# Ev charger design schematic

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Build a 25kW DC EV charger using Silicon Carbide technology. This will enable two-way power flow and support for 400V and 800V batteries.

The Full SiC 25kW DC EV charger platform is a crucial advancement in the rapidly growing electric vehicle (EV) charging infrastructure. As the demand for electric cars continues to rise, fast, efficient, and reliable charging solutions are becoming essential. Based on the Silicon Carbide (SiC) technology, this platform offers high efficiency, improved power density, and the ability to support a wide voltage range, making it suitable for various EV battery systems. The SEC-25KW-SIC-PIM-GEVK reference design kit from Onsemi provides a solution for designing a 25kW fast DC electric vehicle (EV) charger using a SiC power integrated module.

This platform integrates a Power Factor Correction (PFC) stage and a DC-DC conversion stage, featuring multiple 1200V, 10 mOhm half-bridge SiC modules (NXH010P120MNF1). These modules reduce conduction and switching losses, improving the system’s efficiency.

The design includes a Universal Controller Board (UCB), which combines a Zynq-7000 SoC FPGA and ARM-based processor to provide control. This enables the charger to deliver up to 25kW of power with over 96% efficiency. It supports an output voltage range of 200V to 1000V, making it suitable for charging 400V and 800V EV batteries.

The platform is designed for EV charging and three-phase AC-DC conversion applications, offering a solution for transferring energy from alternating current (AC) to direct current (DC) for fast charging.

The platform includes a high-current driver, an auxiliary power solution to ensure stable voltage rails and integrated protections like inrush control and over-voltage protection. These features ensure safe operation during fast-charging sessions. Additionally, the platform supports multiple communication interfaces for integration with other systems.

Operating with an input voltage of 400Vac (EU) or 480Vac (US), the platform supports an output voltage range from 200Vdc to 1000Vdc. The charger"s Three-Phase Power Factor Correction (PFC) and Dual Active Bridge (DAB) topology allow for bidirectional power conversion, making the platform compatible with 400V

and 800V battery systems.

This reference design meets electric vehicle charging standards and is compliant with EN55011 Class A standards and IEC 61851 regulations. The system’s key components include the SiC module, a half-bridge design with 1200V, 10 mOhm SiC MOSFETs, and the NCD57000 high-efficiency gate driver, ensuring reliable operation.

Design engineers can use this as a reference platform to prototype and deploy EV chargers, leveraging its features to integrate SiC technology into charging solutions and meet industry standards for fast EV charging applications.

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