

Products Catalog

Conductive Polymer Hybrid Aluminum Electrolytic Capacitors Hybrid





Conductive Polymer Hybrid Aluminum Electrolytic Capacitors INDEX

	Item		Page				
Safety and Lega	Matters to Be Observed / Matters	s to Be Observed When Using This Product	1				
	Line-up		8				
	Series flow chart						
Coloction swide	Voltage - Capacitance table						
Selection guide	Explanation of part numb	ers	15				
	Recommended reflow so	Idering / Mounting specifications	16				
	Packing specifications		18				
	ZA series	: 105 °C 10000 h	19				
	ZC series	: 125 ℃ 4000 h	22				
	ZK series	: 125 ℃ 4000 h	25				
	ZKU series	: 125 ℃ 4000 h	27				
	ZL series	: 135 °C 4000 h	29				
	ZT series	: 135 °C 4000 h	31				
Curfo og mogunt	ZTU series	: 135 °C 4000 h	33				
Surface mount type	ZV series	: 135 °C 4000 h	35				
type	ZVU series	: 135 °C 4000 h	37				
	ZS series	: 135 ℃ 4000 h	39				
	ZSU series	: 135 °C 4000 h	41				
	<u>ZU series</u>	: 135 ℃ 4000 h	43				
	ZUU series	: 135 ℃ 4000 h	45				
	<u>ZE series</u>	: 145 ℃ 2000 h	47				
	<u>ZF series</u>	: 150 ℃ 1000 h	49				
	ZA-A series	: 105 ℃ 10000 h	51				
	ZC-A series	: 125 ℃ 4000 h	53				
	ZK-A series	: 125 ℃ 4000 h	56				
	ZKU-A series	: 125 ℃ 4000 h	58				
Radial lead type	ZT-A series	: 135 °C 4000 h	60				
	ZS-A series	: 135 ℃ 4000 h	62				
	ZSU-A series	: 135 °C 4000 h	64				
	ZE-A series	: 145 ℃ 2000 h	66				
	<u>ZF-A series</u>	: 150 ℃ 1000 h	68				

Safety and Legal Matters to Be Observed

Product specifications and applications

- Please be advised that this product and product specifications are subject to change without notice for improvement purposes. Therefore, please request and confirm the latest delivery specifications that explain the specifications in detail before the final design, or purchase or use of the product, regardless of the application. In addition, do not use this product in any way that deviates from the contents of the company's delivery specifications.
- Unless otherwise specified in this catalog or the product specifications, this product is intended for use in general electronic equipment (AV products, home appliances, commercial equipment, office equipment, information and communication equipment, etc.).

When this product is used for the following special cases, the specification document suited to each application shall be signed/sealed (with Panasonic Industry and the user) in advance. These include applications requiring special quality and reliability, wherein their failures or malfunctions may directly threaten human life or cause harm to the human body (e.g.: space/aircraft equipment, transportation/traffic equipment, combustion equipment, medical equipment, disaster prevention/crime prevention equipment, safety equipment, etc.).

Safety design and product evaluation

- Please ensure safety through protection circuits, redundant circuits, etc., in the customer's system design so that a defect in our company's product will not endanger human life or cause other serious damage.
- This catalog shows the quality and performance of individual parts. The durability of parts varies depending on the usage environment and conditions. Therefore, please ensure to evaluate and confirm the state of each part after it has been mounted in your product in the actual operating environment before use. If you have any doubts about the safety of this product, then please notify us immediately, and be sure to conduct a technical review including the above protection circuits and redundant circuits at your company.

Laws / Regulations / Intellectual property

- The transportation of dangerous goods as designated by UN numbers, UN classifications, etc., does not apply to this product. In addition, when exporting products, product specifications, and technical information described in this catalog, please comply with the laws and regulations of the countries to which the products are exported, especially those concerning security export control.
- Each model of this product complies with the RoHS Directive (Restriction of the use of hazardous substances in electrical and electronic equipment) (2011/65/EU and (EU) 2015/863). The date of compliance with the RoHS Directive and REACH Regulation varies depending on the product model. Further, if you are using product models in stock and are not sure whether or not they comply with the RoHS Directive or REACH Regulation, please contact us by selecting "Sales Inquiry" from the inquiry form.
- During the manufacturing process of this product and any of its components and materials to be used, Panasonic Industry does not intentionally use ozone-depleting substances stipulated in the Montreal Protocol and specific bromine-based flame retardants such as PBBs (Poly-Brominated Biphenyls) / PBDEs (Poly-Brominated Diphenyl Ethers). In addition, the materials used in this product are all listed as existing chemical substances based on the Act on the Regulation of Manufacture and Evaluation of Chemical Substances.
- With regard to the disposal of this product, please confirm the disposal method in each country and region where it is incorporated into your company's product and used.
- The technical information contained in this catalog is intended to show only typical operation and application circuit examples of this product. This catalog does not guarantee that such information does not infringe upon the intellectual property rights of Panasonic Industry or any third party, nor imply that the license of such rights has been granted.
- Design, materials, or process related to technical owned by Panasonic Industry are subject to change without notice.

Panasonic Industry will assume no liability whatsoever if the use of our company's products deviates from the contents of this catalog or does not comply with the precautions. Please be advised of these restrictions.

Matters to Be Observed When Using This Product

(Conductive polymer hybrid aluminum electrolytic capacitor / Aluminum electrolytic capacitor)

Use environments and cleaning conditions

This product (capacitor) is intended for standard general-purpose use in electronic equipment, and is not designed for use in the specific environments described below. Using the product in such specific environments or service conditions, therefore, may affect the performance of the product.

Check with us about the performance and reliability of the product first before using the product.

- (1) Used at a temperature higher than the upper limit category temperature or lower than the lower limit category temperature.
- (2) Used in an environment where the product is directly exposed to water, salt water, oil, etc., or in a liquid, such as water, oil, chemicals, and organic solvents.
- (3) Used in an outdoor environment where the product is exposed to direct sunlight, ozone, radiation, UV-rays, etc., or in a dusty place.
- (4) Used in a wet place (dew concentration on a resistor, water leakage, etc.), a place exposed to sea breeze, or a place filled with a corrosive gas, such as Cl₂, H₂S, NH₃, SO₂, or NO_X.
- (5) Used in an environment filled with a toxic gas (hydrogen sulfide, sulfurous acid, nitrous acid, chlorine and chlorine compound, bromine and bromine compound, ammonia, etc.)
- (6) Used in an environment where static electricity and electromagnetic waves are strong.
- (7) Located close to heating component or a flammable material, such as a vinyl cable.
- (8) Sealed with a resin, etc.
- (9) Cleansed with a solvent, water, or a water-soluble cleaner, to remove solder flux after soldering.
- (10) Used in an environment where an acidic or alkali atmosphere is present.
- (11) Used in an environment where excessive vibration or mechanical shocks exceeding a specified range is applied to the product (even if the applied vibration or mechanical shocks is within the specified range, it may cause the product to resonate, in which a large vibration acceleration may be generated. Make sure to evaluate/check such vibrations or impacts applied to the product in an actual service condition).
- (12) Used under a low atmospheric pressure condition or depressurized condition.
- The capacitor withstands an immersion cleaning process where the board carrying the product is immersed in a cleaning solution of 60 °C or lower for less than 5 minutes and withstands an ultrasonic cleaning process as well. However, ensure to thoroughly rinse and dry it. Some cleaning methods erase or blur notes on the capacitor in some cases. Some types of capacitors are not washable and some cleaning solutions cannot be used to clean a capacitor. If you are not sure about which type of capacitor is not washable or which cleaning solution cannot be used, please contact us. Solvents you can use to clean the board are as follows.

Pine Alpha ST-100S, Aqua Cleaner 210SEP, Cleanthrough 750H/750L/710M, Sun Elec B-12, Techno Cleaner 219, Cold Cleaner P3-375, DK Be clear CW-5790, Terpene Cleaner EC-7R, Techno Care FRW-17/FRW-1/FRV-1

- Keep the cleaning solution under strict contamination control (conductivity, pH, specific gravity, water content, etc.). A contaminated cleaning solution will show a high chlorine concentration, thereby corroding the interior of the capacitor in some cases. Keep the flux concentration in the cleaning solution at a 2% mass or less.
- Unless otherwise specified in the specifications, avoid cleaning the capacitor with a halogen-based solvent, an alkaline solvent, a petroleum-based solvent, xylene, or acetone. Using a halogen-based solvent may result in a case where the solvent infiltrates (leaks) into the capacitor and break-down releasing chlorine, which reacts with aluminum which can corrode the capacitor interior. 1-1-1 trichloroethane is particularly harmful to a capacitor. Never use it to clean a capacitor. A alkaline solvent may corrode (dissolve) an aluminum case, a petroleum-based solvent and xylene may damage the sealing rubber and accelerate its deterioration, and acetone may erase notes on the capacitor.
- Right after the board cleaning, subject the capacitor to a forced drying process so that no cleaning solution remains between the sealing part of the capacitor and the printed board. Set a drying temperature equal to or lower than the upper limit category temperature.
- When an adhesive or coating agent is used to fix the capacitor and prevent dampening of the board, specific types of solvents included in some adhesives or coating agents may corrode the capacitor. Select a non-halogen solvent for the material making up the adhesive or coating agent. Do not use a chloroprene-based polymer. Solidify and dry the adhesive or coating agent sufficiently to prevent its solvent component from remaining on the capacitor. Leave at least 1/3 of the sealing part unsealed on the surface to which the adhesive or coating agent is applied.

- Do not use the product in a structure sealed by potting or molding. The pressure of a molding resin on a capacitor may deform the capacitor. In addition, the resin covering the capacitor may affect its heat dissipation performance or may leak into the product. These factors lead to the significant degradation of the capacitor's characteristics and reliability. There is also a concern that an electrolytic solution permeating the sealing rubber may agglomerate and cause a short circuit.
- When the capacitor is used in a circuit where an impact voltage is applied or a high voltage is applied in a short period (transient phenomenon) or a high pulse voltage is applied, make sure to use the capacitor at a voltage equal to or lower than its rated voltage.
- The product contains an electrolytic. Improper use of the capacitor leads not only to the rapid degradation of its characteristics but also to electrolytic leakage. These problems damage the circuit board and may lead to destruction of the entire circuit set.

Response to anomalies and handling conditions

- When you see gas coming out of an activated pressure relief valve of a capacitor during use of a circuit set, turn off the main power supply of the circuit set or pull the power cord plug out of the wall-outlet. If you leave the power supply on and the capacitor short-circuits, it will damage the circuit, or the gas can turn into a liquid, which will cause the circuit to short. In the worst case scenarios, these events may develop into a more serious incident, such as burnout of the circuit set. The gas coming out of the pressure relief valve of a capacitor is not smoke, but is the electrolytic solution in its gaseous state.
- When the pressure valve of the capacitor is activated, it emits a high-temperature gas of over 100 °C. Do not bring your face near the valve. In case the gas jetting out of the valve gets in your eyes or comes into your mouth, wash your eyes with water or rinse your mouth immediately. If the gas hits your skin, wash it away with soap.
- If you touch a terminal of the product during use of the circuit set, you will get an electric shock. The aluminum case of the product has an exposed part with no insulation. Do not touch the exposed part because it is as dangerous as the terminal.
- Do not create a short circuit between terminals of the product by inserting a conductor therebetween. Do not splash a conductive solution, such as an acidic or alkali solution, on the capacitor. It puts the capacitor in a shorted state, which causes the circuit to fail and destroys the capacitor as well.
- When a silicone material containing a relatively large amount of a low-molecular-weight siloxane is located close to the product, it may cause the capacitor problems with its electrical performance.
- When electronic equipment having the capacitor built therein is exported to overseas markets, wooden packaging materials are fumigated with a halogen compound, such as methyl bromide. In such cases, if the packaging material subjected to the fumigation treatment is not dried sufficiently, halogen remaining on the packaging material may leach into the capacitor during transportation and trigger a corrosive reaction in the capacitor. When carrying out the fumigation treatment, carefully examine the dried packaging material to confirm that no halogen remains on the packaging material. Never fumigate the entire electronic equipment in its packaged state.

Reliability and product life

- The product life is affected by temperatures. In general, a 10 °C drop in the temperature will double the life. Use the capacitor at a temperature as low as possible from the upper limit category temperature.
- Using a capacitor under a temperature condition outside a specified temperature range causes heavy degradation of the capacitor characteristics, which may result in breakage of the capacitor. You need to confirm not only the ambient temperature and internal temperature of the capacitor but also the temperature of the capacitor's top surface, which is given by radiant heat from built-in heating elements (a power transistor, IC, resistance, etc.) and heat generated by self-heating induced by ripple current. Do not place a heating element on the back of the capacitor.

Panasonic INDUSTRY

The product life is given by the following equation.

T1-(T2+⊿T) $|2| = |1| \times |2|$ Where $T_1 \ge T_2$

- L1 : Guaranteed life (h) at temperature T₁ (°C)
- L2 : Expected life (h) at temperature T_2 (°C)
- T1 : Upper category temperature (°C)
- T2 : Ambient temperature of capacitor (°C)
- ∠T : Temperature increase caused by ripple current (°C)
- Do not use the product for a period longer than its specified service life. A capacitor with its service life ended may cause the following problems: rapid degradation of the product characteristics, short circuit, unnecessary activation of the pressure valve, electrolytic solution leakage, etc. Note that the estimated service life is not longer than 15 years due to the limited environment-resistant property of the sealing rubber.
- When the capacitor is used under a high-temperature condition for a long period, minute cracks develop on the surface of the sealing rubber or the case surface turns brown in some cases. These phenomena, however, have no effects on the reliability of the capacitor.
- A capacitor conforming to "AEC-Q200" refers to a capacitor having passed some or all of evaluation test items defined in AFC-Q200.

To know the detailed specifications of each capacitor or specific evaluation test scores, please contact us. We issue a the product specifications sheet for each product ordered. Please confirm the product specifications sheet when you place an order to us.

Circuit design and circuit board design

The electrical characteristics change as a result of temperature/frequency fluctuations. Take electrical characteristic changes into consideration when working out a circuit design.

(1) Temperature fluctuations	
High-temperature condition	: increase in leak current
Low-temperature condition	: decrease in capacitance, increase in the tangent to the loss angle, increase in impedance (the hybrid type is excluded), etc.
	increase in impedance (the hybrid type is excluded), etc.
(2) Frequency fluctuations	
High-frequency condition	: decrease in capacitance, increase in the tangent to the loss angle, decrease in impedance, etc.
Low-frequency condition	: more heat generation by ripple current as a result of an increase in equivalent series resistance

- The group of factors described below may lead to rapid degradation of the capacitor characteristics, short circuit, or electrolytic solution leakage. They may give rise to sharp heat/gas generation, too, in which case the increasing internal pressure actuates the pressure valve, causes the electrolytic solution to leak out of the sealing part, and, in a worst-case scenario, causes an explosion or ignition incident. When a capacitor bursts, it may scatter flammable materials (electrolytic solution, etc.) in its surroundings.
 - (1) Reverse voltage: The capacitor has preset polarity. Do not apply a reverse voltage to the capacitor. Confirm the polarity indicated on the capacitor and then use it.
 - (2) Charge/discharge: Avoid using the capacitor in a circuit that frequently repeats sharp charge/discharge cycles or a circuit that requires relatively slow but highly frequent charge/discharge cycles. In cases where you use the capacitor in such circuits, make sure to inform us of the charge/discharge conditions. Ensure that a rush current does not exceed 100 A.
 - (3) ON/OFF: Avoid using the capacitor in an on/off circuit that repeatedly switches on and off more than 10,000 times a day. In cases where you use the product in such circuits, make sure to inform us of the circuit conditions, etc.
 - (4) Overvoltage: Do not apply an overvoltage higher than the rated voltage (higher than the surge voltage when the voltage application period is short). A peak value given by superposing a ripple voltage (AC component) on a DC voltage must be equal to or lower than the rated voltage.
 - (5) Ripple current: Do not allow an excessively large ripple current (larger than the rated ripple current specified in the specifications) to flow through the capacitor. Even if a ripple current flow in the capacitor is equal to or smaller than the rated ripple current, a reverse voltage flow may be generated in the capacitor when the DC bias voltage is low flow in the capacitor. Keep the ripple current flow within a range in which no reverse voltage is generated. Even if the ripple current flow is kept equal to or smaller than the rated ripple current, using the capacitor for a period longer than its service life intensifies the degradation of the ESR characteristics, resulting in an increase in internal heating caused by the ripple current. As a result, the pressure valve is actuated, the exterior case or rubber swells, the electrolytic solution leaks, and, in a worst-case scenario, the capacitor short-circuits and ignites or explodes.

- * In the case of a hybrid type, category temperature (°C)
- + temperature increase caused by rated ripple current (°C)

- Because the impedance of the capacitor is close to the circuit impedance, capacitors connected in parallel in the circuit may damage the whole current balance, in which, a ripple current higher than the rated ripple current may flow in some of the capacitors. To prevent concentration of ripple current on the low-impedance side, use capacitors with the same part number and avoid the partiality of cable impedances. Do not use capacitors connected in series.
- When the capacitor is mounted on a double-side wiring board, do not place the wiring pattern directly underneath where the product is mounted. In case the electrolytic solution leaks out, it may short-circuit the pattern and cause tracking or migration. Consider a case where the product is a radial lead capacitor and is mounted on a board with through-holes. In this case, if the sealing part of the capacitor and the board surface stick close to each other, solder flows up to the capacitor during a dip soldering process, which may cause short circuit between the anode and cathode of the capacitor. In such a case, the outer laminate of the product may be damaged. The position of holes, therefore, must be determined properly.
- When designing a printed board carrying radial lead capacitors, make through-holes across the gap equal to the gap between the leads (terminals) of the capacitor. If the gap between the through-holes is narrower or wider than the gap between the leads, stress is applied to the leads when the capacitor is inserted in the holes. This may result in increasing leak current, short circuit, wire breaking, or electrolytic solution leakage.
- A capacitor which has the pressure valve on the case must be provided with a space formed above the pressure valve so that the pressure valve operates without hinderance. When the product is 6.3 mm to 16 mm in diameter, form a space of 2 mm or larger. When the product is 18 mm in diameter, form a space of 3 mm or larger. If the space is not large enough, it will impair the operability of the pressure valve and may lead to an explosion incident.
- Design the circuit in such that the pattern, especially a line pattern carrying high voltage or large current, is not formed above the pressure valve. Upon its activation, the pressure valve emits a flammable high-temperature gas of over 100 °C. This may cause a secondary accident, such as the gas condensing on the pattern and the wire sheathing being melted and catching on fire.
- Be careful with resonance of the capacitor mounted on the board. When a large load is applied to the capacitor at the frequency close to the resonance frequency, it may cause the capacitor to come off or widely change its characteristics.
- Completely isolate the case of the capacitor from the cathode terminal and the circuit pattern.
- The laminate or outer sleeve covering of the product is for displaying information on the product and does not have a guaranteed insulating function.

The laminate may turn brown under a high-temperature condition. However, that does not cause problems with markings recognition on the product surface or electrical performance.

The outer sleeve may crack when dipped in a xylene or toluene solution and exposed to high temperature.

Mounting conditions

Do not reuse a capacitor that was incorporated in a circuit set and energized in the past. Do not use a capacitor that was dropped on the floor.

Do not use a capacitor in its compressed form. Compressing the capacitor makes it less airtight, resulting in poor performance, shorter guaranteed life, and electrolyte leakage.

- A re-striking voltage is generated in a capacitor in some cases. In such a case, let the capacitor discharge through a resistor of about 1 kΩ.
- When a capacitor is kept in storage for a long period, you may find the leak current from the capacitor has increased. In such a case, make voltage adjustment through a resistor of about 1 kΩ.
- Before mounting the capacitor on the board, confirm the ratings (capacitance, rated voltage, etc.) and polarity of the capacitor. Before mounting a surface-mounted type capacitor, confirm its terminal dimensions and land size. Before mounting a radial lead type capacitor, confirm its terminal interval and hole interval. If the terminal interval is not the specified one, stress is applied to internal elements, which may cause problems, such as a short circuit and insufficient mounting strength.

When the terminal interval and the hole interval of the radial lead type capacitor do not match and therefore the capacitor's leads need to be readjusted, make sure that the readjustment does not apply any stress to the capacitor's body.

- Confirm the applied pressure when using an automatically mounting process for a surface-mounted type capacitor. Excessive pressure may result in increasing leak current, short circuit, the capacitor coming off from the board, and the like. When automatically mounting the radial lead type capacitor, check the wear of a cutter for cutting the leads and confirm that the angle of clinching the leads is not too acute with regards to the board. Clinching the leads at too acute of an angle applies tensile stress to the leads, which may lead to destruction of the capacitor.
- Follow soldering conditions (preheating, soldering temperature/time, the number of soldering, etc.) in the specification sheet. A high peak temperature or a long heating time causes the degradation of electrical characteristics or a reduction in the guaranteed life. Note that the specified soldering conditions indicate conditions under which the degradation of capacitor characteristics do not occur but do not indicate conditions under which stable soldering can be performed. Check and set conditions under which stable soldering can be performed, on a case-by-case basis. Measure the temperature of the capacitor, using a thermocouple bonded to the top of the capacitor with an epoxy-based adhesive. This temperature measurement must be conducted in a mass-production setup.
- The surface-mounted type capacitor is soldered by reflow soldering only. It cannot be soldered by flow soldering or dip soldering. Carry out reflow soldering with an atmospheric heat transfer method using infrared hot air, etc. When carrying out two rounds of reflow processes, carry out the second reflow process after the capacitor's temperature settles down to a normal temperature. In the case of VPS reflow, a sharp rise in the capacitor temperature causes a change in the characteristics and appearance of the capacitor, which may give rise to a problem with capacitor mounting. We therefore recommend execution of VPS flow at a temperature rise rate of 3 °C/second or lower. For more information about this matter, please contact us.
- Reflow soldering, under the reflow conditions we recommend, might result in discoloring or swelling of the case or crack formation on the ink mark indicating the cathode. These minor problems, however, do not affect the reliability of the capacitor at all.
- A 6.3-mm diameter vibration-resistant capacitor has a structure that covers the auxiliary terminals to the sides of a seat plate. In cases where you confirm formation of a fillet on the sides of the auxiliary terminals by an image recognition means, etc., examine soldering conditions for the formation of a sufficient fillet on the auxiliary terminals in advance before carrying out the soldering process.

Even if the formation of a sufficient fillet on the auxiliary terminals is not confirmed, a solder junction between the lower surface of the auxiliary terminals and the board ensures vibration-resistant performance, meaning the reliability of the capacitor is not affected.

- The radial lead type capacitor cannot be soldered by reflow soldering. Do not dip the capacitor body, except the leads, in solder. Heat from the solder raises the internal pressure of the capacitor and destroys it. Solder the capacitor according to the following soldering conditions: soldering temperature of 260 °C ±5 °C and soldering time of 10 seconds ±1 second.
- Ensure that other components do not come in contact with the capacitor during the soldering process. When a radial lead type capacitor is set in close contact with the board, check the soldered state of the capacitor well, because its sealing rubber has no venting structure.
- When manually soldering the capacitor, follow the soldering conditions (soldering temperature/time) specified in the specification sheet or adopt a soldering temperature of 350 °C and a soldering time of 3 seconds or less. When you need to remove a capacitor already soldered, remove it after the solder is melted sufficiently so that no stress is applied to the terminals of the capacitor. Be careful not to let the solder iron tip touch the capacitor. The solder iron touching the capacitor may damage the capacitor.
- When the temperature of the capacitor becomes extremely high due to preheating, solidification of the setting resin, etc., may cause the outer sleeve of the capacitor to shrink or crack. When treating the capacitor in a thermosetting furnace, etc., place the capacitor in an atmosphere of 150 °C for 2 minutes or less.
- Do not tilt or twist the capacitor soldered to a printed board or hold the capacitor to carry the board or hit the capacitor against something. Such actions apply a force to the internal elements through the terminals and may destroy the product.
- Using highly active halogenous (chlorine-based or bromic) solder flux poses a concern that residual solder flux will have negative impact on the performance and reliability of the capacitor. Check the influence of residual solder flux before using such solder flux.

Storage conditions

A capacitor left for a long period is prone to have a greater flow of leak current. This happens because the oxide film deteriorates under a no-load condition. Voltage application to the capacitor reduces the leak current. However, at the start of voltage application, a large flow of film recovery current increases the leak current, which may cause a circuit failure, etc.

The storage period of a capacitor is 42 months from the shipment inspection day. However, the storage period of capacitors not listed in the following table is specified as 12 months.
Store the capacitor in a place where a normal temperature condition (5°C to 35°C) and a normal humidity condition

Store the capacitor in a place where a normal temperature condition (5°C to 35°C) and a normal humidity condition (45% to 85%) are maintained and direct sunlight is blocked.

Product category	Product category Series				
Hybrid type	All hybrid series				
Surface-mounted type other than the hybrid type	S (hot lead-free reflow), HA (hot lead-free reflow) HB (hot lead-free reflow, 5.4 mm in height) HC, HD, FCA, FC, FKA, FK, FKS, FP,FT, FH, FN TG, TK, TP, TC, TCU, TQ	42 months from the shipment inspection day			
Radial lead type other than the hybrid type	FC-A, FK-A, HD-A, TA-A, TP-A, FP-A				

- Avoid storing the capacitor in environments not specified in the delivery specification sheet or in the following environments or conditions.
 - (1) Used at a temperature higher than the upper limit category temperature or lower than the lower limit category temperature
 - (2) Environments where the capacitor is exposed to water, salt water, or oil
 - (3) Environments where dew concentrates on the capacitor
 - (4) Environments filled with a toxic gas (hydrogen sulfide, sulfurous acid, nitrous acid, chlorine and chlorine compound, bromine and bromine compound, ammonia, etc.)
 - (5) Environments where the product is exposed to ozone, radiation, UV-rays, etc.
 - (6) Environments where vibrations or mechanical shocks exceeding a specified range is applied to the capacitor

Reference information

Guidelines

Some of the product use guidelines described herein are excerpted from JEITA RCR-2367D "Safety application guide for fixed aluminum electrolytic capacitors for use in electronic equipment," a technical report issued by the Japan Electronics and Information Technology Industries Association on October 2017. For more detailed information, please see the above technical report.

Intellectual property

Panasonic Group provides customers with safe products and services. We are also making great efforts to protect our intellectual property rights for Panasonic Group products. Typical patents related to this product are as follows. (Hybrid type)

[U.S. patent]

USP Nos. 7497879, 7621970, 9208954, 9595396, 9966200, 10453618, 10559432, 10679800, 10685788, and 10790095.

[Japanese patent] Japanese Patent No. 5360250

[European patent] EP-A Nos. 1808875 and 2698802

Lineup

Surface mount type

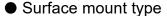
Series	Part No.	Features	size	cap.	ple	imp.	life	Category temperature	Rated voltage	ESR	Capacitance range	Size code	Siz (m	
Sei	T art NO.	reatures	Small s	Large cap.	High ripple	High temp.	Long life	range (℃)	range (V)	(mΩ)	(μF)	Size	øD	L
									25 to 50	80 to 120	10 to 33	С	5.0	5.8
		Low ESR High ripple current							25 to 63	50 to 120	10 to 56	D	6.3	5.8
ZA	EEHZA	Long life	•					-55 to 105	25 10 05	30 to 80	22 to 100	D8	6.3	7.7
		105 ℃ 10000 h							25 to 80	27 to 45	22 to 220	F	8.0	10.2
									2010 00	20 to 36	33 to 330	G	10.0	10.2
									25 to 50	80 to 120	10 to 33	С	5.0	5.8
		Low ESR High ripple current							25 to 63	50 to 120	10 to 56	D	6.3	5.8
ZC	EEHZC	Long life	•				•	-55 to 125	20 10 00	30 to 80	22 to 100	D8	6.3	7.7
		125 ℃ 4000 h							25 to 80	27 to 45	22 to 220	F	8.0	10.2
										20 to 36	33 to 330	G	10.0	10.2
		1								80 to 100	33 to 47	С	5.0	5.8
		Large capacitance High ripple current								50 to 60	56 to 82	D	6.3	5.8
ZK	EEHZK	Long life	•	•	•		•	-55 to 125	25 to 35	30 to 35	100 to 150	D8	6.3	7.7
		125 ℃ 4000 h								27	180 to 270	F	8.0	10.2
										20	330 to 470	G	10.0	10.2
										80 to 100	39 to 56	С	5.0	5.8
		Large capacitance								50 to 60	68 to 100	D	6.3	5.8
ZKU	EEHZKU-	Long life 125 ℃ 4000 h	•	•	•		•	-55 to 125	25 to 35	30 to 35	120 to 180	D8	6.3	7.7
		125 C 4000 II								27	220 to 330	F	8.0	10.2
										20	390 to 560	G	10.0	10.2
										58 to 60	47 to 82	С	5.0	5.8
		125 °C 4000 h								38 to 40	82 to 150	D	6.3	5.8
ZL	EEHZL	135 °C 4000 h	•	•	•		•	-55 to 135	25 to 35	24 to 26	150 to 220	D8	6.3	7.7
										18 to 20	270 to 470	F	8.0	10.2
										14 to 16	470 to 680	G	10.0	10.2
	EEHZT	125 °C 4000 h		•	•		•	-55 to 135	25 to 63	22 to 32	33 to 220	F	8.0	10.2
ZT		135 °C 4000 h								16 to 25	56 to 330	G	10.0	10.2
ZTU	EEHZTU-	125 ℃ 4000 h 135 ℃ 4000 h		•	•		•	-55 to 135	25 to 35	22	220 to 330	F	8.0	10.2
										16	390 to 560	G	10.0	10.2
ZV	EEHZV	125 °C 4000 h 135 °C 4000 h		•	•		•	-55 to 135	25 to 63	16 to 22 12 to 16	33 to 220 56 to 330	F G	8.0	10.2 10.2
										12 to 10	56 to 330	F	10.0 8.0	10.2
NEW ZVU	EEHZVU-	125 °C 4000 h 135 °C 4000 h		•	•		•	-55 to 135	25 to 63	10 to 22	100 to 560	G	10.0	10.2
200										12 to 17 14 to 19	100 to 300	G12	10.0	12.5
ZS	EEHZS	125 ℃ 4000 h 135 ℃ 4000 h		•	•		•	-55 to 135	25 to 63	14 to 19	150 to 560	G12	10.0	12.5
_		125 °C 4000 h								14 to 19	120 to 680	G10	10.0	12.5
UPDATE ZSU	EEHZSU-	125 °C 4000 h		•	•		•	-55 to 135	25 to 63	14 to 15	180 to 1000	G12	10.0	16.5
200										10 to 12	100 to 1000	G12	10.0	12.5
ZU	EEHZU	125 ℃ 4000 h 135 ℃ 4000 h		•	•		•	-55 to 135	25 to 63	8 to 10	150 to 560	G16	10.0	16.5
		125 ℃ 4000 h	-	-	-	-				10 to 12	120 to 680	G10 G12	10.0	12.5
ZUU	EEHZUU-	125 ℃ 4000 h 135 ℃ 4000 h		•	•		•	-55 to 135	25 to 63	8 to 10	120 to 000	G12	10.0	16.5
			-	-	-	-				27 to 40	33 to 220	F	8.0	10.5
ZE	EEHZE	145 ℃ 2000 h 135 ℃ 4000 h		ĺ	ĺ	•	•	-55 to 145	25 to 63	27 to 40 20 to 30	56 to 330	г G	8.0	10.2
		100 C 4000 11	-							20 to 30 27 to 40	33 to 150	F	8.0	10.2
ZF	EEHZF	150 ℃ 1000 h				•	•	-55 to 150	25 to 63	27 to 40 20 to 30	56 to 270	г G	8.0	10.2
				<u> </u>	<u> </u>	L				201030	50 10 270	G	10.0	10.2

