



DLCAP™ Electric Double Layer Capacitors

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◆Regarding compliance for EU REACH Regulation

a) According to the content of REACH handbook (Guidance on requirements for substances in articles which is published on May 2008), our electronic components are "articles without any intended release". Therefore they are not applicable for "Registration" for EU REACH Regulation Article 7 (1).

Reference: Electrolytic Condenser Investigation Society

"Study of REACH Regulation in EU about Electrolytic Capacitor" (publicized on 13 March 2008)

b) DEHP (CAS No.117-81-7) is a high concern substance (SVHC) in the EU REACH rules. DEHP is contained as a plasticizer in PVC sleeve covering material etc.. Nippon Chemi-Con will abolish use of DEHP by June, 2011. Please consult with us about an alternate product.

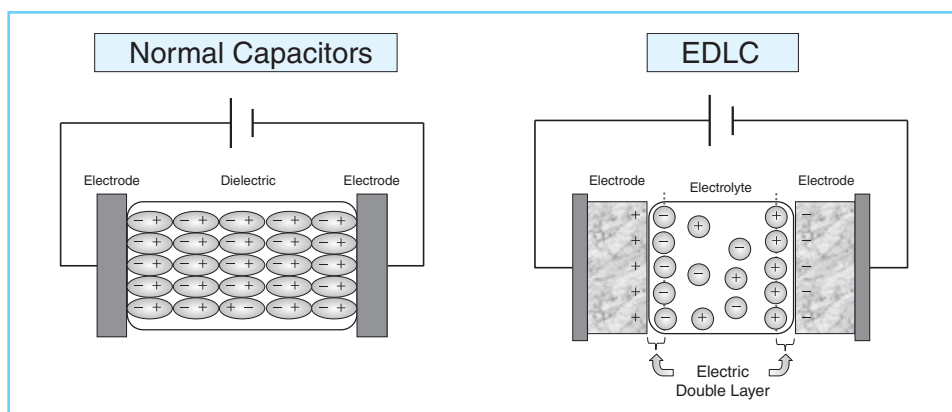
1. Introduction

Compared to the commonly used rechargeable batteries, Electric Double Layer Capacitor (EDLC), which is capable to charge-discharge with high current, is an energy storage device with its 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 emphasized towards loading EDLC with new applications is considered. Also, installation of EDLC in hybrid or fuel vehicle is considered.

Nippon Chemi-Con has strongly pursued towards a product commercialization of an energy conservation, low environmental load, within this, EDLC is a representative product which is environmentally friendly. We hold and provide several hundred F to large capacitance of 3,200F, holding wide specification, meeting user needs.

2. Basic Mechanism of EDLC

General capacitors have a dielectric sandwiched between two electrodes. When a 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 in what is called the "electric double layer."



(Figure1) Mechanism

3. Characteristics

As mentioned above, EDLC differs from rechargeable batteries, not causing chemical reaction, with surface of activated carbon with energy accumulation by ionic physical attachment only, therefore it holds the characteristics stated below;

- With low degradation, multimillion cycles of charge-discharge is possible.
- With a high power density, rapid (high current) charge-discharge is possible.
- With a high charge-discharge efficiency, an output efficiency of over 95% with a power density 1kW/kg is obtained.
- Environmentally friendly without using heavy metal for its structure material.
- High in safety during abnormal time, and no malfunction occurs due to short circulation.

4. Structure

Nippon Chemi-Con is developing a cylindrical type and a prismatic type DLCAP™ (Photo 1).

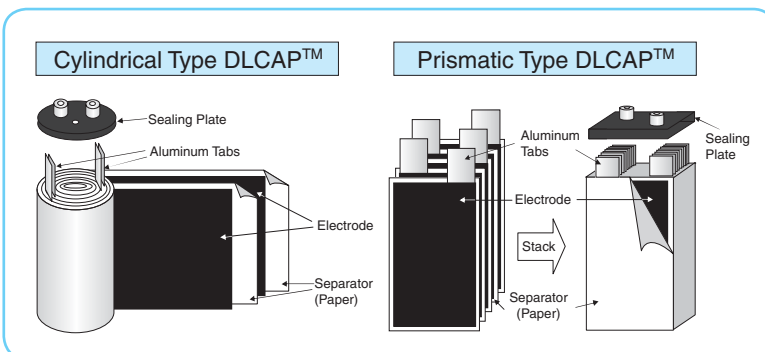
Standard structure is made by both pasting an electrode onto the aluminum foil, prismatic type in stacked layer-type, and cylindrical type in wind type (Figure 2).

