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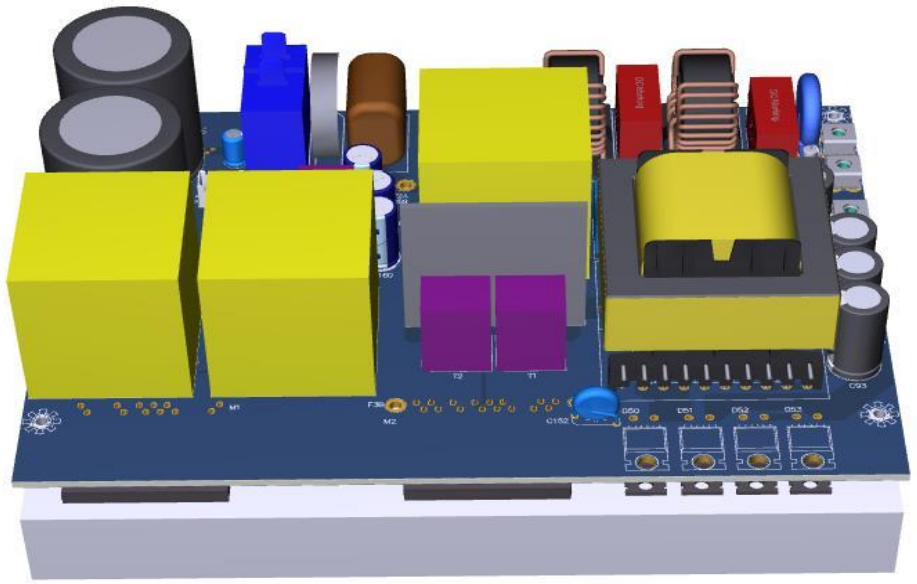
On Board Charger Demo

On Board Charger Demo - Introduction

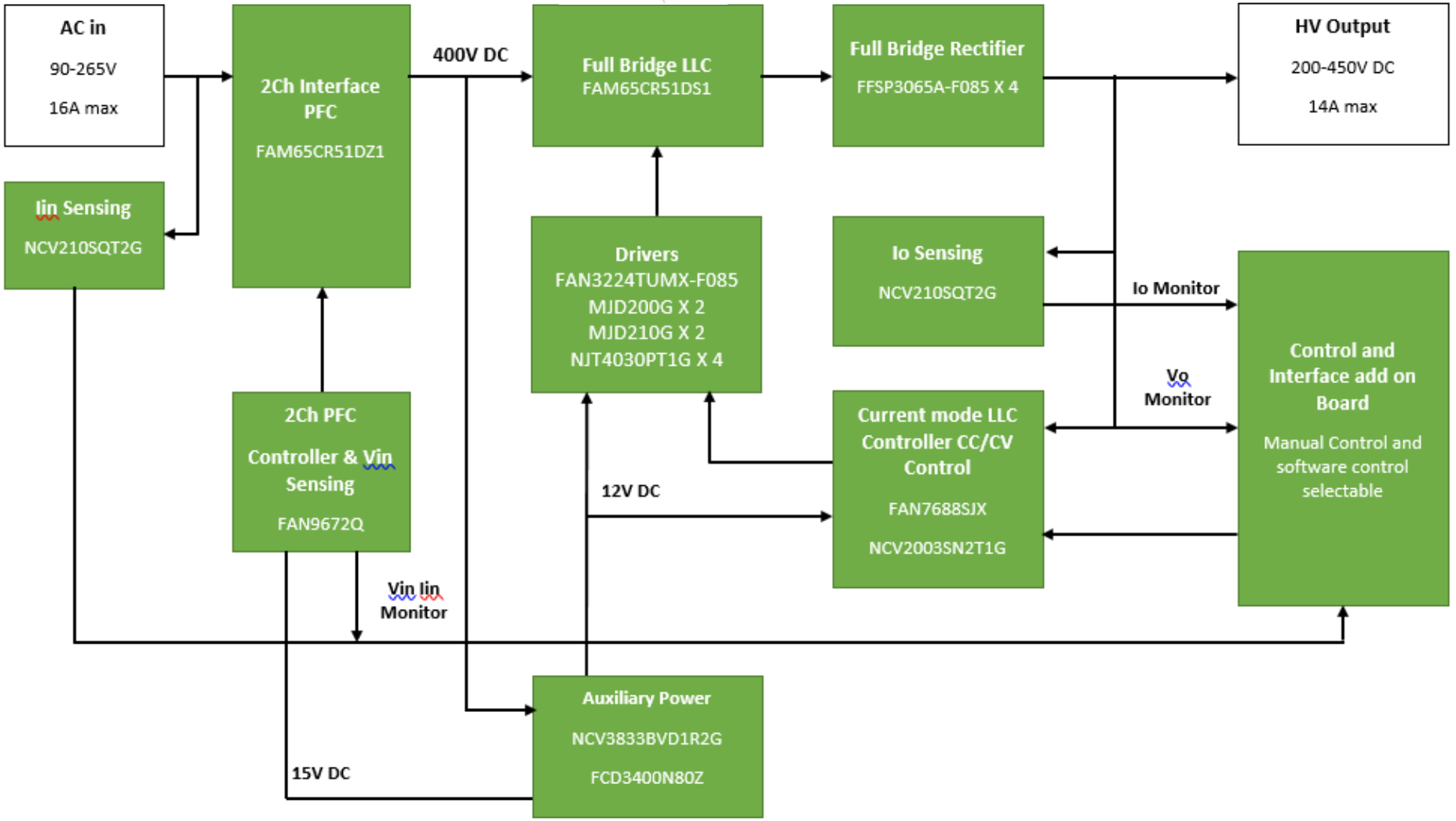
Goal- To demonstrate **complete 3.3KW On Board Charging** solution for HEV/EV based on ON Semiconductor's automotive power module **APM16 platform.**