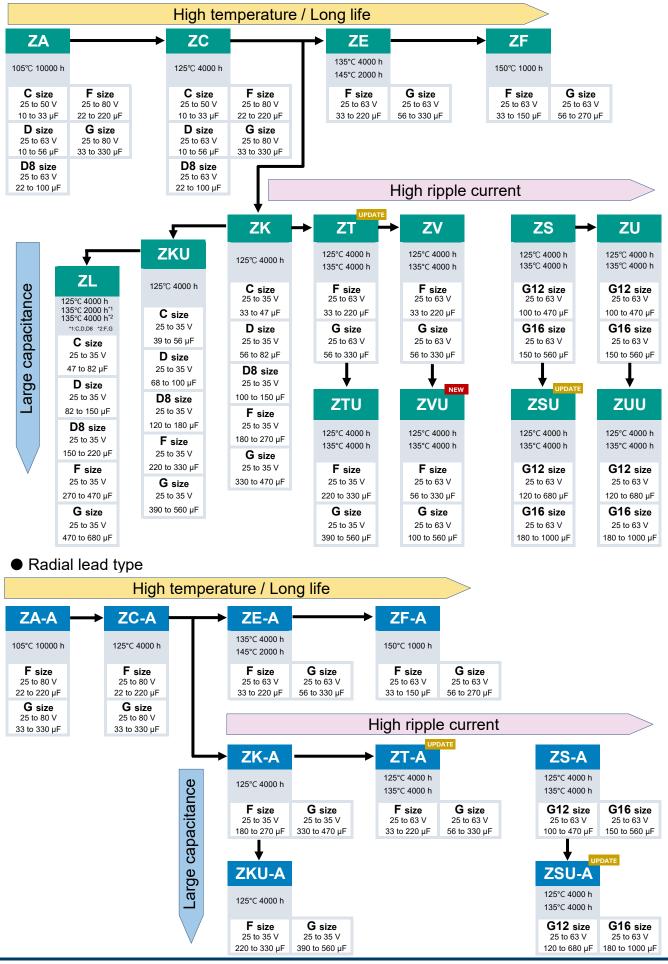
Line up

Radial lead type

Series	Part No.	Features	size	cap.	pple	emp.	life	Category temperature	Rated voltage	ESR	Capacitance range	code	Si (m	
Sel	Tarrio.	i catalos	Small	Large	High ripple	High temp	Long life	range (℃)	range (V)	(mΩ)	(µF)	Size	øD	L
ZA-A	EEHAZAB	105 ℃ 10000 h						-55 to 105	25 to 80	27 to 45	22 to 220	F	8.0	9.5
2/(//		105 C 10000 H							2010-00	20 to 36	33 to 330	G	10.0	9.5
ZC-A	EEHAZCB	125 ℃ 4000 h					•	-55 to 125	25 to 80	27 to 45	22 to 220	F	8.0	9.5
20-7		123 C 4000 11					•	-00 10 120	20 10 00	20 to 36	33 to 330	G	10.0	9.5
ZK-A	EEHAZKB	125 ℃ 4000 h			•		•	-55 to 125	25 to 35	27	180 to 270	F	8.0	9.5
211-71		123 C 4000 11					•	-00 10 120	20 10 00	20	330 to 470	G	10.0	9.5
ZKU	EEHAZKUB	125 ℃ 4000 h			•		•	-55 to 125	25 to 35	27	220 to 330	F	8.0	9.5
-A		123 C 4000 11					•	-00 10 120	20 10 00	20	390 to 560	G	10.0	9.5
UPDATE	EEHAZTB	125 °C 4000 h			•		•	-55 to 135	25 to 63	22 to 32	33 to 220	F	8.0	9.5
ZT-A		135 °C 4000 h			•		•	00 10 100	20 10 00	16 to 25	56 to 330	G	10.0	9.5
ZS-A	EEHAZSB	125 °C 4000 h			•		•	-55 to 135	25 to 63	14 to 19	100 to 470	G12	10.0	11.7
20-7		135 °C 4000 h					•	-00 10 100	20 10 00	11 to 15	150 to 560	G16	10.0	15.7
UPDATE	EEHAZSUB	125 °C 4000 h					•	-55 to 135	25 to 63	14 to 19	120 to 680	G12	10.0	11.7
ZSU- A		135 °C 4000 h					•	-00 10 100	20 10 00	11 to 15	180 to 1000	G16	10.0	15.7
ZE-A	EEHAZEB	145 ℃ 2000 h						-55 to 145	25 to 63	27 to 40	33 to 220	F	8.0	9.5
2L-A		135 ℃ 4000 h						-55 10 145	2010 00	20 to 30	56 to 330	G	10.0	9.5
ZF-A	EEHAZFB	150 ℃ 1000 h					•	-55 to 150	25 to 63	27 to 40	33 to 150	F	8.0	9.5
21 -A								-55 10 150	2010 00	20 to 30	56 to 270	G	10.0	9.5

Series flow chart





Voltage - Capacitance table (SMD type) (Vol. : 25 to 80 V / Cap. : 10 to 120 $\mu F)$

μF	40		07								ESR mΩ)
<u>ب</u>	10	22 ZA [C]	27	33 ZA [C]	39	47 ZA [D]	56 ZA [D]	68 ZA [D8]	82 ZK [D]	100 ZA [D8]	120
		(80)		(80)		(50)	(50)	(30)	(50)	(30)	
		ZC [C] (80)		ZČ [Č] (80)		ZČ [Ď] (50)	ZC [D] (50)	ZČ [Ď8] (30)	ZĹ [Ċ] (58)	ZC [D8] (30)	
						ZK [C] (80)	ZKU [C] (80)	ZK [D] (50)		ZKU [D] (50)	
25											
	ZA [C]	ZA [C]	ZA [D]	ZA [D]	ZKU [C]	ZA [D]	ZK [D]	ZA [D8]	ZL [D]	ZA [F]	ZKU [D8
	(100)	(100)	(60)	(60)	(100)	(60)	(60)	(35)	(40)	(27)	(35)
	ŽC [Ć] (100)	ŽC [Ć] (100)		ZČ [Ď] (60)		ZC [D] (60)		ZC [D8] (35)		ZC [F] (27)	
				ZK [C] (100)		ZL [C] (60)		ZKU [D] (60)		ZK [D8] (35)	
										ZF [F] (30)	
35											
	ZA [C]	ZA [D]		ZA [D8]		ZA [F]	ZF [F]	ZA [F]	ZVU [F]	ZA [G]	ZC [G]
	(120) ZC [C]	(80) ZC [D]		(40) ZC [D8]		(30) ZC [F]	(35)	(30) ZC [F]	(19)	(28) ZC [G]	(28) ZT [G]
	(120)	(80)		(40)		(30)		(30) ZT [F]		(28) ZT [G]	(23)
								(25)		(23)	ZV [Ć] (14)
50								ZE [F] (30)		ZE [G] (28)	
								ZV [F] (19)		ZF [G] (28)	
										ZV [G] (14)	
	ZA [D] (120)	ZA [D8] (80)		ZA [F] (40)		ZA [F] (40)	ZA [G] (30)	ZA [G] (30)	ZA [G] (30)	ZS [G12] (19)	ZSU [G1 2 (19)
	ZC [D]	ZC [D8]		ZC [F]		ZČ [F]	ZC [G]	ZC [G]	ZC [G]	ZU [G12]	ZUU [G12
	(120)	(80)		(40) ZT [F]		(40) ZT [F]	(30) ZT [G]	(30) ZT [G]	(30) ZT [G]	(12) ZVU [G]	(12)
				(32) ZE [F]		(32) ZV [F]	(25) ZE [G]	(25) ZV [G]	(25) ZE [G]	(17)	
63				(40) ZF [F]		(22)	(30) ZF [G]	(16)	(30) ZV [G]		
				(40) ZV [F]			(30) ZV [G]		(16)		
				(22)			(16)				
							ZVU [F] (22)				
		ZA [F] (45)		ZA [G] (36)		ZA [G] (36)					
80		ZC [F] (45)		ZC [G] (36)		ZC [G] (36)					
							<mark>.</mark>				

Voltage - Capacitance table (SMD type) (Vol. : 25 to 80 V / Cap. : 150 to 1000 $\mu F)$

Series [Size] (ESR mΩ)

μF	150	180	220	270	330	390	470	560	680	1000
	ZA [F] (27)	ZKU [D8] (30)	ZA [F] (27)	ZK [F] (27)	ZA [G] (20)		ZK [G] (20)	ZKU [G] (20) ZS [G16]	ZSU [G12] (14)	ZSU [G16 (11)
	ZC [F] (27)		ZČ [F] (27)	ZF [G] (20)	ZČ [Ĝ] (20)		ZS [G12] (14)	(11)	ZUÙ [Ġ12] (10)	ZUU [G16 (8)
	ZK [D8] (30)		ZT [F] (22)		ZKU [F] (27)		ZU [G12] (10)	ZU [G16] (8)	ZL [G] (14)	
	ZF [F] (27)		ZE [F] (27)		ZT [G] (16)		ZL [F] (18)	ZTU [G] (16)	(**/	
25	ZL [D]		ZV [F]		ZE [G]		(10)	ZVU [G]		
	(38)		(16) ZL [D8]		(20) ZTU [F]			(12)		
			(24)		(22) ZV [G]					
					(12)					
					ZVU [F] (16)					
	74 (51	71/ 151	74 (0)	74 (0)	71/ 101	7/11/01	70 (040)		701110401	
	ZA [F] (27)	ZK [F] (27)	ZA [G] (20)	ZA [G] (20)	ZK [G] (20)	ZKU [G] (20)	ZS [G16] (11)		ZSU [G16] (11)	
	ZČ [F] (27)		ZČ [G] (20)	ZC [G] (20)	ZS [G12] (14)	ZTU [G] (16)	ZSÙ [Ġ12] (14)		ZUÙ [Ġ16] (9)	
	ZT [F] (22)		ZKU [F] (27)	ZT [G] (16)	ZU [G12] (11)	ZVU [G] (12)	ZU [G16] (9)			
	ZE [F] (27)		ZTU [F] (22)	ZE [G] (20)	()	(.=)	ZUU [G12] (11)			
35	ZF [G]		ZVU (F1	ZV [G] (12)			ZL [G]			
	(23) ZV [F]		(16)	ZL [F]			(16)			
	(16) ZL [D8]			(20)						
	(26)									
	ZS [G12]	ZSU [G12]	ZS [G16]	ZSU [G16]						
	(17)	(17)	(13)	(13)						
	ZU [G12] (12)	ZUÙ [Ġ12] (12)	ZU [G16] (10)	ZUÙ [Ġ16] (10)						
50										
	ZS [G16]	ZSU [G16]								
	(15) ZU [G16]	(15) ZUU [G16]								
	(10) ZVU [G]	(10)								
	(15)									
63										
••										
80										
50										
	elistøxL(n									
С	5.0	x5.8	D 6	6.3x5.8	F	8.0x10.2	G	10.0x10.2	2	

											ESR mΩ
₽	22	27	33	39	47	56	68	82	100	120	150
											ZA [(27
											ZC [
											(27 ZF [
25											(27
25											
									ZA [F] (27)		ZA [(27
									(27) ZC [F]		ZC [
									(27)		(27
									ZF [F] (30)		ZK (22
35											ZE [
											(27 ZF [
											(23
					ZA [F] (30)	ZF [F] (35)	ZA [F] (30)		ZA [G] (28)	ZC [G] (28)	ZS [G (17
					ZC [F]	(00)	ZC [F]		ZC [G]	ZT [G]	
					(30)		(30) ZT [F]		(28) ZT [G]	(23)	
50							(25)		(23)		
50							ZE [F] (30)		ZE [G] (28)		
							(30)		(28) ZF [G]		
									(28)		
			ZA [F] (40)		ZA [F] (40)	ZA [G] (30)	ZA [G] (30)	ZA [G] (30)	ZS [G12] (19)	ZSU [G12] (19)	ZS [G (15
			ZC [F]		ZC [F]	ZC [G]	ZC [G]	ZC [G]	(10)	(10)	(10
			(40) ZT [F]		(40) ZT [F]	(30) ZT [G]	(30) ZT [G]	(30) ZT [G]			
63			(32)		(32)	(25)	(25)	(25)			
00			ZE [F]			ZE [G]		ZE [G]			
			(40) ZF [F]			(30) ZF [G]		(30)			
			(40)			(30)					
	74 (51		74 (0)		74 (0)						
	ZA [F] (45)		ZA [G] (36)		ZA [G] (36)						
80	ZC [F]		ZC [G] (36)		ZC [G]						
	(45)		(30)		(36)						

Voltage - Capacitance table (Radial lead type) (Vol. : 25 to 80 V / Cap. : 180 to 1000 $\mu F)$

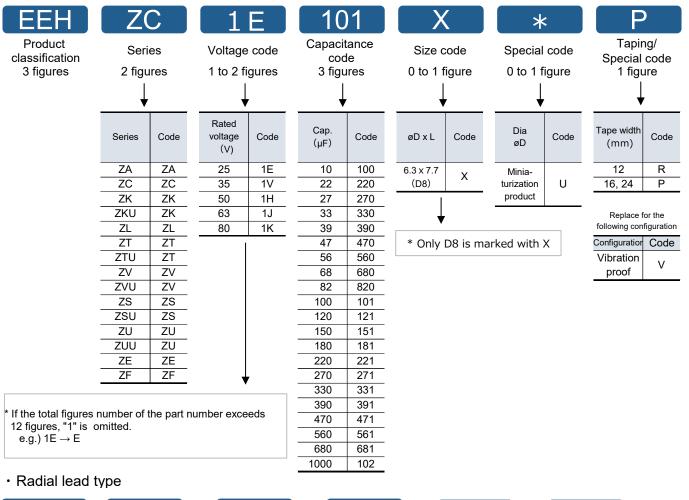
Series [Size] (ESR mΩ)

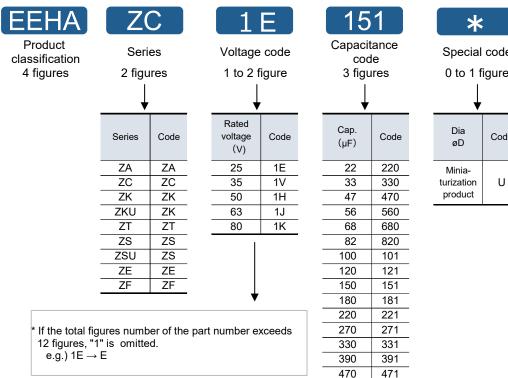
μF	180	220	270	330	390	470	560	680	1000
		ZA [F]	ZK [F]	ZA [G]		ZK [G]	ZKU [G]	ZSU [G12]	
		(27) ZC [F]	(27) ZF [G]	(20) ZC [G]		(20) ZS [G12]	(20) ZS [G16]	(14)	(11)
		(27)	(20)	(20)		(14)	(11)		
		ZT [F]		ZKU [F]					
25		(22)		(27)					
		ZE [F] (27)		ZT [G] (16)					
		(27)		ZE [G]					
				(20)					
	ZK [F]	ZA [G]	ZA [G]	ZK [G]	ZKU [G]	ZS [G16]		ZSU [G16]	
	(27)	(20)	(20)	(20)	(20)	(11)		(11)	
		ZC [G]	ZC [G]	ZS [G12]		ZSU [G12]			
		(20) ZKU [F]	(20) ZT [G]	(14)		(14)			
		(27)	(16)						
35		()	ZE [G]						
			(20)						
	ZSU [G12]		ZSU [G16]						
	(17)	(13)	(13)						
50									
	ZSU [G16]								
	(15)								
63									
80									
Size	list øxL(n	nm)							
F		(9.5	G 10	.0 x 9.5	G12	10.0 x 11.7	G16	10.0 x 15.7	7

Explanation of part numbers

◇ Part number system

Surface mount type





code		Taping	code
gure		1 figu	ure
		Ļ	
Code		Lead space (mm)	Code
	_	3.5, 5.0	В
11	_		

D

*

Dia

øD

U

560

680

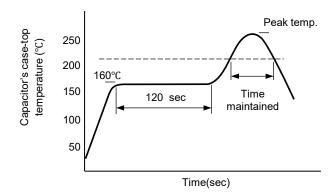
1000

561

681

102

Recommended reflow soldering



Size code	C, D, D8	F, G, G	12, G16
Peak temp.	260℃ (255℃)	245℃	260°C
Time in peak temperature	≧ 250℃ 5 s (10 s)	≧ 240℃ 10 s	≧ 250℃ 5 s
T :	≧ 230℃ 30 s	≧ 230℃ 30 s	≧ 230°C 30 s
Time maintained	≧ 217℃ 40 s	≧ 217℃ 40 s	≧ 217℃ 40 s
maintainea	≧ 200°C 70 s	≧ 200°C 70 s	≧ 200℃ 70 s
Reflow cycles	2 times	2 times	1 time

* For reflow, use a thermal condition system such as infrared and radiation (IR) or hot blas.

* Reflow temperature is measured on capacitor's case top.

Specifications for radial lead type

- Flow soldering condition
 - < RoHS compliant >

_

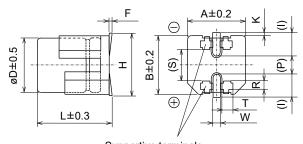
	Temperature	Time	Flow number
Soldering condition	260℃ + 5℃ or less	10 sec +1 sec or less	1 time

Vibration-proof products

The size and shape are different frome standard products. Please inquire details of our company.

() Reference size

< Size code : D, D8 >

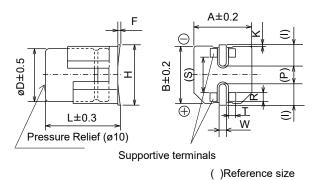


								Unit : mm
Size code	øD	L	А, В	H max.	F		Ι	W
D	6.3	6.1	6.6	7.8	0 to +().15	2.4	0.65±0.1
D8	6.3	8.0	6.6	7.8	0 to +().15	2.4	0.65±0.1
0.	D		17		D		0	T

Size code	Р	K	R	S	Т
D	2.2	0.35 +0.15 -0.20	1.1±0.2	3.3	1.05±0.2
D8	2.2	0.35 ^{+0.15} -0.20	1.1±0.2	3.3	1.05±0.2

Supportive terminals

< Size code : F, G, G12, G16 >



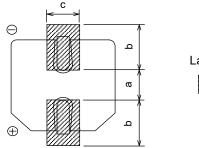
										Unit : mm
Size code	øD	L		А, В	н	max.	F		I	W
F	8.0	10.5	5	8.3	1	0.0	0 to +	0.15	3.4	1.2±0.2
G	10.0	10.5	5	10.3	1	2.0	0 to +	0.15	3.5	1.2±0.2
G12	10.0	12.8	3	10.3	1	1.0 ^{*1}	0 to +	0.15	3.2	1.2±0.2
G16	10.0	16.8	3	10.3	1	1.0 ^{*1}	0 to +	0.15	3.2	1.2±0.2
	*1:±0									*1:±0.2
Size code	Р			K			R		S	Т
F	3.1		(0.70±0.2		0.70±0.2		5.3	1.3±0.2	
G	4.6	i	(0.70±0.2		0.70±0.2			6.9	1.3±0.2
G12	4.6	i		_		0.7	0±0.2		6.9	1.3±0.2
G16	4.6	i		_		0.7	0±0.2		6.9	1.3±0.2

Mounting specification

Land / Pad pattern

The circuit board land/pad pattern size for chip capacitors is specified in the following table. The land pitch influences installation strength.

• Standard products



Land space

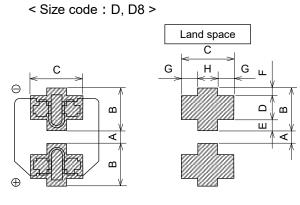
			Unit : mm
Size code	а	b	С
C :ø5×L5.8	1.5	2.8	1.6
D : ø6.3×L5.8	1.8	3.2	1.6
D8 :ø6.3×L7.7	1.8	3.2	1.6
F :ø8×L10.2	3.1	4.0	2.0
G : ø10×L10.2	4.6	4.1	2.0
G12 : ø10×L12.5	4.6	4.1	2.0
G16 : ø10×L16.5	4.6	4.1	2.0

Larger dimension of "a" may prevent back fillet from being

formed adequately to obtain required solder strength.

* Take mounting conditions, solderability and fitting strength into consideration when selecting parts for your design.

Vibration-proof products

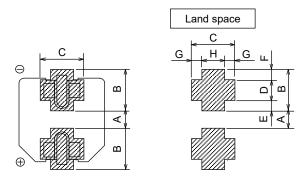


				Unit : mm
Size code	A	В	С	D
D : ø6.3×L6.1	1.2	3.6	3.2	2.0
D8 :ø6.3×L8.0	1.2	3.6	3.2	2.0
Size code	F	F	G	Н

D8 :ø6.3×L8.0	0.95	0.65	1.0	1.2
D :ø6.3×L6.1	0.95	0.65	1.0	1.2
Size code		Г	G	

Larger dimension of "A" may prevent back fillet from being formed adequately to obtain required solder strength.

< 9	lize	code	F	G	G12	G16	>
~ 0	NZE	coue	г,	G,	GIZ,	910	-



				Unit : mm
Size code	A	В	С	D
F :ø8×L10.5	2.7	4.0	4.7	1.3
G :ø10×L10.5	3.9	4.4	4.7	1.3
G12 : ø10×L12.8	3.9	4.4	4.7	1.3
G16 : ø10×L16.8	3.9	4.4	4.7	1.3

Size code	E	F	G	Н
F : ø8×L10.5	1.0	1.7	1.1	2.5
G : ø10×L10.5	1.2	1.9	1.1	2.5
G12 : ø10×L12.8	1.2	1.9	1.1	2.5
G16 : ø10×L16.8	1.2	1.9	1.1	2.5

Larger dimension of "A" may prevent back fillet from being

formed adequately to obtain required solder strength.

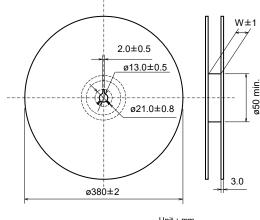
* Take mounting conditions, solderability and fitting strength into consideration when selecting parts for your design.

* The vibration-proof capacitors of size ø6.3 has support terminals extending from the bottom side to the lead edge. Then, make sure to find appropriate soldering conditions to form fillet on the support terminals if required for appearance inspection.

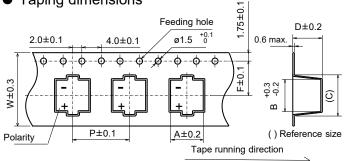
Packaging specifications

Specifications for surface mount type

• Reel dimensions (not to scale)



Taping dimensions Feeding hole

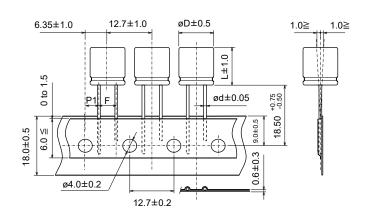


D±0.2

%Ask factory for technical specifications

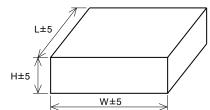
Radial lead type

• Taping dimensions



					Unit : mm
Size code	øD	L	ød	F	P1
F	8.0	9.5	0.6	3.5±0.5	4.60±0.50
G	10.0	9.5	0.6	5.0+0.8/-0.2	3.85±0.50
G12	10.0	11.7	0.8	5.0+0.8/-0.2	3.85±0.50
G16	10.0	15.7	0.8	5.0+0.8/-0.2	3.85±0.50

• Dimensions of outer carton box



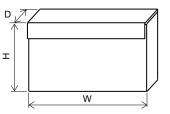
		Unit : mm
Size code	Н	W, L
С	180	395
D, D8	220	395
F, G, G12, G16	180	395

Min.packing quantity

Size code	Min.packing quantity(pcs.)
C, D	1000
D8	900
F, G	500
G12	400
G16	250

							Unit : mm
Size code	А	В	С	D	Р	F	W
С	5.7	5.7	8.0	6.4	12.0	5.5	12.0
D	7.0	7.0	9.0	6.4	12.0	7.5	16.0
D8	7.0	7.0	9.0	8.4	12.0	7.5	16.0
F	8.7	8.7	12.5	11.0	16.0	11.5	24.0
G	10.7	10.7	14.5	11.0	16.0	11.5	24.0
G12	10.7	10.7	14.5	13.7	16.0	11.5	24.0
G16	10.7	10.7	14.5	17.5	20.0	11.5	24.0

• Dimensions of outer carton box / Packaging method



OOOOOO
00000000

Zigzag folded

			Unit : mm
Size code	W	Н	D
F	340 max.	230 max.	55 max.
G	340 max.	170 max.	55 max.
G12	340 max.	170 max.	55 max.
G16	340 max.	170 max.	55 max.

• Min.packing quantity

Size code	Min.packing quantity (pcs.)
F	1000
G	500
G12	500
G16	500

Panasonic

INDUSTRY

Conductive Polymer Hybrid Aluminum Electrolytic Capacitors



Surface Mount Type

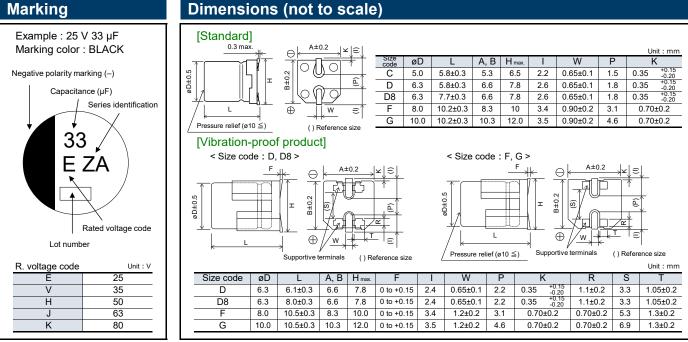
ZA series High temperature lead-free reflow

Features

- Endurance : 10000 h at 105 ℃
- Low ESR and high ripple current (over 70% lower ESR and 100% higher ripple current than V-FP)
- High voltage (to 80 V)
- Characteristics dependencies in frequency and low temperature are as small as polymer type
- Vibration-proof product is available upon request (ø6.3, ø8, ø10)
- AEC-Q200 compliant
- RoHS compliant

•											
Specifications											
Size code	С		D	D8			F		G		
Category temp. range				–55 ℃ to +1	105 ℃						
Rated voltage range	25 V to 50 V		25 V t	o 63 V			25	V to 80 V			
Nominal cap.range	10 µF to 33 µF	10 µ	F to 56 µF	22 µF to 10)0 µF	22	2 μF to 220 μF	33 µF	to 330 µF		
Capacitance tolerance				±20 % (120 Hz	/+20 ℃)						
Leakage current	I ≦ 0.01 CV (μA), 2	minutes	after reaching r	ated voltage, 20)℃ *CV =	= (Cap	acitance in µF)	x (Rated volt	age in V)		
Dissipation factor (tan δ)		Please see the attached characteristics list									
Surge voltage (V)		Rated voltage × 1.25 (15 ℃ to 35 ℃)									
	+105 ℃ ± 2 ℃, 10000 h	, apply th	e rated ripple c	urrent without ex	ceeding t	he rate	ed voltage.				
	Capacitance chan	Within ±30% d	of the initial value	е							
Endurance	Dissipation factor (ta	\leq 200 % of the initial limit									
	ESR	≤ 200 % of the initial limit									
	Leakage curren	Within the initi	al limit								
	ESR after endurance				Size co	ode					
				D	D8		F	G			
	(Ω / 100 kHz)(-40 ℃)		2.0	1.4	0.8		0.4	0.3			
	After storage for 1000 hours at +105 \degree ± 2 \degree with no voltage applied and then being										
Shelf life	stabilized at +20 ℃, ca	pacitors s	hall meet the li	mits specified in	enduranc	ce.					
	(With voltage treatment)										
	+85 ℃ ± 2 ℃, 85 % to 9	90 %RH, 2									
	Capacitance chan		Within ±30% of	of the initial value	е						
Damp heat (Load)	Dissipation factor (ta	an δ)	\leq 200 % of the initial limit								
	ESR		≦ 200 % of the initial limit								
	Leakage current Within the initial limit										
	After reflow soldering ar	nd then be	eing stabilized a	it +20 ℃, capac	itors shall	meet t	the				
Resistance to	following limits.										
soldering heat	Capacitance chan			of the initial value	е						
solucing heat	Dissipation factor (ta		Within the initi								
	Leakage curren	t	Within the initi	al limit							

Dimensions (not to scale)



Design and specifications are each subject to change without notice. Ask factory for the current technical specifications before purchase and/or use Design and specifications are each subject to charge managements contact us immediately. Should a safety concern arise regarding this product, please be sure to contact us immediately. 19

ZA series

Explanation of part numbers

♦ Part number system

	-											
EEH	ZA		16	1E		220					R	
Product classification	Series	Code	Rated voltage (V)	Code [*]	Capacitance (µF)	Code	Capacitance (µF)	Code	D8 size ^{**} øDxL(mm)	Code	Tape width (mm)	Code
	ZA	ZA	25	1E	10	100	68	680	6.3 x 7.7	Х	12	R
			35	1V	22	220	100	101			16, 24	Р
			50	1H	27	270	150	151	-			
			63	1J	33	330	220	221	-		Replace f	or the
			80	1K	39	390	270	271	-		following cont	figuration
*: If the total figure	47	470	330	331	-		Configuration	Code				
exceeds 12 figu	56	560			-		Vibration	V				
**: Only D8 is marke	ed with X						-				proof	v

e.g.: EEHZA1E220R

Characteristics list

Case size Min.packaging Specification Part number q'ty (pcs) (mm) Rated Capacitance L Size voltage (±20 %) Ripple code Standard Vibration-proof ESR^{*2} $tan \, \delta^{*3}$ (V) øD Taping (µF) current*1 product product $(m\Omega)$ Vibration Standard (mA rms) -proof 22 5.0 С 900 80 0.14 EEHZA1E220R 1000 5.8 -5.0 С 900 EEHZA1E330R 1000 33 5.8 80 0.14 47 6.3 5.8 6.1 D 1300 0.14 EEHZA1E470P EEHZA1E470V 1000 50 EEHZA1E560P 56 6.3 5.8 D 1300 50 0.14 EEHZA1E560V 1000 6.1 25 68 6.3 7.7 8.0 D8 2000 30 0.14 EEHZA1E680XP EEHZA1E680XV 900 100 6.3 7.7 8.0 D8 2000 30 0.14 EEHZA1E101XP EEHZA1E101XV 900 150 8.0 10.2 10.5 F 2300 27 0.14 EEHZA1E151P EEHZA1E151V 500 220 8.0 10.2 F 2300 10.5 27 0.14 EEHZA1E221P EEHZA1E221V 500 330 10.0 10.2 10.5 G 2500 20 0.14 EEHZA1E331P EEHZA1E331V 500 10 5.0 5.8 С 900 100 0.12 EEHZA1V100R 1000 22 5.0 5.8 _ С 900 100 0.12 EEHZA1V220R 1000 27 6.3 5.8 6.1 D 1300 60 0.12 EEHZA1V270P EEHZA1V270V 1000 33 6.3 5.8 6.1 D 1300 60 0.12 EEHZA1V330P EEHZA1V330V 1000 EEHZA1V470P 47 6.3 5.8 6.1 D 1300 60 0.12 EEHZA1V470V 1000 35 D8 2000 EEHZA1V680XP 900 68 6.3 7.7 8.0 35 0.12 EEHZA1V680XV 100 8.0 10.2 10.5 F 2300 27 0.12 EEHZA1V101P EEHZA1V101V 500 150 8.0 10.2 F 2300 EEHZA1V151P EEHZA1V151V 500 10.5 27 0.12 220 10.0 10.2 10.5 G 2500 20 0.12 EEHZA1V221P EEHZA1V221V 500 270 10.0 10.2 10.5 G 2500 20 0.12 EEHZA1V271P EEHZA1V271V 500 10 5.0 5.8 С 750 120 0.10 EEHZA1H100R 1000 -EEHZA1H220V 22 6.3 5.8 6.1 D 1100 80 0.10 EEHZA1H220P 1000 33 6.3 7.7 8.0 D8 1600 40 0.10 EEHZA1H330XP EEHZA1H330XV 900 50 1800 EEHZA1H470P 47 8.0 10.2 10.5 F 30 0.10 EEHZA1H470V 500 1800 EEHZA1H680P EEHZA1H680V 68 8.0 10.2 10.5 F 30 0.10 500 100 10.0 10.2 10.5 G 2000 28 EEHZA1H101P EEHZA1H101V 500 0.10 6.3 D 1000 120 0.08 EEHZA1J100P EEHZA1J100V 1000 10 5.8 6.1 22 6.3 7.7 8.0 D8 1500 80 0.08 EEHZA1J220XP EEHZA1J220XV 900 F 33 8.0 10.2 10.5 1700 40 0.08 EEHZA1J330P EEHZA1J330V 500 F 1700 EEHZA1J470P 63 47 8.0 10.2 10.5 40 0.08 EEHZA1J470V 500 G 56 1800 EEHZA1J560P EEHZA1J560V 500 10.0 10.2 10.5 30 0.08 1800 68 10.0 G 30 0.08 EEHZA1J680P EEHZA1J680V 500 10.2 10.5 10.2 G 1800 30 EEHZA1J820P EEHZA1J820V 500 82 10.0 10.5 0.08 EEHZA1K220P 22 10.2 F 1550 45 0.08 EEHZA1K220V 500 8.0 10.5 1700 36 EEHZA1K330P EEHZA1K330V 80 33 10.0 10.2 10.5 G 0.08 500 47 10.0 10.5 1700 0.08 EEHZA1K470P EEHZA1K470V 500 10.2 G 36

*1: Ripple current (100 kHz / +105 ℃)

*2: ESR (100 kHz / +20 ℃)

*3: tan δ (120 Hz / +20 °C)

Please refer to the page of "Reflow profile" and "The taping dimensions".

The dimensions of the vibration-proof products, please refer to the page of the mounting specification.

