Rubycon

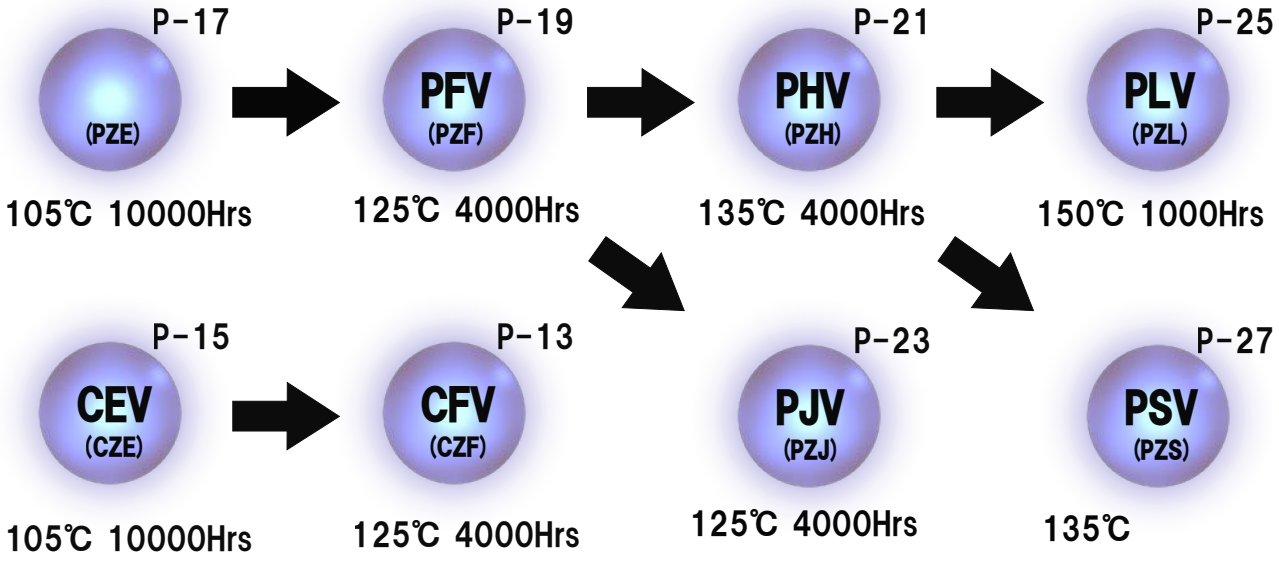
Capacitors Catalog

CONDUCTIVE POLYMER
ALUMINUM CAPACITORS HYBRID TYPE

RUBYCON CORPORATION

CONTENTS

SERIES SPECIFICATION



Key Pointin Selecting the Capacitor

FEATURES

1.FEATURES

"PZ-CAP" has lowest E.S.R. level and excellent performance high frequency though low profile.
"PZ-CAP" is an ideal capacitor for digital and high frequency devices. Furthermore, it has high heat resistance

◆Low impedance and low E.S.R. at high frequency.
"PZ-CAP" is suitable for noise rejection.

◆High ripple current capability.

◆Excellent temperature characteristics within the category temperature range

◆Reflow soldering method available
"PZ-CAP" may has applicability to reflow soldering at 260℃ (peak temperature) .

◆Achieved higher voltage
By select polymer and development of a method for manufacturing, PZ-CAP is achieved higher voltage.

2.APPLICATIONS

◆Application circuit
Noise-Limiter,Smoothing circuit of power supply, High Ripple circuit.

◆Applied equipment
Inverter Circuit,LED Back Light,IGBT Gate Drive, Power Supply for Industrial, Telecommunication device,Brushless DC motor, UPS etc.

特長

1. "PZ-CAP"の特長

"PZ-CAP"は、陰極に導電性に優れた導電性高分子を用いているため小型、低背位にもかかわらず等価直列抵抗が低く、良好な高周波特性を有しています。
電子機器のデジタル化、高周波化に最適であり、また、耐熱性・信頼性にも優れています。

◆低インピーダンス、低ESR(高周波領域)
理想的な周波数特性を有していますので、高周波領域でノイズ除去用として適しています。

◆高許容リプル電流
許容リプル電流が大きく、スイッチング電源の平滑用として適しています。

◆安定した温度特性
カテゴリ温度範囲内にて、フラットな温度特性を有しています。

◆リフローソルダリング対応
高いハンダ耐熱性を有していますので、リフロー対応(ピーク温度:260℃)が可能です。

◆高電圧化
導電性高分子の選定と製造方法の開発により高電圧化を達成しています。

2.用　途

◆適用回路
ノイズ除去用、電源平滑用、高リプル回路用

◆適用機器
インバータ回路、LEDバックライト、
IGBTゲートドライブ回路、
産業機器・通信機器用電源、
DCブラシレスモーター、UPS他

CAUTIONS FOR PROPER USE OF CAPACITOR

To use Capacitors properly, please pay attention to the points listed below.
When the following types of electrical loads indicated below are applied to Capacitors, rapid deterioration ofelectrical property occurs :

- ・reverse voltage
- ・voltage beyond rated voltage
- ・ripple current beyond rated value
- ・severe charging/discharging

At such times, capacitors are heated very much together with gas evolution, so as to allow electrolyte leakage from sealing or to increase internal pressure enough to operate safety vent.
In some condition, capacitors may catch fire or explode to release combustibles (e.g. electrolyte, separator paper).

コンデンサの使用上の注意事項

コンデンサのご使用に際しては下記の点にご留意頂くようお願い致します。

コンデンサに次に示すような負荷を印加すると、急激な特性劣化が起こります。

- ・逆電圧
- ・定格電圧を超える過電圧
- ・定格リプル電流を超える過電流
- ・急激な充放電

この時、急激な発熱やガス発生が起こり、コンデンサ封口部からの電解液漏れや内圧の上昇による圧力弁の作動に至ります。
条件によっては、コンデンサの破壊とともに可燃物(コンデンサに使用している電解液、電解紙は可燃物です)が外部へ飛散したり、発火する場合があります。

1.Cautions on Circuit Design

1)Operational Environment, Mounting Environment

・Ensure that operational and mounting conditions are satisfied with the specified conditions detailed in the catalog and specification sheets.

2)Operating Temperature, Ripple Current and Load Life

・Operating temperature and applied ripple current should be within the values specified in the catalog or specification sheets.

①Do not use Aluminum Electrolytic Capacitors at a temperature exceeding the specified maximum category temperature.

②Do not apply excessive current exceeding the specified rated ripple current or permissible one.

The combined value of DC voltage and the peak of AC voltage must not exceed the rated voltage. Voltage application in the reverse direction is unallowable.

・Consider current balance to connect 2 or more Aluminum Electrolytic Capacitors in parallel.

・Application of ripple voltage with wide amplitude is equivalent to quick charge-discharge operation. Please be careful.

・Expected life of capacitor calculated with "life estimation equation" based on acceleration test results aren't guaranteed,since errors and variations are included.
We recommend to select a capacitor considering appropriate safety factor to the expected life. Please refer to our web-site or consult us for the detail of "life estimation equation".

3)Polarity

・Do not apply reverse voltage or AC voltage to Aluminum Electrolytic Capacitors, since they are normally polarized.

・Polarity is indicated as follows:

(1)On radial leaded Aluminum Electrolytic Capacitors with straight radial leads, the shorter radial lead is the negative terminal.

(2)On capacitors with mark on top of aluminum can, the terminal with the mark〔◖〕is negative.

4)Charging and Discharging

・Do not use Standard Aluminum Electrolytic Capacitors to applications with rapid charge and discharge cycles.
Consult us about capacitors specially designed for rapid charge-discharge cycles.

5)Applied Voltage

・Do not apply voltage beyond the rated voltage to capacitors.

・Use bleeder resistors to a circuit using 2 or more Aluminum Electrolytic Capacitors in series. In this case, the resistors should be connected parallel to the capacitors.

6)

・Electrically isolate Aluminum Electrolytic Capacitors as follows:
Among aluminum can, negative terminal, positive terminal and circuit pattern.
The surface of case of "PZ-CAP" is not recognized as an insulator, and therefore, the standard capacitor should not be used in a place where insulation function is needed.

1．回路設計での注意事項

1)使用環境、取付け環境及び定格性能の確認

・使用環境及び取付け環境が、コンデンサのカタログ又は納入仕様書に規定した定格性能の範囲内である事を確認し、使用してください。

2)使用温度・リプル電流及び寿命

・使用温度及び印加リプル電流は、カタログ又は納入仕様書に規定の範囲内としてください。
①高温度（カテゴリ上限温度を超える温度）で使用しないください。
②過電流（定格または許容リプル電流を超える電流）を流さないでください。
直流電圧とリプル電圧尖頭値の和が定格電圧を越えないように、かつ逆電圧とならないようにしてください。

・コンデンサを2ヶ以上並列に接続する場合は、電流バランスを考慮してください。

・アルミ電解コンデンサ端子間のリプル電圧の変動幅が大きい場合は、急激な充放電と同様な使用となりますので、ご注意ください。

・コンデンサの寿命は加速試験結果を基にした寿命推定式により求める事ができますが、この推定式による寿命時間には誤差が含まれており、保証値ではありません。この式により求められた結果が機器の寿命に対して十分に余裕を持ったコンデンサを選定してください。寿命推定式については弊社ホームページをご参照頂くか、弊社までお問い合わせください。

3)極性

・コンデンサは、有極性です。逆電圧又は交流電圧は、印加しないでください。

・極性は下記(1)～(2)の通り表示してあります。

(1)リード線端子同一方向形アルミニウム電解コンデンサは、リード線加工していない場合、リード線端子の短い方が陰極（マイナス）です。

(2)ケース天面に捺印表示しているアルミニウム電解コンデンサは、〔◖〕状の捺印のある方が陰極（マイナス）です。

4)充放電

・コンデンサは、急激な充放電が繰り返される回路に使用しないでください。急激な充放電が繰り返される回路に使用されるコンデンサについては、ご相談ください。

5)印加電圧

・コンデンサに過電圧（定格電圧を超えた電圧）を印加しないでください。

・コンデンサを2ヶ以上直列に接続する場合は、電圧バランスを考慮してコンデンサと並列に分圧抵抗器を挿入してください。

6) コンデンサの絶縁

・コンデンサは、次の間で回路的に完全に隔離してください。
ケースと陰極端子及び陽極端子並びに回路パターン間

・コンデンサの表面は絶縁が保証されていません。
絶縁機能が必要な箇所には使用しないでください。

7) Use Conditions

・Be sure to keep Aluminum Electrolytic Capacitors from the following environments:

①Damp atmosphere where spray of water, saltwater or oil is expected, or where condensation may occur.

②Atmosphere including hazardous gas/fumes such as hydrogen sulfide, sulfurous acid, nitrous acid, chlorine, ammonia or bromine.

③Exposure to direct sunshine,ozone, ultraviolet rays or radiation.

④Exposure to acid or alkaline solution.

⑤Severe vibration or shock beyond the condition specified in the catalog or specification sheets.

7) 使用環境の制限

・コンデンサは次の環境では、使用しないでください。

①直接水、塩水及び油がかかったり、又は結露状態になる環境

②有害ガス(硫化水素、亜硫酸、亜硝酸、塩素、アンモニア、臭素、臭化メチルなど)が充満する環境

③直射日光、オゾン、紫外線及び放射線が照射される環境

④酸性及びアルカリ性溶剤がかかる環境

⑤振動又は衝撃条件がカタログ又は納入仕様書の規定範囲を超える過激な環境

8) Consideration for Circuit Design

・In designing a printed circuit board (PCB) with Aluminum Electrolytic Capacitors, the following matters should be ensured:

①Alignment of through-hole pitch on the circuit with radial lead pitch of each capacitor.

②Avoid wiring or circuit pattern around the capacitor's pressure relief vent.
The vent is designed to operate to release excessive hot gas including impregnated solution, in case of reverse voltage or excessive voltage, or if ripple current exceeding the permissible value is applied.

(1)The pressure relief vent bulges right before operation. Ensure enough space (2mm MIN) above the vent of each capacitor, so as to prevent the capacitor from touching the cover of the set. The pressure relief vent will not open without appropriate space.

(2)In case capacitor's vent is facing the surface of PCB, make a gas release hole on the board.

③Do not lay copper lines or circuit patterns under capacitors.

④Avoid heating parts mounting around Aluminum Electrolytic Capacitors or backside of PCB.

⑤Land patterns for chip capacitor should comply with the

8) プリント配線板の設計

・コンデンサをプリント配線板に配置する/位置決めするとき、次の内容を確認の上、設計してください。

①コンデンサの端子間隔にプリント配線板の穴間隔を合わせてください。

②コンデンサの圧力弁部の上に配線や回路パターンが来ないように設計してください。
圧力弁付きアルミニウム電解コンデンサは、逆電圧や過電圧が印加された時、又カタログ等で規定する許容値を越えたリプル電流が流れた時等の異常時に、圧力弁が作動して含浸液を含む高温のガスを逃すように設計されています。

(1)ケース圧力弁は、作動時に弁部分が膨らみます。基板取付け時はセットの上蓋等と接触しないように2mm以上の空隙を設けてください。空隙がないと圧力弁が作動しなくなります。

(2)プリント配線板側にコンデンサの圧力弁が付く場合は、圧力弁の位置に合わせて圧力弁作動時のガス抜き穴を開けてください。

③コンデンサの封口部の下には、回路パターンを配線しないでください。

④コンデンサの周辺及びプリント配線板の裏側(コンデンサの下)への発熱部品の配置は避けてください。

⑤チップコンデンサ用プリント配線板のランドパターンは、カタログ又は納入仕様書の規定によって回路設計してください。

9) Short time leakage current

・The leakage current of aluminum electrolytic capacitor is rather larger than other types of capacitor. This value will be influenced by temperature, applied voltage and applying time of voltage.
Particularly, brief leakage current level which does not reach to specified time such as 2 minutes after applied voltage is unstable. Therefore, please pay attentions when aluminum capacitors are used for application such as timing circuit which include time constant circuit because actual leakage current level is different with simple calculation of "CR circuit". If it is used in such a circuit, please select a capacitor with a margin for the required accuracy of the instrument.

9) コンデンサの短時間漏れ電流

・コンデンサに直流電圧を印加すると漏れ電流が流れますが、アルミ電解コンデンサは他のコンデンサに比べて漏れ電流が大きく、温度、印加電圧、印加時間によって漏れ電流が変化します。特に、2分値等の規定時間に達しない短時間の漏れ電流値は変動が大きくなります。従って機器の制御や判定などの時定数回路を含む用途に使用される場合、理論的に得られる値と大きく異なる為、注意が必要です。
このような回路で使用される場合には、機器の要求精度に対して十分余裕を持ったコンデンサを選定してください。

10)
・Consider this variation of electric characteristics of Aluminum Electrolytic Capacitor to design circuits. The characteristics vary with operating temperature and frequency.
・Extra through-holes should be avoided around or under Aluminum Electrolytic Capacitors on double sided or multilayer PCB.
・On use of Aluminum Electrolytic Capacitors to electronic equipment requiring higher safety, consider failure mode of the capacitor to ensure safety at design stage.
①System safety with circuit protection and protective devices.
②System safety with redundant circuits, etc.

10) その他
・温度及び周波数の変動によって、コンデンサの電気的な特性は変化します。この変化分を考慮の上、回路設計してください。
・両面のプリント配線板にコンデンサを取り付けるとき、コンデンサの下に余分なプリント配線板穴及び表裏接続用貫通穴がこないように回路設計してください。
・安全性が求められる電子機器へのご使用に際しては、電解コンデンサの故障モードを考慮し、設計面からの安全性確保を行ってください。
①保護回路、保護装置によるシステムの安全化
②冗長回路などによるシステムの安全化

2. Cautions for Assembly

2.取り付け時の注意事項

1) Precautions for assembly
・Do not reuse Aluminum Electrolytic Capacitors once mounted and electrified in a unit. Reuse of the capacitors is unallowable unless they are detached from PCB for the purpose of electric measurement.
・Aluminum Electrolytic Capacitors may have recurring voltage even after discharging. Please discharge capacitors through a 1kΩ resistor before use.
・Leakage current of Aluminum Electrolytic Capacitors may be increased after storage for a long time. Conduct electrification treatment for such capacitors before use.
Electrification Treatment
Connect a 10～1kΩ resistor in series with the subject capacitor, and apply the DC voltage as high as the Rated Voltage for 2 hours at 105±2℃. Discharge the capacitor through a resistor of about 1Ω/Volt at atomospheric condition after the electrification.

