ELNA

Electronic Components

# High Quality

# CAPACITORS

CONDUCTIVE POLYMER HYBRID ALUMINUM ELECTROLYTIC CAPACITORS

ALUMINUM ELECTROLYTIC CAPACITORS

ELECTRIC DOUBLE LAYER CAPACITORS “DYNACAP™”

ELNA CO., LTD.

CAT.No.2025/2026E

# Notice for ELNA products 1

ELNA

Please read this notice before using the ELNA products.

## ⚠ REMINDERS

### Product Information in this Catalog

Product information in this catalog is as of December 2025. All of the contents specified herein and production status of the products listed in this catalog are subject to change without notice due to technical improvement of our products, etc. Therefore, please check for the latest information carefully before practical application or use of our products.

Please note that ELNA shall not be in any way responsible for any damages and defects in products or equipment incorporating our products, which are caused under the conditions other than those specified in this catalog or individual product specification sheets.

### Approval of Product Specifications

Please contact ELNA for further details of product specifications as the individual product specification sheets are available. When using our products, please be sure to approve our product specifications or make a written agreement on the product specification with ELNA in advance.

### Pre-Evaluation in the Actual Equipment and Conditions

Please conduct validation and verification of our products in actual conditions of mounting and operating environment before using our products.

### Limited Application

**1. Equipment Intended for Use**

The products listed in this catalog are intended for general-purpose and standard use in general electronic equipment (e.g., AV equipment, OA equipment, home electric appliances, office equipment, information and communication equipment including, without limitation, mobile phone, and PC) and other equipment specified in this catalog or the individual product specification sheets.

ELNA has the line-up of the products intended for use in automotive electronic equipment, telecommunications infrastructure and industrial equipment, or medical devices. Therefore, when using our products for these equipment, please check available applications specified in this catalog or the individual product specification sheets and use the corresponding products.

**2. Equipment Requiring Inquiry**

Please be sure to contact ELNA for further information before using the products listed in this catalog for the following equipment (excluding intended equipment as specified in this catalog or the individual product specification sheets) which may cause loss of human life, bodily injury, serious property damage and/or serious public impact due to a failure or defect of the products and/or malfunction attributed thereto.

(1) Transportation equipment (automotive powertrain control system, train control system, and ship control system, etc.)
(2) Traffic signal equipment
(3) Disaster prevention equipment, crime prevention equipment
(4) Medical devices classified as GHTF Class C (Japan Class III)
(5) Highly public information network equipment, data- processing equipment (telephone exchange, and base station, etc.)
(6) Any other equipment requiring high levels of quality and/or reliability equal to the equipment listed above

**3. Equipment Prohibited for Use**

Please do not incorporate our products into the following equipment requiring extremely high levels of safety and/or reliability.

(1) Aerospace equipment (artificial satellite, rocket, etc.)
(2) Aviation equipment *1
(3) Medical devices classified as GHTF Class D (Japan Class IV), implantable medical devices *2
(4) Power generation control equipment (nuclear power, hydroelectric power, thermal power plant control system, etc.)
(5) Undersea equipment (submarine repeating equipment, underwater work equipment, etc.)
(6) Military equipment
(7) Any other equipment requiring extremely high levels of safety and/or reliability equal to the equipment listed above

*Notes:

1. There is a possibility that our products can be used only for aviation equipment that does not directly affect the safe operation of aircraft (e.g., in-flight entertainment, cabin light, electric seat, cooking equipment) if such use meets requirements specified separately by ELNA. Please be sure to contact ELNA for further information before using our products for such aviation equipment.
2. Implantable medical devices contain not only internal unit which is implanted in a body, but also external unit which is connected to the internal unit.

**4. Limitation of Liability**

Please note that unless you obtain prior written consent of ELNA, ELNA shall not be in any way responsible for any damages incurred by you or third parties arising from use of the products listed in this catalog for any equipment that is not intended for use by ELNA, or any equipment requiring inquiry to ELNA or prohibited for use by ELNA as described above.

### Safety Design

When using our products for high safety and/or reliability-required equipment or circuits, please fully perform safety and/or reliability evaluation. In addition, please install (i) systems equipped with a protection circuit and a protection device and/or (ii) systems equipped with a redundant circuit or other system to prevent an unsafe status in the event of a single fault for a failsafe design to ensure safety.

### Intellectual Property Rights

Information contained in this catalog is intended to convey examples of typical performances and/or applications of our products and is not intended to make any warranty with respect to the intellectual property rights or any other related rights of ELNA or any third parties nor grant any license under such rights.

### Limited Warranty

Please note that the scope of warranty for our products is limited to the delivered our products themselves and ELNA shall not be in any way responsible for any damages resulting from a failure or defect in our products. Notwithstanding the foregoing, if there is a written agreement (e.g., supply and purchase agreement, quality assurance agreement) signed by ELNA and your company, ELNA will warrant our products in accordance with such agreement.

### ELNA's Official Sales Channel

The contents of this catalog are applicable to our products which are purchased from our sales offices or authorized distributors (hereinafter "ELNA's official sales channel"). Please note that the contents of this catalog are not applicable to our products purchased from any seller other than ELNA's official sales channel.

### Caution for Export

Some of our products listed in this catalog may require specific procedures for export according to"U.S. Export Administration Regulations","Foreign Exchange and Foreign Trade Control Law" of Japan, and other applicable regulations. Should you have any questions on this matter, please contact our sales staff.

# Notice for ELNA products 2

ELNA

### Equipment intended for use and product categories

| Application | Product Group | |
|---|---|---|
| | Equipment *1 | Category (Part Number Code *2 ) |
| Automotive | Automotive Electronic Equipment (POWERTRAIN, SAFETY) | A |
| | Automotive Electronic Equipment (BODY & CHASSIS, INFOTAINMENT) | C |
| Medical | Medical Devices classified as GHTF Class C (Japan Class III) | M |
| | Medical Devices classified as GHTF Classes A or B (Japan Classes I or II) | L |
| Consumer | General Electronic Equipment | S |

*Notes : 1. Based on the general specification required for electronic components for such equipment, which are recognized by ELNA, the use of each product group for the equipment is recommended. Please be sure to contact ELNA before using our products for equipment other than those covered by the product group.

2. On each of our part number, the 2nd code from the left is a code indicating the “Category” as shown in the above table. For details, please check the explanatory materials regarding the part numbering system of each of our products.

### Automotive Application Guide

We classify automotive electronic equipment into the following four purpose of use and set usable product purpose of use for each of our products. Therefore, we have the corresponding product category code (the part number code of 2nd digit from the left side is “A” or “C”).
When using our products for automotive electronic equipment, please be sure to check such application categories and use the corresponding product series accordingly. Should you have any questions on this matter, please contact us.

| Product category (Part Number Code of 2nd digit from the Left Side) | Purpose of use | Automotive Electronic Equipment (Typical Example) |
|---|---|---|
| A | POWERTRAIN | ・Engine ECU (Electronically Controlled Fuel Injector)<br>・Cruise Control Unit<br>・4WS (4 Wheel Steering)<br>・Transmission<br>・Power Steering<br>・HEV/PHV/EV Core Control (Battery, Inverter, DC-DC)<br>・Automotive Locator (Car location information providing device), etc. |
| | SAFETY | ・ABS (Anti-Lock Brake System)<br>・ESC (Electronic Stability Control)<br>・Airbag<br>・ADAS (Equipment that directly controls running, turning and stopping), etc. |
| C | BODY & CHASSIS | ・Wiper<br>・Automatic Door<br>・Power Window<br>・Keyless Entry System<br>・Electric Door Mirror<br>・Automobile Digital Mirror<br>・Interior Lighting<br>・Automobile Air Conditioning System<br>・TPMS (Tire Pressure Monitoring System)<br>・Anti-Theft Device (Immobilizer), etc. |
| | INFO-TAINMENT | ・Car Infotainment System<br>・ITS/Telematics System<br>・Instrument Cluster<br>・ADAS (Sensor, Equipment that is not interlocked with safety equipment or powertrain)<br>・Dashcam (genuine products for automotive manufacturer), etc. |

# ■ “GREEN CAP™”

**“GREEN CAP”, ELNA considers the global environment and it is a product that doesn't use the hazardous substance and “Lead Free” in the plating of terminals and outer Sleeves.**
**The product in this catalog is 'GREEN CAP'.**

The hazardous substance is
Cadmium and its compounds, Lead and its compounds
Hexavalent chromium compounds, Mercury and its compounds
PBB, PBDE : Specified bromine-based flame retardants
DEHP : Di(2-ethylhexyl)phthalate, BBP : Bis(butylbenzyl) phthalate
DBP : Dibutyl phthalate, DIBP : Diisobutyl phthalate

## ■Regarding to various environmental Regulations

It suits with the following EU regulations.

- End-of-Life Vehicle Directive
- Restriction of the Use of Certain Hazardous Substances In Electrical and Electronic Equipment.
- Waste Electrical and Electronic Equipment,

etc.

For details, please check our website.（https://www.elna.co.jp/en/sustainability/environment/regulation/）

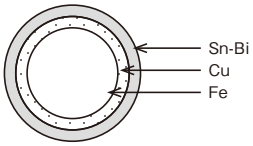
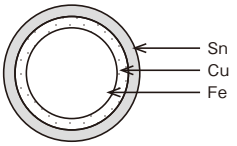
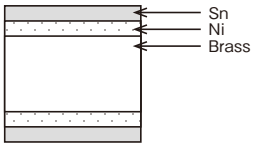
If you need “Halogen-Free” products, please consult with us.

## Terminal area plating material and sleeve material

- (Conductive polymer hybrid) Aluminum electrolytic capacitors
- Electric double layer capacitors (Cylindrical type)

| Product type | Size | Terminal plating | Sleeve |
|---|---|---|---|
| SMD (Chip type) | φ 10 or less | Sn-Bi | Sleeve less |
| | φ 12.5 or more | Sn 100% | Sleeve less |
| | For Vibration resistance Dummy terminal | Sn 100% | — |
| Lead terminal type | All size | Sn 100% | PET (or Sleeve less) |

Terminal plating structure overview

| Terminal plating : Sn-Bi | Terminal plating : Sn 100% | For Vibration resistance Dummy terminal |
|---|---|---|
|  |  |  |



Sn : Tin　Bi : bismuth　Fe : Iron　Cu : Cupper　Ni : Nickel

- Please contact us for excluding the above-mentioned, terminal plating and sleeve.

## ■ About the Sn whisker

1. Sn whisker-generating mechanism on the lead wire

   On the surface of the lead wire, Sn and aluminum will get mixed instead of getting dissolved.

   The surface condition is complex, aluminum will expand due to the heat and humid causing the oxidation and hydration. This reaction will cause the inner stress and influence the development of the whisker.

2. Generation control of the Sn whisker

   In the past, Sn whisker was reduced by adding a lead(Pb). Aluminum electrolytic capacitor was also using the Sn-plate with Pb on the lead wire.

   But due to environmental regulation such as the “ELV” and “RoHS”, Pb was strictly prohibited since 2000.

   Lead wire not containing the Pb was used, which caused the Sn whisker problem to happen again.

   Since Sn whisker is influenced by the mixture of aluminum, method of reducing the aluminum on the welding surface was to clean the lead terminal using the alkali.

   However since the welding area of the large case size is larger compared to the small ones, whisker will generate even if it is cleaned by alkali. This whisker will scatter outside of the capacitor and potentially cause the short-circuit. Countermeasure of keeping the whisker inside the capacitor is being discussed.

3. Prevention of scattering of Sn whisker

   In the past Sn-plate with Pb was used and recently plate with Bi is being introduced to prevent the whisker from generating. However the whisker will still generate under the temperature and moisture condition.

   Therefore, the current method of preventing the whisker will not completely prevent the whisker from generating.

   In our company, we are developing and supplying products with design of preventing the whisker from scattering outside the capacitor.

   This design corresponds to series such as the RJD, RJE and RJK for 105°C use, RKD and RPK for 125°C use.

   If it is required for the other series, please feel free to make an inquiry.

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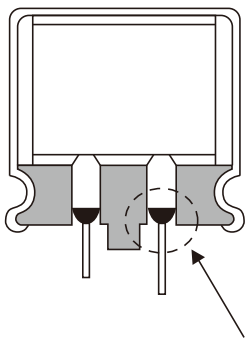
<td> 
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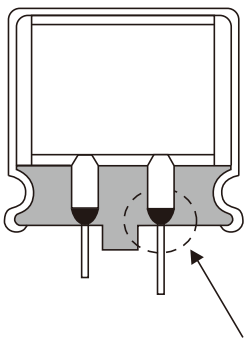
<td> 
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## ■ Ordering Information

Please order by the multiples of the minimum order quantity (MOQ).

## Aluminum Electrolytic Capacitors

| Classification | | Case Size φD×L (mm) | Quantity (PCS.) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Long lead | | Forming lead | | Taping (04 Type) | Taping (Chip Type) | |
| | | | (Q'ty/Bag) | MOQ/Box | (Q'ty/Bag) | MOQ/Box | MOQ/Box | MOQ/Reel | (Q'ty/Box) |
| Conductive Polymer Hybrid Aluminum Electrolytic Capacitors | Chip Type | φ5 to φ6.3 | — | — | — | — | — | 1,000 | 5,000 |
| | | φ8,φ10×10 | — | — | — | — | — | 500 | 2,000 |
| | | φ10×12.5 | — | — | — | — | — | 400 | 1,600 |
| | | φ10×16.5 | — | — | — | — | — | 250 | 1,000 |
| | | φ12.5×13.5 | — | — | — | — | — | 200 | 1,000 |
| Chip Type | | φ6.3 | — | — | — | — | — | 1,000 | 5,000 |
| | | φ8,φ10 | — | — | — | — | — | 500 | 2,000 |
| | | φ12.5×13.5 | — | — | — | — | — | 200 | 1,000 |
| | | φ16×16.5,φ18×16.5 | — | — | — | — | — | 125 | 250 |
| | | φ16×21.5,φ18×21.5 | — | — | — | — | — | 75 | 150 |
| 04 Type | | φ10×12.5 | 200 | 1,000 | 200 (400) | 1,000 (4,000) | 500 | — | — |
| | | φ10×16 | 200 | 1,000 | 200 | 1,000 | 500 | — | — |
| | | φ10×20 | 200 | 1,000 | 200 (100) | 1,000 (500) | 500 | — | — |
| | | φ10×25 to 30 | 200 | 1,000 | 100 (200) | 500 (1,000) | 500 | — | — |
| | | φ12.5×15 to 20 | 100 | 1,000 | 100 | 1,000 (500) | 500 | — | — |
| | | φ12.5×25 | 100 | 500 (1,000) | 100 | 1,000 (500) | 500 | — | — |
| | | φ12.5×30,35 | 100 | 500 | 200 (100) | 2,000 (500) | 500 | — | — |
| | | φ12.5×40 | 100 | 500 (100) | 200 (100) | 2,000 (500) | — | — | — |
| | | φ16×16 to 25 | 100 | 500 | 100 | 1,000 (100) | — | — | — |
| | | φ16×31.5 to 35.5 | 50 | 200 (400) | 100 | 1,000 (100) | — | — | — |
| | | φ16×40 | 50 (100) | 100 | 100 | 800 (100) | — | — | — |
| | | φ18×16 | 50 | 100 | 100 | 1,000 (100) | — | — | — |
| | | φ18×20 | 50 (100) | 100 (500) | 100 | 1,000 (100) | — | — | — |
| | | φ18×25 | 50 (100) | 100 (400) | 100 | 1,000 (100) | — | — | — |
| | | φ18×31.5 to 35.5 | 50 | 100 | 100 | 1,000 (100) | — | — | — |
| | | φ18×40 | 50 | 250 (100) | 100 | 800 (100) | — | — | — |

(Note) It may become the numerical value in ( ).

## Electric Double Layer Capacitors

| Type | Case size φD×L(mm) | Quantity (PCS.) | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | Long lead | | Forming lead | | Taping (04 Type) | Taping (Chip Type) | |
| | | (Q'ty/Bag) | MOQ/Box | (Q'ty/Bag) | MOQ/Box | MOQ/Box | MOQ/Reel | (Q'ty/Box) |
| Cylindrical | φ6.3 | 200 | 2,000 | 200 | 2,000 | 2,000 | — | — |
| | φ8×12 | 200 | 2,000 | 200 | 2,000 | 1,000 | — | — |
| | φ8×20 | 200 | 1,000 | 200 | 1,000 | 1,000 | — | — |
| | φ10×20 to 25 | 200 | 1,000 | 100 | 500 | 500 | — | — |
| | φ10×30 to 35 | 200 | 1,000 | 100 | 500 | 500 | — | — |
| | φ12.5×25 | 100 | 500 | 100 | 1,000 | 500 | — | — |
| | φ12.5×35 | 100 | 500 | 200 | 2,000 | — | — | — |
| | φ16×20 to 25 | 100 | 500 | 100 | 1,000 | — | — | — |
| | φ16×31.5 to 35.5 | 50 | 200 | 100 | 1,000 | — | — | — |
| | φ16×40 | 50 | 100 | 100 | 800 | — | — | — |
| | φ18×40 | 50 | 250 | 100 | 800 | — | — | — |

# ■ Type List for Aluminum Electrolytic Capacitors

★ : New series
☆ : Upgrade

*** Be sure to "Cautions for using Aluminum Electrolytic capacitors", before using these products.**

## ● Conductive Polymer Hybrid Aluminum Electrolytic Capacitors

The series names are linked to each page.

| Category | Series | Application | Category Temp. Range (℃) | | Life time Range (hours) | | Rated Voltage Range (V.DC) | | Rated Capacitance Range (μF) | | Size range φD x L (mm) | | Outside color | JIS Configurati | Note |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | | | |
| Hybrid | HV1 | 105 deg C, low ESR, long ife, chip type | −55 | +105 | 10000 | | 25 | 100 | 10 | 820 | 5×5.8 | 12.5×13.5 | Silver | 32 | |
| | HT1 | 105 deg C, low ESR, long ife, chip type, vibration resistance | −55 | +105 | 10000 | | 25 | 100 | 10 | 820 | 6.3×5.8 | 12.5×13.5 | Silver | 32 | |
| | HVK | 125 deg C, low ESR, long ife, chip type | −55 | +125 | 4000 | 6000 | 25 | 100 | 10 | 1000 | 5×5.8 | 12.5×13.5 | Silver | 32 | |
| | HTK | 125 deg C, low ESR, long ife, chip type, vibration resistance | −55 | +125 | 4000 | 6000 | 25 | 100 | 10 | 1000 | 6.3×5.8 | 12.5×13.5 | Silver | 32 | ☆ |
| | HVL | 125 deg C, low ESR, long ife, chip type | −55 | +125 | 8000 | | 25 | 63 | 33 | 1000 | 8×10 | 12.5×13.5 | Silver | 32 | |
| | HTL | 125 deg C, low ESR, long ife, chip type, vibration resistance | −55 | +125 | 8000 | | 25 | 63 | 33 | 1000 | 8×10 | 12.5×13.5 | Silver | 32 | |
| | HVX | 135 deg C, low ESR, chip type | −55 | +135 | 2000 | 4000 | 25 | 63 | 10 | 1000 | 6.3×5.8 | 10×12.5 | Silver | 32 | |
| | HTX | 135 deg C, low ESR, chip type, vibration resistance | −55 | +135 | 2000 | 4000 | 25 | 63 | 10 | 1000 | 6.3×5.8 | 10×12.5 | Silver | 32 | ☆ |
| | HVQ | 150 deg C, high temperature, low ESR, chip type | −55 | +150 | 1000 | | 25 | 63 | 33 | 330 | 8×10 | 10×10 | Silver | 32 | |
| | HTQ | 150 deg C, high temperature, low ESR, chip type, vibration resistance | −55 | +150 | 1000 | | 25 | 63 | 33 | 330 | 8×10 | 10×10 | Silver | 32 | |
| | HVY | 150 deg C, high temperature, low ESR, chip type | −55 | +150 | 2000 | | 25 | 63 | 33 | 330 | 8×10 | 10×10 | Silver | 32 | |
| | HTY | 150 deg C, high temperature, low ESR, chip type, vibration resistance | −55 | +150 | 2000 | | 25 | 63 | 33 | 330 | 8×10 | 10×10 | Silver | 32 | |

# ■ Type List for Aluminum Electrolytic Capacitors

*** Be sure to "Cautions for using Aluminum Electrolytic capacitors", before using these products.**

## ● Chip Type Aluminum Electrolytic Capacitors

The series names are linked to each page.

| Category | Series | Application | Category Temp. Range (℃) | | Life time Range (hours) | | Rated Voltage Range (V.DC) | | Rated Capacitance Range (μF) | | Size range φD x L (mm) | | Outside color | JIS Configurati | Note |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | | | |
| Standard | VVR | 105 deg C, standard | −40 | +105 | 2000 | | 4 | 50 | 1 | 1500 | 6.3×5.8 | 10×10 | Silver | 32 | |
| High Reliability | VVC | 105 deg C, Long life | −40 | +105 | 3000 | 5000 | 6.3 | 50 | 1 | 1000 | 6.3×5.8 | 10×10 | Silver | 32 | |
| Low Impedance, Low ESR, High Reliability | VVZ | 105 deg C, low ESR | −55 | +105 | 1000 | 5000 | 6.3 | 35 | 4.7 | 2700 | 6.3×5.8 | 12.5×13.5 | Silver | 32 | |
| | VVD | 105 deg C, low ESR, long life | −55 | +105 | 2000 | 5000 | 6.3 | 63 | 10 | 2200 | 6.3×5.8 | 12.5×13.5 | Silver | 32 | |
| | VVV | 105 deg C, low ESR | −55 | +105 | 2000 | | 6.3 | 50 | 33 | 1500 | 6.3×5.8 | 10×10 | Silver | 32 | |
| | VTV | VVV series, for vibration resistance type | | | | | | | | | 6.3×7.7 | | | | |
| | VZD | 105 deg C, low ESR, high CV | −55 | +105 | 2000 | | 6.3 | 50 | 22 | 2200 | 6.3×5.8 | 10×10 | Silver | 32 | |
| | VMD | VZD series, for vibration resistance type | | | | | | | | | 6.3×7.7 | | | | |
| | VVT | 125 deg C, low ESR | −40 | +125 | 1000 | 5000 | 10 | 63 | 10 | 1000 | 6.3×5.8 | 12.5×13.5 | Silver | 32 | |
| | VZJ | 125 deg C, low ESR, long life. Specify ESR after endurance test. | −40 | +125 | 2000 | 3000 | 10 | 35 | 22 | 470 | 6.3×7.7 | 10×10 | Silver | 32 | |
| | VMJ | VZJ series, for vibration resistance type | | | | | | | | | | | | | |
| | VZF | 125 deg C, low ESR, high CV, long life | −40 | +125 | 1000 | 4000 | 10 | 35 | 22 | 680 | 6.3×5.8 | 10×10 | Silver | 32 | |
| | VMF | VZF series, for vibration resistance type | | | | | | | | | 6.3×7.7 | | | | |
| | VZE | 125 deg C, low ESR, high CV, long life. Specify ESR after endurance test. | −40 | +125 | 2000 | | 35 | | 47 | 100 | 6.3×7.7 | | Silver | 32 | |
| | VME | VZE series, for vibration resistance type | | | | | | | | | | | | | |
| | VVX | 125 deg C, high temperature | −40 | +135 | 1000 | | 25 | 35 | 22 | 330 | 8×10 | 10×10 | Silver | 32 | |
| | VTX | VVX series, for vibration resistance type | | | | | | | | | | | | | |
| For Vibration Resistance | VTZ | 105 deg C, low ESR, 30G vibration resistance | −55 | +105 | 1000 | 5000 | 6.3 | 35 | 33 | 8200 | 6.3×7.7 | 18×21.5 | Silver | 32 | |
| | VTD | 105 deg C, low ESR , long life, 30G vibration resistance | −55 | +105 | 2000 | 4000 | 6.3 | 63 | 33 | 8200 | 6.3×7.7 | 18×21.5 | Silver | 32 | |
| | VTT | 125 deg C, low ESR, 30G vibration resistance | −40 | +125 | 1000 | 5000 | 10 | 63 | 22 | 4700 | 6.3×7.7 | 18×21.5 | Silver | 32 | |

## ● Miniature Aluminum Electrolytic Capacitors

The series names are linked to each page.

| Category | Series | Application | Category Temp. Range (℃) | | Life time Range (hours) | | Rated Voltage Range (V.DC) | | Rated Capacitance Range (μF) | | Size range φD x L (mm) | | Outside color | JIS Configurati | Note |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | | | |
| Low Impedance, Low ESR, High Reliability | RJB | 105 deg C, miniature, low impedance | −55 | +105 | 3000 | 5000 | 6.3 | 50 | 150 | 10000 | 10×12.5 | 16×31.5 | Black | 04 | |
| | RJH | 105 deg C, low impedance | −55 | +105 | 3000 | 5000 | 6.3 | 50 | 82 | 15000 | 10×12.5 | 18×40 | Black | 04 | |
| | RJF | 105 deg C, miniature, extra low impedance | −40 | +105 | 3000 | 5000 | 6.3 | 50 | 150 | 6800 | 10×12.5 | 16×25 | Black | 04 | |
| | RJM | 105 deg C, miniature, long life, extra low impedance | −40 | +105 | 10000 | | 6.3 | 50 | 150 | 8200 | 10×12.5 | 16×25 | Black | 04 | |
| | RJD | 105 deg C, miniature, low ESR | −55 | +105 | 5000 | 8000 | 6.3 | 35 | 270 | 18000 | 10×12.5 | 18×40 | Black | 04 | |
| | RKD | 125 deg C, miniature, low ESR | −40 | +125 | 3000 | 5000 | 10 | 35 | 220 | 6800 | 10×12.5 | 18×40 | Black | 04 | |
| | RKB | 135 deg C, miniature, low ESR | −40 | +135 | 2000 | 3000 | 10 | 35 | 220 | 6800 | 10×12.5 | 18×40 | Silver | 04 | |
| | RKC | 135 deg C, high CV, low ESR, high ripple current | −40 | +135 | 2000 | 3000 | 25 | 80 | 270 | 12000 | 12.5×20 | 18×40 | Silver | 04 | |
| For Air bag | RJK | 105 deg C, high CV capacitor for SRS airbag | −55 | +105 | 5000 | | 25 | 35 | 2500 | 14000 | 16×20 | 18×40 | Black | 04 | |
| For Vibration Resistance | RPK | 125 deg C, NC terminal 30G vibration resistance | −40 | +125 | 5000 | | 10 | 35 | 470 | 6800 | 12.5×15 | 18×40 | Black | 04 | |

## ■ Not listed and discontinued series list

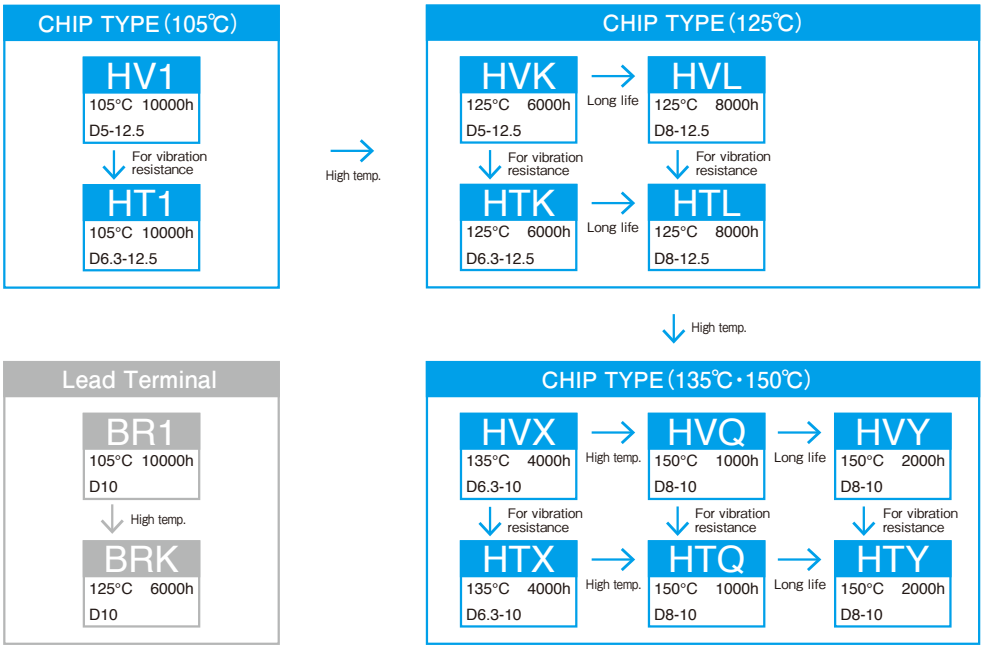
● **Some of the series listed in the below table have been removed from the catalogue.**
**Please contact us for product detail.**

| Category | Series | Application | Category Temp. Range (℃) | | Life time Range (hours) | | Rated Voltage Range (V.DC) | | Rated Capacitance Range (μF) | | Size range φD x L (mm) | | Substitute series to recomend |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | |
| Hybrid | BR1 | 105 deg C, low ESR, long life, lead terminal type | −55 | +105 | 10000 | | 25 | 100 | 15 | 560 | 10×10 | 10×12.5 | — |
| | BRK | 125 deg C, low ESR, long life, lead terminal type | −55 | +125 | 4000 | 6000 | 25 | 100 | 15 | 560 | 10×10 | 10×12.5 | — |
| Polymer | PVG | Ultra Low ESR Conductive Polymer Chip | −55 | +105 | 2000 | | 2.5 | 6.3 | 120 | 1200 | 5×5.7 | 10×7.7 | — |
| | PVX | Ultra Low ESR Conductive Polymer Chip | −55 | +105 | 2000 | | 2.5 | 10 | 100 | 1200 | 5×5.7 | 6.3×5.7 | — |
| | PVM | Super Low ESR Conductive Polymer Chip | −55 | +105 | 2000 | | 2.5 | 16 | 33 | 1200 | 5×5.7 | 6.3×5.7 | — |
| | PVK | Super Low ESR, High Temp. Conductive Polymer Chip | −55 | +125 | 1000 | | 2.5 | 16 | 33 | 1000 | 6.3×5.7 | | — |
| Chip | VV2 | 85 deg C, 5.3mm L | −40 | +85 | 2000 | | 4 | 50 | 1 | 220 | 3×5.3 | 6.3×5.3 | — |
| | VV3 | 85 deg C, Standard | −40 | +85 | 2000 | | 6.3 | 50 | 4.7 | 330 | 4×5.3 | 6.3×7.7 | — |
| | VV1 | 85 deg C, Large Capacitance | −40 | +85 | 2000 | | 6.3 | 100 | 10 | 2200 | 8×6.5 | 12.5×13.5 | — |
| | VV4 | 85 deg C, 4.5mm L | −40 | +85 | 2000 | | 6.3 | 50 | 10 | 100 | 6.3×4.5 | | — |
| | VV5 | 85 deg C, standard | −40 | +85 | 2000 | | 4 | 100 | 1 | 2200 | 4×5.3 | 12.5×13.5 | — |
| | VVS | 105 deg C, standard | −55 | +105 | 1000 | | 6.3 | 50 | 1 | 1500 | 4×5.3 | 10×10.5 | — |
| | VV9 | 105 deg C, bipolar standard | −40 | +105 | 2000 | | 6.3 | 50 | 1 | 47 | 4×5.8 | 6.3×5.8 | — |
| | VVB | 85 deg C, bipolar standard | −40 | +85 | 2000 | | 6.3 | 50 | 1 | 47 | 4×5.3 | 6.3×5.3 | — |
| | VVL | 105 deg C, 5.7mm L | −55 | +105 | 2000 | | 6.3 | 50 | 1 | 100 | 4×5.7 | 6.3×5.7 | — |
| | VVJ | 105 deg C, Large Capacitance | −55 | +105 | 2000 | 5000 | 6.3 | 100 | 10 | 1000 | 8×6.5 | 12.5×13.5 | — |
| | VVE | 105 deg C, 4.5mm L | −55 | +105 | 2000 | 5000 | 6.3 | 100 | 10 | 1000 | 6.3×4.5 | | — |
| | VZH | 105 deg C, Long life | −55 | +105 | 5000 | 7000 | 6.3 | 35 | 22 | 1000 | 6.3×5.8 | 10×10 | — |
| | VMH | VZH series, for vibration resistance type | −55 | +105 | 5000 | 7000 | 6.3 | 100 | 10 | 1000 | 6.3×7.7 | 10×10 | — |
| | VZK | 105 deg C, low ESR, high CV | −55 | +105 | 2000 | | 25 | 35 | 470 | 1000 | 8×10 | 10×10 | — |
| | VTQ | 150 deg C, high temperature, 30G vibration resistance | −40 | +150 | 1000 | | 10 | 35 | 33 | 470 | 8×10 | 10×10 | — |
| Miniature | RC3 | 85 deg C, 5mmL | −40 | +85 | 1000 | | 4 | 50 | 1 | 470 | 4×5 | 8×5 | — |
| | R3S | 105 deg C, 5mmL | −55 | +105 | 1000 | | 6.3 | 50 | 1 | 100 | 4×5 | 6.3×5 | — |
| | RB3 | 85 deg C, 5mmL, Bipolar | −40 | +85 | 1000 | | 6.3 | 50 | 0.33 | 47 | 4×5 | 6.3×5 | — |
| | RC2 | 85 deg C, 7mmL | −40 | +85 | 1000 | | 4 | 100 | 1 | 330 | 4×7 | 8×7 | — |
| | R2S | 105 deg C, 7mmL | −55 | +105 | 1000 | | 6.3 | 50 | 1 | 100 | 4×7 | 6.3×7 | — |
| | RB2 | 85 deg C, 7mmL, Bipolar | −40 | +85 | 1000 | | 6.3 | 50 | 0.33 | 47 | 4×7 | 6.3×7 | — |
| | RE3 | 85 deg C, Standard | −40 | +85 | 2000 | | 6.3 | 450 | 0.47 | 22000 | 5×11 | 18×40 | — |
| | R2B | 85 deg C, Bipolar | −40 | +85 | 2000 | | 6.3 | 100 | 1 | 4700 | 5×11 | 18×35.5 | — |
| | RJP | 105 deg C, Bipolar | −40 | +105 | 1000 | 2000 | 6.3 | 50 | 1 | 6800 | 5×11 | 18×35.5 | — |
| | RJ5 | 105 deg C, Standard | −55 | +105 | 1000 | | 6.3 | 100 | 1 | 22000 | 5×11 | 18×40 | — |
| | RJ4 | 105 deg C, Standard | −55 | +105 | 1000 | 2000 | 6.3 | 100 | 1 | 22000 | 5×11 | 18×40 | — |
| | RJ3 | 105 deg C, Standard | −55 | +105 | 1000 | 2000 | 6.3 | 100 | 1 | 15000 | 5×11 | 18×35.5 | — |
| | RLB | 85 deg C, Low leakage current | −40 | +85 | 1000 | | 6.3 | 50 | 1 | 2200 | 5×11 | 18×35.5 | — |
| | RJE | 105 deg C, capacitor for SRS airbag | −55 | +105 | 5000 | | 25 | 35 | 830 | 11000 | 12.5×15 | 18×40 | — |
| | RQA | 150 deg C, high temperature | −40 | +150 | 1000 | | 10 | 35 | 220 | 4700 | 10×14.5 | 18×42.5 | — |
| | RQB | 150 deg C, high temperature, high ripple current | −40 | +150 | 2000 | | 35 | 50 | 1300 | 4700 | 16×26.5 | 18×42.5 | — |
| | RKE | 125 deg C, 40G vibration resistance | −40 | +125 | 5000 | | 25 | 50 | 1200 | 8200 | 16×31.5 | 18×40 | — |
| | RKF | 135 deg C, 40G vibration resistance | −40 | +135 | 2000 | 3000 | 25 | 80 | 290 | 10000 | 12.5×25 | 18×40 | — |
| | RKG | 150 deg C, 40G vibration resistance | −40 | +150 | 1000 | 2000 | 25 | 80 | 800 | 4700 | 18×42 | | — |
| For Audio | VV0 | Chip Type (PURECAP) | −40 | +85 | 2000 | | 6.3 | 50 | 0.33 | 1000 | 4×5.3 | 10×10 | – |
| | VVF | Chip Type (SILMIC) | −40 | +85 | 2000 | | 10 | 50 | 1 | 100 | 4×5.3 | 8×10 | – |
| | VVM | 105 deg C, chip type capacitor for audio | −55 | +105 | 2000 | | 6.3 | 50 | 10 | 100 | 6.3×5.8 | | – |
| | VVG | 85 deg C, chip type capacitor for audio | −40 | +85 | 2000 | | 6.3 | 35 | 47 | 470 | 8×10 | 10×10 | – |
| | RFS | High Grade (SILMIC Ⅱ) | −40 | +85 | 1000 | | 6.3 | 100 | 3.3 | 3300 | 5×11 | 18×40 | – |
| | R0S | High Grade (SILMIC) | −40 | +85 | 1000 | | 16 | 100 | 10 | 2200 | 6.3×11 | 18×40 | – |
| | R0B | Miniaturized Standard (TONEREX) | −40 | +85 | 1000 | | 6.3 | 100 | 1 | 10000 | 5×11 | 18×40 | – |
| | RF0 | 85 deg C, miniature capacitor for audio(PURECAP) | −40 | +85 | 1000 | | 6.3 | 63 | 100 | 15000 | 10×12.5 | 18×35.5 | – |
| | RA3 | Miniaturized Standard | −40 | +85 | 2000 | | 6.3 | 100 | 1 | 22000 | 5×11 | 18×35.5 | – |
| | RW5 | 105 deg C, miniature capacitor for audio | −55 | +105 | 1000 | | 16 | 25 | 470 | 15000 | 10×12.5 | 18×40 | – |
| | RBD | Miniaturized Bipolar | −40 | +85 | 2000 | | 6.3 | 100 | 1 | 4700 | 5×11 | 18×35.5 | – |

# ■ Systematized Classification of Aluminum Electrolytic Capacitors

## ● Conductive Polymer Hybrid Aluminum Electrolytic Capacitors

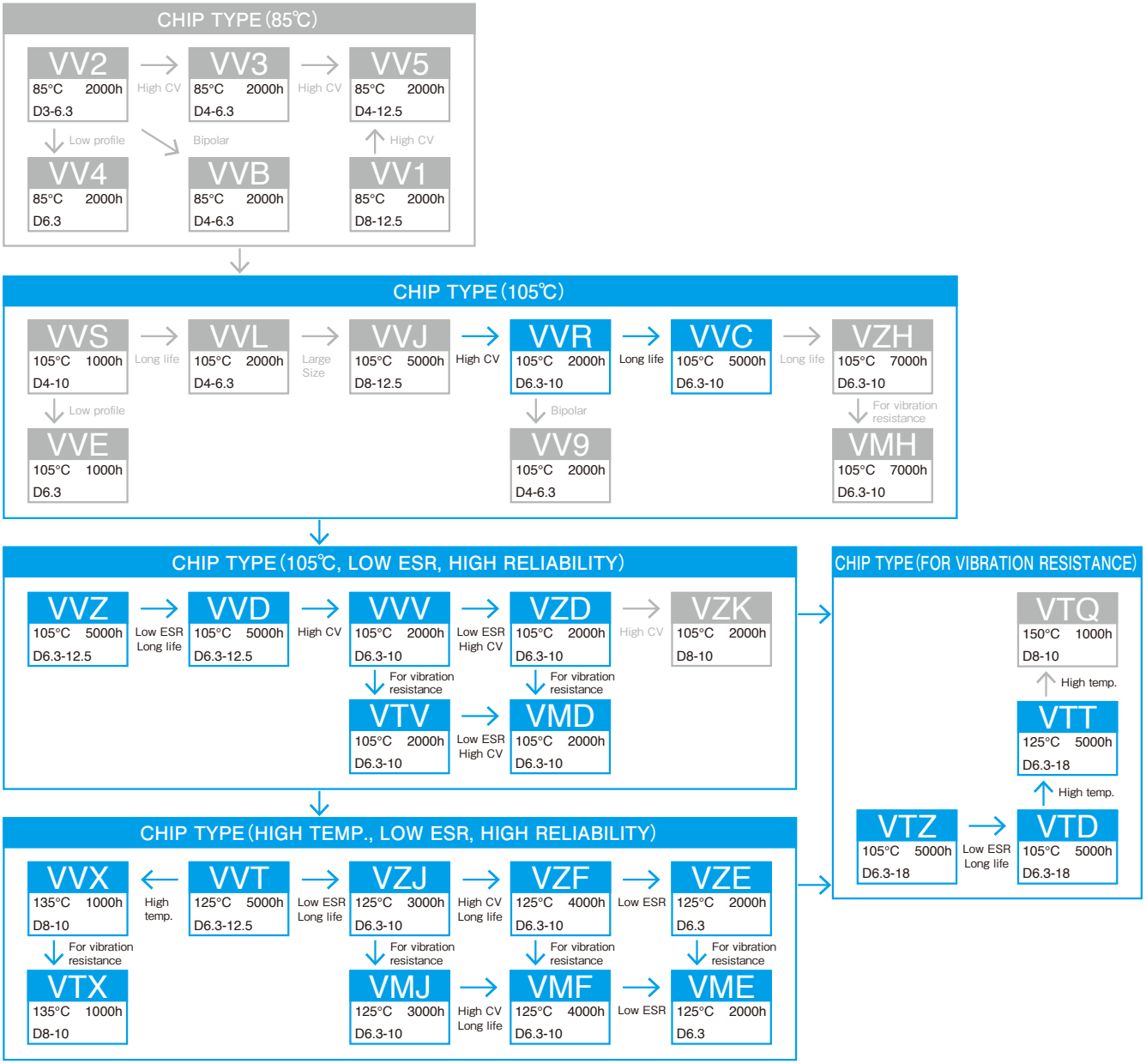
The series names are linked to each page.



# ■ Systematized Classification of Aluminum Electrolytic Capacitors

## ● Miniature Aluminum Electrolytic Capacitors

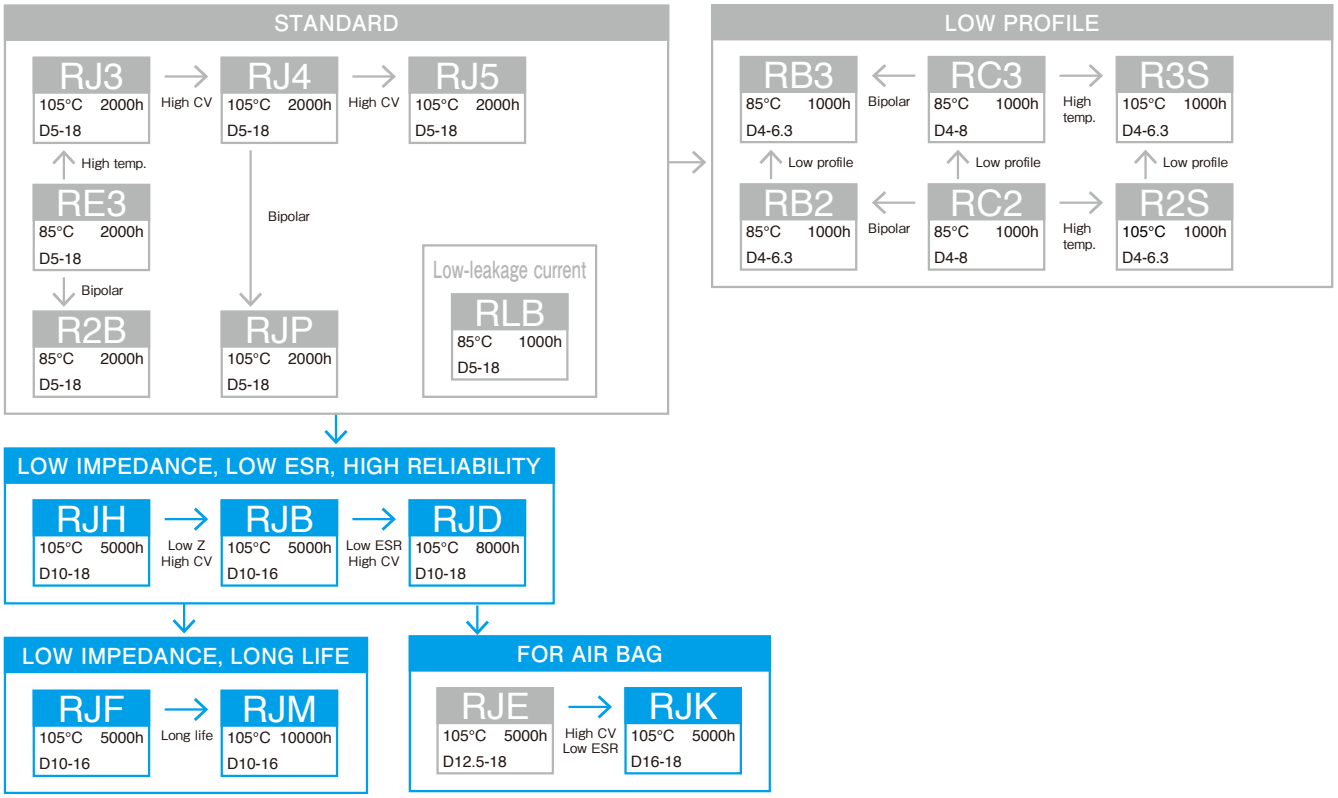
The series names are linked to each page.

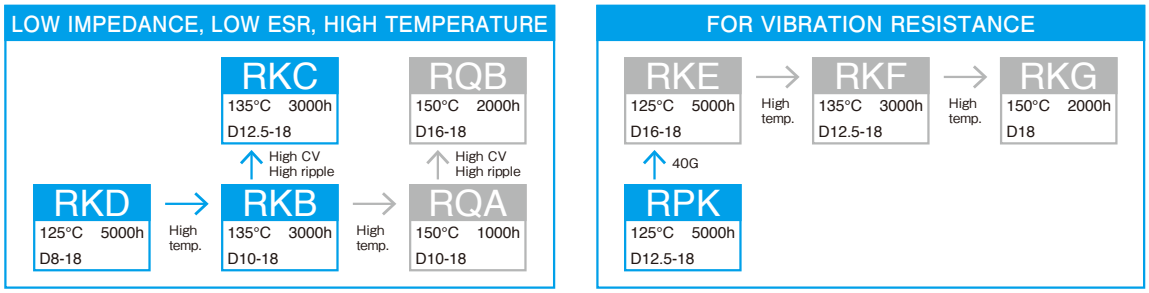


# ■ Systematized Classification of Aluminum Electrolytic Capacitors

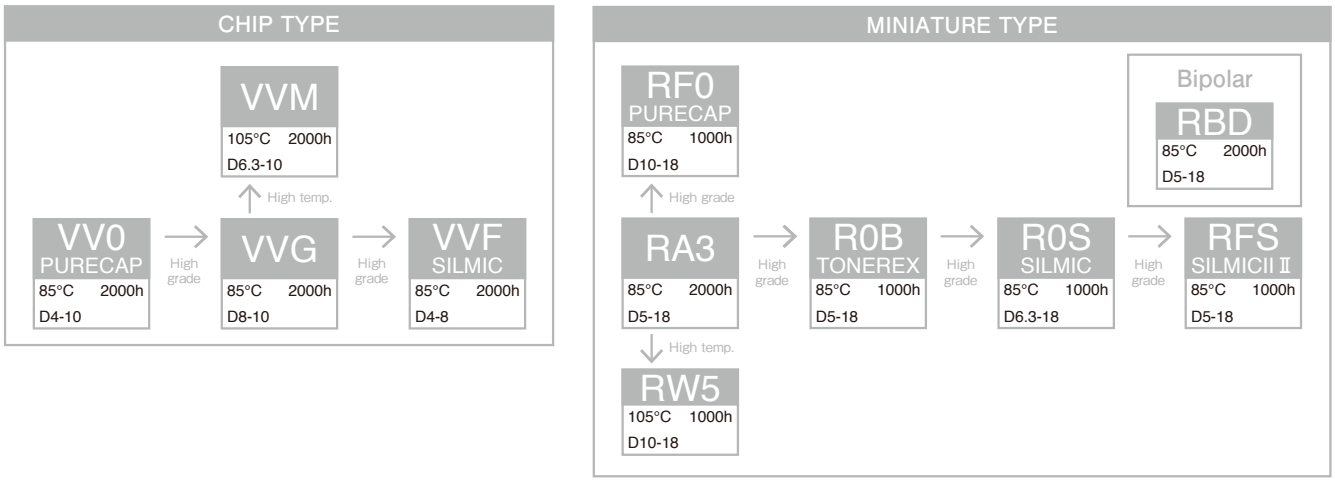
## ● Miniature Aluminum Electrolytic Capacitors

The series names are linked to each page.



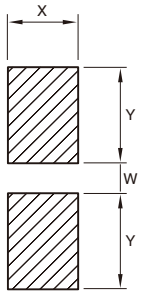

## ● Aluminum Electrolytic Capacitors For Audio



## ■ Recommended land pattern and size

### (Vertical chip type)

● Standard type

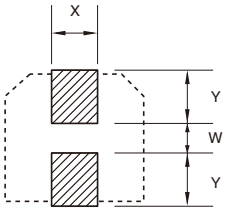



(Unit : mm)

| Case Size φD×L | Land Size | | | Thickness of Solder paste |
|---|---|---|---|---|
| | X | Y | W | |
| 5×5.8 | 1.6 | 3.0 | 1.4 | 0.15 |
| 6.3×5.8, 7.7 | 1.6 | 3.6 | 1.9 | 0.15 |
| 8×10 | 2.5 | 3.5 | 3.0 | 0.15 |
| 10×10, 12.5 | 2.5 | 4.0 | 4.0 | 0.15 |
| 12.5×13.5 | 3.2 | 6.0 | 4.0 | 0.15 |

● For vibration resistance type

HT1, HTK, HTL, HTX, HTQ, HTY series
VTZ, VTD, VTT, VTV, VTX, VMD, VMJ, VMF, VME series




(Unit : mm)

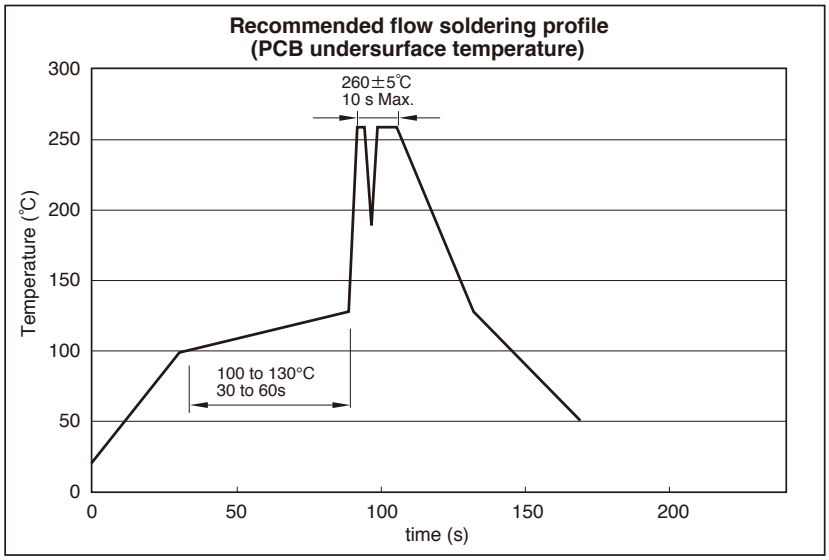
| Case Size φD | Land Size | | | Thickness of Solder paste |
|---|---|---|---|---|
| | X | Y | W | |
| 6.3 | 3.0 | 4.0 | 1.6 | 0.20 |
| 8 | 5.0 | 4.0 | 2.5 | 0.20 |
| 10 | 5.0 | 4.8 | 3.6 | 0.20 |
| 12.5 | 7.0 | 6.6 | 3.2 | 0.20 |
| 16 | 10.5 | 7.8 | 5.0 | 0.20 |
| 18 | 10.5 | 8.8 | 5.0 | 0.20 |

## ■ Recommended soldering conditions (Lead free)

● Lead terminal type aluminum electrolytic capacitors

(1) Soldering iron conditions
Iron tip temperature shall be 400°C±5°C within the duration of $3^{+1}_{0}$ seconds.

(2) Flow soldering conditions
The recommendation soldering conditions of the product in which flow soldering is possible are as graph.




**Caution for Using aluminum Electrolytic Capacitors**

(1) Do not dip the capacitor into melted solder.

(2) Do not flux other part than the terminals.

(3) If there is a direct contact between the sleeve of the capacitor and the printed circuit pattern or a metal part of another component such as a lead wire, it may cause shrinkage of crack.

(4) If the application is for extended use, understand and manage the soldering characteristics to avoid abnormal current caused by a contact failure between the capacitor and the PCB.

(5) Please refer to cautions for using on page and product specifications about other notes.

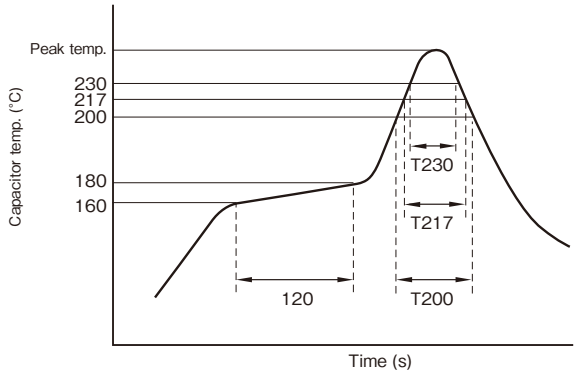
## ■ Recommended soldering conditions (Lead free)

### ● Chip type (conductive polymer hybrid) aluminum electrolytic capacitors

(1) Soldering iron conditions
Iron tip temperature shall be 400°C±5°C within the duration of $3^{+1}_{0}$ seconds.

(2) Reflow soldering conditions

Profile




1. Preheating shall be under 180°C within 120 seconds.
2. Peak temperature shall be within the following table.
3. For conditions exceeding the tolerances, consult with us.

T200 : Duration while capacitor head temperature exceeds 200°C (s)
T217 : Duration while capacitor head temperature exceeds 217°C (s)
T230 : Duration while capacitor head temperature exceeds 230°C (s)
The measurement temperature point is the case top.

### ● Chip type conductive polymer hybrid aluminum electrolytic capacitors

| Series | Size | Peak temp. (5sec or less) | T230 | T217 | T200 | Reflow cycle |
|---|---|---|---|---|---|---|
| HV1, HVK, HVX, HVQ, HT1, HTK, HTX, HTQ, HVY, HVL HTY, HTL | φ5 to φ6.3 | 250℃ Max. | 40 sec. max. | 50 sec. max. | 60 sec. max. | 2 times or less |
| | φ8 to φ10 | 240℃ Max. | 40 sec. max. | 50 sec. max. | 60 sec. max. | 2 times or less |
| | φ12.5 | 240℃ Max. | 20 sec. max. | 30 sec. max. | 50 sec. max. | 2 times or less |

### ● Chip type aluminum electrolytic capacitors

| Series | Size | Peak temp. (5sec or less) | T230 | T217 | T200 | Reflow cycle |
|---|---|---|---|---|---|---|
| VVR, VVC, VVZ, VVD, VVV, VZD, VVT, VZJ, VZF, VZE, VVX | φ4 to φ6.3 | 250℃ Max. | 40 sec. max. | 50 sec. max. | 60 sec. max. | 2 times or less |
| | φ8 to φ10 | 240℃ Max. | 40 sec. max. | 50 sec. max. | 60 sec. max. | 2 times or less |
| | φ12.5 | 240℃ Max. | 20 sec. max. | 30 sec. max. | 50 sec. max. | 2 times or less |
| VTZ, VTD, VTT, VTV, VMD, VMJ, VMF, VME, VTX | φ6.3 | 250℃ Max. | 40 sec. max. | 60 sec. max. | 80 sec. max. | 2 times or less |
| | φ8 to φ10 | 250℃ Max. | 30 sec. max. | 60 sec. max. | 80 sec. max. | 2 times or less |
| | φ12.5 to φ18 | 240℃ Max. | 20 sec. max. | 30 sec. max. | 50 sec. max. | 2 times or less |

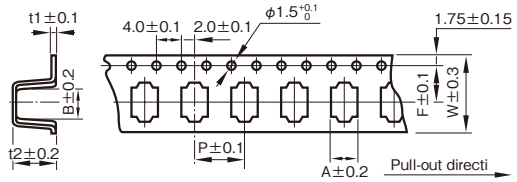
*Please ensure that the capacitor became cold enough to the room temperature (5 to 35℃) before the second reflow.

## ■ Taping

### ■ Carrier tape dimension (taping polarity R)

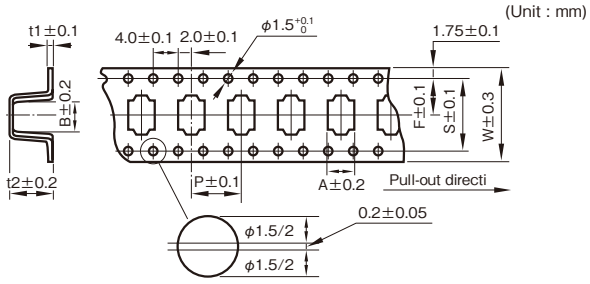
● $\phi$4 to $\phi$10

(Unit : mm)



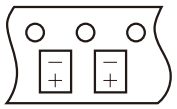

● $\phi$12.5 to 18

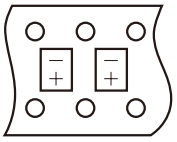
(Unit : mm)




### ■ Taping polarity

(The all series except bypolar type)



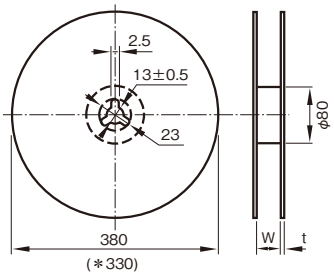


(Unit : mm)

| | Outside size φD×L | W | A | B | P | t2 | F | t1 | S |
|---|---|---|---|---|---|---|---|---|---|
| | 5×5.8 | 12 | 5.7 | 5.7 | 12 | 6.2 | 5.5 | 0.4 | — |
| | 6.3×5.8 | 16 | 7.0 | 7.0 | 12 | 6.2 | 7.5 | 0.4 | — |
| | 6.3×7.7 | 16 | 7.0 | 7.0 | 12 | 8.3 | 7.5 | 0.4 | — |
| | 8×10 | 24 | 8.7 | 8.7 | 16 | 11 | 11.5 | 0.4 | — |
| | 10×10 | 24 | 10.7 | 10.7 | 16 | 11 | 11.5 | 0.4 | — |
| | 10×12.5 | 24 | 10.7 | 10.7 | 16 | 13.5 | 11.5 | 0.5 | — |
| | 10×16.5 | 24 | 10.7 | 10.7 | 20 | 17.5 | 11.5 | 0.5 | — |
| * | 12.5×13.5 | 32 | 13.4 | 13.4 | 24 | 14.5 | 14.2 | 0.5 | 28.4 |
| * | 16×16.5 | 44 | 17 | 17 | 28 | 17.5 | 20.2 | 0.5 | 40.4 |
| * | 16×21.5 | 44 | 17 | 17 | 28 | 22.5 | 20.2 | 0.5 | 40.4 |
| * | 18×16.5 | 44 | 19 | 19 | 32 | 17.5 | 20.2 | 0.5 | 40.4 |
| * | 18×21.5 | 44 | 19 | 19 | 32 | 22.5 | 20.2 | 0.5 | 40.4 |

### ■ Reel dimension

(Unit : mm)




(Unit : mm)

| | Outside size φD×L | Reel dimension W | Reel dimension t |
|---|---|---|---|
| | 5 | 14 | 3 |
| | 6.3 | 18 | 3 |
| | 8, 10 | 26 | 3 |
| * | 12.5 | 34 | 3 |
| * | 16 | 46 | 3 |
| * | 18 | 46 | 3 |

### ■ Packing quantity (Reel)

| | Outside size φD×L | Quatity (PCS.) |
|---|---|---|
| | 5, 6.3 | 1000 |
| | 8×10 | 500 |
| | 10×10 | 500 |
| | 10×12.5 | 400 |
| | 10×16.5 | 250 |
| * | 12.5×13.5 | 200 |
| * | 16×16.5 | 125 |
| * | 16×21.5 | 75 |
| * | 18×16.5 | 125 |
| * | 18×21.5 | 75 |

### ■ Reel material

The details is refer to "Product Code System" pages.

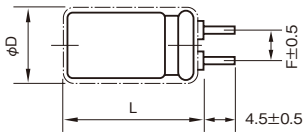
## ■ Lead Forming

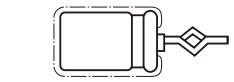
• In order to facilitate insertion into printed circuit board, lead wires are cut or formed.

