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◆Environment-friendly products

Nippon Chemi-Con has been taking proactive approaches toward developing and marketing less environmentally-load products in response to the international efforts for reducing hazardous substances and to the regulations. Subjecting to the revised RoHS directive, there were 10 substances that had been prohibited from July 2019 and 4 new substances that had been added. (2011/65/EU), by innovating alternative materials of the outer tube.

RoHS2 Compliant : Compliant to the 2011/65/EU and the revisions (2015/863/EU)

ELV Compliant : Compliant to the 2000/53/EC and the revisions (2016/774/EU)

Please contact us for more information about "Halogen-free specification".

Introduction of Supercapacitor

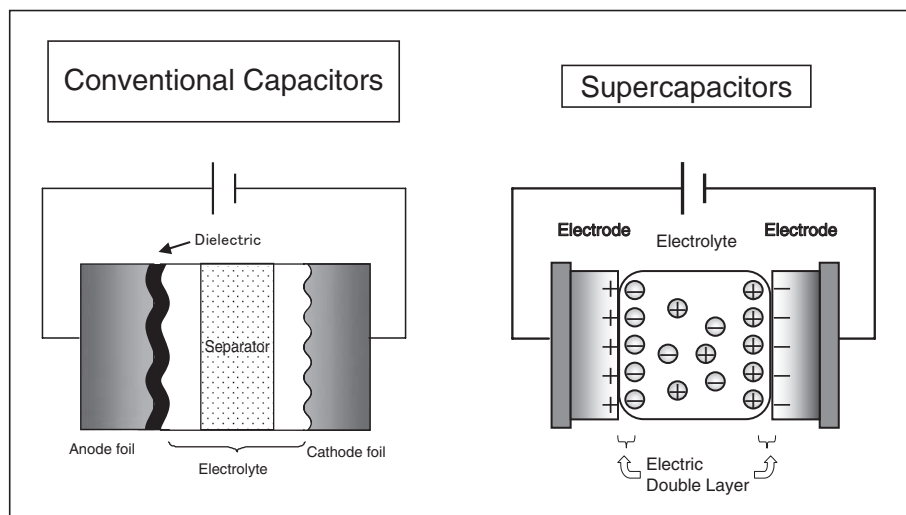
1. Introduction

Compared to the commonly used rechargeable batteries, Supercapacitor(Electric Double Layer Capacitor), which is capable to be charged-discharged with high current, is an energy storage device which has excellent charge-discharge cycle life. In the recent years, with energy issues (reduction of oil consumption, consumer electric power, CO₂ emission, and effective use of new energy) being focused, using Supercapacitor on more and more new applications is considered. Electrification of mobilities and installation of Supercapacitor in hybrid or fuel-cell vehicle is also considered.

Nippon Chemi-Con has been strongly pursuing products that serve for energy conservation, low environmental impact. Supercapacitor represents those environmental-friendly products.

2. Basic Mechanism of Supercapacitor

Conventional capacitors have a dielectric sandwiched between two electrodes. When voltage is applied, dipoles are oriented, and thus electric charge is stored. Electric double layer capacitors have electric charges oriented at the boundary of electrolyte and electrodes which is called the "electric double layer."



(Figure 1.) Mechanism

3. Characteristics

Unlike rechargeable batteries, Supercapacitor does not use chemical reactions and it stores energy solely by physical movement of ion to the surface of activated carbon. That gives Supercapacitor features as follows;

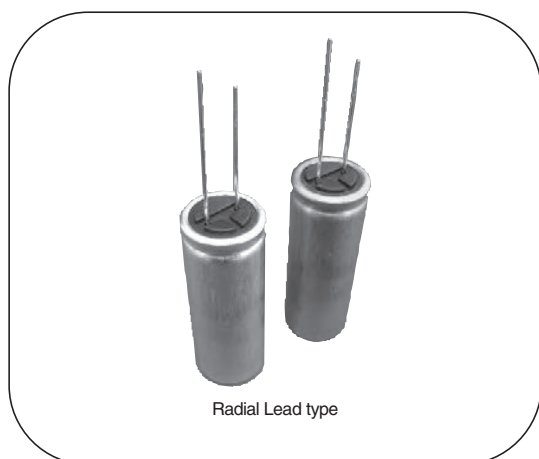
- With low degradation, it withstands multimillion charge-discharge cycles.
- With the high power density, rapid (high current) charge-discharge is possible.
- With a high charge-discharge efficiency, the output efficiency of over 95% with a power density 1kW/kg is achieved.
- Environment-friendly without containing heavy metals.
- High in safety at irregular occasions, and will be not destroyed even by short circuiting.

4. Structure

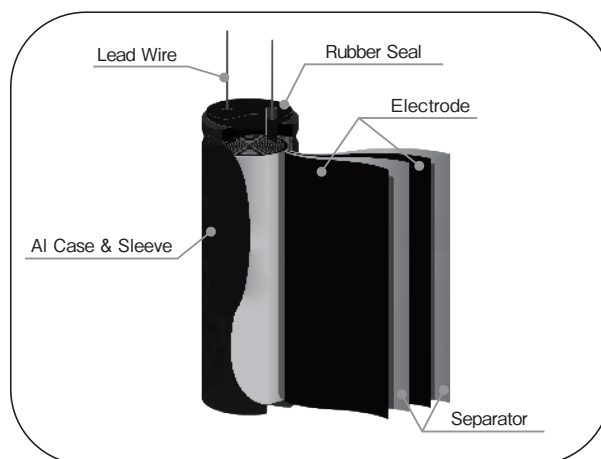
Nippon Chemi-Con produces Radial Lead type DLCAP™ (Photo 1.).

Basic structure is, as shown in figure 2, aluminum foils with electrode pasted on the surface wound into a roll.

Using activated carbon for the electrode utilizing its very large surface area, and with our original high-density electrode manufacturing technology, we achieved both high capacitance and low resistance.



(Photo 1.) DLCAP™ Appearance



(Figure 2.) DLCAP™ Structure

Radial Lead type

DLCAP™ DKG series

High Voltage

Long Life

-40°C

+65°C

RoHS2 Compliant

- Improved rated Voltage 2.5V ⇒ 2.7V
- Long life products 2.7V 65°C 2000h warranty / 2.5V 70°C 2000h warranty
- Space saving with smaller volume when moduled
- Suitable for electricity backups
- AEC-Q200 compliant: Please contact Chemi-Con for more details, test date, information.



