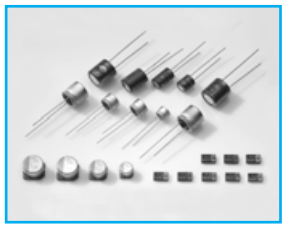
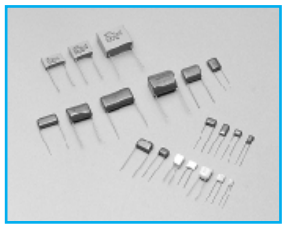




SERIES CHART

■ ALUMINUM ELECTROLYTIC CAPACITORS

● CHIP TYPES

85°C Product

- **SC** 37 — 2000h Standard
- **NC** 47 — 5.5mmL, 2000h Non-polarized

125°C Product

- NEW **UC** 46 — 125°C Wide temp.

105°C Product

- **RC** 39 — 5.5mmL, 1000h Standard → **ZC** 42 — 5.5mmL, 1000h Low Impedance
- **JC** 40 — 6.0mmL, 2000h → UPGRADE **CK** 43 — 1000h Low Impedance
- **TC** 41 — 2000h High CV
- **CN** 48 — 5.5mmL, 1000h Non-polarized
- NEW **CA** 45 — 6mmL, 5000h Long life, High CV

● SOLID TYPES

Organic Semiconductor (APRO-CAP)

- UPGRADE **FX** 18 — 105°C, 2000h Standard
- UPGRADE **FD** 20 — 105°C, 2000h High CV
- **FE** 22 — 5mmL, 2000h
- **FH** 24 — Long life 5000h

Conducting Polymer (Hi-CAP)

- UPGRADE **FC** 31 — 1000h SMD Type
- **FA** 27 — SMD type
- **FB** 29 — Lead type

● MINIATURE RADIAL LEAD TYPES

85°C General Use

- UPGRADE **SD** 54 — 2000h Standard
- **SV** 57 — 2000h Low Profile
- **SS** 58 — 7mmL, 2000h
- **SE** 59 — 5mmL, 2000h

105°C General Use

- **RD** 60 — 2000h Standard
- **RV** 63 — 1000h Low Profile
- **RK** 64 — 7mmL, 1000h
- **RE** 65 — 5mmL, 1000h

Low Impedance

- NEW **WF** 75 — 105°C, 10000h Extremely Low Impedance Long life
- **RZ** 66 — 105°C, 5000h Extremely Low Impedance
- **WL** 70 — 105°C, 5000h Extremely Low Impedance Wide Voltage
- **WD** 68 — 105°C, 5000h Extremely Low Impedance Standard
- **RP** 73 — 105°C, 10000h Extremely Low Impedance Long life
- **WS** 83 — 7mmL, 1000h Low Impedance
- **RQ** 77 — 105°C, 5000h Extremely Low Impedance
- NEW **WH** 81 — 105°C, 2000h Ultra Low Impedance Miniature
- **WE** 5mmL, 1000h Low Impedance
- **WB** 79 — 105°C, 5000h Ultra Low Impedance
- **WZ** 82 — 105°C, 2000h Ultra Low Impedance Miniature

Ballast, Charger, Adapter

- **BW** 89 — 125°C, 3000h Wide temp.
- **BA** 85 — 105°C, 2000h Standard
- **RH** 86 — 105°C, 5000h For Ballast
- **BL** 88 — 105°C, 10000h For Ballast Long life
- UPGRADE **CH** 90 — 85°C, 2000h For Charger and adapter
- NEW **BH** 87 — 105°C, 5000h High Ripple For Ballast

High Reliability

- **RS** 91 — 105°C, 7000h Long life
- **RW** 92 — 125°C, 2000h High Temperature
- **RB** 93 — 125°C, 2000h High Temperature Miniature

SERIES CHART

ALUMINUM ELECTROLYTIC CAPACITORS

MINIATURE RADIAL LEAD TYRES

Non-Polarized

- **NP** 97 — 85°C, 2000h Standard → **RN** 95 — 105°C, 1000h Standard
- **NS** 99 — 7mmL, 2000h → **BP** 101 — 85°C, 2000h Crossover Network → **BR** 102 — 105°C, 2000h Crossover Network
- **NE** 100 — 5mmL, 2000h → **NF** 103 — 85°C, 2000h Horizontal Deflection Current Correction → **NH** 104 — 105°C, 2000h Horizontal Deflection Current Correction

Low Leakage Current

- UPGRADE **LL** 106 — 85°C, 2000h Standard → **RL** 105 — 105°C, 1000h Standard
- **LS** 107 — 7mmL, 2000h → **TH** 109 — 85°C, 2000h TV Vertical Oscillator Circuits
- **LE** 108 — 5mmL, 1000h → **TB** 110 — 85°C, 2000h Timer Circuits

Special Application

- **TF** 111 — Photo Flash

LARGE TYPES

Snap-in Terminal

- **HC** 116 — 85°C, 2000h Standard → UPGRADE **HE** 121 — 105°C, 2000h Standard → **HU** 127 — 105°C, 5000h Long Life
- **HJ** 119 — 85°C, 3000h Miniature → **HK** 124 — 105°C, 3000h Miniature → **HB** 128 — 125°C, 1000h High Temp
- **HT** 126 — 105°C, 15mmL miniaturized → **QB** 130 — 105°C, 2000h Withstanding Overvoltage → NEW **QA** 131 — 105°C, 5000h Permissible Abnormal Voltage

Screw, Lug Terminal

- **SM** 137 — 85°C, 2000h Standard → **CU** 139 — 105°C, 2000h Standard
- **GT** 141 — 85°C, 2000h For Inverter → **EV** 145 — 105°C, 5000h Long Life
- **GF** 143 — 85°C, 5000h For Inverter → **LM** 132 — 85°C, 2000h Lug terminal → NEW **LH** 134 — 105°C, 2000h Lug terminal

Special Application

- **AM** 146 — 85°C, 2000h For Audio
- **DF** 148 — For Photo Flash
- **AR** 150 — 85°C, 3000h For Air-conditioning system
- **HP** 151 — 105°C, Horizontal Mount type
- NEW **LW,SW** 136 — For Welding Machine

PLASTIC FILM CAPACITORS

Inductive

- **TY** 159 — P.E.T. Standard → **TS** 160 — P.E.T. Low Profile

Non-Inductive

- **TM** 165 — P.E.T. Metallized Type Standard → **TX** 161 — P.E.T. Foil Type Standard → NEW **TZ** 162 — P.E.T. Foil Type 105°C
- **TL** 166 — P.E.T. Metallized Type Low Profile → NEW **TJ** 168 — P.E.T. Metallized Type 105°C, Reduce Noise
- **EB** 169 — P.E.T. Metallized Box Type
- NEW **PF** 164 — P.P. Foil Type 105°C
- **PC** 170 — P.P. Metallized Type Standard
- **PX** 163 — P.P. Foil Type Standard
- **PH** 171 — P.P. Foil Type High Voltage

ELECTRIC DOUBLE LAYER CAPACITORS

70°C Product

- NEW **DS** 180 — 70°C, 1000h General type

CONTENTS

★New series
☆Upgrade series

① Aluminum Solid Electrolytic Capacitors

② Surface Mount Aluminum Electrolytic Capacitors

③ Miniature Aluminum Electrolytic Capacitors

CONTENTS

★New series
☆Upgrade series

4 Large Aluminum Electrolytic Capacitors

5 Plastic Film Capacitors

6 Electric Double Layer 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.

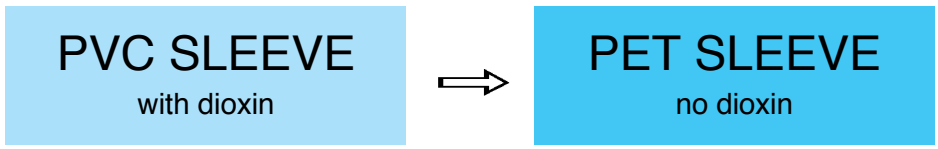
Type	Discontinued series	Characteristics	Substitute series	Page
CHIP TYPE	MC	85℃ miniature	SC	37
	SC	85℃ high CV		
MINIATURE RADIAL LEAD TYPE	SA	85℃ standard	SD	54
	SD	85℃ standard, 2000hours		
	SR			
	SQ			
	SA	85℃ high Voltage		
	SK	Height 7mm, high CV	SS	58
	RA	105℃ standard	RD	60
	RD			
	RY	105℃ miniature		
	RX	Low impedance	WL	70
	RT	105℃ 3000 hours		
	RF	105℃ 5000 hours		
LARGE TYPE	HM	85℃ standard, snap-in	HC	118
	KL			
	HS			
	HQ	85℃ miniature, snap-in		
	HA	105℃ standard, snap-in	HS	121
	HL			
	HD	105℃ miniature, snap-in		
	LH	85℃ standard, lug terminal	LM	132
	SX	Non inductive type, screw terminal	SM	137
	SF	For photo flash	DF	149

환경 친화 커패시터

■ **Dioxin Free Capacitors**

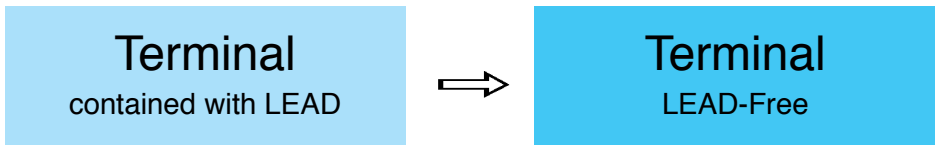
Dioxin은 공기, 토양, 인간의 신체에 직접적으로 영향을 미치는 치명적인 부산물중의 하나입니다. 이를 제거하기 위해 삼화는 아래와 같이 환경대응품을 생산하고 있습니다.

PET SLEEVE에는 Size의 제한이 있으므로 이 제품을 적용하려면 기술팀으로 문의하십시오.



■ **LEAD-Free Capacitors**

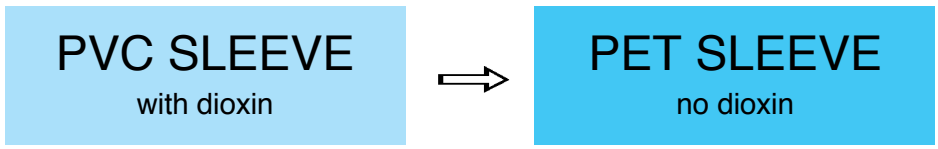
인간의 신체에 납이 미치는 영향은 아주 오랜 기간 동안 지적되어 왔습니다.
삼화는 알루미늄 전해 커패시터에 LEAD-Free용 단자를 사용한 환경대응품을 생산하고 있습니다.



ENVIRONMENT FRIENDLY CAPACITORS

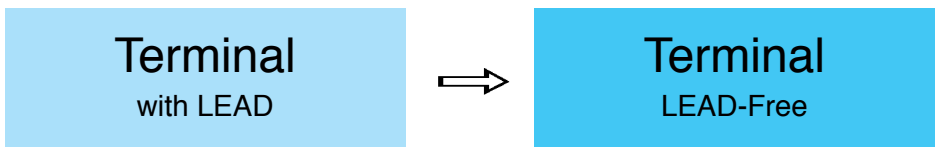
■ **Dioxin Free Capacitors**

Dioxin is one of the critical substances that directly effects to air, earth and human body are suspected. Samwha is producing capacitors to cope with environmental policy as following, There is a size limitation to PET SLEEVE. Please consult about application with our technical department.



■ **LEAD-Free Capacitors**

An effect of Lead to human body has been being pointed out for a long time.
Aluminum electrolytic capacitors are contained Lead, but Samwha changed terminal into LEAD-free terminal.



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 ø6.3 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 ø6.3이상의 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 기술부로 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

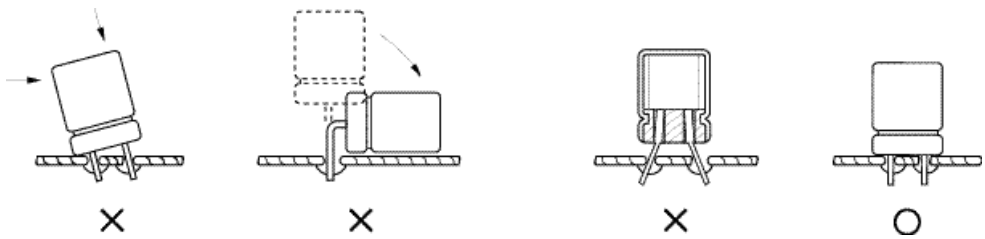
커패시터의 리드선이나 단자에 무리한 힘을 가하지 마십시오.
리드선이나 단자의 단선 및 회로의 開放을 초래할 수 있습니다.
기판 장착 후에도 커패시터에 무리한 힘을 가하지 마십시오.
회로기판에 장착 후 커패시터를 잡고 이동하거나 비틀지 마십시오.

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 단자 간의 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 패턴 사이에 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.
Unless otherwise specified, following space should be made above the capacitor safety vent.

커패시터의 안전 변 위에 회로 패턴이나 배선이 없도록 하여 주십시오.
만약 그렇지 못하면 다음과 같이 안전 변이 작동할 수 있는 공간이 있어야 합니다.

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.

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.

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) Be careful not to apply mechanical stress to the terminals or lead wires

3)Common type of halogenated cleaning agents are listed below

Chemical Name	Structural Formula	Representatice Brand Name
Trichlorotrifluoroethane	$C_2Cl_3F_3$	Freon TF, Daiflon S-3
Fluorotrichloromethane	CCl_3F	Freon-11, Daiflon S-1
1,1,1-Trichloroethane	$C_2H_3Cl_3$	Cholroethene
Trichloroethylene	C_2HCl_3	Trichlene
Methyl Chloride	CH_3Cl	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.

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. 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. 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.

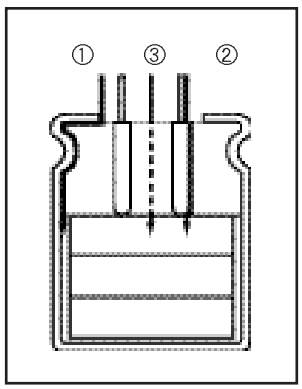
3)할로겐계의 세정제의 일반적 유형은 아래의 표와 같다.

화 학 명	구조식	대표 상품명
Trichlorotrifluoroethane	$C_2Cl_3F_3$	Freon TF, Daiflon S-3
Fluorotrichloromethane	CCl_3F	Freon-11, Daiflon S-1
1,1,1-Trichloroethane	$C_2H_3Cl_3$	Cholroethene
Trichloroethylene	C_2HCl_3	Trichlene
Methyl Chloride	CH_3Cl	MC

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

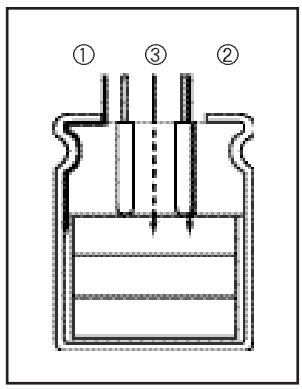
4)커패시터의 밀폐용 고무에 고무계의 접착제를 사용하여 인쇄 회로기판에 접착할 경우, 접착제의 종류에 따라 커패시터의 부식이 발생할 수 있습니다. 접착제로서는 할로겐화되지 않는 유용성 폴리머로 구성된 유기용제를 선택하십시오. 코팅(coating)을 행할 경우 제품과 기판간에 세정액이 남지 않도록 세정 직후 50~80℃에서 열풍 건조하여 주시기 바랍니다.

5)Penetration Channel of Solvent and Corrosion Mechanism



①Penetration between the rubber and the aluminum case
②Penetration between the rubber and the lead wires
③ Penetration 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.

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℃, 45 to 75% 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.
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℃, 45~75% 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.

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 1kΩ의 보호저항을 통해 직류 정격전압을 30분 동안 인가하는 것이 좋습니다.

14. IN AN EMERGENCY

If some gas blow out from the capacitor due to operation of safety vent, immediately turn off the main switch or pull out the plug from the power source.

When the safety vent operates, do not draw your face the safety vent since gas which in over 100℃ will be emitted.
If your eyes entered or breathed the gas, immediately wash out your eyes and mouth with pure water.
Do not touch electrolyte. If your skin is exposed to electrolyte, please wash it away using soap and water.

14. 응급조치

만약 커패시터의 안전 변이 작동되어 가스가 분출되는 것을 볼 경우 주 전원의 스위치를 끄거나 플러그를 뽑아 주십시오.

안전변이 작동될 때 분출되는 가스의 온도가 100℃를 넘기 때문에 얼굴을 가까이 대지 말아 주십시오.
만약 분출된 가스가 눈으로 들어가거나 흡입하였을 경우 즉시 깨끗한 물로 눈을 씻고 입안을 닦아내어 주십시오.
전해액은 만지지 마십시오. 만약 피부에 묻었다면 비누나 물로 닦아 주십시오.

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	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

3. Large aluminum electrolytic capacitors

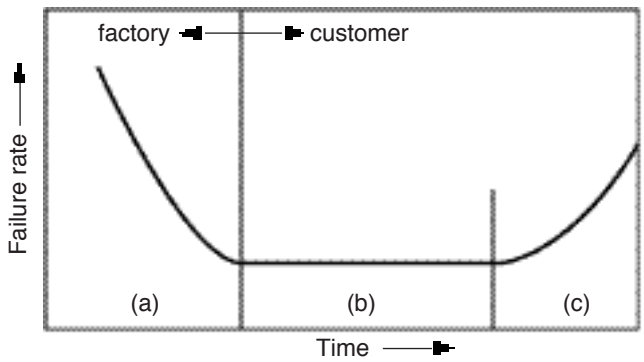
WV / Frequency	50Hz	120Hz	300Hz	1kHz	10kHz~
~ 100	0.85	1.00	1.06	1.15	1.20
160 ~ 250	0.85	1.00	1.20	1.25	1.45
300 ~	0.85	1.00	1.15	1.20	1.40

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

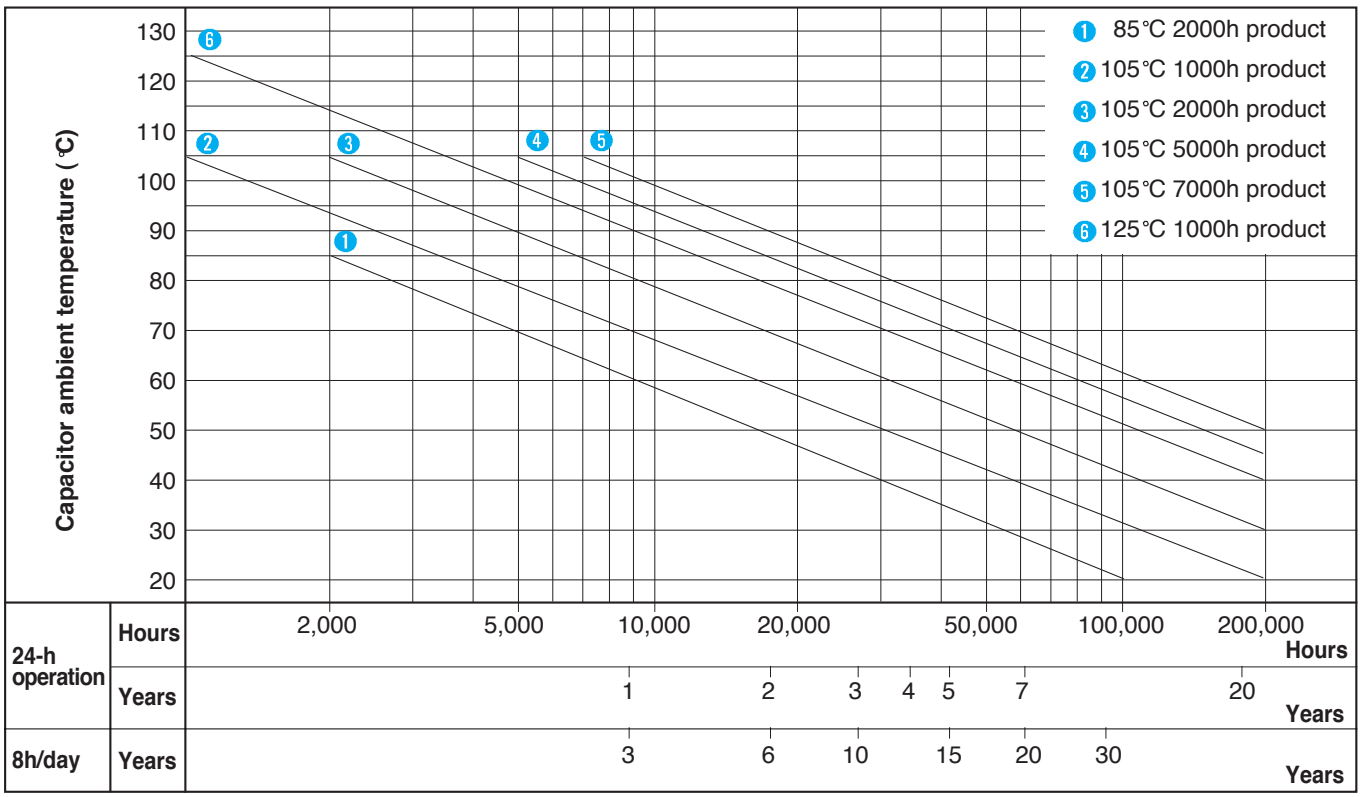
Expected life *-(* for reference)*

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℃. The life acceleration equation computes as shown below.

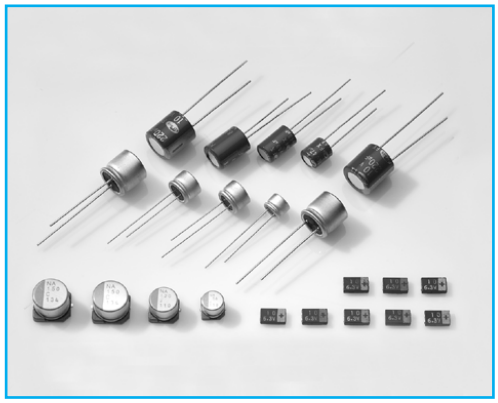
$$L = L_0 \times 2^{\frac{T_0 - T}{10}}$$

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

Expected life chart *-(* for reference)*



1 ALUMINUM SOLID ELECTROLYTIC CAPACITORS



APRO-CAP (Organic Semiconductor Solid Electrolytic Capacitors)

APRO-CAP is an electrolytic capacitor that use organic semiconductor with high conductivity as it's electrolyte. Using an organic semiconductor has a high conductivity, low impedance at high frequency and long life. **APRO-CAP** is roughly the same construction as an aluminum electrolytic capacitor but differs from in that place of the electrolyte solution, organic semiconductor crystal is impregnated and is encased with an epoxy resin instead of rubber encasing.

1. Electrical characteristics

(1) The greatest feature of the APRO-CAP is its excellent frequency characteristic nearly equal to that of film capacitors.
(2) The temperature characteristic of the APRO-CAP is that it features little change in temperature for the ESR.
(3) APRO-CAP has a small ESR, and compared to other electrolytic capacitors, can allow far more ripple current.
(4) APRO-CAP has extremely longer life in practical use even for 105°C 2000h guaranteed products. The load life continues permanently, as it is not generate dry-up phenomenon such that aluminum electrolytic capacitor.

2. Application guidelines

(1) Polarity

APRO-CAP is a solid electrolytic capacitor with positive and negative electrodes. Do not reserve the polarity when using. If it is used with the polarities reserved, increased leakage current or a decreased life span may result.

(2) Prohibited circuits

Since problems can be expected due to the leakage current fluctuations that occur during soldering and other processes, APRO-CAP cannot be used on the following circuits.

① High impedance voltage retention circuits
② Coupling circuits
③ Time constant circuits
* In addition to the leakage current fluctuation above, the operational conditions such as characteristics of temperature, anti-humidity and high temperature loads stipulated in the delivery specifications will affect the electrostatic capacity. The electrostatic capacity fluctuation may cause problem if it is used as a time constant capacitor, which is extremely sensitive to the fluctuation of electrostatic capacity. Do not use it as a time constant capacitor.
④ Circuits greatly affected by leakage current
⑤ The circuit in which two or more of APRO-CAP is connected in series so as to raise the endurance voltage of them

(3) Overvoltage prohibited during design

Overvoltage exceeding the rated voltage may not be applied even for an instant as it may cause a short circuit.

(4) Sudden charge and discharge restricted

Sudden charge and discharge restricted (for maintenance of high-proof reliability) A protection circuit is recommended for when a sudden charge or discharge causes excessive rush current because this is a main cause of short circuits and large leakage current.

(5) Temperature derating voltage

Fundamentally, lifetime is not affected whether voltage is applied to it or not, but apply the following temperature derating voltage to the 25WV products. 6.3~20WV products do not require the application.

(6) Considerations when soldering

Do not use reflow soldering of APRO-CAP (Lead wire type)

The soldering process of lead wire type should be done with following conditions or more gentle one (when soldering phenolic board of 1.6mm in thickness) : 260°C 10 seconds. The leakage current value after soldering may increase a little (from a few μA to several hundred μA) depending on the soldering conditions (preheating and solder temperature and time, PC boards material and thickness).
The leakage current can be reduced through self-repair by applying voltage.

Hi-CAP (Conducting 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℃, 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℃ or under for up to 5 minutes.
Be sure to sufficiently wash (about 3 min. with water) and dry (20 min. at 100℃) 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

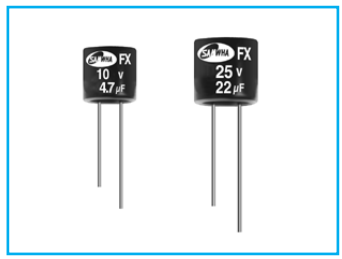
ORGANIC SEMICONDUCTOR SOLID ELECTROLYTIC CAPACITORS

UPGRADE

FX

Lead type, With Organic Semiconductor Series

APRO-CAP



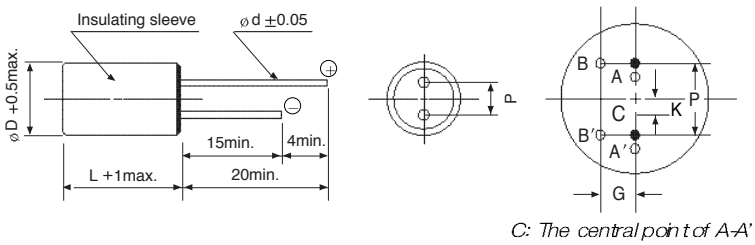
- Low impedance at high frequency
- High ripple current due to reduced ESR
- Excellent noise-absorbent characteristics
- Very stable capacitance, impedance and ESR against temperature
- Designed for use smoothing circuit of power supplies

Item	Characteristics
Operating temperature range	-55 ~ +105℃
Leakage current max.	Not more than the values in Table 1
Capacitance tolerance	±20% at 120Hz, 20℃
Dissipation factor max.	Not more than the values in Table 1
ESR	Not more than the values in Table 1
Temperature characteristics (Impedance ratio at 100kHz)	Z-55℃ / Z+20℃: 0.75 ~ 1.25; Z+105℃ / Z+20℃: 0.75 ~ 1.25
Load life* (after application of the rated voltage for 2000 hours at 105℃)	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℃ for 1000 hours 90~95% R.H.)	Leakage current: Less than specified value; Capacitance change: Within ±10% of initial value; tanδ: Less than 150% of specified value

* Note: 1. To use an APRO-CAP when the operating temperature exceeds 85℃ on a component with a rated voltage of 25V, reduce the voltage by 0.25V for every degree (1℃) relative to the value 85℃ (25V).

2. If any doubt arises, measure the current after applying voltage (voltage treatment) for 30 minutes at 105℃. The rated voltage should be applied for 6.3 to 20WV, while a temperature reduction voltage should be applied for 25WV.

DRAWING (Unit : mm)



C: The central point of A-A'

PART NUMBER SYSTEM (See Page 50)

øD ×L	Code	P	ød	K max.	G max.
5 ×6.8	0506H	2.0 ±0.5	0.5	0.5	0.5
6.3 ×6.8	6L06H	2.5 ±0.5	0.5	0.5	0.5
6.3 ×9.8	6L09H	2.5 ±0.5	0.5	0.5	0.5
8 ×10.5	0810M	3.5 ±0.5	0.6	0.8	0.8
10 ×10.5	1010M	5.0 ±0.5	0.6	0.8	0.8
12.5 ×22	12022	5.0 ±1.0	0.8	0.8	0.8
16 ×25	16025	7.5 ±1.0	0.8	0.8	0.8

DIMENSIONS

μF \ WV	6.3	10	16	20	25	30
1.0					5 × 6.8	5 × 6.8
1.5					5 × 6.8	5 × 6.8
2.2					5 × 6.8	6.3 × 6.8
3.3					5 × 6.8	6.3 × 6.8
4.7		5 ×6.8	5 × 6.8		6.3 × 6.8	6.3 × 9.8
6.8	5 × 6.8	5 ×6.8	5 × 6.8		6.3 × 6.8	6.3 × 9.8
10	5 × 6.8	5 ×6.8	6.3 × 6.8		6.3 × 6.8	8 × 10.5
15	5 × 6.8	6.3 ×6.8	6.3 × 6.8	6.3 × 6.8	6.3 × 9.8	
22	6.3 × 6.8	6.3 ×6.8	6.3 × 6.8	6.3 × 6.8	8 × 10.5	10 × 10.5
33	6.3 × 6.8	6.3 ×6.8	6.3 × 6.8	6.3 × 9.8	10 × 10.5	
47	6.3 × 6.8	6.3 ×9.8	6.3 × 9.8	8 × 10.5	10 × 10.5	
68	6.3 × 9.8	6.3 ×9.8	8 × 10.5	8 × 10.5		
100	8 × 10.5	8 ×10.5	8 × 10.5	10 × 10.5		
150	8 × 10.5	10 ×10.5	10 × 10.5			
220	10 × 10.5	10 ×10.5				
330	10 × 10.5					
470			12.5 × 22			
1000			16 × 25			
2200	16 × 25					
3300	16 × 25					

FX Series

- Table1. FX Series Characteristics List

WV	uF	øD(mm)	L(mm)	ESR(mΩ)max. at 20°C 100~300kHz	Ripple current (mA rms)at 45°C 100kHz	Dissipation factor at 20°C 120Hz	Leakage Current (uA)(max.) after 2minutes
6.3	6.8	5	6.8	180	720	0.07	0.86
6.3	10	5	6.8	150	780	0.07	1.26
6.3	15	5	6.8	120	815	0.07	1.89
6.3	22	6.3	6.8	70	1270	0.07	2.77
6.3	33	6.3	6.8	70	1320	0.07	4.16
6.3	47	6.3	6.8	60	1430	0.07	5.92
6.3	68	6.3	9.8	50	2000	0.07	8.57
6.3	100	8	10.5	30	2670	0.07	12.60
6.3	150	8	10.5	30	2780	0.07	18.90
6.3	220	10	10.5	27	3370	0.07	27.72
6.3	330	10	10.5	25	3500	0.07	41.58
6.3	2200	16	25	15	9750	0.13	554.40
6.3	3300	16	25	15	10100	0.13	831.60
10	4.7	5	6.8	180	720	0.07	0.94
10	6.8	5	6.8	150	745	0.07	1.36
10	10	5	6.8	150	780	0.07	2.00
10	15	6.3	6.8	90	1230	0.07	3.00
10	22	6.3	6.8	70	1270	0.07	4.40
10	33	6.3	6.8	70	1370	0.07	6.60
10	47	6.3	9.8	60	2020	0.07	9.40
10	68	6.3	9.8	50	2000	0.07	13.60
10	100	8	10.5	30	2670	0.07	20.00
10	150	10	10.5	28	3260	0.07	30.00
10	220	10	10.5	27	3370	0.07	44.00
16	4.7	5	6.8	180	720	0.07	1.50
16	6.8	5	6.8	150	745	0.07	2.18
16	10	6.3	6.8	90	1150	0.07	3.20
16	15	6.3	6.8	90	1230	0.07	4.80
16	22	6.3	9.8	70	1800	0.07	7.04
16	33	6.3	6.8	70	1370	0.07	10.56
16	47	6.3	9.8	60	1830	0.07	15.04
16	68	8	10.5	36	2600	0.07	21.76
16	100	8	10.5	30	2740	0.07	32.00
16	150	10	10.5	28	3260	0.07	48.00
16	470	12.5	22	20	6080	0.08	300.80
16	1000	16	25	15	9750	0.09	640.00
20	15	6.3	6.8	90	1200	0.07	6.00
20	22	6.3	6.8	70	1300	0.07	8.80
20	33	6.3	9.8	70	1710	0.07	13.20
20	47	8	10.5	40	2450	0.07	18.80
20	68	8	10.5	36	2600	0.07	27.20
20	100	10	10.5	30	3210	0.07	40.00
25	1	5	6.8	350	430	0.07	0.50
25	1.5	5	6.8	300	435	0.07	0.75
25	2.2	5	6.8	200	695	0.07	1.10
25	3.3	5	6.8	200	700	0.07	1.65
25	4.7	6.3	6.8	100	1130	0.07	2.35
25	6.8	6.3	6.8	100	1140	0.07	3.40
25	10	6.3	6.8	90	1150	0.07	5.00
25	15	6.3	9.8	70	1650	0.07	7.50
25	22	8	10.5	40	2330	0.07	11.00
25	33	10	10.5	35	2900	0.07	16.50
25	47	10	10.5	35	2980	0.07	23.50
30	1	5	6.8	350	430	0.07	1.00
30	1.5	5	6.8	300	435	0.07	1.00
30	2.2	6.3	6.8	250	695	0.07	1.32
30	3.3	6.3	6.8	200	820	0.07	1.98
30	4.7	6.3	9.8	120	1300	0.07	2.82
30	6.8	6.3	9.8	120	1340	0.07	4.08
30	10	8	10.5	110	1380	0.07	6.00
30	22	10	10.5	80	1830	0.07	13.20

ORGANIC SEMICONDUCTOR SOLID ELECTROLYTIC CAPACITORS

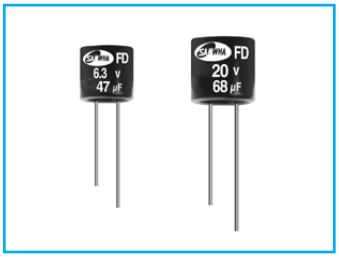
UPGRADE

FD

Lead type, High CV
Series

- Large capacitance and low ESR compared with FX series
- High CV value
- Suitable for high frequency switching power supplies, computer, audio equipment etc.

APRO-CAP

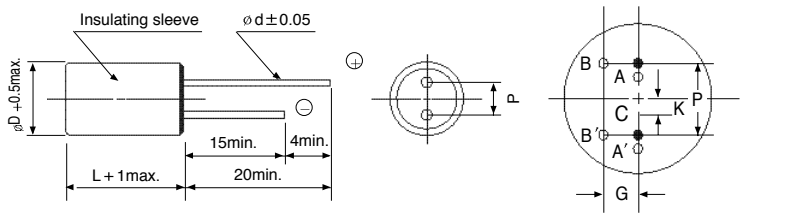


Item	Characteristics
Operating temperature range	-55 ~ +105℃
Leakage current max.	Not more than the values in Table 1
Capacitance tolerance	±20% at 120Hz, 20℃
Dissipation factor max. (at 120Hz, 20℃)	Not more than the values in Table 1
ESR	Not more than the values in Table 1
Low temperature characteristics (Impedance ratio at 100kHz)	Z-55℃ / Z+20℃: 0.75 ~ 1.25; Z+105℃ / Z+20℃: 0.75 ~ 1.25
Load life* (after application of the rated voltage for 2000 hours at 105℃)	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℃ for 1000 hours 90~95% R.H.)	Leakage current: Less than specified value; Capacitance change: Within ±20% of initial value; tanδ: Less than 200% of specified value

* Note: 1. To use an APRO-CAP when the operating temperature exceeds 85℃ on a component with a rated voltage of 25V, reduce the voltage by 0.25V for every degree (1℃) relative to the value 85℃ (25V).

2. If any doubt arises, measure the current after applying voltage (voltage treatment) for 30 minutes at 105℃. The rated voltage should be applied for 6.3 to 20WV, while a temperature reduction voltage should be applied for 25WV.

DRAWING (Unit : mm)



C: The central point of A-A'

PART NUMBER SYSTEM (See Page 50)

ø D ×L	Code	P	ø d	K max.	G max.
6.3 ×6	6L006	2.5 ±0.5	0.45	0.5	0.5
6.3 ×9.8	6L09H	2.5 ±0.5	0.50	0.5	0.5
8 ×7	08007	3.5 ±0.5	0.60	0.8	0.8
8 ×10.5	0810M	3.5 ±0.5	0.60	0.8	0.8
8 ×12	08012	3.5 ±0.5	0.60	0.8	0.8
10 ×8	10008	5.0 ±0.5	0.60	0.8	0.8
10 ×10.5	1010M	5.0 ±0.5	0.60	0.8	0.8
10 ×13	10013	5.0 ±0.5	0.60	0.8	0.8
10 ×20	10020	5.0 ±0.5	0.80	0.8	0.8
12.5 ×22	12022	5.0 ±1.0	0.80	0.8	0.8

DIMENSIONS

μF \ WV	2	2.5	4	6.3	10	16	20	25
33							8 ×7	8 ×10.5
39						6.3 ×6		
47							8 ×7	
56					6.3 ×6		10 ×8	10 ×10.5
68							6.3 ×9.8 10 ×8	
82				6.3 ×6		8 ×7		
100			6.3 ×6			6.3 ×9.8		
120					8 ×7		8 ×10.5	
150			6.3 ×6	8 ×7	6.3 ×9.8	10 ×8		
180						8 ×10.5	10 ×10.5	
220			8 ×7	6.3 ×9.8				
270			6.3 ×9.8		8 ×10.5 10 ×8	10 ×10.5		
330			8 ×7	10 ×8	8 ×12	10 ×13		
470			10 ×8	8 ×10.5	10 ×10.5			
560			8 ×10.5		10 ×13			
680		8 ×10	10 ×8	10 ×10.5				
820			10 ×8	10 ×13				
1000	10 ×10.5							
1200		10 ×10.5	10 ×13					
1500		10 ×13	10 ×20					
1800	10 ×20							
2200			12.5 ×22					

● Table1. FD Series Characteristics List

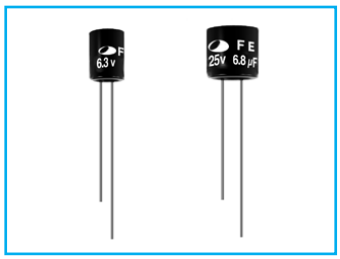
WV	uF	øD(mm)	L(mm)	ESR(mΩ)max. at 20°C 100~300kHz	Ripple current (mA rms)at 45°C 100kHz	Dissipation factor at 20°C 120Hz	Leakage Current (uA)(max.) after 2minutes
2	1000	10	10.5	11	5260	0.08	400.0
2	1800	10	20	8	6500	0.10	720.0
2.5	680	8	12	13	4520	0.08	340.0
2.5	1200	10	10.5	12	5040	0.08	450.0
2.5	1500	10	13	12	5440	0.08	750.0
4	100	6.3	5	40	1810	0.08	200.0
4	150	6.3	6	40	1810	0.08	300.0
4	220	8	7	35	2560	0.08	440.0
4	270	6.3	9.8	20	3160	0.08	108.0
4	330	8	7	35	2560	0.08	660.0
4	470	10	8	25	3700	0.08	376.0
4	560	8	10.5	14	4080	0.08	224.0
4	680	10	8	25	3700	0.08	544.0
4	820	10	10.5	12	5040	0.08	328.0
4	1200	10	13	12	5440	0.08	480.0
4	1500	10	20	8	6500	0.10	600.0
4	2200	12.5	22	10	7100	0.12	880.0
6.3	82	6.3	6	45	1800	0.08	258.0
6.3	150	8	7	35	2560	0.08	472.0
6.3	220	6.3	9.8	20	3160	0.08	138.6
6.3	330	10	8	25	3700	0.08	416.0
6.3	470	8	12	15	4210	0.08	592.0
6.3	680	10	10.5	13	4840	0.08	428.4
6.3	820	10	13	12	5440	0.08	517.0
10	56	6.3	6	45	1700	0.08	280.0
10	120	8	7	35	2560	0.08	600.0
10	150	6.3	9.8	25	2820	0.08	150.0
10	270	8	10.5	18	3600	0.08	270.0
10	270	10	8	25	3700	0.08	540.0
10	330	8	12	17	3950	0.08	660.0
10	470	10	10.5	15	4510	0.08	470.0
10	560	10	13	13	5230	0.08	840.0
16	39	6.3	6	50	1620	0.08	312.0
16	82	8	7	40	2120	0.08	656.0
16	100	6.3	9.8	25	2820	0.08	160.0
16	150	10	8	30	3020	0.08	480.0
16	180	8	10.5	20	3410	0.08	288.0
16	270	10	10.5	18	4400	0.08	432.0
16	330	10	13	16	4720	0.08	792.0
20	33	8	7	45	1890	0.08	330.0
20	47	8	7	45	1890	0.08	470.0
20	56	10	8	40	2440	0.08	224.0
20	68	6.3	9.8	30	2580	0.08	136.0
20	68	10	8	40	2400	0.08	272.0
20	120	8	10.5	24	3110	0.08	240.0
20	180	10	10.5	20	4280	0.08	360.0
25	33	8	10.5	30	2780	0.08	82.5
25	56	10	10.5	25	3260	0.08	140.0

ORGANIC SEMICONDUCTOR SOLID ELECTROLYTIC CAPACITORS

FE Lead type, Height 5mm Series

· Ultra miniature series with 5mm height
· Ideal for use in products such as VCRs, car stereos, etc

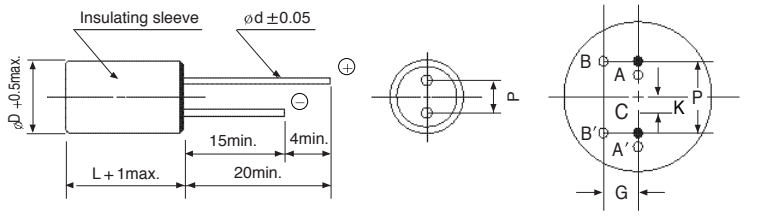
APRO-CAP



Item	Characteristics
Operating temperature range	-55 ~ +105℃
Leakage current max.	Not more than the values in Table 1
Capacitance tolerance	±20% at 120Hz, 20℃
Dissipation factor max.	≦ 0.07 at 120Hz, 20℃
ESR	Not more than the values in Table 1
Low temperature characteristics (Impedance ratio at 100kHz)	Z-55℃ / Z+20℃: 0.75 ~ 1.25; Z+105℃ / Z+20℃: 0.75 ~ 1.25
Load life* (after application of the rated voltage for 2000 hours at 105℃)	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℃ for 1000 hours 90~95% R.H.)	Leakage current: Less than specified value; Capacitance change: Within ±20% of initial value; tanδ: Less than 200% of specified value

* Note: 1. To use an APRO-CAP when the operating temperature exceeds 85℃ on a component with a rated voltage of 25V, reduce the voltage by 0.25V for every degree (1℃) relative to the value 85°C (25V).
2. If any doubt arises, measure the current after applying voltage (voltage treatment) for 30 minutes at 105°C. The rated voltage should be applied for 6.3 to 20WV, while a temperature reduction voltage should be applied for 25WV.

● DRAWING (Unit : mm)



C: The central point of A-A'

● PART NUMBER SYSTEM (See Page 50)

øD × L	Code	P	ød	G max.	K max.
4.5 × 5	04005	1.5 ± 0.5	0.45	0.5	0.5
5 × 5	05005	2.0 ± 0.5	0.45	0.5	0.5
6.3 × 5	6L005	2.5 ± 0.5	0.45	0.5	0.5
8 × 5	08005	3.5 ± 0.5	0.50	0.8	0.8

● DIMENSIONS

μF \ WV	4	6.3	10	16	25
1.0					4 × 5
1.5					4 × 5
2.2				4 × 5	5 × 5
3.3				4 × 5	5 × 5
4.7			4 × 5	5 × 5	6.3 × 5
6.8		4 × 5	5 × 5	5 × 5	6.3 × 5
10		5 × 5	5 × 5	6.3 × 5	
15		5 × 5	6.3 × 5	6.3 × 5	8 × 5
22		6.3 × 5	6.3 × 5		
33		6.3 × 5	6.3 × 5		
47		6.3 × 5	6.3 × 5	8 × 5	
68		8 × 5	8 × 5		
100		8 × 5			
150	8 × 5				

FE Series

● Table1. FE Series Characteristics List

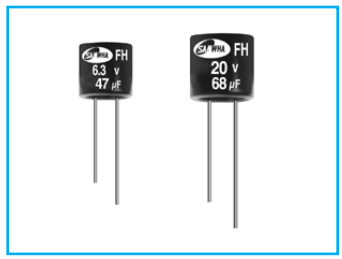
WV	uF	øD(mm)	L(mm)	ESR(mΩ)max. at 20°C 100~300kHz	Ripple current(mA rms) at 45°C, 100kHz	Leakage Current(uA)(max.) after 2minutes
4	150	8	5	60	2000	12.00
6.3	6.8	4	5	350	560	0.86
6.3	10	5	5	150	780	1.26
6.3	15	5	5	120	815	1.89
6.3	22	6.3	5	80	1270	2.77
6.3	33	6.3	5	80	1320	4.16
6.3	47	6.3	5	70	1430	5.92
6.3	68	8	5	65	1550	8.57
6.3	100	8	5	65	1600	12.60
10	4.7	4	5	400	540	0.94
10	6.8	5	5	180	745	1.36
10	10	5	5	150	780	2.00
10	15	6.3	5	100	1230	3.00
10	22	6.3	5	80	1270	4.40
10	33	6.3	5	80	1350	6.60
10	47	6.3	5	70	1430	9.40
10	68	8	5	65	1600	13.60
16	2.2	4	5	400	450	0.70
16	3.3	4	5	400	500	1.06
16	4.7	5	5	250	720	1.50
16	6.8	5	5	180	745	2.18
16	10	6.3	5	100	1150	3.20
16	15	6.3	5	100	1230	4.80
16	47	8	5	70	1550	15.04
25	1	4	5	450	430	0.50
25	1.5	4	5	400	435	0.75
25	2.2	5	5	250	695	1.10
25	3.3	5	5	250	700	1.65
25	4.7	6.3	5	100	1130	2.35
25	6.8	6.3	5	100	1140	3.40
25	15	8	5	75	1400	7.50

ORGANIC SEMICONDUCTOR SOLID ELECTROLYTIC CAPACITORS

FH Lead type, Long Life(5000 hours at 105℃) Series

- Long Life of 5000 hours at 105℃
- High reliability
- Designed for use industrial equipment

APRO-CAP

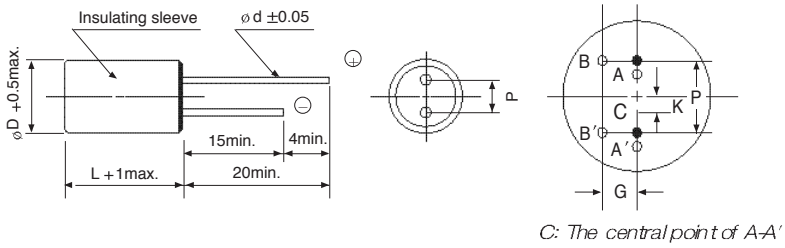


Item	Characteristics
Operating temperature range	-55 ~ +105℃
Leakage current max.	Not more than the values in Table 1
Capacitance tolerance	±20% at 120Hz, 20°C
Dissipation factor max.	Not more than the values in Table 1
ESR	Not more than the values in Table 1
Low temperature characteristics (Impedance ratio at 100kHz)	Z-55℃ / Z+20℃: 0.75~1.25; Z+105℃ / Z+20℃: 0.75~1.25
Load life* (after application of the rated voltage for 5000 hours at 105℃)	Leakage current: Less than specified value; Capacitance change: Within ±30% of initial value; tan δ: Less than 150% of specified value
Moisture resistance (after leaving capacitors under no load at 60℃ for 1000 hours 90~95% R.H.)	Leakage current: Less than specified value; Capacitance change: Within ±10% of initial value; tan δ: Less than 150% of specified value

* Note: 1. To use an APRO-CAP when the operating temperature exceeds 85°C on a component with a rated voltage of 25V, reduce the voltage by 0.25V for every degree (1℃) relative to the value 85℃ (25V).

2. If any doubt arises, measure the current after applying voltage (voltage treatment) for 30 minutes at 105℃. The rated voltage should be applied for 6.3 to 20WV, while a temperature reduction voltage should be applied for 25WV.

● DRAWING (Unit : mm)



C: The central point of A-A′

● PART NUMBER SYSTEM (See Page 50)

øD ×L	Code	P	ød	K max.	G max.
6.3 ×6.8	6L06H	2.5±0.5	0.5	0.5	0.5
6.3 ×9.8	6L09H	2.5±0.5	0.5	0.5	0.5
8 ×10.5	0810M	3.5±0.5	0.6	0.8	0.8
10 ×10.5	1010M	5.0±0.5	0.6	0.8	0.8

● DIMENSIONS

μF \ WV	6.3	10	16	20	25
4.7					6.3 ×6.8
6.8					6.3 ×6.8
10					6.3 ×6.8
15				6.3 ×6.8	6.3 ×9.8
22				6.3 ×6.8	
33			6.3 ×6.8	6.3 ×9.8	
47	6.3 ×6.8		6.3 ×9.8	8 ×10.5	
68	6.3 ×9.8	6.3 ×9.8	8 ×10.5	8 ×10.5	
100	8 ×10.5	8 ×10.5	8 ×10.5	10 ×10.5	
150	8 ×10.5	10 ×10.5	10 ×10.5		
220	10 ×10.5	10 ×10.5			
330	10 ×10.5				

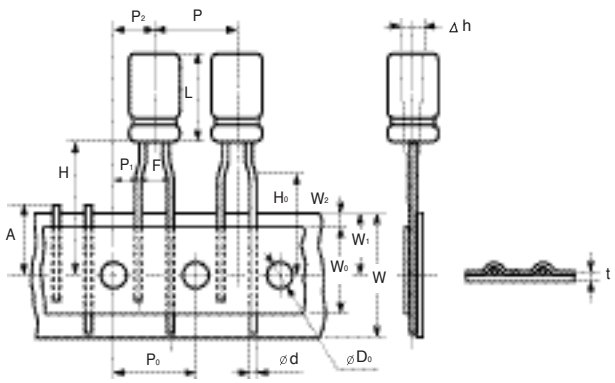
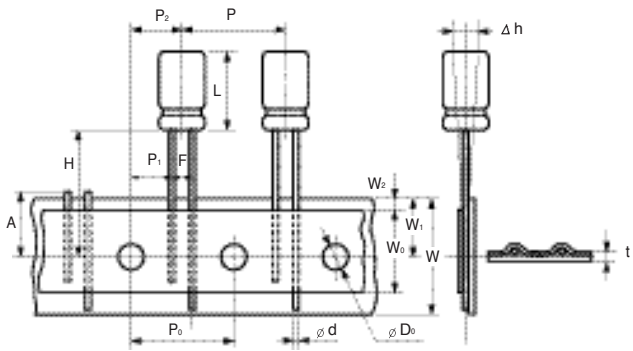
FH Series

● Table1. FH Series Characteristics List

WV	uF	øD(mm)	L(mm)	ESR(mΩ)max. at 20°C 100~300kHz	Ripple current (mA rms)at 45°C 100kHz	Dissipation factor at 20°C 120Hz	Leakage Current (uA)(max.) after 2minutes
6.3	47	6.3	6.8	60	1430	0.07	5.92
6.3	68	6.3	9.8	50	2000	0.07	8.57
6.3	100	8	10.5	30	2670	0.07	12.60
6.3	150	8	10.5	30	2780	0.07	18.90
6.3	220	10	10.5	27	3370	0.07	27.72
6.3	330	10	10.5	25	3500	0.07	41.58
10	68	6.3	9.8	50	2000	0.07	13.60
10	100	8	10.5	30	2670	0.07	20.00
10	150	10	10.5	28	3260	0.07	30.00
10	220	10	10.5	27	3370	0.07	44.00
16	33	6.3	6.8	70	1370	0.07	10.56
16	47	6.3	9.8	60	1830	0.07	15.04
16	68	8	10.5	36	2600	0.07	21.76
16	100	8	10.5	30	2740	0.07	32.00
16	150	10	10.5	28	3260	0.07	48.00
20	15	6.3	6.8	90	1200	0.07	6.00
20	22	6.3	6.8	70	1300	0.07	8.80
20	33	6.3	9.8	70	1710	0.07	13.20
20	47	8	10.5	40	2450	0.07	18.80
20	68	8	10.5	36	2600	0.07	27.20
20	100	10	10.5	30	3210	0.07	40.00
25	4.7	6.3	6.8	100	1130	0.07	2.35
25	6.8	6.3	6.8	100	1140	0.07	3.40
25	10	6.3	6.8	90	1150	0.07	5.00
25	15	6.3	9.8	70	1650	0.07	7.50

TAPING

● Lead Taping Capacitors for Automatic Insertion

DRAWING Ⅰ	DRAWING Ⅱ
	

● DIMENSIONS

Unit : mm

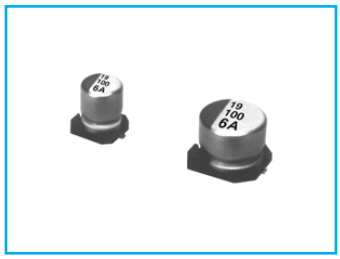
Applicable Drawing No.			Ⅰ				Ⅱ	Ⅰ	Ⅱ		Ⅱ
Description	Symbol	Tolerance	ø5	ø6.3		ø8	ø10	ø5	ø6.3		ø8
Body Height	L	+1	6.8	6.8	9.8	10.5	10.5	6.8	6.8	9.8	10.5
Lead Dia.	ø d	±0.05	0.50	0.50	0.50	0.60	0.60	0.50	0.50	0.50	0.60
Body Pitch	P	±1.0	12.7			12.7	12.7	12.7	12.7		12.7
Feeding Hole Pitch	P_0	±0.2	12.7			12.7	12.7	12.7	12.7		12.7
Feeding Hole Alignment	P_1	±0.4	3.85			3.85	3.85	5.1	5.1		4.6
Feeding Hole Alignment	P_2	±0.4	6.35			6.35	6.35	6.35	6.35		6.35
Lead Center Spacing	F	+0.5/-0.2	5.0			5.0	5.0	2.5	2.5		3.5
Body Inclination	Δh	±0.5	0			0	0	0	0		0
Tape Width	W	±0.2	18.0			18.0	18.0	18.0	18.0		18.0
Adhesive Tape Width	W_0	min.	10.0			13.0	13.0	10.0	10.0		13.0
Feeding Hole Alignment	W_1	±0.3	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	18.5			19.5	18.5	18.5	18.0		18.5
Lead Clinch Height	H_0	min	16.0			16.0	—	16.0	16.0		—
Feeding Hole Dia.	ø D_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		PA			PG	PA	PB	PC		PF

FA

Chip type, With Conducting Polymer Series

- Low ESR, high ripple current
- Designed for surface mounting on high density PC board
- Load life for 2000 hours at 105°C

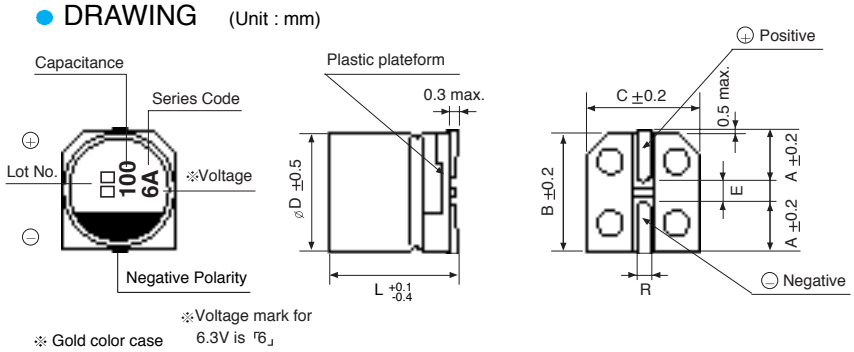
Hi-CAP



Item	Characteristics	
Operating temperature range	-55 ~ +105°C	
Leakage current max. *1	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
	tan δ	Less than 150% of specified value
Resistance to soldering heat (Refer to Page 36 for soldering recommendation)	Leakage current	Less than specified value
	Capacitance change	Within ±10% of initial value
	tan δ	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 temperature derating voltage for 25V products for 120 minutes at 105°C.