Design features:

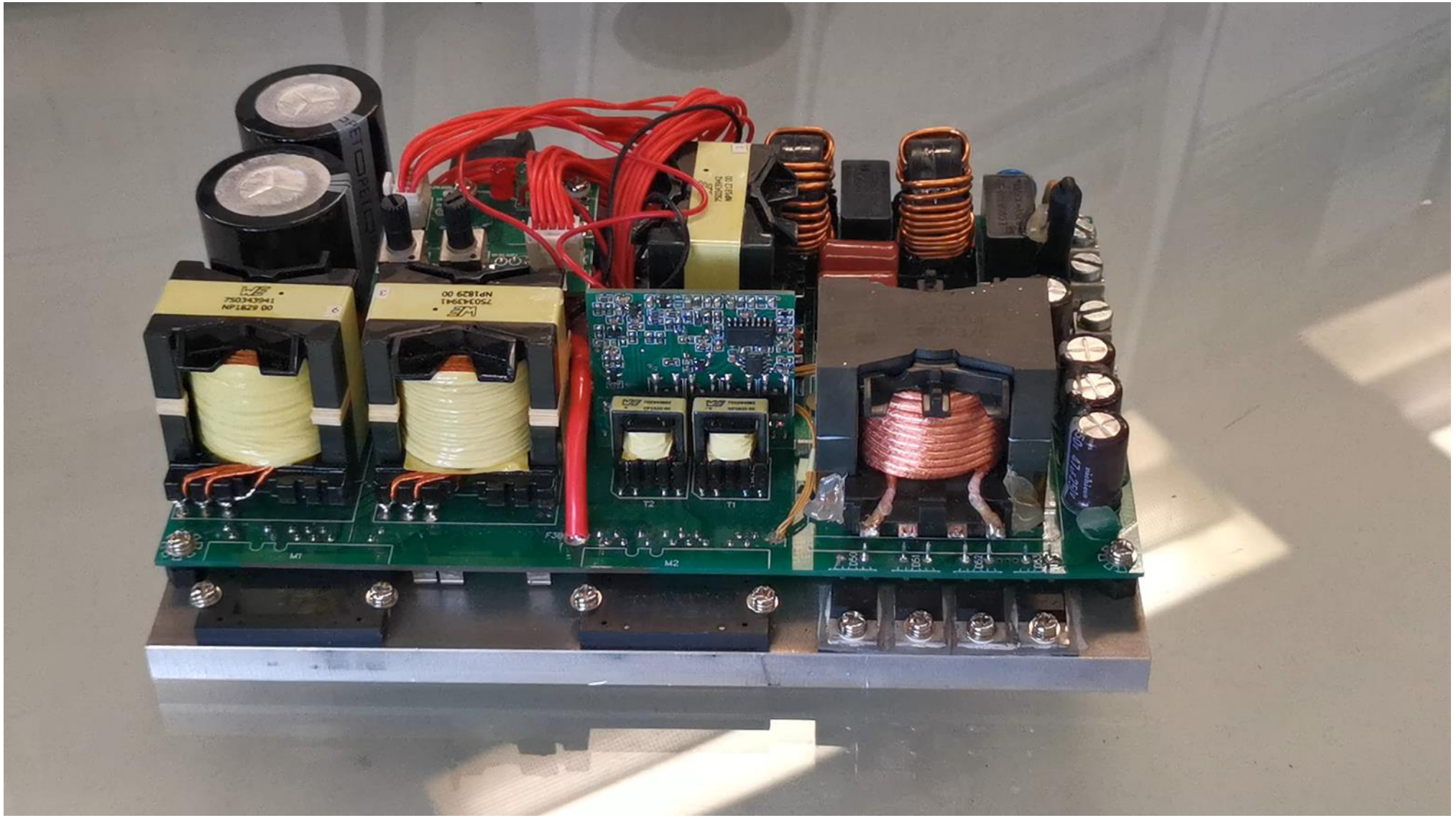
- ✓ Designed for 400V battery system.
- ✓ Output current of 14A with 200-450V from a single phase mains input.
- ✓ 2CH Interleaved PFC for higher efficiency and power density.
- ✓ Full bridge LLC to boost efficiency by high bus voltage usage.
- ✓ Flyback topology to supply auxiliary power.
- ✓ Hardware PFC and LLC control for improved fault modes.
- ✓ Fully functional solution including input/output current/voltage sensing and CC/CV PWM control interface.
- ✓ It will show the benefit of the modular approach using AQG324 Qualified APM16 modules to implement the PFC and the LLC functions