Sleeveless type

◆ SPECIFICATIONS

Items	Specifications		
Operating Temperature	-40℃ to +65℃ (2.7V)/+70℃ (2.5V)/+85℃ (2.0V)		
Capacitance Tolerance	±10% (K)		(25℃)
Temperature Characteristics	Capacitance Change	≤ ±30% of the measured value at 20℃	
	Internal Resistance Change	≤ 600% of the internal resistance maximum value given in the ratings tables (-40℃)	
Load Life Test	After the capacitors are subjected to the rated DC voltage 2.7V at 65℃ for 2,000 hours, the following specifications shall be satisfied when they are restored to 20℃ .		
	Capacitance Change	≤ ±30% of the initial measured value at 20℃	
	Internal Resistance Change	≤ 200% of the internal resistance maximum value given in the ratings tables	
	After the capacitors are subjected to the DC 2.5V at 70℃ for 2,000 hours, the following specifications shall be satisfied when they are restored to 20℃ .		
	Capacitance Change	≤ ±30% of the initial measured value at 20℃	
	Internal Resistance Change	≤ 200% of the internal resistance maximum value given in the ratings tables	
Bias Humidity Test	After the capacitors are left at 60℃ and 90 to 95%RH for 500 hours without voltage applied, the following specifications shall be satisfied when they are restored to 20℃ .		
	Capacitance Change	≤ ±30% of the initial measured value at 20℃	
	Internal Resistance Change	≤ 200% of the internal resistance maximum value given in the ratings tables	

◆ STANDARD RATINGS

● DKG series

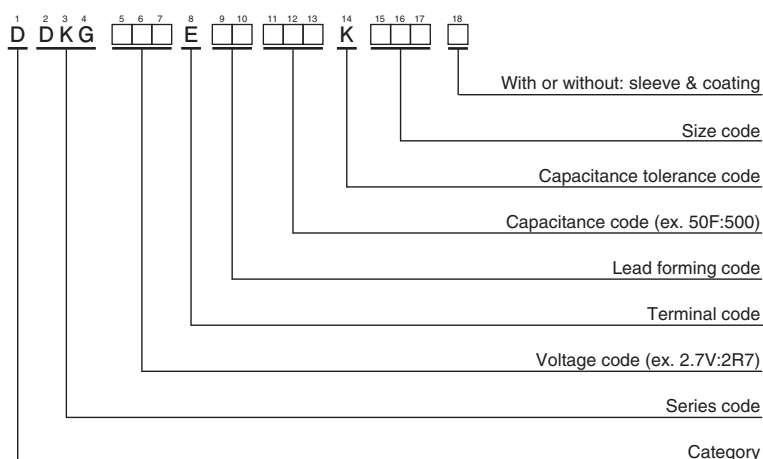
Rated Voltage [V]	Capacitance Typ. (rated) [F]	Nominal Case Size		Internal Resistance		Weight*1 [g]	Energy Storage*2 [Wh]	Part No.	Note*3
		φ D [mm]	L [mm]	Typ. [mΩ]	Max. [mΩ]				
2.7	50	18	40	14.8	17.8	14	0.05	DDKG2R7ELL500KM40T	no sleeve, no coating

* 1 Reference data

* 2 Energy Storage (Wh) is calculated based on 「電気及び電子機器用電気二重層キャパシタの輸送に関する手引書」 (Japanese only) by JEITA (It shows up to the second decimal place).

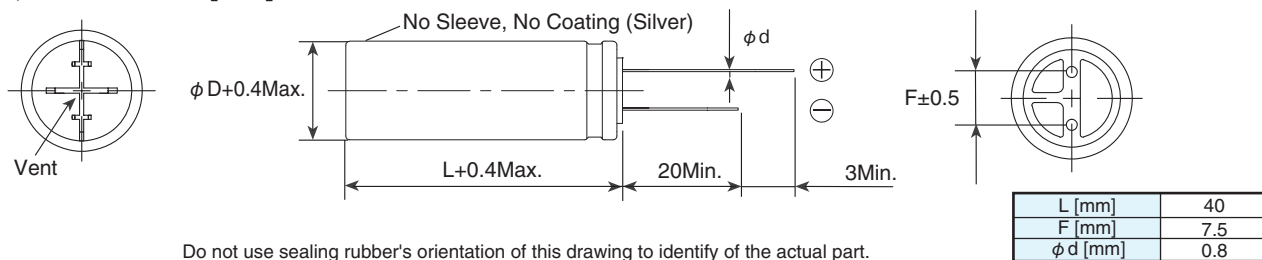
* 3 No sleeve no coating is the basic specification. Consult separately about products with a sleeve.

◆ PART NUMBERING SYSTEM

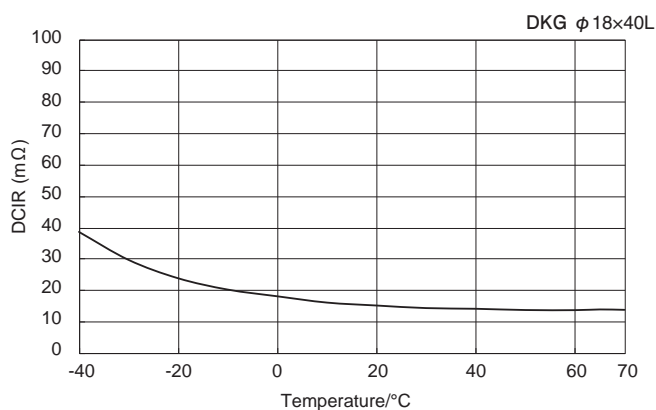
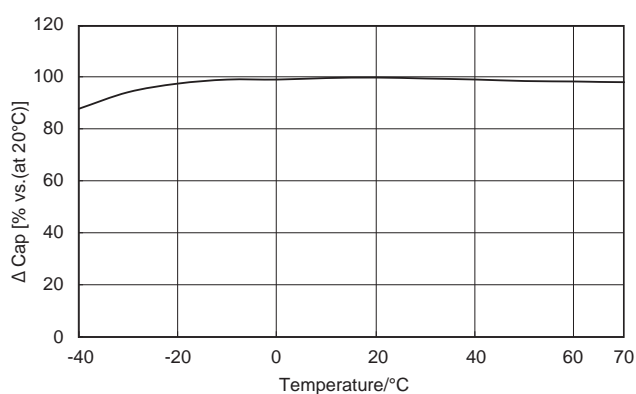


