

## Introduction of Supercapacitor

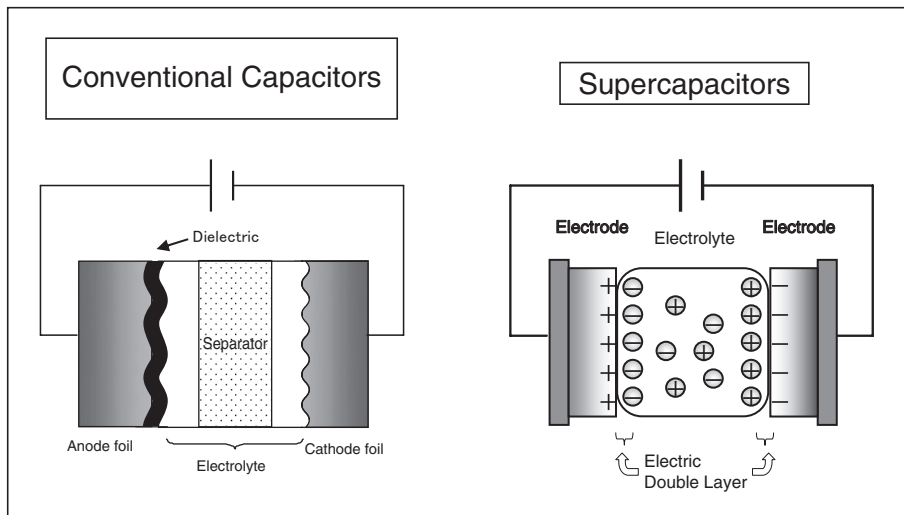
### 1. Introduction

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, CO<sub>2</sub> 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. We have a wide range of products to meet customers' needs, from dozens to thousands of farads.

### 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."



(Figure1.) 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;

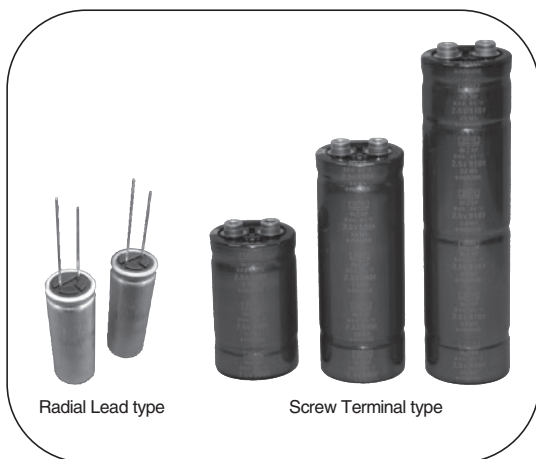
- With low degradation, it withstands multimillion charge-discharge cycles.
- With the high power density, rapid (high current) charge-discharge is possible.
- With a high charge-discharge efficiency, the output efficiency of over 95% with a power density 1kW/kg is achieved.
- Environment-friendly without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

### 4. Structure

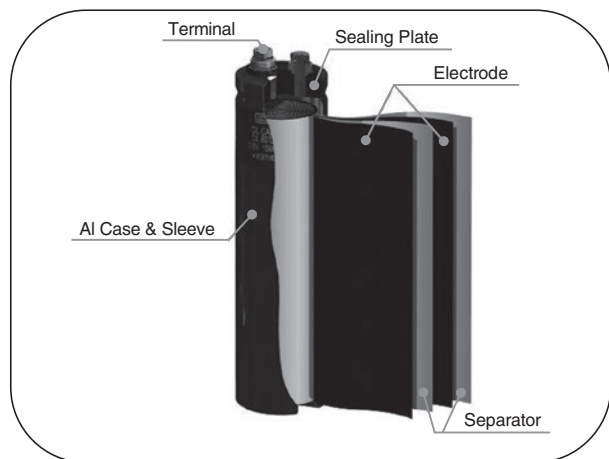
Nippon Chemi-Con produces Radial Lead type and Screw Terminal type DLCAP™ (Photo1.).

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.



(Photo1.) DLCAP™ Appearance



(Figure2.) DLCAP™ Structure