DRAWING (Unit : mm)



PART NUMBER SYSTEM (See Page 34)

Size	øD	L	B	C	E	R
6.3 ×6	6.3	5.9	6.6	6.6	2.1	0.5~0.8
8 ×7	8.0	6.9	8.3	8.3	3.2	0.5~0.8
10 ×8	10.0	7.9	10.3	10.3	4.6	0.5~0.8
8 ×12	8.0	11.9	8.3	8.3	3.2	0.8~1.1
10 ×13	10.0	12.6	10.3	10.3	4.6	0.8~1.1

DIMENSIONS

μF \ WV	2.5	4	6.3	10	16	20	25
6.8							6.3 × 6
10							8 × 7
22						6.3 × 6	10 × 8
27					6.3 × 6	6.3 × 6	
33						8 × 7	8 × 12
39					6.3 × 6		
47				6.3 × 6		8 × 7	
56				6.3 × 6	8 × 7	10 × 8	10 × 13
68						10 × 8	
82			6.3 × 6		10 × 7		
100			6.3 × 6		10 × 8	8 × 12	
120				8 × 7			
150		★8 × 7		○ 10 × 8	10 × 8	10 × 12	
180			8 × 7	10 × 8	● 8 × 12		
220			○ 10 × 8				
270				10 × 8			
330		8 × 7		● 8 × 12	10 × 13		
470			● 8 × 12				
560		8 × 12		10 × 13			
680	8 × 12	10 × 8					
820			10 × 13				
1200	10 × 13	10 × 13	Case size ø D ×L(mm)				
1500							

Size ø6.3 ×6 is available for capacitors marked "★"
Size ø8 ×7 is available for capacitors marked "○"
Size ø10 ×8 is available for capacitors marked "●"

FA series

- Table1. FA(Chip type) Series Characteristics List

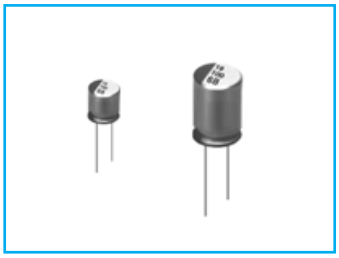
WV	uF	⌀D(mm)	L(mm)	ESR(mΩ)max. at 20℃ 100~300kHz	Ripple current (mA rms)at 105℃ 100kHz	Dissipation factor at 20°C 120Hz	Leakage Current (uA)(max.) after 2minutes
2.5	680	8	12	13	4520	0.15	340
2.5	1500	10	13	12	1810	0.18	750
4	150	6.3	6	40	1810	0.12	120
4	150	8	7	35	2560	0.12	120
4	330	8	7	35	2560	0.12	264
4	680	10	8	25	3700	0.12	544
4	560	8	12	13	4520	0.15	448
4	1200	10	13	12	5440	0.18	960
6.3	82	6.3	6	45	1700	0.12	103
6.3	100	6.3	6	40	1810	0.12	126
6.3	220	8	7	35	2560	0.12	277
6.3	220	10	8	25	3700	0.12	277
6.3	330	10	8	25	3700	0.12	416
6.3	470	10	8	25	3700	0.12	592
6.3	820	10	13	12	5440	0.15	775
10	47	6.3	6	50	1620	0.12	94
10	56	6.3	6	45	1700	0.12	112
10	120	8	7	35	2560	0.12	240
10	150	8	7	35	2560	0.12	300
10	150	10	8	30	3020	0.12	300
10	270	10	8	25	3700	0.12	540
10	330	10	8	25	3700	0.12	660
10	330	8	12	17	3950	0.15	660
10	560	10	13	13	5230	0.15	840
16	27	6.3	6	60	1450	0.10	86
16	39	6.3	6	50	1620	0.10	125
16	56	8	7	45	2120	0.12	179
16	82	8	7	40	2560	0.12	262
16	100	10	8	35	2670	0.12	320
16	150	10	8	30	3020	0.12	480
16	180	10	8	30	3020	0.12	576
16	180	8	12	20	3640	0.15	576
16	330	10	13	16	4720	0.15	792
20	22	6.3	6	60	1450	0.10	88
20	27	6.3	6	60	1450	0.10	108
20	33	8	7	45	1890	0.12	132
20	47	8	7	45	1890	0.12	188
20	56	10	8	40	2400	0.12	224
20	68	10	8	40	2400	0.12	272
20	100	8	12	24	3320	0.15	400
20	150	10	13	20	4320	0.15	600
25	6.8	6.3	6	80	1200	0.10	85
25	10	8	7	60	1500	0.10	125
25	22	10	5	50	2000	0.10	275
25	33	8	12	30	2980	0.12	413
25	56	10	13	28	3800	0.12	700

FB

Lead type, With Conducting Polymer Series

- Low ESR, high ripple current
- Load life for 2000 hours at 105℃

Hi-CAP

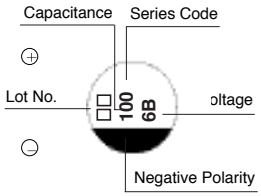


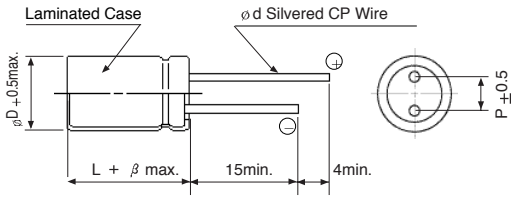
Item	Characteristics
Operating temperature range	-55 ~ +105℃
Leakage current max.*	Less than or equal to the value of Table1
Capacitance tolerance	±20% at 120Hz, 20℃
Dissipation factor max.	Less than or equal to the value of Table1
ESR	Less than or equal to the value of Table1
Temperature characteristics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

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

● DRAWING (Unit : mm)

● PART NUMBER SYSTEM (See Page 50)





Size	ød D	L	P	ød d	β
6.3 ×6	6.3	6.0	2.5	0.45	1.0
8 ×7	8.0	7.0	3.5	0.45	1.0
10 ×8	10.0	8.0	5.0	0.5	1.5
8 ×12	8.0	12.0	3.5	0.6	1.5
10 ×13	10.0	13.0	5.0	0.6	1.5

● DIMENSIONS

μF \ WV	2.5	4	6.3	10	16	20	25
6.8							6.3 ×6
10							8 ×7
22						6.3 ×6	10 ×8
27					6.3 ×6		
33						8 ×7	8 ×12
39					6.3 ×6		
47						8 ×7	10 ×13
56				6.3 ×6		10 ×8	
68						10 ×8	
82			6.3 ×6		8 ×7		
100		6.3 ×6				8 ×12	
120				8 ×7			
150		6.3 ×6	8 ×7		10 ×8	10 ×13	
180					8 ×12		
220		8 ×7					
270				10 ×8	10 ×13		
330		8 ×7	10 ×8	8 ×12			
470		10 ×8	8 ×12				
560		8 ×12		10 ×13			
680	8 ×12	10 ×8	10 ×13				
820							
1200		10 ×13	Case size ød D ×L(mm)				
1500	10 ×13						

FB series

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

WV	uF	⌀D(mm)	L(mm)	ESR(mΩ)max. at 20℃ 100~300kHz	Ripple current (mA rms)at 45℃ 100kHz	Dissipation factor at 20℃ 120Hz	Leakage Current (uA)(max.) after 2minutes
2.5	680	8	12	13	4520	0.15	340
2.5	1500	10	13	12	5440	0.18	750
4	100	6.3	6	40	1810	0.12	200
4	150	6.3	6	40	1810	0.12	300
4	220	8	7	35	2560	0.12	440
4	330	8	7	35	2560	0.12	660
4	470	10	8	25	3700	0.12	376
4	680	10	8	12	3700	0.12	544
4	560	8	12	13	4520	0.15	448
4	1200	10	13	12	5440	0.18	960
6.3	82	6.3	6	45	1700	0.12	258
6.3	150	8	7	35	2560	0.12	472
6.3	330	10	8	25	3700	0.12	416
6.3	470	8	12	15	4210	0.15	592
6.3	820	10	13	12	5440	0.15	775
10	56	6.3	6	45	1700	0.12	280
10	120	8	7	35	2560	0.12	600
10	270	10	8	25	3700	0.12	540
10	330	8	12	17	3950	0.15	660
10	560	10	13	13	5230	0.15	840
16	39	6.3	6	60	1450	0.10	86
16	82	8	7	40	2120	0.12	312
16	150	10	8	30	3020	0.12	480
16	330	10	13	16	4720	0.15	576
20	22	6.3	6	60	1450	0.10	220
20	33	8	7	45	1890	0.12	330
20	47	8	7	45	1890	0.12	470
20	56	10	8	40	2400	0.12	224
20	68	10	8	40	2400	0.12	272
20	100	8	12	24	3320	0.15	400
20	150	10	13	20	4320	0.15	600
25	6.8	6.3	6	80	1200	0.10	170
25	10	8	7	60	1500	0.10	250
25	22	10	8	50	2000	0.10	275
25	33	8	12	30	2980	0.12	413
25	56	10	13	28	3800	0.12	700

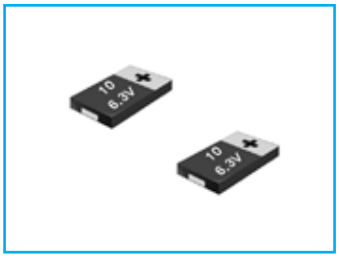
SOLID TYPES

UPGRADE

FC

Chip type, With Conducting Polymer Series

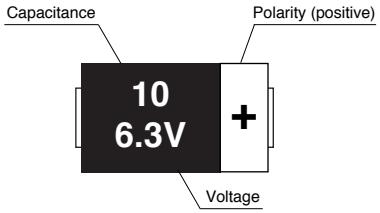
Hi-CAP

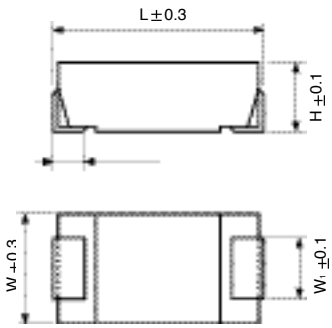


- Low impedance at high frequency (10kHz~10MHz)
- High ripple current due to reduced ESR
- Excellent noise-absorbent characteristics
- Very stable capacitance, impedance and ESR against temperature
- Designed for use smoothing circuit of power supplies and noise limiter

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

● DRAWING (Unit : mm)





L	W	W1	H	S
7.3	4.3	2.4	1.8	1.3

● PART NUMBER SYSTEM (See page 34)

(Example : 6.3V 10㎌)

FC 0J 106 M 7343A VR □□□

- Internal control code
- Taping
- Size(L7.3, W:4.3)
- Capacitance torerance(±20%)
- Capacitance(10㎌)
- Rated voltage(6.3V)
- Series name

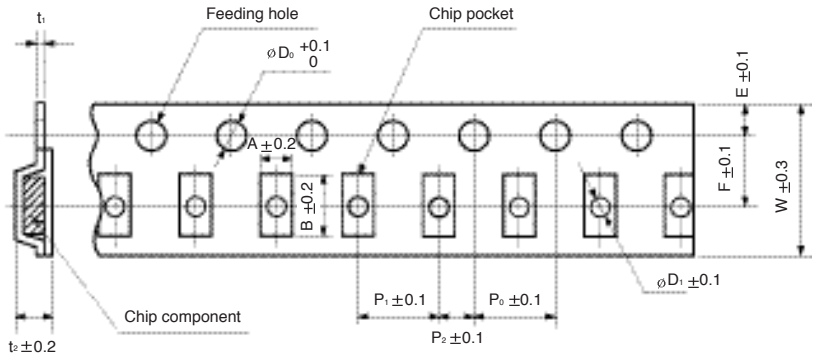
● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

㎌ \ WV	2		2.5		4		6.3	
10							55	1.4
15					55	1.4		
22			55	1.4			40	1.6
33	55	1.4			40	1.6		
47			40	1.6			15	2.5
68	40	1.6			15	2.5		
82			15	2..5				
100	15	2.5						

Ripple current (A rms) at 105℃, 100kHz
ESR (m Ω) max. at 20℃, 100kHz

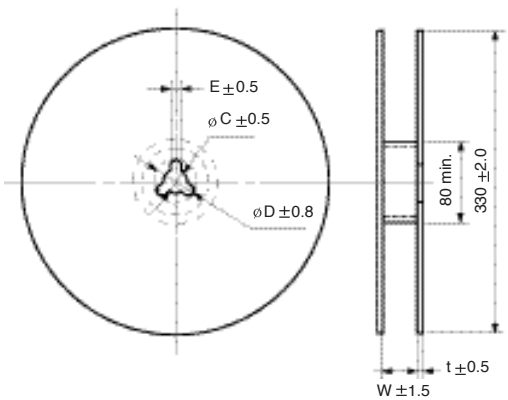
Taping Specifications for Conducting Polymer Capacitors (FC series)

Carrier Tape



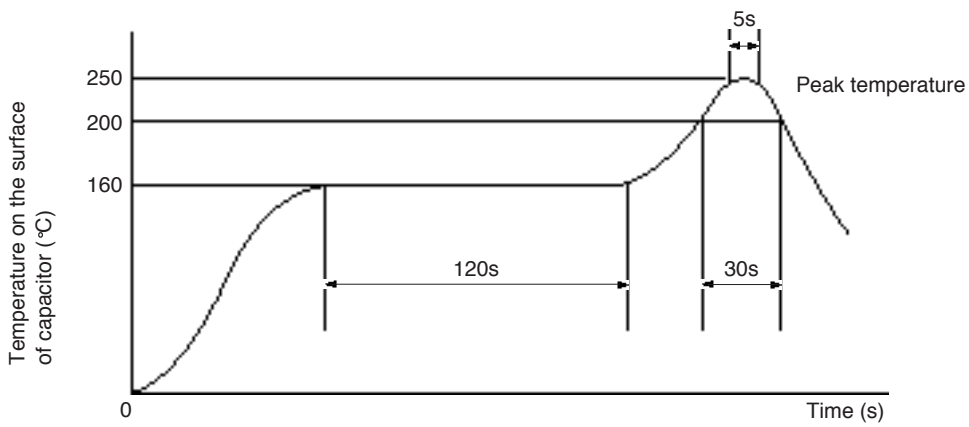
A	B	ø D₀	ø D₁	E	F	P₀	P₁	P₂	t₁	t₂	W
4.7	7.7	1.5	1.6	1.75	5.5	4.0	8.0	2.0	0.3	2.2	12.0

Packaging Specifications

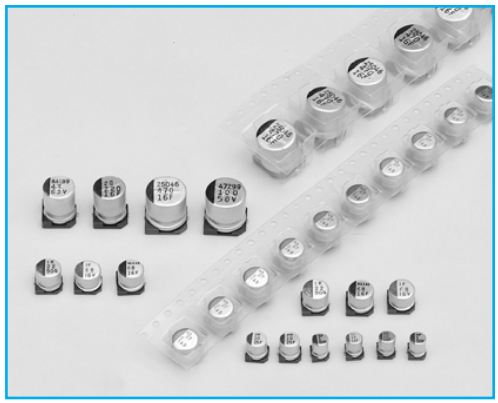


ø C	ø D	E	W	t	Q'ty / Reel
13.0	21.0	2.0	14.0	2.0	3000 pcs.

Recommendable reflow soldering temperature

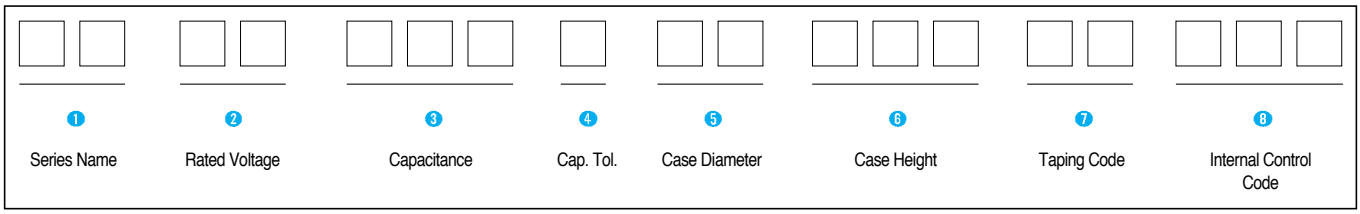


2 SURFACE MOUNT ALUMINUM ELECTROLYTIC CAPACITORS



PART NUMBER SYSTEM

Part Number System



1 Series Name

See page 4~5.

2 Rated Working Voltage

WV	2	2.5	4	6.3	10	16	25
Code	0D	0E	0G	0J	1A	1C	1E

WV	35	40	50	63	80	100
Code	1V	1G	1H	1J	1K	2A

3 Capacitance

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

4 Capacitance Tolerance

Tolerance (%)	±20
Code	M

5 Case Diameter

ex) ø3 03
ø4 04
ø5 05
ø6.3 6L
ø8 08
ø10 10
ø12.5 12

6 Case Height

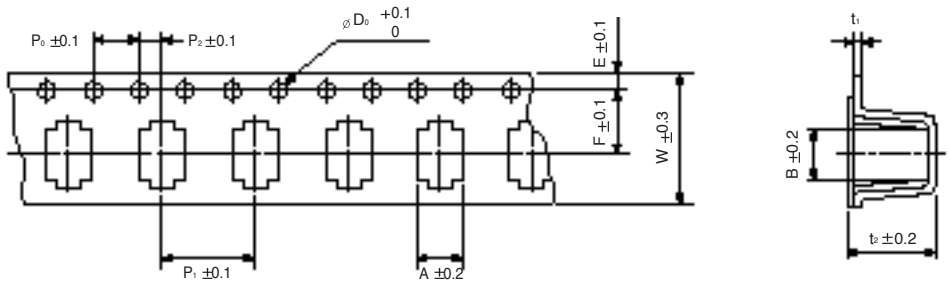
ex) 5.3mm 005
5.8mm 006
6.2mm 06B
7.7mm 07K
10mm 010

7 VR, LR (Reel Type)

VR : Normal Application Type
LR : Pb-Free Application Type

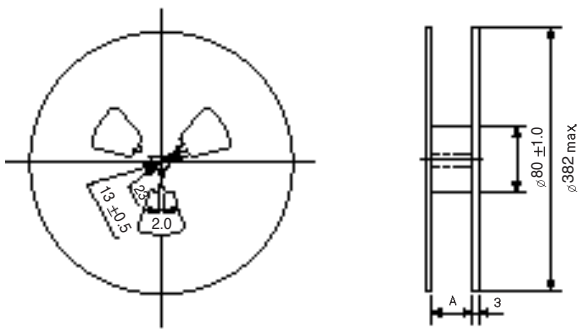
Taping Specifications for Chip Type Capacitors

Carrier Tape



øD ×L	A	B	ø D₀	E	F	P₀	P₁	P₂	t₁	t₂	W
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
4 ×5.8	4.7	4.7	1.5	1.75	5.5	4.0	8.0	2.0	0.4	6.3	12.0
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
5 ×5.8	5.7	5.7	1.5	1.75	5.5	4.0	12.0	2.0	0.4	6.3	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

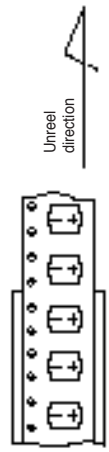
Reel (Taping code : VR)



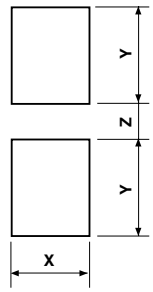
øD ×L	A
4 ×5.3	14
4 ×5.8	14
5 ×5.3	14
5 ×5.8	14
6.3 ×5.3	18
6.3 ×5.8	18
6.3 ×7.7	18
8 ×6.2	18
8 ×10	26
10 ×10	26

5 ×5.8	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

Polarity



Recommended Land Size



øD ×L	X	Y	Z
4 ×5.3	1.6	2.6	1.0
4 ×5.8	1.6	2.6	1.0
5 ×5.3	1.6	3.0	1.4
5 ×5.8	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

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.

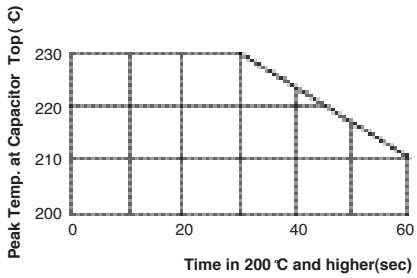
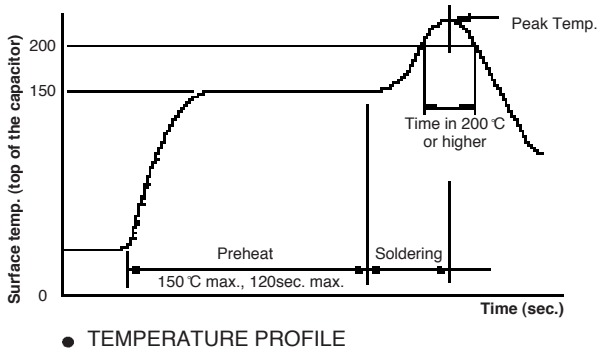
(2) Avoid soldering twice by reflow. The number of reflow time for chip aluminum electrolytic capacitor shall be once basically. If this type of capacitor has to be inevitably subjected to the reflow twice, enough cooling time between the first and the second reflow (at least more than 30 minutes) shall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

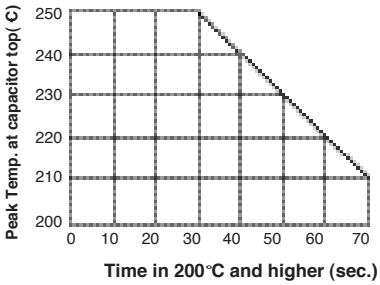
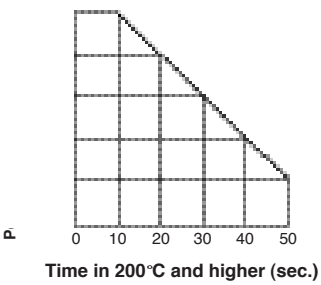
(3) On setting the reflow conditions, it shall be done lest the temperature at surface of the capacitor should exceed more than 230℃

(4) In case the temperature exceeds higher than 200℃, the capacitor shall not be subjected to it more than 30 seconds.

(5) The touch up work with a soldering iron is allowed after the reflow soldering (Temperature of soldering iron : MAX 400℃, 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

<table>
<tr><th></th><th>ALLOWABLE RANGE OF REFLOW</th><th>TEMPERATURE PROFILE</th></tr>
<tr><td>General product</td><td> 
</td><td> 

● TEMPERATURE PROFILE</td></tr>
<tr><td rowspan="2">Lead Free product</td><td>4 ~ 6.3 ø</td><td>8 ~ 10 ø</td></tr>
<tr><td> 
</td><td> 
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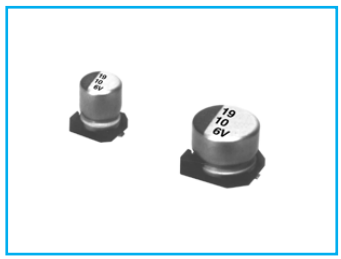
SC Chip type, Standard Series

NC ⇐ SC ⇒ RC
Bi-polar / Wide temp

Solvent Proof



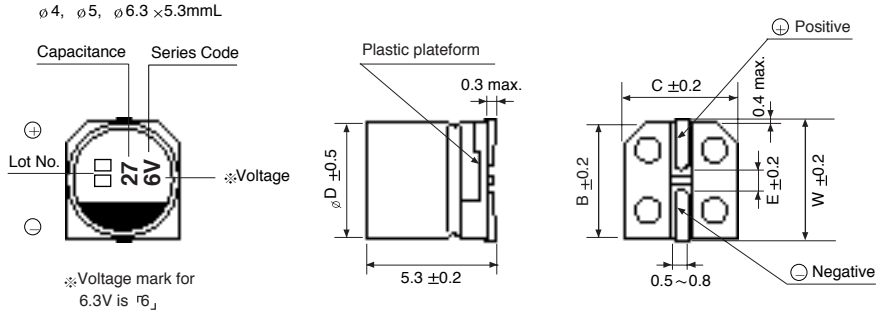
- Chip type higher capacitance in larger case sizes
- Designed for surface mounting on high density PC board
- Applicable to automatic mounting machine using carrier tape

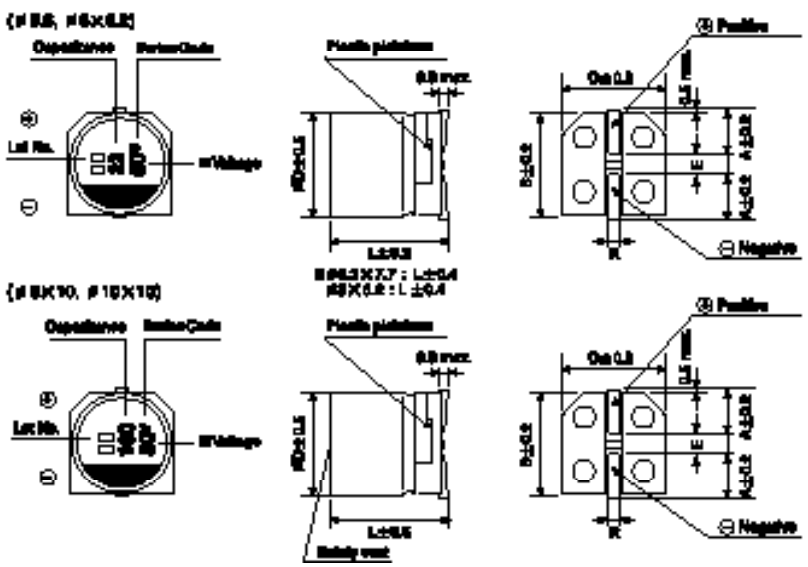
Item	Characteristics
Operating temperature range	-40 ~ +85℃
Leakage current max.	I = 0.01CV or 3μA whichever is greater (after 2 minutes) I = 0.03CV (after 1 minutes)
Capacitance tolerance	±20% at 120Hz, 20℃
Dissipation factor max. (at 120Hz, 20℃)	WV: 4 / 6.3 / 10 / 16 / 25 / 35 / 50 / 63 / 100 tanδ: 0.35 (0.40) / 0.28 (0.35) / 0.20 (0.24) / 0.16 (0.20) / 0.13 (0.16) / 0.12 (0.15) / 0.09 (0.12) / 0.12 / 0.12 Figures in( ) are for small size, over the 6.3 ×5.8(øD ×L)
Low temperature characteristics (Impedance ratio at 120Hz)	WV: 4 / 6.3 / 10 / 16 / 25 / 35 / 50 ~ 100 Z-25℃/Z+20℃: 6 / 5 / 4 / 3 / 2 / 2 / 2 Z-40℃/Z+20℃: 12 / 10 / 8 / 6 / 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 (Small size : ±25%) 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.
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

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	6.0		5.3	5.3	1.4	0.5~0.8
6.3 ×5.3	7.1		6.6	6.6	2.2	0.5~0.8
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

SC series

● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

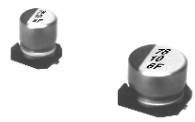
WV / μF	4		6.3		10		16		25		35		50		63		100	
0.1													3×5.3	2.4				
													4×5.3	3.2				
0.22													3×5.3	3.5				
													4×5.3	4.7				
0.33													3×5.3	4.3				
													4×5.3	5.7				
0.47													3×5.3	5.2				
													4×5.3	6.8				
1.0													3×5.3	7.5				
													4×5.3	10				
2.2											3×5.3	10						
											4×5.3	11	4×5.3	14.8				
3.3									3×5.3	12							6.3×5.8	29
									4×5.3	15	4×5.3	16	4×5.3	18.1				
4.7							3×5.3	13			4×5.3	19	4×5.3	24			6.3×5.8	35
							4×5.3	16	4×5.3	18			5×5.3	25	6.3×5.8	31	8×6.2	40
10	3×5.3	13	3×5.3	16					4×5.3	24	4×5.3	27	5×5.3	41				
	4×5.3	16	4×5.3	19	4×5.3	21	4×5.3	21	5×5.3	30	5×5.3	32	6.3×5.3	42.6	8×6.2	46	8×10	77
22	3×5.3	19			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	4×5.3	29	5×5.3	36	5×5.3	41	6.3×5.3	53			6.3×5.8	73	8×10	96	8×10	100
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	6.3×5.8	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	8×10	117	10×10	130
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	8×10	140	10×10	155
100	5×5.3	54	5×5.3	60	6.3×5.3	80	6.3×5.3	88			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	8×6.2	145	8×10	175	10×10	195	10×10	232		
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						
					8×6.2	175	8×10	215	10×10	250								
330			6.3×7.7	188					10×10	305								
			8×6.2	190	8×10	240	8×10	270										
470			8×10	265	8×10	290	8×10	307										
							10×10	330										
1000			8×10	372	10×10	454												
			10×10	400														

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

RC Chip type, Wide Temperature Range Series

Solvent Proof

SC ⇨ RC (Wide temp.)

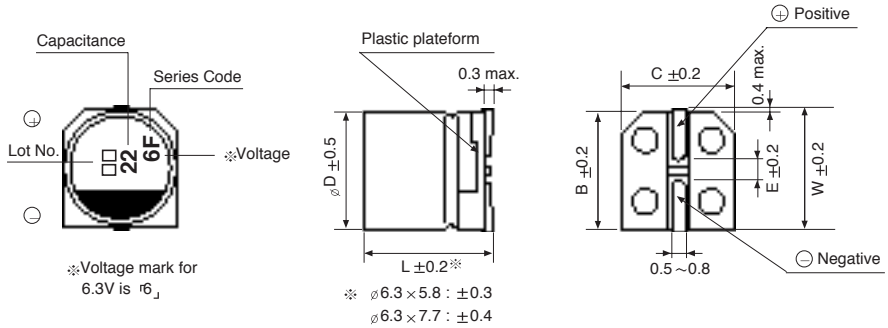


- Wide operating temperature range of -55 ~ +105℃
- Designed for surface mounting on high density PC board
- Applicable to automatic insertion machine using carrier tape

Item	Characteristics
Operating temperature range	-55 ~ +105℃
Leakage current max.	I = 0.01CV or 3㎂ 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: 0.27 / 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℃/Z+20℃: 3 / 3 / 2 / 2 / 2 / 2 Z-40℃/Z+20℃: 8 / 5 / 4 / 3 / 3 / 3
Load life (after application of the rated voltage for 1000 hours at 105℃)	Leakage current: Less than specified value Capacitance change: Within ±25% of initial value tanδ: Less than 200% of specified value
Shelf life (at 105℃)	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 ±15% of initial value tanδ: Less than specified value

DRAWING

Unit : mm



ø D	W	B	C	E
4	4.8	4.3	4.3	1.0
5	6.0	5.3	5.3	1.4
6.3	7.1	6.6	6.6	2.2

DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

㎌ \ 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				
220	6.3×7.7	86	6.3×7.7	105	6.3×7.7	105						
330	6.3×7.7	105										

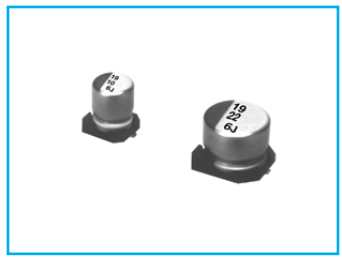
Ripple current (mA rms) at 105℃, 120Hz
Case size ø D × L (mm)

SURFACE MOUNT ALUMINUM ELECTROLYTIC CAPACITORS

JC Chip type with 6mm height Series

Solvent Proof

RC ⇒ JC Long life

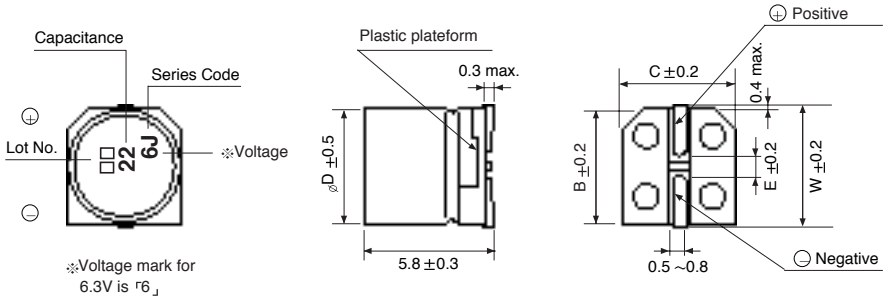


- Chip type with load life 2000 hours at 105°C
- Chip type with 6mm height
- Designed for surface mounting on high density PC board
- Applicable to automatic insertion machine using carrier tape

Item	Characteristics
Operating temperature range	-55 ~ +105℃
Leakage current max.	I = 0.01CV or 3μA whichever is greater (after 2 minutes)
Capacitance tolerance	±20% at 120Hz, 20℃
Dissipation factor max. (at 120Hz, 20℃)	WV: 4 / 6.3 / 10 / 16 / 25 / 35 / 50 tanδ: 0.37 / 0.28 / 0.24 / 0.20 / 0.16 / 0.13 / 0.12
Low temperature characteristics (Impedance ratio at 120Hz)	WV: 4 / 6.3 / 10 / 16 / 25 / 35 / 50 Z-25℃/Z+20℃: 6 / 3 / 3 / 2 / 2 / 2 / 2 Z-40℃/Z+20℃: 12 / 8 / 5 / 4 / 3 / 3 / 3
Load life (after application of the rated voltage for 2000 hours at 105℃)	Leakage current: Less than specified value Capacitance change: Within ±25% of initial value tanδ: Less than 200% of specified value
Shelf life (at 105℃)	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℃ 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	6.0	5.3	5.3	1.4
6.3	7.1	6.6	6.6	2.2

DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

μF \ WV	4		6.3		10		16		25		35		50	
0.1													4×5.8	1.0
0.22													4×5.8	2.6
0.33													4×5.8	3.2
0.47													4×5.8	3.8
1.0													4×5.8	6.2
2.2													4×5.8	11
3.3													4×5.8	14
4.7									4×5.8	13	4×5.8	15	5×5.8	19
10							4×5.8	18	5×5.8	23	5×5.8	25	6.3×5.8	30
22	4×5.8	22	4×5.8	22	5×5.8	27	5×5.8	30	6.3×5.8	38	6.3×5.8	42		
33	5×5.8	30	5×5.8	30	5×5.8	35	6.3×5.8	40	6.3×5.8	48				
47	5×5.8	36	5×5.8	36	6.3×5.8	46	6.3×5.8	50						
100	6.3×5.8	60	6.3×5.8	60	6.3×5.8	60								

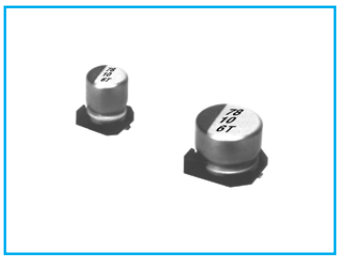
Ripple current (mA rms) at 105℃, 120Hz

Case size øD×L(mm)

TC Chip type, Higher Capacitance Range Series

Solvent Proof

RC ⇒ TC
High CV

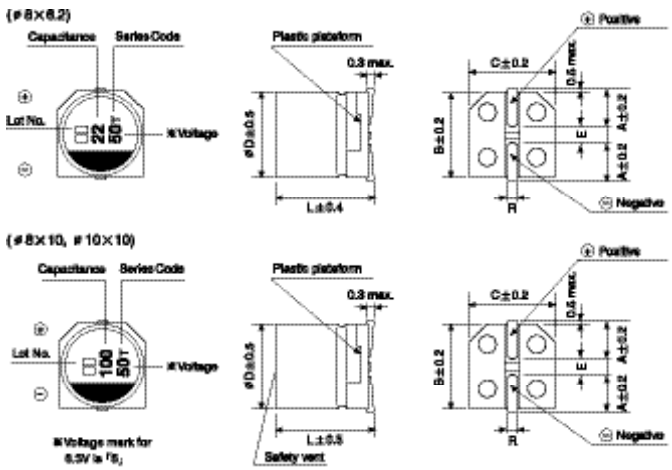


- Chip type, higher capacitance in large case sizes
- Chip type with load life 2000 hours at +105°C
- Designed for surface mounting on high density PC board
- Applicable to automatic insertion machine using carrier tape

Item	Characteristics
Operating temperature range	-55 ~ +105°C
Leakage current max.	I = 0.01CV or 3㎂ 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: 0.22 / 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: 4 / 4 / 3 / 3 / 3 / 2
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.
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



φD×L	W	A	B	C	E	R
8×6.2	3.3	3.3	8.3	8.3	2.3	0.5~0.8
8×10	2.9	2.9	8.3	8.3	3.1	0.8~1.1
10×10	3.2	10.3	10.3	10.3	4.5	0.8~1.1

DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

㎌ \ WV	6.3		10		16		25		35		50	
22											8×6.2	67
33									8×6.2	76	8×10	133
47							8×6.2	79	8×10	124	10×10	180
100			8×6.2	90	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		
330	8×10	288	10×10	318	10×10	441	10×10	372				
470	10×10	340	10×10	351	10×10	489						
680	10×10	408	10×10	392								
1000	10×10	495										

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

CHIP TYPES

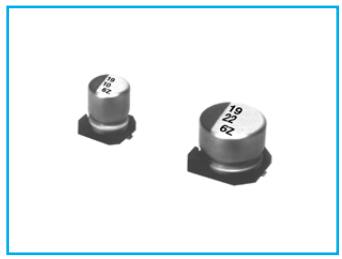
SURFACE MOUNT ALUMINUM ELECTROLYTIC CAPACITORS

ZC Height 5.5mL, Low Impedance Series

- Chip type, low impedance temperature range up to 105℃
- Designed for surface mounting on high density PC board
- Applicable to automatic insertion machine using carrier tape

Low Impedance Solvent Proof

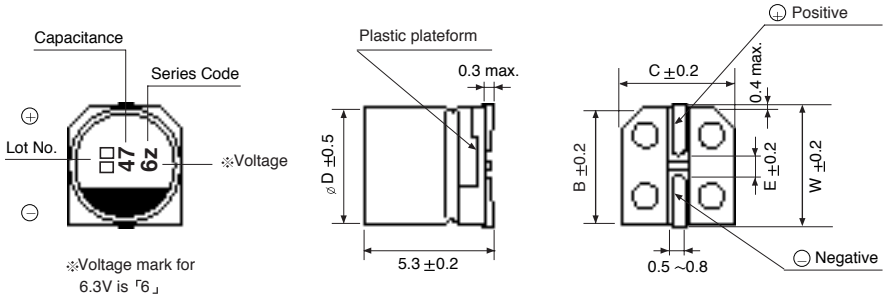
RC ⇨ ZC (Low Imp.)



Item	Characteristics
Operating temperature range	-55 ~ +105℃
Leakage current max.	I = 0.01CV or 3μA 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 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℃/Z+20℃: 2 / 2 / 2 / 2 / 3 Z-55℃/Z+20℃: 4 / 4 / 3 / 3 / 3
Load life (after application of the rated voltage for 1000 hours at 105℃)	Leakage current: Less than specified value Capacitance change: Within ±20% of initial value tanδ: Less than 200% of specified value
Shelf life (at 105℃)	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℃ 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	6.0	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						
68	6.3×5.3	1.3	115	6.3×5.3	1.3	115									
100	6.3×5.3	1.3	115												

Ripple current (mA rms) at 105°C, 100kHz
Impedance (Ω) at 20°C, 100kHz
Case size øD×L(mm)

UPGRADE

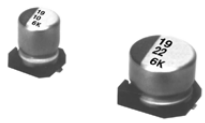
CK

Chip type, Low Impedance, High CV Series

Low Impedance Solvent Proof

ZC ⇒ CK
High CV

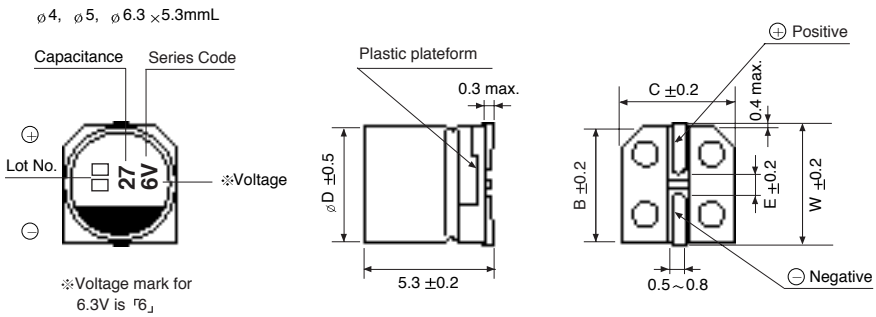
- Chip type, low impedance temperature range up to 105℃
- Designed for surface mounting on high density PC board
- Applicable to automatic insertion machine using carrier tape

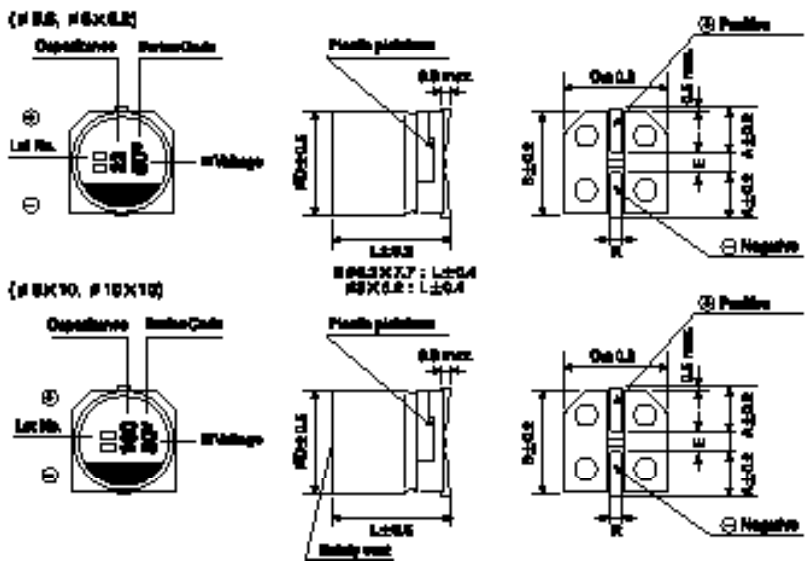


Item	Characteristics
Operating temperature range	-55 ~ +105℃
Leakage current max.	I = 0.01CV or 3㎂ whichever is greater (after 2 minutes)
Capacitance tolerance	±20% at 120Hz, 20℃
Dissipation factor max. (at 120Hz, 20℃)	WV: 6.3 / 10 / 16 / 25 / 35 / 50 tanδ: 0.24 / 0.19 / 0.16 / 0.14 / 0.12 / 0.12
Low temperature characteristics (Impedance ratio at 120Hz)	WV: 6.3 / 10 / 16 / 25 / 35 / 50 Z-25℃/Z+20℃: 2 / 2 / 2 / 2 / 2 / 2 Z-55℃/Z+20℃: 3 / 3 / 3 / 3 / 3 / 3
Load life (after application of the rated voltage for 2000 hours at 105℃)	Leakage current: Less than specified value Capacitance change: Within ±25% of initial value tanδ: Less than 200% of specified value ø4 and ø5 products are for 1000 hours
Shelf life (at 105℃)	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





ø D	W	A	B	C	E	R
4 ×5.8	4.8		4.3	4.3	1.0	0.5~0.8
5 ×5.3	6.0		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		3.4	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

CK Series

● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

μF \ WV	6.3			10			16			25			35			50		
0.1																4×5.8	5.0	30
1.5																4×5.8	5.0	30
2.2																4×5.8	5.0	30
3.3																4×5.8	5.0	30
4.7										4×5.8	1.8	50	4×5.8	1.8	80	5×5.8	1.52	85
6.8										4×5.8	1.8	60	5×5.8	0.76	150	5×5.8	1.52	85
10				4×5.8	1.8	80	4×5.8	1.8	80	4×5.8	1.8	80	5×5.8	0.76	150	6.3×5.8	0.88	165
15				4×5.8	1.8	80	4×5.8	1.8	80	5×5.8	0.76	115	5×5.8	0.76	150	6.3×5.8	0.88	165
22	4×5.8	1.8	80	4×5.8	1.8	80	5×5.8	0.76	150	5×5.8	0.76	140	5×5.8	0.76	150	6.3×5.8	0.88	165
33	5×5.8	0.76	150	5×5.8	0.76	150	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
																8×6.2	0.26	300
47	5×5.8	0.76	150	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
																8×6.2	0.26	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	0.17	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	0.09	670
										8×6.2	0.26	300					
150	6.3×5.8	0.44	230	6.3×5.8	0.44	220	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	220	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 ⌀D x L (mm)

NEW

CA Chip type, Long Life, High CV Series

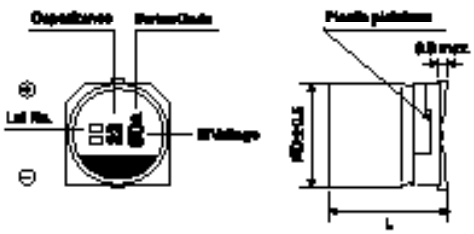
Long Life Solvent Proof

- 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

Item	Characteristics
Operating temperature range	-40 ~ +105℃
Leakage current max.	I = 0.01CV or 3㎂ 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: 0.28 / 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℃/Z+20℃: 4 / 3 / 2 / 2 / 2 / 2 Z-40℃/Z+20℃: 10 / 7 / 5 / 3 / 3 / 3
Load life (after application of the rated voltage for 5000 hours at 105℃)	Leakage current: Less than specified value Capacitance change: Within ±30% of initial value tanδ: Less than 300% of specified value
Shelf life (at 105℃)	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



* Please refer to drawing for SC Series in page 37 for detail drawing.

DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

㎌ \ WV	6.3		10		16		25		35		50	
0.1											4×5.8	1.0
0.22											4×5.8	2.6
0.33											4×5.8	3.2
0.47											4×5.8	3.8
1.0											4×5.8	6.2
2.2											4×5.8	11
3.3											4×5.8	14
4.7							4×5.8	13	4×5.8	15	4×5.8	19
10					4×5.8	18	5×5.8	23	5×5.8	25	6.3×5.8	30
22	4×5.8	22	5×5.8	27	5×5.8	30	6.3×5.8	38	6.3×5.8	42	6.3×7.7	120
33	5×5.8	30	5×5.8	35	6.3×5.8	40	6.3×5.8	48	6.3×7.7	57	8×10	140
47	5×5.8	36	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	120	8×10	141	10×10	290	10×10	320	10×10	375		
330	8×10	290	10×10	290	10×10	290	10×10	450				
470	10×10	320	10×10	320	10×10	320						
1000	10×10	410										

Ripple current (mA rms) at 105℃, 120Hz
Case size ⌀D × L (mm)

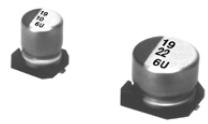
SURFACE MOUNT ALUMINUM ELECTROLYTIC CAPACITORS

UC Chip type, High Reliability Series

- Chip type, high temperature range, for +125℃ use
- Designed for surface mounting on high density PC board
- Applicable to automatic insertion machine using carrier tape

Solvent Proof

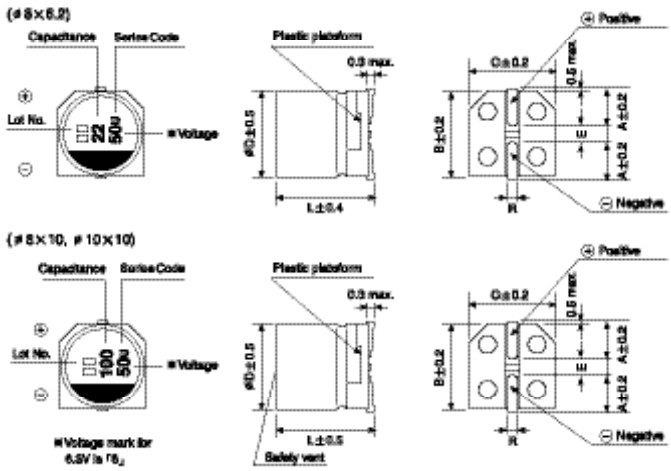
RC ⟹ UC
High temp.



Item	Characteristics
Operating temperature range	-40 ~ +125℃
Leakage current max.	I = 0.03CV or 4 μA 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: 0.32 / 0.24 / 0.21 / 0.18 / 0.18
Low temperature characteristics (Impedance ratio at 120Hz)	WV: 10 / 16 / 25 / 35 / 50 Z-40℃/Z+20℃: 12 / 8 / 6 / 4 / 4
Load life (after application of the rated voltage for 2000 hours at 125℃)	Leakage current: Less than specified value Capacitance change: Within ±30% of initial value tanδ: Less than 300% of specified value φ8 x 6.2mmL product is for 1000 hours
Shelf life (at 125℃)	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℃ for 30 seconds. Leakage current: Less than specified value Capacitance change: Within ±10% of initial value tanδ: Less than specified value

DRAWING

Unit : mm



φD×L	A	B	C	E	R
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

DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

μF \ WV	10		16		25		35		50	
10									8×6.2	24
22									8×6.2	38
33							8×6.2	44	8×10	46
47					8×6.2	48	8×10	52	10×10	58
100	8×6.2	58	8×10	66	8×10	74	10×10	80		
220	8×10	90	10×10	102	10×10	116				
330	10×10	112								

Ripple current (mA rms) at 125°C, 120Hz
Case size φD x L (mm)

NC Chip type, Non-polarized Series

Non-polarized Solvent Proof

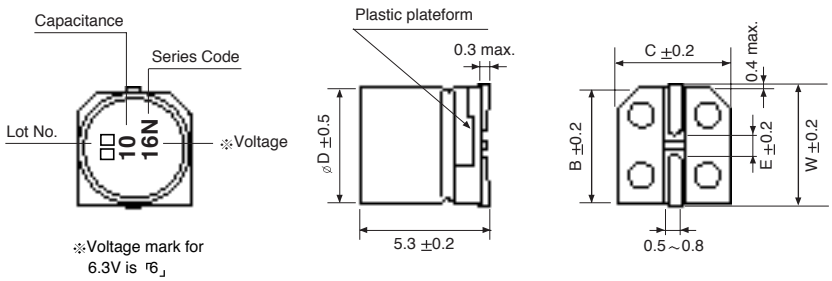
SC (Non-polar) ⇒ NC ⇒ CN (Wide temp.)

- Chip type with 5.5mm height
- Designed for surface mounting on high density PC board
- Applicable to automatic mounting machine using carrier tape

Item	Characteristics
Operating temperature range	-40 ~ +85℃
Leakage current max.	I = 0.05CV or 10㎂ 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 / 0.18
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



ø D	W	B	C	E
4	4.8	4.3	4.3	1.0
5	6.0	5.3	5.3	1.4
6.3	7.1	6.6	6.6	2.2

DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

㎌ \ 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										

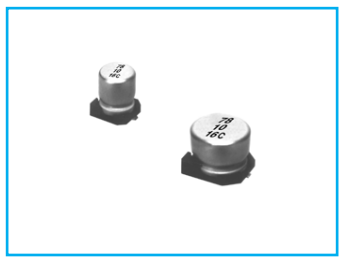
Ripple current (mA rms) at 85℃, 120Hz
Case size ø D X L (mm)

SURFACE MOUNT ALUMINUM ELECTROLYTIC CAPACITORS

CN Height 5.5mmL, 105℃ Non-polarized Series

Solvent Proof

NC ⇒ CN (High temp.)

