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System Solution Guide - Preview

Traction Inverter

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Table of Contents

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1

2

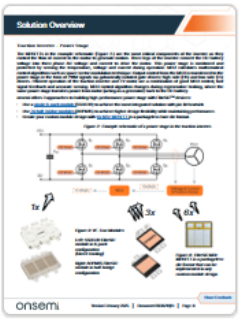
3

4

5

6

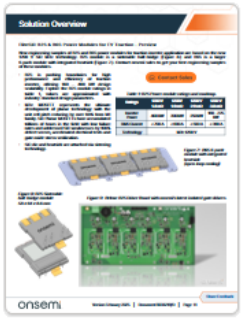
7



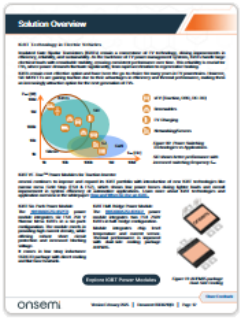
8

9

10



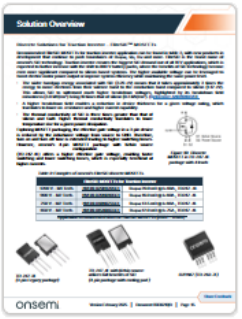
11



12

13

14

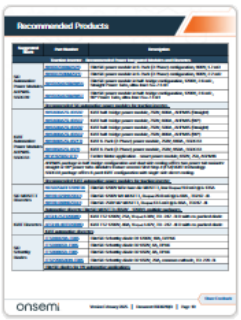


15

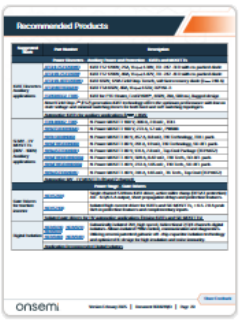
16

17

18



19



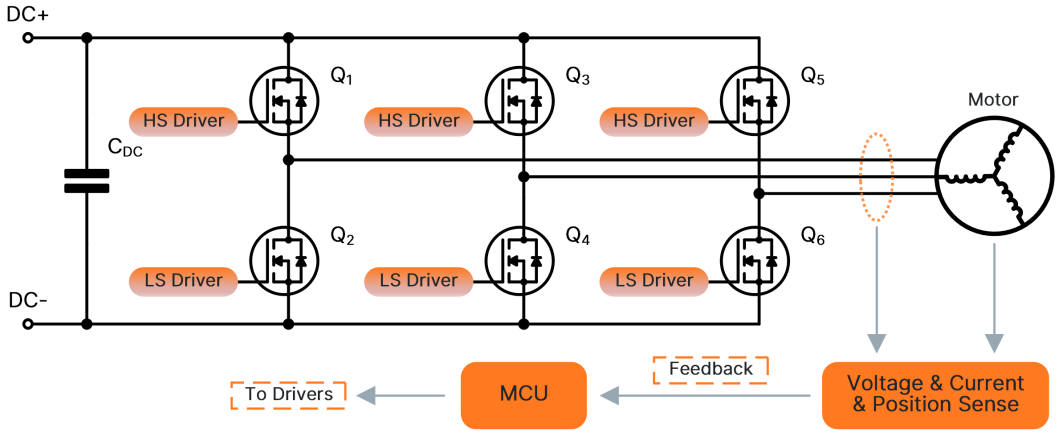
20

Traction Inverter – Power Stage

The MOSFETs in the example schematic below are the most critical components of the inverter as they control the flow of current to the motor to generate motion. Three legs of the inverter convert the DC battery voltage into three-phase AC voltage and current to drive the motor. This power stage is monitored and protected by sensing the temperature, voltage and current during operation. Output control from the MCU is transferred to the power stage in the form of PWM signals via galvanically isolated gate drivers. Efficient operation of the traction inverter and EV motor are a combination of good MCU control, fast signal feedback and accurate sensing. MCU control changes during regenerative braking, where the same power stage transfers power from motor (acting as a generator) back to the DC battery.

onsemi offers 3 approaches to building high-performance power stage with EliteSiC™ devices:

- Use a **single 6-pack module** (SSDC39) to achieve the most integrated solution with pin-fit heatsink.
- Use **3x half-bridge modules** (AHPM15) to achieve higher design flexibility while maintaining performance.
- Create your custom module design with **6x M3e MOSFET** in a packageless bare die format.



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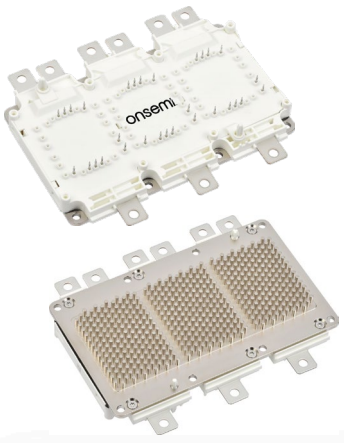

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Figure: VE-Trac Modules

Left: SSDC39 EliteSiC module in 6-pack configuration (Direct Cooling)

Right: AHPM15 EliteSiC module in half-bridge configuration

Figure: EliteSiC M3e MOSFET in a bare die format that can be implemented in any custom module design

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Products for Traction Inverter

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VE-Trac™ SiC Modules for Traction Inverter

SiC technology is revolutionizing battery electric vehicles (BEVs) by enhancing the efficiency and performance of traction inverters. SiC offers superior efficiency and peak power, especially at higher voltages, making it ideal for EVs where range and performance are crucial. The SSDC39 six-pack power module product family offers increased performance, better efficiency, and higher power density in industry standard packaging solution. The NVXR17S90M2SPB module integrates **900 V 1.7 mΩ SiC MOSFETs in a 6-pack configuration**, SSDC39 package.

