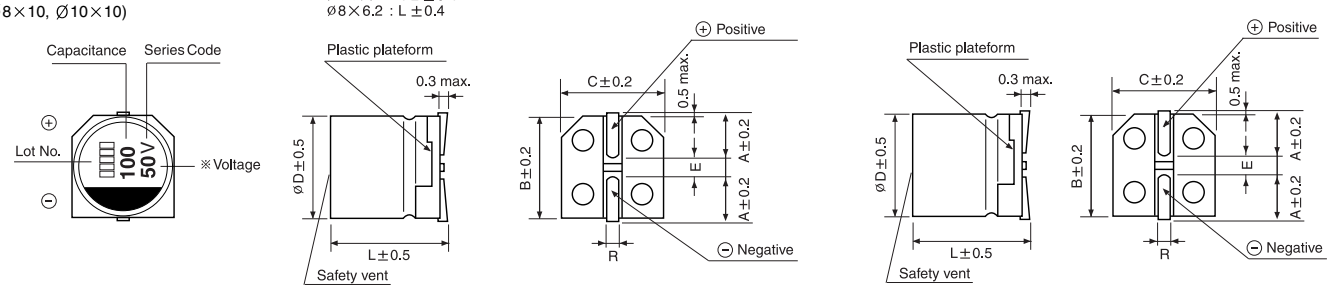


ØD×L	W	A	B	C	E	R
4×5.3	4.8		4.3	4.3	1.0	0.5~0.8
5×5.3	5.8		5.3	5.3	1.4	0.5~0.8
6.3×5.8	7.1		6.6	6.6	2.2	0.5~0.8
6.3×7.7		2.4	6.6	6.6	2.2	0.5~0.8
8×6.2		3.3	8.3	8.3	2.3	0.5~0.8
8×10		2.9	8.3	8.3	3.1	0.8~1.1
10×10		3.2	10.3	10.3	4.5	0.8~1.1
12.5×13.5		4.6	12.8	12.8	4.5	1.1~1.4

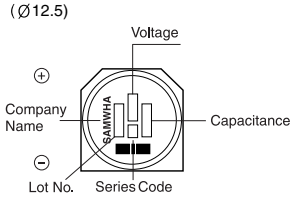
(Ø6.3, Ø8×6.2)



(Ø8×10, Ø10×10)



(Ø12.5)



SC series

● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV / μF	4		6.3		10		16		25		35		50	
0.1													4×5.3	3.2
0.22													4×5.3	4.7
0.33													4×5.3	5.7
0.47													4×5.3	6.8
1.0													4×5.3	10
2.2											4×5.3	11	4×5.3	15
3.3									4×5.3	15	4×5.3	16	4×5.3	18
4.7							4×5.3	16	4×5.3	18	4×5.3	19	4×5.3	24
													5×5.3	25
10	4×5.3	16	4×5.3	19	4×5.3	21	4×5.3	21	4×5.3	24	4×5.3	27	5×5.3	41
									5×5.3	30	5×5.3	32	6.3×5.3	43
22	3×5.3	19	4×5.3	29	4×5.3	28	4×5.3	30	5×5.3	41	6.3×5.3	55	6.3×5.3	71
	4×5.3	24			5×5.3	36	5×5.3	41	6.3×5.3	53			6.3×5.8	73
33	4×5.3	29	4×5.3	30	4×5.3	34	5×5.3	43	5×5.3	50	6.3×5.3	65	6.3×7.7	94
			5×5.3	41	5×5.3	44	6.3×5.3	58	6.3×5.3	64	6.3×5.8	67	8×6.2	95
47	4×5.3	35	4×5.3	36	5×5.3	47	5×5.3	52	6.3×5.3	70	6.3×7.7	94	6.3×7.7	105
			5×5.3	48	6.3×5.3	62	6.3×5.3	69	6.3×5.8	72	8×6.2	105	8×10	140
100	5×5.3	54	5×5.3	60	6.3×5.3	80	6.3×5.3	88	8×6.2	145	6.3×7.7	132	8×10	181
	6.3×5.3	68	6.3×5.3	82	6.3×5.8	82	6.3×5.8	91			8×10	175	10×10	195
220	6.3×5.3	93	6.3×5.8	91	6.3×7.7	173	6.3×7.7	162	8×10	232	10×10	265	10×10	320
					8×6.2	175	8×10	215	10×10	250				
330			6.3×7.7	188	8×10	240	8×10	270	10×10	305	10×10	360	12.5×13.5	600
			8×6.2	190										
470			8×10	265	8×10	290	8×10	307	10×10	400	12.5×13.5	600		
							10×10	330						
1000			8×10	370	10×10	454	12.5×13.5	710	12.5×13.5	820				
			10×10	400										
1500			10×10	480	12.5×13.5	850	12.5×13.5	870						
2200			12.5×13.5	890	12.5×13.5	960								

SC series

● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

μF \ WV	63		100		160		200		250		400		450	
2.2													10×10	85
3.3			6.5×5.8	29							10×10	90	10×10	100
4.7	6.3×5.8	31	6.3×5.8	35			10×10	100	10×10	100	12.5×13.5	115	12.5×13.5	115
			8×6.2	40										
10	6.3×5.8	46	8×10	77	10×10	100	12.5×13.5	150	12.5×13.5	150				
22	8×6.2	96	8×10	100	12.5×13.5	240	12.5×13.5	260						
33	8×10	117	10×10	130	12.5×13.5	260								
47	10×10	140	10×10	155										
68	10×10	160	12.5×13.5	350										
100	12.5×13.5	370	12.5×13.5	420										
220	12.5×13.5	550												

Ripple current (mA rms) at 85℃, 120Hz

Case size ØD x L (mm)

● FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

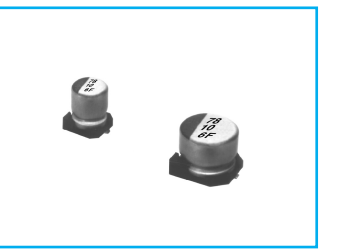
Frequency	50Hz	120Hz	300Hz	1kHz	10kHz≦
Coefficient	0.70	1.00	1.17	1.36	1.50

SURFACE MOUNT ALUMINUM ELECTROLYTIC CAPACITORS

RC Chip type, Wide Temperature Range Series

Solvent Proof

SC ⇨ RC
Wide temp.



- Wide operating temperature range of -55 ~ +105˚C
- Designed for surface mounting on high density PC board
- Applicable to automatic insertion machine using carrier tape
- Complied to the RoHS directive

Item	Characteristics
Operating temperature range	-55 ~ +105˚C
Leakage current max.	I = 0.01CV or 3μA whichever is greater (after 2 minutes)
Capacitance tolerance	±20% at 120Hz, 20˚C
Dissipation factor max. (at 120Hz, 20˚C)	WV: 6.3 / 10 / 16 / 25 / 35 / 50 tanδ: 0.27 / 0.23 / 0.19 / 0.15 / 0.13 / 0.11
Low temperature characteristics (Impedance ratio at 120Hz)	WV: 6.3 / 10 / 16 / 25 / 35 / 50 Z-25˚C/Z+20˚C: 3 / 3 / 2 / 2 / 2 / 2 Z-40˚C/Z+20˚C: 8 / 5 / 4 / 3 / 3 / 3
Load life (after application of the rated voltage for 1000 hours at 105˚C)	Leakage current: Less than specified value Capacitance change: Within ±25% of initial value tanδ: Less than 200% of specified value
Shelf life (at 105˚C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value.
Resistance to soldering heat	The following specifications shall be satisfied when the capacitors are restored to 20˚C after exposing them at 250˚C for 30 seconds. Leakage current: Less than specified value Capacitance change: Within ±10% of initial value tanδ: Less than specified value

DRAWING (See page 49)

Unit : mm

-Series code of RC is F

DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

μF \ WV	6.3		10		16		25		35		50	
0.1											4×5.3	2.3
0.22											4×5.3	3.4
0.33											4×5.3	4.1
0.47											4×5.3	4.9
1.0											4×5.3	7.2
2.2											4×5.3	10.7
3.3											4×5.3	13.1
4.7							4×5.3	13	4×5.3	14	5×5.3	18.1
10					4×5.3	17	5×5.3	23	5×5.3	24	6.3×5.3	30.8
22	4×5.3	22	5×5.3	27	5×5.3	30	6.3×5.3	39	6.3×5.3	42	6.3×5.8	45
33	5×5.3	31	5×5.3	33	6.3×5.3	43	6.3×5.3	48	6.3×5.8	52	6.3×7.7	60
47	5×5.3	36	6.3×5.3	46	6.3×5.3	51	6.3×5.8	59	6.3×5.8	63	6.3×7.7	63
100	6.3×5.3	50	6.3×5.8	64	6.3×5.8	64	6.3×7.7	91	8×10	296	10×10	295
220	6.3×7.7	86	6.3×7.7	105	6.3×7.7	105	8×10	340	10×10	435		
330	6.3×7.7	105	8×10	305	8×10	340	10×10	360				
470	8×10	330	10×10	340	10×10	470						
1000	10×10	475										

Ripple current (mA rms) at 105˚C, 120Hz
Case size ØD×L (mm)

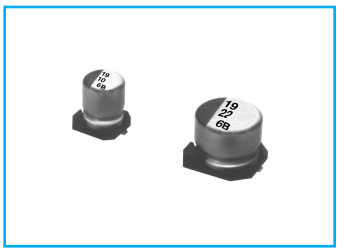
FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

Frequency	50Hz	120Hz	300Hz	1kHz	10kHz≦
Coefficient	0.70	1.00	1.17	1.36	1.50

CB Chip type,Long Life Series

Long Life Solvent Proof

RC ⇨ CB
Long life



- Chip type with load life 5000 hours at 105°C
- Chip type with 5.5mmL Height
- Designed for surface mounting on high density PC board
- Applicable to automatic insertion machine using carrier tape
- Complied to the RoHS directive

Item	Characteristics
Operating temperature range	-55 ~ +105°C
Leakage current max.	I = 0.01CV or 3μA whichever is greater (after 2 minutes)
Capacitance tolerance	±20% at 120Hz, 20°C
Dissipation factor max. (at 120Hz, 20°C)	WV: 4 / 6.3 / 10 / 16 / 25 / 35 / 50 tanδ: 0.24 / 0.22 / 0.19 / 0.16 / 0.14 / 0.12 / 0.11
Low temperature characteristics (Impedance ratio at 120Hz)	WV: 4 / 6.3 / 10 / 16 / 25 ~ 50 Z-25°C/Z+20°C: 2 / 2 / 2 / 2 / 3 Z-55°C/Z+20°C: 4 / 4 / 4 / 3 / 3
Load life (after application of the rated voltage for 5000 hours at 105°C)	Capacitance change: Within ±30% of initial value tanδ: Less than 300% of the specified value Leakage current: Less than specified value
Shelf life(at 105°C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value.
Resistance to soldering heat	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them at 250°C for 30 seconds. Leakage current: Less than specified value Capacitance change: Within ±10% of initial value tanδ: Less than specified value

DRAWING (See page 49)

Unit : mm

-Series code of CB is B

DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

μF \ WV	4		6.3		10		16		25		35		50	
0.1													4×5.3	2.4
0.22													4×5.3	3.5
0.33													4×5.3	4.3
0.47													4×5.3	5.1
1.0													4×5.3	7.4
2.2													4×5.3	11.0
3.3													4×5.3	13.5
4.7									4×5.3	14	4×5.3	15	5×5.3	18.6
6.8									4×5.3	17	5×5.3	21	6.3×5.3	26.1
10							4×5.3	19	5×5.3	24	5×5.3	26	6.3×5.3	32.6
15					4×5.3	22	5×5.3	28	5×5.3	31	6.3×5.3	37	6.3×5.3	40.0
22	4×5.3	24	4×5.3	25	5×5.3	30	5×5.3	33	6.3×5.3	42	6.3×5.3	45		
33	5×5.3	33	5×5.3	35	5×5.3	38	6.3×5.3	48						
47	5×5.3	40	5×5.3	42	6.3×5.3	52	6.3×5.3	57						
68	5×5.3	48	6.3×5.3	55	6.3×5.3	63								
100	5×5.3	55	6.3×5.3	67	6.3×5.3	72								

Ripple current (mA rms) at 105°C, 120Hz
Case size ØD×L(mm)

FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

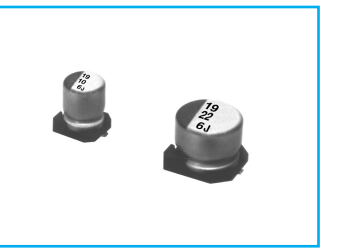
Frequency	50Hz	120Hz	300Hz	1kHz	10kHz≦
Coefficient	0.70	1.00	1.17	1.36	1.50

SURFACE MOUNT ALUMINUM ELECTROLYTIC CAPACITORS

JC Chip type, Higher Capacitance Range Series

Solvent Proof
WV≦100V

RC ⇨ JC
Long life



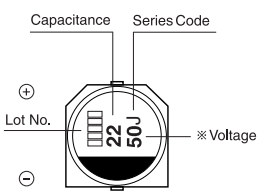
- Chip type higher capacitance in large case sizes
- Designed for surface mounting on high density PC board
- Applicable to automatic insertion machine using carrier tape
- Complied to the RoHS directive

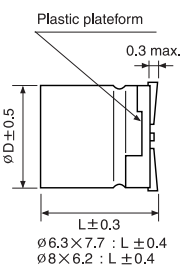
Item	Characteristics
Operating temperature range	WV≦100 : -55 ~ +105˚C WV≧160 : -40 ~ +105˚C
Leakage current max.	WV≦100 I = 0.01CV or 3μA whichever is greater (after 2 minutes) WV≧160 I = 0.04CV + 100μA(after 1 minutes)
Capacitance tolerance	±20% at 120Hz, 20˚C
Dissipation factor max. (at 120Hz, 20˚C)	WV: 4 / 6.3 / 10 / 16 / 25 / 35 / 50 / 63 / 100 / 160 / 200 / 250 / 400 / 450 tanδ: 0.37 / 0.28 / 0.24 / 0.20 / 0.16 / 0.13 / 0.12 / 0.10 / 0.10 / 0.15 / 0.15 / 0.15 / 0.20 / 0.20
Low temperature characteristics (Impedance ratio at 120Hz)	WV: 4 / 6.3 / 10 / 16 / 25 ~ 50 / 63 ~ 100 / 160 ~ 250 / 400 ~ 450 Z-25˚C/Z+20˚C: 6 / 3 / 3 / 2 / 2 / 3 / 3 / 6 Z-40˚C/Z+20˚C: 12 / 8 / 5 / 4 / 3 / 4 / 6 / 10
Load life (after application of the rated voltage for 2000 hours at 105˚C)	Leakage current: Less than specified value Capacitance change: Within ±20% of initial value (Small size : ±25%) tanδ: Less than 200% of specified value
Shelf life (at 105˚C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value.
Resistance to soldering heat	The following specifications shall be satisfied when the capacitors are restored to 20˚C after exposing them at 250˚C for 30 seconds. Leakage current: Less than specified value Capacitance change: Within ±10% of initial value tanδ: Less than specified value

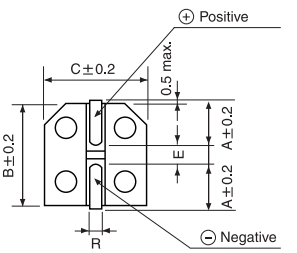
DRAWING

Unit : mm

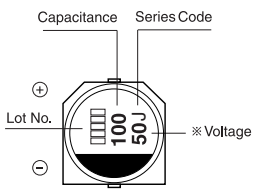
(Ø6.3, Ø8×6.2)

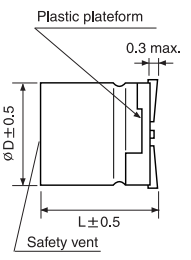


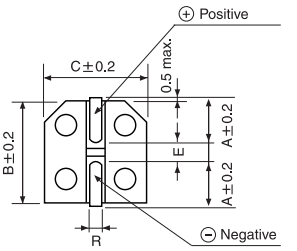




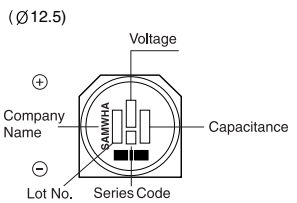
(Ø8×10, Ø10×10)

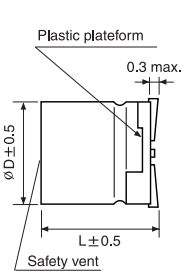


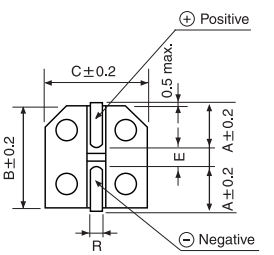




(Ø12.5)







ØD×L	A	B	C	E	R
6.3×5.8	2.4	6.6	6.6	2.2	0.5~0.8
6.3×7.7	2.4	6.6	6.6	2.2	0.5~0.8
8×6.2	3.3	8.3	8.3	2.3	0.5~0.8
8×10	2.9	8.3	8.3	3.1	0.8~1.1
10×10	3.2	10.3	10.3	4.5	0.8~1.1
12.5×13.5	4.6	12.8	12.8	4.5	1.1~1.4

JC series

● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

μF \ WV	4		6.3		10		16		25		35		50	
10													6.3×5.8	30
22									6.3×5.8	38	6.3×5.8	42	8×6.2	67
33							6.3×5.8	40	6.3×5.8	48	8×6.2	76	8×10	133
47					6.3×5.8	46	6.3×5.8	50	8×6.2	79	8×10	124	10×10	180
100	6.3×5.8	60	6.3×5.8	60	6.3×5.8	60	8×10	148	8×10	181	10×10	304	10×10	310
220			8×10	161	8×10	173	10×10	330	10×10	351	10×10	450	12.5×13.5	480
330			8×10	288	10×10	318	10×10	441	10×10	372	12.5×13.5	500		
470			10×10	340	10×10	351	10×10	489	10×10	450	12.5×13.5	600		
680			10×10	408	10×10	392	12.5×13.5	500	12.5×13.5	500				
1000			10×10	495	10×10	550	12.5×13.5	600						
1500			10×10	560	12.5×13.5	650								
2200			12.5×13.5	730										

μF \ WV	63		100		160		200		250		400		450	
3.3									10×10	30	12.5×13.5	30	12.5×13.5	40
4.7							10×10	45	12.5×13.5	65				
10	8×6.2	32			10×10	45	12.5×13.5	75						
22	8×10	60	8×10	90	12.5×13.5	85	12.5×13.5	85						
33	8×10	110	10×10	120	12.5×13.5	95	← Ripple current (mA rms) at 105°C, 120Hz							
47	10×10	130	12.5×13.5	250	↑ Case size ØD x L (mm)									
68	10×10	160	12.5×13.5	300										
100	12.5×13.5	270												

● FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

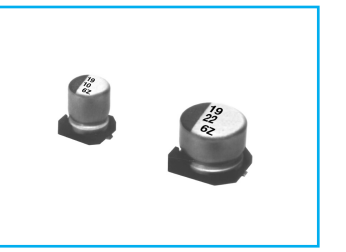
Frequency	50Hz	120Hz	300Hz	1kHz	10kHz≦
Coefficient	0.70	1.00	1.17	1.36	1.50

ZC Height 5.5mmL, Low Impedance Series

Low Impedance Solvent Proof

- Chip type, low impedance temperature range up to 105˚C
- Designed for surface mounting on high density PC board
- Applicable to automatic insertion machine using carrier tape
- Complied to the RoHS directive

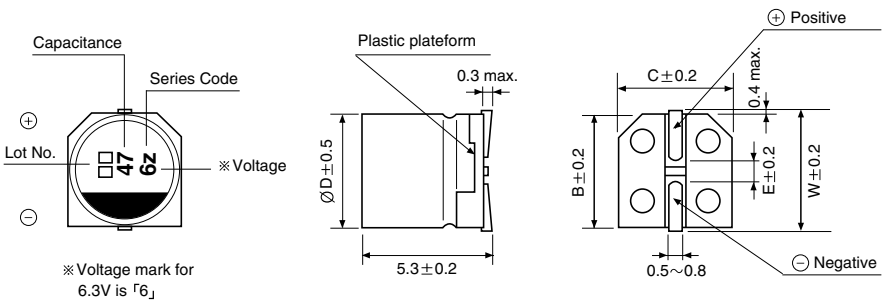
RC ⇒ ZC (Low Imp.)



Item	Characteristics
Operating temperature range	-55 ~ +105˚C
Leakage current max.	I = 0.01CV or 3μA whichever is greater (after 2 minutes)
Capacitance tolerance	±20% at 120Hz, 20˚C
Dissipation factor max. (at 120Hz, 20˚C)	WV: 6.3 / 10 / 16 / 25 / 35 tanδ: 0.22 / 0.19 / 0.16 / 0.14 / 0.12
Low temperature characteristics (Impedance ratio at 120Hz)	WV: 6.3 / 10 / 16 / 25 / 35 Z-25˚C/Z+20˚C: 2 / 2 / 2 / 2 / 3 Z-55˚C/Z+20˚C: 4 / 4 / 3 / 3 / 3
Load life (after application of the rated voltage for 1000 hours at 105˚C)	Leakage current: Less than specified value Capacitance change: Within ±20% of initial value tanδ: Less than 200% of specified value
Shelf life (at 105˚C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value.
Resistance to soldering heat	The following specifications shall be satisfied when the capacitors are restored to 20˚C after exposing them at 250˚C for 30 seconds. Leakage current: Less than specified value Capacitance change: Within ±10% of initial value tanδ: Less than specified value

DRAWING

Unit : mm



ØD	W	B	C	E
4	4.8	4.3	4.3	1.0
5	5.8	5.3	5.3	1.4
6.3	7.1	6.6	6.6	2.2

DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

μF \ WV	6.3			10			16			25			35		
1.0													4×5.3	5.0	50
1.5													4×5.3	5.0	50
2.2													4×5.3	5.0	50
3.3													4×5.3	5.0	50
4.7										4×5.3	5.0	50	4×5.3	5.0	50
6.8										4×5.3	5.0	50	5×5.3	2.6	80
10							4×5.3	5.0	50	5×5.3	2.6	80	5×5.3	2.6	80
15							5×5.3	2.6	80	6.3×5.3	1.3	75	6.3×5.3	1.3	115
22	4×5.3	5.0	50	5×5.3	2.6	80	5×5.3	2.6	80	6.3×5.3	1.3	115	6.3×5.3	1.3	115
33	5×5.3	2.6	80	5×5.3	2.6	80	6.3×5.3	1.3	115	6.3×5.3	1.3	115			
47	5×5.3	2.6	80	6.3×5.3	1.3	115	6.3×5.3	1.3	115	← Ripple current (mA rms) at 105˚C, 100kHz					
68	6.3×5.3	1.3	115	6.3×5.3	1.3	115	↑ Impedance (Ω) at 20˚C, 100kHz								
100	6.3×5.3	1.3	115				↑ Case size ØD×L(mm)								

FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

Frequency	50Hz	120Hz	300Hz	1kHz	10kHz≦
Coefficient	0.35	0.5	0.64	0.83	1.00

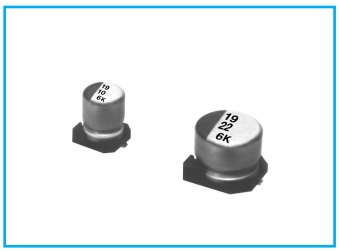
CK

Chip type, Low Impedance, High CV Series

Low Impedance Solvent Proof

- Chip type, low impedance temperature range up to 105˚C
- Designed for surface mounting on high density PC board
- Applicable to automatic insertion machine using carrier tape
- Complied to the RoHS directive

ZC ⇨ CK
Low Imp.

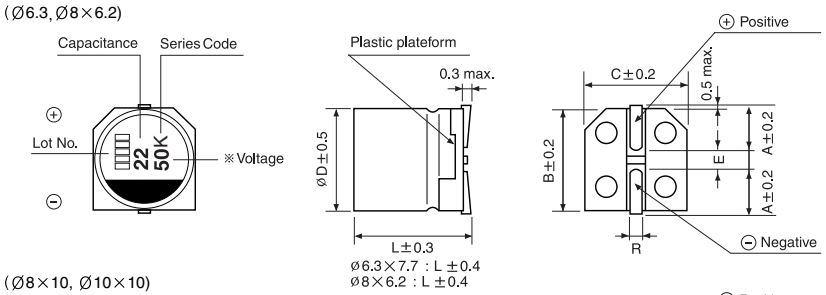


Item	Characteristics
Operating temperature range	-55 ~ +105˚C
Leakage current max.	I = 0.01CV or 3μA whichever is greater (after 2 minutes)
Capacitance tolerance	±20% at 120Hz, 20˚C
Dissipation factor max. (at 120Hz, 20˚C)	WV: 6.3 / 10 / 16 / 25 / 35 / 50 / 63 / 80 / 100 tanδ: 0.24 / 0.19 / 0.16 / 0.14 / 0.12 / 0.12 / 0.10 / 0.10 / 0.10
Low temperature characteristics (Impedance ratio at 120Hz)	WV: 6.3 / 10 / 16 / 25 / 35 / 50 / 63~100 Z-25˚C/Z+20˚C: 2 / 2 / 2 / 2 / 2 / 2 / 3 Z-55˚C/Z+20˚C: 3 / 3 / 3 / 3 / 3 / 3 / 4
Load life (after application of the rated voltage for 2000 hours at 105˚C)	Leakage current: Less than specified value Capacitance change: Within ±25% of initial value tanδ: Less than 200% of specified value
Shelf life (at 105˚C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value.
Resistance to soldering heat	The following specifications shall be satisfied when the capacitors are restored to 20˚C after exposing them at 250˚C for 30 seconds. Leakage current: Less than specified value Capacitance change: Within ±10% of initial value tanδ: Less than specified value

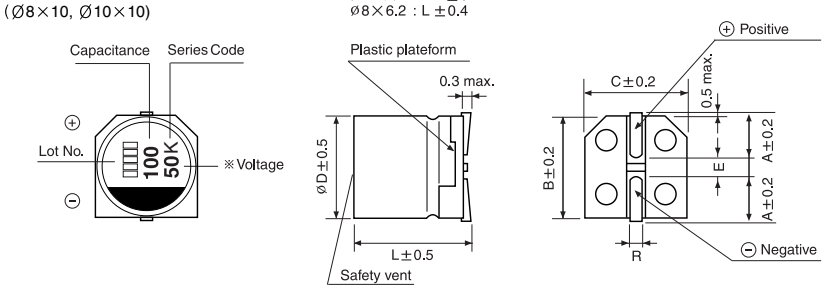
DRAWING

Unit : mm

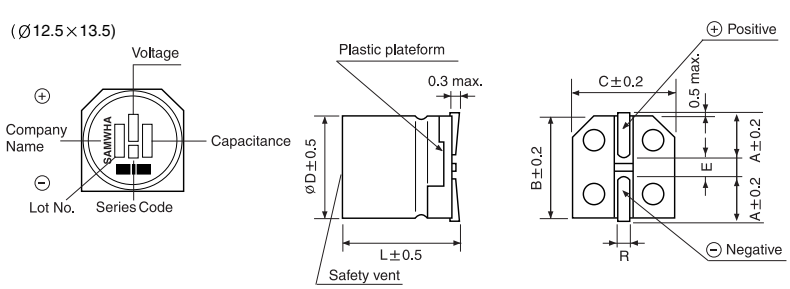
(Ø6.3, Ø8×6.2)



(Ø8×10, Ø10×10)



(Ø12.5×13.5)



ØD×L	A	B	C	E	R
6.3×5.8	2.4	6.6	6.6	2.2	0.5~0.8
6.3×7.7	2.4	6.6	6.6	2.2	0.5~0.8
8×6.2	3.3	8.3	8.3	2.3	0.5~0.8
8×10	2.9	8.3	8.3	3.1	0.8~1.1
10×10	3.2	10.3	10.3	4.5	0.8~1.1
12.5×13.5	4.6	12.8	12.8	4.5	1.1~1.4

CK series

● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

μF \ WV	6.3			10			16			25			35			50		
10																6.3×5.8	0.88	165
15																6.3×5.8	0.88	165
22																6.3×5.8	0.88	165
33							6.3×5.8	0.44	230	6.3×5.8	0.44	230	6.3×5.8	0.44	230	6.3×7.7	0.68	280
																8×6.2	0.63	300
47				6.3×5.8	0.44	230	6.3×5.8	0.44	230	6.3×5.8	0.44	230	6.3×5.8	0.44	230	6.3×7.7	0.68	280
																8×6.2	0.63	300
68	6.3×5.8	0.44	230	6.3×5.8	0.44	230	6.3×5.8	0.44	230	6.3×5.8	0.44	230	6.3×7.7	0.34	280	8×10	0.34	450
													8×6.2	0.26	300			
100	6.3×5.8	0.44	230	6.3×5.8	0.44	230	6.3×5.8	0.44	230	6.3×7.7	0.34	280	8×10	0.17	450	10×10	0.18	670
										8×6.2	0.26	300					
150	6.3×5.8	0.44	230	6.3×5.8	0.44	230	6.3×7.7	0.34	280	8×10	0.17	450	8×10	0.17	450			
							8×6.2	0.26	300									
220	6.3×5.8	0.44	230	6.3×7.7	0.34	280	6.3×7.7	0.34	280	8×10	0.17	450	10×10	0.09	670			
				8×6.2	0.26	300	8×6.2	0.26	300									
330	6.3×7.7	0.34	280	8×10	0.17	450	8×10	0.17	450	10×10	0.09	670						
	8×6.2	0.26	300															
470	8×10	0.17	450	8×10	0.17	450	10×10	0.09	670									
680	8×10	0.17	450	10×10	0.09	670												
1000	10×10	0.09	670															
1500	10×10	0.09	670															

Ripple current (mA rms) at 105°C, 100kHz

Impedance (Ω) at 20°C, 100kHz

Case size ØD x L (mm)

μF \ WV	63			80			100		
10	6.3×5.8	2.3	80	6.3×7.7	2.4	60			
22	6.3×7.7	2.1	120	8×10	1.3	130	8×10	1.3	130
33	8×10	0.9	250	8×10	1.3	130	10×10	0.7	200
47	8×10	0.9	250	10×10	0.7	200	12.5×13.5	0.45	500
68	10×10	0.45	400	12.5×13.5	0.35	500	12.5×13.5	0.45	500
100	10×10	0.45	400	12.5×13.5	0.35	500			
150	12.5×13.5	0.32	800	12.5×13.5	0.35	500			
220	12.5×13.5	0.32	800						

● FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

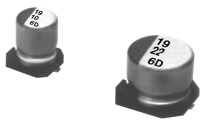
Frequency	50Hz	120Hz	300Hz	1kHz	10kHz≦
Coefficient	0.35	0.5	0.64	0.83	1.00

CD Chip type, Extremely Low Impedance Series

Low Impedance Solvent Proof

- Chip type, low impedance temperature range up to 105˚C
- Designed for surface mounting on high density PC board
- Applicable to automatic insertion machine using carrier tape
- Complied to the RoHS directive

CK ⇨ CD
Low Imp.

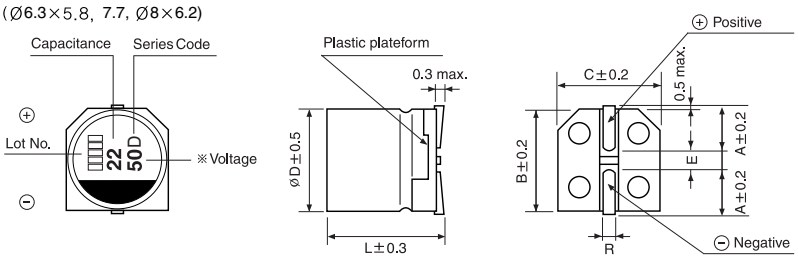


Item	Characteristics
Operating temperature range	-55 ~ +105˚C
Leakage current max.	I = 0.01CV or 3μA whichever is greater (after 2 minutes)
Capacitance tolerance	±20% at 120Hz, 20˚C
Dissipation factor max. (at 120Hz, 20˚C)	WV: 6.3 / 10 / 16 / 25 / 35 / 50 tanδ: 0.24 / 0.19 / 0.16 / 0.14 / 0.12 / 0.12
Low temperature characteristics (Impedance ratio at 120Hz)	WV: 6.3 / 10 / 16 / 25 / 35 / 50 Z-25˚C/Z+20˚C: 2 / 2 / 2 / 2 / 2 / 2 Z-55˚C/Z+20˚C: 3 / 3 / 3 / 3 / 3 / 3
Load life (after application of the rated voltage for 2000 hours at 105˚C)	Leakage current: Less than specified value Capacitance change: Within ±25% of initial value tanδ: Less than 200% of specified value
Shelf life (at 105˚C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value.
Resistance to soldering heat	The following specifications shall be satisfied when the capacitors are restored to 20˚C after exposing them at 250˚C for 30 seconds. Leakage current: Less than specified value Capacitance change: Within ±10% of initial value tanδ: Less than specified value

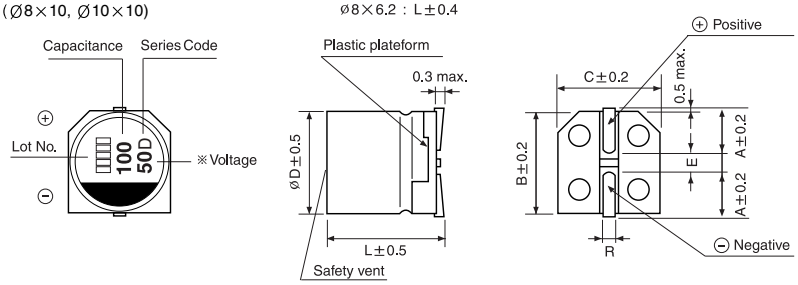
DRAWING

Unit : mm

(Ø6.3×5.8, 7.7, Ø8×6.2)



(Ø8×10, Ø10×10)

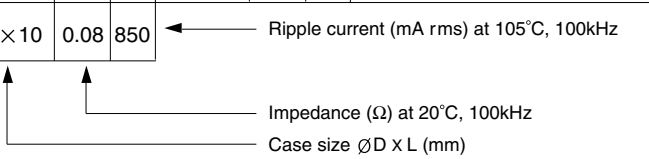


ØD	A	B	C	E	R
6.3×5.8	2.4	6.6	6.6	2.2	0.5~0.8
6.3×7.7	2.4	6.6	6.6	2.2	0.5~0.8
8×6.2	3.3	8.3	8.3	2.3	0.5~0.8
8×10	2.9	8.3	8.3	3.1	0.8~1.1
10×10	3.2	10.3	10.3	4.5	0.8~1.1

CD series

● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

μF \ WV	6.3			10			16			25			35			50		
10																6.3×5.8	0.86	170
15																6.3×5.8	0.86	170
22																6.3×5.8	0.86	170
33							6.3×5.8	0.39	240	6.3×5.8	0.39	240	6.3×5.8	0.39	240	6.3×7.7	0.66	280
																8×6.2	0.63	300
47				6.3×5.8	0.39	240	6.3×5.8	0.39	240	6.3×5.8	0.39	240	6.3×5.8	0.39	240	6.3×7.7	0.66	280
																8×6.2	0.63	300
68	6.3×5.8	0.36	240	6.3×5.8	0.36	240	6.3×5.8	0.36	240	6.3×5.8	0.36	240	6.3×7.7	0.32	290	8×10	0.32	350
100	6.3×5.8	0.36	240	6.3×5.8	0.36	240	6.3×5.8	0.36	240	6.3×7.7	0.32	290	8×10	0.16	600	10×10	0.16	700
										8×6.2	0.26	300						
150	6.3×5.8	0.36	240	6.3×5.8	0.36	240	6.3×7.7	0.32	290	8×10	0.16	600	8×10	0.16	600			
220	6.3×5.8	0.36	240	6.3×7.7	0.32	290	6.3×7.7	0.32	290	8×10	0.16	600	10×10	0.08	850			
				8×6.2	0.26	300	8×6.2	0.26	300									
330	6.3×7.7	0.32	290	8×10	0.16	600	8×10	0.16	600	10×10	0.10	850						
	8×6.2	0.26	300															
470	8×10	0.16	600	8×10	0.16	600	10×10	0.08	850									
680	8×10	0.16	600	10×10	0.08	850												
1000	10×10	0.08	850															
1500	10×10	0.08	850															



● FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

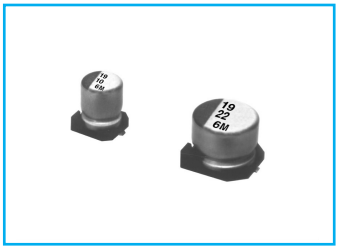
Frequency	50Hz	120Hz	300Hz	1kHz	10kHz≦
Coefficient	0.35	0.5	0.64	0.83	1.00

CM

Chip type, Extremely Low Impedance Long Life Series

Low Impedance　Solvent Proof

CD ⇨ CM
Long life



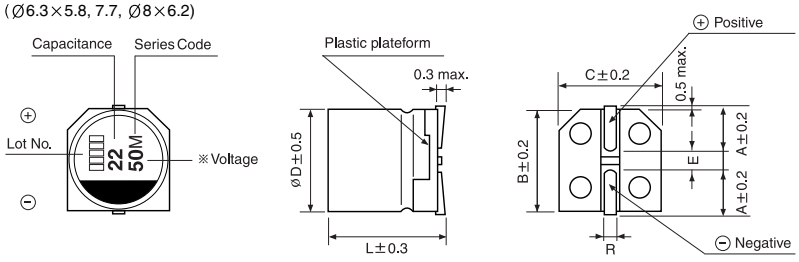
- Chip type, low impedance temperature range up to 105˚C
- Designed for surface mounting on high density PC board
- Applicable to automatic insertion machine using carrier tape
- Complied to the RoHS directive

Item	Characteristics
Operating temperature range	-55 ~ +105˚C
Leakage current max.	I = 0.01CV or 3μA whichever is greater (after 2 minutes)
Capacitance tolerance	±20% at 120Hz, 20˚C
Dissipation factor max. (at 120Hz, 20˚C)	WV: 6.3 / 10 / 16 / 25 / 35 / 50 tanδ: 0.26 / 0.19 / 0.16 / 0.14 / 0.13 / 0.12
Low temperature characteristics (Impedance ratio at 120Hz)	WV: 6.3 / 10 / 16 / 25 / 35 / 50 Z-25˚C/Z+20˚C: 2 / 2 / 2 / 2 / 2 / 2 Z-55˚C/Z+20˚C: 4 / 4 / 4 / 3 / 3 / 3
Load life (after application of the rated voltage for 5000 hours at 105˚C)	Leakage current: Less than specified value Capacitance change: Within ±30% of initial value tanδ: Less than 250% of specified value Ø6.3 and 8×6.2 product are for 3000 hours
Shelf life (at 105˚C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value.
Resistance to soldering heat	The following specifications shall be satisfied when the capacitors are restored to 20˚C after exposing them at 250˚C for 30 seconds. Leakage current: Less than specified value Capacitance change: Within ±10% of initial value tanδ: Less than specified value

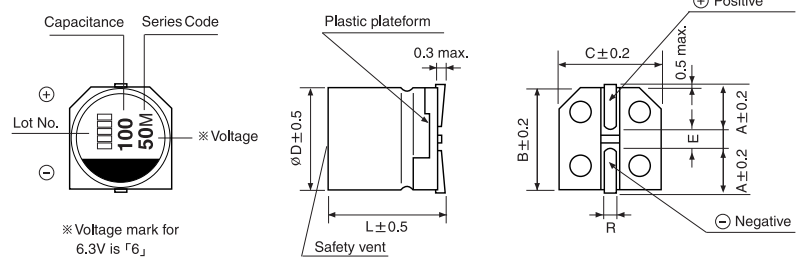
DRAWING

Unit : mm

(Ø6.3×5.8, 7.7, Ø8×6.2)



(Ø8×10, Ø10×10)



ØD	A	B	C	E	R
6.3×5.8	2.4	6.6	6.6	2.2	0.5~0.8
6.3×7.7	2.4	6.6	6.6	2.2	0.5~0.8
8×6.2	3.3	8.3	8.3	2.3	0.5~0.8
8×10	2.9	8.3	8.3	3.1	0.8~1.1
10×10	3.2	10.3	10.3	4.5	0.8~1.1

CM series

● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

μF \ WV	6.3			10			16			25			35			50		
10																6.3×5.8	0.86	170
15																6.3×5.8	0.86	170
22																6.3×5.8	0.86	170
33							6.3×5.8	0.39	240	6.3×5.8	0.39	240	6.3×5.8	0.39	240	6.3×7.7	0.66	280
																8×6.2	0.63	300
47				6.3×5.8	0.39	240	6.3×5.8	0.39	240	6.3×5.8	0.39	240	6.3×5.8	0.39	240	6.3×7.7	0.66	280
																8×6.2	0.63	300
68	6.3×5.8	0.36	240	6.3×5.8	0.36	240	6.3×5.8	0.36	240	6.3×5.8	0.36	240	6.3×7.7	0.32	290	8×10	0.32	350
100	6.3×5.8	0.36	240	6.3×5.8	0.36	240	6.3×5.8	0.36	240	6.3×7.7	0.32	290	8×10	0.16	600	10×10	0.16	700
										8×6.2	0.26	300						
150	6.3×5.8	0.36	240	6.3×5.8	0.36	240	6.3×7.7	0.32	290	8×10	0.16	600	8×10	0.16	600			
220	6.3×5.8	0.36	240	6.3×7.7	0.36	290	6.3×7.7	0.32	290	8×10	0.16	600	10×10	0.08	850			
				8×6.2	0.26	300	8×6.2	0.26	300									
330	6.3×7.7	0.32	290	8×10	0.16	600	8×10	0.16	600	10×10	0.08	850						
	8×6.2	0.26	300															
470	8×10	0.16	600	8×10	0.16	600	10×10	0.08	850									
680	8×10	0.16	600	10×10	0.08	850												
1000	10×10	0.08	850															

Ripple current (mA rms) at 105°C, 100kHz

Impedance (Ω) at 20°C, 100kHz

Case size ØD x L (mm)

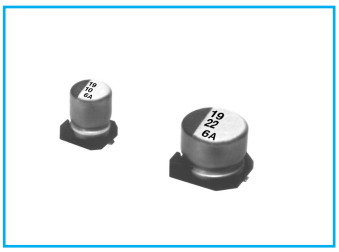
● FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

Frequency	50Hz	120Hz	300Hz	1kHz	10kHz≦
Coefficient	0.35	0.5	0.64	0.83	1.00

CA Chip type, Long Life, High CV Series

Long Life Solvent Proof

JC ⇨ CA
Long life

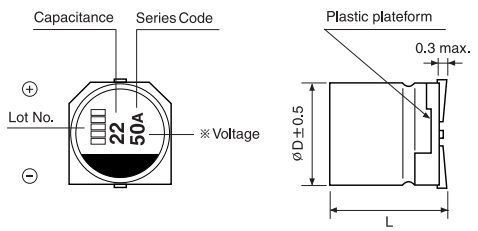


- Chip type, long life capacitance in large case sizes
- Chip type with load life of 5000 hours at +105˚C
- Designed for surface mounting on high density PC board
- Applicable to automatic insertion machine using carrier tape
- Complied to the RoHS directive

Item	Characteristics
Operating temperature range	-55 ~ +105˚C
Leakage current max.	I = 0.01CV or 3μA whichever is greater (after 2 minutes)
Capacitance tolerance	±20% at 120Hz, 20˚C
Dissipation factor max. (at 120Hz, 20˚C)	WV: 6.3 / 10 / 16 / 25 / 35 / 50 tanδ: 0.28 / 0.24 / 0.2 / 0.16 / 0.13 / 0.12
Low temperature characteristics (Impedance ratio at 120Hz)	WV: 6.3 / 10 / 16 / 25 / 35 / 50 Z-25˚C/Z+20˚C: 4 / 3 / 2 / 2 / 2 / 2 Z-40˚C/Z+20˚C: 10 / 7 / 5 / 3 / 3 / 3
Load life (after application of the rated voltage for 5000 hours at 105˚C)	Leakage current: Less than specified value Capacitance change: Within ±30% of initial value tanδ: Less than 300% of specified value
Shelf life (at 105˚C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value.
Resistance to soldering heat	The following specifications shall be satisfied when the capacitors are restored to 20˚C after exposing them at 250˚C for 30 seconds. Leakage current: Less than specified value Capacitance change: Within ±10% of initial value tanδ: Less than specified value

DRAWING

Unit : mm



* Please refer to drawing for CK Series in page 57 for detail drawing.

DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

μF \ WV	6.3		10		16		25		35		50	
10											6.3×5.8	30
22							6.3×5.8	38	6.3×5.8	42	6.3×7.7	120
33					6.3×5.8	40	6.3×5.8	48	6.3×7.7	57	8×10	140
47			6.3×5.8	46	6.3×5.8	50	6.3×7.7	63	8×10	92	8×10	170
100	6.3×5.8	60	6.3×7.7	81	6.3×7.7	81	8×10	116	10×10	151	10×10	310
220	6.3×7.7	101	8×10	141	10×10	216	10×10	216	10×10	216		
330	8×10	160	10×10	238	10×10	238	10×10	238				
470	10×10	254	10×10	254	10×10	254						
1000	10×10	313										

← Ripple current (mA rms) at 105˚C, 120Hz
Case size ØD×L (mm)

FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

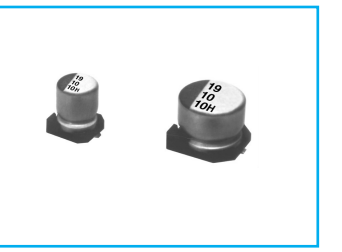
Frequency	50Hz	120Hz	300Hz	1kHz	10kHz≦
Coefficient	0.70	1.00	1.17	1.36	1.50

CF

Chip type, High Temperature, Long Life, Series

Long Life　Solvent Proof

JC ⇨ CF
Wide temp
Long life



- Chip type, high temperature range, for + 130˚C use
- For ECU
- Application to automatic insertion machine using carrier
- Complied to the RoHS directive

Item	Characteristics
Operating temperature range	-40 ~ +130˚C
Leakage current	I = 0.03CV or 4μA whichever is greater (after 2 minutes)
Capacitance tolerance	±20% (20˚C,120Hz)
Dissipation factor max. (at 120Hz, 20˚C)	Rated Voltage(V): 10 / 16 / 25 / 35 / 50 tanδ: 0.32 / 0.24 / 0.21 / 0.18 / 0.18
Low temperature characteristics (Impedance ratio at 120Hz)	WV: 10 / 16 / 25 / 35 / 50 Z-40˚C/Z+20˚C: 12 / 11 / 8 / 6 / 6
Load life (after application of the rated voltage for 5000 hours at 130˚C)	Leakage current: Less than specified value Capacitance change: Within ±30% of initial value tanδ: Less than 300% of the specified value Ø8×6.2 : 2000 hours, Ø8×10 : 3000 hours, Ø10~: 5000 hours
Shelf life (at 130˚C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value.
Resistance to soldering heat	The following specifications shall be satisfied when the capacitors are restored to 20˚C after exposing them at 250˚C for 30 seconds. Leakage current: Less than specified value Capacitance change: Within ±10% of initial value tanδ: Less than specified value

DRAWING (See page 49)

Unit : mm

-Series code of CF is H

DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

μF \ WV	10		16		25		35		50	
22									8×6.2	28
33							8×6.2	41	8×10	75
47							10×10	90	10×10	90
68			8×6.2	50	8×6.2	45	10×10	105	12.5×13.5	132
100	8×6.2	48	8×10	66	10×10	163	10×10	132	12.5×13.5	167
220	8×10	90	10×10	163	10×10	200	12.5×13.5	249		
330	10×10	125	10×10	200	12.5×13.5	304				
470	10×10	150	12.5×13.5	304						
1000	12.5×13.5	405								

Ripple current (mA rms) at 130˚C, 120Hz
Case size ØD×L(mm)

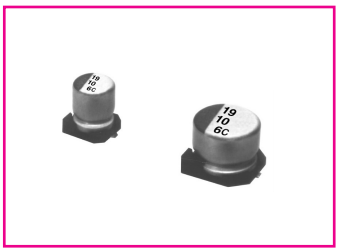
FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

Frequency	50Hz	120Hz	300Hz	1kHz	10kHz≦
Coefficient	0.70	1.00	1.17	1.36	1.50

CT Chip type, High Temperature, Low Imp., Series

Solvent Proof

CF ⇒ CT
Low Imp.



- Chip type, Low Impedance temperature range up to 130˚C use
- For ECU
- Application to automatic insertion machine using carrier tape
- Complied to the RoHS directive

Item	Characteristics
Operating temperature range	-40 ~ +130˚C
Leakage current max.	I = 0.03CV or 4μA whichever is greater (after 2 minutes)
Capacitance tolerance	±20% (20˚C, 120Hz)
Dissipation factor max. (at 120Hz, 20˚C)	Rated Voltage(V): 10 / 16 / 25 / 35 / 50 tanδ: 0.32 / 0.24 / 0.21 / 0.18 / 0.18
Low temperature characteristics (Impedance ratio at 120Hz)	WV: 10 / 16 / 25 / 35 / 50 Z-40˚C/Z+20˚C: 12 / 10 / 8 / 6 / 6
Load life (after application of the rated voltage for 2000 hours at 130˚C)	Leakage Current: Less than specified value Capacitance Change: Within ±30% of initial value tanδ: Less than 300% of specified value
Shelf life (at 130˚C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value.
Resistance to soldering heat	The following specifications shall be satisfied when the capacitors are restored to 20˚C after exposing them at 250˚C for 30 seconds. Leakage Current: Less than specified value Capacitance Change: Within ±10% of initial value tanδ: Less than specified value

● DRAWING (See page 49)

Unit : mm

-Series code of CT is C

● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

μF \ WV	10			16			25			35			50		
33													8×10	0.6	270
47										8×10	0.6	270	10×10	0.5	315
68				8×10	0.6	270	8×10	0.6	270	10×10	0.5	270	10×10	0.5	315
100	8×10	0.6	270	8×10	0.6	270	8×10	0.6	270	10×10	0.5	315	12.5×13.5	0.4	345
220	8×10	0.6	270	8×10	0.6	270	10×10	0.5	315	12.5×13.5	0.4	345			
330	10×10	0.5	315	10×10	0.5	315	12.5×13.5	0.4	345						
470	10×10	0.5	315	12.5×13.5	0.4	345									

← Ripple current (mA rms) at 130˚C, 100kHz
← Impedance (Ω) at 20˚C, 100kHz
← Case size ØD×L(mm)

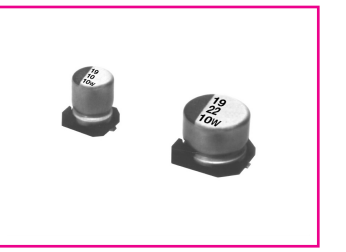
● FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

Frequency	50Hz	120Hz	300Hz	1kHz	10kHz≦
Coefficient	0.35	0.5	0.64	0.83	1.00

CW Chip type, High Reliability Series

Solvent Proof

CF ⇨ CW
High Temp



· Chip type, high temperature range, for + 150˚C use
· Applicable to automatic insertion machine using carrier tape
· Complied to the RoHS directive

Item	Characteristics
Operating temperature range	-40 ~ +150˚C
Leakage current	I = 0.03CV or 4μA whichever is greater (after 2 minutes)
Capacitance tolerance	±20% at 120Hz, 20˚C
Dissipation factor max. (at 120Hz, 20˚C)	WV: 10 / 16 / 25 / 35 / 50 tanδ: 0.30 / 0.20 / 0.16 / 0.14 / 0.14
Low temperature characteristics (Impedance ratio at 120Hz)	WV: 10 / 16 / 25 / 35 / 50 Z-40˚C/Z+20˚C: 12 / 10 / 8 / 6 / 6
Load life (after application of the rated voltage for 1000 hours at 150˚C)	Leakage current: Less than specified value Capacitance change: Within ±30% of initial value tanδ: Less than 300% of the specified value
Shelf life (at 150˚C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value.
Resistance to soldering heat	The following specifications shall be satisfied when the capacitors are restored to 20˚C after exposing them at 250˚C for 30 seconds. Leakage current: Less than specified value Capacitance change: Within ±10% of initial value tanδ: Less than specified value

● DRAWING (See page 49)

Unit : mm

-Series code of CW is W

● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV / μF	10		16		25		35		50	
33									10×10	75
47							10×10	90	10×10	90
68							10×10	105	12.5×13.5	132
100					10×10	160	10×10	132	12.5×13.5	167
220			10×10	163	10×10	200	12.5×13.5	249		
330	10×10	183	10×10	200	12.5×13.5	304				
470	10×10	218	12.5×13.5	304						
1000	12.5×13.5	405								

Ripple current (mA rms) at 150˚C, 120Hz
Case size ØD×L(mm)

● FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

Frequency	50Hz	120Hz	300Hz	1kHz	10kHz≦
Coefficient	0.70	1.00	1.17	1.36	1.50

NC

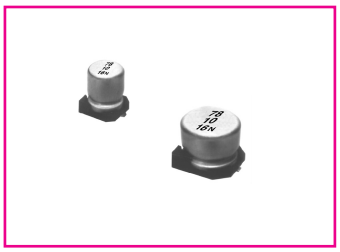
Chip type, Non-polarized
Series

Non-polarized

Solvent Proof

- Chip type with 5.5mmL height
- Designed for surface mounting on high density PC board
- Applicable to automatic mounting machine using carrier tape
- Complied to the RoHS directive

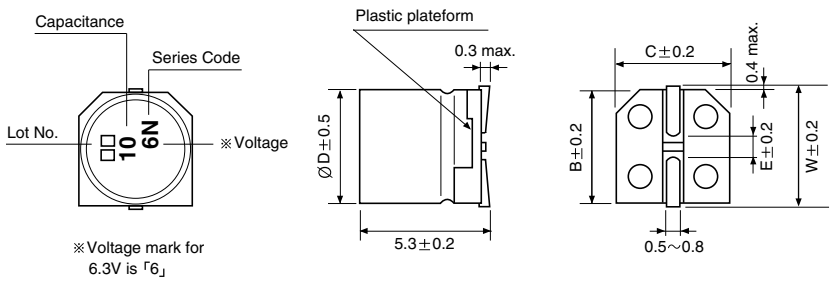
SC (Non-polar) ⇒ NC ⇒ CN (Wide temp.)