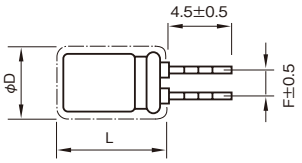
Product Size Table

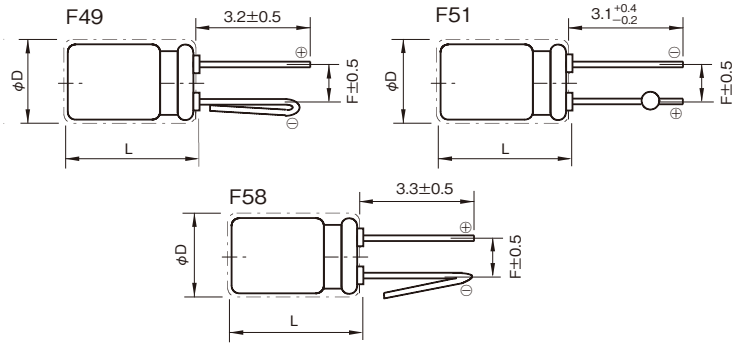
Unit: mm

| Forming name | Dimension F (Lead pitch) | Dimension φD (Case diameter) | Style | Lead forming symbol | Forming& packing code* | Outline drawing |
|---|---|---|---|---|---|---|
| Forming cut | 5.0 | 10 | A | F | A00 | Processed style A |
| | | 12.5 | A | F | A01 | |
| | 7.5 | 16 to 18 | A | F | A01 | |
| Snap-in | 5.0 | 10 | A | S1 | 202 | Processed style A |
| | | 12.5 | A | S1 | 203 | |
| | 7.5 | 16 to 18 | A | S1 | 203 | |
| Forming cut (restrict series) | 5.0 | 10 | F49 | A0A | F49 | |
| | | 12.5 | F49 | A0B | F49 | |
| | | 10 | F51 | A0E | F51 | |
| | | 12.5 | F51 | A0F | F51 | |
| | | 10 | F58 | A0U | F58 | |
| | 7.5 | 16 to 18 | F49 | A0B | F49 | |
| | | 16 to 18 | F51 | A0F | F51 | |

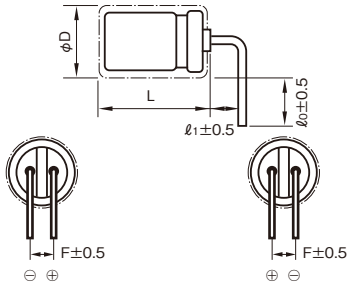





| Forming name | Dimension F (Lead pitch) | Dimension φD (Case diameter) | ℓ0 | ℓ1 | Lead forming symbol | Forming& packing code* | Outline drawing |
|---|---|---|---|---|---|---|---|
| For 90° side mount of case | 5.0 | 10 | 5.5 | 1.0 | G9, G10 | M16, M18 | |
| | | 12.5 | 5.5 | 1.0 | G9, G10 | M17, M19 | |
| | | 12.5 | 7.5 | 2.5 | G55, G56 | M0K, M0M | |
| | | 10 | 3.6 | 1.0 | G59, G60 | M0S, M0U | |
| | | 12.5 | 3.6 | 1.0 | G59, G60 | M0T, M0V | |
| | | 12.5 | 0.96 | 4.9 | G95, G96 | M4B, M4D | |
| | | 10 | 1.0 | 1.9 | G99, GA0 | M4J, M4L | |
| | | 10 | 4.5 | 1.0 | GAS, GAT | M7A, M7C | |
| | | 12.5 | 4.5 | 1.0 | GAS, GAT | M7B, M7C | |
| | 7.5 | 16 to 18 | 5.5 | 1.0 | G9, G10 | M17, M19 | |
| | | 16 to 18 | 4.5 | 1.0 | GAS, GAT | M7B, M7D | |



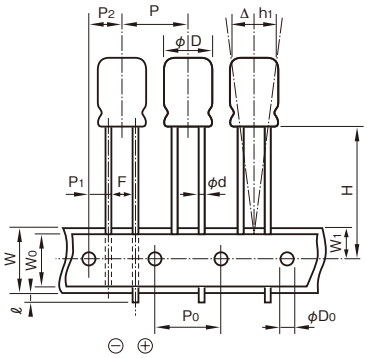

G9, G55, G59, G95, G99, GAS

G10, G56, G60, G96, GA0, GAT

*Forming and packing code: Packing is standard packing. Please refer to "PACKING" page.
Other lead forming and optional packing code: please contact us.

## ■ Taping

• For automatic insertion (radial lead type)




*The shape of a lead wire sandwiched by the mounting strips may differ from the ones shown in the figures.

### Product Size Table

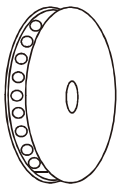
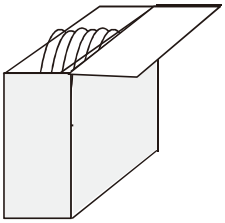
Unit: mm

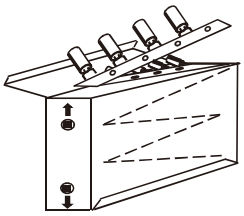
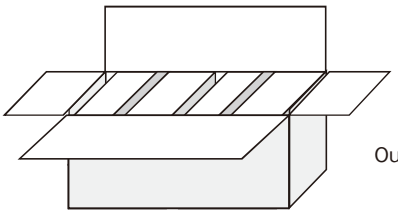
| Item | Symbol | Tolerance | 11L to 25L | |
|---|---|---|---|---|
| | | | φ10 | φ12.5 |
| Lead forming symbol (Taping packing coed) | — | — | T2 (100) | T4 (101) |
| Lead-wire diameter | φd | ±0.05 | 0.6 | |
| Lead to lead distance | F | +0.8 −0.2 | 5.0 | |
| Height of component from tape center | H | +0.75 −0.5 | 18.5 | |
| Pitch of component | P | ±1.0 | 12.7 | 15.0 |
| Feed hole pitch | P0 | ±0.3 | 12.7 | 15.0 |
| Hole center to lead | P1 | ±0.7 | 3.85 | 5.0 |
| Hole center to component | P2 | ±1.0 | 6.35 | 7.5 |
| Tape width | W | ±0.5 | 18.0 | |
| Hold down tape width | W0 | Min. | 6.0 | |
| Feed hole position | W1 | ±0.5 | 9.0 | |
| Max. lead protrusion | ℓ | Max. | 1.0 | |
| Feed hole diameter | φD0 | ±0.2 | 4.0 | |
| Alignment of component to center | Δh | ±1.0 | 0 | |
| Alignment of component to center | Δh1 | ±1.0 | 0 | |
| Total tape thickness | t | ±0.2 | 0.7 | |

Please contact us for lead forming and packing code in regards to the product code.

## ■ [taping article]

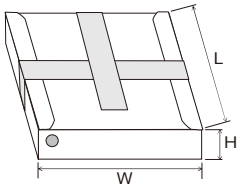
### Standard packing specification of (conductive polymer hybrid) aluminum electrolytic capacitors

| Classification | Chip type |
|---|---|
| Packing style |  Reel<br>  <br>  Inner box |

| Classification | Lead terminal type |
|---|---|
| Packing style |  Inner box<br>  <br>  Outer box |

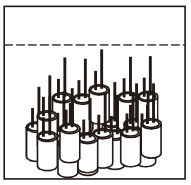
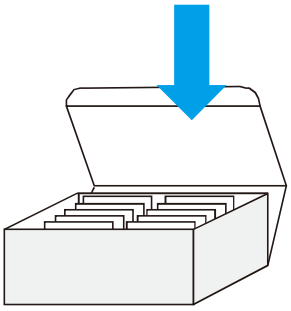
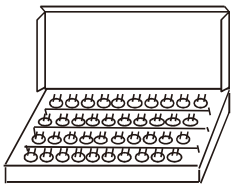
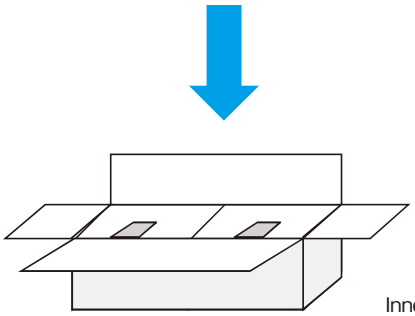
Packing size and quantity

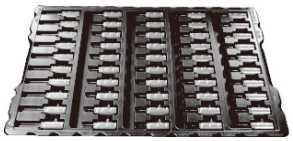
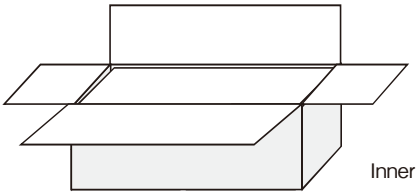
| Case size | Size (mm max.) | | | Quantity (pcs) |
|---|---|---|---|---|
| | W | L | H | |
| φ8×12 | 265 | 340 | 55 | 1,000 |
| φ8×20 | 255 | 340 | 65 | 1,000 |
| φ10×10, φ10×12.5 | 215 | 340 | 55 | 500 |
| φ10×16 | 210 | 340 | 60 | 500 |
| φ10×20 | 210 | 340 | 65 | 500 |
| φ10×25 | 210 | 340 | 70 | 500 |
| φ10×30, φ10×35 | 210 | 340 | 75 | 500 |
| φ12.5×15 | 290 | 340 | 65 | 500 |
| φ12.5×20 | 290 | 340 | 65 | 500 |
| φ12.5×25 | 290 | 340 | 70 | 500 |
| φ12.5×30, φ12.5×35 | 290 | 340 | 70 | 500 |




Please inquire for details.

## ■ [long lead, lead forming]
## Standard packing specification of aluminum electrolytic capacitors

| Classification | Long lead, Lead forming of φ10 or less (Standard packing) | Lead forming of φ12.5 or more (Standard packing) |
|---|---|---|
| Packing style |  Plastic bag  Inner box |  Small box  Inner box |

| Classification | φ10 to φ18 (Optional packing) |
|---|---|
| Packing style |  Tray  Inner box |

Please inquire for details.

# Conductive Polymer Hybrid Aluminum Electrolytic Capacitors

CAT.No.2025/2026E

## ■ Cautions for Using Conductive Polymer Hybrid Aluminum Electrolytic Capacitors

Please be sure to read this specification before using this product.
Before placing an order, please inquire about the Specification to check details.

### ■Cautions for Usage

#### 1. Conductive Polymer Hybrid Aluminum Electrolytic Capacitors are polarized.

- If used with a wrong polarity, it creates an abnormal current resulting in a short circuit or damage to itself.
- Cannot use for the circuit to which the polarity reverses by ripple voltage.

#### 2. Prohibited Circuits

- Since leakage current problem may arise, capacitors cannot be used in the following circuits.
  ①Coupling circuits
  ②Circuits greatly affected by leakage current

#### 3. About applied voltage

- Do not apply a voltage that exceeds the rated voltage because the leakage current will increase significantly, causing characteristic deterioration and short-circuit failure.
  When applying ripple current, the peak value of the ripple voltage must not exceed the rated voltage.
  Surge voltage exceeding the rated voltage is not guaranteed to be used for a long time due to limited conditions.
- Do not apply reverse voltage
  (DC bias + ripple voltage peak sum ≦0V).

#### 4. About use in circuits with rapid charging and discharging

- Please do not use in circuits that repeatedly charge and discharge rapidly. This may result in deterioration of characteristics, short circuits, or destruction. Please consult us separately if you are considering using the capacitor in a circuit that repeatedly charges and discharges.
  In addition, we recommend using a protection circuit if the usage method causes a rush current of more than 10A to flow into the capacitor.

#### 5. Use within the rated ripple current.

- If applied ripple current exceeds rated ripple current, the life of the capacitor may be shortened, or in an extreme case it gets destroyed due to its internal heat. Use high ripple type capacitors for such circuits.

#### 6. Changes in characteristics due to operating temperature

- The characteristics of conductive polymer hybrid aluminum electrolytic capacitors vary by temperature as follows. These variations are temporary and recover when the temperature goes back (except for the case of characteristic deterioration because of high temperatures over a long time).

  Note that using capacitors over the upper category temperature increases leakage current, resulting in a short and destruction.
  Be careful of the capacitor temperature considering not only the ambient temperature where the equipment is placed and the temperature inside the equipment but also radiation heat from the heating element inside the equipment, and self-heat generation by ripple current.
  1)The rated capacitance is normally shown as the value at 20°C-120Hz. It increases as the temperature raises and decreases as it lowers.
  2)The tangent of loss angle (tanδ) is normally shown as the value at 20°C-120Hz. It is temperature independent.
  3)The equivalent series resistance (ESR) expressed in the value at 20°C, 100 kHz is temperature independent.
  4)The leakage current increases as the temperature gets high and decreases as it gets low.

#### 7. Changes in characteristics due to frequency

- The characteristics of conductive polymer hybrid aluminum electrolytic capacitors vary by operating frequency as follows.
  1)The rated capacitance expressed in the value at 20°C, 120 Hz decreases with increased frequency.
  2)Tangent of loss angle (tanδ) expressed in the value at 20°C, 120 Hz increases with increased frequency.
  3)Equivalent series resistance (ESR) expressed in the value at 20°C, 100 kHz increases with decreasing frequency.

#### 8. Capacitor life

- The life of the capacitor terminates when it fails due to the deterioration in its electronic characteristics. Temperature and the ripple current since they especially affect the life on technical note "2. About the Life of an Aluminum Electrolytic Capacitor" of this catalog.

## 9 . Operating environments

- Do not use capacitors in an environment directly exposed to water, saltwater spray, oil spill or condensation.
- Do not use capacitors in an environment filled with toxic gas such as hydrogen sulfide, sulfurous acid, nitrous acid, chlorine, ammonia, etc.
- Do not use capacitors in a place exposed to ozone, ultraviolet rays, or radiation.
- Do not use the product in harsh environments where the vibration or shock conditions exceed the range specified in the technical specifications.
  Even within the specified range, resonance can add a large load, which may cause changes in characteristics or the product to fall off. Be sure to check for resonance after mounting the product.

## 10. Fumigation Process

- Before transportation of electronic equipment to overseas, fumigation process may be subjected to wooden packing material with a halogen (compound) gas such as methyl bromide. Exercise care that this halogen gas may corrode capacitors. Also, be careful of epidemic preventive agent as corrosive component such as halogen may be contained.

## 11. Insulation between the capacitor and the cathode terminal.

- The case and the cathode terminal are not insulated as being connected through inconstant resistance.

## 12. Double-sided PCB's

- When using capacitors on a double-sided PCB, exercise care that the wiring pattern does not touch the area where the capacitors are mounted. Failure to do so may cause a short to occur to the PCB depending on the mounting conditions.

## 13. Short time leakage current

- The leakage current of the capacitors varies depending on the temperature, applied voltage, and applied time.
  Particularly, Short-term leakage currents of less than the specified time tend to be larger than the specified value.
  For short-term leakage current less than the specified time, please contact us.

## 14. Regarding to connection of capacitors

- When connecting more than one conductive polymer hybrid aluminum electrolytic capacitor in parallel, consider the current balance.

## 15. Use at a high altitude

- The use of capacitors at high altitudes such as on an airplane causes a large difference between the internal pressure of the capacitors and the atmospheric pressure. However, there is no problem in use under atmospheric pressure up to about an altitude of 10,000 meters.
  Please check the operation of electronic equipment at the operating environmental temperature because the temperature lowers with increased altitude. If the condition is severe like space, please contact us.

## 16. Capacitors with pressure valves.

- A part of the capacitor case is made thin to have the function as the pressure valve in order to pre-vent explosion due to the rise of inside pressure when a reverse or excessive voltage is applied to the capacitor. Once it has worked as a valve, the whole capacitor needs to be replaced since the valve will not restore.
- When you use a capacitor with pressure valve, provide certain space above the pressure valve as below to prevent an interference when it works as a valve.

| | |
|---|---|
| Diameter of the capacitor (mm) | 12.5 or less |
| Required space above the valve (mm) | 2.0 or more |

## 17. Other Notes

- Electrical characteristics of capacitors vary by variations in temperature and frequency. Please consider these variations when designing a circuit.

## ■ Cautions for Mounting

### 1. Cautions for Mounting

- Do not reuse capacitors that have been assembled in a set and energized. Capacitors cannot be reused except for those which have been measured on electrical performance during periodic inspection.
- Before mounting, confirm the capacitor ratings (rated capacitance and rated voltage).
- Capacitors may generate transient recovery voltage. In this case, discharge through a resistor of about 1 kΩ.
- Before mounting, confirm the polarity of capacitor.
- Do not drop capacitors onto a floor nor use them.
- Do not mount deformed capacitors.
- Do not mount heating parts around capacitors and on the back of the PCB (under or back of capacitors).

### 2. Do not apply excessive pressure to the capaci-tor or its terminals

- Pay attention to the impact given by the component receptacles of the automatic insertion/mounting machines and the product checker, and from the centering operation.

### 3. Soldering

- SMD type have no capability to with stand such dip or wave soldering immersing components into a solder bath.
- Reflow soldering
  Reflow the capacitors within recommended reflow soldering conditions. Verify there is no temperature stress to the capacitors because the following differences might degrade capacitors electrically and mechanically.
- Caution for reflow soldering
  1) Location of components : Temperature increases at the edge of PC board more than the center.
  2) Population of PC board : The lower the component population is, the more temperature rises.
  3) Material of PC board : A ceramic-made board needs more heat than a glass epoxy-made board. The heat increase may cause damage to the capacitors.
  4) Thickness of PC board : A thicker board needs more heat than a thinner board. The heat may damage the capacitors.
  5) Size of PC board : A larger board needs more heat than a smaller board. The heat may damage the capacitors.
  6) Solder paste thickness
  If thin solder paste is to be used compared recommend solder paste thickness, please consult with us.
  7) Location of infrared ray lamps : IR reflow as well as hot plate reflow heats only on the reverse side of the PC board to lessen heat stress to the capacitors.
  8) Case leakage current will increase (about several mA at the maximum) after the reflow process, the leakage current which rose gradually decreases when voltage is applied.
  9) Please consult us about vapor phase soldering (VPS).
- Rework of soldering
  Use a soldering iron for rework. Do not exceed an iron tip temperature of 400±5°C and an exposure time of $3^{+1}_{0}$ seconds.
- Do not allow flux to adhere to areas other than the terminals.
- In case of a long-term use of equipment, control the soldering characteristics so that capacitors and PCB do not fail to connect to avoid abnormal current passage by a failure of soldering to mount.

### 4. Handling after Soldering

- After soldering, applying mechanical stress to the capacitor may cause it to fail. Avoid holding or pushing the capacitor body and bending the PC board.
- Do not bump capacitors against objects. When stacking PCB's, make sure that capacitors do not touch the PCB's or other components.
- Do not subject capacitors to excessive stress.

### 5. Cleaning after Soldering

- Recommended cleaning method
  1) Cleaning solutions:
    (a) CLEANTHROUGH 710M, 750H, 750L
    (b) PINEALPHA ST-100S
  2) Cleaning conditions:
    (a) The temperature of cleaning solution shall be less than 60°C.
    (b) Use immersion or ultrasonic waves within two minutes.
    (c) After cleaning, capacitors and PCB's shall thoroughly be rinsed and dried with hot blast for more than 10 minutes. The temperature of such breeze should be less than the upper category temperature.
    (d) After cleaning, do not keep capacitors in cleaning solution atmosphere or airtight containers.
- During cleaning, control the cleaning solution against contamination.

### 6. Fixing adhesives and coating materials.

- Do not use fixing adhesive or coating material containing halogen-based solvent.
- Before applying the fixing adhesive or the coating material, make sure that there is no remaining flux or stains between the PCB and the sealed part of the capacitor.
- Before applying the fixing adhesive or the coating material, make sure that the detergent etc. has dried up.
- Do not cover the whole surface of the sealed part (terminal side) of the capacitor with the fixing adhesive or the coating material.

- Observe the description in this catalog or the technical specifications concerning the thermal stiffening conditions of the fixing adhesive or the coating material (If there is no such description, contact us). When both discrete and SMT components are on the same PCB, the fixing material for the SMT components may cause crack, tear or shrinkage on the external sleeve depending on the thermal stiffening condition.
- Recommended fixing adhesives and coating materials

  Fixing adhesives : Cemedine 1500
  Diabond DN83K
  Bond G103

  Coating materials : HumiSeal 1B66NS, 1A27NS

## ■ Other Cautions

### 1. Do not touch capacitor terminals with bare hands.

- Failure to do so can cause electric shock or burns. Before use, allow capacitors to discharge through a 1kΩ resistor (with a sufficient margin to the heat generation capacity) as needed.

### 2. Do not short the capacitor terminals with a conductor

- Do not spill conductive solution including acid or alkaline solution on the capacitor.

### 3. Periodic inspection should be performed on the capacitors for the industrial equipment application.

- The following items should be checked:
  (1)Appearance : Check if there is any open valve or leakage.
  (2)Electrical performance: leakage current, rated capacitance, tangent of loss angle, ESR, and items specified in this catalog or the technical specifications.

### 4. Be careful of the following cases of emergency.

- If you see gas coming out of the capacitor valve when the set is in operation, turn off the power switch of the unit or unplug the power cord from the outlet.
- In case of a short, producing gas, it may take a few seconds to a few minutes depending on the conditions. Therefore, ensure that the protective circuit of the power supply works during this time.
- Keep your face away from the capacitor pressure valve, since the high temperature gas at over 100°C bursts out when the valve works. If the gas gets into your eyes or your mouth, wash your eyes or your mouth. Do not ingest the capacitor electrolyte. If the electrolyte gets on your skin, wash it out with soap.

### 5. Storage Conditions.

- Avoid high temperature, high humidity and direct rays when storing capacitors. Keep the storing temperature at 5˚C to 35˚C and the relative humidity not more than 75%. (Recommended storage term: 2year or less after delivery)
- There may have increased leakage current when unused or stored for a long time after mounted on equipment. This phenomenon often occurs at high ambient temperatures; however, leakage current will decrease through voltage treatment.
  If necessary, treatment by voltage application should be made on the capacitors which have been stored for a long period (more than 2 years after production).
  Recommended voltage treatment conditions are provided for each series (According to JIS C5101-4 4.1 described in Shelf life).
  If anything is unclear, please contact us.
  And also, in design of equipment, consider the effect of increase in initial current, and install protective circuits as needed.
- Do not store capacitors in an environment directly exposed to water, saltwater spray, oil spill or condensation. JEDEC-J-STD-020 regulations are not applicable.
- Do not store capacitors in an environment exposed to the air contains dense hazardous gas. (hydrogen sulfide, sulfurous acid, nitrous acid, chlorine, ozone, ammonia, etc.)
- Do not store capacitors at a place where it gets ultraviolet or radioactive rays.
- Fumigation treatment with toxic gas covering the whole wooden container frames as moth proofing during shipment may leave residual toxic gas.

### 6. Please take the following actions when disposing of capacitors.

- Entrust to specialists of industrial waste treatment for incineration.

### 7. Others

- Before using capacitors, check the details of this catalog and the technical specifications as well as the following.

  Technical Report of Japan Electronics and Information Technology Industries Association
  EIAJ RCR-2367
  Guideline of notabilia for fixed aluminum electrolytic capacitors for use in electronic equipment

## ■ Product Code System

H

The Elna product code is Max.20 digits.

Example) HV1 series 25V 220μF φ8x10L

New product code
RSHV1221M1TEH0002E

Old product code
HV-25V221MG10E-R2

| 1 2 | 3 4 5 | 6 7 8 | 9 | 10 11 | 12 | 13 14 | 15 16 17 | 18 19 20 |
|---|---|---|---|---|---|---|---|---|
| R S | H V 1 | 2 2 1 | M | 1 T | E | H 0 | 0 0 2 | E |
| Product category code | Series code | Rated capacitance code | Capacitance tolerance code | Rated voltage code | Case size code | | Packing code | Additional code |

1 Product group
R : Energy devices (Electrolytic capacitor)

2 Category
S : For general
*A : For automotive (powertrain, safety)
*C : For automotive (entertainment, audio)
M : For medical (international classification Ⅲ)
L : For medical (international classification Ⅰ, Ⅱ)

* AEC-Q200 Qualified.

3-5 Series code
Please refer to each series page.
The following changes the series code.

| old code | New code |
|---|---|
| HV | HV1 |
| HT | HT1 |

9 Capacitance tolerance code
Example

| Tolerance (%) | Code |
|---|---|
| ±20 | M |
| 0 to +30 | A |
| -10 to +30 | Q |
| -10 to +50 | T |

10-11 Rated voltage code

| voltage (V) | Code |
|---|---|
| 25 | 1T |
| 35 | 1G |
| 50 | 1U |
| 63 | 4E |
| 80 | 1R |

12 Diameter code
SMD type

| D (mm) | Code |
|---|---|
| 5 | C |
| 6.3 | D |
| 8 | E |
| 10 | F |
| 12.5 | G |

13-14 Length code
SMD type

| L (mm) | Code |
|---|---|
| 5.8 | C8 |
| 7.7 | E7 |
| 10 | H0 |
| 12.5 | K5 |
| 13.5 | L5 |
| 16.5 | P5 |

6-8 Rated capacitance code
The code denoting nominal capacitance shall consist of three numerals.
The first and second numerals shall represent the significant figures of nominal capacitance in the unit of microfarad (μF), And the third numeral shall represent the number of zeros following the significant figures.

Example

| Rated capacitance (μF) | Code |
|---|---|
| 0.1 | R10 |
| 1 | 010 |
| 2.2 | 2R2 |
| 33 | 330 |
| 100 | 101 |
| 2200 | 222 |
| 33000 | 333 |
| 470000 | 474 |

15-17 Packing code (SMD type: Reel taping)

| Old code | New code | Case size | Reel material |
|---|---|---|---|
| | Hybrid | φD (mm) | |
| R2 | 002 | φ10 or less | Polystyrene |
| R5 | 005 | φ12.5 or more | Polystyrene |

Please contact us for special packaging.

18-20 Additional code
Example

| Code | Contents |
|---|---|
| T | Sn 100% plated |

Please contact us for details.

# ELNA Conductive Polymer Hybrid Aluminum Electrolytic Capacitors HV1,HT1 series

Code in front of series have been extracted from product code, which describes the segment of products, such as type and features.

- Low ESR and high ripple current are realized.
- HT1 is resist to vibration. (30G guaranteed)
- Equivalent to conductive polymer type Aluminum Electrolytic Capacitor. (There are little characteristics change by temperature and frequency)
- Guaranteed 105℃, 10000 hours.
- Environmental : GREEN CAP™ , RoHS compliance.

Vibration resistance

HT1 ⇦ HV1


Marking color : Blue print

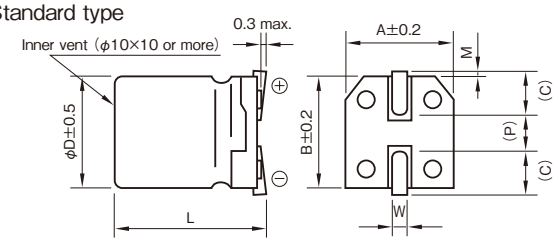
## Specifications

| Item | Performance |
|---|---|
| Category temperature range (℃) | −55 to +105 |
| Tolerance at rated capacitance (%) | ±20 (20℃, 120Hz) |
| Leakage current (μA) (max.) | 0.01CV or 3 whichever is larger (after 2 minutes)<br>C : Rated capacitance (μF) ; V : Rated voltage (V) (20℃) |
| Tangent of loss angle (tanδ) | Rated voltage (V): 25 / 35 / 50 / 63 / 80<br>tanδ (max.): 0.14 / 0.12 / 0.10 / 0.08 / 0.08 (20℃, 120Hz) |
| Characteristics at high and low temperature | Impedance ratio (max.)<br>Z−25℃/Z+20℃: 1.5<br>Z−55℃/Z+20℃: 2.0 (100kHz) |
| Endurance (105℃) (Applied ripple current) | Test time: 10000 hours<br>Leakage current: The initial specified value or less<br>Percentage of capacitance change: Within ±30% of initial value<br>Tangent of the loss angle: 200% or less of the initial specified value<br>ESR change: 200% or less of the initial specified value |
| Shelf life (105℃) | Test time : 1000hours ; other items are same as the endurance. Voltage application treatment : According to JIS C5101-4 4.1. |

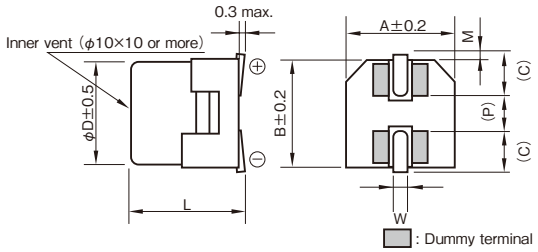
## Outline Drawing

Unit : mm

Standard type




For vibration resistance type




: Dummy terminal

( ) : Reference size

| φD | L | A | B | C | W | P | M | Size code |
|---|---|---|---|---|---|---|---|---|
| 5 | 5.8±0.3 | 5.3 | 5.3 | 2.3 | 0.5~0.8 | 1.5 | 0.4±0.3 | CC8◆ |
| 6.3 | 5.8±0.3 | 6.6 | 6.6 | 2.7 | 0.5~0.8 | 2.0 | 0.4±0.3 | DC8 |
| 6.3 | 7.7±0.3 | 6.6 | 6.6 | 2.7 | 0.5~0.8 | 2.0 | 0.4±0.3 | DE7 |
| 8 | 10±0.5 | 8.4 | 8.4 | 3.0 | 0.7~1.1 | 3.1 | 0.4±0.3 | EH0 |
| 10 | 10±0.5 | 10.4 | 10.4 | 3.3 | 0.7~1.1 | 4.7 | 0.4±0.3 | FH0 |
| 10 | 12.5±0.5 | 10.4 | 10.4 | 3.3 | 0.7~1.1 | 4.7 | 0.4±0.3 | FK5 |
| 12.5 | 13.5±0.5 | 13.0 | 13.0 | 4.9 | 1.0~1.4 | 4.6 | 0.7±0.3 | GL5 |

◆ Marked size deals with only standard type.

Refer to individual page.
(Soldering conditions, Land pattern size, The taping specifications)

## Coefficient of Frequency for Rated Ripple Current

| Rated voltage (V) \ Frequency (Hz) | 120 | 1k | 10k | 100k or more |
|---|---|---|---|---|
| 25 to 80 | 0.10 | 0.30 | 0.60 | 1 |

## Product code system (*For general product)

φ8 or less (example : 35V150μF, Standard type)

| RS* | HV1 | 151 | M | 1G | EH0 | 002 | E |
|---|---|---|---|---|---|---|---|
| Category code | Series code | capacitance code | Cap tol. code | Voltage code | Size code | Taping and packing code | Additional code |

φ10 (example : 35V270μF, Standard type)

| RS* | HV1 | 271 | M | 1G | FH0 | 002 | EX |
|---|---|---|---|---|---|---|---|
| Category code | Series code | capacitance code | Cap tol. code | Voltage code | Size code | Taping and packing code | Additional code |

φ12.5 (example : 35V560μF, Standard type)

| RS* | HV1 | 561 | M | 1G | GL5 | 005 | E |
|---|---|---|---|---|---|---|---|
| Category code | Series code | capacitance code | Cap tol. code | Voltage code | Size code | Taping and packing code | Additional code |

・For vibration resistance type should change Series code "HV1" into "HT1".
・For details, refer to the various "Product Code System" pages.

# ELNA Conductive Polymer Hybrid Aluminum Electrolytic Capacitors HV1,HT1 series

Code in front of series have been extracted from product code, which describes the segment of products, such as type and features.

## Standard ratings (◆Marked: doesn't supports vibration resistance type)

| Rated voltage (V) / Item / Rated capacitance (μF) | 25 (1T) | | | 35 (1G) | | | 50 (1U) | | | 63 (4E) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Case φD×L(mm) | ESR (mΩ max.) | Rated ripple current (mArms) | Case φD×L(mm) | ESR (mΩ max.) | Rated ripple current (mArms) | Case φD×L(mm) | ESR (mΩ max.) | Rated ripple current (mArms) | Case φD×L(mm) | ESR (mΩ max.) | Rated ripple current (mArms) |
| 10 | — | — | — | — | — | — | ◆ 5×5.8 | 120 | 750 | 6.3×5.8 | 120 | 1000 |
| 22 | — | — | — | ◆ 5×5.8 | 100 | 900 | 6.3×5.8 | 80 | 1100 | 6.3×7.7 | 80 | 1500 |
| 33 | ◆ 5×5.8 | 80 | 900 | — | — | — | 6.3×7.7 | 40 | 1600 | 8×10 | 40 | 1600 |
| 47 | — | — | — | 6.3×5.8 | 60 | 1300 | — | — | — | — | — | — |
| 56 | 6.3×5.8 | 50 | 1300 | — | — | — | — | — | — | 10×10 | 30 | 1800 |
| 68 | — | — | — | 6.3×7.7 | 35 | 2000 | 8×10 | 30 | 1800 | — | — | — |
| 100 | 6.3×7.7 | 30 | 2000 | — | — | — | 10×10 | 28 | 2000 | 10×12.5 | 26 | 2500 |
| 120 | — | — | — | — | — | — | — | — | — | 12.5×13.5 | 22 | 3500 |
| 150 | — | — | — | 8×10 | 27 | 2300 | 10×12.5 | 24 | 3000 | — | — | — |
| 220 | 8×10 | 27 | 2300 | — | — | — | — | — | — | — | — | — |
| 270 | — | — | — | 10×10 | 20 | 2500 | — | — | — | — | — | — |
| 330 | 10×10 | 20 | 2500 | — | — | — | 12.5×13.5 | 20 | 4000 | — | — | — |
| 390 | — | — | — | 10×12.5 | 18 | 3500 | — | — | — | — | — | — |
| 560 | 10×12.5 | 18 | 3500 | 12.5×13.5 | 15 | 4500 | — | — | — | — | — | — |
| 820 | 12.5×13.5 | 15 | 4500 | — | — | — | — | — | — | — | — | — |

| Rated voltage (V) / Item / Rated capacitance (μF) | 80 (1R) | | |
|---|---|---|---|
| | Case φD×L(mm) | ESR (mΩ max.) | Rated ripple current (mArms) |
| 22 | 8×10 | 45 | 1550 |
| 33 | 10×10 | 36 | 1700 |

(Note) Rated ripple current : 105℃, 100kHz ; ESR : 20℃, 100kHz

# ELNA Conductive Polymer Hybrid Aluminum Electrolytic Capacitors HVK,HTK series

Code in front of series have been extracted from product code, which describes the segment of products, such as type and features.

☆UPGRADE

- Low ESR and high ripple current are realized.
- HTK is resist to vibration. (30G guaranteed)
- Equivalent to conductive polymer type Aluminum Electrolytic Capacitor. (There are little characteristics change by temperature and frequency)
- Environmental：GREEN CAP™ , RoHS compliance.

Marking color : Blue print

Guaranteed 4000h

Vibration resistance High temperature

HTK ⇦ HVK ⇦ HV1

Guaranteed 6000h

Long life

HVK-B HTK-B ⇦ HVK HTK

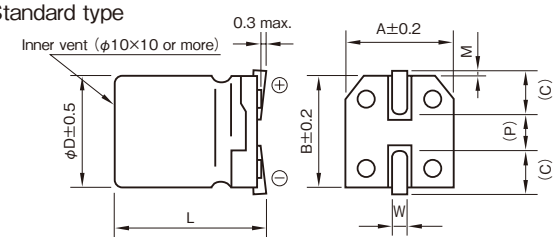
## Specifications

| Item | Performance |
|---|---|
| Category temperature range (℃) | −55 to +125 |
| Tolerance at rated capacitance (%) | ±20 (20℃, 120Hz) |
| Leakage current (μA) (max.) | 0.01CV or 3 whichever is larger (after 2 minutes)<br>C : Rated capacitance (μF) ; V : Rated voltage (V) (20℃) |
| Tangent of loss angle (tanδ) | Rated voltage (V): 25 / 35 / 50 / 63 / 80<br>tanδ (max.): 0.14 / 0.12 / 0.10 / 0.08 / 0.08 (20℃, 120Hz) |
| Characteristics at high and low temperature | Impedance ratio (max.)<br>Z−25℃/Z+20℃: 1.5<br>Z−55℃/Z+20℃: 2.0 (100kHz) |
| Endurance (125℃) (Applied ripple current) | Test time: 4000 hours / 6000 hours (25V～63V：φ6.3 or more)<br>Leakage current: The initial specified value or less / The initial specified value or less<br>Percentage of capacitance change: Within ±30% of initial value / Within ±30% of initial value<br>Tangent of the loss angle: 200% or less of the initial specified value / 200% or less of the initial specified value<br>ESR change: 200% or less of the initial specified value / 200% or less of the initial specified value |
| Shelf life (125℃) | Test time : 1000hours ; other items are same as the endurance. Voltage application treatment : According to JIS C5101-4 4.1. |

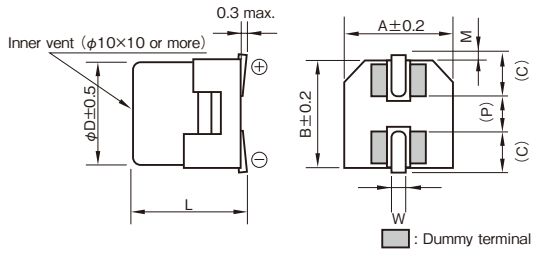
## Outline Drawing

Unit : mm

Standard type




For vibration resistance type




: Dummy terminal

( ) : Reference size

| φD | L | A | B | C | W | P | M | サイズ記号 |
|---|---|---|---|---|---|---|---|---|
| 5 | 5.8±0.3 | 5.3 | 5.3 | 2.3 | 0.5～0.8 | 1.5 | 0.4±0.3 | CC8◆ |
| 6.3 | 5.8±0.3 | 6.6 | 6.6 | 2.7 | 0.5～0.8 | 2.0 | 0.4±0.3 | DC8 |
| 6.3 | 7.7±0.3 | 6.6 | 6.6 | 2.7 | 0.5～0.8 | 2.0 | 0.4±0.3 | DE7 |
| 8 | 10±0.5 | 8.4 | 8.4 | 3.0 | 0.7～1.1 | 3.1 | 0.4±0.3 | EH0 |
| 10 | 10±0.5 | 10.4 | 10.4 | 3.3 | 0.7～1.1 | 4.7 | 0.4±0.3 | FH0 |
| 10 | 12.5±0.5 | 10.4 | 10.4 | 3.3 | 0.7～1.1 | 4.7 | 0.4±0.3 | FK5 |
| 10 | 16.5±0.5 | 10.4 | 10.4 | 3.3 | 0.7～1.1 | 4.7 | 0.4±0.3 | FP5＊ |
| 12.5 | 13.5±0.5 | 13.0 | 13.0 | 4.9 | 1.0～1.4 | 4.6 | 0.7±0.3 | GL5 |

◆ Marked size deals with only standard type.
＊ Marked sieze deals with only vibration resistant type.

Refer to individual page.
(Soldering conditions, Land pattern size, The taping specifications)

## Coefficient of Frequency for Rated Ripple Current

| Rated voltage (V) \ Frequency (Hz) | 120 | 1k | 10k | 100k or more |
|---|---|---|---|---|
| 25 to 80 | 0.10 | 0.30 | 0.60 | 1 |

## Product code system (*For general product)

φ8 or less (example : 35V150μF, Standard type)

| RS* | HVK | 151 | M | 1G | EH0 | 002 | E |
|---|---|---|---|---|---|---|---|
| Category code | Series code | capacitance code | Cap tol. code | Voltage code | Size code | Taping and packing code | Additional code |

φ10 or more (example : 35V270μF, Standard type)

| RS* | HVK | 271 | M | 1G | FH0 | 002 | EX |
|---|---|---|---|---|---|---|---|
| Category code | Series code | capacitance code | Cap tol. code | Voltage code | Size code | Taping and packing code | Additional code |

φ12.5 (example : 35V560μF, Standard type)

| RS* | HVK | 561 | M | 1G | GL5 | 005 | E |
|---|---|---|---|---|---|---|---|
| Category code | Series code | capacitance code | Cap tol. code | Voltage code | Size code | Taping and packing code | Additional code |

・For vibration resistance type should change Series code "HVK" into "HTK".
・6000 hours guaranteed product should change additional code "E" into "B".
・For details, refer to the various "Product Code System" pages.

NOTE : Design, Specifications are subject to change without notice.
It is recommended that you shall obtain technical specifications from ELNA to ensure that the component is suitable for your use.

# ELNA Conductive Polymer Hybrid Aluminum Electrolytic Capacitors HVK,HTK series

Code in front of series have been extracted from product code, which describes the segment of products, such as type and features.

## Standard ratings (◆Marked doesn't supports: vibration resistance type & 6000 hours guaranteed)

| Rated voltage (V) / Item / Rated capacitance (μF) | 25 (1T) | | | 35 (1G) | | | 50 (1U) | | | 63 (4E) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Case φD×L(mm) | ESR (mΩ max.) | Rated ripple current (mArms) | Case φD×L(mm) | ESR (mΩ max.) | Rated ripple current (mArms) | Case φD×L(mm) | ESR (mΩ max.) | Rated ripple current (mArms) | Case φD×L(mm) | ESR (mΩ max.) | Rated ripple current (mArms) |
| 10 | — | — | — | — | — | — | ◆ 5×5.8 | 120 | 500 | 6.3×5.8 | 120 | 700 |
| 22 | — | — | — | ◆ 5×5.8 | 100 | 550 | 6.3×5.8 | 80 | 750 | 6.3×7.7 | 80 | 900 |
| 33 | ◆ 5×5.8 | 80 | 550 | — | — | — | 6.3×7.7 | 40 | 1100 | 8×10 | 40 | 1100 |
| 47 | — | — | — | 6.3×5.8 | 60 | 900 | — | — | — | — | — | — |
| 56 | 6.3×5.8 | 50 | 900 | — | — | — | — | — | — | 10×10 | 30 | 1400 |
| 68 | — | — | — | 6.3×7.7 | 35 | 1400 | 8×10 | 30 | 1250 | — | — | — |
| 100 | 6.3×7.7 | 30 | 1400 | — | — | — | 10×10 | 28 | 1600 | 10×12.5 | 26 | 2000 |
| 150 | — | — | — | 8×10 | 27 | 1600 | 10×12.5 | 24 | 2500 | 10×16.5 | 15 | 3500 |
| | | | | | | | | | | 12.5×13.5 | 22 | 2500 |
| 220 | 8×10 | 27 | 1600 | — | — | — | — | — | — | — | — | — |
| 270 | — | — | — | 10×10 | 20 | 2000 | 10×16.5 | 13 | 3700 | — | — | — |
| 330 | 10×10 | 20 | 2000 | — | — | — | 12.5×13.5 | 20 | 3500 | — | — | — |
| 390 | — | — | — | 10×12.5 | 18 | 3000 | — | — | — | — | — | — |
| 560 | 10×12.5 | 18 | 3000 | 12.5×13.5 | 15 | 4000 | — | — | — | — | — | — |
| 680 | — | — | — | 10×16.5 | 11 | 4000 | — | — | — | — | — | — |
| 820 | 12.5×13.5 | 15 | 4000 | — | — | — | — | — | — | — | — | — |
| 1000 | 10×16.5 | 11 | 4000 | — | — | — | — | — | — | — | — | — |

| Rated voltage (V) / Item / Rated capacitance (μF) | 80 (1R) | | |
|---|---|---|---|
| | Case φD×L(mm) | ESR (mΩ max.) | Rated ripple current (mArms) |
| 22 | 8×10 | 45 | 1100 |
| 33 | 10×10 | 36 | 1200 |

(Note) Rated ripple current : 125℃ , 100kHz ; ESR : 20℃ , 100kHz

# ELNA Conductive Polymer Hybrid Aluminum Electrolytic Capacitors HVL,HTL series

Code in front of series have been extracted from product code, which describes the segment of products, such as type and features.

- Low ESR and high ripple current are realized.
- HTL is resist to vibration. (30G guaranteed)
- Equivalent to conductive polymer type Aluminum Electrolytic Capacitor. (There are little characteristics change by temperature and frequency)
- Guaranteed 125° C, 8000 hours.
- Environmental : GREEN CAP™ , RoHS compliance.

Vibration resistance ⇦ Long life time

HTL ⇦ HVL ⇦ HVK

Marking color : Blue print

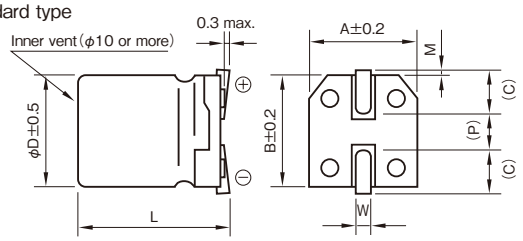
## Specifications

| Item | Performance |
|---|---|
| Category temperature range (℃) | −55 to +125 |
| Tolerance at rated capacitance (%) | ±20 (20℃, 120Hz) |
| Leakage current (μA) (max.) | 0.01CV or 3 whichever is larger (after 2 minutes)<br>C : Rated capacitance (μF) ; V : Rated voltage (V) (20℃) |
| Tangent of loss angle (tanδ) | Rated voltage (V): 25 / 35 / 50 / 63<br>tanδ (max.): 0.14 / 0.12 / 0.10 / 0.08 (20℃, 120Hz) |
| Characteristics at high and low temperature | Impedance ratio (max.)<br>Z−25℃/Z+20℃: 1.5<br>Z−55℃/Z+20℃: 2.0 (100kHz) |
| Endurance (125℃) (Applied ripple current) | Test time: 8000 hours<br>Leakage current: The initial specified value or less<br>Percentage of capacitance change: Within ±30% of initial value<br>Tangent of the loss angle: 200% or less of the initial specified value<br>ESR change: 200% or less of the initial specified value |
| Shelf life (125℃) | Test time : 1000hours ; other items are same as the endurance. Voltage application treatment : According to JIS C5101-4 4.1. |

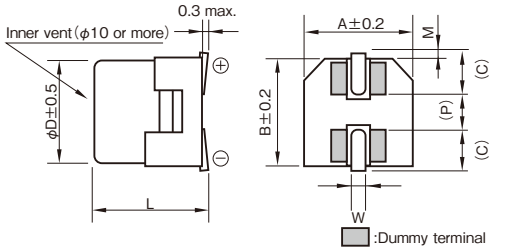
## Outline Drawing

Unit : mm

Standard type




For vibration resistance type




( ) : Reference size

| φD | L | A | B | C | W | P | M | Size code |
|---|---|---|---|---|---|---|---|---|
| 8 | 10±0.5 | 8.4 | 8.4 | 3.0 | 0.7 to 1.1 | 3.1 | 0.4±0.3 | EH0 |
| 10 | 10±0.5 | 10.4 | 10.4 | 3.3 | 0.7 to 1.1 | 4.7 | 0.4±0.3 | FH0 |
| 10 | 12.5±0.5 | 10.4 | 10.4 | 3.3 | 0.7 to 1.1 | 4.7 | 0.4±0.3 | FK5 |
| 12.5 | 13.5±0.5 | 13.0 | 13.0 | 4.9 | 1.0 to 1.4 | 4.6 | 0.7±0.3 | GL5 |

Refer to individual page.
(Soldering conditions, Land pattern size, The taping specifications)

## Coefficient of Frequency for Rated Ripple Current

| Rated voltage (V) \ Frequency (Hz) | 50・60 | 120 | 1k | 100k or more |
|---|---|---|---|---|
| 6.3 to 100 | 0.50 | 0.50 | 0.75 | 1 |

## Product code system (*For general product)

φ8, φ10 (example : 25V220μF, Standard type)

| RS* | HVL | 221 | M | 1T | EH0 | 002 | ⬚ |
|---|---|---|---|---|---|---|---|
| Category code | Series code | capacitance code | Cap tol. code | Voltage code | Size code | Taping and packing code | Additional code |

φ12.5 (example : 25V820μF, Standard type)

| RS* | HVL | 821 | M | 1T | GL5 | 005 | ⬚ |
|---|---|---|---|---|---|---|---|
| Category code | Series code | capacitance code | Cap tol. code | Voltage code | Size code | Taping and packing code | Additional code |

・For vibration resistance type should change Series code "HVL" into "HTL".
・For details, refer to the various "Product Code System" pages.

Code in front of series have been extracted from product code, which describes the segment of products, such as type and features.

## Standard Ratings

| Rated voltage (V) / Item / Rated capacitance (μF) | 25 (1T) | | | 35 (1G) | | | 50 (1U) | | | 63 (4E) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Case φD×L (mm) | ESR (mΩ max.) | Rated ripple current (mArms) | Case φD×L (mm) | ESR (mΩ max.) | Rated ripple current (mArms) | Case φD×L (mm) | ESR (mΩ max.) | Rated ripple current (mArms) | Case φD×L (mm) | ESR (mΩ max.) | Rated ripple current (mArms) |
| 33 | — | — | — | — | — | — | — | — | — | 8×10 | 40 | 1100 |
| 56 | — | — | — | — | — | — | — | — | — | 10×10 | 30 | 1400 |
| 68 | — | — | — | — | — | — | 8×10 | 30 | 1250 | — | — | — |
| 100 | — | — | — | — | — | — | 10×10 | 28 | 1600 | 10×12.5 | 26 | 2000 |
| 120 | — | — | — | — | — | — | — | — | — | 12.5×13.5 | 22 | 2500 |
| 150 | — | — | — | 8×10 | 22 | 1600 | 10×12.5 | 24 | 2500 | — | — | — |
| 220 | 8×10 | 22 | 1600 | — | — | — | — | — | — | — | — | — |
| 270 | — | — | — | 10×10 | 20 | 2000 | — | — | — | — | — | — |
| 330 | 10×10 | 20 | 2000 | — | — | — | 12.5×13.5 | 20 | 3000 | — | — | — |
| 390 | — | — | — | 10×12.5 | 18 | 3000 | — | — | — | — | — | — |
| 560 | 10×12.5 | 18 | 3000 | 12.5×13.5 | 15 | 3500 | — | — | — | — | — | — |
| 820 | 12.5×13.5 | 15 | 3500 | — | — | — | — | — | — | — | — | — |
| 1000 | 12.5×13.5 | 15 | 3500 | — | — | — | — | — | — | — | — | — |

(Note) Rated ripple current : 125℃ , 100kHz ; ESR : 20℃ , 100kHz

# ELNA Conductive Polymer Hybrid Aluminum Electrolytic Capacitors HVX,HTX series

Code in front of series have been extracted from product code, which describes the segment of products, such as type and features.

☆UPGRADE

- Low ESR and high ripple current are realized.
- HTX is resist to vibration. (30G guaranteed)
- Equivalent to conductive polymer type Aluminum Electrolytic Capacitor. (There are little characteristics change by temperature and frequency)
- Guaranteed 135℃, 4000 hours.(φ6.3: 2000 hours)
- Environmental：GREEN CAP™ , RoHS compliance.

Vibration resistance ⇦ High temperature

HTX ⇦ HVX ⇦ HVK


Marking color : Blue print

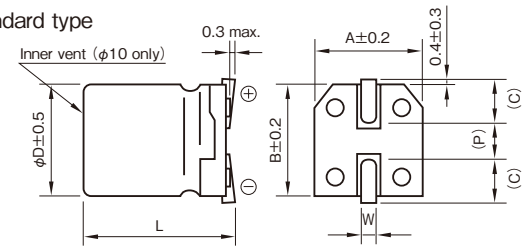
## Specifications

| Item | Performance |
|---|---|
| Category temperature range (℃) | −55 to +135 |
| Tolerance at rated capacitance (%) | ±20 (20℃, 120Hz) |
| Leakage current (μA) (max.) | 0.01CV or 3 whichever is larger (after 2 minutes) C : Rated capacitance (μF) , V : Rated voltage (V) (20℃) |
| Tangent of loss angle (tanδ) | Rated voltage (V): 25 / 35 / 50 / 63 — tanδ (max.): 0.14 / 0.12 / 0.10 / 0.08 (20℃, 120Hz) |
| Characteristics at high and low temperature | Impedance ratio (max.): Z−25℃/Z+20℃ 1.5; Z−55℃/Z+20℃ 2.0 (100kHz) |
| Endurance (135℃) (Applied ripple current) | Test time: 4000 hours(φ6.3: 2000 hours); Leakage current: The initial specified value or less; Percentage of capacitance change: Within ±30% of initial value; Tangent of the loss angle: 200% or less of the initial specified value; ESR change: 200% or less of the initial specified value |
| Shelf life (135℃) | Test time : 1000hours ; other items are same as the endurance. Voltage application treatment : According to JIS C5101-4 4.1. |

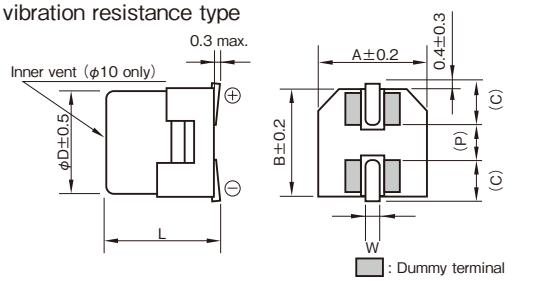
## Outline Drawing

Unit : mm

Standard type




For vibration resistance type




: Dummy terminal

( ) : Reference size

| φD | L | A | B | C | W | P | Size code |
|---|---|---|---|---|---|---|---|
| 6.3 | 5.8±0.3 | 6.6 | 6.6 | 2.7 | 0.5 to 0.8 | 2.0 | DC8 |
| 6.3 | 7.7±0.3 | 6.6 | 6.6 | 2.7 | 0.5 to 0.8 | 2.0 | DE7 |
| 8 | 10±0.5 | 8.4 | 8.4 | 3.0 | 0.7 to 1.1 | 3.1 | EH0 |
| 10 | 10±0.5 | 10.4 | 10.4 | 3.3 | 0.7 to 1.1 | 4.7 | FH0 |
| 10 | 12.5±0.5 | 10.4 | 10.4 | 3.3 | 0.7 to 1.1 | 4.7 | FK5 |
| 10 | 16.5±0.5 | 10.4 | 10.4 | 3.3 | 0.7 to 1.1 | 4.7 | FP5＊ |

＊ mark size deals with only vibration resistant type.

Refer to individual page.
(Soldering conditions, Land pattern size, The taping specifications)

## Coefficient of Frequency for Rated Ripple Current

| Rated voltage (V) \ Frequency (Hz) | 120 | 1k | 10k | 100k or more |
|---|---|---|---|---|
| 25 to 63 | 0.10 | 0.30 | 0.60 | 1 |

## Product code system (*For general product)

φ6.3, φ8 (example : 25V220μF, Standard type)

| RS* | HVX | 221 | M | 1T | EH0 | 002 | □ |
|---|---|---|---|---|---|---|---|
| Category code | Series code | capacitance code | Cap tol. code | Voltage code | Size code | Taping and packing code | Additional code |

φ10 (example : 35V270μF, Standard type)

| RS* | HVX | 271 | M | 1G | FH0 | 002 | X |
|---|---|---|---|---|---|---|---|
| Category code | Series code | capacitance code | Cap tol. code | Voltage code | Size code | Taping and packing code | Additional code |

・For vibration resistance type should change Series code "HVX" into "HTX".
・For details, refer to the various "Product Code System" pages.

NOTE : Design, Specifications are subject to change without notice.
It is recommended that you shall obtain technical specifications from ELNA to ensure that the component is suitable for your use.

# ELNA Conductive Polymer Hybrid Aluminum Electrolytic Capacitors HVX,HTX series

Code in front of series have been extracted from product code, which describes the segment of products, such as type and features.

## Standard Ratings (●Marked: 2000 hours guaranteed)

| Rated voltage (V) / Item / Rated capacitance (μF) | 25 (1T) | | | 35 (1G) | | | 50 (1U) | | | 63 (4E) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Case φD×L (mm) | ESR (mΩ max.) | Rated ripple current (mArms) | Case φD×L (mm) | ESR (mΩ max.) | Rated ripple current (mArms) | Case φD×L (mm) | ESR (mΩ max.) | Rated ripple current (mArms) | Case φD×L (mm) | ESR (mΩ max.) | Rated ripple current (mArms) |
| 10 | — | — | — | — | — | — | — | — | — | ● 6.3×5.8 | 120 | 700 |
| 22 | — | — | — | — | — | — | ● 6.3×5.8 | 80 | 750 | ● 6.3×7.7 | 80 | 900 |
| 33 | — | — | — | — | — | — | ● 6.3×7.7 | 40 | 1100 | 8×10 | 40 | 1100 |
| 47 | — | — | — | ● 6.3×5.8 | 60 | 900 | — | — | — | — | — | — |
| 56 | ● 6.3×5.8 | 50 | 900 | — | — | — | — | — | — | 10×10 | 30 | 1400 |
| 68 | — | — | — | ● 6.3×7.7 | 35 | 1400 | 8×10 | 30 | 1250 | — | — | — |
| 100 | ● 6.3×7.7 | 30 | 1400 | — | — | — | 10×10 | 28 | 1600 | 10×12.5 | 26 | 2000 |
| 150 | — | — | — | 8×10 | 22 | 1600 | 10×12.5 | 24 | 2500 | 10×16.5 | 15 | 3500 |
| 220 | 8×10 | 22 | 1600 | — | — | — | — | — | — | — | — | — |
| 270 | — | — | — | 10×10 | 20 | 2000 | — | — | — | — | — | — |
| 330 | 10×10 | 20 | 2000 | — | — | — | — | — | — | — | — | — |
| 390 | — | — | — | 10×12.5 | 18 | 3000 | — | — | — | — | — | — |
| 560 | 10×12.5 | 18 | 3000 | — | — | — | — | — | — | — | — | — |
| 680 | — | — | — | 10×16.5 | 11 | 3800 | — | — | — | — | — | — |
| 1000 | 10×16.5 | 11 | 4000 | — | — | — | — | — | — | — | — | — |

(Note) Rated ripple current : 135℃ , 100kHz ; ESR : 20℃ , 100kHz

# ELNA Conductive Polymer Hybrid Aluminum Electrolytic Capacitors HVQ,HTQ series

Code in front of series have been extracted from product code, which describes the segment of products, such as type and features.

- Low ESR and high ripple current are realized.
- HTQ is resist to vibration. (30G guaranteed)
- Equivalent to conductive polymer type Aluminum Electrolytic Capacitor. (There are little characteristics change by temperature and frequency)
- Guaranteed 150° C, 1000 hours.
- Environmental : GREEN CAP™ , RoHS compliance.

Vibration resistance ⇦ High temperature

HTQ ⇦ HVQ ⇦ HVX


Marking color : Blue print

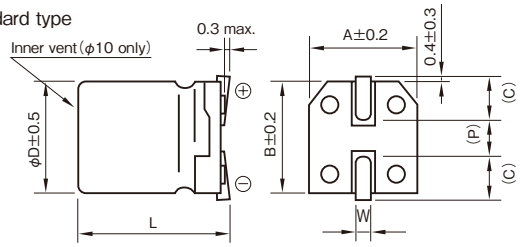
## Specifications

| Item | Performance |
|---|---|
| Category temperature range (℃) | −55 to +150 |
| Tolerance at rated capacitance (%) | ±20 (20℃, 120Hz) |
| Leakage current (μA) (max.) | 0.01CV or 3 whichever is larger (after 2 minutes)<br>C : Rated capacitance (μF) ; V : Rated voltage (V) (20℃) |
| Tangent of loss angle (tanδ) | Rated voltage (V): 25 / 35 / 50 / 63<br>tanδ (max.): 0.14 / 0.12 / 0.10 / 0.08 (20℃, 120Hz) |
| Characteristics at high and low temperature | Impedance ratio (max.) (100kHz)<br>Z−25℃/Z+20℃: 1.5<br>Z−55℃/Z+20℃: 2.0 |
| Endurance (150℃) (Applied ripple current) | Test time: 1000 hours<br>Leakage current: The initial specified value or less<br>Percentage of capacitance change: Within ±30% of initial value<br>Tangent of the loss angle: 200% or less of the initial specified value<br>ESR change: 200% or less of the initial specified value |
| Shelf life (150℃) | Test time : 1000hours ; other items are same as the endurance. Voltage application treatment : According to JIS C5101-4 4.1. |

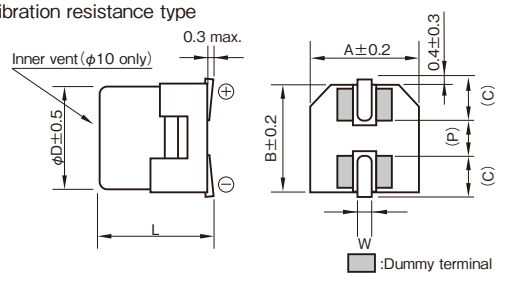
## Outline Drawing

Unit : mm

Standard type




For vibration resistance type




( ) : Reference size

| φD | L | A | B | C | W | P | Size code |
|---|---|---|---|---|---|---|---|
| 8 | 10±0.5 | 8.4 | 8.4 | 3.0 | 0.7 to 1.1 | 3.1 | EH0 |
| 10 | 10±0.5 | 10.4 | 10.4 | 3.3 | 0.7 to 1.1 | 4.7 | FH0 |

Refer to individual page.
(Soldering conditions, Land pattern size, The taping specifications)

## Coefficient of Frequency for Rated Ripple Current

| Frequency (Hz) / Rated voltage (V) | 120 | 1k | 10k | 100k or more |
|---|---|---|---|---|
| 25 to 63 | 0.10 | 0.30 | 0.60 | 1 |

## Product code system (*For general product)

φ8 (example : 25V220μF, Standard type)

| RS* | HVQ | 221 | M | 1T | EH0 | 002 | ⬚ |
|---|---|---|---|---|---|---|---|
| Category code | Series code | capacitance code | Cap tol. code | Voltage code | Size code | Taping and packing code | Additional code |

φ10 (example : 35V270μF, Standard type)

| RS* | HVQ | 271 | M | 1G | FH0 | 002 | X |
|---|---|---|---|---|---|---|---|
| Category code | Series code | capacitance code | Cap tol. code | Voltage code | Size code | Taping and packing code | Additional code |

・For vibration resistance type should change Series code "HVQ" into "HTQ".
・For details, refer to the various "Product Code System" pages.

# ELNA Conductive Polymer Hybrid Aluminum Electrolytic Capacitors HVQ,HTQ series

Code in front of series have been extracted from product code, which describes the segment of products, such as type and features.

## Standard Ratings

| Rated voltage (V) / Item / Rated capacitance (μF) | 25 (1T) | | | 35 (1G) | | | 50 (1U) | | | 63 (4E) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Case φD×L (mm) | ESR (mΩ max.) | Rated ripple current (mArms) | Case φD×L (mm) | ESR (mΩ max.) | Rated ripple current (mArms) | Case φD×L (mm) | ESR (mΩ max.) | Rated ripple current (mArms) | Case φD×L (mm) | ESR (mΩ max.) | Rated ripple current (mArms) |
| 33 | — | — | — | — | — | — | — | — | — | 8×10 | 30 | 610 |
| 56 | — | — | — | — | — | — | — | — | — | 10×10 | 28 | 710 |
| 68 | — | — | — | — | — | — | 8×10 | 30 | 660 | — | — | — |
| 100 | — | — | — | — | — | — | 10×10 | 28 | 800 | — | — | — |
| 150 | — | — | — | 8×10 | 22 | 710 | — | — | — | — | — | — |
| 220 | 8×10 | 22 | 740 | — | — | — | — | — | — | — | — | — |
| 270 | — | — | — | 10×10 | 20 | 830 | — | — | — | — | — | — |
| 330 | 10×10 | 20 | 850 | — | — | — | — | — | — | — | — | — |

(Note) Rated ripple current : 150℃ , 100kHz ; ESR : 20℃ , 100kHz

# ELNA Conductive Polymer Hybrid Aluminum Electrolytic Capacitors HVY,HTY series

Code in front of series have been extracted from product code, which describes the segment of products, such as type and features.