1) 取り付け前の予備知識
・セットに組み込んで通電したコンデンサは、再使用しないでください。定期点検時の電気的性能を測定するために取り外したコンデンサを除いて、再使用はできません。
・コンデンサには、再起電圧が発生する場合があります。このとき、約1kΩの抵抗器を通して放電してください。
・長期保管のコンデンサは、漏れ電流が増大している場合があります。このとき、長時間放置された製品には、以下に示す方法で電圧処理を実施してください。
電圧処理
コンデンサに約10～1000Ωの保護抵抗器を直列に接続し、定格電圧に等しい直流電圧を105±2℃で2時間印加し、次に 常温中で約1Ω／Vの抵抗器を通して放電する。

2) Assembly Process
・Ensure polarity of each capacitor before mounting.
・Keep capacitors from falling onto the floor. Do not use capacitors if they are fallen onto a hard surface.
・Do not deform capacitors.
・Ensure that terminal pitch of each capacitor is aligned with through-hole pitch on PCB.
・Avoid excessive force to clinch lead wires in auto-insertion process.
・Avoid excessive shock to capacitors on automatic insertion machine, during mounting, parts inspection or centering operations.
・Please use supporting materials such as fixture or adhesive to mount capacitors to PCB, in case vibration or shock is expected.
・Use the value of torque within the range described in the catalog or specification sheets to tighten screw terminals.

2) 取り付け時
・コンデンサの定格（静電容量及び電圧）を確認してから、取り付けてください。
・コンデンサの極性を確認してから取り付けてください。
・コンデンサは床などに落下させないでください。このとき、落下したコンデンサは、使用しないでください。
・コンデンサを変形させて取り付けないでください。
・コンデンサの端子間隔とプリント配線板穴間隔とが合っていることを確認してから取り付けてください。
・自動挿入機によってコンデンサのリード線をクリンチ固定する強さは、強すぎないようにしてください。
・自動挿入機及び装着機の吸着具、製品チェッカー及びセンタリング操作による衝撃力に注意してください。
・セットにおける振動・衝撃等が懸念される場合はコンデンサをプリント基板に取付ける際、補助具・接着剤で補強してください。
・ネジ端子の締めつけトルクは、カタログ又は納入仕様書で規定された範囲内としてください。

3-1) Soldering
・Soldering should be performed with the conditions (temperatures, times) specified in the specification sheets.
・In case of requirement of lead wire reforming due to terminal pitch unligned with through-hole pitch on PCB, capacitors should be kept from stress on body.
・In case that capacitor is required to detach from PCB due to hand rework, the detachment should be made after solder is fully melted, so as to keep the capacitor from stress on radial leads.
・Do not touch soldering iron with capacitor body.

3-1) はんだごてによるはんだ付け
・はんだ付け条件（温度、時間）は、納入仕様書に規定の範囲内としてください。
・端子間隔とプリント配線板穴間隔が不整合のため、リード線端子を加工する必要がある場合には、はんだ付けする前に、コンデンサ本体にストレスがかからないように加工してください。
・はんだごてによる手直しをするとき、一度はんだ付けしたコンデンサを取り外す必要がある場合には、コンデンサの端子にストレスがかからないように、はんだが十分溶融してから行ってください。
・はんだごての先がコンデンサの本体に触れないようにしてください。

3-2)

・Do not dip capacitor body into solder bath. Dip only the opposite side of PCB.
・Soldering conditions (preheat, soldering temperature, dipping time) should conform to the specification sheets.
・Be sure to apply soldering flux only to capacitor terminals.
・Be careful that another part doesn't fall in soldering to touch capacitors.

3-3) Reflow Soldering

・Reflow soldering conditions (preheat, soldering temperature, reflow time, reflow cycle) should conform to the catalog or specification sheets.
*Consult us for soldering beyond the specification.
・Be careful of the amount of heating with infrared heater, since infrared absorptance depends on color and material of capacitor sleeve.

4) Handling after Soldering

・Do not bend or twist capacitor body after soldering on PCB.
・Do not hold capacitors to transfer PCB after soldering.
・Keep capacitors from hitting something hard.
Also keep capacitors from touching another PCB or part on stacking PCB.

5) Cleaning after Soldering

(1)Do not clean capacitors with the following cleaning agents:
・Halogenated solvents: except for solvent resistant capacitor types, halogenated solvents can permeate the seal to corrode aluminum foil within capacitor.
・Alkali solvents: could attack and dissolve aluminum can.
・Terpene and Petroleum based solvents: could deteriorate packing rubber.
・Toluene and Xylene: could deteriorate packing rubber.
・Acetone: could blur print on sleeve.

・Do not use of ozone depleting agents to protect the global environment.
We don't recommend hydro-chlorofluorocarbon (HCFC) considering its impact on the environment.

(2)To clean up capacitors, select solvent-resistant capacitors. Also use detergents and conditions stipulated in the catalog or specification sheets.
・Cleaning of solvent-resistant capacitors
Closely control cleaning solution (conductivity, pH, specific gravity, water content, etc.).
The concentration of flux (contamination) must be within 2wt% against the cleaning solution. Excessive contamination could include high content of chloride (halogen) ion, resulting in corrosion of capacitor.
・Do not keep PCB including capacitors in solvent-including environment or non-ventilated container. Be careful of drying not to leave detergent between capacitor surface and PCB.
Use a circulating chamber for drying
(within the maximum category temperature).

3-2) フローはんだ付け

・コンデンサの本体を溶融はんだの中に浸せきしてはんだ付けしないでください。プリント配線板を介在させて、コンデンサのある反対側の裏面のみにはんだ付けしてください。
・はんだ付け条件(予備加熱、はんだ付け温度、端子浸せき時間)は、納入仕様書に規定の範囲内としてください。
・端子部以外にフラックスが付着しないようにしてください。
・はんだ付けのとき、他の部品が倒れてコンデンサに接触しないようにしてください。

3-3) リフローはんだ付け

・はんだ付け条件(予備加熱、はんだ温度、時間、リフロー回数)は、カタログ又は納入仕様書に規定の範囲内としてください。
※)規定の範囲を越えるリフローを必要とする場合は、必ずご連絡ください。
・赤外線ヒータを使用するとき、コンデンサの色や材質によって赤外線吸収率が異なる為、加熱の度合いに注意してください。

4) はんだ付け後の扱い

・プリント配線板にコンデンサをはんだ付けした後、コンデンサ本体を傾けたり又はひねったりしないでください。
・プリント配線板にコンデンサをはんだ付けした後、コンデンサを把手がわりにつかんでプリント配線板を移動しないでください。
・プリント配線板にコンデンサをはんだ付けした後、コンデンサに物をぶつけないでください。
また、プリント配線板を重ねるときコンデンサにプリント配線板、又は他の部品などが当たらないようにしてください。

5) プリント配線板の洗浄

(1)コンデンサは、以下の洗浄剤などでは洗浄できません。
・ハロゲン系溶剤:コンデンサ内部の腐食
洗浄剤がコンデンサ内部に侵入(拡散)し、洗浄剤が分解反応を起こして遊離された塩素(ハロゲンイオン)がアルミと反応し腐食が発生する場合があります。
・アルカリ系溶剤:アルミケースの腐食(溶解)
・テルペン、石油系溶剤:封口ゴムの劣化
・トルエン、キシレン:封口ゴムの劣化
・アセトン:表示の消失

・オゾン層破壊物質は、地球環境保護のため、洗浄剤としての使用は避けてください。
代替フロンも、地球環境保護の見地から将来的に使用できなくなりますので、洗浄剤としての使用を推奨しません。

(2)洗浄する必要がある場合は、耐洗浄用コンデンサを使用し、カタログ又は納入仕様書に規定した洗浄剤、洗浄条件(温度、時間など)の範囲内で洗浄を行ってください。
・耐洗浄用コンデンサに対して洗浄するとき、
洗浄剤の汚染管理(電導度、pH、比重、水分量など)を十分管理してください。
洗浄剤が汚染されていると、塩素(ハロゲンイオン)濃度が高くなり、コンデンサ内部が腐食する場合があります。
洗浄剤に対するフラックス濃度は、2%wt以下に管理してください。
・耐洗浄用コンデンサに対して洗浄の後、洗浄液の雰囲気中又は密閉容器で保管しないでください。
また、基板洗浄直後にコンデンサ封口部とプリント基板の間に洗浄剤が残留しないように充分強制乾燥を行ってください。
(カテゴリ上限温度以下)

(3)Cleaning Procedure
<Cleaning Solvents>
Pine Alpha ST-100S
Clean-thru 750H
IPA (isopropyl alcohol)
<Cleaning Condition>
Immerse into the solution of the solvent, put into mist atmosphere, use ultrasonic vibration, or combine them for 5 minutes (3 minutes for 5L and 7L) up to 60C.
・Please refer to specification sheets, since some products are incompatible with cleaning. Please consult us to use a

(3)洗浄方法
<洗浄剤>
パインアルファ ST-100S
クリンスルー 750H
IPA(イソプロピルアルコール)
<洗浄条件>
60℃の液中浸漬、蒸気、超音波及びこれらの組合わせで5分間以内(5L、7L品は3分間以内)
・商品によっては洗浄できませんので、納入仕様書の耐洗浄性の項目をご参照ください。また、上記以外の洗浄剤を御使用の際には、必ず一報ください。

6) Adhesives and Coating Materials
・Do not use adhesives or coating materials including halogens to fix Aluminum Electrolytic Capacitors.
・Be sure to clean up soldering flux and dirt between each capacitor and the surface of PCB before using an adhesive or a coating material.
・Fully dry solvents on capacitors before using adhesive or coating material.
・Do not cover up all the sealed surface of capacitor with adhesive or coating material.

6) 固定剤・コーティング剤
・ハロゲン系溶剤などを含有する固定剤・コーティング剤は使用しないでください。
・固定剤・コーティング剤を使用する前に、基板とコンデンサの封口部間にフラックス残渣及び汚れが残らないようにしてください。
・固定剤・コーティング剤を使用する前に、洗浄剤などを乾燥させてください。
・固定剤・コーティング剤により、封口部の全面をふさがないでください。

7) Fumigation, Disinfection and Halogenated Flame Retardant
・Note that treatments or environments shown below may cause corrosion inside and outside of capacitor (foils, aluminum can,terminal):
(1)Fumigation of wooden pallets to disinfect vermin before shipment.
(2)Direct deposition to capacitors of halogenated detergents or antiseptics for preventing infection of epidemic diseases contact.
(3)Coexistence of components or parts containing halogenated flame retardant agent (bromine etc.).

7) 燻蒸処理・消毒作業・ハロゲン系難燃剤について
・以下の処理・環境条件は、コンデンサの内部電極やケース及び端子表面の腐食原因となる場合がありますので注意してください。
(1)輸出入時の防虫対策の為のハロゲン化合物による木材パレットの燻蒸処理。
(2)伝染病の感染を防止する為のハロゲン系の洗浄剤・消毒剤が直接コンデンサに付着する場合。
(3)ハロゲン系難燃剤(臭素等)を多く含む部品(電子部品、及び筐体、絶縁フィルム等を含め)との共存環境下での使用、かつそれらの部品からハロゲンが遊離する懸念のある場合。

3.Cautions in Use on Set
・Do not touch the terminals of capacitor.
・Do not short-circuit between terminals of capacitor. Keep capacitors from conductive solutions, such as acid and alkali.
・Ensure that operational environment is satisfied with the conditions mentioned in the catalog or specification sheets.

3.セット使用中の注意事項
・コンデンサの端子に直接触れないでください。
・コンデンサの端子間を導電体でショートさせないでください。また、酸及びアルカリ水溶液などの導電性溶液をコンデンサにかけないでください。
・使用環境及び取付け環境が、コンデンサのカタログ又は納入仕様書に規定した定格性能の範囲内である事を確認し、使用してください。

4.Maintenance
・Periodically inspect capacitors used for industrial equipment. Check the following points at the inspection.
①Visual inspection of pressure relief vent operation and leakage of electrolyte.
②Electrical characteristics: leakage current, capacitance, dissipation factor and other items specified in the catalog or specification Sheets.

4.保守点検
・産業用機器に使用されているコンデンサについては、定期点検をしてください。
定期点検は、次の内容を行ってください。
①外観:開弁、液漏れなどの著しい異常の有無。
②電気的性能:漏れ電流、静電容量、損失角の正接及びカタログ又は納入仕様書に規定の項目。

5.Emergency Action

・If you find pressure relief vent operation or gas evolution from a capacitor, shut off the main switch of the equipment or pull the power cable from the outlet immediately.
・Keep your face off from the capacitor with vent operation. Extremely hot gas (over 100℃) may blow out of it.
In case of eye contact or inhalation of gas, immediately flush the eye(s) with large amount of clean water or gargle the throat.
Do not lick electrolyte. In case of electrolyte reach to skin, wash with soap and water.

5.万一の場合

・セット使用中、コンデンサが開弁し、ガスが見えたときは、セットのメイン電源を切るか又は電源コードのプラグをコンセントから抜いてください。
・コンデンサの圧力弁作動時、＋100℃を超える高温ガスが噴出しますので、顔を近づけないでください。
噴出したガスが目に入ったり、吸い込んだりした場合には、直ちに水で目を洗ったり、うがいをしてください。
コンデンサの電解液は、なめないでください。電解液が皮膚に付いたときは、石鹸で洗い流してください。

6.Storage Condition

・Do not keep Aluminum Electrolytic Capacitors in hot and/or humid atmosphere. Recommended storage condition is 5℃–35℃ in temperature and not higher than 75% in relative humidity.
・Do not keep Aluminum Electrolytic Capacitors in a condition where spray of water, saltwater or oil is expected.
・Do not store Aluminum Electrolytic Capacitors in an environment full of hazardous gas (e.g. hydrogen sulfide, sulfurous acid gas, nitrous acid, chlorine gas, ammonia, bromine gas, methyl bromide).
・Do not keep Aluminum Electrolytic Capacitors under exposure to ozone, ultraviolet rays or radiation.
・Do not keep Aluminum Electrolytic Capacitors under exposure to acid or alkaline environment.

6.保管の条件

・コンデンサを高温度・高湿度で保管しないでください。室内で5℃～35℃の温度、75%以下の相対湿度で保管してください。
・コンデンサに直接、水、塩水及び油がかかる環境で保管しないでください。
・コンデンサを有害ガス（硫化水素、亜硫酸、亜硝酸、塩素、アンモニア、臭素、臭化メチルなど）が充満する環境で保管しないでください。
・コンデンサをオゾン、紫外線及び放射線が照射される環境で保管しないでください。
・コンデンサを酸性及びアルカリ性溶剤がかかる環境で保管しないでください。

7.Disposal

・Please take either of the following actions in case of disposal.
①Incineration (at high temperature over 800℃) after piercing or crushing capacitor body.
②Consignment to specialists of industrial waste.

7.廃棄の場合

・コンデンサを廃棄する場合には、次のいずれかの方法を取ってください。
①コンデンサに穴を開けるか又は十分つぶしてから高温焼却（800℃以上）してください。
②コンデンサを焼却しない場合は、専門の産業廃棄物処理業者

For further details:
Please refer to JEITA RCR-2367D (Safety Application Guide for fixed aluminum electrolytic capacitors for use in electronic equipment).
[Technical Report of Japan Electronics and Information Technology Industries Association (established in March 1995 Revised in March 2019)]

※詳細はJEITA RCR-2367Dをご覧ください。
JEITA RCR-2367D
「電子機器用固定アルミニウム電解コンデンサの安全アプリケーションガイド」
〔社団法人　電子技術情報産業協会、1995年3月制定、2017年10月改正、2019年3月追補1制定〕

⚠

Our products is not used in special circuit(transpo-tation equipment , medical equipment , aerospace equipment, space equipment, nuclear equipment etc) where a defect in this component may cause the loss of human life or other significant damage in the case of high reliability application circuit/equipment , Please contact us in advanece.

⚠

極めて高信頼性を要求される回路、社会的に重大な影響を与えかつ直接生命・身体に対する危険を伴う用途（交通輸送機器・医療機器・航空機器・宇宙機器・原子力用機器等）に使用される場合には、事前にご相談ください。

◆CHIP TYPE PART NUMBER

□□□	□□□	□□□□□	M	□□□	□□	D x L
Rated Voltage	Series	Capacitance	Capacitance Tolerance	Option	Lead Forming	Case Size

Rated Voltage(V)	Code
25	25
63	63

Cap.(μF)	Code
220	220
22	22

Tolerance	Code
±20%	M

8×10.5
10×10.5

Please indicate the above information, when ordering.

例): Example

25	PFV	220	M	8×10.5

◆RADIAL LEAD TYPE PART NUMBER

□□□	□□□	□□□□□	M	□□□	□□	D x L
Rated Voltage	Series	Capacitance	Capacitance Tolerance	Option	Lead Forming	Case Size

Rated Voltage(V)	Code
25	25
63	63

Cap.(μF)	Code
220	220
22	22

Tolerance	Code
±20%	M

TA,KC,
CA etc

8×9
10×9

Please indicate the above information, when ordering.

例): Example

・Long lead type	25	PZF	220	M		8×9
・Taping type	25	PZF	330	M	T8	10×9

※Option : Standard item is blank.