Design and specifications are each subject to change without notice. Ask factory for the current technical specifications before purchase and/or use. Should a safety concern arise regarding this product, please be sure to contact us immediately

Endurance : 105 ℃ 10000 h

ZA series

Frequency correction factor for ripple current										
Rated capacitance (C)	Frequency (f)	100 Hz ≦ f < 200 Hz	200 Hz ≦ f < 300 Hz	300 Hz ≦ f < 500 Hz	500 Hz ≦ f < 1 kHz					
C < 47 µF	Compation	0.10	0.10	0.15	0.20					
47 μF ≦ C < 150 μF	Correction factor	0.15	0.20	0.25	0.30					
150 µF ≦ C		0.15	0.25	0.25	0.30					
Rated capacitance (C)	Frequency (f)	1 kHz ≦ f < 2 kHz	2 kHz ≦ f < 3 kHz	3 kHz ≦ f < 5 kHz	5 kHz ≦ f < 10 kHz					
C < 47 µF	Composition	0.30	0.40	0.45	0.50					
47 µF ≦ C < 150 µF	Correction factor	0.40 0.45		0.55	0.60					
150 µF ≦ C		0.45 0.50		0.60	0.65					
Rated capacitance (C)	Frequency (f)	10 kHz ≦ f < 15 kHz	15 kHz ≦ f < 20 kHz	20 kHz ≦ f < 30 kHz	30 kHz ≦ f < 40 kHz					
C < 47 µF	Composition	0.60	0.65	0.70	0.75					
47 µF ≦ C < 150 µF	Correction factor	0.70	0.75	0.80	0.80					
150 µF ≦ C	lacion	0.75 0.80		0.85	0.85					
Rated capacitance (C)	Frequency (f)	40 kHz ≦ f < 50 kHz	50 kHz ≦ f < 100 kHz	100 kHz ≦ f < 500 kHz	500 kHz ≦ f					
C < 47 μF		0.80	0.85	1.00	1.05					
47 μF ≦ C < 150 μF	Correction	0.85	0.90	1.00	1.00					
150 µF ≦ C	factor	0.85	0.90	1.00	1.00					

Panasonic

INDUSTRY

Conductive Polymer Hybrid Aluminum Electrolytic Capacitors



Surface Mount Type

ZC series

High temperature lead-free reflow

Features

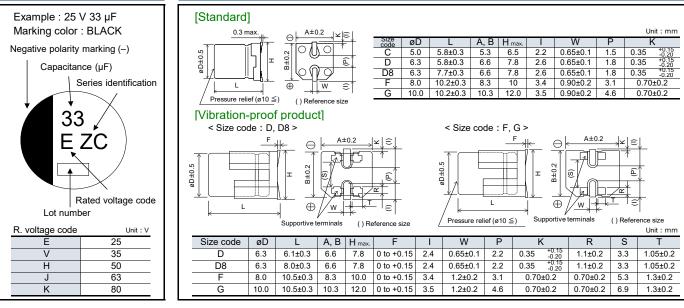
- Endurance: 4000 h at 125 ℃ (High temperature / Long life)
- Low ESR and high ripple current (over 85% lower ESR than V-TP)
- High-withstand voltage (to 80 V)
- Characteristics dependencies in frequency and low temperature are as small as polymer type
- Vibration-proof product is available upon request (ø6.3, ø8, ø10)
- AEC-Q200 compliant
- RoHS compliant

Marking

1.01

Specifications									
Size code	С	D	D8	F	G				
Category temp. range			–55 ℃ to +125 ℃		·				
Rated voltage range	25 V to 50 V		to 63 V		o 80 V				
Nominal cap.range	10 µF to 33 µF	10 µF to 56 µF	22 µF to 100 µF	22 µF to 220 µF	33 µF to 330 µF				
Capacitance tolerance			±20 % (120 Hz / +20 ℃)						
Leakage current	I ≦ 0.01 CV (µA), 2		rated voltage, 20 ℃ *CV		(Rated voltage in V)				
Dissipation factor (tan δ)			see the attached characte						
Surge voltage (V)			l voltage × 1.25 (15 ℃ to						
	+125 ℃ ± 2 ℃, 4000 h,		urrent without exceeding th	ne rated voltage.					
	Capacitance chan	ge Within ±30%	of the initial value						
Endurance 1	Dissipation factor (ta	anδ) ≦ 200 % of tl	ne initial limit						
	ESR	≦ 200 % of t	ne initial limit						
	Leakage curren		Within the initial limit						
	+125 $^{\circ}$ ± 2 $^{\circ}$ C, 3000 h, apply the rated ripple current without exceeding the rated voltage.								
	Capacitance chan	ge Within ±30%	Within ±30% of the initial value						
Endurance 2	Dissipation factor (ta	anδ) ≦ 200 % of tl	ne initial limit						
	ESR		\leq 300 % of the initial limit						
	Leakage curren		Within the initial limit						
	After storage for 1000 hours at +125 °C ± 2 °C with no voltage applied and then being								
Shelf life	stabilized at +20 $^{\circ}$, capacitors shall meet the limits specified in endurance.								
	(With voltage treatment								
	+85 °C ± 2 °C, 85 % to 9								
	Capacitance chan	3-	Within ±30% of the initial value						
Damp heat (Load)	Dissipation factor (ta		≤ 200 % of the initial limit						
	ESR	≦ 200 % of t							
	Leakage curren								
		nd then being stabilized	at +20 ℃, capacitors shall	meet the					
Resistance to	following limits.								
soldering heat	Capacitance chan	5	of the initial value						
soldering heat	Dissipation factor (ta	/	tial limit						
	Leakage curren	t Within the ini	tial limit						

Dimensions (not to scale)



Design and specifications are each subject to change without notice. Ask factory for the current technical specifications before purchase and/or use.

Should a safety concern arise regarding this product, please be sure to contact us immediately.

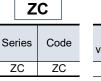
ZC series

Explanation of part numbers

♦ Part number system

EEH
Product

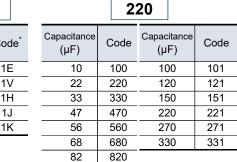
classification



1E Rated Code voltage (V) 25 1E 35 1V 50 1H 63 1J

80

e.g.: EEHZC1E220R



Χ D8 size Code øDxL(mm) 6.3 x 7.7 Х

Replace for the following configuration Configuration Code Vibration V proof

*: If the total figures number of the part number exceeds 12 figures, "1" is omitted.

**: Only D8 is marked with X

Characteristics list

Endurance 1 : 125 °C 4000 h Endurance 2 : 125 °C 3000 h

			Case size (mm)	e		Specification				Part r	Min. packaging	
Rated voltage (V)	Capacitance (±20 %) (µF)	øD	I	-	Size code		current ^{*1} rms)	ESR ^{*2} (mΩ)	tan δ ^{*3}	Standard product	Vibration-proof product	q'ty (pcs)
				Standard	Vibration -proof		Endurance 1	Endurance 2	(11122)		product	product
	22	5.0	5.8	_	С	550	-	80	0.14	EEHZC1E220R	-	1000
	33	5.0	5.8	-	С	550	-	80	0.14	EEHZC1E330R	-	1000
	47	6.3	5.8	6.1	D	900	-	50	0.14	EEHZC1E470P	EEHZC1E470V	1000
	56	6.3	5.8	6.1	D	900	-	50	0.14	EEHZC1E560P	EEHZC1E560V	1000
25	68	6.3	7.7	8.0	D8	1400	-	30	0.14	EEHZC1E680XP	EEHZC1E680XV	900
	100	6.3	7.7	8.0	D8	1400	-	30	0.14	EEHZC1E101XP	EEHZC1E101XV	900
	150	8.0	10.2	10.5	F	1600	1900	27	0.14	EEHZC1E151P	EEHZC1E151V	500
	220	8.0	10.2	10.5	F	1600	1900	27	0.14	EEHZC1E221P	EEHZC1E221V	500
	330	10.0	10.2	10.5	G	2000	2900	20	0.14	EEHZC1E331P	EEHZC1E331V	500
	10	5.0	5.8	_	С	550	-	100	0.12	EEHZC1V100R	-	1000
	22	5.0	5.8	_	С	550	-	100	0.12	EEHZC1V220R	_	1000
	33	6.3	5.8	6.1	D	900	-	60	0.12	EEHZC1V330P	EEHZC1V330V	1000
	47	6.3	5.8	6.1	D	900	-	60	0.12	EEHZC1V470P	EEHZC1V470V	1000
35	68	6.3	7.7	8.0	D8	1400	-	35	0.12	EEHZC1V680XP	EEHZC1V680XV	900
	100	8.0	10.2	10.5	F	1600	1900	27	0.12	EEHZC1V101P	EEHZC1V101V	500
	150	8.0	10.2	10.5	F	1600	1900	27	0.12	EEHZC1V151P	EEHZC1V151V	500
	220	10.0	10.2	10.5	G	2000	2800	20	0.12	EEHZC1V221P	EEHZC1V221V	500
	270	10.0	10.2	10.5	G	2000	2800	20	0.12	EEHZC1V271P	EEHZC1V271V	500
-	10	5.0	5.8	_	С	500	-	120	0.10	EEHZC1H100R	-	1000
	22	6.3	5.8	6.1	D	750	-	80	0.10	EEHZC1H220P	EEHZC1H220V	1000
	33	6.3	7.7	8.0	D8	1100	_	40	0.10	EEHZC1H330XP	EEHZC1H330XV	900
50	47	8.0	10.2	10.5	F	1250	_	30	0.10	EEHZC1H470P	EEHZC1H470V	500
	68	8.0	10.2	10.5	F	1250	_	30	0.10	EEHZC1H680P	EEHZC1H680V	500
	100	10.0	10.2	10.5	G	1600	_	28	0.10	EEHZC1H101P	EEHZC1H101V	500
	120	10.0	10.2	10.5	G	1600	-	28	0.10	EEHZC1H121P	EEHZC1H121V	500
-	10	6.3	5.8	6.1	D	700	-	120	0.08	EEHZC1J100P	EEHZC1J100V	1000
	22	6.3	7.7	8.0	D8	900	_	80	0.08	EEHZC1J220XP	EEHZC1J220XV	900
	33	8.0	10.2	10.5	F	1100	_	40	0.08	EEHZC1J330P	EEHZC1J330V	500
63	47	8.0	10.2	10.5	F	1100	_	40	0.08	EEHZC1J470P	EEHZC1J470V	500
	56	10.0	10.2	10.5	G	1400	_	30	0.08	EEHZC1J560P	EEHZC1J560V	500
	68	10.0	10.2	10.5	G	1400	-	30	0.08	EEHZC1J680P	EEHZC1J680V	500
	82	10.0	10.2	10.5	G	1400	-	30	0.08	EEHZC1J820P	EEHZC1J820V	500
	22	8.0	10.2	10.5	F	1050	-	45	0.08	EEHZC1K220P	EEHZC1K220V	500
80	33	10.0	10.2	10.5	G	1360	_	36	0.08	EEHZC1K330P	EEHZC1K330V	500
	47	10.0	10.2	10.5	G	1360	-	36	0.08	EEHZC1K470P	EEHZC1K470V	500

*1: Ripple current (100 kHz / +125 ℃)

*3: tan δ (120 Hz / +20 °C)

◆ Please refer to the page of "Reflow profile" and "The taping dimensions".

• The dimensions of the vibration-proof products, please refer to the page of the mounting specification.

Design and specifications are each subject to change without notice. Ask factory for the current technical specifications before purchase and/or use. Design and specifications are each subject to change without notice, not deter, i.e., Should a safety concern arise regarding this product, please be sure to contact us immediately. 23

^{*2:} ESR (100 kHz / +20 ℃)

ZC series

Frequency corr	Frequency correction factor for ripple current											
Rated capacitance (C)	Frequency (f)	100 Hz ≦ f < 200 Hz	200 Hz ≦ f < 300 Hz	300 Hz ≦ f < 500 Hz	500 Hz ≦ f < 1 kHz							
C < 47 µF	O a martine	0.10	0.10	0.15	0.20							
47 µF ≦ C < 150 µF	Correction factor	0.15	0.20	0.25	0.30							
150 µF ≦ C		0.15	0.25	0.25	0.30							
Rated capacitance (C)	Frequency (f)	1 kHz ≦ f < 2 kHz	2 kHz ≦ f < 3 kHz	3 kHz ≦ f < 5 kHz	5 kHz ≦ f < 10 kHz							
C < 47 µF	Come ation	0.30	0.40	0.45	0.50							
47 µF ≦ C < 150 µF	Correction factor	0.40	0.45	0.55	0.60							
150 µF ≦ C		0.45	0.50	0.60	0.65							
Rated capacitance (C)	Frequency (f)	10 kHz ≦ f < 15 kHz	15 kHz ≦ f < 20 kHz	20 kHz ≦ f < 30 kHz	30 kHz ≦ f < 40 kHz							
C < 47 µF	Come ation	0.60	0.65	0.70	0.75							
47 µF ≦ C < 150 µF	Correction factor	0.70	0.75	0.80	0.80							
150 µF ≦ C	lacion	0.75	0.80	0.85	0.85							
Rated capacitance (C)	Frequency (f)	40 kHz ≦ f < 50 kHz	50 kHz ≦ f < 100 kHz	100 kHz ≦ f < 500 kHz	500 kHz ≦ f							
C < 47 µF	Querratio	0.80	0.85	1.00	1.05							
47 µF ≦ C < 150 µF	Correction factor	0.85	0.90	1.00	1.00							
150 µF ≦ C		0.85	0.90	1.00	1.00							

After en	After endurance ESR(100 kHz, -40°C)											
Size code	С	D	D8	F	G	ĺ						
ESR (Ω)	2	1.4	0.8	0.4	0.3							

Panasonic

INDUSTRY

Conductive Polymer Hybrid Aluminum Electrolytic Capacitors



Surface Mount Type

ZK series

High temperature lead-free reflow

Features

- High capacitance and High ripple current compared with ZC series
- Endurance : 4000 h at 125 °C (High temperature / Long life)
- Low ESR
- Characteristics dependencies in frequency and low temperature are as small as polymer type
- Vibration-proof product is available upon request (ø6.3, ø8, ø10)
- AEC-Q200 compliant
- RoHS compliant

Specifications

Specifications											
Size code	С		D	D8		F		G			
Category temp. range				–55 ℃ to +	125 ℃						
Rated voltage range				25 V to 3							
Nominal cap.range	33 µF to 47 µF	56 µ	F to 82 µF	100 µF to 1	150 µF	180 µF to 270 µF	[:] 330 μF	⁻ to 470 μF			
Capacitance tolerance			:	±20 % (120 Hz	z / +20 ℃)						
Leakage current	I ≦ 0.01 CV (µA), 2	2 minutes) x (Rated volta	age in V)			
Dissipation factor (tan δ)			Please se	e the attached	d characteris	stics list					
Surge voltage (V)			Rated	voltage × 1.25	(15 ℃ to 3	5 °C)					
	+125 ℃ ± 2 ℃, 4000 h					the rated voltage.					
	Capacitance char		Within ±30%	of the initial va	lue						
	Dissipation factor (t	an δ)	≦ 200 % of th								
Endurance	ESR		≦ 200 % of th	e initial limit							
Endurance	Leakage currer	ıt	Within the init	ial limit							
	ESR after endurance				Size cod	е					
			С	D	D8	F	G				
	(12 / 100 KHZ)(-40	(Ω / 100 kHz)(-40 ℃)		1.4	0.8	0.4	0.3				
	After storage for 1000	hours at	+125 ℃ ± 2 ℃	with no voltag	je applied ar	nd then being					
Shelf life	stabilized at +20 ℃, ca	apacitors	shall meet the	limits specifie	d in endurar	ice.					
	(With voltage treatmer										
	+85 ℃ ± 2 ℃, 85 % to										
	Capacitance char		Within ±30%	of the initial va	lue						
Damp heat (Load)	Dissipation factor (t	≦ 200 % of th	e initial limit								
	ESR		≦ 200 % of th	e initial limit							
	Leakage currer		Within the init								
	After reflow soldering a	After reflow soldering and then being stabilized at +20 °C, capacitors shall meet the									
Resistance to	following limits.										
soldering heat	Capacitance char	nge	Within ±10%	of the initial va	lue						
soluening heat	Dissipation factor (t	an δ)	Within the init	ial limit							
	Leakage currer	nt	Within the init	ial limit							
Marking	Dimensi	ons (r	not to sca	le)							
				,							
Example : 25 V 47 µF	[Standard										
Marking color : BLACK	0.3 max	₩ 0k	,×€					Unit : mm			
		it. Th		code ØD		, B H max. I	W P	K +0.15			
Negative polarity marking (-)	□ □ □ □ □ □ □	B±0.2		C 5.0				$0.35 \begin{array}{c} +0.15 \\ -0.20 \\ 0.35 \end{array}$			
Capacitance (µF)		'ı <u> </u>		D 6.3 D8 6.3				$\begin{array}{c} 0.35 & {}^{+0.15}_{-0.20} \\ \hline 0.35 & {}^{+0.15}_{-0.20} \end{array}$			
\ Series identific	ation / L		W E	F 8.0			.90±0.2 3.1	0.35 _0.20 0.70±0.2			
	Pressure relief (a	→ ∍10 ≦)	() Reference size	G 10.0			.90±0.2 4.6	0.70±0.2			
	[Vibration-	nroof pr	()	0 100							
		de : D. D8				de : F, G >					
		ие. D, Do F	a A+0.2		< 3ize co		A±0.2	-			
E ZK		/ ↑		<u>ŧ</u> ŧ	*			+			
▶ /	<u>ن</u>				0.5			_			
	D±0.5	□	B±0.2	(£)	øD±0.5	B±0.2		<u>+</u>			
	¢				- <u>1/</u> L		Yalpzi				
		<u>U_</u>	- ⊕7/w ∔=€	<u>r et</u>	/ [L	᠈ᢩୗ∕ <u>w</u> ׀ ≹ ҝт⊤⋷	εĵ			
Rated voltage of	code k		$ \stackrel{\sim}{\longrightarrow} \stackrel{\sim}{\longrightarrow} \stackrel{\sim}{\times} \stackrel{\sim}{\longrightarrow} \stackrel{\sim}{\times} \stackrel{\sim}{\longrightarrow} \stackrel{\sim}{\rightarrow} \sim$	∼∣ Reference ci=-	/ Press	ure relief (ø10 ≦) Suppor	rtive terminals () R	Reference size			
Lot number											
	Size code	øD	L A, B H		I W	P K	R S	T			
D veltage ende	D		1±0.3 6.6 7.		2.4 0.65±0.1	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	1.1±0.2 3.3	1.05±0.2			
R. voltage code Un E 25	iit : V D8 F		0±0.3 6.6 7. .5±0.3 8.3 10		2.4 0.65±0.1 3.4 1.2±0.2	2.2 0.35 +0.15 -0.20 3.1 0.70±0.2	1.1±0.2 3.3 0.70±0.2 5.3	1.05±0.2 1.3±0.2			
V 35	G		.5±0.3 10.3 12		3.4 1.2±0.2 3.5 1.2±0.2	4.6 0.70±0.2	0.70±0.2 5.3	1.3±0.2			
v 55	<u> </u>	10.0 10	.0_0.0 10.0 12		1.210.2	0.7010.2	0.9	1.0±0.2			

Design and specifications are each subject to change without notice. Ask factory for the current technical specifications before purchase and/or use.

Should a safety concern arise regarding this product, please be sure to contact us immediately.

ZK series

Explanation of part numbers

♦ Part num	nber sy	vstem	e.g.: EE	e.g.: EEHZK1E470R										
EEH	EEH ZK		1E			4	71		X	R				
Product classification	Series	Code	Rated voltage (V)	Code [*]	Capacitance (µF)	Code	Capacitance (µF)	Code	D8 size ^{**} øDxL(mm)	Tape width (mm)	Code			
	ZK	ZK	25	1E	33	330	150	151	6.3 x 7.7 X	16 to 24	Р			
			35	1V	47	470	180	181						
					56	560	270	271	-	Replace f	or the			
					68	680	330	331	-	following con	figuration			
*: If the total fig	gures numb	per of the pa	art number		82	820	470	471	-	Configuration	Code			
exceeds 12	exceeds 12 figures, "1" is omitted.						_			Vibration	V			
**: Only D8 is m	narked with	х								proof	v			

Characteristics list

Endurance : 125 °C 4000 h

		Case size (mm)				Spe	ecificatio	า	Part n	umber	Min.packaging q'ty (pcs)
Rated voltage (V)	Capacitance (±20 %) (µF)	øD		Vibration	Size code	Ripple current ^{*1}	ESR ^{*2} (mΩ)	tan δ ^{*3}	Standard product	Vibration-proof product	Taping
			Standard	-proof		(mA rms)	(1122)		produot	product	
	47	5.0	5.8	-	С	850	80	0.14	EEHZK1E470R	_	1000
	68	6.3	5.8	6.1	D	1300	50	0.14	EEHZK1E680P	EEHZK1E680V	1000
25	82	6.3	5.8	6.1	D	1300	50	0.14	EEHZK1E820P	EEHZK1E820V	1000
20	150	6.3	7.7	8.0	D8	1800	30	0.14	EEHZK1E151XP	EEHZK1E151XV	900
	270	8.0	10.2	10.5	F	2000	27	0.14	EEHZK1E271P	EEHZK1E271V	500
	470	10.0	10.2	10.5	G	2800	20	0.14	EEHZK1E471P	EEHZK1E471V	500
	33	5.0	5.8	-	С	750	100	0.12	EEHZK1V330R	-	1000
	56	6.3	5.8	6.1	D	1200	60	0.12	EEHZK1V560P	EEHZK1V560V	1000
35	100	6.3	7.7	8.0	D8	1700	35	0.12	EEHZK1V101XP	EEHZK1V101XV	900
	180	8.0	10.2	10.5	F	2000	27	0.12	EEHZK1V181P	EEHZK1V181V	500
	330	10.0	10.2	10.5	G	2800	20	0.12	EEHZK1V331P	EEHZK1V331V	500

*1: Ripple current (100 kHz / +125 ℃)

*2: ESR (100 kHz / +20 ℃)

*3: tan δ (120 Hz / +20 °C)

◆ Please refer to the page of "Reflow profile" and "The taping dimensions".

• The dimensions of the vibration-proof products, please refer to the page of the mounting specification.

Frequency correction factor for ripple current

Rated capacitance (C)	Frequency (f)	100 Hz ≦ f < 200 Hz	200 Hz ≦ f < 300 Hz	300 Hz ≦ f < 500 Hz	500 Hz ≦ f < 1 kHz
C < 47 µF	Correction	0.15	0.20	0.25	0.35
47 μF ≦ C < 100 μF	factor	0.15	0.25	0.30	0.40
100 µF ≦ C		0.15	0.25	0.30	0.40
Rated capacitance (C)	Frequency (f)	1 kHz ≦ f < 2 kHz	2 kHz ≦ f < 3 kHz	3 kHz ≦ f < 5 kHz	5 kHz ≦ f < 10 kHz
C < 47 µF	Correction	0.45	0.55	0.60	0.65
47 μF ≦ C < 100 μF	Correction factor	0.50	0.60	0.65	0.70
100 µF ≦ C	lactor	0.50	0.60	0.65	0.70
	· · ·				
Rated capacitance (C)	Frequency (f)	10 kHz ≦ f < 15 kHz	15 kHz ≦ f < 20 kHz	20 kHz ≦ f < 30 kHz	30 kHz ≦ f < 40 kHz
C < 47 µF	Correction	0.70	0.75	0.75	0.75
47 μF ≦ C < 100 μF	Correction factor	0.75	0.75	0.80	0.80
100 µF ≦ C	lactor	0.75	0.80	0.85	0.85
Rated capacitance (C)	Frequency (f)	40 kHz ≦ f < 50 kHz	50 kHz ≦ f < 100 kHz	100 kHz ≦ f < 500 kHz	500 kHz ≦ f
C < 47 µF	Composition	0.80	0.85	1.00	1.05
47 μF ≦ C < 100 μF	Correction factor	0.85	0.90	1.00	1.00
100 µF ≦ C		0.85	0.90	1.00	1.00

Design and specifications are each subject to change without notice. Ask factory for the current technical specifications before purchase and/or use. Design and specifications are each subject to charge without notice, the subject to charge without notits without notice, the subject to charge wi

Panasonic

INDUSTRY

Conductive Polymer Hybrid Aluminum Electrolytic Capacitors



Surface Mount Type

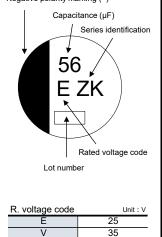
ZKU series High temperature lead-free reflow

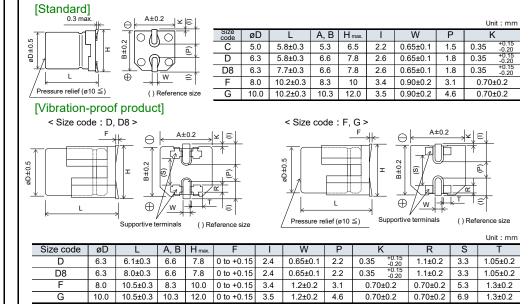
Features

- Endurance : 4000 h at 125 °C (High temperature / Long life)
- Large capacitance compared with ZK series
- Low ESR
- Characteristics dependencies in frequency and low temperature are as small as polymer type
- Vibration-proof product is available upon request. (ø6.3, ø8, ø10)
- AEC-Q200 compliant
- RoHS compliant

Specifications

Specifications												
Size code	С		D	D8			F			G		
Category temp. range				–55 ℃ to +	125 ℃			•				
Rated voltage range				25 V to 3	35 V							
Nominal cap.range	39 µF to 56 µF	68 µl	F to 100 µF	120 µF to '	180 µF	220) µF to 330	μF	390 µ	F to 560 µF		
Capacitance tolerance				±20 % (120 Hz	z/+20 ℃	.)		·				
Leakage current	I ≦ 0.01 CV (μA), 2	minutes	after reaching r	ated voltage, 2	0℃ *CV	= (Cap	acitance in	μF) x (R	ated vo	tage in V)		
Dissipation factor (tan δ)			Please se	ee the attached	d characte	eristics	list					
Surge voltage (V)			Rated	voltage × 1.25	(15 ℃ to	o 35 ℃)					
	+125 ℃ ± 2 ℃ 4000 h	, apply t				ing the	rated voltage	ge.				
	Capacitance chan	ge	Within ±30%	of the initial va	lue							
	Dissipation factor (ta	an δ)	$5) \leq 200 \%$ of the initial limit									
Endurance	ESR		≦ 200 % of th	ne initial limit								
Endulance	Leakage current	t	Within the initial limit									
	ESR after endurance (Ω / 100 kHz)(-40 ℃)				Size o							
			С	D	D8		F		G			
		2.0	1.4	0.8		0.4		0.3				
			t +125 $^{\circ}$ C ± 2 $^{\circ}$ C with no voltage applied and then being									
Shelf life	stabilized at +20 ℃, ca (With voltage treatmen		shall meet the	limits specifie	d in endu	irance.						
	+85 ℃ ± 2 ℃, 85 % to	90 %RH	l, 2000 h, rateo	l voltage applie	ed							
	Capacitance chan	ge	Within ±30%	of the initial va	lue							
Damp heat (Load)	Dissipation factor (ta	an δ)	≦ 200 % of th	ne initial limit								
	ESR		≦ 200 % of th	ne initial limit								
	Leakage current	t	Within the ini	tial limit								
Marking	Dimensi	ons (I	not to sca	ale)								
Example : 25 V 56 μF Marking color : BLACK	[Standard]									Unit : mm		
	<u>ب</u>	┓┲╴ ─	$\left[O \right] $	Size code ØD	L	,	H max. I	W	Р	K		
	 ₽	B±0.2	l l	C 5.0	5.8±0.3	5.3	6.5 2.2	0.65±0.1	-	0.35 +0.15 -0.20		
Negative polarity marking (-)			10119	- D 6.3	5.8±0.3	6.6	7.8 2.6	0.65±0.1		0.35 +0.15 -0.20		

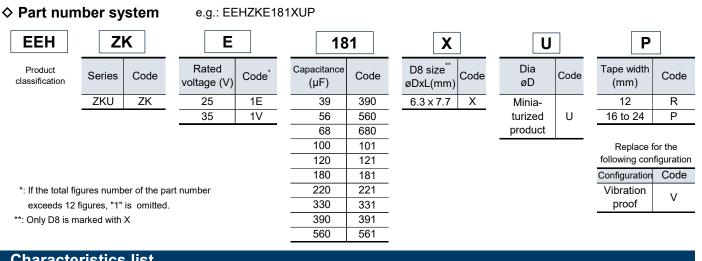




Design and specifications are each subject to change without notice. Ask factory for the current technical specifications before purchase and/or use. Design and specifications are each subject to charge without house, and the second state of the second sta

ZKU series

Explanation of part numbers



Characteristics list

Endurance : 125 ℃ 4000 h

			Case size (mm)	9		Spe	ecificatio	า	Part n	umber	Min.packaging q'ty (pcs)
Rated voltage (V)	Capacitance (±20 %) (µF)	øD	I	L	Size code	Ripple current ^{*1}	ESR ^{*2}	tan δ ^{*3}	Standard	Vibration-proof	Taping
	(81.)	00	Standard	Vibration -proof		(mA rms)	(mΩ)) product		product	ruping
	56	5	5.8	-	С	850	80	0.14	EEHZK1E560UR	-	1000
	100	6.3	5.8	6.1	D	1300	50	0.14	EEHZK1E101UP	EEHZK1E101UV	1000
25	180	6.3	7.7	8.0	D8	1800	30	0.14	EEHZKE181XUP	EEHZKE181XUV	900
	330	8	10.2	10.5	F	2000	27	0.14	EEHZK1E331UP	EEHZK1E331UV	500
	560	10	10.2	10.5	G	2800	20	0.14	EEHZK1E561UP	EEHZK1E561UV	500
	39	5	5.8	-	С	750	100	0.12	EEHZK1V390UR	-	1000
	68	6.3	5.8	6.1	D	1200	60	0.12	EEHZK1V680UP	EEHZK1V680UV	1000
35	120	6.3	7.7	8.0	D8	1700	35	0.12	EEHZKV121XUP	EEHZKV121XUV	900
	220	8	10.2	10.5	F	2000	27	0.12	EEHZK1V221UP	EEHZK1V221UV	500
	390	10	10.2	10.5	G	2800	20	0.12	EEHZK1V391UP	EEHZK1V391UV	500

*1: Ripple current (100 kHz / +125 ℃)

*2: ESR (100 kHz / +20 ℃)

*3: tan δ (120 Hz / +20 ℃)

◆ Please refer to the page of "Reflow profile" and "The taping dimensions".

The dimensions of the vibration-proof products, please refer to the page of the mounting specification.

Frequency correction factor for ripple current

Rated capacitance (C)	Frequency(f)	100 Hz ≦ f < 200 Hz	200 Hz ≦ f < 300 Hz	300 Hz ≦ f < 500 Hz	500 Hz ≦ f < 1 kHz
C < 47 μF	Correction	0.15	0.20	0.25	0.35
47 μF ≦ C < 100 μF	factor	0.15	0.25	0.30	0.40
100 µF ≦ C		0.15	0.25	0.30	0.40
Rated capacitance (C)	Frequency(f)	1 kHz ≦ f < 2 kHz	2 kHz ≦ f < 3 kHz	3 kHz ≦ f < 5 kHz	5 kHz ≦ f < 10 kHz
C < 47 μF	Correction	0.45	0.55	0.60	0.65
47 μF ≦ C < 100 μF	factor	0.50	0.60	0.65	0.70
100 µF ≦ C	laciol	0.50	0.60	0.65	0.70
Rated capacitance (C)	Frequency(f)	10 kHz ≦ f < 15 kHz	15 kHz ≦ f < 20 kHz	20 kHz ≦ f < 30 kHz	30 kHz ≦ f < 40 kHz
C < 47 µF	Correction	0.70	0.75	0.75	0.75
47 μF ≦ C < 100 μF	factor	0.75	0.75	0.80	0.80
100 µF ≦ C	laciol	0.75	0.80	0.85	0.85
Rated capacitance (C)	Frequency(f)	40 kHz ≦ f < 50 kHz	50 kHz ≦ f < 100 kHz	100 kHz ≦ f < 500 kHz	500 kHz ≦ f
C < 47 µF	Correction	0.80	0.85	1.00	1.05
47 μF ≦ C < 100 μF	factor	0.85	0.90	1.00	1.00
100 µF ≦ C		0.85	0.90	1.00	1.00

Design and specifications are each subject to change without notice. Ask factory for the current technical specifications before purchase and/or use.

