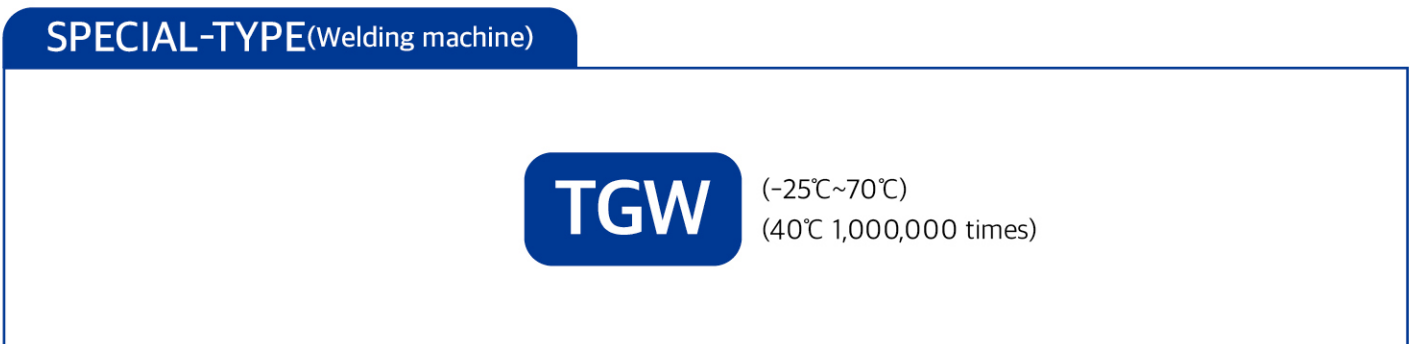
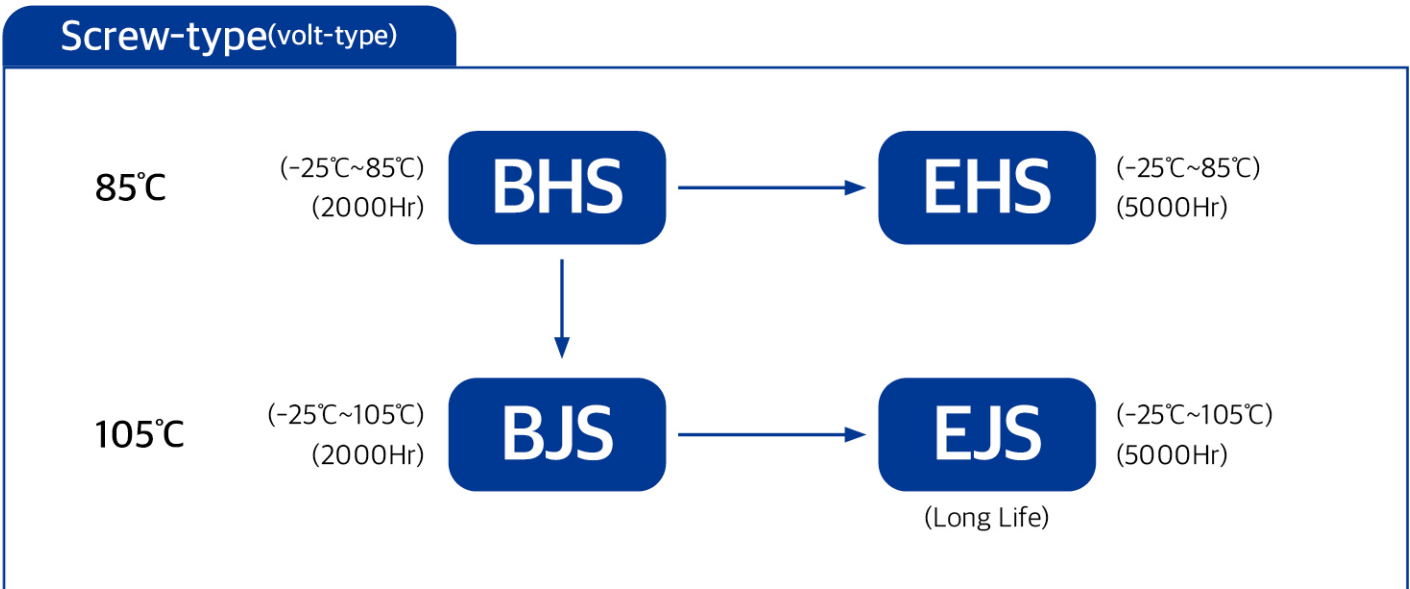
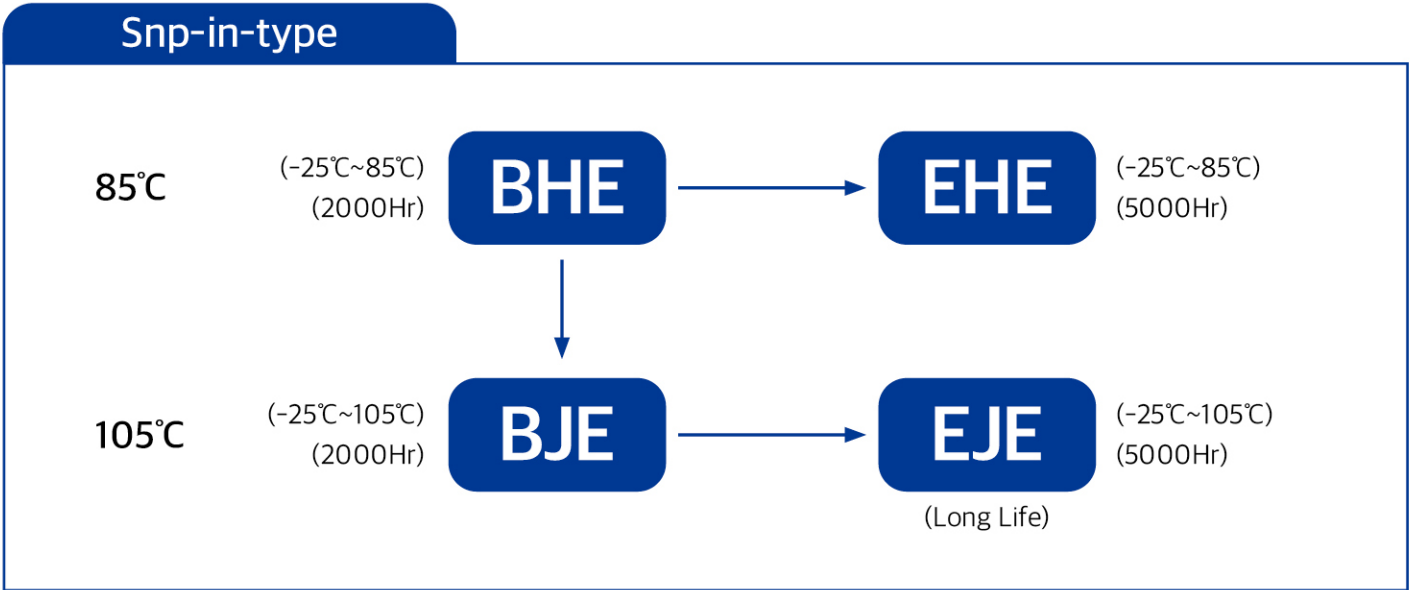