PACKAGING SPECIFICATION

◆V Chip Type

SIZE (mm)	W3 (mm)	φC (mm)	Q'ty (pcs/reel)	Standard Shipping Carton Quantity (pcs/Box)
φ6.3×6.1	18	382	1000	5000
φ6.3×8	18	382	900	4500
φ8×10.5	26	382	500	2000
φ10×10.5	26	382	500	2000
φ10×12.5	26	382	300	1200
φ10×16.5	26	382	200	800

Please refer to TAPING REEL for W3 and φC.

RADIAL LEAD TYPE

SIZE (mm)	LONG LEAD (BULK PACKAGE)	LEAD FORMING (BULK PACKAGE)	TAPING
φ8×9	1000	1000	1000
φ10×9	1000	1000	500
φ10×11	1000	1000	500
φ10×15	1000	1000	500
φ10×20	1000	1000	

There are some differences between actual package quantity and above list.

◆TAPING SPECIFICATIONS

◆RADIAL LEAD Type DIMENSIONS

Fig.1

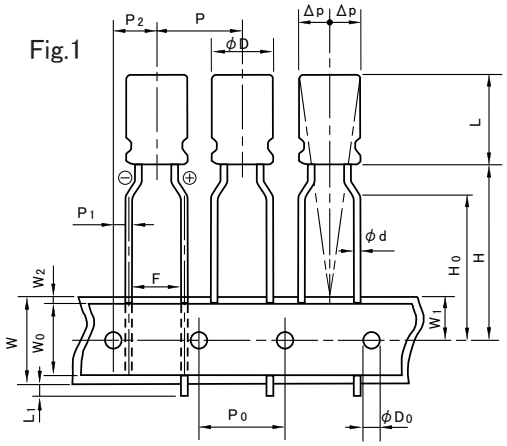
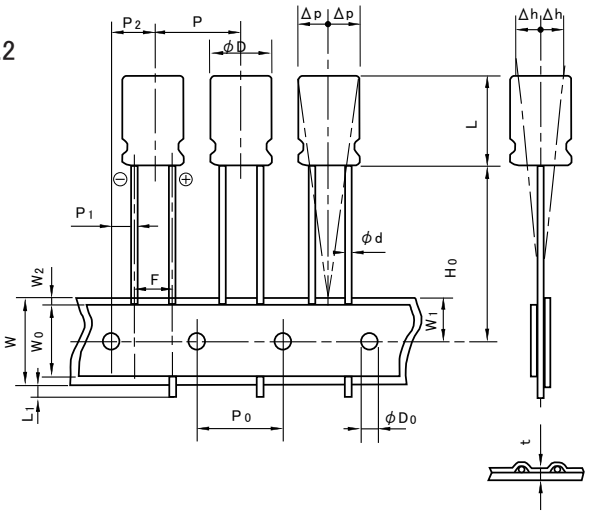


Fig.2



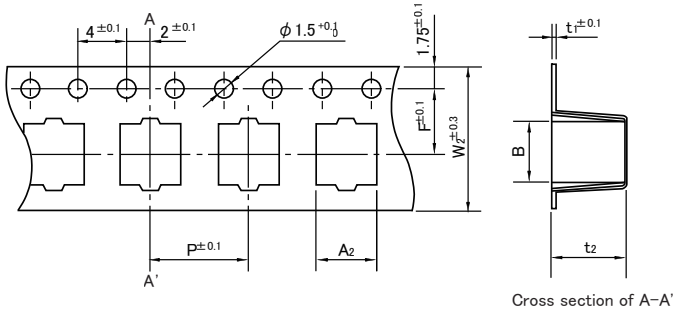
◆SPECIFICATION

Item	Code	φ8				φ10	※ Tolerance
		8mmHeight		9mm more Height			
Taping code		TA	T7	TA	T7	T8	
Applicable Fig. No.		Fig.1	Fig.2	Fig.2	Fig.2	Fig.2	
Dia. of lead	φd	0.45		0.6			±0.05
Height of body	L	9.5		15.0			MAX
Distance from center to center of next body	P	12.7					±1.0
Distance from center to center of next driving hole	P0	12.7					±0.2
Distance between center of driving hole and lead	P1	3.85	4.6	3.85	4.6	3.85	±0.5
Distance between center of driving hole and body	P2	6.35					±1.0
Pitch of lead (at the upper edge of the carrier tape)	F	5.0	3.5	5.0	3.5	5.0±0.8	+0.8 −0.2
Width of mounting tape	W	18.0					±0.3
Width of adhesive tape	W0	5.0					MIN
Distance between center of driving hole and mounting tape edge	W1	9.0					±0.5
Max. allowable distance between mounting and adhesive tape edges	W2	1.5					MAX
Distance between center of driving hole and bottom of body	H	20.0				18.5	±0.75
Distance between center of driving hole and clinch part of lead	H0	16.0	–	16.0	–	–	±0.5
End of lead	L1	0.5					MAX
Dia. of driving hole	φD0	4.0					±0.2
Off alignment of body top	Δh	1.0					MAX
Off alignment of body top	Δp	1.0					MAX
Sum of thickness for mounting and adhesive tape without lead dia	t	0.6					±0.3
Quantity (pcs)		1000				500	

※For the case that tolerance is specified individually, the value shall have the priority.

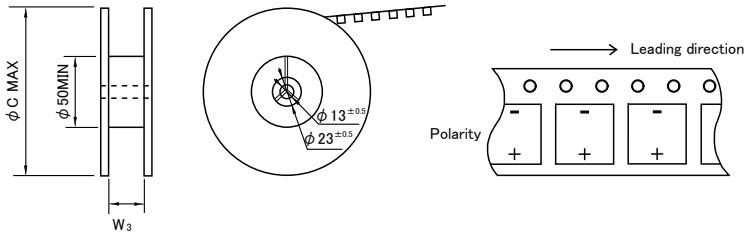
object : Chip type capacitors

◆TAPING



Size	W2 (mm)	A2 (mm)	B2 (mm)	P (mm)	t2 (mm)	F (mm)	t1
φ6.3×6.1	16.0	7.0	7.0	12.0	6.2	7.5	0.4
φ6.3×8	16.0	7.0	7.0	12.0	8.2	7.5	0.4
φ8×10.5	24.0	8.7	8.7	16.0	11.0	11.5	0.4
φ10×10.5	24.0	10.7	10.7	16.0	11.0	11.5	0.4
φ10×12.5	24.0	10.7	10.7	16.0	13.2	11.5	0.5
φ10×16.5	24.0	10.7	10.7	16.0	17.2	11.5	0.5

◆TAPING REEL



Reuseable reels are available according to your request.

Please consult in regard to establishing supply and withdrawal system.

Size	W3 (mm)	φC (mm)
φ6.3×6.1	18	382
φ6.3×8		
φ8×10.5	26	
φ10×10.5		
φ10×12.5		
φ10×16.5		

◆LEAD FREE TYPE REFLOW SOLDERING CONDITION

●Size φ8～φ10

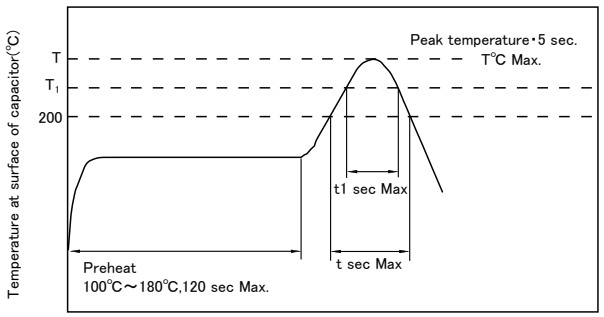
1) Temperature at surface of capacitor shall not exceed T℃.

2) Period that temperature at surface of capacitor becomes more than 200℃ and T1℃ shall not exceed t and t1 seconds, respectively.

3) Preheat shall be made at 100℃～180℃ and for maximum 120 seconds.

4) Please ensure that the capacitor became cold enough to the room temperature before the second reflow.

Size	T(℃) ①	T1(℃)	t(sec) ②	t1(sec) ③	Reflow cycle
φ6.3	250	230	60	40	2
	260	230	60	40	1
φ8	245	230	60	40	2
φ10	260	230	60	40	1



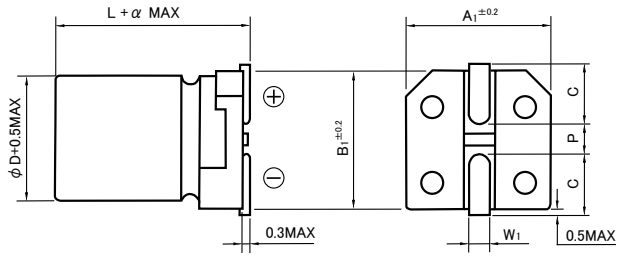
①Peak temperature

②Time more than 200℃

③Time more than T1

Please contact us if the condition is over the maximum.

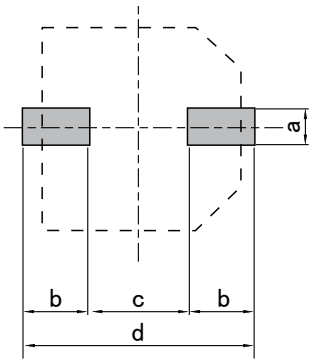
object : Chip type capacitors



(mm)

φD	L	A1	B1	C	W1	P	α
6.3	6.1	6.6	6.6	2.7	0.5～0.8	1.8	0
6.3	8	6.6	6.6	2.7	0.5～0.8	1.8	0
8	10.5	8.3	8.3	2.9	0.8～1.1	3.1	0
10	10.5	10.3	10.3	3.2	0.8～	4.5	0
10	12.5	10.3	10.3	3.2	0.8～1.1	4.5	0.3
10	16.5	10.3	10.3	3.2	0.8～1.1	4.5	0.3

◆RECOMMENDED LAND SIZE

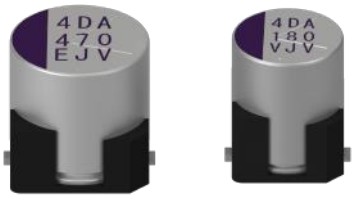


(mm)

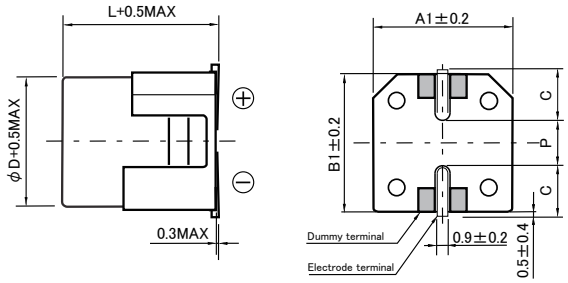
Size	a	b	c	d
φ	1.6	3.5	2.1	9.1
φ	2.2	4.1	3.0	11.2
φ	2.2	4.3	4.5	13.1

◆Vibration proof packcage with the supprting capacitors

●For chip type capacitors more than case size φ8, vibration package support.



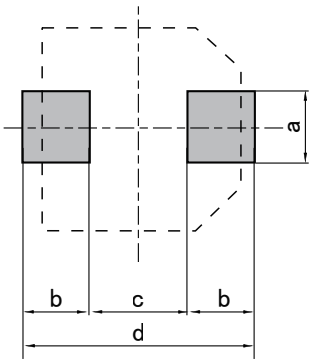
◆DIMENSIONS



(mm)

φD	L	A1	B1	C	P
8	10.5	8.3	8.3	3.1	3.1
10	12.5	10.3	10.3	3.4	4.5

◆RECOMMENDED LAND SIZE



(mm)

Size	a	b	c	d
φ8	4.2	4.5	2.5	11.5
φ10	4.2	4.8	3.9	13.5

CFV / CZF series

Load life : 125℃ 4000 hours (Hybrid Type)

RoHS compliance

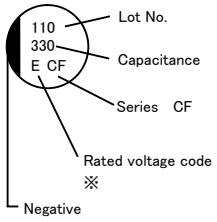
◆SPECIFICATION

Item	Characteristics
Category Temperature Range	−55～+125℃
Rated Voltage Range	25～63Vdc
Capacitance Tolerance	±20%(20℃, 120Hz)
Leakage Current (MAX)	I=0.01CV or 3μA whichever is greater. (After 2 minutes) I=Leakage Current(μA) C=Capacitance(μF) V=Rated Voltage(Vdc)
Endurance 1	After applying rated voltage with rated ripple current for 4000 hours at 125℃, the capacitors shall meet the following Criteria.
Endurance 2	After applying rated voltage with rated ripple current for 3000 hours at 125℃, the capacitors shall meet the following Criteria.
Biased Humidity	After applying rated voltage for 2000 hours at 85℃ and humidity of 85%, the capacitors shall meet the following Criteria .
Criteria	Capacitance Change: Within ±30% of the initial value. Dissipation Factor: Not more than 200% of the specified value. ESR: Not more than 200% of the specified value. Leakage Current: Not more than the specified value.
Low Temperature Stability Impedance Ratio (MAX)	Z(−55℃)/Z(+20℃) ≦ 2.0 (100kHz) Z(−25℃)/Z(+20℃) ≦ 1.5

◆PART NUMBER

□□□	CFV/CZF	□□□□□	M	□□□	□□	D x L
Rated Voltage	Series	Capacitance	Capacitance Tolerance	Option	Lead Forming	Case Size

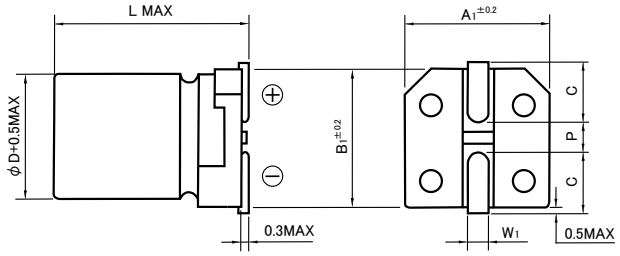
◆MARKING



※Voltage code

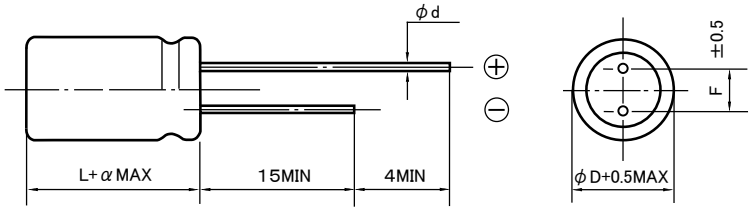
Rated Voltage(Vdc)	25	35	50	63
Voltage code	E	V	H	J

◆DIMENSIONS



(mm)

ϕD	L	A1	B1	C	W1	P
8	10.5	8.3	8.3	2.9	0.8～1.1	3.1
10	10.5	10.3	10.3	3.2	0.8～1.1	4.5



(mm)

ϕD	L	F	ϕd	α
8	9	3.5	0.6	1.5
10	9	5.0	0.6	1.5

◆STANDARD SIZE

Rated Voltage (Vdc)	Capacitance (μF)	Size ϕD×L (mm)		tan δ 120Hz,20℃	E.S.R (mΩ MAX)	Rated Ripple Current (mArms/125℃,100kHz)	
		CFV (SMD)	(LeadWire)		20℃,100kHz	Endurance 1	Endurance 2
25	220	8×10.5	8×9	0.14	27	1600	1900
	330	10×10.5	10×9	0.14	20	2000	2900
35	150	8×10.5	8×9	0.12	27	1600	1900
	270	10×10.5	10×9	0.12	20	2000	2800
50	68	8×10.5	8×9	0.10	30	1250	-
	100	10×10.5	10×9	0.10	28	1600	-
63	33	8×10.5	8×9	0.08	40	1100	-
	56	10×10.5	10×9	0.08	30	1400	-

◆MULTIPLIER FOR RIPPLE CURRENT

Capacitance (C)	Frequency (f)	100Hz≦f＜200Hz	200Hz≦f＜300Hz	300Hz≦f＜500Hz	500Hz≦f＜1kHz
C＜47μF	Coefficient	0.10	0.10	0.15	0.20
47uF≦C＜150μF		0.15	0.20	0.25	0.30
150μF≦C		0.15	0.25	0.25	0.30

Capacitance (C)	Frequency (f)	1kHz≦f＜2kHz	2kHz≦f＜3kHz	3kHz≦f＜5kHz	5kHz≦f＜10kHz
C＜47μF	Coefficient	0.30	0.40	0.45	0.50
47uF≦C＜150μF		0.40	0.45	0.55	0.60
150μF≦C		0.45	0.50	0.60	0.65

Capacitance (C)	Frequency (f)	10kHz≦f＜15kHz	15kHz≦f＜20kHz	20kHz≦f＜30kHz	30kHz≦f＜40kHz
C＜47μF	Coefficient	0.60	0.65	0.70	0.75
47uF≦C＜150μF		0.70	0.75	0.80	0.80
150μF≦C		0.75	0.80	0.85	0.85