- 150° C, High temperature and long life are realized.
- HTY is resist to vibration. (30G guaranteed)
- Equivalent to conductive polymer type Aluminum Electrolytic Capacitor. (There are little characteristics change by temperature and frequency)
- Guaranteed 150° C, 2000 hours.
- Environmental : GREEN CAP™ , RoHS compliance.

Vibration resistance ⇦ Long life

HTY ⇦ HVY ⇦ HVQ


Marking color : Blue print

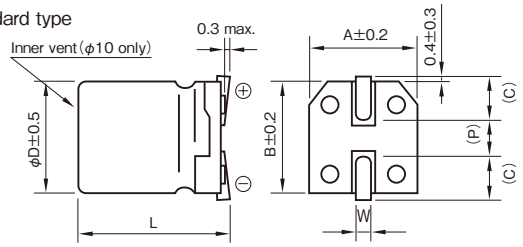
## Specifications

| Item | Performance |
|---|---|
| Category temperature range (℃) | −55 to +150 |
| Tolerance at rated capacitance (%) | ±20 (20℃, 120Hz) |
| Leakage current (μA) (max.) | 0.01CV or 3 whichever is larger (after 2 minutes)<br>C : Rated capacitance (μF) ; V : Rated voltage (V) (20℃) |
| Tangent of loss angle (tanδ) | Rated voltage (V): 25 / 35 / 50 / 63<br>tanδ (max.): 0.14 / 0.12 / 0.10 / 0.08 (20℃, 120Hz) |
| Characteristics at high and low temperature | Impedance ratio (max.) (100kHz)<br>Z−25℃/Z+20℃: 1.5<br>Z−55℃/Z+20℃: 2.0 |
| Endurance (150℃) (Applied ripple current) | Test time: 2000 hours<br>Leakage current: The initial specified value or less<br>Percentage of capacitance change: Within ±30% of initial value<br>Tangent of the loss angle: 200% or less of the initial specified value<br>ESR change: 200% or less of the initial specified value |
| Shelf life (150℃) | Test time : 1000hours ; other items are same as the endurance. Voltage application treatment : According to JIS C5101-4 4.1. |

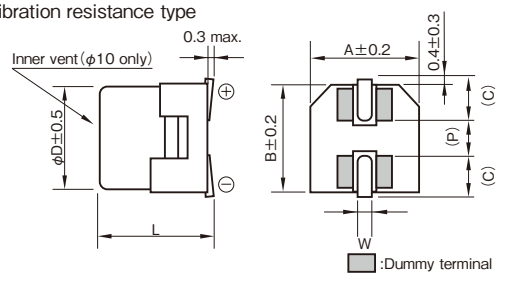
## Outline Drawing

Unit : mm

Standard type




For vibration resistance type




( ) : Reference size

| φD | L | A | B | C | W | P | Size code |
|---|---|---|---|---|---|---|---|
| 8 | 10±0.5 | 8.4 | 8.4 | 3.0 | 0.7 to 1.1 | 3.1 | EH0 |
| 10 | 10±0.5 | 10.4 | 10.4 | 3.3 | 0.7 to 1.1 | 4.7 | FH0 |

Refer to individual page.
(Soldering conditions, Land pattern size, The taping specifications)

## Coefficient of Frequency for Rated Ripple Current

| Rated voltage (V) \ Frequency (Hz) | 120 | 1k | 10k | 100k or more |
|---|---|---|---|---|
| 25 to 63 | 0.10 | 0.30 | 0.60 | 1 |

## Product code system (*For general product)

φ8 , φ10(example : 25V220μF, Standard type)

| RS* | HVY | 221 | M | 1T | EH0 | 002 | ⬚ |
|---|---|---|---|---|---|---|---|
| Category code | Series code | capacitance code | Cap tol. code | Voltage code | Size code | Taping and packing code | Additional code |

・For vibration resistance type should change Series code "HVY" into "HTY".
・For details, refer to the various "Product Code System" pages.

# ELNA Conductive Polymer Hybrid Aluminum Electrolytic Capacitors HVY,HTY series

Code in front of series have been extracted from product code, which describes the segment of products, such as type and features.

## Standard Ratings

| Rated voltage (V) / Item / Rated capacitance (μF) | 25 (1T) | | | 35 (1G) | | | 50 (1U) | | | 63 (4E) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Case φD×L (mm) | ESR (mΩ max.) | Rated ripple current (mArms) | Case φD×L (mm) | ESR (mΩ max.) | Rated ripple current (mArms) | Case φD×L (mm) | ESR (mΩ max.) | Rated ripple current (mArms) | Case φD×L (mm) | ESR (mΩ max.) | Rated ripple current (mArms) |
| 33 | — | — | — | — | — | — | — | — | — | 8×10 | 30 | 610 |
| 56 | — | — | — | — | — | — | — | — | — | 10×10 | 28 | 710 |
| 68 | — | — | — | — | — | — | 8×10 | 30 | 660 | — | — | — |
| 100 | — | — | — | — | — | — | 10×10 | 28 | 800 | — | — | — |
| 150 | — | — | — | 8×10 | 22 | 710 | — | — | — | — | — | — |
| 220 | 8×10 | 22 | 740 | — | — | — | — | — | — | — | — | — |
| 270 | — | — | — | 10×10 | 20 | 830 | — | — | — | — | — | — |
| 330 | 10×10 | 20 | 850 | — | — | — | — | — | — | — | — | — |

(Note) Rated ripple current : 150℃ , 100kHz ; ESR : 20℃ , 100kHz

# Aluminum Electrolytic Capacitors
# (Chip Type, Miniature Type)

## ■ Cautions for Using Aluminum Electrolytic Capacitors

Please read the specification before using ELNA products.

The following cautions should be observed when using our aluminum electrolytic capacitors to assure their maximum stability and performance. When your application design conditions or operating conditions exceed the limit of the product specification, please contact us. If used under conditions beyond the limit of our specifications, it may cause defects such as short circuit, open circuit, leakage, explosion or combustion.

### ■ Cautions for usage

#### 1. DC electrolytic capacitors are polarized.

- If used with a wrong polarity, it creates an abnormal current resulting in a short circuit or damage to itself.
- Cannot use for the circuit to which the polarity reverses by ripple voltage.

#### 2. About use in power supply circuit.

- While aluminum electrolytic capacitors are operated electrolyte liquid inside dries up and E.S.R. (Equivalent Series Resistance) of the capacitor increases. In case operated longer than rated life time, the capacitance much decreases, tangent of loss angle and E.S.R. much increases. Therefore for some case the sum of bias direct voltage and the peak of ripple voltage is over the rated voltage of the capacitor.
- For any type of circuit, in case the sum of bias direct voltage and the peak of ripple voltage is over the rated voltage of the capacitors or in case the minimum voltage is lower than 0 (zero) volt, the voltage control for the capacitors shall be provided.

#### 3. About applied voltage.

- Do not apply a voltage that exceeds the rated voltage because the leakage current will increase significantly, causing characteristic deterioration and short-circuit failure.
  When applying ripple current, the peak value of the ripple voltage must not exceed the rated voltage.
  Surge voltage exceeding the rated voltage is not guaranteed to be used for a long time due to limited conditions.
- Do not apply reverse voltage
  (DC bias + ripple voltage peak sum ≦ 0V).

#### 4. About use in circuits with rapid charging and discharging.

- Please do not use in circuits that repeatedly charge and discharge rapidly. This may result in deterioration of characteristics, short circuits, or destruction. Please consult us separately if you are considering using the capacitor in a circuit that repeatedly charges and discharges.
  In addition, we recommend using a protection circuit if the usage method causes a rush current of more than 10A to flow into the capacitor.

#### 5. Use within the rated ripple current.

- If applied ripple current exceeds rated ripple current, the life of the capacitor may be shortened, or in an extreme case it gets destroyed due to its internal heat. Use high-ripple type capacitors for such circuits.

#### 6. Changes in characteristics due to operating temperature.

- The characteristics of an electrolytic capacitor will change with a change in the temperature. Such changes are temporary and the original characteristics will be restored at the original temperature (if the characteristics are not deteriorated by remaining at a high temperature for a long time). If used at a temperature exceeding the guaranteed temperature range, the capacitor may be damaged due to the increased leakage current. Pay attention to the capacitor temperature being affected by the ambient temperature of the unit, the temperature inside the appliance, the heat radiated by another hot component in the unit and the heat inside the capacitor itself due to the ripple current.
  (1)The rated capacitance is normally shown as the value at 20°C-120Hz. It increases as the temperature raises and decreases as it lowers.
  (2)The tangent of loss angle (tanδ) is normally shown as the value at 20°C-120Hz. It decreases as the ambient temperature gets high and increases as it gets low.
  (3)The equivalent series resistance (ESR) and Impedance is normally shown as the value at 20°C-100kHz. It decreases as the ambient temperature gets high and increases as it gets low.
  (4)The leakage current increases as the temperature gets high and decreases as it gets low.

#### 7. Changes in the characteristics due to frequency.

- The characteristics of an electrolytic capacitor will change according to the change in the operating frequency.
  (1)The rated capacitance is normally shown as the value at 20°C-120Hz. It decreases as the frequency increases.
  (2)The tangent of loss angle (tanδ) is normally shown as the value at 20°C-120Hz. It increases as the frequency gets high.
  (3)The equivalent series resistance (ESR) and Impedance is normally shown as the value at 100kHz 20°C. It increases as the frequency lowers.

#### 8. Capacitor life

- The life of the capacitor terminates when it fails due to the deterioration in its electronic characteristics. Temperature and the ripple current since they especially affect the life on technical note “2. About the Life of an Aluminum Electrolytic Capacitor” of this catalog.

#### 9. Restrictions on the using environment

- Do not use capacitors in an environment directly exposed to water, saltwater spray, oil spill or condensation.

- Do not use capacitors in an environment filled with toxic gas such as hydrogen sulfide, sulfurous acid, nitrous acid, chlorine, ammonia, etc.
- Do not use capacitors in a place exposed to ozone, ultraviolet rays, or radiation.
- Do not use the product in harsh environments where the vibration or shock conditions exceed the range specified in the technical specifications.
  Even within the specified range, resonance can add a large load, which may cause changes in characteristics or the product to fall off. Be sure to check for resonance after mounting the product.

## 10. Fumigation Process

- When exporting electronic equipment abroad, fumigation process may be performed on wooden packaging material with a halogen (compound) gas such as methyl bromide. Exercise care as this halogen gas may corrode capacitors. Also, use caution to epidemic preventive agent as corrosive component such as halogen may be contained.

## 11. Insulation between the capacitor case and the cathode terminal.

- The case and the cathode terminal are not insulated as being connected through inconstant resistance.

## 12. Double-sided PCB's

- When you use electrolytic capacitors on a double sided PCB, be careful not to have the circuit pattern run under where the capacitor is mounted. Otherwise it may cause a short circuit on the PCB depending on the condition of mounting.

## 13. Short time leakage current

The leakage current of the capacitor varies depending on the temperature, applied voltage, and applied time.
Particularly, Short-term leakage currents of less than the specified time tend to be larger than the specified value.
For short-term leakage current less than the specified time, please contact us.

## 14. Regarding to connection of capacitors

- Aluminum electrolytic capacitor has electrolyte liquid so that the most portion of electric loss characteristics came from E.S.R(Equivalent Series Resistance) of electrolyte liquid. Therefore the capacitor is an electronic devise which can flow high ripple current in case the temperature increases and it decreases E.S.R.
  In case connecting two capacitors or more, E.S.R. of the capacitors is close to the resistance of the circuit. Therefore in case current is unbalanced and some capacitors has high ripple current, temperature increase, it makes more high current and finally it is over the rated ripple current.
  For parallel connection of capacitors the proper design of electric circuit such as balancing of each capacitors resistance or control of total ripple current shall be provided to avoid excess ripple current and voltage.
- When connecting two or more capacitors in series, take into consideration the balance of the voltage applied to the capacitors and place a partial pressure resistor in parallel with each capacitor so that the voltage applied to each capacitor is below the rated voltage.

## 15. Use at a high altitude

- The use of capacitors at high altitudes such as on an airplane causes a large difference between the internal pressure of the capacitors and the atmospheric pressure. However, there is no problem in use under atmospheric pressure up to about an altitude of 10,000 meters. Please check the operation of electronic equipment at the operating environmental temperature because the temperature lowers with increased altitude.
  If the condition is severe like space, please contact us.

## 16. Hole pitch adjustment of the PCB to the capacitors.

- Set the hole pitch of the PCB to the lead pitch (the "F" distance in this catalog) of the capacitor. Be careful since a short circuit, a cut or an increase in the leakage current etc. may be caused by the stress given to the lead wire terminals due to the difference between the hole pitch and the lead pitch.

## 17. Capacitors with pressure valves.

- A part of the capacitor case is made thin to have the function as the pressure valve in order to pre vent explosion due to the rise of inside pressure when a reverse or excessive voltage is applied to the capacitor. Once it has worked as a valve, the whole capacitor needs to be replaced since the valve will not restore.
- When you use a capacitor with pressure valve, provide certain space above the pressure valve as below to prevent an interference when it works as a valve.

| Diameter of the capacitor (mm) | 18 or less |
|---|---|
| Required space above the valve (mm) | 2.0 or more |

## 18. NC terminal (the supplemental terminal) (series RPK)

- Since NC terminal is not insulated. It should be mounted at a position electronically independent from all other parts of the circuit.

## 19. External sleeve

- During a preheating or a hardening of mounting adhesive may cause a sleeve cracked. The capacitors are usually sleeved with poly vinyl chloride or poly ethylene terephthalate for the indication purpose only. Please do not consider it as an insulation.

## ■ Cautions for Mounting usage

### 1. Cautions for mounting.

- Do not reuse capacitors that have been assembled in a set and energized. Capacitors cannot be reused except for those which have been measured on electrical performance during periodic inspection.
- Check the ratings (electrostatic capacitance and rated voltage) of the capacitor before mounting.
- Transient recovery voltage may be generated in the capacitor due to dielectric absorption. If required, this voltage can be discharged with a resistor with a value of about 1 kΩ.
- Check the polarity of the capacitor to the chassis.
- Do not drop the capacitor to the floor. Do not use the dropped capacitor.
- Do not deform the capacitor for mounting.
- Do not mount heating parts around capacitors and on the back of the PCB (under or back of capacitors).

### 2. Do not apply excessive pressure to the capacitor, its terminals or lead wires.

- Make sure that the contact path of the capacitor meets the hole pitch of the PCB before mounting.• Do not set the automatic insertion machine to clinch the capacitor lead wires too strong.
- Pay attention to the impact given by the component receptacles of the automatic insertion/mounting machines and the product checker, and from the centering operation.

### 3. Soldering.

- Do not dip the capacitor into melted solder.
- The soldering conditions.
  About detail conditions are described in this catalog “Soldering conditions” page or the technical specifications.
- Do not flux other part than the terminals.
- If there is a direct contact between the sleeve of the capacitor and the printed circuit pattern or a metal part of another component such as a lead wire, it may cause shrinkage of crack.
- When you use the capacitor with its sleeve touching directly to the PCB, excessive solder temperature or excessive soldering time may cause the sleeve to shrink or crack during the heat.
- If the application is for extended use, understand and manage the soldering characteristics to avoid abnormal current caused by a contact failure between the capacitor and the PCB.
- Reflow soldering
  Reflow the capacitors within recommended reflow soldering conditions. Verify there is no temperature stress to the capacitors because the following differences might degrade capacitors electrically and mechanically.
- Caution for reflow soldering
  1)Location of components : Temperature increases at the edge of PC board more than the center.
  2)Population of PC board : The lower the component population is, the more temperature rises.
  3)Material of PC board : A ceramic-made board needs more heat than a glass epoxy-made board. The heat increase may cause damage to the capacitors.
  4)Thickness of PC board : A thicker board needs more heat than a thinner board. The heat may damage the capacitors.
  5)Size of PC board : A larger board needs more heat than a smaller board. The heat may damage the capacitors.
  6)Solder paste thickness
  If thin solder paste is to be used compared recommend solder paste thickness, please consult with us.
  7)Location of infrared ray lamps : IR reflow as well as hot plate reflow heats only on the reverse side of the PC board to lessen heat stress to the capacitors.
  8)Case leakage current will increase (about several mA at the maximum) after the reflow process, the leakage current which rose gradually decreases when voltage is applied.
  9)Please consult us about vapor phase soldering (VPS).
- Rework of soldering
  Use a soldering iron for rework. Do not exceed an iron tip temperature of 400±5°C and an exposure time of $3^{+1}_{0}$ seconds.

### 4. Handling after soldering

- After soldering, applying mechanical stress to the capacitor may cause it to fail. Do not tilt, twist or push down the capacitor body, and do not bending the PC board.
- After soldering, do not hold the capacitor as a handle to carry the PCB.
- After soldering, do not hit the capacitor with any obstacle. If PCB’s are piled up for storage, the capacitor should not touch another PCB or component.

### 5. Cleaning after Soldering

- Recommended cleaning method
  (1)cleaning solutions:
  (a) CLEANTHROUGH 710M, 750H, 750L
  (b) PINEALPHA ST-100S
  (2)Cleaning conditions:
  (a) The temperature of cleaning solution shall be less than 60°C.
  (b) Use immersion or ultrasonic waves within two minutes.
  (c) After cleaning, capacitors and PCB’s shall thoroughly be rinsed and dried with hot blast for more than 10 minutes. The temperature of such breeze should be less than the upper category temperature.
  (d) After cleaning, do not keep capacitors in cleaning solution atmosphere or airtight containers.
- During cleaning, control the cleaning solution against contamination.

### 6. Fixing adhesives and coating materials.

- Do not use fixing adhesive or coating material containing halogen-based solvent.
- Before applying the fixing adhesive or the coating material, make sure that there is no remaining flux or stains between the PCB and the sealed part of the capacitor.
- Before applying the fixing adhesive or the coating material, make sure that the detergent etc. has dried up.
- Do not cover the whole surface of the sealed part (terminal side) of the capacitor with the fixing adhesive or the coating material.
- Observe the description in this catalog or the technical specifications concerning the thermal stiffening conditions of the fixing adhesive or the coating material. (If there is no such description, contact us.) When both discrete and SMT components are on the same PCB, the fixing material for the SMT components may cause crack, tear or shrinkage on the external sleeve depending on the thermal stiffening condition.
- Recommended fixing adhesives and coating materials
  Fixing adhesives : Cemedine 1500
  Diabond DN83K
  Bond G103
  Coating materials : HumiSeal 1B66NS, 1A27NS

## ■ Other Cautions

### 1. Do not touch capacitor terminals with bare hands.

- You may get electric shock or your hand may be burnt. Discharge it with a 1 KΩ resistance before use if necessary.

### 2. Do not short the capacitor terminals with a conductor.

- Do not spill conductive solution including acid or alkaline solution on the capacitor.

### 3. Periodic inspection should be performed on the capacitors for the Industrial equipment application.

- The following items should be checked:
  (1)Appearance : Check if there is any open valve or leakage.
  (2)Electronic performance: Check the leakage current, the electrostatic capacitance, the tangent of loss angle, the equivalent series resistance (ESR), Impedance and other items described in this catalog or the technical specifications.

### 4. Take the following measures in case of emergency.

- If you see gas coming out of the capacitor valve when the set is in operation, turn off the power switch of the unit or unplug the power cord from the outlet.
- In case of a short, producing gas, it may take a few seconds to a few minutes depending on the conditions. Therefore, ensure that the protective circuit of the power supply works during this time.
- Keep your face away from the capacitor pressure valve, since the high temperature gas at over 100°C bursts out when the valve works. If the gas gets into your eyes or your mouth, wash your eyes or your mouth. Do not ingest the capacitor electrolyte. If the electrolyte gets on your skin, wash it out with soap.

### 5. Storing conditions.

- Avoid high temperature, high humidity and direct rays when storing capacitors. Keep the storing temperature at 5˚C to 35˚C and the relative humidity not more than 75%. (Recommended storage term: 2year or less after delivery)
- There may have increased leakage current when unused or stored for a long time after mounted on equipment. This phenomenon often occurs at high ambient temperatures; however, leakage current will decrease through voltage treatment.
  If necessary, treatment by voltage application should be made on the capacitors which have been stored for a long period (more than 2 years after production).
  Recommended voltage treatment conditions are provided for each series (According to JIS C5101-4 4.1 described in Shelf life).
  If anything is unclear, please contact us.
  And also, in design of equipment, consider the effect of increase in initial current, and install protective circuits as needed.
- Do not store capacitors in an environment directly exposed to water, saltwater spray, oil spill or condensation. JEDEC-J-STD-020 regulations are not applicable.
- Do not store capacitors in an environment exposed to the air contains dense hazardous gas. (hydrogen sulfide, sulfurous acid, nitrous acid, chlorine, ozone, ammonia, etc.)
- Do not store capacitors at a place where it gets ultraviolet or radioactive rays.
- Fumigation treatment with toxic gas covering the whole wooden container frames as moth proofing during shipment may leave residual toxic gas.

### 6. Please take the following actions when disposing of capacitors.

- Entrust to specialists of industrial waste treatment for incineration.

### 7. Other notes.

- Please refer to the following literature for anything not described in this catalog and the technical specifications.

  Technical Report of Japan Electronics and Information Technology Industries Association
  EIAJ RCR-2367
  Guideline of notabilia for fixed aluminum electrolytic capacitors for use in electronic equipment

# Chip Type Aluminum Electrolytic Capacitors

## ■ Product Code System

V

The Elna product code is Max.20 digits.

Example) VVD series 10V 470μF φ 8x10L

New product code
RSVVD471M1LEH0002U

Old product code
RVD-10V471MG10U-R2

| 1 2 | 3 4 5 | 6 7 8 | 9 | 10 11 | 12 | 13 14 | 15 16 17 | 18 19 20 |
|---|---|---|---|---|---|---|---|---|
| R S | V V D | 4 7 1 | M | 1 L | E | H 0 | 0 0 2 | U |
| Product category code | Series code | Rated capacitance code | Capacitance tolerance code | Rated voltage code | Case size code | | Packing code | Additional code |

1 Product group
R : Energy devices (Electrolytic capacitor)

2 Category
S : For general
*A : For automotive (powertrain, safety)
*C : For automotive (entertainment, audio)
M : For medical (international classification Ⅲ)
L : For medical (international classification Ⅰ, Ⅱ)

* AEC-Q200 Qualified.

3-5 Series code

| old code | New code |
|---|---|
| RVR | VVR |
| RVC | VVC |
| RVZ | VVZ |
| RVD | VVD |
| RVV | VVV |
| RTV | VTV |
| RZD | VZD |
| RMD | VMD |
| RVT | VVT |
| RZJ | VZJ |
| RMJ | VMJ |
| RZF | VZF |
| RMF | VMF |
| RZE | VZE |
| RME | VME |
| RVX | VVX |
| RTX | VTX |
| RTZ | VTZ |
| RTD | VTD |
| RTT | VTT |

6-8 Rated capacitance code
The code denoting nominal capacitance shall consist of three numerals.
The first and second numerals shall represent the significant figures of nominal capacitance in the unit of microfarad (μF), And the third numeral shall represent the number of zeros following the significant figures.

Example

| Rated capacitance(μF) | Code |
|---|---|
| 0.1 | R10 |
| 1 | 010 |
| 2.2 | 2R2 |
| 33 | 330 |
| 100 | 101 |
| 2200 | 222 |
| 33000 | 333 |
| 470000 | 474 |

12 Diameter code

| D(mm) | Code |
|---|---|
| 6.3 | D |
| 8 | E |
| 10 | F |
| 12.5 | G |
| 16 | J |
| 18 | K |

13-14 Length code

| L(mm) | Code |
|---|---|
| 5.8 | C8 |
| 7.7 | E7 |
| 10 | H0 |
| 12.5 | K5 |
| 13.5 | L5 |
| 16.5 | P5 |
| 21.5 | U5 |

9 Capacitance tolerance code
Example

| tolerance (% ) | Code |
|---|---|
| ± 10 | K |
| ± 20 | M |
| 0 to +30 | A |
| -10 to +30 | Q |
| -10 to +50 | T |

10-11 Rated voltage code

| voltage (V) | Code |
|---|---|
| 4 | 1A |
| 6.3 | 1J |
| 10 | 1L |
| 16 | 1E |
| 25 | 1T |
| 35 | 1G |
| 50 | 1U |
| 63 | 4E |

15-17 Packing code (Reel taping)

| Old code | New code | Case size φ D (mm) | Reel material |
|---|---|---|---|
| R2 | 002 | φ 10 or less | Polystyrene |
| R5 | 005 | φ 12.5 or more | Polystyrene |

Please contact us for special packaging.

18-20 Additional code
Example

| Code | Contents |
|---|---|
| U | Sn-Bi plated |
| T | Sn 100% plated |

Please contact us for details.

# ELNA — Vertical Chip Type Aluminum Electrolytic Capacitors VVR series

Code in front of series have been extracted from product code, which describes the segment of products, such as type and features.

- Compatible with surface mounting.
- Environmental : GREEN CAP™ , RoHS compliance.
- Supplied with carrier taping.
- Guaranteed 2000 hours 105℃.

High CV

VVR ⇦ VVL

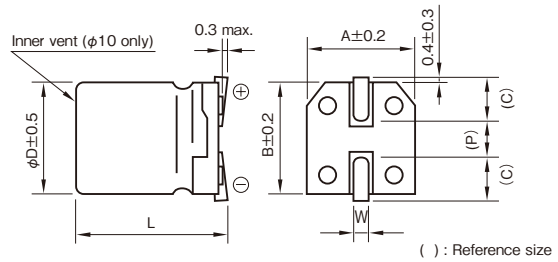
Marking color : Black print

## Specifications

| Item | Performance |
|---|---|
| Category temperature range (℃) | −40 to +105 |
| Tolerance at rated capacitance (%) | ±20 (20℃,120Hz) |
| Leakage current (μA) (max.) | 0.01CV or 3 whichever is larger (after 2 minutes) C : Rated capacitance (μF), V : Rated voltage (V) (20℃) |
| Tangent of loss angle (tanδ) | Rated voltage (V): 4 / 6.3 / 10 / 16 / 25 / 35 / 50<br>tanδ (max.): 0.50 / 0.30 / 0.22 / 0.16 / 0.14 / 0.12 / 0.12 (20℃,120Hz) |
| Characteristics at high and low temperature | Rated voltage (V): 4 / 6.3 / 10 / 16 / 25 / 35 / 50<br>Impedance ratio (max.) Z−25℃/Z+20℃: 7 / 4 / 3 / 2 / 2 / 2 / 2<br>Impedance ratio (max.) Z−40℃/Z+20℃: 15 / 8 / 6 / 4 / 4 / 3 / 3 (120Hz) |
| Endurance (105℃) (Applied ripple current) | Test time: 2000 hours<br>Leakage current: The initial specified value or less<br>Percentage of capacitance change: Within ±20% of initial value<br>Tangent of loss angle: 200% or less of the initial specified value |
| Shelf life (105℃) | Test time : 1000hours ; other items are same as the endurance. Voltage application treatment : According to JIS C5101-4 4.1 |
| Applicable standards | JIS C5101 - 1,- 18 (IEC 60384 - 1,- 18) |

## Outline Drawing

Unit : mm




| ϕD | L | A | B | C | W | P | Size code |
|---|---|---|---|---|---|---|---|
| 6.3 | 5.8±0.3 | 6.6 | 6.6 | 2.7 | 0.5 to 0.8 | 2.0 | DC8 |
| 6.3 | 7.7±0.3 | 6.6 | 6.6 | 2.7 | 0.5 to 0.8 | 2.0 | DE7 |
| 8 | 10±0.5 | 8.4 | 8.4 | 3.0 | 0.7 to 1.1 | 3.1 | EH0 |
| 10 | 10±0.5 | 10.4 | 10.4 | 3.3 | 0.7 to 1.1 | 4.7 | FH0 |

Refer to individual page.
(Soldering conditions, Land pattern size, The taping specifications)

## Coefficient of Frequency for Rated Ripple Current

| Frequency (Hz) / Rated voltage (V) | 50・60 | 120 | 1k | 10k・100k |
|---|---|---|---|---|
| 4 to 16 | 0.80 | 1 | 1.15 | 1.25 |
| 25 to 35 | 0.80 | 1 | 1.25 | 1.40 |
| 50 | 0.50 | 1 | 1.35 | 1.50 |

## Product code system : 16V100F (*For general product)

| RS* | VVR | 101 | M | 1E | DC8 | 002 | U |
|---|---|---|---|---|---|---|---|
| Category code | Series code | capacitance code | Cap tol. code | Voltage code | Size code | Taping and packing code | Additional code |

For details, refer to the various "Product Code System" pages.

Code in front of series have been extracted from product code, which describes the segment of products, such as type and features.

## Standard Ratings

| Rated voltage(V) / Item / Rated capacitance(μF) | 4 (1A) | | | 6.3 (1J) | | | 10 (1L) | | | 16 (1E) | | | 25 (1T) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Case φD×L (mm) | Size code | Rated ripple current (mArms) | Case φD×L (mm) | Size code | Rated ripple current (mArms) | Case φD×L (mm) | Size code | Rated ripple current (mArms) | Case φD×L (mm) | Size code | Rated ripple current (mArms) | Case φD×L (mm) | Size code | Rated ripple current (mArms) |
| 33 | – | – | – | – | – | – | – | – | – | 6.3×5.8 | DC8 | 66 | 6.3×5.8 | DC8 | 69 |
| 47 | – | – | – | – | – | – | 6.3×5.8 | DC8 | 74 | 6.3×5.8 | DC8 | 78 | 6.3×5.8 | DC8 | 82 |
| 100 | – | – | – | 6.3×5.8 | DC8 | 99 | 6.3×5.8 | DC8 | 95 | 6.3×5.8 | DC8 | 112 | 6.3×7.7 | DE7 | 132 |
| 150 | – | – | – | – | – | – | 6.3×5.8 | DC8 | 117 | – | – | – | – | – | – |
| 220 | 6.3×5.8 | DC8 | 121 | 6.3×5.8 | DC8 | 121 | 6.3×7.7 | DE7 | 156 | 6.3×7.7 | DE7 | 183 | 8×10 | EH0 | 320 |
| 330 | 6.3×7.7 | DE7 | 163 | 6.3×7.7 | DE7 | 163 | 8×10 | EH0 | 296 | 8×10 | EH0 | 291 | – | – | – |
| 470 | – | – | – | 8×10 | EH0 | 320 | 8×10 | EH0 | 326 | 8×10 | EH0 | 348 | – | – | – |
| 680 | – | – | – | – | – | – | 10×10 | FH0 | 440 | 10×10 | FH0 | 484 | – | – | – |
| 1000 | – | – | – | 10×10 | FH0 | 495 | – | – | – | – | – | – | – | – | – |

| Rated voltage(V) / Item / Rated capacitance(μF) | 35 (1G) | | | 50 (1U) | | |
|---|---|---|---|---|---|---|
| | Case φD×L (mm) | Size code | Rated ripple current (mArms) | Case φD×L (mm) | Size code | Rated ripple current (mArms) |
| 10 | – | – | – | 6.3×5.8 | DC8 | 47 |
| 22 | – | – | – | 6.3×5.8 | DC8 | 61 |
| 33 | 6.3×5.8 | DC8 | 74 | 6.3×7.7 | DE7 | 82 |
| 47 | 6.3×5.8 | DC8 | 89 | 6.3×7.7 | DE7 | 97 |
| 68 | 6.3×7.7 | DE7 | 117 | – | – | – |
| 100 | 6.3×7.7 | DE7 | 142 | – | – | – |
| | 8×10 | EH0 | 283 | | | |
| 150 | 8×10 | EH0 | 293 | – | – | – |
| 220 | 10×10 | FH0 | 450 | – | – | – |

(Note) Rated ripple current : 105° C, 120Hz

# ELNA Vertical Chip Type Aluminum Electrolytic Capacitors VVC series

Code in front of series have been extracted from product code, which describes the segment of products, such as type and features.

- Compatible with surface mounting, long life capacitors.
- Environmental : GREEN CAP™ , RoHS compliance.
- Supplied with carrier taping.
- Guaranteed 3000 hours at 105℃.
  (10L:5000 hours).

Long life

VVC ⇦ VVL

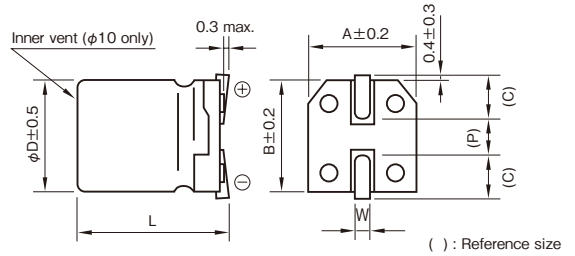
Marking color : Black print

## Specifications

| Item | Performance |
|---|---|
| Category temperature range (℃) | −40 to +105 |
| Tolerance at rated capacitance (%) | ±20 (20℃,120Hz) |
| Leakage current (μA) (max.) | 0.01CV or 3 whichever is larger (after 2 minutes) C : Rated capacitance (μF), V : Rated voltage (V) (20℃) |
| Tangent of loss angle (tanδ) | Rated voltage (V): 6.3 / 10 / 16 / 25 / 35 / 50<br>tanδ (max.): 0.28 / 0.24 / 0.20 / 0.16 / 0.13 / 0.12<br>(20℃,120Hz) |
| Characteristics at high and low temperature | Rated voltage (V): 6.3 / 10 / 16 / 25 / 35 / 50<br>Impedance ratio (max.) Z−25℃/Z+20℃: 4 / 3 / 2 / 2 / 2 / 2<br>Impedance ratio (max.) Z−40℃/Z+20℃: 10 / 7 / 5 / 3 / 3 / 3<br>(120Hz) |
| Endurance (105℃) (Applied ripple current) | Test time: 3000 hours (10L : 5000 hours)<br>Leakage current: The initial specified value or less<br>Percentage of capacitance change: Within ±30% of initial value<br>Tangent of the loss angle: 300% or less of initial specified value |
| Shelf life (105℃) | Test time : 1000hours ; other items are same as the endurance. Voltage application treatment : According to JIS C5101-4 4.1 |
| Applicable standards | JIS C5101 - 1,- 18 (IEC 60384 - 1,- 18) |

## Outline Drawing

Unit : mm




( ) : Reference size

| φD | L | A | B | C | W | P | Size code |
|---|---|---|---|---|---|---|---|
| 6.3 | 5.8±0.3 | 6.6 | 6.6 | 2.7 | 0.5 to 0.8 | 2.0 | DC8 |
| 6.3 | 7.7±0.3 | 6.6 | 6.6 | 2.7 | 0.5 to 0.8 | 2.0 | DE7 |
| 8 | 10.0±0.5 | 8.4 | 8.4 | 3.0 | 0.7 to 1.1 | 3.1 | EH0 |
| 10 | 10.0±0.5 | 10.4 | 10.4 | 3.3 | 0.7 to 1.1 | 4.7 | FH0 |

Refer to individual page.
(Soldering conditions, Land pattern size, The taping specifications)

## Coefficient of Frequency for Rated Ripple Current

| Rated voltage (V) \ Frequency (Hz) | 50・60 | 120 | 1k | 10k・100k |
|---|---|---|---|---|
| 6.3 to 16 | 0.80 | 1 | 1.15 | 1.25 |
| 25 to 35 | 0.80 | 1 | 1.25 | 1.40 |
| 50 | 0.70 | 1 | 1.35 | 1.50 |

## Product code system : 16V47μF (*For general product)

| RS* | VVC | 470 | M | 1E | DC8 | 002 | U |
|---|---|---|---|---|---|---|---|
| Category code | Series code | capacitance code | Cap tol. code | Voltage code | Size code | Taping and packing code | Additional code |

For details, refer to the various "Product Code System" pages.

Code in front of series have been extracted from product code, which describes the segment of products, such as type and features.

## Standard Ratings

| Rated voltage(V) / Item / Rated capacitance(μF) | 6.3 (1J) | | | 10 (1L) | | | 16 (1E) | | | 25 (1T) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Case φD×L (mm) | Size code | Rated ripple current (mArms) | Case φD×L (mm) | Size code | Rated ripple current (mArms) | Case φD×L (mm) | Size code | Rated ripple current (mArms) | Case φD×L (mm) | Size code | Rated ripple current (mArms) |
| 33 | – | – | – | – | – | – | – | – | – | 6.3×5.8 | DC8 | 60 |
| 47 | – | – | – | – | – | – | 6.3×5.8 | DC8 | 70 | 6.3×7.7 | DE7 | 65 |
| 100 | 6.3×5.8 | DC8 | 71 | – | – | – | 6.3×7.7 | DE7 | 81 | 8×10 | EH0 | 130 |
| 220 | 6.3×7.7 | DE7 | 101 | 8×10 | EH0 | 160 | – | – | – | – | – | – |
| 330 | 8×10 | EH0 | 230 | – | – | – | – | – | – | 10×10 | FH0 | 238 |
| 470 | – | – | – | – | – | – | 10×10 | FH0 | 340 | – | – | – |
| 1000 | 10×10 | FH0 | 313 | – | – | – | – | – | – | – | – | – |

| Rated voltage(V) / Item / Rated capacitance(μF) | 35 (1G) | | | 50 (1U) | | |
|---|---|---|---|---|---|---|
| | Case φD×L (mm) | Size code | Rated ripple current (mArms) | Case φD×L (mm) | Size code | Rated ripple current (mArms) |
| 10 | – | – | – | 6.3×5.8 | DC8 | 35 |
| 22 | 6.3×5.8 | DC8 | 55 | 6.3×7.7 | DE7 | 58 |
| 33 | 6.3×7.7 | DE7 | 57 | 8×10 | EH0 | 91 |
| 47 | – | – | – | 8×10 | EH0 | 100 |
| 100 | – | – | – | 10×10 | FH0 | 160 |
| 220 | 10×10 | FH0 | 220 | – | – | – |

(Note) Rated ripple current : 105° C, 120Hz

# ELNA — Vertical Chip Type Aluminum Electrolytic Capacitors VVZ series

Code in front of series have been extracted from product code, which describes the segment of products, such as type and features.

- Compatible with surface mounting, low ESR capacitors.
- Environmental : GREEN CAP™ , RoHS compliance.
- Supplied with carrier taping.
- Guaranteed 5000 hours at 105℃.
  (φ6.3 : 1000hours)
  (φ8, φ10 : 2000hours)

Miniaturized
Low ESR

VVZ ⇦ VVJ

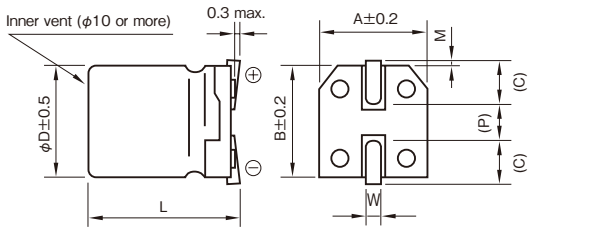

Marking color : Black print

## Specifications

| Item | Performance |
|---|---|
| Category temperature range (℃) | −55 to +105 |
| Tolerance at rated capacitance (%) | ±20 (20℃,120Hz) |
| Leakage current (μA) (max.) | 0.01CV or 3 whichever is larger (after 2 minutes) C : Rated capacitance (μF) ; V : Rated voltage (V) (20℃) |
| Tangent of loss angle (tanδ) | Rated voltage (V): 6.3 / 10 / 16 / 25 / 35<br>tanδ (max.): 0.28 / 0.24 / 0.20 / 0.16 / 0.14<br>0.02 is added to every 1000μF increase over 1000μF. (20℃,120Hz) |
| Characteristics at high and low temperature | Rated voltage (V): 6.3 / 10 / 16 / 25 / 35<br>Impedance ratio (max.) Z−25℃/Z+20℃: 4 / 3 / 2 / 2 / 2<br>Impedance ratio (max.) Z−55℃/Z+20℃: 8 / 5 / 4 / 3 / 3<br>(120Hz) |
| Endurance (105℃) (Applied ripple current) | Test time: 1000 hours (φ6.3) / 2000 hours (φ8, φ10) / 5000 hours (φ12.5)<br>Leakage current: The initial specified value or less<br>Percentage of capacitance change: Within ±25% of initial value<br>Tangent of the loss angle: 200% or less of initial specified value |
| Shelf life (105℃) | Test time : 1000hours ; other items are same as the endurance. Voltage application treatment : According to JIS C5101-4 4.1 |
| Applicable standards | JIS C5101 - 1,- 18 (IEC 60384 - 1,- 18) |

## Outline Drawing

Unit : mm




( ) : Reference size

| φD | L | A | B | C | M | W | P | Size code |
|---|---|---|---|---|---|---|---|---|
| 6.3 | 5.8±0.3 | 6.6 | 6.6 | 2.7 | 0.4±0.3 | 0.5 to 0.8 | 2.0 | DC8 |
| 6.3 | 7.7±0.3 | 6.6 | 6.6 | 2.7 | 0.4±0.3 | 0.5 to 0.8 | 2.0 | DE7 |
| 8 | 10.0±0.5 | 8.4 | 8.4 | 3.0 | 0.4±0.3 | 0.7 to 1.1 | 3.1 | EH0 |
| 10 | 10.0±0.5 | 10.4 | 10.4 | 3.3 | 0.4±0.3 | 0.7 to 1.1 | 4.7 | FH0 |
| 12.5 | 13.5±0.5 | 13.0 | 13.0 | 4.9 | 0.7±0.3 | 1.0 to 1.4 | 4.6 | GL5 |

Refer to individual page.
(Soldering conditions, Land pattern size, The taping specifications)

## Coefficient of Frequency for Rated Ripple Current

| Rated voltage (V) \ Frequency (Hz) | 120 | 1k | 10k | 100k |
|---|---|---|---|---|
| 6.3 to 35 | 0.50 | 0.75 | 0.90 | 1 |

## Product code system (*For general product)

φ6.3 (example : 6.3V330μF)

| RS* | VVZ | 331 | M | 1J | DE7 | 002 | U |
|---|---|---|---|---|---|---|---|
| Category code | Series code | capacitance code | Cap tol. code | Voltage code | Size code | Taping and packing code | Additional code |

φ8 (example : 10V220μF)

| RS* | VVZ | 221 | M | 1L | EH0 | 002 | Y1U |
|---|---|---|---|---|---|---|---|
| Category code | Series code | capacitance code | Cap tol. code | Voltage code | Size code | Taping and packing code | Additional code |

φ10 (example : 16V330μF)

| RS* | VVZ | 331 | M | 1E | FH0 | 002 | EU |
|---|---|---|---|---|---|---|---|
| Category code | Series code | capacitance code | Cap tol. code | Voltage code | Size code | Taping and packing code | Additional code |

φ12.5 (example : 25V680μF)

| RS* | VVZ | 681 | M | 1T | GL5 | 005 | T |
|---|---|---|---|---|---|---|---|
| Category code | Series code | capacitance code | Cap tol. code | Voltage code | Size code | Taping and packing code | Additional code |

・If "For Vibration Resistance" type is required, please see the series VTZ.
・For details, refer to the various "Product Code System" pages.

Code in front of series have been extracted from product code, which describes the segment of products, such as type and features.

## Standard Ratings

| Rated voltage(V) / Item / Rated capacitance(μF) | 6.3 (1J) | | | | 10 (1L) | | | | 16 (1E) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Case φD×L (mm) | Size code | ESR (Ω max.) | Rated ripple current (mArms) | Case φD×L (mm) | Size code | ESR (Ω max.) | Rated ripple current (mArms) | Case φD×L (mm) | Size code | ESR (Ω max.) | Rated ripple current (mArms) |
| 33 | – | – | – | – | – | – | – | – | 6.3×5.8 | DC8 | 0.44 | 230 |
| 47 | – | – | – | – | – | – | – | – | 6.3×5.8 | DC8 | 0.44 | 230 |
| 68 | 6.3×5.8 | DC8 | 0.44 | 230 | 6.3×5.8 | DC8 | 0.44 | 230 | 6.3×5.8 | DC8 | 0.44 | 230 |
| 100 | 6.3×5.8 | DC8 | 0.44 | 230 | 6.3×5.8 | DC8 | 0.44 | 230 | 6.3×5.8 | DC8 | 0.44 | 230 |
| 150 | 6.3×5.8 | DC8 | 0.44 | 230 | 6.3×5.8 | DC8 | 0.44 | 230 | 6.3×7.7 | DE7 | 0.34 | 280 |
| 220 | 6.3×5.8 | DC8 | 0.44 | 230 | 6.3×7.7 | DE7 | 0.34 | 280 | 6.3×7.7 | DE7 | 0.34 | 280 |
| | 6.3×7.7 | DE7 | 0.34 | 280 | 8×10 | EH0 | 0.20 | 450 | 8×10 | EH0 | 0.20 | 450 |
| 330 | 6.3×7.7 | DE7 | 0.34 | 280 | 10×10 | FH0 | 0.10 | 670 | 10×10 | FH0 | 0.10 | 670 |
| | 8×10 | EH0 | 0.20 | 450 | | | | | | | | |
| 470 | 10×10 | FH0 | 0.10 | 670 | 10×10 | FH0 | 0.10 | 670 | 10×10 | FH0 | 0.10 | 670 |
| 1000 | 10×10 | FH0 | 0.10 | 670 | – | – | – | – | 12.5×13.5 | GL5 | 0.06 | 1100 |
| 1500 | – | – | – | – | 12.5×13.5 | GL5 | 0.06 | 1100 | 12.5×13.5 | GL5 | 0.06 | 1100 |
| 2200 | 12.5×13.5 | GL5 | 0.06 | 1100 | 12.5×13.5 | GL5 | 0.06 | 1100 | – | – | – | – |
| 2700 | 12.5×13.5 | GL5 | 0.06 | 1100 | – | – | – | – | – | – | – | – |

| Rated voltage(V) / Item / Rated capacitance(μF) | 25 (1T) | | | | 35 (1G) | | | |
|---|---|---|---|---|---|---|---|---|
| | Case φD×L (mm) | Size code | ESR (Ω max.) | Rated ripple current (mArms) | Case φD×L (mm) | Size code | ESR (Ω max.) | Rated ripple current (mArms) |
| 33 | 6.3×5.8 | DC8 | 0.44 | 230 | 6.3×5.8 | DC8 | 0.44 | 230 |
| 47 | 6.3×5.8 | DC8 | 0.44 | 230 | 6.3×5.8 | DC8 | 0.44 | 230 |
| | | | | | 6.3×7.7 | DE7 | 0.34 | 280 |
| 68 | 6.3×5.8 | DC8 | 0.44 | 230 | 6.3×7.7 | DE7 | 0.34 | 280 |
| 100 | 6.3×7.7 | DE7 | 0.34 | 280 | 8×10 | EH0 | 0.20 | 450 |
| 150 | 8×10 | EH0 | 0.20 | 450 | 10×10 | FH0 | 0.10 | 670 |
| 220 | 10×10 | FH0 | 0.10 | 670 | 10×10 | FH0 | 0.10 | 670 |
| 330 | 10×10 | FH0 | 0.10 | 670 | – | – | – | – |
| 470 | – | – | – | – | 12.5×13.5 | GL5 | 0.06 | 1100 |
| 680 | 12.5×13.5 | GL5 | 0.06 | 1100 | 12.5×13.5 | GL5 | 0.06 | 1100 |
| 1000 | 12.5×13.5 | GL5 | 0.06 | 1100 | – | – | – | – |

(Note) Rated ripple current : 105℃ , 100kHz ; ESR : 20℃ , 100kHz

# ELNA — Vertical Chip Type Aluminum Electrolytic Capacitors VVD series

Code in front of series have been extracted from product code, which describes the segment of products, such as type and features.

- Compatible with surface mounting, low ESR, long life capacitors.
- Environmental : GREEN CAP™ , RoHS compliance.
- Supplied with carrier taping.
- Guaranteed 2000 hours at 105℃.
  (6.3V to 50V 10.0L :5000 hours)
  (φ12.5 : 5000 hours)

Low ESR, Long life

VVD ⇦ VVZ

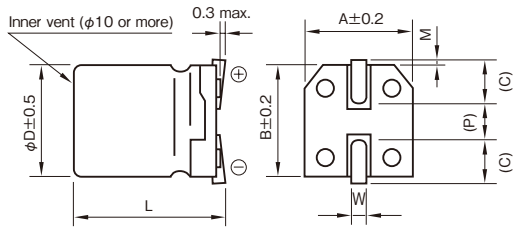
Marking color : Black print

## Specifications

| Item | Performance |
|---|---|
| Category temperature range (℃) | −55 to +105 |
| Tolerance at rated capacitance (%) | ±20 (20℃,120Hz) |
| Leakage current (μA) (max.) | 0.01CV or 3 whichever is larger (after 2 minutes) C : Rated capacitance (μF) , V : Rated voltage (V) (20℃) |
| Tangent of loss angle (tanδ) | Rated voltage (V): 6.3 / 10 / 16 / 25 / 35 / 50 / 63<br>tanδ (max.): 0.26 / 0.19 / 0.16 / 0.14 / 0.12 / 0.10 / 0.08<br>0.02 is added to every 1000μF increase over 1000μF. (20℃,120Hz) |
| Characteristics at high and low temperature | Rated voltage (V): 6.3 / 10 / 16 / 25 / 35 / 50 / 63<br>Impedance ratio (max.) Z−25℃/Z+20℃: 2 / 2 / 2 / 2 / 2 / 2 / 2<br>Impedance ratio (max.) Z−40℃/Z+20℃: 3 / 3 / 3 / 3 / 3 / 3 / 3<br>Impedance ratio (max.) Z−55℃/Z+20℃: 8 / 4 / 4 / 3 / 3 / 3 / 3<br>(120Hz) |
| Endurance (105℃) (Applied ripple current) | Test time: 2000 hours (φ12.5, 6.3V to 50V 10.0L : 5000 hours)<br>Leakage current: The initial specified value or less<br>Percentage of capacitance change: Within ±30% of initial value<br>Tangent of the loss angle: 200% or less of the initial specified value (φ12.5, 6.3V to 50V 10.0L : 300% or less) |
| Shelf life (105℃) | Test time : 1000hours ; other items are same as the endurance. Voltage application treatment : According to JIS C5101-4 4.1 |
| Applicable standards | JIS C5101 - 1,- 18 (IEC 60384 - 1,- 18) |

## Outline Drawing

Unit : mm




( ): Reference size

| φD | L | A | B | C | M | W | P | Size code |
|---|---|---|---|---|---|---|---|---|
| 6.3 | 5.8±0.3 | 6.6 | 6.6 | 2.7 | 0.4±0.3 | 0.5 to 0.8 | 2.0 | DC8 |
| 6.3 | 7.7±0.3 | 6.6 | 6.6 | 2.7 | 0.4±0.3 | 0.5 to 0.8 | 2.0 | DE7 |
| 8 | 10±0.5 | 8.4 | 8.4 | 3.0 | 0.4±0.3 | 0.7 to 1.1 | 3.1 | EH0 |
| 10 | 10±0.5 | 10.4 | 10.4 | 3.3 | 0.4±0.3 | 0.7 to 1.1 | 4.7 | FH0 |
| 12.5 | 13.5±0.5 | 13.0 | 13.0 | 4.9 | 0.7±0.3 | 1.0 to 1.4 | 4.6 | GL5 |

Refer to individual page.
(Soldering conditions, Land pattern size, The taping specifications)

## Coefficient of Frequency for Rated Ripple Current

| Rated voltage (V) \ Frequency (Hz) | 50・60 | 120 | 1k | 10k・100k |
|---|---|---|---|---|
| 6.3 to 63 | 0.50 | 0.50 | 0.75 | 1 |

## Product code system (*For general product)

φ10 or less (example : 16V100μF)

| RS* | VVD | 101 | M | 1E | DC8 | 002 | U |
|---|---|---|---|---|---|---|---|
| Category code | Series code | capacitance code | Cap tol. code | Voltage code | Size code | Taping and packing code | Additional code |

φ12.5 (example : 16V1000μF)

| RS* | VVD | 102 | M | 1E | GL5 | 005 | T |
|---|---|---|---|---|---|---|---|
| Category code | Series code | capacitance code | Cap tol. code | Voltage code | Size code | Taping and packing code | Additional code |

・If "For Vibration Resistance" type is required, please see the series VTD.
・For details, refer to the various "Product Code System" pages.

Code in front of series have been extracted from product code, which describes the segment of products, such as type and features.

## Standard Ratings

| Rated voltage (V) / Item / Rated capacitance (μF) | 6.3 (1J) | | | | 10 (1L) | | | | 16 (1E) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Case φD × L (mm) | Size code | ESR (Ω max.) | Rated ripple current (mArms) | Case φD × L (mm) | Size code | ESR (Ω max.) | Rated ripple current (mArms) | Case φD × L (mm) | Size code | ESR (Ω max.) | Rated ripple current (mArms) |
| 47 | — | — | — | — | — | — | — | — | 6.3 × 5.8 | DC8 | 0.36 | 250 |
| 100 | 6.3 × 5.8 | DC8 | 0.36 | 250 | — | — | — | — | 6.3 × 5.8 | DC8 | 0.36 | 250 |
| 220 | 6.3 × 5.8 | DC8 | 0.36 | 250 | 6.3 × 7.7 | DE7 | 0.30 | 300 | 6.3 × 7.7 | DE7 | 0.30 | 300 |
| 330 | 6.3 × 7.7 | DE7 | 0.30 | 300 | 8 × 10 | EH0 | 0.16 | 600 | 8 × 10 | EH0 | 0.16 | 600 |
| 470 | 8 × 10 | EH0 | 0.16 | 600 | 8 × 10 | EH0 | 0.16 | 600 | 8 × 10 | EH0 | 0.16 | 600 |
| 680 | — | — | — | — | 8 × 10 | EH0 | 0.16 | 600 | 10 × 10 | FH0 | 0.090 | 850 |
| 1000 | 8 × 10 | EH0 | 0.16 | 600 | 10 × 10 | FH0 | 0.090 | 850 | 12.5 × 13.5 | GL5 | 0.054 | 1160 |
| 1500 | 10 × 10 | FH0 | 0.090 | 850 | 12.5 × 13.5 | GL5 | 0.054 | 1160 | 12.5 × 13.5 | GL5 | 0.054 | 1160 |
| 2200 | 12.5 × 13.5 | GL5 | 0.054 | 1160 | 12.5 × 13.5 | GL5 | 0.054 | 1160 | — | — | — | — |

| Rated voltage (V) / Item / Rated capacitance (μF) | 25 (1T) | | | | 35 (1G) | | | | 50 (1U) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Case φD × L (mm) | Size code | ESR (Ω max.) | Rated ripple current (mArms) | Case φD × L (mm) | Size code | ESR (Ω max.) | Rated ripple current (mArms) | Case φD × L (mm) | Size code | ESR (Ω max.) | Rated ripple current (mArms) |
| 10 | — | — | — | — | — | — | — | — | 6.3 × 5.8 | DC8 | 0.86 | 170 |
| 22 | — | — | — | — | — | — | — | — | 6.3 × 5.8 | DC8 | 0.86 | 170 |
| 33 | 6.3 × 5.8 | DC8 | 0.36 | 250 | 6.3 × 5.8 | DC8 | 0.36 | 250 | 6.3 × 7.7 | DE7 | 0.66 | 195 |
| 47 | 6.3 × 5.8 | DC8 | 0.36 | 250 | 6.3 × 5.8 | DC8 | 0.36 | 250 | 6.3 × 7.7 | DE7 | 0.66 | 195 |
| 100 | 6.3 × 7.7 | DE7 | 0.30 | 300 | 6.3 × 7.7 | DE7 | 0.30 | 300 | 8 × 10 | EH0 | 0.34 | 350 |
| | | | | | 8 × 10 | EH0 | 0.16 | 600 | | | | |
| 220 | 8 × 10 | EH0 | 0.16 | 600 | 8 × 10 | EH0 | 0.16 | 600 | 10 × 10 | FH0 | 0.20 | 700 |
| 330 | 8 × 10 | EH0 | 0.16 | 600 | 10 × 10 | FH0 | 0.090 | 850 | 12.5 × 13.5 | GL5 | 0.12 | 900 |
| 470 | 10 × 10 | FH0 | 0.090 | 850 | 12.5 × 13.5 | GL5 | 0.054 | 1160 | — | — | — | — |
| 680 | 12.5 × 13.5 | GL5 | 0.054 | 1160 | 12.5 × 13.5 | GL5 | 0.054 | 1160 | — | — | — | — |
| 1000 | 12.5 × 13.5 | GL5 | 0.054 | 1160 | — | — | — | — | — | — | — | — |

| Rated voltage (V) / Item / Rated capacitance (μF) | 63 (4E) | | | |
|---|---|---|---|---|
| | Case φD × L (mm) | Size code | ESR (Ω max.) | Rated ripple current (mArms) |
| 10 | 6.3 × 5.8 | DC8 | 1.5 | 80 |
| 22 | 6.3 × 7.7 | DE7 | 1.2 | 120 |
| 33 | 8 × 10 | EH0 | 0.65 | 250 |
| 47 | 8 × 10 | EH0 | 0.65 | 250 |
| 68 | 8 × 10 | EH0 | 0.65 | 250 |
| 100 | 10 × 10 | FH0 | 0.35 | 400 |
| | 12.5 × 13.5 | GL5 | 0.16 | 600 |
| 220 | 12.5 × 13.5 | GL5 | 0.16 | 600 |

(Note) Rated ripple current : 105℃ , 100kHz
ESR : 20℃ , 100kHz

# ELNA Vertical Chip Type Aluminum Electrolytic Capacitors VVV, VTV series

Code in front of series have been extracted from product code, which describes the segment of products, such as type and features.

- Compatible with surface mounting, low ESR capacitors.
- Environmental : GREEN CAP™ , RoHS compliance.
- Supplied with carrier taping.
- Guaranteed 2000 hours at 105℃.

Vibration resistance ⇦ Low ESR

VTV ⇦ VVV ⇦ VVD

Marking color : Black print

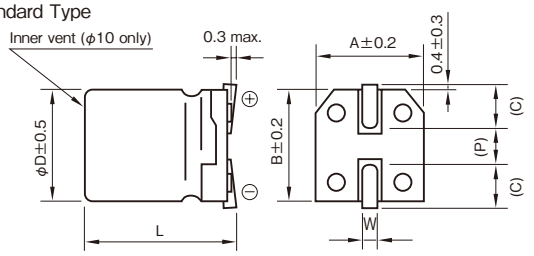
## Specifications

| Item | Performance |
|---|---|
| Category temperature range (℃) | −55 to +105 |
| Tolerance at rated capacitance (%) | ±20 (20℃,120Hz) |
| Leakage current (μA) (max.) | 0.01CV or 3 whichever is larger (after 2 minutes) C : Rated capacitance (μF) , V : Rated voltage (V) (20℃) |
| Tangent of loss angle (tanδ) | Rated voltage (V): 6.3 / 10 / 16 / 25 / 35 / 50<br>tanδ (max.): 0.26 / 0.19 / 0.16 / 0.14 / 0.12 / 0.10 (20℃,120Hz) |
| Characteristics at high and low temperature | Rated voltage (V): 6.3 / 10 / 16 / 25 / 35 / 50<br>Impedance ratio (max.) Z−25℃/Z+20℃: 2 / 2 / 2 / 2 / 2 / 2<br>Z−40℃/Z+20℃: 3 / 3 / 3 / 3 / 3 / 3<br>Z−55℃/Z+20℃: 4 / 4 / 4 / 3 / 3 / 3 (120Hz) |
| Endurance (105℃) (Applied ripple current) | Test time: 2000 hours<br>Leakage current: The initial specified value or less<br>Percentage of capacitance change: Within ±30% of initial value<br>Tangent of the loss angle: 200% or less of initial specified value |
| Shelf life (105℃) | Test time : 1000hours ; other items are same as the endurance. Voltage application treatment : According to JIS C5101-4 4.1 |
| Applicable standards | JIS C5101 - 1,- 18 (IEC 60384 - 1,- 18) |

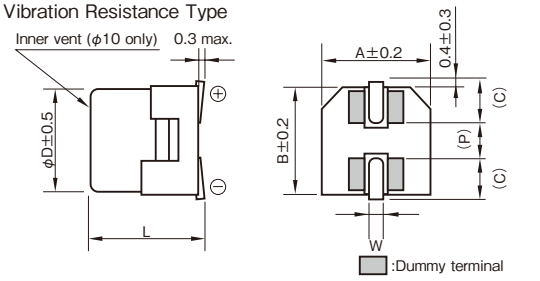
## Outline Drawing

Unit : mm

Standard Type




For Vibration Resistance Type




( ): Reference size

| ϕD | L | A | B | C | W | P | Size code |
|---|---|---|---|---|---|---|---|
| 6.3 | 5.8±0.3 | 6.6 | 6.6 | 2.7 | 0.5 to 0.8 | 2.0 | DC8◆ |
| 6.3 | 7.7±0.3 | 6.6 | 6.6 | 2.7 | 0.5 to 0.8 | 2.0 | DE7 |
| 8 | 10±0.5 | 8.4 | 8.4 | 3.0 | 0.7 to 1.1 | 3.1 | EH0 |
| 10 | 10±0.5 | 10.4 | 10.4 | 3.3 | 0.7 to 1.1 | 4.7 | FH0 |

◆ mark size is standard type only.

Refer to individual page.
(Soldering conditions, Land pattern size, The taping specifications)

## Coefficient of Frequency for Rated Ripple Current

| Rated voltage (V) \ Frequency (Hz) | 50・60 | 120 | 1k | 10k・100k |
|---|---|---|---|---|
| 6.3 to 50 | 0.50 | 0.50 | 0.75 | 1 |

## Product code system (*For general product)

Standard Type (example : 16V100μF)

| RS* | VVV | 101 | M | 1E | DC8 | 002 | U |
|---|---|---|---|---|---|---|---|
| Category code | Series code | capacitance code | Cap tol. code | Voltage code | Size code | Taping and packing code | Additional code |

For Vibration Resistance Type (example : 25V470μF)

| RS* | VTV | 471 | M | 1T | FH0 | 002 | U |
|---|---|---|---|---|---|---|---|
| Category code | Series code | capacitance code | Cap tol. code | Voltage code | Size code | Taping and packing code | Additional code |

For details, refer to the various "Product Code System" pages.

NOTE : Design, Specifications are subject to change without notice.
It is recommended that you shall obtain technical specifications from ELNA to ensure that the component is suitable for your use.

Code in front of series have been extracted from product code, which describes the segment of products, such as type and features.

