System Solution Guide - Preview

Ultra Fast EV Charger

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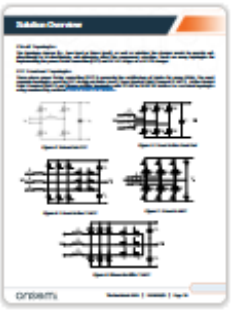
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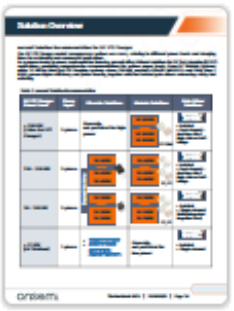
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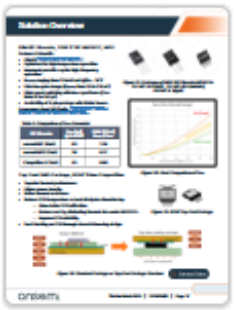
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Block Diagram - DC EV Charger

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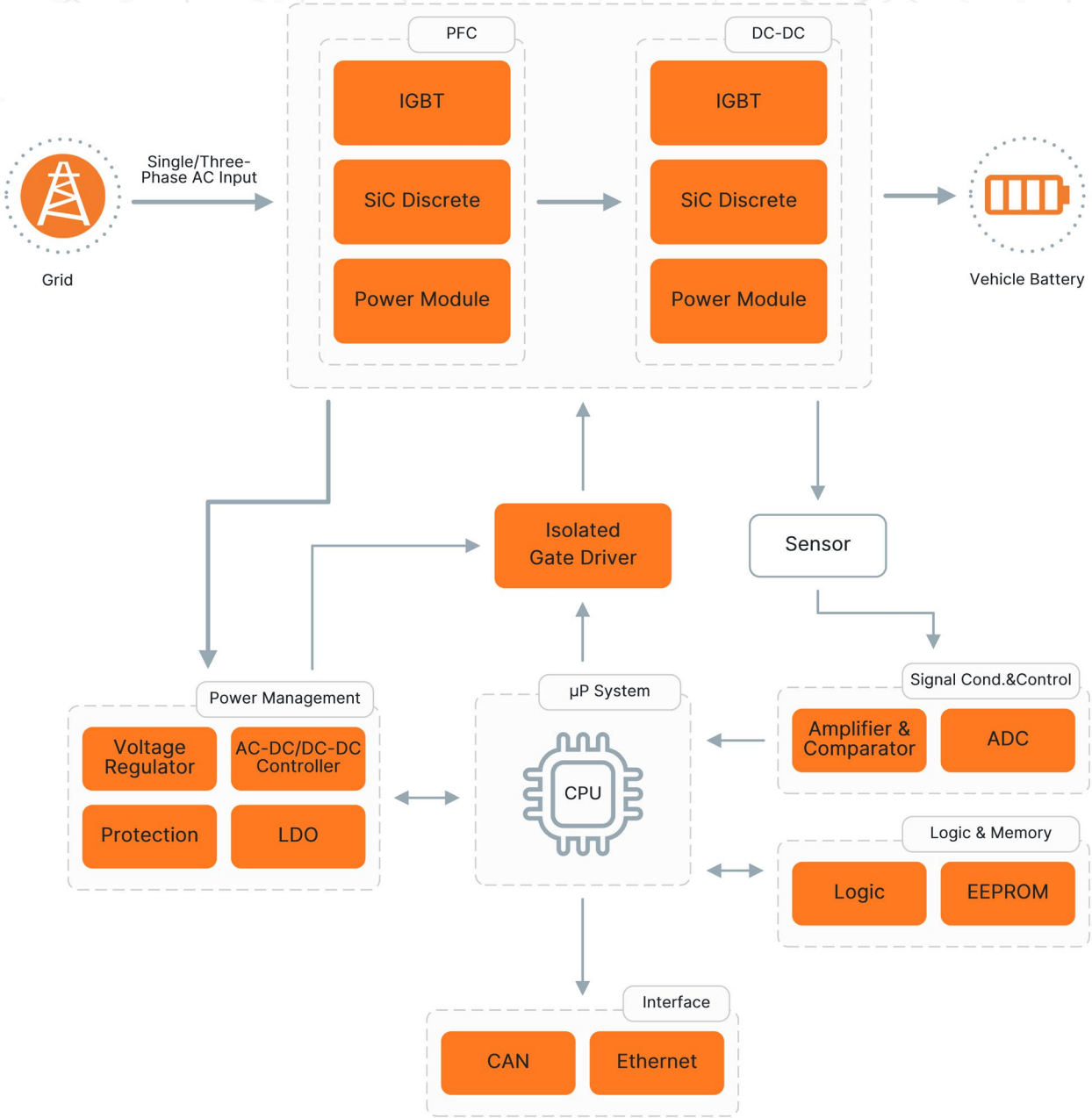
Block Diagram - DC EV Charger

The block diagram below represents DC EV Charger solution created by **onsemi**. The diagram illustrates the power conversion and power management technologies utilized in DC EV Chargers. It features major components such as SiC discrete MOSFETs, IGBTs, power modules and isolated gate drivers, as well as other relevant products. Majority of the functional block devices can be sourced by the **onsemi** solutions as shown in the following recommended product tables.