Using a large activated carbon with large specific surface for the electrode, with our original high-densified electrode manufacturing technology the energetic characterized electrode, is excellent with both high capacitance and low resistance.

Prismatic type DLCAP™ holds an original collecting electricity technology and by using our production made high density low resistance electrode, lowering the products resistance, making high current charge-discharge possible, which will be a product capable for a more high power use compared to the cylindrical type.



(Photo1) DLCAP™



(Figure2) DLCAP™ Structure

DLCAP™ Cylindrical Type



- With the original electrode process, high energy density implementation is possible
- Charge/discharge efficiency are higher than in batteries
- Environment-friendly
- Suited for electricity storage, battery assistance, short-term backups, etc.

◆SPECIFICATIONS

Items	Specifications	
Operating Temperature	-25°C to +60°C	
Capacitance Tolerance	±10% (K)	
Temperature Characteristics	Capacitance Change	≤±30% of the initial measured value at 20°C
	Internal Resistance Change	≤600% of the value given in the Ratings Tables
Load Life Test	After the capacitors are subjected to the rated DC voltage at 60°C for 2,000 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 value given in the Ratings Table
Bias Humidity Test	After the capacitors are left at 40°C and 90 to 95%RH for 500 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 value given in the Ratings Tables

◆STANDARD RATINGS

<Standard Type>

- DLA series

Rated Voltage [V]	Capacitance [F]	Case Size		F [mm]	F ₂ [mm]	G [mm]	Internal Resistance* [mΩ]	Weight** [g]	Part No.
		φD [mm]	L [mm]						
2.5	350	35	65	12.7	8.7	6.0	10.0	90	DDLA2R5LGN351KA65S
	700		105				5.5	160	DDLA2R5LGN701KAA5S

<Power Type (low resistance)>

- DLC series

Rated Voltage [V]	Capacitance [F]	Case Size		F [mm]	F ₂ [mm]	G [mm]	Internal Resistance* [mΩ]	Weight** [g]	Part No.
		φD [mm]	L [mm]						
2.5	350	35	65	12.7	8.7	6.0	8.0	90	DDLC2R5LGN351KA65S
	700		105				5.0	160	DDLC2R5LGN701KAA5S
	1,400	40	150				17.0	10.2	2.5

- DLE series

Rated Voltage [V]	Capacitance [F]	Case Size		F [mm]	F ₂ [mm]	G [mm]	Internal Resistance* [mΩ]	Weight** [g]	Part No.
		φD [mm]	L [mm]						
2.5	2,300	50	172	22.1	11.9	7.0	1.2	490	DDLE2R5LGN232KCH2S

<Energy Type (large capacitance)>

- DLB series

Rated Voltage [V]	Capacitance [F]	Case Size		F [mm]	F ₂ [mm]	G [mm]	Internal Resistance* [mΩ]	Weight** [g]	Part No.
		φD [mm]	L [mm]						
2.5	2,500	50	150	22.1	11.9	7.0	5.0	420	DDLB2R5LGN252KCF0S

- DMB series

Rated Voltage [V]	Capacitance [F]	Case Size		F [mm]	F ₂ [mm]	G [mm]	Internal Resistance* [mΩ]	Weight** [g]	Part No.
		φD [mm]	L [mm]						
2.3	2,000	40	150	17.0	10.2	6.0	10.0	260	DDMB2R3LGN202KBF0S
	3,200	50	150	22.1	11.9	7.0	6.5	380	DDMB2R3LGN322KCF0S

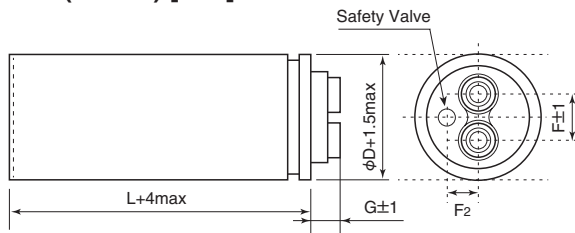
* typical data (at 20°C), ** reference data

Special designs are available on requests.