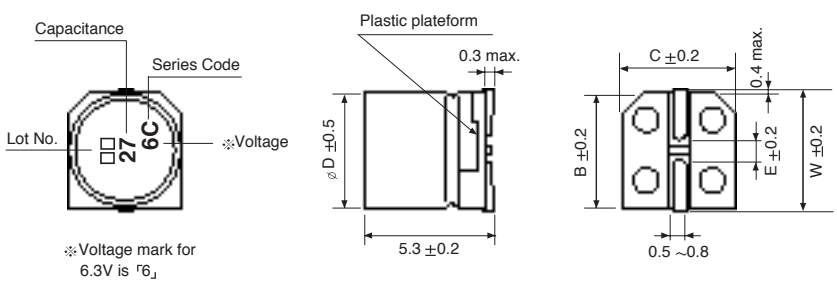


- Chip type, Non-polarized, High temperature (105℃)
- Chip type with 5.5mm height
- Designed for surface mounting on high density PC board
- Applicable to automatic insertion machine using carrier tape

Item	Characteristics
Operating temperature range	-40 ~ +105℃
Leakage current max.	I = 0.05CV 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: 0.32 / 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℃/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 1000 hours at 105℃)	Leakage current: Less than specified value Capacitance change: Within ±20% of initial value tanδ: Less than 200% of specified value
Shelf life (at 105℃)	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℃ for 30 seconds. Leakage current: Less than specified value Capacitance change: Within ±10% of initial value tanδ: Less than specified value

● DRAWING

Unit : mm



ø D	W	B	C	E
4	4.8	4.3	4.3	1.0
5	6.0	5.3	5.3	1.4
6.3	7.1	6.6	6.6	2.2

● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

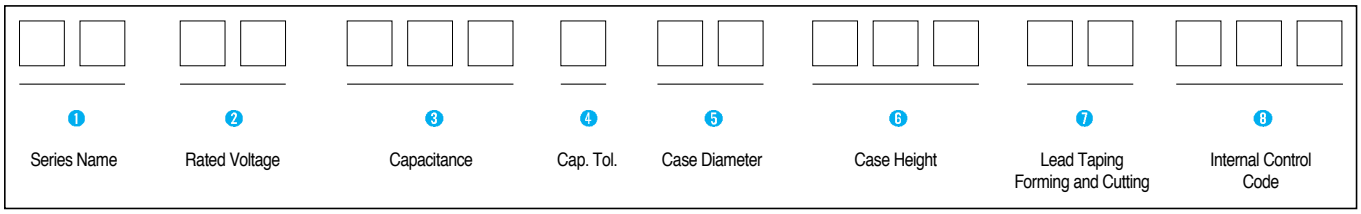
μF \ WV	6.3		10		16		25		35		50	
0.1											4×5.3	1.3
0.22											4×5.3	2.3
0.33											4×5.3	2.8
0.47											4×5.3	4.0
1.0											4×5.3	8.4
2.2									4×5.3	8.4	5×5.3	13
3.3							5×5.3	12	5×5.3	16	5×5.3	17
4.7					4×5.3	12	5×5.3	16	5×5.3	18	6.3×5.3	20
10			4×5.3	17	5×5.3	23	6.3×5.3	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)

3 MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

PART NUMBER SYSTEM

Part Number System



1 Series Name

See page 4~5.

2 Rated Working Voltage

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

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

7 Lead Taping, Forming and Cutting

See pages 51~53.

PACKING

● BULK PACKING QUANTITY(pcs) / BOX

SIZE		BULK (QUANTITY)		
ø D	L	V-Bag	INNER BOX	MIDDLE BOX
3	5	1000	12000	48000
4	5, 7	1000	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, 25(31.5)	50(50)	500(400)	2000(1600)
	35.5	50	300	1200

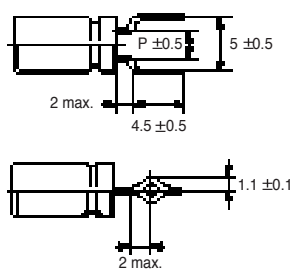
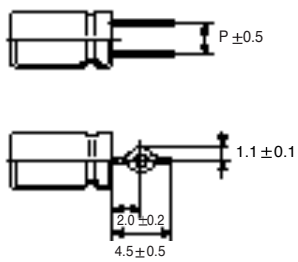
● CUTTING PACKING QUANTITY(pcs) / BOX

SIZE		CUTTING (QUANTITY)		
ø D	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
	8, 11.5	300	3600	14000
10	9		1000	8000(16000)
	12.5		800	6400(12800)
	16		700	5600(11200)
	20		500	4000(8000)
	25		400	3200(6400)
12.5	16		400	3200(6400)
	20		300	2400(4800)
	25		250	2000(4000)
16	16		400	1200
	20		400	1200
	25, 31.5		400	1200
	35.5		400	1200
	40mm 이상		400	900
18	16		300	900
	20		300	900
	25		300	900
	31.5, 35.5		300	900
	40mm이상		300	900
22	35.5이하		200	600
	440mm이상		200	600

※( ) is for oversea

● Lead Forming & Cutting

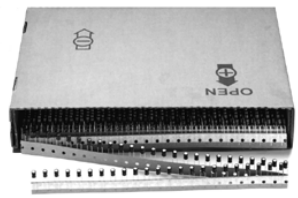
Unit : mm

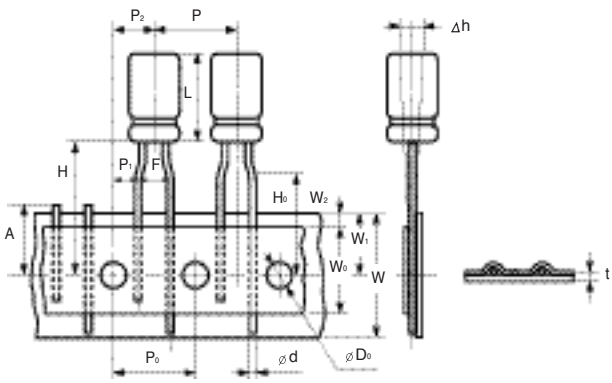
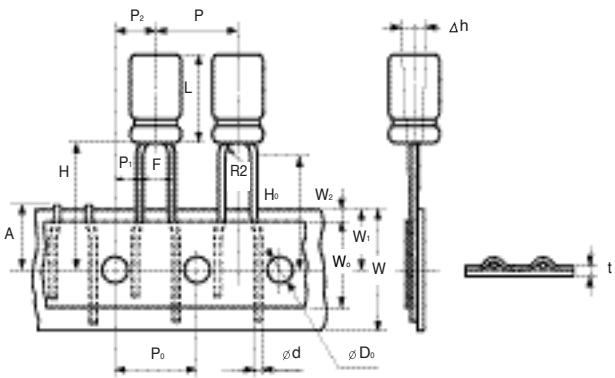
Configurations	Code	Case dia.	Shape	Configurations	Code	Case dia.	Shape
T - Type	TS	øD≦8		S - Type	SS	øD≧10	

TAPING

● Lead Taping Capacitors for Automatic Insertion

● Ammo



DRAWING Ⅰ	DRAWING Ⅱ
	

● DIMENSIONS

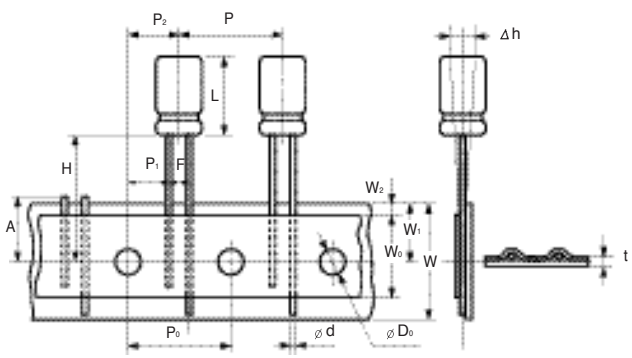
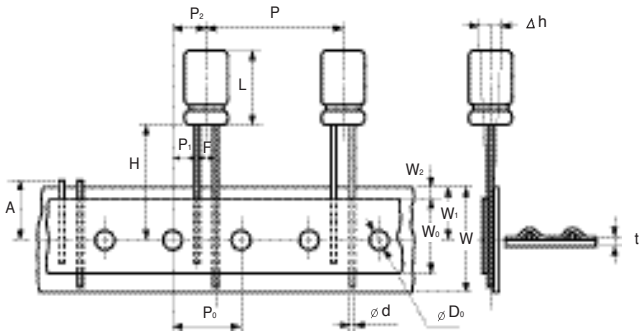
Unit : mm

Applicable Drawing No.			Ⅰ (Ⅱ)				Ⅲ			Ⅰ						
Description	Symbol	Tolerance	⌀3	⌀4	⌀5		⌀6.3		⌀8	⌀4	⌀5		⌀6.3		⌀8	
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.	7.0				7.0		7.0	7.0					7.0	7.0
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, 7mm L = 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.	⌀D_0	±0.2	4.0				4.0		4.0	4.0					4.0	4.0
Total Tape Thickness	t	±0.2	0.6				0.6		0.6	0.6					0.6	0.6
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

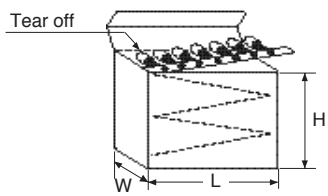
Unit : mm

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.	7.0	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.	ø D_0	±0.2	4.0	4.0		4.0	4.0
Total Tape Thickness	t	±0.2	0.6	0.6		0.6	0.6
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			
ø D	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	

MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

UPGRADE

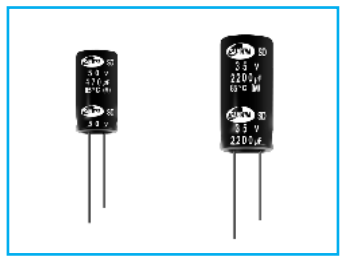
SD

Standard, For General Purposes Series

Miniaturized

Solvent Proof
WV ≦100V

SD ⇨ RD
Wide temp.



- Standard series for general purposes
- High CV value
- Ideal for slim type audio equipment
- Voltage range of 6.3~500V
- Load life of 2000 hours at 85℃

Item	Characteristics
Operating temperature range	WV: 6.3~350 / 400 ~ 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.
Low temperature characteristics (Impedance ratio at 120Hz)	
Load life (after application of the rated voltage for 2000 hours at 85℃)	
Shelf life (at 85℃)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value.

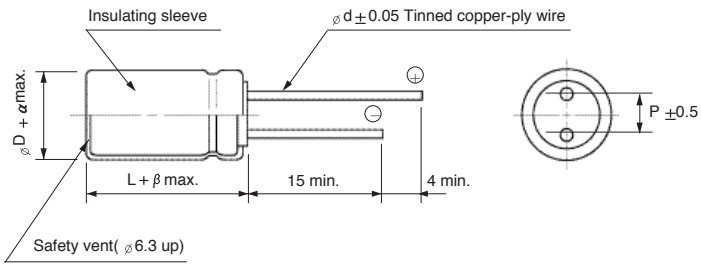
WV	6.3	10	16	25	35	50	63	100	160~250	350~500
tanδ	0.28	0.24	0.20	0.16	0.14	0.12	0.10	0.08	0.15	0.20

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	—

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

DRAWING

Unit : mm



øD	5	6.3	8	10	12.5	16	18	22	25
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	1.0			2.0					

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

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	5×11 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				5×11 120	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	16×20 362	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	12.5×25 516	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	16×31.5 962	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	18×40 1495	25×41 1612				
680	6.3×11 480	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	22×51 1902	25×51 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	25×51 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	22×51 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	25×51 3187							
4700	12.5×20 1736	12.5×25 1903	12.5×25 2129	16×25 2448	16×35.5 2905	18×40 3272	25×41 3412								
6800	12.5×25 2129	16×25 2332	16×25 2577	18×31.5 3114	18×40 3408	25×41 4251	25×51 4351	← Case size ⌀D×L (mm) ← Ripple current (mA rms) at 85℃, 120Hz							
10000	16×25 2629	16×31.5 2830	16×31.5 3176	18×40 3544	25×41 3899										
15000	16×35.5 2959	16×35.5 3284	18×35.5 3656	25×41 4399											
22000	18×40 3733	18×40 3843	22×41 4012												
33000	22×41 5992	25×41 6184	25×51 6276												
39000	25×41 7487	25×51 7613													

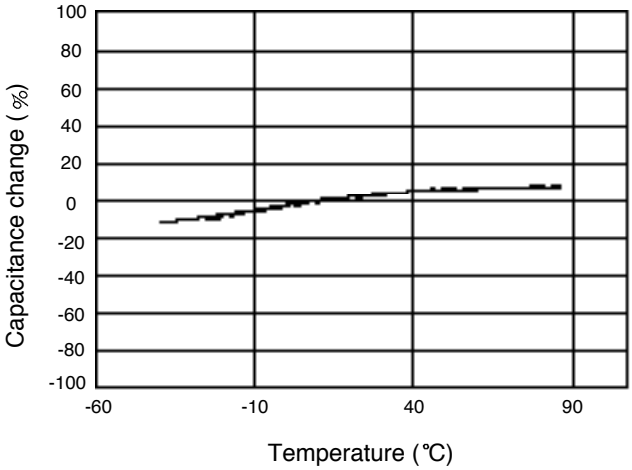
SD series

TYPICAL PERFORMANCE

—— 16V 1000μF
····· 400V 10μF

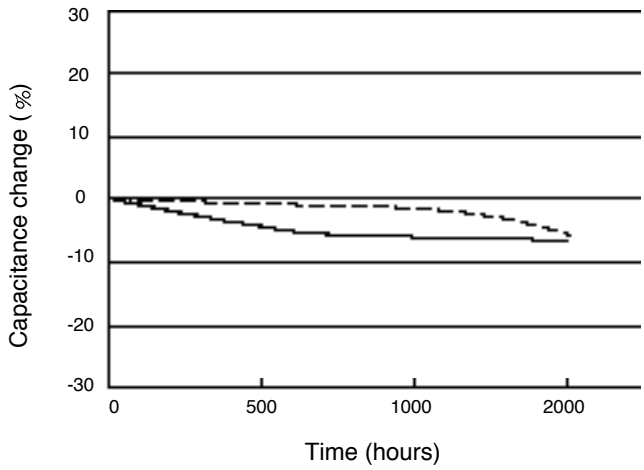
● TEMPERATURE CHARACTERISTICS

Capacitance change vs. temperature

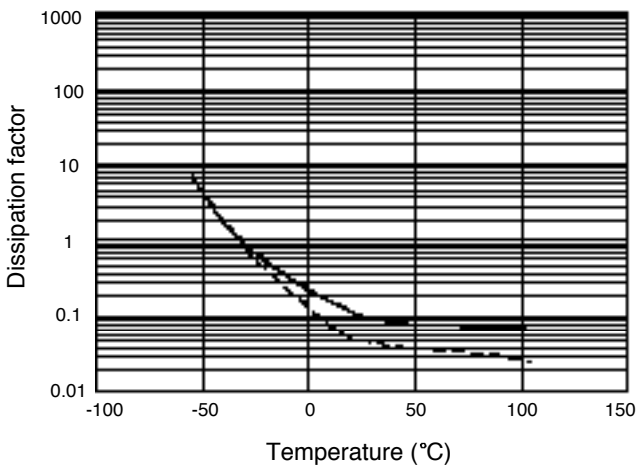


● LOAD LIFE (at +85°C)

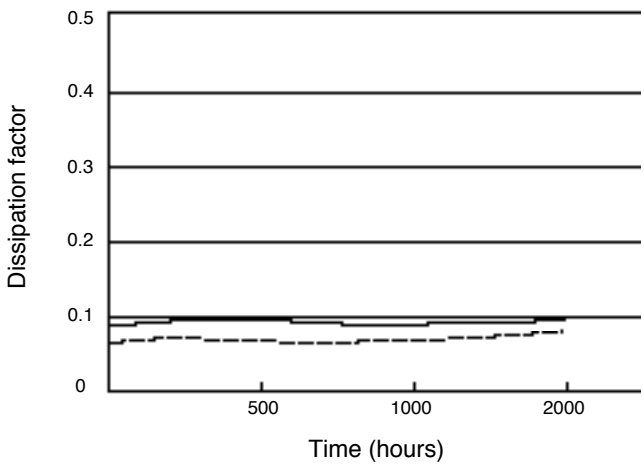
Capacitance change vs. time



Dissipation factor vs. temperature

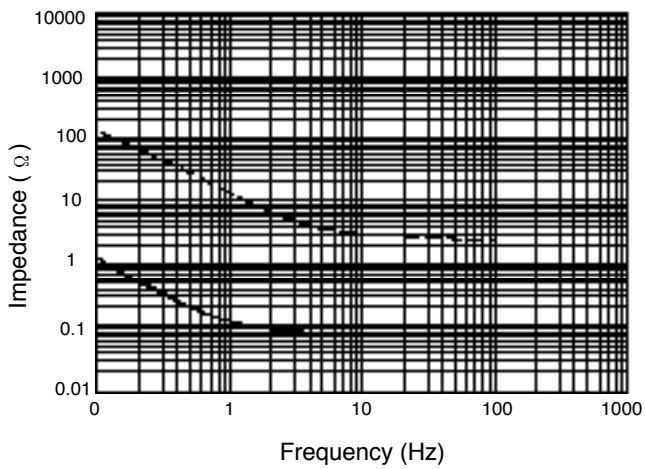


Dissipation factor vs. time

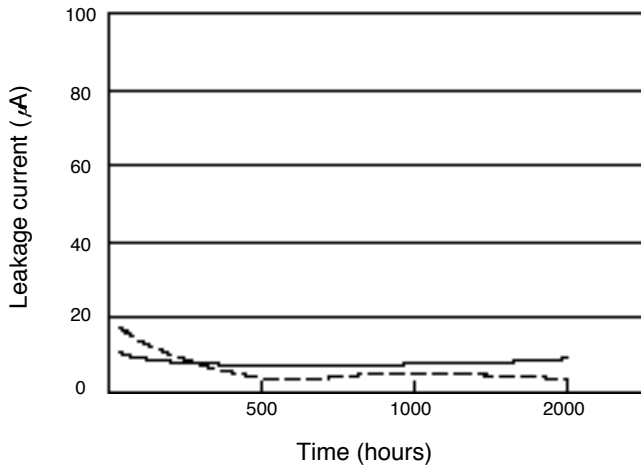


● FREQUENCY CHARACTERISTICS

Impedance vs. frequency



Leakage current vs. time

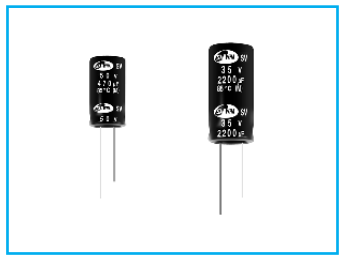


SV Low Profile Series

Solvent Proof

- Low profile case size
- Suited for automotive and portable devices
- Load life of 2000 hours at 85℃

SD (Low profile) → SV ← RV (Wide temp.)



Item	Characteristics
Operating temperature range	-40 ~ +85℃
Leakage current max.	I = 0.01CV or 3㎂ whichever is greater (after 2 minutes)
Capacitance tolerance	±20% at 120Hz, 20℃
Dissipation factor max. (at 120Hz, 20℃)	Capacitance > 1000㎌ : tanδ increases by 0.03 for each 1000㎌ from below value.

WV	6.3	10	16	25	35	40	50
tanδ	0.26	0.22	0.18	0.16	0.14	0.14	0.12

Low temperature characteristics (Impedance ratio at 120Hz)

WV	6.3	10	16	25~50
Z-25℃/Z+20℃	4	3	2	2
Z-40℃/Z+20℃	10	8	6	4

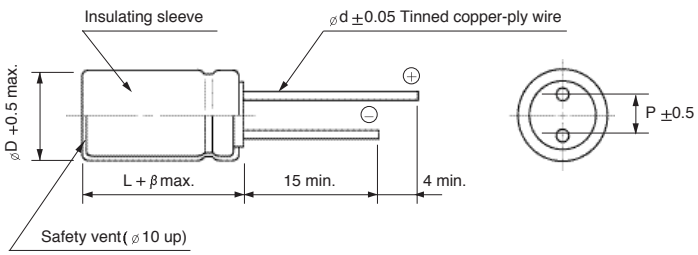
Load life (after application of the rated voltage for 2000 hours at 85℃)

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	6.3	8	10	12.5	16	18
P	2.5	3.5	5.0	5.0	7.5	7.5
ød	0.5	0.6	0.6	0.6	0.8	0.8
β	1.0		1.5			

DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

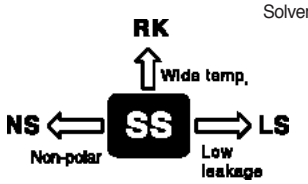
㎌ \ WV	6.3		10		16		25		35		40		50	
15													6.3 ×9	72
22											6.3 ×9	81	6.3 ×9	87
33									6.3 ×9	99	6.3 ×9	99	8 ×9	125
47							6.3 ×9	111	8 ×9	138	8 ×9	138	8 ×9	149
68					6.3 ×9	126	8 ×9	155	8 ×9	166	10 ×9	188	10 ×9	203
100	6.3 ×9	127	6.3 ×9	138	8 ×9	177	8 ×9	188	10 ×9	228	10 ×9	228	10 ×9	247
150	6.3 ×9	155	8 ×9	197	8 ×9	217	10 ×9	262	10 ×9	280	10 ×9	280	10 ×9	302
220	8 ×9	219	8 ×9	238	10 ×9	299	10 ×9	317	10 ×9	339	12.5 ×16	489	12.5 ×16	529
330	8 ×9	268	10 ×9	331	10 ×9	366	10 ×9	388	12.5 ×16	599	12.5 ×16	599	12.5 ×16	647
470	10 ×9	363	10 ×9	395	10 ×9	436	12.5 ×16	669	12.5 ×16	715	12.5 ×16	715	16 ×16	865
680	10 ×9	437	10 ×9	475	12.5 ×16	759	12.5 ×16	805	16 ×16	963	16 ×16	963	16 ×16	1040
1000	12.5 ×16	766	12.5 ×16	832	12.5 ×16	920	16 ×16	1093	16 ×16	1168	18 ×16	1264	18 ×20	1471
1500	12.5 ×16	888	12.5 ×16	956	16 ×16	1168	16 ×16	1228	18 ×20	1514				
2200	16 ×16	1146	16 ×16	1225	16 ×16	1323	18 ×20	1611						
3300	16 ×16	1342	18 ×16	1544	18 ×20	1781								
4700	18 ×20	1792												

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

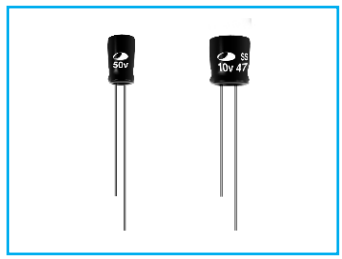
MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

SS Standard, Height 7mm Series

- Super miniature series with 7mm height
- Suited for use in compact audio equipment
- Load life of 2000 hours at 85℃



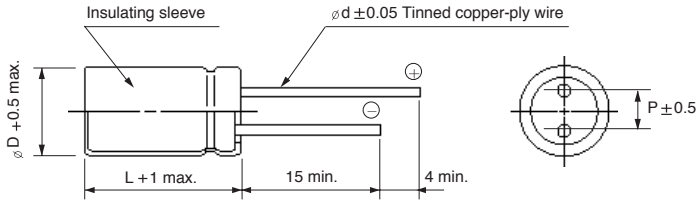
Solvent Proof



Item	Characteristics
Operating temperature range	-40 ~ +85℃
Leakage current max.	I = 0.01CV or 4μA whichever is greater (after 1 minute)
Capacitance tolerance	±20% at 120Hz, 20℃
Dissipation factor max. (at 120Hz, 20℃)	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℃/Z+20℃: 6 / 4 / 3 / 2 / 2 Z-40℃/Z+20℃: 12 / 8 / 6 / 4 / 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
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	D	4	5	6.3
	P	1.5	2.0	2.5
	ød	0.45	0.5	0.5

● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

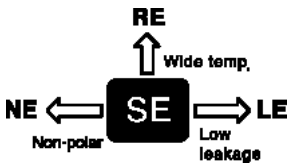
μF \ WV	4		6.3		10		16		25		35		40		50		63	
0.1															4 ×7	4.4	4 ×7	4.4
0.15															4 ×7	5.4	4 ×7	5.4
0.22															4 ×7	6.6	4 ×7	6.6
0.33															4 ×7	8.0	4 ×7	8.0
0.47															4 ×7	10	4 ×7	10
0.68															4 ×7	12	4 ×7	12
1.0															4 ×7	14	4 ×7	14
1.5															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														

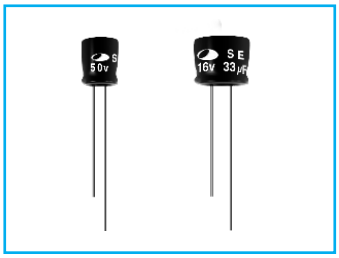
Ripple current (mA rms) at 85℃, 120Hz
Case size ØD ×L (mm)

SE Standard, Height 5mm Series

Miniaturized

- Ultra miniature series with 5mm height
- Suitable to replace tantalum capacitors at low cost
- Load life of 2000 hours at 85℃

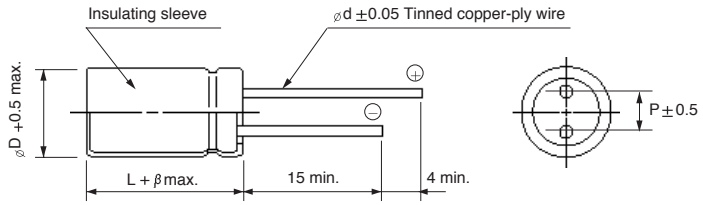




Item	Characteristics
Operating temperature range	-40 ~ +85℃
Leakage current max.	I = 0.01CV or 4㎂ whichever is greater (after 1 minute)
Capacitance tolerance	±20% at 120Hz, 20℃
Dissipation factor max. (at 120Hz, 20℃)	WV: 4 / 6.3 / 10 / 16 / 25 / 35 / 50 / 63 tanδ: 0.35 / 0.24 / 0.20 / 0.16(0.20) / 0.13(0.15) / 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℃/Z+20℃: 6 / 4 / 3 / 2 Z-40℃/Z+20℃: 12 / 8 / 6 / 4
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



⌀D	3	4	5	6.3	8
P	1.0	1.5	2.0	2.5	2.5
⌀d	0.4	0.45	0.45	0.45	0.45
β	1.0				1.5

DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

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℃, 120Hz
Case size ⌀D×L (mm)

MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

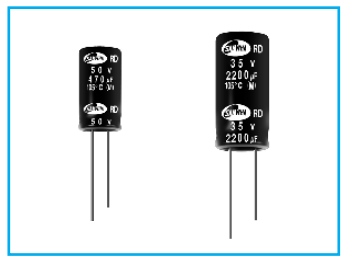
RD Wide Temperature Range Series

- Standard series for general purpose
- High CV value
- Wide operating temperature range of -55 ~ +105℃
- Voltage range of 6.3~450V

Miniaturized

Solvent Proof
WV ≦100V

SD ⇨ RD
Wide temp.



Item	Characteristics
Operating temperature range	WV: 6.3 ~ 100 / 160 ~ 350 / 400, 450 Temperature range: -55 ~ +105℃ / -40 ~ +105℃ / -25 ~ +105℃
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℃)	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℃/Z+20℃	5	4	3	2	2	2	3	4	6	10
Z-40℃/Z+20℃	10	8	6	4	3	3	4	8	—	—

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

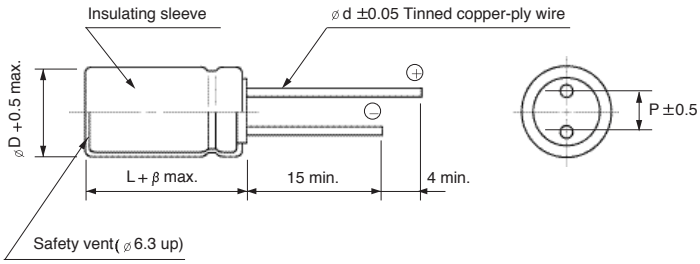
Leakage current	Less than specified value
Capacitance change	Within ±20% of initial value
tanδ	Less than 200% of specified value

φ5, 6.3 and φ8 products are for 1000 hours

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

DRAWING

Unit : mm



φD	5	6.3	8	10	12.5	16	18
P	2.0	2.5	3.5	5.0	5.0	7.5	7.5
φd	0.5	0.5	0.6	0.6	0.6	0.8	0.8
β	1.0			2.0			

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

RD series

● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV / μF	6.3	10	16	25	35	50	63	100	160	200	250	350	400	450
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
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						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
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
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
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
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
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	
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			
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			
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				
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					
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						
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						
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	16×35.5 1794								
3300	12.5×16 983	12.5×20 1148	12.5×25 1323	16×25 1562	16×35.5 1857	18×35.5 2152								
4700	12.5×20 1219	12.5×25 1421	16×25 1657	16×31.5 1916	18×35.5 2224	← Case size ⌀D×L (mm) ← Ripple current (mA rms) at 105℃, 120Hz								
6800	12.5×25 1480	16×25 1737	16×31.5 1982	18×35.5 2335										
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													

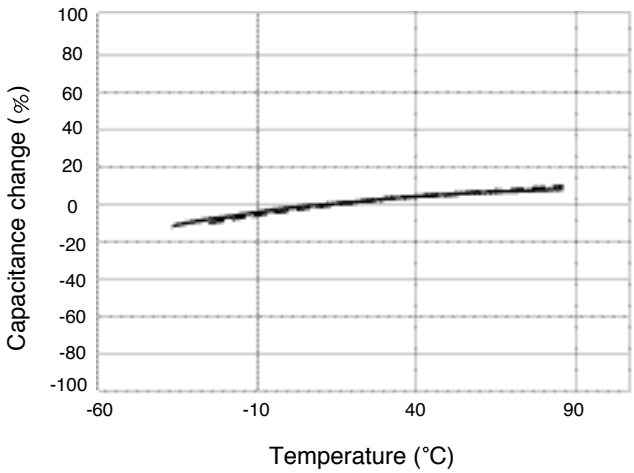
RD series

TYPICAL PERFORMANCE

—— 16V 1000μF
····· 400V 10μF

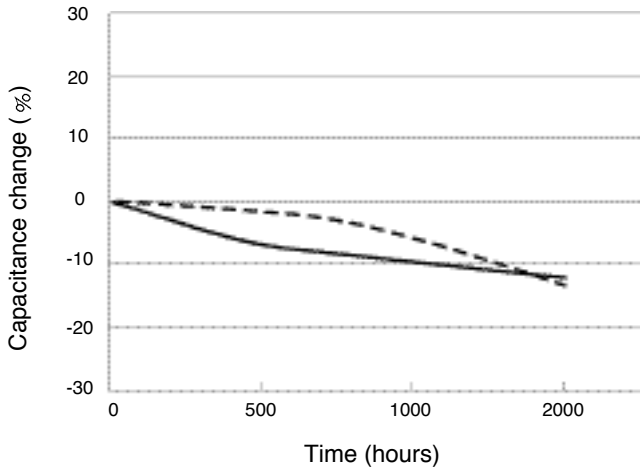
● TEMPERATURE CHARACTERISTICS

Capacitance change vs. temperature

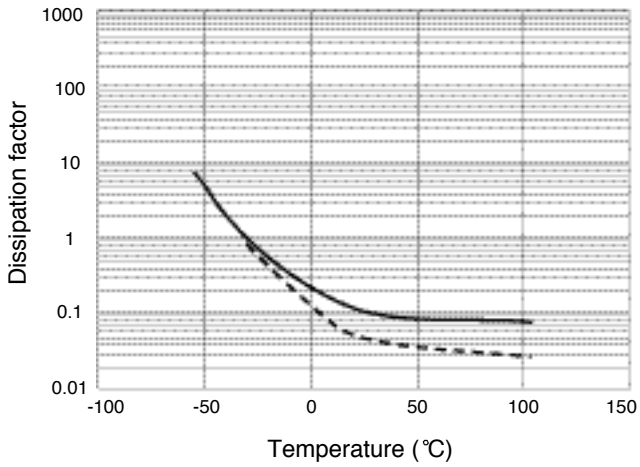


● LOAD LIFE (at +105°C)

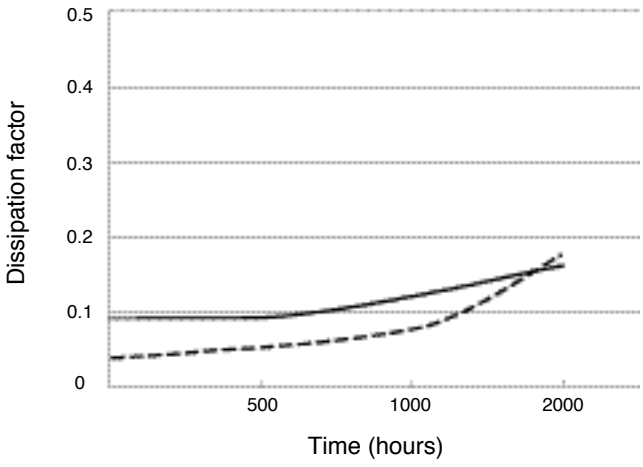
Capacitance change vs. time



Dissipation factor vs. temperature

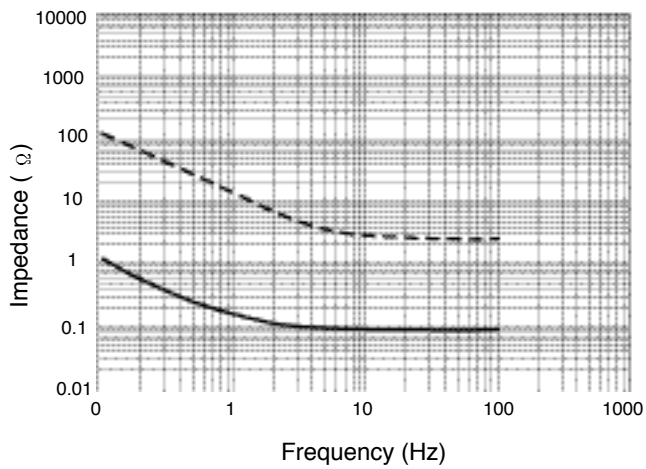


Dissipation factor vs. time

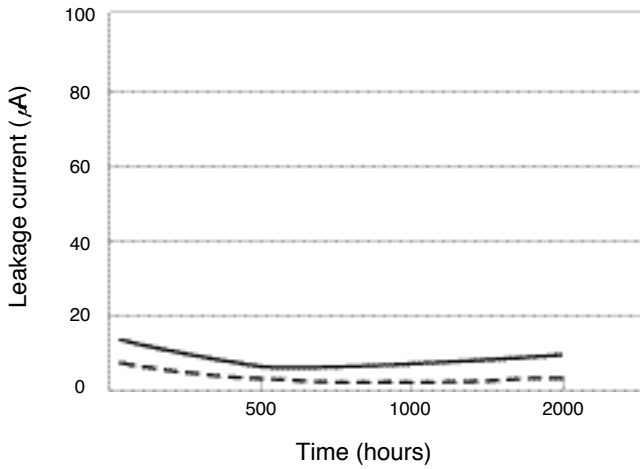


● FREQUENCY CHARACTERISTICS

Impedance vs. frequency



Leakage current vs. time

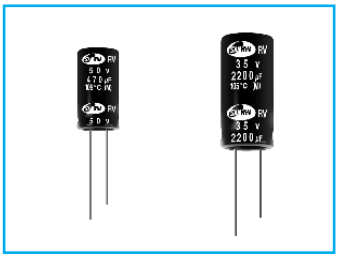


RV Low Profile, Wide Temperature Range Series

Solvent Proof

- Low profile case size
- Wide operating temperature range of -55 ~ +105℃

SV ⇒ RV (Wide temp.)



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

WV	6.3	10	16	25	35	50
tanδ	0.26	0.22	0.18	0.16	0.14	0.12

Low temperature characteristics (Impedance ratio at 120Hz)

WV	6.3	10	16	25 ~ 50
Z-25℃/Z+20℃	4	3	2	2
Z-40℃/Z+20℃	8	6	4	3

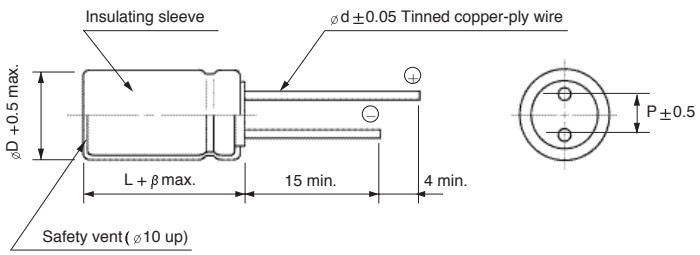
Load life (after application of the rated voltage for 1000 hours at 105℃)

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

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

DRAWING

Unit : mm



ø D	6.3	8	10	12.5	16	18
P	2.5	3.5	5.0	5.0	7.5	7.5
ø d	0.5	0.6	0.6	0.6	0.8	0.8
β	1.0		1.5			

DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

㎌ \ WV	6.3		10		16		25		35		50	
22									6.3 ×9	53	6.3 ×9	57
33							6.3 ×9	60	6.3 ×9	64	8 ×9	81
47					6.3 ×9	68	6.3 ×9	72	8 ×9	90	8 ×9	97
100	6.3 ×9	82	6.3 ×9	89	8 ×9	115	8 ×9	122	10 ×9	148	10 ×12.5	179
220	8 ×9	142	8 ×9	155	10 ×9	194	10 ×12.5	230	12.5 ×16	318	12.5 ×16	344
330	8 ×9	174	10 ×9	215	10 ×12.5	266	12.5 ×16	364	12.5 ×16	390	16 ×16	471
470	10 ×9	236	10 ×12.5	287	12.5 ×16	410	12.5 ×16	435	16 ×16	521	18 ×20	655
1000	12.5 ×16	498	12.5 ×16	541	16 ×16	670	18 ×16	769	18 ×20	885		
2200	16 ×16	769	16 ×16	826	18 ×16	972						
3300	18 ×16	988	18 ×16	1056								
4700	18 ×20	1231										

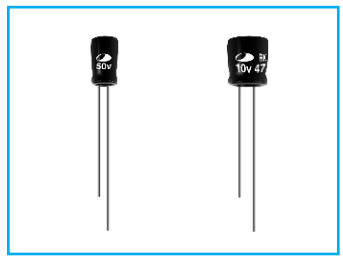
Ripple current (mA rms) at 105℃, 120Hz
Case size øD ×L (mm)

MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

RK Wide Temperature Range, Height 7mm Series

Solvent Proof

SS ⇨ RK (Wide temp.)

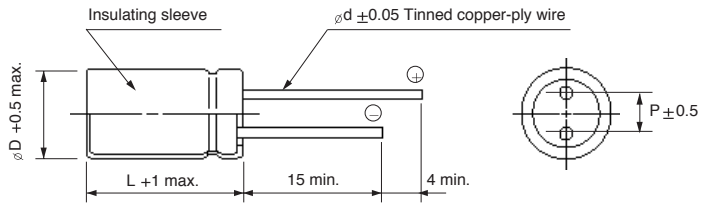


- Super miniature series with 7mm height
- High performance and excellent temperature characteristics
- Wide operating temperature range of -55 ~ +105℃

Item	Characteristics
Operating temperature range	-55 ~ +105℃
Leakage current max.	I = 0.01CV or 3μA whichever is greater (after 1 minute)
Capacitance tolerance	±20% at 120Hz, 20℃
Dissipation factor max. (at 120Hz, 20℃)	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℃)	Leakage current: Less than specified value Capacitance change: Within ±20% of initial value tanδ: Less than 200% of specified value
Shelf life (at 105℃)	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

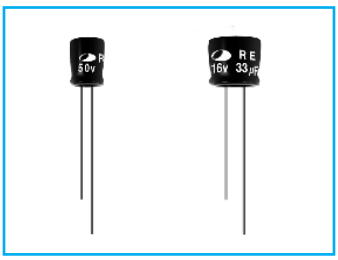
μF \ WV	4		6.3		10		16		25		35		50		63	
0.1													4×7	2.9	4×7	2.9
0.22													4×7	4.3	4×7	4.3
0.33													4×7	5.2	4×7	5.2
0.47													4×7	6.2	4×7	6.2
0.68													4×7	7.5	4×7	7.5
1.0													4×7	9.1	4×7	9.1
2.2													4×7	14	5×7	16
3.3											4×7	15	5×7	19	6.3×7	22
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℃, 120Hz
Case size øD×L (mm)

RE Wide Temperature Range, Height 5mm Series

Miniaturized

SE ⇒ RE (Wide temp.)

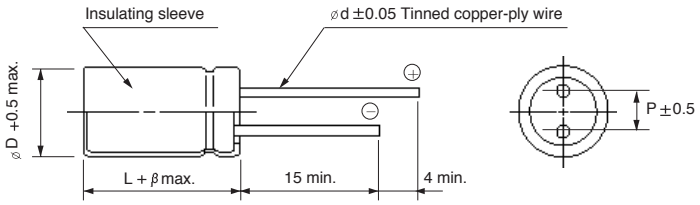


- Ultra miniature series with 5mm height
- Wide operating temperature range of -55 ~ +105℃
- Suitable to replace tantalum capacitors at low cost

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

DRAWING

Unit : mm



ø D	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

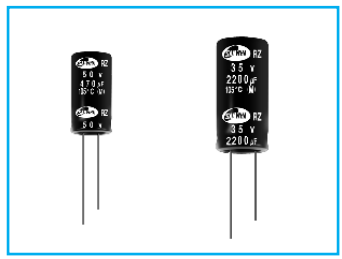
μF \ WV	4		6.3		10		16		25		35		50	
0.1													4 ×5(3 ×5)	2.4(2.0)
0.15													4 ×5(3 ×5)	3.0(2.5)
0.22													4 ×5(3 ×5)	3.6(3.0)
0.33													4 ×5(3 ×5)	4.4(3.7)
0.47													4 ×5(3 ×5)	5.2(4.4)
0.68													4 ×5(3 ×5)	6.3(5.3)
1.0													4 ×5(3 ×5)	7.7(6.4)
1.5													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℃, 120Hz
Case size ø D ×L (mm)

MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

RZ Extremely Low Impedance Series

Low Impedance　Solvent Proof



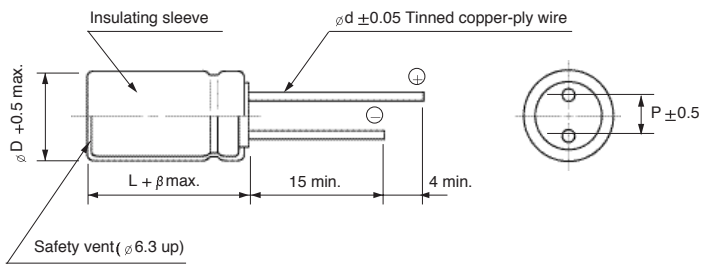
- Extremely low impedance at high frequency
- High reliability withstanding 5000 hours load life at 105℃ (2000/3000 hours for smaller case sizes as specified below)
- Ideally suited for use in switching power supplies

RZ ⇒ WD
Low Imp.
Smaller

Item	Characteristics
Operating temperature range	-55 ~ +105℃
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℃
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℃: 4 / 3 / 2
Load life (after application of the rated voltage for 5000 hours at 105℃)	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℃ 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	1.0			2.0			

RZ series

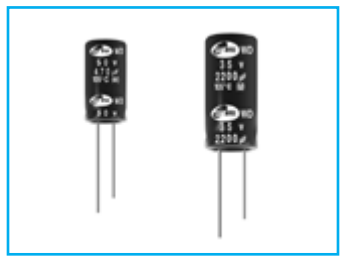
● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV / Item / µF	6.3				10				16				25			
	øD×L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 105°C 120Hz	Ripple current (mA rms) 105°C 100kHz	øD×L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 105°C 120Hz	Ripple current (mA rms) 105°C 100kHz	øD×L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 105°C 120Hz	Ripple current (mA rms) 105°C 100kHz	øD×L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 105°C 120Hz	Ripple current (mA rms) 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	Ripple current (mA rms) 105°C 100kHz	øD×L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 105°C 120Hz	Ripple current (mA rms) 105°C 100kHz	øD×L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 105°C 120Hz	Ripple current (mA rms) 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								

WD Miniaturized, Extremely Low Impedance Series

- Smaller case sizes than RZ series
- Extremely low impedance at high frequency
- High reliability withstanding 5000 hours load life at 105℃ (2000/3000 hours for smaller case sizes as specified below)

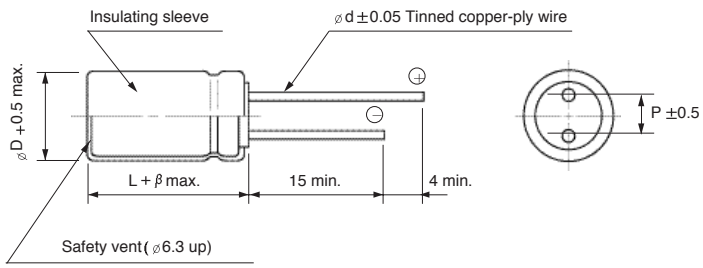


Low Impedance Miniaturized Solvent Proof

Item	Characteristics
Operating temperature range	-55 ~ +105℃
Leakage current max.	I = 0.01CV or 3㎂ whichever is greater (after 2 minutes) I = 0.03CV or 4㎂ whichever is greater (after 1 minute)
Capacitance tolerance	±20% at 120Hz, 20°C
Dissipation factor max. (at 120Hz, 20°C)	Capacitance > 1000㎌ : tanδ increases by 0.02 for each 1000㎌ from below value. WV: 6.3 / 10 / 16 / 25 / 35 / 50 tanδ: 0.24 / 0.20 / 0.16 / 0.14 / 0.12 / 0.10
Low temperature characteristics (Impedance ratio at 120Hz)	WV: 6.3,10 / 16~35 / 50 Z-55℃/Z+20℃: 5 / 4 / 3
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, 8 products are for 2000 hours, ø10 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



ø D	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	1.0			2.0			

WD series

● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

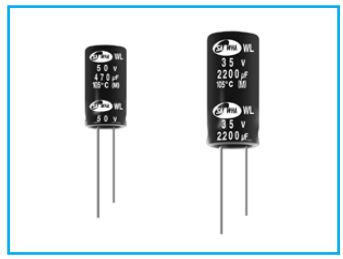
WV / Item / μF	6.3			10			16		
	øD ×L (mm)	Impedance (Ω)max. 20℃ 100kHz	Ripple current (mA rms) 105℃ 100kHz	øD ×L (mm)	Impedance (Ω)max. 20℃ 100kHz	Ripple current (mA rms) 105℃ 100kHz	øD ×L (mm)	Impedance (Ω)max. 20℃ 100kHz	Ripple current (mA rms) 105℃ 100kHz
10							5 × 11	0.70	180
22	5 × 11	0.70	180	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
47	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
150	6.3 × 11	0.30	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	0.080	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 × 25	0.030	2100	16 × 31.5	0.025	2600
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	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
0.47							5 × 11	5.0	25
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	0.70	180	5 × 11	0.70	180	5 × 11	2.3	90
10	5 × 11	0.70	180	5 × 11	0.70	180	5 × 11	1.4	120
22	5 × 11	0.70	180	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
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 × 25	0.043	1600
1500	16 × 20	0.030	2100	16 × 25	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

WL Extremely Low Impedance Series

- Wide voltage compared with WD series
- Operating temperature range of -40 ~ +105℃
- Extremely low impedance at high frequency
- High reliability withstanding 5000 hours load life at 105℃ (2000/3000 hours for smaller case size as specified below)



Low Impedance

Solvent Proof
WV ≦100V

Item	Characteristics
Operating temperature range	WV: 6.3 ~ 100 / 160 ~ 350 / 400 ~ 450 Temperature range: -40 ~ +105℃ / -40 ~ +105℃ / -25 ~ +105℃
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	160~315	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℃/Z+20℃	4	3	2	2	3	8
Z-40℃/Z+20℃	8	6	4	3	4	-

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

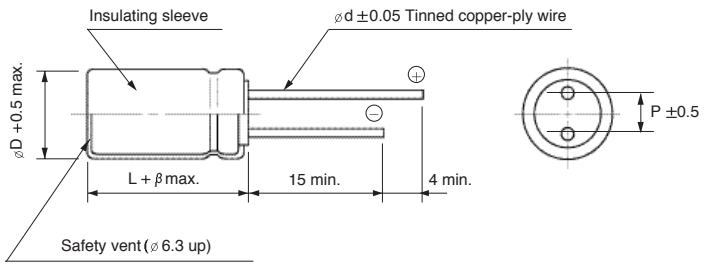
Leakage current	Less than specified value
Capacitance change	Within ±25% of initial value
tanδ	Less than 200% of specified value

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

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

● DRAWING

Unit : mm



ø D	5	6.3	8	10	12.5	16	18
P	2.0	2.5	3.5	5.0	5.0	7.5	7.5
ø d	0.5	0.5	0.6	0.6	0.6	0.8	0.8
β	1.0			2.0			

WL 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	0.70	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℃ 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
0.22				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	1048
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

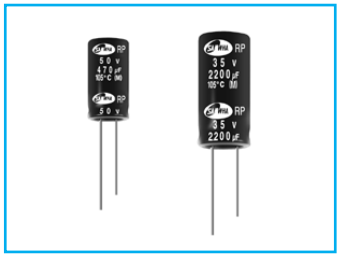
WV / Item / μF	160			200			250		
	ø D × L (mm)	Impedance (Ω)max. 20℃ 100kHz	Ripple current (mA rms) 105℃ 100kHz	ø D × L (mm)	Impedance (Ω)max. 20℃ 100kHz	Ripple current (mA rms) 105℃ 100kHz	ø D × L (mm)	Impedance (Ω)max. 20℃ 100kHz	Ripple current (mA rms) 105℃ 100kHz
10							10 × 20	3.5	300
22	10 × 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		
	ø D × L (mm)	Impedance (Ω)max. 20℃ 100kHz	Ripple current (mA rms) 105℃ 100kHz	ø D × L (mm)	Impedance (Ω)max. 20℃ 100kHz	Ripple current (mA rms) 105℃ 100kHz	ø D × L (mm)	Impedance (Ω)max. 20℃ 100kHz	Ripple current (mA rms) 105℃ 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 × 31.5	1.1	620
47	16 × 25	0.73	700	16 × 25	0.73	700	18 × 31.5	0.93	900
68	16 × 31.5	0.49	1100	16 × 31.5	0.49	1100	18 × 35.5	0.71	980
100	18 × 31.5	0.40	1170	18 × 40	0.34	1250			

RP Extremely Low Impedance Series

Solvent Proof

WL ⇨ WF
Long life

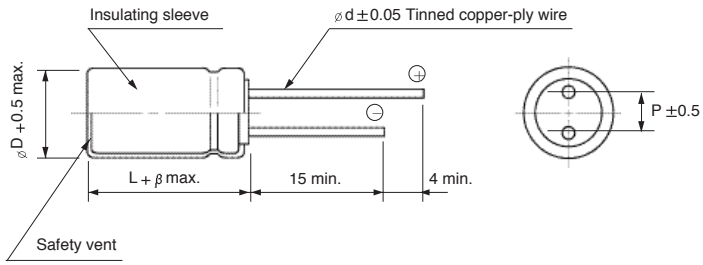


- High reliability long life(10,000 hours)
- Operating temperature -55 ~ +105℃
- Enabled high ripple current by a reduction of impedance at high frequency
- Ideally suited for use in switching power supply, mother board

Item	Characteristics
Operating temperature range	-55 ~ +105℃
Leakage current max.	I = 0.01CV or 3㎂ 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: 0.22 / 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℃/Z+20℃: 3 / 3 / 3 / 3
Load life (after application of the rated voltage for 10,000 hours at 105℃)	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℃)	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			2			

RP series

● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV / Item / μF	6.3			10			16		
	ø D × L (mm)	Impedance (Ω) max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz	ø D × L (mm)	Impedance (Ω) max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz	ø D × 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						

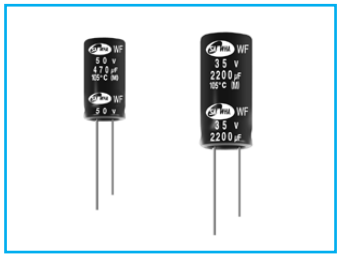
WV / Item / μF	25			35			50		
	ø D × L (mm)	Impedance (Ω) max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz	ø D × L (mm)	Impedance (Ω) max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz	ø D × L (mm)	Impedance (Ω) max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz
1.0							5 × 11	3.5	40
2.2							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						

WF High ripple current, Extremely Low impedance Series

Solvent Proof

- Operating temperature range of -40 ~ +105℃
- Extremely low impedance at high frequency
- High reliability withstanding 10000 hours load life at 105℃
  (5000 / 7000 hours for smaller case size as specified below)

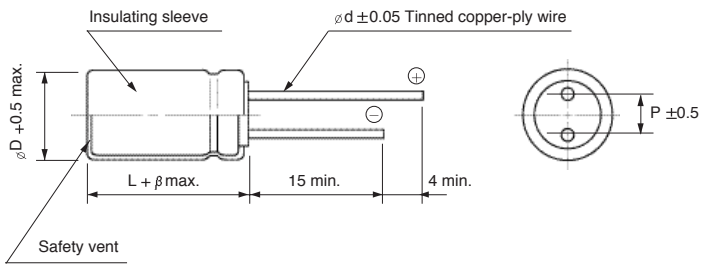
WL ⇨ WF Long life



Item	Characteristics
Operating temperature range	-40 ~ +105℃
Leakage current max.	I = 0.03CV or 3μA whichever is greater (after 2 minutes)
Capacitance tolerance	±20% at 120Hz, 20℃
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℃/Z+20℃: 8 / 6 / 4 / 3
Load life (after application of the rated voltage for 10,000 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°)	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	1.0			2.0			

WF series

● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV / Item / μF	6.3			10			16			25		
	ø D ×L (mm)	Impedance (Ω)max. 20℃ 100kHz	Ripple current (mA rms) 105℃ 100kHz	ø D ×L (mm)	Impedance (Ω)max. 20℃ 100kHz	Ripple current (mA rms) 105℃ 100kHz	ø D ×L (mm)	Impedance (Ω)max. 20℃ 100kHz	Ripple current (mA rms) 105℃ 100kHz	ø D ×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									

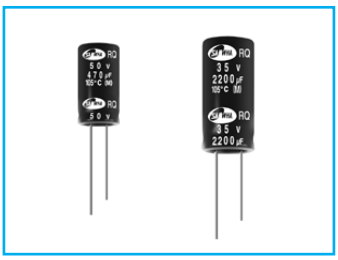
WV / Item / μF	35			50			63			100		
	ø D ×L (mm)	Impedance (Ω)max. 20℃ 100kHz	Ripple current (mA rms) 105℃ 100kHz	ø D ×L (mm)	Impedance (Ω)max. 20℃ 100kHz	Ripple current (mA rms) 105℃ 100kHz	ø D ×L (mm)	Impedance (Ω)max. 20℃ 100kHz	Ripple current (mA rms) 105℃ 100kHz	ø D ×L (mm)	Impedance (Ω)max. 20℃ 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									

RQ Extremely Low Impedance Series

Solvent Proof

- Low impedance compared with WD series
- Operating temperature –55 ~ +105℃
- Enabled high ripple current by a reduction of impedance at high frequency
- Ideally suited for use in switching power supply, mother board

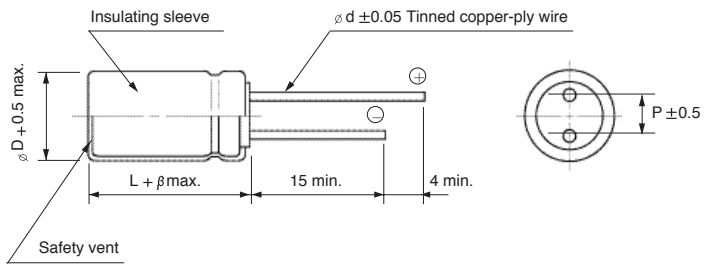
WD ⇨ RQ ⇨ WB
Low Imp. Low Imp.