Item	Characteristics
Operating temperature range	-40 ~ +85℃
Leakage current max.	I = 0.05CV or 10μA whichever is greater (after 2 minutes)
Capacitance tolerance	±20% at 120Hz, 20℃
Dissipation factor max. (at 120Hz, 20℃)	WV: 6.3 / 10 / 16 / 25 / 35 / 50 tanδ: 0.24 / 0.20 / 0.17 / 0.17 / 0.15 / 0.15
Low temperature characteristics (Impedance ratio at 120Hz)	WV: 6.3 / 10 / 16 / 25 / 35 / 50 Z-25℃/Z+20℃: 4 / 3 / 2 / 2 / 2 / 2 Z-40℃/Z+20℃: 8 / 6 / 4 / 4 / 3 / 3
Load life (after application of the rated voltage for 2000 hours at 85℃)	Leakage current: Less than specified value Capacitance change: Within ±20% of initial value tanδ: Less than 200% of specified value Test method: Polarity reverse each 250 hours
Shelf life (at 85℃)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value.
Resistance to soldering heat	The following specifications shall be satisfied when the capacitors are restored to 20℃ after exposing them at 250℃ for 30 seconds. Leakage current: Less than specified value Capacitance change: Within ±10% of initial value tanδ: Less than specified value

● DRAWING

Unit : mm



ØD	W	B	C	E
4	4.8	4.3	4.3	1.0
5	5.8	5.3	5.3	1.4
6.3	7.1	6.6	6.6	2.2

● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

μF \ WV	6.3		10		16		25		35		50	
0.1											4×5.3	1.0
0.22											4×5.3	2.0
0.33											4×5.3	2.8
0.47											4×5.3	4.0
1.0											4×5.3	8.4
2.2									4×5.3	8.4	5×5.3	13
3.3							5×5.3	12	5×5.3	16	5×5.3	17
4.7					4×5.3	12	5×5.3	16	5×5.3	18	6.3×5.3	20
10			4×5.3	17	5×5.3	23	6.3×5.3	27	6.3×5.3	29		
22	5×5.3	28	6.3×5.3	33	6.3×5.3	37						
33	6.3×5.3	37	6.3×5.3	41	6.3×5.3	49						
47	6.3×5.3	45										

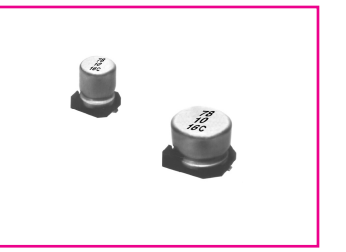
Ripple current (mA rms) at 85℃, 120Hz
Case size ØD x L (mm)

SURFACE MOUNT ALUMINUM ELECTROLYTIC CAPACITORS

CN Height 5.5mmL, 105˚C Non-polarized Series

Non-polarized Solvent Proof

NC ⇨ CN
Wide temp.

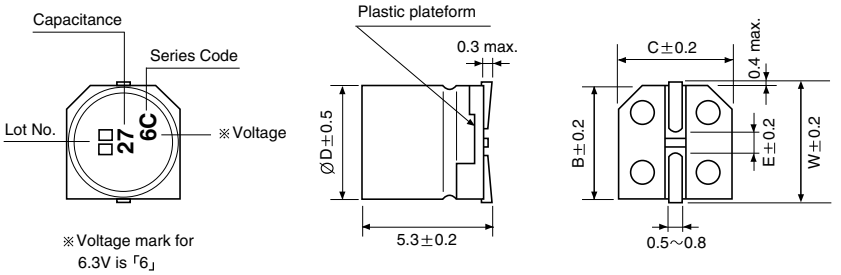


- Chip type, Non-polarized, Wide temperature 105˚C
- Chip type with 5.5mmL height
- Designed for surface mounting on high density PC board
- Applicable to automatic insertion machine using carrier tape
- Complied to the RoHS directive

Item	Characteristics
Operating temperature range	-55 ~ +105˚C
Leakage current max.	I = 0.05CV or 10μA whichever is greater (after 2 minutes)
Capacitance tolerance	±20% at 120Hz, 20˚C
Dissipation factor max. (at 120Hz, 20˚C)	WV: 6.3 / 10 / 16 / 25 / 35 / 50 tanδ: 0.32 / 0.26 / 0.24 / 0.20 / 0.18 / 0.18
Low temperature characteristics (Impedance ratio at 120Hz)	WV: 6.3 / 10 / 16 / 25 / 35 / 50 Z-25˚C/Z+20˚C: 4 / 3 / 2 / 2 / 2 / 2 Z-40˚C/Z+20˚C: 8 / 6 / 4 / 4 / 3 / 3
Load life (after application of the rated voltage for 1000 hours at 105˚C)	Leakage current: Less than specified value Capacitance change: Within ±20% of initial value tanδ: Less than 200% of specified value Test method: Polarity reverse each 250 hours
Shelf life (at 105˚C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value.
Resistance to soldering heat	The following specifications shall be satisfied when the capacitors are restored to 20˚C after exposing them at 250˚C for 30 seconds. Leakage current: Less than specified value Capacitance change: Within ±10% of initial value tanδ: Less than specified value

● DRAWING

Unit : mm



ØD	W	B	C	E
4	4.8	4.3	4.3	1.0
5	5.8	5.3	5.3	1.4
6.3	7.1	6.6	6.6	2.2

● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

μF \ WV	6.3		10		16		25		35		50	
0.1											4×5.3	1.3
0.22											4×5.3	2.3
0.33											4×5.3	2.8
0.47											4×5.3	4.0
1.0											4×5.3	8.4
2.2									4×5.3	8.4	5×5.3	13
3.3							5×5.3	12	5×5.3	16	5×5.3	17
4.7					4×5.3	12	5×5.3	16	5×5.3	18	6.3×5.3	20
10			4×5.3	17	5×5.3	23	6.3×5.3	27	6.3×5.3	29		
22	5×5.3	28	6.3×5.3	33	6.3×5.3	37						
33	6.3×5.3	37	6.3×5.3	41	6.3×5.3	49						
47	6.3×5.3	45										

Ripple current (mA rms) at 105˚C, 120Hz
Case size ØD×L (mm)

4 MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

PACKING

BULK PACKING QUANTITY(pcs) / BOX

Unit : mm

SIZE		BULK (QUANTITY)		
ØD	L	V-Bag	INNER BOX	MIDDLE BOX
3	5	500	12000	48000
4	5, 7	500	10000	40000
5	5, 7, 9, 11	500	7000	28000
6.3	5, 7, 9, 11	500	6000	24000
8	5	500	5000	20000
	9, 11.5	300	3600	14400
10	9, 12.5	200	2400	9600
	16	200	2000	8000
	20, 25	200	1600	6400
12.5	16	100	1200	4800
	20	100	1000	4000
	25	100	900	3600
16	16	100	800	3200
	20	50	600	2400
	25	50	500	2000
	31.5, 35.5	50	400	1600
18	16	50	600	2400
	20	50	500	2000
	20, 25(31.5)	50	400	1600
	35.5	50	300	1200

CUTTING PACKING QUANTITY(pcs) / BOX

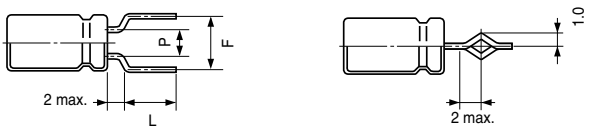
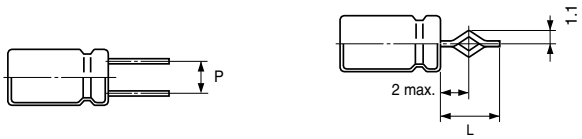
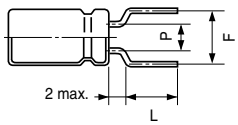
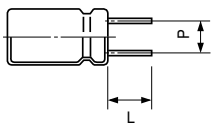
Unit : mm

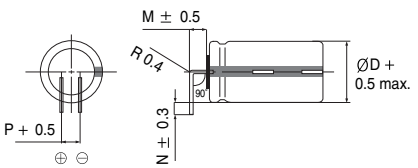
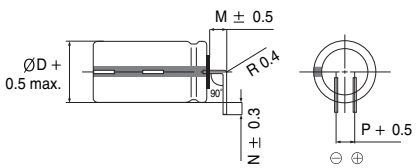
SIZE		CUTTING (QUANTITY)		
ØD	L	V-Bag	INNER BOX	MIDDLE BOX
4	5, 7	500	9000	36000
5	5, 7, 9, 11	500	7000	28000
6.3	5, 7, 9, 11	500	6000	24000
8	5	500	5000	20000
	9, 11.5	300	3600	14400
10	9		1000	8000(16000)
	12.5		800	6400(12800)
	16		700	5600(11200)
	20		500	4000(8000)
	25		400	3200(6400)
	30		900	2700
	40 ↑		900	1800
12.5	16		400	3200(6400)
	20		300	2400(4800)
	25		250	2000(4000)
	40 ↑		600	1200
16	16		400	1200
	20		400	1200
	25, 31.5		400	1200
	35.5		400	1200
	40 ↑		400	1200
18	16		300	900
	20		300	900
	25		300	900
	31.5, 35.5		300	900
	40 ↑		300	900
20	41		240	720
22	35.5 ↓		200	600
	40 ↑		200	600
25.4	35.5 ↓		100	300
	40 ↑		100	300

∗( ) is for oversea

Lead Forming & Cutting

Unit : mm

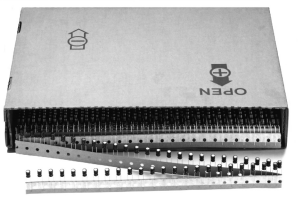
Configurations	Case dia.	Shape	Code	Drawing L	Drawing F
T - Type	ØD≤8		TS	4.5	5.0
S - Type	ØD≥10		SS	4.5	-
F - Type	ØD≤8		FS	5.0	5.0
C - Type	ALL		CS	5.0	-

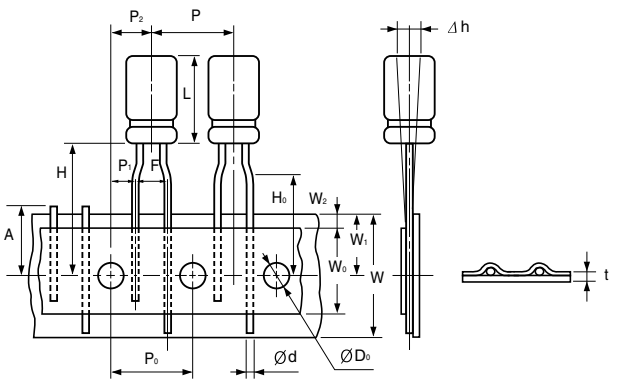
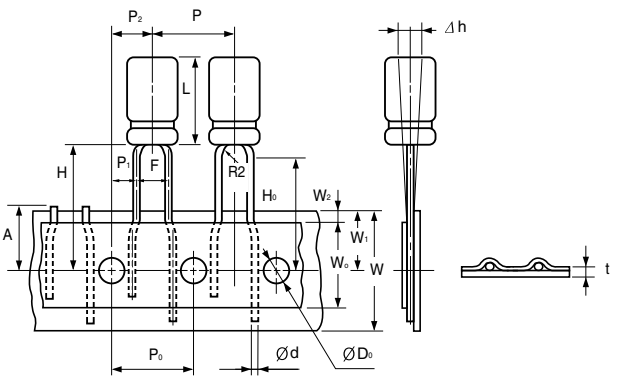
Configurations	Case dia.	Shape		Drawing M	Drawing N
	ØD≥8				
D - Type	Code	DL	DR	3.0	3.2
H - Type		HL	HR	3.0	3.7
M - Type		ML	MR	6.0	2.5
Q - Type		QL	QR	6.0	1.5
J - Type		JL	JR	6.0	0.5

TAPING

Lead Taping Capacitors for Automatic Insertion

● Ammo



DRAWING I	DRAWING II
	

● DIMENSIONS

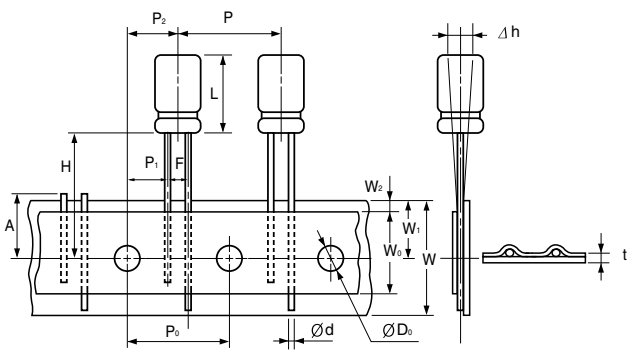
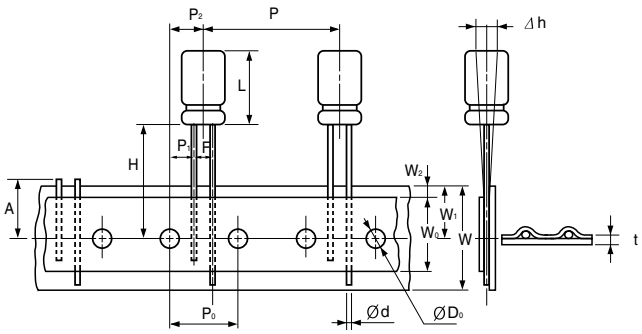
Unit : mm

Applicable Drawing No.			I (II)				III			I						
Description	Symbol	Tolerance	Ø3	Ø4	Ø5		Ø6.3		Ø8	Ø4	Ø5		Ø6.3		Ø8	
Case Height	L	*Note	5	5, 7	5	7~11	5	7~11	5	5, 7	5	7~11	5	7~11	5	9, 11.5
Lead Dia.	d	±0.05	0.4	0.45	0.45	0.5	0.45	0.5	0.45	0.45	0.45	0.5	0.45	0.5	0.45	0.6
Body Pitch	P	±1.0	12.7				12.7		12.7	12.7					12.7	12.7
Feeding Hole Pitch	P_0	±0.2	12.7				12.7		12.7	12.7					12.7	12.7
Feeding Hole Alignment	P_1	±0.7	5.1				5.1		5.1	3.85					3.85	3.85
Feeding Hole Alignment	P_2	±1.0	6.35				6.35		6.35	6.35					6.35	6.35
Lead Center Spacing	F	$^{+0.6}_{-0.2}$	2.5				2.5		2.5	5.0					5.0	5.0
Body Inclination	Δh	±2.0	0				0		0	0					0	0
Tape Width	W	±0.5	18.0				18.0		18.0	18.0					18.0	18.0
Adhesive Tape Width	W_0	min.	9.5				9.5		9.5	9.5					9.5	12.5
Feeding Hole Alignment	W_1	±0.5	9.0				9.0		9.0	9.0					9.0	9.0
Adhesive Tape Margin	W_2	max.	2.0				2.0		2.0	2.0					2.0	2.0
Length from Seating Plane	H	±0.5	17.5 (18.0)				17.5		18.5	18.5 (5, 7mmL = 17.5)					17.5	20.0
Lead Clinch Height	H_0	±0.5	16.5 (17.0)				—		—	16.5					16.5	16.5
Feeding Hole Dia.	ØD_0	±0.2	4.0				4.0		4.0	4.0					4.0	4.0
Total Tape Thickness	t	±0.2	0.7				0.7		0.7	0.7					0.7	0.7
Cut Lead Height	A	max.	11.0				11.0		11.0	11.0					11.0	11.0
Taping Code / Ammo	⊕ leader		PB(PC)				PC		PE	PA					PA	PG

* Note : Refer to the drawing of each series for tolerance.

TAPING

Lead Taping Capacitors for Automatic Insertion

DRAWING Ⅲ	DRAWING Ⅳ
	

DIMENSIONS

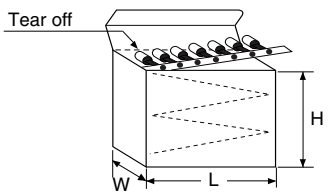
Unit : mm

Applicable Drawing No.			Ⅲ	Ⅲ	Ⅳ	Ⅳ	Ⅳ
Description	Symbol	Tolerance	Ø10	Ø12.5		Ø16	Ø18
Case Height	L	max.	27.0	27.0		37.5	37.5
Lead Dia.	d	±0.05	0.6	0.6		0.8	0.8
Body Pitch	P	±1.0	12.7	15.0	25.4	30.0	30.0
Feeding Hole Pitch	P_0	±0.2	12.7	15.0	12.7	15.0	15.0
Feeding Hole Alignment	P_1	±0.7	3.85	5.0	3.85	3.75	3.75
Feeding Hole Alignment	P_2	±1.0	6.35	7.5	6.35	7.5	7.5
Lead Center Spacing	F	$^{+0.6}_{-0.2}$	5.0	5.0		7.5	7.5
Body Inclination	Δh	±2.0	0	0		0	0
Tape Width	W	±0.5	18.0	18.0		18.0	18.0
Adhesive Tape Width	W_0	min.	12.5	12.5		12.5	12.5
Feeding Hole Alignment	W_1	±0.5	9.0	9.0		9.0	9.0
Adhesive Tape Margin	W_2	max.	2.0	2.0		2.0	2.0
Length from Seating Plane	H	±0.5	18.5	18.5		18.5	18.5
Feeding Hole Dia.	ØD_0	±0.2	4.0	4.0		4.0	4.0
Total Tape Thickness	t	±0.2	0.7	0.7		0.7	0.7
Cut Lead Height	A	max.	11.0	11.0		11.0	11.0
Taping Code / Ammo	⊕ leader		PA	PH	PL	PA	PA

PACKAGING Q'ty(pcs.)/Box

Unit : mm

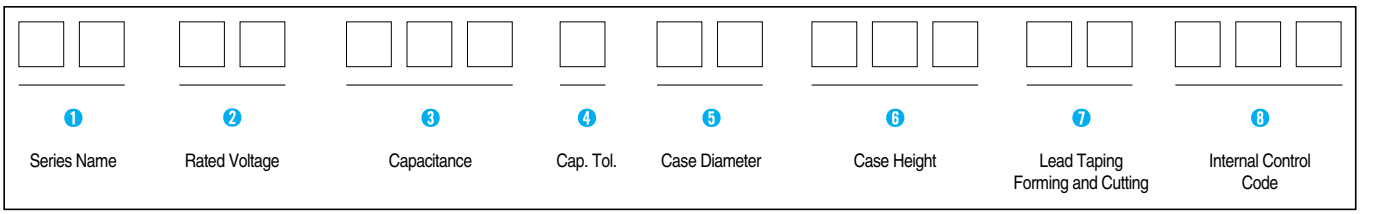
Ammo



Size		Ammo			
ØD	Case Height	L	H	W	Q'ty
3	5	332	230	42	3000
4	5, 7				2500
5	5, 7				2000
	9, 11	332	230	49	
6.3	5, 7	332	230	42	1500
	9, 11	332	230	49	
8	5	332	230	42	1000
	9, 11.5	332	230	49	
10	9, 12.5, 16	332	190	51	500
	20, 25	332	190	59	
12.5	16, 20, 25	342	240	62	400
16	16, 20, 25	342	240	62	250
	31.5, 35.5	342	240	74	
18	16, 20, 25	342	240	62	200
	31.5, 35.5	342	240	74	

PART NUMBER SYSTEM

Part Number System



1 Series Name

See page 4~5.

2 Rated Working Voltage

WV	2.5	4	6.3	10	16	20	25
Code	0E	0G	0J	1A	1C	1D	1E
WV	35	40	50	63	80	100	160
Code	1V	1G	1H	1J	1K	2A	2C
WV	200	250	315	350	400	450	500
Code	2D	2E	2F	2V	2G	2W	2H

3 Capacitance

ex) 0.47μF 474
4.7μF 475
47μF 476
470μF 477
4700μF 478
47000μF 479

4 Capacitance Tolerance

Tolerance (%)	±10	±20	−10 +20	−10 +30	−10 +50
Code	K	M	V	Q	T

5 Case Diameter

ex) Ø3 03 Ø12.5 12
Ø4 04 Ø14.5 14
Ø5 05 Ø16 16
Ø6.3 6L Ø18 18
Ø8 08 Ø22 22
Ø10 10 Ø25.4 25

6 Case Height

ex) 5mm 005
11mm 011
12.5mm 12M
20mm 020
31.5mm 31M
35.5mm 35M

7 Lead Taping, Forming and Cutting

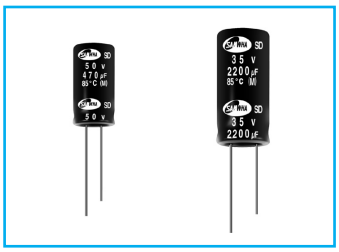
See pages 71 ~ 73

SD

Standard, For General Purposes Series

Solvent Proof
WV≦100V

SD ⇨ RD
Wide temp.



- Standard series for general purposes
- High CV value
- Voltage range of 6.3~500V
- Complied to the RoHS directive

Item	Characteristics
Operating temperature range	WV: 6.3 ~ 250 / 350 ~ 500 Temperature range: -40 ~ +85℃ / -25 ~ +85℃
Leakage current max.	WV≦100: I = 0.01CV or 3μA whichever is greater (after 2 min); I = 0.03CV or 4μA whichever is greater (after 1 min) WV>100: I = 0.02CV+15μA (after 5 min)
Capacitance tolerance	±20% at 120Hz, 20℃
Dissipation factor max. (at 120Hz, 20℃)	Capacitance > 1000μF : tanδ increases by 0.02 for each 1000μF from below value.

WV	6.3	10	16	25	35	50	63	100	160 ~ 250	350 ~ 500
tanδ	0.28	0.24	0.20	0.16	0.14	0.12	0.10	0.08	0.15	0.20

Low temperature characteristics (Impedance ratio at 120Hz)

WV	6.3	10	16	25	35	50 ~ 100	160	200 ~ 350	400 ~ 500
Z-25℃/Z+20℃	5	4	3	2	2	2	4	6	12
Z-40℃/Z+20℃	12	10	8	5	4	3	6	8	—

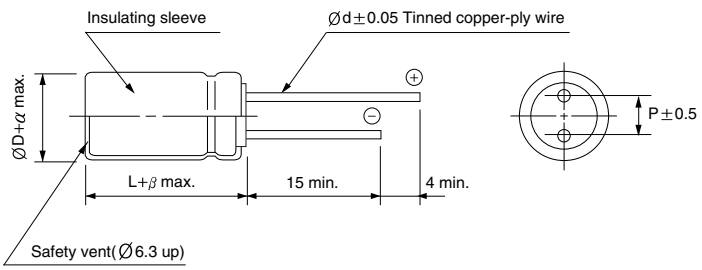
Load life (after application of the rated voltage for 2000 hours at 85℃)

Leakage current	Less than specified value
Capacitance change	Within ±20% of initial value
tanδ	Less than 200% of specified value

Shelf life (at 85℃): After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value.

DRAWING

Unit : mm



ØD	5	6.3	8	10	12.5	16	18	22	25.4
P	2.0	2.5	3.5	5.0	5.0	7.5	7.5	10.0	12.5
Ød	0.5	0.5	0.6	0.6	0.6	0.8	0.8	1.0	1.0
α	0.5							1.0	
β	1.5			2.0					

FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

WV	μF \ Frequency	50Hz	120Hz	300Hz	1kHz	10kHz≦
6.3~100	~ 47	0.75	1.00	1.35	1.55	2.00
	68 ~ 680	0.80	1.00	1.25	1.35	1.50
	1000 ~	0.85	1.00	1.10	1.15	1.15
160~500	0.47 ~ 220	0.80	1.00	1.25	1.40	1.60
	330 ~	0.90	1.00	1.10	1.13	1.15

SD series

● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV / μF	6.3	10	16	25	35	50	63	100	160	200	250	350	400	450	500
1.0						5×11 21	5×11 23	5×11 23						8×11.5 26	
1.5						5×11 26	5×11 28	5×11 28						8×11.5 32	
2.2						5×11 32	5×11 34	5×11 34						8×11.5 33	
3.3						5×11 39	5×11 42	5×11 42	6.3×11 45	6.3×11 45	6.3×11 48	8×11.5 53	8×11.5 56	8×11.5 50	
4.7						5×11 46	5×11 50	5×11 50	6.3×11 53	6.3×11 57	6.3×11 57	8×11.5 66	10×12.5 61	10×12.5 72	10×16 69
6.8						5×11 56	5×11 60	5×11 60	8×11.5 76	8×11.5 76	8×11.5 76	10×12.5 88	10×12.5 87	10×16 86	10×16 76
10						5×11 68	5×11 72	5×11 76	8×11.5 96	8×11.5 96	10×12.5 107	10×12.5 107	10×16 115	10×20 115	12.5×25 178
15						5×11 83	5×11 89	6.3×11 89	10×12.5 131	10×16 143	10×16 143	10×20 156	12.5×20 165	12.5×20 164	
22						5×11 101	5×11 108	6.3×11 124	10×12.5 156	10×16 173	10×16 170	12.5×20 222	12.5×20 218	12.5×25 217	16×25 265
33						5×11 123	6.3×11 151	8×11.5 178	10×16 209	10×20 232	10×20 247	16×20 297	12.5×25 296	16×25 294	16×31.5 310
47					5×11 131	★6.3×11 169	6.3×11 181	8×11.5 222	10×20 293	10×20 293	12.5×20 319	16×20 353	16×25 387	16×31.5 384	18×31.5 412
68				5×11 144	★6.3×11 182	6.3×11 203	8×11.5 256	10×12.5 293	12.5×20 391	12.5×25 426	16×20 425	16×25 465	16×31.5 488	16×35.5 503	18×35.5 457
100			5×11 162	★ 5×11 181	6.3×11 220	8×11.5 291	8×11.5 311	10×16 388	12.5×25 516	16×25 516	16×25 564	18×31.5 592	18×35.5 667	18×40 546	
150			★ 5×11 198	6.3×11 246	8×11.5 318	10×12.5 414	10×12.5 422	10×20 528	16×20 632	16×25 691	16×31.5 726	18×40 845	18×40 863	22×45 1283	
220	5×11 201	★ 5×11 218	6.3×11 276	6.3×11 327	8×11.5 386	10×12.5 501	10×16 586	12.5×20 737	16×25 873	18×31.5 962	18×35.5 988	22×41 1112	22×45 1183		
330	★6.3×11 283	6.3×11 307	6.3×11 359	8×11.5 431	10×12.5 549	10×16 672	10×20 784	12.5×25 1002	16×35.5 1152	18×35.5 1206	22×41 1495				
470	6.3×11 338	6.3×11 366	8×11.5 476	10×12.5 550	10×16 740	10×20 875	12.5×20 1098	16×25 1328	18×40 1434	22×41 1495	25.4×41 1612				
680	8×11.5 480	8×11.5 520	8×11.5 600	10×16 754	10×20 947	12.5×20 1235	12.5×25 1440	16×31.5 1643	22×41 1831	25.4×51 1902	25.4×51 2151				
1000	8×11.5 581	10×12.5 659	10×12.5 796	10×16 942	12.5×20 1306	12.5×25 1633	16×25 1937	18×31.5 1965	25.4×51 2105						
2200	10×16 983	10×16 1051	10×20 1331	12.5×20 1542	16×25 2032	16×31.5 2220	18×31.5 2445	25.4×41 2612							
3300	10×20 1286	12.5×20 1545	12.5×20 1686	16×25 2194	16×31.5 2502	18×31.5 2765	18×40 2987								
4700	12.5×20 1736	12.5×25 1903	12.5×25 2129	16×25 2448	16×35.5 2905	18×40 3272	25.4×41 3412								
6800	12.5×25 2129	16×25 2332	16×25 2577	18×31.5 3114	18×40 3408	25.4×41 4251	25.4×51 4351	← Case size ØD×L (mm) ← Ripple current (mA rms) at 85˚C, 120Hz							
10000	16×25 2629	16×31.5 2830	16×31.5 3176	18×40 3544	25.4×41 3899										
15000	16×35.5 2959	16×35.5 3284	18×35.5 3656	25.4×41 4399											
22000	18×40 3733	18×40 3843	22×41 4012												

Size Ø8×9 is available for capacitors marked "★"

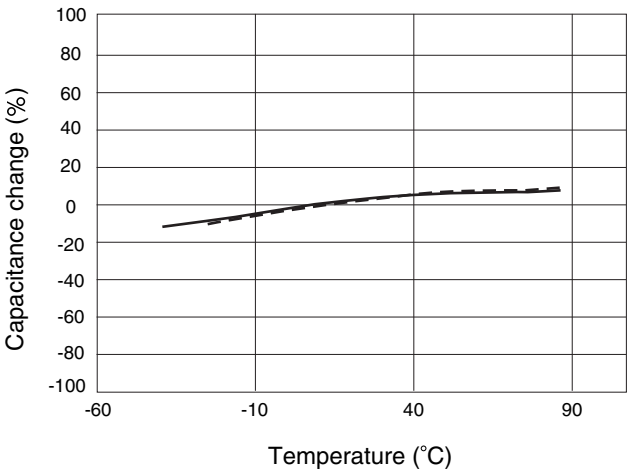
SD series

TYPICAL PERFORMANCE

— 16V 1000μF
····· 400V 10μF

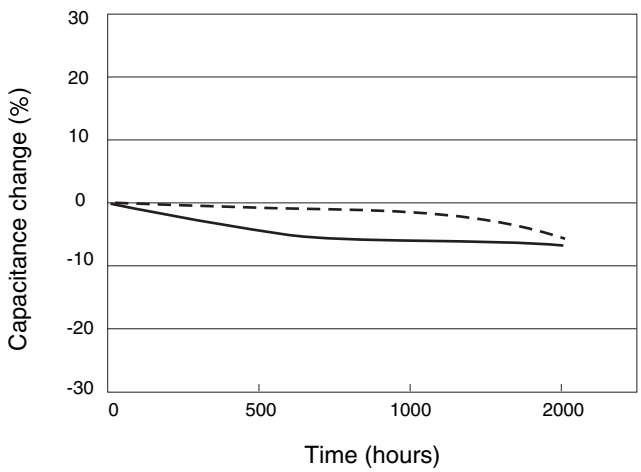
● TEMPERATURE CHARACTERISTICS

Capacitance change vs. temperature

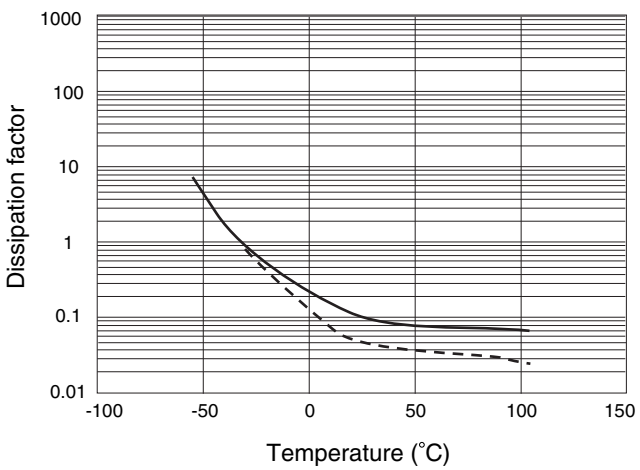


● LOAD LIFE (at +85˚C)

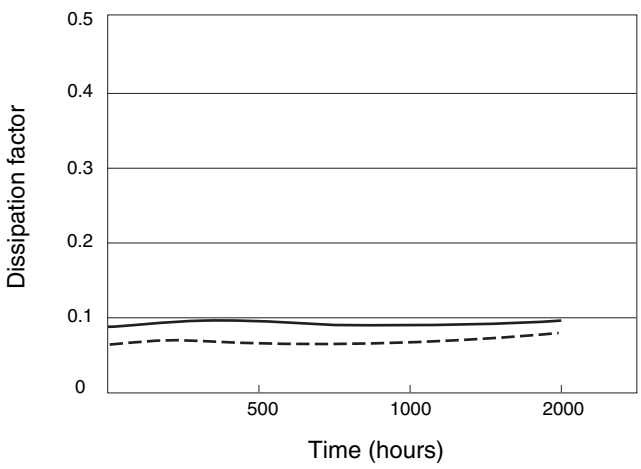
Capacitance change vs. time



Dissipation factor vs. temperature

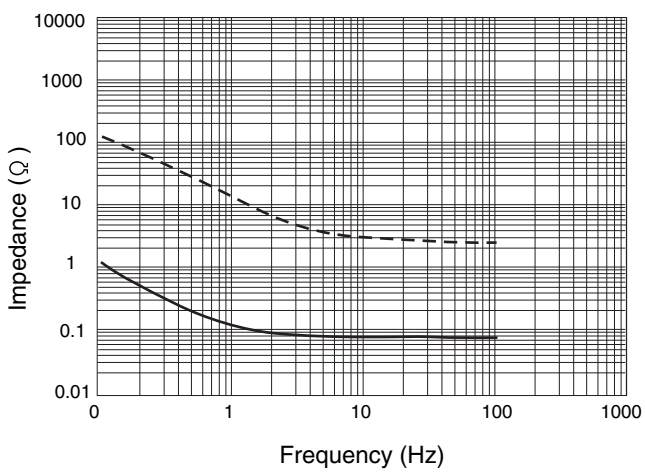


Dissipation factor vs. time

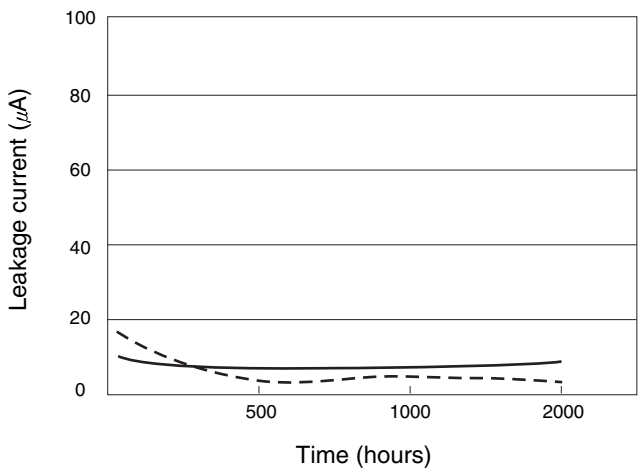


● FREQUENCY CHARACTERISTICS

Impedance vs. frequency



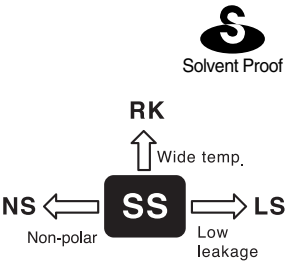
Leakage current vs. time

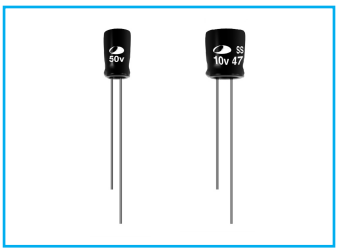


MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

SS Standard, Height 7mmL Series

- Super miniature series with 7mmL height
- Suited for use in compact audio equipment
- Load life of 2000 hours at 85˚C
- Complied to the RoHS directive





Item	Characteristics
Operating temperature range	-40 ~ +85˚C
Leakage current max.	I = 0.01CV or 4μA whichever is greater (after 1 minute)
Capacitance tolerance	±20% at 120Hz, 20˚C
Dissipation factor max. (at 120Hz, 20˚C)	WV: 4 / 6.3 / 10 / 16 / 25 / 35, 40 / 50 / 63 tanδ: 0.35 / 0.24 / 0.20 / 0.16 / 0.14 / 0.12 / 0.10 / 0.10
Low temperature characteristics (Impedance ratio at 120Hz)	WV: 4 / 6.3 / 10 / 16, 25 / 35 ~ 63 Z-25˚C/Z+20˚C: 6 / 4 / 3 / 2 / 2 Z-40˚C/Z+20˚C: 12 / 8 / 6 / 4 / 3
Load life (after application of the rated voltage for 2000 hours at 85˚C)	Leakage current: Less than specified value Capacitance change: Within ±20% of initial value tanδ: Less than 200% of specified value
Shelf life (at 85˚C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value.

DRAWING (See page 85)

Unit : mm

DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

μF \ WV	4		6.3		10		16		25		35		40		50		63	
0.1															4×7	4.4	4×7	4.4
0.15															4×7	5.4	4×7	5.4
0.22															4×7	6.6	4×7	6.6
0.33															4×7	8.0	4×7	8.0
0.47															4×7	10	4×7	10
0.68															4×7	12	4×7	12
1.0															4×7	14	4×7	14
1.5															4×7	17	4×7	17
2.2															4×7	21	4×7	21
3.3															4×7	25	4×7	25
4.7															4×7	30	4×7	30
6.8											4×7	33	4×7	33	4×7	37	5×7	42
10									4×7	37	4×7	40	4×7	40	5×7	51	5×7	51
15							4×7	43	4×7	46	5×7	57	5×7	57	6.3×7	72	6.3×7	72
22					4×7	46	4×7	52	5×7	64	5×7	69	6.3×7	80	6.3×7	88		
33	4×7	43	4×7	52	4×7	57	5×7	73	5×7	78	6.3×7	98	6.3×7	98				
47	4×7	51	4×7	62	5×7	78	5×7	87	6.3×7	108								
68	5×7	71	5×7	86	5×7	94	6.3×7	122										
100	5×7	86	5×7	104	6.3×7	132	6.3×7	148										
150	6.3×7	122	6.3×7	148	6.3×7	162												
220	6.3×7	148	6.3×7	179														

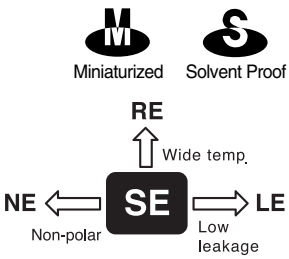
Ripple current (mA rms) at 85˚C, 120Hz
Case size ØD×L (mm)

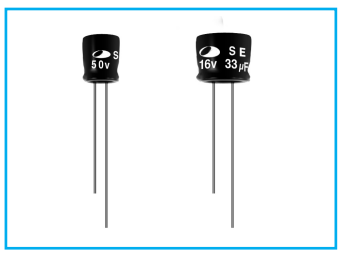
FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

μF \ Frequency	50Hz	120Hz	300Hz	1kHz	10kHz≦
~ 47	0.75	1.00	1.35	1.55	2.00
68 ~ 680	0.80	1.00	1.25	1.35	1.50

SE Standard, Height 5mmL Series

- Ultra miniature series with 5mmL height
- Suitable to replace tantalum capacitors at low cost
- Load life of 2000 hours at 85˚C
- Complied to the RoHS directive





Item	Characteristics
Operating temperature range	-40 ~ +85˚C
Leakage current max.	I = 0.01CV or 4μA whichever is greater (after 1 minute)
Capacitance tolerance	±20% at 120Hz, 20˚C
Dissipation factor max. (at 120Hz, 20˚C)	WV: 4 / 6.3 / 10 / 16 / 25 / 35 / 50 / 63 tanδ: 0.35 / 0.24 / 0.20 / 0.16(0.20) / 0.13(0.15) / 0.12(0.14) / 0.09(0.11) / 0.09(0.11) Figures in ( ) are for ∅3 products.
Low temperature characteristics (Impedance ratio at 120Hz)	WV: 4 / 6.3 / 10 / 16 ~ 63 Z-25˚C/Z+20˚C: 6 / 4 / 3 / 2 Z-40˚C/Z+20˚C: 12 / 8 / 6 / 4
Load life (after application of the rated voltage for 2000 hours at 85˚C)	Leakage current: Less than specified value Capacitance change: Within ±20% of initial value tanδ: Less than 200% of specified value
Shelf life (at 85˚C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value.

DRAWING (See page 86)

Unit : mm

DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

μF \ WV	4		6.3		10		16		25		35		50		63	
0.1													4×5(3×5)	4.1(3.1)	4×5(3×5)	4.1(3.1)
0.15													4×5(3×5)	5.0(3.8)	4×5(3×5)	5.0(3.8)
0.22													4×5(3×5)	6.1(4.6)	4×5(3×5)	6.1(4.6)
0.33													4×5(3×5)	7.5(5.7)	4×5(3×5)	7.5(5.7)
0.47													4×5(3×5)	8.9(6.7)	4×5(3×5)	8.9(6.7)
0.68													4×5(3×5)	11(8.1)	4×5(3×5)	11(8.1)
1.0													4×5(3×5)	13(9.8)	4×5(3×5)	13(9.8)
1.5													4×5(3×5)	16(12)	4×5	16
2.2											4×5(3×5)	17(13)	4×5	19	4×5	19
3.3									4×5(3×5)	20(15)	4×5	20	4×5	24	5×5	27
4.7							4×5(3×5)	21(16)	4×5	23	4×5	24	5×5	33	5×5	33
6.8					4×5(3×5)	23(19)	4×5	25	4×5	28	5×5	34	5×5	39	6.3×5	46
10	4×5(3×5)	21(17)	4×5(3×5)	25(21)	4×5	28	4×5	31	5×5	40	5×5	41	6.3×5	56	6.3×5	56
15	4×5(3×5)	26(21)	4×5	31	4×5	34	5×5	44	5×5	49	6.3×5	59	6.3×5	68	8×5	81
22	4×5(3×5)	31(26)	4×5	37	5×5	47	5×5	53	6.3×5	69	6.3×5	72	8×5	98	8×5	98
33	4×5	38	5×5	53	5×5	58	6.3×5	76	6.3×5	84	8×5	104	8×5	120		
47	4×5	45	5×5	63	6.3×5	81	6.3×5	91	8×5	119	8×5	124				
68	5×5	63	6.3×5	89	6.3×5	98	6.3×5	109	8×5	143						
100	5×5	89	6.3×5	108	8×5	140	8×5	157	8×5	174						
150	6.3×5	109	8×5	157	8×5	172	8×5	192								
220	6.3×5	133	8×5	190	8×5	208										
330	8×5	192														

Ripple current (mA rms) at 85˚C, 120Hz
Case size ∅D×L (mm)

FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

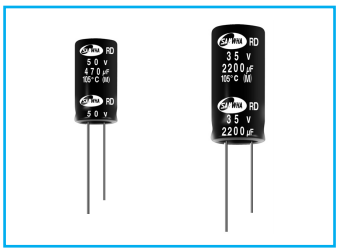
μF \ Frequency	50Hz	120Hz	300Hz	1kHz	10kHz≦
~ 47	0.75	1.00	1.35	1.55	2.00
68 ~ 680	0.80	1.00	1.25	1.35	1.50

MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

RD Wide Temperature Range Series

Solvent Proof
WV≦100V

SD ⇨ RD
Wide temp.



- Standard series for general purpose
- High CV value
- Wide operating temperature range of -55 ~ +105˚C
- Complied to the RoHS directive

Item	Characteristics
Operating temperature range	WV: 6.3 ~ 100 / 160 ~ 250 / 350 ~ 500 Temperature range: -55 ~ +105˚C / -40 ~ +105˚C / -25 ~ +105˚C
Leakage current max.	WV≦100: I = 0.01CV or 3μA whichever is greater (after 2 min); I = 0.03CV or 4μA whichever is greater (after 1 min) WV>100: I = 0.02CV+15μA (after 5 min)
Capacitance tolerance	±20% at 120Hz, 20˚C
Dissipation factor max. (at 120Hz, 20˚C)	Capacitance > 1000μF : tanδ increases by 0.02 for each 1000μF from below value.

WV	6.3	10	16	25	35	50	63	100	160~250	350~500
tanδ	0.28	0.24	0.20	0.16	0.14	0.12	0.10	0.08	0.15	0.20

Low temperature characteristics (Impedance ratio at 120Hz)

WV	6.3	10	16	25	35	50~100	160	200~350	400	450,500
Z-25˚C/Z+20˚C	5	4	3	2	2	2	3	4	6	10
Z-40˚C/Z+20˚C	10	8	6	4	3	3	4	8	—	—

Load life (after application of the rated voltage for 2000 hours at 105˚C)

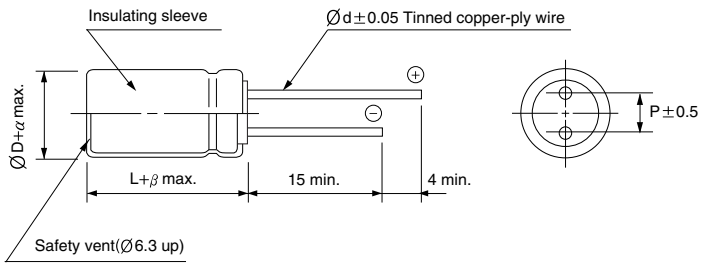
Leakage current	Less than specified value
Capacitance change	Within ±20% of initial value
tanδ	Less than 200% of specified value

Ø5, 6.3 and Ø8 products are for 1000 hours

Shelf life (at 105˚C): After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value.

DRAWING

Unit : mm



ØD	5	6.3	8	10	12.5	16	18	22
P	2.0	2.5	3.5	5.0	5.0	7.5	7.5	10.0
Ød	0.5	0.5	0.6	0.6	0.6	0.8	0.8	1.0
α	0.5							1.0
β	1.5			2.0				

FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

WV	Frequency / μF	50Hz	120Hz	300Hz	1kHz	10kHz≦
6.3~100	~ 47	0.75	1.00	1.35	1.55	2.00
	68 ~ 680	0.80	1.00	1.25	1.35	1.50
	1000 ~	0.85	1.00	1.10	1.15	1.15
160~500	0.47 ~ 220	0.80	1.00	1.25	1.40	1.60
	330 ~	0.90	1.00	1.10	1.13	1.15

RD series

● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV / μF	6.3	10	16	25	35	50	63	100	160	200	250	350	400	450	500
2.2						5×11 24	5×11 26	5×11 26	6.3×11 23	6.3×11 23	6.3×11 23	8×11.5 28	8×11.5 28	10×12.5 27	
3.3						5×11 29	5×11 32	5×11 32	6.3×11 29	6.3×11 29	8×11.5 34	8×11.5 34	10×12.5 39	10×16 36	
4.7						5×11 35	5×11 38	5×11 38	6.3×11 34	8×11.5 40	8×11.5 40	10×12.5 47	10×12.5 47	10×16 43	10×16 59
6.8						5×11 42	5×11 46	5×11 46	8×11.5 49	10×12.5 56	10×12.5 56	10×16 62	10×16 62	10×20 56	10×16 72
10						5×11 51	5×11 56	5×11 56	10×12.5 68	10×12.5 68	10×12.5 68	10×16 75	10×20 82	12.5×20 80	12.5×25 88
15						5×11 62	5×11 68	6.3×11 78	10×16 92	10×16 92	10×16 92	10×20 100	12.5×20 118	12.5×25 107	12.5×30 115
22						5×11 75	5×11 83	6.3×11 95	10×16 111	10×16 111	10×20 121	12.5×20 143	12.5×25 155	16×25 144	16×25 159
33						5×11 92	6.3×11 116	8×11.5 137	10×20 149	10×20 149	12.5×20 175	12.5×25 190	16×25 211	16×31.5 193	16×31.5 207
47					★ 5×11 96	★6.3×11 127	6.3×11 139	10×12.5 190	12.5×20 208	12.5×20 208	12.5×25 227	16×25 252	16×31.5 276	16×35.5 242	18×31.5 261
68				★ 5×11 108	6.3×11 132	8×11.5 180	8×11.5 197	10×16 251	12.5×25 273	16×20 279	16×25 303	16×31.5 332	18×35.5 373	18×40 352	18×35.5 335
100			5×11 119	6.3×11 151	6.3×11 160	8×11.5 218	8×11.5 239	10×20 332	12.5×25 331	16×25 368	16×31.5 402	18×35.5 407	18×40 427	22×41 486	
150		5×11 134	★6.3×11 167	6.3×11 185	8×11.5 231	10×12.5 310	10×12.5 340	12.5×20 477	16×25 450	16×35.5 517	18×35.5 554	18×40 523	22×41 596		
220	5×11 146	★ 5×11 162	6.3×11 203	8×11.5 264	8×11.5 280	10×12.5 376	10×16 451	12.5×25 630	16×31.5 596	18×35.5 671	18×40 694	22×41 721			
330	★6.3×11 206	6.3×11 228	8×11.5 293	8×11.5 324	10×12.5 399	10×16 504	10×20 603	16×25 856	18×35.5 822	18×40 850	22×41 968				
470	6.3×11 246	6.3×11 272	8×11.5 349	10×12.5 449	10×16 521	10×20 657	12.5×20 844	16×25 1021	18×40 1015	22×41 1155					
680	8×11.5 348	10×12.5 449	10×12.5 488	10×16 591	12.5×16 740	12.5×20 927	12.5×25 1107	16×31.5 1344	22×41 1390						
1000	8×11.5 422	10×12.5 544	10×16 648	10×20 782	12.5×20 974	12.5×25 1226	16×25 1490	18×40 1925							
1500	10×16 621	10×16 680	12.5×16 862	12.5×20 1017	16×20 1188	16×25 1442	16×35.5 1770								
2200	10×20 778	10×20 844	12.5×20 1055	12.5×25 1235	16×25 1426	16×31.5 1442	16×35.5 1770								
3300	12.5×16 983	12.5×20 1148	12.5×25 1323	16×25 1562	16×35.5 1857	16×35.5 1794	18×40 2689								
4700	12.5×20 1219	12.5×25 1421	16×25 1657	16×31.5 1916	18×35.5 2224	← Case size ØD×L (mm)									
6800	12.5×25 1480	16×25 1737	16×31.5 1982	18×35.5 2335		← Ripple current (mA rms) at 105°C, 120Hz									
10000	16×25 1807	16×35.5 2172	18×35.5 2409												
15000	16×35.5 2233	18×35.5 2482													
22000	18×40 2652														

Size Ø8×9 is available for capacitors marked "★"

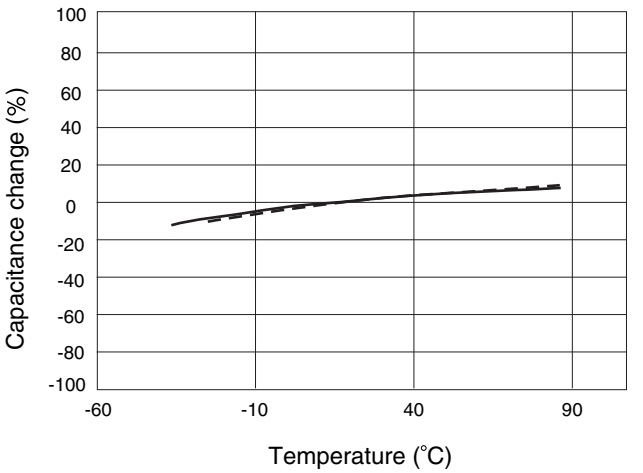
RD series

TYPICAL PERFORMANCE

—— 16V 1000μF
····· 400V 10μF

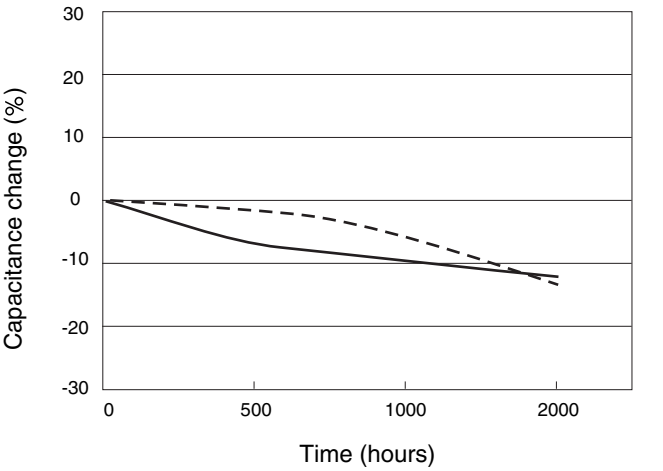
● TEMPERATURE CHARACTERISTICS

Capacitance change vs. temperature

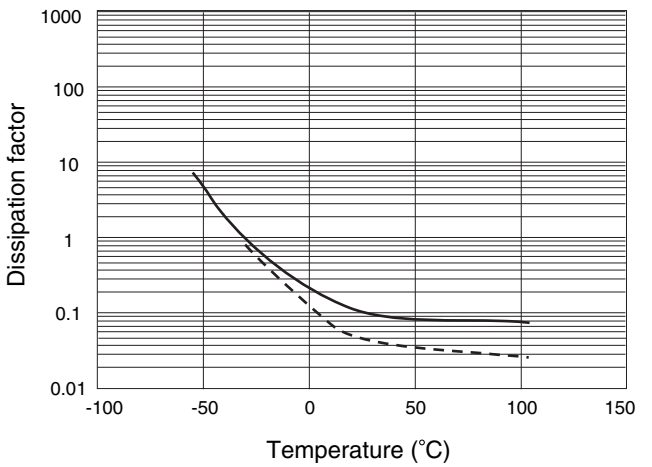


● LOAD LIFE (at +105°C)

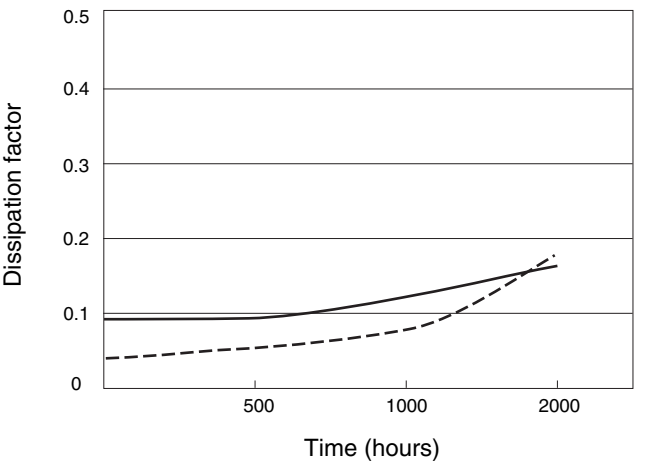
Capacitance change vs. time



Dissipation factor vs. temperature

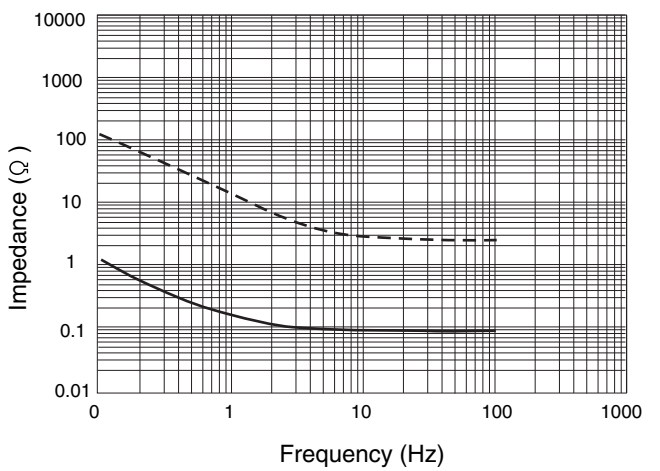


Dissipation factor vs. time

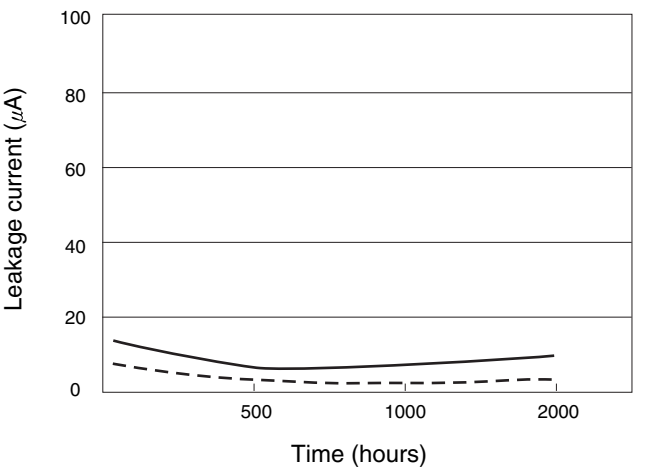


● FREQUENCY CHARACTERISTICS

Impedance vs. frequency



Leakage current vs. time



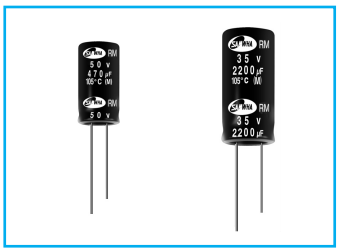
RM

Wide Temperature Range, Miniaturized Series

Miniaturized

Solvent Proof
WV≦100V

RD ⇨ RM
Miniature



- Miniature size compared with RD series
- High CV value
- Wide operating temperature range of -55 ~ +105˚C
- Complied to the RoHS directive

Item	Characteristics
Operating temperature range	WV: 6.3 ~ 100 / 160 ~ 250 / 350 ~ 450 Temperature range: -55 ~ +105˚C / -40 ~ +105˚C / -25 ~ +105˚C
Leakage current max.	WV≦100: I = 0.01CV or 3μA whichever is greater (after 2 min); I = 0.03CV or 4μA whichever is greater (after 1 min) WV>100: I = 0.02CV+15μA (after 5 min)
Capacitance tolerance	±20% at 120Hz, 20˚C
Dissipation factor max. (at 120Hz, 20˚C)	Capacitance > 1000μF : tanδ increases by 0.02 for each 1000μF from below value.