Note : The specifications are subject to change without notice

DLCAP™ Cylindrical Type

◆DIMENSIONS (CE331) [mm]

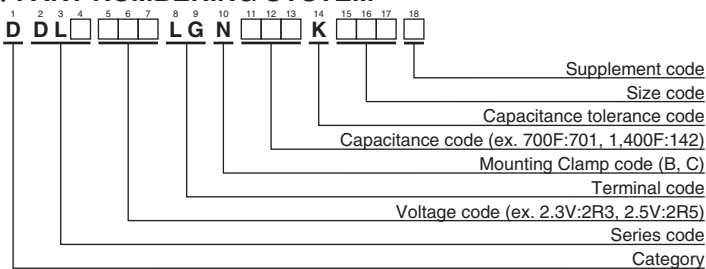


<Screw specification>

Plus hexagon-headed screw : M5×0.8×10

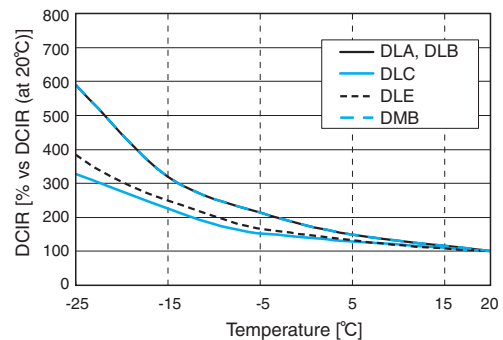
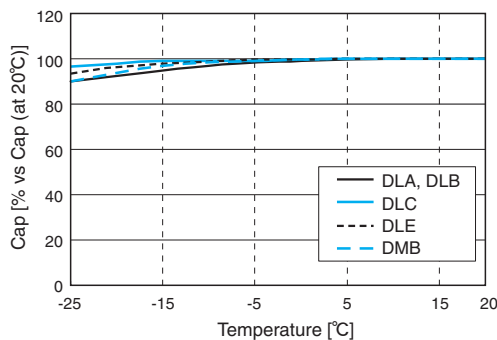
Maximum screw tightening torque : 3.23Nm

◆PART NUMBERING SYSTEM

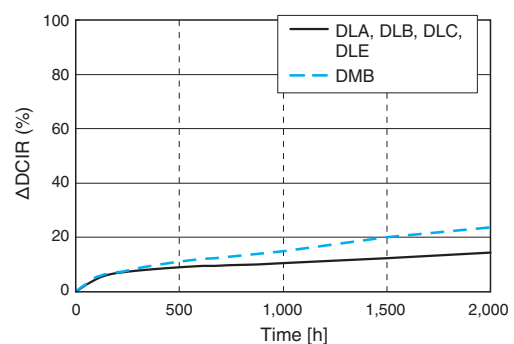
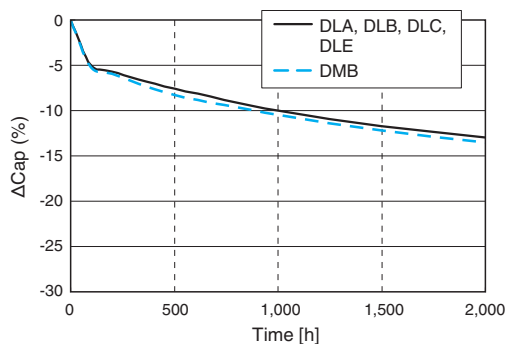


Please refer to "A guide to global code (screw-mount terminal type)"

◆Temperature dependance of Capacitance & DCIR



◆60°C Load Life Test



Special designs are available on requests.

Note : The specifications are subject to change without notice

DLCAP™ Prismatic Type RoHS Compliant



- With the original electrode process, high energy density implementation is possible
- Charge/discharge efficiency are higher than in batteries
- Environment-friendly
- Suited for electricity storage, battery assistance, short-term backups, etc.
- Additionally low resistance was achieved by stacking technology.
- Suited for automotive application (regenerated energy, idling stop).