## Standard Ratings

| Rated voltage (V) / Item / Rated capacitance (μF) | 6.3 (1J) | | | | 10 (1L) | | | | 16 (1E) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Case φD × L (mm) | Size code | ESR (Ω max.) | Rated ripple current (mArms) | Case φD × L (mm) | Size code | ESR (Ω max.) | Rated ripple current (mArms) | Case φD × L (mm) | Size code | ESR (Ω max.) | Rated ripple current (mArms) |
| 47 | — | — | — | — | — | — | — | — | 6.3 × 5.8 | DC8 | 0.26 | 300 |
| 100 | 6.3 × 5.8 | DC8 | 0.26 | 300 | — | — | — | — | 6.3 × 5.8 | DC8 | 0.26 | 300 |
| | | | | | | | | | 6.3 × 7.7 | DE7 | 0.16 | 600 |
| 220 | 6.3 × 5.8 | DC8 | 0.26 | 300 | 6.3 × 7.7 | DE7 | 0.16 | 600 | 6.3 × 7.7 | DE7 | 0.16 | 600 |
| 330 | 6.3 × 7.7 | DE7 | 0.16 | 600 | 8 × 10 | EH0 | 0.09 | 850 | 8 × 10 | EH0 | 0.09 | 850 |
| 470 | 8 × 10 | EH0 | 0.09 | 850 | 8 × 10 | EH0 | 0.09 | 850 | 8 × 10 | EH0 | 0.09 | 850 |
| 680 | — | — | — | — | 8 × 10 | EH0 | 0.09 | 850 | 10 × 10 | FH0 | 0.07 | 1190 |
| 1000 | 8 × 10 | EH0 | 0.09 | 850 | 10 × 10 | FH0 | 0.07 | 1190 | — | — | — | — |
| 1500 | 10 × 10 | FH0 | 0.07 | 1190 | — | — | — | — | — | — | — | — |

| Rated voltage (V) / Item / Rated capacitance (μF) | 25 (1T) | | | | 35 (1G) | | | | 50 (1U) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Case φD × L (mm) | Size code | ESR (Ω max.) | Rated ripple current (mArms) | Case φD × L (mm) | Size code | ESR (Ω max.) | Rated ripple current (mArms) | Case φD × L (mm) | Size code | ESR (Ω max.) | Rated ripple current (mArms) |
| 33 | 6.3 × 5.8 | DC8 | 0.26 | 300 | 6.3 × 5.8 | DC8 | 0.26 | 300 | — | — | — | — |
| 47 | 6.3 × 5.8 | DC8 | 0.26 | 300 | 6.3 × 5.8 | DC8 | 0.26 | 300 | — | — | — | — |
| 100 | 6.3 × 7.7 | DE7 | 0.16 | 600 | 6.3 × 7.7 | DE7 | 0.16 | 600 | 8 × 10 | EH0 | 0.18 | 670 |
| | | | | | 8 × 10 | EH0 | 0.09 | 850 | | | | |
| 220 | 8 × 10 | EH0 | 0.09 | 850 | 8 × 10 | EH0 | 0.09 | 850 | 10 × 10 | FH0 | 0.12 | 900 |
| 330 | 8 × 10 | EH0 | 0.09 | 850 | 10 × 10 | FH0 | 0.07 | 1190 | — | — | — | — |
| 470 | 10 × 10 | FH0 | 0.07 | 1190 | — | — | — | — | — | — | — | — |

(Note) Rated ripple current : 105℃ , 100kHz
ESR : 20℃ , 100kHz

# ELNA — Vertical Chip Type Aluminum Electrolytic Capacitors VZD, VMD series

Code in front of series have been extracted from product code, which describes the segment of products, such as type and features.

- Compatible with surface mounting, low ESR, high CV capacitors.
- Environmental : GREEN CAP™ , RoHS compliance.
- Supplied with carrier taping.
- Guaranteed 2000 hours at 105°C.

Vibration resistance ⇦ High CV

VMD ⇦ VZD ⇦ VVV

Marking color : Black print

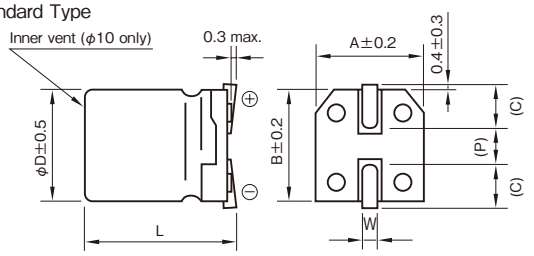
## Specifications

| Item | Performance |
|---|---|
| Category temperature range (℃) | −55 to +105 |
| Tolerance at rated capacitance (%) | ±20 (20℃,120Hz) |
| Leakage current (μA) (max.) | 0.01CV or 3 whichever is larger (after 2 minutes) C : Rated capacitance (μF) , V : Rated voltage (V) (20℃) |
| Tangent of loss angle (tanδ) | Rated voltage (V): 6.3 / 10 / 16 / 25 / 35 / 50 — tanδ (max.): 0.26 / 0.19 / 0.16 / 0.14 / 0.12 / 0.10. 0.02 is added to every 1000μF increase over 1000μF. (20℃,120Hz) |
| Characteristics at high and low temperature | Rated voltage (V): 6.3 / 10 / 16 / 25 / 35 / 50. Impedance ratio (max.) Z−25℃/Z+20℃: 2 / 2 / 2 / 2 / 2 / 2; Z−40℃/Z+20℃: 3 / 3 / 3 / 3 / 3 / 3; Z−55℃/Z+20℃: 4 / 4 / 4 / 3 / 3 / 3. (120Hz) |
| Endurance (105℃) (Applied ripple current) | Test time: 2000 hours; Leakage current: The initial specified value or less; Percentage of capacitance change: Within ±30% of initial value; Tangent of the loss angle: 200% or less of the initial specified value |
| Shelf life (105℃) | Test time : 1000hours ; other items are same as the endurance. Voltage application treatment : According to JIS C5101-4 4.1 |
| Applicable standards | JIS C5101 - 1,- 18 (IEC 60384 - 1,- 18) |

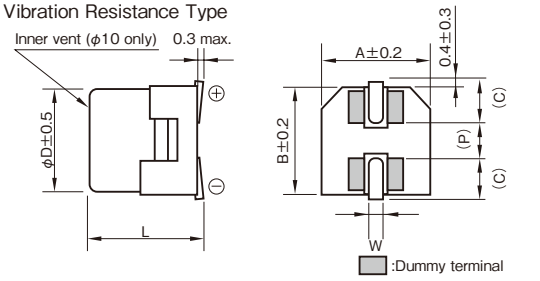
## Outline Drawing

Unit : mm

Standard Type




For Vibration Resistance Type




( ): Reference size

| ϕD | L | A | B | C | W | P | Size code |
|---|---|---|---|---|---|---|---|
| 6.3 | 5.8±0.3 | 6.6 | 6.6 | 2.7 | 0.5 to 0.8 | 2.0 | DC8◆ |
| 6.3 | 7.7±0.3 | 6.6 | 6.6 | 2.7 | 0.5 to 0.8 | 2.0 | DE7 |
| 8 | 10±0.5 | 8.4 | 8.4 | 3.0 | 0.7 to 1.1 | 3.1 | EH0 |
| 10 | 10±0.5 | 10.4 | 10.4 | 3.3 | 0.7 to 1.1 | 4.7 | FH0 |

◆ mark size is standard type only.

Refer to individual page.
(Soldering conditions, Land pattern size, The taping specifications)

## Coefficient of Frequency for Rated Ripple Current

| Rated voltage (V) \ Frequency (Hz) | 50・60 | 120 | 1k | 10k・100k |
|---|---|---|---|---|
| 6.3 to 50 | 0.50 | 0.50 | 0.75 | 1 |

## Product code system (*For general product)

Standard Type (example : 35V150μF)

| RS* | VZD | 151 | M | 1G | DE7 | 002 | U |
|---|---|---|---|---|---|---|---|
| Category code | Series code | capacitance code | Cap tol. code | Voltage code | Size code | Taping and packing code | Additional code |

For Vibration Resistance Type (example : 25V820μF)

| RS* | VMD | 821 | M | 1T | FH0 | 002 | U |
|---|---|---|---|---|---|---|---|
| Category code | Series code | capacitance code | Cap tol. code | Voltage code | Size code | Taping and packing code | Additional code |

For details, refer to the various "Product Code System" pages.

# Vertical Chip Type Aluminum Electrolytic Capacitors VZD, VMD series

Code in front of series have been extracted from product code, which describes the segment of products, such as type and features.

## Standard Ratings

| Rated voltage (V) / Item / Rated capacitance (μF) | 6.3 (1J) | | | | 10 (1L) | | | | 16 (1E) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Case φD × L (mm) | Size code | ESR (Ω max.) | Rated ripple current (mArms) | Case φD × L (mm) | Size code | ESR (Ω max.) | Rated ripple current (mArms) | Case φD × L (mm) | Size code | ESR (Ω max.) | Rated ripple current (mArms) |
| 150 | — | — | — | — | — | — | — | — | 6.3 × 5.8 | DC8 | 0.26 | 300 |
| 220 | — | — | — | — | 6.3 × 5.8 | DC8 | 0.26 | 300 | 6.3 × 5.8 | DC8 | 0.26 | 300 |
| 330 | 6.3 × 5.8 | DC8 | 0.26 | 300 | 6.3 × 7.7 | DE7 | 0.16 | 600 | 6.3 × 7.7 | DE7 | 0.16 | 600 |
| 470 | 6.3 × 7.7 | DE7 | 0.16 | 600 | 6.3 × 7.7 | DE7 | 0.16 | 600 | — | — | — | — |
| 680 | 6.3 × 7.7 | DE7 | 0.16 | 600 | — | — | — | — | 8 × 10 | EH0 | 0.08 | 850 |
| 1000 | — | — | — | — | 8 × 10 | EH0 | 0.08 | 850 | 10 × 10 | FH0 | 0.06 | 1190 |
| 1500 | 8 × 10 | EH0 | 0.08 | 850 | 10 × 10 | FH0 | 0.06 | 1190 | — | — | — | — |
| 2200 | 10 × 10 | FH0 | 0.06 | 1190 | — | — | — | — | — | — | — | — |

| Rated voltage (V) / Item / Rated capacitance (μF) | 25 (1T) | | | | 35 (1G) | | | | 50 (1U) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Case φD × L (mm) | Size code | ESR (Ω max.) | Rated ripple current (mArms) | Case φD × L (mm) | Size code | ESR (Ω max.) | Rated ripple current (mArms) | Case φD × L (mm) | Size code | ESR (Ω max.) | Rated ripple current (mArms) |
| 47 | — | — | — | — | — | — | — | — | 6.3 × 5.8 | DC8 | 0.68 | 195 |
| 100 | — | — | — | — | 6.3 × 5.8 | DC8 | 0.26 | 300 | 6.3 × 7.7 | DE7 | 0.34 | 350 |
| 150 | 6.3 × 5.8 | DC8 | 0.26 | 300 | 6.3 × 7.7 | DE7 | 0.16 | 600 | — | — | — | — |
| 220 | 6.3 × 7.7 | DE7 | 0.16 | 600 | — | — | — | — | 8 × 10 | EH0 | 0.18 | 670 |
| 330 | — | — | — | — | 8 × 10 | EH0 | 0.08 | 850 | 10 × 10 | FH0 | 0.12 | 900 |
| 470 | 8 × 10 | EH0 | 0.08 | 850 | — | — | — | — | — | — | — | — |
| 560 | — | — | — | — | 10 × 10 | FH0 | 0.06 | 1190 | — | — | — | — |
| 820 | 10 × 10 | FH0 | 0.06 | 1190 | — | — | — | — | — | — | — | — |

(Note) Rated ripple current : 105℃ , 100kHz
ESR : 20℃ , 100kHz

# ELNA — Vertical Chip Type Aluminum Electrolytic Capacitors VVT series

Code in front of series have been extracted from product code, which describes the segment of products, such as type and features.

- Compatible with surface mounting, low ESR capacitors.
- Environmental : GREEN CAP™ , RoHS compliance.
- Supplied with carrier taping.
- Guaranteed 1000 to 5000 hours at 125°C. (See table below)

Low ESR, Long Life

VVT ⇦ VVK

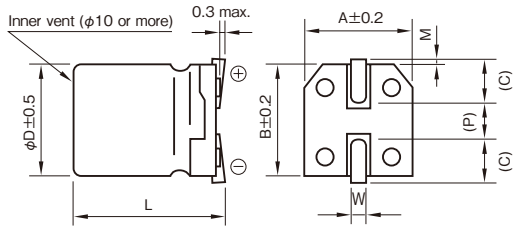
Marking color : Black print

## Specifications

| Item | Performance |
|---|---|
| Category temperature range (℃) | −40 to +125 |
| Tolerance at rated capacitance (%) | ±20 (20℃,120Hz) |
| Leakage current (μA) (max.) | 0.01CV or 3 whichever is larger (after 2 minutes) C : Rated capacitance (μF) ; V : Rated voltage (V) (20℃) |
| Tangent of loss angle (tanδ) | Rated voltage (V): 10 / 16 / 25 / 35 / 50 / 63 — tanδ (max.): 0.24 / 0.20 / 0.16 / 0.14 / 0.14 / 0.12 (20℃,120Hz) |
| Characteristics at high and low temperature | Rated voltage (V): 10 / 16 / 25 / 35 / 50 / 63 — Impedance Ratio (max.) Z−25℃/Z+20℃: 3 / 2 / 2 / 2 / 2 / 2 — Z−40℃/Z+20℃: 4 / 3 / 3 / 3 / 3 / 3 (120Hz) |
| Endurance (125℃) (Applied ripple current) | Test time: 1000 hours (φ6.3); 2000 hours (φ8x10L, φ10X10L); 3000 hours (63V : φ12.5); 5000 hours (50V or less : φ12.5)<br>Leakage current: The initial specified value or less<br>Capacitance change: Within ±30% of initial value<br>Tangent of loss angle: 300% or less of the initial specified value |
| Shelf life (125℃) | Test time : 1000hours ; other items are same as the endurance. Voltage application treatment : According to JIS C5101-4 4.1 |
| Applicable standards | JIS C5101 - 1,- 18 (IEC 60384 - 1,- 18) |

## Outline Drawing

Unit : mm




( ) : Reference size

| φD | L | A | B | C | M | W | P | Size code |
|---|---|---|---|---|---|---|---|---|
| 6.3 | 5.8±0.3 | 6.6 | 6.6 | 2.7 | 0.4±0.3 | 0.5 to 0.8 | 2.0 | DC8 |
| 6.3 | 7.7±0.3 | 6.6 | 6.6 | 2.7 | 0.4±0.3 | 0.5 to 0.8 | 2.0 | DE7 |
| 8 | 10±0.5 | 8.4 | 8.4 | 3.0 | 0.4±0.3 | 0.7 to 1.1 | 3.1 | EH0 |
| 10 | 10±0.5 | 10.4 | 10.4 | 3.3 | 0.4±0.3 | 0.7 to 1.1 | 4.7 | FH0 |
| 12.5 | 13.5±0.5 | 13.0 | 13.0 | 4.9 | 0.7±0.3 | 1.0 to 1.4 | 4.6 | GL5 |

Refer to individual page.
(Soldering conditions, Land pattern size, The taping specifications)

## Coefficient of Frequency for Rated Ripple Current

| Rated voltage(V) \ Frequency (Hz) | 120 | 1k | 10k | 100k |
|---|---|---|---|---|
| 10 to 63 | 0.77 | 0.88 | 0.96 | 1 |

## Product code system (*For general product)

φ10 or less (example : 16V100μF)

| RS* | VVT | 101 | M | 1E | FH0 | 002 | U |
|---|---|---|---|---|---|---|---|
| Category code | Series code | capacitance code | Cap tol. code | Voltage code | Size code | Taping and packing code | Additional code |

50V or less : φ12.5 (example : 35V330μF)

| RS* | VVT | 331 | M | 1G | GL5 | 005 | T |
|---|---|---|---|---|---|---|---|
| Category code | Series code | capacitance code | Cap tol. code | Voltage code | Size code | Taping and packing code | Additional code |

63V : φ12.5 (example : 63V100μF)

| RS* | VVT | 101 | M | 4E | GL5 | 005 | KT |
|---|---|---|---|---|---|---|---|
| Category code | Series code | capacitance code | Cap tol. code | Voltage code | Size code | Taping and packing code | Additional code |

・If "For Vibration Resistance" type is required, please see the series VTT.
・For details, refer to the various "Product Code System" pages.

Code in front of series have been extracted from product code, which describes the segment of products, such as type and features.

## Standard Ratings

| Rated voltage (V) / Item / Rated capacitance (μF) | 10 (1L) | | | | 16 (1E) | | | | 25 (1T) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Case | ESR (Ω max.) | | Rated ripple current | Case | ESR (Ω max.) | | Rated ripple current | Case | ESR (Ω max.) | | Rated ripple current |
| | φD × L (mm) | 20℃ | −40℃ | (mArms) | φD × L (mm) | 20℃ | −40℃ | (mArms) | φD × L (mm) | 20℃ | −40℃ | (mArms) |
| 22 | — | — | — | — | — | — | — | — | 6.3 × 5.8 | 1.0 | 15 | 114 |
| 33 | — | — | — | — | 6.3 × 5.8 | 1.0 | 15 | 114 | 6.3 × 5.8 | 1.0 | 15 | 114 |
| 47 | — | — | — | — | 6.3 × 5.8 | 1.0 | 15 | 114 | 6.3 × 7.7 | 0.60 | 9.0 | 165 |
| 100 | — | — | — | — | — | — | — | — | 6.3 × 7.7 | 0.60 | 9.0 | 165 |
| | | | | | | | | | 8 × 10 | 0.20 | 2.0 | 340 |
| 220 | 6.3 × 7.7 | 0.60 | 9.0 | 165 | 8 × 10 | 0.30 | 2.0 | 340 | 8 × 10 | 0.20 | 2.0 | 340 |
| | | | | | 10 × 10 | 0.15 | 1.5 | 500 | 10 × 10 | 0.15 | 1.5 | 500 |
| 330 | 8 × 10 | 0.20 | 2.0 | 340 | 10 × 10 | 0.15 | 1.5 | 500 | 10 × 10 | 0.15 | 1.5 | 500 |
| | 10 × 10 | 0.15 | 1.5 | 500 | | | | | 12.5 × 13.5 | 0.086 | 1.29 | 750 |
| 470 | 10 × 10 | 0.15 | 1.5 | 500 | 12.5 × 13.5 | 0.086 | 1.29 | 750 | 12.5 × 13.5 | 0.086 | 1.29 | 750 |
| 680 | 12.5 × 13.5 | 0.086 | 1.29 | 750 | 12.5 × 13.5 | 0.086 | 1.29 | 750 | — | — | — | — |
| 1000 | 12.5 × 13.5 | 0.086 | 1.29 | 750 | — | — | — | — | — | — | — | — |

| Rated voltage (V) / Item / Rated capacitance (μF) | 35 (1G) | | | | 50 (1U) | | | | 63 (4E) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Case | ESR (Ω max.) | | Rated ripple current | Case | ESR (Ω max.) | | Rated ripple current | Case | ESR (Ω max.) | | Rated ripple current |
| | φD × L (mm) | 20℃ | −40℃ | (mArms) | φD × L (mm) | 20℃ | −40℃ | (mArms) | φD × L (mm) | 20℃ | −40℃ | (mArms) |
| 10 | 6.3 × 5.8 | 1.0 | 15 | 114 | 6.3 × 5.8 | 3.2 | 48 | 58 | 6.3 × 7.7 | 1.8 | 36 | 95 |
| 22 | 6.3 × 5.8 | 1.0 | 15 | 114 | 6.3 × 7.7 | 1.2 | 18 | 95 | 8 × 10 | 0.70 | 14 | 140 |
| 33 | 6.3 × 7.7 | 0.60 | 9.0 | 165 | 6.3 × 7.7 | 1.2 | 18 | 95 | 8 × 10 | 0.70 | 14 | 140 |
| | | | | | 8 × 10 | 0.50 | 7.5 | 180 | 10 × 10 | 0.50 | 10 | 200 |
| 47 | 6.3 × 7.7 | 0.60 | 9.0 | 165 | 8 × 10 | 0.50 | 7.5 | 180 | 8 × 10 | 0.70 | 14 | 140 |
| | 8 × 10 | 0.20 | 2.0 | 340 | 10 × 10 | 0.30 | 4.5 | 280 | 10 × 10 | 0.50 | 10 | 200 |
| 100 | 8 × 10 | 0.20 | 2.0 | 340 | 10 × 10 | 0.30 | 4.5 | 280 | 12.5 × 13.5 | 0.25 | 3.75 | 400 |
| | 10 × 10 | 0.15 | 1.5 | 500 | 12.5 × 13.5 | 0.18 | 2.7 | 550 | | | | |
| 220 | 10 × 10 | 0.15 | 1.5 | 500 | 12.5 × 13.5 | 0.18 | 2.7 | 550 | — | — | — | — |
| 330 | 12.5 × 13.5 | 0.086 | 1.29 | 750 | — | — | — | — | — | — | — | — |

(Note) Rated ripple current : 125℃ , 100kHz
ESR : 100kHz

# ELNA Vertical Chip Type Aluminum Electrolytic Capacitors VZJ, VMJ series

Code in front of series have been extracted from product code, which describes the segment of products, such as type and features.

- Compatible with surface mounting, low ESR, long life capacitors.
- Environmental : GREEN CAP™ , RoHS compliance.
- Supplied with carrier taping.
- Specify ESR after endurance test.
- Guaranteed 3000 hours at 125°C. (φ6.3 : 2000 hours)

Vibration resistance ⇦ Low ESR, Long Life

VMJ ⇦ VZJ ⇦ VVT

Marking color : Black print

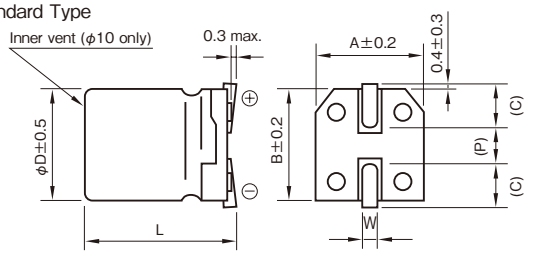
## Specifications

| Item | Performance |
|---|---|
| Category temperature range (℃) | −40 to +125 |
| Tolerance at rated capacitance (%) | ±20 (20℃,120Hz) |
| Leakage current (μA) (max.) | 0.01CV or 3 whichever is larger (after 2 minutes) C : Rated capacitance (μF) ; V : Rated voltage (V) (20℃) |
| Tangent of loss angle (tanδ) | Rated voltage (V): 10 / 16 / 25 / 35 — tanδ (max.): 0.30 / 0.23 / 0.18 / 0.16 (20℃,120Hz) |
| Characteristics at high and low temperature | Rated voltage (V): 10 / 16 / 25 / 35 — Impedance ratio (max.) Z−25℃/Z+20℃: 3 / 2 / 2 / 2 — Z−40℃/Z+20℃: 4 / 3 / 3 / 3 (120Hz) |
| Endurance (125℃) (Applied ripple current) | Test time: 3000 hours (φ6.3 : 2000 hours) — Leakage current: The initial specified value or less — Percentage of capacitance change: Within ±30% of initial value — Tangent of the loss angle: 300% or less of the initial specified value |
| Shelf life (125℃) | Test time : 1000hours ; other items are same as the endurance. Voltage application treatment : According to JIS C5101-4 4.1 |
| Applicable standards | JIS C5101 - 1,- 18 (IEC 60384 - 1,- 18) |

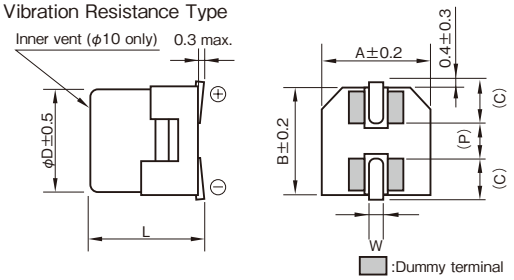
## Outline Drawing

Unit : mm

Standard Type




For Vibration Resistance Type




( ): Reference size

| φD | L | A | B | C | W | P | Size code |
|---|---|---|---|---|---|---|---|
| 6.3 | 7.7±0.3 | 6.6 | 6.6 | 2.7 | 0.5～0.8 | 2.0 | DE7 |
| 8 | 10±0.5 | 8.4 | 8.4 | 3.0 | 0.7～1.1 | 3.1 | EH0 |
| 10 | 10±0.5 | 10.4 | 10.4 | 3.3 | 0.7～1.1 | 4.7 | FH0 |

Refer to individual page.
(Soldering conditions, Land pattern size, The taping specifications)

## Coefficient of Frequency for Rated Ripple Current

| Rated voltage (V) \ Frequency (Hz) | 120 | 1k | 10k | 100k |
|---|---|---|---|---|
| 10 to 35 | 0.77 | 0.88 | 0.96 | 1 |

## Product code system (*For general product)

Standard Type (example : 35V220μF)

| RS* | VZJ | 221 | M | 1G | FH0 | 002 | U |
|---|---|---|---|---|---|---|---|
| Category code | Series code | capacitance code | Cap tol. code | Voltage code | Size code | Taping and packing code | Additional code |

For Vibration Resistance Type (example : 35V220μF)

| RS* | VMJ | 221 | M | 1G | FH0 | 002 | U |
|---|---|---|---|---|---|---|---|
| Category code | Series code | capacitance code | Cap tol. code | Voltage code | Size code | Taping and packing code | Additional code |

For details, refer to the various "Product Code System" pages.

# Vertical Chip Type Aluminum Electrolytic Capacitors VZJ, VMJ series

Code in front of series have been extracted from product code, which describes the segment of products, such as type and features.

## Standard Ratings

| Rated voltag (V) / Item / Rated capacitance (μF) | 10 (1L) | | | | | | 16 (1E) | | | | | | 25 (1T) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Case φD×L (mm) | Initial ESR (Ω max.) | | After endurance test ESR (Ω max.) | | Rated ripple current (mArms) | Case φD×L (mm) | Initial ESR (Ω max.) | | After endurance test ESR (Ω max.) | | Rated ripple current (mArms) | Case φD×L (mm) | Initial ESR (Ω max.) | | After endurance test ESR (Ω max.) | | Rated ripple current (mArms) |
| | | 20℃ | −40℃ | 20℃ | −40℃ | | | 20℃ | −40℃ | 20℃ | −40℃ | | | 20℃ | −40℃ | 20℃ | −40℃ | |
| 100 | — | — | — | — | — | — | 6.3×7.7 | 0.45 | 5.0 | 3.5 | 40 | 220 | 8×10 | 0.15 | 3.0 | 0.60 | 4.5 | 350 |
| | | | | | | | 8×10 | 0.15 | 3.0 | 0.60 | 4.5 | 350 | | | | | | |
| 220 | 8×10 | 0.15 | 3.0 | 0.60 | 4.5 | 350 | 8×10 | 0.15 | 3.0 | 0.60 | 4.5 | 350 | 10×10 | 0.12 | 2.0 | 0.40 | 3.5 | 550 |
| 330 | 8×10 | 0.15 | 3.0 | 0.60 | 4.5 | 350 | 10×10 | 0.12 | 2.0 | 0.40 | 3.5 | 550 | 10×10 | 0.12 | 2.0 | 0.40 | 3.5 | 550 |
| | 10×10 | 0.12 | 2.0 | 0.40 | 3.5 | 550 | | | | | | | | | | | | |
| 470 | 10×10 | 0.12 | 2.0 | 0.40 | 3.5 | 550 | 10×10 | 0.12 | 2.0 | 0.40 | 3.5 | 550 | — | — | — | — | — | — |

| Rated voltag (V) / Item / Rated capacitance (μF) | 35 (1G) | | | | | |
|---|---|---|---|---|---|---|
| | Case φD×L (mm) | Initial ESR (Ω max.) | | After endurance test ESR (Ω max.) | | Rated ripple current (mArms) |
| | | 20℃ | −40℃ | 20℃ | −40℃ | |
| 47 | 6.3×7.7 | 0.45 | 5.0 | 3.5 | 40 | 220 |
| | 8×10 | 0.15 | 3.0 | 0.60 | 4.5 | 350 |
| 100 | 8×10 | 0.15 | 3.0 | 0.60 | 4.5 | 350 |
| 220 | 10×10 | 0.12 | 2.0 | 0.40 | 3.5 | 550 |

(Note) After endurance test : 2000 hours
Rated ripple current : 125℃ , 100kHz, ESR : 100kHz

# ELNA Vertical Chip Type Aluminum Electrolytic Capacitors VZF, VMF series

Code in front of series have been extracted from product code, which describes the segment of products, such as type and features.

- Compatible with surface mounting, low ESR, high CV, long life capacitors.
- Environmental : GREEN CAP™ , RoHS compliance.
- Supplied with carrier taping.
- Guaranteed 4000 hours at 125°C. (2000 hours : φ6.3)

Vibration resistance　High CV, Long Life

VMF ⇦ VZF ⇦ VVT

Marking color : Black print

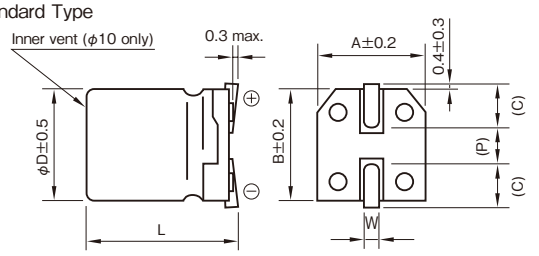
## Specifications

| Item | Performance |
|---|---|
| Category temperature range (℃) | −40 to +125 |
| Tolerance at rated capacitance (%) | ±20 (20℃,120Hz) |
| Leakage current (μA) (max.) | 0.01CV or 3 whichever is larger (after 2 minutes) C : Rated capacitance (μF) ; V : Rated voltage (V) (20℃) |
| Tangent of loss angle (tanδ) | Rated voltage (V): 10 / 16 / 25 / 35<br>tanδ (max.): 0.24 / 0.20 / 0.16 / 0.14 (20℃,120Hz) |
| Characteristics at high and low temperature | Rated voltage (V): 10 / 16 / 25 / 35<br>Impedance ratio (max.) Z−25℃/Z+20℃: 3 / 2 / 2 / 2<br>Impedance ratio (max.) Z−40℃/Z+20℃: 6 / 4 / 4 / 3 (120Hz) |
| Endurance (125℃) (Applied ripple current) | Test time: 2000 hours (φ6.3), 4000 hours (φ8, φ10)<br>Leakage current: The initial specified value or less<br>Percentage of capacitance change: Within ±30% of initial value<br>Tangent of the loss angle: 300% or less of the initial specified value |
| Shelf life (125℃) | Test time : 1000hours ; other items are same as the endurance. Voltage application treatment : According to JIS C5101-4 4.1 |
| Applicable standards | JIS C5101 - 1,- 18 (IEC 60384 - 1,- 18) |

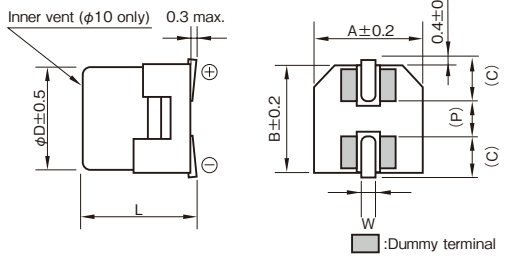
## Outline Drawing

Unit : mm

Standard Type




For Vibration Resistance Type




( ): Reference size

| φD | L | A | B | C | W | P | Size code |
|---|---|---|---|---|---|---|---|
| 6.3 | 5.8±0.3 | 6.6 | 6.6 | 2.7 | 0.5 to 0.8 | 2.0 | DC8◆ |
| 6.3 | 7.7±0.3 | 6.6 | 6.6 | 2.7 | 0.5 to 0.8 | 2.0 | DE7 |
| 8 | 10±0.5 | 8.4 | 8.4 | 3.0 | 0.7 to 1.1 | 3.1 | EH0 |
| 10 | 10±0.5 | 10.4 | 10.4 | 3.3 | 0.7 to 1.1 | 4.7 | FH0 |

◆ mark size is standard type only.

Refer to individual page.
(Soldering conditions, Land pattern size, The taping specifications)

## Coefficient of Frequency for Rated Ripple Current

| Frequency (Hz) / Rated voltage(V) | 120 | 1k | 10k | 100k |
|---|---|---|---|---|
| 10 to 35 | 0.77 | 0.88 | 0.96 | 1 |

## Product code system (*For general product)

Standard Type (example : 35V100μF)

| RS* | VZF | 101 | M | 1G | DE7 | 002 | U |
|---|---|---|---|---|---|---|---|
| Category code | Series code | capacitance code | Cap tol. code | Voltage code | Size code | Taping and packing code | Additional code |

For Vibration Resistance Type (example : 25V330μF)

| RS* | VMF | 331 | M | 1T | FH0 | 002 | U |
|---|---|---|---|---|---|---|---|
| Category code | Series code | capacitance code | Cap tol. code | Voltage code | Size code | Taping and packing code | Additional code |

For details, refer to the various "Product Code System" pages.

# Vertical Chip Type Aluminum Electrolytic Capacitors VZF, VMF series

Code in front of series have been extracted from product code, which describes the segment of products, such as type and features.

## Standard Ratings

| Rated voltage (V) / Item / Rated capacitance (μF) | 10 (1L) | | | | 16 (1E) | | | | 25 (1T) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Case | ESR (Ω max.) | | Rated ripple current | Case | ESR (Ω max.) | | Rated ripple current | Case | ESR (Ω max.) | | Rated ripple current |
| | φD × L (mm) | 20℃ | − 40℃ | (mArms) | φD × L (mm) | 20℃ | − 40℃ | (mArms) | φD × L (mm) | 20℃ | − 40℃ | (mArms) |
| 47 | — | — | — | — | 6.3 × 5.8 | 1.2 | 22 | 110 | 6.3 × 5.8 | 1.2 | 22 | 110 |
| 100 | 6.3 × 5.8 | 1.2 | 22 | 110 | 6.3 × 5.8 | 1.2 | 22 | 110 | 6.3 × 7.7 | 0.60 | 12 | 220 |
| 220 | 6.3 × 7.7 | 0.60 | 12 | 220 | 6.3 × 7.7 | 0.60 | 12 | 220 | 8 × 10 | 0.30 | 5.5 | 296 |
| 330 | 8 × 10 | 0.30 | 5.5 | 296 | 8 × 10 | 0.30 | 5.5 | 296 | 10 × 10 | 0.20 | 3.6 | 440 |
| 470 | 8 × 10 | 0.30 | 5.5 | 296 | 10 × 10 | 0.20 | 3.6 | 440 | — | — | — | — |
| 680 | 10 × 10 | 0.20 | 3.6 | 440 | 10 × 10 | 0.20 | 3.6 | 440 | — | — | — | — |

| Rated voltage (V) / Item / Rated capacitance (μF) | 35 (1G) | | | |
|---|---|---|---|---|
| | Case | ESR (Ω max.) | | Rated ripple current |
| | φD × L (mm) | 20℃ | − 40℃ | (mArms) |
| 47 | 6.3 × 5.8 | 1.2 | 22 | 110 |
| 100 | 6.3 × 7.7 | 0.60 | 12 | 220 |
| 220 | 8 × 10 | 0.30 | 5.5 | 296 |
| 330 | 10 × 10 | 0.20 | 3.6 | 440 |

(Note) Rated ripple current : 125℃ , 100kHz
ESR : 100kHz

# ELNA Vertical Chip Type Aluminum Electrolytic Capacitors VZE, VME series

Code in front of series have been extracted from product code, which describes the segment of products, such as type and features.

- Compatible with surface mounting, low ESR, high CV, long life capacitors.
- Environmental : GREEN CAP™ , RoHS compliance.
- Supplied with carrier taping.
- Specify ESR after endurance test.
- Guaranteed 2000 hours at 125°C.

Vibration resistance ⇦ VME　VZE ⇦ High CV, Long Life VVT

Marking color : Black print

## Specifications

| Item | Performance |
|---|---|
| Category temperature range (℃) | −40 to +125 |
| Tolerance at rated capacitance (%) | ±20 (20℃,120Hz) |
| Leakage current (μA) (max.) | 0.01CV or 3 whichever is larger (after 2 minutes) C : Rated capacitance (μF) ; V : Rated voltage (V) (20℃) |
| Tangent of loss angle (tanδ) | Rated voltage (V): 35 ; tanδ (max.): 0.14 (20℃,120Hz) |
| Characteristics at high and low temperature | Rated voltage (V): 35 ; Impedance Ratio (max.) Z−25℃/Z+20℃: 2 ; Z−40℃/Z+20℃: 3 (120Hz) |
| Endurance (125℃) (Applied ripple current) | Test time: 2000 hours ; Leakage current: The initial specified value or less ; Percentage of capacitance change: Within ±30% of initial value ; Tangent of the loss angle: 300% or less of the initial specified value |
| Shelf life (125℃) | Test time : 1000hours ; other items are same as the endurance. Voltage application treatment : According to JIS C5101-4 4.1 |
| Applicable standards | JIS C5101 - 1,- 18 (IEC 60384 - 1,- 18) |

## Coefficient of Frequency for Rated Ripple Current

| Frequency (Hz) / Rated voltage(V) | 120 | 1k | 10k | 100k |
|---|---|---|---|---|
| 35 | 0.77 | 0.88 | 0.96 | 1 |

Refer to individual page.
(Soldering conditions, Land pattern size, The taping specifications)

For details, refer to the various "Product Code System" pages.

## Product code system (*For general product)

Standard Type (example : 35V47μF)

| RS* | VZE | 470 | M | 1G | DE7 | 002 | U |
|---|---|---|---|---|---|---|---|
| Category code | Series code | capacitance code | Cap tol. code | Voltage code | Size code | Taping and packing code | Additional code |

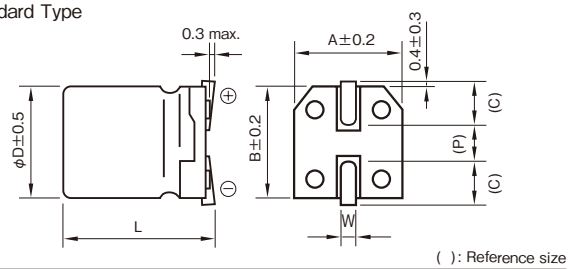
For Vibration Resistance Type (example : 35V47μF)

| RS* | VME | 470 | M | 1G | DE7 | 002 | U |
|---|---|---|---|---|---|---|---|
| Category code | Series code | capacitance code | Cap tol. code | Voltage code | Size code | Taping and packing code | Additional code |

## Outline Drawing

Unit : mm

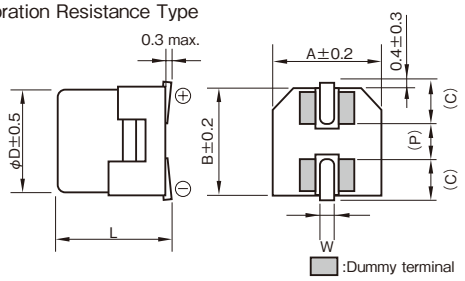
Standard Type




( ): Reference size

| φD | L | A | B | C | W | P | Size code |
|---|---|---|---|---|---|---|---|
| 6.3 | 7.7±0.3 | 6.6 | 6.6 | 2.7 | 0.5 to 0.8 | 2.0 | DE7 |

For Vibration Resistance Type




## Standard Ratings

| Rated voltage (V) / Item / Rated capacitance (μF) | 35 (1G) Case φD × L (mm) | ESR (Ω max.) 20℃ | ESR (Ω max.) -40℃ | ESR (Ω max.) After Endurance -40℃ | Rated ripple current (mArms) |
|---|---|---|---|---|---|
| 47 | 6.3 × 7.7 | 0.30 | 3 | 6 | 240 |
| 100 | 6.3 × 7.7 | 0.30 | 3 | 6 | 240 |

(Note) Rated ripple current : 125℃ , 100kHz
ESR : 100kHz

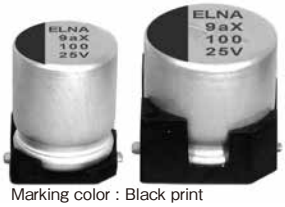
NOTE : Design, Specifications are subject to change without notice.
It is recommended that you shall obtain technical specifications from ELNA to ensure that the component is suitable for your use.

# ELNA Vertical Chip Type Aluminum Electrolytic Capacitors VVX, VTX series

Code in front of series have been extracted from product code, which describes the segment of products, such as type and features.

- Compatible with surface mounting, high temperature capacitors.
- Environmental : GREEN CAP™ , RoHS compliance.
- Supplied with carrier taping.
- Guaranteed 1000 hours 135℃.

Vibration resistance ⇦ VTX　VVX ⇦ High temperature VVT



Marking color : Black print

## Specifications

| Item | Performance |
|---|---|
| Category temperature range (℃) | −40 to +135 |
| Tolerance at rated capacitance (%) | ±20 (20℃,120Hz) |
| Leakage current (μA) (max.) | 0.01CV or 3 whichever is larger (after 2 minutes) C : Rated capacitance (μF) ; V : Rated voltage (V) (20℃) |
| Tangent of loss angle (tanδ) | Rated voltage (V): 25 / 35 ; tanδ (max.): 0.24 / 0.20 (20℃,120Hz) |
| Characteristics at high and low temperature | Rated voltage (V): 25 / 35 ; Impedance Ratio (max.) Z−25℃/Z+20℃: 2 / 2 ; Z−40℃/Z+20℃: 3 / 3 (120Hz) |
| Endurance (135℃) (Applied ripple current) | Test time: 1000 hours ; Leakage current: The initial specified value or less ; Percentage of Capacitance change: Within ±30% of initial value ; Tangent of loss angle: 300% or less of the initial specified value |
| Shelf life (135℃) | Test time : 500hours ; other items are same as the endurance. Voltage application treatment : According to JIS C5101-4 4.1 |
| Applicable standards | JIS C5101 - 1,- 18 (IEC 60384 - 1,- 18) |

## Coefficient of Frequency for Rated Ripple Current

| Frequency (Hz) / Rated voltage(V) | 120 | 1k | 10k | 100k |
|---|---|---|---|---|
| 25 to 35 | 0.77 | 0.88 | 0.96 | 1 |

Refer to individual page.
(Soldering conditions, Land pattern size, The taping specifications)

For details, refer to the various "Product Code System" pages.

## Product code system : 25V330μF (*For general product)

Standard Type

| RS* | VVX | 331 | M | 1T | FH0 | 002 | U |
|---|---|---|---|---|---|---|---|
| Category code | Series code | capacitance code | Cap tol. code | Voltage code | Size code | Taping and packing code | Additional code |

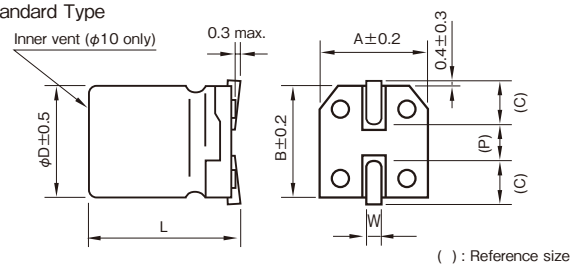
For Vibration Resistance Type

| RS* | VTX | 331 | M | 1T | FH0 | 002 | U |
|---|---|---|---|---|---|---|---|
| Category code | Series code | capacitance code | Cap tol. code | Voltage code | Size code | Taping and packing code | Additional code |

## Outline Drawing

Unit : mm

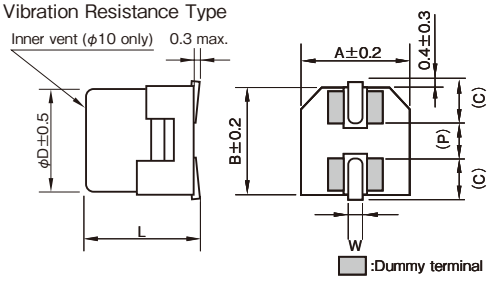
Standard Type



( ) : Reference size

| ϕD | L | A | B | C | W | P | Size code |
|---|---|---|---|---|---|---|---|
| 8 | 10±0.5 | 8.4 | 8.4 | 3.0 | 0.7 to 1.1 | 3.1 | EH0 |
| 10 | 10±0.5 | 10.4 | 10.4 | 3.3 | 0.7 to 1.1 | 4.7 | FH0 |

For Vibration Resistance Type




## Standard Ratings

| Rated voltage (V) / Item / Rated capacitance (μF) | 25 (1T) Case ϕD × L (mm) | Size code | ESR (Ω max.) | Rated ripple current (mArms) | 35 (1G) Case ϕD × L (mm) | Size code | ESR (Ω max.) | Rated ripple current (mArms) |
|---|---|---|---|---|---|---|---|---|
| 22 | — | — | — | — | 8 × 10 | EH0 | 0.70 | 115 |
| 33 | 8 × 10 | EH0 | 0.70 | 115 | 8 × 10 | EH0 | 0.70 | 115 |
| | 10 × 10 | FH0 | 0.50 | 155 | 10 × 10 | FH0 | 0.50 | 155 |
| 47 | 8 × 10 | EH0 | 0.70 | 115 | 8 × 10 | EH0 | 0.70 | 115 |
| | 10 × 10 | FH0 | 0.50 | 155 | 10 × 10 | FH0 | 0.50 | 155 |
| 100 | 8 × 10 | EH0 | 0.70 | 115 | 8 × 10 | EH0 | 0.70 | 115 |
| | 10 × 10 | FH0 | 0.50 | 155 | 10 × 10 | FH0 | 0.50 | 155 |
| 220 | 8 × 10 | EH0 | 0.70 | 115 | 10 × 10 | FH0 | 0.50 | 155 |
| | 10 × 10 | FH0 | 0.50 | 155 | | | | |
| 330 | 10 × 10 | FH0 | 0.50 | 155 | — | — | — | — |

(Note)
Rated ripple current : 135℃ , 100kHz
ESR : 20℃, 100kHz

NOTE : Design, Specifications are subject to change without notice.
It is recommended that you shall obtain technical specifications from ELNA to ensure that the component is suitable for your use.

# For Vibration Resistance,
# Chip Type Aluminum Electrolytic Capacitors

# ELNA — Vertical Chip Type Aluminum Electrolytic Capacitors VTZ series

Code in front of series have been extracted from product code, which describes the segment of products, such as type and features.

- Compatible with surface mounting, low ESR capacitors.
- For Vibration resistance. (30G guaranteed)
- Environmental : GREEN CAP™ , RoHS compliance.
- Supplied with carrier taping.
- Guaranteed 5000 hours at 105℃.
  (φ6.3 : 1000 hours, φ8, φ10 : 2000 hours)

Vibration resistance

VTZ ⇦ VVZ

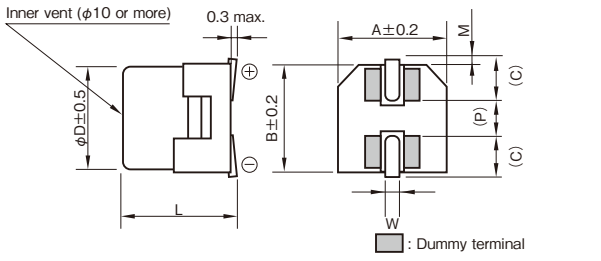
Marking color : Black print

## Specifications

| Item | Performance |
|---|---|
| Category temperature range (℃) | −55 to +105 |
| Tolerance at rated capacitance (%) | ±20 (20℃,120Hz) |
| Leakage current (μA) (max.) | 0.01CV or 3 whichever is larger (after 2 minutes) C : Rated capacitance (μF) , V : Rated voltage (V) (20℃) |
| Tangent of loss angle (tanδ) | Rated voltage (V): 6.3 / 10 / 16 / 25 / 35<br>tanδ (max.): 0.28 / 0.24 / 0.20 / 0.16 / 0.14<br>0.02 is added to every 1000μF increase over 1000μF (20℃,120Hz) |
| Characteristics at high and low temperature | Rated voltage (V): 6.3 / 10 / 16 / 25 / 35<br>Impedance ratio (max.) Z−25℃/Z+20℃: 4 / 3 / 2 / 2 / 2<br>Impedance ratio (max.) Z−55℃/Z+20℃: 8 / 5 / 4 / 3 / 3 (120Hz) |
| Endurance (105℃) (Applied ripple current) | Test time: 1000 hours (φ6.3), 2000 hours (φ8, φ10), 5000 hours (φ12.5 or more)<br>Leakage current: The initial specified value or less<br>Percentage of capacitance change: Within ±25% of initial value<br>Tangent of loss angle: 200% or less of the initial specified value |
| Shelf life (105℃) | Test time : 1000hours ; other items are same as the endurance. Voltage application treatment : According to JIS C5101-4 4.1 |
| Applicable standards | JIS C5101 - 1, - 18 (IEC 60384 - 1, - 18) |

## Outline Drawing

Unit : mm




( ) : Reference size

| φD | L | A | B | C | W | P | M | Size code |
|---|---|---|---|---|---|---|---|---|
| 6.3 | 7.7±0.3 | 6.6 | 6.6 | 2.7 | 0.5 to 0.8 | 2.0 | 0.4±0.3 | DE7 |
| 8 | 10±0.5 | 8.4 | 8.4 | 3.0 | 0.7 to 1.1 | 3.1 | 0.4±0.3 | EH0 |
| 10 | 10±0.5 | 10.4 | 10.4 | 3.3 | 0.7 to 1.1 | 4.7 | 0.4±0.3 | FH0 |
| 12.5 | 13.5±0.5 | 13.0 | 13.0 | 4.9 | 1.0 to 1.4 | 4.6 | 0.7±0.3 | GL5 |
| 16 | 16.5±0.5 | 17.0 | 17.0 | 5.6 | 1.0 to 1.4 | 7.2 | 0.7±0.3 | JP5 |
| 16 | 21.5±0.5 | 17.0 | 17.0 | 5.6 | 1.0 to 1.4 | 7.2 | 0.7±0.3 | JU5 |
| 18 | 16.5±0.5 | 19.0 | 19.0 | 6.6 | 1.0 to 1.4 | 7.2 | 0.7±0.3 | KP5 |
| 18 | 21.5±0.5 | 19.0 | 19.0 | 6.6 | 1.0 to 1.4 | 7.2 | 0.7±0.3 | KU5 |

Refer to individual page.
(Soldering conditions, Land pattern size, The taping specifications)

## Coefficient of Frequency for Rated Ripple Current

| Frequency (Hz) / Rated voltage (V) | 120 | 1k | 10k | 100k |
|---|---|---|---|---|
| 6.3 to 35 | 0.50 | 0.75 | 0.90 | 1 |

## Product code system (*For general product)

φ6.3 (example : 6.3V220μF)

| RS* | VTZ | 221 | M | 1J | DE7 | 002 | U |
|---|---|---|---|---|---|---|---|
| Category code | Series code | capacitance code | Cap tol. code | Voltage code | Size code | Taping and packing code | Additional code |

φ8, φ10 (example : 6.3V1000μF)

| RS* | VTZ | 102 | M | 1J | FH0 | 002 | SU |
|---|---|---|---|---|---|---|---|
| Category code | Series code | capacitance code | Cap tol. code | Voltage code | Size code | Taping and packing code | Additional code |

φ12.5 or more (example : 6.3V2200μF)

| RS* | VTZ | 222 | M | 1J | GL5 | 005 | T |
|---|---|---|---|---|---|---|---|
| Category code | Series code | capacitance code | Cap tol. code | Voltage code | Size code | Taping and packing code | Additional code |

・If "Standard (terminal)" type is required, please see the series VVZ.
・For details, refer to the various "Product Code System" pages.

Code in front of series have been extracted from product code, which describes the segment of products, such as type and features.

## Standard Ratings

| Rated voltage (V) / Item / Rated capacitance (μF) | 6.3 (1J) | | | | 10 (1L) | | | | 16 (1E) | | | | 25 (1T) | | | | 35 (1G) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Case φD × L (mm) | Size code | ESR ( Ω max.) | Rated ripple current (mArms) | Case φD × L (mm) | Size code | ESR ( Ω max.) | Rated ripple current (mArms) | Case φD × L (mm) | Size code | ESR ( Ω max.) | Rated ripple current (mArms) | Case φD × L (mm) | Size code | ESR ( Ω max.) | Rated ripple current (mArms) | Case φD × L (mm) | Size code | ESR ( Ω max.) | Rated ripple current (mArms) |
| 47 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | 6.3×7.7 | DE7 | 0.34 | 280 |
| 68 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | 6.3×7.7 | DE7 | 0.34 | 280 |
| 100 | — | — | — | — | — | — | — | — | — | — | — | — | 6.3×7.7 | DE7 | 0.34 | 280 | 8×10 | EH0 | 0.20 | 450 |
| 150 | — | — | — | — | — | — | — | — | 6.3×7.7 | DE7 | 0.34 | 280 | 8×10 | EH0 | 0.20 | 450 | 10×10 | FH0 | 0.10 | 670 |
| 220 | 6.3×7.7 | DE7 | 0.34 | 280 | 6.3×7.7 | DE7 | 0.34 | 280 | 6.3×7.7 | DE7 | 0.34 | 280 | 10×10 | FH0 | 0.10 | 670 | 10×10 | FH0 | 0.10 | 670 |
| | | | | | 8×10 | EH0 | 0.20 | 450 | 8×10 | EH0 | 0.20 | 450 | | | | | | | | |
| 330 | 6.3×7.7 | DE7 | 0.34 | 280 | 10×10 | FH0 | 0.10 | 670 | 10×10 | FH0 | 0.10 | 670 | 10×10 | FH0 | 0.10 | 670 | — | — | — | — |
| | 8×10 | EH0 | 0.20 | 450 | | | | | | | | | | | | | | | | |
| 470 | 10×10 | FH0 | 0.10 | 670 | 10×10 | FH0 | 0.10 | 670 | 10×10 | FH0 | 0.10 | 670 | — | — | — | — | 12.5×13.5 | GL5 | 0.060 | 1100 |
| | | | | | | | | | | | | | | | | | 16×16.5 | JP5 | 0.046 | 1540 |
| 680 | — | — | — | — | — | — | — | — | — | — | — | — | 12.5×13.5 | GL5 | 0.060 | 1100 | 12.5×13.5 | GL5 | 0.060 | 1100 |
| | | | | | | | | | | | | | | | | | 16×16.5 | JP5 | 0.046 | 1540 |
| 1000 | 10×10 | FH0 | 0.10 | 670 | — | — | — | — | 12.5×13.5 | GL5 | 0.060 | 1100 | 12.5×13.5 | GL5 | 0.060 | 1100 | 16×16.5 | JP5 | 0.046 | 1540 |
| | | | | | | | | | 16×16.5 | JP5 | 0.046 | 1540 | 16×16.5 | JP5 | 0.046 | 1540 | 18×16.5 | KP5 | 0.042 | 1760 |
| 1500 | — | — | — | — | 12.5×13.5 | GL5 | 0.060 | 1100 | 12.5×13.5 | GL5 | 0.060 | 1100 | 16×21.5 | JU5 | 0.040 | 1840 | — | — | — | — |
| | | | | | 16×16.5 | JP5 | 0.046 | 1540 | 16×16.5 | JP5 | 0.046 | 1540 | 18×16.5 | KP5 | 0.042 | 1760 | | | | |
| 2200 | 12.5×13.5 | GL5 | 0.060 | 1100 | 12.5×13.5 | GL5 | 0.060 | 1100 | 16×16.5 | JP5 | 0.046 | 1540 | 16×21.5 | JU5 | 0.040 | 1840 | 18×21.5 | KU5 | 0.038 | 1960 |
| | | | | | 16×16.5 | JP5 | 0.046 | 1540 | 18×16.5 | KP5 | 0.042 | 1760 | 18×16.5 | KP5 | 0.042 | 1760 | | | | |
| 3300 | 16×16.5 | JP5 | 0.046 | 1540 | 16×16.5 | JP5 | 0.046 | 1540 | 16×21.5 | JU5 | 0.040 | 1840 | 18×21.5 | KU5 | 0.038 | 1960 | — | — | — | — |
| | | | | | 18×16.5 | KP5 | 0.042 | 1760 | 18×16.5 | KP5 | 0.042 | 1760 | | | | | | | | |
| 4700 | 16×21.5 | JU5 | 0.040 | 1840 | 16×21.5 | JU5 | 0.040 | 1840 | 18×21.5 | KU5 | 0.038 | 1960 | — | — | — | — | — | — | — | — |
| | 18×16.5 | KP5 | 0.042 | 1760 | 18×21.5 | KU5 | 0.038 | 1960 | | | | | | | | | | | | |
| 6800 | 18×21.5 | KU5 | 0.038 | 1960 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| 8200 | 18×21.5 | KU5 | 0.038 | 1960 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |

(Note) Rated ripple current : 105℃ , 100kHz
ESR : 20℃ , 100kHz

# ELNA — Vertical Chip Type Aluminum Electrolytic Capacitors VTD series

Code in front of series have been extracted from product code, which describes the segment of products, such as type and features.

- Compatible with surface mounting, low ESR, long life capacitors.
- For Vibration resistance. (30G guaranteed)
- Environmental : GREEN CAP™ , RoHS compliance.
- Supplied with carrier taping.
- Guaranteed 5000 hours at 105°C.
  (φ6.3 / 63V 10L : 2000 hours)

Vibration resistance

VTD ⇦ VVD

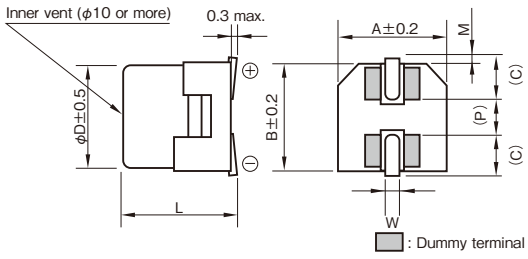

Marking color : Black print

## Specifications

| Item | Performance |
|---|---|
| Category temperature range (℃) | −55 to +105 |
| Tolerance at rated capacitance (%) | ±20 (20℃,120Hz) |
| Leakage current (μA) (max.) | 0.01CV or 3 whichever is larger (after 2 minutes) C : Rated capacitance (μF) , V : Rated voltage (V) (20℃) |
| Tangent of loss angle (tanδ) | Rated voltage (V): 6.3 / 10 / 16 / 25 / 35 / 50 / 63<br>tanδ (max.): 0.26 / 0.19 / 0.16 / 0.14 / 0.12 / 0.1 / 0.08<br>0.02 is added to every 1000μF increase over 1000μF (20℃,120Hz) |
| Characteristics at high and low temperature | Rated voltage (V): 6.3 / 10 / 16 / 25 / 35 / 50 / 63<br>Impedance ratio (max.) Z−25℃/Z+20℃: 2 / 2 / 2 / 2 / 2 / 2 / 2<br>Impedance ratio (max.) Z−40℃/Z+20℃: 3 / 3 / 3 / 3 / 3 / 3 / 3<br>Impedance ratio (max.) Z−55℃/Z+20℃: 8 / 4 / 4 / 3 / 3 / 3 / 3 (120Hz) |
| Endurance (105℃) (Applied ripple current) | Test time: 5000 hours (φ6.3 / 63V 10L : 2000 hours)<br>Leakage current: The initial specified value or less<br>Percentage of capacitance change: Within ±30% of initial value<br>Tangent of loss angle: 300% or less of the initial specified value (φ6.3 / 63V 10L : 200%) |
| Shelf life (105℃) | Test time : 1000hours ; other items are same as the endurance. Voltage application treatment : According to JIS C5101-4 4.1 |
| Applicable standards | JIS C5101-1, -18 (IEC 60384-1, -18) |

## Outline Drawing

Unit : mm




( ) : Reference size

| φD | L | A | B | C | W | P | M | Size code |
|---|---|---|---|---|---|---|---|---|
| 6.3 | 7.7±0.3 | 6.6 | 6.6 | 2.7 | 0.5 to 0.8 | 2.0 | 0.4±0.3 | DE7 |
| 8 | 10±0.5 | 8.4 | 8.4 | 3.0 | 0.7 to 1.1 | 3.1 | 0.4±0.3 | EH0 |
| 10 | 10±0.5 | 10.4 | 10.4 | 3.3 | 0.7 to 1.1 | 4.7 | 0.4±0.3 | FH0 |
| 12.5 | 13.5±0.5 | 13.0 | 13.0 | 4.9 | 1.0 to 1.4 | 4.6 | 0.7±0.3 | GL5 |
| 16 | 16.5±0.5 | 17.0 | 17.0 | 5.6 | 1.0 to 1.4 | 7.2 | 0.7±0.3 | JP5 |
| 16 | 21.5±0.5 | 17.0 | 17.0 | 5.6 | 1.0 to 1.4 | 7.2 | 0.7±0.3 | JU5 |
| 18 | 16.5±0.5 | 19.0 | 19.0 | 6.6 | 1.0 to 1.4 | 7.2 | 0.7±0.3 | KP5 |
| 18 | 21.5±0.5 | 19.0 | 19.0 | 6.6 | 1.0 to 1.4 | 7.2 | 0.7±0.3 | KU5 |

Refer to individual page.
(Soldering conditions, Land pattern size, The taping specifications)

## Coefficient of Frequency for Rated Ripple Current

| Frequency (Hz) / Rated voltage (V) | 50・60 | 120 | 1k | 10k・100k |
|---|---|---|---|---|
| 6.3 to 63 | 0.50 | 0.50 | 0.75 | 1 |

## Product code system (*For general product)

φ6.3 (example : 6.3V330μF)

| RS* | VTD | 331 | M | 1J | DE7 | 002 | U |
|---|---|---|---|---|---|---|---|
| Category code | Series code | capacitance code | Cap tol. code | Voltage code | Size code | Taping and packing code | Additional code |

φ8, φ10 (example : 6.3V1500μF)

| RS* | VTD | 152 | M | 1J | FH0 | 002 | SU |
|---|---|---|---|---|---|---|---|
| Category code | Series code | capacitance code | Cap tol. code | Voltage code | Size code | Taping and packing code | Additional code |

φ12.5 or more (example : 6.3V2200μF)

| RS* | VTD | 222 | M | 1J | GL5 | 005 | T |
|---|---|---|---|---|---|---|---|
| Category code | Series code | capacitance code | Cap tol. code | Voltage code | Size code | Taping and packing code | Additional code |

・If "Standard (terminal)" type is required, please see the series VVD.
・For details, refer to the various "Product Code System" pages.