WV	6.3	10	16	25	35	50	63	100	160~250	350~450
tanδ	0.28	0.24	0.20	0.16	0.14	0.12	0.10	0.08	0.15	0.20

Low temperature characteristics (Impedance ratio at 120Hz)

WV	6.3	10	16	25	35	50~100	160	200~350	400	450
Z-25˚C/Z+20˚C	5	4	3	2	2	2	3	4	6	10
Z-40˚C/Z+20˚C	10	8	6	4	3	3	4	8	—	—

Load life (after application of the rated voltage for 2000 hours at 105˚C)

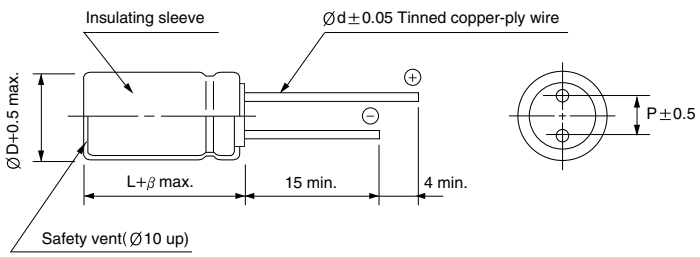
Leakage current	Less than specified value
Capacitance change	Within ±20% of initial value
tanδ	Less than 200% of specified value

Ø5, 6.3 and Ø8 products are for 1000 hours

Shelf life (at 105˚C): After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value.

DRAWING

Unit : mm



ØD	5	6.3	8	10	12.5	16	18
P	2.0	2.5	3.5	5.0	5.0	7.5	7.5
Ød	0.5	0.5	0.6	0.6	0.6	0.8	0.8
β	1.5			2.0			

FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

WV	μF \ Frequency	50Hz	120Hz	300Hz	1kHz	10kHz≦
6.3~100	~ 47	0.75	1.00	1.35	1.55	2.00
	68 ~ 680	0.80	1.00	1.25	1.35	1.50
	1000 ~	0.85	1.00	1.10	1.15	1.15
160~500	0.47 ~ 220	0.80	1.00	1.25	1.40	1.60
	330 ~	0.90	1.00	1.10	1.13	1.15

RM series

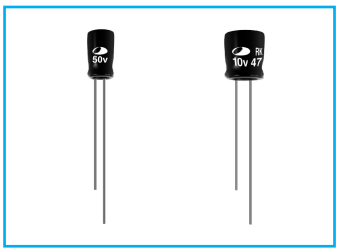
● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV / μF	6.3	10	16	25	35	50	63	100	160	200	250	350	400	450
1.0														6.3×11 13
2.2												6.3×11 23	8×11.5 28	8×11.5 23
3.3											6.3×11 30	8×11.5 34	8×11.5 34	10×12.5 33
4.7										6.3×11 34	8×11.5 40	8×11.5 40	10×12.5 47	10×12.5 39
6.8										8×11.5 49	10×12.5 56	10×12.5 56	10×16 62	10×16 52
10									8×11.5 59	8×11.5 59	10×12.5 68	10×16 75	10×16 75	10×20 68
15									10×12.5 84	10×12.5 84	10×16 92	10×16 92	12.5×20 115	12.5×20 96
22									10×12.5 102	10×16 111	10×16 111	12.5×20 139	12.5×20 140	12.5×25 127
33								8×11.5 139	10×16 136	10×20 149	10×20 149	12.5×25 180	16×25 211	16×25 117
47								10×12.5 190	10×20 177	12.5×20 203	12.5×20 203	16×25 252	16×25 252	16×31.5 231
68								10×12.5 229	12.5×25 267	16×20 279	12.5×25 267	16×31.5 303	16×31.5 332	16×35.5 291
100						8×11.5 218	8×11.5 239	10×16 304	12.5×25 324	16×25 368	16×25 368	18×31.5 432	18×35.5 453	18×40 397
150						8×11.5 267	10×12.5 293	10×20 372	16×25 450	16×25 450	16×31.5 450	18×35.5 554		
220				6.3×11 224	8×11.5 280	10×12.5 376	10×16 451	12.5×20 564	16×31.5 596	18×31.5 641	18×35.5 671			
330			6.3×11 248	8×11.5 324	10×12.5 400	10×16 504	10×20 603	16×25 856	18×31.5 784	18×40 863				
470		6.3×11 272	8×11.5 349	8×11.5 386	10×12.5 476	10×20 657	12.5×20 824	16×25 1021	18×40 1030					
680	6.3×11 295	8×11.5 386	8×11.5 420	10×12.5 540	10×16 627	12.5×20 905	12.5×25 1082	16×31.5 1344						
1000	8×11.5 422	8×11.5 469	10×12.5 592	10×16 717	10×20 829	12.5×25 1197	16×25 1490	18×35.5 1835						
1500	10×16 621	10×16 680	10×20 797	12.5×20 993	12.5×25 1136	16×31.5 1578	18×31.5 1812							
2200	10×16 713	10×16 774	10×20 898	12.5×25 1206	16×25 1426	16×31.5 1709	18×31.5 1935							
3300	10×20 909	10×20 978	12.5×20 1184	16×25 1562	16×31.5 1769	18×35.5 2152								
4700	12.5×20 1189	12.5×20 1272	12.5×25 1459	16×25 1752	16×35.5 2073									
6800	12.5×25 1445	16×25 1529	16×25 1811	16×35.5 2176	18×40 2510	← Case size ØD×L (mm) ← Ripple current (mA rms) at 105°C, 120Hz								
10000	16×25 1807	16×25 1892	16×31.5 2140	18×35.5 2497										
15000	16×31.5 2128	16×35.5 2313	18×35.5 2545											
22000	18×31.5 2411	18×35.5 2595												

RK Wide Temperature Range, Height 7mmL Series

Solvent Proof

SS ⇨ RK
Wide temp.

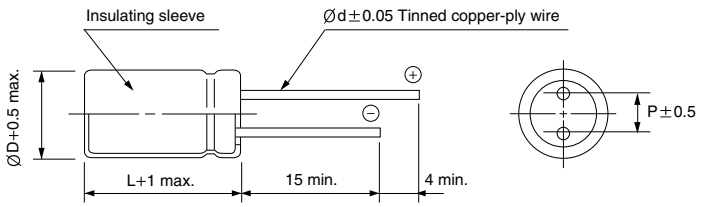


- Super miniature series with 7mmL height
- High performance and excellent temperature characteristics
- Wide operating temperature range of -55 ~ +105˚C
- Complied to the RoHS directive

Item	Characteristics
Operating temperature range	-55 ~ +105˚C
Leakage current max.	I = 0.01CV or 3μA whichever is greater (after 1 minute)
Capacitance tolerance	±20% at 120Hz, 20˚C
Dissipation factor max. (at 120Hz, 20˚C)	WV: 4 / 6.3 / 10 / 16 / 25 / 35 / 50 / 63 tanδ: 0.35 / 0.22 / 0.19 / 0.15 / 0.12 / 0.12 / 0.10 / 0.10
Low temperature characteristics (Impedance ratio at 120Hz)	WV: 4 / 6.3 / 10 / 16 / 25, 35 / 50, 63 Z-25˚C/Z+20˚C: 6 / 4 / 3 / 2 / 2 / 2 Z-40˚C/Z+20˚C: 12 / 10 / 8 / 6 / 4 / 3
Load life (after application of the rated voltage for 1000 hours at 105˚C)	Leakage current: Less than specified value Capacitance change: Within ±20% of initial value tanδ: Less than 200% of specified value
Shelf life (at 105˚C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value.

DRAWING

Unit : mm



ØD	4	5	6.3
P	1.5	2.0	2.5
Ød	0.45	0.5	0.5

DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

μF \ WV	4		6.3		10		16		25		35		50		63	
0.1													4×7	2.9	4×7	2.9
0.22													4×7	4.3	4×7	4.3
0.33													4×7	5.2	4×7	5.2
0.47													4×7	6.2	4×7	6.2
0.68													4×7	7.5	4×7	7.5
1.0													4×7	9.1	4×7	9.1
2.2													4×7	14	5×7	16
3.3											4×7	15	5×7	19	6.3×7	22
4.7									4×7	18	5×7	21	6.3×7	26	6.3×7	26
6.8							4×7	19	5×7	25	5×7	25	6.3×7	32		
10					4×7	21	4×7	24	5×7	30	6.3×7	35				
22			4×7	29	5×7	36	5×7	40	6.3×7	52						
33	4×7	28	5×7	40	6.3×7	51	6.3×7	57								
47	4×7	33	5×7	47	6.3×7	60										
68	5×7	46	6.3×7	67												

Ripple current (mA rms) at 105˚C, 120Hz
Case size ØD×L (mm)

FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

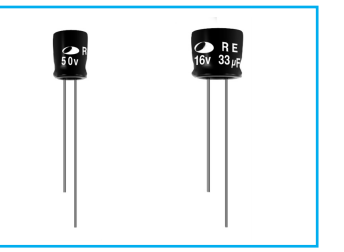
μF \ Frequency	50Hz	120Hz	300Hz	1kHz	10kHz≦
~ 47	0.75	1.00	1.35	1.55	2.00
68 ~ 680	0.80	1.00	1.25	1.35	1.50

MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

RE Wide Temperature Range, Height 5mmL Series

Miniaturized Solvent Proof

SE ⇨ RE (Wide temp.)

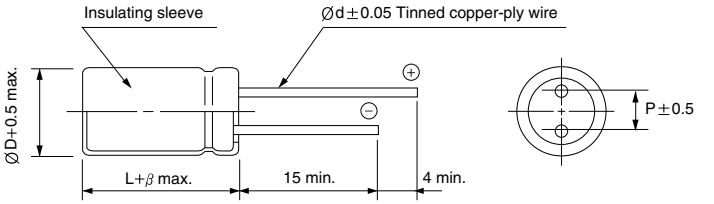


- Ultra miniature series with 5mmL height
- Wide operating temperature range of -55 ~ +105˚C
- Suitable to replace tantalum capacitors at low cost
- Complied to the RoHS directive

Item	Characteristics
Operating temperature range	-55 ~ +105˚C
Leakage current max.	I = 0.01CV or 3μA whichever is greater (after 2 minutes)
Capacitance tolerance	±20% at 120Hz, 20˚C
Dissipation factor max. (at 120Hz, 20˚C)	WV: 4 / 6.3 / 10 / 16 / 25 / 35 / 50 tanδ: 0.35 / 0.27 / 0.23 / 0.19 / 0.15 / 0.13 / 0.11
Low temperature characteristics (Impedance ratio at 120Hz)	WV: 4 / 6.3 / 10 / 16 / 25~50 Z-25˚C/Z+20˚C: 7 / 3 / 3 / 2 / 2 Z-40˚C/Z+20˚C: 12 / 8 / 5 / 4 / 3
Load life (after application of the rated voltage for 1000 hours at 105˚C)	Leakage current: Less than specified value Capacitance change: Within ±25% of initial value tanδ: Less than 200% of specified value
Shelf life (at 105˚C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value.

DRAWING

Unit : mm



ØD	3	4	5	6.3	8
P	1.0	1.5	2.0	2.5	2.5
Ød	0.4	0.45	0.45	0.45	0.45
β	1.0				1.5

DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

μF \ WV	4		6.3		10		16		25		35		50	
0.1													4×5(3×5)	2.4(2.0)
0.15													4×5(3×5)	3.0(2.5)
0.22													4×5(3×5)	3.6(3.0)
0.33													4×5(3×5)	4.4(3.7)
0.47													4×5(3×5)	5.2(4.4)
0.68													4×5(3×5)	6.3(5.3)
1.0													4×5(3×5)	7.7(6.4)
1.5													4×5(3×5)	9.4(7.8)
2.2													4×5(3×5)	11(9.5)
3.3											4×5(3×5)	13(11)	4×5	14
4.7									4×5(3×5)	14(12)	4×5	15	5×5	19
6.8									4×5	17	5×5	21	5×5	23
10			4×5(3×5)	15(13)	4×5(3×5)	17(14)	4×5(3×5)	18(15)	5×5	24	5×5	26	6.3×5	33
15	4×5(3×5)	17(14)	4×5	19	4×5	21	5×5	26	5×5	29	6.3×5	37	6.3×5	40
22	4×5	20	4×5	23	5×5	29	5×5	32	6.3×5	42	6.3×5	45	8×5	58
33	4×5	25	5×5	32	5×5	35	6.3×5	45	6.3×5	51	8×5	65	8×5	71
47	4×5	29	5×5	39	6.3×5	49	6.3×5	54	8×5	72	8×5	77		
68	5×5	41	6.3×5	55	6.3×5	59	8×5	77	8×5	87				
100	5×5	50	6.3×5	66	8×5	85	8×5	93						
150	6.3×5	71	8×5	96	8×5	104								
220	8×5	102	8×5	116										

Ripple current (mA rms) at 105˚C, 120Hz
Case size ØD×L (mm)

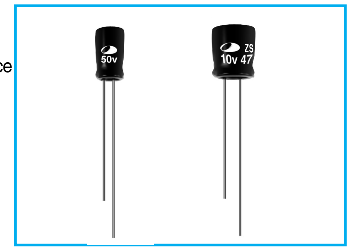
FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

μF \ Frequency	50Hz	120Hz	300Hz	1kHz	10kHz≦
~ 47	0.75	1.00	1.35	1.55	2.00
68 ~ 680	0.80	1.00	1.25	1.35	1.50

ZS

High Ripple Current, Height 7mmL Series

Miniaturized Solvent Proof Low Impedance



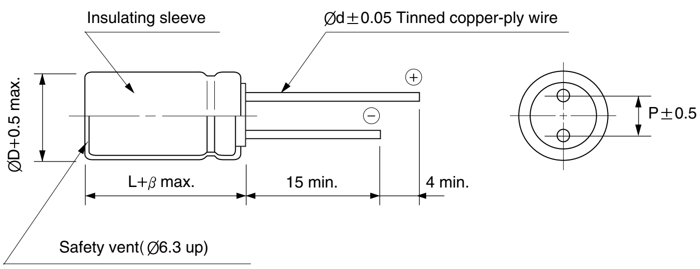
- Super miniature series with 7mmL height
- High ripple current & high temperature with RK series
- Load life of 2000 hours at 105˚C
- Complied to the RoHS directive

RK ⇨ ZS
High Ripple

Item	Characteristics						
Operating temperature range	-40 ~ +105˚C						
Leakage current	I = 0.01CV or 3μA whichever is greater (after 2 minutes) I = 0.03CV or 4μA whichever is greater (after 1 minute)						
Capacitance tolerance	±20% (20˚C, 120Hz)						
Dissipation factor max. (at 120Hz, 20˚C)	WV	6.3	10	16	25	35	50
	tanδ	0.22	0.19	0.16	0.14	0.12	0.10
Low temperature characteristics (Impedance ratio at 120Hz)	WV	6.3	10	16	25	35	50
	Z-25˚C / Z+20˚C	2	2	2	2	2	2
	Z-40˚C / Z+20˚C	6	4	3	3	3	3
Load life (after application of the rated voltage for 2000 hours at 105˚C)	Leakage current	Less than specified value					
	Capacitance change	Within ±25% of the initial value					
	tanδ	Less than 200% of the specified value					
Shelf life (at 105˚C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value.						

● DRAWING

Unit : mm



ØD	5	6.3	8
P	2.0	2.5	2.5
Ød	0.5	0.5	0.5
β	1.0		1.5

● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV / Item / μF	6.3 ØD×L (mm)	6.3 Imp.(Ω) max. 20˚C 100kHz	6.3 Ripple current (mA rms) 105˚C 100kHz	10 ØD×L (mm)	10 Imp.(Ω) max. 20˚C 100kHz	10 Ripple current (mA rms) 105˚C 100kHz	16 ØD×L (mm)	16 Imp.(Ω) max. 20˚C 100kHz	16 Ripple current (mA rms) 105˚C 100kHz	25 ØD×L (mm)	25 Imp.(Ω) max. 20˚C 100kHz	25 Ripple current (mA rms) 105˚C 100kHz	35 ØD×L (mm)	35 Imp.(Ω) max. 20˚C 100kHz	35 Ripple current (mA rms) 105˚C 100kHz	50 ØD×L (mm)	50 Imp.(Ω) max. 20˚C 100kHz	50 Ripple current (mA rms) 105˚C 100kHz
2.2																5×7	2.0	165
10																6.3×7	0.90	235
22													5×7	1.40	165	6.3×7	0.90	235
33	5×7	1.40	165	5×7	1.40	165	5×7	1.40	165	5×7	1.40	165	6.3×7	0.70	235	8×7	0.50	350
47	5×7	1.40	165	5×7	1.40	165	5×7	1.40	165	6.3×7	0.70	235	8×7	0.34	350	8×7	0.50	350
68	6.3×7	0.70	235	6.3×7	0.70	235	6.3×7	0.70	235	6.3×7	0.70	235	8×7	0.34	350			
100	6.3×7	0.70	235	6.3×7	0.70	235	6.3×7	0.70	235	8×7	0.34	350						
150	6.3×7	0.70	235	6.3×7	0.70	235	8×7	0.34	350									
220	8×7	0.34	350	8×7	0.34	350												
330	8×7	0.34	350															

● FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

μF \ Frequency(Hz)	120	1k	10k	100k≦
~ 33	0.35	0.55	0.75	1.00
39 ~ 150	0.40	0.60	0.80	1.00
220 ~ 330	0.50	0.65	0.85	1.00

MINIATURE TYPES

MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

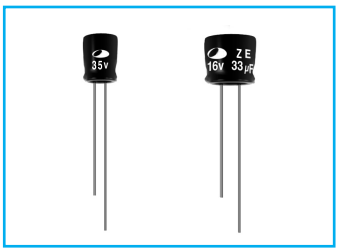
ZE

High Ripple Current, Height 5mmL Series

Miniaturized | Solvent Proof | Low Impedance

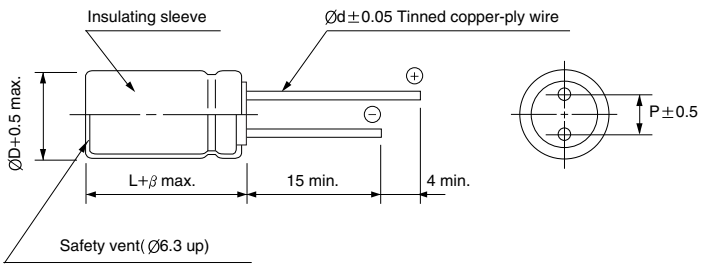
- Super miniature series with 5mmL height
- High ripple current & high temperature with RE series
- Load life of 2000 hours at 105˚C
- Complied to the RoHS directive

RE ⇨ ZE
High Ripple



Item	Characteristics
Operating temperature range	-55 ~ +105˚C
Leakage current	I = 0.01CV or 3μA whichever is greater (after 2 minutes) I = 0.03CV or 4μA whichever is greater (after 1 minute)
Capacitance tolerance	±20% (20˚C, 120Hz)
Dissipation factor max. (at 120Hz, 20˚C)	WV: 6.3 / 10 / 16 / 25 / 35 tanδ: 0.22 / 0.20 / 0.18 / 0.14 / 0.12
Low temperature characteristics (Impedance ratio at 120Hz)	WV: 6.3 / 10 / 16 / 25 / 35 Z-25˚C / Z+20˚C: 3 / 3 / 2 / 2 / 2 Z-40˚C / Z+20˚C: 9 / 7 / 5 / 3 / 3
Load life (after application of the rated voltage for 2000 hours at 105˚C)	Leakage current: Less than specified value Capacitance change: Within ±20% of the initial value tanδ: Less than 200% of the specified value
Shelf life (at 105˚C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value.

DRAWING



Unit : mm

ØD	5	6.3
P	2.0	2.5
Ød	0.45	0.45
β	1.0	

DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV / Item / μF	6.3			10			16			25			35		
	ØD×L (mm)	Imp.(Ω) max. 20˚C 100kHz	Ripple current (mA rms) 105˚C 100kHz	ØD×L (mm)	Imp.(Ω) max. 20˚C 100kHz	Ripple current (mA rms) 105˚C 100kHz	ØD×L (mm)	Imp.(Ω) max. 20˚C 100kHz	Ripple current (mA rms) 105˚C 100kHz	ØD×L (mm)	Imp.(Ω) max. 20˚C 100kHz	Ripple current (mA rms) 105˚C 100kHz	ØD×L (mm)	Imp.(Ω) max. 20˚C 100kHz	Ripple current (mA rms) 105˚C 100kHz
1													5×5	2.40	100
1.5													5×5	2.40	100
2.2													5×5	2.40	100
3.3													5×5	2.40	100
4.7													5×5	2.40	100
6.8													5×5	2.40	100
10										5×5	2.40	100	5×5	2.40	100
15							5×5	2.40	100	5×5	2.40	100	5×5	2.40	100
22							5×5	2.40	100	5×5	2.40	100	6.3×5	0.75	140
33	5×5	2.40	100	5×5	2.40	100	5×5	2.40	100	6.3×5	0.75	140	6.3×5	0.75	140
47	5×5	2.40	100	5×5	2.40	100	6.3×5	0.75	140	6.3×5	0.75	140			
68	6.3×5	0.75	140	6.3×5	0.75	140	6.3×5	0.75	140						
100	6.3×5	0.75	140	6.3×5	0.75	140									

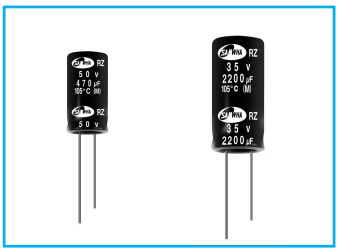
FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

μF \ Frequency(Hz)	120	1k	10k	100k≦
~ 33	0.35	0.55	0.75	1.00
39 ~ 150	0.40	0.60	0.80	1.00
220 ~ 330	0.50	0.65	0.85	1.00

RZ Extremely Low Impedance Series

Low Impedance Solvent Proof

RZ ⇨ RP
Long life



- Extremely low impedance at high frequency
- High reliability withstanding 5000 hours load life at 105˚C (2000/3000 hours for smaller case sizes as specified below)
- Ideally suited for use in switching power supplies
- Complied to the RoHS directive

Item	Characteristics
Operating temperature range	-55 ~ +105˚C
Leakage current max.	I = 0.01CV or 3μA whichever is greater (after 2 minutes) I = 0.03CV or 4μA whichever is greater (after 1 minute)
Capacitance tolerance	±20% at 120Hz, 20˚C
Dissipation factor max. (at 120Hz, 20˚C)	Capacitance > 1000μF : tanδ increases by 0.02 for each 1000μF from below value

WV	6.3	10	16	25	35	50	63
tanδ	0.22	0.19	0.16	0.14	0.12	0.10	0.08

Low temperature characteristics (Impedance ratio at 120Hz)				
WV	6.3, 10	16~35	50, 63
Z-55˚C/Z+20˚C	4	3	2

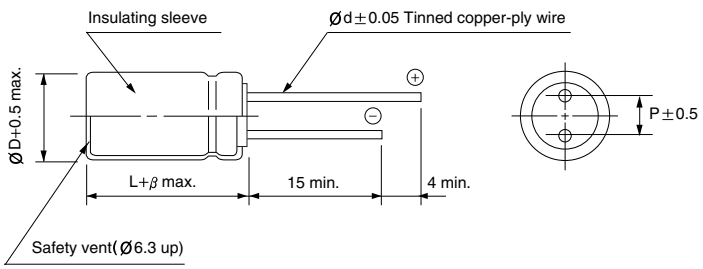
Load life (after application of the rated voltage for 5000 hours at 105˚C)	
Leakage current	Less than specified value
Capacitance change	Within ±20% of initial value
tanδ	Less than 200% of specified value

Ø5, 6.3 products are for 2000 hours, Ø8 products are for 3000 hours

Shelf life (after leaving capacitors under no load at 105˚C for 1000 hours)	
Leakage current	Less than specified value
Capacitance change	Within ±20% of initial value
tanδ	Less than 150% of specified value

DRAWING

Unit : mm



ØD	5	6.3	8	10	12.5	16	18
P	2.0	2.5	3.5	5.0	5.0	7.5	7.5
Ød	0.5	0.5	0.6	0.6	0.6	0.8	0.8
β	1.5			2.0			

FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

μF \ Frequency(Hz)	120	1k	10k	100k≦
~ 33	0.40	0.65	0.82	1.00
39 ~ 270	0.50	0.70	0.84	1.00
330 ~ 680	0.55	0.75	0.86	1.00
820 ~ 1800	0.60	0.80	0.88	1.00
2200 ~ 15000	0.70	0.85	0.90	1.00

RZ series

● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV / Item / μF	6.3				10				16				25			
	ØD×L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 105°C 120Hz	105°C 100kHz	ØD×L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 105°C 120Hz	105°C 100kHz	ØD×L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 105°C 120Hz	105°C 100kHz	ØD×L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 105°C 120Hz	105°C 100kHz
33													5×11	0.80	88	155
47									5×11	0.80	92	155	6.3×11	0.55	125	210
68					5×11	0.80	97	155	6.3×11	0.50	135	220	6.3×11	0.36	160	260
100	5×11	0.85	99	150	6.3×11	0.55	135	210	6.3×11	0.35	175	265	8×11.5	0.24	254	383
150	6.3×11	0.49	155	225	6.3×11	0.35	185	265	8×11.5	0.23	270	388	8×11.5	0.16	320	460
220	6.3×11	0.30	205	285	8×11.5	0.24	283	387	8×11.5	0.16	335	460	10×12.5	0.13	435	600
330	8×11.5	0.20	223	292	8×11.5	0.16	350	460	10×12.5	0.12	480	625	10×16	0.095	575	750
470	10×12.5	0.14	455	575	10×12.5	0.13	475	600	10×16	0.09	615	770	10×20	0.065	810	1020
680	10×16	0.11	580	700	10×16	0.09	635	770	10×20	0.065	845	1020	12.5×20	0.046	1160	1392
1000	10×20	0.075	820	950	10×20	0.060	915	1060	12.5×20	0.047	1206	1411	12.5×25	0.036	1430	1660
1500	10×25	0.055	1090	1220	12.5×20	0.045	1266	1417	12.5×25	0.036	1490	1660	16×20	0.034	1590	1770
2200	12.5×20	0.043	1296	1438	12.5×25	0.034	1530	1710	16×20	0.033	1620	1800	16×25	0.028	1848	2051
3300	12.5×25	0.034	1530	1710	16×20	0.031	1660	1850	16×25	0.027	1888	2095	16×35.5	0.020	2410	2680
4700	16×25	0.032	1728	1935	16×31.5	0.023	2170	2420	16×35.5	0.020	2410	2680	18×40	0.018	2660	2960
6800	16×31.5	0.024	2130	2370	16×35.5	0.020	2410	2680	18×35.5	0.018	2610	2900				
10000	16×40	0.020	2470	2750	18×40	0.017	2730	3040								
15000	18×40	0.018	2660	2960												

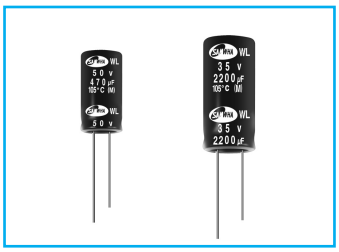
WV / Item / μF	35				50				63			
	ØD×L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 105°C 120Hz	105°C 100kHz	ØD×L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 105°C 120Hz	105°C 100kHz	ØD×L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 105°C 120Hz	105°C 100kHz
1.0					5 × 11	4.0	18	36				
1.5					5 × 11	3.8	22	45				
2.2					5 × 11	3.5	27	54				
3.3					5 × 11	3.0	33	66				
4.7					5 × 11	2.2	40	81				
6.8					5 × 11	1.8	45	91				
10					5 × 11	1.4	57	115	5 × 11	1.06	67	135
15					5 × 11	0.93	72	145	6.3 × 11	0.73	92	185
22	5 × 11	0.75	85	160	6.3 × 11	0.65	100	195	6.3 × 11	0.52	110	215
33	6.3 × 11	0.49	125	225	6.3 × 11	0.43	135	240	8 × 11.5	0.35	179	320
47	6.3 × 11	0.34	160	270	8 × 11.5	0.30	204	344	8 × 11.5	0.25	215	365
68	8 × 11.5	0.24	239	384	8 × 11.5	0.20	255	410	10 × 12.5	0.19	310	495
100	8 × 11.5	0.16	305	460	10 × 16	0.16	385	581	10 × 20	0.12	495	750
150	10 × 12.5	0.12	435	625	10 × 20	0.10	570	820	10 × 25	0.09	665	950
220	10 × 16	0.09	560	770	10 × 25	0.075	760	1040	12.5 × 20	0.065	835	1140
330	10 × 20	0.060	810	1060	12.5 × 20	0.055	978	1281	12.5 × 25	0.049	1090	1420
470	12.5 × 20	0.046	1112	1401	12.5 × 25	0.044	1190	1500	16 × 25	0.042	1350	1700
680	12.5 × 25	0.036	1370	1660	16 × 20	0.040	1350	1630	16 × 31.5	0.032	1700	2050
1000	16 × 20	0.034	1330	1770	16 × 31.5	0.030	1830	2120	18 × 35.5	0.029	1970	2280
1500	16 × 31.5	0.028	2149	2385	16 × 40	0.026	2170	2410				
2200	16 × 35.5	0.020	2410	2680	18 × 40	0.024	2300	2560				
3300	18 × 40	0.017	2730	3040								

WL Extremely Low Impedance Series

Low Impedance

Solvent Proof
WV≦100V

WL ⇨ WF
Long life



- Wide voltage compared with RZ series
- Operating temperature range of −40 ~ +105°C
- Extremely low impedance at high frequency
- High reliability withstanding 5000 hours load life at 105°C (2000/3000 hours for smaller case size as specified below)
- Complied to the RoHS directive

Item	Characteristics
Operating temperature range	WV: 6.3 ~ 100 / 160 ~ 350 / 400 ~ 450 Temperature range: -40 ~ +105°C / -40 ~ +105°C / -25 ~ +105°C
Leakage current max.	WV ≦ 100: I = 0.01CV or 3μA whichever is greater (after 2 min.); I = 0.03CV or 4μA whichever is greater (after 1 min.) WV > 100: I = 0.02CV + 15μA (after 5 min.)
Capacitance tolerance	±20% at 120Hz, 20°C
Dissipation factor max. (at 120Hz, 20°C)	Capacitance > 1000μF : tanδ increases by 0.02 for each 1000μF from below value.

WV	6.3	10	16	25	35	50	63	100	160~315	350~450
tanδ	0.22	0.19	0.16	0.14	0.12	0.10	0.09	0.08	0.15	0.20

Low temperature characteristics (Impedance ratio at 120Hz)

WV	6.3	10	16	25~100	160~250	315~450
Z-25°C/Z+20°C	4	3	2	2	3	8
Z-40°C/Z+20°C	8	6	4	3	4	-

Load life (after application of the rated voltage for 5000 hours at 105°C)

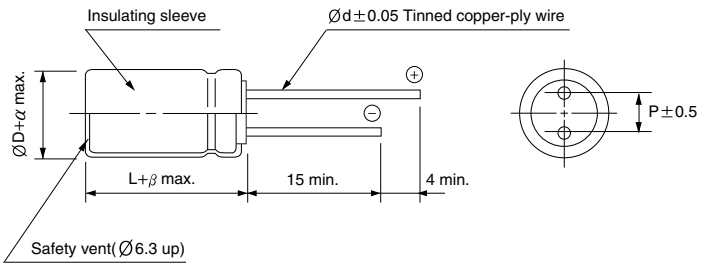
Leakage current	Less than specified value
Capacitance change	Within ±25% of initial value
tanδ	Less than 200% of specified value

Life time	ØD = 5, 6.3	ØD = 8	ØD ≧ 10
WV≦ 100	2000 hours	3000 hours	5000 hours
WV > 100	2000 hours		

Shelf life (at 105°C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value.

DRAWING

Unit : mm



ØD	5	6.3	8	10	12.5	16	18	20
P	2.0	2.5	3.5	5.0	5.0	7.5	7.5	10.0
Ød	0.5	0.5	0.6	0.6	0.6	0.8	0.8	0.8
α	0.5							1.0
β	1.5			2.0				

FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

μF \ Frequency(Hz)	120	1k	10k	100k≦
~ 33	0.40	0.65	0.82	1.00
39 ~ 270	0.50	0.70	0.84	1.00
330 ~ 680	0.55	0.75	0.86	1.00
820 ~ 1800	0.60	0.80	0.88	1.00
2200 ~ 15000	0.70	0.85	0.90	1.00

WL series

● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV / Item / μF	6.3			10			16			25		
	ØD×L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz	ØD×L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz	ØD×L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz	ØD×L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz
4.7										5×11	0.70	180
10							5×11	0.70	180	5×11	0.70	180
22	5×11	0.70	180	5×11	0.70	180	5×11	0.70	180	5×11	0.70	180
33	5×11	0.70	180	5×11	0.70	180	5×11	0.70	180	5×11	0.70	180
47	5×11	0.65	180	5×11	0.65	180	5×11	0.65	180	5×11	0.65	180
100	5×11	0.65	180	5×11	0.65	180	6.3×11	0.30	280	6.3×11	0.30	280
150	6.3×11	0.30	280	6.3×11	0.30	280	6.3×11	0.30	280	8×11.5	0.14	450
220	6.3×11	0.30	280	6.3×11	0.30	280	8×11.5	0.14	450	8×11.5	0.14	450
330	6.3×11	0.30	280	8×11.5	0.14	450	8×11.5	0.14	450	10×12.5	0.10	660
470	8×11.5	0.14	450	8×11.5	0.14	450	10×12.5	0.10	660	10×16	0.080	850
680	10×12.5	0.10	660	10×12.5	0.10	660	10×16	0.080	850	10×20	0.054	1100
1000	10×12.5	0.10	660	10×16	0.080	850	10×20	0.054	1100	12.5×20	0.050	1400
1500	10×20	0.054	1100	10×20	0.054	1100	12.5×20	0.050	1400	16×20	0.030	2100
2200	12.5×20	0.050	1400	12.5×20	0.050	1400	12.5×25	0.038	1700	16×25	0.030	2100
3300	12.5×20	0.050	1400	12.5×25	0.038	1700	16×25	0.030	2100	16×31.5	0.025	2600
4700	16×25	0.030	2100	16×25	0.030	2100	16×31.5	0.025	2600	18×35.5	0.022	3000
6800	16×25	0.030	2100	16×31.5	0.025	2600	18×35.5	0.022	3000			
10000	16×31.5	0.025	2600	18×35.5	0.022	3000						
15000	18×35.5	0.022	3000									

WV / Item / μF	35			50			63			100		
	ØD×L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz	ØD×L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz	ØD×L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz	ØD×L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz
0.22				5×11	8.0	18						
0.47				5×11	5.0	25						
1.0				5×11	3.5	40						
2.2				5×11	3.0	55				5×11	2.5	52
3.3				5×11	2.6	65	5×11	2.0	64	5×11	2.5	64
4.7	5×11	0.70	180	5×11	2.3	90	5×11	2.0	76	5×11	2.5	76
10	5×11	0.70	180	5×11	1.4	120	5×11	2.0	111	6.3×11	1.0	128
22	5×11	0.70	180	5×11	1.2	150	6.3×11	0.60	190	8×11.5	0.60	224
33	5×11	0.65	180	6.3×11	0.60	200	6.3×11	0.60	233	10×12.5	0.40	319
47	6.3×11	0.30	280	6.3×11	0.43	250	8×11.5	0.50	328	10×16	0.30	417
100	8×11.5	0.14	450	8×11.5	0.24	340	10×16	0.12	456	12.5×20	0.15	570
150	8×11.5	0.14	450	10×12.5	0.17	490	10×20	0.10	610	12.5×25	0.12	762
220	10×12.5	0.10	660	10×16	0.12	650	10×25	0.090	809	16×25	0.070	1250
330	10×16	0.080	850	10×20	0.10	810	12.5×20	0.085	1036	16×31.5	0.050	1404
470	10×20	0.054	1100	12.5×20	0.085	1100	16×20	0.050	1411	18×40	0.030	1980
680	12.5×20	0.050	1400	12.5×25	0.065	1200	16×25	0.043	1843			
1000	12.5×25	0.038	1700	16×25	0.043	1600	16×35.5	0.025	1967			
1500	16×25	0.030	2100	16×31.5	0.038	2000						
2200	16×31.5	0.025	2600	18×35.5	0.034	2300						
3300	18×35.5	0.022	3000									

WL series

● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV / Item / μF	160			200			250		
	ØD×L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz	ØD×L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz	ØD×L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz
10							10 × 20	3.5	300
22	10 × 20	1.3	440	10 × 20	1.5	440	12.5 × 20	2.3	480
33	10 × 20	1.3	565	12.5 × 20	0.91	590	12.5 × 25	1.7	630
47	12.5 × 20	0.91	725	12.5 × 20	0.91	780	12.5 × 25	1.7	630
68	12.5 × 25	0.63	950	12.5 × 25	0.63	950	16 × 25	0.78	1000
100	16 × 25	0.27	1280	16 × 25	0.27	1280	16 × 31.5	0.63	1400
150	16 × 31.5	0.22	1300	18 × 25	0.27	1500	18 × 31.5	0.42	1450
220	16 × 31.5	0.22	1300	18 × 31.5	0.22	1700	18 × 40	0.35	1485
330	18 × 31.5	0.22	1700						

WV / Item / μF	350			400			450		
	ØD×L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz	ØD×L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz	ØD×L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz
3.3							10 × 20	6.5	150
4.7							12.5 × 20	3.6	200
10	10 × 20	2.9	180	10 × 20	2.9	180	12.5 × 25	2.5	315
22	12.5 × 20	2.1	270	12.5 × 25	1.3	300	16 × 25	1.7	570
33	16 × 20	0.91	600	16 × 20	0.91	600	16 × 25	1.4	600
47	16 × 25	0.73	700	16 × 25	0.73	700	18 × 25	1.1	720
68	16 × 31.5	0.49	1100	16 × 31.5	0.49	1100	18 × 31.5	0.93	900
100	18 × 31.5	0.40	1170	18 × 40	0.34	1250	18 × 35.5	0.71	1100
150	18 × 40	0.35	1250	20 × 41	0.33	1380	20 × 41	0.32	1600

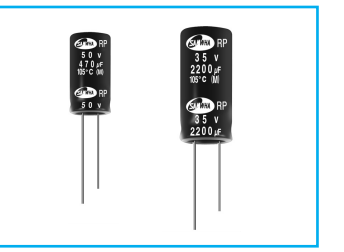
WV / Item / μF	500		
	ØD×L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz
10	12.5 × 25	3.0	260
22	12.5 × 30	2.3	420
	16 × 25	2.2	470
33	18 × 31.5	1.8	560
47	18 × 35.5	1.5	700
68	18 × 40	1.1	820
82	18 × 40	1.0	900
100	20 × 41	0.8	1250

MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

RP Extremely Low Impedance Series

Solvent Proof

RZ ⇨ RP
Long life



- High reliability long life(10000 hours)
- Operating temperature −55 ~ +105˚C
- Enabled high ripple current by a reduction of impedance at high frequency
- Ideally suited for use in switching power supply, main board
- Complied to the RoHS directive

Item	Characteristics
Operating temperature range	-55 ~ +105˚C
Leakage current max.	I = 0.01CV or 3μA whichever is greater (after 2 minutes)
Capacitance tolerance	±20% at 120Hz, 20˚C
Dissipation factor max. (at 120Hz, 20˚C)	Capacitance > 1000μF : tanδ increases by 0.02 for each 1000μF from below value.

WV	6.3	10	16	25	35	50
tanδ	0.22	0.19	0.16	0.14	0.12	0.10

Low temperature characteristics (Impedance ratio at 120Hz)

WV	6.3	10	16 ~ 25	35 ~ 50
Z-55˚C/Z+20˚C	3	3	3	3

Load life (after application of the rated voltage for 10000 hours at 105˚C)

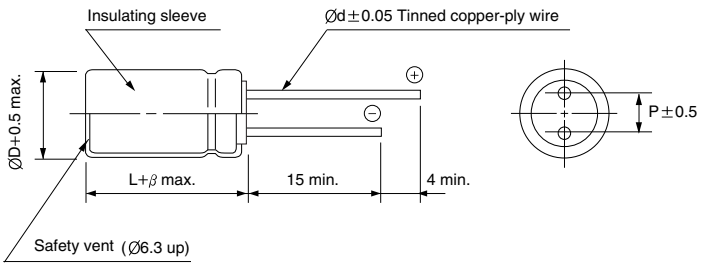
Leakage current	Less than specified value
Capacitance change	Within ±20% of initial value
tanδ	Less than 200% of specified value

(Ø5, 6.3: 4000 hours, Ø8: 6000 hours, Ø10: 7000 hours, ØD≧12.5: 10000 hours)

Shelf life (at 105˚C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value.

DRAWING

Unit : mm



ØD	5	6.3	8	10	12.5	16	18
P	2.0	2.5	3.5	5.0	5.0	7.5	7.5
Ød	0.5	0.5	0.6	0.6	0.6	0.8	0.8
β	1.5			2.0			

FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

μF \ Frequency(Hz)	120	1k	10k	100k≦
~ 33	0.40	0.65	0.82	1.00
39 ~ 270	0.50	0.70	0.84	1.00
330 ~ 680	0.55	0.75	0.86	1.00
820 ~ 1800	0.60	0.80	0.88	1.00
2200 ~ 15000	0.70	0.85	0.90	1.00

RP series

● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

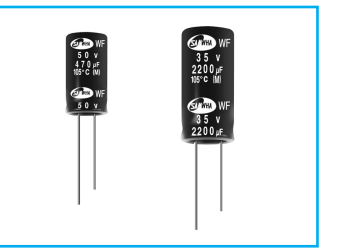
WV / Item / μF	6.3			10			16		
	ØD×L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz	ØD×L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz	ØD×L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz
47							5 × 11	0.65	180
68				5 × 11	0.65	180	6.3 × 11	0.30	280
100	5 × 11	0.65	180	5 × 11	0.65	180	6.3 × 11	0.30	280
150	5 × 11	0.65	280	6.3 × 11	0.30	280	6.3 × 11	0.30	280
220	6.3 × 11	0.30	280	6.3 × 11	0.30	280	8 × 11.5	0.14	450
330	6.3 × 11	0.30	280	8 × 11.5	0.14	450	8 × 11.5	0.14	450
470	8 × 11.5	0.14	450	8 × 11.5	0.14	450	10 × 12.5	0.10	660
680	10 × 12.5	0.10	660	10 × 12.5	0.10	660	10 × 16	0.08	850
1000	10 × 12.5	0.10	660	10 × 16	0.08	850	10 × 20	0.054	1100
1500	10 × 20	0.054	1100	10 × 20	0.054	1100	12.5 × 20	0.050	1400
2200	12.5 × 20	0.050	1400	12.5 × 20	0.050	1400	12.5 × 25	0.038	1700
3300	12.5 × 20	0.050	1400	12.5 × 25	0.038	1700	16 × 25	0.030	2100
4700	16 × 25	0.030	2100	16 × 31.5	0.030	2100	16 × 25	0.025	2600
6800	16 × 25	0.030	2100	16 × 31.5	0.025	2600	16 × 35.5	0.022	3000
10000	16 × 31.5	0.025	2600	18 × 35.5	0.022	3000			
15000	18 × 35.5	0.022	3000						

WV / Item / μF	25			35			50		
	ØD×L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz	ØD×L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz	ØD×L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz
1.0							5 × 11	3.5	40
2.2							5 × 11	3.0	55
3.3							5 × 11	2.6	65
4.7							5 × 11	2.3	90
6.8							5 × 11	1.4	120
10							5 × 11	1.4	120
22				5 × 11	0.70	180	5 × 11	1.2	150
33	5 × 11	0.70	180	5 × 11	0.65	180	6.3 × 11	0.60	200
47	5 × 11	0.65	180	6.3 × 11	0.30	280	6.3 × 11	0.43	250
68	6.3 × 11	0.30	280	8 × 11.5	0.14	450	8 × 11.5	0.24	340
100	6.3 × 11	0.30	280	8 × 11.5	0.14	450	8 × 11.5	0.24	340
150	8 × 11.5	0.14	450	8 × 11.5	0.14	450	10 × 12.5	0.17	490
220	8 × 11.5	0.14	450	10 × 12.5	0.10	660	10 × 16	0.12	650
330	10 × 12.5	0.10	660	10 × 16	0.080	850	10 × 20	0.10	810
470	10 × 16	0.080	850	10 × 20	0.054	1100	12.5 × 20	0.085	1100
680	10 × 20	0.054	1100	12.5 × 20	0.050	1400	12.5 × 25	0.065	1200
1000	12.5 × 20	0.050	1400	12.5 × 25	0.038	1700	16 × 31.5	0.043	1600
1500	16 × 25	0.030	1400	16 × 31.5	0.030	2100	16 × 31.5	0.038	2000
2200	16 × 25	0.030	2100	16 × 31.5	0.025	2600	18 × 35.5	0.034	2300
3300	16 × 31.5	0.025	2600	18 × 35.5	0.022	3000			
4700	18 × 35.5	0.022	3000						

MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

WF High ripple current, Extremely Low Impedance Series

Solvent Proof



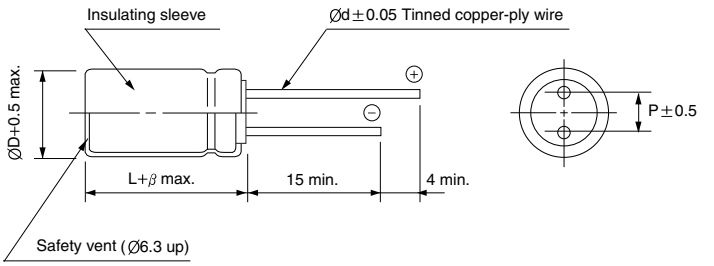
- Operating temperature range of −40 ~ +105˚C
- Extremely low impedance at high frequency
- High reliability withstanding 10000 hours load life at 105˚C (5000 / 7000 hours for smaller case size as specified below)
- Complied to the RoHS directive

WL ⇨ WF
Long life

Item	Characteristics
Operating temperature range	-40 ~ +105˚C
Leakage current max.	I = 0.03CV or 3μA whichever is greater (after 2 minutes)
Capacitance tolerance	±20% at 120Hz, 20˚C
Dissipation factor max. (at 120Hz, 20˚C)	WV: 6.3 / 10 / 16 / 25 / 35 / 50 / 63 / 100 tanδ: 0.22 / 0.19 / 0.16 / 0.14 / 0.12 / 0.10 / 0.09 / 0.08
Low temperature characteristics (Impedance ratio at 120Hz)	WV: 6.3 / 10 / 16 / 25 ~ 100 Z-40˚C/Z+20˚C: 8 / 6 / 4 / 3
Load life (after application of the rated voltage for 10000 hours at 105˚C)	Leakage current: Less than specified value Capacitance change: Within ±25% of initial value tanδ: Less than 200% of specified value ØD: ØD = 5, 6.3 / ØD = 8, 10 / ØD ≧ 12.5 Life time: 5000 hours / 7000 hours / 10000 hours
Shelf life (at 105˚C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value.

DRAWING

Unit : mm



ØD	5	6.3	8	10	12.5	16	18
P	2.0	2.5	3.5	5.0	5.0	7.5	7.5
Ød	0.5	0.5	0.6	0.6	0.6	0.8	0.8
β	1.5			2.0			

FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

μF \ Frequency(Hz)	120	1k	10k	100k≦
~ 33	0.40	0.65	0.82	1.00
39 ~ 270	0.50	0.70	0.84	1.00
330 ~ 680	0.55	0.75	0.86	1.00
820 ~ 1800	0.60	0.80	0.88	1.00
2200 ~ 15000	0.70	0.85	0.90	1.00

WF series

● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

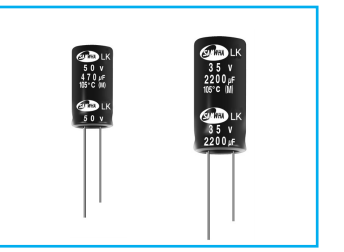
WV / Item / μF	6.3			10			16			25		
	ØD×L (mm)	Impedance (Ω)max. 20℃ 100kHz	Ripple current (mA rms) 105℃ 100kHz	ØD×L (mm)	Impedance (Ω)max. 20℃ 100kHz	Ripple current (mA rms) 105℃ 100kHz	ØD×L (mm)	Impedance (Ω)max. 20℃ 100kHz	Ripple current (mA rms) 105℃ 100kHz	ØD×L (mm)	Impedance (Ω)max. 20℃ 100kHz	Ripple current (mA rms) 105℃ 100kHz
33										5×11	0.90	150
47							5×11	0.90	150	5×11	0.90	150
100	5×11	0.90	150	5×11	0.90	150	6.3×11	0.40	250	6.3×11	0.40	250
220	6.3×11	0.40	250	6.3×11	0.40	250	8×11.5	0.25	400	8×11.5	0.25	400
330	6.3×11	0.40	250	8×11.5	0.25	400	8×11.5	0.25	400	10×12.5	0.16	580
470	8×11.5	0.25	400	8×11.5	0.25	400	10×12.5	0.16	580	10×16	0.120	770
1000	10×12.5	0.16	580	10×16	0.120	770	10×20	0.078	1050	12.5×20	0.062	1300
2200	12.5×20	0.062	1300	12.5×20	0.062	1300	12.5×25	0.048	1650	16×25	0.034	1850
3300	12.5×20	0.062	1300	12.5×25	0.048	1650	16×25	0.034	1850	16×31.5	0.029	2000
4700	16×25	0.034	1850	16×25	0.034	1850	16×31.5	0.029	2000	18×35.5	0.025	2200
6800	16×25	0.034	1850	16×31.5	0.029	2000	18×35.5	0.025	2200			
10000	16×31.5	0.029	2000	18×35.5	0.025	2200						
15000	18×35.5	0.025	2200									

WV / Item / μF	35			50			63			100		
	ØD×L (mm)	Impedance (Ω)max. 20℃ 100kHz	Ripple current (mA rms) 105℃ 100kHz	ØD×L (mm)	Impedance (Ω)max. 20℃ 100kHz	Ripple current (mA rms) 105℃ 100kHz	ØD×L (mm)	Impedance (Ω)max. 20℃ 100kHz	Ripple current (mA rms) 105℃ 100kHz	ØD×L (mm)	Impedance (Ω)max. 20℃ 100kHz	Ripple current (mA rms) 105℃ 100kHz
0.47				5×11	5.5	17				5×11	6.0	15
1.0				5×11	4.0	30				5×11	4.5	20
2.2				5×11	2.5	43				5×11	3.0	30
3.3				5×11	2.2	53				5×11	2.7	40
4.7				5×11	1.9	88				5×11	2.5	65
10				5×11	1.5	100	5×11	2.3	87	6.3×11	1.2	140
22				5×11	0.9	150	6.3×11	1.30	140	8×11.5	0.63	160
33	5×11	0.90	150	6.3×11	0.40	250	6.3×11	1.20	140	10×12.5	0.43	230
47	6.3×11	0.40	250	6.3×11	0.40	250	8×11.5	0.63	210	10×16	0.31	290
100	8×11.5	0.25	400	8×11.5	0.25	400	10×12.5	0.43	300	12.5×20	0.16	430
220	10×12.5	0.16	580	10×16	0.12	770	10×25	0.210	520	16×25	0.073	900
330	10×16	0.120	770	10×20	0.08	1050	12.5×20	0.160	660	16×25	0.073	900
470	10×20	0.078	1050	12.5×20	0.062	1300	12.5×25	0.120	750			
1000	12.5×25	0.048	1650	16×25	0.034	1850	16×31.5	0.054	1390			
2200	16×31.5	0.029	2000	18×35.5	0.025	2200						
3300	18×35.5	0.025	2200									

MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

LK High Ripple Current Series

Low Impedance　Solvent Proof



- Low impedance compared with WL series
- Enabled high ripple current by a reduction of impedance at high frequency
- High reliability withstanding 5000 hours load life at 105˚C
  (2000 ~ 4000 hours for smaller case sizes as specified below)
- Complied to the RoHS directive

WL ⇨ LK
High Ripple

Item	Characteristics
Operating temperature range	-40 ~ +105˚C
Leakage current max.	I = 0.01CV or 3μA whichever is greater (after 2 minutes) I = 0.03CV or 4μA whichever is greater (after 1 minute)
Capacitance tolerance	±20% (20˚C, 120Hz)
Dissipation factor max. (at 120Hz, 20˚C)	Capacitance > 1000μF : tanδ increases by 0.02 for each 1000μF from below value.

WV	6.3	10	16	25	35	50	63	100
tanδ	0.22	0.19	0.16	0.14	0.12	0.10	0.09	0.08

Low temperature characteristics (Impedance ratio at 120Hz)

Z-40˚C / Z+20˚C	Z-25˚C / Z+20˚C
3	2

Load life (after application of the rated voltage for 5000 hours at 105˚C)

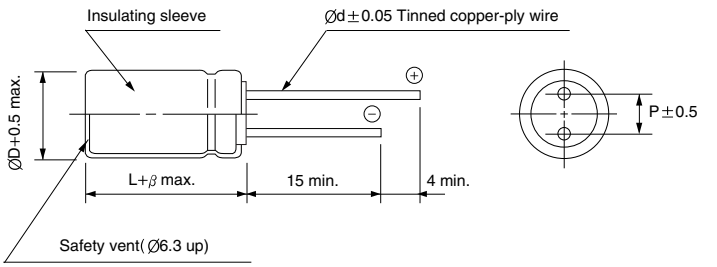
Leakage current	Less than specified value
Capacitance change	Within ±25% of the initial value
tanδ	Less than 200% of the specified value

Ø5, 6.3 : 2000 hours, Ø8 : 3000 hours, Ø10 : 4000 hours

Shelf life (at 105˚C) — After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value.