DLCAP™ DKG series

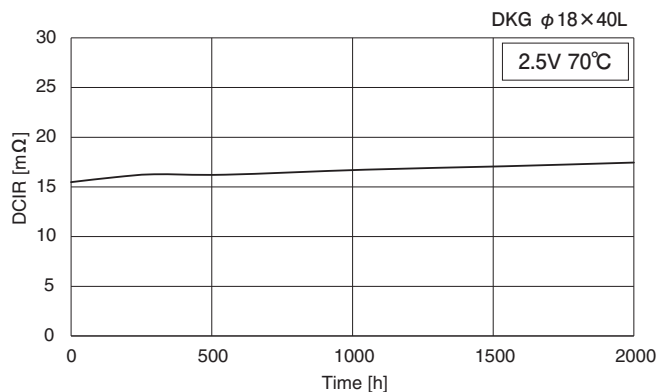
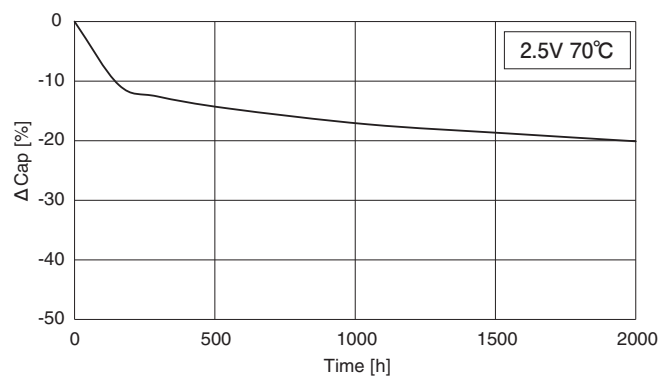
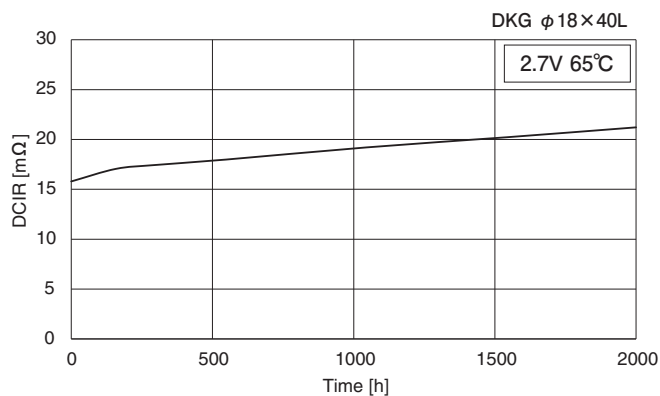
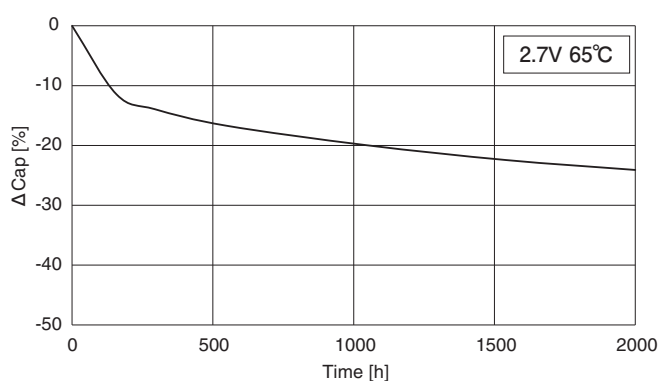
◆ DIMENSIONS [mm]



◆ Temperature Dependence of Capacitance & DCIR



◆ Load Life Test



Radial Lead type

DLCAP™ DKA series

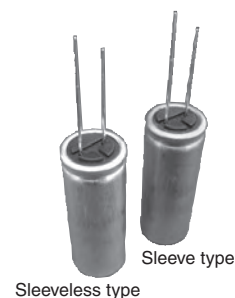
Low
Resistance

-40°C

+70°C

RoHS2
Compliant

- Very low DCIR even at low and high temperature.
- Uses highly safe electrolyte.
- Ideal as a backup power supply for automotive electrical components.
- AEC-Q200 compliant: Please contact Chemi-Con for more details, test date, information.



◆ SPECIFICATIONS

Items	Specifications	
Operating Temperature	-40°C to +70°C (2.5V)/+85°C (2.0V)	
Capacitance Tolerance	φ 18×26L ±20%(M), φ 18×50L ±10%(K), φ 18×70L ±10%(K) (25°C)	
Temperature Characteristics	Capacitance Change	≤ ±30% of the measured value at 20°C
	Internal Resistance Change	≤ 600% of the internal resistance maximum value given in the ratings tables (-40°C)
Load Life Test	After the capacitors are subjected to the rated DC voltage 2.5V at 70°C for 1000 hours, the following specifications shall be satisfied when they are restored to 20°C.	
	Capacitance Change	≤ ±30% of the initial measured value at 20°C
	Internal Resistance Change	≤ 200% of the internal resistance maximum value given in the ratings tables
	After the capacitors are subjected to the rated DC voltage 2.5V at 60°C for 2000 hours, the following specifications shall be satisfied when they are restored to 20°C.	
	Capacitance Change	≤ ±30% of the initial measured value at 20°C
	Internal Resistance Change	≤ 200% of the internal resistance maximum value given in the ratings tables
Bias Humidity Test	After the capacitors are left at 60°C and 90 to 95%RH for 500 hours without voltage applied, the following specifications shall be satisfied when they are restored to 20°C.	
	Capacitance Change	≤ ±30% of the initial measured value at 20°C
	Internal Resistance Change	≤ 200% of the internal resistance maximum value given in the ratings tables