ALUMINUM ELECTROLYTIC CAPACITORS



Series 명칭



가이드라인 Guideline

1. 극성

알루미늄 전해커패시터의 극성을 역으로 사용하면 회로가 단락 되거나 커패시터가 폭발할 수 있습니다. 극성이 역으로 사용될 경우 발생 가능한 사고를 방지하기 위하여 Ø6.3 이상의 표준품은 방폭 구조를 갖도록 설계됩니다. 극성이 불분명하거나, 때때로 극성이 반전되는 DC 회로에는 무극성 전해 커패시터를 사용하십시오.

2. 과전압

과전압을 인가하지 마십시오. 과전압이 커패시터에 인가되면 누설전류가 급격히 증가하며, 이것은 발열이나 회로 단락의 원인이 됩니다.

3. 리플부하

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

4. 온도범위

알루미늄 전해 커패시터는 정격 사용온도 범위 내에서 사용해야 합니다. 보증 범위를 초과하는 조건에서의 사용은 급격한 특성 열화가 발생되어 파손되는 경우가 있습니다. 상온에서 사용하면 수명을 연장시키는 효과를 얻을 수 있습니다. (-45°C 이하에서 커패시터를 사용 시, -45°C와 동일한 수명을 지니게 됩니다.)

5. 충방전

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

6. 직렬 연결

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

7. 병렬 연결

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

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.

2. OVERVOLTAGE

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

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.

4. TEMPERATURE RANGE

Use the electrolytic capacitors according to the specified operating temperature range. Applying capacitors surpassing guaranteed conditions may cause destruction due to rapid characteristic deterioration. Usage at room temperature will ensure longer life.(when using the capacitors under -45°C, it's life equals that using capacitors at -45°C)

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.

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.

7. FOR PARALLEL CONNECTION

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

8. 리드 스트레스

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

8. LEAD STRESS

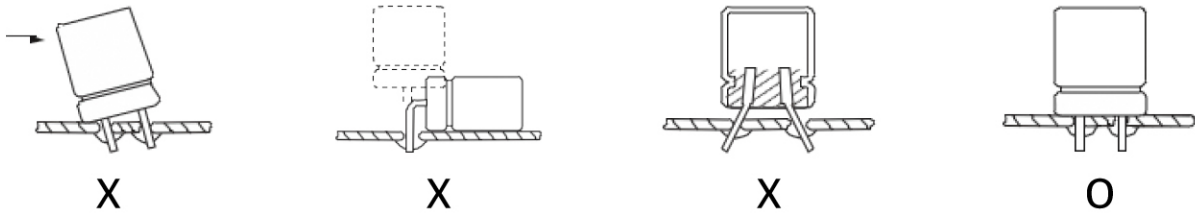
The distance between the terminal holes on the circuit board should be the same as that between the lead wires. Or terminals of the capacitor. Excessive force in mounting on circuit boards should be avoided. Improper insertion of the lead wires in circuit board may cause connection with the internal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

9. 기판 장착

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

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 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.



커패시터에 사용된 전해액의 주 용매와 전해지는 가연성이며 전해액은 전도성 재질입니다. 회로기판에 전해액이 묻을 경우 패턴이 부식되거나 회로 패턴 사이에 쇼트되어 발화될 수도 있으므로 커패시터 봉 입구 밑에는 어떠한 회로 패턴도 설치하지 말아 주십시오. 진동으로 문제시되는 회로기판에 장착하는 경우에는 반드시 기판과 제품 바닥면을 접촉시키거나 별도의 고정 장치를 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 result in smoking or catching fire. Do not locate any circuit pattern beneath the capacitor end seal.

SNAP-IN TYPE	Ø30, L치수 40mm 이상 제품
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SNAP-IN TYPE	Ø30, L치수 40mm 이상 제품
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커패시터의 안전변 위에 회로 패턴이나 배선이 없도록 하여 주십시오. 만약 그렇지 못하면 다음과 같이 안전변이 작동할 수 있는 공간이 있어야 합니다.

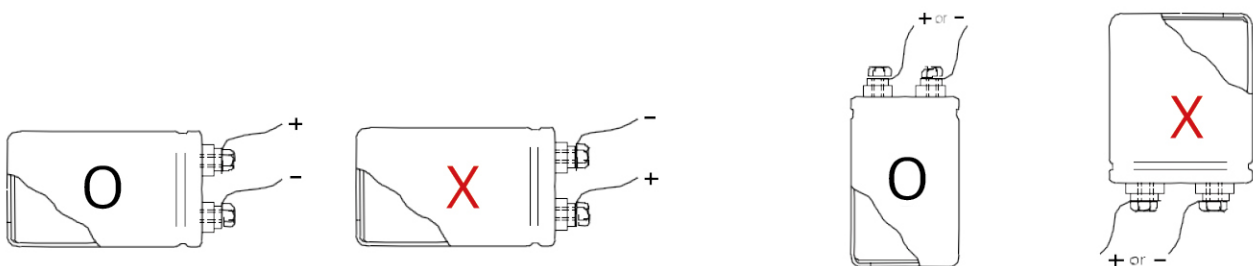
There should not be any circuit pattern or circuit wire above the capacitor safety vent. Unless otherwise specified, following space should be made above the capacitor safety vent.

