Intelligent Power Modules Reinforce Automotive Safety

Due to the extremely high standards required for vehicle safety, power modules utilized in automotive applications must offer much higher reliability than those used in industrial systems. Mitsubishi Electric has been designing and producing power modules for hybrid electric vehicles (HEVs) for nearly a decade and a half. Since then the demand for high-performance power modules has grown tremendously as the market for electric vehicles (EVs) and HEVs has expanded globally.

To meet the new stringent EV and HEV demands, Mitsubishi Electric has developed a new line of higher-current intelligent power modules (IPMs), which were disclosed at the recent PCIM Europe 2013 in Nuremberg, Germany. The company added two new models to the J-Series. Implementing a 3-phase inverter configuration, the new IPMs use Mitsubishi's low-loss carrier stored trench-gate bipolar transistor (CSTBT) chip technology.

While the model PM800CJG060G (see the figure) offers ratings of 600 V and 800 A with a low saturation voltage of 1.8 V (typical) at Tj=25°C, the model PM500CJG120G is rated for 1200 V and 500 A with a typical saturation voltage of 2.0 V. According to Mitsubishi, both the new models in the J-series are supporting higher current in the same footprint as existing types in the J-series, which start from 300 A at 600 V and 150 A at 1200 V. Additionally, both the new models come with built-in power supplies for IGBT drive and logic circuits.

Typical features offered by the IPM J-Series include short-circuit protection, control-power-supply undervoltage protection, overtemperature protection, fault-signaling output, and high input/output isolation. The high isolation is attributed to the use of automotive high-grade photocouplers. In addition, the J-Series provides analog output functions with high-accuracy to monitor the temperature of the power devices. The inverter dc-link voltage is optional. Also, the J-Series IPMs can be controlled by a ready-signal input for fail-safe operation. Vibration-resistant connectors ensure reliability and stability of connection in the customer's product design, says Mitsubishi.

Sampling will begin in August with mass production of the RoHS-compliant modules to commence in 2014.

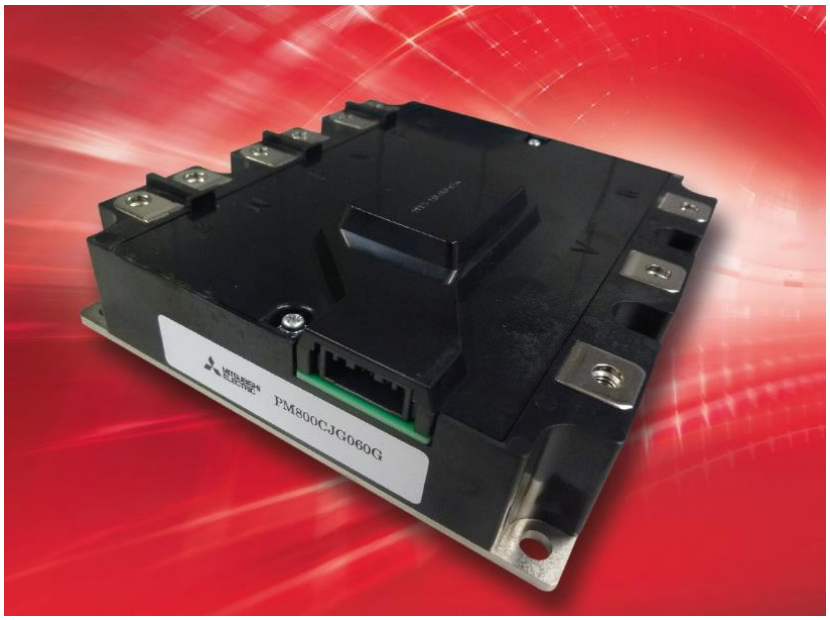

Fig. To meet stringent EV and HEV demands for safety and reliability, while also satisfying requirements for higher current handling ability, Mitsubishi Electric has added two new members to its J series of intelligent power modules. Implementing a 3-phase inverter configuration, the new IPMs use low-loss CSTBT chip technology to provide ratings of 600 V and 800 A with a low saturation voltage of 1.8 V and 1200 V and 500 A with a typical saturation voltage of 2.0 V. In comparison with existing J-series models, the new IPMs offer much higher current for the same footprint.

—Contributed by Ashok Bindra