Item	Characteristics
Operating temperature range	-55 ~ +105℃
Leakage current max.	I = 0.01CV or 3㎂ whichever is greater (after 2 minutes)
Capacitance tolerance	±20% at 120Hz, 20°C
Dissipation factor max. (at 120Hz, 20℃)	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℃/Z+20℃: 3 / 3 / 2 / 2 Z-55℃/Z+20℃: 4 / 4 / 3 / 2
Load life (after application of the rated voltage for 5000 hours at 105℃)	Leakage current: Less than specified value Capacitance change: Within ±20% of initial value tanδ: Less than 200% of specified value (ø5, 6.3 : 2000 hours, ø8 : 3000 hours, øD≥10 : 5000 hours)
Shelf life (at 105°)	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	1.0			2.0			

MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

RQ series

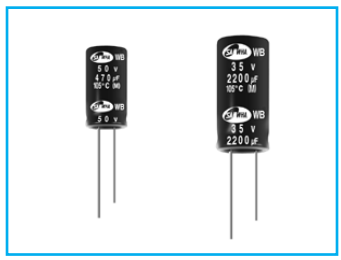
● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV / Item / μF	6.3			10			16		
	ø D × L (mm)	Impedance (Ω)max. 20℃ 100kHz	Ripple current (mA rms) 105℃ 100kHz	ø D × L (mm)	Impedance (Ω)max. 20℃ 100kHz	Ripple current (mA rms) 105℃ 100kHz	ø D × L (mm)	Impedance (Ω)max. 20℃ 100kHz	Ripple current (mA rms) 105℃ 100kHz
47							5 × 11	0.800	175
68							6.3 × 11	0.420	190
100	5 × 11	0.80	175	5 × 11	0.420	190	6.3 × 11	0.350	290
150	6.3 × 11	0.42	280	6.3 × 11	0.250	290	6.3 × 11	0.220	300
220	6.3 × 11	0.35	290	6.3 × 11	0.220	300	8 × 11.5	0.110	560
330	6.3 × 11	0.25	400	8 × 11.5	0.140	560	8 × 11.5	0.085	730
470	8 × 11.5	0.110	560	8 × 11.5	0.085	730	10 × 12.5	0.085	800
680	10 × 12.5	0.095	730	10 × 12.5	0.085	800	10 × 16	0.062	1050
1000	10 × 12.5	0.080	800	10 × 16	0.068	1050	10 × 20	0.039	1450
1500	10 × 20	0.044	1250	10 × 20	0.053	1450	12.5 × 20	0.038	1655
2200	12.5 × 20	0.040	1450	12.5 × 20	0.038	1655	16 × 25	0.030	1945
3300	12.5 × 20	0.038	1655	12.5 × 31.5	0.029	1945	16 × 25	0.022	2100
	12.5 × 20	0.038	1655	12.5 × 31.5	0.029	1945	16 × 31.5	0.022	2510
4700	16 × 25	0.025	2100	16 × 25	0.022	2510	16 × 31.5	0.018	3010
6800	16 × 25	0.022	2555	16 × 31.5	0.018	3010	18 × 35.5	0.015	3680
10000	16 × 31.5	0.018	3150	16 × 35.5	0.015	3680			
15000	18 × 35.5	0.015	3680						

WV / Item / μF	25			35			50		
	ø D × L (mm)	Impedance (Ω)max. 20℃ 100kHz	Ripple current (mA rms) 105℃ 100kHz	ø D × L (mm)	Impedance (Ω)max. 20℃ 100kHz	Ripple current (mA rms) 105℃ 100kHz	ø D × L (mm)	Impedance (Ω)max. 20℃ 100kHz	Ripple current (mA rms) 105℃ 100kHz
4.7							5 × 11	2.00	92
10							5 × 11	1.40	125
22				5 × 11	0.42	175	6.3 × 11	0.70	170
33	5 × 11	1.00	150	5 × 11	0.35	190	6.3 × 11	0.60	260
47	5 × 11	0.80	190	6.3 × 11	0.30	285	8 × 11.5	0.43	300
68	6.3 × 11	0.35	250	8 × 11.5	0.22	300	8 × 11.5	0.23	485
100	6.3 × 11	0.22	300	8 × 11.5	0.11	560	10 × 12.5	0.180	500
150	8 × 11.5	0.11	560	8 × 11.5	0.085	590	10 × 16	0.160	650
220	8 × 11.5	0.085	650	10 × 12.5	0.085	800	10 × 16	0.090	900
							10 × 20	0.090	1030
330	10 × 12.5	0.069	800	10 × 16	0.044	1050	12.5 × 20	0.072	1125
				10 × 20	0.044	1250			
470	10 × 16	0.062	1050	10 × 20	0.044	1450	12.5 × 25	0.045	1832
680	10 × 20	0.039	1450	12.5 × 20	0.038	1655	12.5 × 25	0.045	2215
							16 × 25	0.034	2285
1000	12.5 × 20	0.038	1655	12.5 × 25	0.030	1945	16 × 31.5	0.025	2700
1500	16 × 25	0.025	2100	16 × 25	0.025	2100	16 × 35.5	0.024	2790
2200	16 × 25	0.022	2100	16 × 31.5	0.022	3010			
	16 × 31.5	0.022	2510						
3300	16 × 31.5	0.018	3010	18 × 35.5	0.015	3680			
4700	18 × 35.5	0.015	3680						

WB Ultra Low Impedance Series

RQ ⇨ WB ⇨ WZ
Low Imp. Low Imp.



- Low impedance compared with WD series
- Enabled high ripple current by a reduction of impedance at high frequency
- High reliability withstanding 5000 hours load life at 105℃
  (2000 ~ 4000 hours for smaller case sizes as specified below)
- For switching power supplies, noise filter, adapter, charger

Low Impedance Miniaturized Solvent Proof

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

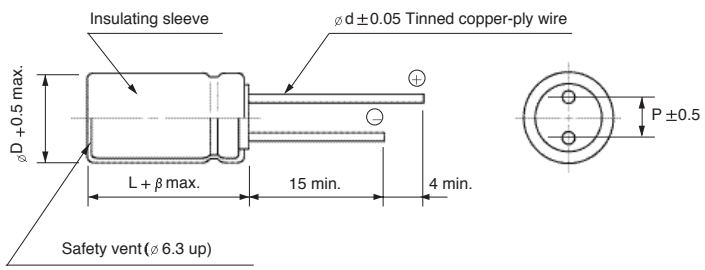
WV	6.3	10	16	25	35	50	63	100
tanδ	0.22	0.19	0.16	0.14	0.12	0.10	0.09	0.08

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

Load life (after application of the rated voltage for 5000 hours at 105℃)		
	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, ø10 : 4000 hours	
Shelf life (at 105℃)	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	1.0			2.0			

WB series

● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV / Item / μF	6.3			10			16			25		
	ø D ×L (mm)	Impedance (Ω)max. 20℃ 100kHz	Ripple current (mA rms) 105℃ 100kHz	ø D ×L (mm)	Impedance (Ω)max. 20℃ 100kHz	Ripple current (mA rms) 105℃ 100kHz	ø D ×L (mm)	Impedance (Ω)max. 20℃ 100kHz	Ripple current (mA rms) 105℃ 100kHz	ø D ×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									

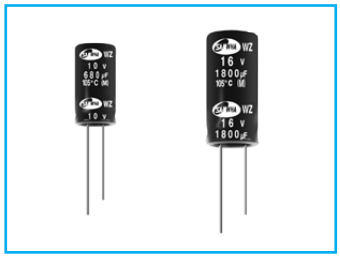
WV / Item / μF	35			50			63			100		
	ø D ×L (mm)	Impedance (Ω)max. 20℃ 100kHz	Ripple current (mA rms) 105℃ 100kHz	ø D ×L (mm)	Impedance (Ω)max. 20℃ 100kHz	Ripple current (mA rms) 105℃ 100kHz	ø D ×L (mm)	Impedance (Ω)max. 20℃ 100kHz	Ripple current (mA rms) 105℃ 100kHz	ø D ×L (mm)	Impedance (Ω)max. 20℃ 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									

WZ

High ripple current, Ultra Low Impedance Series

- Low impedance compared with WB series
- Enabled high ripple current by a reduction of impedance at high frequency range
- High reliability withstanding 2000 hours load life at 105℃

WB ⇨ WZ
Smaller
Low Imp.

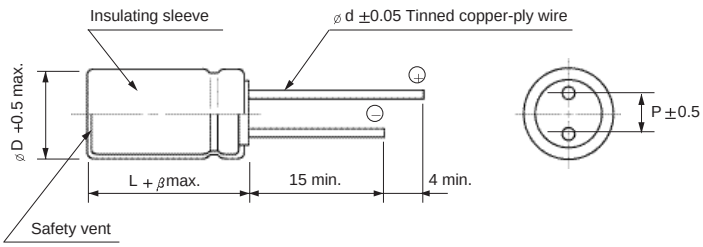


Low Impedance | Miniaturized | Solvent Proof

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

DRAWING

Unit : mm



ø D	8	10
P	3.5	5.0
ød	0.6	0.6
β	1.5	2.0

DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV / Item / ㎌	6.3			10			16		
	ø D × L (mm)	Impedance (mΩ) max. 20℃ 100kHz	Ripple current (mA rms) 105℃ 100kHz	ø D × L (mm)	Impedance (mΩ) max. 20℃ 100kHz	Ripple current (mA rms) 105℃ 100kHz	ø D × L (mm)	Impedance (mΩ) max. 20℃ 100kHz	Ripple current (mA rms) 105℃ 100kHz
470							8 ×11.5	36	1140
680				8 ×11.5	36	1140	8 ×15	28	1490
							10 ×12.5	26	1540
820	8 ×11.5	36	1140						
1000				8 ×15	28	1490	8 ×20	21	1870
				10 ×12.5	26	1540	10 ×16	19	2000
1200	8 ×15	28	1490						
1500	8 ×20	16	1950	8 ×20	21	1870	10 ×20	13	2550
	10 ×12.5	26	1540	10 ×16	19	2000			
1800	8 ×20	21	1870	10 ×20	13	2550	10 ×25	12	2800
	10 ×16	19	2000						
2200	10 ×20	13	2550	10 ×25	12	2800			
3300	10 ×25	12	2800						

MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

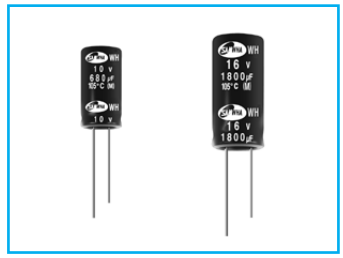
NEW

WH

High ripple current, Ultra Low Impedance Series

WB ⇒ WZ ⇒ WH
Low IZ Low IZ

- Low impedance compared with WZ series
- Enabled high ripple current by a reduction of impedance at high frequency range.
- High reliability withstanding 2000 hours load life at 105℃

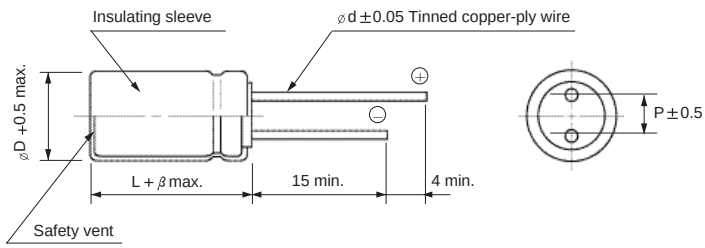


Low Impedance Miniaturized Solvent Proof

Item	Characteristics
Operating temperature range	-40 ~ +105℃
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℃
Dissipation factor max. (at 120Hz, 20℃)	WV: 6.3 / 10 / 16 tanδ: 0.22 / 0.19 / 0.16
Low temperature characteristics (Impedance ratio at 120Hz)	WV: 6.3 / 10 / 16 Z-40℃/ Z+20℃: 3 / 3 / 3
Load life (after application of the rated voltage for 2000 hours at 105℃)	Leakage current: Less than specified value Capacitance change: Within ±25% of initial value tanδ: Less than 200% of specified value
Shelf life (at 105℃)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value.

DRAWING

Unit : mm



øD	8	10
P	3.5	5.0
ød	0.6	0.6
β	1.5	2.0

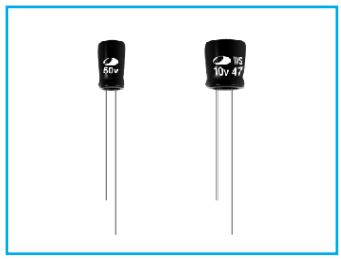
DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV / Item / μF	6.3			10			16		
	øD ×L (mm)	Impedance (mΩ)max. 20℃ 100kHz	Ripple current (mA rms) 105℃ 100kHz	øD ×L (mm)	Impedance (mΩ)max. 20℃ 100kHz	Ripple current (mA rms) 105℃ 100kHz	øD ×L (mm)	Impedance (mΩ)max. 20℃ 100kHz	Ripple current (mA rms) 105℃ 100kHz
470							8 ×11.5	21	1340
680				8 ×11.5	21	1340	8 ×15	20	1850
							10 ×12.5	16	1960
820	8 ×11.5	21	1340						
1000				8 ×15	20	1850	8 ×20	12	2350
				10 ×12.5	16	1960	10 ×16	12.5	2460
1200	8 ×15	20	1850						
1500				8 ×20	12	2350	10 ×20	11	2770
	10 ×12.5	16	1960	10 ×16	12.5	2460			
1800	8 ×20	12.5	2460	10 ×20	11	2770	10 ×20	9	3230
2200	10 ×20	11	2770	10 ×25	9	3230			
3300	10 ×25	9	3230						

WS Low Impedance, Height 7mm Series

Low Impedance Solvent Proof

RK ⇨ WS
Low Imp.

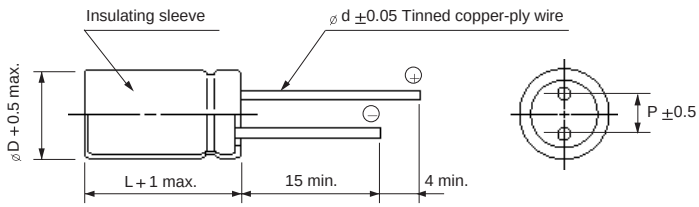


- Low impedance series with 7mm height
- Load life of 1000 hours at 105℃

Item	Characteristics
Operating temperature range	-55 ~ +105℃
Leakage current max.	I = 0.01CV or 3㎂ 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 tanδ: 0.18 / 0.16 / 0.14 / 0.12 / 0.12
Low temperature characteristics (Impedance ratio at 120Hz)	WV: 6.3 / 10 / 16 / 25 / 35 Z-25℃/Z+20℃: 2 / 2 / 2 / 2 / 2 Z-55℃/Z+20℃: 6 / 4 / 4 / 3 / 3
Load life (after application of the rated voltage for 1000 hours at 105℃)	Leakage current: Less than specified value Capacitance change: Within ±25% of initial value tanδ: Less than 200% of specified value
Shelf life (at 105℃)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value.

DRAWING

Unit : mm



ø D	4	5	6.3
P	1.5	2.0	2.5
ø d	0.45	0.5	0.5

DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

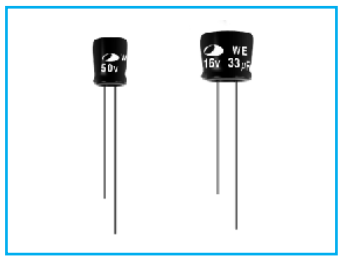
㎌ \ WV	6.3			10			16			25			35		
6.8													4 × 7	3.3	70
10										4 × 7	3.3	70	5 × 7	1.7	110
15							4 × 7	3.3	70	5 × 7	1.7	110	6.3 × 7	0.8	160
22				4 × 7	3.3	70	5 × 7	1.7	110	5 × 7	1.7	110	6.3 × 7	0.8	160
33	5 × 7	1.7	110	5 × 7	1.7	110	6.3 × 7	0.8	160	6.3 × 7	0.8	160			
47	5 × 7	1.7	110	6.3 × 7	0.8	160	6.3 × 7	0.8	160	6.3 × 7	0.8	160			
68	6.3 × 7	0.8	160	6.3 × 7	0.8	160	6.3 × 7	0.8	160	Ripple current (mA rms) at 105℃, 100kHz					
100	6.3 × 7	0.8	160	6.3 × 7	0.8	160	Impedance (Ω) max. at 20℃, 100kHz								
							Case size ø D × L (mm)								

MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

WE Low Impedance, Height 5mm Series

Low Impedance　Miniaturized

RE ⇨ WE
Low Imp.

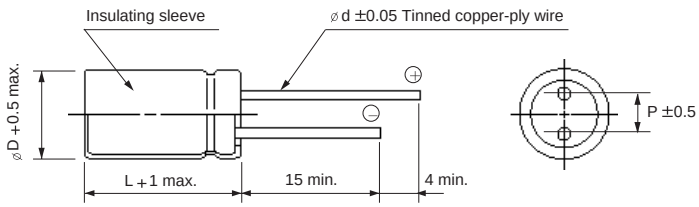


- Low impedance series with 5mm height
- Suited for DC-DC converters where smaller case size and lower impedance are required
- Load life of 1000 hours at 105℃

Item	Characteristics
Operating temperature range	-55 ~ +105℃
Leakage current max.	I = 0.01CV or 3μA 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 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℃/Z+20℃: 2 / 2 / 2 / 2 / 2 Z-55℃/Z+20℃: 8 / 6 / 4 / 3 / 3
Load life (after application of the rated voltage for 1000 hours at 105℃)	Leakage current: Less than specified value Capacitance change: Within ±25% of initial value tanδ: Less than 200% of specified value
Shelf life (at 105℃)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value.

DRAWING

Unit : mm



ø D	4	5	6.3
P	1.5	2.0	2.5
ø d	0.45	0.45	0.45

DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

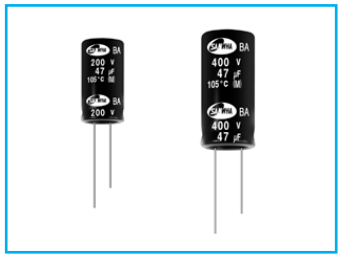
μF \ WV	6.3			10			16			25			35		
1.0													4 × 5	5.0	50
1.5													4 × 5	5.0	50
2.2													4 × 5	5.0	50
3.3													4 × 5	5.0	50
4.7										4 × 5	5.0	50	4 × 5	5.0	50
6.8										4 × 5	5.0	50	5 × 5	2.6	80
10							4 × 5	5.0	50	5 × 5	2.6	80	5 × 5	2.6	80
15							5 × 5	2.6	80	5 × 5	2.6	80	6.3 × 5	1.3	115
22	4 × 5	5.0	50	5 × 5	2.6	80	5 × 5	2.6	80	6.3 × 5	1.3	115	6.3 × 5	1.3	115
33	5 × 5	2.6	80	5 × 5	2.6	80	6.3 × 5	1.3	115	6.3 × 5	1.3	115			
47	5 × 5	2.6	80	6.3 × 5	1.3	115	6.3 × 5	1.3	115						
68	6.3 × 5	1.3	115												
100	6.3 × 5	1.3	115												

Ripple current (mA rms) at 105℃, 100kHz
Impedance (Ω) max. at 20℃, 100kHz
Case size ø D × L (mm)

BA For Ballast, Smaller Case Size Series

- 105℃ 2000 hours
- Smaller case size for energy saving lamp & ballast

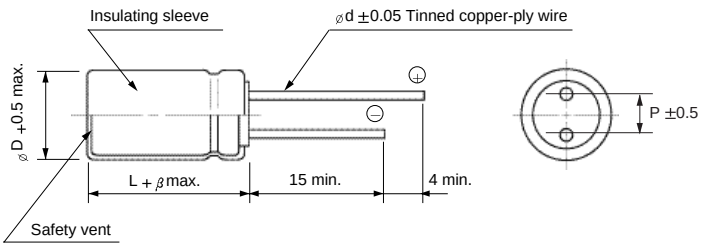
BA ⇨ RH
High reliability



Item	Characteristics
Operating temperature range	-40 ~ +105℃ (160~250V), -25 ~ +105℃ (350~450V)
Rated voltage range	160 ~ 450 V.DC
Leakage current max.	I = 0.03CV + 15㎂ (CV≤1000) I = 0.02CV + 25㎂ (after 5 minutes)
Capacitance tolerance	±20% at 120Hz, 20℃
Dissipation factor max. (at 120Hz, 20℃)	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℃/Z+20℃: 3 / 3 / 3 / 4 / 6 / 6 Z-40℃/Z+20℃: 4 / 4 / 4 / - / - / -
Load life	After an application of DC bias voltage plus the rated AC ripple current for 2000 hours at 105℃. 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℃)	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	1.0	2.0			

DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

㎌ \ 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℃, 120Hz					
220	18 × 25	500			Case size øD × L (mm)							

FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

Frequency(Hz) / ㎌	60	120	300	1k	10k ~ 50k	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

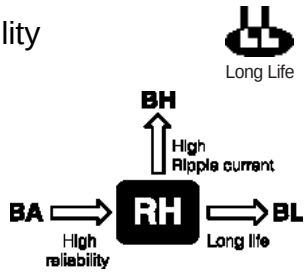
MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

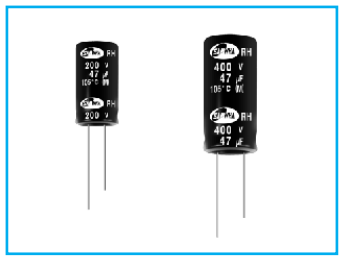
UPGRADE

RH

High Ripple Current, High Reliability Series

- High ripple current
- High reliability withstanding 5000 hours load life at 105℃
- Suited for ballast application

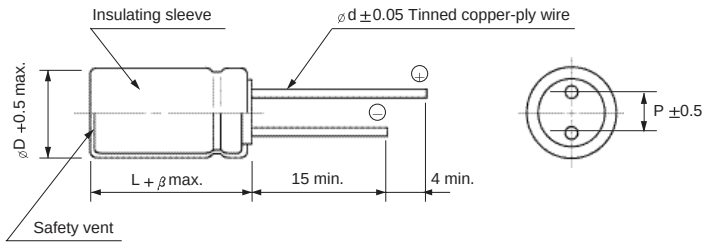




Item	Characteristics
Operating temperature range	WV: 160 ~ 350 / 400, 450 Temperature range: -40 ~ +105℃ / -25 ~ +105℃
Leakage current max.	I = 0.02CV + 15μA (after 5 minutes)
Capacitance tolerance	±20% at 120Hz, 20℃
Dissipation factor max. (at 120Hz, 20℃)	WV: 160 / 200 / 250 / 350 / 400 / 450 tanδ: 0.15 / 0.15 / 0.15 / 0.20 / 0.24 / 0.24
Low temperature characteristics (Impedance ratio at 120Hz)	WV: 160~250 / 350 / 400 / 450 Z-25℃/Z+20℃: 3 / 4 / 6 / 8
Load life	After an application of DC bias voltage plus the rated AC ripple current for 5000 hours at 105℃. 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℃)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value.

● DRAWING

Unit : mm



ø D	10	12.5	16
P	5.0	5.0	7.5
ød	0.6	0.6	0.8
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 10 × 16	100 120	10 × 16	120
3.3							10 × 12.5 10 × 16	100 130	10 × 16	140	10 × 16	140
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 10 × 20	360 500	10 × 16 10 × 20	360 500	12.5 × 20	600	12.5 × 20	350	12.5 × 25	430	16 × 25	550
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		
68	12.5 × 25	600	12.5 × 25	760	16 × 25	920	16 × 31.5	800				
100	16 × 25	1100	16 × 25	1120	16 × 31.5	1200						
150	16 × 31.5	1300	16 × 31.5	1300								

Ripple current (mA rms) at 105℃, 100kHz

Case size ø D × L (mm)

● 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

NEW

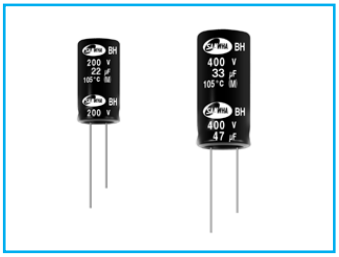
BH

For Ballast, High Ripple Current Series

Long Life

RH ⇨ BH
High Ripple

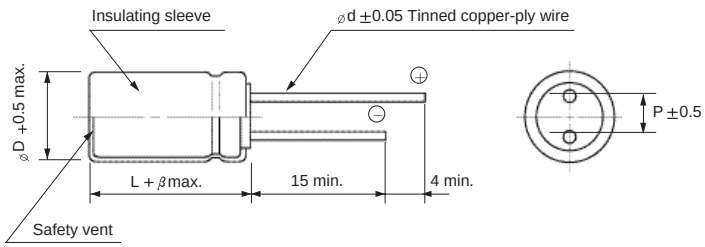
- Higher ripple current comparedwith RH series
- Operating tempersture range of -25~105℃
- High reliabilty withstanding 5000hours load life at 105℃



Item	Characteristics
Operating temperature range	-25 ~ +105℃
Rated voltage Range	200 ~ 400 VDC
Leakage current max.	I = 0.04CV + 100㎂(after 1 minute) I = 0.02CV + 25㎂(after 5 minutes)
Capacitance tolerance	±20% at 120Hz, 20℃
Dissipation factor max. (at 120Hz, 20℃)	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℃/Z+20℃: 3 / 3 / 6 / 6
Load life	After an application of DC bias voltage plus the rated AC ripple current for 5000 hours at 105℃. 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℃)	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 voltrage to the capacitors for 30 minutes.

DRAWING

Unit : mm



ød D	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

㎌ \ 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
10	10 × 16	320	10 × 16	320	10 × 20	350	10 × 20	350
22	10 × 20	550	10 × 20	550	12.5 × 25	680	12.5 × 25	780
33	10 × 20	650	12.5 × 20	800	16 × 25	910	16 × 25	920
47	12.5 × 20	980	12.5 × 25	1040	18 × 20	1150		
68	12.5 × 25	1300	16 × 25	1350				
100	16 × 25	1630						

Ripple current (mA rms) at 105℃, 100kHz

Case size ød D × L (mm)

FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

㎌ \ 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 ~ 150	0.4	0.5	0.7	0.8	0.9	1.0

MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

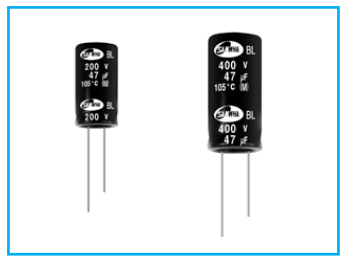
BL

For Ballast, 8000 ~ 10000 hours Series

Long Life

RH ⇨ BL
Long life

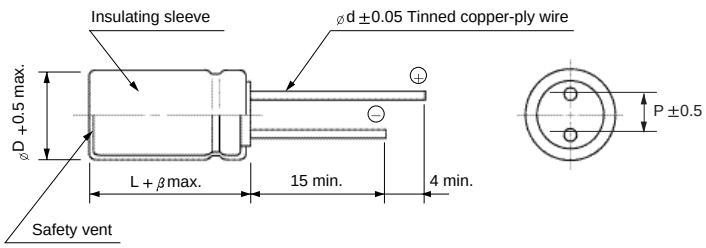
- High ripple current
- Operating temperature range of -25 ~ 105°C
- For ballast and adapter, power supply



Item	Characteristics
Operating temperature range	-25 ~ +105℃
Rated voltage range	160 ~ 450 VDC
Leakage current max.	I = 0.03CV + 15㎂ (CV≦1000) I = 0.02CV + 25㎂ (after 5 minutes)
Capacitance tolerance	±20% at 120Hz, 20℃
Dissipation factor max. (at 120Hz, 20℃)	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℃/Z+20℃: 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℃. The measurement shall meel 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℃)	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



ø D	10	12.5	16	18
P	5.0	5.0	7.5	7.5
ø d	0.6	0.6	0.8	0.8
β	2.0			

DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

㎌ \ 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℃, 100kHz
Case size øD ×L (mm)

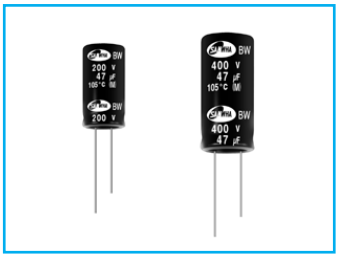
FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

Frequency(Hz)	60	120	300	1k	10k ~ 50k	100k
Coefficient	0.35	0.5	0.6	0.8	0.9	1.0

BW For Ballast, High Temperature Series

- Low ESR characteristic for 125℃ high temperature
- Suitable for compact energy saving lamp

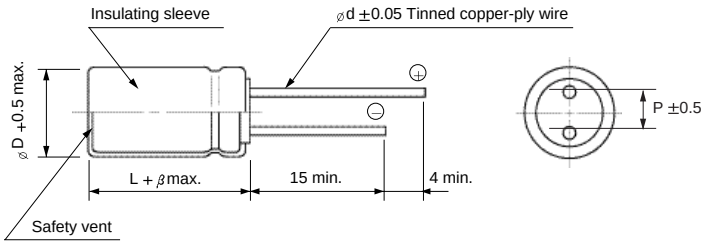
RH ⇨ BW
High temperature



Item	Characteristics
Operating temperature range	-40 ~ +125℃ (160~250V), -25 ~ +125℃ (350~450V)
Rated voltage range	160 ~ 450 VDC
Leakage current max.	I = 0.03CV + 15㎂ (CV≦1000) I = 0.02CV + 25㎂ (after 5 minutes)
Capacitance tolerance	±20% at 120Hz, 20℃
Dissipation factor max. (at 120Hz, 20℃)	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℃/Z+20℃: 3 / 3 / 3 / 4 / 6 / 6 Z-40℃/Z+20℃: 4 / 4 / 4 / - / - / -
Load life	After an application of DC bias voltage plus the rated AC ripple current for 3000 hours at 125℃ (⌀10 : 2000 hours). 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 125℃)	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



⌀D	10	12.5	16
P	5.0	5.0	7.5
⌀d	0.6	0.6	0.8
β	2.0		

DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

㎌ \ WV	160		200		250		350		400		450	
1.0									10 × 12.5	60	10 × 16	60
2.2							10 × 12.5	80	10 × 12.5	90	10 × 16	70
3.3					10 × 12.5	90	10 × 16	110	10 × 16	120	10 × 16	100
4.7	10 × 12.5	90	10 × 12.5	100	10 × 16	100	10 × 16	130	10 × 20	130	10 × 20	130
10	10 × 16	140	10 × 16	160	10 × 20	170	12.5 × 20	220	12.5 × 20	250	12.5 × 25	200
22	10 × 20	280	10 × 20	280	12.5 × 20	300	16 × 20	350	16 × 25	400		
33	12.5 × 20	400	12.5 × 20	400	12.5 × 25	450						
47	12.5 × 25	520	12.5 × 25	520	16 × 25	580						

Ripple current (mA rms) at 125℃, 100kHz
Case size ⌀D ×L (mm)

FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

Frequency(Hz)	60	120	300	1k	10k ~ 50k	100k
Coefficient	0.35	0.5	0.6	0.8	0.9	1.0

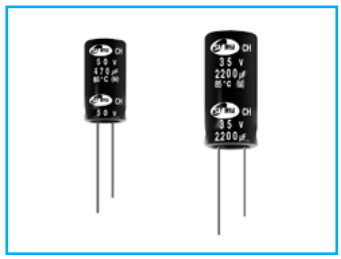
MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

UPGRADE

CH

For Charger and Adapter Series

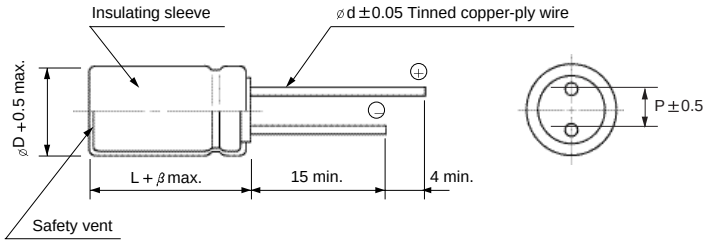
- Load life of 2000 hours 85℃
- Voltage range 400 ~ 450V



Item	Characteristics
Operating temperature range	-25 ~ +85℃
Rated voltage range	400, 450 VDC
Leakage current max.	I = 0.02CV + 15㎂A (after 5 minutes)
Capacitance tolerance	±20% at 120Hz, 20℃
Dissipation factor max.	0.2max. at 120Hz, 20℃
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℃)	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	8	10	12.5	16,18
P	3.5	5.0	5.0	7.5
ød	0.6	0.6	0.6	0.8
β	1.5	2.0		

● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV \ ㎌	2.2	3.3	4.7	6.8	10	15	22	33	47	68
400	6.3 × 11.5 30	8 × 11.5 41	8 × 11.5 49	10 × 12.5 63	10 × 16 84	12.5 × 20 128	12.5 × 25 165	16 × 25 221	16 × 31.5 286	18 × 25 287
450	10 × 12.5 37	10 × 16 46	10 × 20 53	10 × 20 66	12.5 × 20 90	12.5 × 25 117	16 × 25 154	16 × 31.5 203	16 × 35.5 262	18 × 35.5 403

Ripple current (mA rms) at 85℃, 100kHz
Case size øD × L (mm)

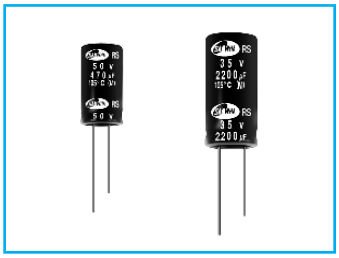
* Note : Other case sizes, rated voltage or capacitance are available upon request.
Please check with us about individual size and dimensions.

RS Long Life (7000 hours at 105°C) Series

Long Life Solvent Proof

- Load life of 7000 hours at 105℃
- High performance
- High ripple capability
- Designed for use in switching power supplies

RD ⇒ RS
Long life



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

WV	10	16	25	35	50	63
tanδ	0.30	0.25	0.22	0.18	0.15	0.12

Low temperature characteristics (Impedance ratio at 120Hz)			
WV	10	16	25 ~ 63
Z-25℃/Z+20℃	2	2	2
Z-40℃/Z+20℃	5	4	3

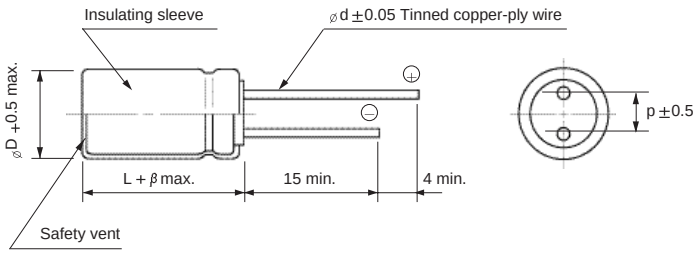
Load life (after application of the rated voltage for 7000 hours at 105℃)	
Leakage current	Less than specified value
Capacitance change	Within ±30% of initial value
tanδ	Less than 300% of specified value

øD 8 products are for 5000 hours

Shelf life (after leaving capacitors under no load at 105°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	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	1.0	2.0			

DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

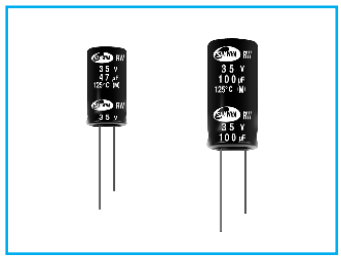
㎌ \ WV	10		16		25		35		50		63	
4.7									8 × 11.5	44	8 × 11.5	47
10									8 × 11.5	64	8 × 11.5	69
22									8 × 11.5	95	8 × 11.5	102
33							8 × 11.5	102	10 × 12.5	135	10 × 12.5	146
47					8 × 11.5	102	8 × 11.5	122	10 × 12.5	161	10 × 12.5	174
100	8 × 11.5	119	8 × 11.5	138	10 × 12.5	172	10 × 12.5	207	10 × 16	257	10 × 20	303
220	10 × 12.5	206	10 × 12.5	238	10 × 16	280	10 × 20	367	12.5 × 20	476	12.5 × 20	515
330	10 × 16	276	10 × 16	319	10 × 20	374	12.5 × 20	515	12.5 × 20	584	12.5 × 20	630
470	10 × 16	330	10 × 20	415	12.5 × 20	511	12.5 × 20	614	16 × 25	863	16 × 25	932
1000	12.5 × 20	601	12.5 × 20	694	16 × 25	924	16 × 25	1110	16 × 31.5	1377	18 × 35.5	1675
2200	16 × 25	1009	16 × 25	1134	16 × 35.5	1376	18 × 35.5	1688				
3300	16 × 31.5	1298	16 × 35.5	1516	18 × 40	1794						
4700	16 × 35.5	1567	18 × 35.5	1855								

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

RW

High Temperature Range, For 125℃ Use Series

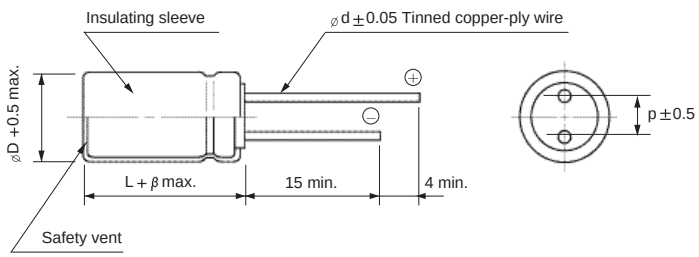
- Load life of 2000 hours at 125℃ (WV≦50)
- Low ESR, low impedance and high ripple current
- Suited for use under severe environmental conditions



Item	Characteristics
Operating temperature range	WV≦50 : -55 ~ +125℃, WV ≧63 : -40 ~ +125℃
Capacitance tolerance	±20% at 120Hz, 20℃
Leakage current max.	WV≦100: I = 0.002CV or 2μA whichever is greater (after 5 min) WV>100: I = 0.002CV+10μA (after 5 min)
Dissipation factor max. (at 120Hz, 20℃)	WV: 10 / 16 / 25 / 35 / 50~100 / 160~250 tanδ: 0.15 / 0.12 / 0.10 / 0.10 / 0.08 / 0.15
Low temperature characteristics (Impedance ratio at 120Hz)	WV: 10 / 16 ~ 250 Z-25℃/Z+20℃: 3 / 2 Z-40℃/Z+20℃: 5 / 4
Load life	WV≦50: After application of the rated voltage for 2000 hours at 125℃ WV ≧63: After application of the rated voltage for 1000 hours at 125℃ Leakage current: Less than specified value Capacitance change: Within ±20% of initial value tanδ: Less than 200% of specified value
Shelf life (at 125℃)	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
P	3.5	5.0	5.0	7.5
ød	0.6	0.6	0.6	0.8
β	2.0	2.5		

DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV / μF	10		16		25		35		50		63		100		160		200		250	
0.47									8×11.5	13	8×11.5	13	8×11.5	13	10×12.5	10	10×12.5	10	10×12.5	10
1.0									8×11.5	19	8×11.5	19	8×11.5	19	10×12.5	15	10×12.5	15	10×12.5	14
2.2									8×11.5	28	8×11.5	28	10×12.5	33	10×16	24	10×16	24	10×16	24
3.3									8×11.5	34	8×11.5	34	10×16	44	10×16	32	10×20	32	10×20	32
4.7									8×11.5	41	8×11.5	41	10×16	52	10×20	38	10×20	38	12.5×20	45
10							8×11.5	53	8×11.5	60	8×11.5	60	10×20	83	12.5×20	66	12.5×25	72	16×25	79
22					8×11.5	79	8×11.5	79	10×12.5	103	10×16	113	12.5×25	157	16×25	118	16×31.5	129		
33			8×11.5	89	8×11.5	97	10×12.5	113	10×16	138	10×20	151	16×25	214	16×31.5	158				
47	8×11.5	95	8×11.5	106	10×12.5	135	10×16	147	10×20	180	12.5×20	211	16×31.5	279						
100	10×12.5	160	10×16	196	10×20	235	12.5×20	275	12.5×25	336	12.5×25	336								
220	10×20	284	12.5×20	373	12.5×25	445	16×25	494												
330	12.5×20	408	12.5×25	498	16×25	605														
470	12.5×25	502	16×25	659																

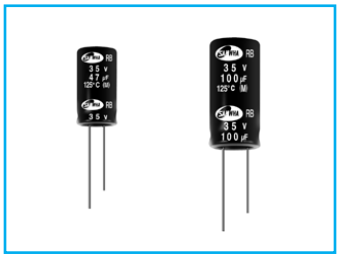
Ripple current (mA rms) at 125℃, 120Hz
Case size øD×L (mm)

RB

High Temperature Range, For 125℃ Use Series

- Load life of 2000 hours at 125℃
- Extremely low impedance at high frequency
- For automobile modules and other high temperature applications

RW ⇨ RB
Smaller



Item	Characteristics
Operating temperature range	-55 ~ +125℃
Leakage current max.	I = 0.01CV or 3㎂ whichever is greater (after 2 minutes) I = 0.03CV or 4㎂ whichever is greater (after 1 minute)
Capacitance tolerance	±20% at 120Hz, 20℃
Dissipation factor max. (at 120Hz, 20℃)	Capacitance > 1000㎌ : tanδ increases by 0.02 for each 1000㎌ 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 ~ 50
Z-25℃/Z+20℃	3	2
Z-40℃/Z+20℃	5	4

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

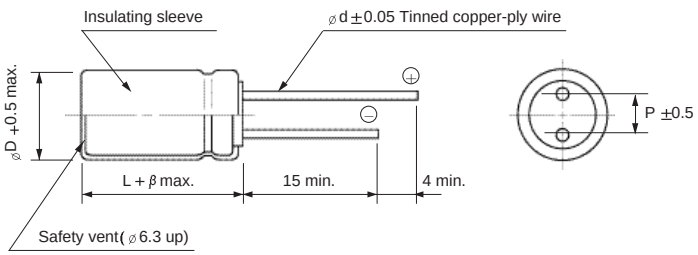
Leakage current	Less than specified value
Capacitance change	Within ±20% of initial value
tanδ	Less than 300% of specified value

ø5, 6.3 and ø8 products are for 1000 hours

Shelf life (at 125℃) — 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	1.0			2.0			

RB series

● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV / Item / μF	6.3			10			16		
	ø D × L (mm)	Impedance (Ω)max. 20℃ 100kHz	Ripple current (mA rms) 125℃ 100kHz	ø D × L (mm)	Impedance (Ω)max. 20℃ 100kHz	Ripple current (mA rms) 125℃ 100kHz	ø D × L (mm)	Impedance (Ω)max. 20℃ 100kHz	Ripple current (mA rms) 125℃ 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						

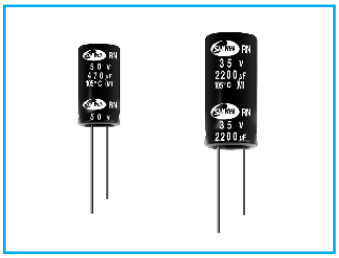
WV / Item / μF	25			35			50		
	ø D × L (mm)	Impedance (Ω)max. 20℃ 100kHz	Ripple current (mA rms) 125℃ 100kHz	ø D × L (mm)	Impedance (Ω)max. 20℃ 100kHz	Ripple current (mA rms) 125℃ 100kHz	ø D × L (mm)	Impedance (Ω)max. 20℃ 100kHz	Ripple current (mA rms) 125℃ 100kHz
1.0							5 × 11	5.2	29
1.5							5 × 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						

RN Non-Polarized, Wide Temperature Range Series

Non-polarized Solvent Proof

- Wide operating temperature range of -40 ~ +105℃
- Designed for use in circuits with reversing polarity

RD ⇨ RN (Non-polar)



Item	Characteristics
Operating temperature range	-40 ~ +105℃
Leakage current max.	I = 0.03CV or 3μA whichever is greater (after 5 minutes)
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	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℃/Z+20℃	4	3	2	2
Z-40℃/Z+20℃	8	6	4	3

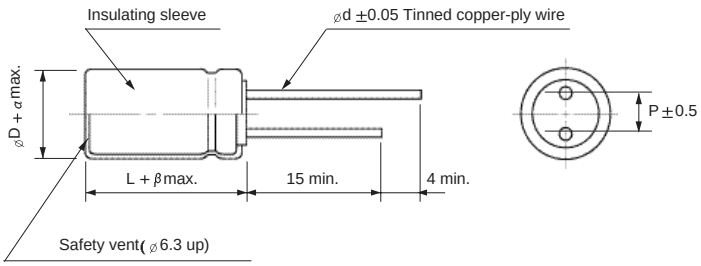
Load life (after application of the rated voltage for 1000 hours at 105℃)

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

DRAWING

Unit : mm



⌀D	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
⌀d	0.5	0.5	0.6	0.6	0.6	0.8	0.8	1.0	1.0
β	1.0			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

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 ×40 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 ×40 1236	25.4 ×40 1350	
1000	12.5 ×25 613	16 ×25 745	16 ×35.5 956	18 ×35.5 1026	18 ×40 1151	22 ×40 1368	25.4 ×40 1637		
1500	16 ×25 800	16 ×35.5 999	18 ×35.5 1184	18 ×40 1243	22 ×40 1451	25.4 ×40 1694			
2200	16 ×35.5 1072	18 ×35.5 1242	18 ×40 1428	22 ×40 1572	25.4 ×50 1974				
3300	18 ×35.5 1361	18 ×40 1534	22 ×40 1835	25.4 ×40 2005	Case size ⌀D×L (mm) Ripple current (mA rms) at 105℃, 120Hz				
4700	18 ×40 1650	22 ×40 1942	25.4 ×50 2498						
6800	22 ×40 2060	25.4 ×50 2603							
10000	25.4 ×50 2755								

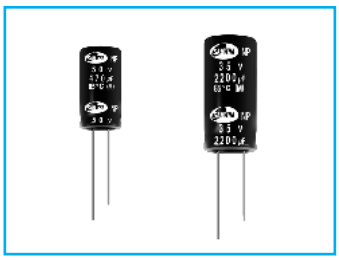
NP Non-Polarized Series

- 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℃

Non-polarized

Solvent Proof
WV ≦100V

SD ⇒ NP
Non-polar



Item	Characteristics
Operating temperature range	-40 ~ +85℃
Leakage current max.	I = 0.03CV or 3㎂ whichever is greater (after 5 minutes)
Capacitance tolerance	±20% at 120Hz, 20℃
Dissipation factor max. (at 120Hz, 20℃)	Capacitance > 1000㎌ : tanδ increases by 0.02 for each 1000㎌ 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℃/Z+20℃	4	3	2	2	3
Z-40℃/Z+20℃	10	8	6	4	5

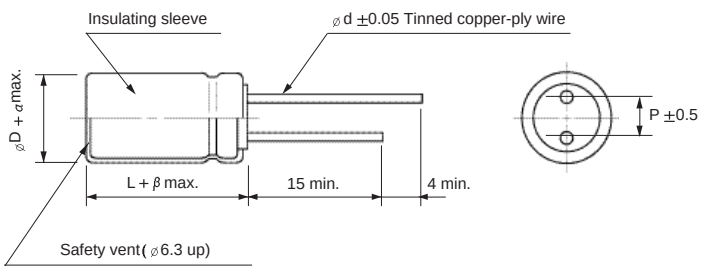
Load life (after application of the rated voltage for 2000 hours at 85℃)

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.

DRAWING

Unit : mm



⌀D	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
⌀d	0.5	0.5	0.6	0.6	0.6	0.8	0.8	1.0	1.0
β	1.0			2.0					
α	0.5							1.0	

PERMISSIBLE RIPPLE CURRENT MULTIPLIERS

㎌ \ 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

MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

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 × 40 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 × 40 1736	25.4 × 40 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 × 40 2105	25.4 × 40 2299				
1500	12.5 × 20 999	12.5 × 25 1132	16 × 25 1338	16 × 35.5 1748	18 × 40 1968	22 × 40 2386	25.4 × 40 2607					
2200	12.5 × 25 1272	16 × 25 1463	16 × 35.5 1781	18 × 40 2254	22 × 40 2481	25.4 × 50 3221						
3300	16 × 25 1672	16 × 35.5 1985	18 × 40 2360	22 × 40 2890	25.4 × 40 3157							
4700	16 × 35.5 2221	18 × 40 2579	22 × 40 2987	25.4 × 50 3927								
6800	18 × 40 2840	22 × 40 3214	25.4 × 50 4004									
10000	22 × 40 3516	25.4 × 50 4290										

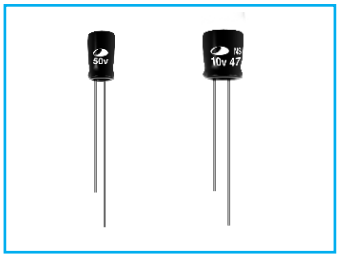
Case size ØD × L (mm)
Ripple current (mA rms) at 85℃, 120Hz

NS Non-Polarized, Height 7mm Series

Non-polarized Solvent Proof

- Non-polarized series with 7mm height
- Load life of 2000 hours at 85°C

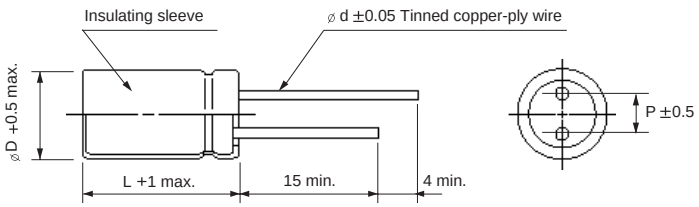
SS ⇒ NS (Non-polar)



Item	Characteristics
Operating temperature range	-40 ~ +85℃
Leakage current max.	I = 0.05CV or 10㎂ 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 / 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℃/Z+20℃: 4 / 3 / 2 / 2 Z-40℃/Z+20℃: 8 / 6 / 4 / 4
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 500 hours no load test, leakage current, capacitance and tanδ are same as load life value.

DRAWING

Unit : mm



ø D	4	5	6.3
P	1.5	2.0	2.5
ø d	0.45	0.5	0.5

DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

㎌ \ 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℃, 120Hz
Case size ø D × L (mm)

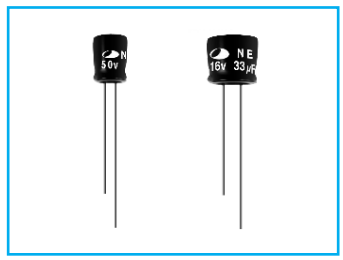
MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

NE Non-Polarized, Height 5mm Series

- Non-polarized and low profile series with 5mm height
- Uniquely designed for use in lightweight and portable equipment

Non-polarized Miniaturized

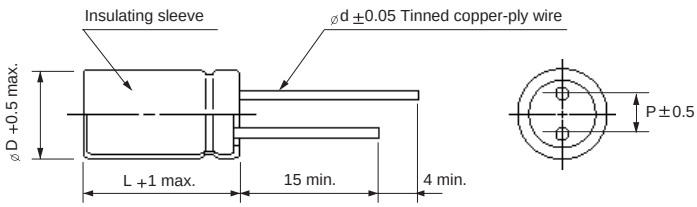
SE ⇒ NE Non-polar



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 Z-40℃/Z+20℃: 8 / 6 / 4 / 3
Load life (after application of the rated voltage for 1000 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 500 hours no load test, leakage current, capacitance and tanδ are same as load life value.