◆ STANDARD RATINGS

● DKA series

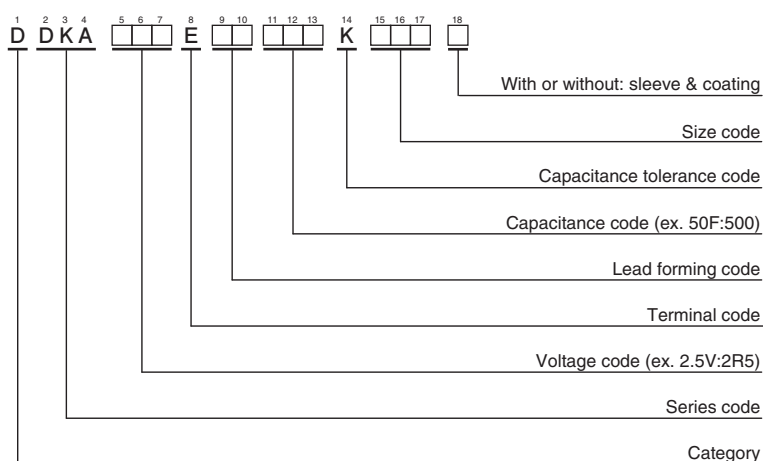
Rated Voltage [V]	Capacitance Typ. (rated) [F]	Nominal Case Size		Internal Resistance		Weight* ¹ [g]	Energy Storage* ² [Wh]	Part No.	Note* ³
		φ D [mm]	L [mm]	Typ. [mΩ]	Max. [mΩ]				
2.5	21	18	26	24.8	30.0	9	0.02	DDKA2R5ELL210MM26S	with sleeve (PET)
								DDKA2R5ELL210MM26T	no sleeve, no coating
	50		50	11.0	13.2	18	0.04	DDKA2R5ELL500KM50S	with sleeve (PET)
								DDKA2R5ELL500KM50T	no sleeve, no coating
	75		70	7.0	8.4	25	0.07	DDKA2R5ELL750KM70T	no sleeve, no coating

* 1 Reference data

* 2 Energy Storage (Wh) is calculated based on 「電気及び電子機器用電気二重層キャパシタの輸送に関する手引書」 (Japanese only) by JEITA (It shows up to the second decimal place).

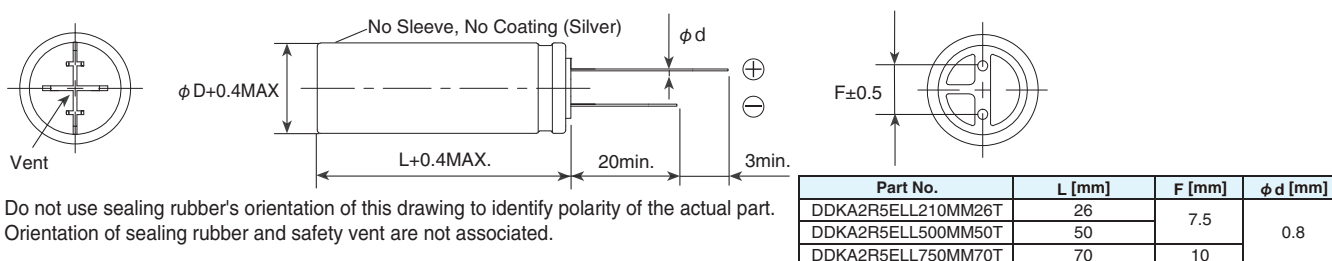
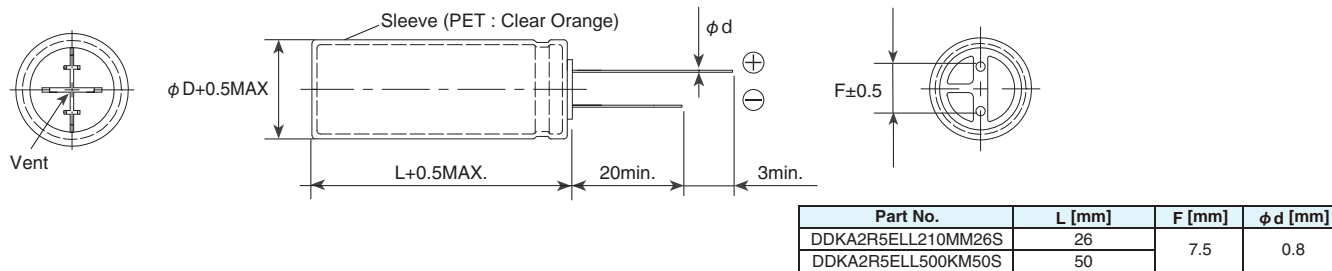
* 3 No sleeve no coating type and sleeve type are the basic specification.

◆ PART NUMBERING SYSTEM



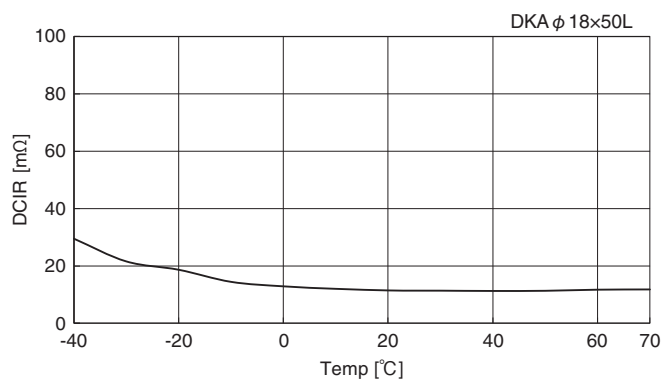
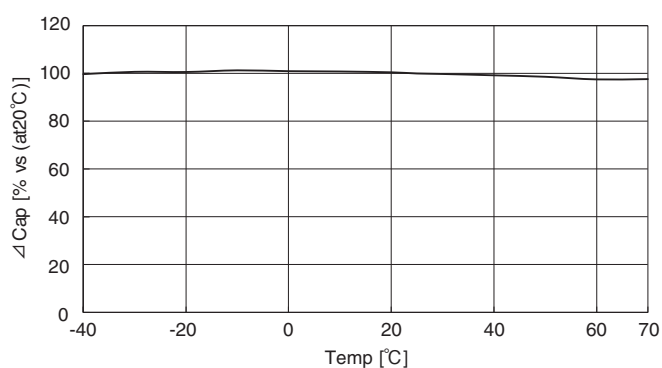
DLCAP™ DKA series