DRAWING

Unit : mm



ØD	5	6.3	8	10	12.5	16	18
P	2.0	2.5	3.5	5.0	5.0	7.5	7.5
Ød	0.5	0.5	0.6	0.6	0.6	0.8	0.8
β	1.5			2.0			

FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

μF \ Frequency(Hz)	120	1k	10k	100k≦
~ 33	0.32	0.60	0.80	1.00
39 ~ 270	0.40	0.63	0.82	1.00
330 ~ 680	0.45	0.67	0.84	1.00
820 ~ 1800	0.50	0.70	0.86	1.00
2200 ~ 6800	0.60	0.75	0.88	1.00

LK series

● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV / Item / μF	6.3			10			16			25		
	ØD×L (mm)	Impedance (Ω)max. 20℃ 100kHz	Ripple current (mA rms) 105℃ 100kHz	ØD×L (mm)	Impedance (Ω)max. 20℃ 100kHz	Ripple current (mA rms) 105℃ 100kHz	ØD×L (mm)	Impedance (Ω)max. 20℃ 100kHz	Ripple current (mA rms) 105℃ 100kHz	ØD×L (mm)	Impedance (Ω)max. 20℃ 100kHz	Ripple current (mA rms) 105℃ 100kHz
33										5×11	0.800	200
47							5×11	0.800	200	5×11	0.550	200
100	5×11	0.850	200	5×11	0.600	200	8×11.5	0.350	550	8×11.5	0.240	550
150	8×11.5	0.490	550	8×11.5	0.350	550	8×11.5	0.240	550	10×12.5	0.160	927
220	8×11.5	0.300	550	8×11.5	0.240	550	10×12.5	0.160	927	10×12.5	0.130	927
330	8×11.5	0.240	550	10×12.5	0.160	927	10×12.5	0.130	927	10×16	0.095	1100
470	10×12.5	0.140	927	10×12.5	0.130	927	10×16	0.095	1100	10×20	0.075	1280
680	10×16	0.110	1100	10×16	0.095	1100	10×20	0.075	1280	10×25	0.055	1495
1000	10×20	0.075	1280	10×20	0.075	1280	10×25	0.055	1495	12.5×25	0.043	2100
1500	10×25	0.055	1495	10×25	0.055	1495	12.5×25	0.043	2100	16×25	0.034	2607
2200	12.5×25	0.043	2100	12.5×25	0.043	2100	12.5×30	0.034	2480	16×31.5	0.032	2840
3300	12.5×30	0.034	2480	16×25	0.034	2607	16×31.5	0.032	2840	16×35.5	0.029	3017
4700	16×31.5	0.032	2840	16×31.5	0.032	2840	16×35.5	0.029	3017	18×40	0.027	3379
6800	16×35.5	0.029	3017	16×35.5	0.029	3017	18×40	0.027	3379			

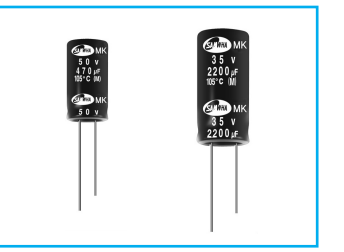
WV / Item / μF	35			50			63			100		
	ØD×L (mm)	Impedance (Ω)max. 20℃ 100kHz	Ripple current (mA rms) 105℃ 100kHz	ØD×L (mm)	Impedance (Ω)max. 20℃ 100kHz	Ripple current (mA rms) 105℃ 100kHz	ØD×L (mm)	Impedance (Ω)max. 20℃ 100kHz	Ripple current (mA rms) 105℃ 100kHz	ØD×L (mm)	Impedance (Ω)max. 20℃ 100kHz	Ripple current (mA rms) 105℃ 100kHz
1.0				5×11	4.00	36						
2.2				5×11	3.50	54				5×11	5.00	38
3.3				5×11	3.00	66				5×11	5.00	44
4.7				5×11	2.20	74				5×11	5.00	53
10				5×11	2.000	115	5×11	1.06	135	6.3×11	2.00	89
22	5×11	2.000	200	5×11	1.800	160	6.3×11	0.520	215	8×11.5	1.200	159
33	5×11	1.500	200	6.3×11	1.200	285	8×11.5	0.350	320	10×12.5	0.800	221
47	8×11.5	0.700	550	8×11.5	0.700	550	8×11.5	0.250	365	10×16	0.600	350
100	10×12.5	0.200	927	10×12.5	0.200	927	10×20	0.120	750	12.5×20	0.300	405
150	10×12.5	0.160	927	10×16	0.120	1100	10×25	0.090	950	12.5×25	0.250	541
220	10×16	0.120	1100	10×20	0.095	1280	12.5×20	0.065	1140	16×25	0.150	885
330	10×20	0.095	1280	10×25	0.075	1495	12.5×25	0.049	1420	16×31.5	0.100	991
470	10×25	0.075	1495	12.5×25	0.055	2100	16×25	0.042	1700	18×40	0.068	1401
680	12.5×25	0.055	2100	16×25	0.043	2770	16×31.5	0.032	2050			
1000	12.5×30	0.043	2480	16×31.5	0.034	2840	18×35.5	0.029	2280			
1500	16×31.5	0.034	2840	16×35.5	0.032	3017						
2200	16×35.5	0.032	3017	18×40	0.029	3379						
3300	18×40	0.029	3379									

MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

Upgrade **MK**

High Ripple Current Series

Low Impedance　Solvent Proof



- Ripple current compared with LK series
- Enabled high ripple current by a reduction of impedance at high frequency
- High reliability withstanding 5000 hours load life at 105˚C (2000 ~ 4000 hours for smaller case sizes as specified below)
- Complied to the RoHS directive

LK ⇒ **MK**
Miniature High Ripple

Item	Characteristics
Operating temperature range	-40 ~ +105˚C
Leakage current max.	I = 0.01CV or 3μA whichever is greater (after 2 minutes) I = 0.03CV or 4μA whichever is greater (after 1 minute)
Capacitance tolerance	±20% (20˚C, 120Hz)
Dissipation factor max. (at 120Hz, 20˚C)	Capacitance > 1000μF : tanδ increases by 0.02 for each 1000μF from below value.

WV	6.3	10	16	25	35	50	63	100
tanδ	0.22	0.19	0.16	0.14	0.12	0.10	0.08	0.08

Low temperature characteristics (Impedance ratio at 120Hz)

Z-40˚C / Z+20˚C	Z-25˚C / Z+20˚C
3	2

Load life (after application of the rated voltage for 5000 hours at 105˚C)

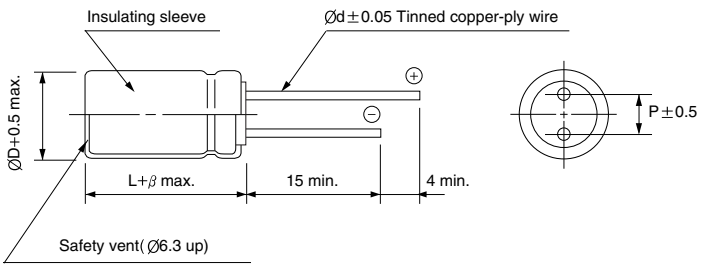
Leakage current	Less than specified value
Capacitance change	Within ±25% of the initial value
tanδ	Less than 200% of the specified value

Ø5, 6.3 : 2000 hours, Ø8 : 3000 hours

Shelf life (at 105˚C) — After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value.

DRAWING

Unit : mm



ØD	5	6.3	8	10	12.5	16	18
P	2.0	2.5	3.5	5.0	5.0	7.5	7.5
Ød	0.5	0.5	0.6	0.6	0.6	0.8	0.8
β	1.5			2.0			

FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

μF \ Frequency(Hz)	120	1k	10k	100k≦
~ 33μF	0.42	0.70	0.90	1.00
47 ~ 220μF	0.50	0.73	0.92	1.00
330 ~ 680μF	0.55	0.77	0.94	1.00
1000 ~ 1500μF	0.60	0.80	0.96	1.00
2200 ~ 15000μF	0.70	0.85	0.98	1.00

MK series

● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV / Item / μF	6.3			10			16			25		
	ØD×L (mm)	Impedance (Ω)max. 20℃ 100kHz	Ripple current (mA rms) 105℃ 100kHz	ØD×L (mm)	Impedance (Ω)max. 20℃ 100kHz	Ripple current (mA rms) 105℃ 100kHz	ØD×L (mm)	Impedance (Ω)max. 20℃ 100kHz	Ripple current (mA rms) 105℃ 100kHz	ØD×L (mm)	Impedance (Ω)max. 20℃ 100kHz	Ripple current (mA rms) 105℃ 100kHz
4.7										5×11	1.000	250
10							5×11	1.000	250	5×11	1.000	250
22	5×11	0.525	250	5×11	0.525	250	5×11	1.000	250	5×11	0.525	250
33	5×11	0.525	250	5×11	0.525	250	5×11	0.525	250	5×11	0.525	250
47	5×11	0.450	250	5×11	0.450	250	5×11	0.450	250	5×11	0.450	250
100	5×11	0.450	250	5×11	0.450	250	6.3×11	0.300	405	6.3×11	0.225	405
150	6.3×11	0.300	405	6.3×11	0.300	405	6.3×11	0.225	405	8×11.5	0.160	760
220	6.3×11	0.225	405	6.3×11	0.225	405	8×11.5	0.108	760	8×11.5	0.160	760
330	6.3×11	0.225	405	8×11.5	0.108	760	8×11.5	0.108	760	10×12.5	0.088	1030
390	8×11.5	0.108	550	8×11.5	0.108	760	8×15	0.980	880	8×15	0.098	1030
							10×12.5	0.980	880	10×12.5	0.098	1030
470	8×11.5	0.108	760	8×11.5	0.108	760	8×15	0.098	1030	10×16	0.065	1430
							10×12.5	0.088	1030			
560	8×15	0.980	880	8×15	0.980	880	8×20	0.088	1030	8×20	0.088	1430
	10×12.5	0.980	880	10×12.5	0.980	880	10×16	0.088	1030	10×16	0.088	1430
680	10×12.5	0.088	1030	8×15	0.098	1030	10×16	0.065	1430	10×20	0.050	1820
				10×12.5	0.088	1030						
1000	10×16	0.065	1430	8×20	0.088	1030	8×20	0.088	1430	12.5×20	0.043	2360
				10×16	0.065	1430	10×20	0.050	1820			
1500	10×20	0.050	1820	10×20	0.050	1820	12.5×20	0.043	2360	16×20	0.024	2880
2200	12.5×20	0.043	2360	12.5×20	0.043	2360	12.5×25	0.029	2770	16×25	0.024	3114
3300	12.5×20	0.040	2360	12.5×25	0.029	2770	16×25	0.024	3114	16×31.5	0.024	3312
4700	16×25	0.024	3114	16×25	0.024	3114	16×31.5	0.024	3312	18×35.5	0.022	3420
6800	16×25	0.024	3114	16×31.5	0.024	3312	18×35.5	0.022	3420			
10000	16×31.5	0.024	3312	18×35.5	0.022	3420						
15000	18×35.5	0.022	3420									

WV / Item / μF	35			50			63			100		
	ØD×L (mm)	Impedance (Ω)max. 20℃ 100kHz	Ripple current (mA rms) 105℃ 100kHz	ØD×L (mm)	Impedance (Ω)max. 20℃ 100kHz	Ripple current (mA rms) 105℃ 100kHz	ØD×L (mm)	Impedance (Ω)max. 20℃ 100kHz	Ripple current (mA rms) 105℃ 100kHz	ØD×L (mm)	Impedance (Ω)max. 20℃ 100kHz	Ripple current (mA rms) 105℃ 100kHz
0.47				5×11	4.00	250						
1.0				5×11	3.00	250						
2.2				5×11	3.00	250				5×11	3.000	125
3.3				5×11	1.50	250	5×11	2.000	165	5×11	2.000	125
4.7	5×11	0.525	250	5×11	1.50	250	5×11	2.000	165	5×11	2.000	125
10	5×11	0.525	250	5×11	1.000	250	5×11	0.500	165	6.3×11	0.500	205
22	5×11	0.525	250	5×11	0.500	250	6.3×11	0.300	265	8×11.5	0.300	355
33	5×11	0.450	250	6.3×11	0.300	405	6.3×11	0.300	265	10×12.5	0.250	450
47	6.3×11	0.300	405	6.3×11	0.300	405	8×11.5	0.200	500	10×16	0.200	580
100	8×11.5	0.160	760	8×11.5	0.108	760	10×16	0.100	945	12.5×20	0.100	1045
150	8×11.5	0.108	760	10×12.5	0.088	1030	10×20	0.080	1100	12.5×25	0.070	1195
220	8×15	0.098	1030	10×16	0.065	1430	10×25	0.070	1300	16×25	0.060	1600
	10×12.5	0.088	1030									
330	10×16	0.065	1430	10×20	0.050	1820	12.5×20	0.040	1495	16×31.5	0.040	1750
470	8×20	0.088	1430	12.5×20	0.043	2360	16×20	0.035	1990	18×40	0.030	2060
	10×20	0.050	1820									
680	12.5×20	0.043	2360	12.5×25	0.029	2770	16×25	0.030	2780			
1000	12.5×25	0.029	2770	16×25	0.027	3114	16×35.5	0.020	2835			
1500	16×25	0.024	3114	16×31.5	0.024	3312						
2200	16×31.5	0.024	3312	18×35.5	0.022	3420						
3300	18×35.5	0.022	3420									

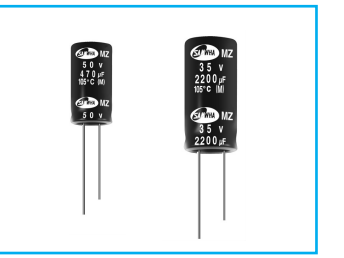
MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

NEW

MZ

Ultra Low Impedance Series

Low Impedance | Miniaturized | Solvent Proof



- Low impedance compared with WL series
- Enabled high ripple current by a reduction of impedance at high frequency
- High reliability withstanding 5000 hours load life at 105˚C
  (2000 ~ 3000 hours for smaller case sizes as specified below)
- For switching power supplies, noise filter, adapter, charger
- Complied to the RoHS directive

WL ⇨ MZ ⇨ ML
Low Imp. / Long life

Item	Characteristics
Operating temperature range	-40 ~ +105˚C
Leakage current max.	I = 0.01CV or 3μA whichever is greater (after 2 minutes) I = 0.03CV or 4μA whichever is greater (after 1 minute)
Capacitance tolerance	±20% at 120Hz, 20˚C
Dissipation factor max. (at 120Hz, 20˚C)	Capacitance > 1000μF : tanδ increases by 0.02 for each 1000μF from below value.

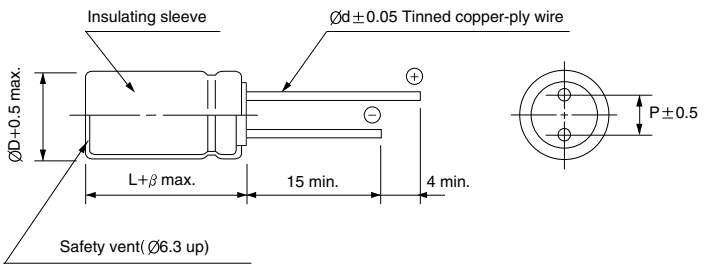
WV	6.3	10	16	25	35	50	63	100
tanδ	0.22	0.19	0.16	0.14	0.12	0.10	0.09	0.08

Low temperature characteristics (Impedance ratio at 120Hz)	Z-40˚C / Z+20˚C	Z-25˚C / Z+20˚C
	3	2

Load life (after application of the rated voltage for 5000 hours at 105˚C)		
	Leakage current	Less than specified value
	Capacitance change	Within ±25% of initial value
	tanδ	Less than 200% of specified value
	Ø5, 6.3 : 2000 hours, Ø8 : 3000 hours	
Shelf life (at 105˚C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value.	

DRAWING

Unit : mm



ØD	5	6.3	8	10	12.5	16	18
P	2.0	2.5	3.5	5.0	5.0	7.5	7.5
Ød	0.5	0.5	0.6	0.6	0.6	0.8	0.8
β	1.5			2.0			

FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

μF \ Frequency(Hz)	120	1k	10k	100k≦
~ 33μF	0.42	0.70	0.90	1.00
47 ~ 220μF	0.50	0.73	0.92	1.00
330 ~ 680μF	0.55	0.77	0.94	1.00
1000 ~ 1500μF	0.60	0.80	0.96	1.00
2200 ~ 15000μF	0.70	0.85	0.98	1.00

MZ series

● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

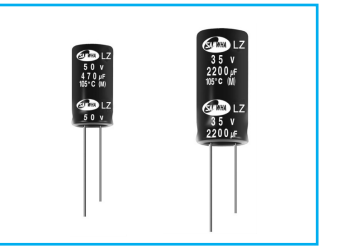
WV / Item / μF	6.3			10			16			25		
	ØD×L (mm)	Impedance (Ω)max. 20℃ 100kHz	Ripple current (mA rms) 105℃ 100kHz	ØD×L (mm)	Impedance (Ω)max. 20℃ 100kHz	Ripple current (mA rms) 105℃ 100kHz	ØD×L (mm)	Impedance (Ω)max. 20℃ 100kHz	Ripple current (mA rms) 105℃ 100kHz	ØD×L (mm)	Impedance (Ω)max. 20℃ 100kHz	Ripple current (mA rms) 105℃ 100kHz
4.7										5×11	0.35	250
10							5×11	0.35	250	5×11	0.35	250
22	5×11	0.35	250	5×11	0.35	250	5×11	0.35	250	5×11	0.35	250
33	5×11	0.35	250	5×11	0.35	250	5×11	0.35	250	5×11	0.35	250
47	5×11	0.30	250	5×11	0.30	250	5×11	0.30	250	5×11	0.30	250
100	5×11	0.30	250	5×11	0.30	250	6.3×11	0.15	405	6.3×11	0.15	405
150	6.3×11	0.15	405	6.3×11	0.15	405	6.3×11	0.15	405	8×11.5	0.072	760
220	6.3×11	0.15	405	6.3×11	0.15	405	8×11.5	0.072	760	8×11.5	0.072	760
330	6.3×11	0.15	405	8×11.5	0.072	760	8×11.5	0.072	760	10×12.5	0.053	1030
470	8×11.5	0.072	760	8×11.5	0.072	760	10×12.5	0.053	1030	10×16	0.038	1430
680	10×12.5	0.053	1030	10×12.5	0.053	1030	10×16	0.038	1430	10×20	0.027	1820
1000	10×12.5	0.053	1030	10×16	0.038	1430	10×20	0.027	1820	12.5×20	0.025	2360
1500	10×20	0.027	1820	10×20	0.027	1820	12.5×20	0.025	2360	16×20	0.015	3460
2200	12.5×20	0.025	2360	12.5×20	0.025	2360	12.5×25	0.018	2770	16×25	0.015	3460
3300	12.5×20	0.025	2360	12.5×25	0.018	2770	16×25	0.015	3460	16×31.5	0.015	3680
4700	16×25	0.015	3460	16×25	0.015	3460	16×31.5	0.015	3680	18×35.5	0.014	3800
6800	16×25	0.015	3460	16×31.5	0.015	3680	18×35.5	0.014	3800			
10000	16×31.5	0.015	3680	18×35.5	0.014	3800						
15000	18×35.5	0.014	3800									

WV / Item / μF	35			50			63			100		
	ØD×L (mm)	Impedance (Ω)max. 20℃ 100kHz	Ripple current (mA rms) 105℃ 100kHz	ØD×L (mm)	Impedance (Ω)max. 20℃ 100kHz	Ripple current (mA rms) 105℃ 100kHz	ØD×L (mm)	Impedance (Ω)max. 20℃ 100kHz	Ripple current (mA rms) 105℃ 100kHz	ØD×L (mm)	Impedance (Ω)max. 20℃ 100kHz	Ripple current (mA rms) 105℃ 100kHz
0.47				5×11	2.0	250						
1.0				5×11	2.0	250						
2.2				5×11	2.0	250				5×11	2.0	125
3.3				5×11	1.0	250	5×11	2.0	165	5×11	2.0	125
4.7	5×11	0.35	250	5×11	1.0	250	5×11	2.0	165	5×11	2.0	125
10	5×11	0.35	250	5×11	0.50	250	5×11	0.45	165	6.3×11	0.50	205
22	5×11	0.35	250	5×11	0.26	250	6.3×11	0.30	265	8×11.5	0.30	355
33	5×11	0.30	250	6.3×11	0.17	405	6.3×11	0.30	265	10×12.5	0.25	450
47	6.3×11	0.15	405	6.3×11	0.14	405	8×11.5	0.20	500	10×16	0.20	580
100	8×11.5	0.072	760	8×11.5	0.072	760	10×16	0.10	945	12.5×20	0.10	1045
150	8×11.5	0.072	760	10×12.5	0.061	1030	10×20	0.08	1100	12.5×25	0.070	1195
220	10×12.5	0.053	1030	10×16	0.038	1430	10×25	0.07	1300	16×25	0.060	1600
330	10×16	0.038	1430	10×20	0.032	1820	12.5×20	0.04	1495	16×31.5	0.040	1750
470	10×20	0.027	1820	12.5×20	0.025	2360	16×20	0.035	1990	18×40	0.030	2060
680	12.5×20	0.025	2360	12.5×25	0.020	2770	16×25	0.030	2780			
1000	12.5×25	0.018	2770	16×25	0.018	3460	16×35.5	0.020	2835			
1500	16×25	0.015	3460	16×31.5	0.015	3680						
2200	16×31.5	0.015	3680	18×35.5	0.014	3800						
3300	18×35.5	0.014	3800									

MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

LZ High ripple current, Long Life Series

Low Impedance | Long Life | Solvent Proof



- Operating temperature range of -40 ~ +105˚C
- Enabled high ripple current by a reduction of impedance at high frequency range
- High reliability withstanding 10000 hours load life at 105˚C (5000/7000 hours for as specified below)
- Complied to the RoHS directive

LK ⇨ LZ
Long life

Item	Characteristics
Operating temperature range	-40 ~ +105˚C
Leakage current max.	I = 0.01CV or 3μA whichever is greater (after 2 minutes) I = 0.03CV or 4μA whichever is greater (after 1 minute)
Capacitance tolerance	±20% (20˚C, 120Hz)
Dissipation factor max. (at 120Hz, 20˚C)	Capacitance > 1000μF : tanδ increases by 0.02 for each 1000μF from below value.

Rated Voltage(V)	6.3	10	16	25	35	50
tanδ	0.22	0.19	0.16	0.14	0.12	0.10

Low temperature characteristics (Impedance ratio at 120Hz)	Z-40˚C / Z+20˚C	Z-25˚C / Z+20˚C
	3	2

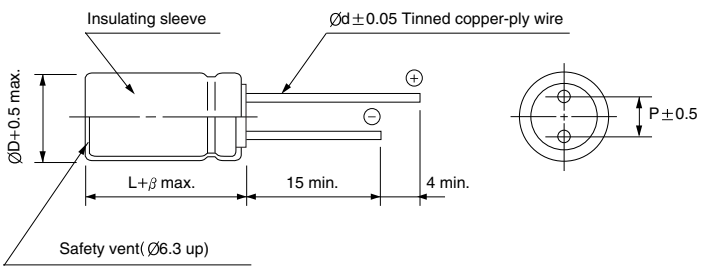
Load life (after application of the rated voltage for 10000 hours at 105˚C)		
	Leakage current	Less than specified value
	Capacitance change	Within ±25% of initial value
	tanδ	Less than 200% of specified value

ØD	ØD = 5, 6.3	ØD = 8	ØD ≥ 10
Life time	6000 hours	8000 hours	10000 hours

Shelf life (at 105˚C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value.

DRAWING

Unit : mm



ØD	5	6.3	8	10	12.5	16	18
P	2.0	2.5	3.5	5.0	5.0	7.5	7.5
Ød	0.5	0.5	0.6	0.6	0.6	0.8	0.8
β	1.5			2.0			

FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

μF \ Frequency(Hz)	120	1k	10k	100k≦
~ 33	0.32	0.60	0.80	1.00
39 ~ 270	0.40	0.63	0.82	1.00
330 ~ 680	0.45	0.67	0.84	1.00
820 ~ 1800	0.50	0.70	0.86	1.00
2200 ~ 8200	0.60	0.75	0.88	1.00

LZ series

● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV / Item / μF	6.3			10			16		
	ØD×L (mm)	Impedance (Ω)max. 20℃ 100kHz	Ripple current (mA rms) 105℃ 100kHz	ØD×L (mm)	Impedance (Ω)max. 20℃ 100kHz	Ripple current (mA rms) 105℃ 100kHz	ØD×L (mm)	Impedance (Ω)max. 20℃ 100kHz	Ripple current (mA rms) 105℃ 100kHz
47	5 × 11	0.600	300	5 × 11	0.600	300	5 × 11	0.600	300
100	5 × 11	0.600	345	5 × 11	0.600	345	6.3 × 11	0.300	345
150	6.3 × 11	0.300	345	6.3 × 11	0.300	345	6.3 × 11	0.300	540
220	6.3 × 11	0.300	345	6.3 × 11	0.300	345	8 × 11.5	0.200	540
330	6.3 × 11	0.300	540	8 × 11.5	0.200	540	8 × 11.5	0.140	945
470	8 × 11.5	0.140	540	8 × 11.5	0.140	540	10 × 12.5	0.105	945
680	10 × 12.5	0.105	945	10 × 12.5	0.105	945	8 × 20	0.105	945
							10 × 16	0.075	1250
820	10 × 12.5	0.105	945	10 × 16	0.075	945	10 × 20	0.054	1760
1000	10 × 16	0.075	1250	8 × 20	0.105	945	8 × 20	0.075	1250
				10 × 16	0.075	1250	10 × 20	0.054	1760
1200	10 × 16	0.075	1500	10 × 16	0.075	1760	10 × 20	0.054	1960
1500	10 × 20	0.054	1760	10 × 20	0.054	1760	12.5 × 20	0.050	1960
1800	10 × 20	0.054	1760	10 × 20	0.054	1760	12.5 × 20	0.050	2250
2200	12.5 × 20	0.050	1960	12.5 × 20	0.050	1960	12.5 × 25	0.040	2480
2700	12.5 × 20	0.050	2250	12.5 × 25	0.040	2250	12.5 × 25	0.040	2900
3300	12.5 × 20	0.050	2480	12.5 × 25	0.040	2480	16 × 25	0.030	3250
3900	12.5 × 25	0.040	2480	16 × 25	0.030	2480	16 × 25	0.030	3570
4700	16 × 25	0.030	3250	16 × 25	0.030	3250	16 × 31.5	0.027	3630
5600	16 × 25	0.030	3570	16 × 25	0.030	3570			
6800	16 × 25	0.030	3630	16 × 31.5	0.027	3630			
8200	16 × 31.5	0.027	3700	18 × 35.5	0.025	3700			

WV / Item / μF	25			35			50		
	ØD×L (mm)	Impedance (Ω)max. 20℃ 100kHz	Ripple current (mA rms) 105℃ 100kHz	ØD×L (mm)	Impedance (Ω)max. 20℃ 100kHz	Ripple current (mA rms) 105℃ 100kHz	ØD×L (mm)	Impedance (Ω)max. 20℃ 100kHz	Ripple current (mA rms) 105℃ 100kHz
22							5×11	1.800	240
47				6.3×11	0.300	345			
56				6.3×11	0.300	345	6.3×11	0.700	385
68	6.3×11	0.300	345	6.3×11	0.300	345			
100	6.3×11	0.300	345	8×11.5	0.250	345	8×11.5	0.300	724
120	6.3×11	0.300	345	8×11.5	0.200	345	8×11.5	0.200	950
150	8×11.5	0.250	345	8×11.5	0.160	945	10×12.5	0.120	979
180	8×11.5	0.200	345	8×11.5	0.140	945	8×20	0.120	1200
							10×12.5	0.120	1190
220	8×11.5	0.160	345	10×12.5	0.105	945	8×20	0.120	1370
							10×16	0.075	1370
270	10×12.5	0.105	945	8×15	0.120	945	10×20	0.064	1580
				10×16	0.075	1250			
330	10×12.5	0.105	945	10×16	0.075	1330	10×20	0.064	1870
390	8×15	0.105	1250	10×20	0.054	1500	10×20	0.064	2050
	10×12.5	0.105	1250						
470	10×16	0.075	1330	8×20	0.085	1430	12.5×20	0.050	2050
				10×20	0.054	1760			
560	8×20	0.054	1500	12.5×20	0.050	1960	12.5×25	0.040	2410
	10×20	0.054	1500						
680	10×20	0.054	1760	12.5×20	0.050	2250	12.5×25	0.040	2410
820	12.5×20	0.050	1960	12.5×25	0.040	2250	16×20	0.040	2730
1000	12.5×20	0.050	2250	12.5×25	0.040	2480	16×25	0.036	3010
1200	12.5×20	0.050	2480	16×20	0.040	2900			
1500	16×20	0.040	2480	16×25	0.030	3250			
1800	16×20	0.040	2900	16×25	0.030	3570			
2200	16×25	0.030	3250	16×31.5	0.027	3630			
2700	16×25	0.030	3570						
3300	16×31.5	0.027	3630						

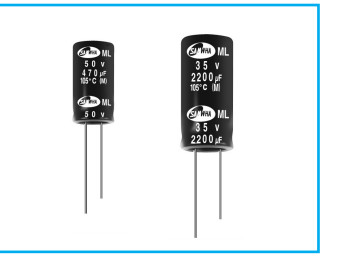
MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

NEW

ML

Ultra Low Impedance, Long Life Series

Low Impedance | Miniaturized | Solvent Proof



- Long Life compared with MZ series
- Enabled high ripple current by a reduction of impedance at high frequency
- High reliability withstanding 10000 hours load life at 105˚C
- Complied to the RoHS directive

MZ ⇨ ML
Miniature
Long life

Item	Characteristics
Operating temperature range	-40 ~ +105˚C
Leakage current max.	I = 0.01CV or 3μA whichever is greater (after 2 minutes) I = 0.03CV or 4μA whichever is greater (after 1 minute)
Capacitance tolerance	±20% at 120Hz, 20˚C
Dissipation factor max. (at 120Hz, 20˚C)	Capacitance > 1000μF : tanδ increases by 0.02 for each 1000μF from below value.

WV	6.3	10	16	25	35	50	63	100
tanδ	0.22	0.19	0.16	0.14	0.12	0.10	0.09	0.08

Low temperature characteristics (Impedance ratio at 120Hz)

Z-40˚C / Z+20˚C	Z-25˚C / Z+20˚C
3	2

Load life (after application of the rated voltage for 10000 hours at 105˚C)

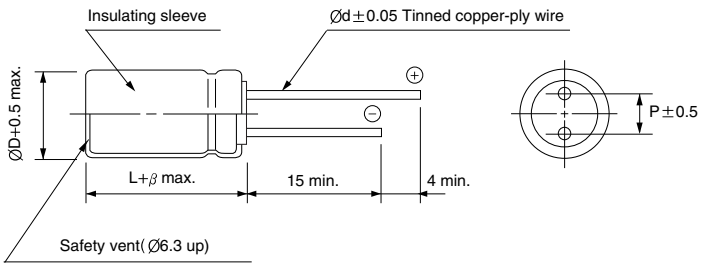
Leakage current	Less than specified value
Capacitance change	Within ±25% of initial value
tanδ	Less than 200% of specified value

ø5, 6.3 : 6000 hours, ø8 : 8000 hours

Shelf life (at 105˚C) — After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value.

DRAWING

Unit : mm



ØD	5	6.3	8	10	12.5	16	18
P	2.0	2.5	3.5	5.0	5.0	7.5	7.5
Ød	0.5	0.5	0.6	0.6	0.6	0.8	0.8
β	1.5			2.0			

FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

μF \ Frequency(Hz)	120	1k	10k	100k≦
~ 33μF	0.42	0.70	0.90	1.00
39 ~ 270μF	0.50	0.73	0.92	1.00
330 ~ 680μF	0.55	0.77	0.94	1.00
820 ~ 1800μF	0.60	0.80	0.96	1.00
2200 ~ 15000μF	0.70	0.85	0.98	1.00

ML series

● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

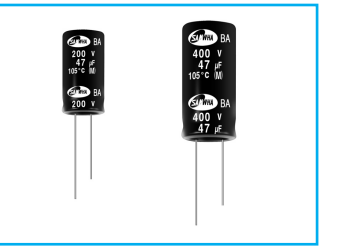
WV / Item / μF	6.3			10			16			25		
	ØD×L (mm)	Impedance (Ω)max. 20℃ 100kHz	Ripple current (mA rms) 105℃ 100kHz	ØD×L (mm)	Impedance (Ω)max. 20℃ 100kHz	Ripple current (mA rms) 105℃ 100kHz	ØD×L (mm)	Impedance (Ω)max. 20℃ 100kHz	Ripple current (mA rms) 105℃ 100kHz	ØD×L (mm)	Impedance (Ω)max. 20℃ 100kHz	Ripple current (mA rms) 105℃ 100kHz
4.7										5×11	0.35	250
10							5×11	0.35	250	5×11	0.35	250
22	5×11	0.35	250	5×11	0.35	250	5×11	0.35	250	5×11	0.35	250
33	5×11	0.35	250	5×11	0.35	250	5×11	0.35	250	5×11	0.35	250
47	5×11	0.30	250	5×11	0.30	250	5×11	0.30	250	5×11	0.30	250
100	5×11	0.30	250	5×11	0.30	250	6.3×11	0.15	405	6.3×11	0.15	405
150	6.3×11	0.15	405	6.3×11	0.15	405	6.3×11	0.15	405	8×11.5	0.072	760
220	6.3×11	0.15	405	6.3×11	0.15	405	8×11.5	0.072	760	8×11.5	0.072	760
330	6.3×11	0.15	405	8×11.5	0.072	760	8×11.5	0.072	760	10×12.5	0.053	1030
470	8×11.5	0.072	760	8×11.5	0.072	760	10×12.5	0.053	1030	10×16	0.038	1430
680	10×12.5	0.053	1030	10×12.5	0.053	1030	10×16	0.038	1430	10×20	0.027	1820
1000	10×12.5	0.053	1030	10×16	0.038	1430	10×20	0.027	1820	12.5×20	0.025	2360
1500	10×20	0.027	1820	10×20	0.027	1820	12.5×20	0.025	2360	16×20	0.015	3460
2200	12.5×20	0.025	2360	12.5×20	0.025	2360	12.5×25	0.018	2770	16×25	0.015	3460
3300	12.5×20	0.025	2360	12.5×25	0.018	2770	16×25	0.015	3460	16×31.5	0.015	3680
4700	16×25	0.015	3460	16×25	0.015	3460	16×31.5	0.015	3680	18×35.5	0.014	3800
6800	16×25	0.015	3460	16×31.5	0.015	3680	18×35.5	0.014	3800			
10000	16×31.5	0.015	3680	18×35.5	0.014	3800						
15000	18×35.5	0.014	3800									

WV / Item / μF	35			50			63			100		
	ØD×L (mm)	Impedance (Ω)max. 20℃ 100kHz	Ripple current (mA rms) 105℃ 100kHz	ØD×L (mm)	Impedance (Ω)max. 20℃ 100kHz	Ripple current (mA rms) 105℃ 100kHz	ØD×L (mm)	Impedance (Ω)max. 20℃ 100kHz	Ripple current (mA rms) 105℃ 100kHz	ØD×L (mm)	Impedance (Ω)max. 20℃ 100kHz	Ripple current (mA rms) 105℃ 100kHz
0.47				5×11	2.0	250						
1.0				5×11	2.0	250						
2.2				5×11	2.0	250				5×11	2.0	125
3.3				5×11	1.0	250	5×11	2.0	165	5×11	2.0	125
4.7	5×11	0.35	250	5×11	1.0	250	5×11	2.0	165	5×11	2.0	125
10	5×11	0.35	250	5×11	0.50	250	5×11	0.45	165	6.3×11	0.50	205
22	5×11	0.35	250	5×11	0.26	250	6.3×11	0.30	265	8×11.5	0.30	355
33	5×11	0.30	250	6.3×11	0.17	405	6.3×11	0.30	265	10×12.5	0.25	450
47	6.3×11	0.15	405	6.3×11	0.14	405	8×11.5	0.20	500	10×16	0.20	580
100	8×11.5	0.072	760	8×11.5	0.072	760	10×16	0.10	945	12.5×20	0.10	1045
150	8×11.5	0.072	760	10×12.5	0.061	1030	10×20	0.08	1100	12.5×25	0.070	1195
220	10×12.5	0.053	1030	10×16	0.038	1430	10×25	0.07	1300	16×25	0.060	1600
330	10×16	0.038	1430	10×20	0.032	1820	12.5×20	0.04	1495	16×31.5	0.040	1750
470	10×20	0.027	1820	12.5×20	0.025	2360	16×20	0.035	1990	18×40	0.030	2060
680	12.5×20	0.025	2360	12.5×25	0.020	2770	16×25	0.030	2780			
1000	12.5×25	0.018	2770	16×25	0.018	3460	16×35.5	0.020	2835			
1500	16×25	0.015	3460	16×31.5	0.015	3680						
2200	16×31.5	0.015	3680	18×35.5	0.014	3800						
3300	18×35.5	0.014	3800									

BA For Ballast, Smaller Case Size Series

· 105˚C 2000 hours
· Smaller case size for energy saving lamp & ballast
· Complied to the RoHS directive

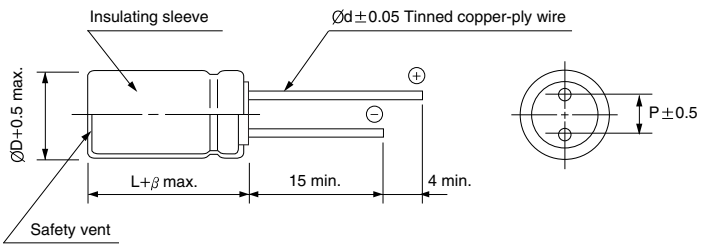
BA → RH
High reliability



Item	Characteristics
Operating temperature range	-40 ~ +105˚C (160~250V), -25 ~ +105˚C (350~450V)
Leakage current max.	I = 0.03CV + 15μA (CV≦1000) I = 0.02CV + 25μA (after 5 minutes)
Capacitance tolerance	±20% at 120Hz, 20˚C
Dissipation factor max. (at 120Hz, 20˚C)	WV: 160 / 200 / 250 / 350 / 400 / 450 tanδ: 0.10 / 0.10 / 0.10 / 0.15 / 0.15 / 0.15
Low temperature characteristics (Impedance ratio at 120Hz)	WV: 160 / 200 / 250 / 350 / 400 / 450 Z-25˚C/Z+20˚C: 3 / 3 / 3 / 4 / 6 / 6 Z-40˚C/Z+20˚C: 4 / 4 / 4 / - / - / -
Load life	After an application of DC bias voltage plus the rated AC ripple current for 2000 hours at 105˚C. The measurement shall meet the following limits. Leakage current: Less than specified value Capacitance change: Within ±20% of initial value tanδ: Less than 200% of specified value
Shelf life (at 105˚C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed after exposure for 24 hours at room temperature after application of DC rated voltage to the capacitors for 30 minutes.

DRAWING

Unit : mm



ØD	8	10	12.5	16	18
P	3.5	5.0	5.0	7.5	7.5
Ød	0.6	0.6	0.6	0.8	0.8
β	1.5	2.0			

DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

μF \ WV	160		200		250		350		400		450	
1.0									8 × 11.5	27	10 × 12.5	27
2.2							10 × 12.5	37	10 × 12.5	43	10 × 12.5	33
3.3					10 × 12.5	44	10 × 12.5	53	10 × 16	58	10 × 16	51
4.7			8 × 11.5	53	10 × 12.5	53	10 × 16	64	10 × 16	66	10 × 20	66
10	10 × 12.5	77	10 × 12.5	86	10 × 16	88	10 × 20	110	10 × 20	125	12.5 × 20	101
22	10 × 16	140	10 × 16	140	10 × 20	168	12.5 × 20	175	12.5 × 25	196	16 × 25	168
33	10 × 20	206	10 × 20	206	12.5 × 20	223	16 × 20	240	16 × 25	260	18 × 25	228
47	10 × 20	266	12.5 × 20	266	12.5 × 25	297	16 × 25	311	18 × 25	317		
100	12.5 × 25	420	16 × 25	460	18 × 25	470	← Ripple current (mA rms) at 105˚C, 120Hz					
220	18 × 25	500			↑ Case size ØD×L (mm)							

FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

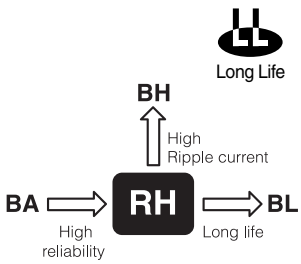
Frequency(Hz) / μF	60	120	300	1k	10k	100k≦
~ 47	0.75	1.0	1.35	1.55	2.0	2.0
68 ~	0.80	1.0	1.25	1.34	1.5	1.5

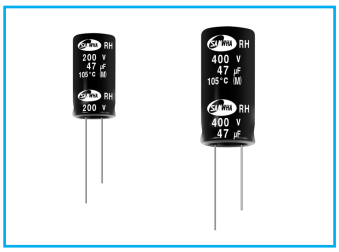
Upgrade

RH

High Ripple Current, High Reliability Series

- High ripple current
- High reliability withstanding 5000 hours load life at 105˚C
- Suited for ballast application
- Complied to the RoHS directive

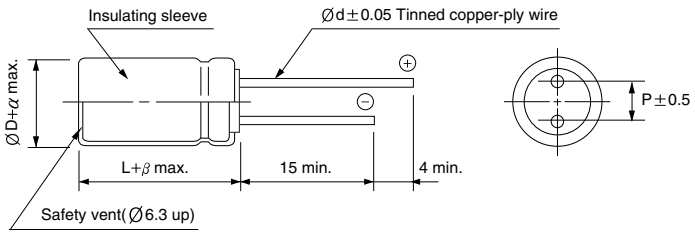




Item	Characteristics
Operating temperature range	WV: 160 ~ 250 / 350 ~ 450; Temperature range: -40 ~ +105˚C / -25 ~ +105˚C
Leakage current max.	I = 0.02CV + 15μA (after 5 minutes)
Capacitance tolerance	±20% at 120Hz, 20˚C
Dissipation factor max. (at 120Hz, 20˚C)	WV: 160 / 200 / 250 / 350 / 400 / 450; tanδ: 0.15 / 0.15 / 0.15 / 0.20 / 0.24 / 0.24
Low temperature characteristics (Impedance ratio at 120Hz)	WV: 160 / 200 / 250 / 350 / 400 / 450; Z-25˚C/Z+20˚C: 3 / 3 / 3 / 4 / 6 / 6; Z-40˚C/Z+20˚C: 4 / 4 / 4 / - / - / -
Load life	After an application of DC bias voltage plus the rated AC ripple current for 5000 hours at 105˚C. The measurement shall meet the following limits. Leakage current: Less than specified value; Capacitance change: Within ±20% of initial value; tanδ: Less than 200% of specified value
Shelf life (at 105˚C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value.

DRAWING

Unit : mm



ØD	10	12.5	16	18	20
P	5.0	5.0	7.5	7.5	10.0
Ød	0.6	0.6	0.8	0.8	0.8
α	0.5				1.0
β	2.0				

DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

μF \ WV	160		200		250		350		400		450	
1.0							10 × 12.5	80	10 × 12.5	90		
2.2							10 × 12.5	90	10 × 12.5	100	10 × 16	120
									10 × 16	120		
3.3							10 × 12.5	100	10 × 16	140	10 × 16	140
							10 × 16	130				
4.7							10 × 16	200	10 × 16	180	10 × 20	180
6.8			10 × 12.5	120	10 × 12.5	120	10 × 16	200	10 × 16	200	10 × 20	200
10	10 × 16	250	10 × 16	300	10 × 20	300	10 × 20	280	10 × 20	280	12.5 × 20	300
22	10 × 16	360	10 × 16	360	12.5 × 20	600	12.5 × 20	350	12.5 × 25	430	16 × 25	550
	10 × 20	500	10 × 20	500								
33	10 × 20	500	12.5 × 20	600	12.5 × 20	600	16 × 20	500	16 × 25	640	16 × 31.5	700
47	12.5 × 20	600	12.5 × 20	660	12.5 × 25	720	16 × 25	660	16 × 31.5	750	16 × 31.5	700
68	12.5 × 25	600	12.5 × 25	760	16 × 25	920	16 × 31.5	800	16 × 31.5	880	18 × 31.5	1000
82	16 × 20	760	16 × 20	880	16 × 25	1120	18 × 31.5	920	16 × 35.5	1000	18 × 35.5	1100
100	16 × 25	1100	16 × 25	1120	16 × 31.5	1200	18 × 31.5	1020	18 × 35.5	1120	18 × 35.5	1250
120	16 × 25	1180	16 × 31.5	1200	18 × 25	1200	18 × 35.5	1150	18 × 40	1250	18 × 40	1400
150	16 × 31.5	1300	16 × 31.5	1300	18 × 31.5	1250	18 × 40	1250	20 × 41	1380	20 × 41	1550

FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

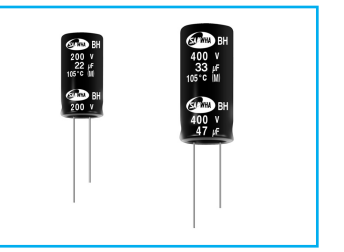
μF \ Frequency(Hz)	50(60)	120	300	1k	10k	100k≦
1.0 ~ 4.7	0.25	0.3	0.45	0.6	0.8	1.0
6.8 ~ 10	0.3	0.4	0.5	0.7	0.9	1.0
22 ~ 150	0.4	0.5	0.7	0.8	0.9	1.0

MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

BH For Ballast, High Ripple Current Series

Long Life

RH ⇨ BH
High Ripple

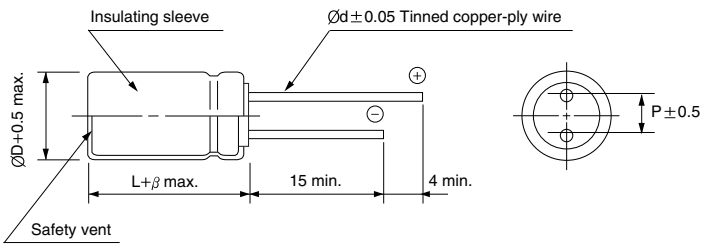


- Higher ripple current compared with RH series
- Operating tempersture range of -25~105˚C
- High reliability withstanding 5000 hours load life at 105˚C
- Complied to the RoHS directive

Item	Characteristics
Operating temperature range	-25 ~ +105˚C
Leakage current max.	I = 0.04CV + 100μA(after 1 minute) I = 0.02CV + 25μA(after 5 minutes)
Capacitance tolerance	±20% at 120Hz, 20˚C
Dissipation factor max. (at 120Hz, 20˚C)	WV: 200 / 250 / 350 / 400 tanδ: 0.15 / 0.15 / 0.20 / 0.24
Low temperature characteristics (Impedance ratio at 120Hz)	WV: 200 / 250 / 350 / 400 Z-25˚C/Z+20˚C: 3 / 3 / 6 / 6
Load life	After an application of DC bias voltage plus the rated AC ripple current for 5000 hours at 105˚C. The measurement shall meet the following limits. Leakage current: Less than specified value Capacitance change: Within ±20% of initial value tanδ: Less than 200% of specified value
Shelf life (at 105˚C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed after exposure for 24hours at room temperature after application of DC rated voltage to the capacitors for 30 minutes.

DRAWING

Unit : mm



ØD	8	10	12.5	16	18
P	3.5	5.0	5.0	7.5	7.5
Ød	0.6	0.6	0.6	0.8	0.8
β	1.5	2.0			

DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

μF \ WV	200		250		350		400	
2.2							10 × 16	160
3.3					10 × 16	190	10 × 16	180
4.7					10 × 16	220	10 × 16	220
6.8					10 × 16	280	10 × 16	280
8.2					8 × 20	300	8 × 20	300
					10 × 16	300	10 × 20	320
10	10 × 16	320	10 × 16	320	8 × 20	300	8 × 23	350
					10 × 20	350	10 × 20	350
22	8 × 20	300	8 × 23	350	12.5 × 25	680	12.5 × 25	780
	10 × 20	550	10 × 20	550				
33	12.5 × 20	700	12.5 × 20	800	16 × 25	910	16 × 25	920
47	12.5 × 20	980	12.5 × 20	1040	18 × 20	1150		
68	12.5 × 25	1300	16 × 25	1350	← Ripple current (mA rms) at 105˚C, 100kHz			
100	16 × 25	1630	↑ Case size ØD×L (mm)					

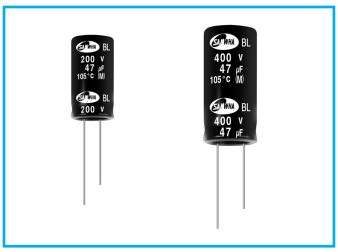
FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

μF \ Frequency(Hz)	50(60)	120	300	1k	10k	100k≦
2.2 ~ 4.7	0.3	0.4	0.5	0.6	0.8	1.0
6.8 ~ 10	0.35	0.4	0.5	0.7	0.9	1.0
22 ~ 100	0.4	0.5	0.7	0.8	0.9	1.0

BL For Ballast, High Ripple Current, Long Life Series

Long Life

RH ⇨ BL
Long life

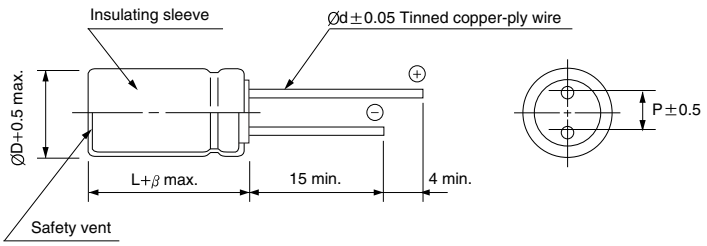


- High ripple current
- Operating temperature range of -25 ~ 105˚C
- For ballast and adapter, power supply
- Complied to the RoHS directive

Item	Characteristics
Operating temperature range	-25 ~ +105˚C
Leakage current max.	I = 0.02CV + 25μA (after 5 minutes)
Capacitance tolerance	±20% at 120Hz, 20˚C
Dissipation factor max. (at 120Hz, 20˚C)	WV: 160 / 200 / 250 / 350 / 400 / 450 tanδ: 0.15 / 0.15 / 0.15 / 0.20 / 0.20 / 0.20
Low temperature characteristics (Impedance ratio at 120Hz)	WV: 160 / 200 / 250 / 350 / 400 / 450 Z-25˚C/Z+20˚C: 3 / 3 / 3 / 4 / 6 / 6
Load life	After an application of DC bias voltage plus the rated AC ripple current for 10000 hours at 105˚C. The measurement shall meet the following limits. Leakage current: Less than specified value Capacitance change: Within ±20% of initial value tanδ: Less than 200% of specified value
Shelf life (at 105˚C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed after exposure for 24 hours at room temperature after application of DC rated voltage to the capacitors for 30 minutes.

DRAWING

Unit : mm



ØD	10	12.5	16	18
P	5.0	5.0	7.5	7.5
Ød	0.6	0.6	0.8	0.8
β	2.0			

DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

μF \ WV	160		200		250		350		400		450	
6.8							10 × 16	220	10 × 16	220	10 × 16	150
10	10 × 16	250	10 × 16	250	10 × 20	280	10 × 20	280	10 × 20	280	12.5 × 20	320
22	10 × 20	500	10 × 20	500	12.5 × 20	600	12.5 × 20	350	12.5 × 25	430	16 × 25	560
33	10 × 20	500	12.5 × 20	600	12.5 × 20	600	16 × 20	500	16 × 25	640	18 × 25	700
47	12.5 × 20	660	12.5 × 20	660	12.5 × 25	720	16 × 25	660	18 × 25	840	18 × 31.5	880
68	12.5 × 25	760	12.5 × 25	760	16 × 25	920	18 × 25	840				
100	16 × 25	1120	16 × 25	1120	18 × 25	1200						
150	18 × 25	1360	18 × 25	1360								

Ripple current (mA rms) at 105˚C, 100kHz
Case size ØD×L (mm)

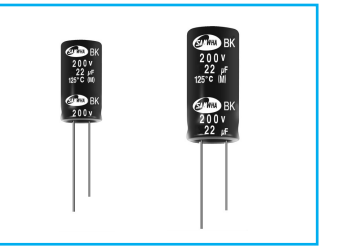
FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

Frequency(Hz)	60	120	300	1k	10k	100k≦
Coefficient	0.35	0.5	0.6	0.8	0.9	1.0

BK For Ballast, High Temperature Series

Long Life

RH ⟹ BK
High Temp

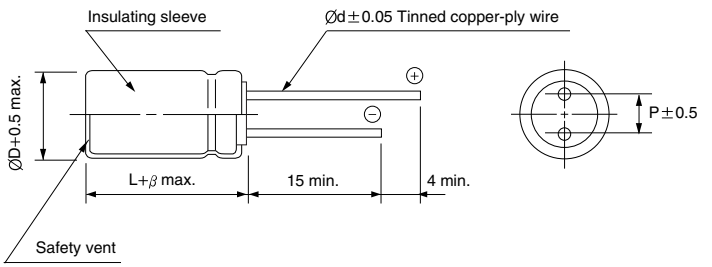


· High reliability withstanding 5,000 Hours load life at 125˚C
· Suitable for compact energy saving lamp
· Complied to the RoHS directive

Item	Characteristics
Operating temperature range	-25 ~ +125˚C
Leakage current max.	I = 0.03CV+15μA (CV≦1000), I = 0.02CV+25μA (CV〉1000) (after 5 minutes)
Capacitance tolerance	±20% (20˚C, 120Hz)
Dissipation factor max. (at 120Hz, 20˚C)	Rated Voltage(V): 160 / 200 / 250 / 350 / 400 tanδ: 0.15 / 0.15 / 0.15 / 0.20 / 0.24
Low temperature characteristics (Impedance ratio at 120Hz)	WV: 160 / 200 / 250 / 350 ~ 400 Z-25˚C/Z+20˚C: 3 / 3 / 3 / 6
Load life (after application of the rated voltage for 5000 hours at 125˚C)	Leakage current: Less than specified value Capacitance change: Within ±20% of initial value tanδ: Less than 200% of specified value After an application of DC bias voltage plus the AC ripple current for 5,000hours at 125˚C
Shelf life (at 125˚C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value.

DRAWING

Unit : mm



ØD	10	12.5
P	5.0	0.5
Ød	0.6	0.6
β	2.0	

DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

μF \ WV	160		200		250		350		400	
2.2							10 × 12.5	90	10 × 12.5	90
3.3					10 × 12.5	90	10 × 16	120	10 × 16	100
4.7	10 × 12.5	90	10 × 12.5	100	10 × 12.5	100	10 × 16	130	10 × 20	170
					10 × 16	120	10 × 20	170		
10	10 × 12.5	110	10 × 12.5	130	10 × 16	140	12.5 × 20	250	12.5 × 20	250
	10 × 16	140	10 × 16	160	10 × 20	170				
22	10 × 20	280	10 × 20	280	12.5 × 20	300				
33	12.5 × 20	400	12.5 × 20	400	12.5 × 25	450				
47	12.5 × 25	520	12.5 × 25	520						

← Ripple current (mA rms) at 125˚C, 100kHz
Case size ØD×L (mm)

FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

Frequency(Hz)	60	120	300	1k	10k	100k≦
Coefficient	0.3	0.4	0.6	0.7	0.9	1.0

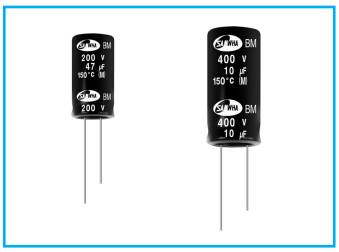
BM

For Ballast, 2,000 hours at 150˚C Series

- High reliability withstanding 2000 hours load life at 150˚C
- Suitable for compact energy saving lamp
- Complied to the RoHS directive

BK ⇨ BM

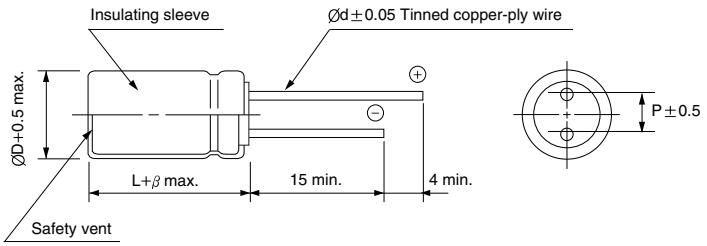
Hihg Temp.



