

Electric double-layer capacitor

Robust energy storage device so thin it can be embedded in a smart card

- 5 mF electric double-layer capacitor with a maximum thickness of just 0.45 mm
- Power source for small e-paper displays and advanced biometric authentication systems
- On show at CARTES SECURE CONNEXIONS

November 17, 2015

TDK Corporation announces the release of an ultra-thin, high-energy capacitor suitable for powering devices such as electronic paper displays in the next generation of smart cards. The EDLC041720-050-2F-13, a 5 mF electric double-layer capacitor, will be demonstrated on the TDK booth, 4H102, at the CARTES SECURE CONNEXIONS exhibition in Paris, France, from November 17 to 19 (www.cartes.com).

With a footprint of 27 mm x 17 mm and a maximum thickness of just 0.45 mm, the new capacitor can be mounted inside a smart card or other thin device. When fully charged, it provides around 50 mJ of energy to power a load. In smart cards, the fast-charging characteristics of the EDLC041720-050-2F-13 make it compatible with radio-frequency energy harvesting circuits. Tests based on NFC energy-harvesting circuits in use today show that its 5 mF capacitance can be charged in less than 1 s by the field emitted by a standard NFC reader.

When embedded in a contactless ticketing card for users of a metro transit system, for instance, the EDLC041720-050-2F-13 is fully charged in the time it takes the user to present the card to the entry gate's card reader. The energy stored on the card on entry to the transit system is sufficient to refresh the card's e-paper display, enabling the card to show for instance an updated read-out of the user's remaining credit.

The device's 5 mF capacitance also provides sufficient energy to power advanced biometric forms of authentication, as used for example in contactless access control cards. While RF energy harvesting is suitable for many smart and contactless payment card applications, the capacitor may in addition be charged by other forms of harvested energy, such as that generated by TDK film solar cells.

Despite being only about one fifth as thick as TDK's previous generation of EDLCs, the new EDLC041720-050-2F-13 is highly resistant to damage by twisting and bending, and offers a long operating lifetime. It can reliably be used in smart cards that must conform to ISO 10373-1 5.8 for dynamic bending stress, and ISO 10373-1 5.9 for dynamic torsion stress. It is rated for operation over a temperature range of -20 °C to 60 °C. It also has high resistance to electro-static discharges and pressure. The EDLC041720-050-2F-13 contains no rare or heavy metals, is non-flammable, and poses no risk of explosion. It is available now for sampling.

Main applications

- Smart cards with electronic paper displays
- Access control cards with a biometric authentication function

Main features and benefits

- Large 5 mF energy-storage capacity in an ultra-thin 27 mm x 17 mm x 0.45 mm form factor
- Fast-charging capability
- Conforms to ISO 10373-1 5.8 and ISO 10373-1 5.9 standards

Key data

Type	Dimensions [mm]	Nominal capacitance [mF]	Nominal impedance [Ω]	Continuous operating voltage [V]	Operating temperature range [$^{\circ}$ C]
EDLC041720-050-2F-13	27 x 17 x 0.45	5	10 (max.)	3.2	-20 to +60

About TDK Corporation

TDK Corporation is a leading electronics company based in Tokyo, Japan. It was established in 1935 to commercialize ferrite, a key material in electronic and magnetic products. TDK's portfolio includes electronic components, modules and systems* marketed under the product brands TDK and EPCOS, power supplies, magnetic application products as well as energy devices, flash memory application devices, and others. TDK focuses on demanding markets in the areas of information and communication technology and consumer, automotive and industrial electronics. The company has a network of design and manufacturing locations and sales offices in Asia, Europe, and in North and South America. In fiscal 2015, TDK posted total sales of USD 9.0 billion and employed about 88,000 people worldwide.

* The product portfolio includes ceramic, aluminum electrolytic and film capacitors, ferrites, inductors, high-frequency components such as surface acoustic wave (SAW) filter products and modules, piezo and protection components, and sensors.

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