◆ DIMENSIONS [mm]

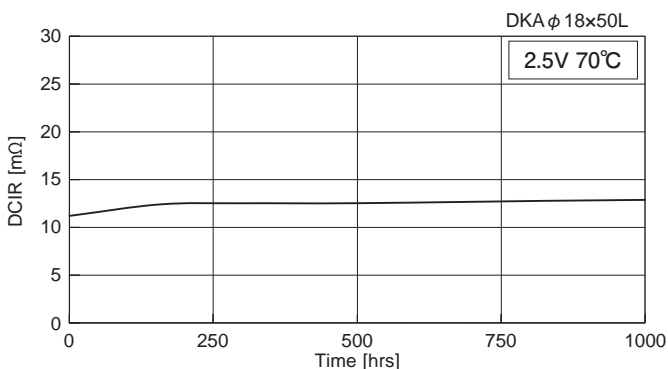
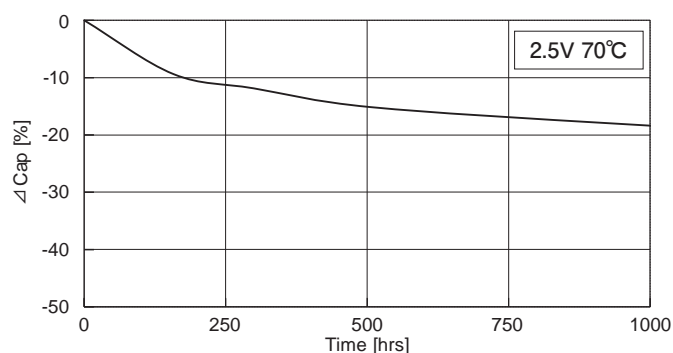


Do not use sealing rubber's orientation of this drawing to identify polarity of the actual part.
Orientation of sealing rubber and safety vent are not associated.

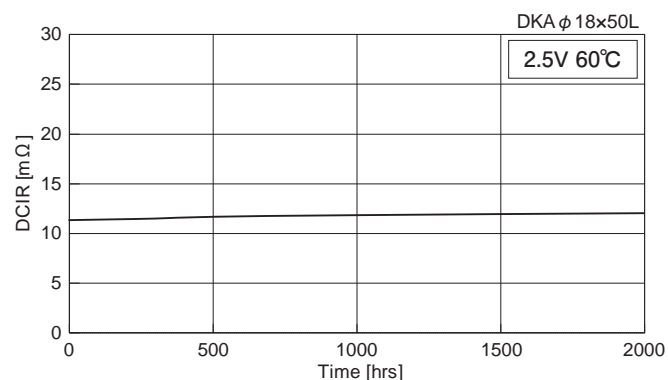
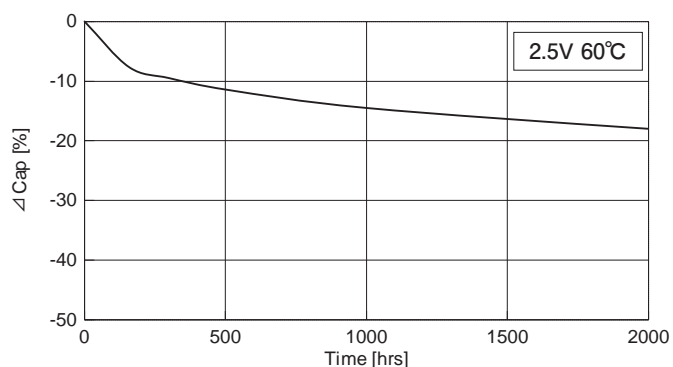
◆ Temperature Dependence of Capacitance & DCIR



◆ 70°C Load Life Test



◆ 60°C Load Life Test



DLCAP™ 2 Cells Module (Radial Lead type)



For an easy usage of Electric Double Layer Capacitor DLCAP™, we have prepared modules (Radial lead type).

● Application Examples

- Electricity assist for battery
- Momentary power supply at power failure
- Back up for power source failure

● DLCAP™ Module

◆ FEATURES

- Equipped with two $\Phi 18 \times 50L$ (50F) DKA series cells with sleeve
- Board mounting of products by snap-fit



◆ SPECIFICATIONS

Items	Specifications	
Operating Temperature	-40°C ~ +70°C	
Capacitance Tolerance	$\pm 10\%$, -15% (20°C)	
Temperature Characteristics	Capacitance Change	$\leq \pm 30\%$ of the measured value at 20°C
	Internal Resistance Change	$\leq 600\%$ of the internal resistance maximum value given in the ratings tables (-40°C)
Load Life Test	After the capacitors are subjected to the rated DC voltage at 70°C for 1000 hours, the following specifications shall be satisfied when they are restored to 20°C.	
	Capacitance Change	$\leq \pm 30\%$ of the initial measured value at 20°C
	Internal Resistance Change	$\leq 200\%$ of the internal resistance maximum value given in the ratings tables
	After the capacitors are subjected to the rated DC voltage at 60°C for 2000 hours, the following specifications shall be satisfied when they are restored to 20°C.	
	Capacitance Change	$\leq \pm 30\%$ of the initial measured value at 20°C
	Internal Resistance Change	$\leq 200\%$ of the internal resistance maximum value given in the ratings tables
Bias Humidity Test	After the capacitors are left at 60°C and 90 to 95%RH for 500 hours without voltage applied, the following specifications shall be satisfied when they are restored to 20°C.	
	Capacitance Change	$\leq \pm 30\%$ of the initial measured value at 20°C
	Internal Resistance Change	$\leq 200\%$ of the internal resistance maximum value given in the ratings tables