# Vertical Chip Type Aluminum Electrolytic Capacitors VTD series

Code in front of series have been extracted from product code, which describes the segment of products, such as type and features.

## Standard Ratings

| Rated voltage (V) / Item / Rated capacitance (μF) | 6.3 (1J) | | | | 10 (1L) | | | | 16 (1E) | | | | 25 (1T) | | | | 35 (1G) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Case φD × L (mm) | Size code | ESR ( Ω max.) | Rated ripple current (mArms) | Case φD × L (mm) | Size code | ESR ( Ω max.) | Rated ripple current (mArms) | Case φD × L (mm) | Size code | ESR ( Ω max.) | Rated ripple current (mArms) | Case φD × L (mm) | Size code | ESR ( Ω max.) | Rated ripple current (mArms) | Case φD × L (mm) | Size code | ESR ( Ω max.) | Rated ripple current (mArms) |
| 100 | – | – | – | – | – | – | – | – | – | – | – | – | 6.3×7.7 | DE7 | 0.30 | 300 | 6.3×7.7 | DE7 | 0.30 | 300 |
| | | | | | | | | | | | | | | | | | 8×10 | EH0 | 0.16 | 600 |
| 220 | – | – | – | – | 6.3×7.7 | DE7 | 0.30 | 300 | 6.3×7.7 | DE7 | 0.30 | 300 | 8×10 | EH0 | 0.16 | 600 | 8×10 | EH0 | 0.16 | 600 |
| 330 | 6.3×7.7 | DE7 | 0.30 | 300 | 8×10 | EH0 | 0.16 | 600 | 8×10 | EH0 | 0.16 | 600 | 8×10 | EH0 | 0.16 | 600 | 10×10 | FH0 | 0.090 | 850 |
| 470 | 8×10 | EH0 | 0.16 | 600 | 8×10 | EH0 | 0.16 | 600 | 8×10 | EH0 | 0.16 | 600 | 10×10 | FH0 | 0.090 | 850 | 12.5×13.5 | GL5 | 0.054 | 1160 |
| 680 | 8×10 | EH0 | 0.16 | 600 | 10×10 | FH0 | 0.090 | 850 | 10×10 | FH0 | 0.090 | 850 | 12.5×13.5 | GL5 | 0.054 | 1160 | 12.5×13.5 | GL5 | 0.054 | 1160 |
| 1000 | 8×10 | EH0 | 0.16 | 600 | 10×10 | FH0 | 0.090 | 850 | 12.5×13.5 | GL5 | 0.054 | 1160 | 12.5×13.5 | GL5 | 0.054 | 1160 | 16×16.5 | JP5 | 0.044 | 1620 |
| 1500 | 10×10 | FH0 | 0.090 | 850 | 12.5×13.5 | GL5 | 0.054 | 1160 | 12.5×13.5 | GL5 | 0.054 | 1160 | 16×16.5 | JP5 | 0.044 | 1620 | 18×16.5 | KP5 | 0.040 | 1840 |
| 2200 | 12.5×13.5 | GL5 | 0.054 | 1160 | 12.5×13.5 | GL5 | 0.054 | 1160 | 16×16.5 | JP5 | 0.044 | 1620 | 16×21.5 | JU5 | 0.038 | 1920 | 18×21.5 | KU5 | 0.036 | 2080 |
| | | | | | | | | | 18×16.5 | KP5 | 0.040 | 1840 | 18×16.5 | KP5 | 0.040 | 1840 | | | | |
| 3300 | 16×16.5 | JP5 | 0.044 | 1620 | 16×16.5 | JP5 | 0.044 | 1620 | 16×21.5 | JU5 | 0.038 | 1920 | 18×21.5 | KU5 | 0.036 | 2080 | – | – | – | – |
| | | | | | | | | | 18×16.5 | KP5 | 0.040 | 1840 | | | | | – | – | – | – |
| 4700 | 18×16.5 | KP5 | 0.040 | 1840 | 18×21.5 | KU5 | 0.036 | 2080 | 18×21.5 | KU5 | 0.036 | 2080 | – | – | – | – | – | – | – | – |
| 6800 | 18×16.5 | KP5 | 0.040 | 1840 | – | – | – | – | – | – | – | – | – | – | – | – | – | – | – | – |
| 8200 | 18×21.5 | KU5 | 0.036 | 2080 | – | – | – | – | – | – | – | – | – | – | – | – | – | – | – | – |

| Rated voltage (V) / Item / Rated capacitance (μF) | 50 (1U) | | | | 63 (4E) | | | |
|---|---|---|---|---|---|---|---|---|
| | Case φD × L (mm) | Size code | ESR ( Ω max.) | Rated ripple current (mArms) | Case φD × L (mm) | Size code | ESR ( Ω max.) | Rated ripple current (mArms) |
| 33 | 6.3×7.7 | DE7 | 0.66 | 195 | 8×10 | EH0 | 0.65 | 250 |
| 47 | 6.3×7.7 | DE7 | 0.66 | 195 | 8×10 | EH0 | 0.65 | 250 |
| 68 | – | – | – | – | 8×10 | EH0 | 0.65 | 250 |
| 100 | 8×10 | EH0 | 0.32 | 350 | 10×10 | FH0 | 0.35 | 400 |
| | | | | | 12.5×13.5 | GL5 | 0.16 | 600 |
| 220 | 10×10 | FH0 | 0.18 | 700 | 12.5×13.5 | GL5 | 0.16 | 600 |
| 330 | 12.5×13.5 | GL5 | 0.12 | 900 | 16×16.5 | JP5 | 0.14 | 800 |
| 470 | 16×16.5 | JP5 | 0.080 | 1000 | 18×16.5 | KP5 | 0.12 | 900 |
| 680 | 16×16.5 | JP5 | 0.080 | 1000 | 18×21.5 | KU5 | 0.10 | 1050 |
| 1000 | 18×16.5 | KP5 | 0.076 | 1100 | – | – | – | – |

(Note) Rated ripple current : 105℃ , 100kHz
ESR : 20℃ , 100kHz

# ELNA — Vertical Chip Type Aluminum Electrolytic Capacitors VTT series

Code in front of series have been extracted from product code, which describes the segment of products, such as type and features.

- Compatible with surface mounting, low ESR capacitors.
- For Vibration resistance. (30G guaranteed)
- Environmental : GREEN CAP™ , RoHS compliance.
- Supplied with carrier taping.
- Guaranteed 1000 to 5000 hours at 125°C. (See table below)

Vibration resistance

VTT ⇦ VVT

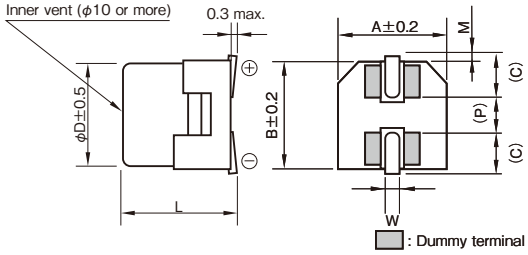

Marking color : Black print

## Specifications

| Item | Performance |
|---|---|
| Category temperature range (℃) | −40 to +125 |
| Tolerance at rated capacitance (%) | ±20 (20℃,120Hz) |
| Leakage current (μA) (max.) | 0.01CV or 3 whichever is larger (after 2 minutes) C : Rated capacitance (μF) , V : Rated voltage (V) (20℃) |
| Tangent of loss angle (tanδ) | Rated voltage (V): 10 / 16 / 25 / 35 / 50 / 63<br>tanδ (max.): 0.24 / 0.20 / 0.16 / 0.14 / 0.14 / 0.12<br>0.02 is added to every 1000μF increase over 1000μF (20℃,120Hz) |
| Characteristics at high and low temperature | Rated voltage (V): 10 / 16 / 25 / 35 / 50 / 63<br>Impedance ratio (max.) Z−25℃/Z+20℃: 3 / 2 / 2 / 2 / 2 / 2<br>Impedance ratio (max.) Z−40℃/Z+20℃: 4 / 3 / 3 / 3 / 3 / 3<br>(120Hz) |
| Endurance (125℃) (Applied ripple current) | Test time: 1000 hours (φ6.3); 2000 hours (φ8, φ10); 3000 hours (63V : φ12.5); 3500 hours (63V : φ16x16.5L, φ18x16.5L); 4000 hours (63V : φ16x21.5L, φ18x21.5L); 5000 hours (50V or less : φ12.5 or more)<br>Leakage current: The initial specified value or less<br>Percentage of capacitance change: Within ±30% of initial value<br>Tangent of loss angle: 300% or less of the initial specified value |
| Shelf life (125℃) | Test time : 1000hours ; other items are same as the endurance. Voltage application treatment : According to JIS C5101-4 4.1 |
| Applicable standards | JIS C5101 - 1, - 18 (IEC 60384 - 1, - 18) |

## Outline Drawing

Unit : mm




( ) : Reference size

| φD | L | A | B | C | W | P | M | Size code |
|---|---|---|---|---|---|---|---|---|
| 6.3 | 7.7±0.3 | 6.6 | 6.6 | 2.7 | 0.5 to 0.8 | 2.0 | 0.4±0.3 | DE7 |
| 8 | 10±0.5 | 8.4 | 8.4 | 3.0 | 0.7 to 1.1 | 3.1 | 0.4±0.3 | EH0 |
| 10 | 10±0.5 | 10.4 | 10.4 | 3.3 | 0.7 to 1.1 | 4.7 | 0.4±0.3 | FH0 |
| 12.5 | 13.5±0.5 | 13.0 | 13.0 | 4.9 | 1.0 to 1.4 | 4.6 | 0.7±0.3 | GL5 |
| 16 | 16.5±0.5 | 17.0 | 17.0 | 5.6 | 1.0 to 1.4 | 7.2 | 0.7±0.3 | JP5 |
| 16 | 21.5±0.5 | 17.0 | 17.0 | 5.6 | 1.0 to 1.4 | 7.2 | 0.7±0.3 | JU5 |
| 18 | 16.5±0.5 | 19.0 | 19.0 | 6.6 | 1.0 to 1.4 | 7.2 | 0.7±0.3 | KP5 |
| 18 | 21.5±0.5 | 19.0 | 19.0 | 6.6 | 1.0 to 1.4 | 7.2 | 0.7±0.3 | KU5 |

Refer to individual page.
(Soldering conditions, Land pattern size, The taping specifications)

## Coefficient of Frequency for Rated Ripple Current

| Frequency (Hz) / Rated voltage (V) | 120 | 1k | 10k | 100k |
|---|---|---|---|---|
| 10 to 63 | 0.77 | 0.88 | 0.96 | 1 |

## Product code system (*For general product)

φ6.3 (example : 10V220μF)

| RS* | VTT | 221 | M | 1L | DE7 | 002 | U |
|---|---|---|---|---|---|---|---|
| Category code | Series code | capacitance code | Cap tol. code | Voltage code | Size code | Taping and packing code | Additional code |

φ8, φ10 (example : 35V100μF)

| RS* | VTT | 101 | M | 1G | FH0 | 002 | SU |
|---|---|---|---|---|---|---|---|
| Category code | Series code | capacitance code | Cap tol. code | Voltage code | Size code | Taping and packing code | Additional code |

50V or less : φ12.5 or more (example : 35V1000μF)

| RS* | VTT | 102 | M | 1G | KU5 | 005 | T |
|---|---|---|---|---|---|---|---|
| Category code | Series code | capacitance code | Cap tol. code | Voltage code | Size code | Taping and packing code | Additional code |

63V : φ12.5 or more (example : 63V220μF)

| RS* | VTT | 221 | M | 4E | JP5 | 005 | KT |
|---|---|---|---|---|---|---|---|
| Category code | Series code | capacitance code | Cap tol. code | Voltage code | Size code | Taping and packing code | Additional code |

・If "Standard (terminal)" type is required, please see the series VVT.
・For details, refer to the various "Product Code System" pages.

Code in front of series have been extracted from product code, which describes the segment of products, such as type and features.

## Standard Ratings

| Rated voltage (V) / Item / Rated capacitance (μF) | 10 (1L) | | | | 16 (1E) | | | | 25 (1T) | | | | 35 (1G) | | | | 50 (1U) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Case | ESR ( Ω max.) | | Rated ripple current | Case | ESR ( Ω max.) | | Rated ripple current | Case | ESR ( Ω max.) | | Rated ripple current | Case | ESR ( Ω max.) | | Rated ripple current | Case | ESR ( Ω max.) | | Rated ripple current |
| | φD × L (mm) | 20℃ | − 40℃ | (mArms) | φD × L (mm) | 20℃ | − 40℃ | (mArms) | φD × L (mm) | 20℃ | − 40℃ | (mArms) | φD × L (mm) | 20℃ | − 40℃ | (mArms) | φD × L (mm) | 20℃ | − 40℃ | (mArms) |
| 22 | – | – | – | – | – | – | – | – | – | – | – | – | – | – | – | – | 6.3×7.7 | 1.2 | 18 | 95 |
| 33 | – | – | – | – | – | – | – | – | – | – | – | – | 6.3×7.7 | 0.60 | 9.0 | 165 | 6.3×7.7 | 1.2 | 18 | 95 |
| | | | | | | | | | | | | | | | | | 8×10 | 0.50 | 7.5 | 180 |
| 47 | – | – | – | – | – | – | – | – | 6.3×7.7 | 0.60 | 9.0 | 165 | 6.3×7.7 | 0.60 | 9.0 | 165 | 8×10 | 0.50 | 7.5 | 180 |
| | | | | | | | | | | | | | 8×10 | 0.20 | 2.0 | 340 | 10×10 | 0.30 | 4.5 | 280 |
| 100 | – | – | – | – | – | – | – | – | 6.3×7.7 | 0.60 | 9.0 | 165 | 8×10 | 0.20 | 2.0 | 340 | 10×10 | 0.30 | 4.5 | 280 |
| | | | | | | | | | 8×10 | 0.20 | 2.0 | 340 | 10×10 | 0.15 | 1.5 | 500 | 12.5×13.5 | 0.18 | 2.7 | 550 |
| 220 | 6.3×7.7 | 0.60 | 9.0 | 165 | 8×10 | 0.20 | 2.0 | 340 | 8×10 | 0.20 | 2.0 | 340 | 8×10 | 0.20 | 2.0 | 340 | 12.5×13.5 | 0.18 | 2.7 | 550 |
| | | | | | 10×10 | 0.15 | 1.5 | 500 | 10×10 | 0.15 | 1.5 | 500 | 10×10 | 0.15 | 1.5 | 500 | | | | |
| 330 | 8×10 | 0.20 | 2.0 | 340 | 10×10 | 0.15 | 1.5 | 500 | 10×10 | 0.15 | 1.5 | 500 | 12.5×13.5 | 0.086 | 1.29 | 750 | 16×16.5 | 0.12 | 1.8 | 850 |
| | 10×10 | 0.15 | 1.5 | 500 | | | | | 12.5×13.5 | 0.086 | 1.29 | 750 | 16×16.5 | 0.060 | 0.90 | 1000 | | | | |
| 470 | 10×10 | 0.15 | 1.5 | 500 | 12.5×13.5 | 0.086 | 1.29 | 750 | 12.5×13.5 | 0.086 | 1.29 | 750 | 16×16.5 | 0.060 | 0.90 | 1000 | 18×16.5 | 0.10 | 1.5 | 920 |
| | | | | | | | | | 16×16.5 | 0.060 | 0.90 | 1000 | | | | | | | | |
| 680 | 12.5×13.5 | 0.086 | 1.29 | 750 | 12.5×13.5 | 0.086 | 1.29 | 750 | 16×16.5 | 0.060 | 0.90 | 1000 | 18×16.5 | 0.050 | 0.75 | 1200 | – | – | – | – |
| | | | | | 16×16.5 | 0.060 | 0.90 | 1000 | 18×16.5 | 0.050 | 0.75 | 1200 | | | | | | | | |
| 1000 | 12.5×13.5 | 0.086 | 1.29 | 750 | 18×16.5 | 0.050 | 0.75 | 1200 | 18×21.5 | 0.042 | 0.63 | 1550 | 18×21.5 | 0.042 | 0.63 | 1550 | – | – | – | – |
| 2200 | 16×16.5 | 0.060 | 0.90 | 1000 | 18×16.5 | 0.050 | 0.75 | 1200 | – | – | – | – | – | – | – | – | – | – | – | – |
| 3300 | 18×16.5 | 0.050 | 0.75 | 1200 | 18×21.5 | 0.042 | 0.63 | 1550 | – | – | – | – | – | – | – | – | – | – | – | – |
| 4700 | 18×21.5 | 0.042 | 0.63 | 1550 | – | – | – | – | – | – | – | – | – | – | – | – | – | – | – | – |

| Rated voltage (V) / Item / Rated capacitance (μF) | 63 (4E) | | | |
|---|---|---|---|---|
| | Case | ESR ( Ω max.) | | Rated ripple current |
| | φD × L (mm) | 20℃ | − 40℃ | (mArms) |
| 22 | 8×10 | 0.70 | 14 | 140 |
| 33 | 8×10 | 0.70 | 14 | 140 |
| | 10×10 | 0.50 | 10 | 200 |
| 47 | 8×10 | 0.70 | 14 | 140 |
| | 10×10 | 0.50 | 10 | 200 |
| 100 | 12.5×13.5 | 0.25 | 3.75 | 400 |
| 220 | 16×16.5 | 0.22 | 3.3 | 500 |
| 330 | 16×16.5 | 0.22 | 3.3 | 500 |
| 470 | 16×21.5 | 0.16 | 2.4 | 650 |

(Note) Rated ripple current : 125℃ , 100kHz
ESR : 100kHz

# Miniature Type Aluminum Electrolytic Capacitors

## ■ Product Code System

R

The Elna product code is Max.20 digits.

Example) RJD series 35V 470μF φ 10x20L

New product code
RSRJD471M1GF20300T

Old product code
RJD-35V471MH5#

| 1 2 | 3 4 5 | 6 7 8 | 9 | 10 11 | 12 | 13 14 | 15 16 17 | 18 19 20 |
|---|---|---|---|---|---|---|---|---|
| R S | R J D | 4 7 1 | M | 1 G | F | 2 0 | 3 0 0 | T |
| Product category code | Series code | Rated capacitance code | Capacitance tolerance code | Rated voltage code | Case size code | | Lead forming and Packing code | Additional code |

1 Product group
R : Energy devices (Electrolytic capacitor)

2 Category
S : For general
*A : For automotive (powertrain, safety)
*C : For automotive (entertainment, audio)
M : For medical (international classification Ⅲ)
L : For medical (international classification Ⅰ, Ⅱ)

* AEC-Q200 Qualified.

10-11 Rated voltage code

| voltage (V) | Code |
|---|---|
| 6.3 | 1J |
| 10 | 1L |
| 16 | 1E |
| 25 | 1T |
| 35 | 1G |
| 50 | 1U |
| 63 | 4E |
| 80 | 1R |
| 100 | 1H |

12 Diameter code

| D(mm) | Code |
|---|---|
| 10 | F |
| 12.5 | G |
| 16 | J |
| 18 | K |

13-14 Length code

| L(mm) | Code |
|---|---|
| 12.5 | 12 |
| 15 | 15 |
| 16 | 16 |
| 20 | 20 |
| 25 | 25 |
| 30 | 30 |
| 31.5 | 31 |
| 35 | 35 |
| 35.5 | 35 |
| 40 | 40 |

3-5 Series code
Please refer to each series page.

15-17 Lead forming and Packing code
Example

| Contents | code |
|---|---|
| Long lead standard packing | 300 |

Please contact us for lead forming, cutting, taping and special packaging.

18-20 Additional code
Example

| Code | Contents |
|---|---|
| T | Sn 100% plated |

Please contact us for details.

6-8 Rated capacitance code
The code denoting nominal capacitance shall consist of three numerals.
The first and second numerals shall represent the significant figures of nominal capacitance in the unit of microfarad (μF), And the third numeral shall represent the number of zeros following the significant figures.
Example

| Rated capacitance (μF) | Code |
|---|---|
| 0.1 | R10 |
| 1 | 010 |
| 2.2 | 2R2 |
| 33 | 330 |
| 100 | 101 |
| 2200 | 222 |
| 33000 | 333 |
| 470000 | 474 |

9 Capacitance tolerance code
Example

| Tolerance (%) | Code |
|---|---|
| ± 10 | K |
| ± 20 | M |
| 0 to +30 | A |
| -10 to +30 | Q |
| -10 to +50 | T |

# ELNA — Miniature Aluminum Electrolytic Capacitors RJB series

Code in front of series have been extracted from product code, which describes the segment of products, such as type and features.

- Low Impedance capacitors.
- Guaranteed 5000 hours at 105°C. (φ10 : 3000 hours)
- Environmental : GREEN CAP™ , RoHS compliance.

Miniaturized

RJB ⇦ RJH

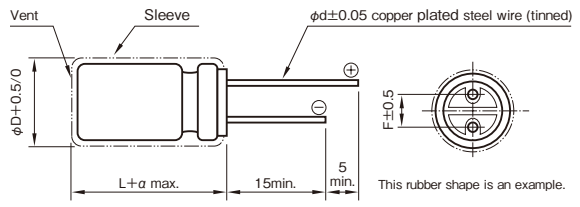
Marking color : White print on a black sleeve

## Specifications

| Item | Performance |
|---|---|
| Category temperature range (℃) | −55 to +105 |
| Tolerance at rated capacitance (%) | ±20 (20℃,120Hz) |
| Leakage current (μA) (max.) | 0.01CV + 1 (after 2 minutes) C : Rated capacitance (μF) ; V : Rated voltage (V) (20℃) |
| Tangent of loss angle (tanδ) | Rated voltage (V): 6.3 / 10 / 16 / 25 / 35 / 50<br>tanδ (max.): 0.22 / 0.19 / 0.16 / 0.14 / 0.12 / 0.10<br>0.02 is added to every 1000μF increase over 1000μF. (20℃,120Hz) |
| Characteristics at high and low temperature | Rated voltage (V): 6.3 / 10 / 16 / 25 / 35 / 50<br>Impedance ratio (max.) Z−55℃/Z+20℃: 3 / 3 / 3 / 3 / 3 / 3<br>(120Hz) |
| Endurance (105℃) (Applied ripple current) | Test time: 5000 hours (φ10 : 3000 hours)<br>Leakage current: The initial specified value or less<br>Percentage of capacitance change: Within ±20% of initial value<br>Tangent of the loss angle: 200% or less of the initial specified value |
| Shelf life (105℃) | Test time: 1000 hours<br>Leakage current: The initial specified value or less<br>Percentage of capacitance change: Within ±15% of initial value<br>Tangent of the loss angle: 150% or less of the initial specified value<br>Voltage application treatment : According to JIS C5101-4 4.1 |
| Applicable standards | JIS C5101 - 1,- 4 (IEC 60384 - 1,- 4) |

## Outline Drawing

Unit : mm




| φD | 10 | 12.5 | 16 |
|---|---|---|---|
| F | 5.0 | 5.0 | 7.5 |
| φd | 0.6 | 0.6 | 0.8 |
| α | 2.0 | 2.0 | 2.0 |

## Coefficient of Frequency for Rated Ripple Current

| Rated capacitance (μF) \ Frequency (Hz) | 120 | 1k | 10k | 100k |
|---|---|---|---|---|
| 150 | 0.40 | 0.75 | 0.90 | 1 |
| 220 to 330 | 0.50 | 0.85 | 0.95 | 1 |
| 470 to 1000 | 0.60 | 0.88 | 0.96 | 1 |
| 2200 to 3300 | 0.75 | 0.90 | 0.98 | 1 |
| 4700 to 10000 | 0.85 | 0.95 | 1.00 | 1 |

## Product code system : 10V1000μF (*For general product)

| RS* | RJB | 102 | M | 1L | F16 | 300 | T |
|---|---|---|---|---|---|---|---|
| Category code | Series code | capacitance code | Cap tol. code | Voltage code | Size code | Lead-forming and packing code | Additional code |

・For details, refer to the various "Product Code System" pages.
・Lead forming and packing code "300" : lead wire is long type and standard packing.
For standard packing, please refer to the "PACKING" page.

Code in front of series have been extracted from product code, which describes the segment of products, such as type and features.

## Standard Ratings

| Rated voltage (V) / Item / Rated capacitance (μF) | 6.3 (1J) | | | | | 10 (1L) | | | | | 16 (1E) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Case φD×L (mm) | Size code | Impedance (Ω max.) 20℃ | Impedance (Ω max.) −10℃ | Rated ripple current (mArms) | Case φD×L (mm) | Size code | Impedance (Ω max.) 20℃ | Impedance (Ω max.) −10℃ | Rated ripple current (mArms) | Case φD×L (mm) | Size code | Impedance (Ω max.) 20℃ | Impedance (Ω max.) −10℃ | Rated ripple current (mArms) |
| 470 | — | — | — | — | — | — | — | — | — | — | 10×12.5 | F12 | 0.12 | 0.24 | 760 |
| 680 | — | — | — | — | — | 10×12.5 | F12 | 0.12 | 0.24 | 760 | 10×16 | F16 | 0.080 | 0.16 | 1050 |
| 1000 | 10×12.5 | F12 | 0.12 | 0.24 | 760 | 10×16 | F16 | 0.080 | 0.16 | 1050 | 10×20 | F20 | 0.062 | 0.124 | 1220 |
| 2200 | 10×25 | F25 | 0.052 | 0.104 | 1440 | 12.5×20 | G20 | 0.042 | 0.084 | 1690 | 12.5×25 | G25 | 0.034 | 0.068 | 1950 |
| 3300 | 12.5×20 | G20 | 0.042 | 0.084 | 1690 | 12.5×25 | G25 | 0.034 | 0.068 | 1950 | 16×25 | J25 | 0.028 | 0.056 | 2560 |
| 4700 | 12.5×30 | G30 | 0.030 | 0.060 | 2310 | 16×25 | J25 | 0.028 | 0.056 | 2560 | 16×31.5 | J31 | 0.025 | 0.050 | 3010 |
| 6800 | 16×25 | J25 | 0.028 | 0.056 | 2560 | 16×31.5 | J31 | 0.025 | 0.050 | 3010 | — | — | — | — | — |
| 10000 | 16×31.5 | J31 | 0.025 | 0.050 | 3010 | — | — | — | — | — | — | — | — | — | — |

| Rated voltage (V) / Item / Rated capacitance (μF) | 25 (1T) | | | | | 35 (1G) | | | | | 50 (1U) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Case φD×L (mm) | Size code | Impedance (Ω max.) 20℃ | Impedance (Ω max.) −10℃ | Rated ripple current (mArms) | Case φD×L (mm) | Size code | Impedance (Ω max.) 20℃ | Impedance (Ω max.) −10℃ | Rated ripple current (mArms) | Case φD×L (mm) | Size code | Impedance (Ω max.) 20℃ | Impedance (Ω max.) −10℃ | Rated ripple current (mArms) |
| 150 | — | — | — | — | — | — | — | — | — | — | 10×12.5 | F12 | 0.19 | 0.38 | 615 |
| 220 | — | — | — | — | — | 10×12.5 | F12 | 0.12 | 0.24 | 760 | 10×16 | F16 | 0.16 | 0.32 | 850 |
| 330 | 10×12.5 | F12 | 0.12 | 0.24 | 760 | 10×16 | F16 | 0.080 | 0.16 | 1050 | 10×20 | F20 | 0.085 | 0.17 | 1050 |
| 470 | 10×16 | F16 | 0.080 | 0.16 | 1050 | 10×20 | F20 | 0.062 | 0.124 | 1220 | 12.5×20 | G20 | 0.060 | 0.12 | 1500 |
| 680 | 10×20 | F20 | 0.062 | 0.124 | 1220 | 12.5×20 | G20 | 0.042 | 0.084 | 1690 | 12.5×25 | G25 | 0.045 | 0.090 | 1832 |
| 1000 | 12.5×20 | G20 | 0.042 | 0.084 | 1690 | 12.5×25 | G25 | 0.034 | 0.068 | 1950 | 16×25 | J25 | 0.038 | 0.076 | 2240 |
| 2200 | 16×25 | J25 | 0.028 | 0.056 | 2560 | 16×31.5 | J31 | 0.025 | 0.050 | 3010 | — | — | — | — | — |
| 3300 | 16×31.5 | J31 | 0.025 | 0.050 | 3010 | — | — | — | — | — | — | — | — | — | — |

(Note) Rated ripple current : 105℃, 100kHz ; Impedance : 100kHz

# ELNA — Miniature Aluminum Electrolytic Capacitors RJH series

Code in front of series have been extracted from product code, which describes the segment of products, such as type and features.

- Low Impedance capacitors.
- Guaranteed 5000 hours at 105℃. (φ10 : 3000 hours)
- Environmental : GREEN CAP™ , RoHS compliance.

Long life

RJH ⇦ RJ3

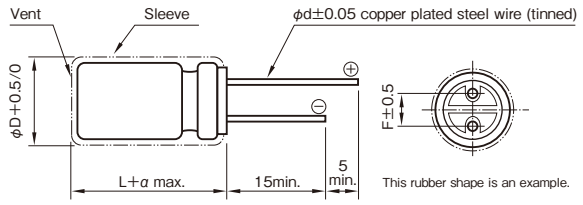
Marking color : White print on a black sleeve

## Specifications

| Item | Performance |
|---|---|
| Category temperature range (℃) | −55 to +105 |
| Tolerance at rated capacitance (%) | ±20 (20℃,120Hz) |
| Leakage current (μA) (max.) | 0.01CV + 2 (after 2 minutes) C : Rated capacitance (μF) ; V : Rated voltage (V) (20℃) |
| Tangent of loss angle (tanδ) | Rated voltage (V): 6.3 / 10 / 16 / 25 / 35 / 50<br>tanδ (max.): 0.22 / 0.19 / 0.16 / 0.14 / 0.12 / 0.10<br>0.02 is added to every 1000μF increase over 1000μF. (20℃,120Hz) |
| Characteristics at high and low temperature | Rated voltage (V): 6.3 / 10 / 16 / 25 / 35 / 50<br>Impedance ratio (max.) Z−25℃/Z+20℃: 2 / 2 / 2 / 2 / 2 / 2<br>Impedance ratio (max.) Z−55℃/Z+20℃: 3 / 3 / 3 / 3 / 3 / 3<br>(120Hz) |
| Endurance (105℃) (Applied ripple current) | Test time: 5000 hours (φ10 : 3000 hours)<br>Leakage current: The initial specified value or less<br>Percentage of capacitance change: Within ±20% of initial value<br>Tangent of the loss angle: 200% or less of the initial specified value |
| Shelf life (105℃) | Test time: 1000 hours<br>Leakage current: The initial specified value or less<br>Percentage of capacitance change: Within ±15% of initial value<br>Tangent of the loss angle: 150% or less of the initial specified value<br>Voltage application treatment : According to JIS C5101-4 4.1 |
| Applicable standards | JIS C5101 - 1, - 4 (IEC 60384 - 1, - 4) |

## Outline Drawing

Unit : mm




| φD | 10 | 12.5 | 16 | 18 |
|---|---|---|---|---|
| F | 5.0 | 5.0 | 7.5 | 7.5 |
| φd | 0.6 | 0.6 | 0.8 | 0.8 |
| α | 2.0 | 2.0 | 2.0 | 2.0 |

## Coefficient of Frequency for Rated Ripple Current

| Rated capacitance (μF) \ Frequency (Hz) | 120 | 1k | 10k | 100k |
|---|---|---|---|---|
| 82 to 270 | 0.70 | 0.85 | 0.90 | 1 |
| 330 to 1000 | 0.80 | 0.93 | 0.98 | 1 |
| 1200 to 15000 | 0.90 | 0.95 | 1.00 | 1 |

Product code system : 10V5600μF (*For general product)

| RS* | RJH | 562 | M | 1L | J31 | 300 | T |
|---|---|---|---|---|---|---|---|
| Category code | Series code | capacitance code | Cap tol. code | Voltage code | Size code | Lead-forming and packing code | Additional code |

・For details, refer to the various "Product Code System" pages.
・Lead forming and packing code “300” : lead wire is long type and standard packing.
For standard packing, please refer to the "PACKING" page.

NOTE : Design, Specifications are subject to change without notice.
It is recommended that you shall obtain technical specifications from ELNA to ensure that the component is suitable for your use.

Code in front of series have been extracted from product code, which describes the segment of products, such as type and features.

## Standard Ratings

| Rated voltage (V) / Item / Case φD×L (mm) | Size code | 6.3 (1J) Rated capacitance (μF) | ESR (Ω) | Impedance (Ω max.) 20℃ | Impedance (Ω max.) −10℃ | Rated ripple current (mArms) | 10 (1L) Rated capacitance (μF) | ESR (Ω) | Impedance (Ω max.) 20℃ | Impedance (Ω max.) −10℃ | Rated ripple current (mArms) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 10×12.5 | F12 | 680 | 0.537 | 0.10 | 0.23 | 625 | 470 | 0.671 | 0.10 | 0.23 | 625 |
| 10×16 | F16 | 820 | 0.446 | 0.080 | 0.18 | 825 | 560 | 0.563 | 0.080 | 0.18 | 825 |
| 10×20 | F20 | 1200 | 0.305 | 0.062 | 0.14 | 1010 | 1000 | 0.316 | 0.062 | 0.14 | 1010 |
| 10×25 | F25 | 1500 | 0.244 | 0.052 | 0.12 | 1190 | 1200 | 0.263 | 0.052 | 0.12 | 1190 |
| 10×30 | F30 | 2200 | 0.181 | 0.044 | 0.099 | 1440 | 1500 | 0.211 | 0.044 | 0.099 | 1440 |
| 12.5×15 | G15 | • 1200 | 0.305 | 0.062 | 0.14 | 1010 | • 1000 | 0.316 | 0.062 | 0.14 | 1010 |
| 12.5×20 | G20 | 2200 | 0.181 | 0.042 | 0.095 | 1400 | 1800 | 0.176 | 0.042 | 0.095 | 1400 |
| 12.5×25 | G25 | 2700 | 0.148 | 0.034 | 0.076 | 1690 | 2200 | 0.159 | 0.034 | 0.076 | 1690 |
| 12.5×30 | G30 | 3900 | 0.111 | 0.030 | 0.068 | 1950 | 2700 | 0.130 | 0.030 | 0.068 | 1950 |
| 12.5×35 | G35 | 4700 | 0.099 | 0.024 | 0.054 | 2220 | 3300 | 0.116 | 0.024 | 0.054 | 2220 |
| 12.5×40 | G40 | 5600 | 0.089 | 0.021 | 0.047 | 2390 | 3900 | 0.098 | 0.021 | 0.047 | 2390 |
| 16×16 | J16 | • 2700 | 0.148 | 0.046 | 0.10 | 1310 | • 1800 | 0.176 | 0.046 | 0.10 | 1310 |
| 16×20 | J20 | • 4700 | 0.099 | 0.034 | 0.077 | 1660 | • 3300 | 0.116 | 0.034 | 0.077 | 1660 |
| 16×25 | J25 | 5600 | 0.089 | 0.028 | 0.063 | 2070 | 3900 | 0.098 | 0.028 | 0.063 | 2070 |
| 16×31.5 | J31 | 6800 | 0.079 | 0.025 | 0.056 | 2350 | 5600 | 0.080 | 0.025 | 0.056 | 2350 |
| 16×35.5 | J35 | 8200 | 0.073 | 0.022 | 0.050 | 2550 | 6800 | 0.071 | 0.022 | 0.050 | 2550 |
| 16×40 | J40 | 12000 | 0.059 | 0.018 | 0.041 | 2970 | 8200 | 0.067 | 0.018 | 0.041 | 2970 |
| 18×16 | K16 | • 3300 | 0.131 | 0.043 | 0.097 | 1460 | • 2200 | 0.159 | 0.043 | 0.097 | 1460 |
| 18×20 | K20 | • 5600 | 0.089 | 0.030 | 0.068 | 1850 | • 3900 | 0.098 | 0.030 | 0.068 | 1850 |
| 18×25 | K25 | • 6800 | 0.079 | 0.027 | 0.061 | 2120 | • 4700 | 0.089 | 0.027 | 0.061 | 2120 |
| 18×31.5 | K31 | 10000 | 0.064 | 0.023 | 0.052 | 2410 | 6800 | 0.071 | 0.023 | 0.052 | 2410 |
| 18×35.5 | K35 | 12000 | 0.059 | 0.019 | 0.043 | 2680 | 8200 | 0.067 | 0.019 | 0.043 | 2680 |
| 18×40 | K40 | 15000 | 0.054 | 0.017 | 0.038 | 3010 | 10000 | 0.059 | 0.017 | 0.038 | 3010 |

| Rated voltage (V) / Item / Case φD×L (mm) | Size code | 16 (1E) Rated capacitance (μF) | ESR (Ω) | Impedance (Ω max.) 20℃ | Impedance (Ω max.) −10℃ | Rated ripple current (mArms) | 25 (1T) Rated capacitance (μF) | ESR (Ω) | Impedance (Ω max.) 20℃ | Impedance (Ω max.) −10℃ | Rated ripple current (mArms) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 10×12.5 | F12 | 330 | 0.805 | 0.10 | 0.23 | 625 | 220 | 1.06 | 0.10 | 0.23 | 625 |
| 10×16 | F16 | 390 | 0.681 | 0.080 | 0.18 | 825 | 270 | 0.861 | 0.080 | 0.18 | 825 |
| 10×20 | F20 | 680 | 0.391 | 0.062 | 0.14 | 1010 | 470 | 0.495 | 0.062 | 0.14 | 1010 |
| 10×25 | F25 | 820 | 0.324 | 0.052 | 0.12 | 1190 | 560 | 0.415 | 0.052 | 0.12 | 1190 |
| 10×30 | F30 | 1200 | 0.222 | 0.044 | 0.099 | 1440 | 820 | 0.284 | 0.044 | 0.099 | 1440 |
| 12.5×15 | G15 | • 680 | 0.391 | 0.062 | 0.14 | 1010 | • 470 | 0.495 | 0.062 | 0.14 | 1010 |
| 12.5×20 | G20 | 1200 | 0.222 | 0.042 | 0.095 | 1400 | 820 | 0.284 | 0.042 | 0.095 | 1400 |
| 12.5×25 | G25 | 1500 | 0.177 | 0.034 | 0.076 | 1690 | 1000 | 0.233 | 0.034 | 0.076 | 1690 |
| 12.5×30 | G30 | 2200 | 0.136 | 0.030 | 0.068 | 1950 | 1500 | 0.155 | 0.030 | 0.068 | 1950 |
| 12.5×35 | G35 | 2700 | 0.111 | 0.024 | 0.054 | 2220 | 1800 | 0.130 | 0.024 | 0.054 | 2220 |
| 12.5×40 | G40 | 3300 | 0.101 | 0.021 | 0.047 | 2390 | 2200 | 0.121 | 0.021 | 0.047 | 2390 |
| 16×16 | J16 | • 1500 | 0.177 | 0.046 | 0.10 | 1310 | • 820 | 0.284 | 0.046 | 0.10 | 1310 |
| 16×20 | J20 | • 2200 | 0.136 | 0.034 | 0.077 | 1660 | • 1500 | 0.155 | 0.034 | 0.077 | 1660 |
| 16×25 | J25 | 2700 | 0.111 | 0.028 | 0.063 | 2070 | 1800 | 0.130 | 0.028 | 0.063 | 2070 |
| 16×31.5 | J31 | 3900 | 0.086 | 0.025 | 0.056 | 2350 | 2700 | 0.099 | 0.025 | 0.056 | 2350 |
| 16×35.5 | J35 | 4700 | 0.078 | 0.022 | 0.050 | 2550 | 3300 | 0.091 | 0.022 | 0.050 | 2550 |
| 16×40 | J40 | 5600 | 0.072 | 0.018 | 0.041 | 2970 | 3900 | 0.077 | 0.018 | 0.041 | 2970 |
| 18×16 | K16 | • 1500 | 0.177 | 0.043 | 0.097 | 1460 | • 1200 | 0.194 | 0.043 | 0.097 | 1460 |
| 18×20 | K20 | • 2700 | 0.111 | 0.030 | 0.068 | 1850 | • 1800 | 0.130 | 0.030 | 0.068 | 1850 |
| 18×25 | K25 | • 3900 | 0.086 | 0.027 | 0.061 | 2120 | • 2700 | 0.099 | 0.027 | 0.061 | 2120 |
| 18×31.5 | K31 | 4700 | 0.078 | 0.023 | 0.052 | 2410 | 3300 | 0.091 | 0.023 | 0.052 | 2410 |
| 18×35.5 | K35 | 6800 | 0.064 | 0.019 | 0.043 | 2680 | 3900 | 0.077 | 0.019 | 0.043 | 2680 |
| 18×40 | K40 | 8200 | 0.061 | 0.017 | 0.038 | 3010 | 4700 | 0.071 | 0.017 | 0.038 | 3010 |

(Note) Rated ripple current : 105℃, 100kHz ; ESR. : 20℃, 120Hz ; Impedance : 100kHz

• : The black circles in the capacitance column denote semi-standard products.

Code in front of series have been extracted from product code, which describes the segment of products, such as type and features.

## Standard Ratings

| Rated voltage (V) / Case φD×L (mm) | Item code | 35 (1G) Rated capacitance (μF) | ESR (Ω) | Impedance (Ω max.) 20℃ | Impedance (Ω max.) −10℃ | Rated ripple current (mArms) | 50 (1U) Rated capacitance (μF) | ESR (Ω) | Impedance (Ω max.) 20℃ | Impedance (Ω max.) −10℃ | Rated ripple current (mArms) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 10×12.5 | F12 | 150 | 1.33 | 0.10 | 0.23 | 625 | 82 | 2.02 | 0.18 | 0.36 | 443 |
| 10×16 | F16 | 180 | 1.11 | 0.080 | 0.18 | 825 | 100 | 1.66 | 0.15 | 0.30 | 553 |
| 10×20 | F20 | 330 | 0.604 | 0.062 | 0.14 | 1010 | 180 | 0.922 | 0.085 | 0.17 | 676 |
| 10×25 | F25 | 390 | 0.511 | 0.052 | 0.12 | 1190 | 220 | 0.754 | 0.075 | 0.15 | 876 |
| 10×30 | F30 | 560 | 0.356 | 0.044 | 0.099 | 1440 | 330 | 0.503 | 0.055 | 0.11 | 1010 |
| 12.5×15 | G15 | • 330 | 0.604 | 0.062 | 0.140 | 1010 | • 180 | 0.922 | 0.095 | 0.19 | 745 |
| 12.5×20 | G20 | 560 | 0.356 | 0.042 | 0.095 | 1400 | 330 | 0.503 | 0.060 | 0.12 | 979 |
| 12.5×25 | G25 | 680 | 0.293 | 0.034 | 0.076 | 1690 | 470 | 0.353 | 0.044 | 0.088 | 1180 |
| 12.5×30 | G30 | 1000 | 0.200 | 0.030 | 0.068 | 1950 | 560 | 0.297 | 0.040 | 0.080 | 1310 |
| 12.5×35 | G35 | 1200 | 0.166 | 0.024 | 0.054 | 2220 | 680 | 0.244 | 0.036 | 0.072 | 1470 |
| 12.5×40 | G40 | 1500 | 0.133 | 0.021 | 0.047 | 2390 | 820 | 0.203 | 0.034 | 0.068 | 1590 |
| 16×16 | J16 | • 560 | 0.356 | 0.046 | 0.10 | 1310 | • 330 | 0.503 | 0.065 | 0.13 | 982 |
| 16×20 | J20 | • 1000 | 0.200 | 0.034 | 0.077 | 1660 | • 680 | 0.244 | 0.045 | 0.090 | 1210 |
| 16×25 | J25 | 1200 | 0.166 | 0.028 | 0.063 | 2070 | 820 | 0.203 | 0.038 | 0.076 | 1490 |
| 16×31.5 | J31 | 1800 | 0.111 | 0.025 | 0.056 | 2350 | 1000 | 0.166 | 0.032 | 0.064 | 1890 |
| 16×35.5 | J35 | 2200 | 0.106 | 0.022 | 0.050 | 2550 | 1200 | 0.139 | 0.028 | 0.056 | 2140 |
| 16×40 | J40 | 2700 | 0.087 | 0.018 | 0.041 | 2970 | 1500 | 0.111 | 0.026 | 0.052 | 2410 |
| 18×16 | K16 | • 680 | 0.293 | 0.043 | 0.097 | 1460 | • 470 | 0.353 | 0.048 | 0.096 | 1180 |
| 18×20 | K20 | • 1200 | 0.166 | 0.030 | 0.068 | 1850 | • 820 | 0.203 | 0.036 | 0.072 | 1450 |
| 18×25 | K25 | • 1800 | 0.111 | 0.027 | 0.061 | 2120 | • 1000 | 0.166 | 0.032 | 0.064 | 1720 |
| 18×31.5 | K31 | 2200 | 0.106 | 0.023 | 0.052 | 2410 | 1500 | 0.111 | 0.026 | 0.052 | 1970 |
| 18×35.5 | K35 | 2700 | 0.087 | 0.019 | 0.043 | 2680 | 1800 | 0.074 | 0.025 | 0.050 | 2310 |
| 18×40 | K40 | 3300 | 0.081 | 0.017 | 0.038 | 3010 | 2200 | 0.073 | 0.024 | 0.048 | 2530 |

(Note) Rated ripple current : 105°C, 100kHz ; ESR. : 20°C, 120Hz ; Impedance : 100kHz

• : The black circles in the capacitance column denote semi-standard products.

# ELNA — Miniature Aluminum Electrolytic Capacitors RJF series

Code in front of series have been extracted from product code, which describes the segment of products, such as type and features.

- Extra low impedance capacitor.
- Environmental : GREEN CAP™ , RoHS compliance.

Low impedance

RJF ⇦ RJB

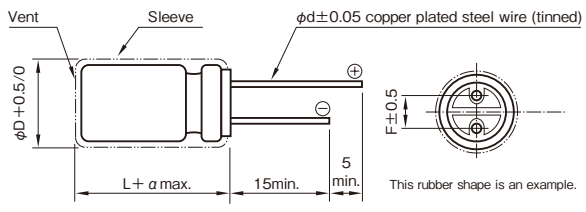

Marking color : White print on a black sleeve

## Specifications

| Item | Performance |
|---|---|
| Category temperature range (℃) | −40 to +105 |
| Tolerance at rated capacitance (%) | ±20 (20℃,120Hz) |
| Leakage current (μA) (max.) | 0.01CV or 3 whichever is larger (after 2 minutes) C : Rated capacitance (μF) ; V : Rated voltage (V) (20℃) |
| Tangent of loss angle (tanδ) | Rated voltage (V): 6.3 / 10 / 16 / 25 / 35 / 50<br>tanδ (max.): 0.22 / 0.19 / 0.16 / 0.14 / 0.12 / 0.10<br>0.02 is added to every 1000μF increase over 1000μF. (20℃,120Hz) |
| Characteristics at high and low temperature | Rated voltage (V): 6.3 / 10 / 16 / 25 / 35 / 50<br>Impedance ratio (max.) Z−25℃/Z+20℃: 2 / 2 / 2 / 2 / 2 / 2<br>Impedance ratio (max.) Z−40℃/Z+20℃: 3 / 3 / 3 / 3 / 3 / 3<br>(120Hz) |
| Endurance (105℃) (Applied ripple current) | Test time: φ10 : 3000 hours; φ12.5 to φ18 : 5000 hours<br>Leakage current: The initial specified value or less<br>Percentage of capacitance change: Within ±25% of initial value<br>Tangent of the loss angle: 200% or less of the initial specified value |
| Shelf life (105℃) | Test time: 1000 hours<br>Leakage current: The initial specified value or less<br>Percentage of capacitance change: Within ±25% of initial value<br>Tangent of the loss angle: 200% or less of the initial specified value<br>Voltage application treatment : According to JIS C5101-4 4.1 |
| Applicable standards | JIS C5101 - 1,- 4 (IEC 60384 - 1,- 4) |

## Outline Drawing

Unit : mm




| φD | 10 | 12.5 | 16 |
|---|---|---|---|
| F | 5.0 | 5.0 | 7.5 |
| φd | 0.6 | 0.6 | 0.8 |
| α | 2.0 | 2.0 | 2.0 |

## Coefficient of Frequency for Rated Ripple Current

| Rated capacitance (μF) \ Frequency (Hz) | 120 | 1k | 10k | 100k |
|---|---|---|---|---|
| 150 | 0.40 | 0.75 | 0.90 | 1 |
| 220 to 330 | 0.50 | 0.85 | 0.94 | 1 |
| 470 to 1800 | 0.60 | 0.87 | 0.95 | 1 |
| 2200 to 3900 | 0.75 | 0.90 | 0.95 | 1 |
| 4700 to 6800 | 0.85 | 0.95 | 0.98 | 1 |

## Product code system : 10V1000μF (*For general product)

| RS* | RJF | 102 | M | 1L | F16 | 300 | T |
|---|---|---|---|---|---|---|---|
| Category code | Series code | capacitance code | Cap tol. code | Voltage code | Size code | Lead-forming and packing code | Additional code |

・For details, refer to the various "Product Code System" pages.
・Lead forming and packing code “300” : lead wire is long type and standard packing.
For standard packing, please refer to the "PACKING" page.

NOTE : Design, Specifications are subject to change without notice.
It is recommended that you shall obtain technical specifications from ELNA to ensure that the component is suitable for your use.

Code in front of series have been extracted from product code, which describes the segment of products, such as type and features.

## Standard Ratings

| Rated voltage (V) / Item / Rated capacitance (μF) | 6.3 (1J) | | | | | 10 (1L) | | | | | 16 (1E) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Case φDxL (mm) | Size code | Impedance (Ω max.) | | Rated ripple current | Case φDxL (mm) | Size code | Impedance (Ω max.) | | Rated ripple current | Case φDxL (mm) | Size code | Impedance (Ω max.) | | Rated ripple current |
| | | | 20℃ | − 10℃ | (mArms) | | | 20℃ | − 10℃ | (mArms) | | | 20℃ | − 10℃ | (mArms) |
| 560 | — | — | — | — | — | — | — | — | — | — | 10 × 16 | F16 | 0.028 | 0.10 | 1760 |
| 680 | — | — | — | — | — | 10 × 12.5 | F12 | 0.039 | 0.14 | 1330 | — | — | — | — | — |
| 1000 | 10 × 12.5 | F12 | 0.039 | 0.14 | 1330 | 10 × 16 | F16 | 0.028 | 0.10 | 1760 | 10 × 20 | F20 | 0.020 | 0.060 | 1960 |
| 1200 | 10 × 16 | F16 | 0.028 | 0.10 | 1760 | 10 × 20 | F20 | 0.020 | 0.060 | 1960 | 10 × 25 | F25 | 0.018 | 0.054 | 2250 |
| 1500 | 10 × 20 | F20 | 0.020 | 0.060 | 1960 | 10 × 25 | F25 | 0.018 | 0.054 | 2250 | 12.5 × 20 | G20 | 0.017 | 0.043 | 2480 |
| 2200 | 10 × 25 | F25 | 0.018 | 0.054 | 2250 | 12.5 × 20 | G20 | 0.017 | 0.043 | 2480 | 12.5 × 25 | G25 | 0.015 | 0.038 | 2900 |
| 2700 | — | — | — | — | — | — | — | — | — | — | 16 × 20 | J20 | 0.015 | 0.038 | 3250 |
| 3300 | 12.5 × 20 | G20 | 0.017 | 0.043 | 2480 | 12.5 × 25 | G25 | 0.015 | 0.038 | 2900 | 16 × 25 | J25 | 0.013 | 0.035 | 3630 |
| 3900 | 12.5 × 25 | G25 | 0.015 | 0.038 | 2900 | 16 × 20 | J20 | 0.015 | 0.038 | 3250 | 16 × 25 | J25 | 0.013 | 0.035 | 3630 |
| 4700 | 12.5 × 30 | G30 | 0.013 | 0.033 | 3450 | 16 × 25 | J25 | 0.013 | 0.035 | 3630 | — | — | — | — | — |
| 5600 | 16 × 20 | J20 | 0.015 | 0.038 | 3570 | 16 × 25 | J25 | 0.013 | 0.035 | 3630 | — | — | — | — | — |
| 6800 | 16 × 25 | J25 | 0.013 | 0.035 | 3630 | — | — | — | — | — | — | — | — | — | — |

| Rated voltage (V) / Item / Rated capacitance (μF) | 25 (1T) | | | | | 35 (1G) | | | | | 50 (1U) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Case φD × L (mm) | Size code | Impedance (Ω max.) | | Rated ripple current | Case φD × L (mm) | Size code | Impedance (Ω max.) | | Rated ripple current | Case φD × L (mm) | Size code | Impedance (Ω max.) | | Rated ripple current |
| | | | 20℃ | − 10℃ | (mArms) | | | 20℃ | − 10℃ | (mArms) | | | 20℃ | − 10℃ | (mArms) |
| 150 | — | — | — | — | — | — | — | — | — | — | 10 × 12.5 | F12 | 0.061 | 0.18 | 979 |
| 220 | — | — | — | — | — | 10 × 12.5 | F12 | 0.039 | 0.14 | 1330 | 10 × 16 | F16 | 0.042 | 0.12 | 1370 |
| 270 | — | — | — | — | — | — | — | — | — | — | 10 × 20 | F20 | 0.030 | 0.090 | 1580 |
| 330 | 10 × 12.5 | F12 | 0.039 | 0.14 | 1330 | 10 × 16 | F16 | 0.028 | 0.10 | 1760 | 10 × 25 | F25 | 0.028 | 0.085 | 1870 |
| 470 | 10 × 16 | F16 | 0.028 | 0.10 | 1760 | 10 × 20 | F20 | 0.020 | 0.060 | 1960 | 12.5 × 20 | G20 | 0.027 | 0.068 | 2050 |
| 560 | — | — | — | — | — | 10 × 25 | F25 | 0.018 | 0.054 | 2250 | 12.5 × 25 | G25 | 0.023 | 0.059 | 2410 |
| 680 | 10 × 20 | F20 | 0.020 | 0.060 | 1960 | 12.5 × 20 | G20 | 0.017 | 0.043 | 2480 | 16 × 20 | J20 | 0.023 | 0.059 | 2730 |
| 820 | 10 × 25 | F25 | 0.018 | 0.054 | 2250 | — | — | — | — | — | 16 × 20 | J20 | 0.023 | 0.059 | 2730 |
| 1000 | 12.5 × 20 | G20 | 0.017 | 0.043 | 2480 | 12.5 × 25 | G25 | 0.015 | 0.038 | 2900 | 16 × 25 | J25 | 0.021 | 0.056 | 3010 |
| 1200 | — | — | — | — | — | 16 × 20 | J20 | 0.015 | 0.038 | 3250 | — | — | — | — | — |
| 1500 | 12.5 × 25 | G25 | 0.015 | 0.038 | 2900 | 16 × 25 | J25 | 0.013 | 0.035 | 3630 | — | — | — | — | — |
| 1800 | 16 × 20 | J20 | 0.015 | 0.038 | 3250 | 16 × 25 | J25 | 0.013 | 0.035 | 3630 | — | — | — | — | — |
| 2200 | 16 × 25 | J25 | 0.013 | 0.035 | 3630 | — | — | — | — | — | — | — | — | — | — |
| 2700 | 16 × 25 | J25 | 0.013 | 0.035 | 3630 | — | — | — | — | — | — | — | — | — | — |

(Note) Rated ripple current : 105℃ , 100kHz ; Impedance : 100kHz

# ELNA

# Miniature Aluminum Electrolytic Capacitors RJM series

Code in front of series have been extracted from product code, which describes the segment of products, such as type and features.

- Long life, extra low impedance capacitor.
- Guaranteed 10000 hours at 105℃.
- Environmental：GREEN CAP™ , RoHS compliance.

Long life

RJM ⇦ RJF

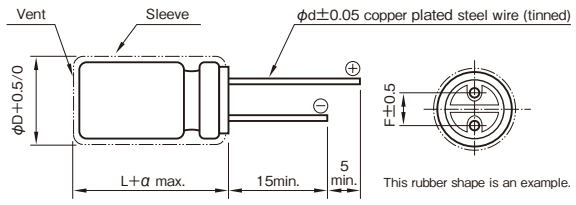

Marking color : White print on a black sleeve

## Specifications

| Item | Performance |
|---|---|
| Category temperature range (℃) | −40 to +105 |
| Tolerance at rated capacitance (%) | ±20 (20℃,120Hz) |
| Leakage current (μA) (max.) | 0.01CV or 3 whichever is larger (after 2 minutes) C : Rated capacitance (μF), V : Rated voltage (V) (20℃) |
| Tangent of loss angle (tanδ) | Rated voltage (V): 6.3 / 10 / 16 / 25 / 35 / 50<br>tanδ (max.): 0.22 / 0.19 / 0.16 / 0.14 / 0.12 / 0.10<br>0.02 is added to every 1000μF increase over 1000μF. (20℃,120Hz) |
| Characteristics at high and low temperature | Rated voltage (V): 6.3 / 10 / 16 / 25 / 35 / 50<br>Impedance ratio (max.) Z−25℃/Z+20℃: 2 / 2 / 2 / 2 / 2 / 2<br>Impedance ratio (max.) Z−40℃/Z+20℃: 3 / 3 / 3 / 3 / 3 / 3<br>(120Hz) |
| Endurance (105℃) (Applied ripple current) | Test time: 10000 hours<br>Leakage current: The initial specified value or less<br>Percentage of capacitance change: Within ±25% of initial value<br>Tangent of the loss angle: 200% or less of the initial specified value |
| Shelf life (105℃) | Test time: 1000 hours<br>Leakage current: The initial specified value or less<br>Percentage of capacitance change: Within ±25% of initial value<br>Tangent of the loss angle: 200% or less of the initial specified value<br>Voltage application treatment : According to JIS C5101-4 4.1 |
| Applicable standards | JIS C5101 - 1, - 4 (IEC 60384 - 1, - 4) |

## Outline Drawing

Unit : mm




| ϕD | 10 | 12.5 | 16 |
|---|---|---|---|
| F | 5.0 | 5.0 | 7.5 |
| ϕd | 0.6 | 0.6 | 0.8 |
| α | 2.0 | 2.0 | 2.0 |

## Coefficient of Frequency for Rated Ripple Current

| Rated capacitance (μF) \ Frequency (Hz) | 120 | 1k | 10k | 100k |
|---|---|---|---|---|
| 150 to 270 | 0.50 | 0.73 | 0.92 | 1 |
| 330 to 680 | 0.55 | 0.77 | 0.94 | 1 |
| 820 to 1800 | 0.60 | 0.80 | 0.96 | 1 |
| 2200 to 8200 | 0.70 | 0.85 | 0.98 | 1 |

Product code system : 10V1000μF (*For general product)

| RS* | RJM | 102 | M | 1L | F12 | 300 | T |
|---|---|---|---|---|---|---|---|
| Category code | Series code | capacitance code | Cap tol. code | Voltage code | Size code | Lead-forming and packing code | Additional code |

・For details, refer to the various "Product Code System" pages.
・Lead forming and packing code “300” : lead wire is long type and standard packing.
For standard packing, please refer to the "PACKING" page.

NOTE : Design, Specifications are subject to change without notice.
It is recommended that you shall obtain technical specifications from ELNA to ensure that the component is suitable for your use.

Code in front of series have been extracted from product code, which describes the segment of products, such as type and features.