Design and specifications are each subject to change without notice, restriction, r

Panasonic

INDUSTRY

Conductive Polymer Hybrid Aluminum Electrolytic Capacitors

Surface Mount Type

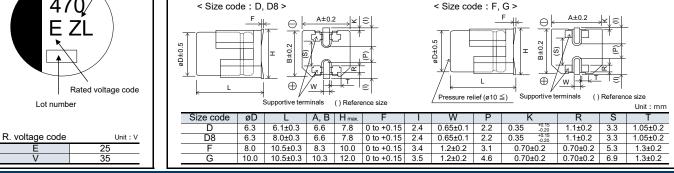
ZL series

High temperature lead-free reflow

Features

- Endurance : 4000 h at 125 °C /135 °C
- Higher capacitance (max 150 % of ZKU series) • AEC-Q200 compliant
- Smaller than ZC series with the same capacitance • Low ESR (max 40 %, lower ESR than ZC or ZKU series)
 - RoHS compliant
- **Hybrid**

AEC-Q200 compliant			Jinpliant								
Specifications											
Size code	С	D	D8		F	G					
Category temp. range			-55 °C to +	135 °C							
Rated voltage range			25 V to 3								
Nominal cap.range	47 μF to 82 μF	82 µF to 150 µF	150 µF to 2	220 µF 27	70 μF to 470 μF	470 µF to	680 µF				
Capacitance tolerance	· · · · ·		±20 % (120 Hz		· · ·						
Leakage current	I ≦ 0.01 CV (μA), 2 minu	ites after reaching ra	ated voltage, 2	0 ℃ *CV = (Ca	apacitance in μF) x (Rated volta	age in V				
Dissipation factor (tan δ)			ee the attached			<u>, , , , , , , , , , , , , , , , , , , </u>	-				
Surge voltage (V)			voltage × 1.25								
	+125 ℃ ± 2 ℃ 4000 h, a				e rated voltage.						
	Capacitance change		of the initial va	lue							
	Dissipation factor (tan &										
Endurance 1	ESR	≦ 200 % of t									
	Leakage current	Within the ini	tial limit								
	ESR after endurance			Size code							
	(Ω / 100 kHz)(-40 °C)	C	D	D8	F	G					
		2.0	1.4	0.8	0.4	0.3					
	+135 °C ± 2 °C 2000 h (C,	D,D8 size) or 4000	h (F,G size), ap	oply the rated r	ipple current witl	nout exceeding					
	the rated voltage.										
	Capacitance change		Within ±30% of the initial value								
	Dissipation factor (tan d										
Endurance 2	ESR	≦ 200 % of t									
	Leakage current	Within the ini	tial limit								
	ESR after endurance	0		Size code							
	(Ω / 100 kHz)(-40 ℃)	C 2.0	D 1.4	D8 0.8	F 0.4	G 0.3					
	After storage for 1000 hou										
Shelf life	capacitors shall meet the					izeu al +20°C,					
	+85 °C ± 2 °C. 85 % to 90				menty						
	Capacitance change	,,	3 11								
Damp heat (Load)	Dissipation factor (tan d		Within $\pm 30\%$ of the initial value $\leq 200\%$ of the initial limit								
Bump flour (Loud)	ESR		$\leq 200 \%$ of the initial limit $\leq 200 \%$ of the initial limit								
	Leakage current	Within the ini									
	After reflow soldering and	then being stabilize	d at +20 °C. ca	apacitors shall	meet the followir	na limits.					
Resistance to	Capacitance change		of the initial va			5					
soldering heat	Dissipation factor (tan &										
5	Leakage current	Within the init	ial limit								
M						-					
Marking	Dimension	ns (not to sca	ale)								
Example : 25 V 470 µF	[Standard]										
Marking color : BLACK	0.3 max.,						Unit : mm				
			code ØD	L A, B		W P	K				
Negative polarity marking (-)			C 5.0	5.8±0.3 5.3		5±0.1 1.5 0.35					
Capacitance (µF)			D 6.3 D8 6.3	5.8±0.3 6.6 7.7±0.3 6.6		5±0.1 1.8 0.35 5±0.1 1.8 0.35	5 +0.15 5 +0.15				
Series identific		⊕ <u>µw</u> ≘î	E 8.0	10.2±0.3 8.3			5 ^{+0.15} -0.20 70±0.2				
	<u>/ Pressure relief (ø</u>	() Reference size () Reference size	G 10.0	10.2±0.3 10.3			70±0.2				
	[Vibration-pro	oof product]	duct]								
470/ \	< Size code :	<pre>< Size code : D, D8 > </pre> <pre>< Size code : F, 0</pre>									
	_	, , , , , , , , , , , , , , , , , , ,			E u L	A+0.2 _					



Design and specifications are each subject to change without notice. Ask factory for the current technical specifications before purchase and/or use. Design and specifications are each subject to change without router router, some subject to change without router router, some subject to contact us immediately. 29

ZL series

Explanation of part numbers

♦ Part nur	nber sy	vstem	e.g.:	e.g.: EEHZL1E221XP										
EEH	Ζ	L	16	Ξ	221				X	Ρ	'			
Product classification	Series	Code	Rated voltage (V)	Code [*]	Capacitance (µF)	Code	Capacitance (µF)	Code	D8 size ^{**} øDxL(mm)	Tape width (mm)	Code			
	ZL	ZL	25	1E	47	470	270	271	6.3 x 7.7 X	12	R			
			35	1V	82	820	470	471		16 to 24	Р			
					150	151	680	681						
					220	221				Replace for	or the			
										following cont	figuration			
										Configuration	Code			
*: If the total f	igures numb	per of the pa	art number excee	eds 12 figu	res, "1" is omitte	d.				Vibration	V			
**: Only D8 is r	marked with	х								proof	v			
Charact		list												
Characte	eristics	SIISt												

Endurance 1 : 125 °C 4000 h

Endurance 2 : 135 °C 2000 h (C, D, D8 size) / 4000 h (F, G size)

			Case size (mm)	9			Specif	ication		Part n	umber	Min. packaging
Rated voltage				L	Size code	Ripple c	current ^{*1} rms)	ESR ^{*2}	*0	Standard	Vibration-proof	q'ty (pcs)
(V)		Standard	Vibration -proof		Endurance 1	Endurance 2	(mΩ)	tan δ ^{*3}	product	product	Taping	
	82	5.0	5.8	_	С	(+125℃) 1000	(+135℃) 600	58	0.14	EEHZL1E820R		1000
	02				-				0.14		-	
	150	6.3	5.8	6.1	D	1500	800	38	0.14	EEHZL1E151P	EEHZL1E151V	1000
25	220	6.3	7.7	8.0	D8	2000	1000	24	0.14	EEHZL1E221XP	EEHZL1E221XV	900
	470	8.0	10.2	10.5	F	3000	2000	18	0.14	EEHZL1E471P	EEHZL1E471V	500
	680	10.0	10.2	10.5	G	3400	2300	14	0.14	EEHZL1E681P	EEHZL1E681V	500
	47	5.0	5.8	-	С	900	550	60	0.12	EEHZL1V470R	-	1000
	82	6.3	5.8	6.1	D	1400	700	40	0.12	EEHZL1V820P	EEHZL1V820V	1000
35	150	6.3	7.7	8.0	D8	1900	900	26	0.12	EEHZL1V151XP	EEHZL1V151XV	900
	270	8.0	10.2	10.5	F	2900	1900	20	0.12	EEHZL1V271P	EEHZL1V271V	500
	470	10.0	10.2	10.5	G	3300	2200	16	0.12	EEHZL1V471P	EEHZL1V471V	500

*1: Ripple current (100 kHz / +125 °C or +135 °C)

*2: ESR (100 kHz / +20 ℃)

*3: tan δ (120 Hz / +20 °C)

• Please refer to the page of "Reflow profile" and "The taping dimensions".

• The dimensions of the vibration-proof products, please refer to the page of the mounting specification.

Frequency correction factor for ripple current

Rated capacitance (C)	Frequency(f)	100 Hz ≦ f < 200 Hz	200 Hz ≦ f < 300 Hz	300 Hz ≦ f < 500 Hz	500 Hz ≦ f < 1 kHz					
Rated capacitance (C)	r requericy(r)	100 Hz = 1 < 200 Hz	200 HZ = 1 < 300 HZ	300 HZ ≅ I < 300 HZ	500 HZ ⊒ I S I KHZ					
47 µF ≦ C < 150 µF	Correction	0.15	0.20	0.25	0.30					
150 μ F \leq C	factor	0.15	0.25	0.25	0.30					
Rated capacitance (C)	Frequency(f)	1 kHz ≦ f < 2 kHz	2 kHz ≦ f < 3 kHz	3 kHz ≦ f < 5 kHz	5 kHz ≦ f < 10 kHz					
$47 \ \mu F \leq C < 150 \ \mu F$	Correction	0.40	0.45	0.55	0.60					
150 μ F \leq C	factor	0.45	0.50	0.60	0.65					
Rated capacitance (C)	Frequency(f)	10 kHz ≦ f < 15 kHz	15 kHz ≦ f < 20 kHz	20 kHz ≦ f < 30 kHz	30 kHz ≦ f < 40 kHz					
$47~\mu\text{F} \leq C < 150~\mu\text{F}$	Correction	0.70	0.75	0.80	0.80					
150 μ F \leq C	factor	0.75	0.80	0.85	0.85					
Rated capacitance (C)	Frequency(f)	40 kHz ≦ f < 50 kHz	50 kHz ≦ f < 100 kHz	100 kHz ≦ f < 500 kHz	500 kHz ≦ 1000 kHz					
47 µF ≦ C < 150 µF	Correction	0.85	0.90	1.00	1.00					
150 μ F \leq C	factor	0.85	0.90	1.00	1.00					

Design and specifications are each subject to change without notice. Ask factory for the current technical specifications before purchase and/or use. Design and specifications are each subject to change without notice, not deter, i.e., Should a safety concern arise regarding this product, please be sure to contact us immediately. 30





Hybrid

Conductive Polymer Hybrid Aluminum Electrolytic Capacitors Surface Mount Type



ZT series

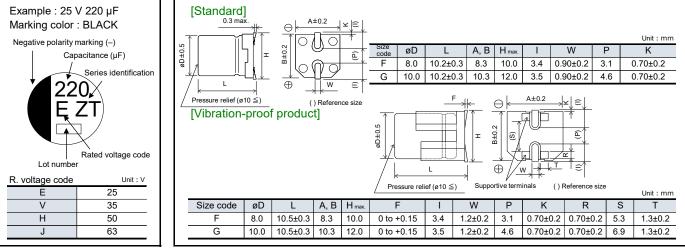
High temperature lead-free reflow

Features

- Endurance: 4000 h at 135 °C / 125 °C
- Higher ripple current (75 % to 118 % higher than ZC series)
- Vibration-proof product is available upon request.
- AEC-Q200 compliant
- RoHS compliant

Specifications

Specifications										
Size code	F	G								
Category temp. range	_55 °C to +135 °C									
Rated voltage range	25 V to 63 V									
Nominal capacitance range	33 µF to 22	20 μF 56 μF to 330 μF								
Capacitance tolerance		±20 % (120 Hz / +20 ℃)								
Leakage current	I ≦ 0.01 CV (μA), 2 minutes	s after reaching rated voltage, 20 °C *CV = (Capacitance in μ F) x (Rated voltage in V)								
Dissipation factor (tan δ)	Please see the attached characteristics list									
Surge voltage (V)	Rated voltage × 1.25 (15 °C to 35 °C)									
	+125 ℃ ± 2 ℃, 4000 h, apply t	the rated ripple current without exceeding the rated voltage								
	Capacitance change	Within ±30% of the initial value								
	Dissipation factor (tan δ)	\leq 200 % of the initial limit								
Endurance 1	E.S.R.	\leq 200 % of the initial limit								
	Leakage current	Within the initial limit								
	ESR after endurance	Size code								
	(Ω / 100 kHz)(-40 ℃)	F G								
	, ,, ,, ,	0.4 0.3								
		the rated ripple current without exceeding the rated voltage								
	Capacitance change Within ±30% of the initial value									
	Dissipation factor (tan δ)	\leq 200 % of the initial limit								
Endurance 2	E.S.R.	$\leq 200 \%$ of the initial limit								
	Leakage current	Within the initial limit								
	ESR after endurance	Size code								
	(Ω / 100 kHz)(-40 ℃)	F G								
		t +135 °C \pm 2 °C with no voltage applied and then being								
Shelf life	stabilized at +20 $^{\circ}$ C, capacitors shall meet the limits specified in endurance.									
	(With voltage treatment) 85 \degree ± 2 \degree , 85 % to 90 %RH, 2000 h, rated voltage applied									
	85 °C ± 2 °C, 85 % to 90 %RH,	, 2000 h, rated voltage applied								
Damp heat	Capacitance change	Within ±30% of the initial value								
(Load)	Dissipation factor (tan δ)	$\leq 200 \%$ of the initial limit								
()	E.S.R.	$\leq 200 \%$ of the initial limit								
	Leakage current	Within the initial limit								
	After reflow soldering and then	being stabilized at +20 $^\circ$ C, capacitors shall meet the								
Resistance to	following limits.									
soldering heat	Capacitance change	Within ±10% of the initial value								
5	Dissipation factor (tan δ)	Within the initial limit								
	Leakage current	Within the initial limit								
Marking	Dimensions (not to scale)								
Example : 25 V 220 µF	[Standard]									



Design and specifications are each subject to change without notice. Ask factory for the current technical specifications before purchase and/or use. Design and specifications are each subject to charge minimation of the second state of

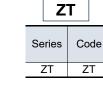
ZT series

Explanation of part numbers

♦ Part number system

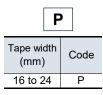
EEH Product

classification



e.g.: EEH	ZT1E221F
1	=
Rated voltage (V)	Code [*]
25	1E
35	1V
50	1H
63	1J
63	1J

221									
Capacitance (µF)	Code	Capacitance (µF)	Code						
33	330	120	121						
47	470	150	151						
56	560	220	221						
68	680	270	271						
82	820	330	331						
100	101								



Replace for the following configuration Configuration Code Vibration V proof

*: If the total figures number of the part number exceeds 12 figures, "1" is omitted.

ΖT

Characteristics list

Endurance 1 : 125 °C 4000 h

Endurance 2 : 135 °C 4000 h

	Case size (mm)		e	Specification					Part r	Min. packaging		
Rated Capacitance voltage (±20%) (V) (μF) ø	_	1	_	Size code		current ^{*1} rms)	ESR ^{*2}	tan δ ^{*3}	Standard	Vibration-proof	q'ty (pcs)	
	ØD	øD Standard	Vibration -proof		Endurance 1 125 °C	Endurance 2	(mΩ)	tan o	product	product	Taping	
05	220	8.0	10.2	10.5	F	2900	1800	22	0.14	EEHZT1E221P	EEHZT1E221V	500
25	330	10.0	10.2	10.5	G	3500	2200	16	0.14	EEHZT1E331P	EEHZT1E331V	500
35	150	8.0	10.2	10.5	F	2900	1800	22	0.12	EEHZT1V151P	EEHZT1V151V	500
35	270	10.0	10.2	10.5	G	3500	2200	16	0.12	EEHZT1V271P	EEHZT1V271V	500
	68	8.0	10.2	10.5	F	2700	1700	25	0.10	EEHZT1H680P	EEHZT1H680V	500
50	100	10.0	10.2	10.5	G	2900	1800	23	0.10	EEHZT1H101P	EEHZT1H101V	500
	120	10.0	10.2	10.5	G	2900	1800	23	0.10	EEHZT1H121P	EEHZT1H121V	500
	33	8.0	10.2	10.5	F	2400	1500	32	0.08	EEHZT1J330P	EEHZT1J330V	500
	47	8.0	10.2	10.5	F	2400	1500	32	0.08	EEHZT1J470P	EEHZT1J470V	500
63	56	10.0	10.2	10.5	G	2800	1700	25	0.08	EEHZT1J560P	EEHZT1J560V	500
	68	10.0	10.2	10.5	G	2800	1700	25	0.08	EEHZT1J680P	EEHZT1J680V	500
	82	10.0	10.2	10.5	G	2800	1700	25	0.08	EEHZT1J820P	EEHZT1J820V	500

*1: Ripple current (100 kHz / +125 °C or 135 °C)

*2: ESR (100 kHz / +20 ℃)

*3: tan δ (120 Hz / +20 °C)

◆ Please refer to the page of "Reflow profile" and "The taping dimensions".

• The dimensions of the vibration-proof products, please refer to the page of the mounting specification.

Frequency correction factor for ripple current

	1				
Rated capacitance (C)	Frequency (f)	100 Hz ≦ f < 200 Hz	200 Hz ≦ f < 300 Hz	300 Hz ≦ f < 500 Hz	500 Hz ≦ f < 1 kHz
C < 47 μF	Correction	0.10	0.10	0.15	0.20
47 µF ≦ C < 150 µF	factor	0.15	0.20	0.25	0.30
150 µF ≦ C	lacion	0.15	0.25	0.25	0.30
	- (0)				
Rated capacitance (C)	Frequency (f)	1 kHz ≦ f < 2 kHz	2 kHz ≦ f < 3 kHz	3 kHz ≦ f < 5 kHz	5 kHz ≦ f < 10 kHz
C < 47 μF	Correction	0.30	0.40	0.45	0.50
47 µF ≦ C < 150 µF	factor	0.40	0.45	0.55	0.60
150 µF ≦ C		0.45	0.50	0.60	0.65
Deted conscitence (C)					
Rated capacitance (C)	Frequency (f)	10 kHz ≦ f < 15 kHz	15 kHz ≦ f < 20 kHz	20 kHz ≦ f < 30 kHz	30 kHz ≦ f < 40 kHz
C < 47 µF	Correction	0.60	0.65	0.70	0.75
47 µF ≦ C < 150 µF	factor	0.70	0.75	0.80	0.80
150 µF ≦ C		0.75	0.80	0.85	0.85
	F (0)				
Rated capacitance (C)	Frequency (f)	40 kHz ≦ f < 50 kHz	50 kHz ≦ f < 100 kHz	100 kHz ≦ f < 500 kHz	500 kHz ≦ f
C < 47 μF	Corroction	0.80	0.85	1.00	1.05
47 µF ≦ C < 150 µF	Correction	0.85	0.90	1.00	1.00
150 µF ≦ C	factor	0.85	0.90	1.00	1.00

Design and specifications are each subject to change without notice. Ask factory for the current technical specifications before purchase and/or use.

Panasonic **INDUSTRY**

Hybrid

Conductive Polymer Hybrid Aluminum Electrolytic Capacitors



Surface Mount Type

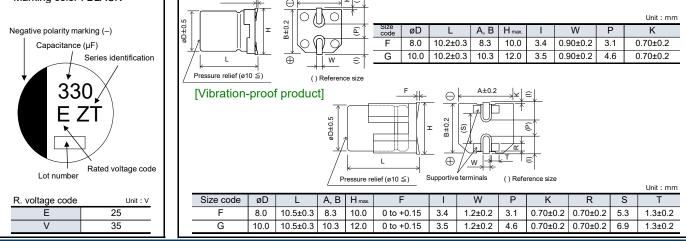
ZTU series High temperature lead-free reflow

Features

- Endurance: 4000 h at 135 °C / 125 °C
- Higher ripple current (max 180 % of ZC series)
- Larger capacitance (max 170 % of ZT series)
- AEC-Q200 compliant
- RoHS compliant

Specifications

Specifications										
Size code	F		G							
Category temp. range	−55 °C to +135 °C									
Rated voltage range	25 V to 35 V									
Nominal capacitance range	220 µF to 3	330 µF	390 µF to 56 0 µF							
Capacitance tolerance		±20 % (120	Hz / +20 ℃)							
Leakage current	$I \leq 0.01 \text{ CV} (\mu A)$, 2 minutes after reaching rated voltage, 20 °C *CV = (Capacitance in μF) x (Rated voltage in V)									
Dissipation factor (tan δ)		Please see the attach	ned characteristics list							
Surge voltage (V)	Rated voltage × 1.25 (15 ℃ to 35 ℃)									
		he rated ripple current with	out exceeding the rated voltage							
	Capacitance change	Within ±30% of the initial								
	Dissipation factor (tan δ)	≤ 200 % of the initial limi								
Endurance 1	E.S.R.	≤ 200 % of the initial limi	t							
	Leakage current	Within the initial limit								
	ESR after endurance	Size code								
	(Ω / 100 kHz)(-40 ℃)	F G								
		0.4 0.3								
		he rated ripple current with	out exceeding the rated voltage.							
		Capacitance change Within ±30% of the initial value								
	Dissipation factor (tan δ) E.S.R.									
Endurance 2	Leakage current									
		Size code								
	ESR after endurance	F G								
	(Ω / 100 kHz)(-40 ℃)	0.4 0.3								
	After storage for 1000 hours at		tage applied and then being							
Shelf life	After storage for 1000 hours at +135 °C \pm 2 °C with no voltage applied and then being stabilized at +20 °C, capacitors shall meet the limits specified in endurance.									
Shell life	(With voltage treatment)									
	85 ℃ ± 2 ℃, 85 % to 90 %RH,	2000 h rated voltage appl	ied							
Denne haat	Capacitance change	Within ±30% of the initial	value							
Damp heat	Dissipation factor (tan δ)	≤ 200 % of the initial limit								
(Load)	E.S.R.	$\leq 200 \%$ of the initial limit								
	Leakage current	Within the initial limit								
	After reflow soldering and then	being stabilized at +20 $^{\circ}$ C,	capacitors shall meet the							
Resistance to	following limits.	0								
	Capacitance change	Within ±10% of the initial value								
soldering heat	Dissipation factor (tan δ)	Within the initial limit								
	Leakage current	Within the initial limit								
Marking	Dimensions (not to scale)								
Marking	Dimensions (
Example : 25 V 330 µF	[Standard]									
Marking color : BLACK	0.3 max.	A+0.2								
WAINING COLOR . BLACK	(
			linit i mm							



Design and specifications are each subject to change without notice. Ask factory for the current technical specifications before purchase and/or use. Design and specifications are each subject to change minimum result. Should a safety concern arise regarding this product, please be sure to contact us immediately.

ZTU series

Explanation of part numbers

ΖT

♦ Part number system

classification



ΖT

e.g.: EEHZT1E331UP

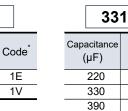
1E

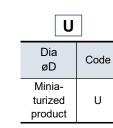
Rated

voltage (V)

25

35





Code

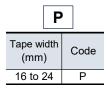
221

331

391

561

560



 Configuration
 Code

 Vibration
 V

 proof
 V

*: If the total figures number of the part number exceeds 12 figures, "1" is omitted.

Characteristics list

Endurance 1 : 125 °C 4000 h Endurance 2 : 135 °C 4000 h

		_		Case size (mm)			Specification			Part number		Min. packaging
Rated Capacitance voltage (±20 %) (V) (μF)	øD		-	Size F code		Ripple current ^{*1} (mA rms)		tan δ ^{*3}	Standard	Vibration-proof	q'ty (pcs)	
()	(µ)	00	Standard	Vibration -proof	Endurance 1 (+125℃)	Endurance 2 (+135°C)	(mΩ)	tan 0	product product	product	Taping	
25	330	8.0	10.2	10.5	F	2900	1800	22	0.14	EEHZT1E331UP	EEHZT1E331UV	500
25	560	10.0	10.2	10.5	G	3500	2200	16	0.14	EEHZT1E561UP	EEHZT1E561UV	500
35	220	8.0	10.2	10.5	F	2900	1800	22	0.12	EEHZT1V221UP	EEHZT1V221UV	500
	390	10.0	10.2	10.5	G	3500	2200	16	0.12	EEHZT1V391UP	EEHZT1V391UV	500

*1: Ripple current (100 kHz / +125 $^\circ\!C$ or +135 $^\circ\!C)$

*2: ESR (100 kHz / +20 ℃)

*3: tan δ (120 Hz / +20 ℃)

◆ Please refer to the page of "Reflow profile" and "The taping dimensions".

• The dimensions of the vibration-proof products, please refer to the page of the mounting specification.

Frequency correction factor for ripple current

Dated consoltance (C)	Frequency (f)								
Rated capacitance (C)	100 Hz \leq f < 200 Hz	200 Hz \leq f < 300 Hz	300 Hz \leq f < 500 Hz	500 Hz \leq f < 1 kHz					
150 μ F \leq C	0.15	0.25	0.25	0.30					
Poted conscitance (C)	Frequency (f)								
Rated capacitance (C)	$1 \text{ kHz} \leq f < 2 \text{ kHz}$	$2 \text{ kHz} \leq \text{f} < 3 \text{ kHz}$	$3 \text{ kHz} \leq \text{f} < 5 \text{ kHz}$	$5 \text{ kHz} \leq f < 10 \text{ kHz}$					
150 μ F \leq C	0.45	0.50	0.60	0.65					
		_	<i>(</i> 1)						
Rated capacitance (C)	Frequency (f)								
	10 kHz $\leq f < 15$ kHz	$15 \text{ kHz} \leq f < 20 \text{ kHz}$	20 kHz \leq f < 30 kHz	$30 \text{ kHz} \leq f < 40 \text{ kHz}$					
150 μ F \leq C	0.75	0.80	0.85	0.85					
Poted consoltance (C)	Frequency (f)								
Rated capacitance (C)	40 kHz \leq f < 50 kHz	50 kHz \leq f < 100 kHz	100 kHz \leq f < 500 kHz	500 kHz \leq f < 1000 kHz					
150 µF ≦ C	0.85	0.90	1.00	1.00					

Design and specifications are each subject to change without notice. Ask factory for the current technical specifications before purchase and/or use. Should a safety concern arise regarding this product, please be sure to contact us immediately.

. 34

INDUSTRY

Conductive Polymer Hybrid Aluminum Electrolytic Capacitors



Surface Mount Type

ZV series

High temperature lead-free reflow

Features

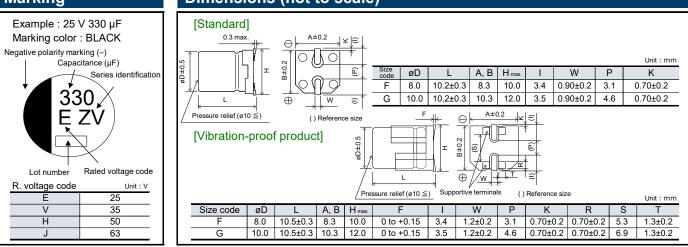
- Endurance: 4000 h at 125 °C / 135 °C
- Low ESR (up to 39 %, Lower ESR than Current ZT series)
- Higher ripple current (max 150 % of ZT series)
- AEC-Q200 compliant
- RoHS compliant

Spacifications

Specifications							
Size code	F	G					
Category temp. range	_55 °C to +135 °C						
Rated voltage range	25 V to 63 V						
Nominal cap.range	33 µF to 2	20 µF 56 µF to 330 µF					
Capacitance tolerance		±20 % (120 Hz / +20 ℃)					
Leakage current	I ≦ 0.01 CV (μA), 2 minutes	after reaching rated voltage, 20 $^{\circ}$ C *CV = (Capacitance in μ F) x (Rated voltage in V)					
Dissipation factor (tan δ)		Please see the attached characteristics list					
Surge voltage (V)		Rated voltage × 1.25 (15 $^{\circ}$ C to 35 $^{\circ}$ C)					
		he rated ripple current without exceeding the rated voltage					
	Capacitance change	Within ±30% of the initial value					
	Dissipation factor (tan δ)	≦ 200 % of the initial limit					
Endurance 1	E.S.R.	\leq 200 % of the initial limit					
	Leakage current	Within the initial limit					
	ESR after endurance	Size code					
	(Ω / 100 kHz)(-40 ℃)	F G					
		0.4 0.3					
	+135 °C ± 2 °C, 4000 h, apply the rated ripple current without exceeding the rated voltage						
	Capacitance change Within ±30% of the initial value						
	Dissipation factor (tan δ) $\leq 200 \%$ of the initial limit						
Endurance 2	E.S.R.	≦ 200 % of the initial limit					
	Leakage current	Within the initial limit					
	ESR after endurance	Size code					
	(Ω / 100 kHz)(-40 ℃)	F G					
		0.4 0.3					
		+135 °C \pm 2 °C with no voltage applied and then being					
Shelf life		shall meet the limits specified in endurance.					
	(With voltage treatment)						
	85 ℃ ± 2 ℃, 85 % to 90 %RH,						
Damp heat	Capacitance change	Within ±30% of the initial value					
(Load)	Dissipation factor (tan δ)	$\leq 200 \%$ of the initial limit					
()	E.S.R.	$\leq 200 \%$ of the initial limit					
	Leakage current	Within the initial limit					
		being stabilized at +20 $^\circ \!$					
Resistance to	following limits.	Within 1100/ of the initial value					
soldering heat	Capacitance change	Within ±10% of the initial value					
	Dissipation factor (tan δ)	Within the initial limit					
	Leakage current	Within the initial limit					

Marking

Dimensions (not to scale)



Design and specifications are each subject to change without notice. Ask factory for the current technical specifications before purchase and/or use Design and specifications are each subject to change without nearest, should a safety concern arise regarding this product, please be sure to contact us immediately. 35

ZV series

Explanation of part numbers

♦ Part number system

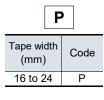
EEH Product classification

ZV Series Code ZV ZV

0	
16	
Rated voltage (V)	Code [*]
25	1E
35	1V
50	1H
63	1J

e.g.: EEHZV1E221P

221 Capacitance Capacitance Code Code (µF) (µF) 33 330 120 121 47 470 150 151 56 560 220 221 270 68 680 271 82 820 330 331 100 101



Replace for the following configuration Configuration Code Vibration V proof

*: If the total figures number of the part number exceeds 12 figures, "1" is omitted.

Characteristics list

Endurance 1 : 125 ℃ 4000 h Endurance 2 : 135 °C 4000 h

			Case size (mm)	Э			Specif	ication		Part r	number	Min. packaging
Rated voltage	Capacitance (±20 %)	-		L			Ripple current ^{*1} (mA rms)		_*3	Standard	Vibration-proof	q'ty (pcs)
(V)	(µF)	øD	Standard	Vibration		Endurance 1	Endurance 2	ESR ^{*2} (mΩ)	$tan \delta^{^{\star 3}}$	product	product	Taping
			Stanuaru	-proof		(+125℃)	(+135℃)		,			
	220	8.0	10.2	10.5	F	3900	2900	16	0.14	EEHZV1E221P	EEHZV1E221V	500
25	330	10.0	10.2	10.5	G	4600	3400	12	0.14	EEHZV1E331P	EEHZV1E331V	500
25	150	8.0	10.2	10.5	F	3900	2900	16	0.12	EEHZV1V151P	EEHZV1V151V	500
35	270	10.0	10.2	10.5	G	4600	3400	12	0.12	EEHZV1V271P	EEHZV1V271V	500
	68	8.0	10.2	10.5	F	3600	2500	19	0.10	EEHZV1H680P	EEHZV1H680V	500
50	100	10.0	10.2	10.5	G	4300	3200	14	0.10	EEHZV1H101P	EEHZV1H101V	500
	120	10.0	10.2	10.5	G	4300	3200	14	0.10	EEHZV1H121P	EEHZV1H121V	500
	33	8.0	10.2	10.5	F	3300	2300	22	0.08	EEHZV1J330P	EEHZV1J330V	500
	47	8.0	10.2	10.5	F	3300	2300	22	0.08	EEHZV1J470P	EEHZV1J470V	500
63	56	10.0	10.2	10.5	G	4000	3000	16	0.08	EEHZV1J560P	EEHZV1J560V	500
	68	10.0	10.2	10.5	G	4000	3000	16	0.08	EEHZV1J680P	EEHZV1J680V	500
	82	10.0	10.2	10.5	G	4000	3000	16	0.08	EEHZV1J820P	EEHZV1J820V	500

*1: Ripple current (100 kHz / +125 °C or +135 °C)

*2: ESR (100 kHz / +20 °C)

*3: tan δ (120 Hz / +20 °C)

◆ Please refer to the page of "Reflow profile" and "The taping dimensions".

• The dimensions of the vibration-proof products, please refer to the page of the mounting specification.

Frequency correction factor for ripple current

Rated capacitance (C)	Frequency (f)	100 Hz ≦ f < 200 Hz	200 Hz ≦ f < 300 Hz	300 Hz ≦ f < 500 Hz	500 Hz ≦ f < 1 kHz
C < 47 µF	Correction	0.10	0.10	0.15	0.20
47 μF ≦ C < 150 μF	Correction factor	0.15	0.20	0.25	0.30
150 µF ≦ C		0.15	0.25	0.25	0.30
Rated capacitance (C)	Frequency (f)	1 kHz ≦ f < 2 kHz	2 kHz ≦ f < 3 kHz	3 kHz ≦ f < 5 kHz	5 kHz ≦ f < 10 kHz
C < 47 µF	Composition	0.30	0.40	0.45	0.50
47 µF ≦ C < 150 µF	Correction factor	0.40	0.45	0.55	0.60
150 µF ≦ C	lactor	0.45	0.50	0.60	0.65
Rated capacitance (C)	Frequency (f)	10 kHz ≦ f < 15 kHz	15 kHz ≦ f < 20 kHz	20 kHz ≦ f < 30 kHz	30 kHz ≦ f < 40 kHz
C < 47 μF		10 kHz ≦ f < 15 kHz 0.60	15 kHz ≦ f < 20 kHz 0.65	20 kHz ≦ f < 30 kHz 0.70	30 kHz ≦ f < 40 kHz 0.75
1 ()	- Correction -				
C < 47 μF		0.60	0.65	0.70	0.75
C < 47 μF 47 μF ≦ C < 150 μF	- Correction -	0.60 0.70	0.65 0.75	0.70 0.80	0.75 0.80
C < 47 μF 47 μF ≦ C < 150 μF 150 μF ≦ C	Correction factor	0.60 0.70 0.75	0.65 0.75 0.80	0.70 0.80 0.85	0.75 0.80 0.85
$C < 47 \ \mu F$ $47 \ \mu F \leq C < 150 \ \mu F$ $150 \ \mu F \leq C$ Rated capacitance (C)	Correction factor Frequency (f) Correction	0.60 0.70 0.75 40 kHz ≤ f < 50 kHz	0.65 0.75 0.80 50 kHz ≤ f < 100 kHz	0.70 0.80 0.85 100 kHz ≦ f < 500 kHz	0.75 0.80 0.85 500 kHz ≦ f < 1000 kHz
$C < 47 \ \mu\text{F}$ $47 \ \mu\text{F} \leq C < 150 \ \mu\text{F}$ $150 \ \mu\text{F} \leq C$ Rated capacitance (C) $C < 47 \ \mu\text{F}$	Correction factor	0.60 0.70 0.75 40 kHz ≤ f < 50 kHz 0.80	0.65 0.75 0.80 50 kHz ≤ f < 100 kHz 0.85	0.70 0.80 0.85 100 kHz ≦ f < 500 kHz 1.00	0.75 0.80 0.85 500 kHz ≦ f < 1000 kHz 1.05

Design and specifications are each subject to change without notice. Ask factory for the current technical specifications before purchase and/or use. Design and specifications are each subject to change without nearest, should a safety concern arise regarding this product, please be sure to contact us immediately. 36





Conductive Polymer Hybrid Aluminum Electrolytic Capacitors



Surface Mount Type

ZVU series High temperature lead-free reflow

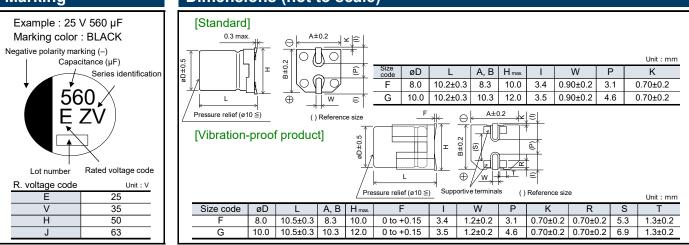
Features

- Endurance: 4000 h at 125 °C / 135 °C
- Larger capacitance (max 170 % of ZV series)
- Higher ripple current (max 150 % of ZT series)
- AEC-Q200 compliant
- RoHS compliant

Specifications						
Size code	F		G			
Category temp. range		–55 °C to	o +135 ℃			
Rated voltage range			o 63 V			
Nominal capacitance range	56 µF to 33	30 µF	100 μF to 560 μF			
Capacitance tolerance		±20 % (120				
Leakage current	I ≦ 0.01 CV (µA), 2 minutes		, 20 ℃ *CV = (Capacitance in μF) x (Rated voltage in V)			
Dissipation factor (tan δ)			ned characteristics list			
Surge voltage (V)		Rated voltage × 1.2				
			out exceeding the rated voltage			
	Capacitance change	Within ±30% of the initial				
	Dissipation factor (tan δ)	≤ 200 % of the initial limit				
Endurance 1	E.S.R.	≤ 200 % of the initial limit	t			
	Leakage current	Within the initial limit				
	ESR after endurance	Size code				
	(Ω / 100 kHz)(-40 ℃)	F G				
		0.4 0.3				
			out exceeding the rated voltage			
	Capacitance change	Within ±30% of the initial				
	Dissipation factor (tan δ)	≤ 200 % of the initial limit				
Endurance 2	E.S.R.	≦ 200 % of the initial limit	t			
	Leakage current	Within the initial limit				
	ESR after endurance	Size code				
	(Ω / 100 kHz)(-40 ℃)	F G				
		0.4 0.3				
	After storage for 1000 hours at					
Shelf life	stabilized at +20 °C, capacitors	shall meet the limits speci	fied in endurance.			
	(With voltage treatment)	00001				
	85 ℃ ± 2 ℃, 85 % to 90 %RH,	Within ±30% of the initial				
Damp heat	Capacitance change					
(Load)	Dissipation factor (tan δ) E.S.R.	≤ 200 % of the initial limit				
(, , , , , , , , , , , , , , , , , , ,		\leq 200 % of the initial limit Within the initial limit	t			
	Leakage current After reflow soldering and then		consisters shall most the			
		being stabilized at +20°C,	capacitors shall meet the			
Resistance to	following limits. Capacitance change	Within ±10% of the initial	velue			
soldering heat	Dissipation factor (tan δ)	Within the initial limit	Value			
-						
	Leakage current Within the initial limit					

Marking

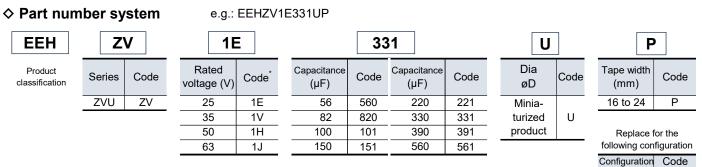
Dimensions (not to scale)



Design and specifications are each subject to change without notice. Ask factory for the current technical specifications before purchase and/or use Design and specifications are each subject to charge without house, and the second state of the second sta

ZVU series

Explanation of part numbers



*: If the total figures number of the part number exceeds 12 figures, "1" is omitted.