Item	Characteristics
Operating temperature range	-25 ~ +150˚C
Leakage current max.	I = 0.03CV or 4μA (after 5 minutes)
Capacitance tolerance	±20% at 120Hz, 20˚C
Dissipation factor max. (at 120Hz, 20˚C)	Rated Voltage(V): 160 / 200 / 350 / 400 — tanδ: 0.20 / 0.20 / 0.24 / 0.24
Low temperature characteristics (Impedance ratio at 120Hz)	WV: 160 / 200 / 350 / 400 — Z-25˚C/Z+20˚C: 3 / 3 / 6 / 6
Load life (after application of the rated voltage for 2000 hours at 150˚C)	Leakage current: Less than specified value; Capacitance change: Within ±20% of initial value; tanδ: Less than 200% of specified value. After an application of DC bias voltage plus the rated AC ripple current for 2000 hours at 150˚C.
Shelf life (at 150˚C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value.

DRAWING

Unit : mm



ØD	10	12.5
P	5.0	5.0
Ød	0.6	0.6
β	2.0	

DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

μF \ WV	160		200		350		400	
2.2					10 × 12.5	36	10 × 16	42
3.3					10 × 12.5	48	10 × 16	50
4.7					10 × 16	77	10 × 20	83
5.6					10 × 20	100	12.5 × 20	97
10	10 × 12.5	110	10 × 16	83	12.5 × 25	120	12.5 × 25	105
22	10 × 20	160	10 × 20	170				
33	12.5 × 20	230	12.5 × 20	210				
47	12.5 × 25	250	12.5 × 25	240				

Case size ØD×L (mm)

Ripple current (mA rms) at 150˚C, 120Hz

FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

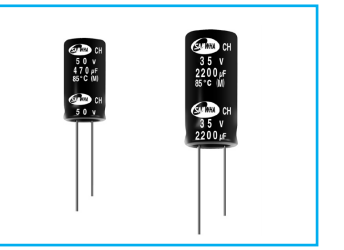
Frequency(Hz)	60	120	300	1k	10k	100k≦
Coefficient	0.75	1.00	1.25	1.50	1.75	1.80

MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

CH

For Charger and Adapter Series

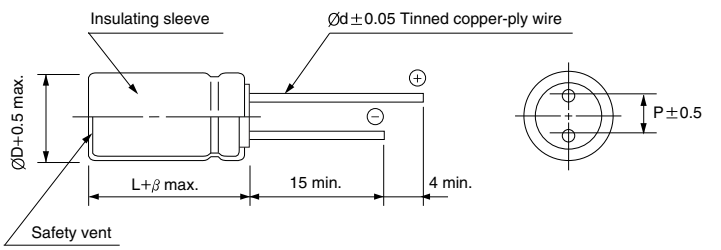
- Load life of 2000 hours at 85˚C
- Voltage range 400 ~ 450V
- Complied to the RoHS directive



Item	Characteristics
Operating temperature range	-25 ~ +85˚C
Leakage current max.	I = 0.02CV + 15μA (after 5 minutes)
Capacitance tolerance	±20% at 120Hz, 20˚C
Dissipation factor max.	0.2max. at 120Hz, 20˚C
Surge test (1.5kVDC: 5th interval 5 sec)	Appearance: Normal Leakage current: Less than specified value Capacitance change: Within initial value tanδ: Less than specified value
Load life (after application of the rated voltage for 2000 hours at 85˚C)	Leakage current: Less than specified value Capacitance change: Within ±20% of initial value tanδ: Less than 200% of specified value
Shelf life (at 85˚C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value.

DRAWING

Unit : mm



ØD	8	10	12.5	16	18
P	3.5	5.0	5.0	7.5	7.5
Ød	0.6	0.6	0.8	0.8	0.8
β	1.5	2.0	2.0	2.0	2.0

* Note : Other case sizes, rated voltage or capacitance are available upon request.
Please check with us about individual size and dimensions.

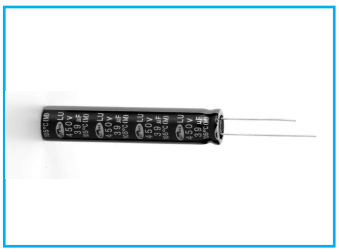
Upgrade

LU

For Slim PSU, 2,000 hours at 105˚C Series

- High reliability withstanding 2,000 hours load life at 105˚C
- Suitable for Slim application
- Complied to the RoHS directive

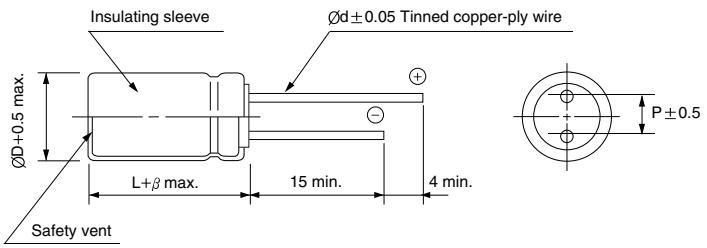
LU ⇨ LB
Long Life



Item	Characteristics			
Operating temperature range	-40 ~ +105˚C(250V), -25 ~ +105˚C(350~)			
Leakage current max.	I = 0.02CV +15μA (after 5 minutes)			
Capacitance tolerance	±20% at 120Hz, 20˚C			
Dissipation factor max. (at 120Hz, 20˚C)	Rated Voltage(V)	250	350	450
	tanδ	0.15	0.20	0.20
Low temperature characteristics (Impedance ratio at 120Hz)	WV	250	350	450
	Z(-25˚C)/Z(+20˚C)	3	8	8
	Z(-40˚C)/Z(+20˚C)	4	-	-
Load life (after application of the rated voltage for 2,000 hours at 105˚C)	Leakage current	Less than specified value		
	Capacitance change	Within ±20% of initial value		
	tanδ	Less than 200% of specified value		
Shelf life (at 105˚C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value.			

DRAWING

Unit : mm



ØD	8	10	12.5
P	3.5	5.0	5.0
Ød	0.6	0.6	0.6
β	1.5	2.0	

DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

μF \ WV	250		350		450	
16			8 × 40	145	8 × 40	165
21	8 × 40	150	8 × 45	180	8 × 50	210
39	8 × 45	215	10 × 40	305	10 × 50	375
47	8 × 50	250	10 × 45	350	10 × 50	410
56	10 × 40	395	10 × 50	405	12.5 × 40	520
68	10 × 40	435	12.5 × 40	495	12.5 × 50	635
82	10 × 45	505	12.5 × 45	570	12.5 × 50	700
100	10 × 50	585	12.5 × 50	660	12.5 × 60	720
150	12.5 × 50	765				

Ripple current (mA rms) at 105˚C, 120Hz
Case size ØD×L (mm)

* Note : If you want to use the other capacitance & working voltage types in your circuit. Please consult our technical department.

FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

Frequency(Hz)	60	120	300	1k	10k	100k≦
Coefficient	0.75	1.00	1.25	1.35	1.50	1.50

MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

Upgrade

LB

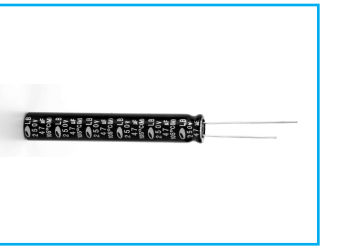
For Slim PSU, 10,000 hours at 105˚C Series

Long Life

- High reliability withstanding 10,000 hours load life at 105˚C (WV › 350V : reliability withstanding 5,000 hours load life at 105˚C)
- Suitable for slim application
- Complied to the RoHS directive

LU ⇨ LB

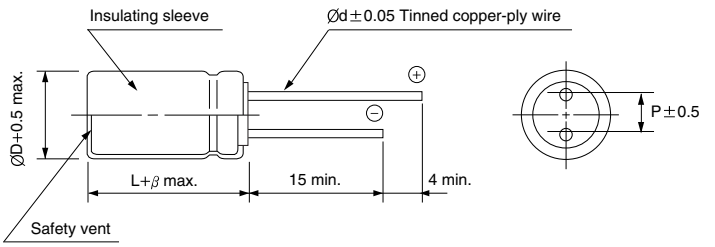
Long Life



Item	Characteristics
Operating temperature range	-40 ~ +105˚C(250V), -25 ~ +105˚C(350~)
Leakage current max.	I = 0.02CV +15μA (after 5 minutes)
Capacitance tolerance	±20% at 120Hz, 20˚C
Dissipation factor max. (at 120Hz, 20˚C)	Rated Voltage(V) 250 350 450 tanδ 0.15 0.20 0.20
Low temperature characteristics (Impedance ratio at 120Hz)	WV 250 350 450 Z-25˚C/Z+20˚C 3 8 8 Z-40˚C/Z+20˚C 4 - -
Load life (after application of the rated voltage for 10,000 hours at 105˚C)	Leakage current: Less than specified value Capacitance change: Within ±20% of initial value tanδ: Less than 200% of specified value Life time: ØD = 8: 5000 hours; ØD ≥ 10: 10000 hours WV = 250: 5000 hours; 10000 hours WV ≥ 350: 5000 hours
Shelf life (at 105˚C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value.

DRAWING

Unit : mm



ØD	8	10	12.5
P	3.5	5.0	5.0
Ød	0.6	0.6	0.6
β	1.5	2.0	

DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

μF \ WV	250		350		450	
16			8 × 40	145	8 × 40	165
21	8 × 40	150	8 × 45	180	8 × 50	210
39	8 × 45	215	10 × 40	305	10 × 50	375
47	8 × 50	250	10 × 45	350	10 × 50	410
56	10 × 40	395	10 × 50	405	12.5 × 40	520
68	10 × 40	435	12.5 × 40	495	12.5 × 50	635
82	10 × 45	505	12.5 × 45	570	12.5 × 50	700
100	10 × 50	585	12.5 × 50	660	12.5 × 60	720
150	12.5 × 50	765				

Ripple current (mA rms) at 105˚C, 120Hz
Case size ØD×L (mm)

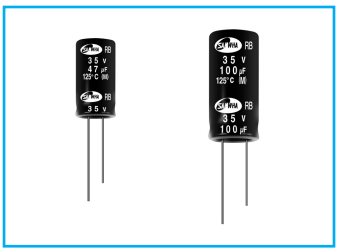
FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

Frequency(Hz)	60	120	300	1k	10k	100k≦
Coefficient	0.75	1.00	1.25	1.35	1.50	1.50

RB High Temperature, For 125°C Use Series

Solvent Proof
WV≦100V

RB ⇨ VA
Hihg Temp.



- Load life of 2000 hours at 125°C
- Low impedance at high frequency
- For Electronic Control Unit and other high temperature applications
- Complied to the RoHS directive

Item	Characteristics
Operating temperature range	WV≦50: -55 ~ +125°C, WV≧63: -40 ~ 125°C
Leakage current max.	WV≦50: I = 0.01CV or 3μA whichever is greater (after 2 minutes) WV≧63: 0.03CV +10μA(after 5 min.)
Capacitance tolerance	±20% at 120Hz, 20°C
Dissipation factor max. (at 120Hz, 20°C)	When the capacitance exceeds 1000μF, 0.02 for each 1000μF increase.

Rated Votage(V)	6.3	10	16	25	35	50	63 ~ 100	160 ~ 250
tanδ	0.22	0.19	0.16	0.14	0.12	0.10	0.08	0.15

Low temperature characteristics (Impedance ratio at 120Hz)

WV	6.3 ~10	16 ~ 250
Z-25°C/Z+20°C	3	2
Z-40°C/Z+20°C	5	4

Load life (after application of the rated voltage for 2000 hours at 125°C)

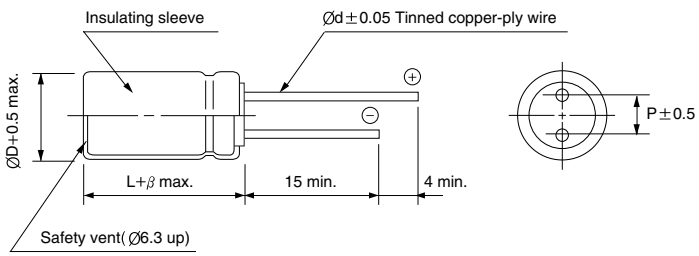
Leakage current	Less than specified value
Capacitance change	Within ±20% of initial value
tanδ	Less than 300% of specified value

Ø5, 6.3 and WV≧100 products are for 1000 hours

Shelf life (at 125°C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value.

DRAWING

Unit : mm



ØD	5	6.3	8	10	12.5	16	18
P	2.0	2.5	3.5	5.0	5.0	7.5	7.5
Ød	0.5	0.5	0.6	0.6	0.6	0.8	0.8
β	1.5			2.0			

FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

WV	Frequency / μF	50Hz	120Hz	300Hz	1kHz	10kHz≦
6.3~100	~ 47	0.75	1.00	1.35	1.55	2.00
	68 ~ 680	0.80	1.00	1.25	1.35	1.50
	1000 ~	0.85	1.00	1.10	1.15	1.15
160~500	0.47 ~ 220	0.80	1.00	1.25	1.40	1.60
	330 ~	0.90	1.00	1.10	1.13	1.15

RB series

● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV / Item / μF	6.3			10			16		
	ØD×L (mm)	Impedance (Ω)max. 20˚C 100kHz	Ripple current (mA rms) 125˚C 100kHz	ØD×L (mm)	Impedance (Ω)max. 20˚C 100kHz	Ripple current (mA rms) 125˚C 100kHz	ØD×L (mm)	Impedance (Ω)max. 20˚C 100kHz	Ripple current (mA rms) 125˚C 100kHz
33									
47							5×11	1.0	124
68				5×11	1.0	124	6.3×11	0.65	176
100	5×11	1.1	120	6.3×11	0.71	168	6.3×11	0.45	212
150	6.3×11	0.64	180	6.3×11	0.45	212	8×11.5	0.30	310
220	6.3×11	0.39	228	8×11.5	0.31	310	8×11.5	0.21	368
330	8×11.5	0.26	234	8×11.5	0.21	368	10×12.5	0.16	500
470	10×12.5	0.18	460	10×12.5	0.17	480	10×16	0.12	616
680	10×16	0.14	560	10×16	0.12	616	10×20	0.085	816
1000	10×20	0.097	760	10×20	0.078	848	12.5×20	0.061	1129
1500	10×25	0.071	976	12.5×20	0.059	1134	12.5×25	0.047	1328
2200	12.5×20	0.056	1150	12.5×25	0.044	1368	16×20	0.043	1440
3300	12.5×25	0.044	1368	16×20	0.040	1480	16×25	0.035	1676
4700	16×25	0.042	1548	16×31.5	0.030	1936	16×35.5	0.026	2144
6800	16×31.5	0.031	1896	16×35.5	0.026	2144	18×35.5	0.023	2320
10000	16×40	0.026	2200	18×40	0.022	2432			
15000	18×40	0.023	2368						

WV / Item / μF	25			35			50		
	ØD×L (mm)	Impedance (Ω)max. 20˚C 100kHz	Ripple current (mA rms) 125˚C 100kHz	ØD×L (mm)	Impedance (Ω)max. 20˚C 100kHz	Ripple current (mA rms) 125˚C 100kHz	ØD×L (mm)	Impedance (Ω)max. 20˚C 100kHz	Ripple current (mA rms) 125˚C 100kHz
1.0							5×11	5.2	29
1.5							5×11	4.9	36
2.2							5×11	4.5	43
3.3							5×11	3.9	53
4.7							5×11	2.9	65
6.8							5×11	2.3	73
10							5×11	1.8	92
15							5×11	1.2	116
22				5×11	0.97	128	6.3×11	0.84	156
33	5×11	1.0	124	6.3×11	0.64	180	6.3×11	0.56	192
47	6.3×11	0.72	168	6.3×11	0.44	216	8×11.5	0.39	275
68	6.3×11	0.47	208	8×11.5	0.31	307	8×11.5	0.26	328
100	8×11.5	0.31	306	8×11.5	0.21	368	10×16	0.21	465
150	8×11.5	0.21	368	10×12.5	0.16	500	10×20	0.13	656
220	10×12.5	0.17	480	10×16	0.12	616	10×25	0.098	832
330	10×16	0.12	600	10×20	0.078	848	12.5×20	0.072	1025
470	10×20	0.084	816	12.5×20	0.060	1121	12.5×25	0.057	1200
680	12.5×20	0.060	1114	12.5×25	0.047	1328	16×20	0.052	1304
1000	12.5×25	0.047	1328	16×20	0.044	1416	16×31.5	0.039	1696
1500	16×20	0.044	1416	16×31.5	0.036	1908	16×40	0.034	1928
2200	16×25	0.036	1641	16×35.5	0.026	2144	18×40	0.031	2048
3300	16×35.5	0.026	2144	18×40	0.022	2432			
4700	18×40	0.023	2368						

RB series

● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV / Item / μF	63		100		160	
	ØD×L (mm)	Ripple current (mA rms) 125℃ 100kHz	ØD×L (mm)	Ripple current (mA rms) 125℃ 100kHz	ØD×L (mm)	Ripple current (mA rms) 125℃ 100kHz
0.47	8×11.5	13	8×11.5	13	10×12.5	10
1.0	8×11.5	19	8×11.5	19	10×12.5	15
2.0	8×11.5	28	10×12.5	33	10×16	24
3.3	8×11.5	34	10×16	44	10×16	32
4.7	8×11.5	41	10×16	52	10×20	38
10	8×11.5	60	10×20	83	12.5×20	66
22	10×16	113	12.5×25	157	16×25	118
33	10×20	151	16×25	214	16×31.5	158
47	12.5×20	211	16×31.5	279		
100	12.5×25	336				

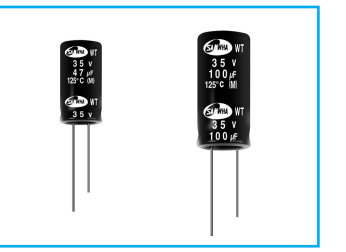
WV / Item / μF	200		250	
	ØD×L (mm)	Ripple current (mA rms) 125℃ 100kHz	ØD×L (mm)	Ripple current (mA rms) 125℃ 100kHz
0.47	10×12.5	10	10×12.5	10
1.0	10×12.5	15	10×12.5	14
2.0	10×16	24	10×16	24
3.3	10×20	32	10×20	32
4.7	10×20	38	12.5×20	45
10	12.5×20	72	16×25	79
22	16×31.5	129		

MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

WT High Temperature, For 125˚C Use Long Life Series

Low Impedance　Solvent Proof

RB ⇨ WT
Long life
Low Imp.

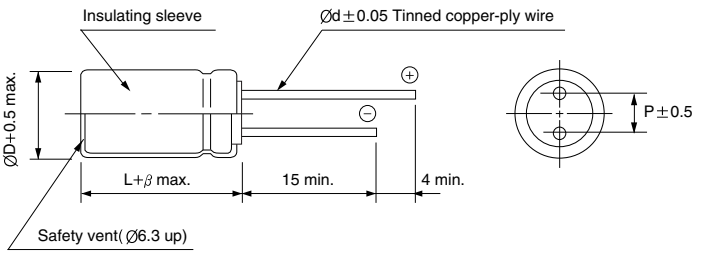


- Load life of 5000 hours at 125˚C
- Low impedance at high frequency
- For electronic control unit and other high temperature applications
- Complied to the RoHS directive

Item	Characteristics
Operating temperature range	-40 ~ +125˚C
Leakage Current max.	I = 0.03CV or 3μA whichever is greater (after 2 minutes)
Capacitance Tolerance	±20% at 120Hz, 20˚C
Dissipation Factor max. (at 120Hz, 20˚C)	WV: 6.3 / 10 / 16 / 25 / 35 tanδ: 0.22 / 0.20 / 0.16 / 0.14 / 0.12 When nominal capacitance is over 1000μF, tanδ shall be added 0.02 to the listed value with increase of every 1000μF.
Low temperature characteristics (Impedance ratio at 120Hz)	WV: 6.3 / 10 / 16 / 25 / 35 Z-25˚C/Z+20˚C: 3 / 3 / 2 / 2 / 2 Z-40˚C/Z+20˚C: 6 / 6 / 4 / 3 / 3
Load life (after application of the rated voltage for 5000 hours at 125˚C)	Capacitance change: Within ±30% of initial value tanδ: Less than 300% of the specified value Leakage current: Less than specified value ØD≦6.3 : 1000 hours, ØD=8: 2000 hours, ØD=10: 3000 hours, ØD =12.5: 5000 hours
Shelf life (at 125˚C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value.

DRAWING

Unit : mm



ØD	5	6.3	8	10	12.5
P	2.0	2.5	3.5	5.0	5.0
Ød	0.5	0.5	0.6	0.6	0.6
β	1.5			2.0	

FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

μF \ Frequency(Hz)	120	1k	10k	100k≦
~ 33	0.20	0.50	0.80	1.00
47 ~ 100	0.25	0.60	0.90	1.00
150 ~ 220	0.35	0.70	0.92	1.00
330 ~ 680	0.45	0.75	0.95	1.00
1000 ~ 1500	0.50	0.80	0.96	1.00
2200 ~	0.55	0.85	0.98	1.00

WT series

● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

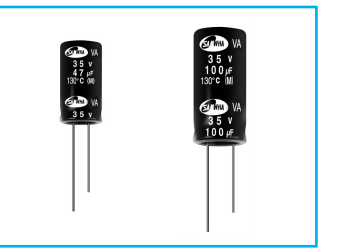
WV / Item / μF	6.3			10			16		
	ØD×L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 125°C 100kHz	ØD×L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 125°C 100kHz	ØD×L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 125°C 100kHz
68				5×11	0.800	250	5×11	0.800	250
100	5×11	0.800	250	6.3×11	0.340	405	6.3×11	0.340	405
150	6.3×11	0.340	405	6.3×11	0.340	405	6.3×11	0.340	405
220	6.3×11	0.340	405	8×11.5	0.188	760	8×11.5	0.188	760
330	8×11.5	0.188	760	8×11.5	0.188	760	10×12.5	0.138	1030
470	10×12.5	0.138	1030	10×12.5	0.138	1030	10×16	0.100	1430
680	10×16	0.100	1430	10×16	0.100	1430	10×20	0.060	1500
1000	10×20	0.060	1500	10×20	0.060	1500	12.5×20	0.056	1720
1500	10×25	0.058	1620	12.5×20	0.056	1720	12.5×25	0.048	1900
2200	12.5×20	0.056	1720	12.5×25	0.048	1900			
3300	12.5×25	0.048	1900						

WV / Item / μF	25			35		
	ØD×L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 125°C 100kHz	ØD×L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 125°C 100kHz
22				5×11	0.800	250
33				6.3×11	0.340	405
47	5×11	0.800	250	6.3×11	0.340	405
68	6.3×11	0.340	405	8×11.5	0.188	760
100	6.3×11	0.340	405	8×11.5	0.188	760
150	8×11.5	0.188	760	10×12.5	0.138	1030
220	10×12.5	0.138	1030	10×16	0.100	1430
330	10×16	0.100	1430	10×25	0.058	1620
470	10×20	0.060	1500	12.5×20	0.056	1720
680	12.5×20	0.056	1720	12.5×25	0.048	1900
1000	12.5×25	0.048	1900			

MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

VA 130˚C, Long Life, Low Impedance Series

Low Impedance | Long Life | Solvent Proof



- Load life of 4000 hours at 130˚C
- Low impedance at high frequency
- For Electronic Control Unit and other high temperature applications
- Complied to the RoHS directive

RB ⇨ VA
Hihg Temp.
Low Imp.

Item	Characteristics
Operating temperature range	-40 ~ +130˚C
Leakage current max.	I = 0.01CV or 3μA whichever is greater (after 2 minutes)
Capacitance tolerance	±20% at 120Hz, 20˚C
Dissipation factor max. (at 120Hz, 20˚C)	When the capacitance exceeds 1000μF, 0.02 for each 1000μF increase.

Rated Voltage(V)	10	16	25	35
tanδ	0.20	0.16	0.14	0.12

Low temperature characteristics (Impedance ratio at 120Hz)

WV	10	16	25	35
Z-25˚C/Z+20˚C	3	2	2	2
Z-40˚C/Z+20˚C	6	4	3	3

Load life (after application of the rated voltage for 4000 hours at 130˚C)

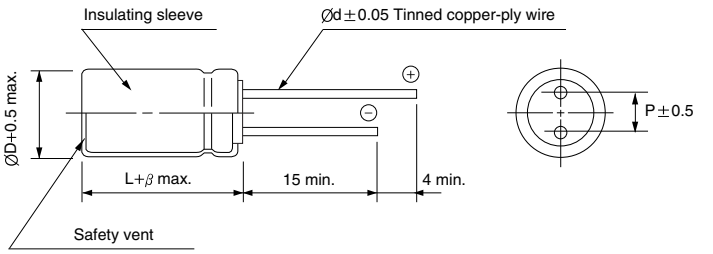
Leakage current	Less than specified value
Capacitance change	Within ±30% of initial value
tanδ	Less than 300% of specified value

Ø8 and Ø10 products are for 2000 hours.

Shelf life (at 130˚C) — After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value.

DRAWING

Unit : mm



ØD	8	10	12.5	16	18
P	3.5	5.0	5.0	7.5	7.5
Ød	0.6	0.6	0.6	0.8	0.8
β	1.5	2.0			

FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

μF \ Frequency(Hz)	60	120	1k	10k	100k≦
~ 330	0.60	0.70	0.85	0.95	1.00
470 ~ 1500	0.65	0.75	0.90	0.98	1.00
2200 ~	0.75	0.80	0.95	1.00	1.00

VA series

● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

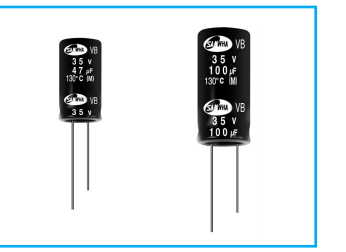
WV / Item / μF	10			16		
	ØD×L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 130°C 100kHz	ØD×L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 130°C 100kHz
220						
330	8×11.5	0.22	360	8×11.5	0.22	360
470	10×12.5	0.15	620	10×12.5	0.15	620
1000	10×20	0.073	960	10×20	0.073	960
2200	12.5×25	0.040	1430	12.5×25	0.040	1430
3300	16×25	0.038	1900	16×31.5	0.034	2300
4700	16×31.5	0.034	2300	16×35.5	0.031	2550

WV / Item / μF	25			35		
	ØD×L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 130°C 100kHz	ØD×L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 130°C 100kHz
220	8×11.5	0.22	360	10×12.5	0.15	500
330	10×12.5	0.15	620	10×16	0.10	700
470	10×20	0.10	800	10×20	0.073	800
1000	12.5×25	0.055	1100	12.5×25	0.040	1100
2200	16×31.5	0.034	2300	16×35.5	0.031	2550
3300	16×35.5	0.031	2550	18×35.5	0.028	2800

MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

VB 155°C, High Temp, High Reliability Series

Solvent Proof



- Load life of 1000 hours at +155°C use
- For Electronic Control Unit and other high temperature applications
- Complied to the RoHS directive

VA ⇨ VB
High Temp

Item	Characteristics
Operating temperature range	-40 ~ +155°C
Leakage current max.	I = 0.03CV or 4μA whichever is greater (after 1 minute)
Capacitance tolerance	±20% (20°C, 120Hz)
Dissipation factor max. (at 120Hz, 20°C)	When the capacitance exceeds 1000μF, 0.02 for each 1000μF increase.

Rated Voltafe(V)	10	16	25	35	50	63	80	100
tanδ	0.20	0.16	0.14	0.12	0.10	0.10	0.08	0.08

Low temperature characteristics (Impedance ratio at 120Hz)

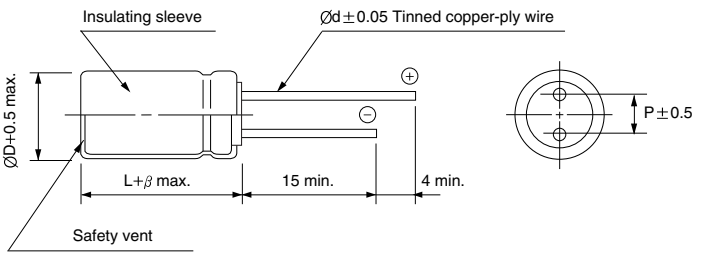
WV	10	16	25	35	50	63	80	100
Z-25°C/Z+20°C	3	2	2	2	2	2	2	2
Z-40°C/Z+20°C	4	4	4	4	4	4	4	4

Load life (after application of the rated voltage for 1000 hours at 155°C)

Leakage current	Less than specified value
Capacitance change	Within ±30% of initial value
tanδ	Less than 300% of specified value

DRAWING

Unit : mm



ØD	10	12.5	16	18
P	5	5	7.5	7.5
Ød	0.6	0.6	0.8	0.8
β	2.0			

FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

CV \ Frequency(Hz)	120	300	1k	100k≦
1000 ≦ CV	0.67	0.79	0.91	1.00
1000 > CV	0.50	0.64	0.83	1.00

VB series

● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

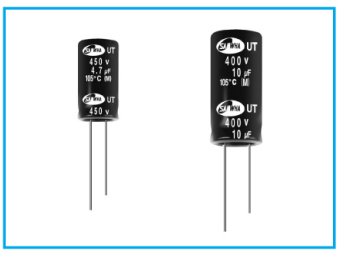
WV / Item / μF	10		16		25		35	
	ØD×L(mm)	Ripple current (mA rms) 155°C, 100kHz	ØD×L(mm)	Ripple current (mA rms) 155°C, 100kHz	ØD×L(mm)	Ripple current (mA rms) 155°C, 100kHz	ØD×L(mm)	Ripple current (mA rms) 155°C, 100kHz
1.0							10 × 12.5	35
2.2							10 × 12.5	50
3.3							10 × 12.5	60
4.7							10 × 12.5	85
10							10 × 12.5	175
22							10 × 12.5	200
33							10 × 12.5	225
47							10 × 12.5	250
100					10 × 12.5	250	10 × 20	400
220			10 × 16	300	12.5 × 20	500	12.5 × 25	600
330	10 × 16	300	10 × 20	400	12.5 × 25	600	16 × 25	800
470	10 × 20	400	12.5 × 20	600	16 × 25	800	16 × 31.5	1000
1000	12.5 × 25	600	16 × 25	800	16 × 31.5	1000	18 × 40	1300
2200	16 × 31.5	1000	18 × 35.5	1200				
3300	18 × 35.5	1200	18 × 40	1300				
4700	18 × 40	1300						

WV / Item / μF	50		63		80		100	
	ØD×L(mm)	Ripple current (mA rms) 155°C, 100kHz	ØD×L(mm)	Ripple current (mA rms) 155°C, 100kHz	ØD×L(mm)	Ripple current (mA rms) 155°C, 100kHz	ØD×L(mm)	Ripple current (mA rms) 155°C, 100kHz
22							10 × 12.5	390
33					10 × 12.5	420	10 × 16	510
47					10 × 16	550	10 × 20	640
56			10 × 12.5	430	10 × 20	690	10 × 20	640
68			10 × 16	560	10 × 20	690	12.5 × 20	760
100	10 × 16	380	10 × 20	710	12.5 × 20	820	12.5 × 25	950
220	12.5 × 20	640	12.5 × 25	1040	16 × 25	1250	16 × 31.5	1380
330	16 × 20	770	16 × 20	1080	16 × 31.5	1480	18 × 31.5	1430
470	16 × 25	960	16 × 25	1280	18 × 31.5	1530		
560	16 × 31.5	1080	16 × 31.5	1520				
680	18 × 25	1190	16 × 35.5	1520				
1000	18 × 31.5	1420						

MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

NEW **UT**

For Flame Retardancy Series

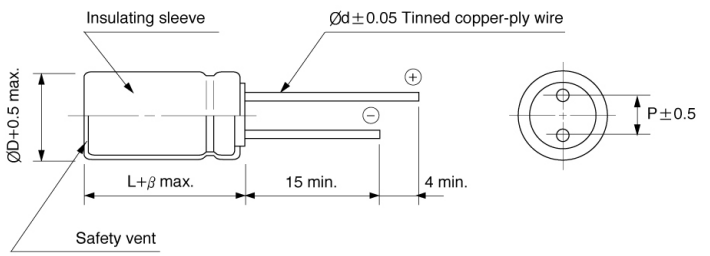


- Flame retardancy series for general purposes
- Load life of 2000 hours at 105˚C
- Complied to the RoHS directive

Item	Characteristics
Operating temperature range	-25 ~ +105˚C
Leakage current max.	I = 0.02CV +15μA (after 5 minutes)
Capacitance tolerance	±20% at 120Hz, 20˚C
Dissipation factor max. (at 120Hz, 20˚C)	Rated Voltage (V): 400 / 450; tanδ: 0.20 / 0.20
Load life (after application of the rated voltage for 2000 hours at 105˚C)	Leakage current: Less than specified value; Capacitance change: Within ±25% of initial value; tanδ: Less than 200% of specified value
Shelf life (at 105˚C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value.

● DRAWING

Unit : mm



ØD	10	12.5	16	18	20
P	5.0	5.0	7.5	7.5	10.0
Ød	0.6	0.6	0.8	0.8	0.8
β	2.0				

● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV / μF	400		450	
2.2			10 × 12.5	47
2.7			10 × 12.5	52
4.7			10 × 16	125
6.8			10 × 16	161
10	10 × 20	131	10 × 20	197
22	12.5 × 25	225	16 × 25	371
33	16 × 20	397	16 × 31.5	422
47	16 × 25	476	18 × 31.5	598
68	16 × 31.5	615	18 × 31.5	663
100	18 × 40	727	18 × 35.5	718
120			18 × 40	745
150			20 × 41	798

Ripple current (mA rms) at 105˚C, 120Hz
Case size ØD×L (mm)

● PERMISSIBLE RIPPLE CURRENT MULTIPLIERS

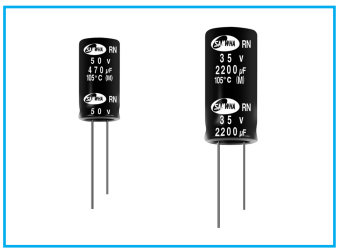
Frequency	50Hz	120Hz	300Hz	1kHz	10kHz≦
Coefficient	0.8	1.0	1.1	1.3	1.4

RN Non-Polarized, Wide Temperature Range Series

Non-polarized Solvent Proof

- Wide operating temperature range of -40 ~ +105˚C
- Designed for use in circuits with reversing polarity
- Complied to the RoHS directive

RD ⇒ RN
Non-polar



Item	Characteristics
Operating temperature range	-40 ~ +105˚C
Leakage current max.	I = 0.03CV or 3μA whichever is greater (after 5 minutes)
Capacitance tolerance	±20% at 120Hz, 20˚C
Dissipation factor max. (at 120Hz, 20˚C)	Capacitance > 1000μF : tanδ increases by 0.02 for each 1000μF from below value.

WV	6.3	10	16	25	35	50	63	80	100
tanδ	0.24	0.20	0.16	0.16	0.14	0.12	0.12	0.12	0.12

Low temperature characteristics (Impedance ratio at 120Hz)

WV	6.3	10	16	25~100
Z-25˚C/Z+20˚C	4	3	2	2
Z-40˚C/Z+20˚C	8	6	4	3

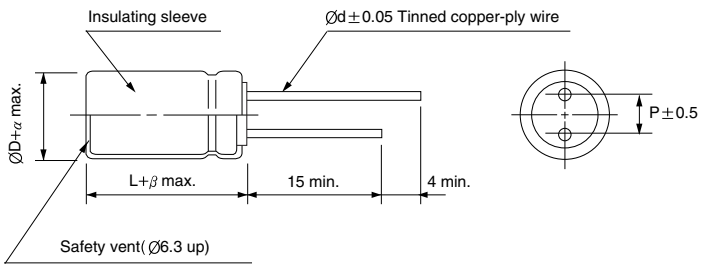
Load life (after application of the rated voltage for 1000 hours at 105˚C)

Leakage current	Less than specified value
Capacitance change	Within ±20% of initial value
tanδ	Less than 200% of specified value
Test method	Polarity reverse each 250 hours

Shelf life (at 105˚C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value.

DRAWING

Unit : mm



ØD	5	6.3	8	10	12.5	16	18	22	25.4
P	2.0	2.5	3.5	5.0	5.0	7.5	7.5	10.0	12.5
Ød	0.5	0.5	0.6	0.6	0.6	0.8	0.8	1.0	1.0
β	1.5			2.0					
α	0.5							1.0	

FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

μF \ Frequency	50Hz	120Hz	300Hz	1kHz	10kHz≦
~ 47	0.75	1	1.35	1.55	2.0
68 ~ 680	0.80	1	1.25	1.34	1.5
1000 ~	0.85	1	1.10	1.13	1.15

RN series

● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

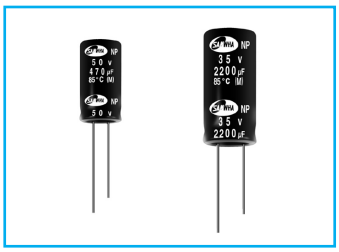
WV / μF	6.3	10	16	25	35	50	63	80	100
0.1						5 × 11 3.6	5 × 11 3.9	5 × 11 3.9	5 × 11 4.2
0.15						5 × 11 4.4	5 × 11 4.8	5 × 11 4.8	5 × 11 5.1
0.22						5 × 11 5.3	5 × 11 5.8	5 × 11 5.8	5 × 11 6.2
0.33						5 × 11 6.5	5 × 11 7.2	5 × 11 7.2	5 × 11 7.5
0.47						5 × 11 7.8	5 × 11 8.5	5 × 11 8.5	5 × 11 9.2
0.68						5 × 11 9.4	5 × 11 10	5 × 11 10	5 × 11 11
1.0						5 × 11 11	5 × 11 12	5 × 11 12	5 × 11 13
1.5						5 × 11 14	5 × 11 15	5 × 11 15	5 × 11 16
2.2						5 × 11 17	5 × 11 18	5 × 11 18	5 × 11 19
3.3						5 × 11 21	5 × 11 23	6.3 × 11 26	6.3 × 11 27
4.7					5 × 11 23	5 × 11 25	6.3 × 11 31	6.3 × 11 31	8 × 11.5 39
6.8				5 × 11 26	5 × 11 27	6.3 × 11 34	6.3 × 11 37	8 × 11.5 44	10 × 12.5 54
10			5 × 11 31	5 × 11 31	6.3 × 11 38	6.3 × 11 41	8 × 11.5 53	10 × 12.5 62	10 × 12.5 65
15		5 × 11 34	5 × 11 38	6.3 × 11 44	8 × 11.5 55	8 × 11.5 60	10 × 12.5 76	10 × 12.5 76	10 × 16 88
22	5 × 11 38	5 × 11 41	6.3 × 11 53	8 × 11.5 63	8 × 11.5 67	10 × 12.5 84	10 × 16 101	10 × 16 101	
33	5 × 11 46	6.3 × 11 58	8 × 11.5 77	8 × 11.5 77	10 × 12.5 95	10 × 16 113	10 × 16 124	10 × 20 135	
47	6.3 × 11 63	6.3 × 11 69	8 × 11.5 92	10 × 12.5 106	10 × 16 125	10 × 20 147	10 × 20 161	12.5 × 20 189	
68	6.3 × 11 76	8 × 11.5 98	10 × 12.5 128	10 × 16 140	10 × 20 164	10 × 20 177	12.5 × 20 227	12.5 × 25 248	
100	8 × 11.5 109	10 × 12.5 139	10 × 16 170	10 × 20 185	10 × 20 198	12.5 × 20 251	12.5 × 25 300	16 × 25 333	
150	10 × 12.5 155	10 × 16 186	10 × 20 227	12.5 × 20 267	12.5 × 20 285	12.5 × 25 336	16 × 25 408	16 × 35.5 468	
220	10 × 12.5 188	10 × 20 246	12.5 × 20 323	12.5 × 20 323	12.5 × 25 376	16 × 25 451	16 × 35.5 567	18 × 35.5 609	
330	10 × 16 252	12.5 × 20 354	12.5 × 20 396	12.5 × 25 431	16 × 25 511	16 × 35.5 634	18 × 35.5 745	18 × 40 782	
470	10 × 20 328	12.5 × 20 422	12.5 × 25 515	16 × 25 571	16 × 35.5 701	18 × 35.5 812	18 × 40 933	22 × 41 1027	
680	12.5 × 20 464	12.5 × 25 554	16 × 25 687	16 × 35.5 788	18 × 35.5 904	18 × 40 1025	22 × 41 1236	25.4 × 41 1350	
1000	12.5 × 25 613	16 × 25 745	16 × 35.5 956	18 × 35.5 1026	18 × 40 1151	22 × 41 1368	25.4 × 41 1637		
1500	16 × 25 800	16 × 35.5 999	18 × 35.5 1184	18 × 40 1243	22 × 41 1451	25.4 × 41 1694			
2200	16 × 35.5 1072	18 × 35.5 1242	18 × 40 1428	22 × 41 1572	25.4 × 51 1974				
3300	18 × 35.5 1361	18 × 40 1534	22 × 41 1835	25.4 × 41 2005	← Case size ØD×L (mm) ← Ripple current (mA rms) at 105°C, 120Hz				
4700	18 × 40 1650	22 × 41 1942	25.4 × 51 2498						
6800	22 × 41 2060	25.4 × 51 2603							
10000	25.4 × 51 2755								

NP Non-Polarized Series

Non-polarized

Solvent Proof
WV≦100V

SD ⇨ NP
Non-polar



- Standard non-polarized series
- Designed for use in circuits with reversing polarity
- Higher voltage ratings available up to 250V
- Load life of 2000 hours at 85˚C
- Complied to the RoHS directive

Item	Characteristics
Operating temperature range	-40 ~ +85˚C
Leakage current max.	I = 0.03CV or 3μA whichever is greater (after 5 minutes)
Capacitance tolerance	±20% at 120Hz, 20˚C
Dissipation factor max. (at 120Hz, 20˚C)	Capacitance > 1000μF : tanδ increases by 0.02 for each 1000μF from below value.

WV	6.3	10	16	25	35	50	63	80	100	160	200,250
tanδ	0.25	0.23	0.20	0.15	0.15	0.12	0.12	0.12	0.12	0.15	0.20

Low temperature characteristics (Impedance ratio at 120Hz)

WV	6.3	10	16	25~100	160~250
Z-25˚C/Z+20˚C	4	3	2	2	3
Z-40˚C/Z+20˚C	10	8	6	4	5

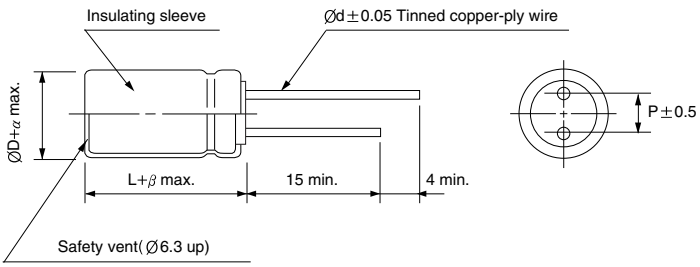
Load life (after application of the rated voltage for 2000 hours at 85˚C)

Leakage current	Less than specified value
Capacitance change	Within ±20% of initial value
tanδ	Less than 200% of specified value
Test method	Polarity reverse each 250 hours

Shelf life (at 85˚C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value.

DRAWING

Unit : mm



ØD	5	6.3	8	10	12.5	16	18	22	25.4
P	2.0	2.5	3.5	5.0	5.0	7.5	7.5	10.0	12.5
Ød	0.5	0.5	0.6	0.6	0.6	0.8	0.8	1.0	1.0
β	1.5			2.0					
α	0.5							1.0	

PERMISSIBLE RIPPLE CURRENT MULTIPLIERS

μF \ Frequency	50Hz	120Hz	300Hz	1kHz	10kHz≦
~ 47	0.75	1	1.35	1.55	2.0
68 ~ 680	0.80	1	1.25	1.34	1.5
1000 ~	0.85	1	1.10	1.13	1.15

NP series

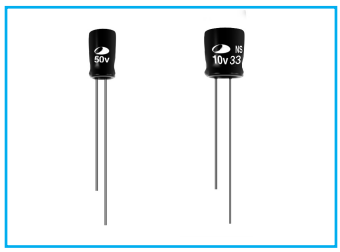
● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV / μF	6.3	10	16	25	35	50	63	80	100	160	200	250
0.47						5×11 12	5×11 12	5×11 12	5×11 12			
0.68						5×11 14	5×11 14	5×11 14	5×11 14			
1.0						5×11 18	5×11 18	5×11 18	5×11 18			
1.5						5×11 21	5×11 21	5×11 21	5×11 21			
2.2						5×11 26	5×11 26	5×11 26	5×11 26			
3.3						5×11 32	5×11 32	5×11 32	5×11 32	10×16 49	10×16 42	10×20 46
4.7						5×11 38	5×11 38	5×11 38	6.3×11 44	10×16 59	10×20 55	12.5×20 63
6.8						5×11 46	5×11 46	6.3×11 52	8×11.5 62	10×20 77	12.5×20 78	12.5×20 78
10						5×11 55	6.3×11 64	6.3×11 64	8×11.5 75	12.5×20 109	12.5×20 95	12.5×25 103
15					5×11 61	6.3×11 78	6.3×11 78	8×11.5 92	10×12.5 107	12.5×20 134	12.5×25 127	16×25 140
22				5×11 73	6.3×11 84	6.3×11 94	8×11.5 111	10×12.5 129	10×16 142	12.5×25 177	16×25 170	16×31.5 186
33			5×11 78	6.3×11 103	6.3×11 103	8×11.5 136	10×12.5 158	10×16 173	10×20 189	16×25 240	16×35.5 239	18×35.5 256
47		5×11 87	6.3×11 107	6.3×11 123	8×11.5 145	10×12.5 189	10×16 207	10×20 226	12.5×20 265	16×35.5 329	18×40 321	
68	5×11 100	6.3×11 120	6.3×11 129	8×11.5 175	10×12.5 203	10×16 249	10×20 272	12.5×20 319	12.5×25 348	18×35.5 425		
100	6.3×11 139	6.3×11 145	8×11.5 184	10×12.5 247	10×16 270	10×20 329	10×20 329	12.5×20 387	16×25 468			
150	6.3×11 171	8×11.5 210	10×12.5 262	10×16 331	10×20 361	10×20 404	12.5×20 474	12.5×25 516	16×25 573			
220	8×11.5 244	10×12.5 295	10×16 347	10×20 437	10×20 437	12.5×20 574	12.5×25 625	16×25 694	16×35.5 797			
330	10×12.5 347	10×16 396	10×20 464	10×20 535	12.5×20 628	16×25 850	16×25 850	16×35.5 976	18×40 1098			
470	10×16 454	10×20 516	10×20 553	12.5×20 750	12.5×25 818	16×31.5 1110	16×35.5 1164	18×40 1311	22×41 1443			
680	10×20 595	12.5×20 729	12.5×20 781	12.5×25 984	16×25 1091	18×35.5 1503	18×40 1577	22×41 1736	25.4×41 1896			
1000	12.5×20 847	12.5×20 883	12.5×25 1033	16×25 1323	16×35.5 1519	18×40 1912	22×41 2105	25.4×41 2299				
1500	12.5×20 999	12.5×25 1132	16×25 1338	16×35.5 1748	18×40 1968	22×41 2386	25.4×41 2607					
2200	12.5×25 1272	16×25 1463	16×35.5 1781	18×40 2254	22×41 2481	25.4×51 3221						
3300	16×25 1672	16×35.5 1985	18×40 2360	22×41 2890	25.4×41 3157							
4700	16×35.5 2221	18×40 2579	22×41 2987	25.4×51 3927	← Case size ØD×L (mm) ← Ripple current (mA rms) at 85°C, 120Hz							
6800	18×41 2840	22×41 3214	25.4×51 4004									
10000	22×41 3516	25.4×51 4290										

NS Non-Polarized, Height 7mmL Series

Non-polarized Solvent Proof

SS ⇒ NS
Non-polar

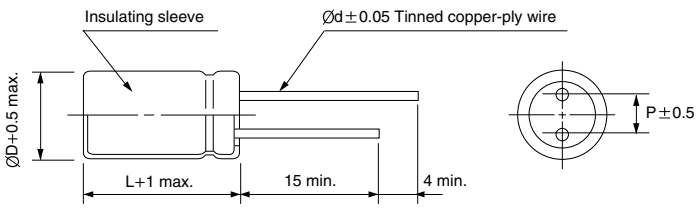


- Non-polarized series with 7mmL height
- Load life of 2000 hours at 85˚C
- Complied to the RoHS directive

Item	Characteristics
Operating temperature range	-40 ~ +85˚C
Leakage current max.	I = 0.05CV or 10μA whichever is greater (after 2 minutes)
Capacitance tolerance	±20% at 120Hz, 20˚C
Dissipation factor max. (at 120Hz, 20˚C)	WV 6.3 10 16 25 35 40 50 63 tanδ 0.24 0.20 0.17 0.16 0.15 0.14 0.12 0.10
Low temperature characteristics (Impedance ratio at 120Hz)	WV 6.3 10 16~25 35~63 Z-25˚C/Z+20˚C 4 3 2 2 Z-40˚C/Z+20˚C 8 6 4 4
Load life (after application of the rated voltage for 2000 hours at 85˚C)	Leakage current: Less than specified value Capacitance change: Within ±20% of initial value tanδ: Less than 200% of specified value Test method: Polarity reverse each 250 hours
Shelf life (at 85˚C)	After 500 hours no load test, leakage current, capacitance and tanδ are same as load life value.

DRAWING

Unit : mm



ØD	4	5	6.3
P	1.5	2.0	2.5
Ød	0.45	0.5	0.5

DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

μF \ WV	6.3		10		16		25		35		40		50		63	
0.1													4×7	4.0	4×7	4.4
0.15													4×7	5.0	4×7	5.4
0.22													4×7	6.0	4×7	6.6
0.33													4×7	7.3	4×7	8.0
0.47													4×7	8.8	4×7	9.6
0.68													4×7	11	4×7	12
1.0													4×7	13	4×7	14
1.5													4×7	16	4×7	17
2.2											4×7	18	4×7	19	5×7	24
3.3							4×7	20	4×7	21	5×7	25	5×7	27	6.3×7	34
4.7					4×7	23	4×7	24	5×7	29	5×7	29	6.3×7	37	6.3×7	40
6.8			4×7	26	5×7	32	5×7	33	6.3×7	39	6.3×7	41				
10			4×7	31	5×7	39	6.3×7	47	6.3×7	48						
15	4×7	35	5×7	44	6.3×7	55										
22	5×7	49	6.3×7	62	6.3×7	67										
33	6.3×7	69	6.3×7	76												
47	6.3×7	83														

Ripple current (mA rms) at 85˚C, 120Hz
Case size ØD×L (mm)

FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

Frequency	50Hz	120Hz	300Hz	1kHz	10kHz≦
Coefficient	0.75	1.00	1.35	1.55	2.00

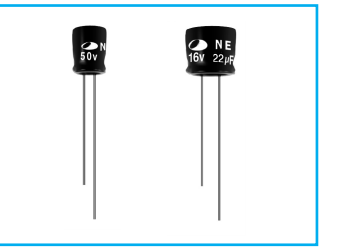
MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

NE Non-Polarized, Height 5mmL Series

Miniaturized | Non-polarized | Solvent Proof

· Non-polarized and low profile series with 5mmL height
· Uniquely designed for use in lightweight and portable equipment
· Complied to the RoHS directive

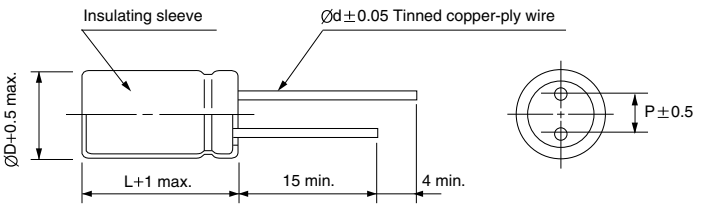
SE ⇨ NE
Non-polar



Item	Characteristics
Operating temperature range	-40 ~ +85˚C
Leakage current max.	I = 0.05CV or 10μA whichever is greater (after 2 minutes)
Capacitance tolerance	±20% at 120Hz, 20˚C
Dissipation factor max. (at 120Hz, 20˚C)	WV: 6.3 / 10 / 16 / 25 / 35 / 50 tanδ: 0.24 / 0.20 / 0.17 / 0.17 / 0.15 / 0.15
Low temperature characteristics (Impedance ratio at 120Hz)	WV: 6.3 / 10 / 16, 25 / 35, 50 Z-25˚C/Z+20˚C: 4 / 3 / 2 / 2 Z-40˚C/Z+20˚C: 8 / 6 / 4 / 3
Load life (after application of the rated voltage for 1000 hours at 85˚C)	Leakage current: Less than specified value Capacitance change: Within ±20% of initial value tanδ: Less than 200% of specified value Test method: Polarity reverse each 250 hours
Shelf life (at 85˚C)	After 500 hours no load test, leakage current, capacitance and tanδ are same as load life value.

DRAWING

Unit : mm



ØD	4	5	6.3
P	1.5	2.0	2.5
Ød	0.45	0.45	0.45

DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

μF \ WV	6.3		10		16		25		35		50	
0.1											4×5	3.2
0.15											4×5	3.9
0.22											4×5	4.7
0.33											4×5	5.8
0.47											4×5	6.9
0.68											4×5	8.3
1.0											4×5	10
1.5											4×5	12
2.2							4×5	14	4×5	15	5×5	17
3.3							5×5	20	5×5	21	5×5	21
4.7					4×5	21	5×5	24	5×5	25	6.3×5	30
6.8					5×5	29	6.3×5	33	6.3×5	36	6.3×5	36
10			4×5	28	5×5	35	6.3×5	41	6.3×5	43		
15	4×5	31	5×5	39	6.3×5	50						
22	5×5	43	6.3×5	55	6.3×5	60						
33	6.3×5	62	6.3×5	68								
47	6.3×5	74										

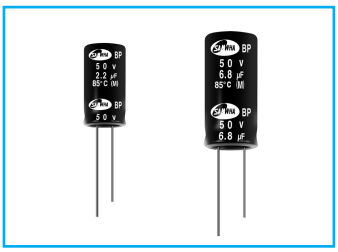
Ripple current (mA rms) at 85˚C, 120Hz
Case size ØD×L (mm)

FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

Frequency	50Hz	120Hz	300Hz	1kHz	10kHz≦
Coefficient	0.75	1.00	1.35	1.55	2.00

BP For Speaker Networks Series

Non-polarized Solvent Proof

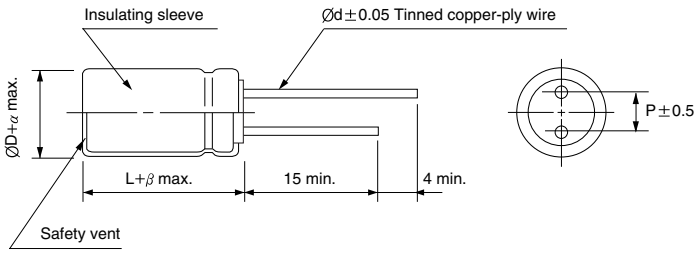


- Non-polarized series for crossover networks in Hi-Fi sound systems
- Excellent frequency characteristics
- Close capacitance tolerance
- Extended voltage range of 25V, 50V, 100V, 200V
- Complied to the RoHS directive

Item	Characteristics
Operating temperature range	-40 ~ +85˚C
Leakage current max.	I = 0.03CV or 3μA whichever is greater (after 5 minutes)
Capacitance tolerance	±20% (20˚C, 120Hz)
Dissipation factor max. (at 120Hz, 20˚C)	Series: BP; Frequency: 25WV, 50WV, 100WV / 200WV 1kHz: 0.10 / 0.12 5kHz: 0.15 / 0.30
Load life (after application of the rated voltage for 2000 hours at 85˚C)	Leakage current: Less than specified value Capacitance change: Within ±15% of initial value tanδ: Less than 200% of specified value Test method: Polarity reverse each 250 hours
Shelf life (at 85˚C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value.