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Evaluation Board & Reference Design

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Evaluation Board for 1200V M3S 4-PACK F2 EliteSiC MOSFET Module | EVBUM2878G-EVB

The Evaluation Board is designed for evaluations **onsemi** 1200V M3S 4-PACK modules in F2 package. Purpose of the evaluation board is double pulse switching test and open loop power test of Full-bridge modules: NXH011F120M3F2PTHG, NXH007F120M3F2PTHG
The evaluation board can be connected to an external controller providing PWM inputs and handling fault signals.

Key Features:

- 4 Layer FR4 PCB with 70 µm copper thickness
- High thermal emissivity - black PCB color
- 4 isolated single gate drivers with 2.5 kV insulation
- Connector base for input and output signals
- Integrated film dc-link
- Mounting holes for connection Rogowski coil and measurement probes
- Low inductance PCB layout

Figure 14: EVBUM2878G Top & Bottom View

Find Evaluation Board

Evaluation Board for 1200V M3S 2-PACK F1 EliteSiC MOSFET Module | EVBUM2880G-EVB

The Evaluation Board is designed for evaluations **onsemi** 1200V M3S (Half bridge) 2-PACK modules in F1 package. Purpose of the evaluation board is double pulse switching test and open loop power test of Half- bridge modules: NXH008P120M3F1PTG, NXH010P120M3F1PTG, NXH015P120M3F1PTG, NXH030P120M3F1PTG
The evaluation board can be connected to an external controller providing PWM inputs and handling fault signals.

Key Features:

- Sockets for two M3S 2-PACK modules in F1 package
- 260 µF integrated dc−link shared for both 2-PACK modules (full−bridge usage design)
- Isolated gate driver NCP51561 with 5 kV_{RMS} isolation for each 2-PACK
- High thermal emissivity using black PCB color
- Sockets for four isolated DC-DC sources
- Low inductance PCB layout
- Controlling 2-PACK using dead - time generation from single PWM input (optional)
- Controlling 2-PACK using dead−time ensuring for 2 separate PWM inputs (optional)
- Controlling 2-PACK without any modified output logic from 2 separate PWM inputs (optional)

Figure 15: EVBUM2880G Top & Bottom View

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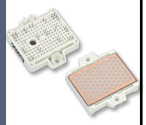
onsemi Solution Recommendations for DC EV Charger

The DC EV Charger market encompasses various use cases, catering to different power levels and charging times for residential and commercial applications.
As a proven leader in power semiconductor industry, **onsemi** offers tailored solutions for DC fast charging (DCFC) applications, providing comprehensive recommendations for various power levels. From DC Wallbox systems under 22 kW to Ultra-fast EV Charging systems above 350 kW, **onsemi**'s **EliteSiC** MOSFETs and Field Stop 7 IGBTs ensure higher efficiency and power density, together with the isolated gate drivers enhancing safety and reliability.

*Table 2: **onsemi** Solution Recommendation*

DC EV Charger Power Level	Phase Input	Discrete Solutions	Module Solutions	Gate Driver Solutions
> 350 kW (Ultra-fast EV Charger)	3-phase	Generally, not preferred for high power	50-100kW 50-100kW 50-100kW  F2 PIM	NCP51563/ NCP51561 • Isolated • Dual channel - dual low side / high-side or half-bridge
150 - 350 kW	3-phase	Stacked Solutions 30-40kW 30-40kW 30-40kW 	30-40kW 30-40kW 30-40kW  F1, F2	NCP51563/ NCP51561 • Isolated • Dual channel - dual low side / high-side or half-bridge
50 - 150 kW	3-phase	20-30kW 20-30kW 20-30kW 	20-30kW 20-30kW 20-30kW  F1, F2	NCP51752/ NCP51152 • Isolated • Single channel (with integrated negative bias)
< 22 kW (DC Wallbox)	1-phase	• 1200V FS7 IGBT • 650V & 1200V M3S & M3P EliteSiC MOSFET	Generally, not preferred for low power	NCP57080/ NCP57090 • Isolated • Single channel

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