Characteristics list

Endurance 1 : 125 °C 4000 h Endurance 2 : 135 °C 4000 h

Vibration

proof

V

Case size (mm)		9			Specif	ication		Part n	Min. packaging			
Rated voltage	voltage (±20 %)	L		Size code		Ripple current ^{*1} (mA rms)		*3	Standard	Vibration-proof	q'ty (pcs)	
(V)	(µF)	øD	Standard	Vibration		Endurance 1	, Endurance 2	(mΩ)	$\begin{array}{c c} ESR^{^{*2}}\\ (m\Omega) \end{array}$ tan $\delta^{^{*3}}$	product	product	Taping
			olandara	-proof		(+125℃)	(+135℃)					
25	330	8.0	10.2	10.5	F	3900	2900	16	0.14	EEHZV1E331UP	EEHZV1E331UV	500
25	560	10.0	10.2	10.5	G	4600	3400	12	0.14	EEHZV1E561UP	EEHZV1E561UV	500
35	220	8.0	10.2	10.5	F	3900	2900	16	0.12	EEHZV1V221UP	EEHZV1V221UV	500
- 35	390	10.0	10.2	10.5	G	4600	3400	12	0.12	EEHZV1V391UP	EEHZV1V391UV	500
50	82	8.0	10.2	10.5	F	3600	2500	19	0.10	EEHZV1H820UP	EEHZV1H820UV	500
	150	10.0	10.2	10.5	G	4300	3200	15	0.10	EEHZV1H151UP	EEHZV1H151UV	500
63	56	8.0	10.2	10.5	F	3300	2300	22	0.08	EEHZV1J560UP	EEHZV1J560UV	500
	100	10.0	10.2	10.5	G	4000	3000	17	0.08	EEHZV1J101UP	EEHZV1J101UV	500

*1: Ripple current (100 kHz / +125 °C or +135 °C)

*2: ESR (100 kHz / +20 ℃)

*3: tan δ (120 Hz / +20 °C)

◆ Please refer to the page of "Reflow profile" and "The taping dimensions".

• The dimensions of the vibration-proof products, please refer to the page of the mounting specification.

Frequency correction factor for ripple current

Rated capacitance (C)	Frequency (f)	100 Hz ≦ f < 200 Hz	200 Hz ≦ f < 300 Hz	300 Hz ≦ f < 500 Hz	500 Hz ≦ f < 1 kHz
47 µF ≦ C < 150 µF	Correction	0.15	0.20	0.25	0.30
150 µF ≦ C	factor	0.15	0.25	0.25	0.30
Rated capacitance (C)	Frequency (f)	1 kHz ≦ f < 2 kHz	2 kHz ≦ f < 3 kHz	3 kHz ≦ f < 5 kHz	5 kHz ≦ f < 10 kHz
47 µF ≦ C < 150 µF	Correction	0.40	0.45	0.55	0.60
150 µF ≦ C	factor	0.45	0.50	0.60	0.65
Rated capacitance (C)	Frequency (f)	10 kHz ≦ f < 15 kHz	15 kHz ≦ f < 20 kHz	20 kHz ≦ f < 30 kHz	30 kHz ≦ f < 40 kHz
47 µF ≦ C < 150 µF	Correction	0.70	0.75	0.80	0.80
47 μF ≦ C < 150 μF 150 μF ≦ C	Correction factor	0.70	0.75	0.80 0.85	0.80 0.85
· · ·					
150 µF ≦ C	factor	0.75	0.80	0.85	0.85

Design and specifications are each subject to change without notice. Ask factory for the current technical specifications before purchase and/or use. Design and specifications are each subject to change without nearest, should a safety concern arise regarding this product, please be sure to contact us immediately.

INDUSTRY

Conductive Polymer Hybrid Aluminum Electrolytic Capacitors

Hybrid

Surface Mount Type

ZS series

High temperature lead-free reflow

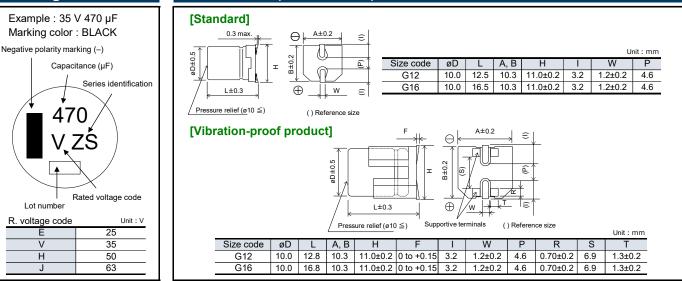
Features

- Endurance: 4000 h at 135 °C / 125 °C
- High ripple current and High capacitance
- High-withstand voltage (to 63 V)
- Vibration-proof product is available upon request.
- AEC-Q200 compliant
- RoHS compliant

Specifications							
Size code	G12		G16				
Category temp. range	_55 ℃ to +135 ℃						
Rated voltage range	25 V to 63 V						
Nominal capacitance range	100 µF to 4		150 μF to 560 μF				
Capacitance tolerance		±20 % (120	Hz / +20 ℃)				
Leakage current	I ≦ 0.01 CV (µA), 2 minutes	after reaching rated voltage	, 20 °C *CV = (Capacitance in μ F) x (Rated voltage in V)				
Dissipation factor (tan δ)			ned characteristics list				
Surge voltage (V)			25 (15 ℃ to 35 ℃)				
	+125 ℃ ± 2 ℃, 4000 h, apply 1		out exceeding the rated voltage.				
	Capacitance change	Within ±30% of the initial	value				
Endurance 1	Dissipation factor (tan δ)	≤ 200 % of the initial limit					
	E.S.R.	≦ 200 % of the initial limit	t				
	Leakage current	Within the initial limit					
	+135 \degree ± 2 \degree , 4000 h, apply the rated ripple current without exceeding the rated voltage.						
	Capacitance change	Within ±30% of the initial value					
Endurance 2	Dissipation factor (tan δ)	≤ 200 % of the initial limit	-				
	E.S.R.	≦ 200 % of the initial limit	t				
	Leakage current	Within the initial limit					
	After storage for 1000 hours at						
Shelf life	stabilized at +20℃, capacitors	shall meet the limits specif	ied in endurance.				
	(With voltage treatment)						
	+85 ℃ ± 2 ℃, 85 % to 90 %R						
Damp heat	Capacitance change	Within ±30% of the initial					
(Load)	Dissipation factor (tan δ)	≤ 200 % of the initial limit	-				
(2000)	E.S.R.	≤ 200 % of the initial limit	t				
	Leakage current	Within the initial limit					
	After reflow soldering and then	being stabilized at +20℃,	capacitors shall meet the				
Resistance to	following limits.						
soldering heat	Capacitance change	Within ±10% of the initial	value				
bolaoning noat	Dissipation factor (tan δ)	Within the initial limit					
	Leakage current	Within the initial limit					

Marking

Dimensions (not to scale)



Design and specifications are each subject to change without notice. Ask factory for the current technical specifications before purchase and/or use Design and specifications are each subject to change without router router, some subject to change without router router, some subject to contact us immediately. 39

ZS series

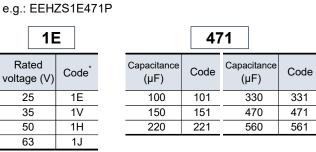
Explanation of part numbers

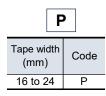
♦ Part number system

EEH	
Product	



0	
16	
Rated voltage (V)	Code
25	1E
35	1V
50	1H
63	1.1





Replace for the following configuration Configuration Code Vibration V proof

*: If the total figures number of the part number exceeds 12 figures, "1" is omitted.

Code

ZS

Characteristics list

Endurance 1 : 125 ℃ 4000 h Endurance 2 : 135 °C 4000 h

		Case size (mm)					Specif	ication		Part n	Min. packaging	
Rated Capacitance voltage (±20 %)	۳D	øD		Size code		current ^{*1} rms)	ESR ^{*2}	tan δ ^{*3}	Standard	Vibration-proof	q'ty (pcs)	
(V)	(µF)	ØD	Standard	Vibration		Endurance 1	Endurance 2	(mΩ)	tan o -	product	product	Taping
				-proof		(+125℃)	(+135℃)					1 0
25	470	10.0	12.5	12.8	G12	3500	2500	14	0.14	EEHZS1E471P	EEHZS1E471V	400
25	560	10.0	16.5	16.8	G16	4000	2900	11	0.14	EEHZS1E561P	EEHZS1E561V	250
35	330	10.0	12.5	12.8	G12	3500	2500	14	0.12	EEHZS1V331P	EEHZS1V331V	400
30	470	10.0	16.5	16.8	G16	4000	2900	11	0.12	EEHZS1V471P	EEHZS1V471V	250
50	150	10.0	12.5	12.8	G12	3200	2250	17	0.10	EEHZS1H151P	EEHZS1H151V	400
50	220	10.0	16.5	16.8	G16	3700	2600	13	0.10	EEHZS1H221P	EEHZS1H221V	250
63	100	10.0	12.5	12.8	G12	3000	2100	19	0.08	EEHZS1J101P	EEHZS1J101V	400
	150	10.0	16.5	16.8	G16	3500	2400	15	0.08	EEHZS1J151P	EEHZS1J151V	250

*1: Ripple current (100 kHz / +125 ℃ or +135 ℃)

*2: ESR (100 kHz / +20 ℃)

*3: tan δ (120 Hz / +20 °C)

◆ Please refer to the page of "Reflow profile" and "The taping dimensions".

• The dimensions of the vibration-proof products, please refer to the page of the mounting specification.

Frequency correction factor for ripple current

Rated capacitance (C)	Frequency (f)	100 Hz ≦ f < 200 Hz	200 Hz ≦ f < 300 Hz	300 Hz ≦ f < 500 Hz	500 Hz ≦ f < 1 kHz
100 µF ≦ C < 150 µF	Correction	0.15	0.20	0.25	0.30
150 µF ≦ C	factor	0.15	0.25	0.25	0.30
Rated capacitance (C)	Frequency (f)	1 kHz ≦ f < 2 kHz	2 kHz ≦ f < 3 kHz	3 kHz ≦ f < 5 kHz	5 kHz ≦ f < 10 kHz
100 µF ≦ C < 150 µF	Correction	0.40	0.45	0.55	0.60
150 µF ≦ C	factor	0.45	0.50	0.60	0.65
Rated capacitance (C)	Frequency (f)	10 kHz ≦ f < 15 kHz	15 kHz ≦ f < 20 kHz	20 kHz ≦ f < 30 kHz	30 kHz ≦ f < 40 kHz
100 µF ≦ C < 150 µF	Correction	0.70	0.75	0.80	0.80
150 µF ≦ C	factor	0.75	0.80	0.85	0.85
Rated capacitance (C)	Frequency (f)	40 kHz ≦ f < 50 kHz	50 kHz ≦ f < 100 kHz	100 kHz ≦ f < 500 kHz	500 kHz ≦ f
100 µF ≦ C < 150 µF	Correction	0.85	0.90	1.00	1.00
150 µF ≦ C	factor	0.85	0.90	1.00	1.00





High temperature lead-free reflow

Hybrid

Conductive Polymer Hybrid Aluminum Electrolytic Capacitors Surface Mount Type



Features

ZSU series

- Endurance: 4000 h at 135 °C / 125 °C
- Large capacitance compared with ZS series
- Vibration-proof product is available upon request.
- AEC-Q200 compliant
- RoHS compliant

Specifications

Specifications									
Size code	G12			G16					
Category temp. range			o +135 ℃						
Rated voltage range			o 63 V						
Nominal capacitance range	120 µF to 6								
Capacitance tolerance			±20 % (120 Hz / +20 ℃)						
Leakage current	$I \leq 0.01 \text{ CV} (\mu A), 2 \text{ minutes}$	after reaching rated voltage	<u>, 20 °C *CV = (</u>	Capacitance in µF) x (Rated voltage in V)					
Dissipation factor (tan δ)		Please see the attach							
Surge voltage (V)	1405 °C + 0 °C 4000 h annh t	Rated voltage × 1.							
		$C \pm 2 $ °C, 4000 h, apply the rated ripple current without exceeding the rated voltage. Apacitance change Within ±30% of the initial value							
	Dissipation factor (tan δ)	J J							
	E.S.R.	$\leq 200 \%$ of the initial limit							
Endurance 1	Leakage current	Within the initial limit	ι						
	0	Size code							
	ESR after endurance	G12	G16						
	(Ω / 100 kHz)(-40 ℃)	0.3	0.3						
	+135 °C ± 2 °C, 4000 h, apply t	he rated ripple current with	out exceeding	the rated voltage.					
	Capacitance change	Within ±30% of the initial	value						
	Dissipation factor (tan δ)	≦ 200 % of the initial limi	t						
Endurance 2	E.S.R.	\leq 200 % of the initial limi	t						
	Leakage current	Within the initial limit		1					
	ESR after endurance	Size code	- 010						
	(Ω / 100 kHz)(-40 ℃)	G12	G16	-					
	After storage for 1000 hours at	0.3	0.3	ad than haing					
Shelf life	stabilized at +20°C, capacitors								
Shell life	(With voltage treatment)	shall meet the limits speci		ce.					
	+85 °C ± 2 °C. 85 % to 90 %RF	2000 h rated voltage ap	olied						
Dama haat	Capacitance change Within ±30% of the initial value								
Damp heat	Dissipation factor (tan δ) ≤ 200 % of the initial limit								
(Load)	E.S.R.	≦ 200 % of the initial limit							
		Leakage current Within the initial limit							
	After reflow soldering and then	being stabilized at +20℃,	capacitors sha	Il meet the					
Resistance to	following limits.								
soldering heat	Capacitance change	Within ±10% of the initial value							
condoning nout	Dissipation factor (tan δ)	Within the initial limit							
	Leakage current	Within the initial limit							
Marking	Dimensions (not to scale)							
Example : 25 V 680 μF	[Standard] 0.3 max								
Marking color : BLACK									
Negative polarity marking (–)	0 ± 0.5			Unit : mm					
		Size	code øD	L A, B H I W P					
Capacitance (µF)	L±0			2.5 10.3 11.0±0.2 3.2 1.2±0.2 4.6					
Series	Pressure relie	f () Reference size G	16 10.0 10	6.5 10.3 11.0±0.2 3.2 1.2±0.2 4.6					
identifica		nreducti							
	[Vibration-proof		⊖ k						
E ZS									
		0.5							
			* # [©] / ~						
Rated voltage co	de		J Y d b=						
Lot number		/ L±0.3							
			<i>γ</i> → *						

Lot number R. voltage code Unit:V 25 V 35 50 н

J

() Reference size Size code øD Α, Β Н W R L F 12.8 10.3 11.0±0.2 0 to +0.15 4.6 0.70±0.2 G12 10.0 3.2 1.2±0.2 63 G16 10.0 16.8 10.3 11.0±0.2 0 to +0.15 3.2 1.2±0.2 4.6 0.70±0.2 6.9

Pressure relief

Supportive terminals

Design and specifications are each subject to change without notice. Ask factory for the current technical specifications before purchase and/or use.

Should a safety concern arise regarding this product, please be sure to contact us immediately. 41

Unit : mm

Т

1.3±0.2

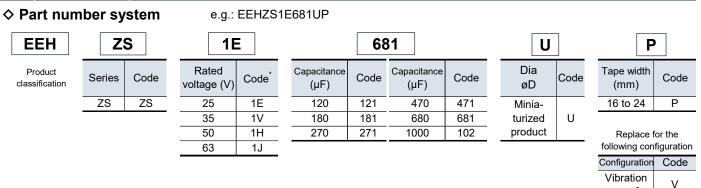
1.3±0.2

S

6.9

ZSU series

Explanation of part numbers



*: If the total figures number of the part number exceeds 12 figures, "1" is omitted.

Characteristics list

Endurance 1 : 125 °C 4000 h Endurance 2 : 135 °C 4000 h

proof

			Case size (mm)	Э			Specif	ification Part number			umber	Min. packaging
Rated voltage (V)	Capacitance L (±20 %) (µF) ØD	L	Size Ripple current ^{*1} code (mA rms)			ESR ^{*2} tan δ ^{*3}		_{δ^{*3}} Standard	Vibration-proof	q'ty (pcs)		
. ,	(1 7	~2	Standard	Vibration -proof		Endurance 1	Endurance 2	(mΩ)	turi o	product	product	Taping
						125 ℃	135 ℃					
25	680	10.0	12.5	12.8	G12	3500	2500	14	0.14	EEHZS1E681UP	EEHZS1E681UV	400
25	1000	10.0	16.5	16.8	G16	4000	2900	11	0.14	EEHZS1E102UP	EEHZS1E102UV	250
35	470	10.0	12.5	12.8	G12	3500	2500	14	0.12	EEHZS1V471UP	EEHZS1V471UV	400
35	680	10.0	16.5	16.8	G16	4000	2900	11	0.12	EEHZS1V681UP	EEHZS1V681UV	250
50	180	10.0	12.5	12.8	G12	3200	2250	17	0.10	EEHZS1H181UP	EEHZS1H181UV	400
50	270	10.0	16.5	16.8	G16	3700	2600	13	0.10	EEHZS1H271UP	EEHZS1H271UV	250
63	120	10.0	12.5	12.8	G12	3000	2100	19	0.08	EEHZS1J121UP	EEHZS1J121UV	400
	180	10.0	16.5	16.8	G16	3500	2400	15	0.08	EEHZS1J181UP	EEHZS1J181UV	250

*1: Ripple current (100 kHz / +125 °C or 135 °C)

*2: ESR (100 kHz / +20 °C)

*3: tan δ (120 Hz / +20 °C)

◆ Please refer to the page of "Reflow profile" and "The taping dimensions".

• The dimensions of the vibration-proof products, please refer to the page of the mounting specification.

Frequency correction factor for ripple current

Rated capacitance (C)	Frequency (f)	100 Hz ≦ f < 120 Hz	120 Hz ≦ f < 200 Hz	200 Hz ≦ f < 300 Hz	300 Hz ≦ f < 500 Hz
120 µF ≦ C	Correction factor	0.15	0.20	0.25	0.30
Rated capacitance (C)	Frequency (f)	500 Hz ≦ f < 1 kHz	1 kHz ≦ f < 2 kHz	2 kHz ≦ f < 3 kHz	3 kHz ≦ f < 5 kHz
120 µF ≦ C	Correction factor	0.40	0.50	0.60	0.65
Rated capacitance (C)	Frequency (f)	5 kHz ≦ f < 10 kHz	10 kHz ≦ f < 15 kHz	15 kHz ≦ f < 20 kHz	20 kHz ≦ f < 30 kHz
120 µF ≦ C	Correction factor	0.70	0.75	0.80	0.85
Rated capacitance (C)	Frequency (f)	30 kHz ≦ f < 50 kHz	50 kHz ≦ f < 100 kHz	100 kHz ≦ f < 500 kHz	500 kHz ≦ f < 1000 kHz
120 µF ≦ C	Correction factor	0.85	0.90	1.00	1.00

Design and specifications are each subject to change without notice. Ask factory for the current technical specifications before purchase and/or use. Design and specifications are each subject to change without notice, the subject to change without notice, the subject to contact us immediately. Should a safety concern arise regarding this product, please be sure to contact us immediately. 42

INDUSTRY

Conductive Polymer Hybrid Aluminum Electrolytic Capacitors



Surface Mount Type

ZU series

High temperature lead-free reflow

Features

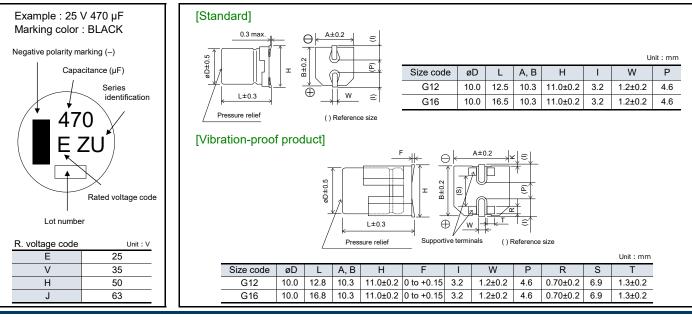
- Endurance: 4000 h at 135 °C / 125 °C
- High ripple current compared with ZS series
- Vibration-proof product is available upon request.
- AEC-Q200 compliant
- RoHS compliant

Specifications

Specifications							
Size code	G12		G16				
Category temp. range	−55 ℃ to +135 ℃						
Rated voltage range		25 V t	o 63 V				
Nominal capacitance range	100 µF to 4		150 μF to 560 μF				
Capacitance tolerance		±20 % (120	Hz / +20 ℃)				
Leakage current	I ≦ 0.01 CV (µA), 2 minutes		, 20 ℃ *CV = (Capacitance in µF) x (Rated voltage in V)				
Dissipation factor (tan δ)			ned characteristics list				
Surge voltage (V)			25 (15 ℃ to 35 ℃)				
		he rated ripple current with	out exceeding the rated voltage				
		Capacitance change Within ±30% of the initial value					
Endurance 1	Dissipation factor (tan δ)	\leq 200 % of the initial limit	-				
	E.S.R.	\leq 200 % of the initial limit	t				
	Leakage current	Within the initial limit					
			out exceeding the rated voltage				
	Capacitance change	Within ±30% of the initial					
Endurance 2	Dissipation factor (tan δ)	≤ 200 % of the initial limit					
	E.S.R. $\leq 200 \%$ of the initial limit						
	Leakage current	Within the initial limit					
	After storage for 1000 hours at +135 $^{\circ}$ C \pm 2 $^{\circ}$ with no voltage applied and then being						
Shelf life	stabilized at +20 $^\circ$ c, capacitors shall meet the limits specified in endurance 2.						
	(With voltage treatment)						
	85 ℃ ± 2 ℃, 85 % to 90 %RH,	2000 h, rated voltage appl	ied				
Damp heat	Capacitance change	Within ±30% of the initial					
(Load)	Dissipation factor (tan δ)	≤ 200 % of the initial limit					
(/	E.S.R.	≤ 200 % of the initial limit	t				
	Leakage current	Within the initial limit					
	After reflow soldering and then	being stabilized at +20 °C,	capacitors shall meet the				
Resistance to	following limits.	Mithin 1400/ of the initial					
soldering heat	Capacitance change	Within ±10% of the initial	value				
	Dissipation factor (tan δ)	Within the initial limit					
	Leakage current	Within the initial limit					

Marking

Dimensions (not to scale)



Design and specifications are each subject to change without notice. Ask factory for the current technical specifications before purchase and/or use.

Should a safety concern arise regarding this product, please be sure to contact us immediately.

ZU series

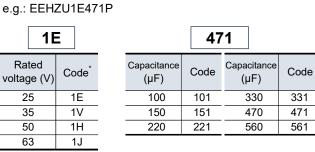
Explanation of part numbers

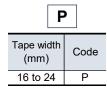
♦ Part number system

EEH Product classification



16	Ξ
Rated voltage (V)	Code [*]
25	1E
35	1V
50	1H
63	1J





Replace for the following configuration Configuration Code Vibration V proof

*: If the total figures number of the part number exceeds 12 figures, "1" is omitted.

Characteristics list

Endurance 1 : 125 °C 4000 h Endurance 2 : 135 °C 4000 h

			Case size (mm)	9			Specif	ication		Part number		Min. packaging
Rated voltage	Capacitance (±20 %)		l	-	Size code			ESR ^{*2}		Standard	Vibration-proof	q'ty (pcs)
(V)	(µF)	øD	Standard	Vibration	0000	Endurance 1	Endurance 2	(mΩ)		product	product	Taping
			Stanuaru	-proof		(+125℃)	(+135℃)				raping	
25	470	10.0	12.5	12.8	G12	5000	3500	10	0.14	EEHZU1E471P	EEHZU1E471V	400
25	560	10.0	16.5	16.8	G16	5800	4000	8	0.14	EEHZU1E561P	EEHZU1E561V	250
35	330	10.0	12.5	12.8	G12	4800	3300	11	0.12	EEHZU1V331P	EEHZU1V331V	400
- 35	470	10.0	16.5	16.8	G16	5500	3800	9	0.12	EEHZU1V471P	EEHZU1V471V	250
50	150	10.0	12.5	12.8	G12	4600	3200	12	0.10	EEHZU1H151P	EEHZU1H151V	400
50	220	10.0	16.5	16.8	G16	5200	3600	10	0.10	EEHZU1H221P	EEHZU1H221V	250
63	100	10.0	12.5	12.8	G12	4600	3200	12	0.08	EEHZU1J101P	EEHZU1J101V	400
	150	10.0	16.5	16.8	G16	5200	3600	10	0.08	EEHZU1J151P	EEHZU1J151V	250

*1: Ripple current (100 kHz / +125 ℃ or + 135℃)

*2: ESR (100 kHz / +20 °C)

*3: tan δ (120 Hz / +20 °C)

◆ Please refer to the page of "Reflow profile" and "The taping dimensions".

• The dimensions of the vibration-proof products, please refer to the page of the mounting specification.

Frequency correction factor for ripple current

Rated capacitance (C)	Frequency (f)	100 Hz ≦ f < 200 Hz	200 Hz ≦ f < 300 Hz	300 Hz ≦ f < 500 Hz	500 Hz ≦ f < 1 kHz
100 µF ≦ C < 150 µF	Correction	0.15	0.20	0.25	0.30
150 µF ≦ C	factor	0.15	0.25	0.25	0.30
				-	
Rated capacitance (C)	Frequency (f)	1 kHz ≦ f < 2 kHz	2 kHz ≦ f < 3 kHz	3 kHz ≦ f < 5 kHz	5 kHz ≦ f < 10 kHz
100 µF ≦ C < 150 µF	Correction	0.40	0.45	0.55	0.60
150 µF ≦ C	factor	0.45	0.50	0.60	0.65
			-		
Rated capacitance (C)	Frequency (f)	10 kHz ≦ f < 15 kHz	15 kHz ≦ f < 20 kHz	20 kHz ≦ f < 30 kHz	30 kHz ≦ f < 40 kHz
100 µF ≦ C < 150 µF	Correction	0.70	0.75	0.80	0.80
150 µF ≦ C	factor	0.75	0.80	0.85	0.85
Rated capacitance (C)	Frequency (f)	40 kHz ≦ f < 50 kHz	50 kHz ≦ f < 100 kHz	100 kHz ≦ f < 500 kHz	500 kHz ≦ f
100 µF ≦ C < 150 µF	Correction	0.85	0.90	1.00	1.00
150 µF ≦ C	factor	0.85	0.90	1.00	1.00

After endurance ESR (100 kHz, -40°C)

Size code	G12	G16
ESR (Ω)	0.3	0.3

Design and specifications are each subject to change without notice. Ask factory for the current technical specifications before purchase and/or use. Design and specifications are each subject to change without house, restriction, re

INDUSTRY

Conductive Polymer Hybrid Aluminum Electrolytic Capacitors



Surface Mount Type

ZUU series High temperature lead-free reflow

Features

- Endurance: 4000 h at 135 °C / 125 °C
- Higher ripple current (max 160 % of ZS series)
- Larger capacitance (max 180 % of ZU series)
- AEC-Q200 compliant
- RoHS compliant

Specifications						
Size code	G12	2 G16				
Category temp. range		–55 °C to +135 °C				
Rated voltage range		25 V to 63 V				
Nominal capacitance range	120 µF to	680 μF 180 μF to 1000 μF				
Capacitance tolerance		±20 % (120 Hz / +20 ℃)				
Leakage current	I ≦ 0.01 CV (μA), 2 minute	s after reaching rated voltage, 20 °C *CV = (Capacitance in μ F) x (Rated voltage in V)				
Dissipation factor (tan δ)		Please see the attached characteristics list				
Surge voltage (V)		Rated voltage × 1.25 (15 $^{\circ}$ C to 35 $^{\circ}$ C)				
		the rated ripple current without exceeding the rated voltage				
	Capacitance change	Within ±30% of the initial value				
	Dissipation factor (tan δ)	\leq 200 % of the initial limit				
Endurance 1	E.S.R.	\leq 200 % of the initial limit				
	Leakage current	Within the initial limit				
	ESR after endurance	Size code				
	(Ω / 100 kHz)(-40 ℃)	G12 G16				
	. ,. ,	0.3 0.3				
		the rated ripple current without exceeding the rated voltage.				
	Capacitance change	Within ±30% of the initial value				
	Dissipation factor (tan δ)	$\leq 200 \%$ of the initial limit				
Endurance 2	E.S.R.	≤ 200 % of the initial limit				
	Leakage current	Within the initial limit Size code				
	ESR after endurance	G12 G16				
	(Ω / 100 kHz)(-40 ℃)	0.3 0.3				
	After storage for 1000 bours a	t +135 °C ± 2 °C with no voltage applied and then being				
Shelf life		s shall meet the limits specified in endurance.				
Shell life	(With voltage treatment)	s shall meet the limits specified in endurance.				
		l, 2000 h, rated voltage applied				
	Capacitance change	Within ±30% of the initial value				
Damp heat	Dissipation factor (tan δ)	$\leq 200 \%$ of the initial limit				
(Load)	E.S.R.	$\leq 200 \%$ of the initial limit				
	Leakage current	Within the initial limit				
		n being stabilized at +20 °C, capacitors shall meet the				
Desistance to	following limits.					
Resistance to	Capacitance change	Within ±10% of the initial value				
soldering heat	Dissipation factor (tan δ)	Within the initial limit				
	Leakage current	Within the initial limit				
Marking	Dimensions	(not to scale)				
Marking	Dimensions					
Example : 35 V 470 µF	[Standard]					
Marking color BLACK	0.3 max.					
		$- \Theta \stackrel{A \pm 0.2}{\frown} $ Unit : mm				
Negative polarity marking (-)						
Capacitance (µF)	ê / III	G12 10.0 12.5 10.3 11.0±0.2 3.2 1.2±0.2 4.6				
Series identifi	cation	$\begin{array}{c c c c c c c c c c c c c c c c c c c $				
	/ ⊷→					
	/ Pressure relief	() Reference size				
	[Vibration-proof	product] _ <u>F_₩</u> _⊖kA±0.2_¥⊻j≘j				
Poted voltage	aada					
Lot number		$\left \begin{array}{c} L \pm 0.3 \end{array} \right \oplus \left \frac{W}{W} + \frac{W}{K} \right = \left \begin{array}{c} \\ \end{array} \right $				
		Pressure relief Supportive terminals () Reference size Unit : mm				
R. voltage code Uni	it : V Size code	ØD L A, B H F I W P R S T				
E 25 H 5	50 G12 *	10.0 12.8 10.3 11.0±0.2 0 to +0.15 3.2 1.2±0.2 4.6 0.70±0.2 6.9 1.3±0.2				
V 35 J 6	G16 ·	10.0 16.8 10.3 11.0±0.2 0 to +0.15 3.2 1.2±0.2 4.6 0.70±0.2 6.9 1.3±0.2				

Design and specifications are each subject to change without notice. Ask factory for the current technical specifications before purchase and/or use. Design and specifications are each subject to change without notice, not deter, i.e., Should a safety concern arise regarding this product, please be sure to contact us immediately. 45

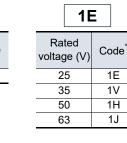
ZUU series

Explanation of part numbers

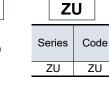
♦ Part number system



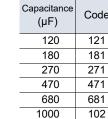
e.g.: EEHZU1E681UP

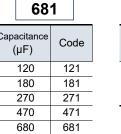


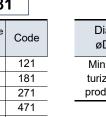
*: If the total figures number of the part number exceeds 12 figures, "1" is omitted.