For assembly ease and reliability, a new generation of press−fit pins are integrated into the power module for signal terminals. To allow direct cooling, gel-filled package integrates an optimized pin−fin heatsink in the baseplate. Designed to meet AQG324 automotive standard.

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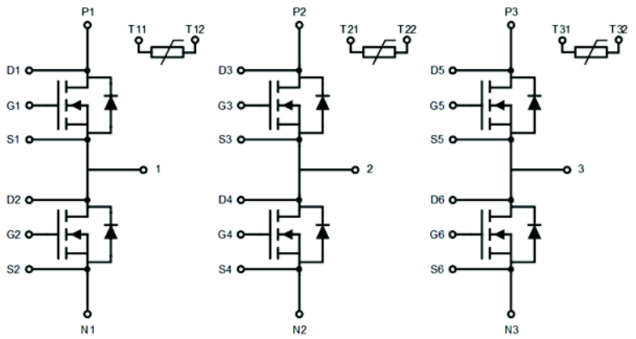
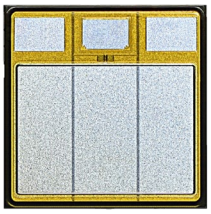
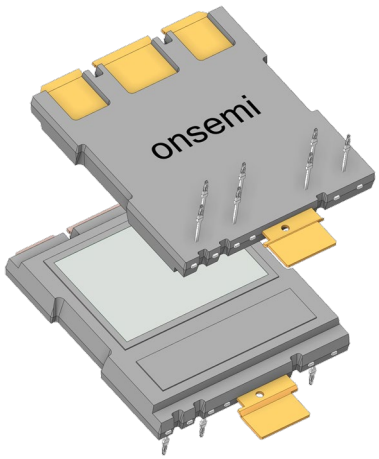


Figure: 6-pack MOSFET configuration inside the SSDC39 power module

New EliteSiC™ 1200 V M3e MOSFET Technology

High−performance **onsemi's** 3rd generation 1200 V SiC MOSFET NCS025M3E120NF06X in a packageless 5x5 mm bare die format can be implemented in any custom module design. Based on the latest generation of SiC MOSFET technology from **onsemi**, the M3e product family offers the lowest on-resistance in its class, typ. 11.0 mΩ at V_{GS} = 18 V, I_D = 135 A, T_J = 25 °C, which makes the MOSFET the ideal choice for automotive traction inverters.



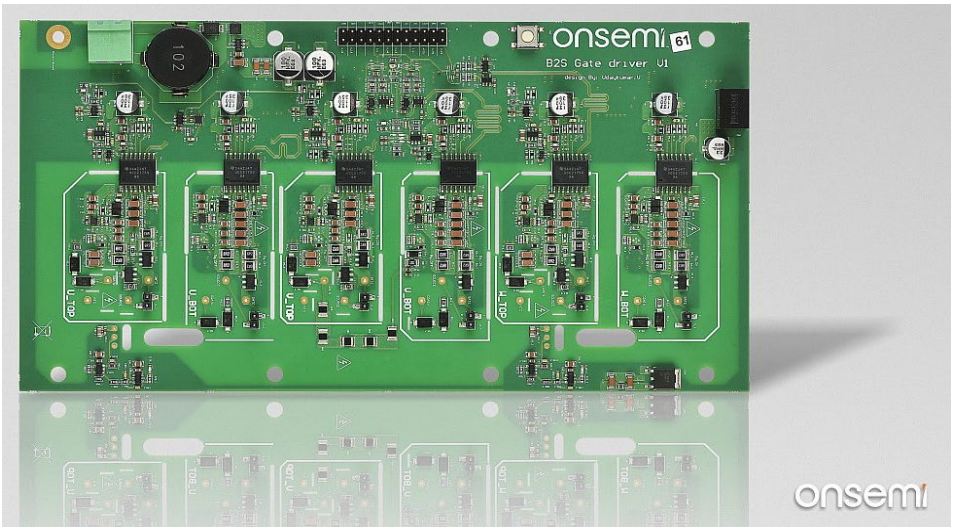


Above: B2S Sinterable half-bridge module 58 x 64 x 8.6 mm

Right: B2S Driver Board with onsemi's latest isolated gate drivers.

New engineering samples of B2S and B6S power modules for traction inverter application are based on the new 1200 V SiC M3e technology. B2S module is a sinterable half-bridge and B6S is a larger 6-pack module with integrated heatsink. Contact onsemi sales to get your first engineering samples of these modules.

M3e MOSFET represents the ultimate development of planar technology with the unit cell pitch reducing by over 60% from M1 family.



Traction Inverter

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