Capacitance (C)	Frequency (f)	40kHz≦f＜50kHz	50kHz≦f＜100kHz	100kHz≦f＜500kHz	500kHz≦f
C＜47μF	Coefficient	0.80	0.85	1.00	1.05
47uF≦C＜150μF		0.85	0.90	1.00	1.00
150μF≦C		0.85	0.90	1.00	1.00

◆ESR AFTER ENDURANCE TEST (-40℃

Size	8x10.5	10x10.5
ESR (Ω)	0.4	0.3

CEV / CZE series

Load life : 105℃ 10000 hours (Hybrid Type)

RoHS compliance

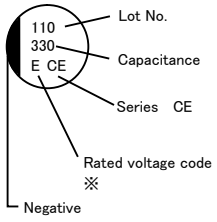
◆SPECIFICATION

Item	特性 Characteristics
Category Temperature Range	−55～+105℃
Rated Voltage Range	25～63Vdc
Capacitance Tolerance	±20%(20℃, 120Hz)
Leakage Current (MAX)	I=0.01CV or 3μA whichever is greater. (After 2 minutes) I=Leakage Current(μA) C=Capacitance(μF) V=Rated Voltage(Vdc)
Endurance	After applying rated voltage with rated ripple current for 10000 hours at 105℃, the capacitors shall meet the following Criteria.
Biased Humidity	After applying rated voltage for 2000 hours at 85℃ and humidity of 85%, the capacitors shall meet the following Criteria .
Criteria	Capacitance Change: Within ±30% of the initial value. Dissipation Factor: Not more than 200% of the specified value. ESR: Not more than 200% of the specified value. Leakage Current: Not more than the specified value.
Low Temperature Stability Impedance Ratio (MAX)	Z(−55℃)/Z(+20℃) ≦ 2.0 (100kHz) Z(−25℃)/Z(+20℃) ≦ 1.5

◆PART NUMBER

□□□	CEV/CZE	□□□□□	M	□□□	□□	D x L
Rated Voltage	Series	Capacitance	Capacitance Tolerance	Option	Lead Forming	Case Size

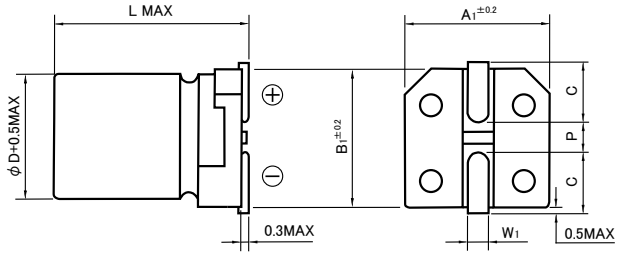
◆MARKING



※Voltage code

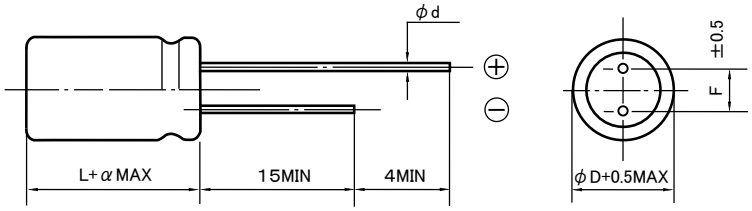
Rated Voltage(Vdc)	25	35	50	63
Voltage code	E	V	H	J

◆DIMENSIONS



(mm)

ϕD	L	A1	B1	C	W1	P
8	10.5	8.3	8.3	2.9	0.8～1.1	3.1
10	10.5	10.3	10.3	3.2	0.8～1.1	4.5



(mm)

ϕD	L	F	ϕd	α
8	9	3.5	0.6	1.5
10	9	5.0	0.6	1.5

◆STANDARD SIZE

Rated Voltage (Vdc)	Capacitance (μF)	Size ϕD×L (mm)		tan δ 120Hz,20℃	E.S.R (mΩ MAX)	Rated Ripple Current (mArms/105℃,100kHz)
		CEV (SMD)	(LeadWire)		20℃,100kHz	
25	220	8×10.5	8×9	0.14	27	2300
	330	10×10.5	10×9	0.14	20	2500
35	150	8×10.5	8×9	0.12	27	2300
	270	10×10.5	10×9	0.12	20	2500
50	68	8×10.5	8×9	0.10	30	1800
	100	10×10.5	10×9	0.10	28	2000
63	33	8×10.5	8×9	0.08	40	1700
	56	10×10.5	10×9	0.08	30	1800

◆MULTIPLIER FOR RIPPLE CURRENT

Capacitance (C)	Frequency (f)	100Hz≦f＜200Hz	200Hz≦f＜300Hz	300Hz≦f＜500Hz	500Hz≦f＜1kHz
C＜47μF	Coefficient	0.10	0.10	0.15	0.20
47uF≦C＜150μF		0.15	0.20	0.25	0.30
150μF≦C		0.15	0.25	0.25	0.30

Capacitance (C)	Frequency (f)	1kHz≦f＜2kHz	2kHz≦f＜3kHz	3kHz≦f＜5kHz	5kHz≦f＜10kHz
C＜47μF	Coefficient	0.30	0.40	0.45	0.50
47uF≦C＜150μF		0.40	0.45	0.55	0.60
150μF≦C		0.45	0.50	0.60	0.65

Capacitance (C)	Frequency (f)	10kHz≦f＜15kHz	15kHz≦f＜20kHz	20kHz≦f＜30kHz	30kHz≦f＜40kHz
C＜47μF	Coefficient	0.60	0.65	0.70	0.75
47uF≦C＜150μF		0.70	0.75	0.80	0.80
150μF≦C		0.75	0.80	0.85	0.85

Capacitance (C)	Frequency (f)	40kHz≦f＜50kHz	50kHz≦f＜100kHz	100kHz≦f＜500kHz	500kHz≦f
C＜47μF	Coefficient	0.80	0.85	1.00	1.05
47uF≦C＜150μF		0.85	0.90	1.00	1.00
150μF≦C		0.85	0.90	1.00	1.00

PEV / PZE series

Load life : 105℃ 10000 hours (Hybrid Type)

AEC-Q200

RoHS compliance

◆SPECIFICATION

Item	Characteristics
Category Temperature Range	−55～+105℃
Rated Voltage Range	25～80Vdc
Capacitance Tolerance	±20%(20℃, 120Hz)
Leakage Current (MAX)	I=0.01CV or 3μA whichever is greater. (After 2 minutes) I=Leakage Current(μA) C=Capacitance(μF) V=Rated Voltage(Vdc)
Dissipation Factor(MAX)	(20℃, 120Hz)
Endurance	After applying rated voltage with rated ripple current for 10000 hours at 105℃, the capacitors shall meet the following Criteria.
Biased Humidity	After applying rated voltage for 2000 hours at 85℃ and humidity of 85%, the capacitors shall meet the following Criteria .
Criteria	
Low Temperature Stability Impedance Ratio (MAX)	Z(−55℃)/Z(+20℃) ≦ 2.0 (100kHz) Z(−25℃)/Z(+20℃) ≦ 1.5

Rated Voltage (Vdc)	25	35	50	63	80
tan δ	0.14	0.12	0.10	0.09	0.08

Capacitance Change	Within ±30% of the initial value.
Dissipation Factor	Not more than 200% of the specified value.
ESR	Not more than 200% of the specified value.
Leakage Current	Not more than the specified value.

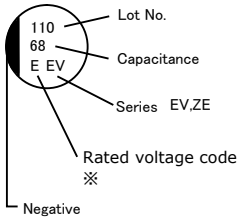
◆PART NUMBER

□□□	PEV/PZE	□□□□□	M	□□□	□□	D x L
Rated Voltage	Series	Capacitance	Capacitance Tolerance	Option	Lead Forming	Case Size

◆

Frequency (Hz)	100≦f<1k	1k≦f<10k	10k≦f<20k
Coefficient	0.05	0.30	0.70
Frequency (Hz)	20k≦f<50k	50k≦f<100k	100k≦
Coefficient	0.80	0.90	1.00

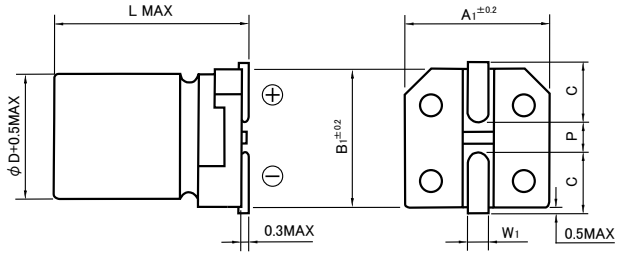
◆MARKING



※Voltage code

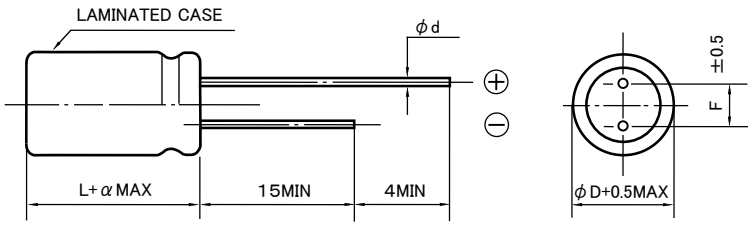
Rated Voltage (Vdc)	25	35	50	63	80
Voltage code	E	V	H	J	K

◆DIMENSIONS



(mm)

ϕD	L	A1	B1	C	W1	P
6.3	6.1	6.6	6.6	2.7	0.5～0.8	1.8
6.3	8	6.6	6.6	2.7	0.5～0.8	1.8
8	10.5	8.3	8.3	2.9	0.8～1.1	3.1
10	10.5	10.3	10.3	3.2	0.8～1.1	4.5



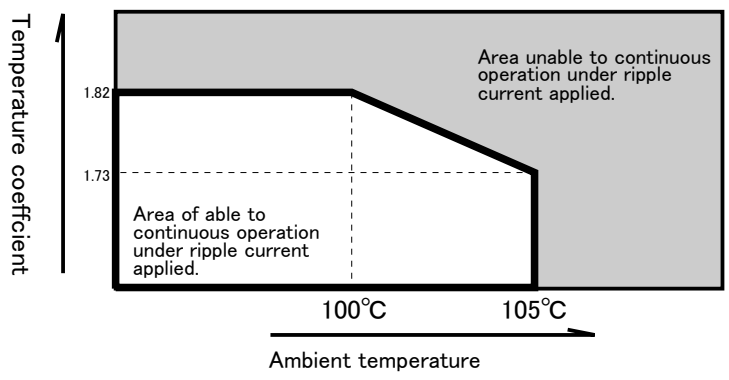
(mm)

ϕD	L	F	ϕd	α
8	9	3.5	0.6	1.5
10	9	5.0	0.6	1.5

◆STANDARD SIZE

Rated Voltage (Vdc)	Capacitance (μF)	Size ϕD×L (mm)		E.S.R (mΩ/100kHz MAX)		Rated Ripple Current (mArms/105℃,100kHz)	Permissible Ripple Current (mA)	
		PEV (SMD)	(LeadWire)	20℃	-40℃		105℃,100kHz	100℃,100kHz
25	56	6.3×6.1	-	50		1300	2240	2360
	100	6.3×8	-	30		2000	3460	3640
	220	8×10.5	8×9	27		2300	3970	4180
	330	10×10.5	10×9	20		2500	4320	4550
35	47	6.3×6.1	-	60		1300	2240	2360
	68	6.3×8	-	35		2000	3460	3640
	150	8×10.5	8×9	27		2300	3970	4180
	270	10×10.5	10×9	20		2500	4320	4550
50	22	6.3×6.1	-	80		1100	1900	2000
	33	6.3×8	-	40		1600	2760	2910
	68	8×10.5	8×9	30		1800	3110	3270
	100	10×10.5	10×9	28		2000	3460	3640
63	10	6.3×6.1	-	120		1000	1730	1820
	22	6.3×8	-	80		1500	2590	2730
	33	8×10.5	8×9	40		1700	2940	3090
	56	10×10.5	10×9	30		1800	3110	3270
80	22	8×10.5	8×9	45		1600	2760	2910
	39	10×10.5	10×9	35		1700	2940	3090

◆

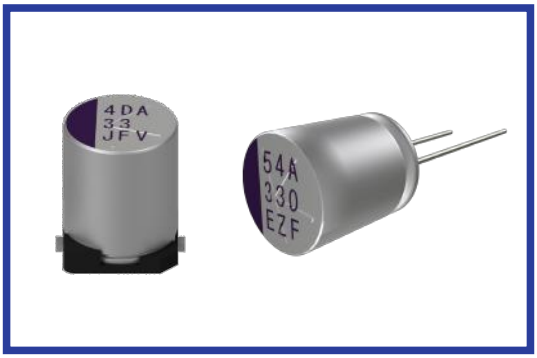


Temperature T(℃)	≦100	105
Coefficient (IMAX/Ir)	1.82	1.73

Temperature coefficient IMAX/I_0 : Coefficient indicating the maximum permissible ripple current (IMAX) that can be continuously applied beyond the rated current (I_0). Estimated lifetime complies with our lifetime calculation formula.

PFV / PZF series

Load life : 125℃ 4000 hours (Hybrid Type)



AEC-Q200

RoHS compliance

◆SPECIFICATION

Item	Characteristics
Category Temperature Range	−55～+125℃
Rated Voltage Range	25～80Vdc
Capacitance Tolerance	±20%(20℃, 120Hz)
Leakage Current (MAX)	I=0.01CV or 3μA whichever is greater. (After 2 minutes) I=Leakage Current(μA) C=Capacitance(μF) V=Rated Voltage(Vdc)
Dissipation Factor(MAX)	(20℃, 120Hz)
Endurance	After applying rated voltage with rated ripple current for 4000 hours at 125℃, the capacitors shall meet the following Criteria.
Biased Humidity	After applying rated voltage for 2000 hours at 85℃ and humidity of 85%, the capacitors shall meet the following Criteria .
Criteria	
Low Temperature Stability Impedance Ratio (MAX)	Z(−55℃)/Z(+20℃) ≦ 2.0 (100kHz) Z(−25℃)/Z(+20℃) ≦ 1.5

Rated Voltage (Vdc)	25	35	50	63	80
tan δ	0.14	0.12	0.10	0.09	0.08

Capacitance Change	Within ±30% of the initial value.
Dissipation Factor	Not more than 200% of the specified value.
ESR	Not more than 200% of the specified value.
Leakage Current	Not more than the specified value.

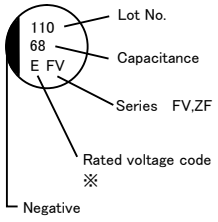
◆PART NUMBER

□□□	PFV/PZF	□□□□□	M	□□□	□□	D x L
Rated Voltage	Series	Capacitance	Capacitance Tolerance	Option	Lead Forming	Case Size

◆

Frequency (Hz)	100≦f<1k	1k≦f<10k	10k≦f<20k
Coefficient	0.05	0.30	0.70
Frequency (Hz)	20k≦f<50k	50k≦f<100k	100k≦
Coefficient	0.80	0.90	1.00

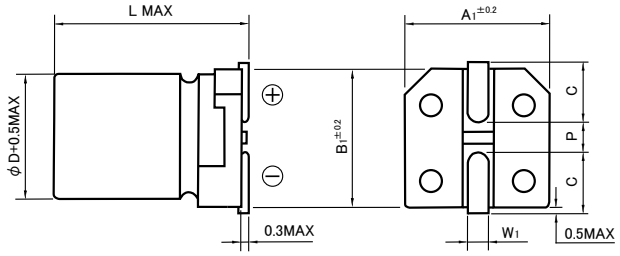
◆MARKING



※Voltage code

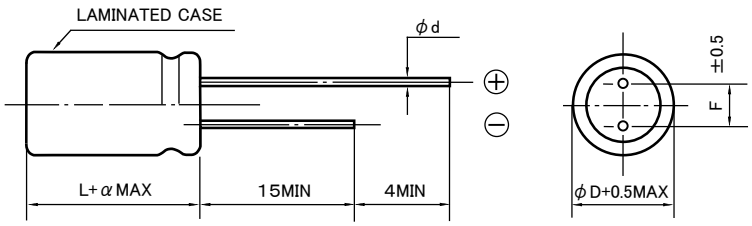
Rated Voltage (Vdc)	25	35	50	63	80
Voltage code	E	V	H	J	K

◆DIMENSIONS



(mm)

φD	L	A1	B1	C	W1	P
6.3	6.1	6.6	6.6	2.7	0.5～0.8	1.8
6.3	8	6.6	6.6	2.7	0.5～0.8	1.8
8	10.5	8.3	8.3	2.9	0.8～1.1	3.1
10	10.5	10.3	10.3	3.2	0.8～1.1	4.5