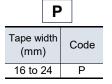












Replace for the following configuration Configuration Code Vibration V proof

Characteristics list

Endurance 1 : 125 °C 4000 h Endurance 2 : 135 °C 4000 h

			Case size (mm)	9			Specif	fication Part number		umber	Min. packaging	
Rated voltage	Capacitance (±20 %)	- D		L	Size code	ruppio ourione		ESR ^{*2} tau 5*3		standard	Vibration-proof	q'ty (pcs)
(V)	(µF)	øD	Standard	Vibration -proof		Endurance 1 (+125°C)	Endurance 2 (+135℃)	(mΩ)	tan o *	product	product	Taping
25	680	10.0	12.5	12.8	G12	5300	3700	10	0.14	EEHZU1E681UP	EEHZU1E681UV	400
25	1000	10.0	16.5	16.8	G16	6100	4300	8	0.14	EEHZU1E102UP	EEHZU1E102UV	250
35	470	10.0	12.5	12.8	G12	5000	3500	11	0.12	EEHZU1V471UP	EEHZU1V471UV	400
35	680	10.0	16.5	16.8	G16	5800	4100	9	0.12	EEHZU1V681UP	EEHZU1V681UV	250
50	180	10.0	12.5	12.8	G12	4800	3400	12	0.10	EEHZU1H181UP	EEHZU1H181UV	400
50	270	10.0	16.5	16.8	G16	5500	3800	10	0.10	EEHZU1H271UP	EEHZU1H271UV	250
63	120	10.0	12.5	12.8	G12	4800	3400	12	0.08	EEHZU1J121UP	EEHZU1J121UV	400
03	180	10.0	16.5	16.8	G16	5500	3800	10	0.08	EEHZU1J181UP	EEHZU1J181UV	250

*1: Ripple current (100 kHz / +125 °C or +135 °C)

*2: ESR (100 kHz / +20 ℃)

*3: tan δ (120 Hz / +20 °C)

◆ Please refer to the page of "Reflow profile" and "The taping dimensions".

The dimensions of the vibration-proof products, please refer to the page of the mounting specification.

Frequency correction factor for ripple current

Rated capacitance (C)	Frequency (f)	100 Hz ≦ f < 200 Hz	200 Hz ≦ f < 300 Hz	300 Hz ≦ f < 500 Hz	500 Hz ≦ f < 1 kHz	
120 μ F \leq C < 150 μ F	Correction	0.15	0.20	0.25	0.30	
150 µF ≦ C	factor	0.15	0.25	0.25	0.30	
Rated capacitance (C)	Frequency (f)	1 kHz ≦ f < 2 kHz	2 kHz ≦ f < 3 kHz	3 kHz ≦ f < 5 kHz	5 kHz ≦ f < 10 kHz	
120 μ F \leq C < 150 μ F	Correction	0.40	0.45	0.55	0.60	
150 µF ≦ C	factor	0.45	0.50	0.60	0.65	
Rated capacitance (C)	Frequency (f)	10 kHz ≦ f < 15 kHz	15 kHz ≦ f < 20 kHz	20 kHz ≦ f < 30 kHz	30 kHz ≦ f < 40 kHz	
120 μ F \leq C < 150 μ F	Correction	0.70	0.75	0.80	0.80	
150 µF ≦ C	factor	0.75	0.80	0.85	0.85	
Rated capacitance (C)	Frequency (f)	40 kHz ≦ f < 50 kHz	50 kHz ≦ f < 100 kHz	100 kHz ≦ f < 500 kHz	500 kHz \leq f < 1000 kHz	
120 μ F \leq C < 150 μ F	Correction	0.85	0.90	1.00	1.00	
150 µF ≦ C	factor	0.85	0.90	1.00	1.00	

Design and specifications are each subject to change without notice. Ask factory for the current technical specifications before purchase and/or use. Design and specifications are each subject to change without notice, the test, the Should a safety concern arise regarding this product, please be sure to contact us immediately. 46

INDUSTRY

Conductive Polymer Hybrid Aluminum Electrolytic Capacitors



Surface Mount Type

ZE series

High temperature lead-free reflow

Features

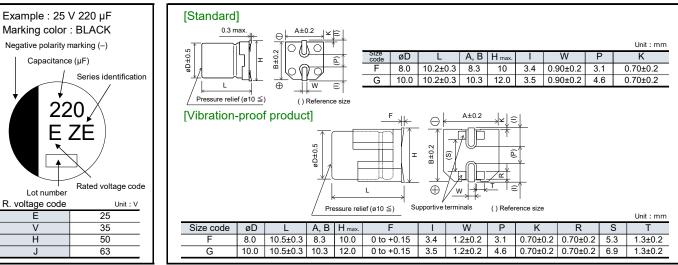
- Endurance: 2000 h at 145 ℃ (High temperature / Long life)
- Low ESR and high ripple current
- High-withstand voltage (to 63 V)
- Characteristics dependencies in frequency and low temperature are as small as polymer type
- Vibration-proof product is available upon request
- AEC-Q200 compliant
- RoHS compliant

Specifications

Specifications						
Size code	F		G			
Category temp. range	−55 ℃ to +145 ℃					
Rated voltage range	25 V to 63 V					
Nominal cap.range	33 µF to 2	20 µF	56 μF to 330 μF			
Capacitance tolerance		±20 % (120	Hz / +20 ℃)			
Leakage current	I ≦ 0.01 CV (μA), 2 minutes	after reaching rated voltage	, 20 ℃ *CV = (Capacitance in µF) x (Rated voltage in V)			
Dissipation factor (tan δ)			ned characteristics list			
Surge voltage (V)		Rated voltage × 1.	25 (15 ℃ to 35 ℃)			
	+145 ℃ ± 2 ℃, 2000 h, apply t	he rated ripple current with	out exceeding the rated voltage			
	Capacitance change	Within ±30% of the initial	value			
Endurance 1	Dissipation factor (tan δ)	≦ 200 % of the initial limit	t			
	E.S.R.	≦ 200 % of the initial limit	t			
	Leakage current	Within the initial limit				
	+135 ℃ ± 2 ℃, 4000 h, apply t	he rated ripple current with	out exceeding the rated voltage			
	Capacitance change	Within ±30% of the initial				
Endurance 2	Dissipation factor (tan δ)	≤ 200 % of the initial limitian	t			
	E.S.R.					
	Leakage current Within the initial limit					
	After storage for 1000 hours at +145 °C ± 2 °C with no voltage applied and then being					
Shelf life	stabilized at +20 °C, capacitors shall meet the limits specified in endurance 1.					
	(With voltage treatment)					
	85 ℃ ± 2 ℃, 85 % to 90 %RH,	2000 h, rated voltage appl	ied			
Damp heat	Capacitance change	Within ±30% of the initial	value			
(Load)	Dissipation factor (tan δ)	≤ 200 % of the initial limit	t			
(LOAU)	E.S.R.	≤ 200 % of the initial limit	t			
	Leakage current	Within the initial limit				
	After reflow soldering and then	being stabilized at +20 ℃,	capacitors shall meet the			
Resistance to	following limits.					
soldering heat	Capacitance change	Within ±10% of the initial	value			
solueing near	Dissipation factor (tan δ)	Within the initial limit				
	Leakage current	Within the initial limit				

Marking

Dimensions (not to scale)



Design and specifications are each subject to change without notice. Ask factory for the current technical specifications before purchase and/or use.

Should a safety concern arise regarding this product, please be sure to contact us immediately.

ZE series

Explanation of part numbers

*: If the total figures number of the part number exceeds 12 figures, "1" is omitted.

♦ Part number	e.g.:	EEHZE1E	221P			
EEH	ZE		1E			
Product classification	Series	Code		Rated voltage (V)	Code [*]	Cap
	ZE	ZE	_	25	1E	
			-	35	1V	
				50	1H	
				63	1J	

	2	21	
Capacitance (µF)	Code	Capacitance (µF)	Code
33	330	150	151
56	560	220	221
68	680	270	271
82	820	330	331
100	101		
		-	

Ρ	
Tape width (mm)	Code
16 to 24	Р

Replace for the following configuration Configuration Code Vibration V proof

Characteristics list

Endurance 1 : 145 ℃ 2000 h Endurance 2 : 135 °C 4000 h

		Case size (mm)				Specification			Part number		Min. packaging	
Rated voltage	Capacitance (±20 %) (µF)		L				current ^{*1} A rms) ESR ^{*2}			Standard	Vibration-proof	q'ty (pcs)
(V)		øD Standard		Vibration	oode		,	(mO)	tan δ ^{*3}	product	product	Tanina
			Standard	tandard -proof	Endurance 1 Endurance 2 (+145°C) (+135°C)					Taping		
	220	8.0	10.2	10.5	F	700	1600	27	0.14	EEHZE1E221P	EEHZE1E221V	500
25	330	10.0	10.2	10.5	G	900	2000	20	0.14	EEHZE1E331P	EEHZE1E331V	500
35	150	8.0	10.2	10.5	F	700	1600	27	0.12	EEHZE1V151P	EEHZE1V151V	500
30	270	10.0	10.2	10.5	G	900	2000	20	0.12	EEHZE1V271P	EEHZE1V271V	500
50	68	8.0	10.2	10.5	F	600	1250	30	0.10	EEHZE1H680P	EEHZE1H680V	500
50	100	10.0	10.2	10.5	G	800	1600	28	0.10	EEHZE1H101P	EEHZE1H101V	500
	33	8.0	10.2	10.5	F	600	1100	40	0.08	EEHZE1J330P	EEHZE1J330V	500
63	56	10.0	10.2	10.5	G	800	1400	30	0.08	EEHZE1J560P	EEHZE1J560V	500
	82	10.0	10.2	10.5	G	800	1400	30	0.08	EEHZE1J820P	EEHZE1J820V	500

*1: Ripple current (100 kHz / +145 °C or + 135°C)

*2: ESR (100 kHz / +20 ℃) ◆ Please refer to the page of "Reflow profile" and "The taping dimensions".

*3: tan δ (120 Hz / +20 °C)

• The dimensions of the vibration-proof products, please refer to the page of the mounting specification.

Frequency correction factor for ripple current						
Rated capacitance (C)	Frequency (f)	100 Hz ≦ f < 200 Hz	200 Hz ≦ f < 300 Hz	300 Hz ≦ f < 500 Hz	500 Hz ≦ f < 1 kHz	
C < 47 µF	Correction	0.10	0.10	0.15	0.20	
47 μF ≦ C < 150 μF	factor	0.15	0.20	0.25	0.30	
150 µF ≦ C	Tactor	0.15	0.25	0.25	0.30	
Rated capacitance (C)	Frequency (f)	1 kHz ≦ f < 2 kHz	2 kHz ≦ f < 3 kHz	3 kHz ≦ f < 5 kHz	5 kHz ≦ f < 10 kHz	
C < 47 µF	Correction	0.30	0.40	0.45	0.50	
47 µF ≦ C < 150 µF	-	0.40	0.45	0.55	0.60	
150 µF ≦ C	factor	0.45	0.50	0.60	0.65	
Rated capacitance (C)	Frequency (f)	10 kHz ≦ f < 15 kHz	15 kHz ≦ f < 20 kHz	20 kHz ≦ f < 30 kHz	30 kHz ≦ f < 40 kHz	
C < 47 µF	Correction	0.60	0.65	0.70	0.75	
47 µF ≦ C < 150 µF	factor	0.70	0.75	0.80	0.80	
150 µF ≦ C	Tactor	0.75	0.80	0.85	0.85	
Rated capacitance (C)	Frequency (f)	40 kHz ≦ f < 50 kHz	50 kHz ≦ f < 100 kHz	100 kHz ≦ f < 500 kHz	500 kHz ≦ f	
C < 47 µF	Correction	0.80	0.85	1.00	1.05	
47 µF ≦ C < 150 µF	factor	0.85	0.90	1.00	1.00	
150 µF ≦ C		0.85	0.90	1.00	1.00	

After en	durance ES	R (100 kł	Hz, -40°C)
Size code	F	G	
ESR (Ω)	0.4	0.3	_

Design and specifications are each subject to change without notice. Ask factory for the current technical specifications before purchase and/or use. Design and specifications are each subject to change without notice, not determined. Should a safety concern arise regarding this product, please be sure to contact us immediately. 48

INDUSTRY

Conductive Polymer Hybrid Aluminum Electrolytic Capacitors



Surface Mount Type

ZF series

High temperature lead-free reflow

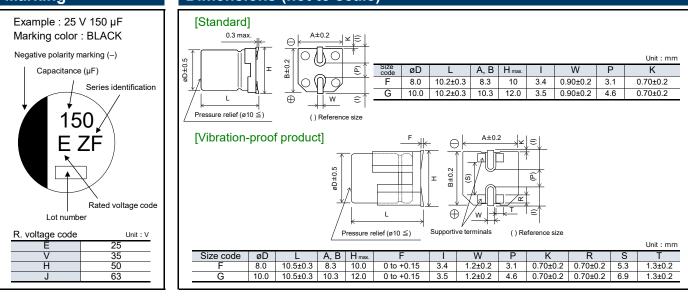
Features

- Endurance : 1000 h at 150 ℃ (High temperature)
- Low ESR and high ripple current
- High-withstand voltage (to 63 V)
- Vibration-proof product is available upon request
- AEC-Q200 compliant
- RoHS compliant

Specifications						
Size code	F			G		
Category temp. range		−55 ℃ to +150 ℃				
Rated voltage range		:	25 V to 63 V			
Nominal cap.range	33 µF to 1	50 µF		56 μF to 270 μF		
Capacitance tolerance		±20 %	o (120 Hz / +20℃)			
Leakage current	I ≦ 0.01 CV (µA), 2 minutes			(Capacitance in µF) x (Rated voltage in V)		
Dissipation factor (tan δ)			attached characteri			
Surge voltage (V)			e × 1.25 (15 ℃ to 3			
	+150 ℃ ± 2 ℃, 1000 h, apply t			the rated voltage.		
	Capacitance change	Within ±30% of the	initial value			
	Dissipation factor (tan δ)	\leq 200 % of the initia	al limit			
Endurance	ESR	\leq 200 % of the initial limit				
Endurance	Leakage current	Within the initial limit				
	ESR after endurance (Ω / 100 kHz)(-40 ℃)	Size				
		F	G			
		0.4	0.3			
	After storage for 1000 hours at +150 $^{\circ}$ C ± 2 $^{\circ}$ C with no voltage applied and then being					
Shelf life	stabilized at +20 ℃, capacitors	s shall meet the limits	s specified in endura	ance.		
	(With voltage treatment)					
	+85 ℃ ± 2 ℃, 85 % to 90 %RH					
	Capacitance change	Within ±30% of the				
Damp heat (Load)	Dissipation factor (tan δ)	\leq 200 % of the initia				
	ESR	\leq 200 % of the initia				
	Leakage current	Within the initial lim				
	After reflow soldering and then	being stabilized at +2	20 °C, capacitors sh	all meet the		
Resistance to	following limits.	Within ±10% of the	initial value			
soldering heat	Capacitance change					
-	Dissipation factor (tan δ)	Within the initial lim				
	Leakage current	Within the initial lim	IL			

Marking

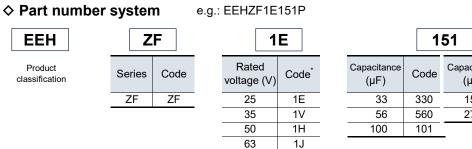
Dimensions (not to scale)



Design and specifications are each subject to change without notice. Ask factory for the current technical specifications before purchase and/or use. Design and specifications are each subject to change without router router, see the sum of the second secon

ZF series

Explanation of part numbers



151							
Capacitance (µF)	Code	Capacitance (µF)	Code				
33	330	150	151				
56	560	270	271				
100	101	_					

Ρ					
Tape width (mm)	Code				
16 to 24	Р				

Replace for the following configuration Configuration Code Vibration V proof

*: If the total figures number of the part number exceeds 12 figures, "1" is omitted.

Characteristics list

Case size Min.packaging Specification Part number q'ty (pcs) (mm) Rated Capacitance 1 Size voltage Ripple (±20 %) ESR*2 Standard Vibration-proof code (V) (µF) øD $tan \ \delta^{^{\star 3}}$ Taping current*1 product product Vibration $(m\Omega)$ Standard (mA rms) -proof 150 8.0 10.2 10.5 F 800 27 0.14 EEHZF1E151P EEHZF1E151V 500 25 270 10.0 10.2 10.5 G 1000 20 0.14 EEHZF1E271P EEHZF1E271V 500 F 770 100 8.0 10.2 10.5 30 0.12 EEHZF1V101P EEHZF1V101V 500 35 150 10.0 10.2 10.5 950 23 0.12 EEHZF1V151P EEHZF1V151V 500 G F 700 0.10 EEHZF1H560P EEHZF1H560V 500 56 8.0 10.2 10.5 35 50 100 10.0 10.2 10.5 G 900 28 0.10 EEHZF1H101P EEHZF1H101V 500 10.5 0.08 EEHZF1J330P 500 33 8.0 10.2 F 650 40 EEHZF1J330V 63 56 10.0 10.2 10.5 G 840 30 0.08 EEHZF1J560P EEHZF1J560V 500

*1: Ripple current (100 kHz / +150 ℃)

*2: ESR (100 kHz / +20 ℃)

*3: tan δ (120 Hz / +20 °C)

◆ Please refer to the page of "Reflow profile" and "The taping dimensions".

The dimensions of the vibration-proof products, please refer to the page of the mounting specification.

Frequency correction factor for ripple current

Rated capacitance (C)	Frequency (f)	100 Hz ≦ f < 200 Hz	200 Hz ≦ f < 300 Hz	300 Hz ≦ f < 500 Hz	500 Hz ≦ f < 1 kHz
C < 47 μF		0.10	0.10	0.15	0.20
47 µF ≦ C < 150 µF	Correction factor	0.15	0.20	0.25	0.30
150 µF ≦ C		0.15	0.25	0.25	0.30
Rated capacitance (C)	Frequency (f)	1 kHz ≦ f < 2 kHz	2 kHz ≦ f < 3 kHz	3 kHz ≦ f < 5 kHz	5 kHz ≦ f < 10 kHz
C < 47 µF		0.30	0.40	0.45	0.50
47 µF ≦ C < 150 µF	Correction factor	0.40	0.45	0.55	0.60
150 µF ≦ C		0.45	0.50	0.60	0.65
Rated capacitance (C)	Frequency (f)	10 kHz ≦ f < 15 kHz	15 kHz ≦ f < 20 kHz	20 kHz ≦ f < 30 kHz	30 kHz ≦ f < 40 kHz
C < 47 µF		0.60	0.65	0.70	0.75
47 µF ≦ C < 150 µF	Correction factor	0.70	0.75	0.80	0.80
150 µF ≦ C		0.75	0.80	0.85	0.85
Rated capacitance (C)	Frequency (f)	40 kHz ≦ f < 50 kHz	50 kHz ≦ f < 100 kHz	100 kHz ≦ f < 500 kHz	500 kHz ≦ f
C < 47 µF		0.80	0.85	1.00	1.05
47 µF ≦ C < 150 µF	Correction factor	0.85	0.90	1.00	1.00
150 µF ≦ C		0.85	0.90	1.00	1.00

Design and specifications are each subject to change without notice. Ask factory for the current technical specifications before purchase and/or use. Design and specifications are each subject to change without nearest, should a safety concern arise regarding this product, please be sure to contact us immediately. 50

Endurance : 150 °C 1000 h

INDUSTRY

Conductive Polymer Hybrid Aluminum Electrolytic Capacitors



Hybrid

Radial Lead Type **ZA-A** series

Features

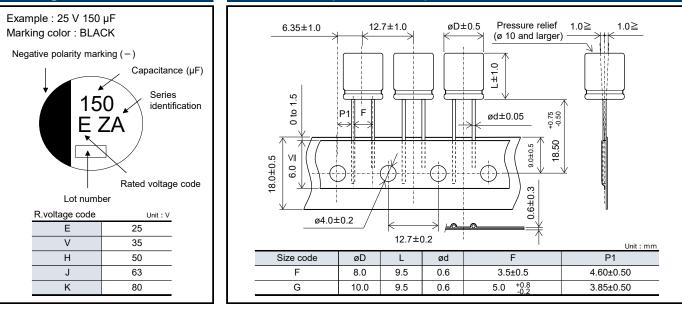
- Endurance : 10000 h at 105 °C (105 °C standard product)
- Taping products for automatic insertion
- AEC-Q200 compliant
- RoHS compliant

Specifications

Specifications					
Size code	F		G		
Category temp. range		_55 ℃ to) +105 ℃		
Rated voltage range		25 V te	o 80 V		
Nominal cap.range	22 µF to 22	20 µF	33 μF to 330 μF		
Capacitance tolerance		±20 % (120	Hz / +20℃)		
Leakage current	I ≦ 0.01 CV (µA), 2 minutes	after reaching rated voltage,	, 20 °C *CV = (Capacitance in μ F) x (Rated voltage in V)		
Dissipation factor (tan δ)		Please see the attach	ed characteristics list		
Surge voltage (V)		Rated voltage × 1.2	25 (15 ℃ to 35 ℃)		
	+105 $^{\circ}$ C ± 2 $^{\circ}$ C, 10000 h, apply the rated ripple current without exceeding the rated voltage.				
	Capacitance change	Within ±30% of the initial	value		
	Dissipation factor (tan δ)	≤ 200 % of the initial limit			
Endurance	ESR	≦ 200 % of the initial limit			
Lindulatice	Leakage current	Within the initial limit			
	ESR after endurance	Size code			
	(Ω / 100 kHz)(-40 ℃)	F G			
		0.4 0.3			
	After storage for 1000 hours at				
Shelf life	stabilized at +20 °C, capacitors	s shall meet the limits spec	ified in endurance.		
	(With voltage treatment)				
	+85 °C ± 2 °C, 85 % to 90 %RH				
	Capacitance change	Within ±30% of the initial			
Damp heat (Load)	Dissipation factor (tan δ)	≦ 200 % of the initial limit			
	ESR	≤ 200 % of the initial limit			
	Leakage current	Within the initial limit			
	After flow soldering and then be	eing stabilized at +20 ℃, ca	apacitors shall meet the		
Resistance to	following limits.	1			
soldering heat	Capacitance change	Within ±10% of the initial	value		
conserving noar	Dissipation factor (tan δ)	Within the initial limit			
	Leakage current	Within the initial limit			

Marking

Dimensions (not to scale)



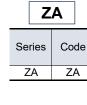
Design and specifications are each subject to change without notice. Ask factory for the current technical specifications before purchase and/or use. Design and specifications are each subject to charge managements are each subject to charge managements and specifications are each specifications are e

ZA-A series

Explanation of part numbers

♦ Part number system

EEHA Product classification



1	Ε	
Rated voltage (V)	Code [*]	
25	1E	
35	1V	
50	1H	

1J

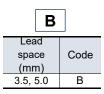
1K

e.g.: EEHAZA1E151B

63

80

		1	51	
	Capacitance (µF)	Code	Capacitance (µF)	Code
_	22	220	82	820
_	33	330	100	101
_	47	470	150	151
_	56	560	220	221
	68	680	330	331



*: If the total figures number of the part number exceeds 12 figures, "1" is omitted.

Characteristics list

Endurance : 105 ℃ 10000 h

			Case size (mm)	9		S	pecification			Min.packaging q'ty (pcs)
Rated voltage (V)	Capacitance (±20 %) (µF)	øD	L	ød	Size code	Ripple current ^{*1} (mA rms)	ESR ^{*2} (mΩ)	tan δ ^{*3}	Part number	Taping
	150	8.0	9.5	0.6	F	2300	27	0.14	EEHAZA1E151B	1000
25	220	8.0	9.5	0.6	F	2300	27	0.14	EEHAZA1E221B	1000
	330	10.0	9.5	0.6	G	2500	20	0.14	EEHAZA1E331B	500
	100	8.0	9.5	0.6	F	2300	27	0.12	EEHAZA1V101B	1000
35	150	8.0	9.5	0.6	F	2300	27	0.12	EEHAZA1V151B	1000
30	220	10.0	9.5	0.6	G	2500	20	0.12	EEHAZA1V221B	500
	270	10.0	9.5	0.6	G	2500	20	0.12	EEHAZA1V271B	500
	47	8.0	9.5	0.6	F	1800	30	0.10	EEHAZA1H470B	1000
50	68	8.0	9.5	0.6	F	1800	30	0.10	EEHAZA1H680B	1000
	100	10.0	9.5	0.6	G	2000	28	0.10	EEHAZA1H101B	500
	33	8.0	9.5	0.6	F	1700	40	0.08	EEHAZA1J330B	1000
	47	8.0	9.5	0.6	F	1700	40	0.08	EEHAZA1J470B	1000
63	56	10.0	9.5	0.6	G	1800	30	0.08	EEHAZA1J560B	500
	68	10.0	9.5	0.6	G	1800	30	0.08	EEHAZA1J680B	500
	82	10.0	9.5	0.6	G	1800	30	0.08	EEHAZA1J820B	500
	22	8.0	9.5	0.6	F	1550	45	0.08	EEHAZA1K220B	1000
80	33	10.0	9.5	0.6	G	1700	36	0.08	EEHAZA1K330B	500
	47	10.0	9.5	0.6	G	1700	36	0.08	EEHAZA1K470B	500

*1: Ripple current (100 kHz / +105 ℃)

*2: ESR (100 kHz / +20 ℃)

*3: tan δ (120 Hz / +20 °C)

◆ Please refer to the page of "Flow soldering profile" and "The taping dimensions".

Frequency correction factor for ripple current

Rated capacitance (C)	Frequency (f)	100 Hz ≦ f < 200 Hz	200 Hz ≦ f < 300 Hz	300 Hz ≦ f < 500 Hz	500 Hz ≦ f < 1 kHz
C < 47 µF	Correction	0.10	0.10	0.15	0.20
47 μF ≦ C < 150 μF	factor	0.15	0.20	0.25	0.30
150 µF ≦ C		0.15	0.25	0.25	0.30
Rated capacitance (C)	Frequency (f)	1 kHz ≦ f < 2 kHz	2 kHz ≦ f < 3 kHz	3 kHz ≦ f < 5 kHz	5 kHz ≦ f < 10 kHz
C < 47 µF	Correction	0.30	0.40	0.45	0.50
47 μF ≦ C < 150 μF	factor	0.40	0.45	0.55	0.60
150 µF ≦ C		0.45	0.50	0.60	0.65
Rated capacitance (C)	Frequency (f)	10 kHz ≦ f < 15 kHz	15 kHz ≦ f < 20 kHz	20 kHz ≦ f < 30 kHz	30 kHz ≦ f < 40 kHz
C < 47 μF	Correction	0.60	0.65	0.70	0.75
47 μF ≦ C < 150 μF	factor	0.70	0.75	0.80	0.80
150 µF ≦ C		0.75	0.80	0.85	0.85
Rated capacitance (C)	Frequency (f)	40 kHz ≦ f < 50 kHz	50 kHz ≦ f < 100 kHz	100 kHz ≦ f < 500 kHz	500 kHz ≦ f < 1000 kHz
C < 47 µF	Correction	0.80	0.85	1.00	1.05
47 μF ≦ C < 150 μF	factor	0.85	0.90	1.00	1.00
		0.85	0.90	1.00	1.00

Design and specifications are each subject to change without notice. Ask factory for the current technical specifications before purchase and/or use. Design and specifications are each subject to change without notice, risk deter, risk best, risk be

Panasonic **INDUSTRY**

Conductive Polymer Hybrid Aluminum Electrolytic Capacitors



Hybrid

Radial Lead Type ZC-A series

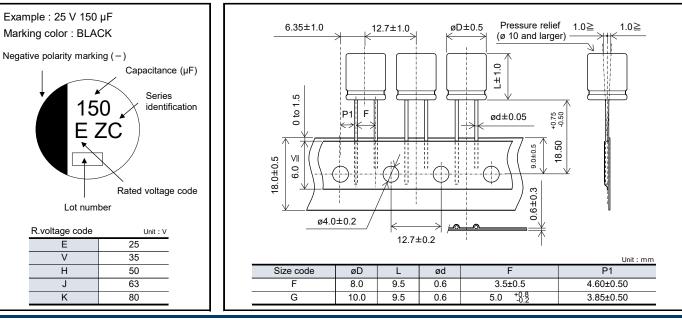
Features

- Endurance : 4000 h at 125 °C (125 °C standard product)
- Taping products for automatic insertion
- AEC-Q200 compliant
- RoHS compliant

Specifications						
Size code	F	G				
Category temp. range		–55 ℃ to +125 ℃				
Rated voltage range		25 V to 80 V				
Nominal cap.range	22 µF to 2	220 μF 33 μF to 330 μF				
Capacitance tolerance		±20 % (120 Hz / +20℃)				
Leakage current	I ≦ 0.01 CV (μA), 2 minutes	s after reaching rated voltage, 20 °C *CV = (Capacitance in μ F) x (Rated voltage in V)				
Dissipation factor (tan δ)		Please see the attached characteristics list				
Surge voltage (V)		Rated voltage × 1.25 (15 ℃ to 35 ℃)				
		the rated ripple current without exceeding the rated voltage.				
	Capacitance change	Within ±30% of the initial value				
Endurance 1	Dissipation factor (tan δ)	≦ 200 % of the initial limit				
	ESR	≦ 200 % of the initial limit				
	Leakage current	Within the initial limit				
	_ +125 ℃ ± 2 ℃, 3000 h, apply t	the rated ripple current without exceeding the rated voltage.				
	Capacitance change	Within ±30% of the initial value				
Endurance 2	Dissipation factor (tan δ)	≦ 200 % of the initial limit				
	ESR	≦ 300 % of the initial limit				
	Leakage current	Within the initial limit				
		t +125 $^{\circ}$ $^{\circ}$ $^{\circ}$ 2 $^{\circ}$ with no voltage applied and then being				
Shelf life		rs shall meet the limits specified in endurance 1.				
	(With voltage treatment)					
	<u>+85 ℃ ± 2 ℃, 85 % to 90 %R</u>	H, 2000 h, rated voltage applied				
	Capacitance change	Within ±30% of the initial value				
Damp heat (Load)	Dissipation factor (tan δ)	\leq 200 % of the initial limit				
	ESR	≦ 200 % of the initial limit				
	Leakage current	Within the initial limit				
		eing stabilized at +20 $^{\circ}$ C, capacitors shall meet the				
Resistance to	following limits.					
soldering heat	Capacitance change	Within ±10% of the initial value				
soluening heat	Dissipation factor (tan δ)	Within the initial limit				
	Leakage current	Within the initial limit				

Marking

Dimensions (not to scale)



Design and specifications are each subject to change without notice. Ask factory for the current technical specifications before purchase and/or use Design and specifications are each subject to change without notice, the test, the Should a safety concern arise regarding this product, please be sure to contact us immediately. 53

ZC-A series

Explanation of part numbers

♦ Part number system

EEHA

Product classification



 Rated voltage (V)
 Code

 25
 1E

 35
 1V

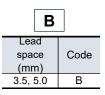
 50
 1H

 63
 1J

 80
 1K

e.g.: EEHAZC1E151B

_		1	51	
	Capacitance (µF)	Code	Capacitance (µF)	Code
-	22	220	100	101
	33	330	120	121
-	47	470	150	151
	56	560	220	221
_	68	680	270	271
	82	820	330	331



*: If the total figures number of the part number exceeds 12 figures, "1" is omitted.

Characteristics list

Endurance 1 : 125 ℃ 4000 h Endurance 2 : 125 ℃ 3000 h

		(Case size (mm)	Э			Specif	ication	-		Min.packaging q'ty (pcs)
Rated voltage (V)	Capacitance (±20 %) (µF)	øD	L	ød	Size code	(mA	current ^{*1} rms)	ESR ^{*2} (mΩ)	tan δ ^{*3}	Part number	Taping
						Endurance 1	Endurance 2				
	150	8.0	9.5	0.6	F	1600	1900	27	0.14	EEHAZC1E151B	1000
25	220	8.0	9.5	0.6	F	1600	1900	27	0.14	EEHAZC1E221B	1000
	330	10.0	9.5	0.6	G	2000	2900	20	0.14	EEHAZC1E331B	500
	100	8.0	9.5	0.6	F	1600	1900	27	0.12	EEHAZC1V101B	1000
35	150	8.0	9.5	0.6	F	1600	1900	27	0.12	EEHAZC1V151B	1000
35	220	10.0	9.5	0.6	G	2000	2800	20	0.12	EEHAZC1V221B	500
	270	10.0	9.5	0.6	G	2000	2800	20	0.12	EEHAZC1V271B	500
	47	8.0	9.5	0.6	F	1250	-	30	0.10	EEHAZC1H470B	1000
50	68	8.0	9.5	0.6	F	1250	-	30	0.10	EEHAZC1H680B	1000
50	100	10.0	9.5	0.6	G	1600	-	28	0.10	EEHAZC1H101B	500
	120	10.0	9.5	0.6	G	1600	-	28	0.10	EEHAZC1H121B	500
	33	8.0	9.5	0.6	F	1100	-	40	0.08	EEHAZC1J330B	1000
	47	8.0	9.5	0.6	F	1100	-	40	0.08	EEHAZC1J470B	1000
63	56	10.0	9.5	0.6	G	1400	-	30	0.08	EEHAZC1J560B	500
	68	10.0	9.5	0.6	G	1400	-	30	0.08	EEHAZC1J680B	500
	82	10.0	9.5	0.6	G	1400	-	30	0.08	EEHAZC1J820B	500
	22	8.0	9.5	0.6	F	1050	-	45	0.08	EEHAZC1K220B	1000
80	33	10.0	9.5	0.6	G	1360	-	36	0.08	EEHAZC1K330B	500
	47	10.0	9.5	0.6	G	1360	-	36	0.08	EEHAZC1K470B	500

*1: Ripple current (100 kHz / +125 ℃)

*2: ESR (100 kHz / +20 ℃)

*3: tan δ (120 Hz / +20 °C)

♦ Please refer to the page of "Flow soldering profile" and "The taping dimensions".