DRAWING

Unit : mm



ø**D**	**4**	**5**	**6.3**
P	1.5	2.0	2.5
ø **d**	0.45	0.45	0.45

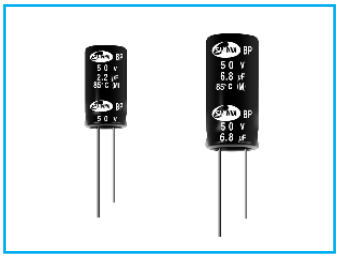
DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

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℃, 120Hz
Case size øD ×L (mm)

BP For Speaker Networks Series

Non-polarized Solvent Proof

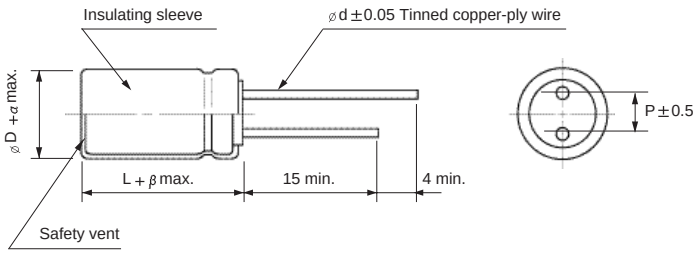


- Non-polarized series for crossover networks in Hi-Fi sound systems
- Excellent frequency characteristics
- Close capacitance tolerance
- Extended voltage range of 25V, 50V, 100V, 200V

Item	Characteristics
Operating temperature range	-40 ~ +85℃
Leakage current max.	I = 0.03CV or 3㎂ whichever is greater (after 5 minutes)
Capacitance tolerance	±20% (20℃, 120kHz)
Dissipation factor max. (at 120Hz, 20℃)	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℃)	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℃)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value.

DRAWING

Unit : mm



ø D	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	1.0	2.0					
α	0.5					1.0	

DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

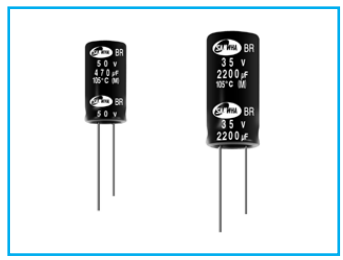
WV \ ㎌	1.0	1.5	2.2	3.3	4.7	6.8	10	15	22	33	47	68	100
25	8×11.5 67	8×11.5 82	10×12.5 114	10×12.5 139	10×12.5 166	10×16 222	10×20 297	10×20 364	10×20 440	12.5×20 678	12.5×25 890		
50	8×11.5 67	8×11.5 82	10×12.5 114	10×12.5 139	10×12.5 166	10×16 222	10×20 297	10×20 364	10×20 440	12.5×20 678	12.5×25 890	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℃, 1kHz

MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

BR For Speaker Networks Series

Non-polarized Solvent Proof

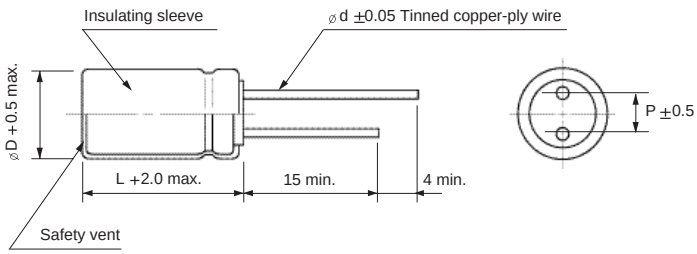


- Non-polarized series for crossover networks in Hi-Fi sound systems
- Excellent frequency characteristics
- Close capacitance tolerance

Item	Characteristics
Operating temperature range	-40 ~ +105℃
Leakage current max.	I = 0.03CV or 3μA whichever is greater (after 5 minutes)
Capacitance tolerance	±20% (20℃, 120kHz)
Dissipation factor max. (at 120Hz, 20℃)	Series / Frequency: BR (200WV); 1kHz: 0.12; 5kHz: 0.30
Load life (after application of the rated voltage for 2000 hours at 105℃)	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℃)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value.

● DRAWING

Unit : mm



ø D	10	12.5	16	18
P	5.0	5.0	7.5	7.5
ø d	0.6	0.6	0.8	0.8

● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

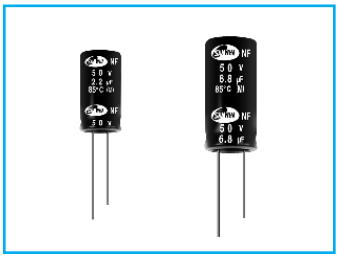
WV \ μF	1.0	1.5	2.2	3.3	4.7	6.8	10	15	22	33	47	68	100
200				10 ×16 185	10 ×20 250	12.5 ×20 300	12.5 ×20 340	12.5 ×25 420	16 ×25 650	18 ×25 730	18 ×40 920	18 ×40 935	18 ×40 950

Case size ø D ×L (mm)
Ripple current (mA rms) at 105℃, 1kHz

NF For Horizontal Deflection Current Correction Series

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

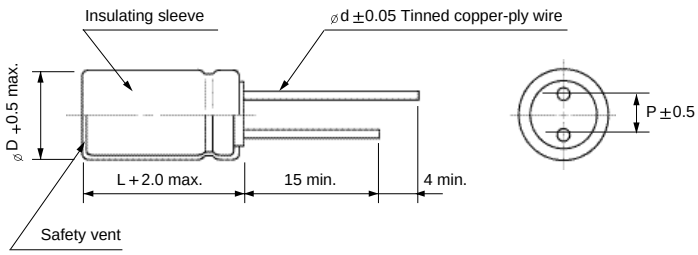
Non-polarized Solvent Proof



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

● DRAWING

Unit : mm



ø D	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

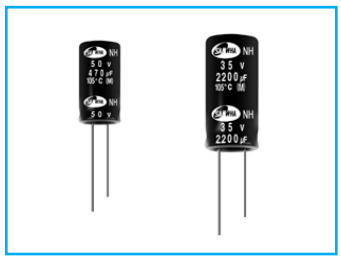
Ripple current (Ap-p) at 85℃, 15.75kHz
Case size ø D × L(mm)

MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

NH For Horizontal Deflection Current Correction Series

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

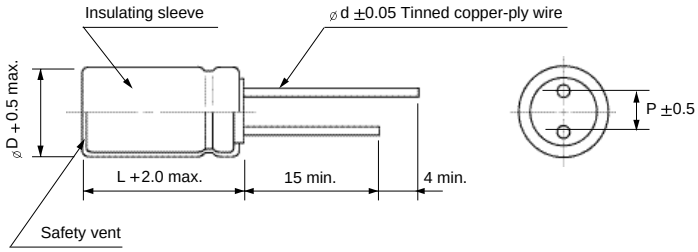
Non-polarized Solvent Proof



Item	Characteristics
Operating temperature range	-40 ~ +105℃
Leakage current max.	I = 0.03CV+50㎂ (after 5 minutes)
Capacitance tolerance	±10, ±20% at 120Hz, 20℃
Dissipation factor max.	0.04 max. at 120Hz, 20℃
Low temperature characteristics (Impedance ratio at 120Hz)	Z-25℃/Z+20℃: 1.5 Z-40℃/Z+20℃: 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℃
Shelf life (at 105℃)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value.

DRAWING

Unit : mm



ø D	10	12.5	16	18
P	5.0	5.0	7.5	7.5
ø d	0.6	0.6	0.8	0.8

DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

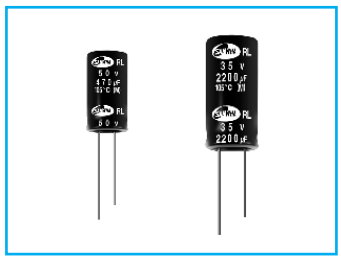
WV / ㎌	1.0	1.5	2.2	3.3	4.7	6.8	8.2	10.0
25, 50	2.3	3.1	4.8	6.5	8.6	10.6	10.4	10.7
	10 × 20	12.5 × 20	12.5 × 25	16 × 25	16 × 31.5	16 × 35.5	16 × 40	18 × 40

Ripple current (Ap-p) at 105°C, 15.75kHz
Case size ø D × L(mm)

RL Low Leakage Current, Wide Temperature Range Series

- Low leakage current series
- Wide operating temperature range of -55 ~ +105℃
- Low ESR, low impedance
- For Hi-Fi sound audio systems

RD ⇨ RL (Low leakage)

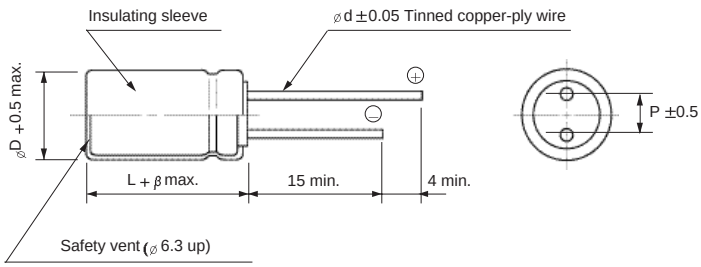


Low Leakage Current | Solvent Proof

Item	Characteristics
Operating temperature range	-55 ~ +105℃
Leakage current max.	I = 0.002CV or 0.4㎂ whichever is greater (after 2 minutes)
Capacitance tolerance	±20% at 120Hz, 20℃
Dissipation factor max. (at 120Hz, 20℃)	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℃/Z+20℃: 2 / 2 / 1.5 Z-40℃/Z+20℃: 4 / 3 / 2
Load life (after application of the rated voltage for 1000 hours at 105℃)	Leakage current: Less than specified value Capacitance change: Within ±15% of initial value tanδ: Less than 150% of specified value
Shelf life (at 105℃)	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	1.0			2.0

DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

㎌ \ 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)

MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

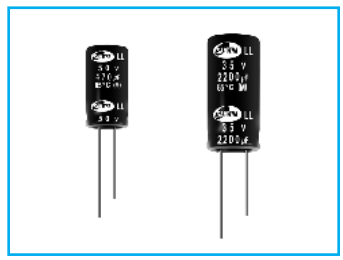
UPGRADE

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

Item	Characteristics
Operating temperature range	-40 ~ +85℃
Leakage current max.	I = 0.002CV or 0.4㎂ whichever is greater (after 2 minutes)
Capacitance tolerance	±20% at 120Hz, 20℃
Dissipation factor max. (at 120Hz, 20℃)	Capacitance > 1000㎌ : tanδ increases by 0.02 for each 1000㎌ 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℃/Z+20℃	2	1.75	1.75	1.5	1.5	1.5
Z-40℃/Z+20℃	4	4	4	2	2	2

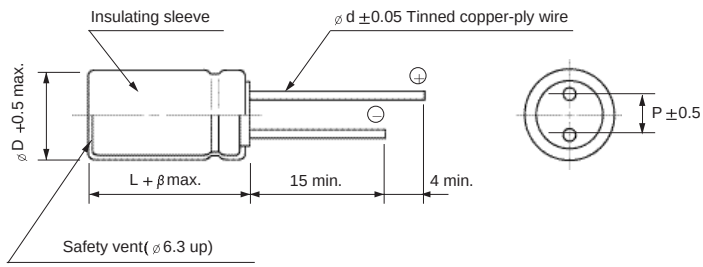
Load life (after application of the rated voltage for 2000 hours at 85℃)

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



ø D	5	6.3	8	10	12.5	16	18
P	2.0	2.5	3.5	5.0	5.0	7.5	7.5
ø d	0.5	0.5	0.6	0.6	0.6	0.8	0.8
β	1.0			2.0			

DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

㎌ \ WV	10		16		25		35		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	46	5 ×11	50	5 ×11	53	6.3 ×11	53
10					5 ×11	55	5 ×11	55	5 ×11	55	6.3 ×11	70	6.3 ×11	73	8 ×11.5	76
15			5 ×11	61	5 ×11	68	5 ×11	68	6.3 ×11	78	6.3 ×11	85	8 ×11.5	106	8 ×11.5	93
22	5 ×11	69	5 ×11	73	5 ×11	82	6.3 ×11	94	6.3 ×11	94	8 ×11.5	122	8 ×11.5	129	10 ×12.5	130
33	5 ×11	84	5 ×11	90	6.3 ×11	116	6.3 ×11	116	8 ×11.5	136	8 ×11.5	149	10 ×12.5	183	10 ×16	175
47	5 ×11	101	6.3 ×11	123	8 ×11.5	163	8 ×11.5	163	8 ×11.5	163	10 ×12.5	207	10 ×16	239	10 ×20	227
68	6.3 ×11	139	6.3 ×11	148	8 ×11.5	196	10 ×12.5	227	10 ×12.5	227	10 ×16	273	10 ×20	314	12.5 ×20	313
100	6.3 ×11	169	8 ×11.5	212	10 ×12.5	276	10 ×16	302	10 ×16	302	10 ×20	361	12.5 ×20	447	12.5 ×25	380
150	8 ×11.5	244	10 ×12.5	302	10 ×16	370	10 ×20	404	10 ×20	404	12.5 ×20	519	12.5 ×25	596	16 ×25	508
220	10 ×12.5	344	10 ×16	401	10 ×20	489	12.5 ×20	574	12.5 ×20	475	12.5 ×25	685	16 ×25	801	16 ×31.5	699
330	10 ×16	461	10 ×20	535	12.5 ×20	703	12.5 ×25	766	12.5 ×25	7666	16 ×25	931	16 ×31.5	1074	16 ×35.5	983
470	10 ×20	600	12.5 ×20	750	12.5 ×25	914	12.5 ×25	914	16 ×25	1014	16 ×31.5	1216	16 ×35.5	1345	18 ×40	1320
680	12.5 ×20	847	12.5 ×20	902	12.5 ×25	1100	16 ×25	1220	16 ×25	1220	18 ×35.5	1534	18 ×40	1821		
1000	12.5 ×20	1028	12.5 ×25	1193	16 ×25	1480	16 ×31.5	1619	16 ×31.5	1699	18 ×40	2095				
1500	12.5 ×25	1298	16 ×25	1522	16 ×31.5	1835	18 ×35.5	2066	18 ×40	2168						
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)

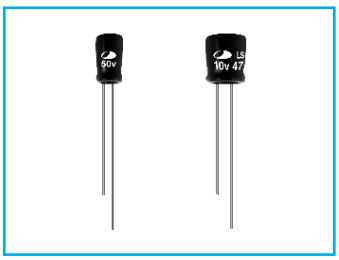
LS Low Leakage Current, Height 7mm Series

- Low leakage current series with 7mm height
- Load life of 2000 hours at 85°C

Low Leakage Current

Solvent Proof

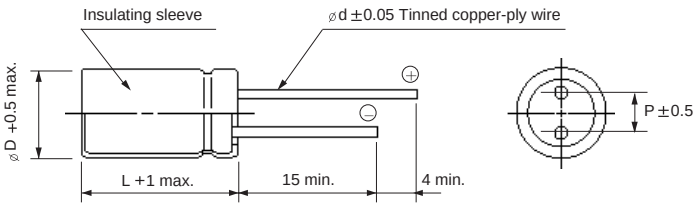
SS ⇒ LS Low leakage



Item	Characteristics
Operating temperature range	-40 ~ +85℃
Leakage current max.	I = 0.002CV or 0.4㎂ 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 / 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℃/Z+20℃: 4 / 3 / 2 / 2 Z-40℃/Z+20℃: 8 / 6 / 4 / 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
Shelf life (at 85℃)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value.

DRAWING

Unit : mm



ø D	4	5	6.3
P	1.5	2.0	2.5
ø d	0.45	0.5	0.5

DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

㎌ \ 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

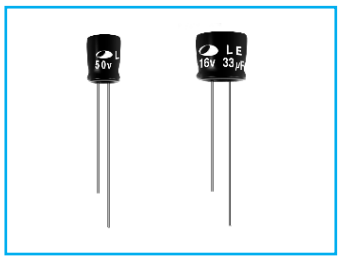
Case size ø D ×L (mm)

MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

LE Low Leakage Current, Height 5mm Series

Miniaturized | Low Leakage Current

SE ⇒ LE (Low leakage)

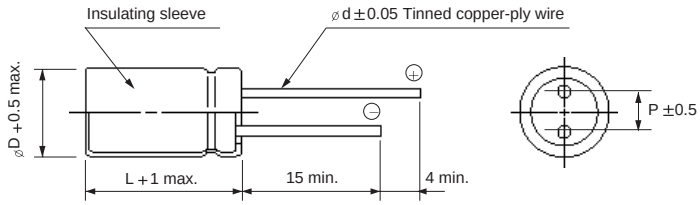


- Low leakage current series with 5mm height
- Designed for use in lightweight and portable equipment

Item	Characteristics
Operating temperature range	-40 ~ +85℃
Leakage current max.	I = 0.002CV or 0.4μA whichever is greater (after 2 minutes)
Capacitance tolerance	±20% at 120Hz, 20℃
Dissipation factor max. (at 120Hz, 20℃)	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℃/Z+20℃: 7 / 4 / 3 / 2 / 2 / 2 Z-40℃/Z+20℃: 15 / 10 / 8 / 6 / 4 / 3
Load life (after application of the rated voltage for 1000 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 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

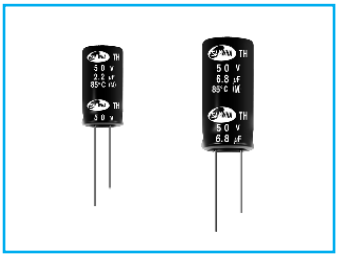
DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV / μF	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℃, 120Hz
Case size øD×L (mm)

TH For TV Vertical Oscillator Circuits Series

Solvent Proof

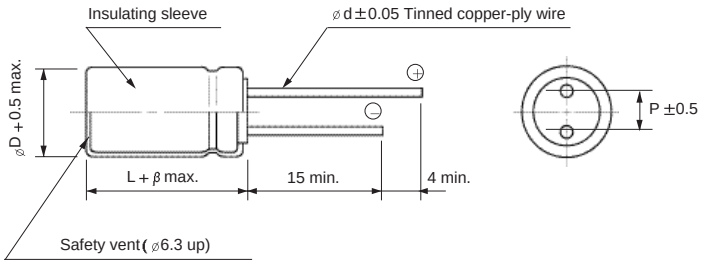


- For TV vertical output sweep control circuits
- Close capacitance tolerance, low leakage current and low impedance
- Load life of 2000 hours at 85℃

Item	Characteristics
Operating temperature range	-40 ~ +85℃
Leakage current max.	I = 0.01CV+3μA (after 2 minutes)
Capacitance tolerance	±20% at 120Hz, 20℃
Dissipation factor	0.08 max. at 120Hz, 20℃
Temperature characteristics	Temperature: -40℃ / +85℃; tanδ: 0.24 max. / 0.08 max.; Capacitance change/20℃: -20% max. / +20% max.; Impedance ratio/20℃: 3 / —
Load life (after application of the rated voltage for 2000 hours at 85℃)	Leakage current: Less than specified value; Capacitance change: Within ±15% of initial value; tanδ: Less than 150% 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



ø D	6.3	8	10	12.5
P	2.5	3.5	5.0	5.0
ø d	0.5	0.6	0.6	0.6
β	1.0		2.0	

DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

μF \ WV	16		25		50	
1.0					6.3 ×11	25
1.5					6.3 ×11	30
2.2					6.3 ×11	37
3.3					6.3 ×11	45
4.7			6.3 ×11	53	8 ×11.5	63
6.8	6.3 ×11	64	8 ×11.5	76	8 ×11.5	76
10	8 ×11.5	92	8 ×11.5	92	10 ×12.5	107
15	8 ×11.5	113	10 ×12.5	131	10 ×16	143
22	10 ×12.5	158	10 ×16	173	10 ×20	189
33	10 ×16	212	10 ×20	232	12.5 ×20	272
47	10 ×20	277	10 ×20	277	12.5 ×20	325
68	12.5 ×20	391	12.5 ×20	391	12.5 ×25	426
100	12.5 ×20	474	12.5 ×25	516		

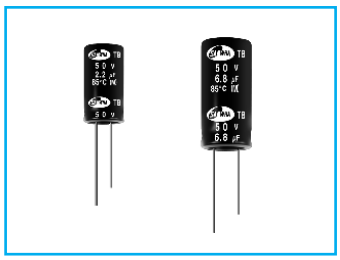
Ripple current (mA rms) at 85℃, 120Hz
Case size ø D ×L (mm)

MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

TB For Timer Circuits Series

Low Leakage Current

Solvent Proof

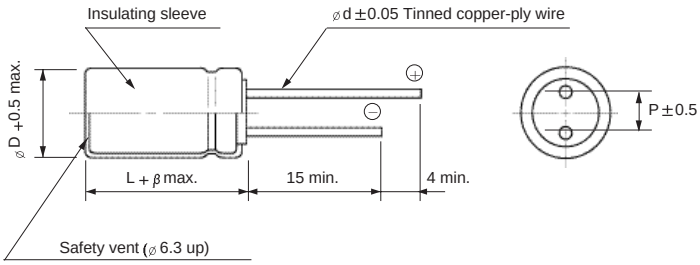


- Ideally suited for timer circuits
- Excellent current-time characteristics

Item	Characteristics
Operating temperature range	-40 ~ +85℃
Leakage current max.	I = 0.001CV+1㎂ (after 2 minutes)
Capacitance tolerance	±10%, ±20% at 120Hz, 20℃
Dissipation factor max. (at 120Hz, 20℃)	WV: 25 / 50 / 100 tanδ: 0.12 / 0.10 / 0.08
Low temperature characteristics (Impedance ratio at 120Hz)	WV: 25 / 50 / 100 Z-25℃/Z+20℃: 2 / 2 / 2 Z-40℃/Z+20℃: 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 ±15% of initial value tanδ: Less than 150% 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



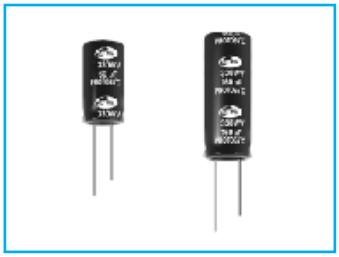
ø D	6.3	8	10	12.5	16
P	2.5	3.5	5.0	5.0	7.5
ø d	0.5	0.6	0.6	0.6	0.8
β	1.0		2.0		

DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

㎌ \ WV	25		50		100	
1.0					6.3 × 11	25
1.5					6.3 × 11	30
2.2			6.3 × 11	33	8 × 11.5	43
3.3			6.3 × 11	40	8 × 11.5	53
4.7			6.3 × 11	48	10 × 12.5	73
6.8	6.3 × 11	52	8 × 11.5	68	10 × 12.5	88
10	6.3 × 11	64	8 × 11.5	82	10 × 16	117
15	8 × 11.5	92	10 × 12.5	117	12.5 × 20	183
22	8 × 11.5	111	10 × 16	155	12.5 × 20	222
33	10 × 12.5	158	10 × 20	207	12.5 × 25	297
47	10 × 16	207	10 × 20	247	16 × 25	393
68	10 × 20	272	12.5 × 20	349	16 × 25	472
100	12.5 × 20	387	12.5 × 25	462	16 × 35.5	658
150	12.5 × 20	474	16 × 25	628	Case size ø D ×L (mm)	Ripple current (mA rms) at 85℃, 120Hz
220	12.5 × 25	625	16 × 31.5	832		
330	16 × 25	850	16 × 35.5	1069		
470	16 × 31.5	1100				

TF

For Photo Flash Series

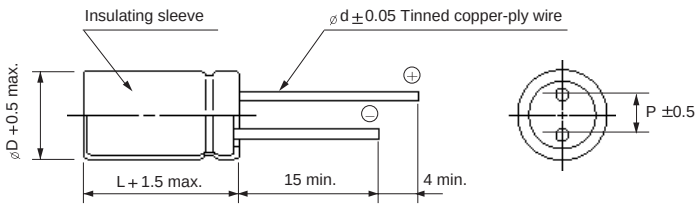


- For photo flash applications with lead wire terminal
- Low dissipation factor, low leakage current and high stability during the repetition of charge and discharge

Item	Characteristics
Operating temperature range	-20 ~ +55℃
Capacitance tolerance	-10 ~ +20% at 120Hz, 20℃
Leakage current max.	I = 1 × C(μA) (after 5 minutes), where C=Nominal capacitance (μF)
Dissipation factor	0.06 max. at 120Hz, 20°C
Charge and discharge characteristics	Charge and discharge at rated voltage at 5~35℃ with a switch sequence of 30 seconds for 5000 times via xenon flash tube with discharge resistance of 0.7~1.0 Ω Leakage current: Less than 150% of specified value Capacitance change: Within ±10% of initial value tanδ: Less than 150% of specified value
Shelf life	The following specifications shall be satisfied when capacitors are restored to 20℃ after exposing them for 1000 hours at 55℃ without voltage applied. Leakage current: Less than 150% of specified value Capacitance change: Within ±10% of initial value tanδ: Less than 150% of specified value

DRAWING

Unit : mm



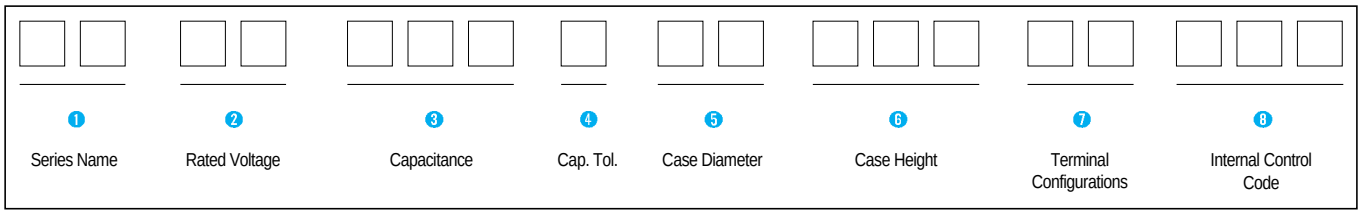
ø D	8	10	11.5	12.5	13	14	14.5	16	18
P	3.5	5.0	5.0	5.0	5.0	5.0	7.5	7.5	7.5
ø d	0.6	0.6	0.8	0.8	0.8	0.8	0.8	0.8	0.8

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

4 LARGE ALUMINUM ELECTROLYTIC CAPACITORS

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	80	100
Code	1G	1H	1J	1K	2A

WV	160	200	250	315	330
Code	2C	2D	2E	2F	2L

WV	350	360	400	450	500
Code	2V	2Z	2G	2W	2H

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

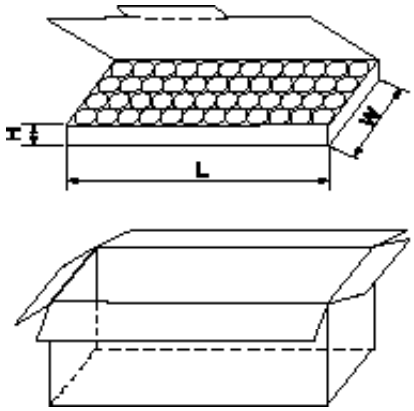
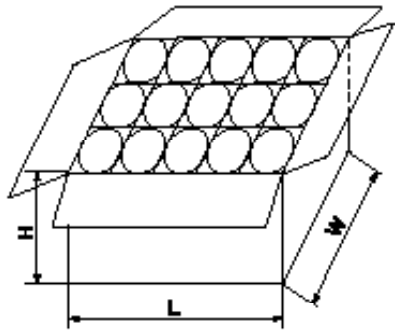
6 Case Height

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	ø D ≦ 35	LC
	ø D = 40	LA
	ø D = 51	LD
	ø D ≧ 63.5	LE
Photo Flash	ø D ≦ 20	PJ
	ø D = 22	PK
	ø D = 25.4, 30	LC
	ø D = 35	LF
Screw Terminal Type		SB

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)	
ø D	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
ø D	L	QUANTITY
35	50 ~ 100	60
	105 ~ 120	60
51	60 ~ 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	140 ~ 160	9

LARGE ALUMINUM ELECTROLYTIC CAPACITORS

HC Snap-in Terminal Type, Standard Series

Solvent Proof
WV ≦200V

- Standard snap-in terminal type
- Extended Voltage range of 6.3~500V
  (For 500WV products, apply only FL series, high ripple use)
- Including height 20mm products, low profile sized
  (Voltage range of 160~450V)

HE ⇦ Wide temp. | HC | ⇨ HJ Smaller

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

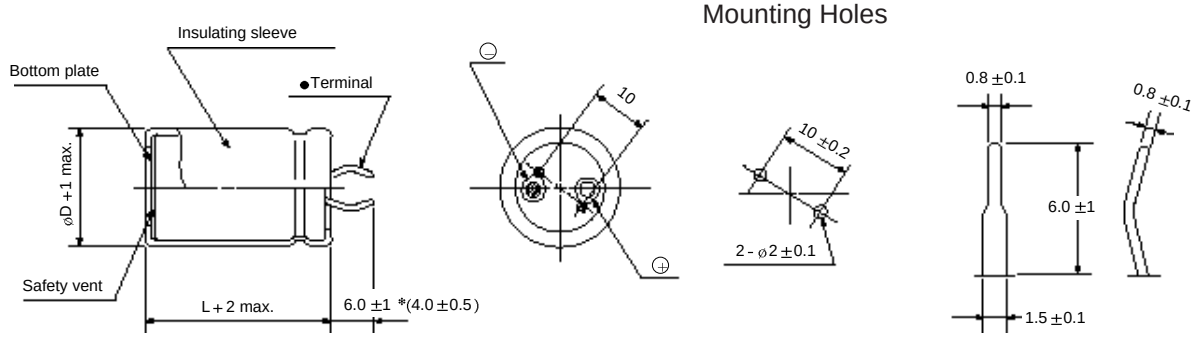
Load life (after application of the rated voltage for 2000 hours at 85℃)		
	Leakage current	Less than specified value
	Capacitance change	Within ±20% of initial value
	tanδ	Less than 200% of specified value

Shelf life (after leaving capacitors under no load at 85℃ for 1000 hours)		
	Leakage current	Less than specified value
	Capacitance change	Within ±15% of initial value
	tanδ	Less than 150% of specified value

DRAWING

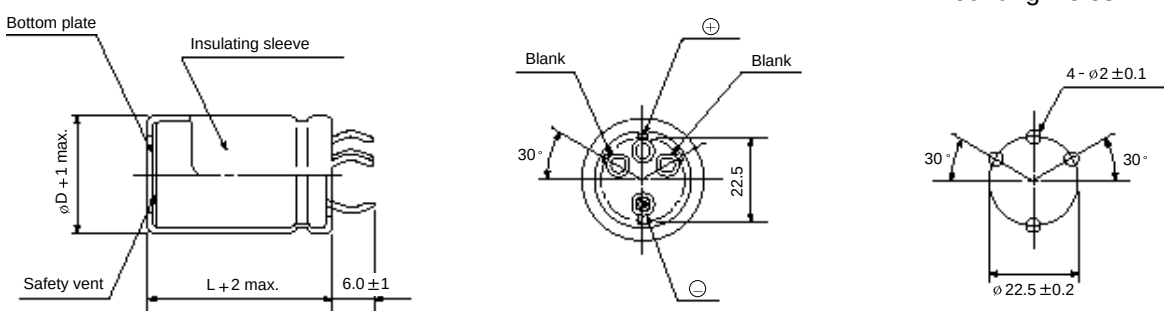
Unit : mm

ø D ≦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.

ø D =40



HC 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
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 / μF \ ØD	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 / μF \ ØD	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 5.46						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					
12000				35 × 45 6.83	40 × 40 6.95										

Case size ø D × L (mm)
Ripple current (Arms) at 85℃, 120Hz

* Note: Case diameter (ø 20)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

Solvent Proof
WV ≦200V

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

HC (Smaller) ⇨ HJ ⇨ HK (Wide temp.)

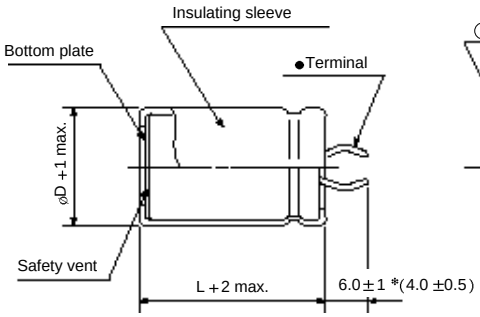
Item	Characteristics
Operating temperature range	WV≦350 : -40 ~ +85℃, WV>350 : -25 ~ +85℃
Capacitance tolerance	±20% at 120Hz, 20℃
Leakage current max.	I=3√ (μA) (after 5 minutes)
Dissipation factor max. (at 120Hz, 20°C)	Capacitance > 1000μF : tanδ increases by 0.01 for each 1000μF from below value.

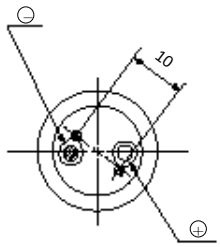
WV	160	200	250	350	400	450
tanδ	0.15	0.15	0.15	0.15	0.15	0.20

Load life (after application of the rated voltage for 3000 hours at 85℃)	
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.

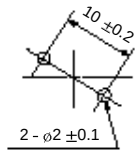
● DRAWING

Unit : mm

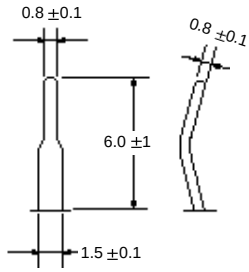




PC Board Mounting Holes



● 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.

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				
1000				35 × 45 3.65								

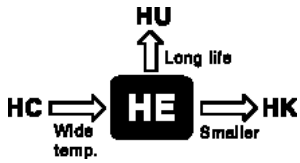
Case size ØD × L (mm)
Ripple current (Arms) at 85°C, 120Hz

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)



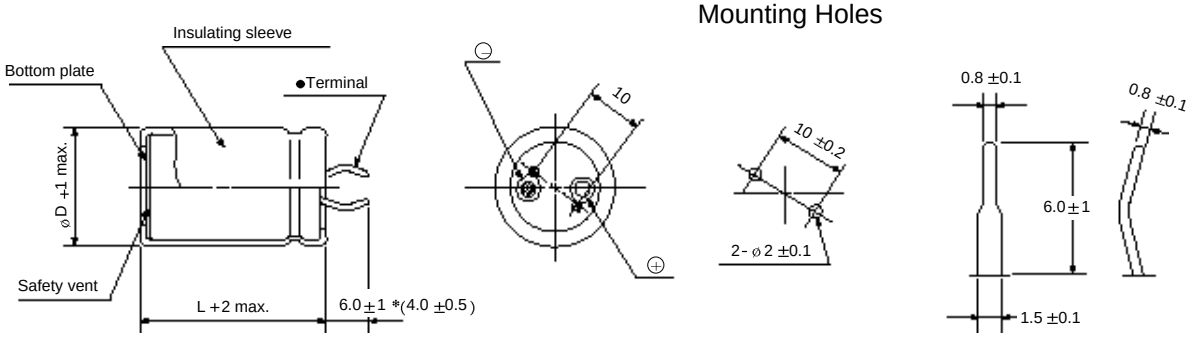
Item	Characteristics
Operating temperature range	WV ≦400 : -40 ~ +105℃, WV ≧ 450 : -25 ~ +105℃
Capacitance tolerance	±20% at 120Hz, 20℃
Leakage current max.	I=3√C (μA) (after 5 minutes)
Dissipation factor max. (at 120Hz, 20℃)	Capacitance > 1000μF : tanδ increases by 0.01 for each 1000μF from below value.
Load life (after application of the rated voltage for 2000 hours at 105℃)	Leakage current : Less than specified value Capacitance change : Within ±20% of initial value tanδ : Less than 200% of specified value
Shelf life (at 105℃)	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

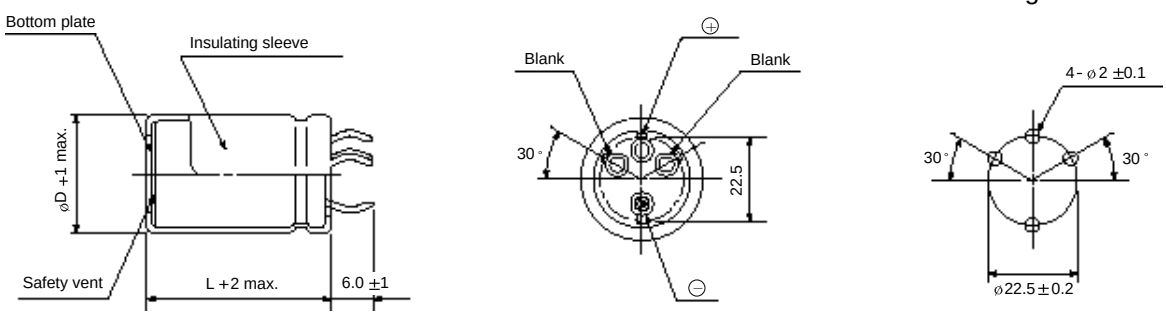
Unit : mm

ø D≦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.

ø D = 40



LARGE TYPES

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 × 40 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					
10000				35 × 50 4.74	40 × 40 4.64										

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

HE series

● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV / μF \ ø D	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 / μF \ ø D	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 / μF \ ø D	450					500				
	22	25.4	30	35	40	22	25.4	30	35	40
47	22 × 20 0.34					22 × 25 0.25	25.4 × 20 0.30			
56	22 × 25 0.40	25.4 × 20 0.41				22 × 30 0.29	25.4 × 30 0.30	30 × 20 0.36		
68	22 × 30 0.47	25.4 × 25 0.48	30 × 20 0.49			22 × 40 0.34	25.4 × 35 0.35	30 × 25 0.36	35 × 20 0.48	
82	22 × 35 0.54	25.4 × 30 0.86	30 × 20 0.54			22 × 45 0.40	25.4 × 40 0.41	30 × 30 0.48	35 × 25 0.48	
100	22 × 40 0.63	25.4 × 30 0.62	30 × 25 0.64	35 × 20 0.65		22 × 50 0.47	25.4 × 45 0.46	30 × 35 0.47	35 × 30 0.48	
120	22 × 45 0.73	25.4 × 35 0.72	30 × 30 0.74	35 × 25 0.76			25.4 × 50 0.53	30 × 40 0.55	35 × 30 0.56	
150	22 × 50 0.85	25.4 × 40 0.85	30 × 30 0.83	35 × 25 0.85				30 × 45 0.61	35 × 35 0.62	
180		25.4 × 45 0.97	30 × 35 0.96	35 × 30 0.98				30 × 50 0.70	35 × 40 0.78	
220		25.4 × 50 1.12	30 × 40 1.11	35 × 30 1.08					35 × 45 0.80	
270			30 × 45 1.28	35 × 35 1.26					35 × 50 0.93	40 × 40 1.36
330			30 × 50 1.48	35 × 40 1.46						40 × 50 1.61
390				35 × 45 1.66						
470				35 × 50 1.89	40 × 40 1.85					
560					40 × 50 2.18					

Case size ø D × 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
- Voltage range of 160 ~ 450V

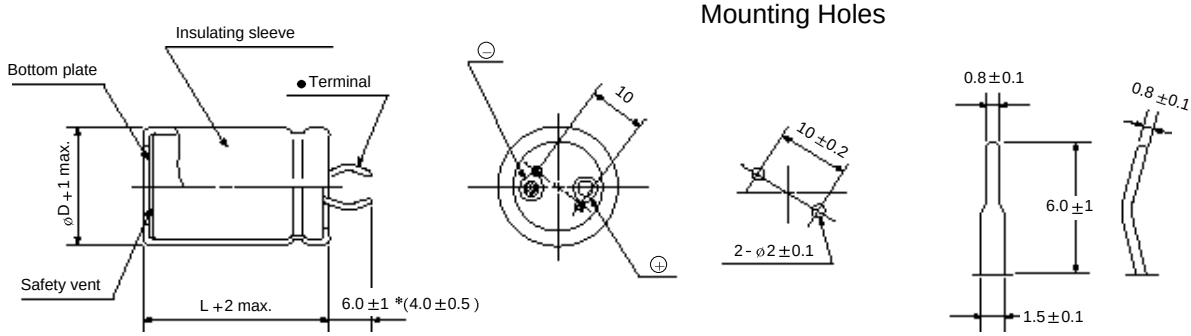
HE ⇒ HK (Smaller)

Item	Characteristics
Operating temperature range	WV ≦400 : -40 ~ +105°C, WV=450 : -25 ~ +105°C
Capacitance tolerance	±20% at 120Hz, 20°C
Leakage current max.	I=3$\sqrt{\ }$ (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.

HK series

● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV / μF \ ø D	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 1.2	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 1.7	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 / μF \ ø D	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 ø D × L (mm)
Ripple current (Arms) at 105°C, 120Hz

LARGE ALUMINUM ELECTROLYTIC CAPACITORS

HT Wide Temperature Range, Miniaturized Series

Miniaturized

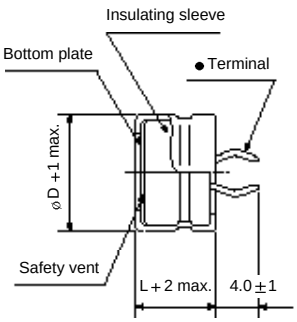
- Height 15mm
- Load life of 2000 hours at 105°C
- Voltage range of 160~400V

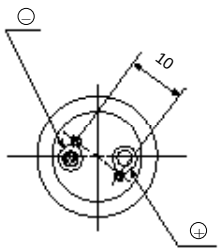
Item	Characteristics
Operating temperature range	-25 ~ +105℃
Capacitance tolerance	±20% at 120Hz, 20℃
Leakage current max.	I=3$\sqrt{}$ (μA) (after 5 minutes)
Dissipation factor	Capacitance > 1000μF : tanδ increases by 0.01 for each 1000μF from below value.

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

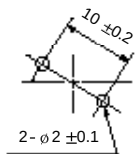
Load life (after application of the rated voltage for 2000 hours at 105℃)		
	Leakage current	Less than specified value
	Capacitance change	Within ±20% of initial value
	tanδ	Less than 200% of specified value
Shelf life (at 105℃)	After 1000 hours no load test, leakage current, capacitance and tanδ are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

DRAWING



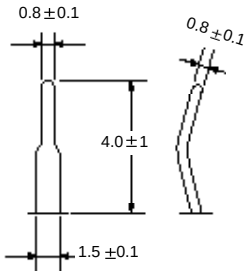


PC Board Mounting Holes



Terminal

Unit : mm



DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV / ø D / μF	160				200				250			
	22	25.4	30	35	22	25.4	30	35	22	25.4	30	35
82									22 ×15 0.42			
100										25.4 ×15 0.52		
120					22 ×15 0.51					25.4 ×15 0.57		
150	22 ×15 0.57					25.4 ×15 0.63					30 ×15 0.70	
180		25.4 ×15 0.70					30 ×15 0.77				30 ×15 0.77	
220		25.4 ×15 0.77					30 ×15 0.85					35 ×15 0.93
270			30 ×15 0.94					35 ×15 1.03				
330			30 ×15 1.04					35 ×15 1.14				
390				35 ×15 1.24								

WV / ø D / μF	315				350				400			
	22	25.4	30	35	22	25.4	30	35	22	25.4	30	35
39					22 ×15 0.28				22 ×15 0.28			
47	22 ×15 0.17				22 ×15 0.31	25.4 ×15 0.41				25.4 ×15 0.34		
68		25.4 ×15 0.23				25.4 ×15 0.45					30 ×15 0.45	
82			30 ×15 0.28								30 ×15 0.50	
100			30 ×15 0.31				30 ×15 0.55					35 ×15 0.60
120				35 ×15 0.37			30 ×15 0.60					35 ×15 0.66
150				35 ×15 0.41				35 ×15 0.74				

Case size ø D ×L (mm)
Ripple current (A rms) at 105℃, 120Hz

HU Snap-in Terminal Type, Long Life Series

Long Life

- Long life guaranteed for 5000 hours load life at 105℃
- Voltage range of 200~450V
- Suited for use in high reliability equipment

HE ⇨ HU
Long life

Item	Characteristics
Operating temperature range	WV ≦400 : -40 ~ +105℃, WV=450 : -25 ~ +105℃
Capacitance tolerance	±20% at 120Hz, 20℃
Leakage current max.	I=3$\sqrt{}$ (μA) (after 5 minutes)
Dissipation factor max. (at 120Hz, 20℃)	Capacitance > 1000μF : tanδ increases by 0.01 for each 1000μF from below value.

WV	200	250	315	350	400	450
tanδ	0.15	0.15	0.15	0.15	0.15	0.20

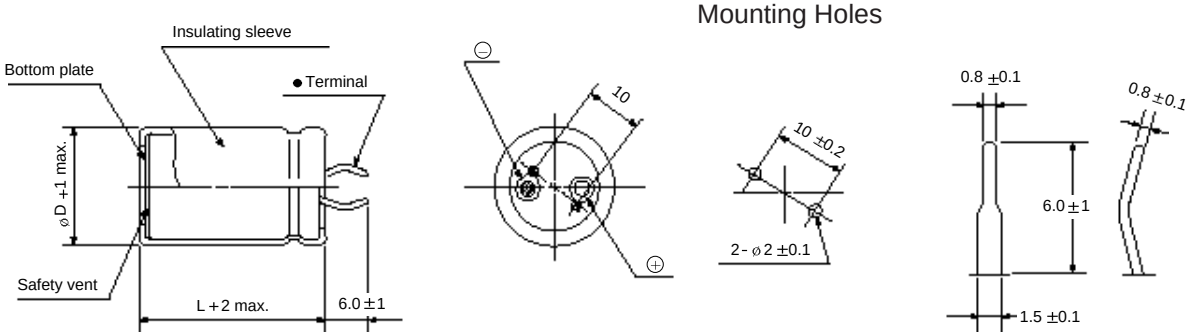
Load life	After an application of DC bias voltage plus the rated AC ripple current for 5000 hours at 105℃ The measurement shall meet the following limits.

Leakage current	Less than specified value
Capacitance change	Within ±25% of initial value
tanδ	Less than 250% of specified value

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

DRAWING

Unit : mm



DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

μF \ WV	200		250		315		350		400		450	
47											22 ×30	0.39
56									22 ×25	0.40	25.4 ×25	0.44
68									25.4 ×25	0.48	25.4 ×30	0.51
82					22 ×25	0.48	22 ×25	0.48	25.4 ×25	0.53	30 ×30	0.61
100					22 ×30	0.57	25.4 ×25	0.59	25.4 ×30	0.62	30 ×30	0.68
120					25.4 ×25	0.64	25.4 ×30	0.68	30 ×25	0.70	30 ×30	0.74
150			22 ×25	0.68	30 ×25	0.78	25.4 ×30	0.76	30 ×30	0.83	35 ×30	0.90
180			22 ×30	0.79	30 ×25	0.86	25.4 ×35	0.88	35 ×30	0.98	35 ×35	1.03
220	22 ×25	0.82	25.4 ×30	0.96	30 ×30	1.00	30 ×35	1.06	35 ×30	1.08	35 ×40	1.19
270	25.4 ×25	1.00	25.4 ×35	1.13	35 ×30	1.20	30 ×40	1.23	35 ×35	1.26	35 ×45	1.38
330	25.4 ×30	1.18	30 ×30	1.28	35 ×30	1.33	35 ×35	1.40	35 ×40	1.46	35 ×50	1.58
390	25.4 ×35	1.35	30 ×35	1.47	35 ×35	1.52	35 ×40	1.59	35 ×45	1.66		
470	25.4 ×40	1.56	35 ×30	1.65	35 ×40	1.74	35 ×45	1.82	35 ×50	1.89		
560	30 ×35	1.76	35 ×35	1.89	35 ×45	1.98	35 ×50	2.06				
680	30 ×40	2.03	35 ×40	2.18	35 ×50	2.27						
820	35 ×35	2.29	35 ×45	2.50								
1000	35 ×35	2.53	35 ×50	2.87								
1200	35 ×40	2.69	Ripple current (A rms) at 105℃, 120Hz									
1500	35 ×50	3.25	Case size øD ×L (mm)									

LARGE ALUMINUM ELECTROLYTIC CAPACITORS

HB High Temperature Range, For 125°C Use Series

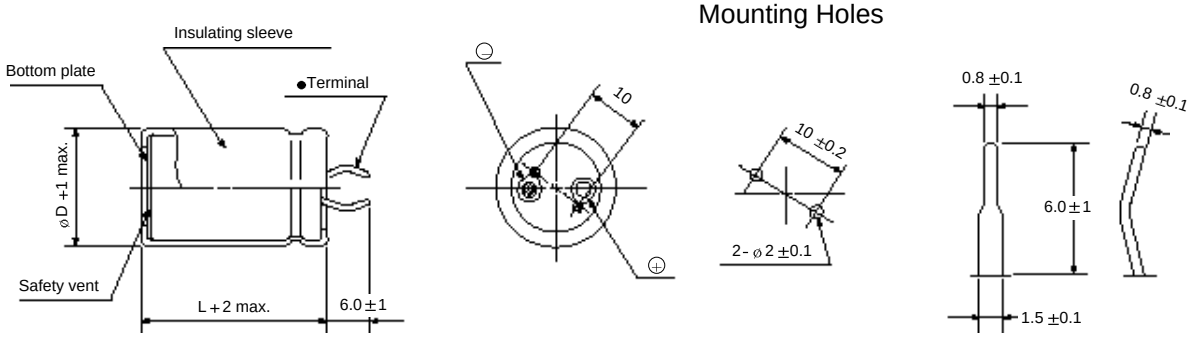
- Wide operating temperature range of -40 ~ +125℃
- With a guaranteed useful life of 10 years at 60℃
- Ideal for industrial applications requiring continuous operation

HE ⇒ HB (High temp.)

Item	Characteristics
Operating temperature range	-40 ~ +125℃
Capacitance tolerance	±20% at 120Hz, 20°C
Leakage current max.	I=3√C V (μA) (after 5 minutes)
Dissipation factor max. (at 120Hz, 20℃)	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℃)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value.

● DRAWING

Unit : mm



HB series

● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV / μF \ ØD	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 / μF \ ØD	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 / μF \ ØD	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 / μF \ ØD	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℃, 120Hz

LARGE ALUMINUM ELECTROLYTIC CAPACITORS

QB Withstanding Overvoltage Series

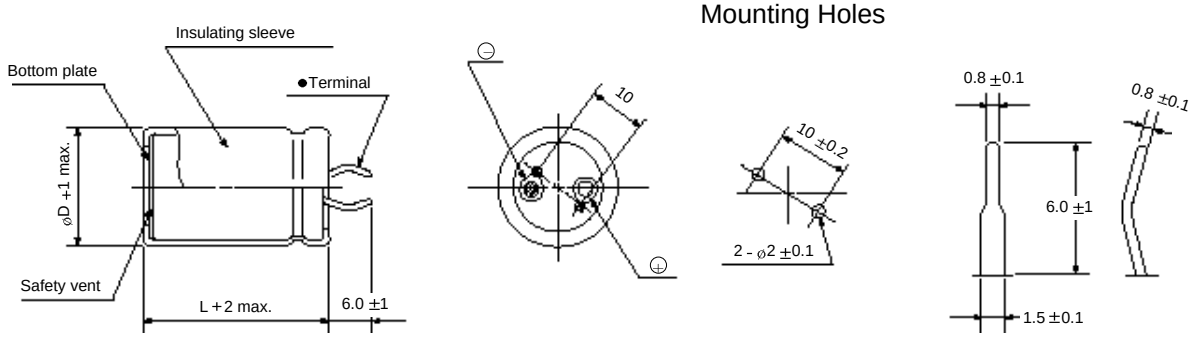
- Withstanding overvoltage and high surge voltage
- Extended voltage range of 200, 400V
- Load life of 2000 hours at 105℃

Item	Characteristics
Operating temperature range	-25 ~ +105℃
Capacitance tolerance	±20% at 120Hz, 20℃
Leakage current max.	I=3$\sqrt{\ }$ (μA) (after 5 minutes)
Dissipation factor	0.15 max. at 120Hz, 20℃
Load life	After an application of DC bias voltage plus the rated AC ripple current for 2000 hours at 105℃ 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℃)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value.
Withstand excess voltage	The safety vent will operate after a excessive voltage is applied to capacitors under the following test conditions, and shall come to open-circuit without flaming.