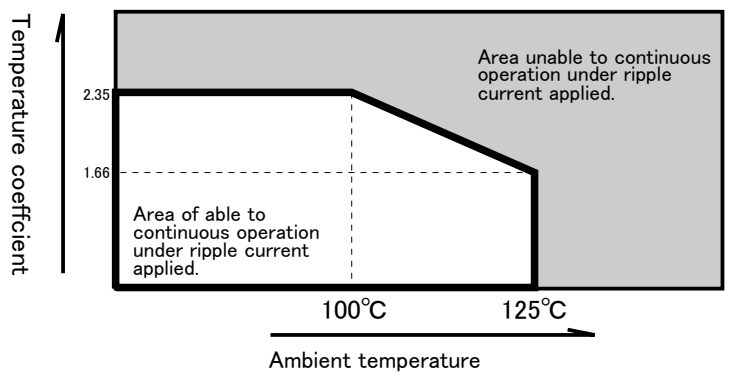
(mm)

φD	L	F	φd	α
8	9	3.5	0.6	1.5
10	9	5.0	0.6	1.5

◆STANDARD SIZE

Rated Voltage (Vdc)	Capacitance (μF)	Size φD×L (mm)		E.S.R (mΩ/100kHz MAX)		Rated Ripple Current (mArms/125℃,100kHz)	Permissible Ripple Current (mA)	
		PFV (SMD)	(LeadWire)	20℃	-40℃		125℃,100kHz	100℃,100kHz
25	56	6.3×6.1	-	50		900	1490	2110
	100	6.3×8	-	30		1400	2320	3290
	220	8×10.5	8×9	27		1600	2650	3760
	330	10×10.5	10×9	20		2000	3320	4700
35	47	6.3×6.1	-	60		900	1490	2110
	68	6.3×8	-	35		1400	2320	3290
	150	8×10.5	8×9	27		1600	2650	3760
	270	10×10.5	10×9	20		2000	3320	4700
50	22	6.3×6.1	-	80		750	1240	1760
	33	6.3×8	-	40		1100	1820	2580
	68	8×10.5	8×9	30		1250	2070	2930
	100	10×10.5	10×9	28		1600	2650	3760
63	10	6.3×6.1	-	120		700	1160	1640
	22	6.3×8	-	80		900	1490	2110
	33	8×10.5	8×9	40		1100	1820	2580
	56	10×10.5	10×9	30		1400	2320	3290
80	22	8×10.5	8×9	45		1100	1820	2580
	39	10×10.5	10×9	35		1200	1990	2820

◆

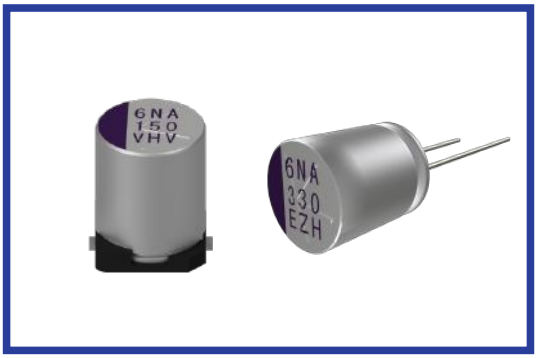


Temperature T(℃)	≦100	105	110	115	125
Coefficient (IMAX/Ir)	2.35	2.23	2.10	1.97	1.66

Temperature coefficient IMAX/I_0 : Coefficient indicating the maximum permissible ripple current (IMAX) that can be continuously applied beyond the rated current (I_0). Estimated lifetime complies with our lifetime calculation formula.

PHV / PZH series

Load life : 135℃ 2000～4000 hours (Hybrid Type)
High Temperature, High Ripple Current



AEC-Q200

RoHS compliance

◆SPECIFICATION

Item	Characteristics
Category Temperature Range	-55～+135℃(150℃)
Rated Voltage Range	25～63Vdc
Capacitance Tolerance	±20%(20℃, 120Hz)
Leakage Current (MAX)	I=0.01CV or 3μA whichever is greater. (After 2 minutes) I=Leakage Current(μA) C=Capacitance(μF) V=Rated Voltage(Vdc)
Dissipation Factor(MAX)	(20℃, 120Hz)
Endurance	After applying rated voltage with rated ripple current for 4000 hours(φ6.3:2000 hours) at 125℃ or 135℃, the capacitors shall meet the following Criteria.
Biased Humidity	After applying rated voltage for 2000 hours at 85℃ and humidity of 85%, the capacitors shall meet the following Criteria .
Over Temperatur Proof	After applying rated voltage for 2000 hours(φ6.3:150 hours) at 150℃,the capacitors shall meet the criteria.
Criteria	Capacitance Change: Within ±30% of the initial value. Dissipation Factor: Not more than 200% of the specified value. ESR: Not more than 200% of the specified value. Leakage Current: Not more than the specified value.
Low Temperature Stability Impedance Ratio (MAX)	Z(-55℃)/Z(+20℃) ≦ 2.0 (100kHz) Z(-25℃)/Z(+20℃) ≦ 1.5

Rated Voltage (Vdc)	25	35	50	63
tan δ	0.14	0.12	0.10	0.08

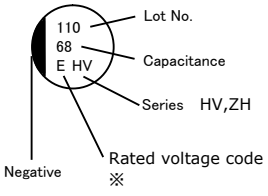
◆PART NUMBER

□□□	PHV/PZH	□□□□□	M	□□□	□□	D x L
Rated Voltage	Series	Capacitance	Capacitance Tolerance	Option	Lead Forming	Case Size

◆

Frequency (Hz)	100≦f<1k	1k≦f<10k	10k≦f<20k
Coefficient	0.05	0.30	0.70
Frequency (Hz)	20k≦f<50k	50k≦f<100k	100k≦
	0.80	0.90	1.00

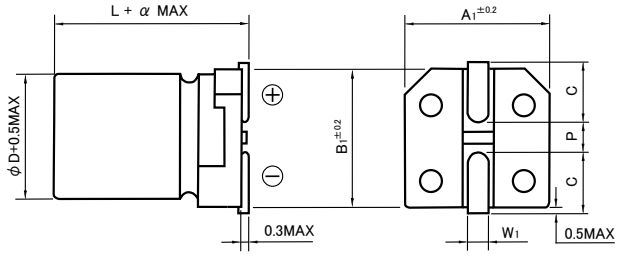
◆MARKING



※Voltage code

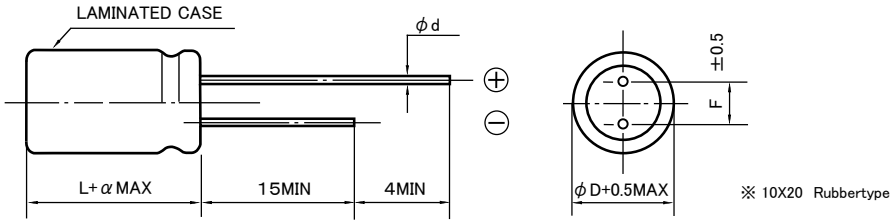
Rated Voltage (Vdc)	25	35	50	63
Voltage code	E	V	H	J

◆DIMENSIONS



(mm)

φD	L	A1	B1	C	W1	P	α
6.3	6.1	6.6	6.6	2.7	0.5～0.8	1.8	0
6.3	8	6.6	6.6	2.7	0.5～0.8	1.8	0
8	10.5	8.3	8.3	2.9	0.8～1.1	3.1	0
10	10.5	10.3	10.3	3.2	0.8～1.1	4.5	0
10	12.5	10.3	10.3	3.2	0.8～1.1	4.5	0.3
10	16.5	10.3	10.3	3.2	0.8～1.1	4.5	0.3



※ 10X20 Rubbertype

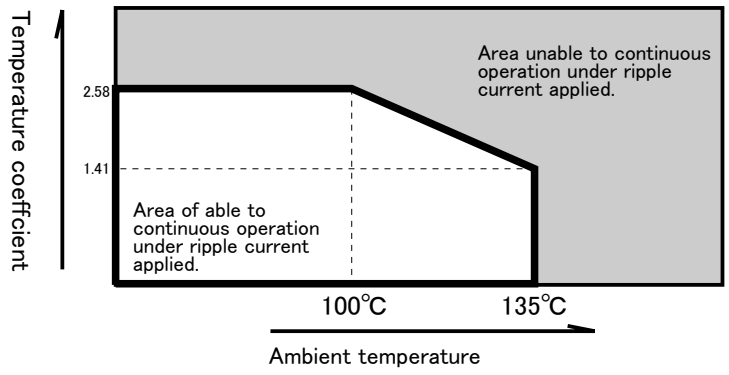
(mm)

φD	L	F	φd	α
8	9	3.5	0.6	1.5
10	9	5.0	0.6	1.5
10	11	5.0	0.6	1.5
10	15	5.0	0.6	1.5
10	20	5.0	0.6	2

◆STANDARD SIZE

Rated Voltage (Vdc)	Capacitance (μF)	Size φD×L (mm)		E.S.R (mΩ/100kHz MAX)		Rated RippleCurrent (mArms,100kHz)		Permissible Ripple Current (mA)		
		PHV (SMD)	(LeadWire)	20℃	-40℃	135℃	125℃	135℃,100kHz	125℃,100kHz	100℃,100kHz
25	56	6.3×6.1	-	50		900	1400	1260	1630	2320
	100	6.3×8	-	30		1400	2200	1970	2540	3610
	220	8×10.5	8×9	22		1600	2900	2250	2910	4120
	330	10×10.5	10×9	20		2000	3600	2820	3640	5160
	470	10×12.5	10×11	14		2300	4100	3240	4180	5930
	560	10×16.5	10×15	11		2900	4800	4090	5280	7480
	820	-	10×20	9		3100	5100	4370	5640	8000
35	47	6.3×6.1	-	60		900	1400	1260	1630	2320
	68	6.3×8	-	35		1400	2200	1970	2540	3610
	150	8×10.5	8×9	22		1600	2900	2250	2910	4120
	270	10×10.5	10×9	20		2000	3600	2820	3640	5160
	330	10×12.5	10×11	14		2300	4100	3240	4180	5930
	470	10×16.5	10×15	11		2900	4800	4090	5280	7480
	680	-	10×20	9		3100	5100	4370	5640	8000
50	68	8×10.5	8×9	30		1300	2300	1760	2370	3220
	100	10×10.5	10×9	28		1600	2900	2250	2910	4120
	150	10×12.5	10×11	18		2100	3400	2960	3820	5420
	180	10×16.5	10×15	13		2600	4200	3670	4730	6710
	270	-	10×20	11		2700	4500	3810	4910	6960
63	33	8×10.5	8×9	40		1200	2100	1550	2200	2830
	56	10×10.5	10×9	30		1500	2600	1970	2730	3610
	68	10×12.5	10×11	19		2000	3200	2820	3640	5160
	100	10×16.5	10×15	15		2400	3900	3380	4370	6190
	150	-	10×20	13		2500	4100	3520	4550	6450

◆TEMPERATURE COEFFICIENT FOR RIPPLE CURRENT

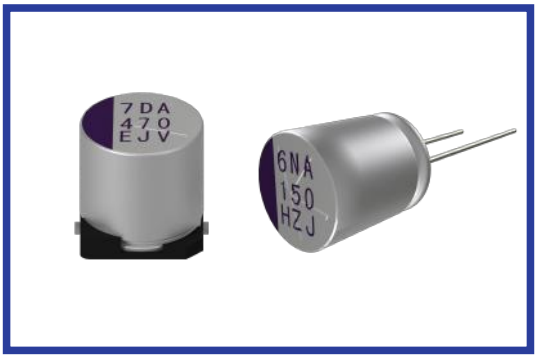


Temperature T(℃)	≦100	105	110	115	125	135
Coefficient (IMAX/Ir)	2.58	2.44	2.30	2.16	1.82	1.41

Temperature coefficient IMAX/I_0 : Coefficient indicating the maximum permissible ripple current (IMAX) that can be continuously applied beyond the rated current (I_0). Estimated lifetime complies with our lifetime calculation formula.

PJV / PZJ series

Load life : 125℃ 4000 hours (Hybrid Type)
High Temperature, High Ripple Current



AEC-Q200

RoHS compliance

◆SPECIFICATION

Item	Characteristics
Category Temperature Range	−55～+125℃
Rated Voltage Range	25～63Vdc
Capacitance Tolerance	±20%(20℃, 120Hz)
Leakage Current (MAX)	I=0.01CV or 3μA whichever is greater. (After 2 minutes) I=Leakage Current(μA) C=Capacitance(μF) V=Rated Voltage(Vdc)
Dissipation Factor(MAX)	(20℃, 120Hz)
Endurance	After applying rated voltage with rated ripple current for 4000 hours at 125℃, the capacitors shall meet the following Criteria.
Biased Humidity	After applying rated voltage for 2000 hours at 85℃ and humidity of 85%, the capacitors shall meet the following Criteria .
Criteria	
Low Temperature Stability Impedance Ratio (MAX)	Z(−55℃)/Z(+20℃) ≦ 2.0 (100kHz) Z(−25℃)/Z(+20℃) ≦ 1.5

Rated Voltage (Vdc)	25	35	50	63
tan δ	0.14	0.12	0.10	0.08

Capacitance Change	Within ±30% of the initial value.
Dissipation Factor	Not more than 200% of the specified value.
ESR	Not more than 200% of the specified value.
Leakage Current	Not more than the specified value.

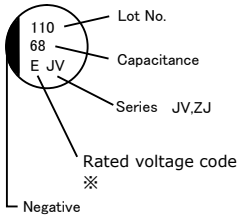
◆PART NUMBER

□□□	PJV/PZJ	□□□□□	M	□□□	□□	D x L
Rated Voltage	Series	Capacitance	Capacitance Tolerance	Option	Lead Forming	Case Size

◆

Frequency (Hz)	100≦f<1k	1k≦f<10k	10k≦f<20k
Coefficient	0.05	0.30	0.70
Frequency (Hz)	20k≦f<50k	50k≦f<100k	100k≦
Coefficient	0.80	0.90	1.00

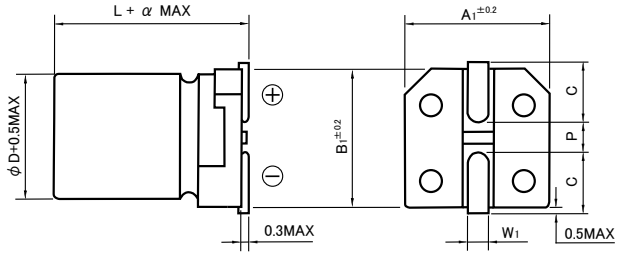
◆MARKING



※Voltage code

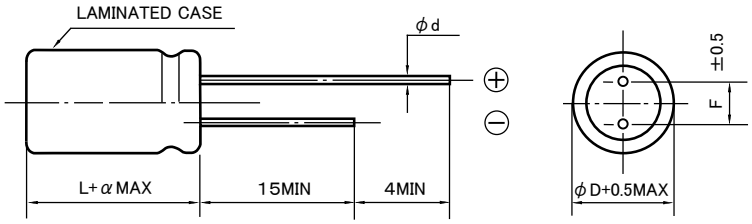
Rated Voltage (Vdc)	25	35	50	63
Voltage code	E	V	H	J

◆DIMENSIONS



(mm)

φD	L	A1	B1	C	W1	P	α
6.3	6.1	6.6	6.6	2.7	0.5～0.8	1.8	0
6.3	8	6.6	6.6	2.7	0.5～0.8	1.8	0
8	10.5	8.3	8.3	2.9	0.8～1.1	3.1	0
10	10.5	10.3	10.3	3.2	0.8～1.1	4.5	0
10	12.5	10.3	10.3	3.2	0.8～1.1	4.5	0.3
10	16.5	10.3	10.3	3.2	0.8～1.1	4.5	0.3



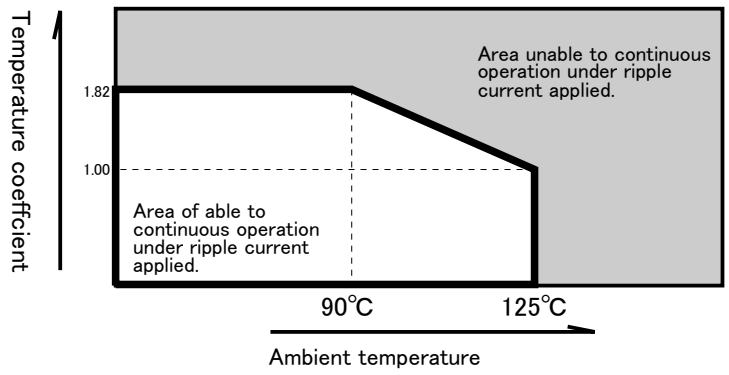
(mm)

φD	L	F	φd	α
8	9	3.5	0.6	1.5
10	9	5.0	0.6	1.5
10	11		0.6	1.5
10	15	5.0	0.6	2

◆STANDARD SIZE

Rated Voltage (Vdc)	Capacitance (μF)	Size φD×L (mm)		E.S.R (mΩ MAX,100kHz)		Rated Ripple Current (mArms/125℃,100kHz)	Permissible Ripple Current (mA)	
		PJV (SMD)	(LeadWire)	20℃	-40℃		125℃,100kHz	90℃,100kHz
25	68	6.3×6.1	-	50		1080	1080	1960
	150	6.3×8	-	30		1680	1680	3220
	270	8×10.5	8×9	25		1920	1920	3490
	470	10×10.5	10×9	20		2800	2800	5090
	560	10×12.5	10×11	14		3500	3500	6370
	820	10×16.5	10×15	11		4000	4000	7280
35	56	6.3×6.1	-	50		1080	1080	1960
	100	6.3×8	-	30		1680	1680	3220
	180	8×10.5	8×9	25		1920	1920	3490
	330	10×10.5	10×9	20		2800	2800	5090
	390	10×12.5	10×11	14		3500	3500	6370
	560	10×16.5	10×15	11		4000	4000	7280
50	82	8×10.5	8×9	30		1700	1700	3090
	150	10×10.5	10×9	28		2200	2200	4000
	180	10×12.5	10×11	18		3000	3000	5460
	220	10×16.5	10×15	13		3600	3600	6550
63	47	8×10.5	8×9	40		1500	1500	2730
	82	10×10.5	10×9	30		1900	1900	3450
	100	10×12.5	10×11	19		2700	2700	4910
	150	10×16.5	10×15	15		3300	3300	6000

◆TEMPERATURE COEFFICIENT FOR RIPPLE CURRENT



Temperature T(℃)	≦90	95	100	105	110	115	125
Coefficient (IMAX/Ir)	1.82	1.73	1.63	1.52	1.41	1.29	1.00

Temperature coefficient IMAX/I_0 : Coefficient indicating the maximum permissible ripple current (IMAX) that can be continuously applied beyond the rated current (I_0). Estimated lifetime complies with our lifetime calculation formula.