ZC-A series

Frequency correction factor for ripple current									
Rated capacitance (C)	Frequency (f)	100 Hz ≦ f < 200 Hz	200 Hz ≦ f < 300 Hz	300 Hz ≦ f < 500 Hz	500 Hz ≦ f < 1 kHz				
C < 47 µF	a	0.10	0.10	0.15	0.20				
47 μF ≦ C < 150 μF	Correction factor	0.15	0.20	0.25	0.30				
150 µF ≦ C		0.15	0.25	0.25	0.30				
Rated capacitance (C)	Frequency (f)	1 kHz ≦ f < 2 kHz	2 kHz ≦ f < 3 kHz	3 kHz ≦ f < 5 kHz	5 kHz ≦ f < 10 kHz				
C < 47 μF	Correction	0.30	0.40	0.45	0.50				
47 µF ≦ C < 150 µF	factor	0.40	0.45	0.55	0.60				
150 µF ≦ C		0.45	0.50	0.60	0.65				
Rated capacitance (C)	Frequency (f)	10 kHz ≦ f < 15 kHz	15 kHz ≦ f < 20 kHz	20 kHz ≦ f < 30 kHz	30 kHz ≦ f < 40 kHz				
C < 47 μF		0.60	0.65	0.70	0.75				
47 µF ≦ C < 150 µF	Correction factor	0.70	0.75	0.80	0.80				
150 µF ≦ C		0.75	0.80	0.85	0.85				
Rated capacitance (C)	Frequency (f)	40 kHz ≦ f < 50 kHz	50 kHz ≦ f < 100 kHz	100 kHz ≦ f < 500 kHz	500 kHz ≦ f < 1000 kHz				
C < 47 µF		0.80	0.85	1.00	1.05				
47 µF ≦ C < 150 µF	Correction factor	0.85	0.90	1.00	1.00				
150 µF ≦ C		0.85	0.90	1.00	1.00				
After endurance	e ESR (10	0 kHz, -40 ℃)							
Size code	F (ø8 x	L9.5) G (ø10	x L9.5)						

0.3

0.4

ESR (Ω)

INDUSTRY

Conductive Polymer Hybrid Aluminum Electrolytic Capacitors



Radial Lead Type **ZK-A** series

Features

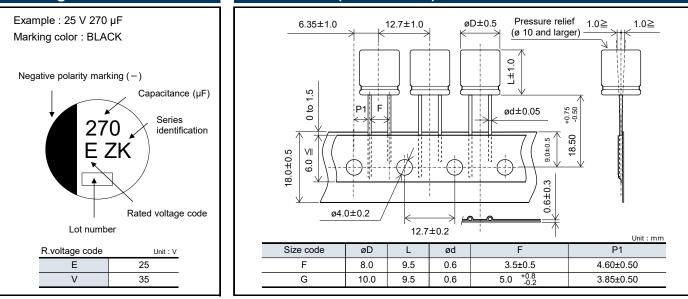
- Endurance : 4000 h at 125 °C (Large capacitance / High ripple current)
- Taping products for automatic insertion
- AEC-Q200 compliant
- RoHS compliant

Specifications

Specifications							
Size code	F		G				
Category temp. range		–55 ℃ to) +125 ℃				
Rated voltage range	25 V to 35 V						
Nominal cap.range	180 µF to 2	270 μF	330 μF to 470 μF				
Capacitance tolerance		±20 % (120	Hz / +20℃)				
Leakage current	I ≦ 0.01 CV (μA), 2 minutes	after reaching rated voltage,	, 20 °C *CV = (Capacitance in μ F) x (Rated voltage in V)				
Dissipation factor (tan δ)		Please see the attach	ed characteristics list				
Surge voltage (V)		Rated voltage × 1.2					
	+125 ℃ ± 2 ℃, 4000 h, apply t		out exceeding the rated voltage.				
	Capacitance change	Within ±30% of the initial value					
	Dissipation factor (tan δ)	≤ 200 % of the initial limit					
Endurance	ESR	≦ 200 % of the initial limit					
Endurance	Leakage current	Within the initial limit					
	ESR after endurance	Size code					
	(Ω / 100 kHz)(-40 °C)	F G					
		0.4 0.3					
	After storage for 1000 hours at +125 $^\circ$ C \pm 2 $^\circ$ C with no voltage applied and then being						
Shelf life	stabilized at +20 $^\circ$ C, capacitors shall meet the limits specified in endurance.						
	(With voltage treatment)						
	+85 ℃ ± 2 ℃, 85 % to 90 %RF						
	Capacitance change	Within ±30% of the initial					
Damp heat (Load)	Dissipation factor (tan δ)	≦ 200 % of the initial limit					
	ESR	≦ 200 % of the initial limit					
	Leakage current	Within the initial limit					
	After flow soldering and then be	eing stabilized at +20 ℃, ca	apacitors shall meet the				
Resistance to	following limits.						
soldering heat	Capacitance change	Within ±10% of the initial	value				
concerning nout	Dissipation factor (tan δ)	Within the initial limit					
	Leakage current	Within the initial limit					

Marking

Dimensions (not to scale)



56

Design and specifications are each subject to change without notice. Ask factory for the current technical specifications before purchase and/or use.

Should a safety concern arise regarding this product, please be sure to contact us immediately.

ZK-A series

Explanation of part numbers

♦ Part numb	er syst	em	e.g.: EEHAZ	K1E271I	З						
EEHA	Ζ	Κ	1	Ε			2	71		В	
Product classification	Series	Code	Rated voltage (V)	Code [*]		Capacitance (µF)	Code	Capacitance (µF)	Code	Lead space (mm)	(
	ZK	ZK	25	1E		180	181	330	331	3.5, 5.0	
			35	1V		270	271	470	471		

*: If the total figures number of the part number exceeds 12 figures, "1" is omitted.

Characteristics list

Endurance : 125 ℃ 4000 h

Code В

		(Case size (mm)	Э		Specification				Min.packaging q'ty (pcs)
Rated voltage (V)	Capacitance (±20 %) (µF)	øD	L	ød	Size code	Ripple current ^{*1} (mA rms)	ESR ^{*2} (mΩ)	tan δ ^{*3}	Part number	Taping
25	270	8.0	9.5	0.6	F	2000	27	0.14	EEHAZK1E271B	1000
25	470	10.0	9.5	0.6	G	2800	20	0.14	EEHAZK1E471B	500
35	180	8.0	9.5	0.6	F	2000	27	0.12	EEHAZK1V181B	1000
	330	10.0	9.5	0.6	G	2800	20	0.12	EEHAZK1V331B	500

*1: Ripple current (100 kHz / +125 ℃)

*2: ESR (100 kHz / +20 ℃)

*3: tan δ (120 Hz / +20 °C)

◆ Please refer to the page of "Flow soldering profile" and "The taping dimensions".

Frequency correction factor for ripple current

Frequency (f)	100 Hz ≦ f < 120 Hz	120 Hz ≦ f < 200 Hz	200 Hz ≦ f < 300 Hz	300 Hz ≦ f < 500 Hz	
Correction factor	0.15	0.20	0.25	0.30	
Frequency (f)	500 Hz ≦ f < 1 kHz	1 kHz ≦ f < 2 kHz	2 kHz ≦ f < 3 kHz	3 kHz ≦ f < 5 kHz	
Correction factor	0.40	0.50	0.60	0.65	
Frequency (f)	5 kHz ≦ f < 10 kHz	10 kHz ≦ f < 15 kHz	15 kHz ≦ f < 20 kHz	20 kHz ≦ f < 30 kHz	
Correction factor	0.70	0.75	0.80	0.85	
Frequency (f)	30 kHz ≦ f < 40 kHz	40 kHz ≦ f < 50 kHz	50 kHz ≦ f < 100 kHz	100 kHz ≦ f < 1000 kHz	
Correction factor	0.85	0.85	0.90	1.00	

INDUSTRY

Conductive Polymer Hybrid Aluminum Electrolytic Capacitors



Radial Lead Type ZKU-A series

Features

- Endurance : 4000 h at 125 °C (Large capacitance / High ripple current)
- Taping products for automatic insertion
- AEC-Q200 compliant
- RoHS compliant

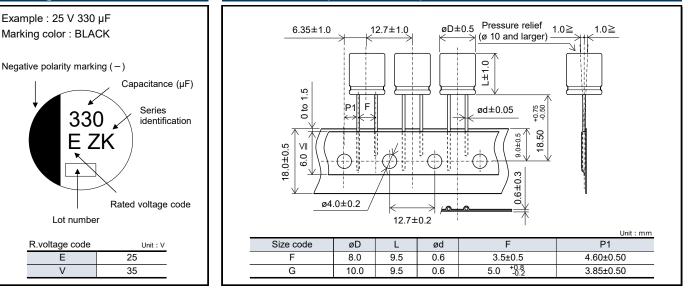
Specifications							
Size code	F		G				
Category temp. range		_55 ℃ to	+125 ℃				
Rated voltage range		25 V to	o 35 V				
Nominal cap.range	220 µF to 3	330 µF	390 μF to 560 μF				
Capacitance tolerance		±20 % (120	Hz / +20℃)				
Leakage current	I ≦ 0.01 CV (μA), 2 minutes	after reaching rated voltage,	20 ℃ *CV = (Capacitance in µF) x (Rated voltage in V)				
Dissipation factor (tan δ)		Please see the attache	ed characteristics list				
Surge voltage (V)		Rated voltage × 1.2	25 (15 ℃ to 35 ℃)				
	+125 $^{\circ}$ ± 2 $^{\circ}$, 4000 h, apply the rated ripple current without exceeding the rated voltage.						
	Capacitance change	Within ±30% of the initial value					
Endurance	Dissipation factor (tan δ)	\leq 200 % of the initial limit					
	ESR	\leq 200 % of the initial limit					
	Leakage current	Within the initial limit					
	ESR after endurance	Size code					
	(Ω / 100 kHz)(-40 °C)	F G					
		0.4 0.3					
	After storage for 1000 hours at +125 $^{\circ}$ C ± 2 $^{\circ}$ C with no voltage applied and then being						
Shelf life	stabilized at +20 $^\circ$ C, capacitors shall meet the limits specified in endurance.						
	(With voltage treatment)						
	+85 ℃ ± 2 ℃, 85 % to 90 %RF	<u> </u>					
	Capacitance change	Within ±30% of the initial v					
Damp heat (Load)	Dissipation factor (tan δ)	\leq 200 % of the initial limit					
	ESR	≤ 200 % of the initial limit					
	Leakage current	Within the initial limit					
	After flow soldering and then be	eing stabilized at +20 ℃, ca	pacitors shall meet the				
Resistance to	following limits.						
soldering heat	Capacitance change	Within ±10% of the initial	value				
ooldonnig node	Dissipation factor (tan δ)	Within the initial limit					
	Leakage current	Within the initial limit					

Marking

Е

V

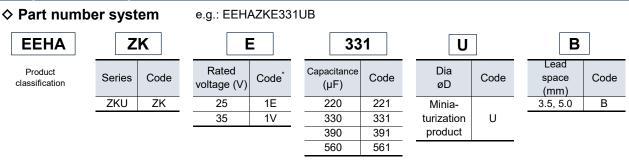
Dimensions (not to scale)



Design and specifications are each subject to change without notice. Ask factory for the current technical specifications before purchase and/or use. Design and specifications are each subject to change without notice, restriction, r

ZKU-A series

Explanation of part numbers



*: If the total figures number of the part number exceeds 12 figures, "1" is omitted.

Characteristics list

Endurance : 125 °C 4000 h

		Case size (mm)				Specification				Min.packaging q'ty (pcs)
Rated voltage (V)	Capacitance (±20 %) (µF)	øD	L	ød	Size code	Ripple current ^{*1} (mA rms)	ESR ^{*2} (mΩ)	tan δ ^{*3}	Part number	Taping
25	330	8.0	9.5	0.6	F	2000	27	0.14	EEHAZKE331UB	1000
20	560	10.0	9.5	0.6	G	2800	20	0.14	EEHAZKE561UB	500
35	220	8.0	9.5	0.6	F	2000	27	0.12	EEHAZKV221UB	1000
	390	10.0	9.5	0.6	G	2800	20	0.12	EEHAZKV391UB	500

*1: Ripple current (100 kHz / +125 ℃)

*2: ESR (100 kHz / +20 ℃)

*3: tan δ (120 Hz / +20 °C)

• Please refer to the page of "Flow soldering profile" and "The taping dimensions".

Frequency correction factor for ripple current

Frequency (f)	100 Hz ≦ f < 120 Hz	120 Hz ≦ f < 200 Hz	200 Hz ≦ f < 300 Hz	300 Hz ≦ f < 500 Hz
Correction factor	0.15	0.20	0.25	0.30
Frequency (f)	500 Hz ≦ f < 1 kHz	1 kHz ≦ f < 2 kHz	2 kHz ≦ f < 3 kHz	3 kHz ≦ f < 5 kHz
Correction factor	0.40	0.50	0.60	0.65
Frequency (f)	5 kHz ≦ f < 10 kHz	10 kHz ≦ f < 15 kHz	15 kHz ≦ f < 20 kHz	20 kHz ≦ f < 30 kH
Correction factor	0.70	0.75	0.80	0.85
Frequency (f)	30 kHz ≦ f < 40 kHz	40 kHz ≦ f < 50 kHz	50 kHz ≦ f < 100 kHz	100 kHz ≦ f < 1000 k
Correction factor	0.85	0.85	0.90	1.00

Design and specifications are each subject to change without notice. Ask factory for the current technical specifications before purchase and/or use. Should a safety concern arise regarding this product, please be sure to contact us immediately.





Hybrid

INDUSTRY

Conductive Polymer Hybrid Aluminum Electrolytic Capacitors



Radial Lead Type

ZT-A series

Features

- Endurance : 4000 h at 135 °C / 125 °C (High ripple current)
- Taping products for automatic insertion
- AEC-Q200 compliant
- RoHS compliant

Specifications										
	F	G _55 ℃ to +135 ℃								
Category temp. range										
Rated voltage range	22E to 2									
Nominal capacitance range	33 µF to 2									
Capacitance tolerance		$\pm 20\%$ (120 Hz / $\pm 20\%$)								
Leakage current	$I \ge 0.01 \text{ CV} (\mu\text{A}) 2 \text{ minutes}$	s after reaching rated voltage, 20 ℃ *CV = (Capacitance in μF) x (Rated voltage in V) Please see the attached characteristics list								
Dissipation factor (tan δ)										
Surge voltage (V)		Rated voltage × 1.25 (15 ℃ to 35 ℃)								
		e rated ripple current without exceeding the rated voltage. Within ±30% of the initial value								
	Capacitance change									
	Dissipation factor (tan δ)	≤ 200 % of the initial limit								
Endurance 1	ESR	≤ 200 % of the initial limit Within the initial limit								
	Leakage current									
	ESR after endurance	Size code								
	(Ω / 100 kHz)(-40 ℃)	F G 04 03								
-		+135 °C ± 2 °C, 4000 h, apply the rated ripple current without exceeding the rated voltage. Capacitance change Within ±30% of the initial value								
	$\frac{1}{200\%} \text{ for the initial value}$									
Endurance 2										
	Leakage current Within the initial limit									
	ESR after endurance	Size code								
	(Ω / 100 kHz)(-40 ℃)	F G								
		+135 °C \pm 2 °C with no voltage applied and then being								
Shelf life		shall meet the limits specified in endurance.								
	(With voltage treatment)									
	+85 ℃ ± 2 ℃, 85 % to 90 %RH,									
Down boot (Lood)	Capacitance change	Within ±30% of the initial value								
Damp heat (Load)	Dissipation factor (tan δ)	$\leq 200 \%$ of the initial limit								
	ESR	≤ 200 % of the initial limit								
	Leakage current	Within the initial limit								
		ing stabilized at +20 $^\circ \!$								
Resistance to	following limits.									
soldering heat	Capacitance change	Within ±10% of the initial value								
soldoning nout	Dissipation factor (tan δ)	Within the initial limit								
	Leakage current	Within the initial limit								

Marking

Example : 25 V 220 µF

Marking color : BLACK Negative polarity marking (-)

Lot number

R.voltage code

F

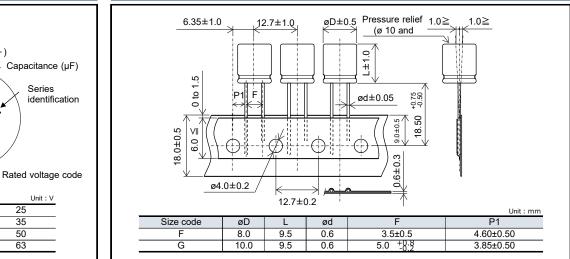
V

Н

220

E ZT

Dimensions (not to scale)



Design and specifications are each subject to change without notice. Ask factory for the current technical specifications before purchase and/or use.

Should a safety concern arise regarding this product, please be sure to contact us immediately.

ZT-A series

Explanation of part numbers

♦ Part number system

EEHA

Product classification



1E Rated Code voltage (V) 25 35 50 63

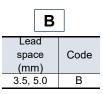
e.g.: EEHAZT1E221B

1E

1V 1H

1J

221									
Capacitance (µF)	Code	Capacitance (µF)	Code						
33	330	120	121						
47	470	150	151						
56	560	220	221						
68	680	270	271						
82	820	330	331						
100	101								



*: If the total figures number of the part number exceeds 12 figures, "1" is omitted.

Characteristics list

Endurance 1 : 125 °C 4000 h

Endurance 2 : 135 °C 4000 h

		Case size (mm)					Specificat	lion		Min.packaging q'ty (pcs)	
Rated Capacitance voltage (±20 %) (V) (μF)	(±20 %)	øD L		ød	Size code	(mA	Ripple current ^{*1} (mA rms)		tan δ ^{*3}	Part number	Taping
					Endurance 1 (+125 °C)	Endurance 2 (+135°C)	(mΩ)				
25	220	8.0	9.5	0.6	F	2900	1800	22	0.14	EEHAZT1E221B	1000
20	330	10.0	9.5	0.6	G	3500	2200	16	0.14	EEHAZT1E331B	500
35	150	8.0	9.5	0.6	F	2900	1800	22	0.12	EEHAZT1V151B	1000
30	270	10.0	9.5	0.6	G	3500	2200	16	0.12	EEHAZT1V271B	500
	68	8.0	9.5	0.6	F	2700	1700	25	0.10	EEHAZT1H680B	1000
50	100	10.0	9.5	0.6	G	2900	1800	23	0.10	EEHAZT1H101B	500
	120	10.0	9.5	0.6	G	2900	1800	23	0.10	EEHAZT1H121B	500
	33	8.0	9.5	0.6	F	2400	1500	32	0.08	EEHAZT1J330B	1000
	47	8.0	9.5	0.6	F	2400	1500	32	0.08	EEHAZT1J470B	1000
63	56	10.0	9.5	0.6	G	2800	1700	25	0.08	EEHAZT1J560B	500
	68	10.0	9.5	0.6	G	2800	1700	25	0.08	EEHAZT1J680B	500
	82	10.0	9.5	0.6	G	2800	1700	25	0.08	EEHAZT1J820B	500

*1: Ripple current (100 kHz / +125 °C or +135 °C)

*2: ESR (100 kHz / +20 °C)

*3: tan δ (120 Hz / +20 °C)

◆ Please refer to the page of "Flow soldering profile" and "The taping dimensions".

Frequency correction factor for ripple current

Rated capacitance (C)	Frequency (f)	100 Hz ≦ f < 200 Hz	200 Hz ≦ f < 300 Hz	300 Hz ≦ f < 500 Hz	500 Hz ≦ f < 1 kHz
C < 47 μF	Compation	0.10	0.10	0.15	0.20
47 µF ≦ C < 150 µF	Correction factor	0.15	0.20	0.25	0.30
150 µF ≦ C	Tactor	0.15	0.25	0.25	0.30
					·····
Rated capacitance (C)	Frequency (f)	1 kHz ≦ f < 2 kHz	2 kHz ≦ f < 3 kHz	3 kHz ≦ f < 5 kHz	5 kHz ≦ f < 10 kHz
C < 47 µF	Correction	0.30	0.40	0.45	0.50
47 µF ≦ C < 150 µF	Correction factor	0.40	0.45	0.55	0.60
150 µF ≦ C		0.45	0.50	0.60	0.65
Rated capacitance (C)	Frequency (f)	10 kHz ≦ f < 15 kHz	15 kHz ≦ f < 20 kHz	20 kHz ≦ f < 30 kHz	30 kHz ≦ f < 40 kHz
0 + 47 5			0.05	0.70	0.75
C < 47 µF	Correction	0.60	0.65	0.70	0.75
C < 47 μF 47 μF ≦ C < 150 μF	Correction	0.60	0.65	0.80	0.80
-	Correction factor				
47 µF ≦ C < 150 µF	-	0.70	0.75	0.80	0.80
47 µF ≦ C < 150 µF	-	0.70	0.75	0.80	0.80
47 μF ≦ C < 150 μF 150 μF ≦ C	factor Frequency (f)	0.70 0.75	0.75 0.80	0.80 0.85	0.80 0.85
$47 \ \mu F \leq C < 150 \ \mu F$ $150 \ \mu F \leq C$ Rated capacitance (C)	Frequency (f) Correction	0.70 0.75 40 kHz ≤ f < 50 kHz	0.75 0.80 50 kHz ≤ f < 100 kHz	0.80 0.85 100 kHz ≦ f < 500 kHz	0.80 0.85 500 kHz ≦ f < 1000 kHz
$\begin{array}{c} 47 \ \mu F \leq C < 150 \ \mu F \\ 150 \ \mu F \leq C \end{array}$ Rated capacitance (C) C < 47 \ \mu F	factor Frequency (f)	0.70 0.75 40 kHz ≤ f < 50 kHz 0.80	0.75 0.80 50 kHz ≤ f < 100 kHz 0.85	0.80 0.85 100 kHz ≦ f < 500 kHz 1.00	0.80 0.85 500 kHz ≦ f < 1000 kHz 1.05

Design and specifications are each subject to change without notice. Ask factory for the current technical specifications before purchase and/or use. Design and specifications are each subject to charge without house, i.e., sector, should a safety concern arise regarding this product, please be sure to contact us immediately. 61

Panasonic **INDUSTRY**

Conductive Polymer Hybrid Aluminum Electrolytic Capacitors Radial Lead Type



Features

- Endurance : 4000 h at 135 °C / 125 °C (Large capacitance / High ripple current / Low ESR)
- Taping products for automatic insertion
- AEC-Q200 compliant

ZS-A series

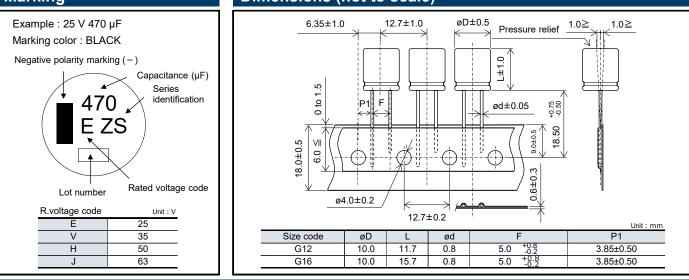
RoHS compliant

.....

Specifications								
Size code	G12		G16					
Category temp. range		–55 ℃ to	o +135 ℃					
Rated voltage range		25 V t	o 63 V					
Nominal cap.range	100 µF to 4	70 µF	150 μF to 560 μF					
Capacitance tolerance		Hz / +20℃)						
Leakage current	I ≦ 0.01 CV (μA) 2 minutes	after reaching rated voltage,	, 20 ℃ *CV = (Capacitance in μF) x (Rated voltage in V)					
Dissipation factor (tan δ)	Please see the attached characteristics list							
Surge voltage (V)		Rated voltage × 1.25 (15 °C to 35 °C)						
			out exceeding the rated voltage.					
	Capacitance change	Capacitance change Within ±30% of the initial value						
Endurance 1	Dissipation factor (tan δ)	\leq 200 % of the initial limit	t					
	ESR	\leq 200 % of the initial limit	t					
	Leakage current Within the initial limit							
			out exceeding the rated voltage.					
	Capacitance change	Within ±30% of the initial	value					
Endurance 2	Dissipation factor (tan δ)	\leq 200 % of the initial limit	-					
	ESR							
	Leakage current	Within the initial limit						
	After storage for 1000 hours at		• • • •					
Shelf life	stabilized at +20 $^{\circ}$ C, capacitors shall meet the limits specified in endurance.							
	(With voltage treatment)							
	+85 ℃ ± 2 ℃, 85 % to 90 %RH							
	Capacitance change	Within ±30% of the initial						
Damp heat (Load)	Dissipation factor (tan δ)	≤ 200 % of the initial limit	-					
	ESR	≤ 200 % of the initial limit	t					
	Leakage current	Within the initial limit						
	After flow soldering and then be	eing stabilized at +20 ℃, ca	apacitors shall meet the					
Resistance to	following limits.							
soldering heat	Capacitance change	Within ±10% of the initial	value					
0	Dissipation factor (tan δ)	Within the initial limit						
	Leakage current	Within the initial limit						

Marking

Dimensions (not to scale)

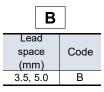


Design and specifications are each subject to change without notice. Ask factory for the current technical specifications before purchase and/or use. Design and specifications are each subject to change without notice, risk deter, risk best, risk best, risk deter, risk best, risk deter, risk deter,

ZS-A series

Explanation of part numbers

♦ Part number system			e.g.	e.g.: EEHAZS1E471B							
EEHA	EEHAZS			1E			471				
Product classification	Series	Code	vo	Rated oltage (V)	Code [*]		Capacitance (µF)	Code	Capacitance (µF)	Code	
	ZS	ZS		25	1E		100	101	330	331	
				35	1V		150	151	470	471	
				50	1H		220	221	560	561	
				63	1J						



*: If the total figures number of the part number exceeds 12 figures, "1" is omitted.

Characteristics list

Endurance 1 : 125 ℃ 4000 h Endurance 2 : 135 ℃ 4000 h

voltage (±2	Capacitance (±20 %) (μF)	Case size (mm)					Specif	ication		_	Min.packaging q'ty (pcs)
		øD	L	ød	Size code	Ripple current ^{*1} (mA rms)		ESR ^{*2}	tan δ ^{*3}	Part number	Taping
						Endurance 1	Endurance 2	(mΩ)			
						(+125℃)	(+135℃)				
25	470	10.0	11.7	0.8	G12	3500	2500	14	0.14	EEHAZS1E471B	500
20	560	10.0	15.7	0.8	G16	4000	2900	11	0.14	EEHAZS1E561B	500
35	330	10.0	11.7	0.8	G12	3500	2500	14	0.12	EEHAZS1V331B	500
30	470	10.0	15.7	0.8	G16	4000	2900	11	0.12	EEHAZS1V471B	500
50	150	10.0	11.7	0.8	G12	3200	2250	17	0.10	EEHAZS1H151B	500
50	220	10.0	15.7	0.8	G16	3700	2600	13	0.10	EEHAZS1H221B	500
62	100	10.0	11.7	0.8	G12	3000	2100	19	0.08	EEHAZS1J101B	500
63	150	10.0	15.7	0.8	G16	3500	2400	15	0.08	EEHAZS1J151B	500

*1: Ripple current (100 kHz / +125 °C or +135 °C)

*2: ESR (100 kHz / +20 °C)

*3: tan δ (120 Hz / +20 ℃)

◆ Please refer to the page of "Flow soldering profile" and "The taping dimensions".

Frequency correction factor for ripple current

Rated capacitance (C)	Frequency (f)	100 Hz ≦ f < 200 Hz	200 Hz ≦ f < 300 Hz	300 Hz ≦ f < 500 Hz	500 Hz ≦ f < 1 kHz	
100 µF ≦ C < 150 µF	Correction	0.15	0.20	0.25	0.30	
150 µF ≦ C	factor	0.15	0.25	0.25	0.30	
Rated capacitance (C)	Frequency (f)	1 kHz ≦ f < 2 kHz	2 kHz ≦ f < 3 kHz	3 kHz ≦ f < 5 kHz	5 kHz ≦ f < 10 kHz	
100 µF ≦ C < 150 µF	Correction	0.40	0.45	0.55	0.60	
150 µF ≦ C	factor	0.45	0.50	0.60	0.65	
Rated capacitance (C)	Frequency (f)	10 kHz ≦ f < 15 kHz	15 kHz ≦ f < 20 kHz	20 kHz ≦ f < 30 kHz	30 kHz ≦ f < 40 kHz	
100 µF ≦ C < 150 µF	Correction	0.70	0.75	0.80	0.80	
150 µF ≦ C	factor	0.75	0.80	0.85	0.85	
Rated capacitance (C)	Frequency (f)	40 kHz ≦ f < 50 kHz	50 kHz ≦ f < 100 kHz	100 kHz ≦ f < 500 kHz	500 kHz ≦ f < 1000 kHz	
100 µF ≦ C < 150 µF	Correction	0.85	0.90	1.00	1.00	
150 µF ≦ C	factor	0.85	0.90	1.00	1.00	

*6*3

Design and specifications are each subject to change without notice. Ask factory for the current technical specifications before purchase and/or use.





Hybrid

Conductive Polymer Hybrid Aluminum Electrolytic Capacitors Radial Lead Type



ZSU-A series

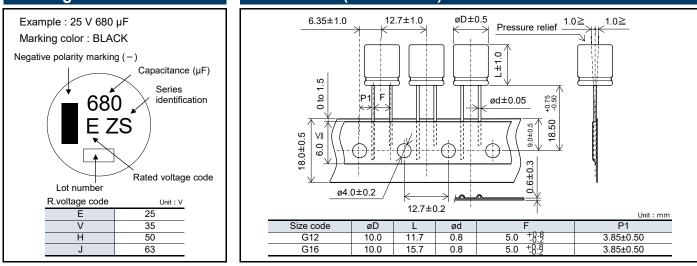
Features

- Endurance : 4000 h at 135 °C / 125 °C
- Large capacitance compared with ZS series
- Taping products for automatic insertion
- AEC-Q200 compliant
- RoHS compliant

Specifications										
Size code	G12		G16							
Category temp. range		–55 °C to	o +135 ℃							
Rated voltage range			o 63 V							
Nominal capacitance range	120 µF to 6	80 µF	180 μF to 1000 μF							
Capacitance tolerance	· · · · ·	±20 % (120	Hz / +20°C)							
Leakage current	I ≦ 0.01 CV (µA), 2 minutes		, 20 °C *CV = (Capacitance in μ F) x (Rated voltage in V)							
Dissipation factor (tan δ)		Please see the attach	ned characteristics list							
Surge voltage (V)		Rated voltage × 1.	25 (15 ℃ to 35 ℃)							
	+125 ℃ ± 2 ℃, 4000 h, apply the									
	Capacitance change	Within ±30% of the initial v	alue							
	Dissipation factor (tan δ)	≦ 200 % of the initial limit								
Endurance 1	ESR	≤ 200 % of the initial limit								
	Leakage current	Within the initial limit								
	ESR after endurance	Size code								
	(Ω / 100 kHz)(-40 °C)	G12 G16								
		0.3 0.3								
		+135 °C ± 2 °C, 4000 h, apply the rated ripple current without exceeding the rated voltage.								
	Capacitance change	Within ±30% of the initial v	alue							
	Dissipation factor (tan δ) $\leq 200 \%$ of the initial limit									
Endurance 2		ESR ≤ 200 % of the initial limit								
	Leakage current	Within the initial limit								
	ESR after endurance	Size code								
	(Ω / 100 kHz)(-40 ℃)	G12 G16								
	()()	0.3 0.3								
	After storage for 1000 hours at +									
Shelf life	stabilized at +20 ℃, capacitors s	shall meet the limits specified	d in endurance.							
	(With voltage treatment)									
	+85 ℃ ± 2 ℃, 85 % to 90 %RH,									
	Capacitance change	Within ±30% of the initial v	alue							
Damp heat (Load)	Dissipation factor (tan δ)	$\leq 200 \%$ of the initial limit								
	ESR	≤ 200 % of the initial limit								
	Leakage current	Within the initial limit								
	After flow soldering and then beir	ng stabilized at +20 °C, capa	citors shall meet the							
Resistance to	following limits.	Mithin 100/ of the initiality								
soldering heat	Capacitance change	Within ±10% of the initial v	alue							
J	Dissipation factor (tan δ)	Within the initial limit								
	Leakage current	Within the initial limit								

Marking

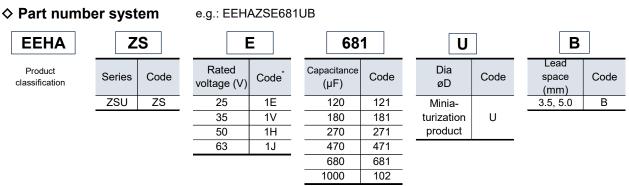
Dimensions (not to scale)



Design and specifications are each subject to change without notice. Ask factory for the current technical specifications before purchase and/or use. Design and specifications are each subject to change without house, raise regarding this product, please be sure to contact us immediately. 64

ZSU-A series

Explanation of part numbers



*: If the total figures number of the part number exceeds 12 figures, "1" is omitted.

Characteristics list

Endurance 1 : 125 °C 4000 h Endurance 2 : 135 °C 4000 h

Rated c voltage (V)	Capacitance (±20 %) (µF)	Case size (mm)					Specifica	tion		_	Min.packaging q'ty (pcs)
		øD	L	ød	Size code	Ripple current ^{*1} (mA rms) Endurance 1 Endurance 2		ESR ^{*2} (mΩ)	tan δ ^{*3}	Part number	Taping
						(+125 °C)	(+135°C)				
25	680	10.0	11.7	0.8	G12	3500	2500	14	0.14	EEHAZSE681UB	500
20	1000	10.0	15.7	0.8	G16	4000	2900	11	0.14	EEHAZSE102UB	500
35	470	10.0	11.7	0.8	G12	3500	2500	14	0.12	EEHAZSV471UB	500
- 55	680	10.0	15.7	0.8	G16	4000	2900	11	0.12	EEHAZSV681UB	500
50	180	10.0	11.7	0.8	G12	3200	2250	17	0.10	EEHAZSH181UB	500
50	270	10.0	15.7	0.8	G16	3700	2600	13	0.10	EEHAZSH271UB	500
63	120	10.0	11.7	0.8	G12	3000	2100	19	0.08	EEHAZSJ121UB	500
	180	10.0	15.7	0.8	G16	3500	2400	15	0.08	EEHAZSJ181UB	500

*1: Ripple current (100 kHz / +125 °C or +135 °C)

*2: ESR (100 kHz / +20 °C)

*3: tan δ (120 Hz / +20 ℃)

◆ Please refer to the page of "Flow soldering profile" and "The taping dimensions".