◆ STANDARD RATINGS

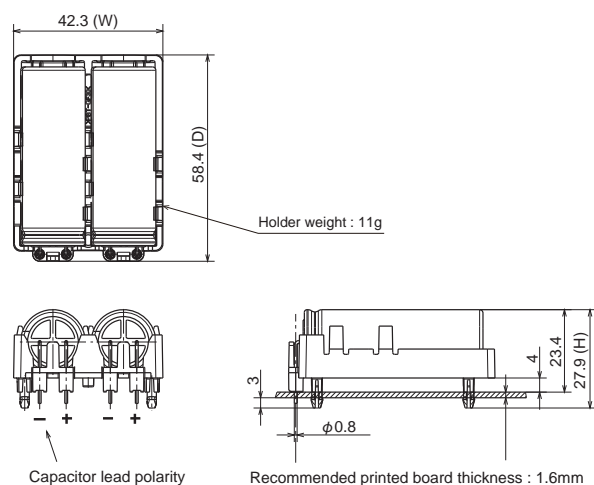
Rated Voltage [V]*1	Capacitance*1 Typ. [F]	Product Size			Internal Resistance*1		Weight*2 [kg]	Energy Storage*1*3 [Wh]	Part No.
		W [mm]	D [mm]	H [mm]	Typ. [mΩ]	Max. [mΩ]			
2.5	50	42.3	58.4	27.9	11	13.2	0.047	0.05	MDKA2R5T500PN1111A

* 1 Per single cell

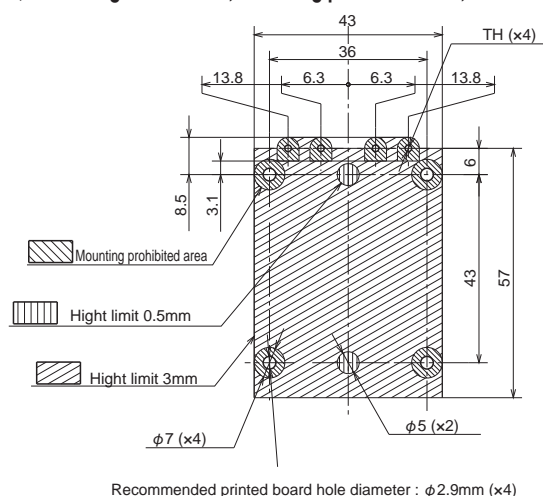
* 2 Reference data

* 3 Energy Storage (Wh) is calculated based on 「電気及び電子機器用電気二重層キャパシタの輸送に関する手引書」 (Japanese only) by JEITA.

◆ DIMENSIONS



◆ Mounting dimensions, mounting prohibited area, mounting limit height.



● Series and or parallels connection of DLCAP™ Module

This module can be connected and used in series and parallel if necessary. If you need to connect more than 12 pieces in series please consult us.

● DLCAP™ Custom Module Acceptable

Customized designs for system integration are available upon request.

Please consult us for other special specifications.

DLCAP™ Module (Radial Lead type)

Low
Resistance

+70°C

RoHS2
Compliant

For an easy usage of Electric Double Layer Capacitor DLCAP™, we have prepared modules (Radial lead type).

● Application Examples

- Electricity assist for battery
- Momentary power supply at power failure
- Back up for power source failure

● DLCAP™ Module

◆ FEATURES

- Voltage balancing circuit installed
- Over voltage detection circuit installed
- Equipped with six Φ 18x50L (50F) DKA series cells with sleeve



◆ SPECIFICATIONS

Items	Specifications		
Operating Temperature	-40℃ ～ +70℃		
Capacitance Tolerance	±10%, -15% (20℃)		
Temperature Characteristics	Capacitance Change	≤ ±30% of the measured value at 20℃	
	Internal Resistance Change	≤ 600% of the internal resistance maximum value given in the ratings tables (-40℃)	
Load Life Test	After the capacitors are subjected to the rated DC voltage at 70℃ for 1000 hours, the following specifications shall be satisfied when they are restored to 20℃ .		
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	Internal Resistance Change	≤ 200% of the internal resistance maximum value given in the ratings tables	
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	Capacitance Change	≤ ±30% of the initial measured value at 20℃	
	Internal Resistance Change	≤ 200% of the internal resistance maximum value given in the ratings tables	
Bias Humidity Test	After the capacitors are left at 60℃ and 90 to 95%RH for 500 hours without voltage applied, the following specifications shall be satisfied when they are restored to 20℃ .		
	Capacitance Change	≤ ±30% of the initial measured value at 20℃	
	Internal Resistance Change	≤ 200% of the internal resistance maximum value given in the ratings tables	

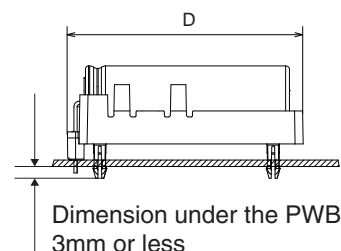
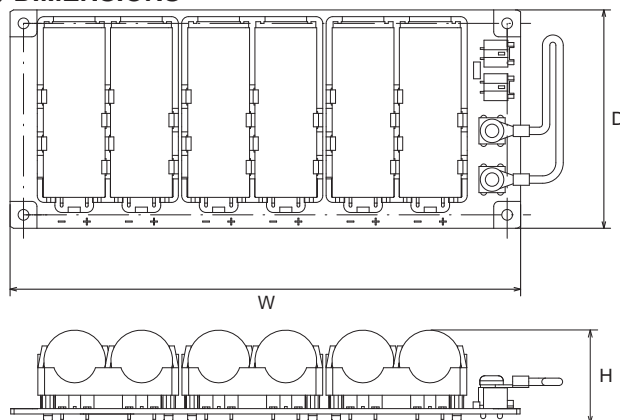
◆ STANDARD RATINGS

Rated Voltage [V]	Capacitance		Product Size			Internal Resistance		Weight* ¹ [kg]	Energy Storage* ² [Wh]	Part No.
	Typ. [F]	Min. [F]	W [mm]	D [mm]	H [mm]	Typ. [mΩ]	Max. [mΩ]			
15	8.3	7.1	152	65	28	74.2	87.4	0.2	0.26	MDKA150S8R3PE6111A

* 1 Reference data

* 2 Energy Storage (Wh) is calculated based on 「電気及び電子機器用電気二重層キャパシタの輸送に関する手引書」 (Japanese only) by JEITA.

◆ DIMENSIONS



◆ Screw Specification

Screw : M4

Tightning torque : 1.5 Nm±10%

● Series and or parallels connection of DLCAP™ Module

This module can be connected and used in series and parallel if necessary.
If you need to connect more than 5 pieces in series please consult us.

● DLCAP™ Custom Module Acceptable

Customized designs for system integration are available upon request.

