SiC Power Module And Gate Driver Kit Speeds Inverter Design

Microchip Technology's AgileSwitch digital programmable gate driver and SP6LI SiC power module kit form a unified system solution to help designers quickly and effectively adopt SiC power devices, reducing time to market and ensuring confidence in field deployment. The AgileSwitch digital programmable gate driver and SP6LI SiC power module kit speed development from evaluation through production, eliminating the need to procure power modules and gate drivers separately including gate drivers that are qualified for end-product production. By eliminating the need to qualify power modules and develop their own gate drivers, developers can save months in development schedules (Fig. 1).

This kit supports inverter development for applications at 50-kW and higher, even into the megawatt range, using SiC MOSFET modules with ratings from 700 to 1700 V and low stray inductance (<2.9 nH). Possible end applications include EV traction inverters; high-speed chargers; trains, trams, trolleys and busses; heavy duty vehicles; micro grids; and wind, solar and various other motor drives.

"We listened to developers in providing total system solutions for our microcontrollers and analog products," said Leon Gross, vice president of Microchip's Discrete Product Group business unit. "Now as SiC power modules increasingly enable the technologies transforming transportation and other industries, this complete product kit allows developers to focus on innovation and significantly reduce time to market."

Microchip's flexible portfolio of 700-, 1200- and 1700-V SiC MOSFET and Schottky Barrier Diode (SBD)-based power modules uses its newest generation of SiC die. In addition, its dsPIC digital signal controllers deliver performance, low power consumption and flexible peripherals. Microchip's AgileSwitch family of digital programmable gate drivers further accelerates the process of moving from the design stage to production.

Microchip's combination of SiC power module and software-configurable gate driver features Augmented Switching technology (in the gate driver) that enables designers to address dynamic issues such as voltage overshoot, switching losses and electromagnetic interference. Using a Windows-based computer interface, this "configure-at-a-click" method may be used throughout the design process, from expediting early evaluation to simplifying final optimization using a computer mouse instead of a soldering iron.

Augmented Switching effectively slows down the gate-drive signal in multiple steps which are programmed in software. This avoids the losses imposed by inserting a gate resistor to slow down the power switch turn-on, thereby reducing the power switch's ringing and overshoot without degrading efficiency through gate-resistor losses.

Microchip's AgileSwitch digital programmable gate driver and SP6LI SiC power module kit provides design engineers with a central point of contact for support, and ensures that the die, power package and gate driver are designed specifically for each other, eliminating potential development delays. The kit includes the AgileSwitch Intelligent Configuration Tool that optimizes gate turn-on and turn-off, short circuit response and module efficiency while reducing voltage overshoot, ringing and electromagnetic interference (see Figs. 2 and 3).

Microchip's AgileSwitch digital programmable gate driver and SP6LI SiC power module kit solution is available for volume production and limited sampling. Family pricing on Microchip's ASDAK-MSCSM70AM025CT6LIAG-01 AgileSwitch digital programmable gate driver and 1200-V, 495-A, single-phase leg SP6LI SiC power module kits starts at $999.95. For additional information, see Microchip's website.

Fig. 1. Microchip's new kit brings together a SiC power module (the 62-mm SP6LI) and a digital programmable gate driver (AgileSwitch), both of which are qualified for end-product production. This ensures that the die, power package and gate driver are designed specifically for each other, eliminating potential development delays. This kit solution enables developers to proceed quickly from benchtop to production.

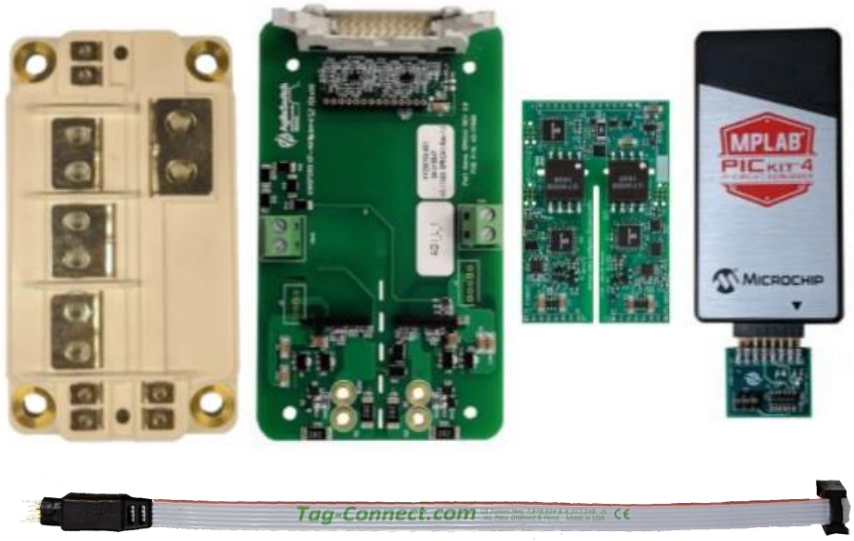

Fig. 2. Each kit contains a gate driver consisting of a 2ASC-12A1HP Core and an SP6CA1 adapter board; an SP6LI power module; mounting hardware; and a programming kit consisting of a PicKit 4 and a programming adapter.

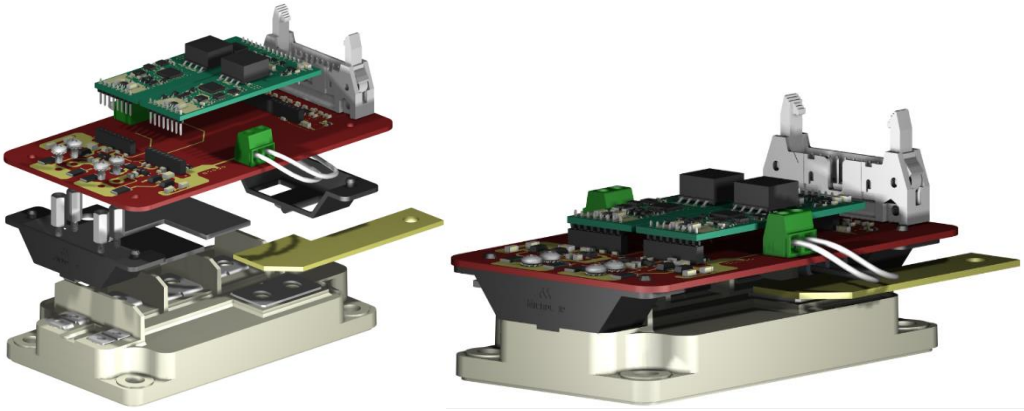

Fig. 3. The kit provides all the hardware elements needed for a single, high-power phase leg except for the bus bar. These elements are shown here stacked in an unassembled view (left) and as they would appear after assembly (right). Three kits can be combined to create a three-phase power stage.