Power capacitors

Compact DC-link circuit PCCs for electromobility

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TDK-EPC, a Group Company of TDK Corporation, presents the new PCC™ (Power Capacitor Chip) from EPCOS as an ideal DC-link circuit solution for the electric drives of motor vehicles. The B25655J4307K*1 and B25655J4507K*5 types were developed specifically for reference designs of the IGBT modules HybridPACK™1 (up to 20 kW) and Hybrid-PACK™2 (up to 90 kW) from Infineon Technologies. The PCCs are also contained in the new evaluation kits from Infineon. Depending on the power output, the inverter modules are suited for mild hybrid drives or for full electric drives. These modules are the only solutions currently in volume production.

The power capacitors are characterized by a volume fill factor of nearly 1 and fit perfectly onto the IGBT modules thanks to their low-inductance busbars. This makes complex mounting unnecessary as well as the snubber capacitors and symmetry resistors usually required with other capacitor technologies.

The rated voltage of these PCCs is 450 V DC, their capacitances are 300 and 500 µF. They also feature an especially low ESL of no more than 15 and 25 nH, respectively. The ESR is a maximum of 1 mΩ for all types. The capacitors are designed for a temperature range of -40 °C to +110 °C and can also be briefly operated at 125 °C. Their average operating life is 15 000 hours. They are self-healing, meaning that breakdowns of the film at overload do not lead to short circuit or destruction of the capacitor. Despite their high performance, these DC-link circuit capacitors have dimensions of only 140 x 72 x 50 mm³ and 237 x 72 x 50 mm³, respectively.

Thanks to their great ruggedness and compact dimensions, capacitors in PCC technology are also well suited for highly space-saving converters and for inverters in photovoltaic installations. With rated voltages of up to 1250 V DC and integrated busbars, they are superior to other capacitor technologies in many applications.

Glossary

- IGBT module: Insulated Gate Bipolar Transistor. As a rule, a module contains six of these power semiconductors. They are through-connected alternately by means of control electronics and can thus supply three-phase motors. IGBT modules are key components of frequency converters in electric drives.
- DC link circuit: The DC-link circuit is located between the rectifier and inverter. It is designed to smooth and filter the voltages and currents supplied by the rectifier. High-rated capacitors such as PCCs or aluminum electrolytic capacitors are required for this purpose.

Main applications

- DC-link circuit capacitor for inverters of electric and hybrid drives in motor vehicles

Main features and benefits

- Volume fill factor of nearly 1
- Busbars designed to fit perfectly onto the IGBT module
- Low ESL and ESR values (max. 15 or 25 nH and 1 mΩ, respectively)

About TDK-EPC Corporation

TDK-EPC Corporation (TDK-EPC), a TDK group company, is a leading manufacturer of electronic components, modules and systems headquartered in Tokyo, Japan. TDK-EPC has emerged from the combination of the electronic components business of TDK and the EPCOS Group and markets its products under the product brands, TDK and EPCOS.

The product portfolio includes ceramic, aluminum electrolytic and film capacitors, ferrites and inductors, high-frequency components such as surface acoustic wave (SAW) filter products and modules, piezo and protection components, and sensors. With this product spectrum TDK-EPC offers a broad range of products and solutions of outstanding value from a single source and focuses on demanding markets in the areas of information and communication technology and automotive, industrial and consumer electronics. The company has design and manufacturing locations and sales offices in Asia, Europe, and in North and South America.

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