DRAWING

Unit : mm



ØD	8	10	12.5	16	18	22	25.4
P	3.5	5	5	7.5	7.5	10	12.5
Ød	0.6	0.6	0.6	0.8	0.8	1.0	1.0
β	1.5	2.0					
α	0.5					1.0	

DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

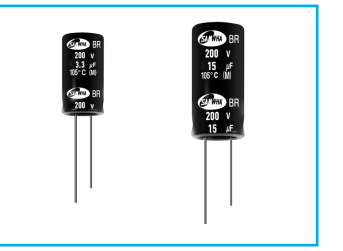
WV \ μF	1.0	1.5	2.2	3.3	4.7	6.8	10	15	22	33	47	68	100
25	8×11.5 67	8×11.5 82	10×12.5 114	10×12.5 139	10×12.5 166	10×16 222	10×20 297	10×20 364	10×20 440	12.5×20 678	12.5×25 890		
50	8×11.5 67	8×11.5 82	10×12.5 114	10×12.5 139	10×12.5 166	10×16 222	10×20 297	10×20 364	10×20 440	12.5×20 678	12.5×25 890	16×31.5 950	16×35.5 1170
100	10×16 100	10×16 125	10×16 150	10×16 185	10×16 225	10×20 275	12.5×20 340	12.5×20 420	12.5×25 543	16×25 737	16×31.5 790	16×35.5 983	16×40 1253
200							16×25 403	16×31.5 540	16×35.5 687	16×40 884	18×40 920	22×40 1218	25.4×40 1614

Case size ØD×L (mm)
Ripple current (mA rms) at 85˚C, 1kHz

MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

BR For Speaker Networks Series

Non-polarized

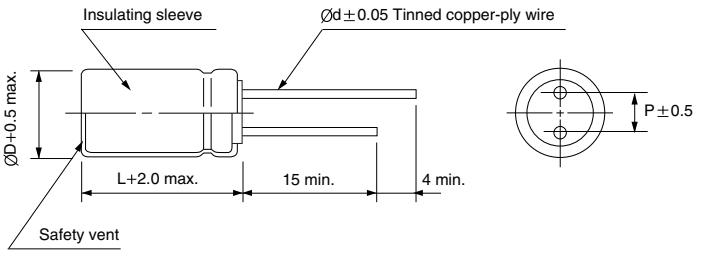


- Non-polarized series for crossover networks in Hi-Fi sound systems
- Excellent frequency characteristics
- Close capacitance tolerance
- Complied to the RoHS directive

Item	Characteristics
Operating temperature range	-40 ~ +105˚C
Leakage current max.	I = 0.03CV or 3μA whichever is greater (after 5 minutes)
Capacitance tolerance	±20% (20˚C, 120Hz)
Dissipation factor max. (at 120Hz, 20˚C)	Frequency \ Series: BR; 200WV 1kHz: 0.12 5kHz: 0.30
Load life (after application of the rated voltage for 2000 hours at 105˚C)	Leakage current: Less than specified value Capacitance change: Within ±15% of initial value tanδ: Less than 200% of specified value Test method: Polarity reverse each 250 hours
Shelf life (at 105˚C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value.

DRAWING

Unit : mm



ØD	10	12.5	16	18
P	5.0	5.0	7.5	7.5
Ød	0.6	0.6	0.8	0.8

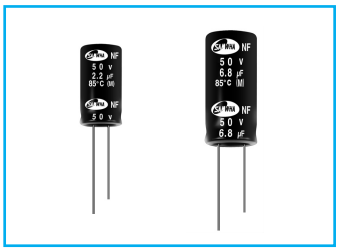
DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV \ μF	3.3	4.7	6.8	10	15	22	33	47	68	100
200	10×16 185	10×20 250	12.5×20 300	12.5×20 340	12.5×25 420	16×25 650	18×25 730	18×40 920	18×40 935	18×40 950

Case size ØD×L (mm)
Ripple current (mA rms) at 105˚C, 1kHz

NF For Horizontal Deflection Current Correction Series

Non-polarized Solvent Proof

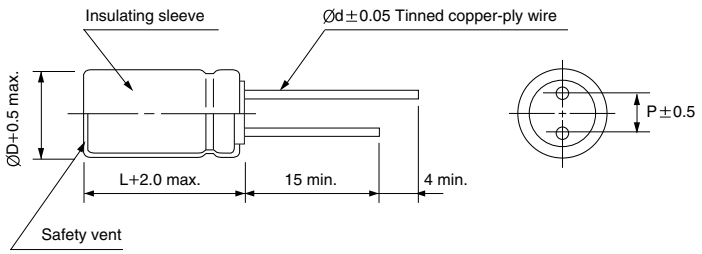


- Designed for horizontal deflection current correction in TV, monitor or computer
- Stable characteristics at high frequency and high ripple current
- Complied to the RoHS directive

Item	Characteristics
Operating temperature range	-40 ~ +85˚C
Leakage current max.	I = 0.03CV+50㎂ (after 5 minutes)
Capacitance tolerance	±10, ±20% at 120Hz, 20˚C
Dissipation factor max.	0.04 max. at 120Hz, 20˚C
Low temperature characteristics (Impedance ratio at 120Hz)	Z-25˚C/Z+20˚C: 1.5 Z-40˚C/Z+20˚C: 3.0
Load life (after application of DC 12V superimposed with specified ripple current)	Leakage current: Less than specified value Capacitance change: Within ±15% of initial value tanδ: Less than 200% of specified value Test method: Polarity reverse each 250 hours NF series are for 2000 hours at 85˚C
Shelf life (at 85˚C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value.

DRAWING

Unit : mm



ØD	10	12.5	16	18
P	5.0	5.0	7.5	7.5
Ød	0.6	0.6	0.8	0.8

DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

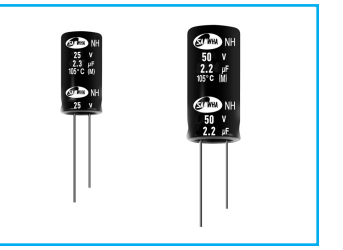
WV \ ㎌	1.0	1.5	2.2	3.3	4.7	6.8	8.2	10
25, 50	1.8	2.4	3.3	4.5	6.0	8.0	9.0	10.0
	10×20	12.5×20	12.5×25	16×25	16×31.5	16×35.5	16×40	18×40

Ripple current (Ap-p) at 85˚C, 15.75kHz
Case size ØD×L(mm)

MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

NH For Horizontal Deflection Current Correction Series

Non-polarized Solvent Proof

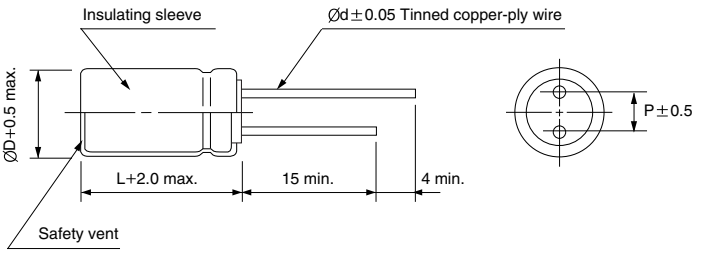


- Designed for horizontal deflection current correction in TV, monitor or computer
- Stable characteristics at high frequency and high ripple current
- Complied to the RoHS directive

Item	Characteristics
Operating temperature range	-40 ~ +105˚C
Leakage current max.	I = 0.03CV+50μA (after 5 minutes)
Capacitance tolerance	±10, ±20% at 120Hz, 20˚C
Dissipation factor max.	0.04 max. at 120Hz, 20˚C
Low temperature characteristics (Impedance ratio at 120Hz)	Z-25˚C/Z+20˚C: 1.5 Z-40˚C/Z+20˚C: 3.0
Load life (after application of DC 12V superimposed with specified ripple current)	Leakage current: Less than specified value Capacitance change: Within ±15% of initial value tanδ: Less than 200% of specified value Test method: Polarity reverse each 250 hours NH series are for 2000 hours at 105˚C
Shelf life (at 105˚C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value.

DRAWING

Unit : mm



ØD	10	12.5	16	18
P	5.0	5.0	7.5	7.5
Ød	0.6	0.6	0.8	0.8

DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

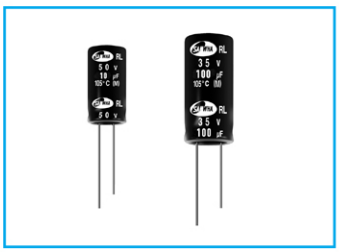
WV \ μF	1.0	1.5	2.2	3.3	4.7	6.8	8.2	10
25, 50	2.3	3.1	4.8	6.5	8.6	10.6	10.4	10.7
	10×20	12.5×20	12.5×25	16×25	16×31.5	16×35.5	16×40	18×40

Ripple current (Ap-p) at 105˚C, 15.75kHz
Case size ØD×L(mm)

RL

Low Leakage Current, Wide Temperature Range Series

Low Leakage Current | Solvent Proof

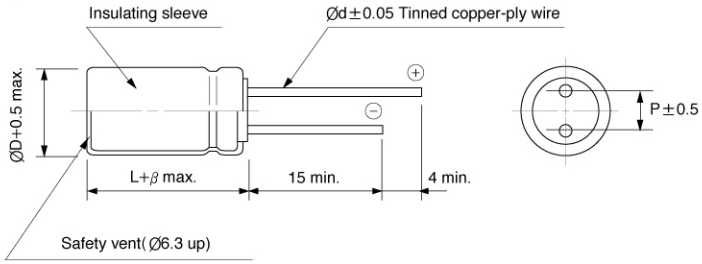


- Low leakage current series
- Wide operating temperature range of -55 ~ +105˚C
- Low ESR, low impedance
- For Hi-Fi sound audio systems
- Complied to the RoHS directive

Item	Characteristics
Operating temperature range	-55 ~ +105˚C
Leakage current max.	I = 0.002CV or 0.4μA whichever is greater (after 2 minutes)
Capacitance tolerance	±20% at 120Hz, 20˚C
Dissipation factor max. (at 120Hz, 20˚C)	WV: 10 / 16 / 25 / 35 / 40 / 50 tanδ: 0.15 / 0.12 / 0.08 / 0.08 / 0.08 / 0.08
Low temperature characteristics (Impedance ratio at 120Hz)	WV: 10 / 16 / 25~50 Z-25˚C/Z+20˚C: 2 / 2 / 1.5 Z-40˚C/Z+20˚C: 4 / 3 / 2
Load life (after application of the rated voltage for 1000 hours at 105˚C)	Leakage current: Less than specified value Capacitance change: Within ±15% of initial value tanδ: Less than 150% of specified value
Shelf life (at 105˚C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value.

DRAWING

Unit : mm



ØD	5	6.3	8	10
P	2.0	2.5	3.5	5.0
Ød	0.5	0.5	0.6	0.6
β	1.1			2.0

DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

μF \ WV	10		16		25		35		40		50	
0.1											5×11	4.4
0.15											5×11	5.4
0.22											5×11	6.5
0.33											5×11	8.0
0.47											5×11	9.6
0.68											5×11	11
1.0											5×11	14
1.5											5×11	17
2.2											5×11	21
3.3											5×11	25
4.7											5×11	30
6.8											5×11	36
10									5×11	44	5×11	44
15							5×11	54	6.3×11	62	6.3×11	62
22					5×11	65	6.3×11	75	6.3×11	75	6.3×11	75
33			5×11	65	6.3×11	92	6.3×11	92	8×11.5	109	8×11.5	109
47	5×11	70	6.3×11	90	6.3×11	110	8×11.5	129	8×11.5	129	8×11.5	129
68	6.3×11	96	6.3×11	108	8×11.5	156	8×11.5	156	10×12.5	181	10×12.5	181
100	6.3×11	117	8×11.5	154	8×11.5	189	10×12.5	219				
150	8×11.5	169	8×11.5	189	10×12.5	269						
220	8×11.5	205	10×12.5	266								
330	10×12.5	291										

Ripple current (mA rms) at 105˚C, 120Hz
Case size ØD×L (mm)

FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

μF \ Frequency	50Hz	120Hz	300Hz	1kHz	10kHz≦
~ 47	0.75	1.00	1.35	1.55	2.00
68 ~ 680	0.80	1.00	1.25	1.35	1.50

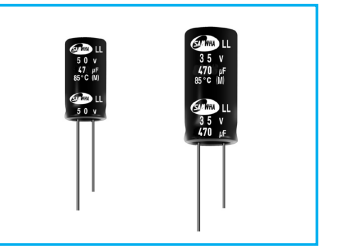
MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

LL Low Leakage Current Series

Low Leakage Current

Solvent Proof

SD ⇨ LL (Low leakage)



- Standard low leakage current series
- Suited for high gain audio coupling applications
- Stable leakage current characteristics for a long period of use
- Voltage range of 10 ~ 100V
- Complied to the RoHS directive

Item	Characteristics
Operating temperature range	-40 ~ +85˚C
Leakage current max.	I = 0.002CV or 0.4μA whichever is greater (after 2 minutes)
Capacitance tolerance	±20% at 120Hz, 20˚C
Dissipation factor max. (at 120Hz, 20˚C)	Capacitance > 1000μF : tanδ increases by 0.02 for each 1000μF from below value.

WV	10	16	25	35	40	50	63	100
tanδ	0.17	0.15	0.12	0.12	0.12	0.10	0.09	0.09

Low temperature characteristics (Impedance ratio at 120Hz)

WV	10~25	35	40	50	63	100
Z-25˚C/Z+20˚C	2	1.75	1.75	1.5	1.5	1.5
Z-40˚C/Z+20˚C	4	4	4	2	2	2

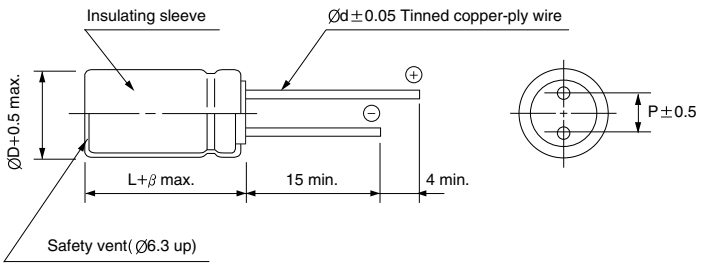
Load life (after application of the rated voltage for 2000 hours at 85˚C)

Leakage current	Less than specified value
Capacitance change	ØD≦6.3: WV≦16 ±20%, WV>16 ±20%; ØD>6.3: WV≦16 ±20%, WV>16 ±15%
tanδ	Less than 150% of specified value

Shelf life (at 85˚C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value.

DRAWING

Unit : mm



ØD	5	6.3	8	10	12.5	16	18
P	2.0	2.5	3.5	5.0	5.0	7.5	7.5
Ød	0.5	0.5	0.6	0.6	0.6	0.8	0.8
β	1.5			2.0			

FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

μF \ Frequency	50Hz	120Hz	300Hz	1kHz	10kHz~
~ 47	0.75	1.00	1.35	1.55	2.00
68 ~ 680	0.80	1.00	1.25	1.35	1.50
1000 ~	0.85	1.00	1.10	1.15	1.15

LL series

● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

μF \ WV	10		16		25		35	
1.0								
1.5								
2.2								
3.3								
4.7								
6.8							5 × 11	46
10					5 × 11	55	5 × 11	55
15			5 × 11	61	5 × 11	68	5 × 11	68
22		69	5 × 11	73	5 × 11	82	6.3 × 11	94
33	5 × 11	84	5 × 11	90	6.3 × 11	116	6.3 × 11	116
47	5 × 11	101	6.3 × 11	123	8 × 11.5	163	8 × 11.5	163
68	6.3 × 11	139	6.3 × 11	148	8 × 11.5	196	10 × 12.5	227
100	6.3 × 11	169	8 × 11.5	212	10 × 12.5	276	10 × 16	302
150	8 × 11.5	244	10 × 12.5	302	10 × 16	370	10 × 20	404
220	10 × 12.5	344	10 × 16	401	10 × 20	489	12.5 × 20	574
330	10 × 16	461	10 × 20	535	12.5 × 20	703	12.5 × 25	766
470	10 × 20	600	12.5 × 20	750	12.5 × 25	914	12.5 × 25	914
680	12.5 × 20	847	12.5 × 20	902	12.5 × 25	1100	16 × 25	1220
1000	12.5 × 20	1028	12.5 × 25	1193	16 × 25	1480	16 × 31.5	1619
1500	12.5 × 25	1298	16 × 25	1522	16 × 31.5	1835	18 × 35.5	2066
2200	16 × 25	1659	16 × 31.5	1908	18 × 35.5	2341		
3300	16 × 31.5	2124	18 × 35.5	2502				
4700	18 × 35.5	2737						

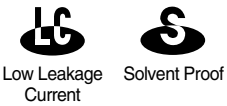
Ripple current (mA rms) at 85°C, 120Hz
Case size ØD×L (mm)

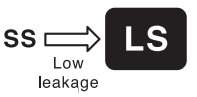
μF \ WV	40		50		63		100	
1.0					5 × 11	20	5 × 11	18
1.5					5 × 11	25	5 × 11	22
2.2					5 × 11	30	5 × 11	26
3.3			5 × 11	35	5 × 11	37	5 × 11	32
4.7	5 × 11	38	5 × 11	42	5 × 11	44	5 × 11	38
6.8	5 × 11	46	5 × 11	50	5 × 11	53	6.3 × 11	53
10	5 × 11	55	6.3 × 11	70	6.3 × 11	73	8 × 11.5	76
15	6.3 × 11	78	6.3 × 11	85	8 × 11.5	106	8 × 11.5	93
22	6.3 × 11	94	8 × 11.5	122	8 × 11.5	129	10 × 12.5	130
33	8 × 11.5	136	8 × 11.5	149	10 × 12.5	183	10 × 16	175
47	8 × 11.5	163	10 × 12.5	207	10 × 16	239	10 × 20	227
68	10 × 12.5	227	10 × 16	273	10 × 20	314	12.5 × 20	313
100	10 × 16	302	10 × 20	361	12.5 × 20	447	12.5 × 25	380
150	10 × 20	404	12.5 × 20	519	12.5 × 25	596	16 × 25	508
220	12.5 × 20	475	12.5 × 25	685	16 × 25	801	16 × 31.5	699
330	12.5 × 25	766	16 × 25	931	16 × 31.5	1074	16 × 35.5	983
470	16 × 25	1014	16 × 31.5	1216	16 × 35.5	1345	18 × 40	1320
680	16 × 25	1220	18 × 35.5	1534	18 × 40	1821		
1000	16 × 31.5	1699	18 × 40	2095				
1500	18 × 40	2168						

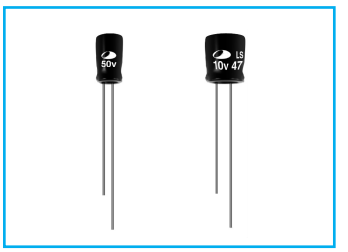
Ripple current (mA rms) at 85°C, 120Hz
Case size ØD×L (mm)

MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

LS Low Leakage Current, Height 7mmL Series





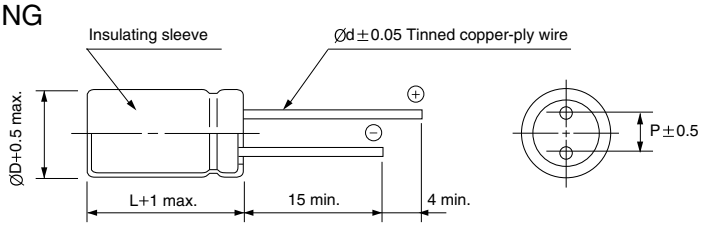


- Low leakage current series with 7mmL height
- Load life of 2000 hours at 85˚C
- Complied to the RoHS directive

Item	Characteristics
Operating temperature range	-40 ~ +85˚C
Leakage current max.	I = 0.002CV or 0.4μA whichever is greater (after 2 minutes)
Capacitance tolerance	±20% at 120Hz, 20˚C
Dissipation factor max. (at 120Hz, 20˚C)	WV: 6.3 / 10 / 16 / 25 / 35 / 40 / 50 / 63 tanδ: 0.24 / 0.20 / 0.16 / 0.14 / 0.12 / 0.12 / 0.10 / 0.10
Low temperature characteristics (Impedance ratio at 120Hz)	WV: 6.3 / 10 / 16, 25 / 35~63 Z-25˚C/Z+20˚C: 4 / 3 / 2 / 2 Z-40˚C/Z+20˚C: 8 / 6 / 4 / 3
Load life (after application of the rated voltage for 2000 hours at 85˚C)	Leakage current: Less than specified value Capacitance change: Within ±20% of initial value tanδ: Less than 200% of specified value
Shelf life (at 85˚C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value.

DRAWING

Unit : mm



ØD	4	5	6.3
P	1.5	2.0	2.5
Ød	0.45	0.5	0.5

DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

μF \ WV	6.3		10		16		25		35		40		50		63	
0.1													4×7	4.4	4×7	4.4
0.15													4×7	5.4	4×7	5.4
0.22													4×7	6.6	4×7	6.6
0.33													4×7	8.0	4×7	8.0
0.47													4×7	9.6	4×7	9.6
0.68													4×7	12	4×7	12
1.0													4×7	14	4×7	14
1.5													4×7	17	4×7	17
2.2													4×7	21	4×7	21
3.3													4×7	25	5×7	29
4.7									4×7	28	4×7	28	5×7	35	6.3×7	40
6.8							4×7	31	5×7	38	5×7	39	5×7	42	6.3×7	49
10					4×7	35	5×7	43	5×7	46	5×7	47	6.3×7	59		
15			4×7	38	5×7	49	5×7	53	6.3×7	66	6.3×7	66	6.3×7	72		
22	4×7	43	5×7	53	5×7	60	6.3×7	74	6.3×7	80	6.3×7	79				
33	5×7	60	5×7	65	6.3×7	85	6.3×7	91								
47	5×7	71	6.3×7	90	6.3×7	101										
68	6.3×7	99	6.3×7	109												
100	6.3×7	120														

Ripple current (mA rms) at 85˚C, 120Hz
Case size ØD×L (mm)

FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

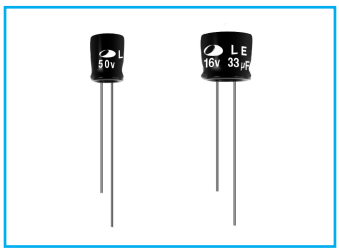
μF \ Frequency	50Hz	120Hz	300Hz	1kHz	10kHz≦
~ 47	0.75	1.00	1.35	1.55	2.00
68 ~ 680	0.80	1.00	1.25	1.35	1.50

LE Low Leakage Current, Height 5mmL Series

Low Leakage Current | Miniaturized | Solvent Proof

- Low leakage current series with 5mmL height
- Designed for use in lightweight and portable equipment
- Complied to the RoHS directive

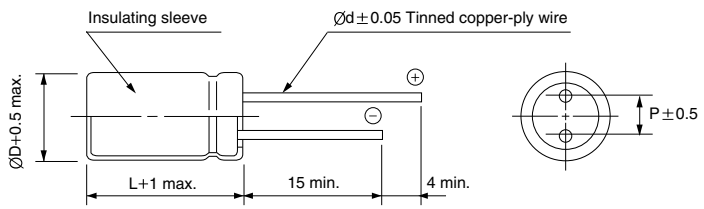
SE ⇨ LE (Low leakage)



Item	Characteristics
Operating temperature range	-40 ~ +85˚C
Leakage current max.	I = 0.002CV or 0.4μA whichever is greater (after 2 minutes)
Capacitance tolerance	±20% at 120Hz, 20˚C
Dissipation factor max. (at 120Hz, 20˚C)	WV: 4 / 6.3 / 10 / 16 / 25 / 35 / 50 tanδ: 0.35 / 0.24 / 0.20 / 0.16 / 0.14 / 0.12 / 0.10
Low temperature characteristics (Impedance ratio at 120Hz)	WV: 4 / 6.3 / 10 / 16 / 25 / 35, 50 Z-25˚C/Z+20˚C: 7 / 4 / 3 / 2 / 2 / 2 Z-40˚C/Z+20˚C: 15 / 10 / 8 / 6 / 4 / 3
Load life (after application of the rated voltage for 1000 hours at 85˚C)	Leakage current: Less than specified value Capacitance change: Within ±20% of initial value tanδ: Less than 200% of specified value
Shelf life (at 85˚C)	After 500 hours no load test, leakage current, capacitance and tanδ are same as load life value.

DRAWING

Unit : mm



ØD	4	5	6.3
P	1.5	2.0	2.5
Ød	0.45	0.45	0.45

DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

μF \ WV	4		6.3		10		16		25		35		50	
0.1													4×5	3.9
0.15													4×5	4.8
0.22													4×5	5.8
0.33													4×5	7.1
0.47													4×5	8.5
0.68													4×5	10
1.0													4×5	12
1.5													4×5	15
2.2													4×5	18
3.3													4×5	22
4.7											4×5	25	5×5	31
6.8									4×5	27	5×5	34	6.3×5	44
10							4×5	31	5×5	38	5×5	42	6.3×5	53
15					4×5	34	5×5	44	6.3×5	55	6.3×5	59		
22			4×5	37	5×5	47	6.3×5	62	6.3×5	66				
33	5×5	44	5×5	53	6.3×5	68	6.3×5	76						
47	5×5	52	6.3×5	74	6.3×5	81								
68	6.3×5	74	6.3×5	89										
100	6.3×5	89												

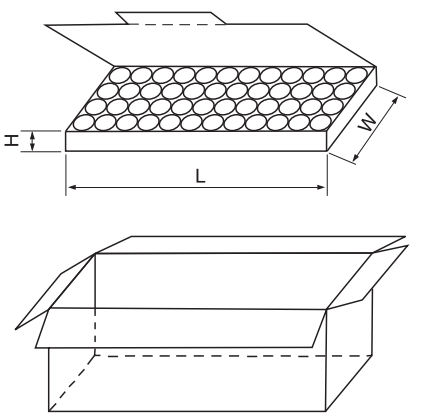
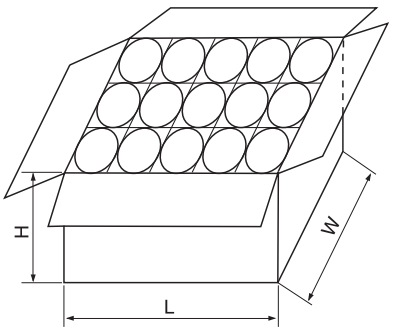
Ripple current (mA rms) at 85˚C, 120Hz
Case size ØD×L (mm)

FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

μF \ Frequency	50Hz	120Hz	300Hz	1kHz	10kHz≦
~ 47	0.75	1.00	1.35	1.55	2.00
68 ~ 680	0.80	1.00	1.25	1.35	1.50

5 LARGE ALUMINUM ELECTROLYTIC CAPACITORS

PACKING

FIGURE 1	FIGURE 2
SNAP-IN TYPE INNER, MIDDLE BOX	SCREW TYPE BOX
	

● SNAP-IN TYPE PACKAGING Quantity (pcs) / BOX (FIGURE 1)

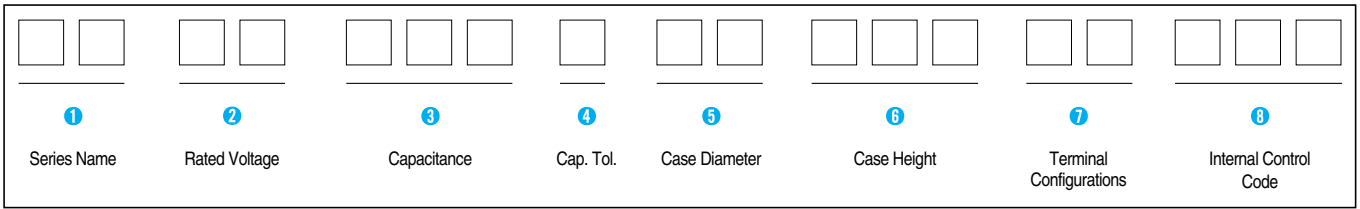
SIZE		SNAP-IN(QUANTITY)	
ØD	L	INNER BOX	MIDDLE BOX
20, 22	20 ~ 40	200	600
	45 ~ 50		
25	20 ~ 40	150	450
	45 ~ 50		
	60		
30	20 ~ 40	100	300
	45 ~ 55		
	60 ~ 80		
35	20 ~ 40	50	200
	45 ~ 55		
	60 ~ 80		150
	100 ~ 120		
40	30 ~ 40	50	150
	50		
	60 ~ 80		
	90 ~ 110		

● SCREW TYPE PACKAGING Quantity (pcs) / BOX & BOX SIZE (FIGURE 2)

SIZE		SCREW
ØD	L	QUANTITY
35	50 ~ 100	60
	105 ~ 120	60
51	50 ~ 100	30
	105 ~ 125	30
	130 ~ 140	30
64	60 ~ 100	25
	105 ~ 125	25
	130 ~ 160	25
76	80 ~ 100	16
	105 ~ 125	16
	130 ~ 160	16
89	100 ~ 160	9

PART NUMBER SYSTEM

Part Number System



1 Series Name

See page 5.

2 Rated Working Voltage

WV	6.3	10	16	25	35
Code	0J	1A	1C	1E	1V

WV	40	50	63	100	160
Code	1G	1H	1J	2A	2C

WV	200	250	315	330	350
Code	2D	2E	2F	2L	2V

WV	360	400	450	500	550
Code	2Z	2G	2W	2H	7H

3 Capacitance

ex) 47μF 476
470μF 477
4700μF 478
47000μF 479

4 Capacitance Tolerance

Tolerance (%)	±10	±20	0 +20	−10 +20	−10 +30	−10 +50
Code	K	M	W	V	Q	T

5 Case Diameter

ex) ø14 14
ø25.4 25
ø30 30
ø63.5 64
ø76.2 76

6 Case Height

ex) 30mm 030
105mm 105

7 Terminal Configurations

Terminal Configurations		Code
Snap-in Terminal for PC board mounting	Terminal Length 6mm	HA
	Terminal Length 4mm	HC
Lug Terminal for Soldering	ØD ≦ 35	LC
	ØD = 40	LA
	ØD = 51	LD
	ØD ≧ 63.5	LE
Photo Flash	ØD ≦ 20	PJ
	ØD = 22	PK
	ØD = 25.4, 30	LC
	ØD = 35	LF
Screw Terminal Type		SB
Screw Terminal Type (Stud Type)		TB

LARGE ALUMINUM ELECTROLYTIC CAPACITORS

HC Snap-in Terminal Type, Standard Series

Solvent Proof
WV≦100V

· Standard snap-in terminal type
· Including height 20mm products, low profile sized (Voltage range of 160 ~ 450V)
· Complied to the RoHS directive

HE ⇦ Wide temp. | HC | ⇨ HJ Smaller

Item	Characteristics
Operating temperature range	WV< 350 : -40 ~ +85˚C, WV≧350 : -25 ~ +85˚C
Capacitance tolerance	±20% at 120Hz, 20˚C
Leakage current max.	I=3 $\sqrt{CV}$ (μA) (after 5 minutes)
Dissipation factor max. (at 120Hz, 20˚C)	Capacitance > 1000μF : tanδ increases by 0.01 for each 1000μF from below value.

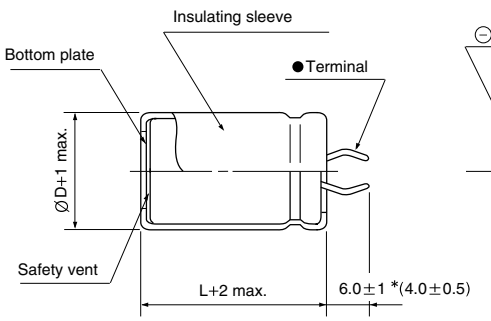
WV	6.3	10	16, 25	35	50, 63	80, 100	160 ~ 400	450, 500
tanδ	0.45	0.40	0.35	0.30	0.25	0.20	0.15	0.20

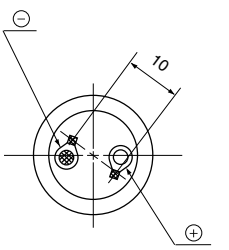
Load life (after application of the rated voltage for 2000 hours at 85˚C)		
	Leakage current	Less than specified value
	Capacitance change	Within ±20% of initial value
	tanδ	Less than 200% of specified value
Shelf life (after leaving capacitors under no load at 85˚C for 1000 hours)		
	Leakage current	Less than specified value
	Capacitance change	Within ±15% of initial value
	tanδ	Less than 150% of specified value

DRAWING

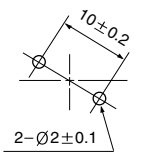
Unit : mm

ØD≦35

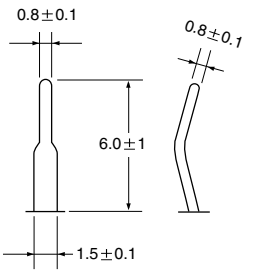




PC Board Mounting Holes

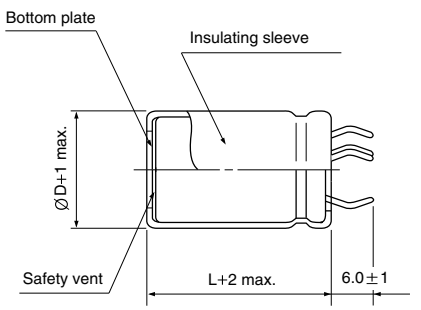


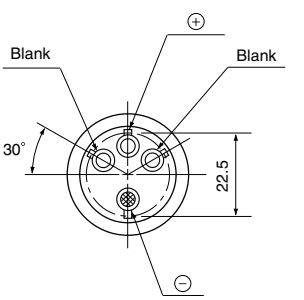
● Terminal



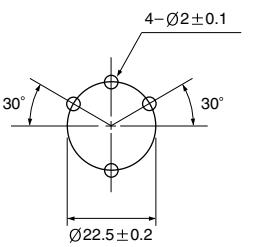
* Shorter terminal(4.0±0.5) is also available upon request.
Terminal length of height 20mm products is applied shorter terminal to standard terminal type.

ØD=40





PC Board Mounting Holes



FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

μF \ Frequency(Hz)	50Hz	120Hz	300Hz	1kHz	10kHz~
~ 100	0.85	1.00	1.06	1.15	1.20
160 ~ 250	0.85	1.00	1.20	1.25	1.45
300 ~	0.85	1.00	1.15	1.20	1.40

HC series

● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV / ØD / μF	6.3					10					16				
	22	25.4	30	35	40	22	25.4	30	35	40	22	25.4	30	35	40
10000											22×25 3.32				
12000						22×25 3.31					22×30 3.55	25.4×25 3.89			
15000	22×25 3.39					22×30 3.82	25.4×25 3.39				22×35 4.29	25.4×30 4.45	30×25 4.56		
18000	22×30 3.85	25.4×25 3.96				22×35 4.28	25.4×25 4.17				22×40 4.77	25.4×35 4.96	30×30 5.10		
22000	22×35 4.34	25.4×25 4.22				22×40 4.79	25.4×30 4.71	30×25 4.83			22×50 5.51	25.4×40 5.51	30×30 5.39		
27000	22×40 4.85	25.4×30 4.77	30×25 4.89			22×45 5.30	25.4×35 5.26	30×30 5.41				25.4×45 6.06	30×35 5.98	35×25 5.80	
33000	22×45 5.36	25.4×35 5.32	30×30 5.47			22×50 5.82	25.4×40 5.81	30×30 5.69	35×25 5.81				30×40 6.56	35×30 6.41	
39000	22×50 5.83	25.4×40 5.82	30×30 5.70	35×25 5.82			25.4×45 6.31	30×35 6.22	35×30 6.38				30×45 7.08	35×35 6.96	
47000		25.4×45 6.35	30×35 6.26	35×30 6.41			25.4×50 6.83	30×40 6.78	35×30 6.62				30×50 7.62	35×40 7.54	
56000		25.4×50 6.85	30×40 6.80	35×30 6.64				30×45 7.31	35×35 7.18					35×45 8.08	40×40 8.23
68000			30×45 7.35	35×35 7.23					35×40 7.76					35×50 8.63	40×50 9.13
100000				35×45 8.34	40×40 8.49					40×50 9.35					40×60 10.2

WV / ØD / μF	25					35					50				
	22	25.4	30	35	40	22	25.4	30	35	40	22	25.4	30	35	40
3300											22×30 2.97	25.4×25 3.06			
4700						22×30 3.06	25.4×25 2.98				22×40 3.83	25.4×35 3.98	30×25 3.86	35×25 4.19	
5600	22×25 2.65					22×35 3.28	25.4×30 3.39				22×45 4.26	25.4×40 4.44	30×30 4.35	35×25 4.44	
6800	22×30 3.06	25.4×25 3.15				22×40 3.73	25.4×30 3.67	30×25 3.76			22×50 4.77	25.4×40 4.76	30×35 4.92	35×30 5.04	
8200	22×35 3.45	25.4×30 3.57				22×45 4.13	25.4×35 4.10	30×30 4.22				25.4×50 5.43	30×40 5.38	35×30 5.26	
10000	22×40 3.95	25.4×30 3.89	30×25 3.99			22×50 4.68	25.4×40 4.68	30×30 4.58					30×45 6.07	35×35 5.97	
12000	22×45 4.41	25.4×35 4.37	30×30 4.50				25.4×45 5.18	30×35 5.11	35×30 5.24				30×50 6.62	35×40 6.55	
15000	22×50 4.94	25.4×40 4.94	30×35 5.10					30×40 5.72	35×35 5.88					35×45 7.20	
18000		25.4×45 5.45	30×35 5.38	35×30 5.51				30×45 6.28	35×40 6.46					35×50 7.74	40×40 7.62
22000			30×45 6.22	35×35 6.12					35×45 7.07	40×40 7.20					40×50 8.54
27000			30×50 6.82	35×40 6.74						40×50 8.14					40×60 9.45
33000				35×45 7.35	40×40 7.48					40×50 8.46					

WV / ØD / μF	63					80					100				
	22	25.4	30	35	40	22	25.4	30	35	40	22	25.4	30	35	40
1200						22×25 2.24					22×30 2.39	25.4×25 2.46			
1500						22×30 2.67					22×35 2.83	25.4×30 2.93	30×25 3.00		
1800	22×25 2.20					22×30 2.92	25.4×25 3.01				22×40 3.26	25.4×35 3.39	30×30 3.49		
2200	22×30 2.50	25.4×25 2.58				22×35 3.25	25.4×30 3.36	30×25 3.45			22×45 3.58	25.4×40 3.74	30×30 3.66		
2700	22×35 2.94	25.4×30 3.04				22×40 3.79	25.4×35 3.94	30×30 4.05				25.4×45 4.33	30×35 4.27	35×30 4.37	
3300	22×35 3.14	25.4×30 3.26	30×25 3.34			22×45 4.18	25.4×40 4.36	30×30 4.27				25.4×50 4.76	30×40 4.72	35×35 4.85	
3900	22×40 3.60	25.4×35 3.74	30×30 3.85			22×50 4.75	25.4×45 4.96	30×35 4.89					30×45 5.36	35×35 5.27	
4700	22×50 4.19	25.4×40 4.19	30×35 4.10	35×30 4.19			25.4×50 5.44	30×40 5.39	35×30 5.27				30×50 5.86	35×40 5.80	
5600		25.4×45 4.65	30×35 4.58	35×30 4.70				30×45 5.91	35×35 5.81					35×45 6.34	40×40 6.45
6800		25.4×50 5.20	30×40 5.16	35×30 5.04					35×40 6.45						40×50 7.40
8200			30×45 5.62	35×35 5.53					35×45 6.91	40×40 7.04					40×50 7.60
10000			30×50 6.32	35×40 6.25						40×50 8.14	← Case size ØD×L (mm)				
12000				35×45 6.83	40×40 6.95						← Ripple current (Arms) at 85°C, 120Hz				

* Note: Case diameter (Ø20) is available upon request.

HC series

● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV / ØD / μF	160					200					250				
	22	25.4	30	35	40	22	25.4	30	35	40	22	25.4	30	35	40
150											22×25 0.90	25.4×20 0.92			
180						22×20 0.91					22×25 0.90	25.4×20 1.01			
220	22×20 1.01					22×25 1.09	25.4×20 1.11				22×25 1.09	25.4×25 1.19	30×20 1.22		
270	22×25 1.20	25.4×20 1.32				22×25 1.20	25.4×25 1.32	30×20 1.35			22×30 1.28	25.4×25 1.32	30×20 1.35		
330	22×25 1.33	25.4×20 1.36				22×30 1.42	25.4×25 1.46	30×20 1.49			22×35 1.50	25.4×30 1.56	30×25 1.60	35×20 1.62	
390	22×25 1.45	25.4×25 1.59	30×20 1.62			22×30 1.54	25.4×25 1.59	30×25 1.74	35×20 1.77		22×40 1.72	25.4×30 1.69	30×25 1.73	35×20 1.77	
470	22×30 1.69	25.4×25 1.75	30×20 1.78			22×35 1.79	25.4×30 1.86	30×25 1.90	35×20 1.94		22×45 1.98	25.4×35 1.96	30×30 2.02	35×25 2.06	
560	22×35 1.96	25.4×30 2.03	30×25 2.08	35×20 2.12		22×40 2.06	25.4×35 2.14	30×25 2.08	35×25 2.25		22×50 2.26	25.4×40 2.25	30×30 2.20	35×25 2.25	
680	22×40 2.27	25.4×30 2.23	30×25 2.29	35×20 2.33		22×45 2.38	25.4×40 2.48	30×30 2.43	35×25 2.48			25.4×45 2.60	30×35 2.56	35×30 2.62	
820	22×45 2.61	25.4×35 2.59	30×30 2.67	35×25 2.73		22×50 2.73	25.4×45 2.85	30×35 2.81	35×30 2.88				30×40 2.95	35×35 3.03	
1000	22×50 3.01	25.4×40 3.01	30×30 2.95	35×25 3.01				30×40 3.26	35×30 3.18				30×45 3.40	35×40 3.50	
1200		25.4×45 3.23	30×35 3.18	35×30 3.26				30×45 3.49	35×35 3.43					35×45 3.74	40×40 3.81
1500			30×40 3.73	35×35 3.83				30×50 4.06	35×40 4.01					35×50 4.35	40×50 4.60
1800				35×40 4.39	40×40 4.66				35×45 4.58	40×40 4.66					40×60 5.39

WV / ØD / μF	315					350					400				
	22	25.4	30	35	40	22	25.4	30	35	40	22	25.4	30	35	40
68											22×20 0.56				
82						22×20 0.62					22×25 0.66	25.4×20 0.68			
100	22×20 0.68					22×25 0.73	25.4×20 0.75				22×30 0.78	25.4×25 0.81	30×20 0.82		
120	22×25 0.80	25.4×20 0.82				22×30 0.86	25.4×25 0.88	30×20 0.90			22×30 0.86	25.4×25 0.88	30×20 0.90		
150	22×30 0.96	25.4×25 0.99	30×20 1.01			22×35 1.01	25.4×30 1.05	30×20 1.01			22×35 1.01	25.4×30 1.05	30×25 1.08	35×20 1.09	
180	22×35 1.11	25.4×30 1.15	30×25 1.18	35×20 1.20		22×40 1.17	25.4×35 1.21	30×25 1.18	35×20 1.20		22×40 1.17	25.4×35 1.21	30×25 1.18	35×25 1.28	
220	22×40 1.29	25.4×30 1.27	30×25 1.30	35×20 1.33		22×45 1.35	25.4×35 1.34	30×30 1.38	35×25 1.41		22×45 1.35	25.4×40 1.41	30×30 1.38	35×25 1.41	
270	22×45 1.50	25.4×35 1.49	30×30 1.53	35×25 1.56			25.4×45 1.64	30×35 1.61	35×25 1.65			25.4×45 1.64	30×35 1.61	35×30 1.65	
330	22×50 1.73	25.4×40 1.73	30×35 1.78	35×30 1.83			25.4×50 1.89	30×40 1.87	35×30 1.83			25.4×50 1.89	30×40 1.87	35×30 1.83	
390		25.4×45 1.97	30×35 1.94	35×30 1.99				30×45 2.12	35×35 2.09				30×45 2.12	35×35 2.09	
470			30×40 2.23	35×35 2.29				30×50 2.43	35×40 2.40				30×50 2.43	35×40 2.40	
560				35×40 2.62					35×45 2.73					35×45 2.73	40×40 2.78
680				35×45 3.01					35×50 3.13	40×40 3.06					40×50 3.31
820				35×50 3.44	40×40 3.37					40×50 3.63					40×60 3.89

WV / ØD / μF	450					500				
	22	25.4	30	35	40	22	25.4	30	35	40
56	22×20 0.51									
68	22×25 0.60	25.4×20 0.62				22×30 0.49				
82	22×30 0.71	25.4×25 0.73	30×20 0.74			22×35 0.57	25.4×30 0.59			
100	22×35 0.83	25.4×30 0.86	30×25 0.88	35×20 0.89		22×40 0.67	25.4×35 0.69			
120	22×40 0.95	25.4×35 0.99	30×25 0.96	35×20 0.98			25.4×40 0.80			
150	22×50 1.17	25.4×40 1.17	30×30 1.14	35×25 1.17				30×35 0.92		
180		25.4×45 1.34	30×35 1.32	35×25 1.28				30×40 1.06		
220		25.4×50 1.54	30×40 1.53	35×30 1.49				30×45 1.22		
270			30×45 1.77	35×35 1.74					35×45 1.45	
330			30×50 2.03	35×40 2.01					35×50 1.66	
390				35×45 2.28						
470				35×50 2.60	40×40 2.55					40×50 2.10
560					40×50 3.00					40×60 2.45
680					40×60 3.54					40×60 2.70

← Case size ØD×L (mm)
← Ripple current (Arms) at 85°C, 120Hz

HJ Snap-in Terminal Type, Miniaturized Series

Miniaturized

- Smaller case sizes than HC series
- High CV series
- Load life of 3000 hours at 85°C
- Voltage range of 160 ~ 450V
- Complied to the RoHS directive

HC Smaller → HJ → HK Wide temp.

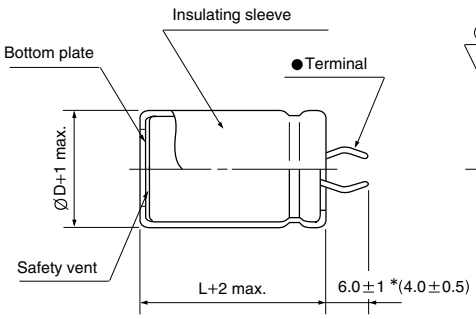
Item	Characteristics
Operating temperature range	WV< 350 : -40 ~ +85°C, WV≧350 : -25 ~ +85°C
Capacitance tolerance	±20% at 120Hz, 20°C
Leakage current max.	I=3$\sqrt{CV}$ (μA) (after 5 minutes)
Dissipation factor max. (at 120Hz, 20°C)	Capacitance > 1000μF : tanδ increases by 0.01 for each 1000μF from below value.

WV	160	200	250	350	400	450
tanδ	0.15	0.15	0.15	0.15	0.15	0.20

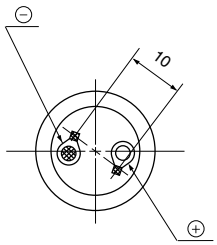
Load life (after application of the rated voltage for 3000 hours at 85°C)		
	Leakage current	Less than specified value
	Capacitance change	Within ±20% of initial value
	tanδ	Less than 200% of specified value
Shelf life (at 85°C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value.	

DRAWING

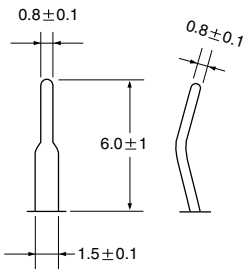
Unit : mm



PC Board Mounting Holes



Terminal



∗ Shorter terminal(4.0±0.5) is also available upon request.
Terminal length of height 20mm products is applied shorter terminal to standard terminal type.

FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

μF \ Frequency	50Hz	120Hz	300Hz	1kHz	10kHz~
160 ~ 250	0.85	1.00	1.20	1.25	1.45
300 ~	0.85	1.00	1.15	1.20	1.40

HJ series

● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV / μF \ ØD	160				200				250			
	22	25.4	30	35	22	25.4	30	35	22	25.4	30	35
150									22×20 0.83			
180					22×20 0.91				22×20 0.91			
220					22×20 1.01				22×25 1.09	25.4×20 1.11		
270	22×20 1.12				22×25 1.20	25.4×20 1.23			22×25 1.20	25.4×25 1.32		
330	22×25 1.33	25.4×20 1.36			22×25 1.33	25.4×20 1.36			22×30 1.42	25.4×25 1.46	30×20 1.49	
390	22×25 1.45	25.4×20 1.48			22×25 1.45	25.4×25 1.59	30×20 1.62		22×35 1.63	25.4×30 1.69	30×25 1.73	35×20 1.77
470	22×30 1.69	25.4×25 1.75			22×30 1.69	25.4×25 1.75	30×20 1.78		22×35 1.79	25.4×35 1.96	30×25 1.90	35×20 1.94
560	22×30 1.85	25.4×25 1.91	30×20 1.94		22×35 1.96	25.4×30 2.03	30×25 2.08	35×20 2.12	22×40 2.06	25.4×35 2.14	30×25 2.08	35×25 2.25
680	22×35 2.16	25.4×30 2.23	30×25 2.29	35×20 2.33	22×40 2.27	25.4×30 2.23	30×25 2.29	35×25 2.33	22×50 2.49	25.4×40 2.48	30×30 2.43	35×25 2.48
820	22×40 2.50	25.4×30 2.45	30×25 2.52	35×20 2.56	22×45 2.61	25.4×35 2.59	30×30 2.67	35×25 2.73		25.4×45 2.85	30×35 2.81	35×30 2.88
1000	22×45 2.89	25.4×35 2.86	30×30 2.95	35×25 3.01	22×50 3.01	25.4×40 3.01	30×35 3.11	35×30 3.18			30×40 3.26	35×35 3.35
1200	22×50 3.09	25.4×40 3.08	30×30 3.02	35×25 3.08		25.4×45 3.23	30×35 3.18	35×30 3.26			30×45 3.49	35×35 3.43
1500		25.4×45 3.61	30×35 3.56	35×30 3.65			30×45 3.90	35×35 3.83				35×40 4.01
1800			30×40 4.09	35×35 4.20			30×50 4.44	35×40 4.39				35×50 4.76
2200			30×50 4.63	35×40 4.58				35×45 4.77				
2700				35×45 5.29								
3300				35×50 5.77								

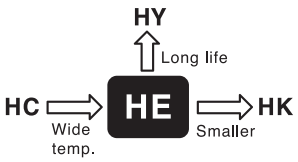
WV / μF \ ØD	350				400				450			
	22	25.4	30	35	22	25.4	30	35	22	25.4	30	35
56									22×20 0.51			
68					22×20 0.56				22×20 0.56			
82					22×20 0.62				22×25 0.66	25.4×20 0.68		
100	22×20 0.68				22×25 0.73	25.4×20 0.75			22×25 0.73	25.4×25 0.81		
120	22×25 0.80	25.4×20 0.82			22×25 0.80	25.4×20 0.82			22×30 0.86	25.4×25 0.88	30×20 0.90	
150	22×25 0.90	25.4×25 0.92			22×30 0.90	25.4×25 0.99	30×20 1.01		22×35 1.01	25.4×30 1.05	30×25 1.08	35×20 1.10
180	22×30 1.05	25.4×25 1.08			22×30 1.05	25.4×25 1.08	30×25 1.10		22×35 1.11	25.4×35 1.21	30×25 1.18	35×20 1.20
220	22×30 1.16	25.4×30 1.19	30×25 1.22		22×35 1.23	25.4×30 1.27	30×25 1.30	35×20 1.33	22×40 1.29	25.4×35 1.34	30×25 1.30	35×25 1.41
270	22×35 1.36	25.4×30 1.41	30×25 1.44	35×20 1.47	22×40 1.43	25.4×35 1.49	30×30 1.44	35×25 1.47	22×50 1.57	25.4×40 1.56	30×30 1.53	35×25 1.56
330	22×45 1.58	25.4×35 1.56	30×30 1.60	35×25 1.62	22×50 1.66	25.4×40 1.64	30×30 1.69	35×25 1.73		25.4×45 1.81	30×35 1.78	35×30 1.83
390	22×50 1.80	25.4×40 1.79	30×30 1.84	35×25 1.88		25.4×45 1.88	30×35 1.94	35×30 1.99			30×40 2.03	35×35 2.09
470		25.4×45 2.06	30×35 2.02	35×30 2.06		25.4×50 2.16	30×40 2.23	35×30 2.18			30×45 2.33	35×35 2.29
560		25.4×50 2.46	30×40 2.32	35×35 2.38			30×45 2.55	35×35 2.50				35×40 2.62
680			30×45 2.69	35×35 2.76			30×50 2.92	35×40 2.89				35×50 3.13
820				35×40 3.17				35×50 3.31	← Case size ØD×L (mm) ← Ripple current (Arms) at 85°C, 120Hz			
1000				35×45 3.65								

Upgrade **HE**

Wide Temperature Range, Standard Series

- Wide temperature range of -40(-25) ~ +105˚C
- Standard snap-in terminal type
- Including height 20mm products, low profile sized (Voltage range of 160 ~ 500V)
- Complied to the RoHS directive

Solvent Proof
WV≦100V



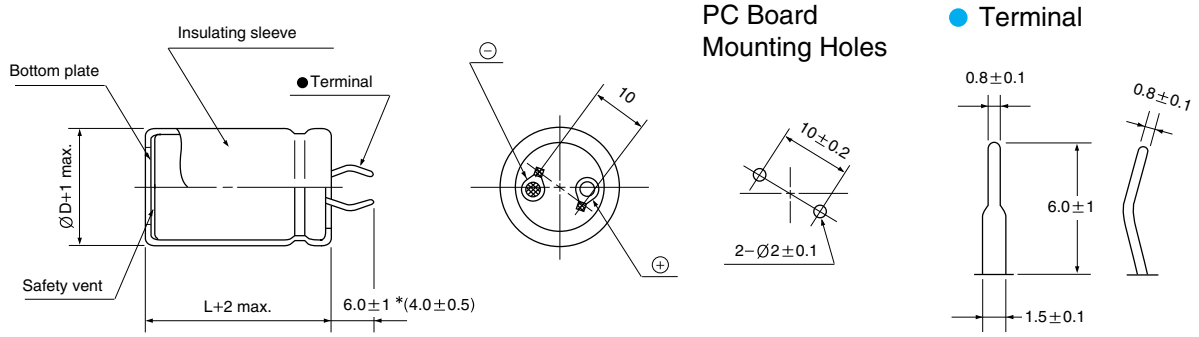
Item	Characteristics
Operating temperature range	WV< 350 : -40 ~ +105˚C, WV ≧ 350 : -25 ~ +105˚C
Capacitance tolerance	±20% at 120Hz, 20˚C
Leakage current max.	I=3$\sqrt{CV}$ (μA) (after 5 minutes)
Dissipation factor max. (at 120Hz, 20˚C)	Capacitance > 1000μF : tanδ increases by 0.01 for each 1000μF from below value.
Load life (after application of the rated voltage for 3000 hours at 105˚C)	Leakage current: Less than specified value Capacitance change: Within ±20% of initial value tanδ: Less than 200% of specified value 160 ~ 500WV products are for 2000 hours
Shelf life (at 105˚C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value.