PLV / PZL series

Load life : 150℃ 1000 hours (Hybrid Type)

AEC-Q200

RoHS compliance

◆SPECIFICATION

Item	Characteristics
Category Temperature Range	−55～+150℃
Rated Voltage Range	25～63Vdc
Capacitance Tolerance	±20%(20℃, 120Hz)
Leakage Current (MAX)	I=0.01CV or 3μA whichever is greater. (After 2 minutes) I=Leakage Current(μA) C=Capacitance(μF) V=Rated Voltage(Vdc)
Dissipation Factor(MAX)	(20℃, 120Hz)
Endurance	After applying rated voltage with rated ripple current for 1000 hours at 150℃, the capacitors shall meet the following Criteria.
Biased Humidity	After applying rated voltage for 2000 hours at 85℃ and humidity of 85%, the capacitors shall meet the following Criteria .
Criteria	
Low Temperature Stability Impedance Ratio (MAX)	Z(−55℃)/Z(+20℃) ≦ 2.0 (100kHz) Z(−25℃)/Z(+20℃) ≦ 1.5

Rated Voltage (Vdc)	25	35	50	63
tan δ	0.14	0.12	0.10	0.08

Capacitance Change	Within ±30% of the initial value.
Dissipation Factor	Not more than 200% of the specified value.
ESR	Not more than 200% of the specified value.
Leakage Current	Not more than the specified value.

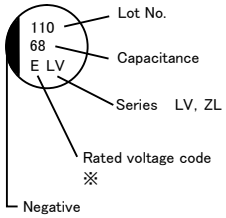
◆PART NUMBER

□□□	PLV/PZL	□□□□□	M	□□□	□□	D x L
Rated Voltage	Series	Capacitance	Capacitance Tolerance	Option	Lead Forming	Case Size

◆

Frequency (Hz)	100≦f<1k	1k≦f<10k	10k≦f<20k
Coefficient	0.05	0.30	0.70
Frequency (Hz)	20k≦f<50k	50k≦f<100k	100k≦
Coefficient	0.80	0.90	1.00

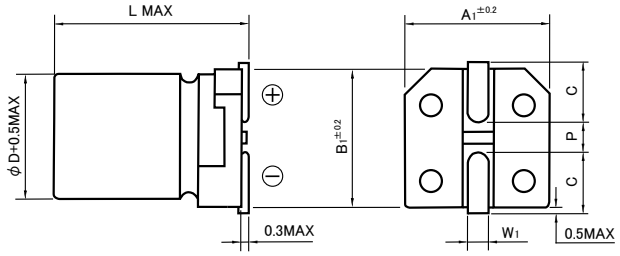
◆MARKING



※Voltage code

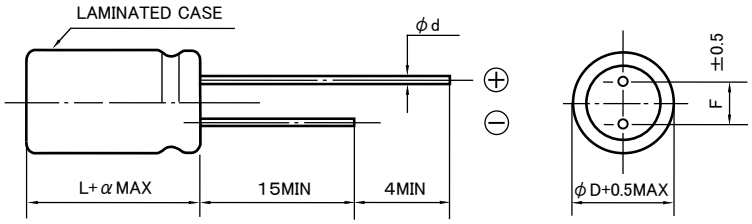
Rated Voltage (Vdc)	25	35	50	63
Voltage code	E	V	H	J

◆DIMENSIONS



(mm)

ΦD	L	A1	B1	C	W1	P
8	10.5	8.3	8.3	2.9	0.8～1.1	3.1
10	10.5	10.3	10.3	3.2	0.8～1.1	4.5



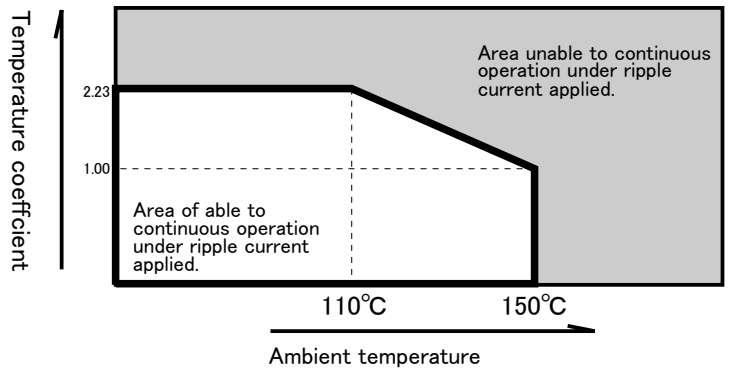
(mm)

φD	L	F	φd	α
8	9	3.5	0.6	1.5
10	9	5.0	0.6	1.5

◆STANDARD SIZE

Rated Voltage (Vdc)	Capacitance (μF)	Size φD×L (mm)		E.S.R (mΩ MAX,100kHz)		Rated Ripple Current (mArms/ 150℃,100kHz)	Permissible Ripple Current (mA)	
		PLV (SMD)	(LeadWire)	20℃	−40℃		150℃,100kHz	110℃,100kHz
25	150	8×10.5	8×9	25		1400	1400	3120
	270	10×10.5	10×9	20		1800	1800	4010
35	100	8×10.5	8×9	25		1400	1400	3120
	150	10×10.5	10×9	20		1800	1800	4010
50	68	8×10.5	8×9	35		1000	1000	2230
	100	10×10.5	10×9	28		1300	1300	2890
63	33	8×10.5	8×9	40		900	900	2000
	56	10×10.5	10×9	30		1100	1100	2450

◆

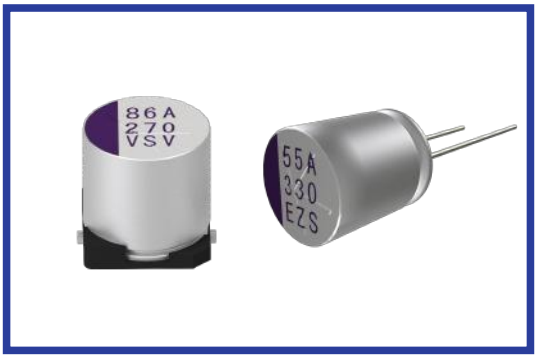


Temperature T(℃)	≦110	115	125	135	140
Coefficient (IMAX/Ir)	2.23	2.12	1.87	1.58	1.41

Temperature T(℃)	145	150
Coefficient (IMAX/Ir)	1.22	1.00

Temperature coefficient IMAX/I_0: Coefficient indicating the maximum permissible ripple current (IMAX) that can be continuously applied beyond the rated current (I_0). Estimated lifetime complies with our lifetime calculation formula.

PSV / PZS series



Load life : 135℃ 3000 hours (Hybrid Type)
Specify the ESR value at 20℃ and -40℃ before and after the endurance test.

AEC-Q200

RoHS compliance

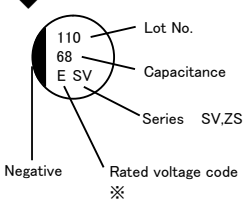
◆SPECIFICATION

Item	Characteristics
Category Temperature Range	-55～+135℃(150℃)
Rated Voltage Range	25～63Vdc
Capacitance Tolerance	±20%(20℃, 120Hz)
Leakage Current (MAX)	I=0.01CV or 3μA whichever is greater. (After 2 minutes) I=Leakage Current(μA) C=Capacitance(μF) V=Rated Voltage(Vdc)
Dissipation Factor(MAX)	Rated Voltage (Vdc): 25 / 35 / 50 / 63 tan δ: 0.14 / 0.12 / 0.10 / 0.08 (20℃, 120Hz)
Endurance	After applying rated voltage with rated ripple current for 3000hours
Biased Humidity	After applying rated voltage for 2000 hours at 85℃ and humidity of 85%, the capacitors shall meet the following Criteria .
Over Temperatur Proof	After applying rated voltage for 300hours at 150℃, the capacitors shall meet the following Criteria .
Criteria	Capacitance Change: Within ±30% of the initial value. Dissipation Factor: Not more than 200% of the specified value. ESR: Not more than the specified value of STANDARD SIZE TABLE Leakage Current: Not more than the specified value.
Low Temperature Stability Impedance Ratio (MAX)	Z(-55℃)/Z(+20℃) ≦ 2.0 (100kHz) Z(-25℃)/Z(+20℃) ≦ 1.5

◆PART NUMBER

□□□	PSV/PZS	□□□□□	M	□□□	□□	D x L
Rated Voltage	Series	Capacitance	Capacitance Tolerance	Option	Lead Forming	Case Size

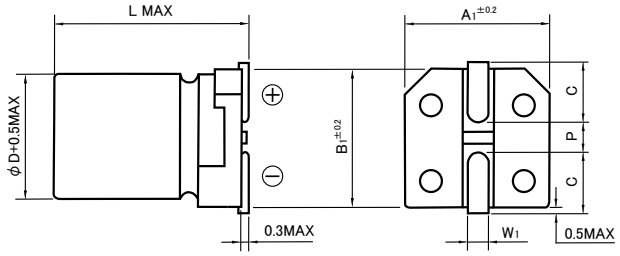
◆



※Voltage code

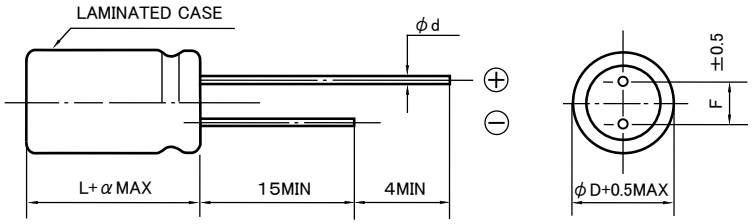
Rated Voltage (Vdc)	25	35	50	63
Voltage code	E	V	H	J

◆DIMENSIONS



(mm)

ΦD	L	A1	B1	C	W1	P
8	10.5	8.3	8.3	2.9	0.8～1.1	3.1
10	10.5	10.3	10.3	3.2	0.8～1.1	4.5



(mm)

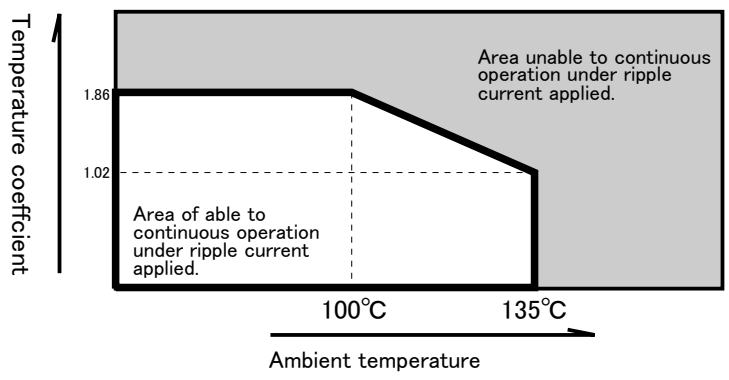
φD	L	F	φd	α
8	9	3.5	0.6	1.5
10	9	5.0	0.6	1.5

◆STANDARD SIZE

Rated Voltage (Vdc)	Capacitance (μF)	Size φD×L (mm)		Rated Ripple Current (mArms/ 135℃,100kHz)	ESR (mΩmax)				Permissible Ripple Current (mA,100kHz)	
					Initial value		after endurance test			
		(SMD)	(LeadWire)		20℃ 100kHz	−40℃ 100kHz	20℃ 100kHz	−40℃ 100kHz	135℃	100℃
25	220	8×10.5	8×9	2400	17	14	22	18	2440	4460
	330	10×10.5	10×9	3000	16	13	20	17	3060	5580
35	150	8×10.5	8×9	2400	17	14	22	18	2440	4460
	270	10×10.5	10×9	3000	16	13	20	17	3060	5580
50	68	8×10.5	8×9	1870	24	20	30	26	1900	3470
	100	10×10.5	10×9	2400	22	18	28	24	2440	4460
63	33	8×10.5	8×9	1650	30	24	40	32	1680	3060
	56	10×10.5	10×9	2100	28	23	37	30	2140	3900

Frequency (Hz)	100≦f<1k	1k≦f<10k	10k≦f<20k	20k≦f<50k	50k≦f<100k	100k≦
Coefficient	0.10	0.40	0.75	0.85	0.90	1.00

◆



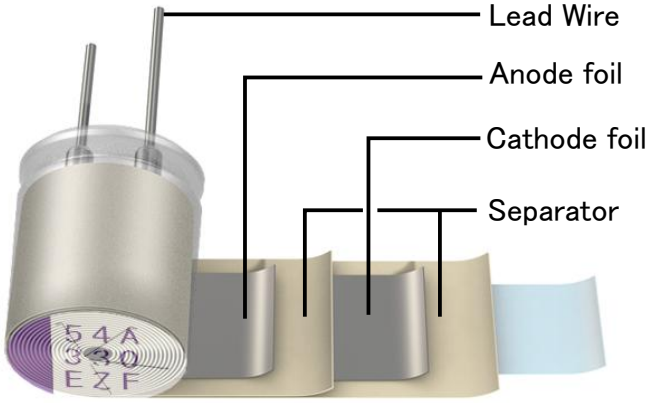
Temperature T(℃)	≦100	105	110	115	125	135
Coefficient (IMAX/Ir)	1.86	1.76	1.66	1.55	1.31	1.02

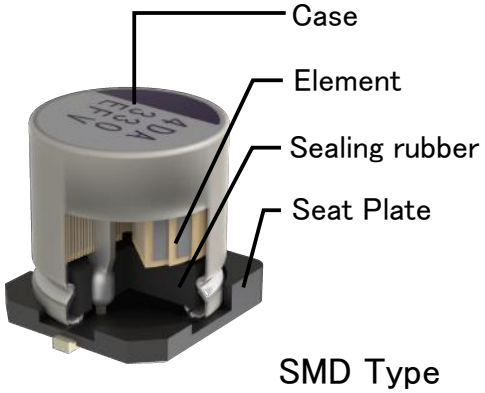
Temperature coefficient IMAX/I_0 : Coefficient indicating the maximum permissible ripple current (IMAX) that can be continuously applied beyond the rated current (I_0). Estimated lifetime complies with our lifetime calculation formula.

Key Pointin Selecting the Capacitor

What is Rubycon Hybrid Type?