Case diameter	Ø30~Ø35	Ø40~
Space	3mm 이상	5mm 이상

Case diameter	Ø30~Ø35	Ø40~
Space	3mm 이상	5mm 이상

만약 커패시터의 안전변이 회로기판으로 향한다면, 커패시터 안전변 위치의 기판에 구멍을 설치해야 합니다. Screw 단자형 커패시터의 봉 입구를 아래로 향하게 하지 말아 주십시오. 제품을 옆으로 눕혀 사용할 경우에는 양극단자를 위로 향하도록 하여 주십시오.

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. 납땜 후 회로 기판 세정

- 1) 인쇄회로기판 세정 시 할로겐계의 세정제가 커패시터의 내부에 침투하게 되면 알루미늄호일과 리드에 부식의 원인이 될 수 있습니다. 세척이 필요한 경우에는 할로겐계 세정제 대신 이소프로필 알코올이나 물을 사용하십시오.
- 2) 세정 조건은 초음파, 증기, 침적 등의 세척 방법에 대하여 5분(단 chip type 은 2분) 단자나 리드선에 기계적인 힘이 가해지지 않도록 주의하십시오.
- 3) 할로겐계의 세정제의 일반적 유형은 아래의 표와 같다.

화 학 명	구조식	대표상품명
Trichlorotrifluoroethane	C ₂ Cl ₃ F ₃	Freon TF, Daiflon S-3
Fluorotrichloromethane	CCl ₃ F	Freon-11, Daiflon S-1
1,1,1-Trichloroethane	C ₂ H ₃ Cl ₃	Chloroethene
Trichloroethylene	C ₂ HCl ₃	Trichlene
Methyl Chloride	CH ₃ Cl	MC

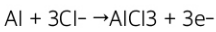
위의 표에 열거한 물질들은 반응성이 매우 강하므로 내세척용 커패시터의 경우에도 세정제로 사용해서 안됩니다.

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

5) 용제의 침투 경로 및 반응 메커니즘

- ① 밀폐용 고무와 알루미늄 케이스 사이로 침투
- ② 밀폐용 고무와 리드선 사이로 침투
- ③ 밀폐용 고무를 통과하여 침투

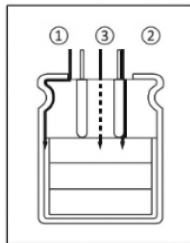
커패시터의 내부로 침투한 염소 이온은 아래와 같이 알루미늄과 반응을 한다.



이때 AlCl₃는 물에 녹아 아래와 같이 된다.



그래서 염소이온(Cl⁻)은 다시 자유전자가 되어 알루미늄을 부식 시킨다.



11. 납땜

알루미늄 전해 커패시터가 장착된 인쇄회로기판의 침적 납땜 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.

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

12. 제품 고정제와 코팅

할로겐계 용제를 포함하는 고정제, 코팅제는 사용하지 말아 주십시오. 고정제, 코팅제를 사용하기 전에 기판과 콘덴서 봉구부 부분에 플럭스가 남거나 오염된 채로 놓아두지 말아 주십시오. 기판 세척제는 고정제, 코팅제를 사용할 때 콘덴서 봉구부 전체를 밀봉시키지 말아 주십시오. (봉구부의 30% 이하)

10. Cleaning, Mounting of the PCB after soldering

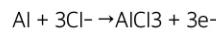
- 1) When you clean a PCB, halogen cleaning agents can cause corrosion of aluminum foil and lead tab. If you need to clean, please replace isopropyl Alcohol(IPA), water as halogenated cleaning agents.
- 2) 5minutes either by ultrasonic, vapor or immersion cleaning method. (chip type : 2minutes) Be careful not to apply mechanical stress to the terminals or lead wires.
- 3) Common type of halogenated cleaning agents are listed below

화 학 명	구조식	대표상품명
Trichlorotrifluoroethane	C ₂ Cl ₃ F ₃	Freon TF, Daiflon S-3
Fluorotrichloromethane	CCl ₃ F	Freon-11, Daiflon S-1
1,1,1-Trichloroethane	C ₂ H ₃ Cl ₃	Chloroethene
Trichloroethylene	C ₂ HCl ₃	Trichlene
Methyl Chloride	CH ₃ Cl	MC

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

- 4) When using a latex-based adhesive on the capacitor's rubber end seal for adhesion to a PCB, corrosion may occur depending on the kind of solvent in the adhesive. Select an adhesive as an organic solvent with dissolved polymer that is not halogenated hydrocarbon.
- 5) Penetration channel of solvent and corrosion Mechanism
 - ① Penetration between the rubber and the aluminum case
 - ② Penetration between the rubber and the lead wires
 - ③ Penetration through the rubber

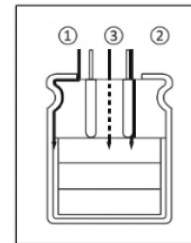
Cl⁻ gotten inside a capacitor reacts with aluminum.



Then AlCl₃ resolves in water



Thus, the (Cl⁻) ion is freed again and repeats the corrosion of aluminum.



11. SOLDERING

In the dip soldering process of PC boards 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 of pattern of both-sided 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.