## Standard Ratings

| Rated voltage(V) / Item / Rated capacitance (μF) | 6.3 (1J) | | | | | 10 (1L) | | | | | 16 (1E) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Case φDxL (mm) | Size code | Impedance (Ω max.) 20℃ | Impedance (Ω max.) − 10℃ | Rated ripple current (mArms) | Case φDxL (mm) | Size code | Impedance (Ω max.) 20℃ | Impedance (Ω max.) − 10℃ | Rated ripple current (mArms) | Case φDxL (mm) | Size code | Impedance (Ω max.) 20℃ | Impedance (Ω max.) − 10℃ | Rated ripple current (mArms) |
| 680 | — | — | — | — | — | — | — | — | — | — | 10×12.5 | F12 | 0.039 | 0.14 | 1560 |
| 1000 | — | — | — | — | — | 10×12.5 | F12 | 0.039 | 0.14 | 1560 | 10×16 | F16 | 0.028 | 0.10 | 2000 |
| 1200 | 10×12.5 | F12 | 0.039 | 0.14 | 1560 | — | — | — | — | — | — | — | — | — | — |
| 1500 | — | — | — | — | — | 10×16 | F16 | 0.028 | 0.10 | 2000 | 10×20 | F20 | 0.020 | 0.060 | 2500 |
| 1800 | 10×16 | F16 | 0.028 | 0.10 | 2000 | 10×20 | F20 | 0.020 | 0.060 | 2500 | 10×25 | F25 | 0.017 | 0.051 | 2900 |
| 2200 | 10×20 | F20 | 0.020 | 0.060 | 2500 | 10×25 | F25 | 0.017 | 0.051 | 2900 | 12.5×20 | G20 | 0.017 | 0.043 | 2600 |
| 2700 | 10×25 | F25 | 0.017 | 0.051 | 2900 | — | — | — | — | — | 12.5×25 | G25 | 0.015 | 0.038 | 3200 |
| 3300 | — | — | — | — | — | 12.5×20 | G20 | 0.017 | 0.043 | 2600 | 12.5×30 | G30 | 0.013 | 0.033 | 3795 |
| | | | | | | | | | | | 16×20 | J20 | 0.015 | 0.038 | 3575 |
| 3900 | 12.5×20 | G20 | 0.017 | 0.043 | 2600 | 12.5×25 | G25 | 0.015 | 0.038 | 3200 | 12.5×35 | G35 | 0.012 | 0.031 | 4120 |
| 4700 | 12.5×25 | G25 | 0.015 | 0.038 | 3200 | 12.5×30 | G30 | 0.013 | 0.033 | 3795 | 16×25 | J25 | 0.013 | 0.035 | 3810 |
| | | | | | | 16×20 | J20 | 0.015 | 0.038 | 3575 | | | | | |
| 5600 | 12.5×30 | G30 | 0.013 | 0.033 | 3795 | 12.5×35 | G35 | 0.012 | 0.031 | 4120 | — | — | — | — | — |
| 6800 | 12.5×35 | G35 | 0.012 | 0.031 | 4120 | 16×25 | J25 | 0.013 | 0.035 | 3810 | — | — | — | — | — |
| | 16×20 | J20 | 0.015 | 0.038 | 3575 | | | | | | | | | | |
| 8200 | 16×25 | J25 | 0.013 | 0.035 | 3810 | — | — | — | — | — | — | — | — | — | — |

| Rated voltage(V) / Item / Rated capacitance (μF) | 25 (1T) | | | | | 35 (1G) | | | | | 50 (1U) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Case φDxL (mm) | Size code | Impedance (Ω max.) 20℃ | Impedance (Ω max.) − 10℃ | Rated ripple current (mArms) | Case φDxL (mm) | Size code | Impedance (Ω max.) 20℃ | Impedance (Ω max.) − 10℃ | Rated ripple current (mArms) | Case φDxL (mm) | Size code | Impedance (Ω max.) 20℃ | Impedance (Ω max.) − 10℃ | Rated ripple current (mArms) |
| 150 | — | — | — | — | — | — | — | — | — | — | 10×12.5 | F12 | 0.061 | 0.18 | 1250 |
| 220 | — | — | — | — | — | — | — | — | — | — | 10×16 | F16 | 0.042 | 0.12 | 1650 |
| 270 | — | — | — | — | — | — | — | — | — | — | 10×20 | F20 | 0.030 | 0.090 | 2060 |
| 330 | — | — | — | — | — | 10×12.5 | F12 | 0.039 | 0.14 | 1560 | 10×25 | F25 | 0.028 | 0.084 | 2420 |
| 470 | 10×12.5 | F12 | 0.039 | 0.14 | 1560 | 10×16 | F16 | 0.028 | 0.10 | 2000 | 12.5×20 | G20 | 0.027 | 0.068 | 2300 |
| 560 | — | — | — | — | — | 10×20 | F20 | 0.020 | 0.060 | 2500 | 12.5×25 | G25 | 0.023 | 0.059 | 2800 |
| 680 | 10×16 | F16 | 0.028 | 0.10 | 2000 | 10×25 | F25 | 0.017 | 0.051 | 2900 | 12.5×30 | G30 | 0.021 | 0.052 | 3500 |
| 820 | 10×20 | F20 | 0.020 | 0.060 | 2500 | — | — | — | — | — | 12.5×35 | G35 | 0.019 | 0.051 | 3810 |
| | | | | | | | | | | | 16×20 | J20 | 0.023 | 0.059 | 3070 |
| 1000 | 10×25 | F25 | 0.017 | 0.051 | 2900 | 12.5×20 | G20 | 0.017 | 0.043 | 2600 | 16×25 | J25 | 0.021 | 0.056 | 3270 |
| 1200 | — | — | — | — | — | 12.5×25 | G25 | 0.015 | 0.038 | 3200 | — | — | — | — | — |
| 1500 | 12.5×20 | G20 | 0.017 | 0.043 | 2600 | 12.5×30 | G30 | 0.013 | 0.033 | 3795 | — | — | — | — | — |
| | | | | | | 16×20 | J20 | 0.015 | 0.038 | 3575 | | | | | |
| 1800 | 12.5×25 | G25 | 0.015 | 0.038 | 3200 | 12.5×35 | G35 | 0.012 | 0.031 | 4120 | — | — | — | — | — |
| 2200 | 12.5×30 | G30 | 0.013 | 0.033 | 3795 | 16×25 | J25 | 0.013 | 0.035 | 3810 | — | — | — | — | — |
| | 16×20 | J20 | 0.015 | 0.038 | 3575 | | | | | | | | | | |
| 2700 | 12.5×35 | G35 | 0.012 | 0.031 | 4120 | — | — | — | — | — | — | — | — | — | — |
| 3300 | 16×25 | J25 | 0.013 | 0.035 | 3810 | — | — | — | — | — | — | — | — | — | — |

(Note) Rated ripple current : 105℃ , 100kHz ; Impedance : 100kHz

# ELNA — Miniature Aluminum Electrolytic Capacitors RJD series

Code in front of series have been extracted from product code, which describes the segment of products, such as type and features.

- Low ESR capacitors.
- Guaranteed 8000 hours at 105℃. (φ10 : 5000 hours)
- Environmental : GREEN CAP™ , RoHS compliance.

Miniaturized
Low ESR

RJD ⇦ RJB

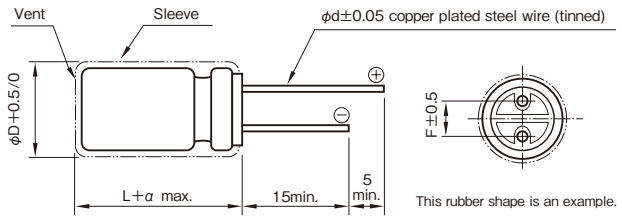

Marking color : White print on a black sleeve

## Specifications

| Item | Performance |
|---|---|
| Category temperature range (℃) | −55 to +105 |
| Tolerance at rated capacitance (%) | ±20 (20℃,120Hz) |
| Leakage current (μA) (max.) | 0.01CV or 3 whichever is larger (after 2 minutes) C : Rated capacitance (μF), V : Rated voltage (V) (20℃) |
| Tangent of loss angle (tanδ) | Rated voltage (V): 6.3 / 10 / 16 / 25 / 35<br>tanδ (max.): 0.22 / 0.19 / 0.16 / 0.14 / 0.12<br>0.02 is added to every 1000μF increase over 1000μF. (20℃,120Hz) |
| Characteristics at high and low temperature | Rated voltage (V): 6.3 / 10 / 16 / 25 / 35<br>Impedance ratio (max.) Z−55℃/Z+20℃: 3 / 3 / 3 / 3 / 3<br>(120Hz) |
| Endurance (105℃) (Applied ripple current) | Test time: φ10 : 5000 hours; φ12.5 or more : 8000 hours<br>Leakage current: The initial specified value or less<br>Percentage of capacitance change: Within ±20% of initial value<br>Tangent of the loss angle: 200% or less of the initial specified value |
| Shelf life (105℃) | Test time : 1000hours ; other items are same as the endurance. Voltage application treatment : According to JIS C5101-4 4.1 |
| Applicable standards | JIS C5101 - 1,- 4 (IEC 60384 - 1,- 4) |

## Outline Drawing

Unit : mm




| φD | 10 | 12.5 | 16 | 18 |
|---|---|---|---|---|
| F | 5.0 | 5.0 | 7.5 | 7.5 |
| φd | 0.6 | 0.6 | 0.8 | 0.8 |
| α | 2.0 | 2.0 | 2.0 | 2.0 |

(Note) Whisker preventive structure is possible.

## Coefficient of Frequency for Rated Ripple Current

| Rated Capacitance (μF) \ Frequency (Hz) | 50・60 | 120 | 300 | 1k | 10k・100k |
|---|---|---|---|---|---|
| 270 to 330 | 0.55 | 0.65 | 0.75 | 0.85 | 1 |
| 390 to 1000 | 0.70 | 0.75 | 0.80 | 0.90 | 1 |
| 1200 to 18000 | 0.80 | 0.85 | 0.90 | 0.95 | 1 |

## Product code system : 25V10000μF (*For general product)

| RS* | RJD | 103 | M | 1T | K40 | 300 | T |
|---|---|---|---|---|---|---|---|
| Category code | Series code | capacitance code | Cap tol. code | Voltage code | Size code | Lead-forming and packing code | Additional code |

・If it is whisker preventive structure, should change "T" into "G".
・For details, refer to the various "Product Code System" pages.
・Lead forming and packing code “300” : lead wire is long type and standard packing.
For standard packing, please refer to the "PACKING" page.

Code in front of series have been extracted from product code, which describes the segment of products, such as type and features.

## Standard Ratings

| Rated voltage(V) / Item / Rated capacitance (μF) | 6.3 (1J) | | | | | 10 (1L) | | | | | 16 (1E) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Case φD × L (mm) | Size code | ESR (Ω max.) 20℃ | ESR (Ω max.) −10℃ | Rated ripple current (mArms) | Case φD × L (mm) | Size code | ESR (Ω max.) 20℃ | ESR (Ω max.) −10℃ | Rated ripple current (mArms) | Case φD × L (mm) | Size code | ESR (Ω max.) 20℃ | ESR (Ω max.) −10℃ | Rated ripple current (mArms) |
| 470 | — | — | — | — | — | — | — | — | — | — | 10 × 12.5 | F12 | 0.090 | 0.180 | 764 |
| 680 | — | — | — | — | — | — | — | — | — | — | 10 × 12.5 | F12 | 0.090 | 0.180 | 764 |
| 820 | — | — | — | — | — | 10 × 12.5 | F12 | 0.090 | 0.180 | 764 | 10 × 16 | F16 | 0.068 | 0.136 | 1060 |
| 1000 | 10 × 12.5 | F12 | 0.090 | 0.180 | 764 | 10 × 12.5 | F12 | 0.090 | 0.180 | 764 | 10 × 16 | F16 | 0.068 | 0.136 | 1060 |
| | | | | | | 10 × 16 | F16 | 0.068 | 0.136 | 1060 | 10 × 20 | F20 | 0.052 | 0.104 | 1230 |
| 1200 | 10 × 12.5 | F12 | 0.090 | 0.180 | 764 | 10 × 16 | F16 | 0.068 | 0.136 | 1060 | 10 × 20 | F20 | 0.052 | 0.104 | 1230 |
| | 10 × 16 | F16 | 0.068 | 0.136 | 1060 | | | | | | 10 × 25 | F25 | 0.045 | 0.090 | 1450 |
| 1500 | 10 × 16 | F16 | 0.068 | 0.136 | 1060 | 10 × 20 | F20 | 0.052 | 0.104 | 1230 | 10 × 25 | F25 | 0.045 | 0.090 | 1450 |
| | | | | | | 12.5 × 15 | G15 | 0.062 | 0.124 | 1210 | 10 × 30 | F30 | 0.035 | 0.070 | 1830 |
| 1800 | 12.5 × 15 | G15 | 0.062 | 0.124 | 1210 | 10 × 20 | F20 | 0.052 | 0.104 | 1230 | — | — | — | — | — |
| | | | | | | 10 × 25 | F25 | 0.045 | 0.090 | 1450 | | | | | |
| 2200 | 10 × 20 | F20 | 0.052 | 0.104 | 1230 | 10 × 25 | F25 | 0.045 | 0.090 | 1450 | 10 × 30 | F30 | 0.035 | 0.070 | 1830 |
| | | | | | | | | | | | 12.5 × 20 | G20 | 0.038 | 0.076 | 1700 |
| | 10 × 25 | F25 | 0.045 | 0.090 | 1450 | 12.5 × 20 | G20 | 0.038 | 0.076 | 1700 | 16 × 16 | J16 | 0.043 | 0.086 | 1700 |
| 2700 | 10 × 25 | F25 | 0.045 | 0.090 | 1450 | 10 × 30 | F30 | 0.035 | 0.070 | 1830 | 12.5 × 25 | G25 | 0.030 | 0.060 | 1950 |
| | | | | | | 12.5 × 20 | G20 | 0.038 | 0.076 | 1700 | 18 × 16 | K16 | 0.038 | 0.076 | 2010 |
| 3300 | 10 × 30 | F30 | 0.035 | 0.070 | 1830 | 12.5 × 25 | G25 | 0.030 | 0.060 | 1950 | 12.5 × 30 | G30 | 0.025 | 0.050 | 2330 |
| | 12.5 × 20 | G20 | 0.038 | 0.076 | 1700 | | | | | | 16 × 20 | J20 | 0.029 | 0.058 | 2230 |
| 3900 | 12.5 × 25 | G25 | 0.030 | 0.060 | 1950 | 12.5 × 25 | G25 | 0.030 | 0.060 | 1950 | 12.5 × 35 | G35 | 0.022 | 0.044 | 2620 |
| | | | | | | 18 × 16 | K16 | 0.038 | 0.076 | 2010 | 16 × 20 | J20 | 0.029 | 0.058 | 2230 |
| 4700 | 12.5 × 25 | G25 | 0.030 | 0.060 | 1950 | 12.5 × 30 | G30 | 0.025 | 0.050 | 2330 | 12.5 × 40 | G40 | 0.017 | 0.034 | 3160 |
| | | | | | | | | | | | 16 × 25 | J25 | 0.022 | 0.044 | 2650 |
| | 18 × 16 | K16 | 0.038 | 0.076 | 2010 | 16 × 20 | J20 | 0.029 | 0.058 | 2230 | 18 × 20 | K20 | 0.028 | 0.056 | 2500 |
| 5600 | 12.5 × 30 | G30 | 0.025 | 0.050 | 2330 | 12.5 × 35 | G35 | 0.022 | 0.044 | 2620 | 16 × 25 | J25 | 0.022 | 0.044 | 2650 |
| | 16 × 20 | J20 | 0.029 | 0.058 | 2230 | | | | | | 16 × 31.5 | J31 | 0.018 | 0.036 | 3210 |
| 6800 | 12.5 × 35 | G35 | 0.022 | 0.044 | 2620 | 12.5 × 40 | G40 | 0.017 | 0.034 | 3160 | 18 × 25 | K25 | 0.020 | 0.040 | 3000 |
| | | | | | | 16 × 25 | J25 | 0.022 | 0.044 | 2650 | | | | | |
| 8200 | 12.5 × 40 | G40 | 0.017 | 0.034 | 3160 | 16 × 31.5 | J31 | 0.018 | 0.036 | 3210 | 18 × 35.5 | K35 | 0.015 | 0.030 | 3960 |
| | 16 × 25 | J25 | 0.022 | 0.044 | 2650 | | | | | | | | | | |
| | 18 × 20 | K20 | 0.028 | 0.056 | 2500 | 18 × 25 | K25 | 0.020 | 0.040 | 3000 | | | | | |
| 10000 | 16 × 31.5 | J31 | 0.018 | 0.036 | 3210 | 16 × 40 | J40 | 0.015 | 0.030 | 3880 | 18 × 40 | K40 | 0.014 | 0.028 | 4300 |
| | 18 × 25 | K25 | 0.020 | 0.040 | 3000 | 18 × 35.5 | K35 | 0.015 | 0.030 | 3960 | | | | | |
| 12000 | 18 × 25 | K25 | 0.020 | 0.040 | 3000 | — | — | — | — | — | — | — | — | — | — |
| 15000 | 18 × 35.5 | K35 | 0.015 | 0.030 | 3960 | 18 × 40 | K40 | 0.014 | 0.028 | 4300 | — | — | — | — | — |
| 18000 | 18 × 40 | K40 | 0.014 | 0.028 | 4300 | — | — | — | — | — | — | — | — | — | — |

(Note) Rated ripple current : 105℃ , 100kHz ; ESR : 100kHz

Code in front of series have been extracted from product code, which describes the segment of products, such as type and features.

## Standard Ratings

| Rated voltage(V) / Item / Rated capacitance (μF) | 25 (1T) | | | | | 35 (1G) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Case φD × L (mm) | Size code | ESR (Ω max.) 20℃ | ESR (Ω max.) −10℃ | Rated ripple current (mArms) | Case φD × L (mm) | Size code | ESR (Ω max.) 20℃ | ESR (Ω max.) −10℃ | Rated ripple current (mArms) |
| 270 | — | — | — | — | — | 10 × 12.5 | F12 | 0.090 | 0.180 | 764 |
| 330 | 10 × 12.5 | F12 | 0.090 | 0.180 | 764 | 10 × 16 | F16 | 0.068 | 0.136 | 1060 |
| 390 | — | — | — | — | — | 10 × 16 | F16 | 0.068 | 0.136 | 1060 |
| 470 | 10 × 12.5 | F12 | 0.090 | 0.180 | 764 | 10 × 20 | F20 | 0.052 | 0.104 | 1230 |
| 560 | 10 × 16 | F16 | 0.068 | 0.136 | 1060 | 10 × 20 | F20 | 0.052 | 0.104 | 1230 |
| | | | | | | 12.5 × 15 | G15 | 0.062 | 0.124 | 1210 |
| 680 | 10 × 16 | F16 | 0.068 | 0.136 | 1060 | 10 × 25 | F25 | 0.045 | 0.090 | 1450 |
| 820 | 10 × 20 | F20 | 0.052 | 0.104 | 1230 | 12.5 × 20 | G20 | 0.038 | 0.076 | 1700 |
| | 12.5 × 15 | G15 | 0.062 | 0.124 | 1210 | | | | | |
| 1000 | 10 × 25 | F25 | 0.045 | 0.090 | 1450 | 10 × 30 | F30 | 0.035 | 0.070 | 1830 |
| | 12.5 × 20 | G20 | 0.038 | 0.076 | 1700 | 12.5 × 20 | G20 | 0.038 | 0.076 | 1700 |
| 1200 | 12.5 × 20 | G20 | 0.038 | 0.076 | 1700 | 12.5 × 25 | G25 | 0.030 | 0.060 | 1950 |
| | | | | | | 18 × 16 | K16 | 0.038 | 0.076 | 2010 |
| 1500 | 10 × 30 | F30 | 0.035 | 0.070 | 1830 | 12.5 × 30 | G30 | 0.025 | 0.050 | 2330 |
| | 16 × 16 | J16 | 0.043 | 0.086 | 1700 | 16 × 20 | J20 | 0.029 | 0.058 | 2230 |
| 1800 | 12.5 × 25 | G25 | 0.030 | 0.060 | 1950 | 12.5 × 35 | G35 | 0.022 | 0.044 | 2620 |
| | 18 × 16 | K16 | 0.038 | 0.076 | 2010 | 16 × 20 | J20 | 0.029 | 0.058 | 2230 |
| 2200 | 12.5 × 30 | G30 | 0.025 | 0.050 | 2330 | 12.5 × 40 | G40 | 0.017 | 0.034 | 3160 |
| | | | | | | 16 × 25 | J25 | 0.022 | 0.044 | 2650 |
| | 16 × 20 | J20 | 0.029 | 0.058 | 2230 | 18 × 20 | K20 | 0.028 | 0.056 | 2500 |
| 2700 | 12.5 × 35 | G35 | 0.022 | 0.044 | 2620 | 16 × 31.5 | J31 | 0.018 | 0.036 | 3210 |
| | 18 × 25 | K25 | 0.020 | 0.040 | 3000 | 18 × 25 | K25 | 0.020 | 0.040 | 3000 |
| 3300 | 12.5 × 40 | G40 | 0.017 | 0.034 | 3160 | 18 × 25 | K25 | 0.020 | 0.040 | 3000 |
| | 16 × 25 | J25 | 0.022 | 0.044 | 2650 | | | | | |
| | 18 × 20 | K20 | 0.028 | 0.056 | 2500 | 18 × 31.5 | K31 | 0.016 | 0.032 | 3660 |
| 3900 | — | — | — | — | — | 18 × 35.5 | K35 | 0.015 | 0.030 | 3960 |
| | | | | | | 18 × 40 | K40 | 0.014 | 0.028 | 4300 |
| 4700 | 18 × 25 | K25 | 0.020 | 0.040 | 3000 | 18 × 35.5 | K35 | 0.015 | 0.030 | 3960 |
| | | | | | | 18 × 40 | K40 | 0.014 | 0.028 | 4300 |
| 5600 | 18 × 35.5 | K35 | 0.015 | 0.030 | 3960 | 18 × 40 | K40 | 0.014 | 0.028 | 4300 |
| 6800 | 18 × 35.5 | K35 | 0.015 | 0.030 | 3960 | 18 × 40 | K40 | 0.014 | 0.028 | 4300 |
| 8200 | — | — | — | — | — | 18 × 40 | K40 | 0.014 | 0.028 | 4300 |
| 10000 | 18 × 40 | K40 | 0.014 | 0.028 | 4300 | — | — | — | — | — |

(Note) Rated ripple current : 105℃ , 100kHz ; ESR : 100kHz

# ELNA — Miniature Aluminum Electrolytic Capacitors RJK series

Code in front of series have been extracted from product code, which describes the segment of products, such as type and features.

- For SRS AirBag application
- Special tolerance at rated capacitance and high capacitance, and good low temperature behavior.
- Guaranteed 5000 hours at 105℃.
- Environmental : GREEN CAP™ , RoHS compliance.

Miniaturized
Low ESR

RJK ⇦ RJE

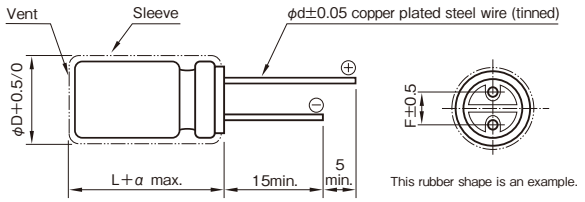

Marking color : White print on a black sleeve

## Specifications

| Item | Performance |
|---|---|
| Category temperature range (℃) | −55 to +105 |
| Tolerance at rated capacitance (%) | 0 to +30 (20℃,120Hz) |
| Leakage current (μA) (max.) | 0.01CV (after 2 minutes) C : Rated capacitance (μF) , V : Rated voltage (V) (20℃) |
| Tangent of loss angle (tanδ) | Rated voltage (V): 25 / 35 — tanδ (max.): 0.20 / 0.16. 0.02 is added to every 1000μF increase over 1000μF (20℃,120Hz) |
| Characteristics at high and low temperature | Rated voltage (V): 25 / 35 — Impedance ratio (max.) Z−55℃/Z+20℃: 3 / 3 (120Hz) |
| Endurance (105℃) | Test time: 5000 hours; Leakage current: The initial specified value or less; Percentage of capacitance change: Within ±30% of initial value; Tangent of loss angle: 300% or less of the initial specified value |
| Shelf life (105℃) | Test time : 1000hours ; other items are same as the endurance. Voltage application treatment : According to JIS C5101-4 4.1 |
| Applicable standards | JIS C5101 - 1,- 4 (IEC 60384 - 1,- 4) |

## Outline Drawing

Unit : mm




| ϕD | 16 | 18 |
|---|---|---|
| F | 7.5 | 7.5 |
| ϕd | 0.8 | 0.8 |
| α | 1.5 | 1.5 |

(Note) Whisker preventive structure is possible.

## Coefficient of Frequency for Rated Ripple Current

| Frequency (Hz) / Rated voltage (V) | 120 | 1k | 10k | 100k |
|---|---|---|---|---|
| 25, 35 | 0.80 | 0.85 | 0.95 | 1 |

## Product code system : 25V4200μF (*For automotive: powertrain, safety)

| RA* | RJK | 422 | A | 1T | J20 | 300 | T |
|---|---|---|---|---|---|---|---|
| Category code | Series code | capacitance code | Cap tol. code | Voltage code | Size code | Lead-forming and packing code | Additional code |

- If it is whisker preventive structure, should change "T" into "G".
- For details, refer to the various "Product Code System" pages.
- Lead forming and packing code “300” : lead wire is long type and standard packing.
  For standard packing, please refer to the "PACKING" page.

Code in front of series have been extracted from product code, which describes the segment of products, such as type and features.

## Standard Ratings

| Rated voltage (V) / Item / Case φD × L (mm) | Size code | 25 (1T) Rated capacitance (μF) | 25 (1T) ESR (Ω max.) 20℃ | 25 (1T) ESR (Ω max.) − 40℃ | 25 (1T) Rated ripple current (mArms) | 35 (1G) Rated capacitance (μF) | 35 (1G) ESR (Ω max.) 20℃ | 35 (1G) ESR (Ω max.) − 40℃ | 35 (1G) Rated ripple current (mArms) |
|---|---|---|---|---|---|---|---|---|---|
| 16 × 20 | J20 | 4200 | 0.033 | 0.095 | 2250 | 2500 | 0.033 | 0.095 | 2250 |
| 18 × 20 | K20 | 5300 | 0.029 | 0.082 | 2500 | 3100 | 0.029 | 0.082 | 2500 |
| 16 × 25 | J25 | 5900 | 0.024 | 0.073 | 2600 | 3500 | 0.024 | 0.073 | 2600 |
| 18 × 25 | K25 | 7500 | 0.022 | 0.063 | 2800 | 4500 | 0.022 | 0.063 | 2800 |
| 16 × 31.5 | J31 | 8000 | 0.021 | 0.052 | 3200 | 4700 | 0.021 | 0.052 | 3200 |
| 18 × 31.5 | K31 | 9500 | 0.019 | 0.046 | 3500 | 5600 | 0.019 | 0.046 | 3500 |
| 16 × 35.5 | J35 | 10000 | 0.019 | 0.045 | 3500 | 6000 | 0.019 | 0.045 | 3500 |
| 18 × 35.5 | K35 | 11000 | 0.017 | 0.040 | 3700 | 7100 | 0.017 | 0.040 | 3700 |
| 16 × 40 | J40 | 11000 | 0.017 | 0.040 | 3800 | 6600 | 0.017 | 0.040 | 3800 |
| 18 × 40 | K40 | 14000 | 0.015 | 0.035 | 4000 | 8400 | 0.015 | 0.035 | 4000 |

(Note) Rated ripple current : 105℃, 100kHz ; ESR : 100kHz

# ELNA — Miniature Aluminum Electrolytic Capacitors RKD series

Code in front of series have been extracted from product code, which describes the segment of products, such as type and features.

- Low ESR capacitor.
- Guaranteed 5000 hours at 125℃. (φ10 : 3000 hours)
- Environmental : GREEN CAP™ , RoHS compliance.

Miniaturized, Low ESR

RKD ⇦ RK1

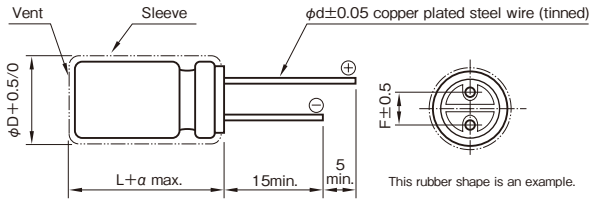
Marking color : White print on a black sleeve

## Specifications

| Item | Performance |
|---|---|
| Category temperature range (℃) | −40 to +125 |
| Tolerance at rated capacitance (%) | ±20 (20℃,120Hz) |
| Leakage current (μA) (max.) | 0.01CV or 3 whichever is larger (after 2 minutes) C : Rated capacitance (μF), V : Rated voltage (V) (20℃) |
| Tangent of loss angle (tanδ) | Rated voltage (V): 10 / 16 / 25 / 35 — tanδ (max.): 0.20 / 0.16 / 0.14 / 0.12. 0.02 is added to every 1000μF increase over 1000μF. (20℃,120Hz) |
| Characteristics at high and low temperature | Rated voltage (V): 10 / 16 / 25 / 35 — Impedance ratio (max.) Z−40℃/Z+20℃: 4 / 3 / 3 / 3 (120Hz) |
| Endurance (125℃) (Applied ripple current) | Test time: 5000 hours (φ10 : 3000 hours); Leakage current: The initial specified value or less; Percentage of capacitance change: Within ±30% of initial value; Tangent of the loss angle: 300% or less of the initial specified value |
| Shelf life (125℃) | Test time : 1000hours ; other items are same as the endurance. Voltage application treatment : According to JIS C5101-4 4.1 |
| Applicable standards | JIS C5101 - 1, - 4 (IEC 60384 - 1, - 4) |

## Outline Drawing

Unit : mm




| φD | 10 | 12.5 | 16 | 18 |
|---|---|---|---|---|
| F | 5.0 | 5.0 | 7.5 | 7.5 |
| φd | 0.6 | 0.6 | 0.8 | 0.8 |
| α | 2.0 | 2.0 | 2.0 | 2.0 |

(Note) Whisker preventive structure is possible.

## Coefficient of Frequency for Rated Ripple Current

| Rated capacitance (μF) \ Frequency (Hz) | 50・60 | 120 | 1k | 10k・100k |
|---|---|---|---|---|
| 220 to 330 | 0.55 | 0.65 | 0.85 | 1 |
| 390 to 1000 | 0.70 | 0.75 | 0.90 | 1 |
| 1200 to 6800 | 0.80 | 0.85 | 0.95 | 1 |

## Product code system : 10V1000μF (*For general product)

| RS* | RKD | 102 | M | 1L | F20 | 300 | T |
|---|---|---|---|---|---|---|---|
| Category code | Series code | capacitance code | Cap tol. code | Voltage code | Size code | Lead-forming and packing code | Additional code |

・If it is whisker preventive structure, should change "T" into "G".
・For details, refer to the various "Product Code System" pages.
・Lead forming and packing code "300" : lead wire is long type and standard packing.
For standard packing, please refer to the "PACKING" page.

Code in front of series have been extracted from product code, which describes the segment of products, such as type and features.

## Standard Ratings

| Rated voltage (V) / Item / Rated capacitance (μF) | 10 (1L) | | | | 16 (1E) | | | | 25 (1T) | | | | 35 (1G) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Case φD × L (mm) | Size code | ESR (Ω max.) | Rated ripple current (mArms) | Case φD × L (mm) | Size code | ESR (Ω max.) | Rated ripple current (mArms) | Case φD × L (mm) | Size code | ESR (Ω max.) | Rated ripple current (mArms) | Case φD × L (mm) | Size code | ESR (Ω max.) | Rated ripple current (mArms) |
| 220 | – | – | – | – | 10×12.5 | F12 | 0.098 | 732 | 10×12.5 | F12 | 0.098 | 732 | 10×12.5 | F12 | 0.098 | 732 |
| | | | | | | | | | | | | | 10×16 | F16 | 0.075 | 953 |
| 330 | 10×12.5 | F12 | 0.098 | 732 | 10×12.5 | F12 | 0.098 | 732 | 10×12.5 | F12 | 0.098 | 732 | 10×16 | F16 | 0.075 | 953 |
| | | | | | | | | | 10×16 | F16 | 0.075 | 953 | 10×20 | F20 | 0.057 | 1140 |
| 470 | 10×12.5 | F12 | 0.098 | 732 | 10×16 | F16 | 0.075 | 953 | 10×16 | F16 | 0.075 | 953 | 10×20 | F20 | 0.057 | 1140 |
| | | | | | | | | | 10×20 | F20 | 0.057 | 1140 | 12.5×20 | G20 | 0.040 | 1820 |
| | | | | | | | | | | | | | 16×16 | J16 | 0.044 | 1930 |
| 1000 | 10×20 | F20 | 0.057 | 1140 | 10×20 | F20 | 0.057 | 1140 | 12.5×20 | G20 | 0.040 | 1820 | 12.5×25 | G25 | 0.032 | 2400 |
| | 12.5×15 | G15 | 0.059 | 1380 | 12.5×20 | G20 | 0.040 | 1820 | 12.5×25 | G25 | 0.032 | 2400 | 16×25 | J25 | 0.024 | 3100 |
| | | | | | 16×16 | J16 | 0.044 | 1930 | 16×16 | J16 | 0.044 | 1930 | 18×20 | K20 | 0.029 | 2490 |
| 1200 | – | – | – | – | – | – | – | – | 12.5×20 | G20 | 0.040 | 1820 | 12.5×30 | G30 | 0.029 | 2560 |
| | | | | | | | | | | | | | 16×20 | J20 | 0.032 | 2280 |
| 1500 | – | – | – | – | – | – | – | – | – | – | – | – | 12.5×35 | G35 | 0.023 | 2970 |
| | | | | | | | | | | | | | 16×31.5 | J31 | 0.020 | 3160 |
| | | | | | | | | | | | | | 18×25 | K25 | 0.022 | 3200 |
| 1800 | – | – | – | – | – | – | – | – | 12.5×25 | G25 | 0.032 | 2400 | 12.5×40 | G40 | 0.020 | 3600 |
| | | | | | | | | | 16×20 | J20 | 0.032 | 2280 | 16×25 | J25 | 0.024 | 3100 |
| 2200 | 12.5×25 | G25 | 0.032 | 2400 | 12.5×25 | G25 | 0.032 | 2400 | 12.5×30 | G30 | 0.029 | 2560 | 16×31.5 | J31 | 0.020 | 3160 |
| | 16×20 | J20 | 0.032 | 2280 | 16×25 | J25 | 0.024 | 3100 | 16×25 | J25 | 0.024 | 3100 | 16×35.5 | J35 | 0.019 | 3590 |
| | 18×16 | K16 | 0.041 | 2170 | 18×20 | K20 | 0.029 | 2490 | 18×20 | K20 | 0.029 | 2490 | 18×25 | K25 | 0.022 | 3200 |
| 2700 | – | – | – | – | – | – | – | – | 12.5×35 | G35 | 0.023 | 2970 | 16×35.5 | J35 | 0.019 | 3590 |
| | | | | | | | | | 16×25 | J25 | 0.024 | 3100 | | | | |
| | | | | | | | | | 18×20 | K20 | 0.029 | 2490 | 18×31.5 | K31 | 0.018 | 3410 |
| 3300 | 16×25 | J25 | 0.024 | 3100 | 16×31.5 | J31 | 0.020 | 3160 | 12.5×40 | G40 | 0.020 | 3600 | 16×40 | J40 | 0.017 | 4300 |
| | 18×20 | K20 | 0.029 | 2490 | 18×25 | K25 | 0.022 | 3200 | 16×31.5 | J31 | 0.020 | 3160 | 18×35.5 | K35 | 0.017 | 4200 |
| 3900 | – | – | – | – | – | – | – | – | 16×35.5 | J35 | 0.019 | 3590 | – | – | – | – |
| | | | | | | | | | 18×25 | K25 | 0.022 | 3200 | | | | |
| 4700 | 16×31.5 | J31 | 0.020 | 3160 | 16×35.5 | J35 | 0.019 | 3590 | 18×35.5 | K35 | 0.017 | 4200 | 18×40 | K40 | 0.016 | 4600 |
| | 18×25 | K25 | 0.022 | 3200 | 18×31.5 | K31 | 0.018 | 3410 | | | | | | | | |
| 5600 | – | – | – | – | – | – | – | – | 16×40 | J40 | 0.017 | 4300 | – | – | – | – |
| | | | | | | | | | 18×35.5 | K35 | 0.017 | 4200 | | | | |
| 6800 | – | – | – | – | – | – | – | – | 18×40 | K40 | 0.016 | 4600 | – | – | – | – |

(Note) Rated ripple current : 125℃ , 100kHz ; ESR : 20℃ , 100kHz

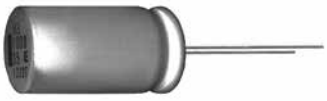
# ELNA — Miniature Aluminum Electrolytic Capacitors RKB series

Code in front of series have been extracted from product code, which describes the segment of products, such as type and features.

- Guaranteed 3000 hours at 135℃. (φ10 : 2000 hours)
- High temperature guaranteed and low ESR series for automotive.
- Environmental : GREEN CAP™ , RoHS compliance.

High temperature

RKB ⇦ RKD



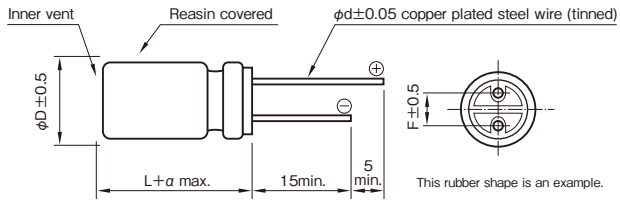
Marking color : Black print

## Specifications

| Item | Performance |
|---|---|
| Category temperature range (℃) | −40 to +135 |
| Tolerance at rated capacitance (%) | ±20 (20℃,120Hz) |
| Leakage current (μA) (max.) | 0.01CV or 3 whichever is larger (after 2 minutes) C : Rated capacitance (μF), V : Rated voltage (V) (20℃) |
| Tangent of loss angle (tanδ) | Rated voltage (V): 10 / 16 / 25 / 35 — tanδ (max.): 0.20 / 0.16 / 0.14 / 0.12<br>0.02 is added to every 1000μF increase over 1000μF. (20℃,120Hz) |
| Characteristics at high and low temperature | Rated voltage (V): 10 / 16 / 25 / 35 — Impedance ratio (max.) Z−40℃/Z+20℃: 4 / 3 / 3 / 3 (120Hz) |
| Endurance (135℃) (Applied ripple current) | Test time: 3000 hours (φ10 : 2000 hours)<br>Leakage current: The initial specified value or less<br>Percentage of capacitance change: Within ±30% of initial value<br>Tangent of the loss angle: 300% or less of the initial specified value |
| Shelf life (135℃) | Test time : 1000hours ; other items are same as the endurance. Voltage application treatment : According to JIS C5101-4 4.1 |
| Applicable standards | JIS C5101 - 1, - 4 (IEC 60384 - 1, - 4) |

## Outline Drawing

Unit : mm




| φD | 10 | 12.5 | 16 | 18 |
|---|---|---|---|---|
| F | 5.0 | 5.0 | 7.5 | 7.5 |
| φd | 0.6 | 0.6 | 0.8 | 0.8 |
| α | 2.0 | 2.0 | 2.0 | 2.0 |

## Coefficient of Frequency for Rated Ripple Current

| Rated capacitance (μF) \ Frequency (Hz) | 50・60 | 120 | 1k | 10k・100k |
|---|---|---|---|---|
| 220 to 330 | 0.55 | 0.65 | 0.85 | 1 |
| 470 to 1000 | 0.70 | 0.75 | 0.90 | 1 |
| 1200 to 6800 | 0.80 | 0.85 | 0.95 | 1 |

## Product code system : 10V1000μF (*For automotive: powertrain, safety)

| RA* | RKB | 102 | M | 1L | F20 | 300 | T |
|---|---|---|---|---|---|---|---|
| Category code | Series code | capacitance code | Cap tol. code | Voltage code | Size code | Lead-forming and packing code | Additional code |

・For details, refer to the various "Product Code System" pages.
・Lead forming and packing code “300” : lead wire is long type and standard packing.
For standard packing, please refer to the "PACKING" page.

Code in front of series have been extracted from product code, which describes the segment of products, such as type and features.

## Standard Ratings

| Rated voltage (V) / Item / Rated capacitance (μF) | 10 (1L) | | | | 16 (1E) | | | | 25 (1T) | | | | 35 (1G) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Case φD × L (mm) | Size code | ESR (Ω max.) | Rated ripple current (mArms) | Case φD × L (mm) | Size code | ESR (Ω max.) | Rated ripple current (mArms) | Case φD × L (mm) | Size code | ESR (Ω max.) | Rated ripple current (mArms) | Case φD × L (mm) | Size code | ESR (Ω max.) | Rated ripple current (mArms) |
| 220 | — | — | — | — | 10×12.5 | F12 | 0.098 | 725 | 10×12.5 | F12 | 0.098 | 725 | 10×12.5 | F12 | 0.098 | 725 |
| | | | | | | | | | | | | | 10×16 | F16 | 0.075 | 951 |
| 330 | 10×12.5 | F12 | 0.098 | 725 | 10×12.5 | F12 | 0.098 | 725 | 10×12.5 | F12 | 0.098 | 725 | 10×16 | F16 | 0.075 | 951 |
| | | | | | | | | | 10×16 | F16 | 0.075 | 951 | 10×20 | F20 | 0.057 | 1130 |
| 470 | 10×12.5 | F12 | 0.098 | 725 | 10×16 | F16 | 0.075 | 951 | 10×16 | F16 | 0.075 | 951 | 10×20 | F20 | 0.057 | 1130 |
| | | | | | | | | | 10×20 | F20 | 0.057 | 1130 | 12.5×20 | G20 | 0.040 | 1550 |
| 1000 | 10×20 | F20 | 0.057 | 1130 | 10×20 | F20 | 0.057 | 1130 | 12.5×20 | G20 | 0.040 | 1550 | 12.5×25 | G25 | 0.032 | 1880 |
| | 12.5×15 | G15 | 0.059 | 1130 | 12.5×20 | G20 | 0.040 | 1550 | 12.5×25 | G25 | 0.032 | 1880 | | | | |
| 1200 | — | — | — | — | — | — | — | — | 12.5×20 | G20 | 0.040 | 1550 | 12.5×30 | G30 | 0.029 | 2160 |
| | | | | | | | | | | | | | 16×20 | J20 | 0.032 | 2020 |
| 1500 | — | — | — | — | — | — | — | — | — | — | — | — | 12.5×35 | G35 | 0.023 | 2580 |
| | | | | | | | | | | | | | 16×31.5 | J31 | 0.020 | 3040 |
| 1800 | — | — | — | — | — | — | — | — | 12.5×25 | G25 | 0.032 | 1880 | 12.5×40 | G40 | 0.020 | 2920 |
| | | | | | | | | | 16×20 | J20 | 0.032 | 2020 | 16×25 | J25 | 0.024 | 2550 |
| 2200 | 12.5×25 | G25 | 0.032 | 1880 | 12.5×25 | G25 | 0.032 | 1880 | 12.5×30 | G30 | 0.029 | 2160 | 16×31.5 | J31 | 0.020 | 3040 |
| | 16×20 | J20 | 0.032 | 2020 | 16×25 | J25 | 0.024 | 2550 | 16×25 | J25 | 0.024 | 2550 | 16×35.5 | J35 | 0.019 | 3280 |
| 2700 | — | — | — | — | — | — | — | — | 12.5×35 | G35 | 0.023 | 2580 | 16×35.5 | J35 | 0.019 | 3280 |
| | | | | | | | | | 16×25 | J25 | 0.024 | 2550 | 18×31.5 | K31 | 0.018 | 3410 |
| 3300 | 16×25 | J25 | 0.024 | 2550 | 16×31.5 | J31 | 0.020 | 3040 | 12.5×40 | G40 | 0.020 | 2920 | 16×40 | J40 | 0.017 | 3630 |
| | 18×20 | K20 | 0.029 | 2320 | 18×25 | K25 | 0.022 | 2880 | 16×31.5 | J31 | 0.020 | 3040 | 18×35.5 | K35 | 0.017 | 3710 |
| 4700 | 16×31.5 | J31 | 0.020 | 3040 | 16×35.5 | J35 | 0.019 | 3280 | 16×35.5 | J35 | 0.019 | 3280 | 18×40 | K40 | 0.016 | 4000 |
| | 18×25 | K25 | 0.022 | 2880 | 18×31.5 | K31 | 0.018 | 3410 | 18×31.5 | K31 | 0.018 | 3410 | | | | |
| 5600 | — | — | — | — | — | — | — | — | 16×40 | J40 | 0.017 | 3630 | — | — | — | — |
| 6800 | — | — | — | — | — | — | — | — | 18×40 | K40 | 0.016 | 4000 | — | — | — | — |

(Note) Rated ripple current : 135℃ , 100kHz ; ESR : 20℃ , 100kHz

# ELNA — Miniature Aluminum Electrolytic Capacitors RKC series

Code in front of series have been extracted from product code, which describes the segment of products, such as type and features.

- Guaranteed 3000 hours at 135℃. (63V to 80V : 2000 hours)
- High temperature guaranteed for automotive.
- High CV, low ESR, high ripple current capacitors.
- For ECU of Direct injection engine, ESP etc.
- Environmental：GREEN CAP™ , RoHS compliance.

RKC ⇦ RKB (High CV, High ripple)

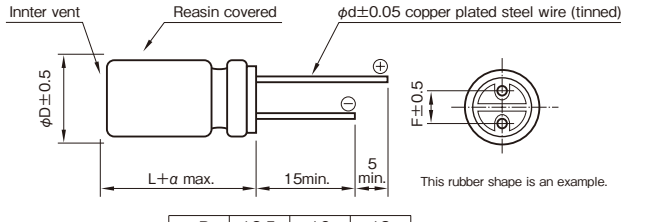
Marking color : Black print

## Specifications

| Item | Performance |
|---|---|
| Category temperature range (℃) | −40 to +135 |
| Tolerance at rated capacitance (%) | ±20 (20℃,120Hz) |
| Leakage current (μA) (max.) | 0.01CV or 3 whichever is larger (after 2 minutes) C : Rated capacitance (μF), V : Rated voltage (V) (20℃) |
| Tangent of loss angle (tanδ) | Rated voltage (V): 25 / 35 / 50 / 63 / 80<br>tanδ (max.): 0.14 / 0.12 / 0.10 / 0.10 / 0.08<br>0.02 is added to every 1000μF increase over 1000μF. (20℃,120Hz) |
| Characteristics at high and low temperature | Rated voltage (V): 25 / 35 / 50 / 63 / 80<br>Impedance ratio (max.) Z−40℃/Z+20℃: 3 / 3 / 3 / 3 / 3<br>(120Hz) |
| Endurance 1 (135℃) (Applied ripple current) | Test time: 3000 hours (63V to 80V : 2000 hours)<br>Leakage current: The initial specified value or less<br>Percentage of capacitance change: Within ±30% of initial value<br>Tangent of the loss angle: 300% or less of the initial specified value |
| Endurance 2 (125℃) (Applied ripple current) | Test time: 3000 hours (63V to 80V : 2000 hours)<br>Leakage current: The initial specified value or less<br>Percentage of capacitance change: Within ±30% of initial value<br>Tangent of the loss angle: 300% or less of the initial specified value |
| Shelf life (135℃) | Test time : 1000hours ; other items are same as the endurance. Voltage application treatment : According to JIS C5101-4 4.1 |
| Applicable standards | JIS C5101 - 1, - 4 (IEC 60384 - 1, - 4) |

## Outline Drawing

Unit : mm




| ϕD | 12.5 | 16 | 18 |
|---|---|---|---|
| F | 5.0 | 7.5 | 7.5 |
| ϕd | 0.6 | 0.8 | 0.8 |
| α | 2.0 | 2.0 | 2.0 |

## Coefficient of Frequency for Rated Ripple Current

| Rated capacitance (μF) \ Frequency (Hz) | 50・60 | 120 | 1k | 10k・100k |
|---|---|---|---|---|
| 270 | 0.55 | 0.65 | 0.85 | 1 |
| 390 to 1000 | 0.70 | 0.75 | 0.90 | 1 |
| 1100 to 12000 | 0.80 | 0.85 | 0.95 | 1 |

## Product code system : 25V2000μF (*For automotive: powertrain, safety)

| RA* | RKC | 202 | M | 1T | G20 | 300 | T |
|---|---|---|---|---|---|---|---|
| Category code | Series code | capacitance code | Cap tol. code | Voltage code | Size code | Lead-forming and packing code | Additional code |

・For details, refer to the various "Product Code System" pages.
・Lead forming and packing code “300” : lead wire is long type and standard packing.
For standard packing, please refer to the "PACKING" page.

Code in front of series have been extracted from product code, which describes the segment of products, such as type and features.

## Standard Ratings

| Rated voltage (V) / Item / Rated capacitance (μF) | 25 (1T) | | | | | | 35 (1G) | | | | | | 50 (1U) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Case | Size code | ESR (Ω max. / 100kHz) | | Rated ripple current (mArms / 100kHz) | | Case | Size code | ESR (Ω max. / 100kHz) | | Rated ripple current (mArms / 100kHz) | | Case | Size code | ESR (Ω max. / 100kHz) | | Rated ripple current (mArms / 100kHz) | |
| | φD × L (mm) | | 20℃ | − 40℃ | 135℃ | 125℃ | φD × L (mm) | | 20℃ | − 40℃ | 135℃ | 125℃ | φD × L (mm) | | 20℃ | − 40℃ | 135℃ | 125℃ |
| 620 | — | — | — | — | — | — | — | — | — | — | — | — | 12.5 × 20 | G20 | 0.073 | 0.88 | 1470 | 2400 |
| 820 | — | — | — | — | — | — | — | — | — | — | — | — | 12.5 × 25 | G25 | 0.058 | 0.67 | 2260 | 3350 |
| 1000 | — | — | — | — | — | — | — | — | — | — | — | — | 16 × 20 | J20 | 0.050 | 0.55 | 1870 | 2960 |
| 1100 | — | — | — | — | — | — | — | — | — | — | — | — | 12.5 × 30 | G30 | 0.048 | 0.52 | 2520 | 4220 |
| 1300 | — | — | — | — | — | — | 12.5 × 20 | G20 | 0.042 | 0.48 | 1690 | 2760 | 12.5 × 35 | G35 | 0.042 | 0.44 | 2780 | 4810 |
| | | | | | | | | | | | | | 16 × 25 | J25 | 0.042 | 0.44 | 2500 | 4040 |
| | | | | | | | | | | | | | 18 × 20 | K20 | 0.042 | 0.44 | 2110 | 3130 |
| 1600 | — | — | — | — | — | — | — | — | — | — | — | — | 12.5 × 40 | G40 | 0.037 | 0.36 | 3020 | 5240 |
| | | | | | | | | | | | | | 16 × 31.5 | J31 | 0.035 | 0.36 | 2960 | 5130 |
| 1800 | — | — | — | — | — | — | 12.5 × 25 | G25 | 0.033 | 0.30 | 2010 | 3480 | 18 × 25 | K25 | 0.033 | 0.32 | 2530 | 4230 |
| 2000 | 12.5 × 20 | G20 | 0.042 | 0.48 | 1690 | 2760 | 16 × 20 | J20 | 0.035 | 0.27 | 2160 | 3040 | — | — | — | — | — | — |
| 2200 | — | — | — | — | — | — | 12.5 × 30 | G30 | 0.028 | 0.24 | 2900 | 4490 | 16 × 35.5 | J35 | 0.029 | 0.27 | 3160 | 5480 |
| 2400 | — | — | — | — | — | — | 18 × 20 | K20 | 0.034 | 0.22 | 2320 | 3250 | 18 × 31.5 | K31 | 0.028 | 0.25 | 3020 | 5240 |
| 2700 | — | — | — | — | — | — | 12.5 × 35 | G35 | 0.025 | 0.21 | 3190 | 5140 | 16 × 40 | J40 | 0.025 | 0.22 | 3420 | 5930 |
| 3000 | 12.5 × 25 | G25 | 0.033 | 0.30 | 2010 | 3480 | 16 × 25 | J25 | 0.028 | 0.22 | 2870 | 4260 | 18 × 35.5 | K35 | 0.024 | 0.20 | 3390 | 5870 |
| 3300 | 16 × 20 | J20 | 0.035 | 0.27 | 2160 | 3040 | 12.5 × 40 | G40 | 0.024 | 0.19 | 3470 | 5810 | — | — | — | — | — | — |
| 3600 | 12.5 × 30 | G30 | 0.028 | 0.24 | 2900 | 4490 | 16 × 31.5 | J31 | 0.023 | 0.18 | 3400 | 5480 | 18 × 40 | K40 | 0.023 | 0.16 | 3700 | 6420 |
| 3900 | — | — | — | — | — | — | 18 × 25 | K25 | 0.027 | 0.19 | 2900 | 4500 | — | — | — | — | — | — |
| 4300 | 18 × 20 | K20 | 0.034 | 0.22 | 2320 | 3250 | 16 × 35.5 | J35 | 0.020 | 0.14 | 3630 | 6070 | — | — | — | — | — | — |
| 4700 | 12.5 × 35 | G35 | 0.025 | 0.21 | 3190 | 5140 | 18 × 31.5 | K31 | 0.022 | 0.16 | 3470 | 5600 | — | — | — | — | — | — |
| | 16 × 25 | J25 | 0.028 | 0.22 | 2870 | 4260 | | | | | | | | | | | | |
| 5100 | 12.5 × 40 | G40 | 0.024 | 0.19 | 3470 | 5810 | — | — | — | — | — | — | — | — | — | — | — | — |
| 5600 | 16 × 31.5 | J31 | 0.023 | 0.18 | 3400 | 5480 | 16 × 40 | J40 | 0.019 | 0.12 | 3930 | 6810 | — | — | — | — | — | — |
| 6200 | — | — | — | — | — | — | 18 × 35.5 | K35 | 0.019 | 0.12 | 3750 | 6280 | — | — | — | — | — | — |
| 7500 | 16 × 35.5 | J35 | 0.020 | 0.14 | 3630 | 6070 | 18 × 40 | K40 | 0.018 | 0.10 | 4080 | 7070 | — | — | — | — | — | — |
| | 18 × 31.5 | K31 | 0.022 | 0.16 | 3470 | 5600 | | | | | | | | | | | | |
| 9100 | 16 × 40 | J40 | 0.019 | 0.12 | 3930 | 6810 | — | — | — | — | — | — | — | — | — | — | — | — |
| 10000 | 18 × 35.5 | K35 | 0.019 | 0.12 | 3750 | 6280 | — | — | — | — | — | — | — | — | — | — | — | — |
| 12000 | 18 × 40 | K40 | 0.018 | 0.10 | 4080 | 7070 | — | — | — | — | — | — | — | — | — | — | — | — |

| Rated voltage (V) / Item / Rated capacitance (μF) | 63 (4E) | | | | | | 80 (1R) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Case | Size code | ESR (Ω max. / 100kHz) | | Rated ripple current (mArms / 100kHz) | | Case | Size code | ESR (Ω max. / 100kHz) | | Rated ripple current (mArms / 100kHz) | |
| | φD × L (mm) | | 20℃ | − 40℃ | 135℃ | 125℃ | φD × L (mm) | | 20℃ | − 40℃ | 135℃ | 125℃ |
| 270 | — | — | — | — | — | — | 12.5 × 20 | G20 | 0.072 | 0.56 | 1420 | 1640 |
| 390 | 12.5 × 20 | G20 | 0.072 | 0.56 | 1420 | 1640 | 12.5 × 25 | G25 | 0.052 | 0.39 | 2050 | 2520 |
| 470 | — | — | — | — | — | — | 16 × 20 | J20 | 0.053 | 0.34 | 1910 | 2140 |
| 510 | — | — | — | — | — | — | 12.5 × 30 | G30 | 0.042 | 0.30 | 2630 | 3110 |
| 560 | 12.5 × 25 | G25 | 0.052 | 0.39 | 2050 | 2520 | — | — | — | — | — | — |
| 620 | — | — | — | — | — | — | 12.5 × 35 | G35 | 0.035 | 0.25 | 2970 | 3760 |
| | | | | | | | 18 × 20 | K20 | 0.044 | 0.26 | 2100 | 2350 |
| 680 | 16 × 20 | J20 | 0.053 | 0.34 | 1910 | 2140 | 16 × 25 | J25 | 0.038 | 0.23 | 2680 | 2940 |
| 750 | 12.5 × 30 | G30 | 0.042 | 0.30 | 2630 | 3110 | 12.5 × 40 | G40 | 0.031 | 0.22 | 3260 | 4610 |
| | | | | | | | 16 × 31.5 | J31 | 0.034 | 0.20 | 3050 | 3860 |
| 820 | — | — | — | — | — | — | 18 × 25 | K25 | 0.033 | 0.19 | 2810 | 3080 |
| 910 | 12.5 × 35 | G35 | 0.035 | 0.25 | 2970 | 3760 | — | — | — | — | — | — |
| | 18 × 20 | K20 | 0.044 | 0.26 | 2100 | 2350 | | | | | | |
| 1000 | 16 × 25 | J25 | 0.038 | 0.23 | 2680 | 2940 | 16 × 35.5 | J35 | 0.027 | 0.15 | 3420 | 4590 |
| 1100 | 12.5 × 40 | G40 | 0.031 | 0.22 | 3260 | 4610 | 18 × 31.5 | K31 | 0.028 | 0.15 | 3220 | 4080 |
| 1200 | 16 × 31.5 | J31 | 0.034 | 0.20 | 3050 | 3860 | — | — | — | — | — | — |
| 1300 | 18 × 25 | K25 | 0.033 | 0.19 | 2810 | 3080 | 16 × 40 | J40 | 0.025 | 0.14 | 3670 | 5190 |
| | | | | | | | 18 × 35.5 | K35 | 0.022 | 0.12 | 3690 | 5220 |
| 1600 | 16 × 35.5 | J35 | 0.027 | 0.15 | 3420 | 4590 | 18 × 40 | K40 | 0.021 | 0.11 | 3820 | 5660 |
| | 18 × 31.5 | K31 | 0.028 | 0.15 | 3220 | 4080 | | | | | | |
| 1800 | 16 × 40 | J40 | 0.025 | 0.14 | 3670 | 5190 | — | — | — | — | — | — |
| 2200 | 18 × 35.5 | K35 | 0.022 | 0.12 | 3690 | 5220 | — | — | — | — | — | — |
| 2400 | 18 × 40 | K40 | 0.021 | 0.11 | 3820 | 5660 | — | — | — | — | — | — |

# For Vibration, Resistance, Miniature Aluminum Electrolytic Capacitors

CAT.No.2025/2026E

# ELNA — Miniature Aluminum Electrolytic Capacitors RPK series

Code in front of series have been extracted from product code, which describes the segment of products, such as type and features.

- Guaranteed 5000 hours at 125℃.
- Best-suited to smoothing circuits and control circuits for industrial equipment power supplies of which long life and high reliability are required.
- NC terminal added items are lineup for vibration resistance. (30G guaranteed : 20mmL or less)
- Environmental : GREEN CAP™ , RoHS compliance.

For vibration

RPK ⇦ RKD

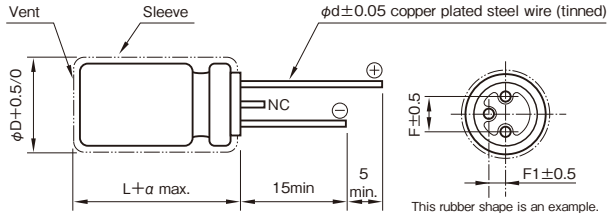
Marking color : White print on a black sleeve

## Specifications

| Item | Performance |
|---|---|
| Category temperature range (℃) | −40 to +125 |
| Tolerance at rated capacitance (%) | ±20 (20℃,120Hz) |
| Leakage current (μA) (max.) | 0.01CV or 3 whichever is larger (after 2 minutes) C : Rated capacitance (μF) , V : Rated voltage (V) (20℃) |
| Tangent of loss angle (tanδ) | Rated voltage (V): 10 / 16 / 25 / 35 — tanδ (max.): 0.20 / 0.16 / 0.14 / 0.12. 0.02 is added to every 1000μF increase over 1000μF. (20℃,120Hz) |
| Characteristics at high and low temperature | Rated voltage (V): 10 / 16 / 25 / 35 — Impedance ratio (max.) Z−40℃/Z+20℃: 4 / 3 / 3 / 3 (120Hz) |
| Endurance (125℃) (Applied ripple current) | Test time: 5000 hours; Leakage current: The initial specified value or less; Percentage of capacitance change: Within ±30% of initial value; Tangent of the loss angle: 300% or less of the initial specified value |
| Shelf life (125℃) | Test time : 1000hours ; other items are same as the endurance. Voltage application treatment : According to JIS C5101-4 4.1 |
| Applicable standards | JIS C5101 - 1, - 4 (IEC 60384 - 1, - 4) |

## Outline Drawing

Unit : mm




| ϕD | 12.5 | 16 | 18 |
|---|---|---|---|
| F | 5.0 | 7.5 | 7.5 |
| F1 | 2.5 | 3.75 | 3.75 |
| ϕd | 0.8 | 0.8 | 0.8 |
| α | 2.0 ( 30L : 2.5 ) | 2.0 ( 20, 25L : 2.5 ) | |

(Note) Since NC terminal is not insulated, it should be mounted at a position electronically independent from all other parts of the circuit.
(Note) Whisker preventive structure is possible.

## Coefficient of Frequency for Rated Ripple Current

| Rated capacitance (μF) \ Frequency (Hz) | 50・60 | 120 | 1k | 10k・100k |
|---|---|---|---|---|
| 470 to 1000 | 0.70 | 0.75 | 0.90 | 1 |
| 1200 to 6800 | 0.80 | 0.85 | 0.95 | 1 |

## Product code system : 16V2200μF (*For general product)

| RS* | RPK | 222 | M | 1E | J25 | 300 | DT |
|---|---|---|---|---|---|---|---|
| Category code | Series code | capacitance code | Cap tol. code | Voltage code | Size code | Lead-forming and packing code | Additional code |

・If it is whisker preventive structure, should change "T" into "G".
・For details, refer to the various "Product Code System" pages.
・Lead forming and packing code “300” : lead wire is long type and standard packing.
For standard packing, please refer to the "PACKING" page.

Code in front of series have been extracted from product code, which describes the segment of products, such as type and features.

## Standard Ratings

| Rated voltage (V) / Item / Rated capacitance (μF) | 10 (1L) | | | | 16 (1E) | | | | 25 (1T) | | | | 35 (1G) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Case φD × L (mm) | Size code | ESR (Ω max.) | Rated ripple current (mArms) | Case φD × L (mm) | Size code | ESR (Ω max.) | Rated ripple current (mArms) | Case φD × L (mm) | Size code | ESR (Ω max.) | Rated ripple current (mArms) | Case φD × L (mm) | Size code | ESR (Ω max.) | Rated ripple current (mArms) |
| 470 | – | – | – | – | – | – | – | – | – | – | – | – | 12.5×20 | G20 | 0.040 | 1820 |
| 1000 | 12.5×15 | G15 | 0.059 | 1380 | 12.5×20 | G20 | 0.040 | 1820 | 12.5×20 | G20 | 0.040 | 1820 | 12.5×25 | G25 | 0.032 | 2400 |
| | | | | | | | | | 12.5×25 | G25 | 0.032 | 2400 | 16×25 | J25 | 0.024 | 3100 |
| | | | | | 16×16 | J16 | 0.044 | 1930 | 16×16 | J16 | 0.044 | 1930 | 18×20 | K20 | 0.029 | 2490 |
| 1200 | – | – | – | – | – | – | – | – | 12.5×20 | G20 | 0.040 | 1820 | 12.5×30 | G30 | 0.029 | 2560 |
| | | | | | | | | | | | | | 16×20 | J20 | 0.032 | 2280 |
| 1500 | – | – | – | – | – | – | – | – | – | – | – | – | 12.5×35 | G35 | 0.023 | 2970 |
| | | | | | | | | | | | | | 16×31.5 | J31 | 0.020 | 3160 |
| | | | | | | | | | | | | | 18×25 | K25 | 0.022 | 3200 |
| 1800 | – | – | – | – | – | – | – | – | 12.5×25 | G25 | 0.032 | 2400 | 12.5×40 | G40 | 0.020 | 3600 |
| | | | | | | | | | 16×20 | J20 | 0.032 | 2280 | 16×25 | J25 | 0.024 | 3100 |
| 2200 | 12.5×25 | G25 | 0.032 | 2400 | 12.5×25 | G25 | 0.032 | 2400 | 12.5×30 | G30 | 0.029 | 2560 | 16×31.5 | J31 | 0.020 | 3160 |
| | 16×20 | J20 | 0.032 | 2280 | 16×25 | J25 | 0.024 | 3100 | 16×25 | J25 | 0.024 | 3100 | 16×35.5 | J35 | 0.019 | 3590 |
| | 18×16 | K16 | 0.041 | 2170 | 18×20 | K20 | 0.029 | 2490 | 18×20 | K20 | 0.029 | 2490 | 18×25 | K25 | 0.022 | 3200 |
| 2700 | – | – | – | – | – | – | – | – | 12.5×35 | G35 | 0.023 | 2970 | 16×35.5 | J35 | 0.019 | 3590 |
| | | | | | | | | | 16×25 | J25 | 0.024 | 3100 | | | | |
| | | | | | | | | | 18×20 | K20 | 0.029 | 2490 | 18×31.5 | K31 | 0.018 | 3410 |
| 3300 | 16×25 | J25 | 0.024 | 3100 | 16×31.5 | J31 | 0.020 | 3160 | 12.5×40 | G40 | 0.020 | 3600 | 16×40 | J40 | 0.017 | 4300 |
| | 18×20 | K20 | 0.029 | 2490 | 18×25 | K25 | 0.022 | 3200 | 16×31.5 | J31 | 0.020 | 3160 | 18×35.5 | K35 | 0.017 | 4200 |
| 3900 | – | – | – | – | – | – | – | – | 16×35.5 | J35 | 0.019 | 3590 | – | – | – | – |
| | | | | | | | | | 18×25 | K25 | 0.022 | 3200 | | | | |
| 4700 | 16×31.5 | J31 | 0.020 | 3160 | 16×35.5 | J35 | 0.019 | 3590 | 18×35.5 | K35 | 0.017 | 4200 | 18×40 | K40 | 0.016 | 4600 |
| | 18×25 | K25 | 0.022 | 3200 | 18×31.5 | K31 | 0.018 | 3410 | | | | | | | | |
| 5600 | – | – | – | – | – | – | – | – | 16×40 | J40 | 0.017 | 4300 | – | – | – | – |
| | | | | | | | | | 18×35.5 | K35 | 0.017 | 4200 | | | | |
| 6800 | – | – | – | – | – | – | – | – | 18×40 | K40 | 0.016 | 4600 | – | – | – | – |

(Note) Rated ripple current : 125℃ , 100kHz ; ESR : 20℃ , 100kHz

# 1 General Description of Aluminum Electrolytic Capacitors

## 1-1 The Principle of Capacitor

The principle of capacitor can be presented by the principle drawing as in Fig.1-1.