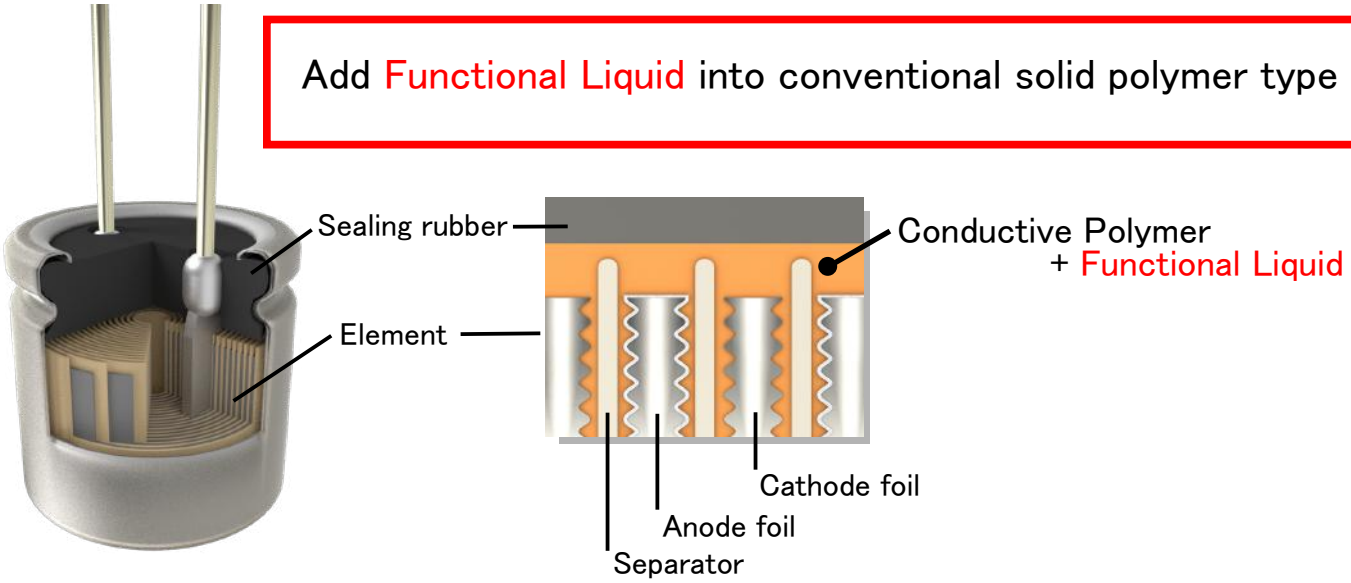
Structure of HybridType





SMD Type

Add Functional Liquid into conventional solid polymer type



Function of Functional Liquid

- Stable reforming ability to oxide film
- Inhibition of higher leakage current
- Inhibition of Polymer degradation

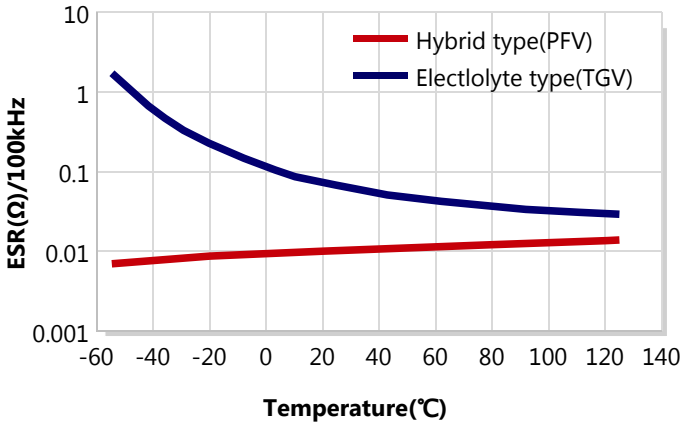
Advantage of Hybrid type against conventional solid type

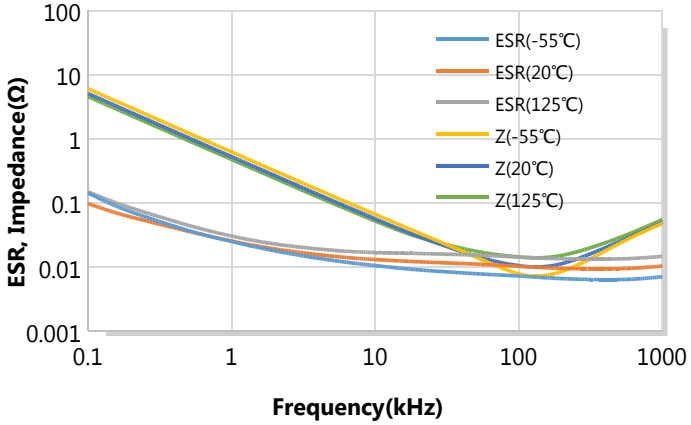
- Higher withstanding voltage
- High capacitance (downsizing)
- Longer lifetime
- Higher reliability

Key Pointin Selecting the Capacitor

Comparison with electrolytic capacitors

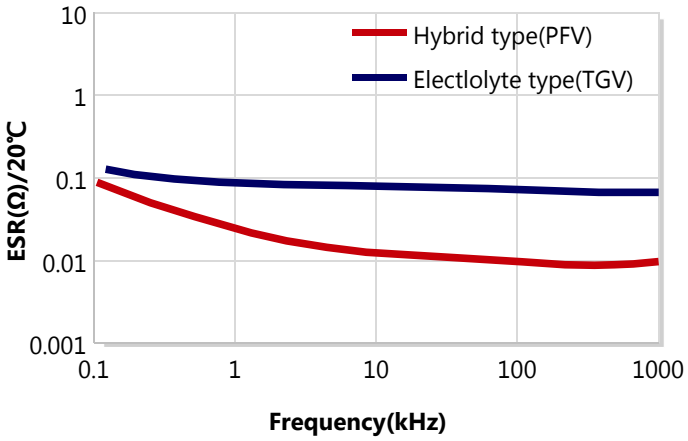
◆ Temperature Characteristics

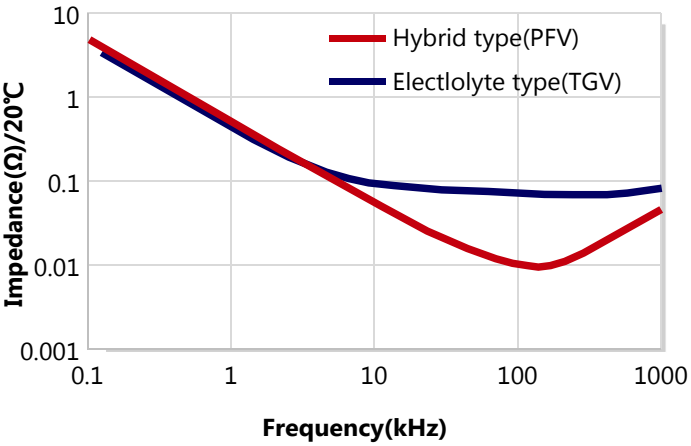




Hybrid Type is more stable than Electrolyte type across a wider temperature range.

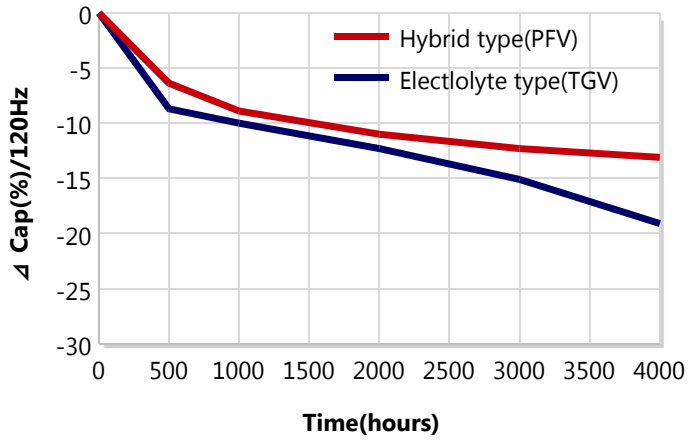
◆ Frequency Characteristics

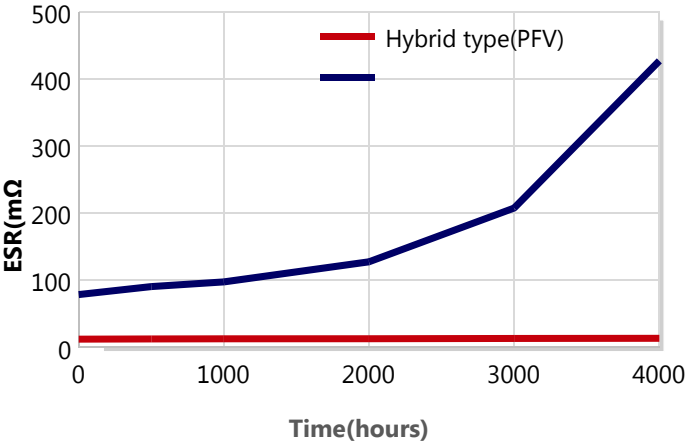




The Hybrid Type achieves lower ESR in the actual use frequency range as compared with the Electrolyte type.

◆ Lifetime Characteristics（125℃ load life test）





Hybrid Type has stable performance over lifetime as compared with Electrolyte type.

Key Pointin Selecting the Capacitor

Replace to Hybrid Type

Comparison with electrolyte type capacitors

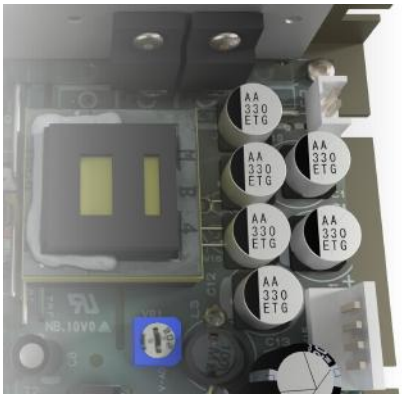
Electrolyte type/125℃ TGV series		Hybrid type/125℃ PJV series
	25v2700uF Φ18x21.5L Volume: 5.47cm^3 ESR:39mΩ Ripple:1800mArms	 25v270uF Φ8x10.5L Volume: 0.53cm^3 ESR:25mΩ Ripple:1920mArms

It is possible to obtain miniaturization and low ESR with the same ripple current

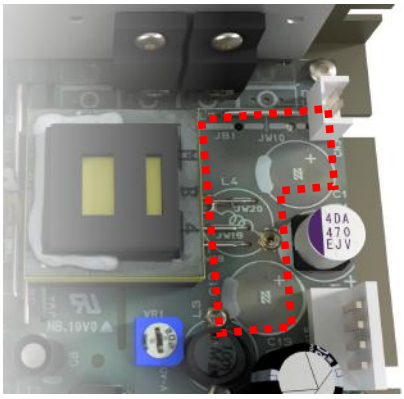
	25v220uF Φ8x10.5L Volume: 2.64cm^3 Ripple:350mArms X 5 Total : 1750mArms	 25v270uF Φ8x10.5L Volume: 0.53cm^3 ESR:25mΩ Ripple:1920mArms

It is possible to obtain cost & space saving with the same ripple current

	25v330uF Φ10x10.5L Volume: 4.95cm^3 ESR:120mΩ / 6 Total : 20mΩ	 25v470uF Φ10x10.5L Volume: 0.83cm^3 ESR:20mΩ



Cost & Space Saving !!

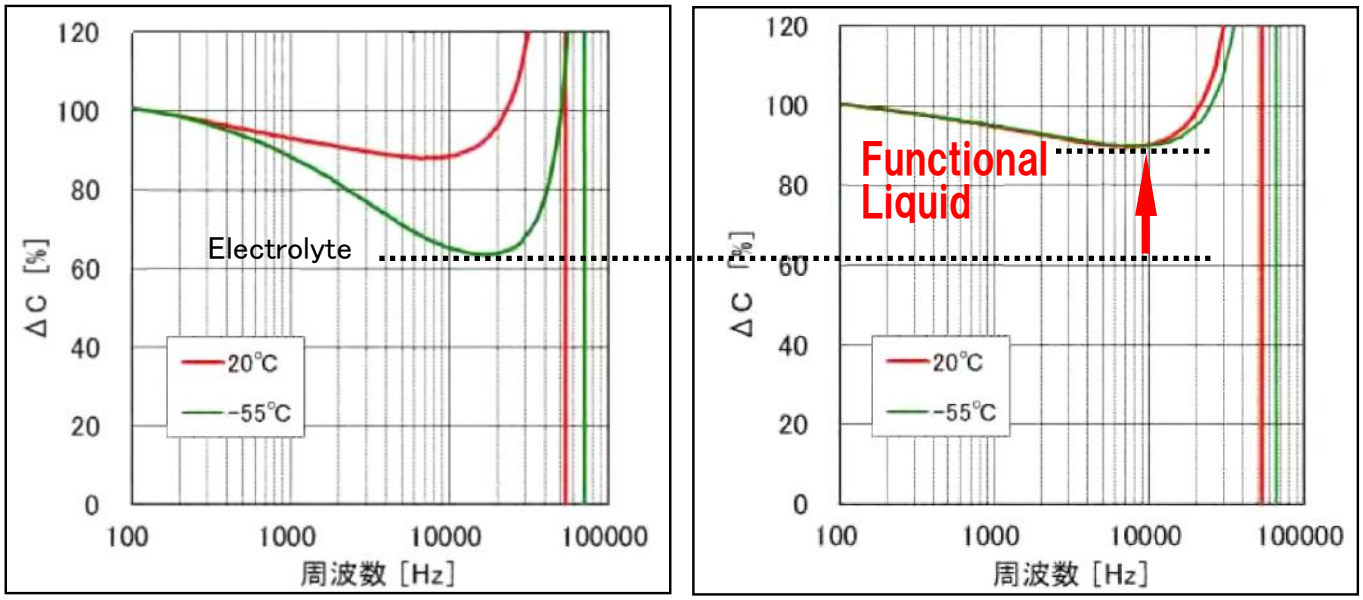


It is possible to obtain cost & space saving with the same ESR

Key Pointin Selecting the Capacitor

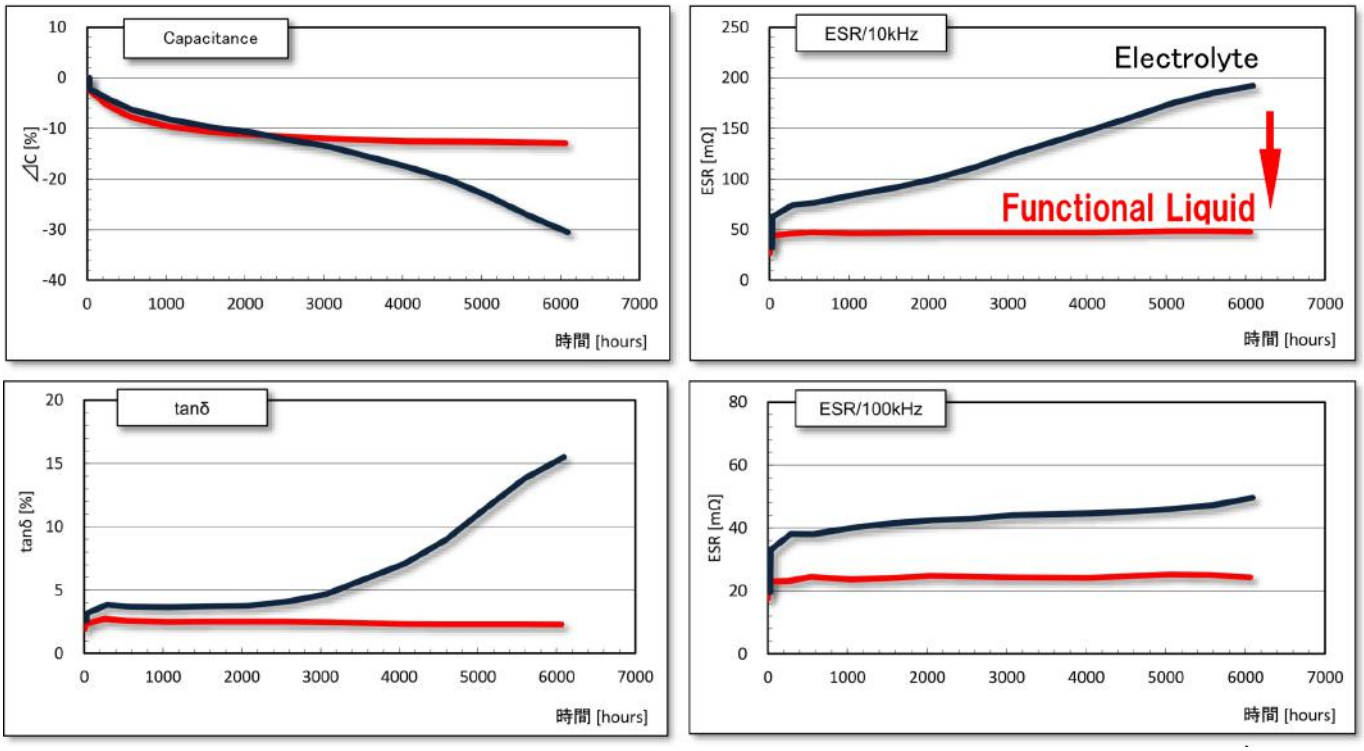
FunctionalLiquid Vs Electrolyte

Frequency characteristics Room temp(20℃) vs. Low temp(-55℃)



FunctionalLiquid Type has stable Cap characteristics in wide temperature range than Electrolyte type

Lifetime characteristics 125℃ DC Load Life



Test Item:35V 68uF φ6.3×8L

FunctinalLiquid Type has stable lifetime characteristics.