Frequency correction factor for ripple current

Rated capacitance (C)	Frequency (f)	100 Hz ≦ f < 120 Hz	120 Hz ≦ f < 200 Hz	200 Hz ≦ f < 300 Hz	300 Hz ≦ f < 500 Hz
Rated capacitance (C)	Trequency (I)	100 112 = 1 < 120 112	120112 = 1 < 200112	200112 = 1 < 300112	300 HZ = 1 < 300 HZ
120 µF ≦ C	Correction factor	0.15	0.20	0.25	0.30
Rated capacitance (C)	Frequency (f)	500 Hz ≦ f < 1 kHz	1 kHz ≦ f < 2 kHz	2 kHz ≦ f < 3 kHz	3 kHz ≦ f < 5 kHz
120 µF ≦ C	Correction factor	0.40	0.50	0.60	0.65
Rated capacitance (C)	Frequency (f)	5 kHz ≦ f < 10 kHz	10 kHz ≦ f < 15 kHz	15 kHz ≦ f < 20 kHz	20 kHz ≦ f < 30 kHz
120 µF ≦ C	Correction factor	0.70	0.75	0.80	0.85
Rated capacitance (C)	Frequency (f)	30 kHz ≦ f < 50 kHz	50 kHz ≦ f < 100 kHz	100 kHz ≦ f < 500 kHz	500 kHz ≦ f < 1000 kHz
120 µF ≦ C	Correction factor	0.85	0.90	1.00	1.00

Design and specifications are each subject to change without notice. Ask factory for the current technical specifications before purchase and/or use. Design and specifications are each subject to change without notice, risk deter, risk best, risk best, risk deter, risk best, risk deter, risk deter,

INDUSTRY

Conductive Polymer Hybrid Aluminum Electrolytic Capacitors



Radial Lead Type **ZE-A** series

Features

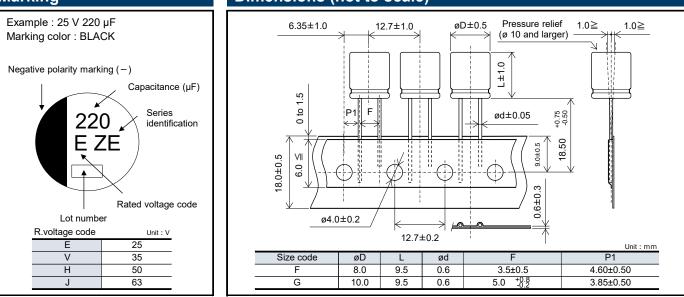
- Endurance : 2000 h at 145 °C (High temperature / Long life)
- Taping products for automatic insertion
- AEC-Q200 compliant
- RoHS compliant

Specifications

Size codeFGCategory temp. range-55 °C to +145 °CRated voltage range25 V to 63 VNominal cap.range33 µF to 220 µFCapacitance tolerance $\pm 20 \% (120 Hz / +20°C)$ Leakage current1 ≤ 0.01 CV (µA), 2 minutes after reaching rated voltage, 20 °C °CV = (Capacitance in µF) x (Rated voltage in V)Dissipation factor (tan δ)Please see the attached characteristics listSurge voltage (V)Rated voltage × 1.25 (15 °C to 35 °C)+145 °C ± 2 °C, 2000 h, apply the rated ripple current without exceeding the rated voltage.Capacitance changeWithin ±30% of the initial valueDissipation factor (tan δ)≤ 200 % of the initial limitEndurance 1ESREndurance 2Solo % of the initial limitEndurance 2ESRShelf lifeAfter storage for 1000 hours at +145 °C ± 2 °C with no voltage applied and then being stabilized at +20 °C, capacitors shall meet the limits specified in endurance 1. (Within voltage treatment)+85 °C ± 2 °C, 55 % to 90 %RH, 2000 h, rated voltage appliedCapacitance changeWithin ±30% of the initial valueDissipation factor (tan δ)≤ 200 % of the initial limitEndurance 2Mithin ±30% of the initial limitHat 2 °C, 5000 h, apply the rated ripple current without exceeding the rated voltage.Capacitance changeWithin ±100 % of the initial valueDissipation factor (tan δ)≤ 200 % of the initial limitLeakage currentWithin ±100 % of the initial valueDissipation factor (tan δ)≤ 200 % of the initial valueBerno table for	Specifications							
Rated voltage range25 V to 63 VNominal cap.range33 µF to 220 µF56 µF to 330 µFCapacitance tolerance $\pm 20 \% (120 Hz / \pm 20^{\circ}C)$ Leakage currentI ≤ 0.01 CV (µA), 2 minutes after reaching rated voltage, 20 °C *CV = (Capacitance in µF) x (Rated voltage in V)Dissipation factor (tan δ)Please see the attached characteristics listSurge voltage (V)Rated voltage × 1.25 (15 °C to 35 °C)Endurance 1ESR $\geq 200 \%$ of the initial valueDissipation factor (tan δ) $\geq 200 \%$ of the initial limitEndurance 2ESR $\leq 200 \%$ of the initial limitEndurance 2ESR $\leq 200 \%$ of the initial limitEndurance 2ESR $\leq 300 \%$ of the initial limitEndurance 2ESR $\leq 300 \%$ of the initial limitKetter charge currentWithin the initial limitH35 °C ± 2 °C, 4000 h, apply the rated ripple current without exceeding the rated voltage.Capacitance changeWithin the initial limitLeakage currentWithin the initial limitLeakage currentWithin the initial limitLeakage currentWithin the initial limitKater storage for 1000 hours at +145 °C ± 2 °C with no voltage applied and then being stabilized at +20 °C, capacitors shall meet the limits specified in endurance 1.With voltage treatment)+85 °C ± 2 °C, 85 % to 90 %RH, 2000 h, rated voltage appliedCapacitance changeWithin ±30% of the initial value	Size code	F		G				
Nominal cap.range $33 \ \mu\text{F}$ to $220 \ \mu\text{F}$ $56 \ \mu\text{F}$ to $330 \ \mu\text{F}$ Capacitance tolerance $\pm 20 \ \% (120 \ \text{Hz} / +20 \ \%)$ $\pm 20 \ \% (120 \ \text{Hz} / +20 \ \%)$ Leakage current $1 \le 0.01 \ \text{CV} (\mu\text{A}), 2 \ \text{minutes after reaching rated voltage, 20 \ \% \ \text{CV} = (\text{Capacitance in }\mu\text{F}) \times (\text{Rated voltage in V})Dissipation factor (tan \delta)Please see the attached characteristics listSurge voltage (V)Rated voltage \times 1.25 \ (15 \ \% \ to 35 \ \%)= 1445 \ \% \ \pm 2 \ \%, 2000 \ h, apply the rated ripple current without exceeding the rated voltage.Capacitance changeWithin \pm 30\% \ of the initial valueDissipation factor (tan \delta)\le 200 \ \% \ of the initial limitEndurance 1ESR\le 200 \ \% \ of the initial valueDissipation factor (tan \delta)\le 200 \ \% \ of the initial valueDissipation factor (tan \delta)\le 200 \ \% \ of the initial valueDissipation factor (tan \delta)\le 200 \ \% \ of the initial valueDissipation factor (tan \delta)\le 200 \ \% \ of the initial valueDissipation factor (tan \delta)\le 200 \ \% \ of the initial valueDissipation factor (tan \delta)\le 200 \ \% \ of the initial valueDissipation factor (tan \delta)\le 200 \ \% \ of the initial valueDissipation factor (tan \delta)\le 200 \ \% \ of the initial valueDissipation factor (tan \delta)\le 200 \ \% \ of the initial limitLeakage currentWithin the initial limitLeakage currentWithin the initial limitLeakage currentWithin the initial limitLeakage currentWithin the initial limit$	Category temp. range							
Capacitance tolerance $\pm 20 \% (120 \text{ Hz} / \pm 20\%)$ Leakage currentI ≤ 0.01 CV (µA), 2 minutes after reaching rated voltage, 20 °C *CV = (Capacitance in µF) x (Rated voltage in V)Dissipation factor (tan δ)Please see the attached characteristics listSurge voltage (V)Rated voltage × 1.25 (15 °C to 35 °C)+145 °C ± 2 °C, 2000 h, apply the rated ripple current without exceeding the rated voltage. Capacitance changeEndurance 1Usispation factor (tan δ)Endurance 1ESREndurance 2200 % of the initial limitEndurance 2Uthin ±30% of the initial limitEndurance 2EsREndurance 3\$200 % of the initial limitEndurance 4EsREndurance 5\$200 % of the initial limitEndurance 6\$200 % of the initial limitEndurance 7\$200 % of the initial limitEndurance 8\$400 % of the initial limitEndurance 9\$200 % of the initial limitEsc\$200 % of the initial limit\$200 % of the initial limit\$200 % of the initial l	Rated voltage range	25 V to 63 V						
Leakage currentI ≤ 0.01 CV (µA), 2 minutes after reaching rated voltage, 20 °C *CV = (Capacitance in µF) x (Rated voltage in V)Dissipation factor (tan $\overline{\delta}$)Please see the attached characteristics listSurge voltage (V)Rated voltage × 1.25 (15 °C to 35 °C)Endurance 1+145 °C ± 2 °C, 2000 h, apply the rated ripple current without exceeding the rated voltage. Capacitance changeEndurance 1Uitsipation factor (tan $\overline{\delta}$)≤ 200 % of the initial valueDissipation factor (tan $\overline{\delta}$)≤ 200 % of the initial limitEndurance 2ESR≤ 200 % of the initial limitEndurance 2Within the initial limitEndurance 2Autom factor (tan $\overline{\delta}$)≤ 200 % of the initial limitEndurance 2Autom factor (tan $\overline{\delta}$)≤ 200 % of the initial limitEndurance 2Autom factor (tan $\overline{\delta}$)≤ 200 % of the initial limitHas °C ± 2 °C, 4000 h, apply the rated ripple current without exceeding the rated voltage. Capacitance changeWithin the initial limitEndurance 2Within factor (tan $\overline{\delta}$)≤ 200 % of the initial valueEndurance 2Autom factor (tan $\overline{\delta}$)≤ 200 % of the initial limitLeakage currentWithin the initial limitLeakage current	Nominal cap.range	33 μF to 220 μF 56 μF to 330 μF						
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	Capacitance tolerance		±20 % (120	Hz / +20℃)				
Surge voltage (V)Rated voltage × 1.25 (15 °C to 35 °C)Facted voltage (V)Rated voltage × 1.25 (15 °C to 35 °C)Facted voltage °C ± 2 °C, 2000 h, apply the rated ripple current without exceeding the rated voltage.Capacitance changeWithin ±30% of the initial valueDissipation factor (tan δ) \leq 200 % of the initial limitLeakage currentWithin ±30% of the initial limitLeakage currentWithin the initial limitLeakage currentWithin ±30% of the initial valueDissipation factor (tan δ) \leq 200 % of the initial valueLeakage currentWithin ±30% of the initial valueDissipation factor (tan δ) \leq 200 % of the initial valueDissipation factor (tan δ) \leq 200 % of the initial valueDissipation factor (tan δ) \leq 200 % of the initial limitLeakage currentWithin the initial	Leakage current	I ≦ 0.01 CV (µA), 2 minutes	after reaching rated voltage	e, 20 °C *CV = (Capacitance in μ F) x (Rated voltage in V)				
The second seco	Dissipation factor (tan δ)		Please see the attach	ned characteristics list				
Endurance 1Capacitance changeWithin $\pm 30\%$ of the initial valueDissipation factor (tan δ) $\leq 200\%$ of the initial limitESR $\leq 200\%$ of the initial limitLeakage currentWithin the initial limit+135 °C ± 2 °C, 4000 h, apply the rated ripple current without exceeding the rated voltage.Capacitance changeWithin $\pm 30\%$ of the initial valueDissipation factor (tan δ) $\leq 200\%$ of the initial valueDissipation factor (tan δ) $\leq 200\%$ of the initial valueDissipation factor (tan δ) $\leq 200\%$ of the initial limitLeakage currentWithin the initial limitLeakage currentWithin the initial limitLeakage currentWithin the initial limitAfter storage for 1000 hours at +145 °C ± 2 °C with no voltage applied and then being stabilized at +20 °C, capacitors shall meet the limits specified in endurance 1. (With voltage treatment)+85 °C ± 2 °C, 85 % to 90 %RH, 2000 h, rated voltage applied Capacitance changeWithin $\pm 30\%$ of the initial value	Surge voltage (V)		Rated voltage × 1.	25 (15 ℃ to 35 ℃)				
Endurance 1Dissipation factor (tan δ) $\leq 200 \%$ of the initial limitESR $\leq 200 \%$ of the initial limitLeakage currentWithin the initial limit+135 °C ± 2 °C, 4000 h, apply the rated ripple current without exceeding the rated voltage.Capacitance changeWithin ±30% of the initial valueDissipation factor (tan δ) $\leq 200 \%$ of the initial limitLeakage currentWithin ±30% of the initial valueDissipation factor (tan δ) $\leq 200 \%$ of the initial limitLeakage currentWithin the initial limitLeakage currentWithin the initial limitLeakage currentWithin the initial limitAfter storage for 1000 hours at +145 °C ± 2 °C with no voltage applied and then being stabilized at +20 °C, capacitors shall meet the limits specified in endurance 1. (With voltage treatment)+85 °C ± 2 °C, 85 % to 90 %RH, 2000 h, rated voltage applied Capacitance changeWithin ±30% of the initial value		+145 ℃ ± 2 ℃, 2000 h, apply t	he rated ripple current with	out exceeding the rated voltage.				
Endurance 2EsR $\leq 200 \%$ of the initial limitEndurance 2 $+135 \% \pm 2\%, 4000 h, apply the rated ripple current without exceeding the rated voltage.Capacitance changeWithin \pm 30\% of the initial valueDissipation factor (tan \delta)\leq 200 \% of the initial limit\equiv SR\leq 300 \% of the initial limitLeakage currentWithin the initial limitLeakage currentWithin the initial limitAfter storage for 1000 hours at \pm 145 \% \pm 2 \% with no voltage applied and then beingstabilized at \pm 20 \%, capacitors shall meet the limits specified in endurance 1.(With voltage treatment)\pm 85 \% \pm 2 \%, 85 \% to 90 %RH, 2000 h, rated voltage appliedCapacitance changeWithin \pm 30\% of the initial value$		Capacitance change	Within ±30% of the initial	value				
Leakage currentWithin the initial limit+135 $^{\circ}$ C ± 2 $^{\circ}$, 4000 h, apply the rated ripple current without exceeding the rated voltage.Capacitance changeWithin ±30% of the initial valueDissipation factor (tan δ) ≤ 200 % of the initial limitESR ≤ 300 % of the initial limitLeakage currentWithin the initial limitLeakage currentWithin the initial limitAfter storage for 1000 hours at +145 $^{\circ}$ C ± 2 $^{\circ}$ with no voltage applied and then being stabilized at +20 $^{\circ}$, capacitors shall meet the limits specified in endurance 1. (With voltage treatment)+85 $^{\circ}$ C ± 2 $^{\circ}$, 85 % to 90 %RH, 2000 h, rated voltage applied Capacitance changeWithin ±30% of the initial value	Endurance 1	Dissipation factor (tan δ)	≤ 200 % of the initial limit	t				
Endurance 2 $+135 \ \ \mathbb{C} \pm 2 \ \ \mathbb{C}, 4000 \ h, apply the rated ripple current without exceeding the rated voltage.Capacitance change Within ±30% of the initial valueDissipation factor (tan \delta) \leq 200 \ \% of the initial limitLeakage current Within the initial limitLeakage current Within the initial limitAfter storage for 1000 hours at +145 \ \mathbb{C} \pm 2 \ \mathbb{C} with no voltage applied and then beingstabilized at +20 \ \mathbb{C}, capacitors shall meet the limits specified in endurance 1.(With voltage treatment)+85 \ \mathbb{C} \pm 2 \ \mathbb{C}, 85 \ \% to 90 \ \% RH, 2000 \ h, rated voltage appliedCapacitance change Within ±30% of the initial value$		ESR	≤ 200 % of the initial limit	t				
		Leakage current Within the initial limit						
Endurance 2Capacitance changeWithin $\pm 30\%$ of the initial valueDissipation factor (tan δ) $\leq 200\%$ of the initial limitESR $\leq 300\%$ of the initial limitLeakage currentWithin the initial limitAfter storage for 1000 hours at +145 °C ± 2 °C with no voltage applied and then being stabilized at +20 °C, capacitors shall meet the limits specified in endurance 1. (With voltage treatment)+85 °C ± 2 °C, 85 % to 90 %RH, 2000 h, rated voltage applied Capacitance changeWithin $\pm 30\%$ of the initial value		+135 \degree ± 2 \degree , 4000 h, apply the rated ripple current without exceeding the rated voltage.						
ESR $\leq 300 \%$ of the initial limitLeakage currentWithin the initial limitAfter storage for 1000 hours at +145 \degree ± 2 \degree with no voltage applied and then being stabilized at +20 \degree , capacitors shall meet the limits specified in endurance 1. (With voltage treatment)+85 \degree ± 2 \degree , 85 % to 90 %RH, 2000 h, rated voltage applied Capacitance changeWithin ±30% of the initial value								
Leakage current Within the initial limit After storage for 1000 hours at +145 °C ± 2 °C with no voltage applied and then being stabilized at +20 °C, capacitors shall meet the limits specified in endurance 1. (With voltage treatment) +85 °C ± 2 °C, 85 % to 90 %RH, 2000 h, rated voltage applied Capacitance change Within ±30% of the initial value	Endurance 2	Dissipation factor (tan δ) $\leq 200 \%$ of the initial limit						
After storage for 1000 hours at +145 °C ± 2 °C with no voltage applied and then being stabilized at +20 °C, capacitors shall meet the limits specified in endurance 1. (With voltage treatment) +85 °C ± 2 °C, 85 % to 90 %RH, 2000 h, rated voltage applied Capacitance change Within ±30% of the initial value		ESR ≦ 300 % of the initial limit						
Shelf life stabilized at +20 °C, capacitors shall meet the limits specified in endurance 1. (With voltage treatment) +85 °C ± 2 °C, 85 % to 90 %RH, 2000 h, rated voltage applied Capacitance change Within ±30% of the initial value		Leakage current Within the initial limit						
(With voltage treatment) +85 °C ± 2 °C, 85 % to 90 %RH, 2000 h, rated voltage applied Capacitance change Within ±30% of the initial value		After storage for 1000 hours at	+145 ℃ ± 2 ℃ with no vol	tage applied and then being				
+85 °C ± 2 °C, 85 % to 90 %RH, 2000 h, rated voltage applied Capacitance change Within ±30% of the initial value	Shelf life	stabilized at +20 ℃, capacitors	s shall meet the limits spec	cified in endurance 1.				
Capacitance change Within ±30% of the initial value		(With voltage treatment)						
Capacitance change Within ±30% of the initial value		+85 ℃ ± 2 ℃, 85 % to 90 %RH	l, 2000 h, rated voltage app	plied				
$D_{\text{result}} = b_{\text{result}} (b_{\text{result}}) = D_{\text{result}} (b_{\text{result}} - \overline{b}) = \frac{1}{2} (b_{\text{result}} - b_{\text{result}}) (b_{\text{result}} - \overline{b}) = \frac{1}{2} (b_{\text{result}} - b_{\text{result}}) (b_{\text{result}}) (b_{\text{result}} - b_{\text{result}}) (b_{\text{result}}) (b_{\text{result}}) (b_{result$								
Damp neat (Load) Dissipation factor (tan 0) $\leq 200 \%$ of the initial limit	Damp heat (Load)	Dissipation factor (tan δ)	≤ 200 % of the initial limitian	t				
ESR ≤ 200 % of the initial limit		ESR	≦ 200 % of the initial limit					
Leakage current Within the initial limit		Leakage current	Within the initial limit					
After flow soldering and then being stabilized at +20 °C, capacitors shall meet the		After flow soldering and then be	eing stabilized at +20 ℃, ca	apacitors shall meet the				
Resistance to	Posistanco to							
soldering heat		Capacitance change	Within ±10% of the initial	value				
Dissipation factor (tan δ) Within the initial limit	soluening heat	Dissipation factor (tan δ)	Within the initial limit					
Leakage current Within the initial limit		Leakage current	Within the initial limit					

Marking

Dimensions (not to scale)



66

Design and specifications are each subject to change without notice. Ask factory for the current technical specifications before purchase and/or use.

Should a safety concern arise regarding this product, please be sure to contact us immediately.

ZE-A series

Explanation of part numbers

Part number syste	m
-------------------	---

e.g.: EEHAZE1E221B **EEHA** ΖE 1E 221 Rated Capacitance Capacitance Product Series Code Code Code classification voltage (V) (µF) (µF) 25 ΖE ZE 1E 33 330 150 35 1V 56 560 220

1H

1J

50

63

В								
Lead								
space	Code							
(mm)								
3.5, 5.0	В							

Code

151

221

271

331

*: If the total figures number of the part number exceeds 12 figures, "1" is omitted.

Characteristics list

Endurance 1 : 145 ℃ 2000 h Endurance 2 : 135 ℃ 4000 h

			Case size (mm)	9		Specification			Min.packaging q'ty (pcs)		
Rated voltage (V)	Capacitance (±20 %) (µF)	(±20 %) Size Ripple current (±20 %) ESP*2	code (mA rms)	tan δ ^{*3}	Part number	Taping					
						Endurance 1 (+145 ℃)	Endurance 2 (+135 ℃)	(11122)			
25	220	8.0	9.5	0.6	F	700	1600	27	0.14	EEHAZE1E221B	1000
20	330	10.0	9.5	0.6	G	900	2000	20	0.14	EEHAZE1E331B	500
35	150	8.0	9.5	0.6	F	700	1600	27	0.12	EEHAZE1V151B	1000
30	270	10.0	9.5	0.6	G	900	2000	20	0.12	EEHAZE1V271B	500
50	68	8.0	9.5	0.6	F	600	1250	30	0.10	EEHAZE1H680B	1000
50	100	10.0	9.5	0.6	G	800	1600	28	0.10	EEHAZE1H101B	500
	33	8.0	9.5	0.6	F	600	1100	40	0.08	EEHAZE1J330B	1000
63	56	10.0	9.5	0.6	G	800	1400	30	0.08	EEHAZE1J560B	500
	82	10.0	9.5	0.6	G	800	1400	30	0.08	EEHAZE1J820B	500

68

82 100 680

820

101

270

330

*1: Ripple current (100 kHz / +145 $^{\circ}\!\!\!C$ or +135 $^{\circ}\!\!\!C$)

*2: ESR (100 kHz / +20 ℃)

*3: tan δ (120 Hz / +20 °C)

• Please refer to the page of "Flow soldering profile" and "The taping dimensions".

Frequency correction factor for ripple current

Rated capacitance (C)	Frequency (f)	100 Hz ≦ f < 200 Hz	200 Hz ≦ f < 300 Hz	300 Hz ≦ f < 500 Hz	500 Hz ≦ f < 1 kHz
C < 47 µF	Correction	0.10	0.10	0.15	0.20
47 μF ≦ C < 150 μF	factor	0.15	0.20	0.25	0.30
150 µF ≦ C	lactor	0.15	0.25	0.25	0.30
Rated capacitance (C)	Frequency (f)	1 kHz ≦ f < 2 kHz	2 kHz ≦ f < 3 kHz	3 kHz ≦ f < 5 kHz	5 kHz ≦ f < 10 kHz
C < 47 µF	Correction	0.30	0.40	0.45	0.50
47 μF ≦ C < 150 μF	factor	0.40	0.45	0.55	0.60
150 µF ≦ C	laciol	0.45	0.50	0.60	0.65
Rated capacitance (C)	Frequency (f)	10 kHz ≦ f < 15 kHz	15 kHz ≦ f < 20 kHz	20 kHz ≦ f < 30 kHz	30 kHz ≦ f < 40 kHz
Rated capacitance (C) C < 47 μF	. ,	10 kHz ≦ f < 15 kHz 0.60	15 kHz ≦ f < 20 kHz 0.65	20 kHz ≦ f < 30 kHz 0.70	30 kHz ≦ f < 40 kHz 0.75
,	Correction				••••••
C < 47 µF	. ,	0.60	0.65	0.70	0.75
C < 47 μF 47 μF ≦ C < 150 μF	Correction	0.60 0.70	0.65	0.70 0.80	0.75
C < 47 μF 47 μF ≦ C < 150 μF	Correction	0.60 0.70	0.65	0.70 0.80	0.75
C < 47 μF 47 μF ≦ C < 150 μF 150 μF ≦ C	Correction factor	0.60 0.70 0.75	0.65 0.75 0.80	0.70 0.80 0.85	0.75 0.80 0.85
$C < 47 \ \mu\text{F}$ $47 \ \mu\text{F} \leq C < 150 \ \mu\text{F}$ $150 \ \mu\text{F} \leq C$ Rated capacitance (C)	Correction factor Frequency (f) Correction	0.60 0.70 0.75 40 kHz ≤ f < 50 kHz	0.65 0.75 0.80 50 kHz ≤ f < 100 kHz	0.70 0.80 0.85 100 kHz ≤ f < 500 kHz	0.75 0.80 0.85 500 kHz ≤ f < 1000 kHz
$C < 47 \ \mu F$ $47 \ \mu F \leq C < 150 \ \mu F$ $150 \ \mu F \leq C$ Rated capacitance (C) $C < 47 \ \mu F$	Correction factor	0.60 0.70 0.75 40 kHz ≤ f < 50 kHz 0.80	0.65 0.75 0.80 50 kHz ≤ f < 100 kHz 0.85	0.70 0.80 0.85 100 kHz ≤ f < 500 kHz 1.00	0.75 0.80 0.85 500 kHz ≤ f < 1000 kHz 1.05

After endurance ESR (100 kHz, -40 ℃)

Size code	F (ø8 x L9.5)	G (ø10 x L9.5)
ESR (Ω)	0.4	0.3

Design and specifications are each subject to change without notice. Ask factory for the current technical specifications before purchase and/or use. Design and specifications are each subject to charge without house, i.e., sector, should a safety concern arise regarding this product, please be sure to contact us immediately. 67

INDUSTRY

Conductive Polymer Hybrid Aluminum Electrolytic Capacitors



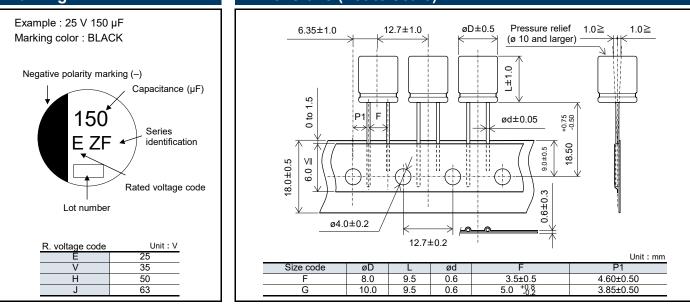
Radial Lead Type **ZF-A** series

Features

- Endurance : 1000 h at 150 °C (High temperature)
- High temperature compared with ZC series •
- High-withstand voltage (to 63 V)
- Characteristics dependencies in frequency and low temperature are as small as polymer type
- Compatible with taping products for automatic insertion
- AEC-Q200 compliant
- RoHS compliant

Spacifications

Size code	F			G			
Category temp. range	_55 ℃ to +150 ℃						
Rated voltage range	25 V to 63 V						
Nominal cap.range	33 µF to 1			56 μF to 270 μF			
Capacitance tolerance			Hz / +20℃)				
Leakage current	I ≤ 0.01 CV (μA), 2 minutes after reaching rated voltage, 20 °C *CV = (Capacitance in μF) x (Rated vo						
Dissipation factor (tan δ)	Please see the attached characteristics list						
Surge voltage (V)		Rated voltage × 1.					
	+150 ℃ ± 2 ℃, 1000 h, apply t			the rated voltage.			
	Capacitance change	Within ±30% of the initial					
Endurance	Dissipation factor (tan δ)	≦ 200 % of the initial limit					
	ESR		\leq 200 % of the initial limit				
	Leakage current	Within the initial limit					
	ESR after endurance	Size code					
	(Ω / 100 kHz)(-40 ℃)	F	G				
		0.4	0.3				
	After storage for 1000 hours at						
Shelf life	stabilized at +20 °C, capacitor	s shall meet the limits spec	cified in endura	nce.			
	(With voltage treatment)						
	+85 ℃ ± 2 ℃, 85 % to 90 %RF						
5	Capacitance change	Within ±30% of the initial					
Damp heat (Load)	Dissipation factor (tan δ)	\leq 200 % of the initial limit					
	ESR	≤ 200 % of the initial limit					
	Leakage current	Within the initial limit					
	After flow soldering and then b	eing stabilized at +20 °C, ca	apacitors shall	meet the			
Resistance to	following limits.						
soldering heat	Capacitance change	Within ±10% of the initial	value				
0	Dissipation factor (tan δ)	Within the initial limit					
	Leakage current	Within the initial limit					



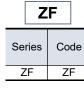
Design and specifications are each subject to change without notice. Ask factory for the current technical specifications before purchase and/or use. Design and specifications are each subject to orange mutour reservence. Should a safety concern arise regarding this product, please be sure to contact us immediately.

ZF-A series

Explanation of part numbers

♦ Part number system

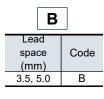
EEHA Product classification





1E Rated vol. Code^{*1} (V) 25 1E 35 1V 50 1H 63 1J

151 Capacitance Capacitance Code Code (µF) (µF) 150 33 330 151 56 560 270 271 100 101



*: If the total figures number of the part number exceeds 12 figures, "1" is omitted.

Characteristics list

Endurance : 150 ℃ 1000 h

		(Case size (mm)	Э		Specification				Min.packaging q'ty (pcs)
Rated voltage (V)	Capacitance (±20 %) (µF)	øD	L	ød	Size code	Ripple current ^{*1} (mA rms)	ESR ^{*2} (mΩ)	tan δ ^{*3}	Part number	Taping
25	150	8.0	9.5	0.6	F	800	27	0.14	EEHAZF1E151B	1000
25	270	10.0	9.5	0.6	G	1000	20	0.14	EEHAZF1E271B	500
35	100	8.0	9.5	0.6	F	770	30	0.12	EEHAZF1V101B	1000
35	150	10.0	9.5	0.6	G	950	23	0.12	EEHAZF1V151B	500
50	56	8.0	9.5	0.6	F	700	35	0.10	EEHAZF1H560B	1000
50	100	10.0	9.5	0.6	G	900	28	0.10	EEHAZF1H101B	500
63	33	8.0	9.5	0.6	F	650	40	0.08	EEHAZF1J330B	1000
	56	10.0	9.5	0.6	G	840	30	0.08	EEHAZF1J560B	500

*1: Ripple current (100 kHz / +150 °C)

*2: ESR (100 kHz / +20 ℃)

*3: tan δ (120 Hz / +20 °C)

• Please refer to the page of "Flow soldering profile" and "The taping dimensions".

Frequency correction factor for ripple current

Rated capacitance (C)	Frequency (f)	100 Hz ≦ f < 200 Hz	200 Hz ≦ f < 300 Hz	300 Hz ≦ f < 500 Hz	500 Hz ≦ f < 1 kHz	
C < 47 μF		0.10	0.10	0.15	0.20	
47 μF ≦ C < 150 μF	Correction factor	0.15	0.20	0.25	0.30	
150 µF ≦ C		0.15	0.25	0.25	0.30	
				•		
Rated capacitance (C)	Frequency (f)	1 kHz ≦ f < 2 kHz	2 kHz ≦ f < 3 kHz	3 kHz ≦ f < 5 kHz	5 kHz ≦ f < 10 kHz	
C < 47 µF	0 "	0.30	0.40	0.45	0.50	
47 µF ≦ C < 150 µF	Correction factor	0.40	0.45	0.55	0.60	
150 µF ≦ C		0.45	0.50	0.60	0.65	
			·			
Rated capacitance (C)	Frequency (f)	10 kHz ≦ f < 15 kHz	15 kHz ≦ f < 20 kHz	20 kHz ≦ f < 30 kHz	30 kHz ≦ f < 40 kHz	
C < 47 µF	O anna atlana	0.60	0.65	0.70	0.75	
47 µF ≦ C < 150 µF	Correction factor	0.70	0.75	0.80	0.80	
150 µF ≦ C		0.75	0.80	0.85	0.85	
			1			
Rated capacitance (C)	Frequency (f)	40 kHz ≦ f < 50 kHz	50 kHz ≦ f < 100 kHz	100 kHz ≦ f < 500 kHz	500 kHz ≦ f	
C < 47 µF	O	0.80	0.85	1.00	1.05	
47 µF ≦ C < 150 µF	Correction factor	0.85	0.90	1.00	1.00	
150 µF ≦ C		0.85	0.90	1.00	1.00	

Design and specifications are each subject to change without notice. Ask factory for the current technical specifications before purchase and/or use. Design and specifications are each subject to change without notice, risk deter, risk best, risk be

Safty Precautions

When using our products, no matter what sort of equipment they might be used for, be sure to confirm the applications and environmental conditions with our specifications in advance.



Panasonic Industry Co., Ltd. Device Solutions Business Division

1006 Kadoma, Kadoma City, Osaka 571-8506 Japan

© Panasonic Industry

Unauthorized duplication of this catalog is strictly forbidden. The contents of catalog are as of May 2025.