When a voltage is applied between the metal electrodes placed opposite on both surfaces of a dielectric, electric charge can be stored proportional to the voltage.

$Q = C \cdot V$

Q : Quantity of electricity (C)

V : Voltage (V)

C : Capacitance (F)

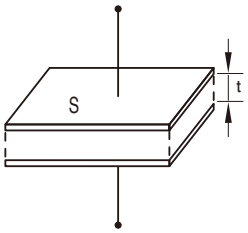



Fig.1-1

C. called the capacitance of capacitor, is expressed by the following expression with the electrode area S[m²], the electrode spacing t [m] and the dielectric constant of dielectric " $\varepsilon$ ":

$$C[F] = \varepsilon 0 \cdot \varepsilon \cdot \frac{S}{t}$$

$\varepsilon 0$ : Dielectric constant in vacuum ($=8.85\times10^{-12}$F/m)

The dielectric constant of an aluminum oxide film is 7 to 8. Larger capacitances can be obtained by enlarging the electrode area S or reducing t.

Table 1-1 shows the dielectric constants of typical dielectrics used in the capacitor. In many cases, capacitor names are determined by the dielectric material used, for example, aluminum electrolytic capacitor, tantalum capacitor, etc.

Table 1

| Dielectric | Dielectric Constant | Dielectric | Dielectric Constant |
|---|---|---|---|
| Aluminum oxide film | 7 to 8 | Porcelain (ceramic) | 10 to 120 |
| Mylar | 3.2 | Polystyrene | 2.5 |
| Mica | 6 to 8 | Tantalum oxide film | 10 to 20 |

Although the aluminum electrolytic capacitor is small, it has a large capacitance. It is because the electrode area is roughened by electrochemical etching, enlarging the electrode area and also because the dielectric is very thin.

The schematic cross section of the aluminum electrolytic capacitor is as in Fig.1-2.

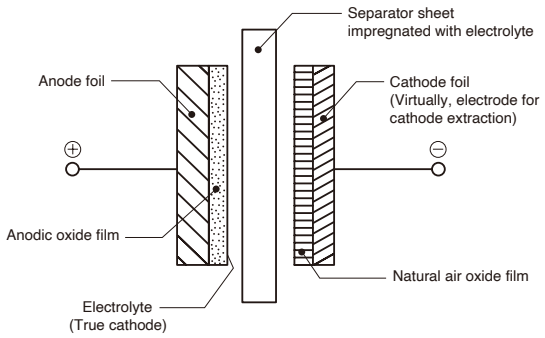
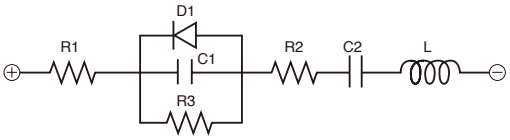



Fig.1-2

## 1-2 Equivalent Circuit of the Capacitor

The electrical equivalent circuit of the aluminum electrolytic capacitor is as presented in the following figure.




R1 : Resistance of terminal and electrode

R2 : Resistances of anodic oxide film and electrolyte

R3 : Insulation resistance because of defective anodic oxide film

D1 : Oxide semiconductor of anode foil

C1 : Capacity of anode foil

C2 : Capacity of cathode foil

L : Inductance caused by terminals, electrodes, etc.

# 2 About the Life of an Aluminum Electrolytic Capacitor

## 2-1 Concept of Life Estimation

### 2-1-1 Estimation of life with minimal ripple current (negligible).

Generally, the life of an aluminum electrolytic capacitor is closely related with its ambient temperature and the life will be approximately the same as the one obtained by Arrhenius' equation.

$$L = L_0 \times 2^{\left(\frac{T_0 - T}{10}\right)} \quad \cdots\cdots\cdots\cdots\cdots\cdots(1)$$

Where L : Life at temperature T

$L_0$ : Life at temperature $T_0$

### 2-1-2 Estimation of life considering the ripple current.

The ripple current affects the life of a capacitor because the internal loss (ESR) generates heat. The generated heat will be :

$$P = I^2R \quad \text{.....(2)}$$

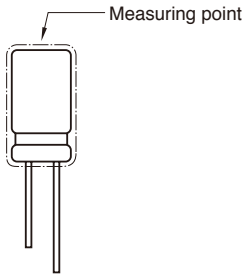
Where $I$ : Ripple current (Arms)
$R$ : ESR (Ω)

With increase in the temperature of the capacitor:

$$\Delta T = \frac{I^2 \times R}{A \times H} \quad \text{.....(3)}$$

Where $\Delta T$ : Temperature increase in the capacitor core(deg.)
$I$ : Ripple current (Arms)
R : ESR (Ω)
A : Surface area of the capacitor ($cm^2$)
H : Radiation coefficient (Approx. 1.5 to 2.0 $\times 10^{-3} W/cm^2 \times ℃$)

The above equation (3) shows that the temperature of a capacitor increases in proportion to the square of the applied ripple current and ESR, and in inverse proportion to the surface area. Therefore, the amount of the ripple current determines the heat generation, which affects the life. The value of Δ T varies depending on the capacitor types and operating conditions. The usage is generally desirable if Δ T remains less than 5℃. The measuring point for temperature increase due to ripple current is shown below ;




Since it is actually difficult to measure the temperature increase at the capacitor core, the following table is provided for conversion from the surface temperature increase to the core temperature increase.

Table 2-1

| Case diameter | to 10 | 12.5 to 16 | 18 |
|---|---|---|---|
| Core / Surface | 1.1 | 1.2 | 1.25 |

①The life estimation formula that considers ambient temperature and temperature rise due to ripple is derived as follows by modifying formula (1).

$$L = L_d \times 2^{\left(\frac{T_0 - T}{10}\right)} \times K^{\left(\frac{-\Delta T}{10}\right)} \quad \text{.....(4)}$$

Where $L_d$ : Life at DC operation (h) at Upper category temperature
K : Ripple acceleration factor (K=2, within allowable ripple current)
$T_0$ : Upper category temperature (℃)
T : Ambient temperature (℃)
Δ T : Temperature increase at capacitor core (deg.)

②The life estimation formula based on Guaranteed life (when rated ripple current is superimposed at upper category temperature) is derived as follows by modifying formula (4).

$$L = L_r \times 2^{\left(\frac{T_0 - T}{10}\right)} \times K^{\left(\frac{\Delta T_0 - \Delta T}{10}\right)} \quad \text{.....(5)}$$

Where $L_r$ : Guaranteed life (Life at the upper category temperature with the rated ripple current [h])
$\Delta T_0$ : Temperature increase at capacitor core, at the upper category temperature (deg.)

③Life estimation formula considering ambient temperature and ripple current is derived as follows by using equation (3) to transform equation (5) into equations for $I$, $I_0$, $\Delta T_0$.

$$L = L_r \times 2^{\left(\frac{T_0 - T}{10}\right)} \times K^{\left\{1 - \left(\frac{I}{I_0}\right)^2\right\} \times \frac{\Delta T_0}{10}} \quad \text{.....(6)}$$

Where $I_0$ : Rated ripple current at the upper category temperature (Arms)
$I$ : Applied ripple current (Arms)

Use below $\Delta T_0$ value at each category highest temperature when calculating life expectancy using equation (5) or (6).

| | | |
|---|---|---|
| Aluminum Electrolytic Capacitors | 85 | : 10deg |
| | 105 to 135 | : 5deg |
| | 150 | : 3deg |
| Polymer hybrid type aluminum Electrolytic Capacitors | 105 | : 15deg |
| | 125 | : 10deg |
| | 135 | : 10deg |
| | 150 | : 5deg |

The life expectancy formula shall in principle be applied to the temperature range between the ambient temperature of +40℃ and upper category temperature. (Temperature conditions below +40℃ are uniformly treated as +40°C.)
The expected life time shall be about fifteen years at maximum as a guide in terms of deterioration of the sealant. Also, please note that the calculation results calculated by the above formulas (4), (5), and (6) are not guaranteed values.

## 2-2 Practical Examples of Life Expectancy

By using the life estimation formula (6), the capacitor's guaranteed time $L_r$ (category upper limit temperature $T_0$, rated ripple current $I_0$) can be converted to operating time L under actual usage conditions (temperature T, ripple current I).

When considering whether a certain capacitor can be applied to a mission profile (a combination of multiple conditions of temperature, current, and operating time) that assumes actual use, calculate L for each profile condition using formula (6), and it can be assumed that the capacitor is applicable for profile conditions if the ratio of the total value of actual operating time $L_c$ to the total value of L (life consumption rate $L_{et}$) is within 100%.

(Since the calculation result is not a guaranteed value, please make a decision after thorough testing regarding profile application.)

[Calculation example]
Calculate whether the RKC series 80V1600µF (Data A) is applicable to the mission profile (Data B).

Data A (Basic sample data)

| | |
|---|---|
| Item | : 80V 1600µF φ18 x 40L RKC series |
| $T_0$ | = 135°C |
| $\Delta T_0$ | = 5deg |
| $I_0$ | = 3.82Arms at 135°C, 100kHz |
| $L_r$ (Guarantee time) | = 2000hours at 135°C |

Data B (Mission profile)

| | T (Ambient temperature) | I (Ripple current at 100kHz) | $L_c$ (Operating time) |
|---|---|---|---|
| Condition1 | 80°C | 2.00Arms | 5000h |
| Condition2 | 120°C | 3.00Arms | 3000h |
| Condition3 | 40°C | 0.00Arms | 123400h |

[Condition1]
Calculate $L_1$ (80°C, 2.00Arms) by using
$T_0$=135°C, $I_0$=3.82Arms, $L_r$=2000h, $\Delta T_0$=5degC

$$L_1 = 2000\times\left[2^{|(135-80)/10|}\times 2^{|1-(2.00/3.82)^2|\times(5/10)}\right] = 116400[h]$$

Life consumption rate $L_{et1}$ of actual operating time $L_{c1}$ (=5000h) against $L_1$ is calculated as,

$$L_{et1} = 100\times(L_{c1}/L_1) = 100\times(5000/116400) = 4.30[\%]$$

[Condition2]
Calculate $L_2$ (120°C, 3.00Arms) by using
$T_0$=135°C, $I_0$=3.82Arms, $L_r$=2000h, $\Delta T_0$=5degC

$$L_2 = 2000\times\left[2^{|(135-120)/10|}\times 2^{|1-(3.00/3.82)^2|\times(5/10)}\right] = 6461[h]$$

Life consumption rate $L_{et2}$ of actual operating time $L_{c2}$ (=3000h) against $L_2$ is calculated as,

$$L_{et2} = 100\times(L_{c2}/L_2) = 100\times(3000/6461) = 46.4[\%]$$

[Condition3]
Calculate $L_3$ (40°C, 0.00Arms) by using
$T_0$=135°C, $I_0$=3.82Arms, $L_r$=2000h, $\Delta T_0$=5degC

$$L_3 = 2000\times\left[2^{|(135-40)/10|}\times 2^{|1-(0.00/3.82)^2|\times(5/10)}\right] = 2048000[h]$$

Life consumption rate $L_{et3}$ of actual operating time $L_{c3}$ (=123400h) against $L_3$ is calculated as,

$$L_{et3} = 100\times(L_{c3}/L_3) = 100\times(123400/2048000) = 6.03[\%]$$

Therefore, the total value $L_{et\_all}$ of the life consumption rate of each profile is calculated as follows.

$$L_{et\_all} = L_{et1}+L_{et2}+L_{et3} = 4.30[\%]+46.4[\%]+6.03[\%] = 56.8[\%]$$

Therefore, since it is less than 100%, RKC series 80V1600µF is presumed to be applicable to this profile.

## 3 Regarding Recovery Voltage

• After charging and then discharging the aluminum electrolytic capacitor, and further causing short-circuit to the terminals and leave them alone, the voltage between the two terminals will rise again after some interval. Voltage caused in such case is called recovery voltage. Following is the process that causes this phenomenon :

• When the voltage is impressed on a dielectric, electrical transformation will be caused inside the dielectric due to dielectric action, and electrification will occur in positive-negative opposite to the voltage impressed on the surface of the dielectric. This phenomenon is called polarization action.

• After the voltage is impressed with this polarization action, and if the terminals are discharged till the terminal voltage reaches 0 and are left open for a while, an electric potential will arise between the two terminals and thus causes recovery voltage.

• Recovery voltage comes to a peak around 10 to 20 days after the two terminals are left open, and then gradually declines. Recovery voltage has a tendency to become bigger as the component (stand-alone base type) becomes bigger.

• If the two terminals are short-circuited after the recovery voltage is generated, a spark may scare the workers working in the assembly line, and may put low-voltage driven components (CPU, memory, etc.) in danger of being destroyed. Measures to prevent this is to discharge the accumulated electric charge with resistor of about 100 to 1kΩ before using, or ship out by making the terminals in short-circuit condition by covering them with an aluminum foil at the production stage. Please consult us for adequate procedures.

## 5 Electrode Foil Development Technology

### 5-1 Corrosion inhibition of cathode foil

Inactive treatment is implemented to ensure long life by inhibiting natural corrosion of the cathode foil. Fig. 3-1 shows its effects with values of the polarization resistance inversely proportional to the corrosion rate using the AC impedance method (FRA). This indicates that the cathode foil used in the High reliability capacitors has the polarization resistance higher than that of the conventional capacitors owing to corrosion inhibition.

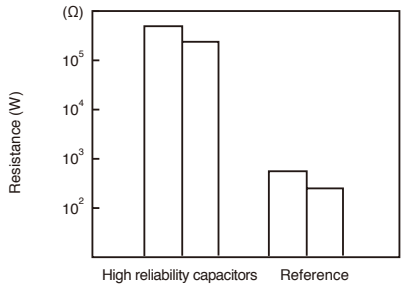



Fig. 3-1

### 5-2 Sealing material permeability of electrolyte

To ensure long life, a low permeable lactone solvent for the sealing material is used as the main solvent of the electrolyte of the High reliability capacitor. Fig. 3-2 shows the test results on the permeability obtained by changing the weight of the capacitors produced with different types of electrolytes at a high temperature.

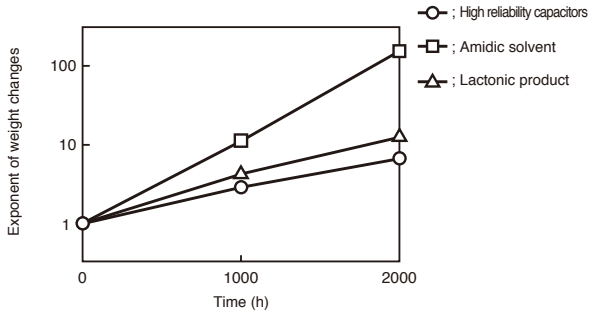



Fig. 3-2

### 5-3 Airtightness of sealing material

Since the electrolyte is stable for hours, the key element for capacitor's life is the sealing material. By optimizing the crosslinking density of the sealing material polymer, the sealing material of the High reliability capacitor attains its long life with electrolyte permeability less than that of the conventional capacitors.

Fig. 3-3 shows the test results on the airtightness of the sealing material obtained by changing the weight of the capacitors at a high temperature, producing capacitors with the conventional sealing material and improved one both containing the electrolyte used in the High reliability capacitor.

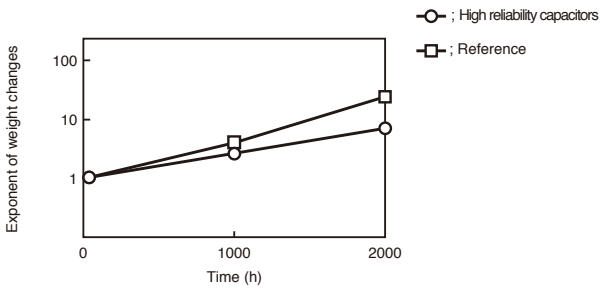



Fig. 3-3

### 5-4 Long-time stability of electrolyte

The electrolyte used in the High reliability capacitor is stable with low initial resistivity and small secular changes at a high temperature. Fig. 3-4 shows change in resistivity at 105°C.

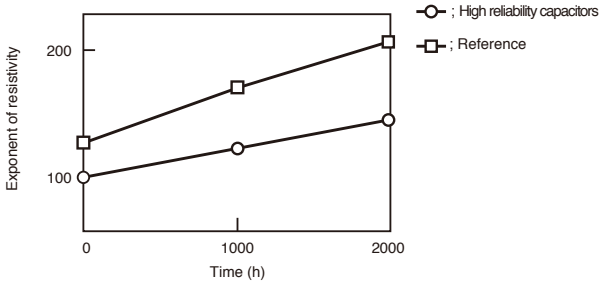



Fig. 3-4

### 5-5 Dielectric formation voltage and leakage current characteristics of anode foil

To increase the operating life by controlling the gas generation inside capacitor because of 1.5 to 2 times the rated voltage, while that of the previous capacitor is about 1.3 times the rated voltage.

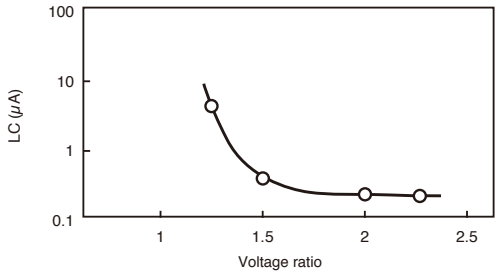



Fig. 3-5

### 5-6 Lowered ESR of Electrode Foil

To reduce the ESR of electrolytic capacitor, we have improved our chemical conversion technology for anode foil to develop lower ESR electrode foil compared to the conventional product as shown in Fig. 3-6

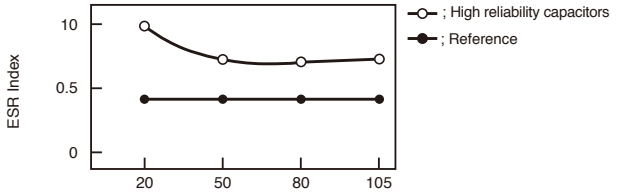


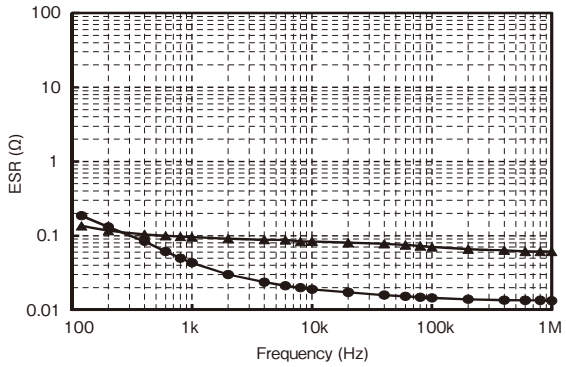

Fig. 3-6 ESR Index of Anode Foil

# Electric Characteristics Data

## 1.CONDUCTIVE POLYMER HYBRID ALUMINUM ELECTROLYTIC CAPACITORS

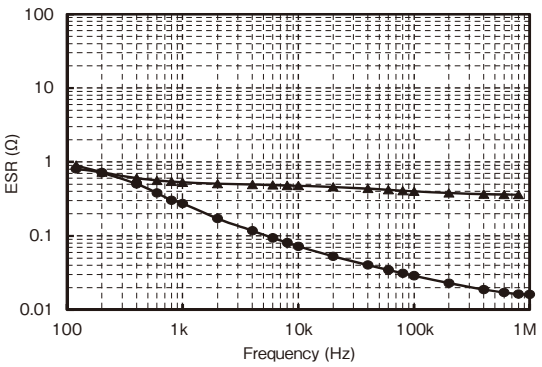
### Series HV1 (guaranteed 105°C)
### Frequency characteristics at 20°C

| | Series | Ratings | Case size |
|---|---|---|---|
| ● | HV1 | 25V330μF | φ10×10 L |
| ▲ | VVD | 25V470μF | φ10×10 L |



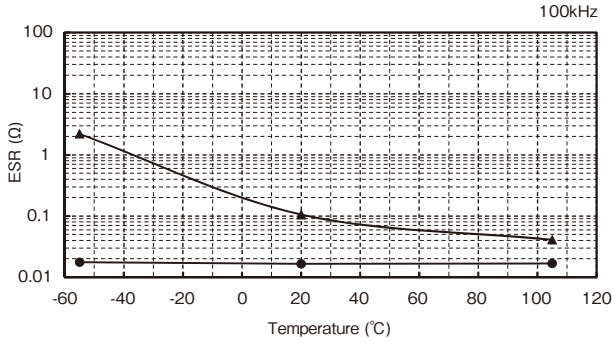

### Series HVK (guaranteed 125°C)
### Frequency characteristics at 20°C

| | Series | Ratings | Case size |
|---|---|---|---|
| ● | HVK | 25V100μF | φ6.3×7.7 L |
| ▲ | VVT | 25V100μF | φ6.3×7.7 L |



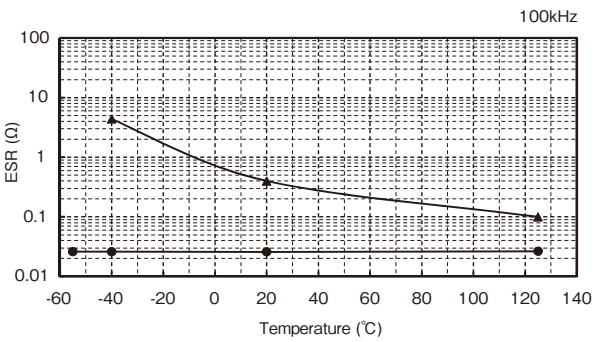

### Temperature Characteristics

| | Series | Ratings | Case size |
|---|---|---|---|
| ● | HV1 | 25V330μF | φ10×10 L |
| ▲ | VVD | 25V470μF | φ10×10 L |



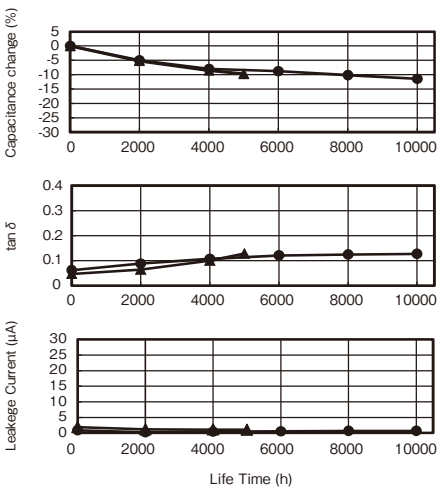

### Temperature Characteristics

| | Series | Ratings | Case size |
|---|---|---|---|
| ● | HVK | 25V100μF | φ6.3×7.7 L |
| ▲ | VVT | 25V100μF | φ6.3×7.7 L |



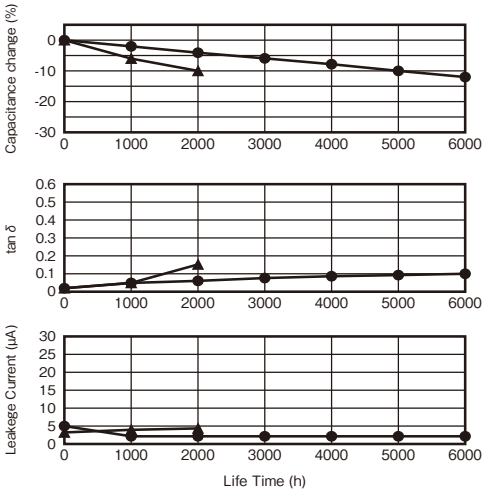

### Endurance (Applied ripple current) at 105°C

| | Series | Ratings | Case size | Rated ripple current (100kHz) |
|---|---|---|---|---|
| ● | HV1 | 25V220μF | φ8×10 L | 2300mArms |
| ▲ | VVD | 25V220μF | φ8×10 L | 600mArms |




### Endurance (Applied ripple current) at 125°C

| | Series | Ratings | Case size | Rated ripple current (100kHz) |
|---|---|---|---|---|
| ● | HVK | 35V270μF | φ10×10 L | 2000mArms |
| ▲ | VVT | 35V220μF | φ10×10 L | 500mArms |

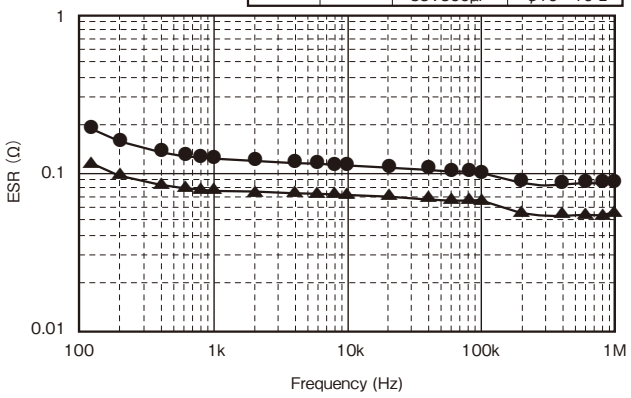



Notice : The measurement values are not guaranteed values, but measurements.

## 2.CHIP TYPE ALUMINUM ELECTROLYTIC CAPACITORS

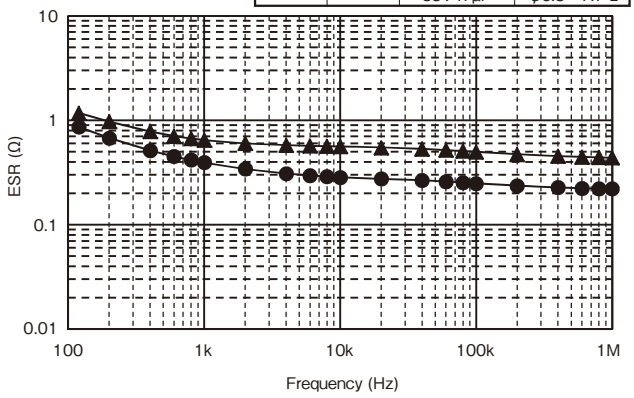
### Series VZD (guaranteed 105°C)
### Frequency characteristics at 20°C

| | Series | Ratings | Case size |
|---|---|---|---|
| ● | VVD | 35V330μF | φ10×10 L |
| ▲ | VZD | 35V560μF | φ10×10 L |



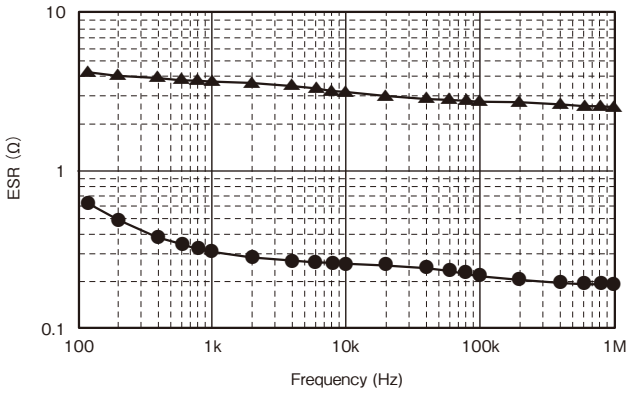

### Series VZF (guaranteed 125°C)
### Frequency characteristics at 20°C

| | Series | Ratings | Case size |
|---|---|---|---|
| ● | VZF | 35V100μF | φ6.3×7.7 L |
| ▲ | VVT | 35V47μF | φ6.3×7.7 L |



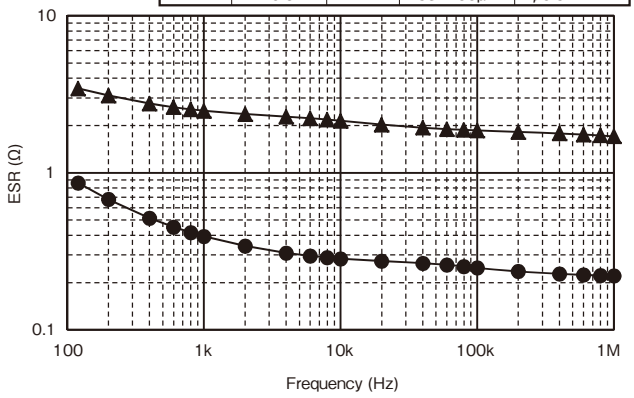

### Temperature Characteristics (20°C, −40°C)

| | Temperature | Series | Ratings | Case size |
|---|---|---|---|---|
| ● | 20℃ | VZD | 35V100μF | φ6.3×5.8 L |
| ▲ | −40℃ | VZD | 35V100μF | φ6.3×5.8 L |



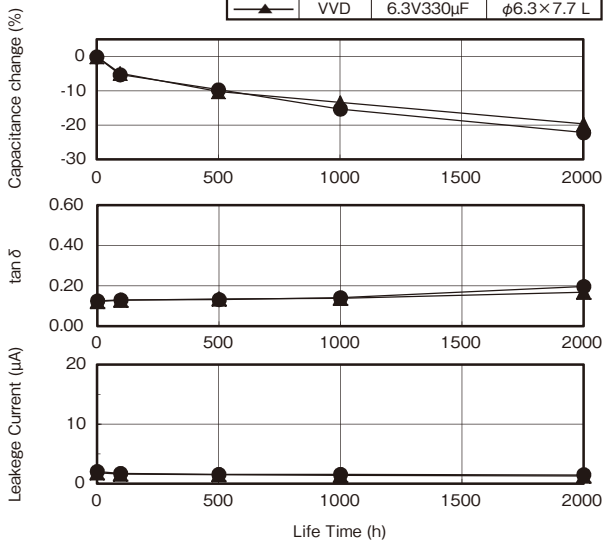

### Temperature Characteristics (20°C, −40°C)

| | Temperature | Series | Ratings | Case size |
|---|---|---|---|---|
| ● | 20℃ | VZF | 35V100μF | φ6.3×7.7 L |
| ▲ | −40℃ | VZF | 35V100μF | φ6.3×7.7 L |



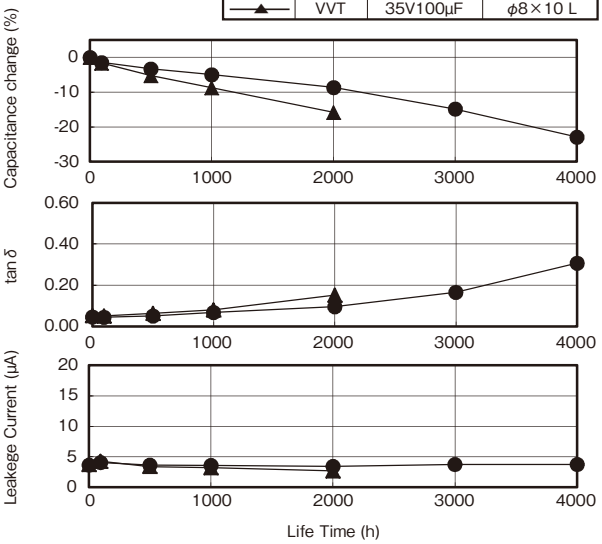

### Endurance at 105°C

| | Series | Ratings | Case size |
|---|---|---|---|
| ● | VZD | 6.3V680μF | φ6.3×7.7 L |
| ▲ | VVD | 6.3V330μF | φ6.3×7.7 L |




### Endurance at 125°C

| | Series | Ratings | Case size |
|---|---|---|---|
| ● | VZF | 35V220μF | φ8×10 L |
| ▲ | VVT | 35V100μF | φ8×10 L |

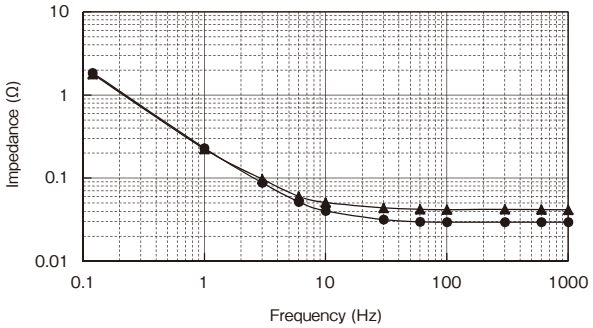



Notice : The measurement values are not guaranteed values, but measurements.

## 3.MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS (1)

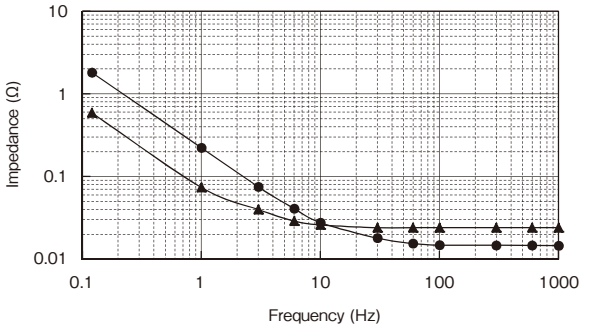
### Series RJD (guaranteed 105°C)
### Frequency characteristics at 20°C

| | Series | Ratings | Case size |
|---|---|---|---|
| ● | RJD | 35V1000μF | φ12.5×20 L |
| ▲ | RJB | 35V680μF | φ12.5×20 L |



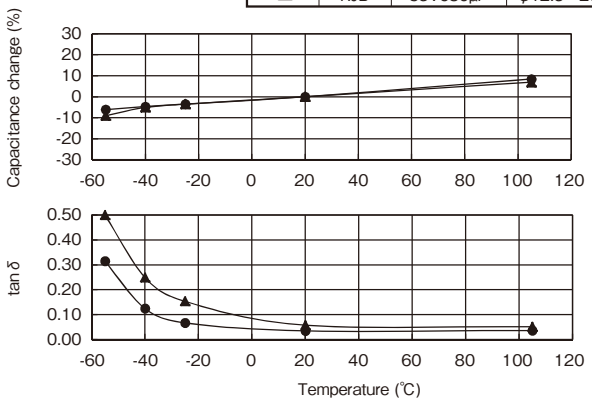

### Series RJM (guaranteed 105°C)
### Frequency characteristics at 20°C

| | Series | Ratings | Case size |
|---|---|---|---|
| ● | RJM | 35V1000μF | φ12.5×20 L |
| ▲ | RJL | 35V1000μF | φ12.5×25 L |



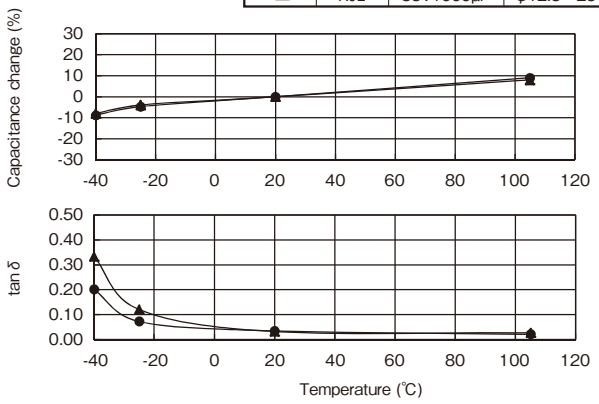

### Temperature Characteristics

| | Series | Ratings | Case size |
|---|---|---|---|
| ● | RJD | 35V1000μF | φ12.5×20 L |
| ▲ | RJB | 35V680μF | φ12.5×20 L |



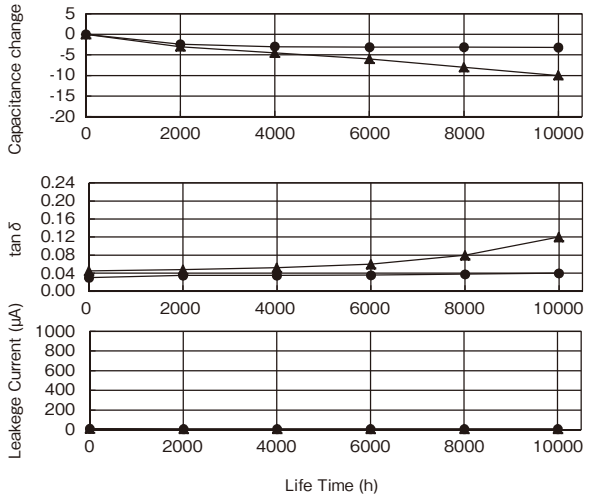

### Temperature Characteristics

| | Series | Ratings | Case size |
|---|---|---|---|
| ● | RJM | 35V1000μF | φ12.5×20 L |
| ▲ | RJL | 35V1000μF | φ12.5×25 L |



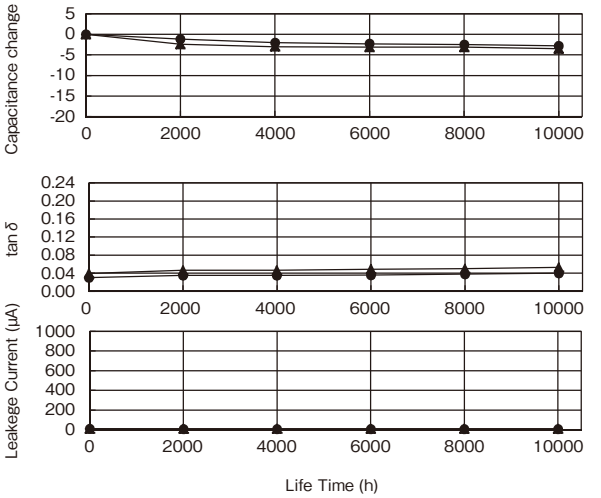

### Endurance (Applied ripple current) at 105°C

| | Series | Ratings | Case size | Rated ripple current (100kHz) |
|---|---|---|---|---|
| ● | RJD | 35V1000μF | φ12.5×20 L | 1700mArms |
| ▲ | RJB | 35V680μF | φ12.5×20 L | 1690mArms |




### Endurance (Applied ripple current) at 105°C

| | Series | Ratings | Case size | Rated ripple current (100kHz) |
|---|---|---|---|---|
| ● | RJM | 35V1000μF | φ12.5×20 L | 2600mArms |
| ▲ | RJL | 35V1000μF | φ12.5×25 L | 2230mArms |

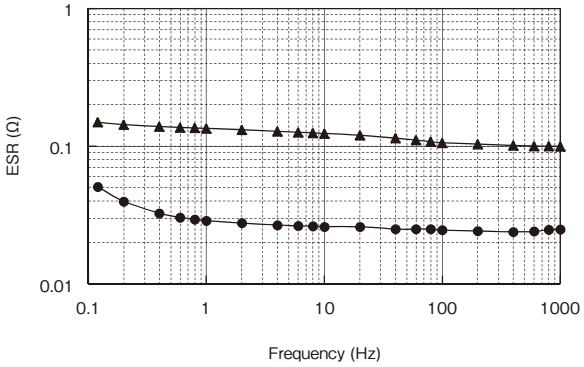



Notice : The measurement values are not guaranteed values, but measurements.

## 4.MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS (2)

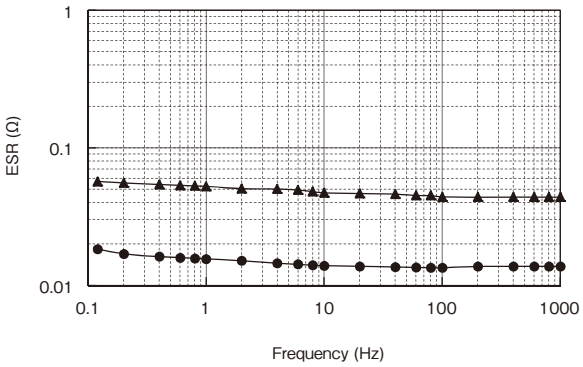
### Series RKD (guaranteed 125°C)
### Frequency characteristics at 20°C

| | Temperature | Series | Ratings | Case size |
|---|---|---|---|---|
| ●—● | 20℃ | RKD | 35V1000μF | φ12.5×25 L |
| ▲—▲ | −40℃ | RKD | 35V1000μF | φ12.5×25 L |



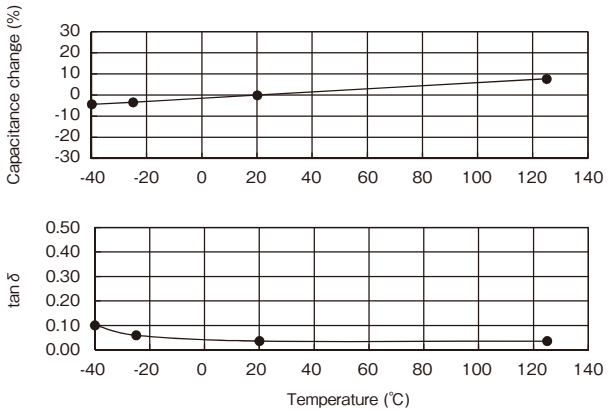

### Series RKC (guaranteed 135°C)
### Frequency characteristics at 20°C

| | Temperature | Series | Ratings | Case size |
|---|---|---|---|---|
| ●—● | 20℃ | RKC | 35V6200μF | φ18×35.5 L |
| ▲—▲ | −40℃ | RKC | 35V6200μF | φ18×35.5 L |



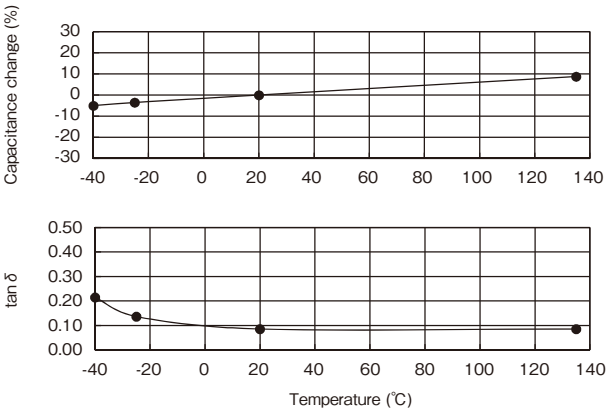

### Temperature Characteristics

| | Series | Ratings | Case size |
|---|---|---|---|
| ●—● | RKD | 35V1000μF | φ12.5×25 L |



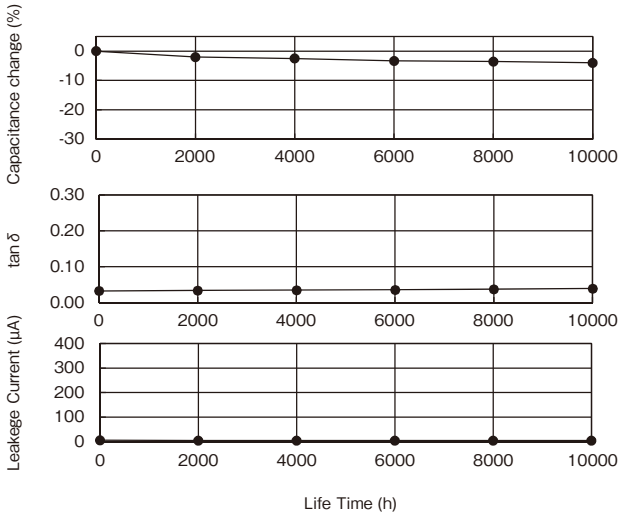

### Temperature Characteristics

| | Series | Ratings | Case size |
|---|---|---|---|
| ●—● | RKC | 35V6200μF | φ18×35.5 L |



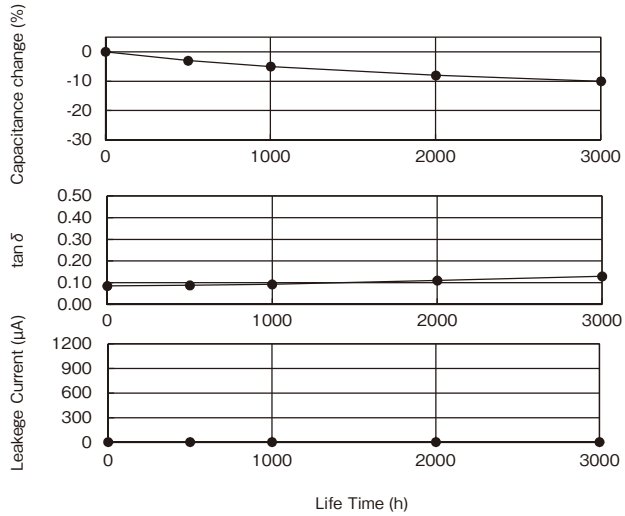

### Endurance (Applied ripple current) at 125°C

| | Series | Ratings | Case size | Rated ripple current (100kHz) |
|---|---|---|---|---|
| ●—● | RKD | 35V1000μF | φ12.5×25 L | 2400mArms |




### Endurance (Applied ripple current) at 135°C

| | Series | Ratings | Case size | Rated ripple current (100kHz) |
|---|---|---|---|---|
| ●—● | RKC | 35V6200μF | φ18×35.5 L | 3750mArms |




Notice : The measurement values are not guaranteed values, but measurements.

# Electric Double Layer Capacitors “DYNACAP™”

CAT.No.2025/2026E

## ■ Product Code System

EDLC

The Elna product code is Max.20 digits.

Example) DZN series 2.5V 2.7F φ 8x20L

New product code
RSDZN2752R5E20300ST

Old product code
DZN-2R5D275G5ST

| 1 2 | 3 4 5 | 6 7 8 | 9 10 11 | 12 | 13 14 | 15 16 17 | 18 19 20 |
|---|---|---|---|---|---|---|---|
| R S | D Z N | 2 7 5 | 2 R 5 | E | 2 0 | 3 0 0 | S T |
| Product category code | Series code | Rated capacitance code | Max. operating voltage code | Case size code | | Lead forming and Packing code | Additional code |

1 Product group
R : Energy devices
(Electrolytic double layer capacitor)

2 Category
S : For general
A : For automotive (powertrain, safety)
C : For automotive (entertainment, audio)
M : For medical
(international classification Ⅲ)
L : For medical
(international classification Ⅰ, Ⅱ)

3-5 Series code
Please refer to each series page.

6-8 Rated capacitance code
The code denoting nominal capacitance shall consist of three numerals.
The first and second numerals shall represent the significant figures of nominal capacitance in the unit of microfarad (μF), And the third numeral shall represent the number of zeros following the significant figures.
Example

| Rated capacitance (F) | Code |
|---|---|
| 1 | 105 |
| 2.7 | 275 |
| 3.3 | 335 |
| 4.7 | 475 |
| 5.6 | 565 |
| 6.8 | 685 |
| 10 | 106 |
| 15 | 156 |
| 22 | 226 |
| 33 | 336 |
| 40 | 406 |
| 50 | 506 |

9-11 Max. operating voltage code

| voltage (V) | Code |
|---|---|
| 2.5 | 2R5 |
| 2.7 | 2R7 |

12 Diameter code

| D(mm) | Code |
|---|---|
| 6.3 | D |
| 8 | E |
| 10 | F |
| 12.5 | G |
| 16 | J |
| 18 | K |

13-14 Length code

| L(mm) | Code |
|---|---|
| 12 | 12 |
| 14 | 14 |
| 20 | 20 |
| 25 | 25 |
| 30 | 30 |
| 31.5 | 31 |
| 35 | 35 |
| 35.5 | 35 |
| 40 | 40 |

15-17 Lead forming and Packing code
Example

| Contents | code |
|---|---|
| Long lead standard packing | 300 |

Please contact us for lead forming, cutting, taping and special packaging.

18-20 Additional code
Example

| Code | Contents |
|---|---|
| T | Sn 100% plated |

Please contact us for details.

## ■ Type List for DYNACAP™(NRND Poduct)

The series names are linked to each page.

**Not recommended for new design. (There are not substitute series.)**

| Category | | Series | Category temp. range ℃ Max. | Category temp. range ℃ Min. | Max.operating voltage V.DC | Capacitance range F | Color of sleeve | Applications | Remarks |
|---|---|---|---|---|---|---|---|---|---|
| For power | Standard type | DZ1 | + 70 | − 25 | 2.5 / 2.7 | 1 to 40 | Black | Ideal for power supplies of LED displays, personal wireless items, backup for power supplies, and the storage battery of solar battery. | |
| | Large capacitance type | DZH | + 60 | − 25 | 2.5 | 22 to 50 | Black | | |
| | High power type | DZN | + 70 | − 25 | 2.5 / 2.7 | 1 to 40 | Blue | Ideal for actuator of moters and electromagnetic coil drives. | |
| | High power Low temperature type | DDU | + 70 | − 40 | 2.7 | 3.3 to 50 | Brown | Ideal for actuator of moters and electromagnetic coil drives. | |

**● The series listed in the below table have been removed from the catalogue (discontinued series). Please contact us for product detail.**

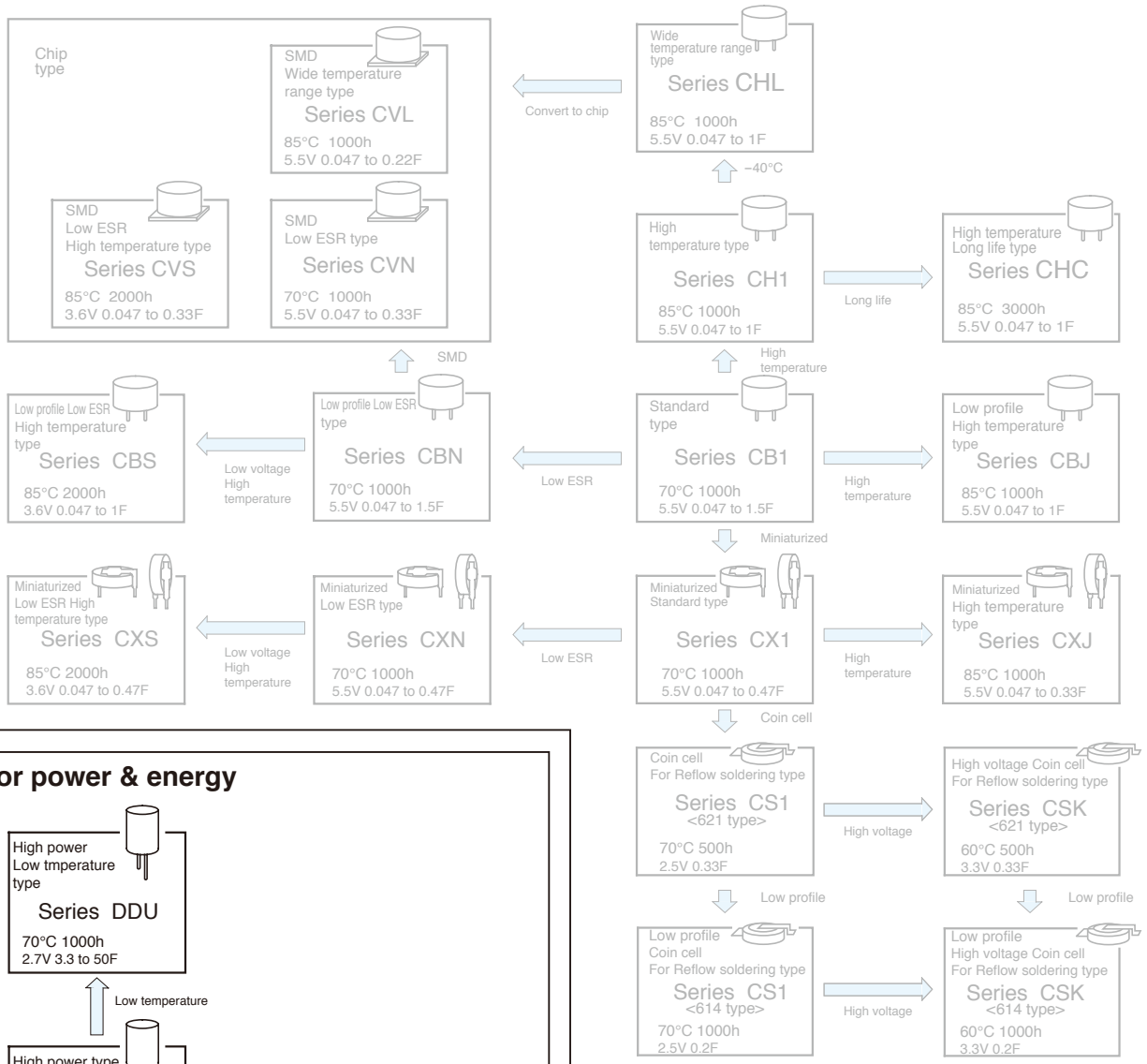
| Category | | Series | Category temp. range ℃ Max. | Category temp. range ℃ Min. | Max.operating voltage V.DC | Capacitance range F | Color of sleeve | Applications |
|---|---|---|---|---|---|---|---|---|
| For memory backup | Reflow soldering type | CVN | + 70 | − 25 | 5.5 | 0.047 to 0.33 | Brown | Ideal for industrial, smart meter, backing up of RTC's for surveillance camera, momentary power assistance of a battery etc. |
| | Reflow soldering type | CVL | + 85 | − 40 | 5.5 | 0.047 to 0.22 | Brown | |
| | Reflow soldering type | CVS | + 85 | − 25 | 3.6 | 0.047 to 0.33 | Brown | |
| | Standard type | CB1 | + 70 | − 25 | 5.5 | 0.047 to 1.5 | Indigo | Ideal for backing up of CMOS's, IC's of camera, microcomputers, RAM's, RTC's and the like used in audio, general electronic device, and others. |
| | Low profile Low ESR type | CBN | + 70 | − 25 | 5.5 | 0.047 to 1.5 | Indigo | |
| | Low profile High temperature type | CBJ | + 85 | − 10 | 5.5 | 0.047 to 1 | Black | |
| | Low profile Low ESR High temperature | CBS | + 85 | − 25 | 3.6 | 0.047 to 1 | Black | Ideal for backing up of CMOS's, IC's of camera, microcomputers, RAM's, RTC's and the like used in audio, smart meter, general electronic device, and others. |
| | Miniaturized Standard type | CX1 | + 70 | − 25 | 5.5 | 0.047 to 0.47 | Indigo | Ideal for backing up of CMOS's, IC's of camera, microcomputers, RAM's, RTC's and the like used in audio, general electronic device, and others. |
| | Miniaturized Low ESR type | CXN | + 70 | − 25 | 5.5 | 0.047 to 0.47 | Indigo | |
| | Miniaturized High temperature type | CXJ | + 85 | − 10 | 5.5 | 0.047 to 0.33 | Black | |
| | Miniaturized Low ESR High temperature type | CXS | + 85 | − 25 | 3.6 | 0.047 to 0.47 | Black | |
| | High temperature type | CH1 | + 85 | − 25 | 5.5 | 0.047 to 1 | Indigo | Ideal for backing up of RTC's for smart meter, outdoor equipment, industrial, momentary power assistance of a battery, automotive etc. |
| | Wide temperature range type | CHL | + 85 | − 40 | 5.5 | 0.047 to 1 | Indigo | Ideal for backing up of CMOS IC's, microcomputers, RAM's, RTC's for smart meter, outdoor equipment, auto motive and industrial. |
| | High temperature long life type | CHC | + 85 | − 25 | 5.5 | 0.047 to 1 | Black | |
| | Reflow soldering Coin type | CS1 (614) | + 70 | − 25 | 2.5 | 0.2 | Silver | Mountable on board with best suited for mainly memory and time functions as well as memory backup for PDA and DSC. |
| | | CSK (614) | + 60 | − 10 | 3.3 | 0.2 | | |
| | | CS1 (621) | + 70 | − 25 | 2.5 | 0.33 | | |
| | | CSK (621) | + 60 | − 10 | 3.3 | 0.33 | | |

# ■ Systematized Classification of Electric Double Layer Capacitors

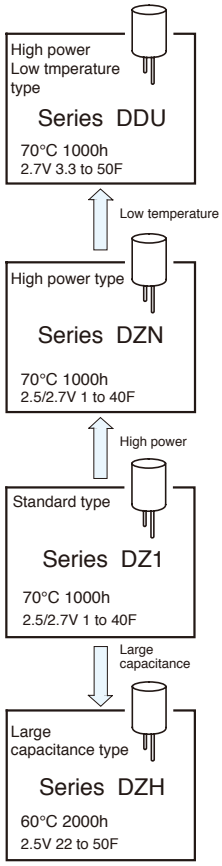
**DYNACAP™** "POWERCAP™"

The series names are linked to each page.

## For memory backup




## For power & energy

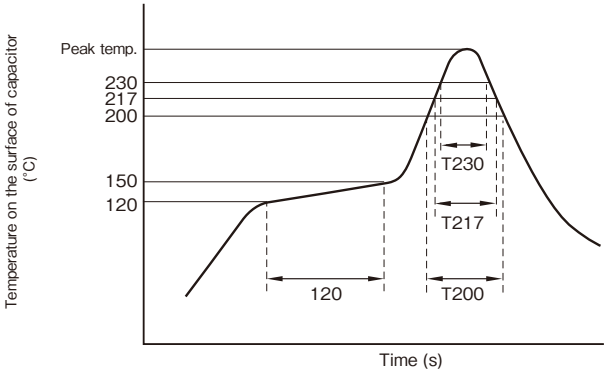


## ■ Recommended soldering conditions (Lead Free)

● Series CS1, CSK, CVN, CVL, CVS

Reflow soldering conditions.

Profile




1. Preheating shall be under 150℃ within 120 seconds.
2. Peak temperature shall be within the following table.
3. For conditions exceeding the tolerances, consult with us.

T200 : Duration while capacitor head temperature exceeds 200℃ (s).
T217 : Duration while capacitor head temperature exceeds 217℃ (s).
T230 : Duration while capacitor head temperature exceeds 230℃ (s).
The measurement temperature point is the case top.

| Series | Size | Peak temp. (5sec or less) | T230 | T217 | T200 | Reflow cycle |
|---|---|---|---|---|---|---|
| CS1<br>CSK | φ6.8 | 250℃ Max. | 20sec. max. | 30sec. max. | 40sec. max. | 2 times or less |
| CVN<br>CVL<br>CVS | φ12.5 | 260℃ Max. | 20sec. max. | 30sec. max. | 50sec. max. | 2 times or less |

Attention : Carry out soldering work at low temperature and in the shortest time within above conditions.
Do NOT reflow solder, when cell voltage is above 0.5V.
＊Please consult with us about reflow soldering conditions other than the above.

## ■ Recommended soldering conditions (Lead free)

### ● Electric Double Layer capacitors

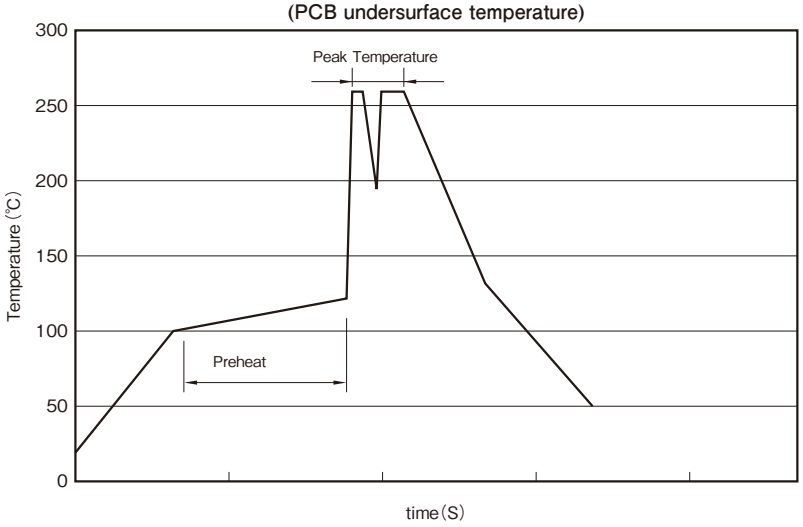
(1) Soldering iron conditions

Iron tip temperature should be 400°C±5°C within the duration of 4 secons.

(2) Flow soldering conditions

The recommendation soldering conditions of the product in which flow soldering is possible are as graph.

Recommended flow soldering profile
(PCB undersurface temperature)

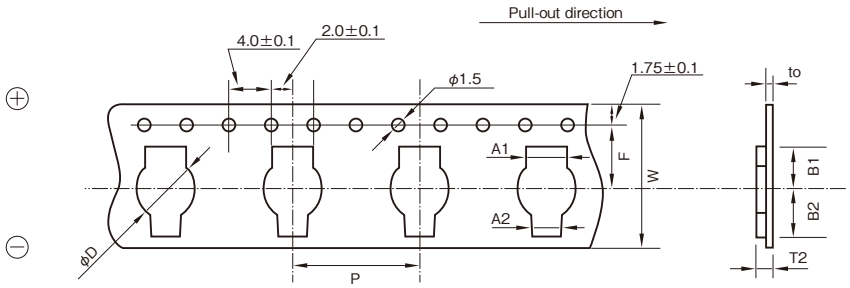



| Type | Series | Size | Preheat | | Peak | |
|---|---|---|---|---|---|---|
| | | | Temperature | Time | Temperature | Time |
| Coin cell | CB1,CBN,CBJ CBS,CX1,CXN CXJ,CXS,CH1 CHL,CHC | φ11.5 to φ21.5 | 100 to 110°C | 30sec. max. | 260°C Max | 5sec. max. |
| Cylindrical cell | DZ1,DZH,DZN DDU | φ6.3 to φ18 | 100 to 130°C | 30 to 60sec. | 260°C±5°C | 10sec. max. |

### Cautions when soldering

(1) Do not dip the capacitor into melted solder.
(2) Do not flux other part than the terminals.
(3) If there is a direct contact between the sleeve of the capacitor and the printed circuit pattern or a metal part of another component such as a lead wire, it may cause shrinkage of crack.
(4) If it is a coin type, please manage so that main part temperature including preheating does not exceed 90°C.
(5) Please refer to cautions for using and the specification about other notes.