WV	6.3, 10	16	25, 35	50, 63	80, 100	160~400	450, 500
tanδ	0.50	0.40	0.35	0.25	0.20	0.15	0.20

DRAWING

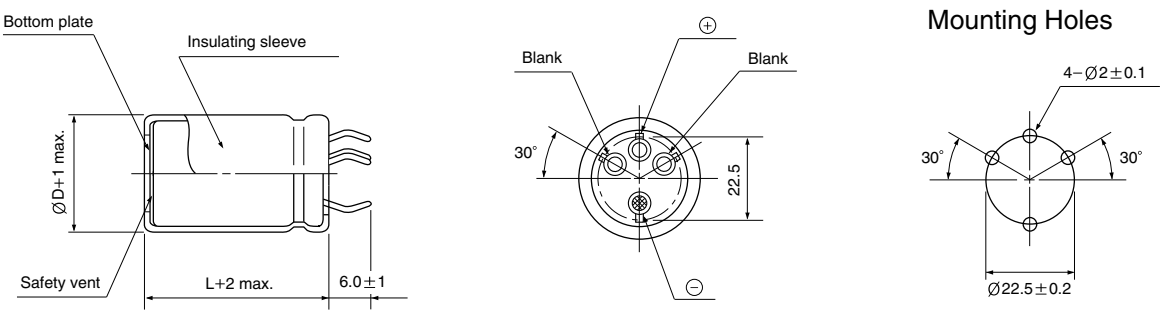
Unit : mm

ØD≦35



* Shorter terminal(4.0±0.5) is also available upon request.
Terminal length of height 20mm products is applied shorter terminal to standard terminal type.

ØD=40



FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

μF \ Frequency(Hz)	50Hz	120Hz	300Hz	1kHz	10kHz~
~ 100	0.85	1.00	1.06	1.15	1.20
160 ~ 250	0.85	1.00	1.20	1.25	1.45
300 ~	0.85	1.00	1.15	1.20	1.40

LARGE ALUMINUM ELECTROLYTIC CAPACITORS

HE series

● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV / μF \ ØD	6.3					10					16				
	22	25.4	30	35	40	22	25.4	30	35	40	22	25.4	30	35	40
8200											22×25 2.14				
10000						22×25 2.17					22×30 2.48	25.4×25 2.56			
12000	22×25 2.19					22×30 2.48					22×35 2.80	25.4×30 2.90	30×25 2.97		
15000	22×30 2.53					22×35 2.83	25.4×25 2.75				22×40 3.17	25.4×35 3.29	30×30 3.38		
18000	22×35 2.85	25.4×25 2.77				22×35 3.00	25.4×30 3.11				22×45 3.50	25.4×40 3.65	30×30 3.57		
22000	22×35 3.04	25.4×30 3.15				22×40 3.35	25.4×35 3.48	30×25 3.38				25.4×45 4.03	30×35 3.98		
27000	22×40 3.40	25.4×35 3.53	30×25 3.42			22×50 3.88	25.4×40 3.87	30×30 3.79				25.4×50 4.42	30×40 4.39	35×30 4.29	
33000	22×50 3.92	25.4×40 3.91	30×30 3.83				25.4×45 4.26	30×35 4.20					30×45 4.79	35×35 4.71	
39000		25.4×45 4.26	30×35 4.20				25.4×50 4.60	30×40 4.57	35×30 4.46				30×50 5.16	35×40 5.10	
47000		25.4×50 4.63	30×40 4.60	35×30 4.50				30×45 4.95	35×35 4.87					35×45 5.50	40×40 5.60
56000			30×50 5.17	35×40 5.12					35×45 5.49	40×40 5.59					40×50 6.22
68000				35×45 5.52	40×40 5.62					40×50 6.22					40×60 6.83

WV / μF \ ØD	25					35					50				
	22	25.4	30	35	40	22	25.4	30	35	40	22	25.4	30	35	40
2700											22×30 1.94				
3300						22×25 1.62					22×35 2.20				
3900						22×30 1.88					22×40 2.52	25.4×35 2.62	30×25 2.54		
4700	22×25 1.73					22×35 2.14	25.4×25 2.09				22×45 2.81	25.4×40 2.93	30×30 2.87		
5600	22×30 1.98					22×35 2.29	25.4×30 2.37	30×25 2.43			22×50 3.11	25.4×40 3.11	30×35 3.21		
6800	22×30 2.14					22×40 2.61	25.4×35 2.71	30×30 2.79				25.4×50 3.64	30×40 3.61	35×30 3.53	
8200	22×35 2.42	25.4×30 2.50				22×50 3.02	25.4×40 3.02	30×30 2.95					30×45 3.94	35×35 3.87	
10000	22×40 2.77	25.4×35 2.88					25.4×45 3.43	30×35 3.38					30×50 4.42	35×40 4.37	
12000	22×45 3.09	25.4×40 3.22	30×30 3.15				25.4×50 3.78	30×40 3.75	35×30 3.67					35×45 4.78	
15000		25.4×45 3.62	30×35 3.57	35×30 3.65				30×45 4.19	35×35 4.12					35×50 5.24	40×40 5.13
18000		25.4×50 3.98	30×40 3.95	35×35 4.06					35×40 4.52						40×50 5.76
22000			30×45 4.36	35×35 4.28					35×45 4.95	40×40 5.04					40×50 5.98
27000				35×45 4.92	40×40 5.01					40×50 5.92					40×60 6.61

WV / μF \ ØD	63					80					100				
	22	25.4	30	35	40	22	25.4	30	35	40	22	25.4	30	35	40
820						22×25 1.37					22×30 1.46	25.4×25 1.51			
1000						22×30 1.62	25.4×25 1.67				22×35 1.71	25.4×30 1.77			
1200	22×25 1.37					22×30 1.67	25.4×25 1.72				22×40 1.86	25.4×35 1.94	30×25 1.88		
1500	22×30 1.50	25.4×25 1.54				22×35 1.98	25.4×30 2.05				22×45 2.18	25.4×40 2.28	30×30 2.23		
1800	22×30 1.64	25.4×25 1.69				22×40 2.28	25.4×35 2.37	30×25 2.30				25.4×45 2.61	30×35 2.57		
2200	22×35 1.86	25.4×30 1.92				22×45 2.51	25.4×35 2.49	30×30 2.56				25.4×50 2.85	30×40 2.83	35×30 2.76	
2700	22×40 2.17	25.4×30 2.13	30×25 2.18				25.4×45 3.03	30×35 2.99					30×45 3.27	35×35 3.22	
3300	22×50 2.53	25.4×40 2.53	30×30 2.48				25.4×50 3.33	30×40 3.30	35×30 3.23				30×50 3.59	35×40 3.55	
3900		25.4×45 2.88	30×35 2.84					30×45 3.75	35×35 3.69					35×45 4.03	
4700		25.4×50 3.20	30×40 3.17	35×30 3.10				30×50 4.10	35×40 4.06					35×50 4.40	40×40 4.31
5600			30×45 3.51	35×35 3.46					35×45 4.44						40×50 4.88
6800			30×50 3.92	35×40 3.88					35×50 4.90	40×40 4.80					40×50 5.18
8200				35×45 4.22						40×50 5.32	← Case size ØD×L (mm) ← Ripple current (Arms) at 105°C, 120Hz				
10000				35×50 4.74	40×40 4.64										

HE series

● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV / ØD / μF	160					200					250				
	22	25.4	30	35	40	22	25.4	30	35	40	22	25.4	30	35	40
150						22×20 0.63					22×25 0.68	25.4×20 0.69			
180	22×20 0.69					22×20 0.69					22×25 0.74	25.4×20 0.76	30×20 0.83		
220	22×20 0.76					22×25 0.82	25.4×20 0.84				22×30 0.88	25.4×25 0.90	30×20 0.92		
270	22×25 0.91	25.4×20 0.93				22×30 0.91	25.4×25 1.00	30×20 1.02			22×35 1.03	25.4×30 1.06	30×25 1.09	35×20 1.11	
330	22×25 1.01	25.4×25 1.10	30×20 1.13			22×30 1.07	25.4×25 1.11	30×20 1.13			22×40 1.20	25.4×30 1.18	30×25 1.21	35×20 1.23	
390	22×30 1.17	25.4×25 1.20	30×20 1.23			22×35 1.24	25.4×30 1.28	30×25 1.31	35×20 1.34		22×45 1.36	25.4×40 1.42	30×30 1.39	35×25 1.42	
470	22×35 1.36	25.4×25 1.32	30×25 1.44	35×20 1.47		22×40 1.43	25.4×35 1.40	30×25 1.44	35×25 1.56		22×50 1.56	25.4×40 1.56	30×30 1.53	35×25 1.56	
560	22×40 1.56	25.4×30 1.53	30×25 1.57	35×25 1.70		22×45 1.63	25.4×40 1.62	30×30 1.67	35×25 1.70			25.4×50 1.86	30×35 1.76	35×30 1.80	
680	22×45 1.80	25.4×35 1.79	30×25 1.73	35×25 1.88		22×50 1.88	25.4×45 1.96	30×30 1.84	35×25 1.88				30×45 2.12	35×35 2.09	
820	22×50 2.06	25.4×40 2.06	30×30 2.02	35×25 2.06			25.4×50 2.25	30×35 2.13	35×30 2.18					35×40 2.40	
1000		25.4×45 2.38	30×35 2.35	35×30 2.41				30×45 2.57	35×35 2.53					35×45 2.76	40×40 2.81
1200		25.4×50 2.52	30×40 2.50	35×30 2.44				30×50 2.72	35×35 2.57	40×40 2.85				35×50 2.91	40×50 3.08
1500				35×40 3.00	40×40 3.19				35×45 3.13	40×50 3.44					40×60 3.68

WV / ØD / μF	315					350					400				
	22	25.4	30	35	40	22	25.4	30	35	40	22	25.4	30	35	40
56											22×20 0.37				
68						22×20 0.41					22×25 0.44	25.4×20 0.45			
82	22×20 0.45					22×25 0.48	25.4×20 0.49				22×30 0.51	25.4×25 0.53	30×20 0.54		
100	22×25 0.53	25.4×20 0.55				22×25 0.53	25.4×25 0.59	30×20 0.60			22×35 0.60	25.4×30 0.62	30×20 0.60		
120	22×30 0.62	25.4×25 0.64	30×20 0.65			22×30 0.62	25.4×25 0.64	30×20 0.65			22×40 0.69	25.4×30 0.68	30×25 0.70	35×20 0.71	
150	22×35 0.74	25.4×30 0.76	30×20 0.73			22×40 0.78	25.4×30 0.76	30×25 0.78	35×20 0.80		22×45 0.81	25.4×35 0.81	30×30 0.83	35×20 0.80	
180	22×40 0.85	25.4×35 0.88	30×25 0.86	35×20 0.87		22×45 0.89	25.4×35 0.88	30×30 0.91	35×20 0.87		22×50 0.93	25.4×40 0.93	30×30 0.91	35×25 0.93	
220	22×45 0.98	25.4×35 0.98	30×30 1.00	35×20 0.96		22×50 1.03	25.4×40 1.03	30×30 1.00	35×25 1.03			25.4×45 1.07	30×35 1.06	35×30 1.08	
270		25.4×45 1.19	30×35 1.17	35×25 1.14			25.4×45 1.19	30×35 1.17	35×30 1.20			25.4×50 1.24	30×40 1.23	35×30 1.20	
330		25.4×50 1.37	30×40 1.36	35×30 1.33				30×40 1.36	35×35 1.40				30×45 1.42	35×35 1.40	
390			30×45 1.54	35×35 1.52				30×45 1.54	35×40 1.59				30×50 1.61	35×40 1.59	
470			30×50 1.76	35×40 1.74					35×45 1.82					35×45 1.82	40×40 1.85
560				35×40 1.90					35×50 2.06	40×40 2.02				35×50 2.06	40×50 2.18
680				35×50 2.27	40×40 2.23					40×50 2.40					40×60 2.57

WV / ØD / μF	450					500				
	22	25.4	30	35	40	22	25.4	30	35	40
47	22×20 0.34					22×25 0.27	25.4×20 0.27			
56	22×25 0.40	25.4×20 0.41				22×30 0.31	25.4×25 0.32	30×20 0.33		
68	22×30 0.47	25.4×25 0.48	30×20 0.49			22×35 0.36	25.4×30 0.38	30×25 0.39	35×20 0.39	
82	22×35 0.54	25.4×30 0.56	30×20 0.54			22×40 0.42	25.4×35 0.44	30×25 0.43	35×20 0.43	
100	22×40 0.63	25.4×30 0.62	30×25 0.64	35×20 0.65		22×45 0.49	25.4×40 0.51	30×30 0.50	35×25 0.51	
120	22×45 0.73	25.4×35 0.72	30×30 0.74	35×25 0.76		22×50 0.56	25.4×45 0.58	30×35 0.58	35×30 0.59	
150	22×50 0.85	25.4×40 0.85	30×30 0.83	35×25 0.85			25.4×50 0.68	30×40 0.67	35×35 0.69	
180		25.4×45 0.97	30×35 0.96	35×30 0.98				30×45 0.77	35×40 0.79	
220		25.4×50 1.12	30×40 1.11	35×30 1.08				30×50 0.89	35×45 0.92	
270			30×45 1.28	35×35 1.26					35×45 1.01	40×40 1.03
330			30×50 1.48	35×40 1.46					35×50 1.17	40×50 1.23
390				35×45 1.66						40×50 1.34
470				35×50 1.89	40×40 1.85					
560					40×50 2.18	← Case size ØD×L (mm) ← Ripple current (Arms) at 105°C, 120Hz				

LARGE ALUMINUM ELECTROLYTIC CAPACITORS

HK Wide Temperature Range, Miniaturized Series

Miniaturized

- Smaller case sizes than HE series
- High CV series
- Load life of 3000 hours at 105˚C
- Complied to the RoHS directive

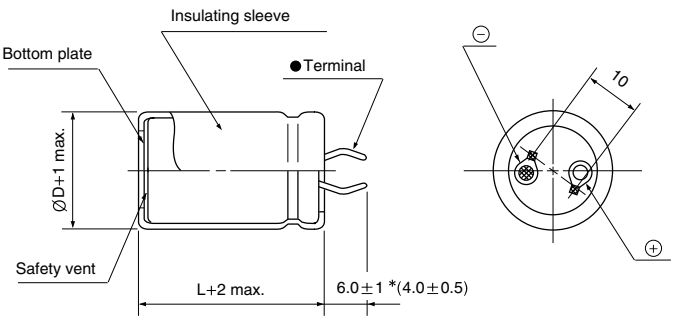
HE ⇨ HK ⇨ HL
Smaller — Long life

Item	Characteristics
Operating temperature range	WV< 350 : -40 ~ +105˚C, WV ≧350 : -25 ~ +105˚C
Capacitance tolerance	±20% at 120Hz, 20˚C
Leakage current max.	I=3$\sqrt{CV}$ (μA) (after 5 minutes)
Dissipation factor max. (at 120Hz, 20˚C)	Capacitance > 1000μF : tanδ increases by 0.01 for each 1000μF from below value.
Load life (after application of the rated voltage for 3000 hours at 105˚C)	Leakage current: Less than specified value Capacitance change: Within ±20% of initial value tanδ: Less than 200% of specified value
Shelf life (at 105˚C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value.

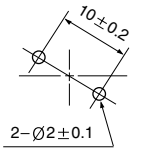
WV	160	200	250	350	400	450
tanδ	0.15	0.15	0.15	0.15	0.15	0.20

● DRAWING

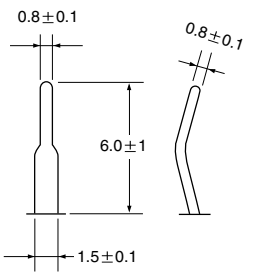
Unit : mm



PC Board Mounting Holes



● Terminal



* Shorter terminal(4.0±0.5) is also available upon request.
Terminal length of height 20mm products is applied shorter terminal to standard terminal type.

● FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

μF \ Frequency	50Hz	120Hz	300Hz	1kHz	10kHz~
160 ~ 250	0.85	1.00	1.20	1.25	1.45
300 ~	0.85	1.00	1.15	1.20	1.40

HK series

● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV / ØD / μF	160				200				250			
	22	25.4	30	35	22	25.4	30	35	22	25.4	30	35
120									22×20 0.56			
150					22×20 0.63				22×25 0.68	25.4×20 0.69		
180					22×20 0.69	25.4×20 0.76			22×25 0.74	25.4×20 0.76		
220	22×20 0.76				22×25 0.82	25.4×20 0.84			22×25 0.82	25.4×25 0.90	30×20 0.92	
270	22×25 0.91	25.4×20 0.93			22×25 0.91	25.4×25 1.00	30×20 1.02		22×30 0.97	25.4×25 1.00	30×20 1.02	
330	22×25 1.01	25.4×20 1.03			22×30 1.07	25.4×25 1.11	30×20 1.13		22×35 1.14	25.4×30 1.18	30×25 1.21	35×20 1.23
390	22×25 1.09	25.4×25 1.20	30×20 1.23		22×30 1.17	25.4×25 1.20	30×25 1.31	35×20 1.34	22×40 1.30	25.4×35 1.35	30×25 1.31	35×25 1.42
470	22×30 1.28	25.4×25 1.32	30×20 1.35		22×35 1.36	25.4×30 1.40	30×25 1.44	35×20 1.47	22×45 1.50	25.4×35 1.48	30×30 1.53	35×25 1.56
560	22×35 1.48	25.4×30 1.53	30×25 1.57	35×20 1.60	22×40 1.56	25.4×30 1.53	30×25 1.57	35×25 1.70	22×50 1.71	25.4×40 1.70	30×30 1.67	35×25 1.70
680	22×40 1.72	25.4×30 1.69	30×25 1.73	35×20 1.76	22×45 1.80	25.4×35 1.79	30×30 1.84	35×25 1.88		25.4×50 2.05	30×35 1.94	35×30 1.98
820	22×45 1.98	25.4×35 1.96	30×30 2.02	35×25 2.06		25.4×45 2.16	30×30 2.02	35×25 2.06			30×40 2.23	35×35 2.29
1000	22×50 2.28	25.4×40 2.28	30×30 2.23	35×25 2.28		25.4×50 2.48	30×35 2.35	35×30 2.41			30×50 2.68	35×40 2.65
1200		25.4×45 2.41	30×35 2.38	35×30 2.44			30×40 2.50	35×35 2.57			30×60 2.92	35×45 2.80
1500		25.4×50 2.81	30×40 2.79	35×30 2.73			30×50 3.04	35×40 3.00				35×50 3.25
1800			30×45 3.19	35×35 3.14				35×45 3.43				
2200			30×50 3.44	35×45 3.55				35×50 3.68				
2700				35×50 4.08								

WV / ØD / μF	350				400				450			
	22	25.4	30	35	22	25.4	30	35	22	25.4	30	35
47					22×20 0.34							
56	22×20 0.37				22×20 0.37	25.4×20 0.41			22×25 0.40			
68	22×20 0.41	25.4×20 0.45			22×25 0.44	25.4×20 0.45			22×30 0.47	25.4×25 0.48		
82	22×25 0.48	25.4×20 0.49			22×25 0.48	25.4×25 0.53	30×20 0.54		22×30 0.51	25.4×25 0.53		
100	22×25 0.53	25.4×25 0.58	30×20 0.60		22×30 0.57	25.4×25 0.58	30×20 0.60		22×35 0.60	25.4×30 0.62	30×25 0.64	
120	22×30 0.62	25.4×25 0.64	30×20 0.65		22×35 0.66	25.4×25 0.64	30×25 0.70	35×20 0.71	22×40 0.69	25.4×30 0.68	30×25 0.70	35×25 0.76
150	22×35 0.74	25.4×30 0.76	30×25 0.78	35×20 0.80	22×40 0.78	25.4×30 0.76	30×25 0.78	35×20 0.80	22×45 0.81	25.4×40 0.85	30×30 0.83	35×25 0.85
180	22×40 0.85	25.4×30 0.83	30×25 0.86	35×20 0.87	22×45 0.89	25.4×35 0.88	30×30 0.91	35×25 0.93	22×50 0.93	25.4×40 0.93	30×30 0.91	35×25 0.93
220	22×45 0.98	25.4×35 0.98	30×30 1.00	35×25 1.03	22×50 1.03	25.4×40 1.03	30×30 1.00	35×25 1.03		25.4×45 1.07	30×35 1.06	35×25 1.03
270	22×50 1.14	25.4×40 1.14	30×30 1.11	35×25 1.14		25.4×45 1.19	30×35 1.17	35×30 1.20			30×40 1.23	35×30 1.20
330		25.4×45 1.31	30×35 1.30	35×30 1.33		25.4×50 1.37	30×40 1.36	35×30 1.33			30×45 1.42	35×35 1.40
390		25.4×50 1.49	30×40 1.48	35×35 1.52			30×45 1.54	35×35 1.52			30×50 1.61	35×40 1.59
470			30×45 1.69	35×35 1.67			30×50 1.76	35×40 1.74				35×45 1.82
560			30×50 1.92	35×40 1.90				35×45 1.98				35×50 2.06
680				35×50 2.27				35×50 2.27	← Case size ØD×L (mm) ← Ripple current (Arms) at 105°C, 120Hz			

LARGE ALUMINUM ELECTROLYTIC CAPACITORS

HL Wide Temperature Range, Miniaturized, Long Life Series

Long Life

· Long life than HK series
· Load life of 5000 hours at 105˚C
· Complied to the RoHS directive

HK ⇨ HL
Long life

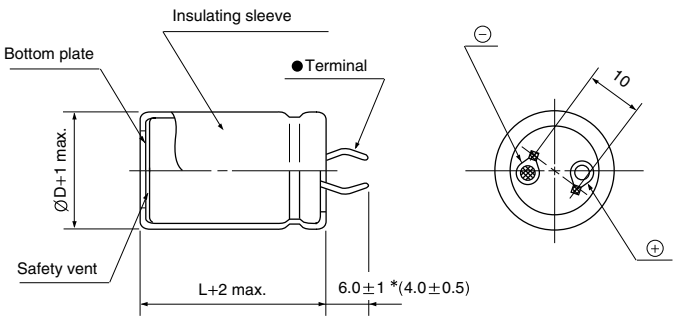
Item	Characteristics
Operating temperature range	WV< 350 : -40 ~ +105˚C, WV≧350 : -25 ~ +105˚C
Capacitance tolerance	±20% (20˚C,120Hz)
Leakage current max.	I=3$\sqrt{CV}$ (μA) (after 5 minutes)
Dissipation factor max. (at 120Hz, 20˚C)	Capacitance > 1000μF : tanδ increases by 0.01 for each 1000μF from below value.

Rated Voltage(V)	160	200	250	350	400	450
tanδ	0.15	0.15	0.15	0.15	0.15	0.2

Load life (after application of the rated voltage for 5000 hours at 105˚C)		
	Capacitance change	Within ±25% of initial value
	tanδ	Less than 250% of specified value
	Leakage current	Less than specified value
Shelf life (at 105˚C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value.	

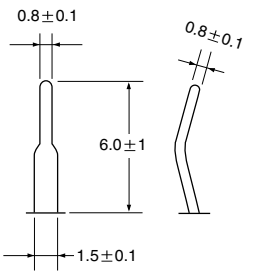
● DRAWING

Unit : mm



PC Board Mounting Holes

● Terminal



● FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

μF \ Frequency	50Hz	120Hz	300Hz	1kHz	10kHz~
160 ~ 250	0.85	1.00	1.20	1.25	1.45
300 ~	0.85	1.00	1.15	1.20	1.40

HL series

● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV / ØD / μF	160				200				250			
	22	25.4	30	35	22	25.4	30	35	22	25.4	30	35
120									22×20 0.56			
150					22×20 0.63				22×25 0.68	25.4×20 0.69		
180					22×20 0.69	25.4×20 0.76			22×25 0.74	25.4×20 0.76		
220	22×20 0.76				22×25 0.82	25.4×20 0.84			22×25 0.82	25.4×25 0.90	30×20 0.92	
270	22×25 0.91	25.4×20 0.93			22×25 0.91	25.4×25 1.00	30×20 1.02		22×30 0.97	25.4×25 1.00	30×20 1.02	
330	22×25 1.01	25.4×20 1.03			22×30 1.07	25.4×25 1.11	30×20 1.13		22×35 1.14	25.4×30 1.18	30×25 1.21	35×20 1.23
390	22×25 1.09	25.4×25 1.20	30×20 1.23		22×30 1.17	25.4×25 1.20	30×25 1.31	35×20 1.34	22×40 1.30	25.4×35 1.35	30×25 1.31	35×25 1.42
470	22×30 1.28	25.4×25 1.32	30×20 1.35		22×35 1.36	25.4×30 1.40	30×25 1.44	35×20 1.47	22×45 1.50	25.4×35 1.48	30×30 1.53	35×25 1.56
560	22×35 1.48	25.4×30 1.53	30×25 1.57	35×20 1.60	22×40 1.56	25.4×30 1.53	30×25 1.57	35×25 1.70	22×50 1.71	25.4×40 1.70	30×30 1.67	35×25 1.70
680	22×40 1.72	25.4×30 1.69	30×25 1.73	35×20 1.76	22×45 1.80	25.4×35 1.79	30×30 1.84	35×25 1.88		25.4×50 2.05	30×35 1.94	35×30 1.98
820	22×45 1.98	25.4×35 1.96	30×30 2.02	35×25 2.06		25.4×45 2.16	30×30 2.02	35×25 2.06			30×40 2.23	35×35 2.29
1000	22×50 2.28	25.4×40 2.28	30×30 2.23	35×25 2.28		25.4×50 2.48	30×35 2.35	35×30 2.41			30×50 2.68	35×40 2.65
1200		25.4×45 2.41	30×35 2.38	35×30 2.44			30×40 2.50	35×35 2.57				35×45 2.80
1500		25.4×50 2.81	30×40 2.79	35×35 2.73			30×50 3.04	35×40 3.00				35×50 3.25

WV / ØD / μF	350				400				450			
	22	25.4	30	35	22	25.4	30	35	22	25.4	30	35
47					22×20 0.34							
56	22×20 0.37				22×20 0.37	25.4×20 0.41			22×25 0.40			
68	22×20 0.41	25.4×20 0.45			22×25 0.44	25.4×20 0.45			22×30 0.47	25.4×25 0.48		
82	22×25 0.48	25.4×20 0.49			22×25 0.48	25.4×25 0.53	30×20 0.54		22×30 0.51	25.4×25 0.53		
100	22×25 0.53	25.4×25 0.58	30×20 0.60		22×30 0.57	25.4×25 0.58	30×20 0.60		22×35 0.60	25.4×30 0.62	30×25 0.64	
120	22×30 0.62	25.4×25 0.64	30×20 0.65		22×35 0.66	25.4×25 0.64	30×25 0.70	35×20 0.71	22×40 0.69	25.4×30 0.68	30×25 0.70	35×25 0.76
150	22×35 0.74	25.4×30 0.76	30×25 0.78	35×20 0.80	22×40 0.78	25.4×30 0.76	30×25 0.78	35×20 0.80	22×45 0.81	25.4×40 0.85	30×30 0.83	35×25 0.85
180	22×40 0.85	25.4×30 0.83	30×25 0.86	35×20 0.87	22×45 0.89	25.4×35 0.88	30×30 0.91	35×25 0.93	22×50 0.93	25.4×40 0.93	30×30 0.91	35×25 0.93
220	22×45 0.98	25.4×35 0.98	30×30 1.00	35×25 1.03	22×50 1.03	25.4×40 1.03	30×30 1.00	35×25 1.03		25.4×45 1.07	30×35 1.06	35×25 1.03
270	22×50 1.14	25.4×40 1.14	30×30 1.11	35×25 1.14		25.4×45 1.19	30×35 1.17	35×30 1.20			30×40 1.23	35×30 1.20
330		25.4×45 1.31	30×35 1.30	35×30 1.33		25.4×50 1.37	30×40 1.36	35×30 1.33			30×45 1.42	35×35 1.40
390		25.4×50 1.49	30×40 1.48	35×35 1.52			30×45 1.54	35×35 1.52			30×50 1.61	35×40 1.59
470			30×45 1.69	35×35 1.67			30×50 1.76	35×40 1.74	← Case size ØD×L (mm)			
560			30×50 1.92	35×40 1.90				↑	↑ Ripple current (Arms) at 105°C, 120Hz			

LARGE ALUMINUM ELECTROLYTIC CAPACITORS

HY Snap-in Terminal Type, Long Life Series

Long Life

HE ⇨ HY
Long life

- Load life of 7000 hours at 105˚C
- Voltage range of 160 ~ 450V
- Suited for use in industrial power supplies where high reliablity
- Complied to the RoHS directive

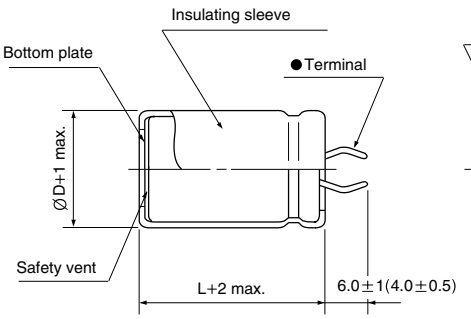
Item	Characteristics
Operating temperature range	WV< 350: -40 ~ +105˚C, WV ≧ 350: -25 ~ +105˚C
Capacitance tolerance	±20% at 120Hz, 20˚C
Leakage current max.	$I=3\sqrt{CV}$ (μA) (after 5 minutes)
Dissipation factor max. (at 120Hz, 20˚C)	Capacitance > 1000μF : tanδ increases by 0.01 for each 1000μF from below value.

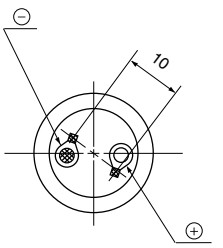
WV	160	200	250	350	400	450
tanδ	0.15	0.15	0.15	0.15	0.15	0.20

Load life (after application of the rated voltage for 7000 hours at 105˚C)		
	Leakage current	Less than specified value
	Capacitance change	Within ±25% of initial value
	tanδ	Less than 250% of specified value
Shelf life (at 105˚C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value.	

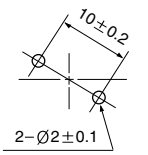
DRAWING

Unit : mm

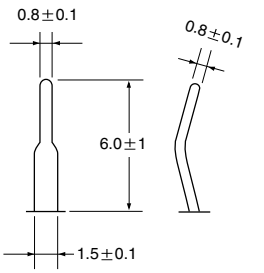




PC Board Mounting Holes



Terminal



FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

μF \ Frequency	50Hz	120Hz	300Hz	1kHz	10kHz~
160 ~ 250	0.85	1.00	1.20	1.25	1.45
300 ~	0.85	1.00	1.15	1.20	1.40

HY series

● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

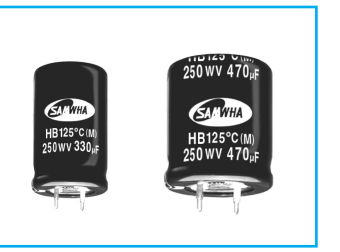
WV / ØD / μF	160				200				250			
	22	25.4	30	35	22	25.4	30	35	22	25.4	30	35
270	22×25 0.91				22×30 0.97	25.4×25 1.00			22×35 1.02	25.4×30 1.06	30×25 1.09	
330	22×30 1.07				22×30 1.07	25.4×25 1.10			22×40 1.19	25.4×35 1.24	30×25 1.20	
390	22×30 1.23	25.4×25 1.35			22×35 1.23	25.4×30 1.27	30×25 1.31		22×45 1.36	25.4×35 1.35	30×30 1.39	
470	22×35 1.35	25.4×30 1.40			22×40 1.42	25.4×35 1.48	30×30 1.52			25.4×45 1.63	30×35 1.61	35×30 1.64
560	22×40 1.55	25.4×30 1.53	30×25 1.57		22×45 1.63	25.4×35 1.62	30×30 1.67			25.4×50 1.85	30×35 1.75	35×30 1.80
680	22×45 1.80	25.4×35 1.78	30×30 1.93			25.4×40 1.87	30×35 1.93				30×45 2.12	35×35 2.08
820		25.4×40 2.06	30×30 2.01			25.4×50 2.24	30×40 2.23	35×30 2.17			30×50 2.42	35×40 2.39
1000		25.4×45 2.38	30×35 2.34				30×45 2.57	35×35 2.52				35×45 2.76
1200		25.4×50 2.51	30×40 2.49	35×35 2.56			30×50 2.71	35×40 2.68				35×50 2.90
1500			30×45 2.91	35×35 2.86				35×50 3.25				
1800			30×50 3.32	35×40 3.28								

WV / ØD / μF	350				400				450			
	22	25.4	30	35	22	25.4	30	35	22	25.4	30	35
47									22×30 0.38			
56					22×25 0.39				22×35 0.45	25.4×25 0.43		
68					22×30 0.46	25.4×25 0.48			22×35 0.52	25.4×30 0.51		
82	22×25 0.48				22×35 0.54	25.4×25 0.53			22×45 0.60	25.4×35 0.59	30×25 0.57	
100	22×30 0.56	25.4×25 0.58			22×35 0.60	25.4×30 0.62			22×50 0.69	25.4×40 0.69	30×30 0.67	
120	22×35 0.65	25.4×30 0.68			22×40 0.69	25.4×35 0.72	30×25 0.69			25.4×45 0.79	30×30 0.74	
150	22×40 0.77	25.4×30 0.76			22×50 0.84	25.4×40 0.84	30×30 0.82			25.4×50 0.92	30×40 0.91	35×30 0.89
180	22×45 0.89	25.4×35 0.88				25.4×45 0.97	30×35 0.95	35×25 0.92			30×45 1.04	35×35 1.03
220	22×50 1.02	25.4×40 1.02	30×30 1.00			25.4×50 1.11	30×40 1.11	35×30 1.08			30×50 1.20	35×40 1.19
270		25.4×50 1.23	30×35 1.17	35×30 1.20			30×45 1.28	35×35 1.26				35×45 1.37
330			30×45 1.42	35×35 1.37			30×50 1.47	35×40 1.46				35×50 1.58
390			30×50 1.60	35×40 1.58				35×45 1.65				
470				35×40 1.74				35×50 1.88	← Case size ØD×L (mm) ← Ripple current (A rms) at 105°C, 120Hz			
560				35×50 2.06								

LARGE ALUMINUM ELECTROLYTIC CAPACITORS

HB High Temperature Range, For 125˚C Use Series

Solvent Proof
WV≦100V



HE ⇒ HB
High temp.

- Wide operating temperature range of -40 ~ +125˚C
- With a guaranteed useful life of 10 years at 60˚C
- Ideal for industrial applications requiring continuous operation
- Complied to the RoHS directive

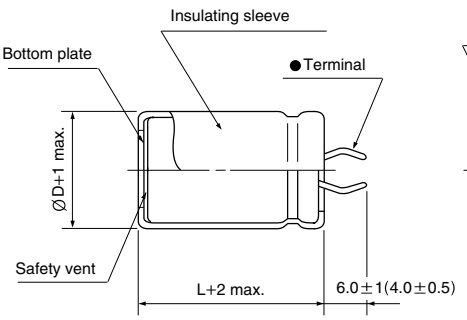
Item	Characteristics
Operating temperature range	-40 ~ +125˚C
Capacitance tolerance	±20% at 120Hz, 20˚C
Leakage current max.	I=3 $\sqrt{CV}$ (μA) (after 5 minutes)
Dissipation factor max. (at 120Hz, 20˚C)	Capacitance > 1000μF : tanδ increases by 0.01 for each 1000μF from below value.

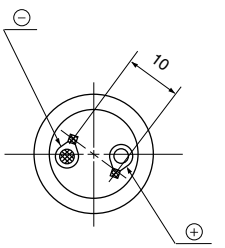
WV	10	16	25	35	50, 63	80 ~ 160	200, 250
tanδ	0.50	0.40	0.30	0.25	0.20	0.17	0.15

Load life (after application of the rated voltage for 1000 hours at 125˚C)		
	Leakage current	Less than specified value
	Capacitance change	Within ±15% of initial value
	tanδ	Less than 150% of specified value
Shelf life (at 125˚C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value.	

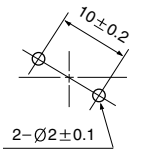
● DRAWING

Unit : mm

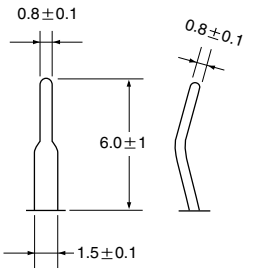




PC Board Mounting Holes



● Terminal



● FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

μF \ Frequency	50Hz	120Hz	300Hz	1kHz	10kHz~
~ 100	0.85	1.00	1.06	1.15	1.20
160 ~ 250	0.85	1.00	1.20	1.25	1.45

HB series

● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV / ØD / μF	10				16				25			
	22	25.4	30	35	22	25.4	30	35	22	25.4	30	35
1500									22×30 0.95			
2200					22×30 1.00				22×40 1.28	25.4×30 1.26		
3300	22×30 1.09				22×40 1.36	25.4×35 1.41			22×50 1.72	25.4×40 1.72	30×30 1.68	
4700	22×40 1.45	25.4×35 1.51			22×50 1.78	25.4×40 1.77	30×30 1.74			25.4×50 2.23	30×40 2.22	35×30 2.17
6800	22×50 1.91	25.4×40 1.91	30×35 1.97				30×40 2.31	35×30 2.26			30×50 2.90	35×40 2.87
10000			30×45 2.62	35×35 2.57				35×45 3.14				
15000				35×45 3.44								

WV / ØD / μF	35				50				63			
	22	25.4	30	35	22	25.4	30	35	22	25.4	30	35
470									22×35 0.69	25.4×30 0.71		
680					22×30 0.78				22×40 0.87	25.4×35 0.91	30×30 0.93	
1000	22×30 0.85				22×40 1.06	25.4×30 1.04				25.4×45 1.21	30×35 1.19	35×30 1.22
1500	22×40 1.16	25.4×30 1.14			22×50 1.42	25.4×40 1.42	30×30 1.39				30×45 1.60	35×40 1.65
2200	22×50 1.54	25.4×40 1.54	30×30 1.50				30×40 1.86	35×35 1.91				35×50 2.16
3300			30×40 2.04	35×35 2.09				35×40 2.45				
4700				35×40 2.61								

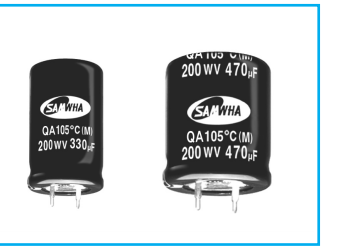
WV / ØD / μF	80				100				160			
	22	25.4	30	35	22	25.4	30	35	22	25.4	30	35
150									22×30 0.37			
220					22×30 0.48				22×40 0.50	25.4×30 0.49		
330	22×30 0.59				22×40 0.66	25.4×30 0.65			22×50 0.67	25.4×40 0.67	30×30 0.65	
470	22×40 0.79	25.4×35 0.82			22×50 0.86	25.4×40 0.86	30×35 0.89			25.4×50 0.87	30×40 0.86	35×30 0.84
680		25.4×40 1.04	30×35 1.07				30×40 1.12	35×30 1.09			30×50 1.12	35×40 1.11
1000			30×45 1.42	35×35 1.40				35×40 1.46				35×50 1.46
1500				35×45 1.86								

WV / ØD / μF	200				250			
	22	25.4	30	35	22	25.4	30	35
100					22×30 0.32			
150	22×35 0.42				22×40 0.44	25.4×30 0.43		
220	22×45 0.56	25.4×40 0.58	30×30 0.57		22×50 0.58	25.4×40 0.58	30×35 0.60	35×30 0.61
330		25.4×50 0.77	30×40 0.77	35×30 0.75			30×45 0.80	35×35 0.79
470			30×50 0.99	35×40 0.98				35×45 1.03
680				35×50 1.28				

← Case size ØD×L (mm)
← Ripple current (A rms) at 125°C, 120Hz

LARGE ALUMINUM ELECTROLYTIC CAPACITORS

QA Permissible Abnormal Voltage, Wide Temperature Range Series



- Improved safety features for abnormally excessive voltage
- Ideally suited for the equipment used at voltage fluctuating area
- No sparks with overvoltage
- Complied to the RoHS directive

Item	Characteristics
Operating temperature range	-25 ~ +105˚C
Capacitance tolerance	±20% at 120Hz, 20˚C
Leakage current max.	I=3$\sqrt{CV}$ (μA) (after 5 minutes)
Dissipation factor max.	0.15 max. at 120Hz, 20˚C
Load life	After an application of DC bias voltage plus the rated AC ripple current for 2000 hours at 105˚C The measurement shall meet the following limits. Leakage current: Less than specified value Capacitance change: Within ±20% of initial value tanδ: Less than 200% of specified value
Shelf life (at 105˚C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value.
Safety Performance	The pressure relief vent will operate in normal conditions, with no dangerous conditions such as flames, ignitions or dispersion of peaces of the capacitor and/or case

WV	μF	Limited DC current	Test voltage (VDC)
200	C < 300	4A	300 & 375
	330 ≦ C < 470	5A	
	470 ≦ C	7A	
400	C < 100	2A	500 & 600
	100 ≦ C < 220	4A	
	220 ≦ C	7A	

DRAWING (See Page 160)

Unit : mm

DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

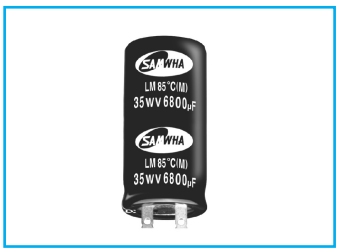
WV / μF \ ØD	200								400							
	22		25.4		30		35		22		25.4		30		35	
47									22×25	0.42						
56									22×25	0.45						
68									22×25	0.50	25.4×25	0.55				
82									22×30	0.59	25.4×25	0.60	30×25	0.73		
100									22×35	0.69	25.4×30	0.71	30×25	0.80		
120									22×40	0.79	25.4×30	0.78	30×30	0.95		
150									22×45	0.93	25.4×35	0.92	30×30	1.04	35×25	0.97
180	22×25	0.74							22×50	1.06	25.4×40	1.06	30×35	1.21	35×25	1.06
220	22×25	0.82									25.4×45	1.22	30×40	1.40	35×30	1.24
270	22×30	0.97	25.4×25	1.00									30×50	1.68	35×35	1.44
330	22×30	1.07	25.4×30	1.18	30×25	1.21									35×40	1.67
390	22×35	1.24	25.4×30	1.28	30×25	1.31									35×45	1.89
470	22×40	1.43	25.4×35	1.48	30×25	1.44									35×50	2.15
560	22×40	1.63	25.4×40	1.70	30×35	1.76	35×25	1.70								
680			25.4×50	2.05	30×40	2.03	35×30	1.98								
820					30×45	2.33	35×35	2.29								
1000					30×50	2.68	35×40	2.65								
1200							35×45	2.80								
1500							35×50	3.25								

Case size ØD×L (mm)
Ripple current (A rms) at 105˚C, 120Hz

FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

μF \ Frequency	50Hz	120Hz	300Hz	1kHz	10kHz~
160 ~ 250	0.85	1.00	1.20	1.25	1.45
300 ~	0.85	1.00	1.15	1.20	1.40

LM Lug Terminal Type Series



- Lug terminal series
- Suited for use in power supplies and industrial controls
- Complied to the RoHS directive

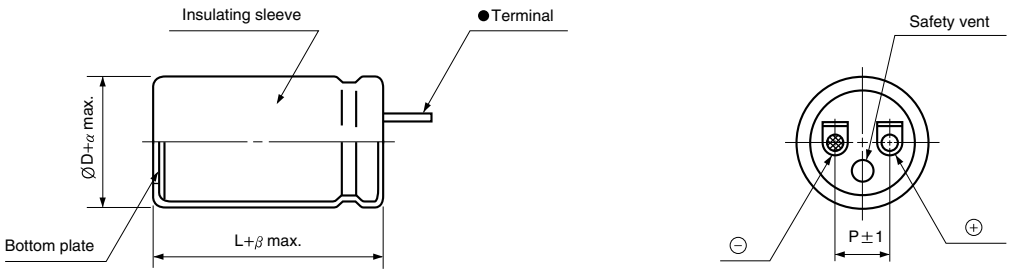
Item	Characteristics
Operating temperature range	WV< 350 : -40 ~ +85°C, WV ≧ 350 : -25 ~ +85°C
Capacitance tolerance	±20% at 120Hz, 20°C
Leakage current max.	I=3 $\sqrt{CV}$ (μA) (after 5 minutes)
Dissipation factor max. (at 120Hz, 20°C)	Capacitance > 1000μF : tanδ increases by 0.01 for each 1000μF from below value.

WV	16	25	35~63	80~350	400~450
tanδ	0.35	0.30	0.25	0.20	0.25

Load life (after application of the rated voltage for 2000 hours at 85°C)		
	Leakage current	Less than specified value
	Capacitance change	Within ±20% of initial value
	tanδ	Less than 200% of specified value
Shelf life (at 85°C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value.	

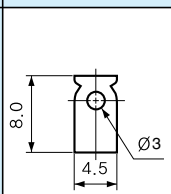
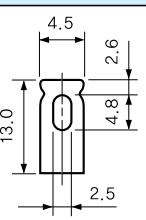
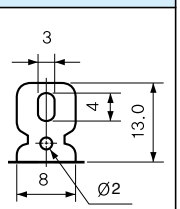
DRAWING

Unit : mm



TERMINAL

For solder tag

ØD	≦35	40	51
Dimensions			
Code	LC	LA	LD

ØD	25.4	30	35	40	51
P	10	10	14	18	18
α	1				2
β	2				3

FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

μF \ Frequency(Hz)	50Hz	120Hz	300Hz	1kHz	10kHz~
~ 100	0.85	1.00	1.06	1.15	1.20
160 ~ 250	0.85	1.00	1.20	1.25	1.45
300 ~	0.85	1.00	1.15	1.20	1.40

LM series

● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV / μF	16		25		35		40		50	
3300							25.4×30	2.46	25.4×30	2.46
4700					25.4×30	2.89	25.4×40	3.21	25.4×40	3.21
6800			25.4×30	3.12	25.4×40	3.73	25.4×50	4.07	25.4×50	4.07
10000	25.4×30	3.42	25.4×40	4.03	25.4×50	4.71	25.4×60	5.07	30×50	5.08
15000	25.4×40	4.41	25.4×50	5.07	30×50	5.81	30×60	6.24	35×60	6.67
22000	25.4×50	5.44	30×50	6.15	35×60	7.44	35×60	7.44	35×80	8.34
33000	30×50	6.57	35×60	7.85	35×80	9.18	35×80	9.18	40×100	10.6
47000	35×60	8.19	35×80	9.49	40×100	11.3	51×105	12.5	51×105	12.5
68000	35×80	9.85	40×100	11.6	51×105	13.2				
100000	40×100	12.0	51×105	13.5						
150000	51×105	13.9								

WV / μF	63		80		100		160		200	
330							25.4×30	0.92	25.4×30	0.92
470							25.4×40	1.22	25.4×40	1.22
680							25.4×50	1.60	25.4×50	1.60
1000					25.4×30	1.60	25.4×60	2.09	30×50	2.09
1500			25.4×30	1.92	25.4×40	2.13	30×60	2.69	35×60	2.87
2200	25.4×30	2.05	25.4×40	2.52	25.4×50	2.75	35×60	3.40	35×80	3.81
3300	25.4×40	2.73	25.4×50	3.29	30×50	3.55	35×100	5.02	40×100	5.27
4700	25.4×50	3.50	25.4×60	4.14	35×60	4.76	40×100	6.15	51×105	6.80
6800	25.4×60	4.38	30×60	5.15	35×80	6.17	51×105	7.86		
10000	30×60	5.46	35×80	7.08	40×100	8.16				
15000	35×80	7.48	40×80	8.43	51×105	10.2				
22000	35×100	9.16	51×105	11.3						
33000	51×105	11.7								

WV / μF	250		315		350		400		450	
68									25.4×30	0.37
100					25.4×30	0.51	25.4×30	0.45	25.4×40	0.50
150			25.4×30	0.62	25.4×40	0.69	25.4×40	0.62	25.4×50	0.67
220	25.4×30	0.75	25.4×40	0.84	25.4×50	0.91	25.4×50	0.81	30×50	0.88
330	25.4×40	1.02	25.4×50	1.12	25.4×60	1.20	30×60	1.16	35×60	1.24
470	25.4×50	1.33	25.4×60	1.43	30×60	1.54	35×60	1.47	35×80	1.65
680	30×50	1.73	30×60	1.86	35×60	1.98	35×80	1.99	35×100	2.18
1000	30×60	2.25	35×70	2.56	35×100	2.96	40×100	2.78	51×80	2.77
1500	35×80	3.22	35×100	3.54	40×100	3.72	51×105	3.69		
2200	35×100	4.19	40×100	4.40	51×105	4.86	← Ripple current (A rms) at 85°C, 120Hz			
3300	51×80	5.24	51×105	5.82			← Case size ØD×L (mm)			

LW,SW

For Welding Machine Series

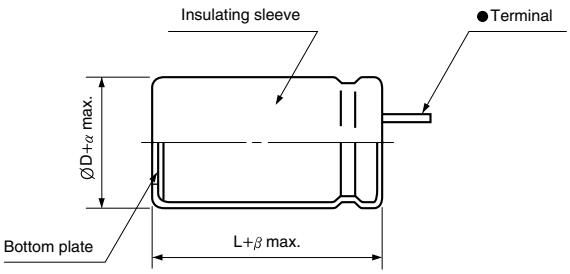
- For welding machine applications
- Charge and discharge characteristic : 100000 times at 5 ~ 35˚C
- LW series with lug terminal type, SW series with screw terminal type
- Complied to the RoHS directive

Item	Characteristics
Operating temperature range	-25 ~ +85˚C
Capacitance tolerance	-10 ~ +50% at 120Hz, 20˚C
Leakage current max.	I=3 $\sqrt{CV}$ (μA) (after 5 minutes)
Dissipation factor max.	0.20 max.at 120Hz, 20˚C
Charge and discharge charateristics	After charge and discharge for 100000 cycles at 5~35˚C with application of the rate voltage, the capacitors shall be satisfied the following specifications. Leakage current : Less than 150% of specified value Capacitance change : Within ±15% of initial value tanδ : Less than 150% of specified value Conditions : Charge resistance : 4Ω Charge time : 1 sec Discharge resistance : 0.12Ω Discharge time : 0.5sec

DRAWING

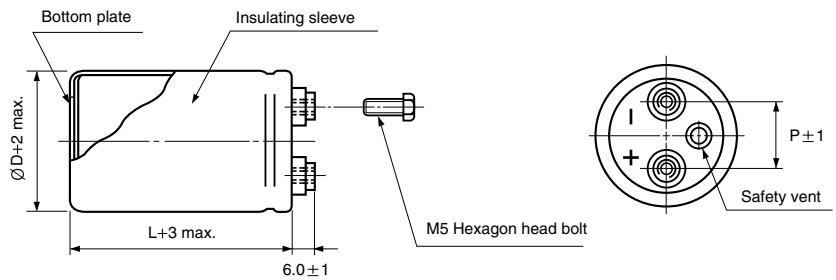
Unit : mm

LW series



ØD	35	40	51
P	14	18	18
α	1		2
β	2		3

SW series



ØD	51	63.5	76.2
P	22	28.6	31.8

DIMENSIONS

ØD×L (mm)

WV / SERIES / μF	315		475	
	LW	SW	LW	SW
225			51×100	51×100
330	35×100			
470	51×100			76.2×120
1000		63.5×140		76.2×160
1500		76.2×120		
2200		76.2×160		

LARGE ALUMINUM ELECTROLYTIC CAPACITORS

GT Screw Terminal Type, Standard Series

- Ideally suited for use as input and output filter capacitors in power supplies
- Suited for smoothing circuits for general purpose inverters and control circuits for F.A. machines
- Designed for use as input filter capacitor for current U.P.S.
- Complied to the RoHS directive

GT ⟹ CU
Wide Temp.

Item	Characteristics
Operating temperature range	WV< 350 : -40 ~ 85˚C, WV ≧350 : -25 ~ +85˚C
Capacitance tolerance	±20% at 120Hz, 20˚C
Leakage current max.	I=3$\sqrt{CV}$ (μA) (after 5 minutes)

Dissipation factor max. (at 120Hz, 20˚C)

ØD \ WV	16	25	35	50	63	80	100	160 ~250	350 ~450
35	0.70	0.45	0.45	0.30	0.25	0.25	0.20	0.15	0.25
51	1.00	0.60	0.60	0.45	0.35	0.30	0.20	0.15	0.25
63.5	1.30	0.80	0.70	0.50	0.40	0.35	0.25	0.20	0.25
76.2	2.00	1.20	0.90	0.70	0.50	0.45	0.35	0.25	0.25
89	2.50	1.40	1.00	0.80	0.60	0.50	0.40	0.30	0.25

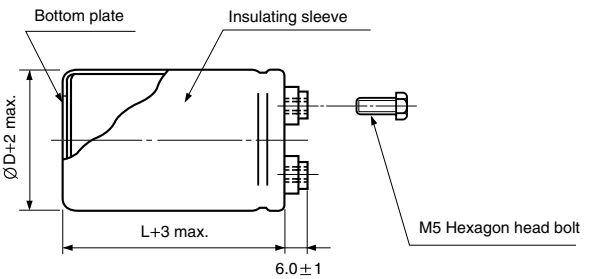
Load life (after application of the rated voltage for 2000 hours at 85˚C)

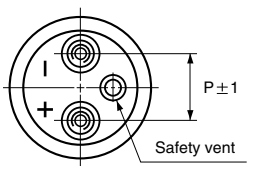
Leakage current	Less than specified value
Capacitance change	WV≦250 : Within ±15% of the initial value WV≧350 : Within ±20% of the initial value
tanδ	WV≦250 : Less than 175% of the specified value WV≧350 : Less than 300% of the specified value

Shelf life (at 85˚C) — After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value.