On Board Charger Demo - Circuit Configuration



On Board Charger Demo - walkthrough



3.3 kW OBC Demo: APM16 Platform

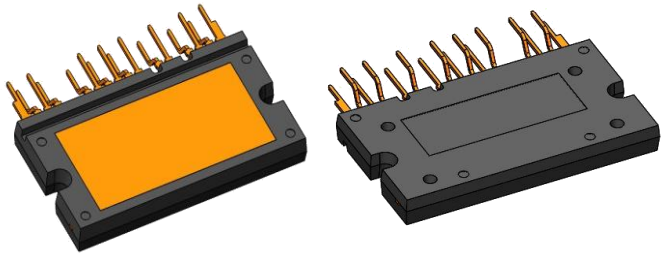
Features

- SIP or DIP H−Bridge Power Module for On−board Charger (OBC) in EV or PHEV
- 5 kV/1 sec Electrically Isolated Substrate for Easy Assembly
- Creepage and Clearance per IEC60664−1, IEC 60950−1
- Compact Design for Low Total Module Resistance
- Module Serialization for Full Traceability
- Lead Free, RoHS and UL94V−0 Compliant
- Automotive Qualified per AEC Q101 and AQG324 Guidelines

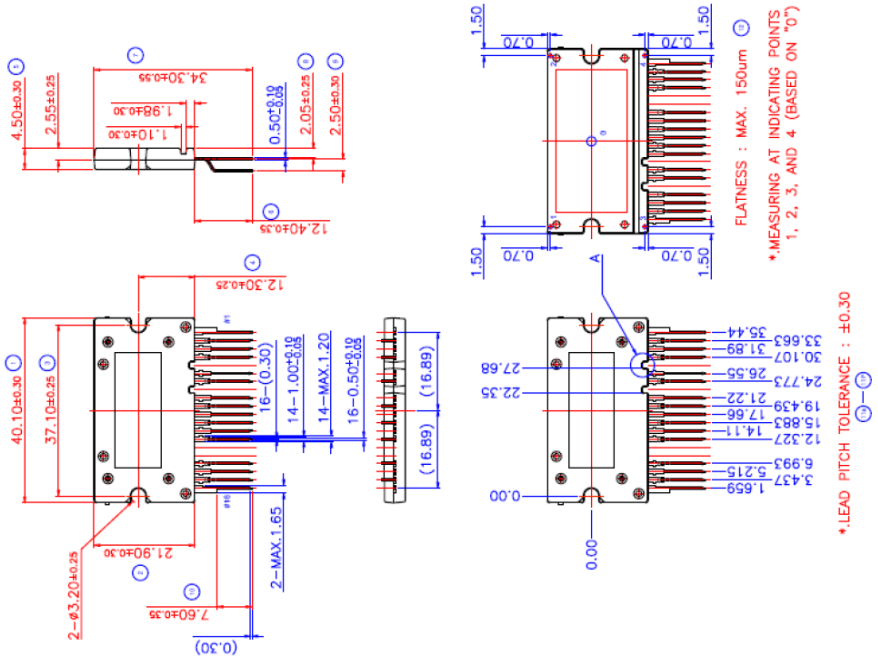
Application

3.3 KW			
DC-DC APM16 Al2O3 Substrate		PFC APM16 Al2O3 Substrate	
Ordering Part#	Package	Ordering Part#	Package
FAM65HR51DS1	APM16−CAA	FAM65CR51DZ1	APM16−CDA
FAM65HR51DS2	APM16−CAB	FAM65CR51DZ2	APM16−CDB

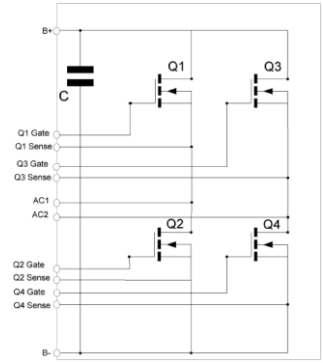
Package : 40.1 mm × 21.9 mm × 4.5 mm



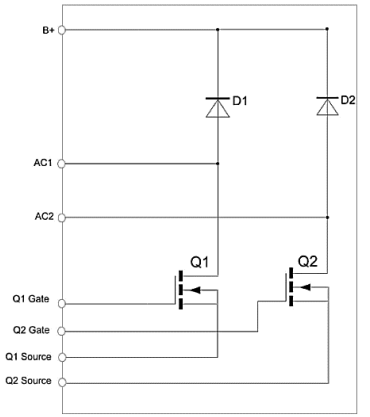
Package Details



DC DC



PFC



3.3 kW OBC Demo – Addition Featured Products

Component featured

Part number	Function
FAN9672Q	PFC controller
FAN7688SJX	LLC controller
NCV3843B	PWM controller
FAN3224TUMX-F085	Low-side gate driver
NCV890100PDR2G	Buck mode switching regulator
NCV51460SN33T1G	Precision voltage reference
NCV210RSQT2G	Current sense amplifier
NCV2003SN2T1T	Precision operational amplifier
