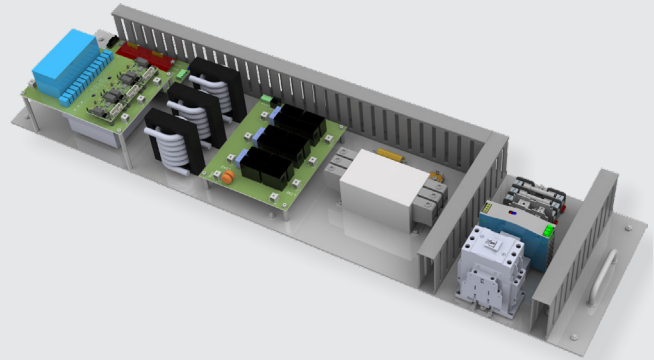


25kW SiC ACTIVE FRONT END (AFE)

WOLFSPEED WOLFPACK™ REFERENCE DESIGN FEATURING CCB021M12FM3

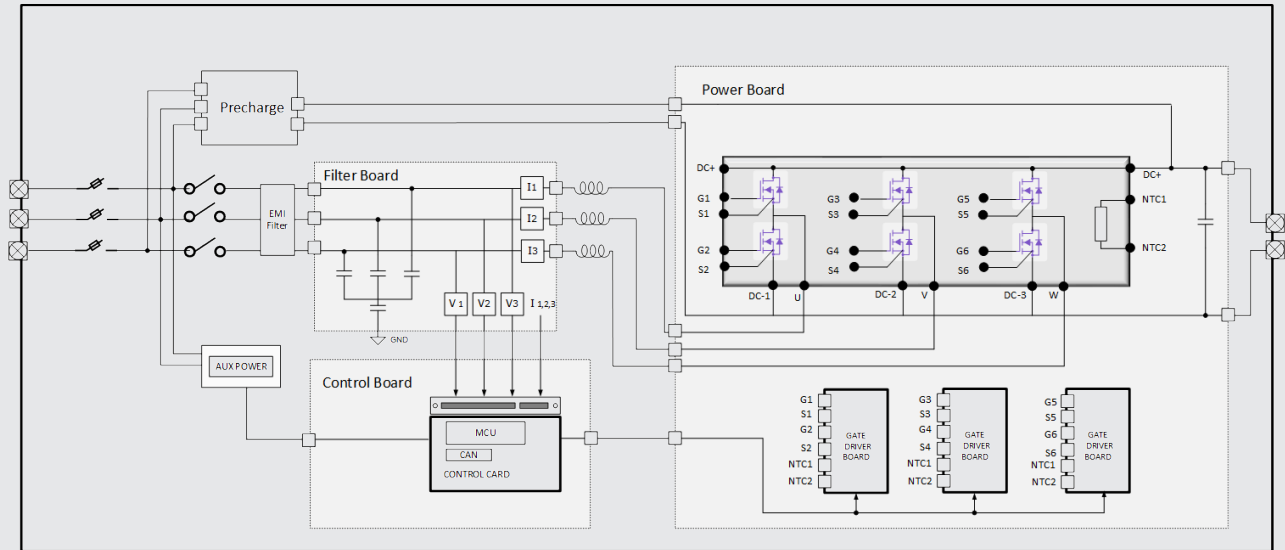
This reference design demonstrates the application of the Wolfspeed WolfPACK™ power module to create a bidirectional high-power density Active Front End (AFE) that can be applied to electric vehicle (EV) fast charging, industrial motor drives, power supplies, and renewable energy applications. The design is ideal for scaling up to higher power levels by interleaving multiple 25 kW AFEs. The use of a single power module with an isolated substrate simplifies the system design with commonly used thermal management techniques. The use of Wolfspeed's third generation C3M MOSFETs enables high switching frequencies and faster switching speeds resulting in increased control bandwidth and power factor as well as smaller magnetics and DC bus capacitors.



SYSTEM SPECS

Parameter	Specification [Units]	Notes
P_{OUT}	25 kW	$T_A = 25^\circ\text{C}$, 480 VAC PF=1, $F_s = 100$ kHz
V_{DC}	800 V_{DC} nominal	900 V Maximum
F_{Sw}	100 kHz	Controller-tuned
I_{Phase}	30 $A_{AC, RMS}$	$T_A = 25^\circ\text{C}$, 480 VAC PF=1, $F_s = 100$ kHz

SYSTEM BLOCK DIAGRAM



KEY SYSTEM BENEFITS WITH SiC

- » Reduced system losses
- » Increased power density

APPLICATIONS

- » Electric vehicle (EV) fast charging
- » Industrial motor drives
- » Power supplies
- » Renewable energy

SYSTEM INCLUDES

- » Power stage utilizing Wolfspeed WolfPACK™ power module
- » Line-side protection circuitry
- » Pre-charge circuit
- » EMI filter and line filter PCB
- » Controller PCB implementing closed-loop control
- » Custom inductors