

Inside the LoPak module, IGBT and freewheeling diode chips are soldered onto ceramic insulating substrates. The phase current is fed through hundreds of aluminum wires which are bonded to the chip surfaces.



IGBT 'six-pack' module as standard for a new era

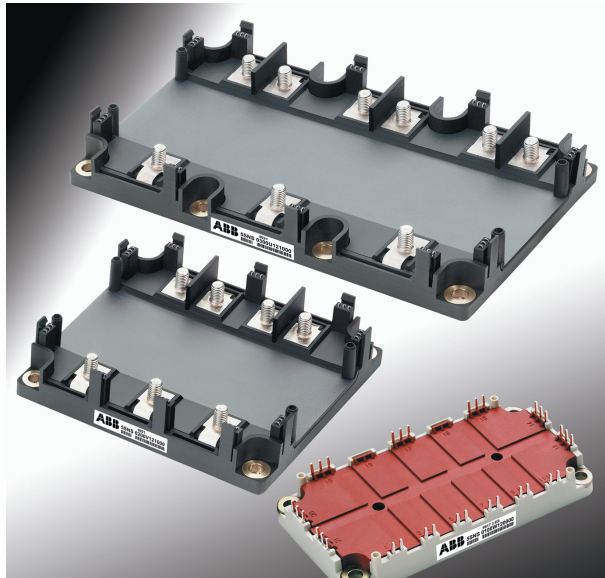
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IGBT modules have become the key power-handling components in low-voltage variable-speed drives. However, the supply of these components is highly fragmented, with different manufacturers offering IGBT modules with a range of topologies, dimensions and parameters. Besides making interchangeability difficult for users this has also limited the market for each manufacturer's products. What is clearly needed is cost optimization – extending from the manufacturer to the end-user.

To address the problem ABB has created a common specification for IGBT six-pack modules that goes by the name of LoPak. It became clear early on that for LoPak to really become a standard the module would have to be multiple-sourced, ie there would have to be several suppliers, and, of course, it

would have to be used by several customers. ABB Drives, a world leader in variable-speed drives, contacted module manufacturers to get their input for the specification and to secure a wide range of suppliers. On the demand side, ABB Semiconductors contacted target customers to test their reaction to the module.

Using new rapid prototyping methods, ABB Corporate Research was able to design and deliver the first prototypes with the latest, low-loss technology semiconductors in only a few months. These prototypes were then put through their paces in order to verify the specification.



The LoPak module family: three different footprints cover the wide power range of ABB's drive products. One of the new features of the LoPak 4 and 5 modules (in black) are the bolted terminals, on which the busbars can be dropped and fixed with a combi-nut.

The LoPak module family, as the new ABB standard product for traction and drive applications, will host power semiconductors rated from 600 to 1700 V. It provides the ideal platform for innovative drive designs, offering several advantages over conventional modules, such as higher power density, shorter assembly time and low-inductance circuit design. A new semiconductor IGBT

generation, designated SPT for 'Soft Punch Through', developed by ABB Semiconductors, achieves low losses to complement the benefits of the LoPak packaging. With SPT technology, the MOS transistors on the surface of the wafer and the thickness of the silicon wafer itself are optimized for high performance when the IGBT is in the on-state, ie conducting current, and for

very low losses when the device switches to the off-state to stop current flowing.

LoPak is yet another product underscoring ABB's strength in innovative design.

The Insulated Gate Bipolar Transistor (IGBT) is a power switch that combines the microelectronic technology used to precisely control the low-voltage signals in integrated circuits with the high power-handling capability needed for power semiconductor devices. Other advantages of the IGBT worth mentioning are: it switches at high frequency, switching losses are low, snubbers are not necessary, it has an integrated gate drive, and it is of modular design.

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