SC431AVSNT1G	Precision voltage reference
FODM8801C	Opto-coupler

Control features

PFC Controller FAN9672

- Continuous Conduction Mode with Average Current Mode Control
- Two-Channel Interleave Operation
- Programmable Operation Frequency Range: 18 kHz~40 kHz or 55 kHz~75 kHz
- Programmable PFC Output Voltage, UVLO, Soft-start
- Two Current-Limit Functions
- TriFault Detect™ Protects Against Feedback Loop Failure

LLC Controller FAN7688

- Secondary Side PFM Controller for LLC Resonant Converter with Synchronous Rectifier Control
- Charge Current Control for Better Transient Response and Feedback Loop Design
- Adaptive Synchronous Rectification Control with Dual Edge Tracking
- Closed Loop Soft-Start for Monotonic Rising Output
- Wide Operating Frequency (39 kHz ~ 690 kHz)
- Green Functions to Improve Light-Load Efficiency
- Protection Functions: OCP, OVP, OTP, VCC-UVLO, overload, all with Auto-Restart
- Wide Operating Temperature Range -40°C to +125°C

PWM Controller NCV3843

- Trimmed Oscillator, Frequency Guaranteed at 250 kHz
- Current Mode Operation to 500 kHz
- Automatic Feed Forward Compensation
- Latching PWM for Cycle-By-Cycle Current Limiting
- Internally Trimmed Reference with Undervoltage Lockout
- High Current Totem Pole Output
- Low-startup/operating current, UVLO with Hysteresis

Thank you!

For more information, visit OBC landing page