12. Adhesive and Coating Material

Do not use halogenated adhesives and coating materials to fix Aluminum Electrolytic Capacitors. Flux between the surface of capacitors should be cleaned before using adhesives or coating materials. Solvents should be dried up before using adhesives or coating materials. Do not cover up all the sealing area of capacitors with adhesives or coating materials. Make coverage only partial. (The sealing area 30%)

13. 절연

슬리브 재질 : 표준 슬리브의 재질은 PET이며, 크실렌이나 톨루엔에 노출되거나, 커패시터가 고온의 환경에서 사용된다면 슬리브가 갈라질 수 있습니다.
케이스와 음극 단자 : 커패시터의 케이스와 음극 단자는 절연이 되지 않습니다.
SNAP-IN 단자형 제품의 보조 단자 : 보조 단자는 내부 요소와 절연이 되지 않습니다. 보조 단자는 커패시터를 견고하게 고정시키기 위한 것이므로 양극 단자나 음극 단자와 전기적인 연결이 없어야 합니다.

14. 보관

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

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

전압을 인가하지 않는 상태에서 장기간 보관된 커패시터는 누설전류가 증가하는 경향이 있습니다. 그러나 커패시터에 전압을 인가하면 정상으로 환원됩니다. 장기간 보관되었던 커패시터는 전압 처리 후 사용하여 주십시오. 전압 처리는 1kΩ의 보호 저항을 통해 직류 정격전압을 30분 동안 인가해야 합니다.

15. 응급 조치

커패시터 사용 중 커패시터 안전변이 열려 Gas가 분출될 경우 set의 전원 장치의 스위치를 끄거나 플러그를 즉시 뽑아 주십시오. 커패시터의 안전변 동작시 +100°C를 초과하는 Gas 분출 시 전해액이 흘러내릴 수 있으므로 가까이 다가가지 마십시오. 분출한 Gas가 눈에 들어가거나 흡입한 경우에는 즉시 물로 눈을 행구거나 삼키지 말고 입안을 닦아 주시기 바랍니다. 전해액은 만지지 말고 만약 피부에 묻었을 경우 물이나 비누로 닦아 주십시오.

16. 커패시터 폐기 및 기타

커패시터 폐기 및 기타 커패시터를 폐기할 경우에는 구멍을 내거나 충분히 부순 후에 소각하여 주십시오. 소각 시 커패시터가 폭발하는 경우도 있습니다.

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

커패시터를 소각하지 않은 경우에는 전문 산업폐기물 처리 업체에 의뢰하여 주십시오.

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

감전 및 화상의 우려가 있으므로 사용 전에 1kΩ(전압, 용량에 따라 충분히 여유를 고려한 저항 선택)의 저항을 통해서 방전처리를 해주십시오.

카탈로그에 규정된 제품 사이즈 및 제품 기준은 품질 개선의 필요성으로 인하여 귀사에 통지 없이 변경될 수 있습니다.

13. 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.

14. STORAGE

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

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

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 30minutes through 1kΩ of protective series resistor.

15. EMERGENCY ACTION

When the safety vent is Open and some gas blows out from the capacitor, please turn the main switch of the equipment off or pull out the plug the power outlet immediately. During vent operation, extremely hot gas(over 100°C) and electrolyte may blow out from the capacitors. Do not stand close the capacitors. In case of eye contact, flush the open eyes with large amount of clean water immediately, do not swallow. do not touch electrode but wash skin with soap and water in case of skin contact.

16. DESTRUCTING CAPACITORS & OTHERS

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

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

when you do not have burning facilities, please contact special industrial waste processing companies.

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

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

For methods of testing, refer to KS CIEC 60384-4 (JIS C 5101-1, JIS C 5101-4) capacitors case size and other product standards specified in this catalog may be changed or modified without notice for improvement of quality.

BHE Series

- 85°C 2,000Hrs assured.
- Standard snap-in terminal type
- RoHS compliant

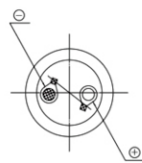
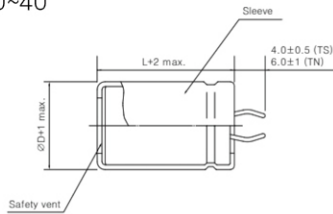


Specifications

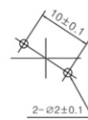
Item	Characteristics		
Rated Voltage Range	400, 450 Vdc		
Operating Temperature Range	-25 ~ +85°C		
Capacitance Tolerance (at 120Hz, 20°C)	±20% (M)		
Leakage current max. (at 20°C, 5min.)	$I=3\sqrt{CV}$ (μA) Where, C : Nominal capacitance (μF), V : Rated voltage (Vdc)		
Dissipation factor max. (at 120Hz, 20°C)	Capacitance > 1000μF : tanδ increases by 0.01 for each 1000μF from below value.	Rated Voltage(Vdc)	400 450
		tanδ	0.15 0.20
Load Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after the rated voltage is applied for 2,000 hours at 85°C.		
	Leakage current	Less than the initial specified value	
	Capacitance change	Within ±20% of the initial value	
	tanδ	Less than 200% of the initial specified value	
Shelf Life	After exposing them for 1,000 hours at 85°C without voltage applied, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20°C by the KS C IEC 60384 - 4		

Dimensions

∅D=30~40



PC board pin-out



(Unit : mm)

Rated ripple current multipliers

Vdc	Frequency				
	50Hz	120Hz	300Hz	1kHz	10kHz~
400~	0.85	1.00	1.15	1.20	1.40

Ratings for BHE Series

μF	vdc	400			450		
		D	30	35	40	30	35
220		30 × 30	35 × 25		30 × 35	35 × 30	
		1.38	1.41		1.45	1.49	
270		30 × 30	35 × 25		30 × 40	35 × 30	
		1.55	1.56		1.62	1.65	
330		30 × 35	35 × 30		30 × 45	35 × 35	
		1.78	1.83		1.94	1.94	
470		30 × 45	35 × 35		30 × 50	35 × 40	40 × 40
		2.30	2.30		2.42	2.42	2.55
560			35 × 40	40 × 40		35 × 50	40 × 50
			2.62	2.78		2.84	3.00
680			35 × 50	40 × 50			40 × 60
			3.13	3.31			3.54
820				40 × 60	← case size D x L (mm)		
				3.89	← Ripple current (Arms) at 85°C, 120Hz		