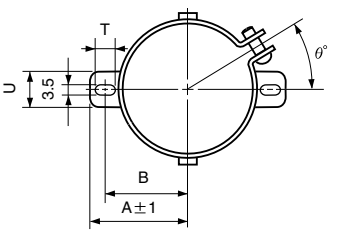
DRAWING

Unit : mm

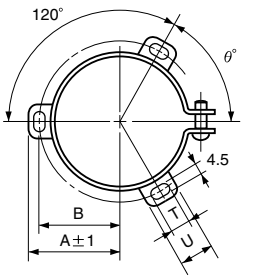




TWO LEGS ANGLE



THREE LEGS ANGLE



TWO LEGS ANGLE SIZE TABLE

ØD	B	A	T	U	θ˚	P
35	24	29	7	10	30	12.7
51	33.6	39.9	6	14	30	22
63.5	40.8	46.8	6	14	30	28.6

THREE LEGS ANGLE SIZE TABLE

ØD	B	A	T	U	θ˚	P
51	32.9	38.9	7	12	60	22
63.5	38.4	45.3	7	14	60	28.6
76.2	44.5	51.5	8	16	60	31.8
89	50.8	61	8	16	60	31.8

GT series

● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV / μF	16		25		35		50	
10000							35×60	6.2
15000					35×50	5.8	35×80	8.5
22000			35×60	7.5	35×68	7.9	35×100	11.3
33000	35×60	7.4	35×80	10.3	35×100	11.3	35×120	15.0
47000	35×80	9.9	35×100	13.5	35×120	14.6	51×100	15.2
68000	35×100	13.1	51×80	14.5	51×100	15.9	51×120	19.7
100000	51×80	13.7	51×100	19.2	51×120	20.7	63.5×120	24.2
150000	51×100	18.3	51×140	27.1	63.5×120	25.1	76.2×120	25.9
220000	51×140	25.4	63.5×120	28.4	76.2×120	27.7	76.2×160	35.1
330000	63.5×120	27.3	76.2×120	29.3	76.2×160	37.9		
470000	76.2×120	27.1	76.2×160	39.2				
680000	76.2×160	36.5						

WV / μF	63		80		100		160	
1500							35×60	3.4
2200							35×80	4.6
3300							35×100	6.2
4700					35×60	5.2	51×80	7.7
6800	35×50	5.2	35×60	5.6	35×80	7.0	51×100	10.0
10000	35×60	6.8	35×80	7.6	35×100	9.4	51×140	14.1
15000	35×80	9.3	35×120	11.1	51×80	11.8	63.5×140	16.5
22000	35×120	13.4	51×80	11.7	51×100	15.6	76.2×140	17.6
33000	51×100	14.5	51×120	16.8	51×140	22.0		
47000	51×120	18.6	63.5×100	18.5	63.5×140	25.0		
68000	63.5×100	20.8	63.5×140	25.4	76.2×140	26.2		
100000	76.2×120	25.0	76.2×140	29.7				
150000	76.2×140	32.5						

WV / μF	200		250	
330				
470				
680			35×50	2.1
1000	35×60	2.8	35×68	2.9
1500	35×68	3.6	35×80	3.8
2200	35×100	5.1	35×120	5.5
3300	35×120	6.7	51×100	7.0
4700	51×100	8.3	51×140	9.6
6800	51×140	11.5	63.5×120	10.0
10000	63.5×120	12.1	76.2×120	11.2
15000	76.2×120	13.7	76.2×160	15.3
22000	76.2×160	18.6		

Ripple current (A rms) at 85°C, 120Hz
Case size ØD×L (mm)

GT series

● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV / Item / μF	350			400			450		
	ØD×L (mm)	Ripple current (A rms)		ØD×L (mm)	Ripple current (A rms)		ØD×L (mm)	Ripple current (A rms)	
		40°C 120Hz	85°C 120Hz		40°C 120Hz	85°C 120Hz		40°C 120Hz	85°C 120Hz
180							35×60	2.9	1.0
220				35×50	3.0	1.1	35×60	3.2	1.1
270	35×50	3.3	1.2	35×50	3.3	1.2	35×60	3.6	1.2
330	35×50	3.7	1.3	35×60	3.9	1.4	35×80	4.4	1.5
390	35×60	4.3	1.5	35×60	4.3	1.5	35×80	4.8	1.7
470	35×60	4.7	1.6	35×80	5.3	1.8	35×100	5.8	2.0
560	35×80	5.8	2.0	35×100	6.3	2.2	35×100	6.3	2.2
680	35×80	6.4	2.2	35×100	7.0	2.4	35×120	7.5	2.6
820	35×100	7.7	2.7	35×120	8.3	2.9	51×80	8.0	2.8
1000	35×120	9.2	3.2	51×80	8.8	3.1	51×100	9.6	3.4
1200	51×80	9.7	3.4	51×80	9.7	3.4	51×100	10.6	3.7
1500	51×80	10.8	3.8	51×100	11.8	4.1	51×120	12.7	4.4
1800	51×100	12.9	4.5	51×120	13.9	4.9	63.5×100	13.8	4.8
2200	51×120	15.4	5.4	51×140	16.4	5.7	63.5×120	16.3	5.7
2700	51×140	18.2	6.4	63.5×120	18.1	6.3	63.5×140	19.2	6.7
3300	63.5×120	20.0	7.0	63.5×140	21.3	7.4	76.2×120	20.6	7.2
3900	63.5×140	23.1	8.1	63.5×160	24.4	8.6	76.2×140	23.7	8.3
4700	63.5×160	26.8	9.4	76.2×140	26.0	9.1	76.2×160	27.5	9.6
5600	76.2×140	28.4	10.0	76.2×160	30.0	10.5	89×140	31.3	10.9
6800	76.2×160	33.0	11.6	89×140	34.5	12.1	89×160	36.3	12.7
8200	89×140	37.8	13.2	89×160	39.8	13.9			
10000	89×160	44.0	15.4	89×160	44.0	15.4			

WV / Item / μF	500		
	ØD×L (mm)	Ripple current (A rms)	
		40°C 120Hz	85°C 120Hz
1000	51×120	12.2	4.2
1200	63.5×100	13.1	4.5
1500	63.5×100	14.8	5.1
1800	63.5×120	17.4	6.0
2200	63.5×140	20.3	7.0
2700	76.2×120	22.3	7.5
3300	76.2×140	26.1	8.8

● PERMISSIBLE RIPPLE CURRENT MULTIPLIERS

WV \ Frequency	50Hz	120Hz	300Hz	1kHz	10kHz≦
~ 100	0.8	1	1.1	1.15	1.2
160 ~ 250	0.8	1	1.1	1.15	1.3
315 ~	0.8	1	1.2	1.35	1.4

NEW

GK

Screw Terminal Type, High Ripple Series

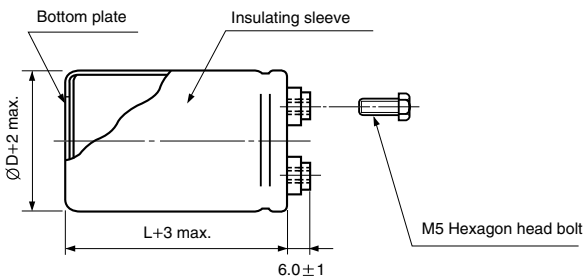
- Ideally suited for use as input and output filter capacitors in power supplies
- High ripple current capability
- Suited for smoothing circuits for general purpose inverters and control circuits for F.A. machines
- Designed for use as input filter capacitor for current U.P.S.
- Complied to the RoHS directive

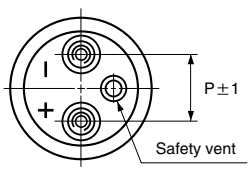
GT ⇨ GK
High Ripple

Item	Characteristics
Operating temperature range	-25 ~ +85˚C
Capacitance tolerance	±20% at 120Hz, 20˚C
Leakage current max.	I=3 $\sqrt{CV}$ (μA) (after 5 minutes)
Dissipation factor max. (at 120Hz, 20˚C)	0.25 max. at 120Hz, 20˚C
Load life (after application of the rated voltage for 2000 hours at 85˚C)	Leakage current: Less than specified value Capacitance change: Within ±20% of initial value tanδ: Less than 300% of specified value
Shelf life (at 85˚C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value.

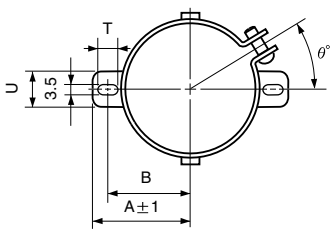
DRAWING

Unit : mm

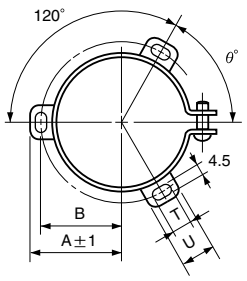




TWO LEGS ANGLE



THREE LEGS ANGLE



TWO LEGS ANGLE SIZE TABLE

ØD	B	A	T	U	θ˚	P
35	24	29	7	10	30	12.7
51	33.6	39.9	6	14	30	22
63.5	40.8	46.8	6	14	30	28.6

THREE LEGS ANGLE SIZE TABLE

ØD	B	A	T	U	θ˚	P
51	32.9	38.9	7	12	60	22
63.5	38.4	45.3	7	14	60	28.6
76.2	44.5	51.5	8	16	60	31.8
89	50.8	61	8	16	60	31.8

GK series

● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV / Item / μF	350			400			450		
	ØD×L (mm)	Ripple current (A rms)		ØD×L (mm)	Ripple current (A rms)		ØD×L (mm)	Ripple current (A rms)	
		40°C 120Hz	85°C 120Hz		40°C 120Hz	85°C 120Hz		40°C 120Hz	85°C 120Hz
180							35×60	4.4	1.5
220				35×50	4.5	1.7	35×60	4.8	1.7
270	35×50	5.0	1.8	35×50	5.0	1.8	35×60	5.4	1.8
330	35×50	5.6	2.0	35×60	5.9	2.1	35×80	6.6	2.3
390	35×60	6.5	2.3	35×60	6.5	2.3	35×80	7.2	2.6
470	35×60	7.1	2.4	35×80	8.0	2.7	35×100	8.7	3.0
560	35×80	8.7	3.0	35×100	9.5	3.3	35×100	9.5	3.3
680	35×80	9.6	3.3	35×100	10.5	3.6	35×120	11.3	3.9
820	35×100	11.6	4.1	35×120	12.5	4.4	51×80	12.0	4.2
1000	35×120	13.8	4.8	51×80	13.2	4.7	51×100	14.4	5.1
1200	51×80	14.6	5.1	51×80	14.6	5.1	51×100	15.9	5.6
1500	51×80	16.2	5.7	51×100	17.7	6.2	51×120	19.1	6.6
1800	51×100	19.4	6.8	51×120	20.9	7.4	63.5×100	20.7	7.2
2200	51×120	23.1	8.1	51×140	24.6	8.6	63.5×120	24.5	8.6
2700	51×140	27.3	9.6	63.5×120	27.2	9.5	63.5×140	28.8	10.1
3300	63.5×120	30.0	10.5	63.5×140	32.0	11.1	76.2×120	30.9	10.8
3900	63.5×140	34.7	12.2	63.5×160	36.6	12.9	76.2×140	35.6	12.5
4700	63.5×160	40.2	14.1	76.2×140	39.0	13.7	76.2×160	41.3	14.4
5600	76.2×140	42.6	15.0	76.2×160	45.0	15.8	89×140	47.0	16.4
6800	76.2×160	49.5	17.4	89×140	51.8	18.2	89×160	54.5	19.1
8200	89×140	56.7	19.8	89×160	59.7	20.9			
10000	89×160	66.0	23.1	89×160	66.0	23.1			

● PERMISSIBLE RIPPLE CURRENT MULTIPLIERS

Frequency	50Hz	120Hz	300Hz	1kHz	3kHz
Coefficient	0.8	1.0	1.1	1.3	1.4

CU Screw Terminal Type, Wide Temperature Range Series

- Screw terminal series for high temperature up to 105˚C
- High ripple current capability
- Ideally suited for use as input and output filter capacitors in power supplies
- Complied to the RoHS directive

GT ⇨ CU
Wide Temp.

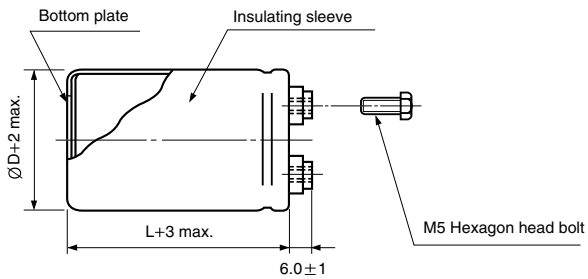
Item	Characteristics
Operating temperature range	WV< 350 : -40~105˚C, WV ≧350 : -25~105˚C
Capacitance tolerance	±20% at 120Hz, 20˚C
Leakage current max.	I=3 $\sqrt{CV}$ (μA) (after 5 minutes)
Dissipation factor max. (at 120Hz, 20˚C)	

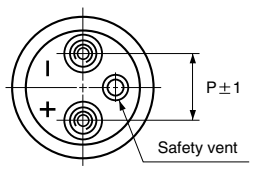
ØD \ WV	16	25	35	50	63	80	100	160	200,250	350,400
35	0.45	0.45	0.40	0.30	0.25	0.25	0.20	0.15	0.15	0.25
51	0.60	0.60	0.45	0.45	0.35	0.30	0.20	0.15	0.15	0.25
63.5	0.80	0.70	0.50	0.50	0.40	0.35	0.25	0.20	0.20	0.25
76.2	1.20	0.90	0.70	0.70	0.70	0.50	0.40	0.35	0.25	0.25

Load life (after application of the rated voltage for 2000 hours at 105˚C)		
	Leakage current	Less than specified value
	Capacitance change	Within ±20% of initial value
	tanδ	Less than 200% of specified value
Shelf life (at 105˚C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value.	

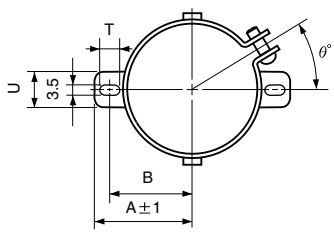
DRAWING

Unit : mm

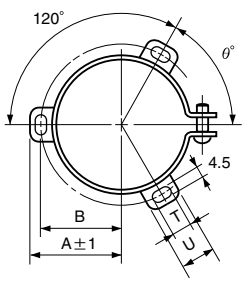




TWO LEGS ANGLE



THREE LEGS ANGLE



TWO LEGS ANGLE SIZE TABLE

ØD	B	A	T	U	θ°	P
35	24	29	7	10	30	12.7
51	33.6	39.9	6	14	30	22
63.5	40.8	46.8	6	14	30	28.6

THREE LEGS ANGLE SIZE TABLE

ØD	B	A	T	U	θ°	P
51	32.9	38.9	7	12	60	22
63.5	38.4	45.3	7	14	60	28.6
76.2	44.5	51.5	8	16	60	31.8

CU series

● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV / μF	16		25		35		50	
6800							35×50	3.1
10000					35×60	3.5	35×60	4.0
15000			35×50	3.8	35×80	4.8	35×80	5.5
22000	35×60	4.9	35×68	5.1	35×100	6.4	35×120	8.0
33000	35×80	6.7	35×100	7.4	35×120	8.5	51×100	8.3
47000	35×100	8.8	35×120	9.5	51×100	9.9	51×120	10.7
68000	51×80	9.5	51×100	10.3	51×120	12.8	63.5×100	12.6
100000	51×100	12.5	51×120	13.5	63.5×120	16.4	76.2×120	13.7
150000	51×140	17.6	63.5×120	16.9	76.2×120	16.8	76.2×140	17.9
220000	63.5×120	18.4	76.2×120	18.0	76.2×160	22.8		
330000	76.2×120	19.1	76.2×160	24.6				
470000	76.2×160	25.5						

WV / μF	63		80		100		160	
1000							35×60	1.7
1500					35×60	1.9	35×68	2.1
2200					35×80	2.6	35×100	3.0
3300					35×100	3.5	35×120	4.0
4700			35×60	3.0	51×80	4.3	51×100	5.0
6800	35×60	3.7	35×80	4.1	51×100	5.7	51×140	7.0
10000	35×80	5.0	35×100	5.4	51×140	7.9	63.5×120	7.3
15000	35×120	7.2	51×80	6.3	63.5×140	9.2	76.2×120	7.0
22000	51×80	7.0	51×100	8.3	76.2×140	9.1	76.2×160	9.4
33000	51×120	10.1	51×140	11.7				
47000	63.5×100	11.7	63.5×140	14.3				
68000	63.5×140	16.0	76.2×140	14.2				
100000	76.2×140	14.6						

WV / μF	200		250		350		400	
220							35×50	0.6
330					35×60	0.7	35×60	0.7
470			35×60	1.1	35×80	1.0	35×80	1.0
680	35×50	1.3	35×80	1.5	35×100	1.3	35×120	1.4
1000	35×68	1.8	35×100	2.1	35×120	1.7	51×80	1.6
1500	35×80	2.3	51×80	2.6	51×100	2.2	51×120	2.4
2200	35×120	3.3	51×100	3.4	51×140	3.1	63.5×120	3.2
3300	51×100	4.2	51×140	4.8	63.5×120	3.9	76.2×120	3.9
4700	51×140	5.8	63.5×120	5.2	76.2×120	4.6	76.2×160	5.2
6800	63.5×120	6.2	76.2×120	5.5	76.2×160	6.2		
10000	76.2×120	6.7	76.2×160	7.5	← Ripple current (A rms) at 105°C, 120Hz			
15000	76.2×160	9.2			← Case size ØD×L (mm)			

WV / μF	450	
2200	63.5×115	12.1
2700	63.5×130	14.3
3300	76.2×130	16.9
3900	76.2×140	20.5
4700	76.2×150	22.6
5600	76.2×150	25.2
6800	89×150	26.0

● PERMISSIBLE RIPPLE CURRENT MULTIPLIERS

WV \ Frequency	50Hz	120Hz	300Hz	1kHz	10kHz≦
~ 100	0.8	1	1.1	1.15	1.2
160 ~ 250	0.8	1	1.1	1.15	1.3
315 ~	0.8	1	1.2	1.35	1.4

GF For Inverter Circuits Series

Long Life

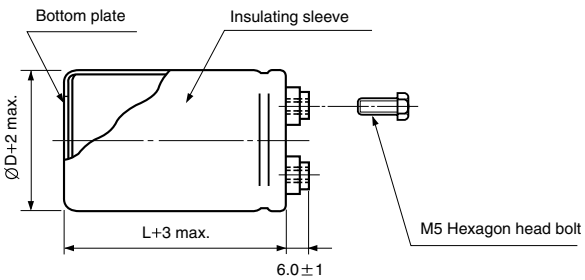
GF ⇨ GL
Long life

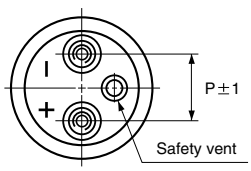
- Screw terminal series in compact case sizes
- High reliability, long life guaranteed for 5000 hours load life at 85˚C (500 ~ 600WV is assured 2000 hours at 85˚C)
- Suited for use in industrial power supplies for inverters
- Complied to the RoHS directive

Item	Characteristics
Operating temperature range	-25~105˚C
Capacitance tolerance	±20% at 120Hz, 20˚C
Leakage current max.	I=3 $\sqrt{CV}$ (μA) (after 5 minutes)
Dissipation factor max.	0.20 max. at 120Hz, 20˚C
Load life (after application of the rated voltage for 5000 hours at 85˚C)	Leakage current: Less than specified value Capacitance change: Within ±20% of initial value tanδ: Less than 300% of specified value 500~600WV products are for 2000 hours.
Shelf life (at 85˚C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value.

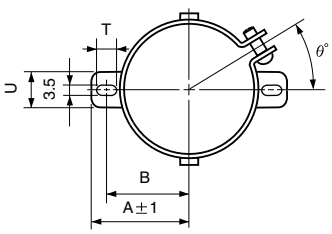
DRAWING

Unit : mm

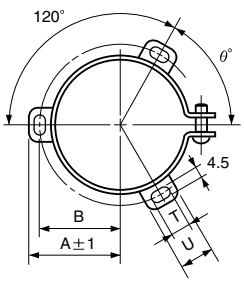




TWO LEGS ANGLE



THREE LEGS ANGLE



TWO LEGS ANGLE SIZE TABLE

ØD	B	A	T	U	θ˚	P
51	33.6	39.9	6	14	30	22
63.5	40.8	46.8	6	14	30	28.6

THREE LEGS ANGLE SIZE TABLE

ØD	B	A	T	U	θ˚	P
51	32.9	38.9	7	12	60	22
63.5	38.4	45.3	7	14	60	28.6
76.2	44.5	51.5	8	16	60	31.8
89	50.8	61	8	16	60	31.8

GF series

● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV / μF	350		400		450	
2200	51 × 110	6.0	51 × 130	6.4	63.5 × 110	6.4
2700	51 × 130	7.1	63.5 × 110	7.1	63.5 × 130	7.5
3300	63.5 × 100	7.5	63.5 × 130	8.3	76.2 × 110	8.0
3900	63.5 × 100	8.2	76.2 × 100	8.4	76.2 × 130	9.3
4700	76.2 × 100	9.3	76.2 × 130	10.2	76.2 × 150	10.8
5600	76.2 × 110	10.5	76.2 × 150	11.8	76.2 × 160	12.1
6800	76.2 × 130	12.3	76.2 × 160	13.4	89 × 150	14.3
8200	76.2 × 160	14.7	89 × 150	15.7	89 × 160	16.1
10000	89 × 150	17.3	89 × 160	17.8		
12000	89 × 160	19.5				

WV / μF	500		550		600	
1000	51 × 120	4.2	51 × 130	4.2	63.5 × 130	5.9
1200	63.5 × 100	4.5	63.5 × 110	5.0	76.2 × 120	6.7
1500	63.5 × 100	5.1	63.5 × 130	6.0	76.2 × 140	8.1
1800	63.5 × 120	6.0	76.2 × 110	6.7	76.2 × 160	9.6
2200	63.5 × 140	7.0	76.2 × 130	8.0	76.2 × 160	10.7
2700	76.2 × 120	7.5	76.2 × 150	9.4	89 × 160	12.6
3300	76.2 × 140	8.8	76.2 × 160	11.0		
3900			89 × 160	12.5		

Ripple current (A rms) at 85°C, 120Hz

Case size ØD×L (mm)

● PERMISSIBLE RIPPLE CURRENT MULTIPLIERS

Frequency	50Hz	120Hz	300Hz	1kHz	3kHz
Coefficient	0.8	1.0	1.1	1.3	1.4

GH For inverter Circuits Series

Miniaturized Long Life

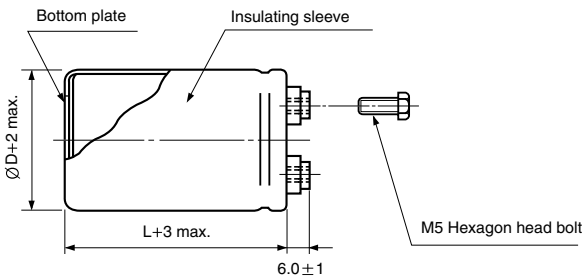
GF ⇒ GH
Miniature High ripple

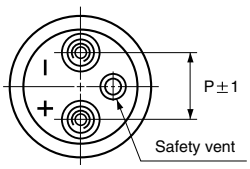
- Screw terminal series in compact case sizes
- Miniature size, High ripple current compared with GF series
- High reliability, long life guaranteed for 5000 hours load life at 85˚C (500WV is assured 2000 hours at 85˚C)
- Suited for use in industrial power supplies for inverters
- Complied to the RoHS directive

Item	Characteristics
Operating temperature range	-25 ~ +85˚C
Capacitance tolerance	±20% at 120Hz, 20˚C
Leakage current max.	I=3 $\sqrt{CV}$ (μA) (after 5 minutes)
Dissipation factor max.	0.20 max. at 120Hz, 20˚C
Load life (after application of the rated voltage for 5000 hours at 85˚C)	Leakage current: Less than the specified value Capacitance change: Within ±20% of the initial value tanδ: Less than 300% of specified value 500WV products are for 2000 hours
Shelf life (at 85˚C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value.

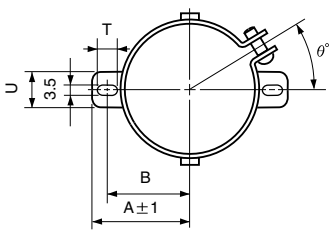
DRAWING

Unit : mm

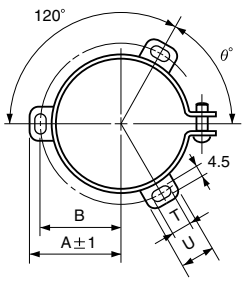




TWO LEGS ANGLE



THREE LEGS ANGLE



TWO LEGS ANGLE SIZE TABLE

ØD	B	A	T	U	θ°	P
51	33.6	39.9	6	14	30	22
63.5	40.8	46.8	6	14	30	28.6

THREE LEGS ANGLE SIZE TABLE

ØD	B	A	T	U	θ°	P
51	32.9	38.9	7	12	60	22
63.5	38.4	45.3	7	14	60	28.6
76.2	44.5	51.5	8	16	60	31.8
89	50.8	61	8	16	60	31.8

GH series

● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

μF \ WV	400		450		500	
1800					63.5×110	6.5
2200	51×100	8.4	51×130	8.6	63.5×130	7.7
2700	51×130	10.5	63.5×110	10.5	76.2×110	8.8
3300	63.5×100	11.6	63.5×120	11.9	76.2×130	10.4
3900	63.5×110	12.3	76.2×110	13.9	76.2×150	12.1
4700	63.5×130	14.5	76.2×120	15.5	89×130	13.7
5600	76.2×120	16.5	76.2×140	15.9	89×150	17.8
6800	76.2×130	17.5	76.2×160	18.4		
8200	76.2×150	18.7	89×150	19.7		
10000	89×150	20.5				
12000	89×160	21.0				

Ripple current (A rms) at 85°C, 120Hz

Case size ØD×L (mm)

● PERMISSIBLE RIPPLE CURRENT MULTIPLIERS

Frequency	50Hz	120Hz	300Hz	1kHz	3kHz
Coefficient	0.8	1.0	1.1	1.3	1.4

GN For Inverter, Miniature, High Ripple Series

Miniaturized Long Life

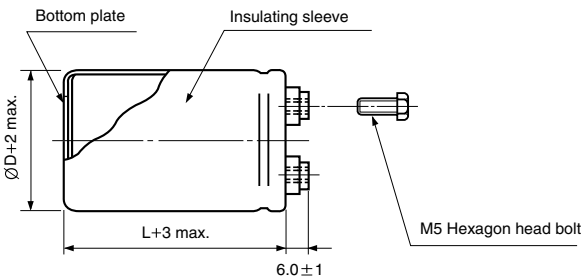
GH ⇨ GN
Miniature High Ripple

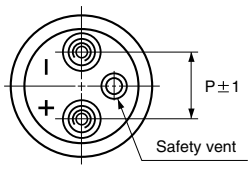
- Miniature size, High ripple current compared with GH series
- High reliability, long life guaranteed for 5000 hours load life at 85˚C
- Suited for use in industrial power supplies for inverters
- Complied to the RoHS directive

Item	Characteristics
Operating temperature range	-25 ~ +85˚C
Capacitance tolerance	±20% at 120Hz, 20˚C
Leakage current max.	I=3 $\sqrt{CV}$ (μA) (after 5 minutes)
Dissipation factor max.	0.20 max. at 120Hz, 20˚C
Load life (after application of the rated voltage for 5000 hours at 85˚C)	Leakage current: Less than specified value Capacitance change: Within ±20% of the initial value tanδ: Less than 300% of specified value 500WV products are for 2000 hours.
Shelf life (at 85˚C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value.

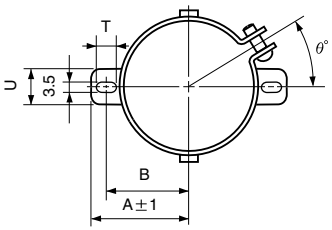
DRAWING

Unit : mm

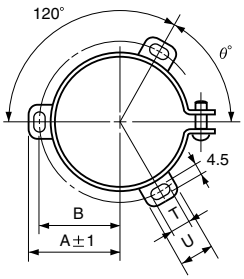




TWO LEGS ANGLE



THREE LEGS ANGLE



TWO LEGS ANGLE SIZE TABLE

ØD	B	A	T	U	θ˚	P
51	33.6	39.9	6	14	30	22
63.5	40.8	46.8	6	14	30	28.6

THREE LEGS ANGLE SIZE TABLE

ØD	B	A	T	U	θ˚	P
51	32.9	38.9	7	12	60	22
63.5	38.4	45.3	7	14	60	28.6
76.2	44.5	51.5	8	16	60	31.8
89	50.8	61	8	16	60	31.8

GN series

● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV / μF	400		450		500	
1800					63.5 × 100	6.5
2200	51 × 100	8.4	51 × 120	8.6	63.5 × 120	7.7
2700	51 × 110	10.0	63.5 × 100	10.5	76.2 × 100	8.8
3300	63.5 × 100	11.6	63.5 × 110	11.9	76.2 × 120	10.4
3900	63.5 × 100	12.3	76.2 × 100	13.9	76.2 × 140	12.1
4700	63.5 × 120	14.5	76.2 × 110	15.5	89 × 120	13.7
5600	76.2 × 110	16.5	76.2 × 130	15.9	89 × 140	17.8
6800	76.2 × 120	17.5	76.2 × 150	18.4		
8200	76.2 × 140	18.7	89 × 140	19.7		
10000	89 × 140	20.5				
12000	89 × 150	21.0				

Ripple current (A rms) at 85°C, 120Hz

Case size ØD×L (mm)

● PERMISSIBLE RIPPLE CURRENT MULTIPLIERS

Frequency	50Hz	120Hz	300Hz	1kHz	3kHz
Coefficient	0.8	1.0	1.1	1.3	1.4

GL

Screw Terminal Type, Long Life Series

Long Life

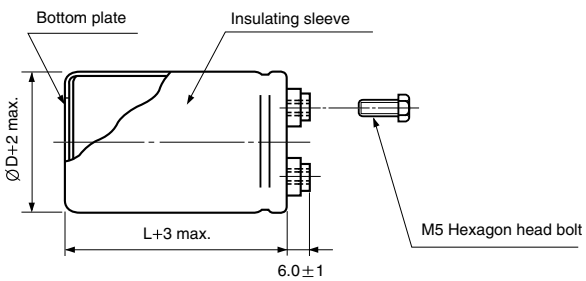
GF ⇨ GL
Long life

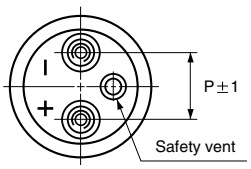
- Screw terminal series in compact case sizes
- High reliability, long life guaranteed for 20000 hours load life at 85˚C
- Suited for use in industrial power supplies for inverters
- Complied to the RoHS directive

Item	Characteristics
Operating temperature range	-25 ~ +85˚C
Capacitance tolerance	±20% at 120Hz, 20˚C
Leakage current max.	I=3$\sqrt{CV}$ (μA) (after 5 minutes)
Dissipation factor max.	0.20 max. at 120Hz, 20˚C
Load life (after application of the rated voltage for 20000 hours at 85˚C)	Leakage current: Less than specified value Capacitance change: Within ±20% of initial value tanδ: Less than 300% of specified value
Shelf life (at 85˚C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value.

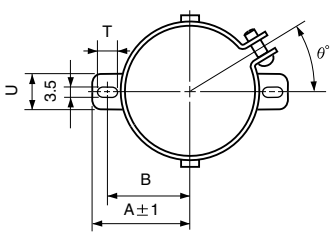
DRAWING

Unit : mm

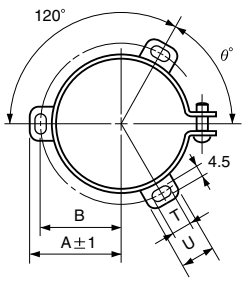




TWO LEGS ANGLE



THREE LEGS ANGLE



TWO LEGS ANGLE SIZE TABLE

ØD	B	A	T	U	θ°	P
51	33.6	39.9	6	14	30	22
63.5	40.8	46.8	6	14	30	28.6

THREE LEGS ANGLE SIZE TABLE

ØD	B	A	T	U	θ°	P
51	32.9	38.9	7	12	60	22
63.5	38.4	45.3	7	14	60	28.6
76.2	44.5	51.5	8	16	60	31.8
89	50.8	61	8	16	60	31.8

GL series

● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV / Item / μF	350			400			450		
	ØD×L (mm)	Ripple current (A rms)		ØD×L (mm)	Ripple current (A rms)		ØD×L (mm)	Ripple current (A rms)	
		40°C 120Hz	85°C 120Hz		40°C 120Hz	85°C 120Hz		40°C 120Hz	85°C 120Hz
1500							51×110	13.4	6.1
1800				51×110	14.6	6.6	51×130	15.7	7.1
2200	51×110	16.2	7.3	51×130	17.3	7.9	63.5×110	17.2	7.8
2700	51×130	19.2	8.7	63.5×110	19.0	8.7	63.5×130	20.3	9.2
3300	63.5×100	20.3	9.2	63.5×130	22.5	10.2	76.2×110	21.7	9.9
3900	63.5×110	22.9	10.4	76.2×100	22.7	10.3	76.2×130	25.1	11.4
4700	76.2×100	25.0	11.4	76.2×130	27.6	12.5	76.2×150	29.1	13.2
5600	76.2×110	28.2	12.8	76.2×150	31.8	14.5	76.2×160	32.7	14.8
6800	76.2×130	33.1	15.1	76.2×160	36.0	16.4	89×150	38.5	17.5
8200	76.2×150	39.5	18.0	89×150	42.3	19.2	89×160	43.4	19.7
10000	89×150	46.7	21.2	89×160	47.9	21.8			
12000	89×160	52.5	23.9						

● PERMISSIBLE RIPPLE CURRENT MULTIPLIERS

Frequency	50Hz	120Hz	300Hz	1kHz	3kHz
Coefficient	0.8	1.0	1.1	1.3	1.4

EV

High ripple Current, High Reliability Series

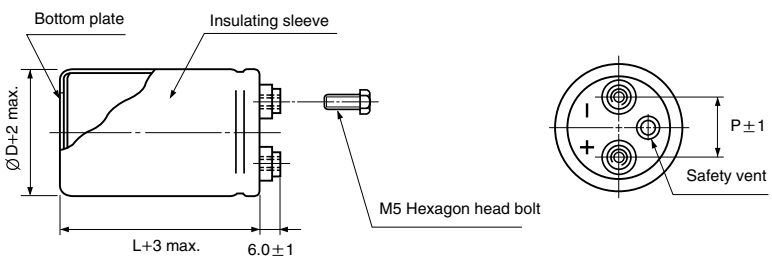
- High ripple current compared with GF series
- Newly improved long life guaranteed for 5000 hours load life at 105˚C
- Suited for the general-purpose inverter
- Complied to the RoHS directive

GF ⇨ EV
Wide Temp.

Item	Characteristics
Operating temperature range	-25 ~ +105˚C
Capacitance tolerance	±20% at 120Hz, 20˚C
Leakage current max.	I = 3√CV (μA) (after 5 minutes)
Dissipation factor max.	0.2 max. at 120Hz, 20˚C
Load life (after application of the rated voltage for 5000 hours at 105˚C)	Leakage current: Less than specified value Capacitance change: Within ±20% of initial value tanδ: Less than 200% of specified value 500WV products are for 2000hours
Shelf life (at 105˚C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value.

DRAWING

Unit : mm



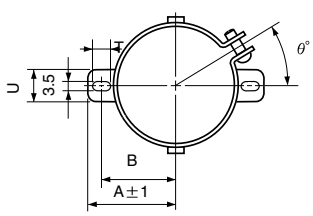
TWO LEGS ANGLE SIZE TABLE

ØD	B	A	T	U	θ˚	P
51	33.6	39.9	6	14	30	22
63.5	40.8	46.8	6	14	30	28.6

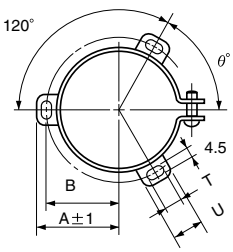
THREE LEGS ANGLE SIZE TABLE

ØD	B	A	T	U	θ˚	P
51	32.9	38.9	7	12	60	22
63.5	38.4	45.3	7	14	60	28.6
76.2	44.5	51.5	8	16	60	31.8
89	50.8	61	8	16	60	31.8

TWO LEGS ANGLE



THREE LEGS ANGLE



DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV / Item / μF	400		450		500	
	ØD×L (mm)	Ripple Current (A rms) 105˚C 120Hz	ØD×L (mm)	Ripple Current (A rms) 105˚C 120Hz	ØD×L (mm)	Ripple Current (A rms) 105˚C 120Hz
1000					51 × 130	6.3
1500					63.5 × 110	7.5
2200	63.5 × 110	11.6	63.5 × 115	12.1	76.2 × 130	10.1
2700	63.5 × 115	13.7	63.5 × 130	14.3	76.2 × 140	12.3
3300	63.5 × 130	16.1	76.2 × 130	16.9	76.2 × 150	13.0
3900	63.5 × 140	18.1	76.2 × 140	20.5	89 × 160	15.0
4700	76.2 × 130	21.2	76.2 × 150	22.6	89 × 160	16.5
5600	76.2 × 150	24.3	76.2 × 150	25.2		
6800	89 × 150	27.1	89 × 150	26.0		

PERMISSIBLE RIPPLE CURRENT MULTIPLIERS

Frequency	50Hz	120Hz	300Hz	1kHz	3kHz
Coefficient	0.8	1.0	1.1	1.3	1.4

LARGE ALUMINUM ELECTROLYTIC CAPACITORS

EY High Ripple, High Reliability Long Life Series

Long Life

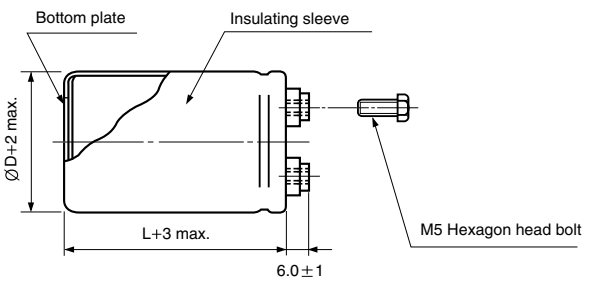
EV ⇨ EY
Long life

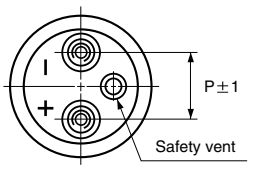
- High ripple current compared with GF Series
- High reliability, long life guaranteed for 7000 hours load life at 105˚C
- Suited for use in industrial power supplies for inverter
- Complied to the RoHS directive

Item	Characteristics
Operating temperature range	-25 ~ +105˚C
Capacitance tolerance	±20% at 120Hz, 20˚C
Leakage current max.	I=3$\sqrt{CV}$ (μA) (after 5 minutes)
Dissipation factor max.	0.20 max. at 120Hz, 20˚C
Load life (after application of the rated voltage for 7000 hours at 105˚C)	Leakage current: Less than specified value Capacitance change: Within ±20% of initial value tanδ: Less than 300% of specified value
Shelf life (at 105˚C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value.

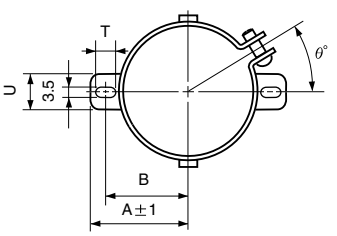
DRAWING

Unit : mm

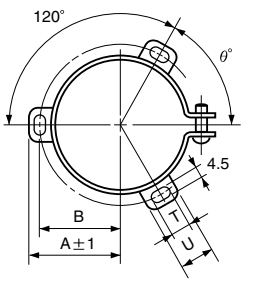




TWO LEGS ANGLE



THREE LEGS ANGLE



TWO LEGS ANGLE SIZE TABLE

ØD	B	A	T	U	θ°	P
51	33.6	39.9	6	14	30	22
63.5	40.8	46.8	6	14	30	28.6

THREE LEGS ANGLE SIZE TABLE

ØD	B	A	T	U	θ°	P
51	32.9	38.9	7	12	60	22
63.5	38.4	45.3	7	14	60	28.6
76.2	44.5	51.5	8	16	60	31.8
89	50.8	61	8	16	60	31.8

EY series

● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV / Item / μF	350			400			450		
	ØD×L (mm)	Ripple current (A rms)		ØD×L (mm)	Ripple current (A rms)		ØD×L (mm)	Ripple current (A rms)	
		40°C 120Hz	105°C 120Hz		40°C 120Hz	105°C 120Hz		40°C 120Hz	105°C
1500							51×110	13.4	6.1
1800				51×110	16.4	7.4	51×130	15.7	7.1
2200	51×110	18.1	8.2	51×130	19.4	8.8	63.5×110	17.2	7.8
2700	51×130	21.5	9.8	63.5×110	21.3	9.7	63.5×130	20.3	9.2
3300	63.5×100	22.7	10.3	63.5×130	25.1	11.4	76.2×110	21.7	9.9
3900	63.5×110	25.6	11.6	76.2×100	25.4	11.6	76.2×130	25.1	11.4
4700	76.2×100	27.9	12.7	76.2×130	30.8	14.0	76.2×150	29.1	13.2
5600	76.2×110	31.6	14.3	76.2×150	35.6	16.2	76.2×160	32.7	14.8
6800	76.2×130	37.1	16.8	76.2×160	40.2	18.3	89×150	38.5	17.5
8200	76.2×150	44.2	20.1	89×150	47.3	21.5	89×160	43.4	19.7
10000	89×150	52.2	23.7	89×160	53.6	24.3			
12000	89×160	58.7	26.7						

● PERMISSIBLE RIPPLE CURRENT MULTIPLIERS

Frequency	50Hz	120Hz	300Hz	1kHz	3kHz
Coefficient	0.8	1.0	1.1	1.3	1.4

AM For Hi-Fi Component System Series

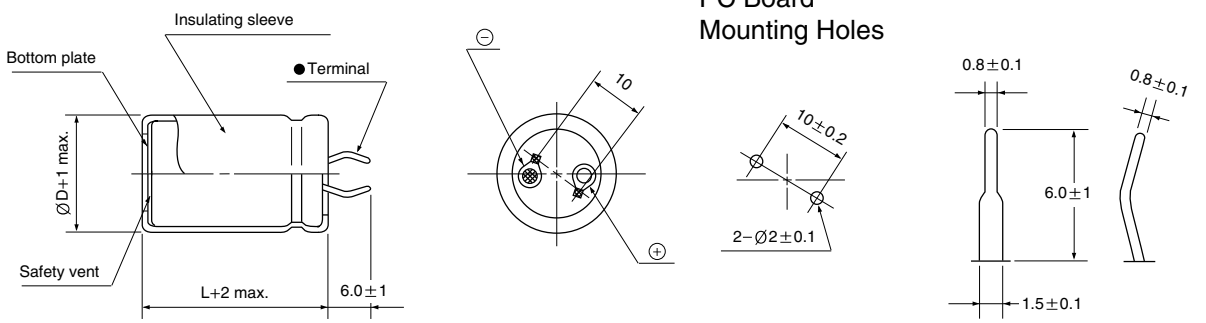
For Audio Use Solvent Proof

- For high grade audio equipment
- High resonance frequency, low ESR and low impedance
- Ideally suited for Hi-Fi VTR and CD players
- Snap-in terminal type
- Voltage range of 16~100V
- Complied to the RoHS directive

Item	Characteristics
Operating temperature range	-40 ~ +85˚C
Capacitance tolerance	±20% at 120Hz, 20˚C
Leakage current max.	$I = 3\sqrt{CV}$ (μA) (after 5 minutes)
Dissipation factor max. (at 120Hz, 20˚C)	WV: 16 | 25 ~ 35 | 50 ~ 63 | 80 ~ 100 tanδ: 0.25 | 0.22 | 0.20 | 0.15
Charge and discharge characteristics	After charge and discharge for 5000 cycles at 70˚C with application of the rated voltage, the capacitors shall be satisfied the following specifications. Appearance: No visible damage and no leakage electrolyte Leakage current: Less than specified value Capacitance change: Within ±15% of initial value tanδ: Less than 150% of specified value Conditions : Charge resistance : 4Ω Applied current : 1A Discharge resistance : 100Ω Charge and discharge time : 60sec. (each)
Load life (after application of the rated voltage for 2000 hours at 85˚C)	Leakage current: Less than specified value Capacitance change: Within ±20% of initial value tanδ: Less than 200% of specified value
Shelf life (at 85˚C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value.

DRAWING

Unit : mm



AM series

● DIMENSIONS

ØD×L(mm)

μF \ WV	16	25	35	50	63	80	100
470							22×40
680						22×40	25.4×40
1000					22×40	25.4×40	25.4×50
1500				22×40	25.4×40	25.4×50	30×50
2200			22×40	25.4×40	25.4×50	30×50	35×50
3300		22×40	25.4×40	25.4×50	30×50	30×60	35×60
4700		25.4×40	25.4×50	30×50	30×60	35×60	
6800	22×40	25.4×50	30×50	30×60	35×60		
8200	25.4×40	30×50	35×50	35×60	35×60		
10000	25.4×50	35×50	35×60	35×60			
12000	30×50	35×50	35×60				
15000	35×50	35×60					
22000	35×60						
33000	35×60						

* Lug terminal type : Applicable to case sizes larger than Ø25.4. Screw terminal type : Applicable to case sizes larger than Ø35.

LARGE ALUMINUM ELECTROLYTIC CAPACITORS

DF For Photo Flash Series

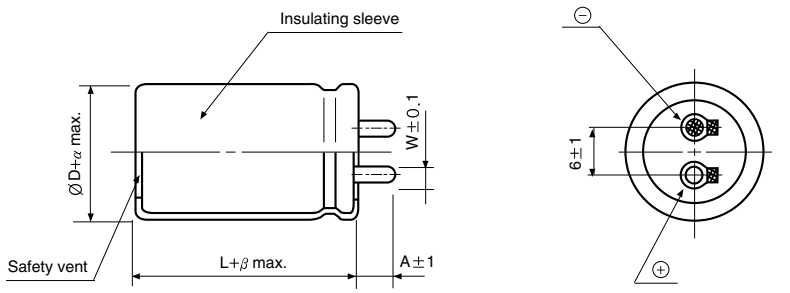
- For photo flash applications with lug terminal
- Low dissipation factor, low leakage current and high stability during the repetition of charge and discharge
- Complied to the RoHS directive

Item	Characteristics
Operating temperature range	-20 ~ +55˚C
Capacitance tolerance	-10 ~ +20% at 120Hz, 20˚C
Leakage current max.	I=1×C (μA) (after 5 minutes), where C=Nominal capacitance (μF)
Dissipation factor max. (at 120Hz, 20˚C)	Capacitance range(μF) | 150 ~ 600 | 700 ~ 1500 tanδ | 0.10 | 0.15
Charge and discharge characteristics	Charge and discharge at rated voltage at 5~35˚C with a switch sequence of 30 seconds for 5000 times via xenon flash tube with discharge resistance of 0.7~1.0Ω Leakage current: Less than 150% of specified value Capacitance change: Within ±10% of initial value tanδ: Less than 150% of specified value
Shelf life	This following specifications shall be satisfied when capacitors are restored to 20˚C after exposing them for 1000 hours at 55˚C without voltage applied. Leakage current: Less than 300% of specified value Capacitance change: Within ±10% of initial value tanδ: Less than 150% of specified value

DRAWING

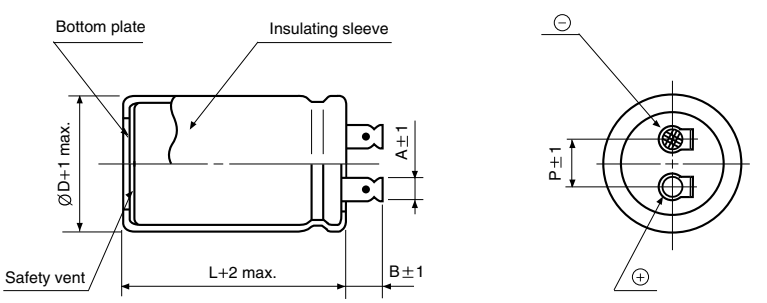
Unit : mm

ØD≦20



	ØD=20
W	2.5
α	1.0
β	2.0
A	4.0

ØD≧22



	ØD=22	ØD≧25.4	ØD=40 *
A	3.5	4.5	4.5
B	6.0	8.0	11.0
p	8.0	10.0	18.0

* Note : Ø40 is available upon request. Please check with us individual size and dimensions.

DF series

● DIMENSIONS

ØD×L(mm)

WV (SV)	ØD / μF	20	22	25.4	30	35
330 (350)	200	20×27				
	250	20×30	22×27			
	300	20×36	22×30			
	350	20×39	22×33			
	400	20×44	22×36	25.4×30		
	450		22×42	25.4×33		
	500		22×44	25.4×37		
	600			25.4×42	30×33	
	700			25.4×47	30×38	
	800			25.4×54	30×42	
	900			25.4×57	30×45	
	1000				30×48	35×40
	1200				30×58	35×45
	1300				30×63	35×50
	1500				30×70	35×55
360 (390)	200	20×30	22×27			
	250	20×36	22×30			
	300	20×39	22×36	25.4×30		
	350	20×44	22×40	25.4×33		
	400		22×42	25.4×35		
	450		22×48	25.4×40		
	500			25.4×44	30×35	
	600			25.4×54	30×38	
	700			25.4×57	30×45	
	800				30×50	35×40
	900				30×55	35×45
	1000				30×58	35×55
	1200				30×70	35×55
	1300					35×60
	1500					35×70

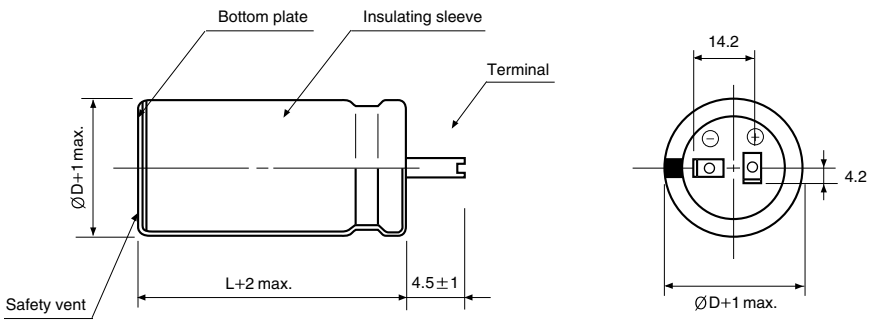
AR For Inverter Air-conditioning System Series

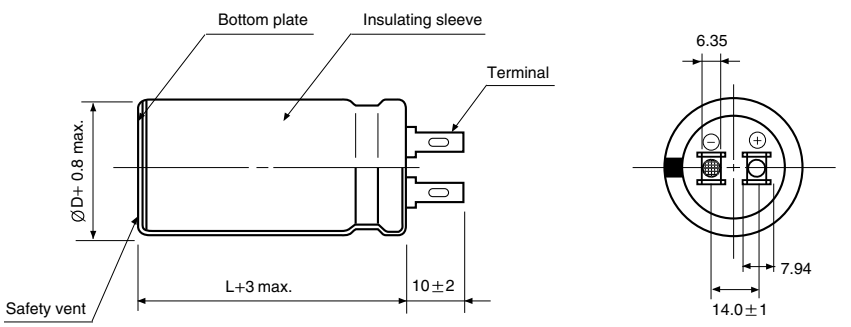
· For high ripple current application such as air conditioning system
· Load life of 3000 hours at 85˚C
· Complied to the RoHS directive

Item	Characteristics
Operating temperature range	-25 ~ +85˚C
Capacitance tolerance	±10% at 120Hz, 20˚C
Leakage current max.	I=3 $\sqrt{CV}$ (μA) (after 5 minutes)
Dissipation factor max. (120Hz, 20˚C)	WV: 220 / 330 / 400 tanδ: 0.02 / 0.03 / 0.05
Low temperature characteristics (120Hz)	Z-25˚C/ Z+20˚C≦4
Load life	After an application of DC bias voltage plus the rated AC ripple current for 3000 hours at 85˚C. The measurement shall meet the following limits. Leakage current: Less than specified value Capacitance change: Within ±20% of initial value tanδ: Less than 200% of specified value
Shelf life(at 85˚C)	This following specifications shall be satisfied when capacitors are restored to 20˚C after exposing them for 1000 hours at 85˚C without voltage applied. Leakage current: Less than specified value Capacitance change: Within ±15% of initial value tanδ: Less than 150% of specified value

● DRAWING

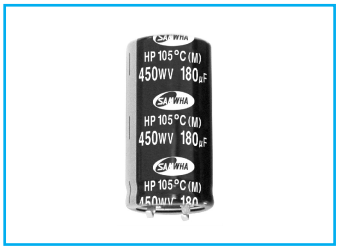
Unit : mm





* Note : If you want to use the 'AR' series in your circuit, Please consult our technical department.

HP Horizontal Mount Type Series

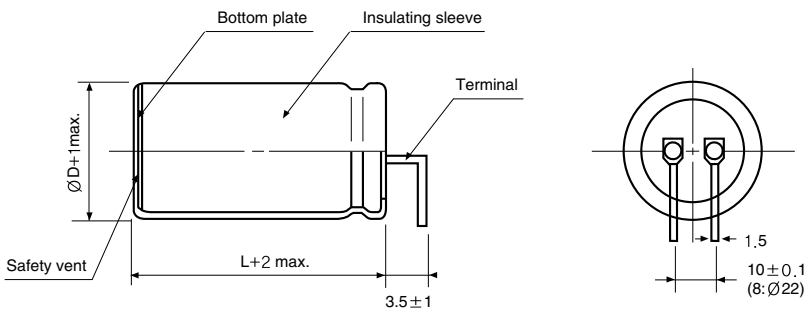


· Layout mounting
· Suited for use in flat electronic device where height space is limited (adapter,etc.)
· Complied to the RoHS directive

Item	Characteristics
Operating temperature range	WV200 : -40 ~ +105˚C, WV400 : -25 ~ +105˚C
Leakage current max.	I=3 $\sqrt{CV}$ (μA) (after 5 minutes)
Capacitance tolerance	±20% at 120Hz, 20˚C
Dissipation factor max. (at 120Hz, 20˚C)	WV: 200 — tanδ: 0.15; WV: 400 — tanδ: 0.15
Low temperature characteristics (impedance ratio at 120Hz)	WV: 200 — Z-25˚C/Z+20˚C: 3, Z-40˚C/Z+20˚C: 10; WV: 400 — Z-25˚C/Z+20˚C: 3, Z-40˚C/Z+20˚C: 10
Load life (after application of the rated voltage for 2000 hours at 105˚C)	After an application of DC bias voltage plus the rated AC ripple current for 2000 hours at 105˚C the peak voltage shall not exceed the rated DC voltage. The measurement shall meet the following limits. Measurement shall be performed after 2 hours exposure at room temperature. Leakage current: Less than specified value; Capacitance change: Within ±25% of initial value; tanδ: Less than 200% of specified value
Shelf life (at 105˚C)	After 1000 hours at 105˚C without voltage application measurement shall meet the following limits. Measurement shall be performed after exposure for 24 hours at room temperature after application of DC rated voltage to the capacitors for 30 minutes. Leakage current: Less than specified value; Capacitance change: Within ±25% of initial value; tanδ: Less than 200% of specified value

● DRAWING

Unit : mm



HP series

● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV / ØD / μF	200				400			
	22		25.4		22		25.4	
68					22 × 25	0.46		
82					22 × 30	0.57		
100					22 × 35	0.65	25.4 × 30	0.67
120					22 × 40	0.74	25.4 × 30	0.72
150					22 × 45	0.88	25.4 × 35	0.84
180					22 × 50	0.95	25.4 × 40	0.93
220					22 × 50	1.10	25.4 × 45	1.09
270	22 × 30	0.93					25.4 × 50	1.25
330	22 × 35	1.09						
390	22 × 40	1.26	25.4 × 30	1.30				
470	22 × 45	1.42	25.4 × 35	1.39				
560	22 × 50	1.56	25.4 × 35	1.55				
680			25.4 × 45	1.85				
820			25.4 × 50	2.18				
1000			25.4 × 60	2.30				

Ripple current (A rms) at 105℃, 120Hz
Case size ØD×L (mm)

● FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

μF / Frequency	50Hz	120Hz	300Hz	1kHz	10kHz～
160 ~ 250	0.85	1.00	1.20	1.25	1.45
300 ~	0.85	1.00	1.15	1.20	1.40