WV	Applied voltage(VDC)	Applied time	Ambient temperature
200	300	50 hours	70℃
400	500		

DRAWING

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	0.37						
56									22 ×25	0.40						
68									22 ×30	0.47	25.4 ×25	0.48				
82									22 ×35	0.54	25.4 ×30	0.56	30 ×25	0.58		
100									22 ×40	0.63	25.4 ×30	0.62	30 ×25	0.64		
120									22 ×45	0.73	25.4 ×35	0.72	30 ×30	0.74		
150									22 ×50	0.85	25.4 ×40	0.85	30 ×30	0.83	35 ×25	0.85
180	22 ×25	0.74									25.4 ×45	0.97	30 ×35	0.96	35 ×30	0.98
220	22 ×25	0.82									25.4 ×50	1.12	30 ×40	1.00	35 ×35	1.14
270	22 ×30	0.97	25.4 ×25	1.00	30 ×25	1.09							30 ×45	1.28	35 ×40	1.32
330	22 ×35	1.14	25.4 ×30	1.18	30 ×25	1.21									35 ×45	1.52
390	22 ×40	1.30	25.4 ×35	1.35	30 ×30	1.39									35 ×50	1.72
470	22 ×45	1.50	25.4 ×35	1.48	30 ×30	1.53	35 ×25	1.56	Case size øD ×L (mm)							
560	22 ×50	1.71	25.4 ×40	1.70	30 ×35	1.76	35 ×30	1.80	Ripple current (A rms) at 105℃, 120Hz							
680			25.4 ×50	2.05	30 ×35	1.94	35 ×35	2.09								
820					30 ×40	2.23	35 ×35	2.29								
1000					30 ×50	2.68	35 ×40	2.65								

NEW

QA Permissible Abnormal Voltage, Wide Temperature Range Series

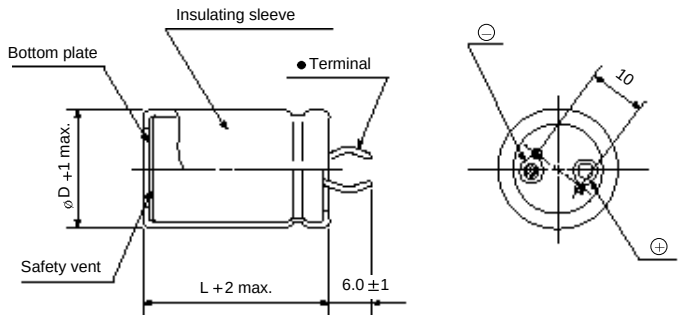
- Improved safety features for abnormally excessive voltage
- Ideally suited for the equipment used at voltage fluctuating area
- No speaks with overvoltage

Item	Characteristics
Operating temperature range	-25 ~ +105℃
Capacitance tolerance	±20% at 120Hz, 20°C
Leakage current max.	I=3√CV (μA) (after 5 minutes)
Dissipation factor	0.15 max. at 120Hz, 20℃
Load life	After an application of DC bias voltage plus the rated AC ripple current for 2000 hours at 105℃ 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℃)	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

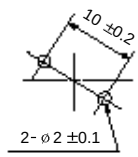
WV	μF	Limited DC current	Test voltage (VDC)
200	C < 300	4A	300 & 375
	330 ≦ C < 470	5A	
	470 ≦ C	7A	
400	C < 100	2A	500 & 600
	100 ≦ C < 220	4A	
	220 ≦ C	7A	

DRAWING

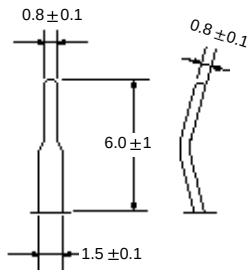
Unit : mm



PC Board Mounting Holes



Terminal



DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV / μF \ ø D	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

LARGE ALUMINUM ELECTROLYTIC CAPACITORS

LM Lug Terminal Type Series

- Lug terminal series
- Suited for use in power supplies and industrial controls

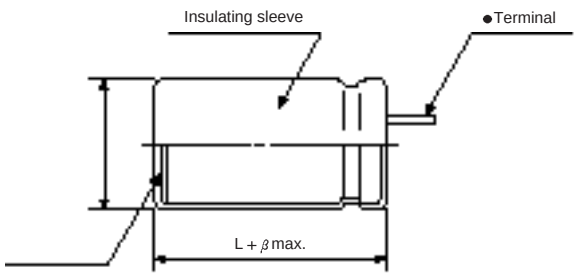
Item	Characteristics
Operating temperature range	WV ≦350 : -40 ~ +85℃, WV > 350 : -25 ~ +85℃
Capacitance tolerance	±20% at 120Hz, 20℃
Leakage current max.	I=3$\sqrt{}$ (μA) (after 5 minutes)
Dissipation factor max. (at 120Hz, 20℃)	Capacitance > 1000μF : tanδ increases by 0.01 for each 1000μF from below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

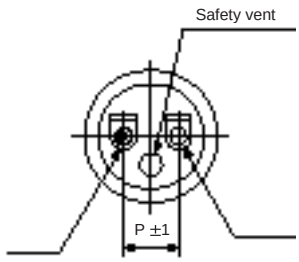
WV	16	25	35~63	80~350	400~450
tanδ	0.35	0.30	0.25	0.20	0.25

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

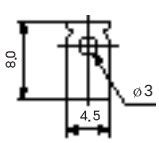
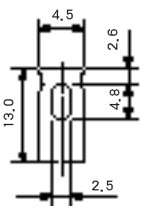
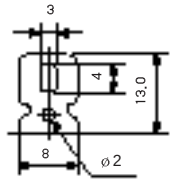
Unit : mm





TERMINAL

For solder tag

ø D	≦35	40	51
Dimensions			
Code	LC	LA	LD

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

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				
3300	51 ×80	5.24	51 ×105	5.82						

Ripple current (A rms) at 85℃, 120Hz

Case size ⌀D ×L (mm)

LARGE ALUMINUM ELECTROLYTIC CAPACITORS

NEW

LH

Lug Terminal Type, Wide Temperature Range Series

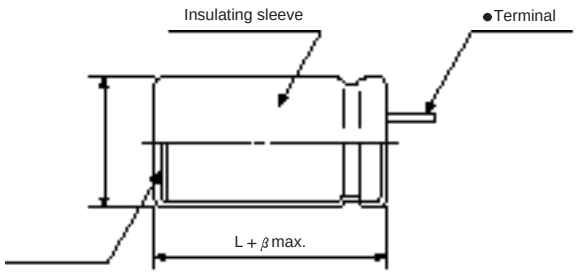
- Lug terminal series for high temperature up to 105℃
- Suited for use in power supplies and industrial controls

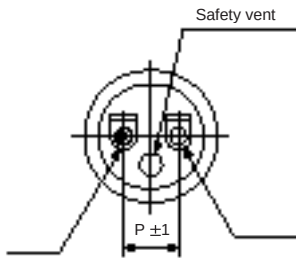
Item	Characteristics
Operating temperature range	WV ≦400 : -40 ~ +105℃, WV = 450 : -25 ~ +105℃
Capacitance tolerance	±20% at 120Hz, 20℃
Leakage current max.	I=3$\sqrt{}$ (μA) (after 5 minutes)
Dissipation factor	Capacitance > 1000μF : tanδ increases by 0.01 for each 1000μF from below value.
Load life (after application of the rated voltage for 2000 hours at 105℃)	Leakage current: Less than specified value Capacitance change: Within ±20% of initial value tanδ: Less than 200% of specified value
Shelf life (at 105℃)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value.

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

● DRAWING

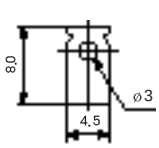
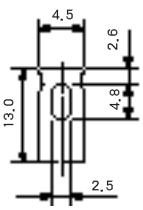
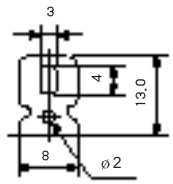
Unit : mm





● TERMINAL

For solder tag

ø D	≦35	40	51
Dimensions			
Code	LC	LA	LD

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

LH series

● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV / μF	16		25		35		40		50	
2200							25.4 ×30	2.05	25.4 ×30	2.05
3300					25.4 ×30	2.46	25.4 ×40	2.73	25.4 ×40	2.73
4700			25.4 ×30	2.67	25.4 ×40	3.21	25.4 ×50	3.50	25.4 ×50	3.50
6800	25.4 ×30	2.92	25.4 ×40	3.46	25.4 ×50	4.07	25.4 ×60	4.38	30 ×50	4.39
10000	25.4 ×40	3.80	25.4 ×50	4.40	30 ×50	5.08	30 ×60	5.46	35 ×60	5.83
15000	25.4 ×50	4.81	30 ×50	5.47	35 ×60	6.67	35 ×60	6.67	35 ×80	7.48
22000	30 ×50	5.87	35 ×60	7.06	35 ×80	8.34	35 ×80	8.34	40 ×100	9.61
33000	35 ×60	7.55	35 ×80	8.80	40 ×100	10.58	51 ×105	11.70	51 ×105	11.70
47000	35 ×80	9.19	40 ×100	10.93	51 ×105	12.51				
68000	40 ×100	11.35	51 ×105	12.88						
100000	51 ×105	13.28								

WV / μF	63		80		100		160		200	
220							25.4 ×30	0.75	25.4 ×30	0.75
330							25.4 ×40	1.02	25.4 ×40	1.02
470							25.4 ×50	1.33	25.4 ×50	1.33
680					25.4 ×30	1.32	25.4 ×60	1.72	30 ×50	1.73
1000			25.4 ×30	1.60	25.4 ×40	1.78	30 ×60	2.25	30 ×60	2.25
1500	25.4 ×30	1.72	25.4 ×40	2.13	25.4 ×50	2.32	35 ×60	2.87	35 ×100	3.54
2200	25.4 ×40	2.27	25.4 ×50	2.75	30 ×50	2.96	35 ×100	4.19	40 ×100	4.40
3300	25.4 ×50	2.98	25.4 ×60	3.54	35 ×60	4.07	40 ×100	5.27	51 ×105	5.82
4700	25.4 ×60	3.77	30 ×60	4.45	35 ×80	5.34	51 ×105	6.81		
6800	30 ×60	4.71	35 ×80	6.17	40 ×100	7.11				
10000	35 ×80	6.54	40 ×80	7.45	51 ×105	9.03				
15000	35 ×100	8.21	51 ×105	10.21						
22000	51 ×105	10.63								

WV / μF	250		315		350		400		450	
47									25.4 ×30	0.31
68					25.4 ×30	0.42	25.4 ×30	0.37	25.4 ×40	0.42
100			25.4 ×30	0.51	25.4 ×40	0.56	25.4 ×40	0.50	25.4 ×50	0.55
150	25.4 ×30	0.62	25.4 ×40	0.69	25.4 ×50	0.75	25.4 ×50	0.67	30 ×50	0.73
220	25.4 ×40	0.84	25.4 ×50	0.91	25.4 ×60	0.98	30 ×60	0.94	35 ×60	1.01
330	25.4 ×50	1.12	25.4 ×60	1.20	30 ×60	1.29	35 ×60	1.24	35 ×80	1.39
470	30 ×50	1.44	30 ×60	1.54	35 ×60	1.65	35 ×80	1.65	35 ×100	1.82
680	30 ×60	1.86	30 ×80	1.86	35 ×100	2.44	40 ×100	2.29	51 ×80	2.28
1000	35 ×80	2.70	35 ×100	2.96	40 ×100	3.11	51 ×105	3.08		
1500	35 ×100	3.54	40 ×100	3.72	51 ×105	4.11				
2200	51 ×80	4.37	51 ×105	4.86						

Ripple current (A rms) at 105°C, 120Hz

Case size ø D × L (mm)

LARGE ALUMINUM ELECTROLYTIC CAPACITORS

NEW

LW, SW

For Welding Machine Series

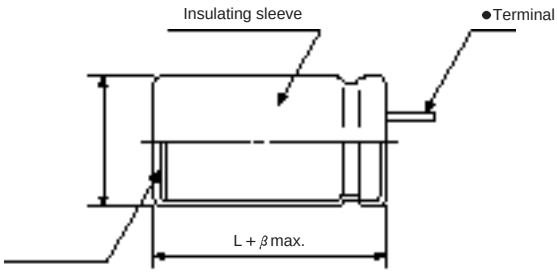
- For welding machine applications
- Charge and discharge characterastic : 100,000 times at 5 ~ 35℃
- LW series with lug terminal type, SW series with screw terminal type

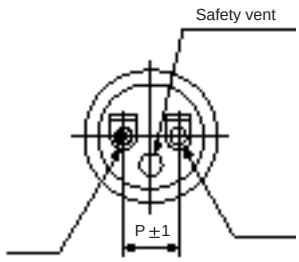
Item	Characteristics
Operating temperature range	-25 ~ +85℃
Capacitance tolerance	-10 ~ +50% at 120Hz, 20℃
Leakage current max.	I=3$\sqrt{}$ (μA) (after 5 minutes)
Dissipation factor max.	0.20 max.at 120Hz, 20℃
Charge and discharge charatoristic	After charge and discharge for 100000 cycles at 5~35℃ with application of the rate voltage, the capacitors shall be satisfied the following specifffications. 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 : 4 Ω Charge time : 1 sec Discharge resistance : 0.12 Ω Discharge time : 0.5sec

DRAWING

Unit : mm

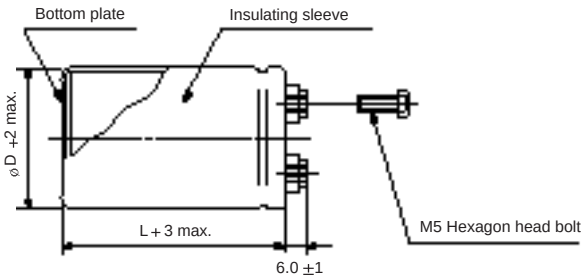
LW series

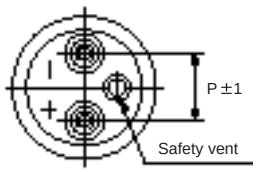




ø D	35	40	51
P	14	18	18
α	1		2
β	2		3

SW series





ø D	51	63.5	76.2
P	22	28.6	31.8

DIMENSIONS

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		

SM Screw Terminal Type, Standard Series

- High ripple current capability
- Ideally suited for use as input and output filter capacitors in power supplies

Item	Characteristics
Operating temperature range	WV ≦350 : -40 ~ +85℃, WV > 350 : -25 ~ +85℃
Capacitance tolerance	±20% at 120Hz, 20℃
Leakage current max.	I=3$\sqrt{}$ (μA) (after 5 minutes)
Dissipation factor max. (at 120Hz, 20℃)	See table below
Load life (after application of the rated voltage for 2000 hours at 85℃)	See table below
Shelf life (at 85℃)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value.

Dissipation factor max. (at 120Hz, 20℃)

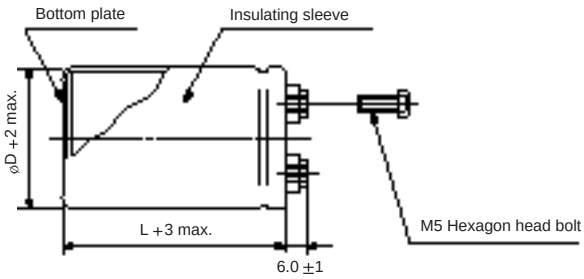
ø D \ WV	16	25	35	50	63	80	100	160~350	400,450
35	0.70	0.45	0.45	0.30	0.25	0.25	0.20	0.15	0.25
51	1.00	0.60	0.60	0.45	0.35	0.30	0.20	0.15	0.25
63.5	1.30	0.80	0.70	0.50	0.40	0.35	0.25	0.20	0.25
76.2	2.00	1.20	0.90	0.70	0.50	0.40	0.35	0.25	0.25

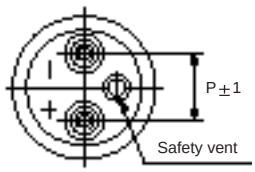
Load life (after application of the rated voltage for 2000 hours at 85℃)

Leakage current	Less than specified value
Capacitance change	Within ±15% of initial value
tanδ	Less than 175% of specified value

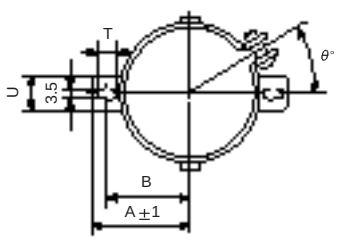
DRAWING

Unit : mm

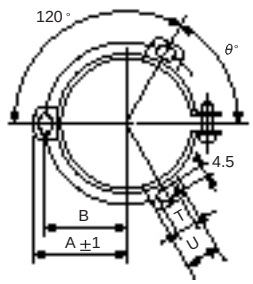




TWO LEGS ANGLE



THREE LEGS ANGLE



TWO LEGS ANGLE SIZE TABLE

ø D	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

ø D	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

SM 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		350		400	
330							35 ×60	1.2
470					35 ×60	1.9	35 ×80	1.7
680			35 ×50	2.1	35 ×80	2.6	35 ×100	2.2
1000	35 ×60	2.8	35 ×68	2.9	35 ×100	3.4	35 ×120	2.9
1500	35 ×68	3.6	35 ×80	3.8	51 ×80	4.3	51 ×100	3.7
2200	35 ×100	5.1	35 ×120	5.5	51 ×100	5.7	51 ×140	5.1
3300	35 ×120	6.7	51 ×100	7.0	51 ×140	8.0	63.5 ×120	6.2
4700	51 ×100	8.3	51 ×140	9.6	63.5 ×120	8.3	76.2 ×120	7.7
6800	51 ×140	11.5	63.5 ×120	10.0	76.2 ×120	9.2	76.2 ×160	10.3
10000	63.5 ×120	12.1	76.2 ×120	11.2	76.2 ×160	12.5		
15000	76.2 ×120	13.7	76.2 ×160	15.3				
22000	76.2 ×160	18.6						

Ripple current (A rms) at 85℃, 120Hz

Case size øD ×L (mm)

WV / μF	450	
220	35 ×50	0.9
330	35 ×60	1.2
470	35 ×80	1.7
680	35 ×120	2.4
1000	51 ×80	2.7
1500	51 ×120	3.9
2200	63.5 ×120	5.1
3300	76.2 ×120	6.4
4700	76.2 ×160	8.6

● 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

CU Screw Terminal Type, Wide Temperature Range Series

- Screw terminal series for high temperature up to 105℃
- High ripple current capability
- Ideally suited for use as input and output filter capacitors in power supplies

SM ⇨ CU (Wide temp.)

Item	Characteristics
Operating temperature range	-40 ~ +105℃
Capacitance tolerance	±20% at 120Hz, 20℃
Leakage current max.	I=3√CV (μA) (after 5 minutes)
Dissipation factor max. (at 120Hz, 20℃)	See table below
Load life (after application of the rated voltage for 2000 hours at 105℃)	See table below
Shelf life (at 105℃)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value.

Dissipation factor max. (at 120Hz, 20℃)

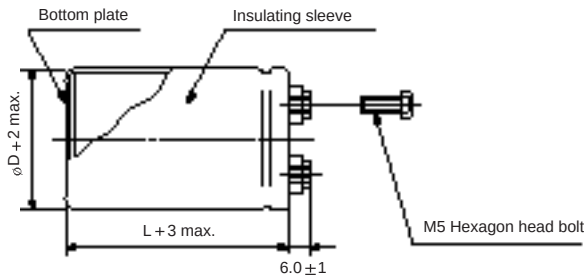
ØD \ WV	16	25	35	50	63	80	100	160	200,250	350,400
35	0.45	0.45	0.40	0.30	0.25	0.25	0.20	0.15	0.15	0.25
51	0.60	0.60	0.45	0.45	0.35	0.30	0.20	0.15	0.15	0.25
63.5	0.80	0.70	0.50	0.50	0.40	0.35	0.25	0.20	0.20	0.25
76.2	1.20	0.90	0.70	0.70	0.70	0.50	0.40	0.35	0.25	0.25

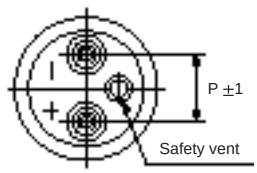
Load life (after application of the rated voltage for 2000 hours at 105℃)

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

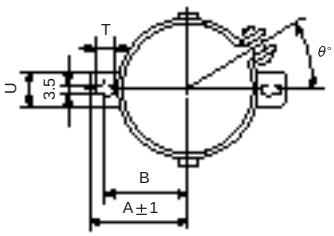
DRAWING

Unit : mm

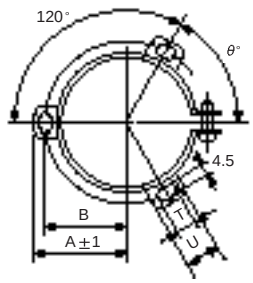




TWO LEGS ANGLE



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	19.2	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	7.6
15000	35 ×120	7.2	51 ×80	6.3	63.5 ×140	9.5	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				
15000	76.2 ×160	9.2						

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

● 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

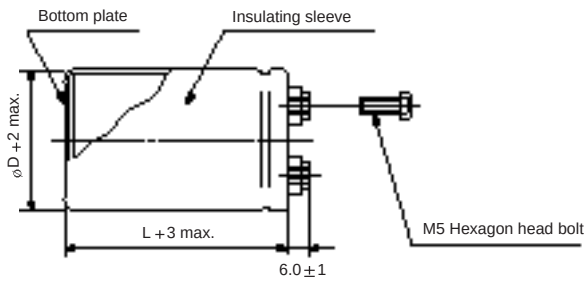
GT For Inverter Circuits Series

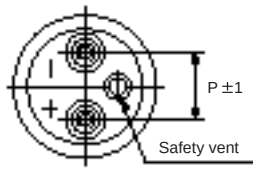
- High reliability
- High ripple current
- Suited for smoothing circuits for general purpose inverters and control circuits for F.A. machines
- Designed for use as input filter capacitor for current U.P.S.

Item	Characteristics
Operating temperature range	-25 ~ +85℃
Capacitance tolerance	±20% at 120Hz, 20°C
Leakage current max.	I=3$\sqrt{\quad}$ (μA) (after 5 minutes)
Dissipation factor	0.25 max. at 120Hz, 20°C
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 300% of specified value
Shelf life (after leaving capacitors under no load for 1000 hours at 85℃)	Leakage current: Less than specified value Capacitance change: Within ±20% of initial value tanδ: Less than 300% of specified value

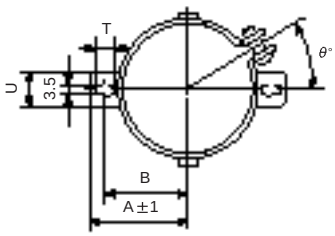
DRAWING

Unit : mm

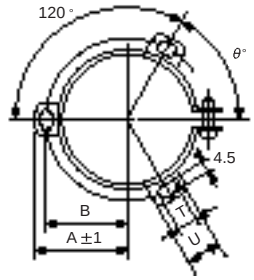




TWO LEGS ANGLE



THREE LEGS ANGLE



TWO LEGS ANGLE SIZE TABLE

ø D	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

ø D	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 / Item / μF	350			400			450		
	ø D ×L (mm)	Ripple current (A rms)		ø D ×L (mm)	Ripple current (A rms)		ø D ×L (mm)	Ripple current (A rms)	
		40℃ 120Hz	85℃ 120Hz		40℃ 120Hz	85℃ 120Hz		40℃ 120Hz	85℃ 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			

● PERMISSIBLE RIPPLE CURRENT MULTIPLIERS

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

GF Screw Terminal Type, Long Life Series

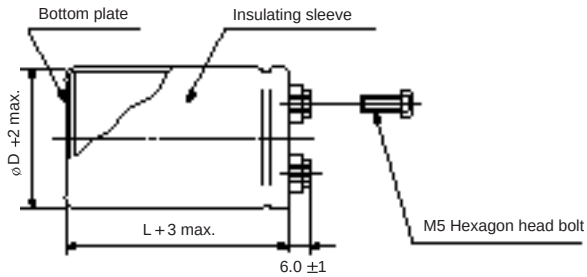
- Screw terminal series in more compact case sizes
- High reliability, long life guaranteed for 5000 hours load life at 85℃ (The only 500WV is assured 2000 hours at 85℃)
- Ideally suited for use in industrial robots, tooling machines, inverters, telecommunication equipment, measuring instruments and etc.

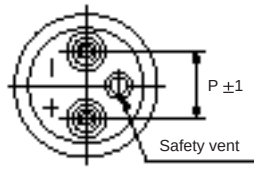
GT ⇨ GF
Long life

Item	Characteristics
Operating temperature range	-25 ~ +85°C
Capacitance tolerance	±20% at 120Hz, 20℃
Leakage current max.	I=3$\sqrt{\ \ }$ (μA) (after 5 minutes)
Dissipation factor	0.20 max. at 120Hz, 20℃
Low temperature characteristics (Impedance ratio at 120Hz)	Z-25℃ / Z+20℃ ≦ 8
Load life (after application of the rated voltage for 5000 hours at 85℃)	Leakage current: Less than specified value Capacitance change: Within ±20% of initial value tanδ: Less than 200% 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.

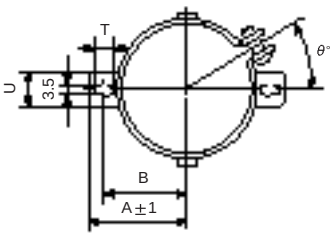
DRAWING

Unit : mm

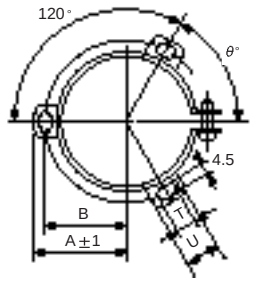




TWO LEGS ANGLE



THREE LEGS ANGLE



TWO LEGS ANGLE SIZE TABLE

ø D	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

ø D	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		500	
1000							51 × 120	4.2
1200							63.5 × 100	4.5
1500							63.5 × 100	5.1
1800							63.5 × 120	6.0
2200	51 × 110	6.0	51 × 130	6.4	63.5 × 110	6.4	63.5 × 140	7.0
2700	51 × 130	7.1	63.5 × 110	7.1	63.5 × 130	7.5	76.2 × 120	7.5
3300	63.5 × 100	7.5	63.5 × 130	8.3	76.2 × 110	8.0	76.2 × 140	8.8
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	Ripple current (A rms) at 85℃, 120Hz			
12000	89 × 160	19.5	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

EV

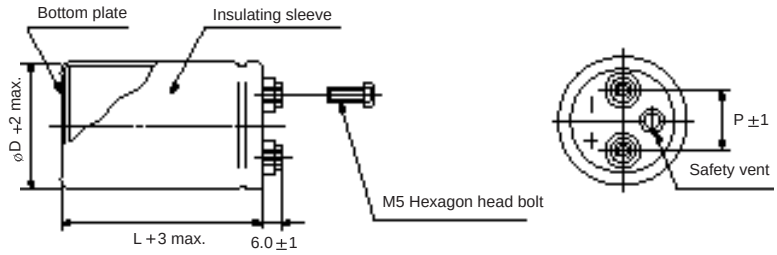
High ripple Current, High Reliability Series

- High ripple current compared with GF series
- Newly improved long life guaranteed for 5000 hours load life at 105℃
- Suitable for the general-purpose inverter

Item	Characteristics
Rated voltage	400V, 450V
Operating temperature range	-25 ~ +105℃
Capacitance tolerance	±20% at 120Hz, 20℃
Leakage current max.	I = 3√C (μA) (after 5 minutes)
Dissipation factor	0.2 max. at 120Hz, 20℃
Load life (after application of the rated voltage for 5000 hours at 105℃)	Leakage current: Less than specified value Capacitance change: Within ±20% of initial value tanδ: Less than 200% of specified value
Shelf life (at 105℃)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value.

DRAWING

Unit : mm



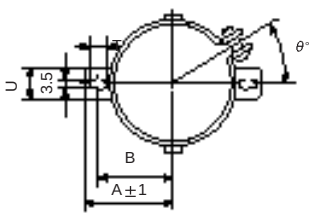
TWO LEGS ANGLE SIZE TABLE

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

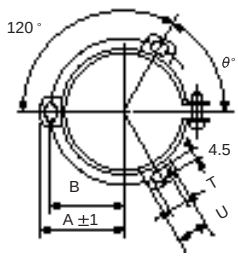
THREE LEGS ANGLE SIZE TABLE

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	
	øD ×L (mm)	Ripple Current (A rms) 105℃ 120Hz	øD ×L (mm)	Ripple Current (A rms) 105℃ 120Hz
2200	63.5 × 110	11.6	63.5 × 115	12.1
2700	63.5 × 115	13.7	63.5 × 130	14.3
3300	63.5 × 130	16.1	76.2 × 110	16.9
4700	76.2 × 130	21.2	76.2 × 140	22.6
5600	76.2 × 150	24.3	76.2 × 160	25.2
6800	89 × 150	27.1	89 × 160	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

AM For Hi-Fi Component System Series

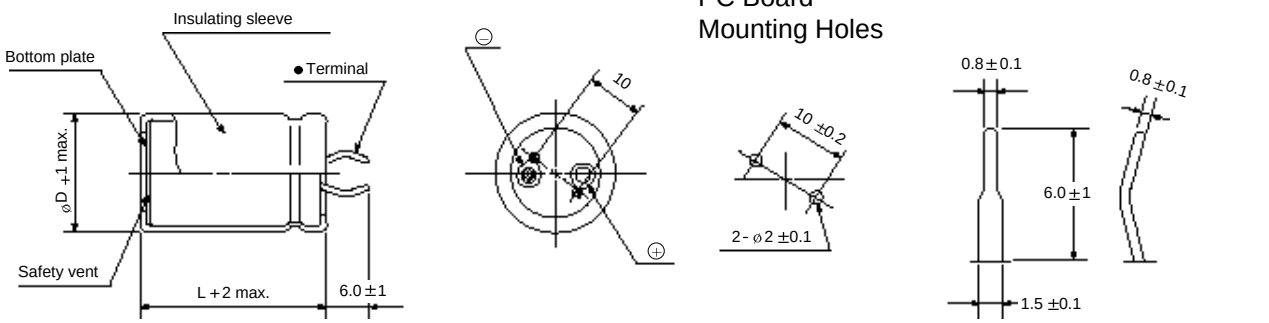
For Audio Use

- 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

Item	Characteristics
Operating temperature range	-40 ~ +85℃
Capacitance tolerance	±20% at 120Hz, 20°C
Leakage current max.	I = 3$\sqrt{\quad}$ (μA) (after 5 minutes)
Dissipation factor max. (at 120Hz, 20℃)	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℃ 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 : 4 Ω Applied current : 1A Discharge resistance : 100 Ω Charge and discharge time : 60sec. (each)
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



AM series

● DIMENSIONS

ø D × 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. Screw terminal type : Applicable to case sizes larger than ø35.

LARGE ALUMINUM ELECTROLYTIC CAPACITORS

DF For Photo Flash Series

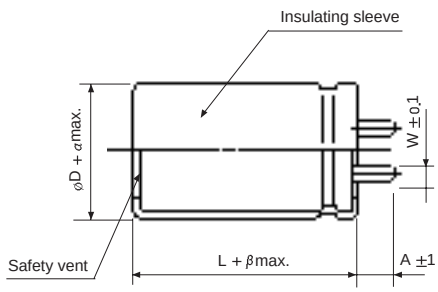
- For photo flash applications with lug terminal
- Low dissipation factor, low leakage current and high stability during the repetition of charge and discharge

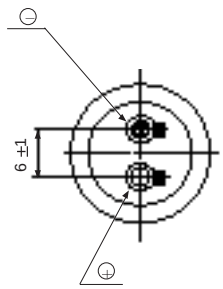
Item	Characteristics
Operating temperature range	-20 ~ +55℃
Capacitance tolerance	-10 ~ +20% at 120Hz, 20℃
Leakage current max.	I=1 ×C (μA) (after 5 minutes), where C=Nominal capacitance (μF)
Dissipation factor max. (at 120Hz, 20℃)	Capacitance range(μF) 150~600 601~1500 tanδ 0.07 0.10
Charge and discharge characteristics	Charge and discharge at rated voltage at 5~35℃ with a switch sequence of 30 seconds for 5000 times via xenon flash tube with discharge resistance of 0.7~1.0 Ω 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℃ after exposing them for 1000 hours at 55℃ 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

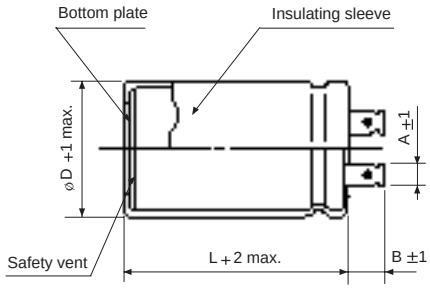
ø D ≦20

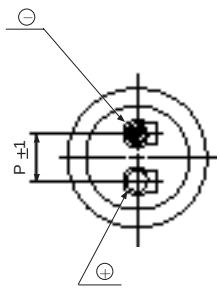




	ø D=14	ø D ≦18	ø D=20
W	1.5	2.5	2.5
α	0.5	0.5	1.0
β	1.0	1.0	2.0
A	5.0	4.0	4.0

ø D ≧22





	ø D=22	ø D ≧25.4	ø D=40 *
A	3.5	4.5	4.5
B	6.0	8.0	11.0
p	8.0	10.0	18.0

* Note : ø 40 is available upon request. Please check with us individual size and dimensions.

DF series

● DIMENSIONS

ø D × L(mm)

WV (SV)	ø D / μF	14	16	18	20	22	25.4	30	35
330 (350)	150	14 × 36	16 × 30	18 × 25					
	200	14 × 46	16 × 38	18 × 30	20 × 27				
	250		16 × 45	18 × 36	20 × 30	22 × 27			
	300			18 × 42	20 × 36	22 × 30			
	350			18 × 46	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)	150	14 × 40	16 × 35	18 × 28					
	200		16 × 45	18 × 36	20 × 30	22 × 27			
	250			18 × 42	20 × 36	22 × 30			
	300			18 × 48	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

LARGE ALUMINUM ELECTROLYTIC CAPACITORS

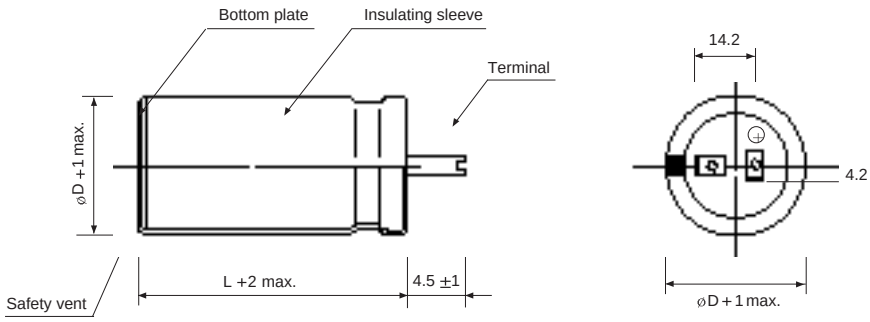
AR For Inverter Air-conditioning System Series

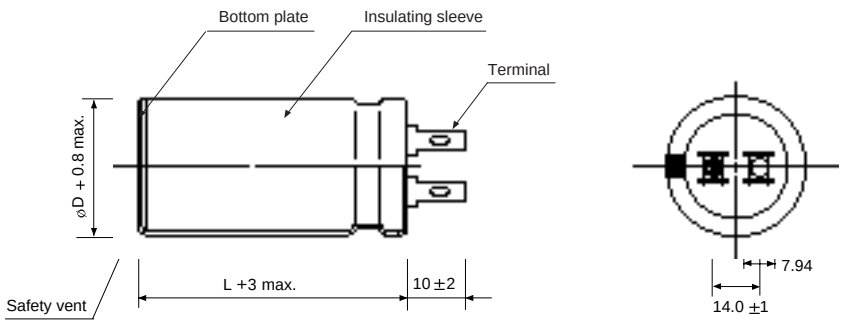
· For high ripple current application such as air conditioning system
· Load life of 3000 hours at 85°C

Item	Characteristics
Operating temperature range	-25 ~ +85℃
Capacitance tolerance	±10% at 120Hz, 20℃
Leakage current max.	I=3$\sqrt{\ }$ (μA) (after 5 minutes)
Dissipation factor (120Hz, 20℃)	WV: 220 / 330 / 400 tanδ: 0.02 / 0.03 / 0.05
Low temperature characteristics (120Hz)	Z-25℃/ Z+20℃≦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℃)	This following specifications shall be satisfied when capacitors are restored to 20℃ 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.

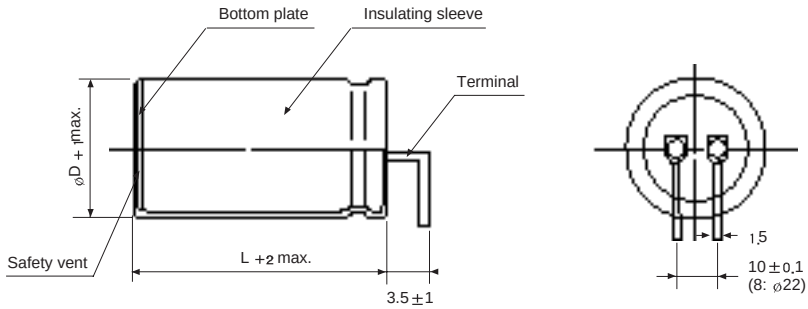
HP Horizontal Mount Type Series

· Layout mounting
· Suited for use in flat electronic device where height space is limited(adapter,etc.)

Item	Characteristics
Operating temperature range	-40 ~ +105℃
Leakage current	I=3√C·V (μA) (after 5 minutes)
Capacitance tolerance	±20% at 120Hz, 20℃
Dissipation factor max. (at 120Hz, 20℃)	WV: 200 / 400 tanδ: 0.15 / 0.15
Low temperature characteristics (impedance ratio at 120Hz)	WV: 200 / 400 Z-25℃/Z+20℃: 3 / 3 Z-40℃/Z+20℃: 10 / 10
Load life (after application of the rated voltage for 2000 hours at 105℃)	After an application of DC bias voltage plus the rated AC ripple current for 2000 hours at 105℃ 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℃)	After 1000 hours at 105℃ 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

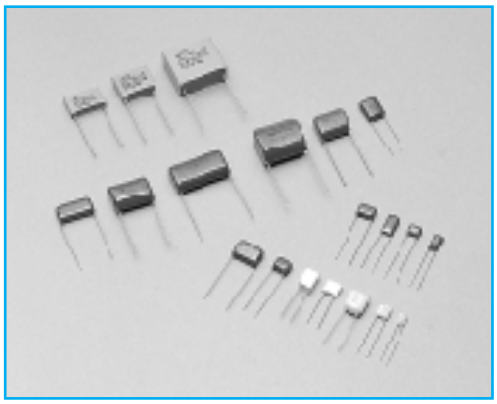


DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV / μF \ ØD	200				400			
	22 ø		25 ø		22 ø		25 ø	
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)

5 PLASTIC FILM CAPACITORS



Application guidelines

When you use non-inductive film capacitors, pay attention to the following.

무유도 필름 커패시터를 사용할 때 다음 사항에 주의하여 주시기 바랍니다.

1. DC Rated voltage vs. AC Rated voltage

Rated voltage of capacitor is normally specified at DC except for special type. When DC rated capacitor is operated in AC circuit (except for across-the-line and AC power capacitor), AC rating shall be within a value specified below, because of inherent temperature rise and discharge, etc.

1. 직류 정격전압과 교류 정격전압의 관계

커패시터의 정격전압은 특수한 제품을 제외하고는 직류전압으로 규정되어 있습니다. 직류 정격 커패시터를 교류 회로에서 사용할 때(across-the-line과 교류 파워용 커패시터는 제외), 교류 정격은 다음과 같이 규정됩니다.

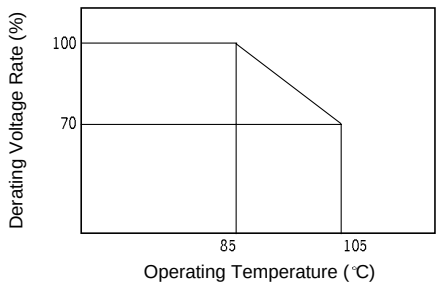
DC rated voltage (DC 정격전압)	AC rated voltage (AC 정격전압)	Applicable series (적용 시리즈)
50V	40VAC (50Hz, 60Hz)	TM TL PC
63V	50VAC 〃	
100V	75VAC 〃	
200V	100VAC 〃	
250V	150VAC 〃	
400V	200VAC 〃	
630V	250VAC 〃	

2. Derating of rated voltage to operating temperature

When operating metallized polyester film capacitors (TM, TL, EB series) at high temperature range (Max. 105℃), the rated voltage shall be derated to operating temperature as specified below. However, in case of metallized polypropylene film capacitors (PC series), they shall be operated within the specified temperature range since their heat shrinkage is much greater than metallized polyester film.

2. 사용온도에 대한 정격전압의 경감

금속증착 폴리에스테르 필름 커패시터(TM, TL, EB series)를 고온(최고 105℃)에서 사용할 때 정격전압은 다음과 같이 경감되어야 합니다. 그러나 금속증착 폴리프로필렌 필름 커패시터(PC series)의 경우에는 열 수축율이 금속증착 폴리에스테르 필름보다 상당히 크기 때문에 반드시 정격 사용 온도 내에서만 사용하여야 합니다.



3. Inherent temperature rise

When capacitor is operated in AC circuit, especially at high frequency, temperature of capacitor rises inherently. In case temperature rises to high, performance of capacitor may be deteriorated or damaged. The inherent temperature rise at no air circulation (Ambient temperature at 40℃) shall be within a value specified below.

3. 온도 상승 (내부 발열)

커패시터를 교류 회로, 특히 고주파수나 고온에서 사용할 때 커패시터의 온도 상승이 발생합니다. 온도가 크게 상승할 경우에는 커패시터의 성능이 저하될 수 있습니다.
커패시터의 온도 상승 분은 공기 순환이 없는 곳 (40℃의 주위온도)에서 다음에 규정된 값 이내이어야 합니다.

Polyester & Metallized polyester film capacitor (TX, TM, TL, TJ, TZ, EB Series)	Within ±15℃
Polypropylene & Metallized polypropylene film capacitor (PX, PH, PC, PF Series)	Within ±5℃

4. Operating temperature range

Operating temperature range is specified as a sum of ambient temperature and inherent temperature rise. Especially at high frequency operation, temperature of capacitor rises inherently. For such an application, make sure that the temperature at capacitor surface is within the operating temperature range.

4. 사용 온도 범위

사용 온도 범위는 주위 온도와 온도 상승분의 합으로 규정됩니다. 특히 고주파수의 환경에서 사용할 때는 커패시터의 온도가 상승합니다. 이러한 환경에서 사용할 때는 커패시터의 표면 온도가 사용 온도 범위 이내인지를 확인하십시오.

5. General precaution

(1) Soldering conditions

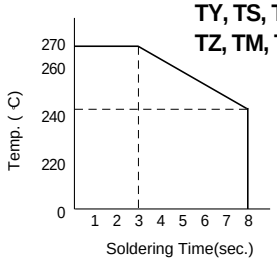
When soldering capacitors, a soldering process for a long time or at high temperature will result in deterioration of characteristics or short-circuit defect. Please ensure the soldering is carried out within the range shown in the diagram below.

5. 일반적인 주의 사항

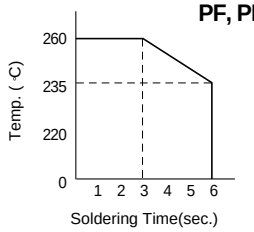
(1) 납땜 조건

커패시터를 장시간이나 고온에서 납땜을 할 경우 커패시터 특성이 저하되거나 회로의 단락 등과 같은 결함이 발생될 수 있습니다. 다음 그림에 표시된 조건 내에서 납땜 작업이 수행되어야 커패시터에 영향이 없습니다.

TY, TS, TX, TJ, TZ, TM, TL, EB



PX, PC, PF, PH



(2) Load to lead wire

Attention must be paid to avoid mechanical shock or damage to capacitors so that lead wires may not be loaded more than necessary, because excess load may result in disconnection of lead wires or short circuit defects.

(2) 리드선에의 부하

커패시터에 기계적인 충격이 인가되지 않도록 주의하십시오. 리드선에의 과도한 부하는 리드선의 단선이나 회로의 단락등과 같은 결함을 초래할 수 있습니다.

(3) Shock to capacitors

Attention must be paid so that any sharp objects like air-driver, soldering iron, pincette edge and etc. may not stick strongly to surface of capacitors, otherwise short circuit, etc. will occur.

(3) 커패시터에의 충격

커패시터에 air 드라이버, 납땜기, 핀셋 등과 같은 날카로운 물건이 강하게 찍히지 않도록 주의하십시오. 그렇지 않으면 회로의 단락 등이 발생할 수 있습니다.

(4) Charging / Discharging

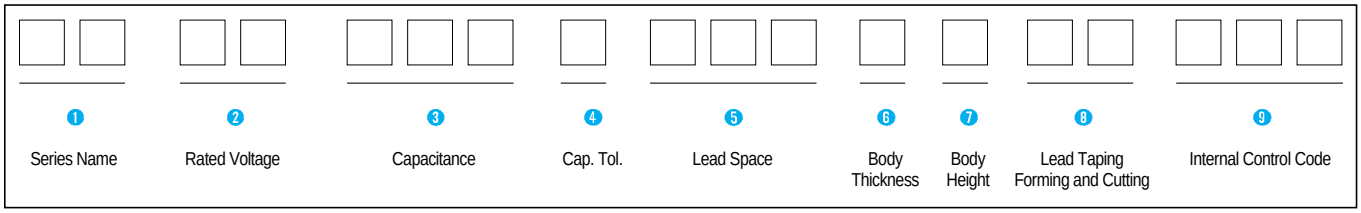
When capacitors are used in a rapid and frequent charge/discharge circuit, the deterioration of capacitor performance is accelerated. So, film capacitors are not suited for such an application. If used so, charge/discharge should be done through a resistor of 2kΩ or higher.

(4) 충방전

급격한 충방전이 계속 반복되는 회로에 커패시터가 사용되면 커패시터의 성능 저하가 가속됩니다. 필름 커패시터는 이러한 응용에 적합하지 않습니다. 만약 커패시터가 이러한 환경에서 사용된다면 충방전은 2kΩ 이상의 저항을 통해서 행해져야 합니다.

PART NUMBER SYSTEM

Part Number System



1 Series Name

Type	Series
Inductive	TY, TS
Non-Inductive	TX, TM, TL, EB, TJ, TF PH, PX, PC, PF

2 Rated Working Voltage

WV	50	63	100	200	250	400
Code	1H	1J	2A	2D	2E	2G

WV	630	800	1000	1250	1600
Code	2J	2K	3A	3B	3C

3 Capacitance

ex) 0.001㎌ 102
0.01㎌ 103
0.1㎌ 104
1.0㎌ 105

4 Capacitance Tolerance

Tolerance (%)	±5	±10	±20
Code	J	K	M

5 Lead Space(P)

Pitch (mm)	5.0	7.5	10.0	15.0
Code	050	075	100	150

6, 7 Body Thickness (T) and Body Height (H)

Body Thickness (T)	Body Height (H)	Code
3.0	6.5	BA
3.5	7.5	CC
4.5	9.5	EG
5.0	10.0	FH
5.0	11.0	FK
6.0	11.0	HK
6.0	12.0	HM
8.0	17.0	MS
7.5	13.5	LN
7.0	16.0	KR
8.5	17.0	NS
10.0	19.0	RU
11.5	21.5	SV

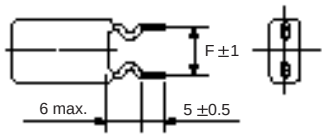
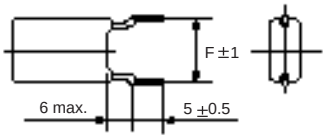
※ Body Thickness and Height for EB Series(Box Type)

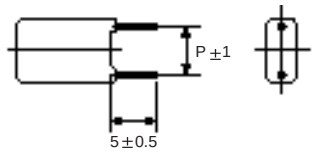
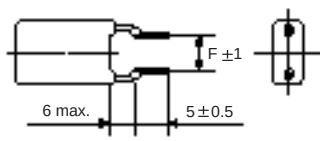
8 Lead Taping, Forming and Cutting

Lead Configurations		Code
Ammo Taping	F = 5.0 mm	AN
	F = 7.5 mm	AF
EB Series (Box Type)	Ammo Taping	AG
Forming and Cutting	See page 151	

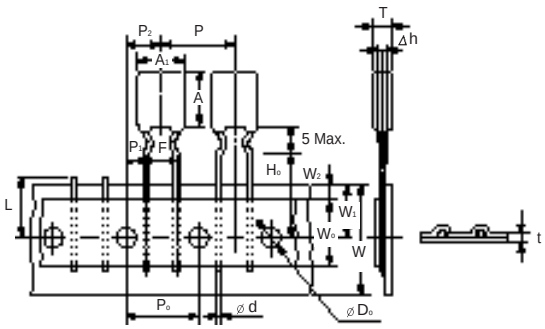
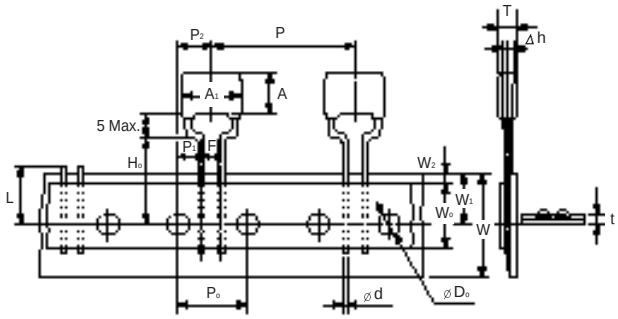
●LEAD FORMING & CUTTING

Unit : mm

Configuration	Code	Shape
B - Type	B__	
F - Type	F__	

Configuration	Code	Shape
C - Type	CS	
L - Type	L__	

●LEAD TAPING CAPACITORS FOR AUTOMATIC INSERTION

DRAWING Ⅰ	DRAWING Ⅱ
	

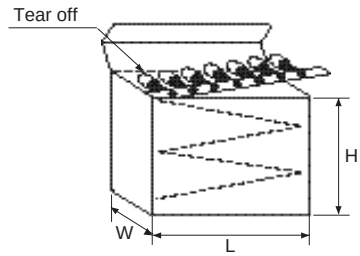
Unit : mm

Description	Symbol	Drawing		Tolerance
		Ⅰ	Ⅱ	
Body Height	A	12.5	20.0	max.
Body Width	A_1	12.0	22.5	max.
Body Thickness	T	9.0	13.0	max.
Lead Wire Dia.	ø d	0.5, 0.6	0.6, 0.8	±0.05
Body Pitch	P	12.7	30.0	±1.0
Feeding Hole Pitch	P_0	12.7	15.0	±0.2
Feeding Hole Alignment	P_1	3.85	3.75	±0.4
Feeding Hole Alignment	P_2	6.35	7.5	±0.4
Lead Center Spacing	F	5.0	7.5	+0.5, -0.2
Body Inclination	Δh	0	0	±0.5
Tape Width	W	18.0	18.0	±0.2
Adhesive Tape Width	W_0	13	13	±0.2
Feeding Hole Alignment	W_1	9.0	9.0	±0.2
Adhesive Tape Margin	W_2	2.0	2.0	max.
Lead Clinch Height	H_0	16.5	16.5	±0.5
Feeding Hole Dia	ø D_0	4.0	4.0	±0.2
Total Tape Thickness	t	0.7	0.7	±0.2
Cut Lead Height	L	11.0	11.0	max.
Taping Code	Ammo	AN	AF	

●Taping Box Dimensions

Unit : mm

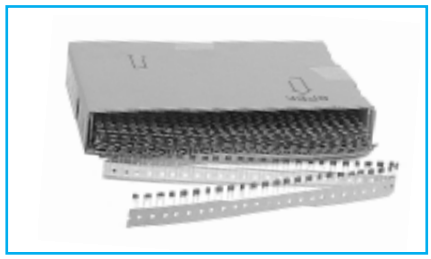
Ammo



Drawing	L	H	W	Remark
Ⅰ	332	230	49	—
Ⅱ	342	240	51	H★≦15
	342	240	62	16≦H★≦24

H★: Body height

· Ammo



PACKAGING

Q'ty(pcs.)/Box

● Lead Space : 5.0 mm

Series	WV	Ammo	
		μF	Q'ty
TY TS	50 100	0.001 ~ 0.0056	3500
		0.0068 ~ 0.012	3000
		0.015 ~ 0.027	2500
		0.033 ~ 0.047	2000
		0.056 ~ 0.068	1500
		0.082 ~ 0.1	1000
		0.15	800
	200	0.001 ~ 0.0022	3500
		0.0027 ~ 0.0047	3000
		0.0056 ~ 0.01	2500
		0.012	2000
		0.015 ~ 0.027	1500
	400	0.001	3500
		0.0012 ~ 0.0022	3000
		0.0027 ~ 0.0033	2500
TX TZ	100	0.001 ~ 0.027	1000
	200	0.001 ~ 0.012	1000
	400	0.001 ~ 0.0047	1000
	630	0.001 ~ 0.0018	1000

Series	WV	Ammo	
		μF	Q'ty
TL TJ	63	0.047 ~ 0.12	2000
		0.15 ~ 0.39	1500
		0.47 ~ 0.56	1000
		0.68 ~ 1.0	800
	100 (P:5.0mm)	0.01 ~ 0.082	2000
		0.1	1500
		0.15	1000
	100 (P:7.5mm)	0.01 ~ 0.082	1500
		0.1 ~ 0.33	1000
		0.47	800
	250	0.01 ~ 0.082	1500
		0.1	1000
	400	0.01 ~ 0.018	1500
PX PF	100 200 400	0.001 ~ 0.0047	1000

● Lead Space : 7.5 mm

Series	WV	Ammo	
		μF	Q'ty
TX TZ	100	0.033 ~ 0.082	600
		0.1 ~ 0.18	500
		0.22 ~ 0.27	400
		0.33 ~ 0.47	300
	200	0.015 ~ 0.027	600
		0.033 ~ 0.047	500
		0.056 ~ 0.15	400
		0.18 ~ 0.22	300
	400	0.0056 ~ 0.015	600
		0.018 ~ 0.027	500
		0.033 ~ 0.082	400
		0.1	300
	630	0.0022 ~ 0.0068	500
		0.0082 ~ 0.047	400
		0.056 ~ 0.068	300
TM	100	0.01 ~ 0.22	600
		0.27 ~ 0.56	500
		0.68 ~ 1.2	400
	250	0.01 ~ 0.22	600
		0.27 ~ 0.39	500
		0.47 ~ 0.68	400
	400	0.01 ~ 0.056	600
		0.068 ~ 0.1	500
		0.12 ~ 0.33	400
	630	0.01 ~ 0.082	500
		0.1 ~ 0.12	300
TL TJ	100	0.12 ~ 0.56	600
		0.68 ~ 0.82	500
		1.0	400
	250	0.12 ~ 0.56	600
		0.68 ~ 0.82	500
		1.0	400
	400	0.022 ~ 0.22	600
		0.27 ~ 0.47	500
	630	0.01 ~ 0.068	600
		0.082 ~ 0.18	500

