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Electric Double-Layer Capacitors

For many years, rechargeable batteries were the only solution for temporary memory backup of data or timing clocks in various electronic devices. They have also been used as an emergency or short-term secondary power source during the events when the primary power source was not sufficient. Recent advances in capacitor development have made the electric double-layer capacitors (EDLC) a viable alternative.

There are many advantages to the EDLC:

Advantage #1: Longer Life

Rechargeable batteries typically have 500 to 1000 life cycles. After being charged and discharged a few hundred times, the capacity of the batteries starts to decrease. Eventually, they will lose most of their storage capacity. An EDLC can be charged and discharged for more than a million times without any reduction in its storage capacity. If an EDLC can be used in conjunction with the battery, it can increase the battery's life.

Advantage #2: Faster Charging Times

Since a rechargeable battery stores energy by chemical reactions, it generally takes much longer to recharge, usually about an hour. Whereas the EDLC stores energy by the movement of ions, it usually takes from 0.1 to 30 seconds. Therefore, if equipment needs rapid energy, the EDLC is a much better choice.

Advantage #3: Lighter and Safer

Rechargeable batteries usually contain heavy and harmful metals like lead and cadmium. As the size increases, they could weigh more than twice that of an EDLC of the same volume. EDLCs don't contain harmful metals and are environmentally friendly.

Advantage #4: No Limitation for the Charging Current

A current limiting circuit is sometimes needed when a rechargeable battery is used to prevent any rush charging current from damaging the battery. The EDLC has no limitation for the charging circuit provided the charging voltage does not exceed the rated voltage of the EDLC. Please note that if high ripple current, high pulse current and/or high charge and discharge currents are applied to the capacitor, the internal temperature rise generated by self-heating of the capacitor may cause deterioration greater than one might expect.

Advantage # 5: Maintenance Free

EDLC is a "Fit and Forget" device. There's no maintenance required or special handling like a rechargeable battery.

Electric Double Layer Capacitors

Quick Facts

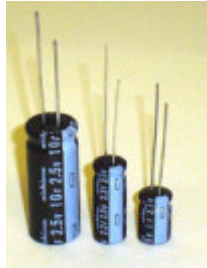
- EDLCs have short-charge and discharge times
- Maintenance-Free: Fit and Forget Device
- No special Charge-Control needed
- With its short charging and discharging times, EDLCs are well suited for intermittent loads
- Environmentally Friendly: The method of storage of energy is done naturally between the double-layers which is safer vs. through chemical reactions with rechargeable batteries
- Long Life
- Less Weight
- Damage Proof against Short Circuit
- Completely Dischargeable
- High Power Density compared to standard capacitors

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The EVerCAP



In 2006, worldwide demand for Electric Double Layer Capacitors is expected to be \$272 million and more than double in 5 years to \$560 million. EDLCs come in a variety of types. Nichicon's response to this exciting growing market is the EVerCAP.

Nichicon has four series of EVerCAPs: UC, JC, JD and JL. These come in leaded, snap-in and screw terminal types. They are available in 2.5 Volt and capacitance ranges from 0.47 to 4000 Farads. Data sheets are included in this Tech Topic and can also be found on our web site at www.nichicon-us.com.

Markets

Consumer

*Cell phones, Digital Cameras, Video Games, Radio Control Cars, Video Projectors, Garden Lights, Computers, Video Recorders

Equipment

*Power Supply, Traffic Control, Solar and Wind Power, Construction Equipment, Welding, Electric Power Tools, Copiers, Satellite Receivers, Street Lights

Transportation

*Electric Motorcycle, Golf Cart, Electric Assist Bicycle, Railroad, Automobile

Applications



There is a wide variety of applications for EDLCs and in this Tech Topic we have merely scratched the surface. We encourage you to contact your Nichicon Account Representative to assist you if you have any additional questions.

Backup Power

Power and memory backup can be provided by the EDLC while the battery is disconnected, a temporary power outage occurs or during the replacement of batteries.

Main Power

Main power can be provided to motor drive by a quick charge or through combination of a power generator and charging circuit.

Alternating Power

This application is accomplished through the use of solar cells. During the day the electric load is supplied by solar cells, which also recharge the EDLC.