EHE Series

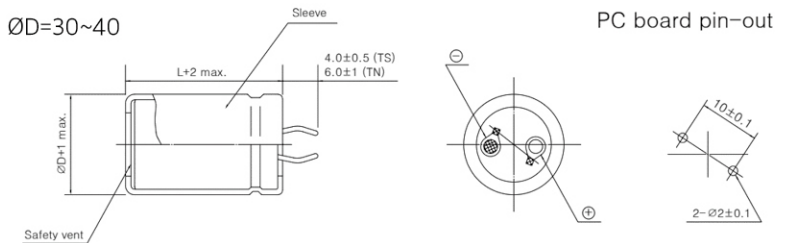
- 85°C 5,000Hrs assured.
- Long life
- RoHS compliant



Specifications

Item	Characteristics						
Rated Voltage Range	400, 450 Vdc						
Operating Temperature Range	-25 ~ +85°C						
Capacitance Tolerance (at 120Hz, 20°C)	±20% (M)						
Leakage current max. (at 20°C, 5min.)	$I=3\sqrt{CV}$ (µA) Where, C : Nominal capacitance (µF), V : Rated voltage (Vdc)						
Dissipation factor max. (at 120Hz, 20°C)	Capacitance > 1000 µF : tanδ increases by 0.01 for each 1000 µF from below value. <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Rated Voltage(Vdc)</th> <th>400</th> <th>450</th> </tr> </thead> <tbody> <tr> <td>tanδ</td> <td>0.15</td> <td>0.20</td> </tr> </tbody> </table>	Rated Voltage(Vdc)	400	450	tanδ	0.15	0.20
Rated Voltage(Vdc)	400	450					
tanδ	0.15	0.20					
Load Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after the rated voltage is applied for 2,000 hours at 85°C. <table border="1" style="margin-left: auto; margin-right: auto;"> <tbody> <tr> <td>Leakage current</td> <td>Less than the initial specified value</td> </tr> <tr> <td>Capacitance change</td> <td>Within ±20% of the initial value</td> </tr> <tr> <td>tanδ</td> <td>Less than 200% of the initial specified value</td> </tr> </tbody> </table>	Leakage current	Less than the initial specified value	Capacitance change	Within ±20% of the initial value	tanδ	Less than 200% of the initial specified value
Leakage current	Less than the initial specified value						
Capacitance change	Within ±20% of the initial value						
tanδ	Less than 200% of the initial specified value						
Shelf Life	After exposing them for 1,000 hours at 85°C without voltage applied, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20°C by the KS C IEC 60384 - 4						

Dimensions



Rated ripple current multipliers

Vdc	Frequency				
	50Hz	120Hz	300Hz	1kHz	10kHz~
400~	0.85	1.00	1.15	1.20	1.40

Ratings for EHE Series

µF	400		450	
	30	35	30	35
220			30 × 30 1.22	35 × 25 1.24
330	30 × 35 1.89		30 × 40 1.69	35 × 30 1.63
470	30 × 45 2.51	35 × 35 2.48	30 × 50 2.22	35 × 40 2.19
560	30 × 50 3.00	35 × 40 2.86	30 × 60 2.60	35 × 45 2.51
680	30 × 60 3.50	35 × 45 3.31	30 × 70 3.10	35 × 50 2.89
820	30 × 70 4.00	35 × 50 3.80	30 × 70 3.43	
1000		35 × 60 4.54	← case size D x L (mm) ← Ripple current (Arms) at 85°C, 120Hz	

BJE Series

- 105°C 2,000Hrs assured.
- Standard snap-in terminal type
- RoHS compliant

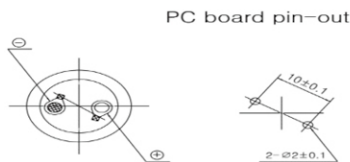
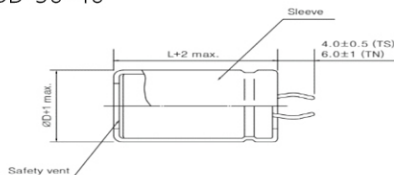


Specifications

Item	Characteristics		
Rated Voltage Range	400, 450 Vdc		
Operating Temperature Range	-25 ~ +105°C		
Capacitance Tolerance (at 120Hz, 20°C)	±20% (M)		
Leakage current max. (at 20°C, 5min.)	$I=3\sqrt{CV}$ (µA) Where, C : Nominal capacitance (µF), V : Rated voltage (Vdc)		
Dissipation factor max. (at 120Hz, 20°C)	Capacitance > 1000µF : tanδ increases by 0.01 for each 1000µF from below value.	Rated Voltage(Vdc)	400 450
		tanδ	0.15 0.20
Load Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after the rated voltage is applied for 2,000 hours at 105°C.		
	Leakage current	Less than the initial specified value	
	Capacitance change	Within ±20% of the initial value	
	tanδ	Less than 200% of the initial specified value	
Shelf Life	After exposing them for 1,000 hours at 105°C without voltage applied, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20°C by the KS C IEC 60384 - 4		

Dimensions

ØD=30~40



(Unit : mm)

Rated ripple current multipliers

Vdc	Frequency				
	50Hz	120Hz	300Hz	1kHz	10kHz~
400~	0.85	1.00	1.15	1.20	1.40

Ratings for BJE Series

µF \ vdc	350		400			450		
	30	35	30	35	40	30	35	40
220	30 × 30 1.00	35 × 25 1.03	30 × 30 1.00	35 × 30 1.08		30 × 30 1.06	35 × 30 1.08	
330	30 × 40 1.36	35 × 30 1.36	30 × 40 1.36	35 × 35 1.40		30 × 40 1.42	35 × 35 1.46	
470		35 × 40 1.74	30 × 50 1.76	35 × 40 1.82	40 × 40 1.85		35 × 40 1.81	40 × 40 1.85
560		35 × 45 2.06		35 × 45 2.06	40 × 50 2.18		35 × 45 2.06	40 × 50 2.18
680				35 × 50 2.27	40 × 60 2.57	← Case size ØD×L (mm) ← Ripple current (Arms) at 105°C, 120Hz		