Series	WV	Ammo	
		μF	Q'ty
PH	800	0.001 ~ 0.0039	600
		0.0047 ~ 0.0068	500
		0.0082	400
	1000	0.001 ~ 0.0022	600
		0.0027 ~ 0.0039	500
		0.0047 ~ 0.0056	400
	1250	0.001 ~ 0.0015	600
		0.0018 ~ 0.0022	500
		0.0027 ~ 0.0039	400
	1600	0.001 ~ 0.0018	500
		0.0022 ~ 0.0033	400
PC	100/250	0.01 ~ 0.1	600
		0.12 ~ 0.15	500
		0.18 ~ 0.22	400
		0.27 ~ 0.33	300
	400/630	0.01 ~ 0.033	600
		0.039 ~ 0.047	500
		0.056 ~ 0.082	400
		0.1 ~ 0.18	300
	800	0.01 ~ 0.027	600
		0.033 ~ 0.047	500
		0.056 ~ 0.082	400
		0.1	300
PX PF	100	0.0068 ~ 0.015	500
		0.022 ~ 0.1	400
	200	0.0068 ~ 0.01	600
		0.015 ~ 0.047	400
	400	0.0033 ~ 0.01	500
		0.015 ~ 0.022	400
	630	0.001 ~ 0.0022	600
		0.0027 ~ 0.015	400
TY	200	0.068 ~ 0.1	500
	400	0.047 ~ 0.056	500

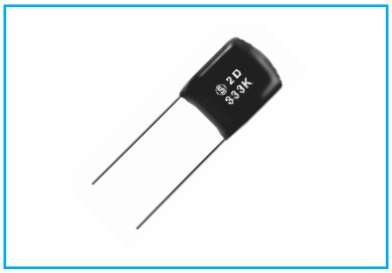
● EB Series (Box Type)

Packing / Pitch / Thickness	Ammo		
	5.0	7.5	10
2.5	2000	2000	
3.0	1500	1500	
3.5	1500	1500	
4.0	1200	1200	600
4.5	1200	1200	
5.0	1000	1000	500
6.0	800	800	400

TY Polyester Film Series

- Inductive construction
- Epoxy resin coating
- Applications : Various industrial equipment

Item	Characteristics
Operating temperature range	-40 ~ +85℃
Capacitance tolerance	±5% (J), ±10% (K), ±20% (M) at 1kHz, 20℃
Dissipation factor	0.01 max. at 1kHz, 20℃
Insulation resistance	30000 MΩ min.
Withstand voltage	Test voltage: Terminal to terminal — Rated voltage × 2: 60~65 s; Rated voltage × 2.5: 1~5 s Test voltage: Terminal to coating — Rated voltage × 2: 1~5 s; Rated voltage × 2.5: —



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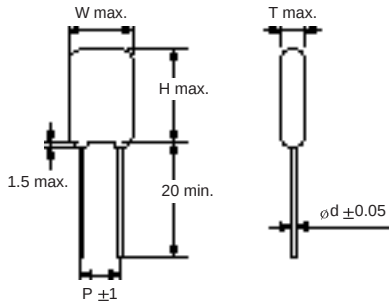


DIMENSIONS

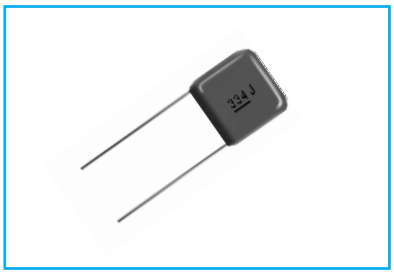
Unit : mm

WV / Code / μF	100VDC(2A)					200VDC(2D)					400VDC(2G)				
	T	W	H	P	ød	T	W	H	P	ød	T	W	H	P	ød
0.001	2.8	5.3	10.0	3.0	0.5	2.8	5.4	12.5	4.0	0.5	3.5	6.0	12.5	4.0	0.5
0.0012	2.8	5.4	10.0	3.5	0.5	2.9	5.5	12.5	4.0	0.5	3.5	6.0	12.5	4.0	0.5
0.0015	2.8	5.4	10.0	3.5	0.5	2.9	5.5	12.5	4.0	0.5	3.5	6.0	12.5	4.0	0.5
0.0018	2.9	5.5	10.0	3.5	0.5	3.1	5.5	12.5	4.0	0.5	4.0	7.0	12.5	4.0	0.5
0.0022	2.9	5.5	10.0	3.5	0.5	3.1	5.7	12.5	4.0	0.5	4.0	7.0	12.5	4.0	0.5
0.0027	3.0	5.7	10.0	3.5	0.5	3.3	5.9	12.5	4.0	0.5	4.0	7.5	12.5	4.0	0.5
0.0033	3.0	5.8	12.5	3.5	0.5	3.3	5.9	12.5	4.0	0.5	4.5	7.5	12.5	4.0	0.5
0.0039	3.1	5.8	12.5	3.5	0.5	3.5	6.0	12.5	4.0	0.5	4.5	8.5	12.7	4.0	0.5
0.0047	3.1	5.8	12.5	3.5	0.5	3.5	6.0	12.5	4.0	0.5	4.5	8.5	12.7	5.5	0.5
0.0056	3.2	5.8	12.5	3.5	0.5	3.7	6.5	12.5	4.0	0.5	4.5	8.5	12.9	5.5	0.5
0.0068	3.2	5.8	12.5	3.5	0.5	3.7	7.0	12.5	4.0	0.5	5.5	9.0	12.8	5.5	0.5
0.0082	3.4	6.0	12.5	3.5	0.5	4.2	7.5	12.5	4.0	0.5	5.5	9.5	13.0	5.5	0.5
0.01	3.4	6.5	12.5	3.5	0.5	4.2	7.5	12.5	5.5	0.5	6.0	11.0	13.0	6.0	0.5
0.012	3.5	6.0	12.5	3.5	0.5	4.4	8.0	12.5	5.5	0.5	6.0	10.5	13.7	6.0	0.5
0.015	3.5	6.0	12.5	3.5	0.5	4.4	10.0	12.5	5.5	0.5	6.5	11.0	13.9	7.0	0.5
0.018	3.5	6.5	12.5	5.0	0.5	4.5	10.5	12.5	5.5	0.5	6.5	12.0	15.5	7.0	0.5
0.022	3.9	7.2	12.5	5.0	0.5	5.5	10.5	12.5	7.5	0.5	7.5	12.0	15.5	8.0	0.5
0.027	4.0	7.3	12.5	5.0	0.5	5.5	11.0	12.5	7.5	0.5	6.5	12.0	18.8	8.0	0.5
0.033	4.5	7.5	12.5	5.5	0.5	5.0	10.3	18.5	8.0	0.5	7.0	13.0	18.8	8.0	0.5
0.039	4.8	8.0	12.5	5.5	0.5	5.7	11.0	18.5	8.0	0.5	7.5	13.5	19.0	8.0	0.5
0.047	5.0	8.5	12.5	5.5	0.5	5.7	11.0	18.5	8.0	0.5	8.0	14.0	19.5	10.0	0.5
0.056	5.0	9.5	12.5	7.0	0.5	6.0	12.0	19.0	8.0	0.5	9.0	14.5	19.5	10.0	0.5
0.068	5.5	10.0	12.5	7.0	0.5	6.0	13.0	19.0	10.0	0.5	8.0	14.5	24.0	10.0	0.6
0.082	6.0	10.5	12.5	7.0	0.5	6.5	14.0	19.0	10.0	0.5	9.5	16.5	24.8	10.0	0.6
0.1	5.5	10.5	12.5	7.0	0.5	7.0	14.0	19.0	11.0	0.6					
0.12	6.0	11.0	19.0	7.5	0.5										
0.15	6.0	11.5	19.0	7.5	0.5										
0.18	6.5	13.0	19.0	7.5	0.5										
0.22	7.5	13.0	19.0	7.5	0.5										
0.27	7.5	14.0	23.0	9.0	0.6	□ Applicable to taping of lead center spacing = 5.0 mm									
0.33	8.0	14.0	23.0	9.0	0.6										
0.39	9.5	16.0	24.0	9.5	0.6										
0.47	10.0	16.0	24.0	9.5	0.6										

TS Polyester Film, Low Profile Small Sized Series

· Inductive construction
· Epoxy resin coating
· Applications : VTR and automotive electronics

Item	Characteristics
Operating temperature range	-40 ~ +85℃
Capacitance tolerance	±5% (J), ±10% (K), ±20% (M) at 1kHz, 20℃
Dissipation factor	0.01 max. at 1kHz, 20℃
Insulation resistance	30000 MΩ min.
Withstand voltage	Test voltage: Terminal to terminal — Rated voltage ×2: 60~65 s — Rated voltage ×2.5: 1~5 s; Terminal to coating — Rated voltage ×2: 1~5 s — Rated voltage ×2.5: —



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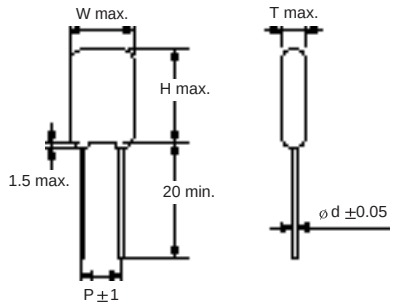


DIMENSIONS

Unit : mm

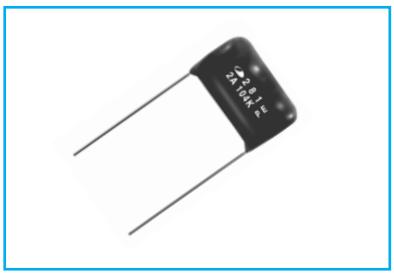
WV / Code / μF	50VDC(1H) T	W	H	P	ød
0.001	2.8	5.0	7.0	3.5	0.5
0.0012	2.8	5.0	7.0	3.5	0.5
0.0015	2.8	5.5	7.0	3.5	0.5
0.0018	2.8	5.5	7.0	3.5	0.5
0.0022	3.0	5.5	7.0	3.5	0.5
0.0027	3.0	5.5	7.0	3.5	0.5
0.0033	3.0	5.5	7.0	3.5	0.5
0.0039	3.0	5.5	7.0	3.5	0.5
0.0047	3.0	5.5	7.0	3.5	0.5
0.0056	3.0	5.5	7.0	3.5	0.5
0.0068	3.0	5.5	7.0	3.5	0.5
0.0082	3.0	5.7	7.0	3.5	0.5
0.01	3.2	6.0	7.0	3.5	0.5
0.012	3.2	6.5	8.5	3.5	0.5
0.015	3.5	6.5	9.0	3.5	0.5
0.018	3.5	6.5	9.0	3.5	0.5
0.022	4.0	7.0	8.0	3.5	0.5
0.027	4.0	7.5	10.5	5.0	0.5
0.033	4.0	8.0	8.0	5.0	0.5
0.039	4.0	7.5	11.0	5.0	0.5
0.047	5.0	8.0	10.0	5.0	0.5
0.056	5.0	8.5	10.0	5.0	0.5
0.068	5.0	9.0	12.0	5.5	0.5
0.082	5.0	9.5	12.0	5.5	0.5
0.1	5.5	10.0	12.0	5.5	0.5
0.12	5.5	10.0	12.5	7.0	0.5
0.15	6.0	11.0	12.5	7.5	0.5
0.18	6.5	11.5	14.0	7.5	0.5
0.22	7.0	13.2	14.0	7.5	0.5
0.27	7.5	13.5	17.0	7.5	0.5
0.33	7.5	13.5	17.0	9.5	0.6
0.39	9.0	14.5	17.5	9.5	0.6
0.47	9.0	15.5	17.5	9.5	0.6

□ Applicable to taping of lead center spacing = 5.0 mm

TX Non-Inductive Polyester Film Series

- Non-inductive construction
- Epoxy resin coating
- Excellent frequency characteristics
- General purpose usage

Item	Characteristics
Operating temperature range	-40 ~ +85℃
Capacitance tolerance	±5% (J), ±10% (K), ±20% (M) at 1kHz, 20℃
Dissipation factor	0.01 max. at 1kHz, 20℃
Insulation resistance	30000 MΩ min.
Withstand voltage	Test voltage: Terminal to terminal — Rated voltage × 2: 60~65 s; Rated voltage × 2.5: 1~5 s Test voltage: Terminal to coating — Rated voltage × 2: 1~5 s; Rated voltage × 2.5: —



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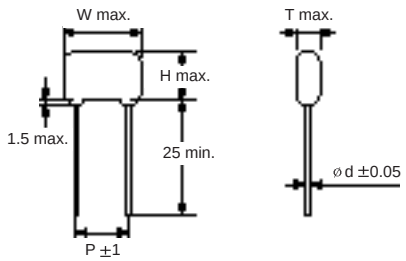


DIMENSIONS

Unit : mm

WV / Code / μF	100VDC(2A)					200VDC(2D)					400VDC(2G)					630VDC(2J)				
	T	W	H	P	ød	T	W	H	P	ød	T	W	H	P	ød	T	W	H	P	ød
0.001	5.5	10.0	8.5	6.0	0.5	5.5	10.0	8.5	6.0	0.5	5.5	10.0	8.5	6.0	0.5	6.0	11.0	9.5	7.5	0.5
0.0012	5.5	10.0	8.5	6.0	0.5	5.5	10.0	8.5	6.0	0.5	5.5	10.0	8.5	6.0	0.5	6.0	11.0	9.5	7.5	0.5
0.0015	5.5	10.0	8.5	6.0	0.5	5.5	10.0	8.5	6.0	0.5	5.5	10.0	8.5	6.0	0.5	6.0	11.0	9.5	7.5	0.5
0.0018	5.5	10.0	8.5	6.0	0.5	5.5	10.0	8.5	6.0	0.5	5.5	10.0	8.5	6.0	0.5	6.0	11.0	9.5	7.5	0.5
0.0022	5.5	10.0	8.5	6.0	0.5	5.5	10.0	8.5	6.0	0.5	6.0	11.0	9.0	7.5	0.5	6.0	14.0	9.5	10.5	0.5
0.0027	5.5	10.0	8.5	6.0	0.5	5.5	10.0	8.5	6.0	0.5	6.0	11.0	9.5	7.5	0.5	6.5	14.0	10.0	10.5	0.6
0.0033	5.5	10.0	8.5	6.0	0.5	5.5	10.0	8.5	6.0	0.5	6.0	11.0	10.0	7.5	0.5	6.5	14.0	10.0	10.5	0.6
0.0039	5.5	10.0	8.5	6.0	0.5	5.5	10.0	8.5	6.0	0.5	6.0	11.0	10.0	7.5	0.5	6.5	14.0	10.5	10.5	0.6
0.0047	5.5	10.0	8.5	6.0	0.5	5.5	10.0	8.5	6.0	0.5	6.5	11.0	10.5	7.5	0.5	6.5	14.0	10.5	10.5	0.6
0.0056	5.5	10.0	9.0	6.0	0.5	5.5	10.0	9.0	6.0	0.5	6.0	14.0	9.5	10.5	0.5	7.0	14.0	11.5	10.5	0.6
0.0068	5.5	11.0	8.5	6.0	0.5	5.5	11.0	8.5	7.5	0.5	6.0	14.0	9.5	10.5	0.5	7.5	14.0	11.5	10.5	0.6
0.0082	5.5	11.0	8.5	7.5	0.5	5.5	11.0	8.5	7.5	0.5	6.0	14.0	10.5	10.5	0.6	8.0	14.0	12.5	10.5	0.6
0.01	5.5	11.0	8.5	7.5	0.5	6.0	11.0	9.0	7.5	0.5	6.5	14.0	10.5	10.5	0.6	8.5	14.0	13.0	10.5	0.6
0.012	6.0	11.0	9.0	7.5	0.5	6.5	11.0	9.5	7.5	0.5	6.0	16.0	10.5	12.5	0.6	8.5	16.0	13.0	12.5	0.6
0.015	5.5	11.0	8.5	7.5	0.5	5.5	14.0	9.0	10.5	0.5	6.5	16.0	11.5	12.5	0.6	8.5	16.0	13.0	12.5	0.6
0.018	5.5	11.0	8.5	7.5	0.5	5.5	14.0	9.5	10.5	0.5	7.0	16.0	12.5	12.5	0.6	8.5	19.0	13.0	15.5	0.6
0.022	6.0	11.0	9.0	7.5	0.5	6.0	14.0	10.0	10.5	0.5	7.5	16.0	13.0	12.5	0.6	8.5	19.0	13.5	15.5	0.6
0.027	6.5	11.0	9.5	7.5	0.5	6.5	14.0	10.5	10.5	0.5	7.5	19.0	13.0	15.5	0.6	9.5	19.0	14.5	15.5	0.6
0.033	6.0	14.0	9.5	10.5	0.5	7.0	14.0	11.0	10.5	0.6	8.0	19.0	13.0	15.5	0.6	10.0	19.0	15.0	15.5	0.8
0.039	6.0	14.0	9.5	10.5	0.5	7.5	14.0	11.5	10.5	0.6	8.5	19.0	14.0	15.5	0.6	10.5	19.0	16.0	15.5	0.8
0.047	6.0	14.0	9.5	10.5	0.5	7.5	16.0	11.5	12.5	0.6	9.0	19.0	15.0	15.5	0.6	10.5	21.5	16.0	17.5	0.8
0.056	5.5	16.0	10.0	12.5	0.5	8.0	16.0	12.0	12.5	0.6	9.5	21.5	15.5	17.5	0.6	11.0	21.5	18.0	17.5	0.8
0.068	6.0	16.0	10.0	12.5	0.5	8.5	16.0	12.5	12.5	0.6	10.5	21.5	16.5	17.5	0.6	12.0	21.5	18.5	17.5	0.8
0.082	6.5	16.0	10.5	12.5	0.5	8.0	19.0	12.5	15.5	0.6	10.5	21.5	17.0	17.5	0.6	12.0	27.5	18.5	23.5	0.8
0.1	7.0	16.0	11.0	12.5	0.5	8.5	19.0	13.5	15.5	0.6	12.5	21.5	20.0	17.5	0.8	12.0	27.5	18.5	23.5	0.8
0.12	6.5	19.0	11.5	15.5	0.6	9.5	19.0	14.0	15.5	0.6										
0.15	7.0	19.0	12.0	15.5	0.6	10.5	19.0	15.5	15.5	0.6										
0.18	8.0	19.5	13.0	15.5	0.8	11.5	21.5	16.5	17.5	0.8										
0.22	8.5	19.5	14.0	15.5	0.8	13.0	21.5	18.0	17.5	0.8										
0.27	9.5	21.5	15.0	17.5	0.8	11.0	27.5	17.5	23.5	0.8										
0.33	11.0	21.5	16.5	17.5	0.8	13.0	27.5	19.0	23.5	0.8										
0.39	12.0	21.5	17.0	17.5	0.8	14.0	27.5	20.0	23.5	0.8										
0.47	13.0	21.5	18.5	17.5	0.8															

□ Applicable to taping of lead center spacing = 5.0 mm
□ Applicable to taping of lead center spacing = 7.5 mm

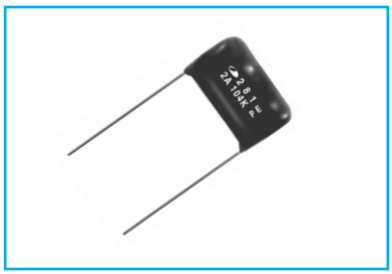
PLASTIC FILM CAPACITORS

NEW

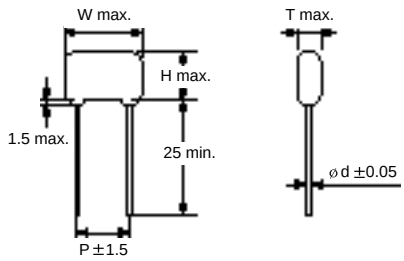
TZ Non-Inductive Polyester Film Series

- Non-inductive construction
- Wide operating temperature -40 ~ +105℃
- Excellent frequency characteristics
- Ideally suited for LCD, PDP Panel, filtering and coupling circuits.

Item	Characteristics
Operating temperature range	-40 ~ +105℃
Capacitance tolerance	±5% (J), ±10% (K), ±20% (M) at 1kHz, 20℃
Dissipation factor	0.01 max. at 1kHz, 20℃
Insulation resistance	30000 MΩ min.
Withstand voltage	Test voltage: Terminal to terminal — Rated voltage ×2: 60 ~ 65 s; Rated voltage ×2.5: 1 ~ 5 s Test voltage: Terminal to coating — Rated voltage ×2: 1 ~ 5 s; Rated voltage ×2.5: —



DRAWING



DIMENSIONS

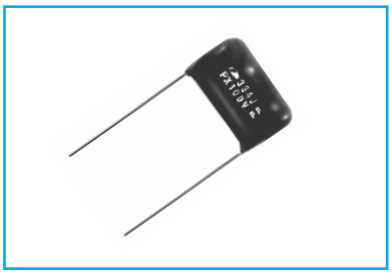
Unit : mm

WV / ΔF Code	100VDC(2A)					200VDC(2D)					400VDC(2G)					630VDC(2J)				
	T	W	H	P	ød	T	W	H	P	ød	T	W	H	P	ød	T	W	H	P	ød
0.001	5.5	10.0	8.5	6.0	0.5	5.5	10.0	8.5	6.0	0.5	5.5	10.0	8.5	6.0	0.5	6.0	11.0	9.5	7.5	5.5
0.0012	5.5	10.0	8.5	6.0	0.5	5.5	10.0	8.5	6.0	0.5	5.5	10.0	8.5	6.0	0.5	6.0	11.0	10.0	7.5	5.5
0.0015	5.5	10.0	8.5	6.0	0.5	5.5	10.0	8.5	6.0	0.5	6.0	10.0	9.0	6.0	0.5	6.5	11.0	10.5	7.5	5.5
0.0018	5.5	10.0	8.5	6.0	0.5	5.5	10.0	8.5	6.0	0.5	6.0	10.0	9.5	6.0	0.5	7.0	11.0	11.0	7.5	5.5
0.0022	5.5	10.0	8.5	6.0	0.5	5.5	10.0	8.5	6.0	0.5	6.0	10.0	9.5	7.5	0.5	6.0	14.0	9.59	10.5	5.5
0.0027	5.5	10.0	8.5	6.0	0.5	5.5	10.0	8.5	6.0	0.5	6.0	11.0	10.0	7.5	0.5	6.0	14.0	.0	10.5	6.0
0.0033	5.5	10.0	8.5	6.0	0.5	5.5	10.0	8.5	6.0	0.5	6.5	11.0	10.5	7.5	0.5	6.5	14.0	10.0	10.5	6.0
0.0039	5.5	10.0	8.5	6.0	0.5	5.5	10.0	8.5	6.0	0.5	7.0	11.0	11.0	7.5	0.5	6.5	14.0	11.0	10.5	6.0
0.0047	5.5	10.0	8.5	6.0	0.5	5.5	10.0	8.5	6.0	0.5	7.5	11.0	9.5	7.5	0.5	6.5	14.0	12.0	10.5	6.0
0.0056	5.5	10.0	9.0	6.0	0.5	5.5	10.0	9.0	6.0	0.5	6.0	14.0	10.0	10.5	0.5	7.5	14.0	12.0	10.5	6.0
0.0068	5.5	11.0	8.5	7.5	0.5	5.5	11.0	8.5	7.5	0.5	6.5	14.0	11.0	10.5	0.5	8.5	14.0	12.5	10.5	6.0
0.0082	5.5	11.0	8.5	7.5	0.5	5.5	11.0	8.5	7.5	0.5	6.5	14.0	11.5	10.5	0.6	9.0	14.0	12.5	10.5	6.0
0.01	5.5	11.0	8.5	7.5	0.5	6.0	11.0	9.0	7.5	0.5	7.0	14.0	11.0	10.5	0.6	10.0	14.0	13.5	10.5	6.0
0.012	5.5	11.0	9.0	7.5	0.5	6.5	11.0	9.5	7.5	0.5	7.0	16.0	12.0	12.5	0.6	9.5	16.0	13.5	12.5	6.0
0.015	5.5	11.0	9.0	7.5	0.5	5.5	14.0	9.0	10.5	0.5	7.0	16.0	13.0	12.5	0.6	10.5	16.0	14.5	12.5	6.0
0.018	6.5	11.0	10.0	7.5	0.5	5.5	14.0	9.5	10.5	0.5	7.5	16.0	13.5	12.5	0.6	9.5	19.0	14.0	15.5	6.0
0.022	7.0	11.0	10.0	7.5	0.5	6.0	14.0	10.0	10.5	0.5	8.0	16.0	13.0	12.5	0.6	10.0	19.0	15.0	15.5	6.0
0.027	7.0	11.0	10.5	7.5	0.5	6.5	14.0	10.5	10.5	0.5	8.0	19.0	14.0	15.5	0.6	11.0	19.0	15.5	15.5	6.0
0.033	6.0	14.0	9.0	10.5	0.5	7.0	14.0	11.0	10.5	0.6	8.5	19.0	14.5	15.5	0.6	12.0	19.0	17.0	15.5	0.8
0.039	6.0	14.0	9.5	10.5	0.5	7.5	14.0	11.5	10.5	0.6	9.0	19.0	15.5	15.5	0.6	11.5	19.0	16.0	15.5	0.8
0.047	6.0	14.0	9.5	10.5	0.5	7.5	16.0	11.5	12.5	0.6	10.0	19.0	15.0	15.5	0.6	12.5	19.0	18.0	15.5	0.8
0.056	5.5	16.0	10.0	12.5	0.5	8.0	16.0	12.0	12.5	0.6	10.0	19.5	16.0	15.5	0.6	13.0	21.5	18.0	17.5	0.8
0.068	6.0	16.0	10.0	12.5	0.5	8.5	16.0	12.5	12.5	0.6	11.0	20.0	16.0	15.5	0.6	13.0	21.5	19.5	17.5	0.8
0.082	6.5	16.0	10.5	12.5	0.5	8.0	19.0	12.5	12.5	0.6	11.5	20.0	16.0	15.5	0.6	11.5	21.5	18.0	17.5	0.8
0.1	7.0	16.0	11.0	12.5	0.5	8.5	19.0	13.5	15.5	0.6	11.5	20.0	16.0	15.5	0.8	11.5	27.5	19.0	23.5	0.8
0.12	6.5	19.0	11.5	15.5	0.6	9.5	19.0	14.0	15.5	0.6						11.5	27.5	18.0	23.5	0.8
0.15	7.0	19.5	12.0	15.5	0.6	10.5	19.0	15.5	15.5	0.6										
0.18	8.0	19.5	13.0	15.5	0.8	11.5	21.5	16.5	17.5	0.8										
0.22	8.5	21.5	14.0	15.5	0.8	13.0	21.5	18.0	17.5	0.8										
0.27	9.5	21.5	15.0	17.5	0.8	11.0	27.5	17.5	23.5	0.8		□ Applicable to taping of lead center spacing = 5.0 mm								
0.33	11.0	21.5	16.5	17.5	0.8	13.0	27.5	19.0	23.5	0.8		□ Applicable to taping of lead center spacing = 7.5 mm								
0.39	12.0	21.5	17.0	17.5	0.8	14.0	27.5	20.0	23.5	0.8										
0.47	13.0	21.5	18.5	17.5	0.8															

PX Polypropylene Film Series

- Non-inductive construction
- Epoxy resin coating
- Low dissipation factor
- Excellent frequency characteristics

Item	Characteristics
Operating temperature range	-40 ~ +85℃
Capacitance tolerance	±5% (J), ±10% (K) at 1kHz, 20℃
Dissipation factor	0.001 max. at 1kHz, 20℃
Insulation resistance	30000 MΩ min.
Withstand voltage	Test voltage: Terminal to terminal — Rated voltage ×2: 60 ~ 65 s; Rated voltage ×2.5: 1 ~ 5 s Test voltage: Terminal to coating — Rated voltage ×2: 1 ~ 5 s; Rated voltage ×2.5: —



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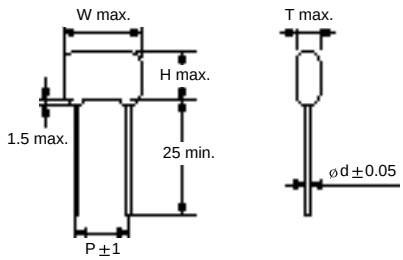


DIMENSIONS

Unit : mm

WV / μF \ Code	100VDC(2A) T	W	H	P	ød	200VDC(2D) T	W	H	P	ød	400VDC(2G) T	W	H	P	ød	630VDC(2J) T	W	H	P	ød
0.001											6.0	11.0	9.0	7.5	0.5	6.0	14.0	9.0	10.5	0.6
0.0015											6.0	11.0	9.0	7.5	0.5	6.0	14.0	9.5	10.5	0.6
0.0022											6.0	11.0	9.0	7.5	0.5	6.0	14.0	10.5	10.5	0.6
0.0033											6.0	14.0	9.0	10.5	0.5	6.5	14.0	11.0	10.5	0.6
0.0047											6.0	14.0	9.5	10.5	0.5	7.5	14.0	12.0	10.5	0.6
0.0068											6.5	14.0	10.0	10.5	0.5	6.0	19.0	11.5	15.5	0.6
0.01						5.5	14.0	10.0	10.5	0.5	7.5	14.0	11.0	10.5	0.5	7.0	19.0	12.5	15.5	0.6
0.015	7.0	14.0	11.5	10.5	0.5	6.0	16.0	10.0	12.5	0.6	7.0	19.0	11.0	15.5	0.6	8.5	19.0	14.0	15.5	0.6
0.022	6.0	16.0	10.5	12.5	0.5	6.5	16.0	10.5	12.5	0.6	8.0	19.0	12.5	15.5	0.6	7.5	24.0	14.5	20.5	0.6
0.033	6.0	16.0	10.5	12.5	0.5	6.0	19.0	11.5	15.5	0.6	7.5	24.0	14.5	20.5	0.6	9.0	24.0	15.5	20.5	0.6
0.047	6.0	16.0	10.5	12.5	0.5	7.0	19.0	12.5	15.5	0.6	8.5	24.0	15.5	20.5	0.6	10.5	24.0	18.0	20.5	0.6
0.068	6.0	19.0	10.5	15.5	0.6	7.0	24.0	12.5	20.5	0.6	10.5	24.0	17.0	20.5	0.6	11.0	29.0	18.5	25.5	0.6
0.1	7.0	19.0	12.0	15.5	0.6	8.0	24.0	15.0	20.5	0.6	10.5	29.0	19.0	25.5	0.6					
0.15	6.5	24.0	13.5	20.5	0.6	8.0	29.0	16.5	25.5	0.6	13.0	29.0	21.0	25.5	0.6					
0.22	7.5	24.0	14.5	20.5	0.6	9.5	29.0	18.0	25.5	0.6										
0.33	8.0	29.0	15.0	25.5	0.8															

□ Applicable to taping of lead center spacing = 5.0 mm
□ Applicable to taping of lead center spacing = 7.5 mm

PLASTIC FILM CAPACITORS

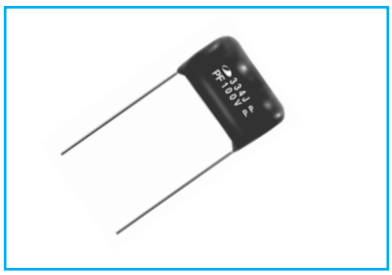
NEW

PF

Non-Inductive Polyester Film
Series

- Non-inductive construction
- Wide operating temperature -40 ~ +105℃
- Insulation reistance
- Ideally suited for LCD, PDP Panel, filtering and coupling circuits.

Item	Characteristics
Operating temperature range	-40 ~ +105℃
Capacitance tolerance	±5% (J), ±10% (K), ±20% (M) at 1kHz, 20℃
Dissipation factor	0.001 max. at 1kHz, 20℃
Insulation resistance	30000 MΩ min.
Withstand voltage	Test voltage: Terminal to terminal — Rated voltage ×2: 60~65 s; Rated voltage ×2.5: 1~5 s Test voltage: Terminal to coating — Rated voltage ×2: 1~5 s; Rated voltage ×2.5: —



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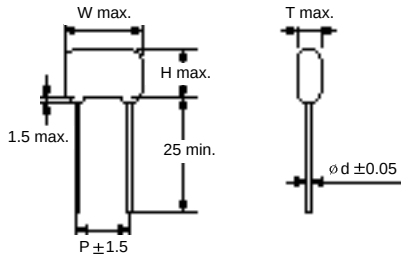


DIMENSIONS

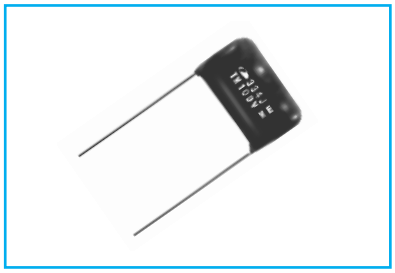
Unit : mm

WV / μF \ Code	100VDC(2A)					200VDC(2D)					400VDC(2E)					630VDC(2E)				
	T	W	H	P	ød	T	W	H	P	ød	T	W	H	P	ød	T	W	H	P	ød
0.001	5.0	11.0	8.5	7.5	0.5	6.0	11.0	9.5	7.5	0.5	5.5	11.0	9.0	7.5	0.5	6.0	14.0	9.5	10.5	0.6
0.0015	6.0	11.0	9.5	7.5	0.5	6.0	11.0	9.5	7.5	0.5	5.5	11.0	9.0	7.5	0.5	6.0	14.0	10.5	10.5	0.6
0.0022	6.0	11.0	9.5	7.5	0.5	6.0	11.0	9.5	7.5	0.5	5.5	11.0	9.0	7.5	0.5	6.5	14.0	11.0	10.5	0.6
0.0033	6.0	11.0	9.5	7.5	0.5	6.0	11.0	9.5	7.5	0.5	5.0	14.0	8.5	10.5	0.5	7.5	14.0	12.0	10.5	0.6
0.0047	6.0	11.0	9.5	7.5	0.5	5.5	14.0	9.5	10.5	0.5	5.5	14.0	9.5	10.5	0.5	8.5	14.0	13.0	10.5	0.6
0.0068	5.5	14.0	9.5	10.5	0.5	5.5	14.0	9.0	10.5	0.5	6.5	14.0	10.0	10.5	0.5	7.0	19.0	12.5	15.5	0.6
0.01	5.5	14.0	9.0	10.5	0.5	6.0	14.0	10.0	10.5	0.5	7.5	14.0	11.0	10.5	0.5	8.0	19.0	13.5	15.5	0.6
0.015	6.0	14.0	9.0	10.5	0.5	6.0	16.0	10.5	12.5	0.6	6.5	19.0	11.0	15.5	0.5	9.5	19.0	15.0	15.5	0.6
0.022	6.0	16.0	10.0	12.5	0.5	6.0	16.0	10.5	12.5	0.6	7.0	19.0	12.5	15.5	0.5	8.8	24.0	15.5	20.5	0.6
0.033	6.0	16.0	10.5	12.5	0.5	6.0	19.0	11.0	15.5	0.6	7.5	24.0	13.5	20.5	0.6	10.5	24.0	17.5	20.5	0.6
0.047	6.0	16.0	10.5	12.5	0.5	6.5	19.0	12.0	15.5	0.6	7.5	24.0	14.5	20.5	0.6	10.5	24.0	17.5	20.5	0.6
0.068	5.5	19.0	10.5	15.5	0.5	6.5	24.0	12.0	20.5	0.6	9.0	25.5	16.0	20.5	0.6	10.5	29.0	17.5	25.5	0.6
0.1	6.0	19.0	10.0	15.5	0.6	7.5	24.0	14.0	20.5	0.6	9.0	29.0	17.5	25.5	0.6					
0.15	6.0	24.0	12.5	20.5	0.6	7.5	30.5	15.5	25.5	0.6	12.0	29.0	18.5	25.5	0.6					
0.22	6.5	24.0	13.5	20.5	0.6	8.5	30.5	16.5	25.5	0.6		□ Applicable to taping of lead center spacing = 5.0 mm								
0.33	7.0	29.0	14.0	25.5	0.8							□ Applicable to taping of lead center spacing = 7.5 mm								

TM Non-Inductive Metallized Polyester Film Series

- Non-inductive construction
- Flame retardant epoxy resin coating
- Self-healing property
- Applications : Filtering and coupling circuits of general communication equipment

Item	Characteristics
Operating temperature range	-40 ~ +85℃
Capacitance tolerance	±5% (J), ±10% (K), ±20% (M) at 1kHz, 20℃
Dissipation factor	0.01 max. at 1kHz, 20℃
Insulation resistance	C≦0.33μF : 9000 MΩ min., C>0.33μF : 3000 ΩF min.
Withstand voltage	Test voltage: Rated voltage ×1.5 — Terminal to terminal: 60~65 s — Terminal to coating: 1~5 s; Rated voltage ×1.75 — Terminal to terminal: 1~5 s — Terminal to coating: —



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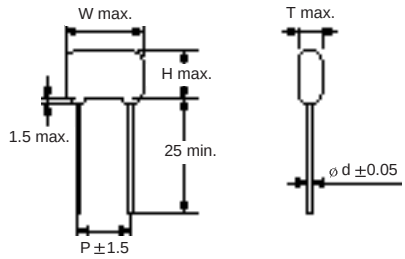


DIMENSIONS

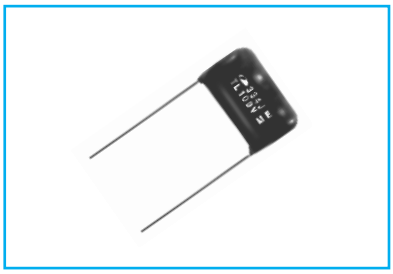
Unit : mm

μF \ WV Code	100VDC(2A)					250VDC(2E)					400VDC(2G)					630VDC(2J)				
	T	W	H	P	ød	T	W	H	P	ød	T	W	H	P	ød	T	W	H	P	ød
0.01											5.0	14.5	9.5	10.0	0.6	5.7	16.5	9.5	12.5	0.6
0.012											5.0	14.5	9.5	10.0	0.6	5.7	16.5	9.5	12.5	0.6
0.015											5.5	14.5	9.5	10.0	0.6	5.7	16.5	9.5	12.5	0.6
0.018											6.0	14.5	9.5	10.0	0.6	5.7	16.5	9.5	12.5	0.6
0.022											6.0	14.5	9.5	10.0	0.6	5.7	16.5	10.5	12.5	0.6
0.027											6.0	14.5	10.0	10.0	0.6	6.2	16.5	11.0	12.5	0.6
0.033											6.0	14.5	10.5	10.0	0.6	6.7	16.5	11.7	12.5	0.6
0.039											6.0	16.5	10.5	12.5	0.6	7.2	16.5	12.2	12.5	0.6
0.047						5.7	14.5	8.8	10.0	0.6	6.0	16.5	10.5	12.5	0.6	6.2	21.5	11.0	17.5	0.6
0.056						5.8	14.5	8.8	10.0	0.6	6.0	16.5	10.5	12.5	0.6	6.5	21.5	11.5	17.5	0.6
0.068						5.7	14.5	8.8	10.0	0.6	6.5	16.5	10.8	12.5	0.6	7.0	21.5	12.0	17.5	0.6
0.082						5.7	14.5	10.5	10.0	0.6	6.8	16.5	12.0	12.5	0.6	7.5	21.5	12.5	17.5	0.6
0.1	5.7	14.5	9.5	10.0	0.6	5.7	16.5	10.3	12.5	0.6	6.5	21.5	11.5	17.5	0.6	8.0	21.5	13.5	17.5	0.6
0.12	5.8	14.5	10.0	10.0	0.6	5.7	16.5	10.6	12.5	0.6	7.0	21.5	12.0	17.5	0.6	8.5	21.5	14.0	17.5	0.8
0.15	5.7	16.5	10.3	12.5	0.6	6.2	16.5	11.0	12.5	0.6	7.5	21.5	12.2	17.5	0.6	8.2	26.5	14.5	22.5	0.8
0.18	5.7	16.5	10.5	12.5	0.6	6.6	16.5	11.5	12.5	0.6	8.0	21.5	12.8	17.5	0.6	8.7	26.5	15.5	22.5	0.8
0.22	6.0	16.5	10.5	12.5	0.6	5.9	21.5	11.0	17.5	0.6	8.7	21.5	13.5	17.5	0.6	9.7	26.5	17.0	22.5	0.8
0.27	6.3	16.5	11.0	12.5	0.6	6.3	21.5	11.4	17.5	0.8	10.0	21.5	14.7	17.5	0.8	10.7	26.5	17.5	22.5	0.8
0.33	6.0	21.5	10.5	17.5	0.6	6.9	21.5	12.0	17.5	0.8	9.6	21.5	17.0	17.5	0.8	11.7	26.5	19.0	22.5	0.8
0.39	6.3	21.5	10.8	17.5	0.6	7.3	21.5	12.4	17.5	0.8	9.2	26.5	16.0	22.5	0.8	11.2	31.5	18.0	27.5	0.8
0.47	6.9	21.5	11.3	17.5	0.6	7.9	21.5	13.0	17.5	0.8	10.2	26.5	17.0	22.5	0.8	12.2	31.5	19.0	27.5	0.8
0.56	7.3	21.5	11.8	17.5	0.8	7.9	21.5	14.7	17.5	0.8	11.2	26.5	18.0	22.5	0.8	13.5	31.5	20.0	27.5	0.8
0.68	7.8	21.5	12.4	17.5	0.8	8.5	21.5	14.7	17.5	0.8	12.8	26.5	20.0	22.5	0.8					
0.82	7.9	21.5	14.0	17.5	0.8	8.3	26.5	15.1	22.5	0.8	12.2	31.5	19.0	27.5	0.8					
1.0	8.6	21.5	16.0	17.5	0.8	9.1	26.5	15.9	22.5	0.8	13.2	31.5	20.0	27.5	0.8					
1.2	8.9	21.5	17.0	17.5	0.8	9.9	26.5	16.6	22.5	0.8	15.0	31.5	22.5	27.5	0.8					
1.5	9.1	26.5	17.0	22.5	0.8	11.3	26.5	17.7	22.5	0.8										
1.8	10.0	26.5	18.0	22.5	0.8	12.0	26.5	18.7	22.5	0.8										
2.2	11.0	26.5	19.5	22.5	0.8							□ Applicable to taping of lead center spacing = 7.5 mm								
2.7	12.2	26.5	20.5	22.5	0.8															

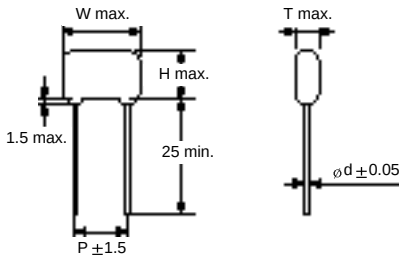
TL Non-Inductive Metallized Polyester Film Series

- Smaller sizes than TM series
- Including lead space of 5.0mm
- Non-inductive construction
- Flame retardant epoxy resin coating
- Self-healing property
- Applications : Filtering and coupling circuits of general communication equipment

Item	Characteristics
Operating temperature range	-40 ~ +85℃
Capacitance tolerance	±5%(J), ±10%(K), ±20%(M) at 1kHz, 20℃
Dissipation factor	0.01 max. at 1kHz, 20°C
Insulation resistance	C≦0.33μF : 9000 MΩ min., C>0.33μF : 3000 ΩF min.
Withstand voltage	Test voltage: Rated voltage × 1.5 / Rated voltage × 1.75 Terminal to terminal: 60 ~ 65 s / 1 ~ 5 s Terminal to coating: 1 ~ 5 s / —



DRAWING



TL series

● DIMENSIONS/LEAD SPACE : 5mm

Unit : mm

WV / Code / μF	63VDC(1J)					100VDC(2A)				
	T	W	H	P	ød	T	W	H	P	ød
0.01						3.5	7.5	7.0	5.0	0.5
0.012						3.5	7.5	7.0	5.0	0.5
0.015						3.5	7.5	7.0	5.0	0.5
0.018						3.5	7.5	7.0	5.0	0.5
0.022						3.5	7.5	7.0	5.0	0.5
0.027						3.5	7.5	7.0	5.0	0.5
0.033						3.5	7.5	7.0	5.0	0.5
0.039						3.5	7.5	7.0	5.0	0.5
0.047	3.5	7.5	7.0	5.0	0.5	3.5	7.5	7.0	5.0	0.5
0.056	3.5	7.5	7.0	5.0	0.5	3.5	7.5	7.5	5.0	0.5
0.068	3.5	7.5	7.0	5.0	0.5	3.5	7.5	7.5	5.0	0.5
0.082	3.5	7.5	7.0	5.0	0.5	4.0	7.5	8.0	5.0	0.5
0.1	3.5	7.5	7.0	5.0	0.5	4.5	7.5	8.5	5.0	0.5
0.12	3.5	7.5	7.0	5.0	0.5					
0.15	4.0	7.5	7.0	5.0	0.5					
0.18	4.5	7.5	7.0	5.0	0.5					
0.22	4.5	7.5	7.5	5.0	0.5					
0.27	5.0	7.5	8.0	5.0	0.5					
0.33	5.5	7.5	9.0	5.0	0.5					
0.39	5.5	7.5	9.5	5.0	0.5					
0.47	6.0	7.5	9.5	5.0	0.5					
0.56	6.0	7.5	10.0	5.0	0.5					
0.68	6.5	7.5	10.5	5.0	0.5					
0.82	6.5	7.5	10.5	5.0	0.5					
1.0	6.5	7.5	10.5	5.0	0.5					

* Note : The above products of lead space 5.0mm are applied to taping of lead center spacing 5.0mm

● DIMENSIONS

Unit : mm

WV / Code / μF	100VDC(2A)					250VDC(2E)					400VDC(2G)					630VDC(2J)				
	T	W	H	P	ød	T	W	H	P	ød	T	W	H	P	ød	T	W	H	P	ød
0.01	5.0	11.0	8.0	7.5	0.6	5.0	11.0	8.0	7.5	0.6	5.5	11.0	8.5	7.5	0.6	5.5	13.0	9.0	10.0	0.6
0.012	5.0	11.0	8.0	7.5	0.6	5.0	11.0	8.0	7.5	0.6	5.5	11.0	8.5	7.5	0.6	5.5	13.0	10.0	10.0	0.6
0.015	5.0	11.0	8.5	7.5	0.6	5.0	11.0	8.5	7.5	0.6	5.5	11.0	9.0	7.5	0.6	5.5	13.0	10.0	10.0	0.6
0.018	5.0	11.0	8.5	7.5	0.6	5.0	11.0	8.5	7.5	0.6	6.0	11.0	9.0	7.5	0.6	5.5	13.0	10.0	10.0	0.6
0.022	5.0	11.0	8.5	7.5	0.6	5.0	11.0	8.5	7.5	0.6	5.5	13.0	10.0	10.0	0.6	5.5	13.0	10.0	10.0	0.6
0.027	5.0	11.0	8.5	7.5	0.6	5.0	11.0	8.5	7.5	0.6	5.5	13.0	10.0	10.0	0.6	5.5	13.0	10.0	10.0	0.6
0.033	5.0	11.0	8.5	7.5	0.6	5.0	11.0	8.5	7.5	0.6	6.0	13.0	10.0	10.0	0.6	6.5	13.0	10.5	10.0	0.6
0.039	5.0	11.0	8.5	7.5	0.6	5.0	11.0	8.5	7.5	0.6	6.0	13.0	10.0	10.0	0.6	7.0	13.0	11.0	10.0	0.6
0.047	5.0	11.0	8.5	7.5	0.6	5.5	11.0	8.5	7.5	0.6	6.0	13.0	10.0	10.0	0.6	7.0	13.0	12.0	10.0	0.6
0.056	5.0	11.0	9.0	7.5	0.6	5.5	11.0	9.0	7.5	0.6	6.0	13.0	10.5	10.0	0.6	6.0	18.5	11.5	15.0	0.6
0.068	5.0	11.0	9.0	7.5	0.6	5.5	11.0	9.0	7.5	0.6	6.5	13.0	10.5	10.0	0.6	6.5	18.5	11.5	15.0	0.6
0.082	5.0	11.0	9.0	7.5	0.6	5.5	11.0	9.0	7.5	0.6	7.0	13.0	11.0	10.0	0.6	6.5	18.5	11.5	15.0	0.6
0.1	5.5	11.0	9.0	7.5	0.6	5.5	11.0	9.5	7.5	0.6	6.0	18.5	10.0	15.0	0.6	7.5	18.5	13.5	15.0	0.6
0.12	5.5	13.0	10.0	10.0	0.6	5.5	13.0	9.5	10.0	0.6	6.0	18.5	10.5	15.0	0.6	8.0	18.5	13.5	15.0	0.8
0.15	5.5	13.0	10.0	10.0	0.6	5.5	13.0	10.0	10.0	0.6	6.5	18.5	11.0	15.0	0.6	8.0	18.5	15.5	15.0	0.8
0.18	6.0	13.0	10.5	10.0	0.6	6.0	13.0	10.5	10.0	0.6	6.5	18.5	12.0	15.0	0.6	9.0	18.5	16.0	15.0	0.8
0.22	6.5	13.0	11.0	10.0	0.6	6.5	13.0	11.0	10.0	0.6	7.0	18.5	13.0	15.0	0.6	8.0	26.0	15.0	22.5	0.8
0.27	7.0	13.0	11.5	10.0	0.6	7.0	13.0	11.5	10.0	0.6	8.0	18.5	13.0	15.0	0.8	8.0	26.0	15.5	22.5	0.8
0.33	6.0	18.5	11.0	15.0	0.6	6.0	18.5	11.0	15.0	0.6	8.5	18.5	14.0	15.0	0.8	9.0	26.0	16.0	22.5	0.8
0.39	6.5	18.5	11.0	15.0	0.6	6.5	18.5	11.0	15.0	0.6	8.5	18.5	15.0	15.0	0.8	9.5	26.0	17.0	22.5	0.8
0.47	7.0	18.5	11.5	15.0	0.6	7.0	18.5	12.0	15.0	0.6	9.0	18.5	16.0	15.0	0.8	10.5	26.0	18.0	22.5	0.8
0.56	7.5	18.5	12.0	15.0	0.6	7.5	18.5	12.0	15.0	0.6	8.0	26.0	15.0	22.5	0.8	10.5	26.0	19.5	22.5	0.8
0.68	7.5	18.5	13.0	15.0	0.8	7.5	18.5	13.0	15.0	0.8	8.5	26.0	15.5	22.5	0.8	12.0	26.0	20.5	22.5	0.8
0.82	8.0	18.5	14.0	15.0	0.8	8.0	18.5	14.0	15.0	0.8	9.5	26.0	16.5	22.5	0.8	13.0	31.0	20.0	27.5	0.8
1.0	9.0	18.5	14.5	15.0	0.8	9.0	18.5	15.0	15.0	0.8	10.0	26.0	18.0	22.5	0.8	14.0	31.0	20.0	27.5	0.8
1.2	8.5	26.0	14.0	22.5	0.8	8.5	26.0	14.0	22.5	0.8	10.5	26.0	19.0	22.5	0.8					
1.5	9.0	26.0	14.5	22.5	0.8	9.0	26.0	14.5	22.5	0.8	11.0	31.0	19.0	27.5	0.8					
1.8	9.0	26.0	16.0	22.5	0.8	9.0	26.0	16.0	22.5	0.8	12.0	31.0	20.0	27.5	0.8					
2.2	10.0	26.0	17.0	22.5	0.8	10.0	26.0	17.0	22.5	0.8	13.0	31.0	21.0	27.5	0.8					
2.7	11.0	26.0	18.0	22.5	0.8	11.0	26.0	18.0	22.5	0.8										
3.3	12.5	26.0	20.0	22.5	0.8	12.5	26.0	20.0	22.5	0.8	□ Applicable to taping of lead center spacing = 5.0 mm									
3.9	13.0	26.0	21.0	22.5	0.8	13.0	26.0	21.0	22.5	0.8	□ Applicable to taping of lead center spacing = 7.5 mm									

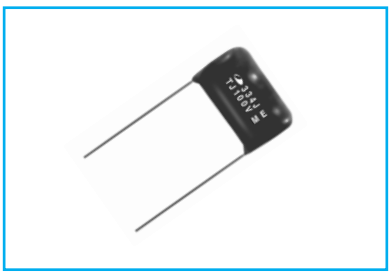
NEW

TJ

Non-Inductive Metallized Polyester Film Series

- Non-inductive construction
- Wide operating temperature -40 ~ +105℃
- Self-healing property
- Ideally suited for using in order to reduce the nose of PDP panel

Item	Characteristics
Operating temperature range	-40 ~ +105℃
Capacitance tolerance	±5% (J), ±10% (K), ±20% (M) at 1kHz, 20℃
Dissipation factor	0.01 max. at 1kHz, 20℃
Insulation resistance	C ≦0.33μF : 9000 MΩ min., C>0.33μF : 3000 ΩF min.
Withstand voltage	Test voltage: Terminal to terminal — Rated voltage ×2: 60~65 s; Rated voltage ×2.5: 1~5 s Test voltage: Terminal to coating — Rated voltage ×2: 1~5 s; Rated voltage ×2.5: —



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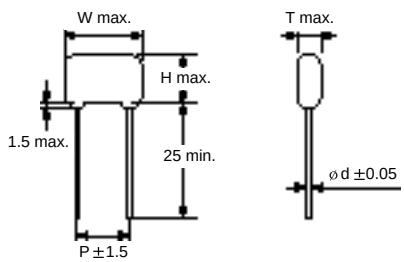
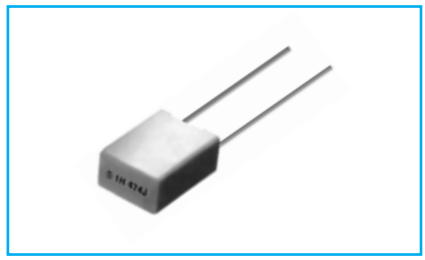