◆SPECIFICATIONS

Items	Specifications	
Operating Temperature	-25°C to +60°C	
Capacitance Tolerance	±10% (K) (20°C)	
Temperature Characteristics	Capacitance Change	≤±30% of the initial measured value at 20°C
	Internal Resistance Change	≤600% of the value given in the Ratings Tables (-25°C)
Load Life Test	After the capacitors are subjected to the rated DC voltage at 60°C for 2,000 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 value given in the Ratings Table
Bias Humidity Test	After the capacitors are left at 40°C and 90 to 95%RH for 500 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 value given in the Ratings Tables

◆STANDARD RATINGS

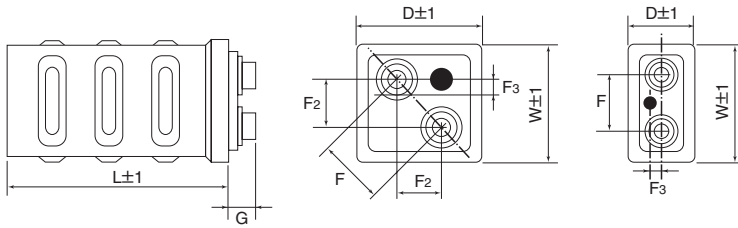
- DSC series

Rated Voltage [V]	Capacitance [F]	Case Size		F [mm]	F ₂ [mm]	F ₃ [mm]	G [mm]	Internal Resistance* [mΩ]	Weight** [g]	Part No.
		W×D [mm]	L [mm]							
2.5	2,400	54×54	128	27.15	19.2	10.0	11	0.8	520	DDSC2R5LGN242K54BS
	1,200	54×30	128	27.40	-	3.9	7	1.6	290	DDSC2R5LGN122K30BS

* typical data (at 20°C) **reference data

DLCAP™ Prismatic Type

◆DIMENSIONS (CE331) [mm]



<Screw specification>

Plus hexagon-headed screw :

M5×0.8×10 (54×30)

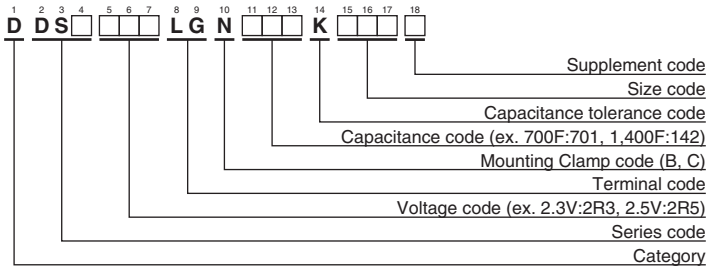
M6×1.0×12 (54×54)

Maximum screw tightening torque :

3.23Nm (M5/54×30)

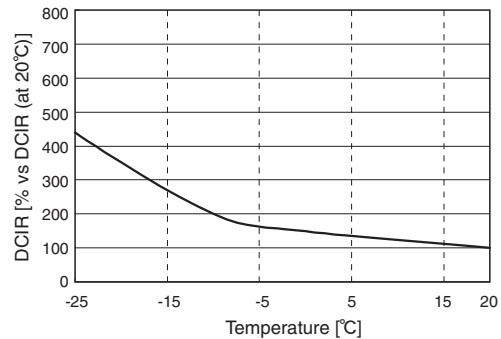
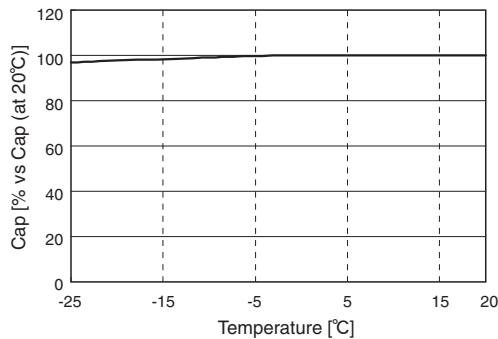
4.2Nm (M6/54×54)

