



## Press Release

Nippon Chemi-Con Corporation

December 6, 2011

# Nippon Chemi-Con to Supply Electric Double Layer Capacitors DLCAP™ for Passenger Vehicles

Nippon Chemi-Con Corporation will supply electric double layer capacitors (EDLC), the DLCAP™ to Mazda Motor Corporation from 2012. The DLCAP™ will be used as part of Mazda vehicle's regenerative braking system.

An announcement was made by Mazda in October, 2010 about the next-generation SKYACTIV technologies, which significantly improves fuel efficiency and environmental performance by enhancing basic performance of engines, transmissions, vehicle bodies and chassis. The new Demio, which went on sale this June, is receiving attention as the new-style, non-hybrid eco-friendly vehicle that offers fuel economy of 30.0km/L (10-15 mode).

For Mazda's vehicle in 2012, regenerative braking systems will begin to appear for additional fuel efficiency improvement. This regenerative system will use EDLC as its storage device for the first time in a passenger vehicle.

The system captures regenerative braking energy when the vehicle decelerates and stores it in the EDLC then uses the stored energy to power headlights, audio, navigation systems, and other electrical components. This will reduce alternator load and improve fuel economy by approximately 10 percent in real-world driving conditions with frequent acceleration and braking.

The new DLCAP™ series selected for Mazda's regenerative braking system has been specifically developed for use in vehicles. Its internal resistance has been significantly reduced, while environmental durability (vibration and shock immunity, heat resistance) has also been improved. The main features of the new series are as follows.



### **(1) Features ultra-low internal resistance**

Large current charge is frequently repeated in regenerative braking systems each time the vehicle decelerates. Under this condition, using EDLC with high internal resistance often leads to suspension of the system's function due to self-heating of EDLC.

The new DLCAP™ series, developed specifically for regenerative braking applications, features one third of the internal resistance compared to the previous series with the same size.

With lower resistance, the new series also has enhanced high current charge/discharge capability.

### **(2) Features superior heat resistance**

Conventional EDLC is able to perform under temperatures below +60 degrees Celsius. For the aim to use EDLC safely in more severe conditions, Nippon Chemi-Con developed EDLC with an extended temperature range up to +70 degrees Celsius in 2009.

The new DLCAP™ series developed this time also guarantees +70 degrees Celsius as its maximum temperature. As a result, it can be mounted in the engine room, and its tolerance toward self-heating caused by frequent regenerative braking has been improved.

### **(3) Comprises Non-acetonitrile electrolyte**

Acetonitrile is one of the chemical compounds used in some companies EDLC's electrolyte. It is said to be more beneficial to lower internal resistance than other electrolyte chemicals, however, it may generate extremely hazardous gases in case of combustion.

From the point of safety-first, Nippon Chemi-Con has always been developing the EDLC that does not comprise acetonitrile in its electrolyte. Using highly safe propylene carbonate, DLCAP™ features low resistance, quite comparable to the other EDLC using acetonitrile.

### **(4) Features high durability and superior vibration resistance**

The new DLCAP™ series achieve superior charge/discharge cycle characteristics; in other words, long life, based on Nippon Chemi-Con's years of research and development of reliability improvement technologies. It will therefore require no periodic replacement. With its rigid aluminum case structure, the new DLCAP™ series also features high durability.

With regard to vibration resistance, a new element fixing structure has been employed as a countermeasure for vibration of the element inside the aluminum case.

### **(5) Uses environmentally-friendly materials**

The major material used in EDLC is activated carbon. No hazardous heavy metal is used and assures high safety levels. The impact on the environment can therefore be reduced when eventually disposing of the EDLC.

Nippon Chemi-Con has applied for 20 patents regarding the development of the new DLCAP™ series.

#### **<Business deployment>**

Nippon Chemi-Con will start production of the new DLCAP™ series in spring 2012 at Chemi-Con Yamagata Corporation (Nagai City, Yamagata Prefecture, Japan: 100% owned subsidiary of Nippon Chemi-Con) and will increase its production capacity gradually.

In 2013, Nippon Chemi-Con plans to increase overall production capacity of DLCAP™ to 480 thousand cells per month, which is 2.6 times the current capacity, when including the capacity of the existing production base at Chemi-Con Yonezawa Corporation (Kawanishi-machi, Higashi-Okitama, Yamagata Prefecture, Japan: 100% owned subsidiary of Nippon Chemi-Con). A new production line with significantly improved automation rate will be introduced to Chemi-Con Yamagata as Nippon Chemi-Con's third generation production facility.

EDLC modules will be assembled at Chemi-Con Nagaoka Corporation (Nagaoka City, Niigata Prefecture, Japan: 100% owned subsidiary of Nippon Chemi-Con). The company will keep pace with increasing production of DLCAP™.

Specifications of the new DLCAP™ series meets the demands of regenerative braking applications used in automobiles, industrial machinery and other transports, as well as high power applications. It is expected that the new series will serve as a trigger to extend the market. Nippon Chemi-Con aims to boost sales of DLCAP™ to 10 billion yen by the end of fiscal year 2015.