

 **MAGNA**
MAGNA POWERTRAIN

 **MAGNA**
MAGNA ELECTRONICS

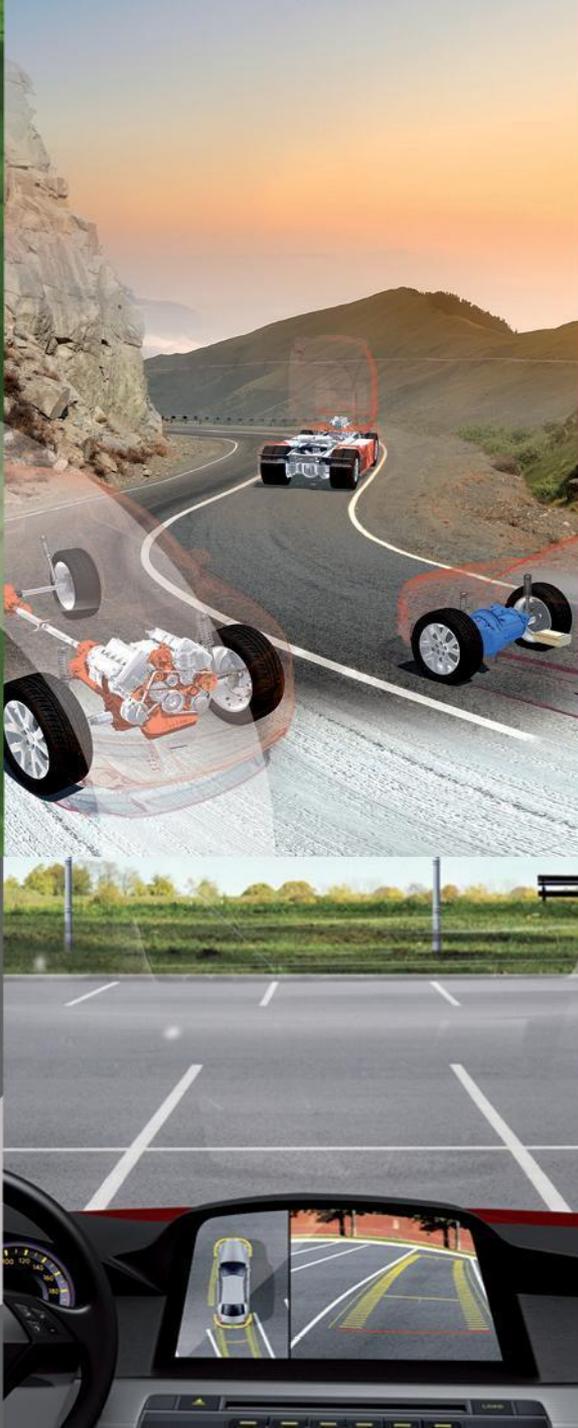
Magna  **car**
SYSTEMS

Automotive Wide Bandgap Devices and Applications Workshop

15 November 2012

Brian Peaslee

Propulsion Systems Chief Engineer
Magna E-Car Systems

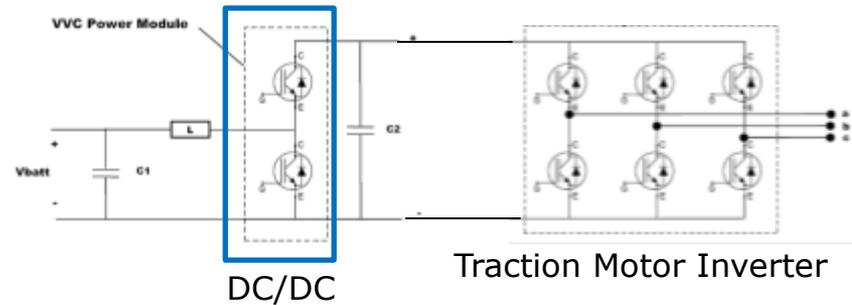


Magna E-Car Portfolio for Early WBG Potential

Propulsion Systems		Energy Systems		
WBG Focus				
				
<u>Powerplant</u>	<u>Electric Motors</u>	<u>Inverters</u>	<u>Converters</u>	<u>Control Units</u>
Integrated motor and Inverter Coaxial or Offset Gearbox Interfaces Complete e-Drive Subsystem	Chassis Motor Stator & Rotors Hub Motor	Stand Alone Inverter Integrated Inverter Dual Inverter	Charger Aux DC/DC (Integrated w/Charger or Inverter)	Powertrain Controllers Chassis Controllers Battery Management Systems

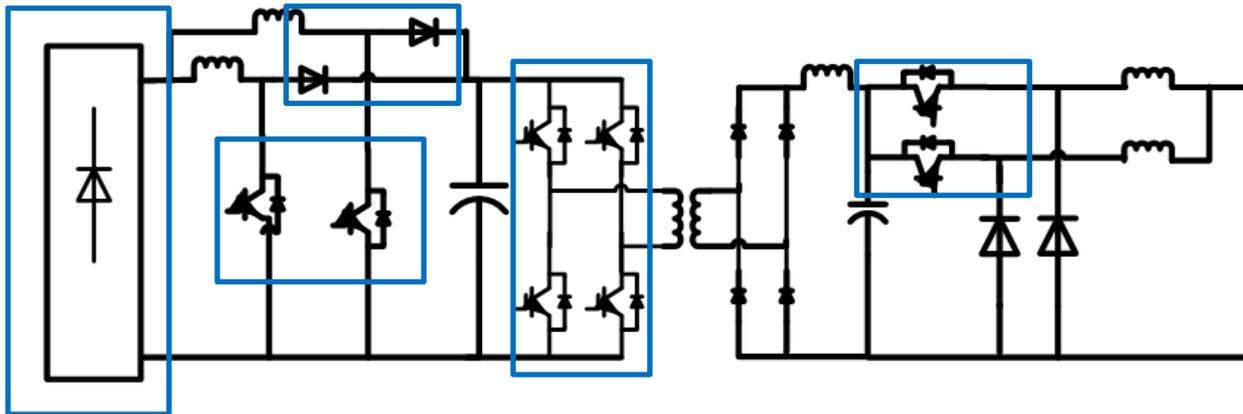
Traction Applications

- DC/DC Boost Converter
- Reduce Inductor Size & Mass
- High Temperature Motor Inverter
- High Speed 100K RPM Motor Drives



Auxiliary 12V DC/DC Converters & Line Powered Battery Chargers

- Passive rectifiers
- PFC Front End
- Inter-leaved boost Converter
- Full Bridge Drives
- Synchronous Rectifiers



Power Stage Attributes Rated for Power Conversion

- **High Switching Frequency**
 - Low inductance, materials, power cycle reliability
 - NVH, EMC
- **Lower Thermal Impedance**
 - Thin stack, materials, thermal cycle reliability
- **High Temperature Lead frame & Interfaces**
 - soldering / sintering, wire bonding, encapsulates
- **Supporting WBG Component Integration:**
 - Interface Electronics for WBG
 - Gate drive & protection circuits
 - High Temperature – Close to the Gate
 - High Temperature Film Capacitor > 120 °C
 - Thermal Management – Air, Oil or 105 °C Water
 - Smaller Overall Mechanical Package with higher power density