◆PART NUMBERING SYSTEM

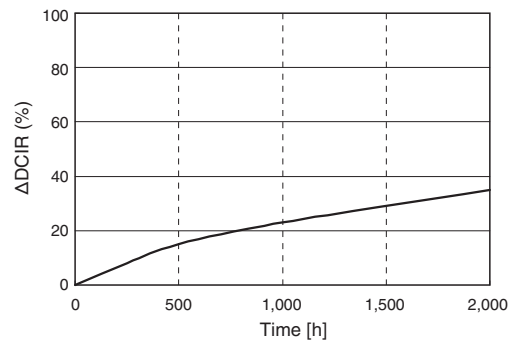
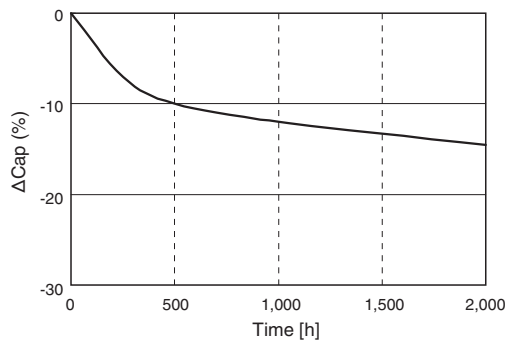


Please refer to "A guide to global code (screw-mount terminal type)"

◆Temperature dependance of Capacitance & DCIR



◆60°C Load Life Test



Special designs are available on requests.

Note : The specifications are subject to change without notice

DLCAP™ Module



For an easy usage of Electric Double Layer Capacitor DLCAP™, we have prepared a module.
By connecting several of these modules, higher voltage and larger capacitance modules will be possible.

● Application Examples

◆ Energy Saving

- Peak power assistance
- Effective use of regenerated energy

◆ New Energy

- Stabilization of wind power
- High efficient charge of solar energy
- Electricity assist for fuel cell

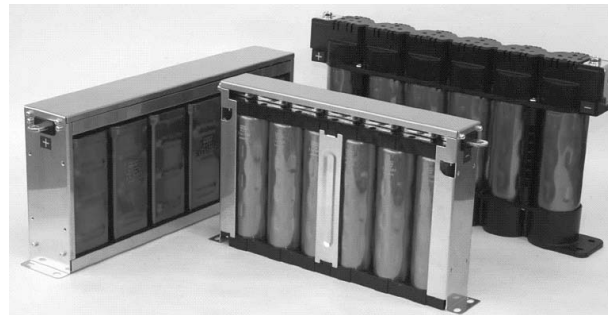
◆ Safety, Crisis Measures

- Large power supply during blackouts
- Back up for power source failure

● DLCAP™ Module

◆ FEATURES

- Voltage balance circuit installed



Rated: 15V 400F

Rated: 15V 233F

Rated: 15V 383F

◆ SPECIFICATIONS

Items	Specifications	
Operating Temperature	-25°C to +60°C	
Capacitance Tolerance	±10% (K) (20°C)	
Temperature Characteristics	Capacitance Change	≤±30% of the initial measured value at 20°C
	Internal Resistance Change	≤600% of the value given in the Ratings Tables (-25°C)
Load Life Test	After the modules are subjected to the rated DC voltage at 60°C for 2,000 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 value given in the Ratings Table
Bias Humidity Test	After the modules are left at 40°C and 90 to 95%RH for 500 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 value given in the Ratings Tables
Insulation Resistance	The measured value between the lumped terminal and the case using 500V _{dc} insulation resistance meter shall be more than 100MΩ.	
Insulation Withstand Voltage	No abnormality after the voltage given in the rating tables is applied between lumped terminal and package for 1 minute.	

◆ STANDARD RATINGS

Rated Voltage [V]	Capacitance [F]	Case Size [mm]			Internal Resistance* [mΩ]	Weight** [kg]	Insulation Withstand Voltage [kV]	Part No.
		A	B	C				
15	116	261	48	130	36.6	1.3	1.5	MDLA15R0V116FB0
	233	314	44	177	16.2	2.4	1.0	MDLC15R0V233FA0
	383	370	55	209	7.8	3.8	1.5	MDLE15R0V383FB0
	400	401	60	162	5.4	4.3	1.0	MDSC15R0V400FA0

*typical data(at 20°C), **reference data

Connecting parts are attached.