EJE Series

- 105°C 5,000Hrs assured.
- Long life
- RoHS compliant

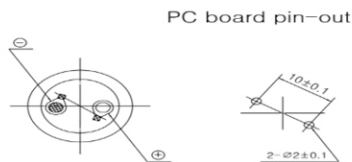
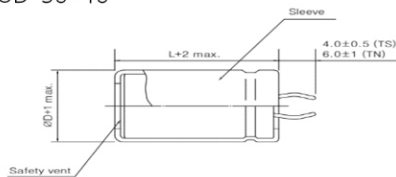


Specifications

Item	Characteristics		
Rated Voltage Range	400, 450 Vdc		
Operating Temperature Range	-25 ~ +85°C		
Capacitance Tolerance (at 120Hz, 20°C)	±20% (M)		
Leakage current max. (at 20°C, 5min.)	$I=3\sqrt{CV}$ (µA) Where, C : Nominal capacitance (µF), V : Rated voltage (Vdc)		
Dissipation factor max. (at 120Hz, 20°C)	Capacitance > 1000 µF : tanδ increases by 0.01 for each 1000 µF from below value.	Rated Voltage(Vdc)	400 450
		tanδ	0.15 0.20
Load Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after the rated voltage is applied for 2,000 hours at 85°C.		
	Leakage current	Less than the initial specified value	
	Capacitance change	Within ±20% of the initial value	
Shelf Life	After exposing them for 1,000 hours at 85°C without voltage applied, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20°C by the KS C IEC 60384 - 4		
	tanδ	Less than 200% of the initial specified value	

Dimensions

∅D=30~40



(Unit : mm)

Rated ripple current multipliers

Vdc	Frequency				
	50Hz	120Hz	300Hz	1kHz	10kHz~
400~	0.85	1.00	1.15	1.20	1.40

Ratings for EJE Series

µF	350		400		450		
	∅D	30	35	30	35	30	35
220		30 × 35 1.03	35 × 30 1.04	30 × 40 1.18	35 × 35 1.26	30 × 40 1.21	35 × 35 1.22
330		30 × 50 1.49	35 × 40 1.49		35 × 45 1.50	30 × 50 1.60	35 × 45 1.61
470			35 × 50 1.73	← Case size ∅D×L (mm) ← Ripple current (Arms) at 105°C, 120Hz			35 × 50 2.14

BHS Series

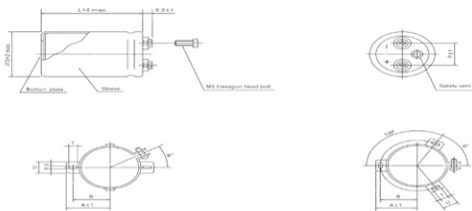
- 85°C 2,000Hrs assured.
- Standard screw terminal type
- RoHS compliant



Specifications

Item	Characteristics												
Rated Voltage Range	400, 450 Vdc												
Operating Temperature Range	-25 ~ +85°C												
Capacitance Tolerance (at 120Hz, 20°C)	±20% (M)												
Leakage current max. (at 20°C, 5min.)	$I=3\sqrt{CV}$ (µA) Where, C : Nominal capacitance (µF), V : Rated voltage (Vdc)												
Dissipation factor max. (at 120Hz, 20°C)	<table border="1"> <tr> <td>Vdc \ ΦD</td> <td>35</td> <td>51</td> <td>63.5</td> <td>76.2</td> <td>89</td> </tr> <tr> <td>400, 450</td> <td>0.25</td> <td>0.25</td> <td>0.25</td> <td>0.25</td> <td>0.25</td> </tr> </table>	Vdc \ ΦD	35	51	63.5	76.2	89	400, 450	0.25	0.25	0.25	0.25	0.25
Vdc \ ΦD	35	51	63.5	76.2	89								
400, 450	0.25	0.25	0.25	0.25	0.25								
Load Life	<p>The following specifications shall be satisfied when the capacitors are restored to 20°C after the rated voltage is applied for 2,000 hours at 85°C.</p> <table border="1"> <tr> <td>Leakage current</td> <td>Less than the initial specified value</td> </tr> <tr> <td>Capacitance change</td> <td>Within ±20% of the initial value</td> </tr> <tr> <td>tanδ</td> <td>Less than 300% of the initial specified value</td> </tr> </table>	Leakage current	Less than the initial specified value	Capacitance change	Within ±20% of the initial value	tanδ	Less than 300% of the initial specified value						
Leakage current	Less than the initial specified value												
Capacitance change	Within ±20% of the initial value												
tanδ	Less than 300% of the initial specified value												
Shelf Life	After exposing them for 1,000 hours at 85°C without voltage applied, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20°C by the KS C IEC 60384 - 4												

Dimensions



(Unit : mm)

ΦD	B	A	T	U	Φ*	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	26.6

ΦD	B	A	T	U	Φ*	P
51	32.9	39.9	7	12	60	22
63.5	38.4	45.3	7	14	60	26.6
76.2	44.5	51.5	8	16	60	31.8

Rated ripple current multipliers

Vdc \ Frequency	50Hz	120Hz	300Hz	1kHz	10kHz~
400~	0.80	1.00	1.20	1.35	1.40

Ratings for BHS Series

µF \ vdc	Item	400		450			
		ΦD × L (mm)	Ripple current (A ms)		ΦD × L (mm)	Ripple current (A ms)	
			85°C 120Hz			85°C 120Hz	
1000		35 × 120	4.8		51 × 80	5.0	
1500		51 × 100	5.9		51 × 100	6.7	
2200		51 × 120	8.5		51 × 120	8.5	
3300		63.5 × 120	11.3		63.5 × 130	11.2	
3900		63.5 × 130	12.8		63.5 × 130	11.9	
4700		63.5 × 160	13.2		63.5 × 160	14.0	
5600		76.2 × 130	16.2		76.2 × 130	16.8	
6800		76.2 × 140	18.5		76.2 × 140	18.1	
10000		89 × 140	21.8		89 × 160	20.6	
12000		89 × 160	22.8		89 × 190	21.9	
15000		89 × 190	23.3		← Ripple current (Arms) at 105°C, 120Hz		