Please consult us for other special specifications.

Precaution

The circuits described as examples in this catalog and the "delivery specifications" are featured in order to show the operations and usage of our products, however, this fact does not guarantee that the circuits are available to function in your equipment systems.

We are not in any case responsible for any failures or damage caused by the use of information contained herein.

You should examine our products, of which the characteristics are described in the "delivery specifications" and other documents, and determine whether or not our products suit your requirements according to the specifications of your equipment systems. Therefore, you bear final responsibility regarding the use of our products.

Please make sure that you take appropriate safety measures such as use of redundant design and malfunction prevention measures in order to prevent fatal accidents and/or fires in the event any of our products malfunction.

1. Precautions in use

- ① Please do not use the Supercapacitor under the environment, which exceeds the rated performance range.
 - a) High temperature (over operating temperature)
 - b) Over voltage (over rated voltage)
 - c) Application of reverse or alternate voltage
- ② The outer sleeve and resin plate of the Supercapacitor does not assure electrical insulation.
- ③ Supercapacitor has finite and regulated life.
- ④ Please do not use or store Supercapacitor under the following environment;
 - a) Environment where the Supercapacitor could be exposed to water, salt water or oil, or the environment which is filled with gaseous oil or salt.
 - b) Environment which is filled with toxic gases such as hydrogen sulfide, sulfurous acid, chlorine, ammonia, bromine, or methyl bromide.
 - c) Environment where the Supercapacitor could be exposed to acidic or alkaline solvent.
 - d) Environment where the Supercapacitor could be exposed to direct sunlight, ozone, ultraviolet rays or radiation.
 - e) Environment under extreme vibration or mechanical impact.
- ⑤ Please note the followings when designing;
 - a) Please provide enough clearance space over the pressure relief vent.
 - b) Align the distance between the Supercapacitor terminals with the distance between the printed wiring board holes. (If the distances differ, use a lead forming processed product.)
 - c) Provide clearance space specified below at the section over the Supercapacitor pressure relief vent.
 - φ 8 (6.3) to φ 16 2 mm or more
 - φ 18 to φ 22: 2.5 mm or more
 - d) Ensure that no wire or circuit patterns are placed over the Supercapacitor pressure relief vent.
If the Supercapacitor pressure valve is attached to the printed wiring board side, create an air release hole for the pressure relief vent taking the location of the pressure valve into consideration.
 - e) Provide clearance space specified below at the section over the rubber on the Supercapacitor lead terminal side.
(Do not attach the Supercapacitor directly to the board. Provide space in between them.)
 - φ 8 (6.3) to φ 18 2 mm or more
 - φ 20 to φ 22: 3 mm or more
 - f) Do not wire a circuit pattern below the sealing section of the Supercapacitor. If a circuit pattern needs to be wired near the Supercapacitor, reserve 1 mm or more (ideally 2 mm) between them.
 - g) Avoid attaching any heat source components near the Supercapacitor or on the back (under the Supercapacitor) of the printed wiring board.
 - h) When attaching a Supercapacitor on a tow-sided printed wiring board, design it so that any unnecessary board holes or through holes for interfacial connection do not come under the Supercapacitor.
 - i) When attaching a Supercapacitor on a tow-sided printed wiring board, design it so that wire or circuit patterns do not come in contact with the assembled sections of the Supercapacitor.
 - j) To assure insulation voltage, provide adequate space between the Supercapacitor case, cathode terminal, anode terminal, circuit pattern, and chassis when designing.
 - k) Please note that electrical properties of Supercapacitor may change according to the changes in temperature and frequency of Supercapacitor.

- l) When the temperature between Supercapacitor cells in a same system differs largely, it may amplify the slight characteristic difference of each cell, and may cause the system to malfunction in the end.
Please make sure to design the system with an adequate heat radiation to avoid variation in temperature among the cells.
- m) When heat increase is expected due to charging and discharging of Supercapacitor, please conduct a load test to confirm there is no abnormal heat rise, and the temperature stays within the Supercapacitor's specified temperature range.
- n) Please assure appropriate current balance when connecting two or more Supercapacitor in parallel.
- o) Please assure appropriate voltage balance when connecting two or more Supercapacitor in series.
- p) In case of use outside of specification, such as overvoltage and/or above specified temperature range, the electrolyte fume from inside may be expelled through releasing valve. Please take that into consideration at the time of system design.
- q) Please establish safety design such as stopping charge/discharge in case of abnormal temperature and voltage. Applying voltage that exceeds rated voltage frequently may cause the devices to smoke or burn.
Please design the system with fail-safe functions.
- r) As Supercapacitor has internal resistance, the internal heat generated by charge-discharge affects its life.
Please choose the products with low resistance and make sure to avoid overheating of the Supercapacitor.
- s) Due to Supercapacitor's internal resistance, there is a voltage drop (also referred to as "IR drop") at the beginning of charge-discharge. Please consider this voltage drop in your circuit design.
- ⑥ When a Supercapacitor is fully charged, short-circuiting the output terminals could cause the electric current to flow as high as a few hundred amperes. Please do not install or uninstall a module when it is charged.
- ⑦ Please do not drop Supercapacitor. Do not use it once it is dropped.
- ⑧ Please make sure of the polarity when assembling Supercapacitor into a module.
- ⑨ When assembling Supercapacitor into a circuit, position it so that the case and the circuit electronic components do not come in contact with each other.
- ⑩ Please do not deform Supercapacitor when assembling it into a module.
- ⑪ Voltage of Supercapacitor changes in proportion to the stored energy.
If stable output voltage is required, circuit system such as converter needs to be added.
- ⑫ When using Supercapacitor for industrial application, following periodical check is recommended.
Please disconnect power from the device and fully discharge Supercapacitor before conducting periodical check.
- a) Appearance: Significant damage in appearance including deformation, liquid leakage, discolor, dust between the terminals and stain
- b) Electrical characteristics: Characteristics prescribed in the catalog or product specifications.
- ⑬ Please stop the whole system when Supercapacitor generates excessive heat or a foul smell.
In case of excessive heat, do not get close to the part in order to avoid injury.
- ⑭ Please stop the system immediately and ventilate the area sufficiently when the pressure relief vent on Supercapacitor operates and releases a gas from inside.
Never expose your face or your hand as hot gas may expel.
If the gas is inhaled or hits eyes, please wash your eyes, gargle, and consult with a doctor immediately.
Do not lick the electrolyte of Supercapacitor. Wash away the electrolyte from the skin with soap and water.
- ⑮ Supercapacitor may have been spontaneously recharged with time by a recovery voltage phenomenon.
Discharge Supercapacitor as necessary especially before connecting multiple Supercapacitors in series.
- ⑯ Please discharge Supercapacitor before assembling or removing. There is a risk of large current flow and electrical shock when short-circuiting the terminal with residual voltage.
Note that Supercapacitor may be self-charged while being left open-circuit even after fully discharged.
- ⑰ Do not wash Supercapacitor.
- ⑱ Do not use any adhesive or coating materials containing halogenated solvents.