● DLCAP™ Custom Module Acceptable

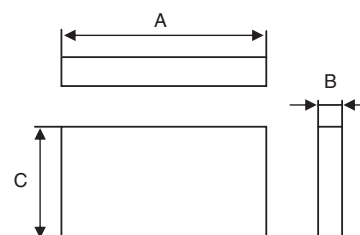
Special designs are available on requests.

◆ Special Specification Example

- High voltage application response
- Large capacitance application response
- High current application response
- Proper balance circuit suggestion
- Vibration and impact application response
- Uncommon circuit or controlled charge discharge circuit response

Please consult us if special specification is required.

◆ DIMENSIONS



◆ Screw Specification (Suggested)

MDLA15R0V116FB0	M5×12
MDLC15R0V233FA0	M6×20
MDLE15R0V383FB0	M8×15
MDSC15R0V400FA0	M6×20

Please consult us if these items are needed to be connected more than 3 in series.

Note : The specifications are subject to change without notice

DLCAP™ Rack



- Rack type for fixed energy storage.
- Suitable for industrial machine high voltage use.
- Possible to connect racks in series or parallel.

◆Application Example

- Instant low voltage electricity (less than 1 sec) measuring equipment energy storage use.
- Regenerative Energy Storage use for cranes, etc.
- * By connecting several racks, higher voltage and larger capacitance bank will be possible.
- * Forced cooling fan (24 pieces) can be attached as an option.

◆SPECIFICATIONS

Items	Specifications	
Operating Temperature	-25°C to +60°C	
Capacitance Tolerance	±10% (K) (20°C)	
Temperature Characteristics	Capacitance Change	≤±30% of the initial measured value at 20°C
	Internal Resistance Change	≤600% of the value given in the Ratings Tables (-25°C)
Load Life Test	After the racks are subjected to the rated DC voltage at 60°C for 2,000 hours, the following specification 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 value given in the Ratings Table
Bias Humidity Test	After the racks are left at 40°C and 90 to 95%RH for 500 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 value given in the Ratings Tables
Insulation Resistance	The measured value between the lumped terminal and the case using 500Vdc insulation resistance meter shall be more than 100MΩ.	
Insulation Withstand Voltage	No abnormality after AC2,500V is applied between lumped terminal and package for 1 minute.	

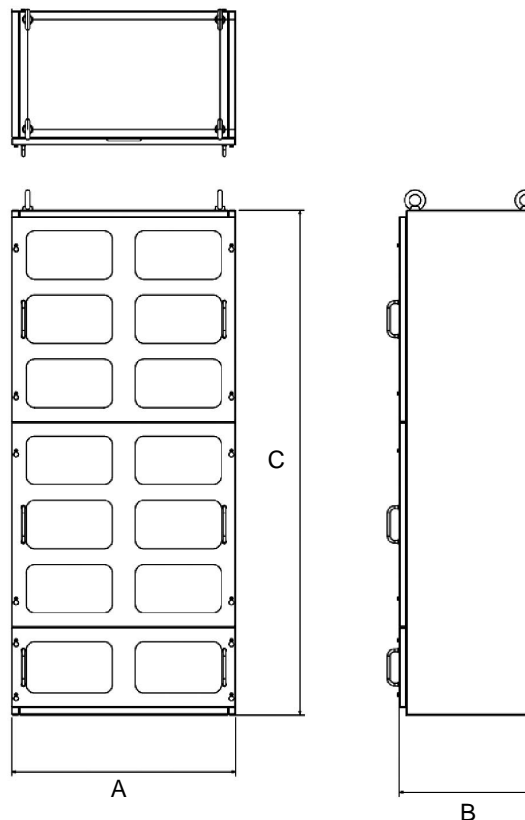
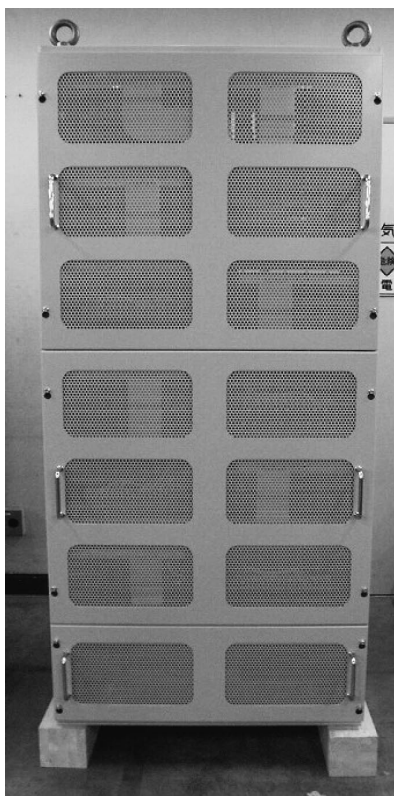
◆STANDARD RATINGS