EHS Series

- 85°C 5,000Hrs assured.
- Long life
- RoHS compliant

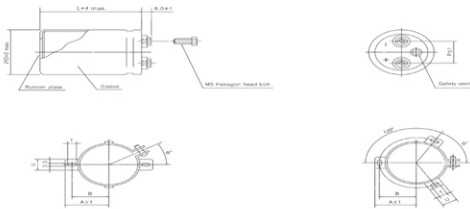


Specifications

Item	Characteristics												
Rated Voltage Range	400, 450 Vdc												
Operating Temperature Range	-25 ~ +85°C												
Capacitance Tolerance (at 120Hz, 20°C)	±20% (M)												
Leakage current max. (at 20°C, 5min.)	$I=3\sqrt{CV}$ (µA) Where, C : Nominal capacitance (µF), V : Rated voltage (Vdc)												
Dissipation factor max. (at 120Hz, 20°C)	<table border="1"> <tr> <th>Vdc \ ΦD</th> <th>35</th> <th>51</th> <th>63.5</th> <th>76.2</th> <th>89</th> </tr> <tr> <th>400, 450</th> <td>0.25</td> <td>0.25</td> <td>0.25</td> <td>0.25</td> <td>0.25</td> </tr> </table>	Vdc \ ΦD	35	51	63.5	76.2	89	400, 450	0.25	0.25	0.25	0.25	0.25
Vdc \ ΦD	35	51	63.5	76.2	89								
400, 450	0.25	0.25	0.25	0.25	0.25								
Load Life	<p>The following specifications shall be satisfied when the capacitors are restored to 20°C after the rated voltage is applied for 2,000 hours at 85°C.</p> <table border="1"> <tr> <td>Leakage current</td> <td>Less than the initial specified value</td> </tr> <tr> <td>Capacitance change</td> <td>Within ±20% of the initial value</td> </tr> <tr> <td>tanδ</td> <td>Less than 300% of the initial specified value</td> </tr> </table>	Leakage current	Less than the initial specified value	Capacitance change	Within ±20% of the initial value	tanδ	Less than 300% of the initial specified value						
Leakage current	Less than the initial specified value												
Capacitance change	Within ±20% of the initial value												
tanδ	Less than 300% of the initial specified value												
Shelf Life	After exposing them for 1,000 hours at 85°C without voltage applied, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20°C by the KS C IEC 60384 - 4												

Dimensions

(Unit : mm)



ΦD	B	A	T	U	Φ'	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

ΦD	B	A	T	U	Φ'	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

Rated ripple current multipliers

Vdc \ Frequency	50Hz	120Hz	300Hz	1kHz	10kHz~
400~	0.80	1.00	1.20	1.35	1.40

Ratings for EHS Series

vdc \ Item	400		450	
	ΦD × L (mm)	Ripple current (A ms)	ΦD × L (mm)	Ripple current (A ms)
		85°C 120Hz		85°C 120Hz
2200	51 × 100	8.4	51 × 120	8.6
3300	63.5 × 100	11.6	63.5 × 110	11.9
3900	63.5 × 100	12.3	76.2 × 100	13.9
4700	63.5 × 120	14.5	76.2 × 110	15.5
5600	76.2 × 110	16.5	76.2 × 130	15.9
6800	76.2 × 120	17.5	76.2 × 150	18.4
10000	89 × 140	20.5	← Ripple current (Arms) at 105°C, 120Hz	
12000	89 × 150	21.0		

BJS Series

- 105°C 2,000Hrs assured.
- Standard screw terminal type
- RoHS compliant

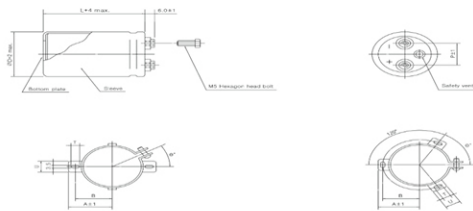


Specifications

Item	Characteristics												
Rated Voltage Range	400, 450 Vdc												
Operating Temperature Range	-25 ~ +105°C												
Capacitance Tolerance (at 120Hz, 20°C)	±20% (M)												
Leakage current max. (at 20°C, 5min.)	$I=3\sqrt{CV}$ (μA) Where, C : Nominal capacitance (μF), V : Rated voltage (Vdc)												
Dissipation factor max. (at 120Hz, 20°C)	<table border="1"> <tr> <th>Vdc \ ΦD</th> <th>35</th> <th>51</th> <th>63.5</th> <th>76.2</th> <th>89</th> </tr> <tr> <th>400, 450</th> <td>0.25</td> <td>0.25</td> <td>0.25</td> <td>0.25</td> <td>0.25</td> </tr> </table>	Vdc \ ΦD	35	51	63.5	76.2	89	400, 450	0.25	0.25	0.25	0.25	0.25
Vdc \ ΦD	35	51	63.5	76.2	89								
400, 450	0.25	0.25	0.25	0.25	0.25								
Load Life	<p>The following specifications shall be satisfied when the capacitors are restored to 20°C after the rated voltage is applied for 2,000 hours at 105°C.</p> <table border="1"> <tr> <td>Leakage current</td> <td>Less than the initial specified value</td> </tr> <tr> <td>Capacitance change</td> <td>Within ±20% of the initial value</td> </tr> <tr> <td>tanδ</td> <td>Less than 300% of the initial specified value</td> </tr> </table>	Leakage current	Less than the initial specified value	Capacitance change	Within ±20% of the initial value	tanδ	Less than 300% of the initial specified value						
Leakage current	Less than the initial specified value												
Capacitance change	Within ±20% of the initial value												
tanδ	Less than 300% of the initial specified value												
Shelf Life	After exposing them for 1,000 hours at 105°C without voltage applied, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20°C by the KS C IEC 60384 - 4												