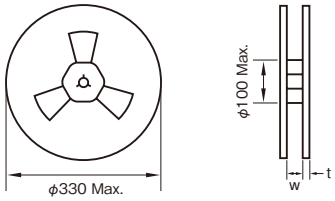
## ■ Carrier tape dimensions (Series CS1, CSK) polarity L




(Unit : mm)

| Outside size | W | P | F | A1 | A2 | B1 | B2 | T2 | to | φD |
|---|---|---|---|---|---|---|---|---|---|---|
| φ6.8×1.4 to 2.1L | 24±0.2 | 12.0 | 11.5 | 4.4 | 3.4 | 5.9 | 6.5 | 3.2 | 0.3 | 6.9 |

## ■ Reel dimensions



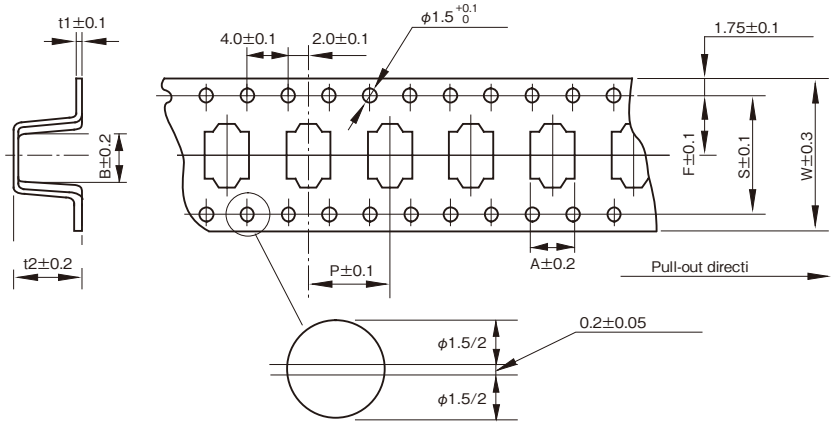

(Unit : mm)

| Outside size | W | t |
|---|---|---|
| φ6.8×1.4 to 2.1L | 26 | 3 |

## ■ Packing quantity

| Outside size | Quantity |
|---|---|
| φ6.8×2.1L | 1500PCS. |
| φ6.8×1.4L | 1500PCS. to 2000PCS. |

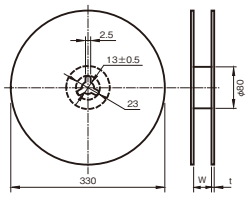
## ■ Carrier tape dimensions (Series CVN, CVL, CVS) polarity R




(Unit : mm)

| Outside size | W | A | B | P | t2 | F | t1 | S |
|---|---|---|---|---|---|---|---|---|
| φ12.5×10.5L | 32 | 13.4 | 13.4 | 24 | 11 | 14.2 | 0.5 | 28.4 |
| φ12.5× 8.5L | 32 | 13.4 | 13.4 | 24 | 9.5 | 14.2 | 0.5 | 28.4 |

## ■ Reel dimensions



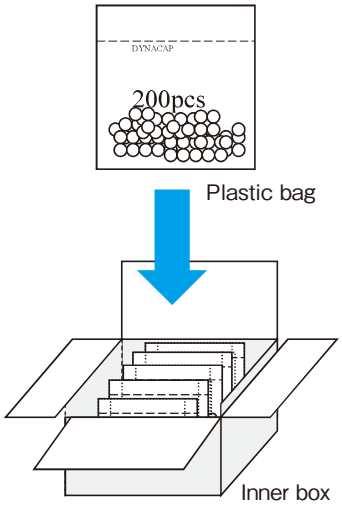
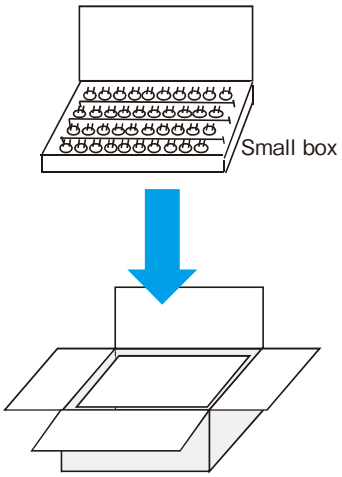
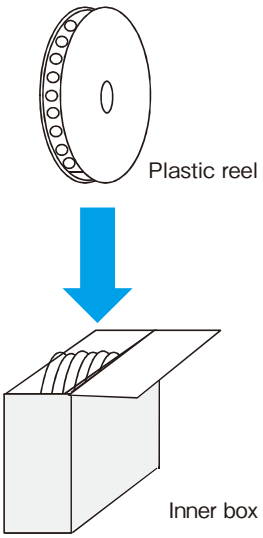

(Unit : mm)

| Outside size | W | t |
|---|---|---|
| φ12.5×10.5L | 34 | 3 |
| φ12.5× 8.5L | 34 | 3 |

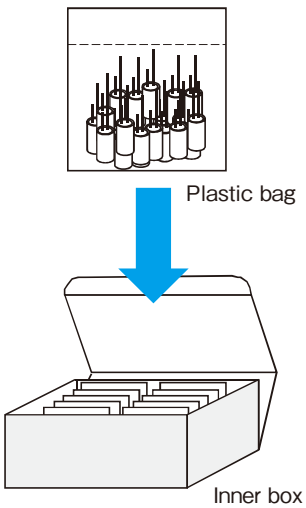
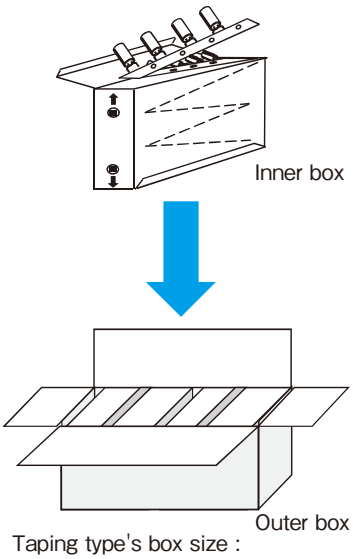
## ■ Packing quantity

| Outside size | Quantity |
|---|---|
| φ12.5×10.5L | 250pcs. |
| φ12.5× 8.5L | 300pcs. |

## ■ Standard packing specification of Coin cell type

| Series | ・CX1, CXJ, CXN, CXS<br>・CB1, CBN, CBJ, CBS, CH1, CHL, CHC (φ13.5) | ・CB1, CBN, CBJ, CBS, CH1, CHL, CHC (φ21.5) | ・CS1, CSK (614, 621)<br>・CVN, CVL, CVS |
|---|---|---|---|
| Packing style |  |  |  |

## ■ Standard packing specification of Cylindrical cell type

| Series | ・DDU, DZ1, DZN, DZH (φ6.3 to φ18) | ・DDU, DZ1, DZN, DZH (φ6.3 to φ12.5) Taping |
|---|---|---|
| Packing style |  |  <br>Taping type's box size : refer to specification of aluminum electrolytic capacitors. |

Please inquire for details.

# Cautions for Using Electric Double Layer Capacitors (DYNACAP™)

## ■ Usage

**1. Electric double layer capacitors (EDLC) use a conductive organic electrolyte.**

The use at excessive mounting temperature or exceeding the upper category temperature can cause the electrolyte to leak. Especially,coin and multilayer coin types for the memory backup (excluding cylindrical type) series use a low elastic plastic as the sealant in the cell construction like coin batteries; therefore, avoid using such capacitors in the Vicinity of automotive equipment with steep temperature change, and heating element such as motor, relay, transformer, power IC, etc. because of the risk of leakage of electrolyte.

**2. Since EDLC is polarized, do not apply a reversed voltage.**

EDLC is polarized. If a reversed voltage is applied for a long time, the leakage current will increase abruptly, which may cause a decrease in the capacity, an increase in the internal resistance, and causing leakage or damage to the product in some cases.

**3. Do not apply any voltage higher than the Max. operating voltage (this means the surge voltage in the case of short-time charge).**

If an overvoltage is applied to the product, the leakage current will increase abruptly and the product will become overheated, which may cause a decrease in the capacity, an increase in the internal resistance, and causing leakage or damage to the product in some cases.

**4. Do not use smoothing a power supply ( for absorbing its ripple).**

Since the internal resistance of EDLC is high, the product will be overheated if it is used for smoothing a power supply (for absorbing its ripple), which may cause a decrease in the capacity. an increase in the internal resistance, and causing leakage or damage to the product in some cases .

**5. Do not use in a circuit where quick charge and discharge are repeated Very often.**

In a circuit where quick charge and discharge are repeated very often , the product will become overheated, which may cause a decrease in the capacity, an increase in the internal resistance, and causing leakage or damage to the product in some cases.

Reduce the charge and discharge currents while selecting a product with low internal resistance, and rnake sure that the product surface temperature does not rise.

**6. EDLC life depends heavily on the ambient temperature.**

①The lifetime of EDLC is seriously affected by change in ambient temperature. If the temperature is lowered by 10˚C, the lifetime will be approximately doubled. Therefore, the product should be used at a temperature lower than the guaranteed maximum value for maximum life.

②If the capacitor is used at a temperature exceeding its maximum guaranteed temperature, not only is its life shortened, but increased vapor pressure of electrolyte or electrochemical reactions may increase the internal pressure, and causing leakage or damage to the product in some cases.

**7. Do not use the product in an ambient atomsphere containing waterdrops ( condensation ) or toxic gases.**

Although EDLC is sealed, water droplets or toxic gases may do degradation characteristics, a leakage and corrode the lead wires and the case, which may cause a breaking of the wires.

Avoid abrupt temperature changes, which may cause water droplets, resulting in product deterioration and electrolyte leakage.

**8. Contact us before connecting the products in series.**

A series connection will cause imbalance in the voltage, charged to the capacitors and an overvoltage may be charged to one or more them. This may cause a decrease in the capacity, an increase in the internal resistance and causing leakage or damage to the product in some cases. When using series connection for several capacitors, please derate the applied voltage from the Max. operating voltage or use balancing circuits (bleeder resistor, etc.) to compensate for the imbalance in the applied voltage for each capacitor. Moreover, please ensure the arrangement does not cause temperature fluctuation between capacitors.

**9.About vibration.**

A terminal blank, a terminal bend, and a crease may occur by adding too much vibration to a capacitor.

Moreover, depending on the case, an EDLC may do degradation of the characteristic, breakage, and a leakage.

When you become too much vibration, please contact us.

**10.When used on a double sided printed circuit board, do not overlap the wiring patterns on the mounted part.**

A short circuit may be created by certain wiring conditions. Should the electrolyte leaks, the circuit pattern may cause a short circuit, resulting in tracking or migration.

**11.Do not keep In high temperature and high humidity atmospheres.**

①Avoid high temperature or high humidity or direct rays when storing capacitors.

② Keep the product in a place where the temperature is 5˚C to 30˚C and the humidity is lower than 60%. Avoid an abrupt temperature change, which may cause condensation or deterioration of the product or liquid leakage. (Recommended storage term: 1year or less after delivery)

③ Do not store EDLC at a place where there is a possibility that they may get water, salt or oil spill.

④Do not store EDLC at place where the air contains dense hazardous gas (hydrogen sulfide, sulfurous acid, nitrous acid, chlorine ammonia, etc.).
⑤Fumigation treatment with toxic gas covering the whole wooden container frames as moth proofing during shipment may leave residual toxic gas.
⑥Do not store EDLC at a place where it gets ultraviolet ray or radioactive ray.

**12. Capacitors fitted with a relief valve**

①The relief valve is provided with a valve function with part of the case made thin to avoid explosion by increased internal pressure when the capacitor is under abnormal load such as overvoltage or reverse voltage. After activation of the relief valve, the capacitor must be replaced as it does not restore.
②For the capacitors with a case relief valve (Cylindrical type), provide a void on the top of the relief valve so as not to hamper its activation. Make a void of 2 mm or more for the product of $\phi$18 or less in diameter in diameter on the top.

**13. Use at a high altitude**

The use of capacitors at high altitudes such as on an airplane causes a large difference between the internal pressure of the capacitors and the atmospheric pressure.
However, there is no problem in use under atmospheric pressure up to about an altitude of 10,000 meters.
If the condition is severe like space, please contact us.

## ■Mounting

**1. Do not overheat when soldered.**

Depending on the type and size of the board, the product may be subjected to overheat, leading to loss of airtightness. This may greatly shorten the product life or cause liquid leakage.
In case of a 1.6mm-thick and single side printed board. for example, keep the following soldering conditions: temperature lower then 260℃, time within 5 seconds (coin type), 10 seconds (Cylindrical type).
When a board thinner than 1.6 mm or multi-layer printed board is used, contact us.
In the case of hand soldering, the iron tip temperature is lower than 400℃, time is shorter than 4 seconds.
The coin types and multilayer coin types excluding the DZ and reflow-compatible coin types use polypropylene as the packing material for sealing and therefore susceptible to excessive heat. Note that the component body temperature shall be controlled so as not to exceed 90℃ including preheating.

**2. When soldering the capacitor to the wiring board, do not attach the body of the capacitor to the circuit board.**

If the body of the capacitor is attached directly to the circuit board, the flux or solder can blow through the through holes in the circuit board, negatively impacting the capacitor.
Moreover, the heat influence at the time of soldering can be reduced by floating the body.

**3. Contact us when cleaning is necessary after soldering.**

Certain types of solvents are not compatible and may cause damage.

**4. Contact us when the product Is attached by adhesive bonding.**

Certain types of adhesives are not compatible.
Paste bond partially between the product and the board so that the product will not adhere completely to the board.
Do not raise the temperature over the guaranteed value while the bond is hardening.

**5. Heating conditions of adhesive curing oven**

During heating of the adhesive curing oven, application of excessive heat may significantly shorten the product life or cause liquid leakage. Control the body temperature so as not to exceed 90℃ during work while setting the allowable atmospheric temperature below 110℃, and allowable heating time within 30 seconds.
For the heating conditions deviating from the above, consult with us providing your temperature profile conditions.

**6. Be careful not to apply an excessive force to the capacitor body, terminals or lead wires.**

①Mount the capacitor while making sure that the terminal spacing of the capacitor and the spacing of the holes in the printed wiring board are aligned.
②If the capacitor body is subjected to stress such as grabbing, falling, bend, pushing or twisting after mounted, its terminals may come off, leading to open, short or liquid leakage.

## ■Other cautions

**1. Emergency procedures**

If the EDLC overheats or starts to smell, immediately switch off the units main power supply to stop operation.
Keep your face and hands away from the EDLC, since the temperature may be high enough to cause the EDLC to ignite and burn.

**2. Periodical inspections should be established for the EDLC used in industrial appliances.**

The following items should be checked:
①Appearance : Check if there is leakage.
②Electronic performance : Check the leakage current, the electrostatic, the internal resistance and other items described in the catalog or the product specifications.

**3. Disposing of EDLC**

①Punch a hole or crush the EDLC (to prevent explosion) before incineration at approved facility.
②If they are not to be incinerated, bring them to a professional industrial waste disposal company.

**4. Other notes**

Please refer to the following literature for anything not described in the specification or the catalog. (Technical Report of Japan Electronics and Information Technology Industries Association #EIAJ RCR-2370 “Guideline of notabilia for fixed electric double layer capacitors”)

ELNA

This products are not recommended for new design.

# Electric Double Layer Capacitors "DYNACAP" DZ1, DZH series

Code in front of series have been extracted from product code, which describes the segment of products, such as type and features.

- Standard, Large Capacitance Type Capacitors.
- Environmentally Friendly : without environmentally hazardous substances such as Cd or Pb.
- Unlike batteries, excellent charge and discharge characteristics with no chemical reactions.
- Environmental : GREEN CAP™ , RoHS compliance.

Large capacitance

DZH ⇦ DZ1

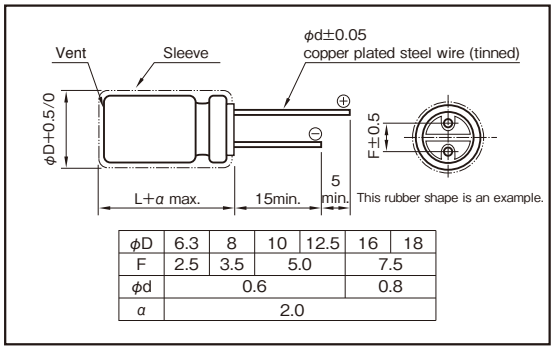

Marking color :
White print on a black sleeve

## Specifications

| Item | Performance | |
|---|---|---|
| Series name | Series DZ1 | Series DZH |
| Category temperature range (℃) | −25 to +70 | −25 to +60 |
| Tolerance at rated capacitance (%) | −20 to +80 | −20 to +80 |
| Internal resistance at 1kHz | Refer to the following page | |
| Characteristics at high and low temperature | Percentage of capacitance change: Within ±30% of the value at 20℃<br>Internal resistance: Five times or less of the value at 20℃ | Percentage of capacitance change: Within ±30% of the value at 20℃<br>Internal resistance: Eight times or less of the value at 20℃ |
| Endurance | Test temperature: 70℃<br>Test time: 1000 hours<br>Percentage of capacitance change: Within ±30% of the initial measured value<br>Internal resistance: Four times or less of the initial specified value | Test temperature: 60℃<br>Test time: 2000 hours<br>Percentage of capacitance change: Within ±30% of the initial measured value<br>Internal resistance: Four times or less of the initial specified value |
| Shelf life | Same as endurance | Same as endurance |
| Applicable standards | Conforms to JIS C5160 - 1 (IEC 62391 - 1) | |

## Outline Drawing

Unit : mm




| φD | 6.3 | 8 | 10 | 12.5 | 16 | 18 |
|---|---|---|---|---|---|---|
| F | 2.5 | 3.5 | 5.0 | | 7.5 | |
| φd | 0.6 | | | | 0.8 | |
| α | 2.0 | | | | | |

Product code system: 2.5V10F (*For general product)

| RS* | DZ1 | 106 | 2R5 | ☐ | 300 | (S)T |
|---|---|---|---|---|---|---|
| Category code | Series code | capacitance code | Voltage code | Size code | Lead-forming and packing code | Additional code |

・For details, refer to the variaous "Product Code System" pages.
・Lead forming and packing code “300” : lead wire is long type and standard packing.
For standard packing, please refer to the "PACKING" page.

NOTE : Design, Specifications are subject to change without notice.
It is recommended that you shall obtain technical specifications from ELNA to ensure that the component is suitable for your use.

Code in front of series have been extracted from product code, which describes the segment of products, such as type and features.

## Standard Ratings (Series DZ1 2.5V)

| Max. operating voltage (V) | Rated capacitance (F) | Max. Leakage Current (mA) after 24h | ELNA Parts No. | φD × L (mm) | Internal resistance (Ω max.) at 1kHz | Internal resistance (mΩ) at 1kHz (measurement value) |
|---|---|---|---|---|---|---|
| 2.5 | 1 | 0.1 | RSDZ11052R5D14300T | 6.3 × 14 | 1.0 | 400 |
| 2.5 | 1 | 0.1 | RSDZ11052R5E12300T | 8 × 12 | 1.0 | 200 |
| 2.5 | 2.7 | 0.2 | RSDZ12752R5E20300ST | 8 × 20 | 0.5 | 150 |
| 2.5 | 3.3 | 0.2 | RSDZ13352R5F20300T | 10 × 20 | 0.3 | 90 |
| 2.5 | 4.7 | 0.3 | RSDZ14752R5F20300T | 10 × 20 | 0.2 | 80 |
| 2.5 | 5.6 | 0.3 | RSDZ15652R5F20300T | 10 × 20 | 0.2 | 70 |
| 2.5 | 6.8 | 0.4 | RSDZ16852R5F25300T | 10 × 25 | 0.2 | 60 |
| 2.5 | 10 | 0.5 | RSDZ11062R5F35300T | 10 × 35 | 0.2 | 40 |
| 2.5 | 10 | 0.5 | RSDZ11062R5G25300ST | 12.5 × 25 | 0.2 | 40 |
| 2.5 | 15 | 0.7 | RSDZ11562R5G35300ST | 12.5 × 35 | 0.2 | 35 |
| 2.5 | 15 | 0.7 | RSDZ11562R5J20300T | 16 × 20 | 0.2 | 35 |
| 2.5 | 22 | 0.8 | RSDZ12262R5J25300T | 16 × 25 | 0.2 | 30 |
| 2.5 | 33 | 0.8 | RSDZ13362R5J35300T | 16 × 35.5 | 0.2 | 30 |
| 2.5 | 40 | 0.8 | RSDZ14062R5K40300T | 18 × 40 | 0.2 | 30 |

We tailor packaged product in series and parallel arrangements according to voltage and capacitance as required.

## Standard Ratings (Series DZ1 2.7V)

| Max. operating voltage (V) | Rated capacitance (F) | Max. Leakage Current (mA) after 24h | ELNA Parts No. | φD × L (mm) | Internal resistance (Ω max.) at 1kHz | Internal resistance (mΩ) at 1kHz (measurement value) |
|---|---|---|---|---|---|---|
| 2.7 | 1 | 0.2 | RSDZ11052R7D14300T | 6.3 × 14 | 1.0 | 400 |
| 2.7 | 1 | 0.2 | RSDZ11052R7E12300T | 8 × 12 | 1.0 | 200 |
| 2.7 | 2.7 | 0.3 | RSDZ12752R7E20300ST | 8 × 20 | 0.5 | 150 |
| 2.7 | 3.3 | 0.3 | RSDZ13352R7F20300T | 10 × 20 | 0.3 | 130 |
| 2.7 | 4.7 | 0.4 | RSDZ14752R7F20300T | 10 × 20 | 0.2 | 80 |
| 2.7 | 5.6 | 0.4 | RSDZ15652R7F20300T | 10 × 20 | 0.2 | 70 |
| 2.7 | 6.8 | 0.5 | RSDZ16852R7F25300T | 10 × 25 | 0.2 | 60 |
| 2.7 | 10 | 0.6 | RSDZ11062R7F35300T | 10 × 35 | 0.2 | 40 |
| 2.7 | 10 | 0.6 | RSDZ11062R7G25300ST | 12.5 × 25 | 0.2 | 40 |
| 2.7 | 15 | 0.8 | RSDZ11562R7G35300ST | 12.5 × 35 | 0.2 | 35 |
| 2.7 | 15 | 0.8 | RSDZ11562R7J25300T | 16 × 25 | 0.2 | 35 |
| 2.7 | 22 | 1.0 | RSDZ12262R7J31300T | 16 × 31.5 | 0.2 | 30 |
| 2.7 | 33 | 1.0 | RSDZ13362R7J40300T | 16 × 40 | 0.2 | 30 |

We tailor packaged product in series and parallel arrangements according to voltage and capacitance as required.

## Standard Ratings (Series DZH 2.5V)

| Max. operating voltage (V) | Rated capacitance (F) | Max. Leakage Current (mA) after 24h | ELNA Parts No. | φD × L (mm) | Internal resistance (Ω max.) at 1kHz | Internal resistance (mΩ) at 1kHz (measurement value) |
|---|---|---|---|---|---|---|
| 2.5 | 22 | 0.8 | RSDZH2262R5G35300ST | 12.5 × 35 | 0.2 | 55 |
| 2.5 | 50 | 1.0 | RSDZH5062R5K40300T | 18 × 40 | 0.08 | 30 |

We tailor packaged product in series and parallel arrangements according to voltage and capacitance as required.

ELNA

This products are not recommended for new design.

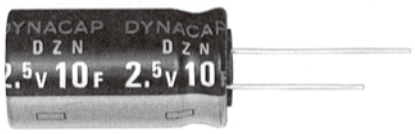
# Electric Double Layer Capacitors "DYNACAP" DZN series

Code in front of series have been extracted from product code, which describes the segment of products, such as type and features.

- High Power Type Capacitors.
- Low internal resistance allows boosting charge and heavy-current discharge. (ampere level)
- Environmentally Friendly : without environmentally hazardous substances such as Cd or Pb.
- Unlike batteries, excellent charge and discharge characteristics with no chemical reaction.
- Environmental : GREEN CAP™ , RoHS compliance.

High power

DZN ⇦ DZ1



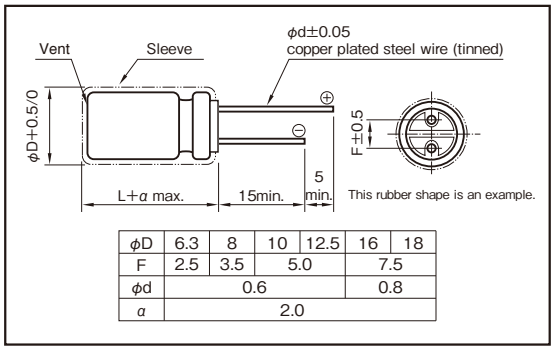

Marking color :
White print on a blue sleeve

## Specifications

| Item | Performance |
|---|---|
| Category temperature range (℃) | −25 to +70 |
| Tolerance at rated capacitance (%) | −20 to +80 |
| Internal resistance | Refer to the following page |
| Characteristics at high and low temperature | Percentage of capacitance change: Within ±30% of the value at 20℃<br>Internal resistance: Five times or less of the value at 20℃ |
| Endurance (70℃) | Test time: 1000 hours<br>Percentage of capacitance change: Within ±30% of the initial measured value<br>Internal resistance: Four times or less of the initial specified value |
| Shelf life (70℃) | Test time : 1000 hours ; Same as endurance. |
| Applicable standards | Conforms to JIS C5160 - 1 (IEC 62391 - 1) |

## Outline Drawing

Unit : mm




| φD | 6.3 | 8 | 10 | 12.5 | 16 | 18 |
|---|---|---|---|---|---|---|
| F | 2.5 | 3.5 | 5.0 | | 7.5 | |
| φd | 0.6 | | | | 0.8 | |
| α | 2.0 | | | | | |

Product code system: 2.5V10F (*For general product)

| RS* | DZN | 106 | 2R5 | ⬚ | 300 | (S)T |
|---|---|---|---|---|---|---|
| Category code | Series code | capacitance code | Voltage code | Size code | Lead-forming and packing code | Additional code |

・Product code is refer to following table and "Product Code System" pages.
・Lead forming and packing code "300" : lead wire is long type and standard packing.
For standard packing, please refer to the "PACKING" page.

NOTE : Design, Specifications are subject to change without notice.
It is recommended that you shall obtain technical specifications from ELNA to ensure that the component is suitable for your use.

Code in front of series have been extracted from product code, which describes the segment of products, such as type and features.

## Standard Ratings (2.5V)

| Max. operating voltage (V) | Rated capacitance (F) | Max. Leakage Current (mA) after 24h | ELNA Parts No. | φD × L (mm) | Internal resistance (Ω max.) at 1kHz | Internal DC resistance (mΩ Max.) |
|---|---|---|---|---|---|---|
| 2.5 | 1 | 0.1 | RSDZN1052R5D14300T | 6.3 × 14 | 0.4 | 1500 |
| 2.5 | 1 | 0.1 | RSDZN1052R5E12300T | 8 × 12 | 0.3 | 1000 |
| 2.5 | 2.7 | 0.2 | RSDZN2752R5E20300ST | 8 × 20 | 0.3 | 500 |
| 2.5 | 3.3 | 0.2 | RSDZN3352R5F20300T | 10 × 20 | 0.1 | 400 |
| 2.5 | 4.7 | 0.3 | RSDZN4752R5F20300T | 10 × 20 | 0.1 | 400 |
| 2.5 | 5.6 | 0.3 | RSDZN5652R5F20300T | 10 × 20 | 0.1 | 350 |
| 2.5 | 6.8 | 0.4 | RSDZN6852R5F25300T | 10 × 25 | 0.1 | 300 |
| 2.5 | 10 | 0.5 | RSDZN1062R5F35300T | 10 × 35 | 0.1 | 200 |
| 2.5 | 10 | 0.5 | RSDZN1062R5G25300ST | 12.5 × 25 | 0.1 | 200 |
| 2.5 | 15 | 0.7 | RSDZN1562R5G35300ST | 12.5 × 35 | 0.1 | 150 |
| 2.5 | 15 | 0.7 | RSDZN1562R5J20300T | 16 × 20 | 0.1 | 150 |
| 2.5 | 22 | 0.8 | RSDZN2262R5J25300T | 16 × 25 | 0.1 | 120 |
| 2.5 | 33 | 0.8 | RSDZN3362R5J35300T | 16 × 35.5 | 0.1 | 100 |
| 2.5 | 40 | 0.8 | RSDZN4062R5K40300T | 18 × 40 | 0.1 | 75 |

## Standard Ratings (2.7V)

| Max. operating voltage (V) | Rated capacitance (F) | Max. Leakage Current (mA) after 24h | ELNA Parts No. | φD × L (mm) | Internal resistance (Ω max.) at 1kHz | Internal DC resistance (mΩ Max.) |
|---|---|---|---|---|---|---|
| 2.7 | 1 | 0.2 | RSDZN1052R7D14300T | 6.3 × 14 | 0.4 | 1500 |
| 2.7 | 1 | 0.2 | RSDZN1052R7E12300T | 8 × 12 | 0.3 | 1000 |
| 2.7 | 2.7 | 0.3 | RSDZN2752R7E20300ST | 8 × 20 | 0.3 | 500 |
| 2.7 | 3.3 | 0.3 | RSDZN3352R7F20300T | 10 × 20 | 0.2 | 470 |
| 2.7 | 4.7 | 0.4 | RSDZN4752R7F20300T | 10 × 20 | 0.1 | 400 |
| 2.7 | 5.6 | 0.4 | RSDZN5652R7F20300T | 10 × 20 | 0.1 | 350 |
| 2.7 | 6.8 | 0.5 | RSDZN6852R7F25300T | 10 × 25 | 0.1 | 300 |
| 2.7 | 10 | 0.6 | RSDZN1062R7F35300T | 10 × 35 | 0.1 | 200 |
| 2.7 | 10 | 0.6 | RSDZN1062R7G25300ST | 12.5 × 25 | 0.1 | 200 |
| 2.7 | 15 | 0.8 | RSDZN1562R7G35300ST | 12.5 × 35 | 0.1 | 150 |
| 2.7 | 15 | 0.8 | RSDZN1562R7J25300T | 16 × 25 | 0.1 | 150 |
| 2.7 | 22 | 1.0 | RSDZN2262R7J31300T | 16 × 31.5 | 0.1 | 120 |
| 2.7 | 33 | 1.0 | RSDZN3362R7J40300T | 16 × 40 | 0.1 | 100 |

ELNA

This products are not recommended for new design.

# Electric Double Layer Capacitors "DYNACAP" DDU series

Code in front of series have been extracted from product code, which describes the segment of products, such as type and features.

- High power, for low temperature (— 40°C) type capacitors.
- Environmentally Friendly : without environmentally hazardous substances such as Cd or Pb.
- Unlike batteries, excellent charge and discharge characteristics with no chemical reaction.
- Environmental : GREEN CAP™ , RoHS compliance.

For low temperature

DDU ⇦ DZN

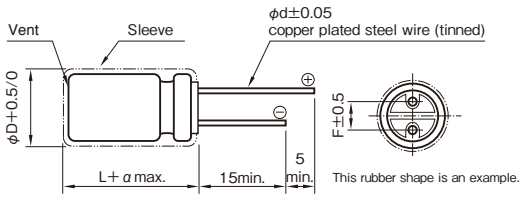

Marking color :
White print on a brown sleeve

## Specifications

| Item | Performance |
|---|---|
| Category temperature range (℃) | −40 to +70 |
| Tolerance at rated capacitance (%) | −20 to +20 |
| Internal resistance | Refer to the Standard Ratings |
| Characteristics at high and low temperature | Percentage of capacitance change: Within ±30% of the value at 20℃<br>Internal resistance: Three times or less of the value at 20℃ |
| Endurance (70℃) | Test time: 1000 hours<br>Percentage of capacitance change: Within ±30% of the initial measured value<br>Internal resistance: Three times or less of the initial specified value |
| Shelf life (70℃) | Test time : 1000 hours ; same as endurance. |
| Applicable standards | Conforms to JIS C5160 - 1 (IEC 62391 - 1) |

## Outline Drawing

Unit : mm




| ϕD | 8 | 10 | 12.5 | 16 | 18 |
|---|---|---|---|---|---|
| F | 3.5 | 5.0 | | 7.5 | |
| ϕd | 0.6 | | | 0.8 | |
| α | 2.0 | | | | |

Product code system : 2.7V10F (*For general product)

| RS* | DDU | 106 | 2R7 | F30 | 300 | T |
|---|---|---|---|---|---|---|
| Category code | Series code | capacitance code | Voltage code | Size code | Lead-forming and packing code | Additional code |

・Product code is refer to following table and "Product Code System" pages.
・Lead forming and packing code "300" : lead wire is long type and standard packing.
For standard packing, please refer to the "PACKING" page.

## Standard Ratings

| Max. operating voltage (V) | Rated capacitance (F) | Max. Leakage Current (mA) after 24h | ELNA Parts No. | ϕD × L (mm) | Internal resistance (mΩ max.) at 1kHz | Internal DC resistance (mΩ Max.) |
|---|---|---|---|---|---|---|
| 2.7 | 3.3 | 0.3 | RSDDU3352R7E20300T | 8 × 20 | 60 | 180 |
| 2.7 | 6.8 | 0.5 | RSDDU6852R7F20300T | 10 × 20 | 50 | 100 |
| 2.7 | 10 | 0.6 | RSDDU1062R7F30300T | 10 × 30 | 30 | 65 |
| 2.7 | 15 | 0.8 | RSDDU1562R7G25300T | 12.5 × 25 | 25 | 50 |
| 2.7 | 25 | 1.0 | RSDDU2562R7J25300T | 16 × 25 | 17 | 35 |
| 2.7 | 33 | 1.0 | RSDDU3362R7J31300T | 16 × 31.5 | 13 | 25 |
| 2.7 | 50 | 1.5 | RSDDU5062R7K40300T | 18 × 40 | 10 | 21 |

# 1 Description of Electric Double Layer Capacitor

## 1-1 Basic Concepts

Generally capacitors are constructed with a dielectric placed between opposed electrodes, functioning as capacitors by accumulating charges in the dielectric material. Aluminum electrolytic and tantalum electrolytic capacitors, for example, use an aluminum oxide film and a tantalum oxide film as the dielectric, respectively.

On the other hand, Electric Double Layer Capacitors have no visible dielectric in a general sense but utilize the state referred to as the electric double layer, which is developed naturally on the interface between substances, as the function of dielectric.

## 1-2 Operating Principle

The Electric Double Layer represents the state in which positive and negative charges exist at a very short distance on the boundary where contact occurs between two different substances (e.g. solid and liquid). By externally applying a voltage below a certain voltage to the boundary, higher charges can be accumulated. Accordingly, charge and discharge of electric double layer capacitors utilize adsorption and desorption of ions to the ionic adsorption layer (Electric Double Layer) formed on the electrode surface of the activated carbon used for electrodes.

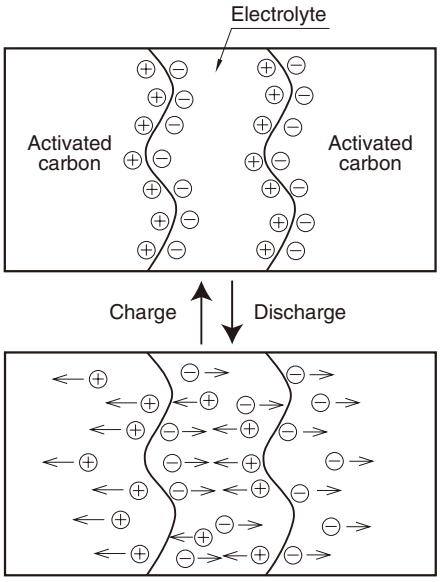



Fig.1 Schematic of Principle of Electric Double Layer Capacitor

Applying DC voltage externally across the electrodes of the Electric Double Layer allows almost no passage of current up to a certain voltage, exhibiting a condition like insulation.
However, the application of voltages exceeding the certain voltage causes electrolysis to occur in the electrolyte, resulting in abrupt passage of current.

This voltage determines the resistance of voltage of an Electric Double Layer Capacitor. We use an organic electrolyte and its standard electrolysis occurs at the voltage of about 2.5 to 3V.

## 1-3 Advantages and Disadvantages of Electric Double Layer Capacitor

**[Advantages]**

(1) Small size and capacitance in farads (F) available by utilizing the activated carbon electrode with a large surface area
(2) No special charging circuit and constrains during discharge are required.
(3) No effect on the life through overcharging and overdischarging
(4) Environmentally clean energy

**[Disadvantage]**

(1) The life is limited due to the use of electrolyte.
(2) Series connection is required when used with a low resistance of voltage at a high voltage.
(3) Cannot be used in AC circuits due to high internal resistance unlike aluminum electrolytic capacitors.

### 1-4 Construction of DYNACAP

The series which consists of coin cells is similar to that of coin-type batteries as shown in Fig.2. DYNACAP contains a single cell or two to three cells stacked in series.

Since these series have a large electrode-to-electrode distance and a small electrode area exhibiting a large internal resistance, they are suitable for the memory backup application that involves microcurrent discharge.

The cylindrical cell construction as seen in the DZ1 and DZN series has the construction similar to that of aluminum electrolytic capacitors as shown in Fig.3.

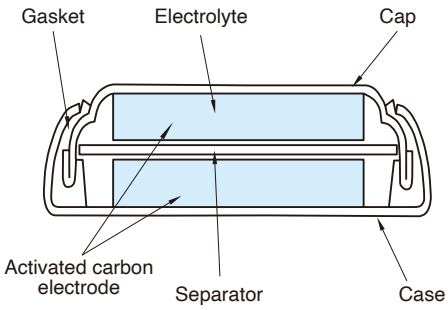



Fig.2 Example of Basic Construction of Coin Cell

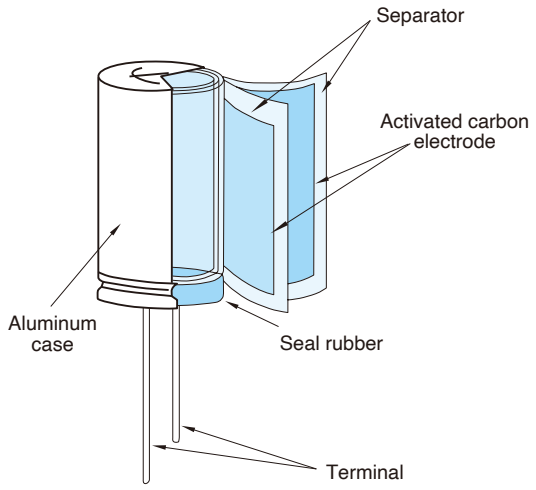



Fig.3 Example of Basic Construction of Cylindrical Cell

These series have a small electrode-to-electrode distance, allowing a large electrode area because of the winding structure. This decreases the internal resistance, which is primary suitable for applications requiring high-power such as motor drive and LED lighting that need high currents.

## 2 Description of Life Expectancy

Generally, the life of Electric Double Layer Capacitors is largely affected by the ambient temperature.
The expected life is approximated by the equation as shown below:

$$L = L_0 \times 2^{\left(\frac{T_0 - T}{10}\right)}$$

Where,

$L$ : Expected lifetime at temperature T
$L_0$ : Lifetime at temperature $T_0$
$T$ : Expected working temperature
$T_0$ : Upper category temperature

Note that the above equation does not cover charge and discharge. In the case of charge and discharge, heat generation occurs inside a capacitor; the temperature rise by this heat generation must also be considered.

The expected life time is a maximum as a guide in terms of deterioration of the sealant.
Coin cell type : about ten years
Cylindrical type : about fifteen years

## 3 Calculation Method of Discharge Time

### 3-1 Approximating the Discharge Time of Basic Constant Current Discharge

The discharge time at the constant current of a capacitor can be calculated by the following equation.

$t = (C \times \Delta V)/I$

Where,

t : Discharge time (sec.)
C : Capacitor capacitance (F)
ΔV : Working voltage range (V)
I : Discharge current (A)

As an example, we calculate the discharge time when a capacitor of the CB1 series 5.5V 1F is charged with 5V and discharged to 3V at a constant current of 1 mA. Since the working voltage range ΔV is 2V from 5 − 3V, t = (1F × 2V)/0.001A from the above equation, and the discharge time can be calculated as 2,000 seconds (about 33 minutes). Note that the actual discharge time may be different because this equation does not cover the effect of the self-discharge and the IR drop by internal resistance described below.

### 3-2 Effect of Self-discharge at Microcurrents

When backup is made by discharge with a micro-current below some μA especially for the memory backup application and the like, the discharge time must be determined while taking into account the self-discharge as shown in Fig.4.

The value closer to the actual discharge curve is obtained by adding the voltage drop through the self-discharge determined from the voltage retention characteristic test to the discharge curve given by calculation.

Note that the value of self-discharge varies by the charge time, charging current and an ambient temperature.

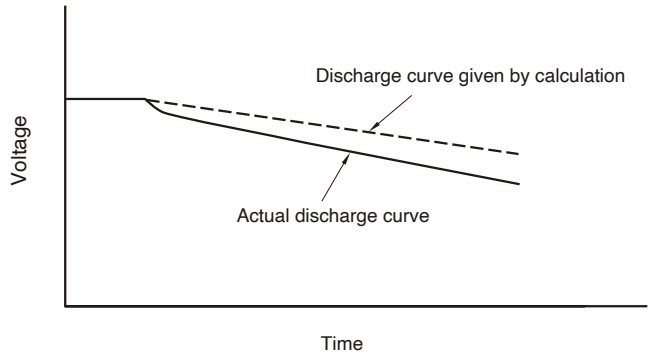



Fig.4 Example of Discharge Curve involving Self-Discharge

### 3-3 Effect of IR Drop at Large Currents

When a large Current discharge and a capacitor with a high internal resistance are used, the effect of IR drop by the product of the internal resistance and the current must be considered as shown in Fig.5. Moreover, the maximum discharge current of the product (coin cell series) of a memory backup use recommends below 1 mA/F (at20 °C).

When a large current is required in a very short time, or a large instantaneous current flows at the start of discharge, the voltage drop indicated with ΔV1 counts. However, when the discharge continues as it is, the discharge curve indicates in a manner showing a slow diffusion and then keeps a constant straight line.

We also make calculation including ΔV2 of the intersection extending from the initial discharge and the discharge straight line section including the diffusion curve when indicating the DC internal resistance.

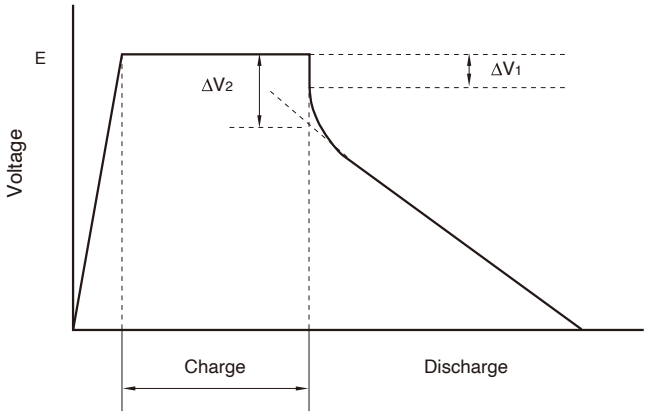



Fig.5 Example of Discharge Curve involving IR Drop

Due to IR drop, the shape of the discharge curve varies by the internal resistance and ambient temperature for each series.

## 4 Moisture-proof provision

If a electric double layer capacitor is used in a heat-and-high-humidity environment, the characteristic will deteriorate.
Please consult when using in a heat and high humidlty environment.

## 5 Regarding Recovery Voltage

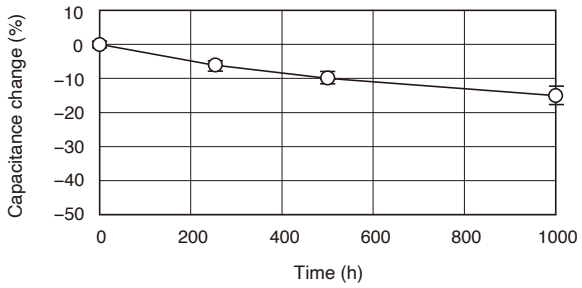
After charging and then discharging the electric double layer capacitor, and further causing short-circuit to the terminals and leave them alone, the voltage between the two terminals will rise again after some interval. This voltage is called recovery voltage.
This voltage may cause the bad influence to the low-voltage driven components (CPU, memory, etc.) or damage of the capacitor with soldering.
Discharging before use is safer. It is important especially when using it by series connection.
Moreover, it is possible making the terminals in short-circuit condition at the production stage. Please consult us for adequate procedures.

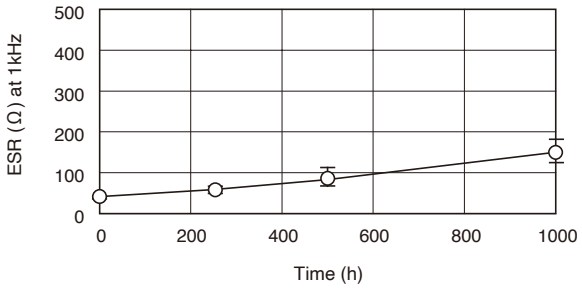
## 7 Electric Characteristics Data

### 7-1 Coin type for memory back-up

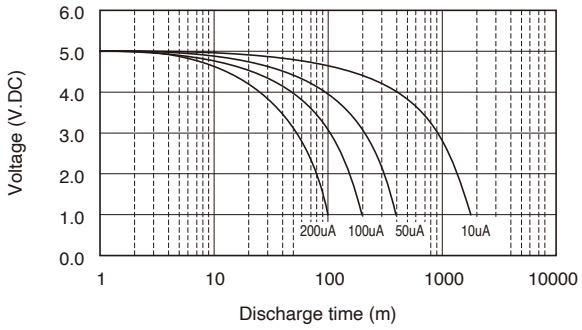
DYNACAP Series CXJ
5.5V 0.33F $\phi$11.5×5L (mm)

■ Endurance (85℃ 5.5V.DC)

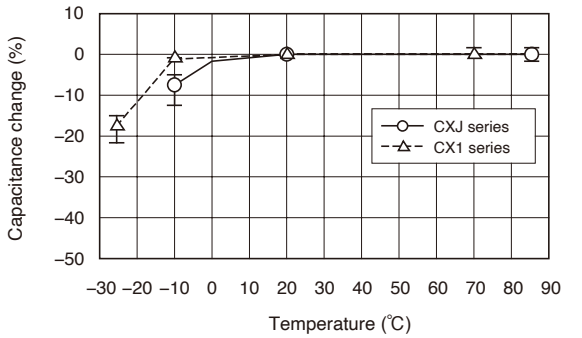


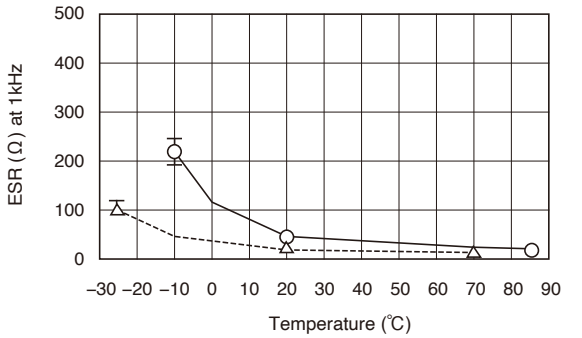




■ Discharge characteristics

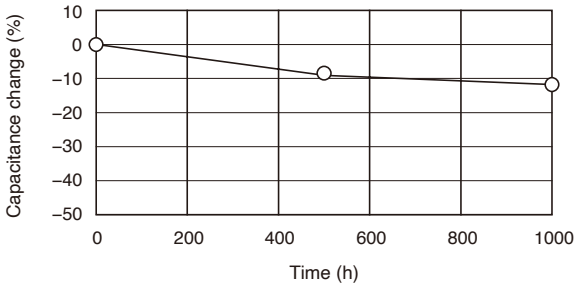


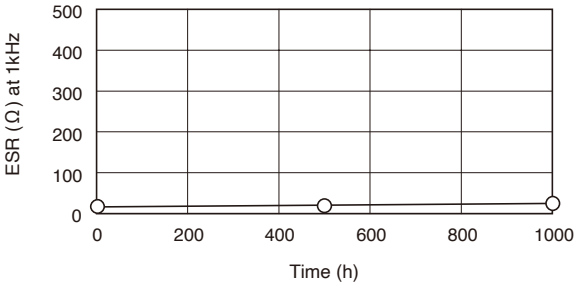

■ Characteristics at high and low temperature

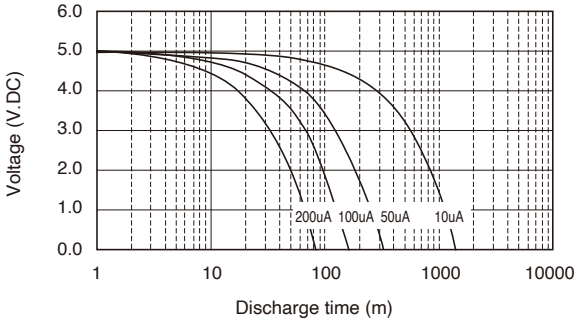


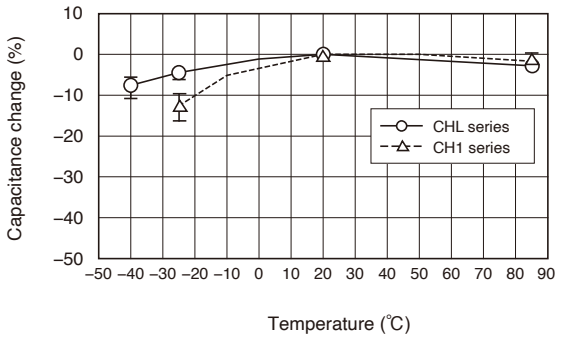



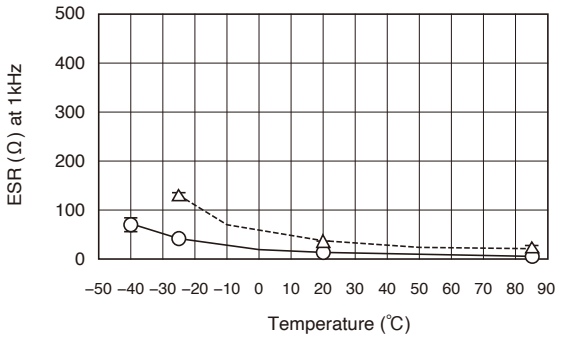

DYNACAP Series CHL
5.5V 0.22F $\phi$13.5×9.5L (mm)



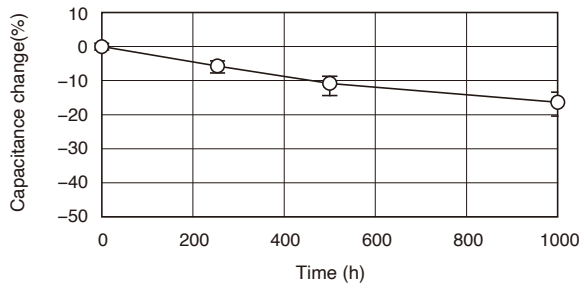



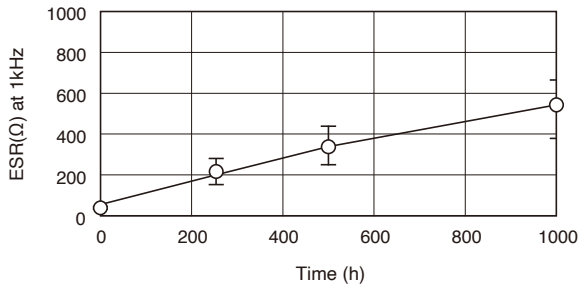




NOTE : Design, Specifications are subject to change without notice.
It is recommended that you shall obtain technical specifications from ELNA to ensure that the component is suitable for your use.

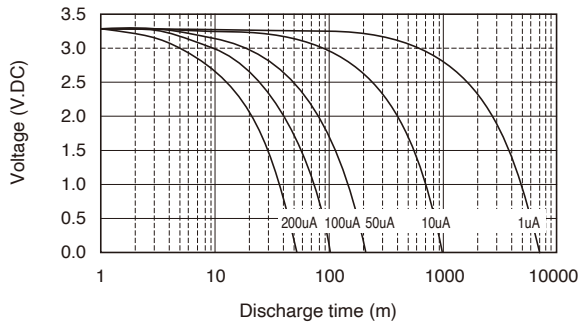
DYNACAP Series CSK
3.3V 0.2F $\phi$6.8×1.4 L (mm)

■ Endurance (60℃ 3.3V.DC)

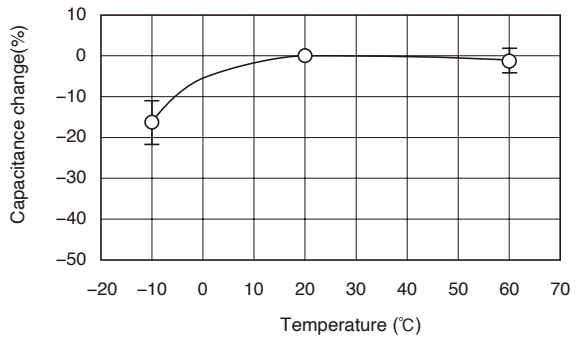


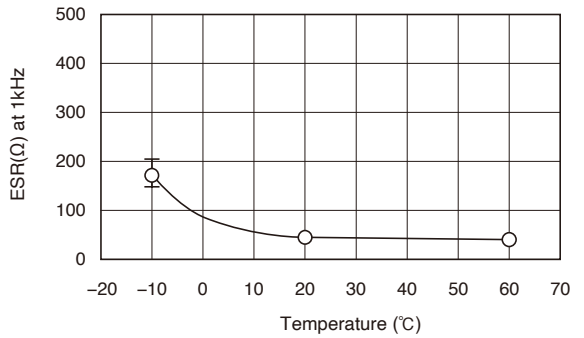




■ Discharge characteristics



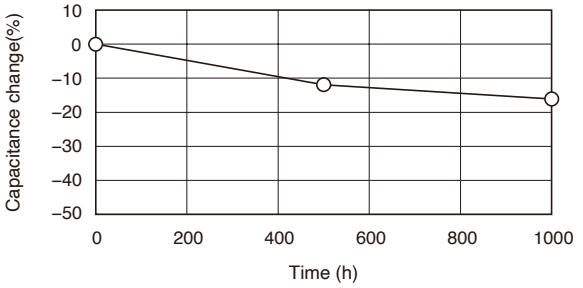

■ Characteristics at high and low temperature

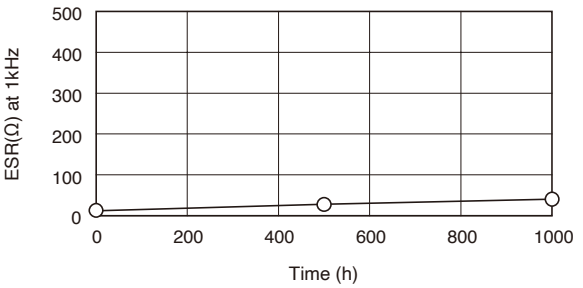


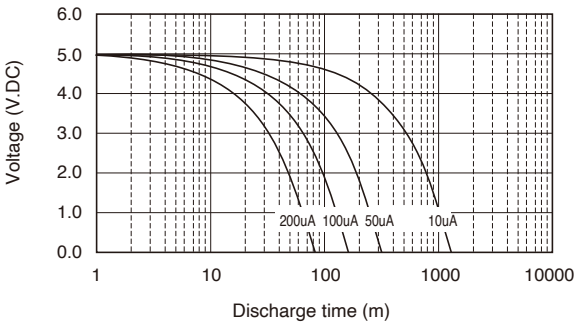



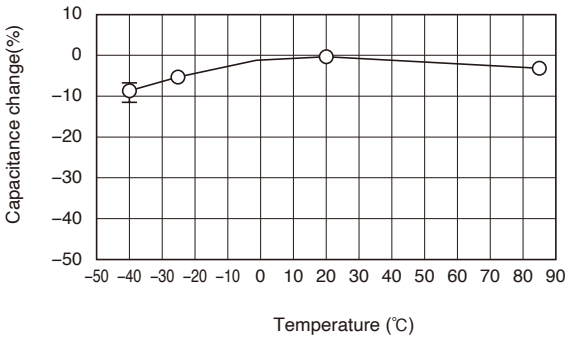

DYNACAP Series CVL
5.5V 0.22F $\phi$12.5×10.5L (mm)

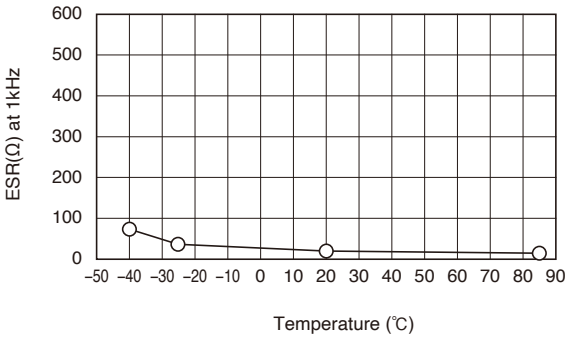
■ Endurance (85℃ 5.5V.DC)



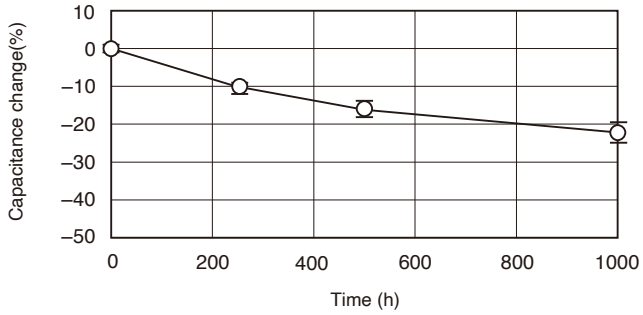



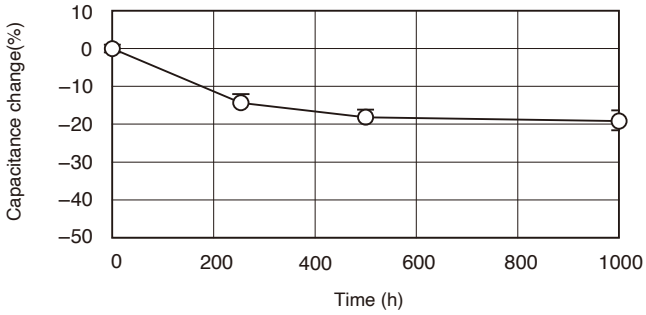
## 7-2 Cylindrical type for power

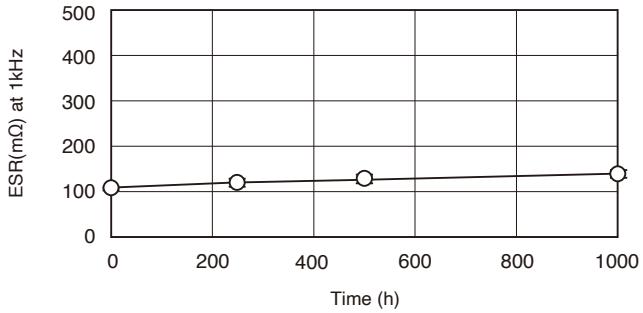
DYNACAP Series DZN
2.7V 2.7F φ8×20L (mm)

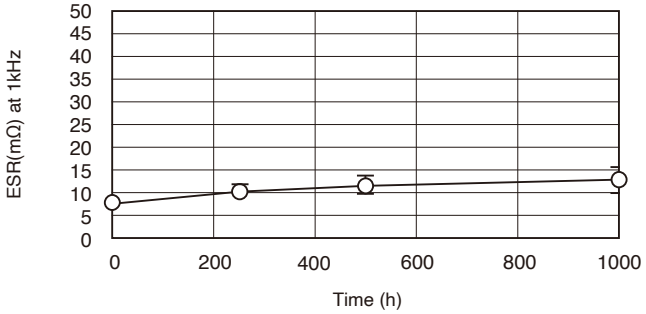
DYNACAP Series DDU
2.7V 25F φ16×25L (mm)

■ Endurance (70℃ 2.7V.DC)

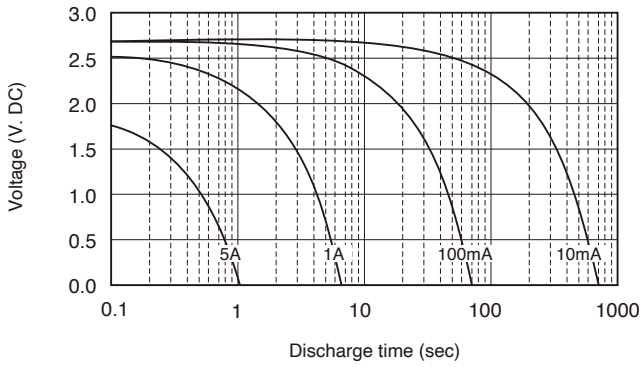


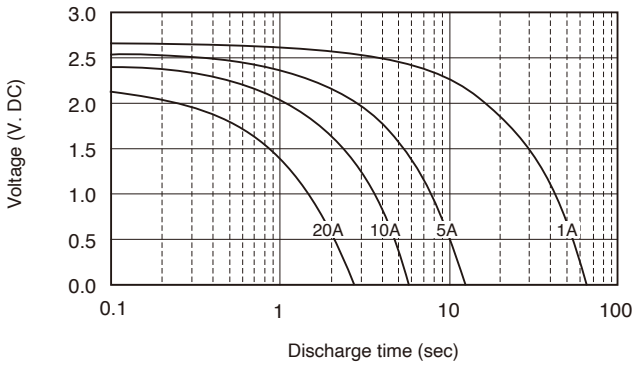




■ Discharge characteristics




■ Characteristics at high and low temperature DYNACAP Series DDU : 2.7V 25F φ16×25L(mm)