DIMENSIONS

Unit : mm

WV / μF Code	100/250VDC(2A/2E)					400VDC(2G)					630VDC(2J)				
	T	W	H	P	ød	T	W	H	P	ød	T	W	H	P	ød
0.01	5.0	11.0	8.0	7.5	0.6	5.5	13.0	10.0	10.0	0.6	5.0	13.0	9.0	10.0	0.6
0.012	5.0	11.0	8.0	7.5	0.6	5.5	13.0	10.0	10.0	0.6	5.0	13.0	9.5	10.0	0.6
0.015	5.0	11.0	8.5	7.5	0.6	5.5	13.0	10.0	10.0	0.6	5.0	13.0	10.0	10.0	0.6
0.018	5.0	11.0	9.0	7.5	0.6	5.5	13.0	10.0	10.0	0.6	5.0	13.0	10.0	10.0	0.6
0.022	5.0	11.0	8.0	7.5	0.6	5.5	13.0	10.0	10.0	0.6	5.0	13.0	10.5	10.0	0.6
0.027	5.5	11.0	8.5	7.5	0.6	5.5	13.0	10.0	10.0	0.6	6.0	13.0	11.0	10.0	0.6
0.033	5.5	11.0	9.0	7.5	0.6	6.0	13.0	10.0	10.0	0.6	6.5	13.0	11.5	10.0	0.6
0.039	5.5	11.0	8.5	7.5	0.6	6.0	13.0	10.5	10.0	0.6	7.0	13.0	12.0	10.0	0.6
0.047	5.5	11.0	9.0	7.5	0.6	6.0	13.0	10.5	10.0	0.6	7.5	13.0	12.5	10.0	0.6
0.056	6.0	11.0	9.5	7.5	0.6	6.0	13.0	11.0	10.0	0.6	6.5	18.5	11.5	15.0	0.6
0.068	6.0	11.0	9.0	7.5	0.6	6.5	13.0	11.5	10.0	0.6	7.0	18.5	12.0	15.0	0.6
0.082	6.0	11.0	9.0	7.5	0.6	6.5	13.0	12.0	10.0	0.6	7.5	18.5	12.5	15.0	0.6
0.1	6.5	11.0	9.5	7.5	0.6	6.0	18.5	10.0	15.0	0.6	8.0	18.5	13.5	15.0	0.6
0.12	5.5	13.0	9.5	10.0	0.6	6.0	18.5	10.5	15.0	0.6	8.5	18.5	15.0	15.0	0.8
0.15	5.5	13.0	10.0	10.0	0.6	6.5	18.5	11.0	15.0	0.6	9.0	18.5	16.0	15.0	0.8
0.18	6.0	13.0	10.5	10.0	0.6	6.5	18.5	12.0	15.0	0.6	10.0	18.5	17.0	15.0	0.8
0.22	6.5	13.0	10.0	10.0	0.6	7.0	18.5	13.0	15.0	0.6	9.0	26.0	15.5	22.5	0.8
0.27	7.0	13.0	11.5	12.0	0.6	8.0	18.5	13.0	15.0	0.8	9.5	26.0	16.5	22.5	0.8
0.33	6.0	18.5	11.0	15.0	0.6	8.5	18.5	14.0	15.0	0.8	10.5	26.0	17.5	22.5	0.8
0.39	6.5	18.5	11.0	15.0	0.6	8.5	18.5	15.0	15.0	0.8	11.5	26.0	18.5	22.5	0.8
0.47	7.0	18.5	12.0	15.0	0.6	9.0	18.5	16.0	15.0	0.8	11.5	26.0	19.5	22.5	0.8
0.56	7.5	18.5	12.0	15.0	0.6	8.0	26.0	15.0	22.5	0.8	11.5	26.0	19.5	22.5	0.8
0.068	7.5	18.5	13.0	15.0	0.8	8.5	26.0	15.5	22.5	0.8	11.5	26.0	19.5	22.5	0.8
0.82	8.0	18.5	14.0	15.0	0.8	9.5	26.0	16.5	22.5	0.8	11.0	31.0	19.0	22.5	0.8
1	9.0	18.0	15.0	22.5	0.8	10.5	26.0	18.5	22.5	0.8	12.5	31.0	20.5	22.5	0.8
1.2	8.5	26.0	14.0	22.5	0.8	11.5	26.0	19.5	22.5	0.8					
1.5	9.0	26.0	14.5	22.5	0.8	11.5	31.0	19.5	27.5	0.8					
1.8	9.0	26.0	16.0	22.5	0.8	13.0	31.0	20.5	27.5	0.8					
2.2	10.0	26.0	17.0	22.5											
2.7	10.5	26.0	18.0	22.5											
3.3	12.5	26.0	20.0	22.5						□ Applicable to taping of lead center spacing = 5.0 mm					
3.9	13.0	26.0	20.0	22.5						□ Applicable to taping of lead center spacing = 7.5 mm					
4.7	13.0	26.0	20.0	27.5											
5.6	13.0	26.0	20.0	27.5											
6.8	13.0	26.0	20.0	27.5											
8.2	12.5	26.0	20.0	27.5											

EB Non-Inductive Metallized Polyester Film Series

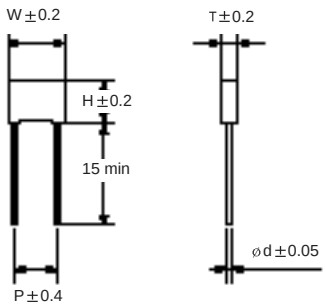


- Non-inductive construction
- Flame retardant resin case
- Small sized and available for automatic insertion
- Applications : VTR and automotive electronics

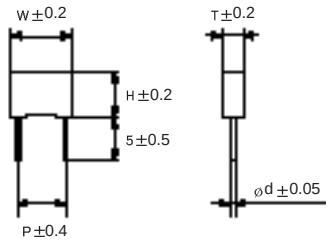
Item	Characteristics
Operating temperature range	-40 ~ +85℃
Capacitance tolerance	±5% (J), ±10% (K), ±20% (M) at 1kHz, 20℃
Dissipation factor	0.01 max. at 1kHz, 20℃
Insulation resistance	WV ≦100: C ≦0.1㎌ : 10000MΩmin., C>0.1㎌ : 1000ΩF min. WV>100: C ≦0.33㎌ : 30000MΩmin., C>0.33㎌ : 10000ΩF min.
Withstand voltage (Terminal to terminal)	Test voltage : Rated voltage × 1.6 (VDC) Test time : 2s

DRAWING

Unit : mm

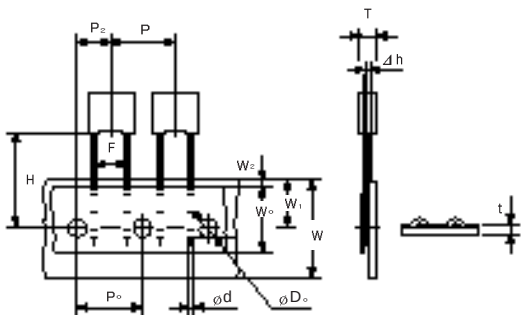


Lead cut



Lead Taping Capacitors for Automatic Insertion

LEAD SPACE : 5mm



Unit : mm

Description	Symbol	Drawing	Tolerance
Lead wire diameter	ød	0.6	±0.05
Body pitch	P_1	12.7	±1.0
Feeding hole pitch	P_0	12.7	±0.3
Feeding hole off alignment	P_2	6.35	±1.0
Lead center spacing	F	5.0	+0.6,-0.2
Body inclination	Δh	0	±2.0
Length from seating plane	H	18.5	±0.75
Tape width	W	18.0	±0.5
Adhesive tape width	W_0	6.0	min.
Feeding hole off alignment	W_1	9.0	±0.5
Adhesive tape margin	W_2	2.0	max.
Feeding hole diameter	ø D_0	4.0	±0.2
Total tape thickness	t	0.7	±0.2
Taping code	Ammo	AG	

DIMENSIONS

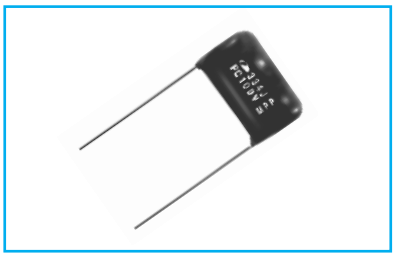
Unit : mm

VDC(VAC) / ㎌ Code	50 (30)					63 (40)					100 (63)				
	T	W	H	P	ød	T	W	H	P	ød	T	W	H	P	ød
0.001											3.0	7.2	6.5	5.0	0.6
0.0015											3.0	7.2	6.5	5.0	0.6
0.0022											3.0	7.2	6.5	5.0	0.6
0.0033											3.0	7.2	6.5	5.0	0.6
0.0047											3.0	7.2	6.5	5.0	0.6
0.0068											3.0	7.2	6.5	5.0	0.6
0.01											3.0	7.2	6.5	5.0	0.6
0.015											3.0	7.2	6.5	5.0	0.6
0.022											3.0	7.2	6.5	5.0	0.6
0.033											3.0	7.2	6.5	5.0	0.6
0.047						3.0	7.2	6.5	5.0	0.6	3.0	7.2	6.5	5.0	0.6
0.068						3.0	7.2	6.5	5.0	0.6	3.5	7.2	7.5	5.0	0.6
0.1	3.0	7.2	6.5	5.0	0.6	3.0	7.2	6.5	5.0	0.6	3.5	7.2	7.5	5.0	0.6
0.15	3.0	7.2	6.5	5.0	0.6	3.0	7.2	6.5	5.0	0.6	4.5	7.2	9.5	5.0	0.6
0.22	3.0	7.2	6.5	5.0	0.6	3.5	7.2	7.5	5.0	0.6					
0.33	3.5	7.2	7.5	5.0	0.6	3.5	7.2	7.5	5.0	0.6					
0.47	4.5	7.2	9.5	5.0	0.6	5.0	7.2	10.0	5.0	0.6					
0.68	5.0	7.2	10.0	5.0	0.6	5.0	7.2	10.0	5.0	0.6					
1.0	6.0	7.2	11.0	5.0	0.6										

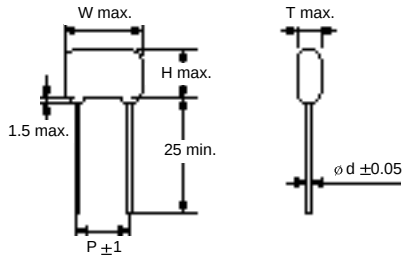
PC Non-Inductive Metallized Polypropylene Film Series

- Non-inductive construction
- Large current use at high frequency
- Epoxy resin coating
- Very low dissipation factor at high frequency

Item	Characteristics
Operating temperature range	-40 ~ +85℃
Capacitance tolerance	±5%(J), ±10%(K) at 1kHz, 20℃
Dissipation factor	0.001 max. at 1kHz, 20℃
Insulation resistance	C ≦0.33μF : 25000 MΩ min., C>0.33μF : 7500 ΩF min.
Withstand voltage	Test voltage: Rated voltage ×1.5 — Terminal to terminal: 60~65 s — Terminal to coating: 1~5 s; Rated voltage ×1.75 — Terminal to terminal: 1~5 s — Terminal to coating: —



DRAWING



DIMENSIONS

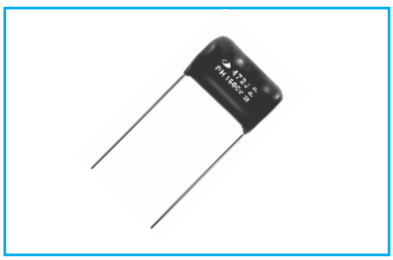
Unit : mm

WV / μF \ Code	100/250VDC (2A/2E)					400/630VDC (2G/2J)					800VDC (2K)				
	T	W	H	P	ø d	T	W	H	P	ø d	T	W	H	P	ø d
0.01						5.5	16.0	10.5	12.5	0.6	5.5	16.0	10.5	12.5	0.6
0.012						5.5	16.0	10.5	12.5	0.6	5.5	16.0	10.5	12.5	0.6
0.015						6.0	16.0	11.0	12.5	0.6	6.0	16.0	11.0	12.5	0.6
0.018						5.5	19.0	10.5	15.0	0.6	5.5	19.0	10.5	15.0	0.6
0.022						6.0	19.0	11.0	15.0	0.6	6.0	19.0	11.0	15.0	0.6
0.027						6.0	19.0	12.0	15.0	0.6	6.5	19.0	11.5	15.0	0.6
0.033						6.5	19.0	12.5	15.0	0.6	7.0	19.0	12.0	15.0	0.6
0.039						7.0	19.0	13.0	15.0	0.6	7.5	19.0	13.0	15.0	0.6
0.047						8.0	19.0	13.5	15.0	0.6	8.0	19.0	13.5	15.0	0.6
0.056						8.5	19.0	14.0	15.0	0.6	8.5	19.0	14.0	15.0	0.6
0.068						9.0	19.0	14.5	15.0	0.8	9.0	19.0	14.5	15.0	0.6
0.082						9.5	19.0	15.5	15.0	0.8	9.5	19.0	15.5	15.0	0.8
0.1	6.5	19.0	12.5	15.0	0.8	10.5	19.0	16.5	15.0	0.8	10.5	19.0	16.5	15.0	0.8
0.12	7.0	19.0	13.0	15.0	0.8	8.5	19.0	15.5	15.0	0.8	9.0	26.0	14.0	22.5	0.8
0.15	8.0	19.0	13.5	15.0	0.8	9.0	19.0	16.5	15.0	0.8	9.5	26.0	16.5	22.5	0.8
0.18	8.5	19.0	14.5	15.0	0.8	10.0	19.0	17.5	15.0	0.8	10.0	26.0	17.5	22.5	0.8
0.22	9.0	19.0	15.0	15.0	0.8	9.0	26.0	16.0	22.5	0.8	11.5	26.0	18.5	22.5	0.8
0.27	10.0	19.0	16.0	15.0	0.8	9.5	26.0	16.5	22.5	0.8	12.5	26.0	20.0	22.5	0.8
0.33	11.0	19.0	17.0	15.0	0.8	10.5	26.0	17.5	22.5	0.8					
0.39	9.0	26.0	16.5	22.5	0.8	11.5	26.0	18.5	22.5	0.8					
0.47	10.0	26.0	17.0	22.5	0.8	12.5	26.0	19.5	22.5	0.8					
0.56	10.5	26.0	18.0	22.5	0.8	14.0	26.0	21.0	22.5	0.8					
0.68	11.5	26.0	19.0	22.5	0.8										
0.82	12.5	26.0	20.0	22.5	0.8										
1.0	14.5	26.0	22.0	22.5	0.8			□ Applicable to taping of lead center spacing = 7.5 mm							
1.2	9.0	31.0	18.5	27.5	0.8										
1.5	10.0	31.0	20.0	27.5	0.8										
1.8	11.0	31.0	21.0	27.5	0.8										

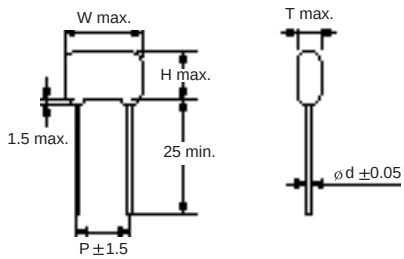
PH High Voltage Polypropylene Film Series

- Non-inductive construction
- Epoxy resin coating
- Very low dissipation factor at high frequency
- Voltage range of 800~1600V
- Applications : Horizontal resonance circuits of TV sets

Item	Characteristics
Operating temperature range	-40 ~ +85℃
Capacitance tolerance	±5%(J), ±10%(K) at 1kHz, 20℃
Dissipation factor	0.001 max. at 1kHz, 20℃
Insulation resistance	25000 MΩ min.
Withstand voltage	Test voltage: Terminal to terminal — Rated voltage × 1.5: 60~65 s — Rated voltage × 1.75: 1~5 s; Terminal to coating — 1~5 s — —



DRAWING



DIMENSIONS

Unit : mm

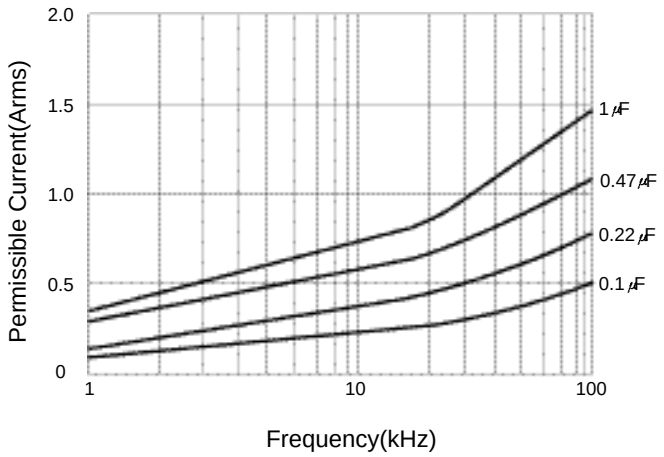
WV / μF Code	800VDC (2K)					1000VDC (3A)					1250VDC (3B)					1600VDC (3C)				
	T	W	H	P	ød	T	W	H	P	ød	T	W	H	P	ød	T	W	H	P	ød
0.001																6.0	21.0	10.5	17.5	0.8
0.0012											5.5	21.0	10.0	17.5	0.8	6.5	21.0	11.5	17.5	0.8
0.0015											6.0	21.0	10.5	17.5	0.8	6.5	21.0	12.5	17.5	0.8
0.0018						5.5	21.0	10.0	17.5	0.8	6.5	21.0	11.0	17.5	0.8	7.0	21.0	12.5	17.5	0.8
0.0022						6.0	21.0	10.5	17.5	0.8	6.5	21.0	12.0	17.5	0.8	7.5	21.0	13.0	17.5	0.8
0.0027						6.5	21.0	11.0	17.5	0.8	7.5	21.0	13.0	17.5	0.8	8.5	21.0	13.5	17.5	0.8
0.0033	5.5	21.0	10.0	17.5	0.8	6.5	21.0	12.0	17.5	0.8	7.5	21.0	14.0	17.5	0.8	9.0	21.0	14.5	17.5	0.8
0.0039	6.0	21.0	10.5	17.5	0.8	7.0	21.0	12.5	17.5	0.8	6.5	26.0	13.5	22.5	0.8	7.0	26.0	14.0	22.5	0.8
0.0047	6.5	21.0	11.0	17.5	0.8	7.5	21.0	13.0	17.5	0.8	6.5	26.0	13.5	22.5	0.8	7.5	26.0	14.5	22.5	0.8
0.0056	7.0	21.0	12.0	17.5	0.8	7.5	21.0	14.5	17.5	0.8	7.0	26.0	14.0	22.5	0.8	8.5	26.0	15.5	22.5	0.8
0.0068	7.5	21.0	13.0	17.5	0.8	6.5	26.0	13.0	22.5	0.8	7.5	26.0	15.0	22.5	0.8	9.0	26.0	16.5	22.5	0.8
0.0082	8.0	21.0	13.5	17.5	0.8	7.0	26.0	13.5	22.5	0.8	8.0	26.0	15.5	22.5	0.8	9.5	26.0	17.5	22.5	0.8
0.01	6.5	26.0	13.5	22.5	0.8	7.5	26.0	14.5	22.5	0.8	9.0	26.0	16.0	22.5	0.8	9.0	29.0	18.0	25.0	0.8
0.012	7.0	26.0	13.5	22.5	0.8	8.0	26.0	15.5	22.5	0.8	10.0	26.0	17.0	22.5	0.8	10.0	29.0	19.0	25.0	0.8
0.015	7.5	26.0	14.0	22.5	0.8	9.0	26.0	16.0	22.5	0.8	10.0	29.0	17.0	25.5	0.8	11.0	29.0	20.0	25.0	0.8
0.018	8.0	26.0	14.5	22.5	0.8	10.0	26.0	17.0	22.5	0.8	11.0	29.0	18.0	25.5	0.8					
0.022	8.5	26.0	15.5	22.5	0.8	11.0	26.0	18.0	22.5	0.8	12.0	29.0	19.5	25.5	0.8					
0.027	9.5	26.0	16.5	22.5	0.8	12.0	26.0	19.0	22.5	0.8										
0.033	10.5	26.0	17.5	22.5	0.8	11.5	29.0	20.5	25.0	0.8										
0.039	11.5	26.0	18.5	22.5	0.8															
0.047	11.0	29.0	18.5	25.0	0.8															
0.056	11.5	29.0	20.5	25.0	0.8															

□ Applicable to taping of lead center spacing = 7.5 mm

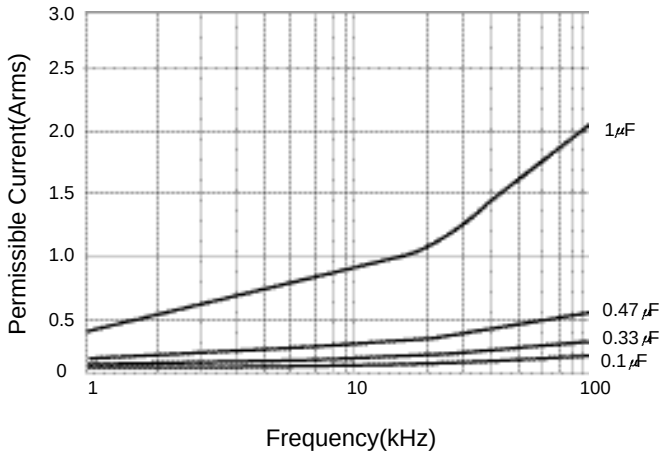
Characteristics of permissible current to frequency

Metallized Polyester Film Capacitors (TM series)

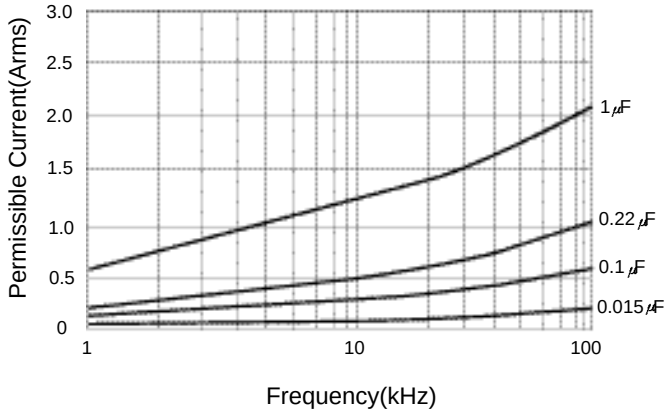
100WV Products



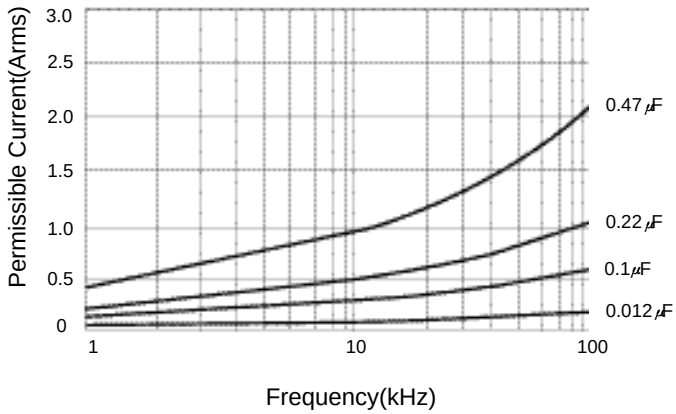
250WV Products



400WV Products

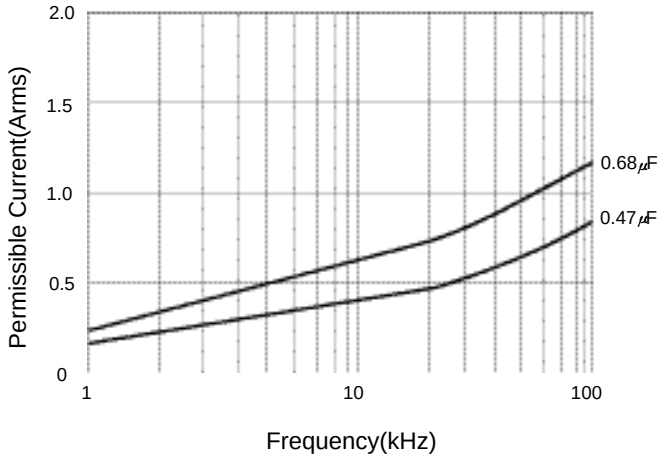


630WV Products

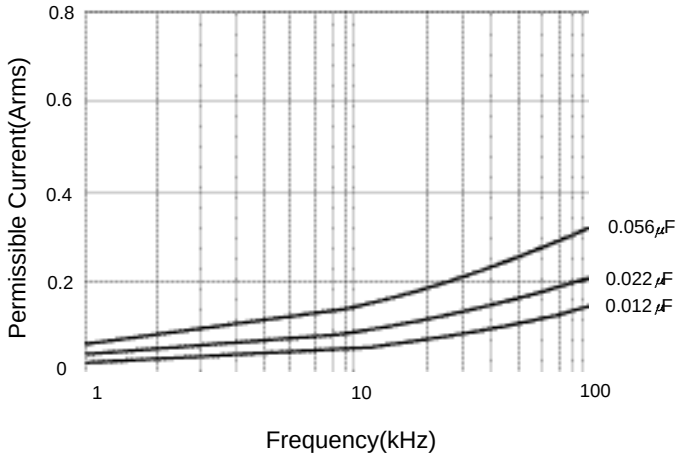


Metallized Polyester Film Capacitors (TL series : Pitch 5.0mm)

63WV Products



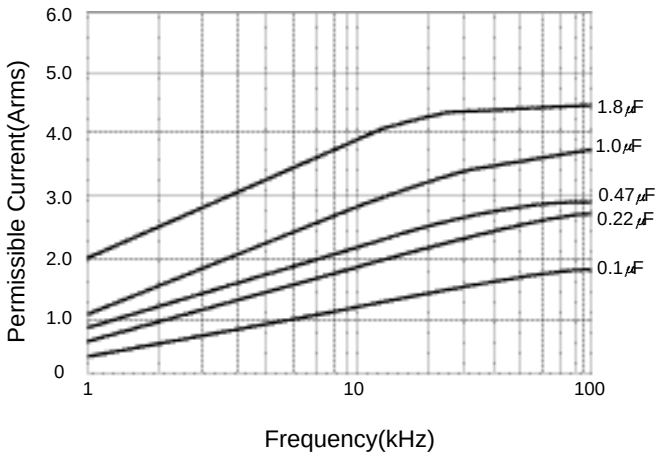
100WV Products



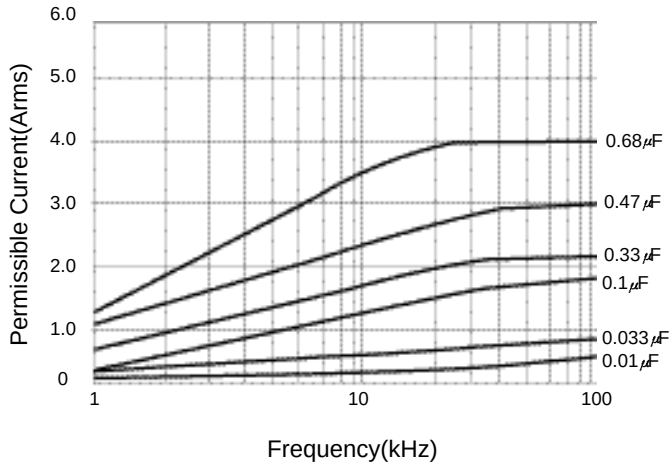
Characteristics of permissible current to frequency

Metallized Polypropylene Film Capacitors (PC series)

100/250WV Products

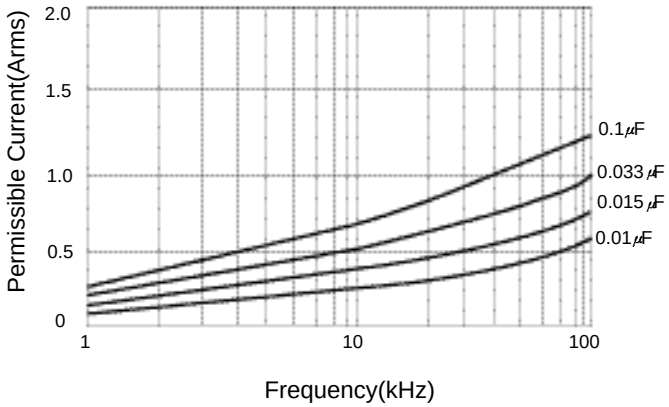


400/630WV Products

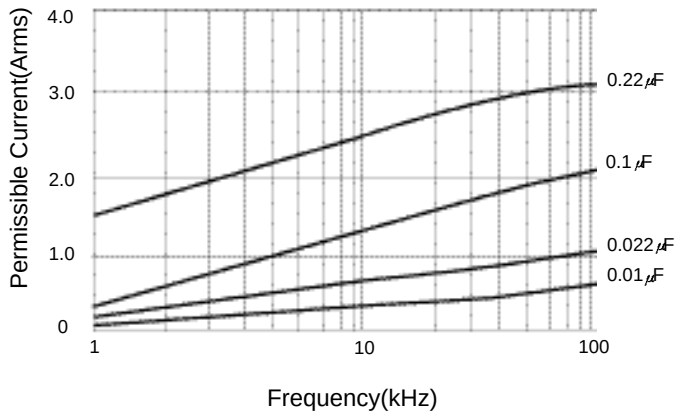


Polypropylene Film Capacitors (PX series)

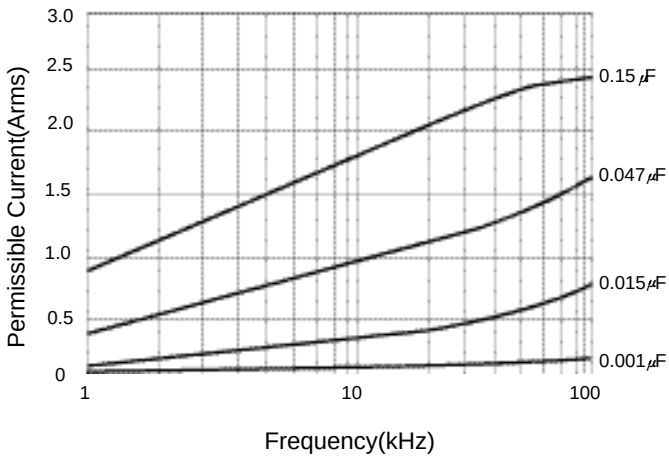
100WV Products



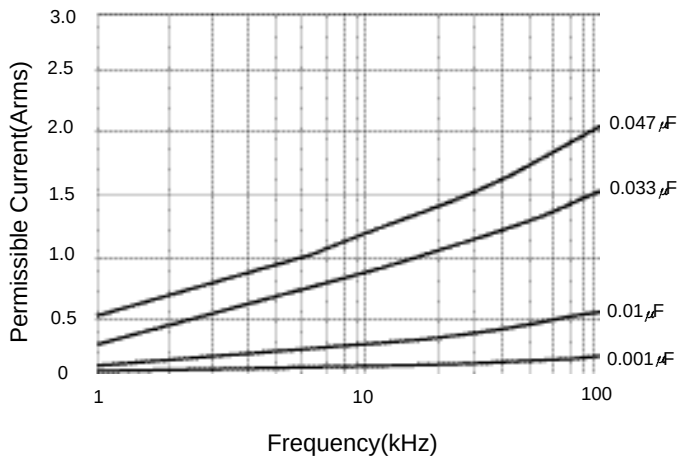
200WV Products



400WV Products



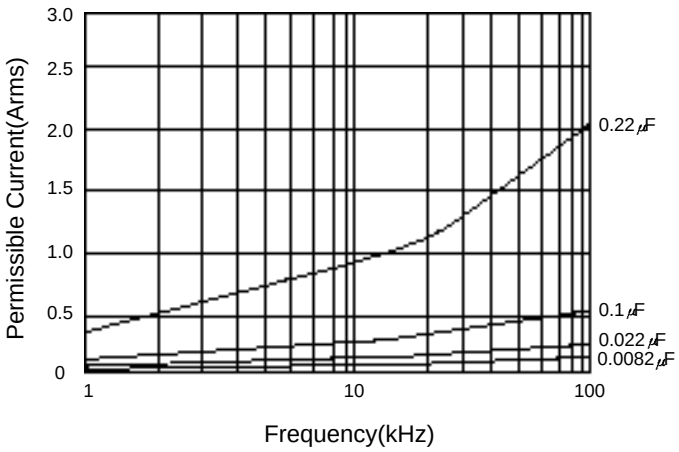
630WV Products



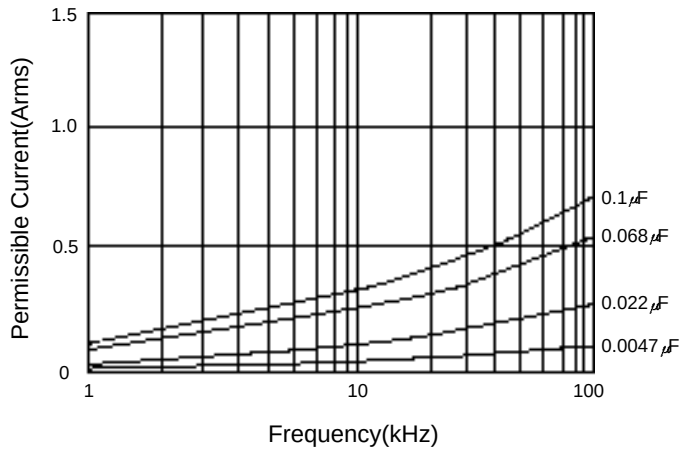
Characteristics of permissible current to frequency

- Polyester Film Capacitors (TX series)

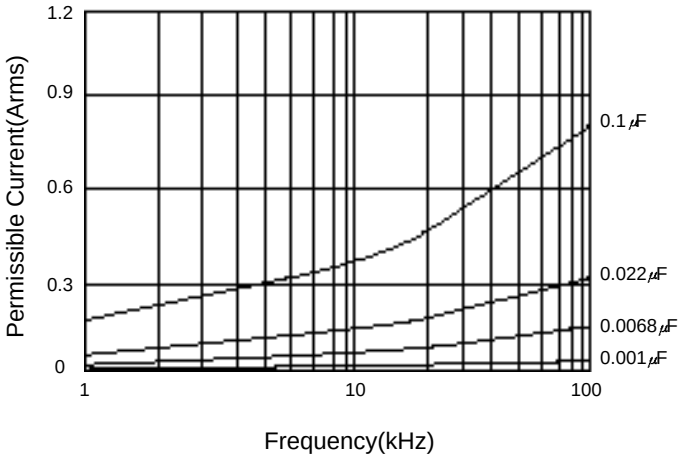
100WV Products



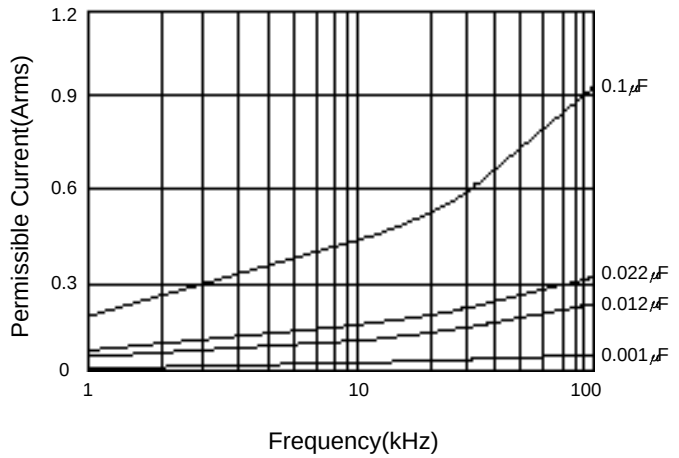
200WV Products



400WV Products



630WV Products

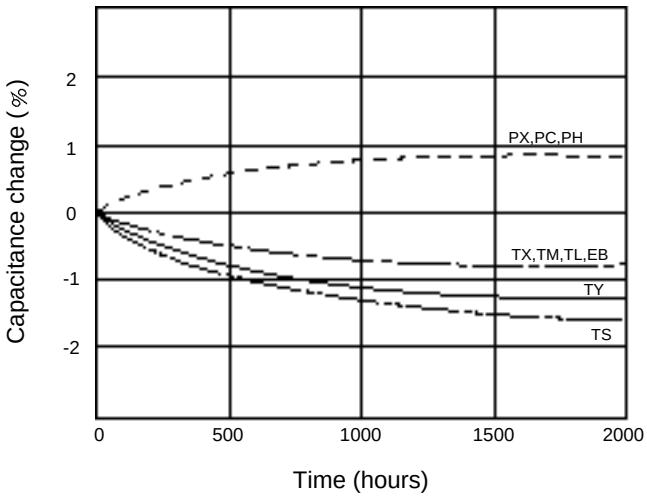


- Remarks : Input current wave form is sine wave

TYPICAL PERFORMANCE

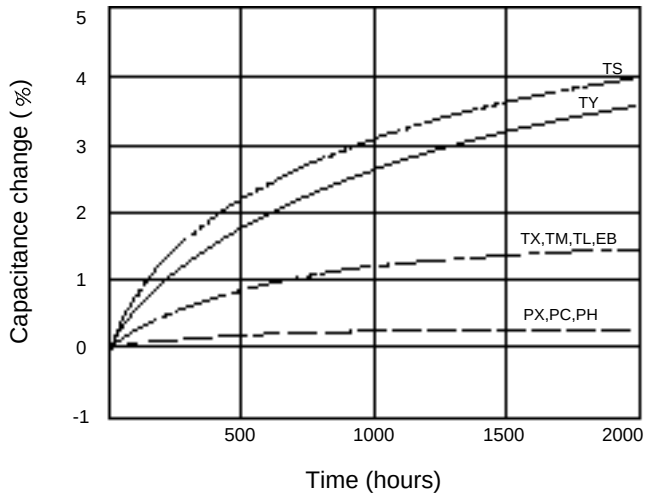
● LOAD LIFE (at +85°C)

Capacitance change vs. time

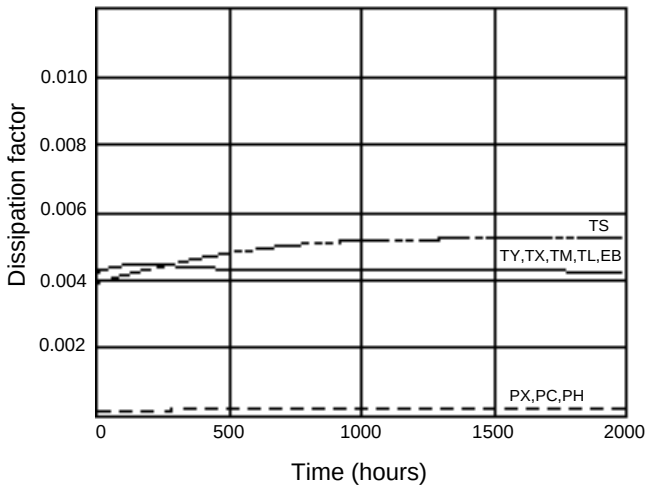


● DAMP HEAT STEADY STATE (at+40℃, humid 95%)

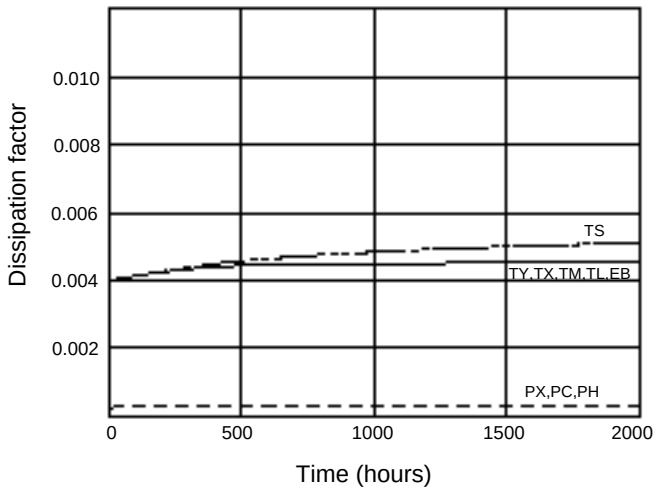
Capacitance change vs. time



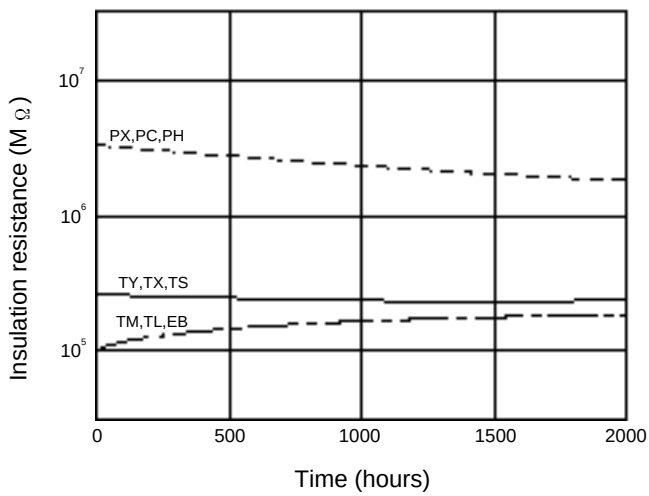
Dissipation factor vs. time



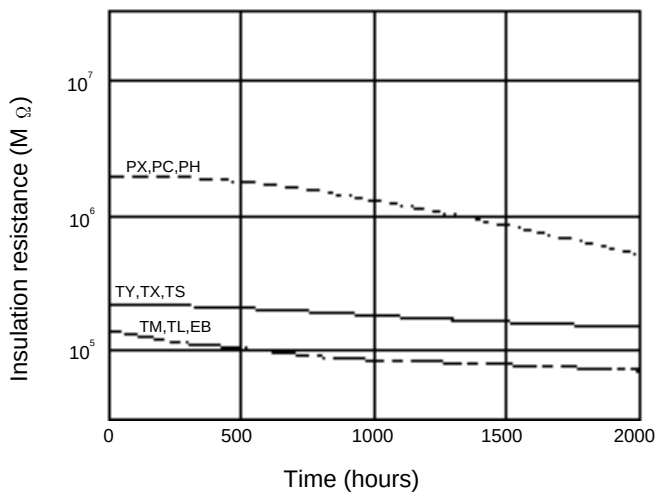
Dissipation factor vs. time



Insulation resistance vs. time



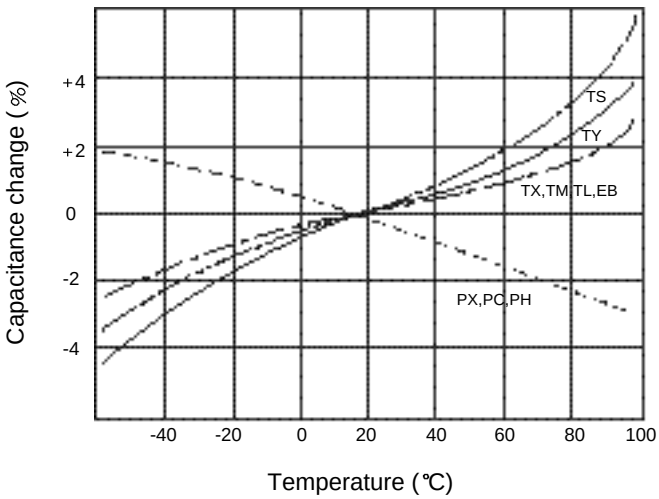
Insulation resistance vs. time



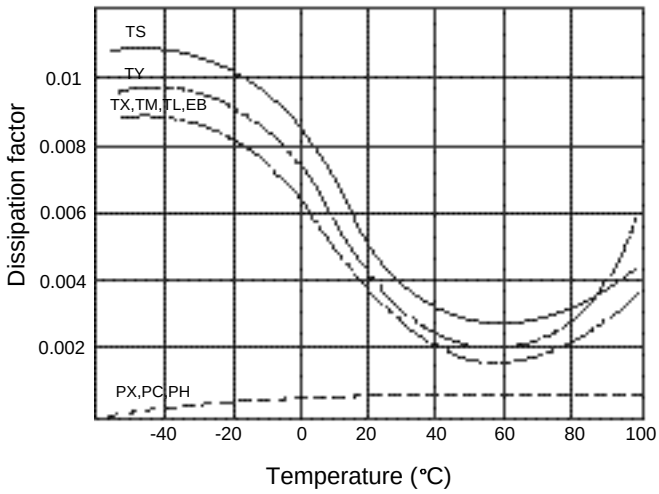
TYPICAL PERFORMANCE

● TEMPERATURE CHARACTERISTICS

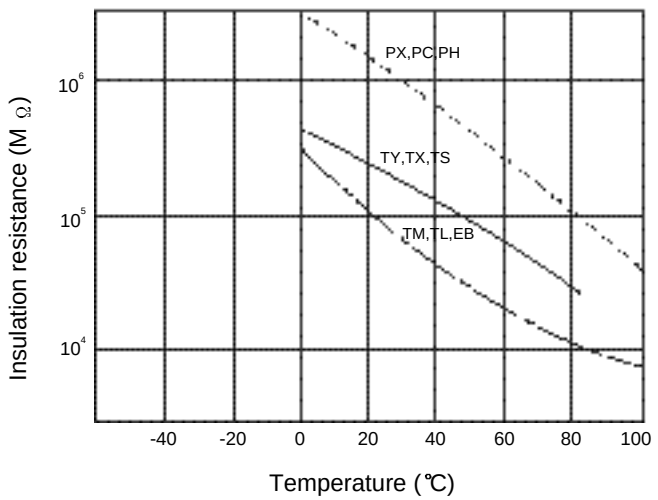
Capacitance change vs. temperature



Dissipation factor vs. temperature

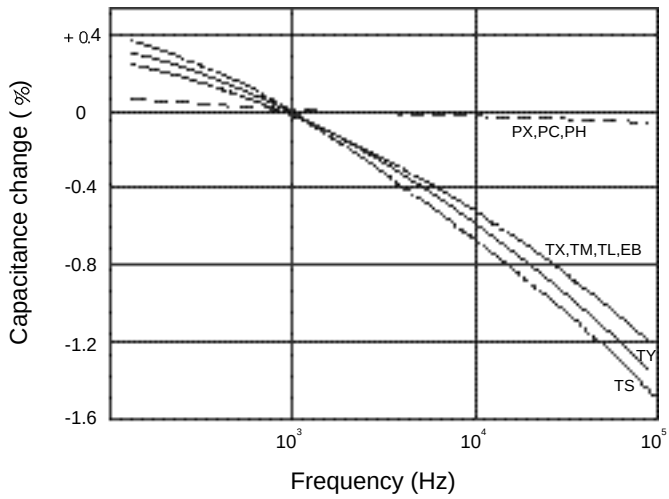


Insulation resistance vs. temperature

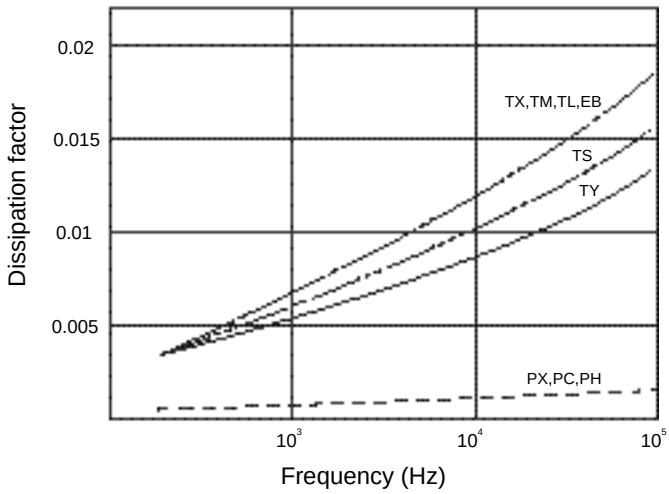


● FREQUENCY CHARACTERISTICS

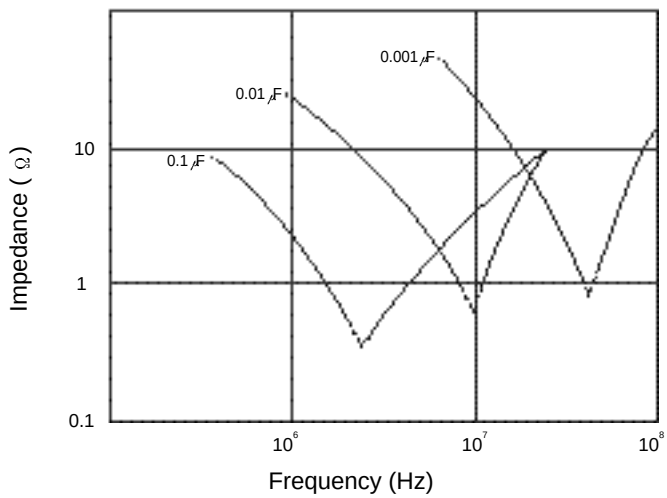
Capacitance change vs. frequency



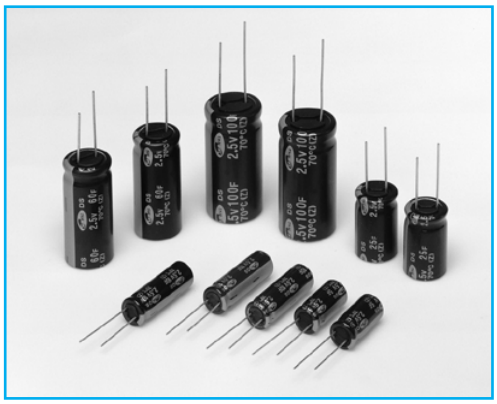
Dissipation factor vs. frequency



Impedance vs. frequency



6 ELECTRIC DOUBLE LAYER CAPACITORS



ELECTRIC DOUBLE LAYER CAPACITORS

1. Polarity

Be sure verity the poiarity 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 ELDC 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℃ 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 concideration 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

EDLC have 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 EDLC, 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℃ 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℃ .
If the temperature is higher than this, the extermal sleeve may crack and the end seal may suffer reduced performance.
(5) Never perform reflow soldering on EDLC using infrared or atmospheric methods.

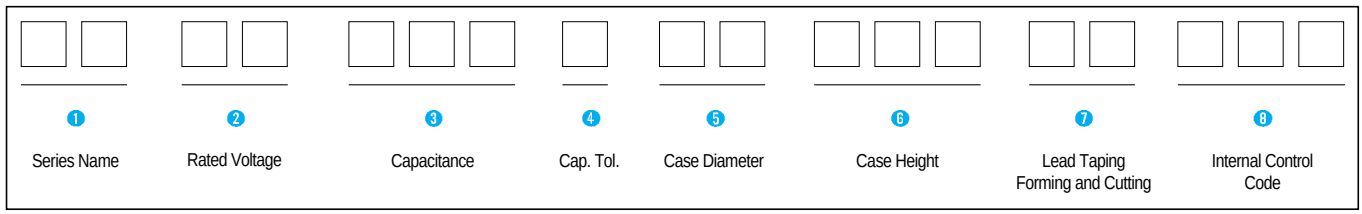
6. Circuit Board Cleaning

Circuit board can be immersed or ultrasonically cleaned using suitable cleaning solvents for up to 5 minutes and up to 60℃ 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

PART NUMBER SYSTEM

Part Number System



1 Series Name

See page 4 ~ 5.

2 Rated Working Voltage

WV	2.5
CODE	0E

3 Capacitance

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

4 Capacitance Tolerance

Tolerance (%)	-20 +80
Code	Z

5 Case Diameter

ex) ø 10 10
ø 16 16
ø 18 18
ø 22 22

6 Case Height

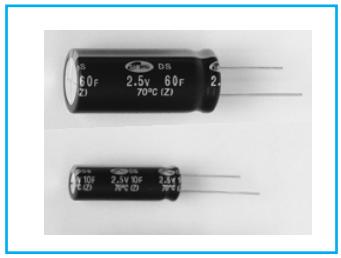
ex) 20mm 020
25mm 025
30mm 030
40mm 040
45mm 045

7 Lead Taping, Forming and Cutting

See pages 51 ~ 53.

ELECTRIC DOUBLE LAYER CAPACITORS

DS Lead Type, Standard Series

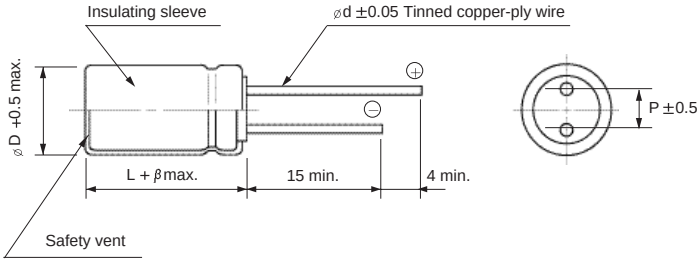


- Endurance : 70°C 1000 hours
- The small size and high capacitance, low resistance
- Can be charge and discharged more times than secondary batteries

Item	Characteristics	
Operating temperature range	-25 ~ +70℃	
Rated Working Voltage	2.5VDC	
Capacitance tolerance	-20 ~ +80% at 20℃	
Low temperature characteristics	Capacitance change	Within ±30% of initial value at +20°C (-25 to +70℃)
	Internal resistance	Less than 300% of initial at +20℃
Edurance(70℃)	Test time	1000 hours
	Capacitance change	Within ±30% of initial value
	Internal resistance	Less than 300% of initial at specified value
Shelf life (at 70℃)	After 1000 hours no load test same as endurance	

DRAWING

Unit : mm



ø D	10	16	18	22
P	5	7.5	7.5	10
ø d	0.6	0.8	0.8	1.0
α	2.0			
β	0.5			1.0

CHARACTERISTIC LIST & DIMENSIONS

Rate Working Voltage	Capacitance(F)	Internal resistance (mΩ) at 1KHz	Leakage Current (mA)(max.) after 30 minutes	Size ø D ×L(mm)
2.5	5	86	4	10 × 20
2.5	10	60	8	10 × 30
2.5	25	40	18	16 × 25
2.5	60	25	40	18 × 40
2.5	100	15	80	22 × 45