2. Precautions in transportation

- ① When exporting Supercapacitor, fumigation process may be required for export in some countries.
Please note that some types of fumigation process which uses halogenated ions may cause corrosion on Supercapacitor materials.
- ② Due to the Export Trade Control Ordinance, the documents obtained to the exporter concerning that export trade, with information that the product is being used for developing mass destruction weapons, the exporter will have to apply and hand in the export permission from the Ministry of Industrial Trade and Industry.
- ③ Transport operations of Supercapacitor has been changed in line with the revision of
"The Recommendations on the Transport of Dangerous Goods" adopted by the United Nations in December 2010.
Please confirm the latest information of the followings as well as laws of each country.
 - United Nations (UN) Recommendations on the Transport of Dangerous Goods-Model Regulations.
 - International Civil Aviation Organization (ICAO) Technical Instructions for the Safe Transport of Dangerous Goods by Air.
 - International Air Transport Association (IATA) Dangerous Goods Regulations.
 - International Maritime Organization (IMO) IMDG (International Maritime Dangerous Goods) -code.

3. Precautions in storage

- ① Please store Supercapacitor at temperature between 5°C~35°C and humidity less than 75% .
Please avoid an environment with drastic temperature change which could damage the product.
- ② Long term storage may cause an increase of leakage current, decrease of capacitance, increase of internal resistance, etc..
Before using the part after a long term storage over 6 months, please charge it with a current of 5mA per Farad, up to the rated voltage, then keep the voltage for around 20 hours.
Please then measure the electric characteristics to ensure the part still has the desired performance.

4. Precautions in disposal

Please discharge the electricity to safety voltage before disposal.
Please follow the laws or regulations at the place of disposal.
Please drill or crash the part before incineration.

Please refer to the following report before using Supercapacitor.

Japan Electronics and Information Technology Industries Association, JEITA RCR-2370B

"Safety Application Guide for electric double layer capacitors (Guideline of notes for electric double layer capacitors)"

Japan Electronics and Information Technology Industries Association

"Guidelines of the transport of fixed electric double-layer capacitors for use in electric and electronic equipment" (Japanese only)

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* Specifications in this catalog are subject to change without notice.

DLCAP™ Specifications Check Sheet

Customer contact information	Customer name :	
	Post name :	
	Name :	
	Contact : TEL	E-mail

Schedule and planned number of units

Prototype	②	Delivery date	: Number of prototype units	(Units)
Mass production		Start of mass production time	: Planned number of units	(Units/month or year)

Intended use and conditions

Application and purpose	Select from the following or write down the application and purpose of using the DLCAP within the permissible scope.
	[Equipment Classification] · Passenger vehicles · Buses · Trucks · Railways · Ships · Aircraft · Construction machines · Military · Medical devices · Office automation equipment · Factory automation equipment · Measuring instruments · Household equipment
	③ · Others:
	[Purpose] · Power regeneration · Power backup · Power peak assist · Environment load reduction · Instantaneous drop compensation
	· Others:

Environmental conditions	Enter the temperature environment conditions of the location where the module is installed. In addition, enter any special conditions such as high humidity, presence of salt water, oil and chemicals.	
	Location	[Outdoor/Indoor] ·Accommodated in the panel ·Incorporated in the equipment ·Others ()
	④ Operating Temperature	Operating temperature range () °C to () °C Average usage temperature () °C
	Storage temperature	Storage temperature range () °C to () °C Average storage temperature () °C
	Other special environmental conditions	

Expected service life	⑤	() years
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Required specifications

Electrical specification	Enter the charge/discharge specifications, cycle pattern including pause, and operating rate (charge/discharge frequency). If doing so is complicated, ideally attach graphs and other documents. Item ⑨ operating rate is used to check the heating state.	
	⑥	Voltage specifications
		Max. charge voltage () V * Rated voltage of module
		Voltage range at normal use () V to () V
		Standby voltage * Starting voltage of charge/discharge () V
	⑦	Charge/discharge power or current
		Charge power () W or Charge current () A
		Discharge power () W or Discharge current () A
	⑧	Charge/discharge time (charge/discharge cycle)
		Charge time () sec. Discharge time () sec. Pause () sec.
	One cycle time () sec.	
⑨	Operating rate	
	Charge/discharge operation time () hours/day or year Or Charge/discharge cycle count () time/second, hour, day, or year	

Mechanical specifications		Enter the requirements of the mechanical specifications. If doing so is complicated, ideally attach diagrams and other documents.
	⑩	<div>Restrictions on outside dimensions</div> <div>Orientation and length requiring restrictions () D × () W × () H mm</div>
		<div>Weight restrictions</div> <div>Weight () kg or less</div>
	⑪	<div>Vibration/impact resistance performance</div> <div>Required specifications ·Standards</div>
	⑫	<div>Waterproof/anti-dust performance</div> <div>Required specifications ·Standards (IPxx)</div>
	⑬	<div>Package and terminal specifications</div> <div>Add any specification requirements on the exterior package (chassis), or shape and position of the terminal (+)(-), if any.</div>



Additional function		Enter any necessary functions other than the basic module configuration. Basic configuration: Cell and bus-bar connection, voltage balance circuit, overvoltage detection circuit [Presence/absence]
	14	Temperature sensor, relay, fuse, cooling fan, others ()

Others Remarks	
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Attached document

[Presence/absence] Document name:

Field used by Nippon chemi-con



 Nippon chemi-con corporation