Key Pointin Selecting the Capacitor

Estimated Life Expectancy for Hybrid typeWhat is Rubycon

◆

$$L = L_b \times 2^{\frac{T\max + \Delta To - Tj}{10}}$$

L : Estimated life expectancy in actual use

L_b : Specified lifetime

Tmax : Upper category temperature

ΔTo : Temperature rise when rated ripple current is applied

PSV(PZS)	ΔTo =12K
PHV(PZH)	ΔTo = 5K(135℃), ΔTo = 16K(125℃)
PFV(PZF),CFV(CZF)※	ΔTo = 6K
PJV(PZJ),PEV(PZE),CEV(CZE)	ΔTo =10K
PLV(PZL)	ΔTo = 4K

※ CFV(CZF) Edndurance 1

Tj : Element temperature of capacitor in actual use(℃)

●When calculating Tj using a formula.

I : Actual ripple current converted to specified frequency (Arms)

$$\Delta Tj = \Delta To \times \left(\frac{I}{I_0}\right)^2$$

Io : Rated ripple current (Arms)

Ta : Ambient temperature of capacitor in actual use(℃) (When Ta is 40℃ or low, Ta shall be 40℃.)

$$Tj = Ta + \Delta Tj$$

Please note that the estimated lifetime is a reference value and not a guaranteed value. Therefore, please select a product that has sufficient margin for the design life of the equipment. If the life calculation result exceeds 15 years, 15 years will be the upper limit. Please contact us if you need further life.

Key Pointin Selecting the Capacitor

Rated current and Permissible current

The standard product list for each series defines two types of ripple current: rated ripple current and permissible ripple current.

- Rated ripple current：Ripple current continuous operation within endurance lifetime
- permissible ripple current ：permissible ripple current continuous operation.
  Estimated lifetime complies with our lifetime calculation fomula.

定格リプル電流 Rated Ripple Current (mArms/ 125℃,100kHz)	許容リプル電流 Permissible Ripple Current (mA)	
	125℃,100kHz	100℃,100kHz
900	1490	2110
1400	2320	3290
1600	2650	3760
2000	3320	4700

The rated ripple current is the same as the rated ripple current defined for general aluminum electrolytic capacitors. The allowable ripple current is a value that indicates the upper limit that can be applied continuously when a current exceeding the rated ripple current is applied.

Since the permissible ripple current varies depending on the ambient temperature, the temperature and coefficient are listed for each series. For example, in the case of the PFV series, the permissible ripple current value is given in the table below. When the ambient temperature is Ta 125℃, the rated ripple current Io is 1.66 times, and when the ambient temperature Ta100℃, the ripple is 2.35 times the rated ripple. It is possible to apply current continuously. An example of calculating the estimated life time is shown below.

Ex. PFV series 50WV,100uF,10x10.5

125℃	Rated Ripple Current 1,600mArms/100kHz	ΔTo 6℃	Life	4000hours
125℃	Permissible Ripple Current 2,650mArms/100kHz(x 1.66)	ΔTj 16.54℃	Life	1900hours
100℃	Permissible Ripple Current 3,760mArmd/100kHz(x 2.35)	ΔTj 33.15℃	Life	3400hours

※Calicuration of Element Temperature,Life Time

①HeatGeneration ΔTj (℃)

$$\Delta Tj = \Delta To \times \left(\frac{I}{I_0}\right)^2$$
$$= 6 \times 2.35^2$$
$$= 33.15$$

②Element Temperature Tj (℃)

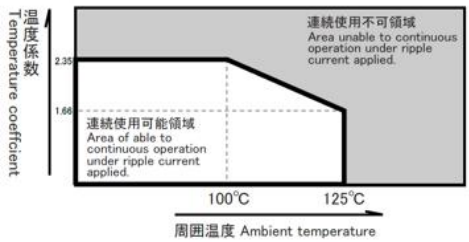
$$Tj = Ta + \Delta Tj$$
$$= 100 + 33.15$$
$$= 133.15$$

③Estimated life expectancy in actual use (Hours)

$$L = L_b \times 2^{\frac{T_{max}+\Delta To-Tj}{10}}$$
$$= 4000 \times 2^{\frac{125+6-133.15}{10}}$$
$$= 3400$$

Ex. PFV Series
Temperature Coeffcient

◆温度係数／TEMPERATURE COEFFCIENT FOR RIPPLE CURRENT



温度 Temperature T(℃)	≦100	105	110	115	125
係数 Coefficient (IMAX/Ir)	2.35	2.23	2.10	1.97	1.66

温度係数 IMAX/I_0：定格リプル電流(I_0)を超えて連続印加可能なリプル電流最大値(IMAX)を示す係数。寿命推定時間は寿命計算式に従う。
Temperature coefficient IMAX/I_0: Coefficient indicating the maximum permissible ripple current (IMAX) that can be [illegible] beyond the rated

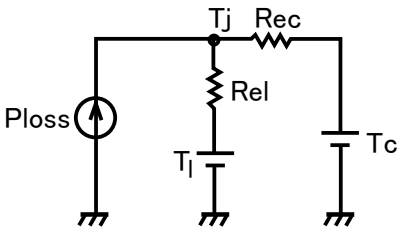
Key Pointin Selecting the Capacitor

Calculation method of element temperature

The element center temperature on P-34 is a heat value under the assumption that there is no heat dissipation to the substrate in the natural environment of a single capacitor, and under actual mounting conditions, a heat dissipation circuit to different substrates or forced cooling The exothermic value will be low depending on the conditions.
In the case of our PZ-Cap, it is designed so that it can be used continuously if it is less than the heat generation value calculated from the permissible ripple value. By accurately estimating the heat generation value under actual use conditions by the following method, Can be significantly smaller and lower cost.
* However, 10 Arms / 100 kHz MAX per capacitor.

The element center temperature under actual use conditions can be calculated by measuring the case temperature Tc, terminal temperature Tl, and ripple current (ampere, frequency). If you send us the actual measurement data, we will calculate the element center temperature under actual usage conditions and propose the optimum number and size that can apply the desired ripple current.

【EquivalentCircuit】



Tj : Element Temperature(℃)

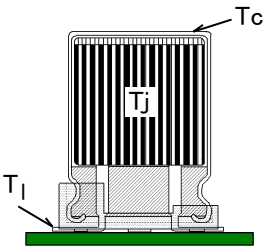
Ploss : Thermal Current(=ESR･I²) [W]

Rec : Thermal resistance between element and case (K/W)

Rel : Thermal resistance between element and PCB (K/W)

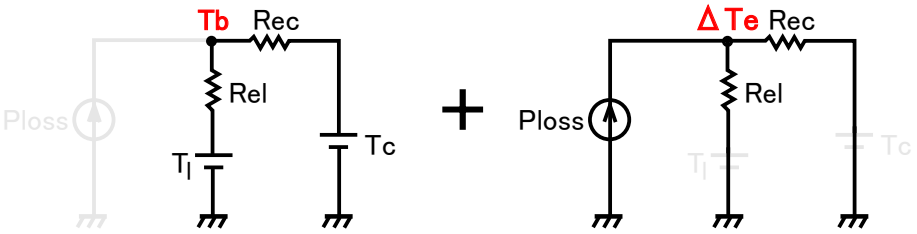
Tc : Surface Temperature (℃)

T_l : Terminal Temperature (℃)



【Superposition principle】

$$Tj = \Delta T_e + Tb$$



$$T_b = \frac{R_{el} \cdot T_c + R_{ec} \cdot T_l}{R_{el} + R_{ec}}$$

$$Min(T_c, T_l) \le T_b \le Max(T_c, T_l)$$

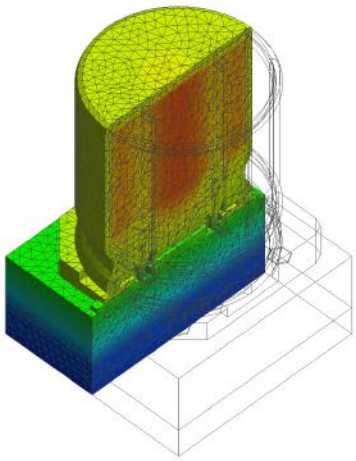
$$\Delta T_e = R_{th} \cdot P_{loss} \qquad R_{th} = \frac{R_{ec} \cdot R_{el}}{R_{ec} + R_{el}}$$

Key Pointin Selecting the Capacitor

Thermal Analysys and Thermal Equivalent

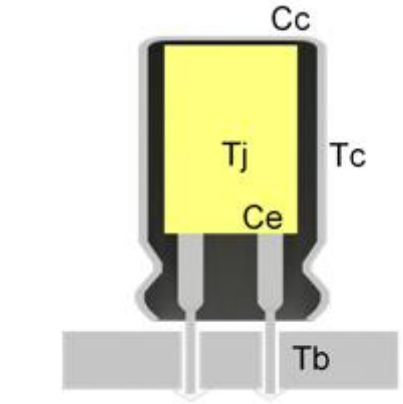
The capacitors internal temperature is the most important factor to evaluate its performance (life and maximum ripple current.) It is important to correctly estimate the capacitors temperature under the true operating conditions to avoid unnecessary over spec, while ensuring minimal reliability. Rubycon is doing thermal conductive analysis based on finite element methods. We can offer precise thermal equivalent circuit model (TECM) by utilizing this thermal conductive analysis result and experimental test data. We offer such data for aluminum electrolytic and PZ-CAP hybrid polymer capacitors used for 12V/24V line of automotive applications.

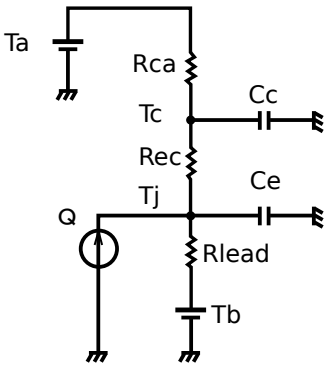
FEM Thermal Analysys Example



Analysis example of heat dissipation (heat reception) when mounted on PCB

Thermal Equivalent Circuit Example





Tj: Element temp. Ce: Element heat capacitance Rca: Rth (Surface to amb.)
Tc: Surface temp. Cc: Al-case heat capacitance Rec: Rth (Element to surface)
Tb: PCB temp. Q : Power Loss Rlead: Rth (Element to PCB)
Ta: Ambient temp.

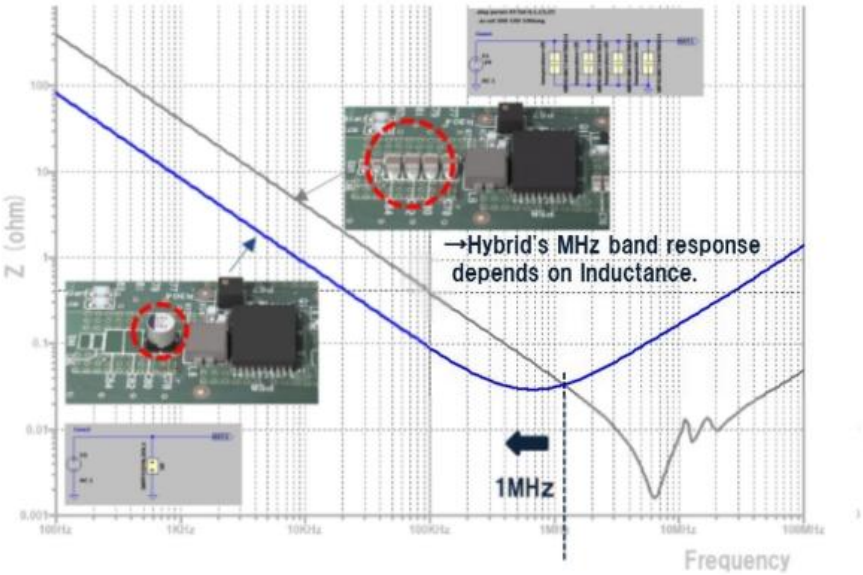
Aluminum Electrolytic Capacitor-Through Hole Type

Key Pointin Selecting the Capacitor

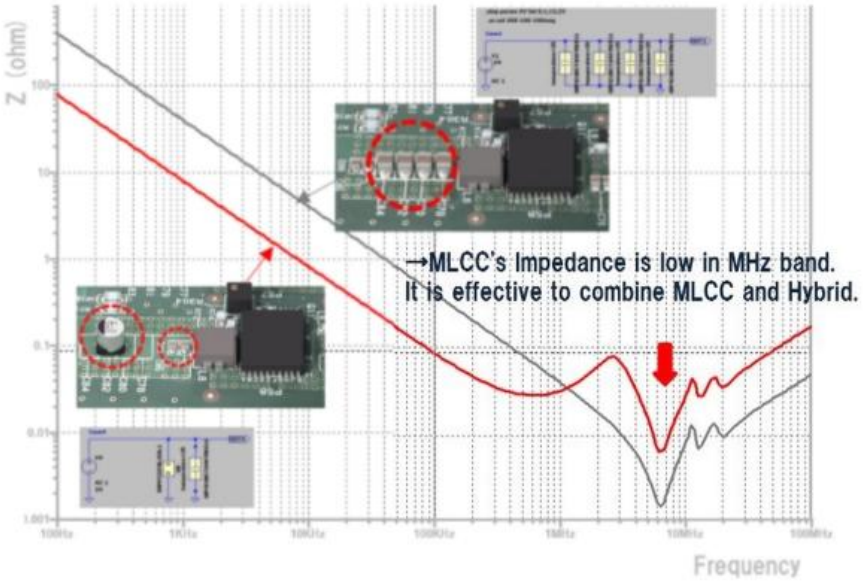
Impedance Analysys with LTSPICE

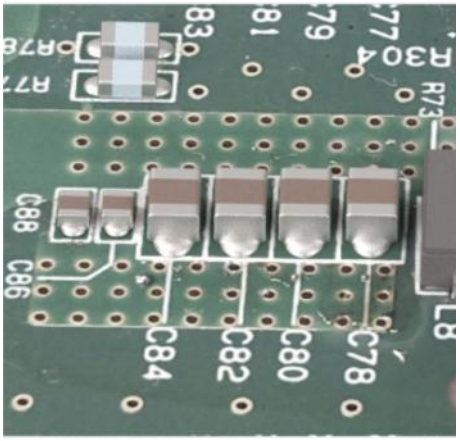
Result of Simulation

Only Hybrid use
: Good characteristics in LW-band(150kHz～) ,AM-band (400kHz～1.5MHz)



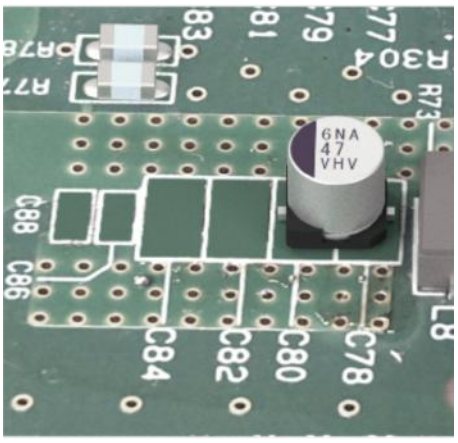
Hybrid with MLCC
: Good characteristics in SW-band(2MHz～) , Chracteristics of LW-band and AM-band remain





MLCC to PZ-CAP

MLCC 6pcs to PZ-CAP 1pcs (φ6.3)



Please refer to the Spice Models of PZ-CAP on Rubycon's web site

◆Conforming to RoHS Directive

TYPE	Conductive Polymer Aluminum solid electrolytic Capacitors	
	PZ-CAP	
	LEAD	SMD
RoHS Compliance	Complied	
Lead	Not contain	
Terminal material	Fe/Cu/Sn	Fe/Cu/Sn-0.5Bi Fe/Cu/Sn
Resistance to Soldering heat	260℃ Flow Soldering	Reflow(※1)
Cadmium	Not contain	
Mercury	Not contain	
Chrome(Ⅵ)	Not contain	
PBB PBDE	Not contain	
DEHP, BBP DBP, DIBP	Not contain	
Identification for RoHS Compliance Parts	Add "RoHS Compliance" marking on inner and outer carton lable	

※1:Please find "Reflow Soldering Condition".

Regarding compliance to European REACH Regulation

According to the content of RIP3.8TGD(Technical Guidance Document) which is published on 26 May 2008, our electronic components are "articles without any intended release." Therfore the are not applicable for "Registration"for European REACH Regulation Article 7(1).

Production discontinuation of old series at Rubycon is implemented as planned. Technical documents and samples are

Features	Previous Series	Final Accepted Order Date	Substitute Series
General Purposes	PAV	2019/06/01	PEV
	PCV		PFV
	PZA	2019/06/01	PZE
	PZC		PZF

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The contents presented in this catalog have been update as of June 2020. Product name ans specification are subject to change or cancellation of production without notice.
The contents presented in this catalog is an introductory document of the product. Please ask the detailed specification when using the products contained in this catalog.

Our products is not used in special circuit (transpotation equipment , medical equipment , aerospace equipment, space equipment , nuclear equipment etc) where a defect in this component may cause the loss of human life or other significant damage in the case of high reliability application circuit/equipment , Please contact us in advanece.

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http://www.rubycon.co.jp
PZ2006EN-1-500