Dimensions

(Unit : mm)



ΦD	B	A	T	U	Φ'	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

ΦD	B	A	T	U	Φ'	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

Rated ripple current multipliers

Vdc \ Frequency	50Hz	120Hz	300Hz	1kHz	10kHz~
400~	0.80	1.00	1.20	1.35	1.40

Ratings for BJS Series

μF \ vdc	350		400		450	
	ΦD × L (mm)	Ripple	ΦD × L (mm)	Ripple	ΦD × L (mm)	Ripple
1000			51 × 70	3.2		
1500			51 × 80	4.8		
2200			51 × 120	6.4	63.5 × 100	6.7
3300			63.5 × 120	10.5	76.2 × 100	8.7
4700			76.2 × 120	12.5	76.2 × 130	11.9
6800	76.2 × 120	12.4	76.2 × 140	15.4	89 × 140	14.9
10000			89 × 160	20.1	89 × 190	21.0
12000			89 × 190	23.0	89 × 190	23.1

Ripple current (Arms) at 105°C, 120Hz ↑

EJS Series

- 105°C 5,000Hrs assured.
- Long life
- RoHS compliant

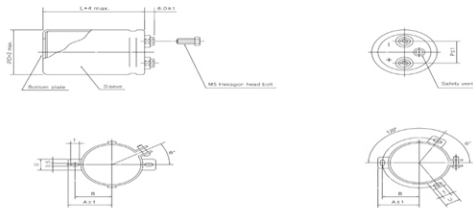


Specifications

Item	Characteristics												
Rated Voltage Range	400, 450 Vdc												
Operating Temperature Range	-25 ~ +105°C												
Capacitance Tolerance (at 120Hz, 20°C)	±20% (M)												
Leakage current max. (at 20°C, 5min.)	$I=3\sqrt{CV}$ (μA) Where, C : Nominal capacitance (μF), V : Rated voltage (Vdc)												
Dissipation factor max. (at 120Hz, 20°C)	<table border="1"> <tr> <th>Vdc \ ΦD</th> <th>35</th> <th>51</th> <th>63.5</th> <th>76.2</th> <th>89</th> </tr> <tr> <th>400, 450</th> <td>0.25</td> <td>0.25</td> <td>0.25</td> <td>0.25</td> <td>0.25</td> </tr> </table>	Vdc \ ΦD	35	51	63.5	76.2	89	400, 450	0.25	0.25	0.25	0.25	0.25
Vdc \ ΦD	35	51	63.5	76.2	89								
400, 450	0.25	0.25	0.25	0.25	0.25								
Load Life	<p>The following specifications shall be satisfied when the capacitors are restored to 20°C after the rated voltage is applied for 2,000 hours at 105°C.</p> <table border="1"> <tr> <td>Leakage current</td> <td>Less than the initial specified value</td> </tr> <tr> <td>Capacitance change</td> <td>Within ±20% of the initial value</td> </tr> <tr> <td>tanδ</td> <td>Less than 300% of the initial specified value</td> </tr> </table>	Leakage current	Less than the initial specified value	Capacitance change	Within ±20% of the initial value	tanδ	Less than 300% of the initial specified value						
Leakage current	Less than the initial specified value												
Capacitance change	Within ±20% of the initial value												
tanδ	Less than 300% of the initial specified value												
Shelf Life	After exposing them for 1,000 hours at 105°C without voltage applied, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20°C by the KS C IEC 60384 - 4												

Dimensions

(Unit : mm)



ΦD	B	A	T	U	Ø*	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

ΦD	B	A	T	U	Ø*	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

Rated ripple current multipliers

Vdc \ Frequency	50Hz	120Hz	300Hz	1kHz	10kHz~
400~	0.80	1.00	1.20	1.35	1.40

Ratings for EJS Series

vdc \ μF	Item	400		450	
		ΦD × L (mm)	Ripple	ΦD × L (mm)	Ripple
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 × 130	16.9
4700		76.2 × 130	21.2	76.2 × 150	22.6
6800		89 × 150	27.1	89 × 150	28.2

Ripple current (Arms) at 105°C, 120Hz

TGW Series

- 40°C 1,000,000Times assured.
- For welding machine
- Lug & screw terminal type
- RoHS compliant

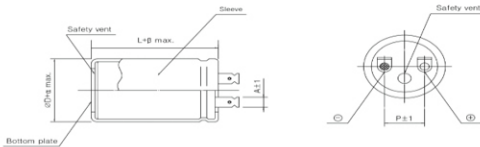


Specifications

Item	Characteristics	
Rated Voltage Range	315, 475 Vdc	
Operating Temperature Range	-25 ~ +70°C	
Capacitance Tolerance (at 120Hz, 20°C)	-10 ~ +50% (T)	
Leakage current max. (at 20°C, 5min.)	$I=3\sqrt{CV}$ (μA) Where, C : Nominal capacitance (μF), V : Rated voltage (Vdc)	
Dissipation factor max. (at 120Hz, 20°C)	0.10	
Load Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after charge and discharge for 1,000,000times at 40°C with application of the rate voltage.	
	Leakage current	Less than 200% of the initial specified value
	Capacitance change	Within $\pm 20\%$ of the initial value
	tan δ	Less than 200% of the initial specified value

Dimensions

Lug terminal type



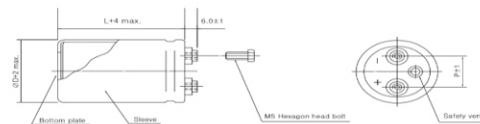
(Unit : mm)

ØD	35	51
P	14	18
α	1	2
β	2	3
A	4.5	8

Rated ripple current multipliers

Vdc	Frequency				
	50Hz	120Hz	300Hz	1kHz	10kHz~
400~	0.80	1.00	1.20	1.35	1.40

Screw terminal type



ØD	35	51	63.5	76.2
P	12.7	22	28.6	31.8

Ratings for TGW Series

μF	vdc	
	315	475
1000		51 × 100
1500	35 × 100	
2200	51 × 100	76.2 × 120



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