Rated Voltage [V]	Capacitance [F]	Case Size [mm]			Internal Resistance* [mΩ]	Weight** [kg]	Part No.
		A	B	C			
210	116	780	470	1,770	32	445	MDLC210V116F *1
105	466				8		MDLC105V466F *2

*typical data(at 20°C), **reference data

Connection *1...84 in series 7 in parallel, *2...42 in series 14 in parallel

◆ASPECT/ DIMENSIONS



Note : The specifications are subject to change without notice

Precaution Statement

1. Precautions in use

- 1 Please do not use the capacitor 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 sleeves of the EDLC are not insulation.
- 3 EDLC has finite and regulated life.
- 4 Please do not use or store EDLC under the following environment;
 - a) Environment which is not free from water, salt water or oil, or the environment which is filled with gaseous oil or gaseous salinity.
 - b) Environment which is filled with toxic gases such as hydrogen sulfide, sulfurous acid, chlorine, ammonia, bromine, or methyl bromide.
 - c) Environment which is not free from acidic or alkaline solvent.
 - d) Environment which catches direct sunlight, ozone, ultraviolet rays or radiation.
 - e) Environment under severe vibration or mechanical shock.
- 5 Please assemble the module with cell terminals upward to avoid liquid leakage.
- 6 As EDLC has internal resistance, its internal heat by charge-discharge affects module's life.
Please choose the products with low resistance and make sure temperature of EDLC not to get high.
- 7 Rapid charge-discharge causes voltage drop, called IR drop, in the beginning of charge-discharge because of its internal resistance.
Please consider this voltage change in design.
- 8 When output terminals are shortened during charge, several hundred amperes current will flow.
Please do not install or uninstall a module when it is being charged.
- 9 Please do not drop EDLC. Do not use it once it is dropped.
- 10 Please confirm the polar before assembling EDLC into module.
- 11 Please follow the specification of the screw tightening torque.
- 12 Please do not deform EDLC to assemble module.
- 13 As the characteristic of EDLC, the voltage is changed in proportion to the quantity of storage.
If stable output voltage is required, circuit system such as converter needs to be added.
- 14 When use EDLC for industrial application, following periodical check is recommended.
 - a) Appearance: Significant abnormality such as deformation, electrolyte leakage, or dust between terminals
 - b) Electrical characteristics: Characteristics prescribed in the catalog or product specifications.
- 15 Please stop using EDLC when it generates excessive heat or generates a foul smell.
If it reaches a high temperature, please do not put face or hands close to it to avoid injury.
- 16 Please ventilate sufficiently when venting.
If spouting gas hits eyes or throat, please wash eyes, gargle, and consult with a doctor.
Do not lick the electrolyte of EDLC. Wash the electrolyte away from the skin with soap and water.

2. Precautions in transportation

- 1 Fumigation process may be required when EDLC is exported.
Please note that this process, actually halogenated ions, may cause corrosion.
- 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 Economy, Trade and Industry.

3. Precautions in storage

- 1 Please store EDLC indoors at a temperature of 5 to 35°C, and a humidity of less than 75%RH.
Please avoid rapid temperature change, which leads to condensation or deterioration.
- 2 Voltage treatment is recommended when EDLC is stored for more than one year.
To do this, please charge 1 to 10A to the rated voltage, then keep applying rated voltage for about 20 hours.

4. Precautions in disposal

Please discharge the electricity to safety voltage before disposal. According laws or ordinances of local public authority, hand EDLC to an industrial waste disposer, and make it operated incinerate or landfill. Please drill or crash before incineration.

Please refer to the following report before using EDLC.

Japan Electronics and Information Technology Industries Association, JEITA RCR-2370C
"Safety Application Guide for electric double layer capacitors (Guideline of notabilia for electric double layer capacitors)"

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