



System Solution Guide - Preview

Ultra Fast EV Charger



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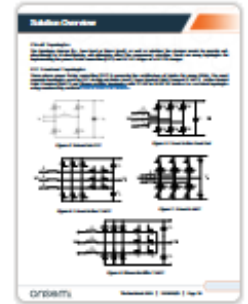
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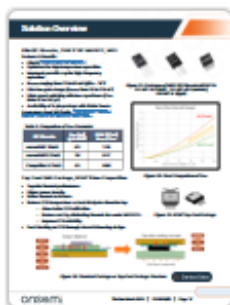
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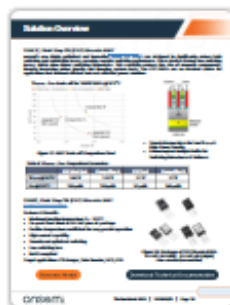
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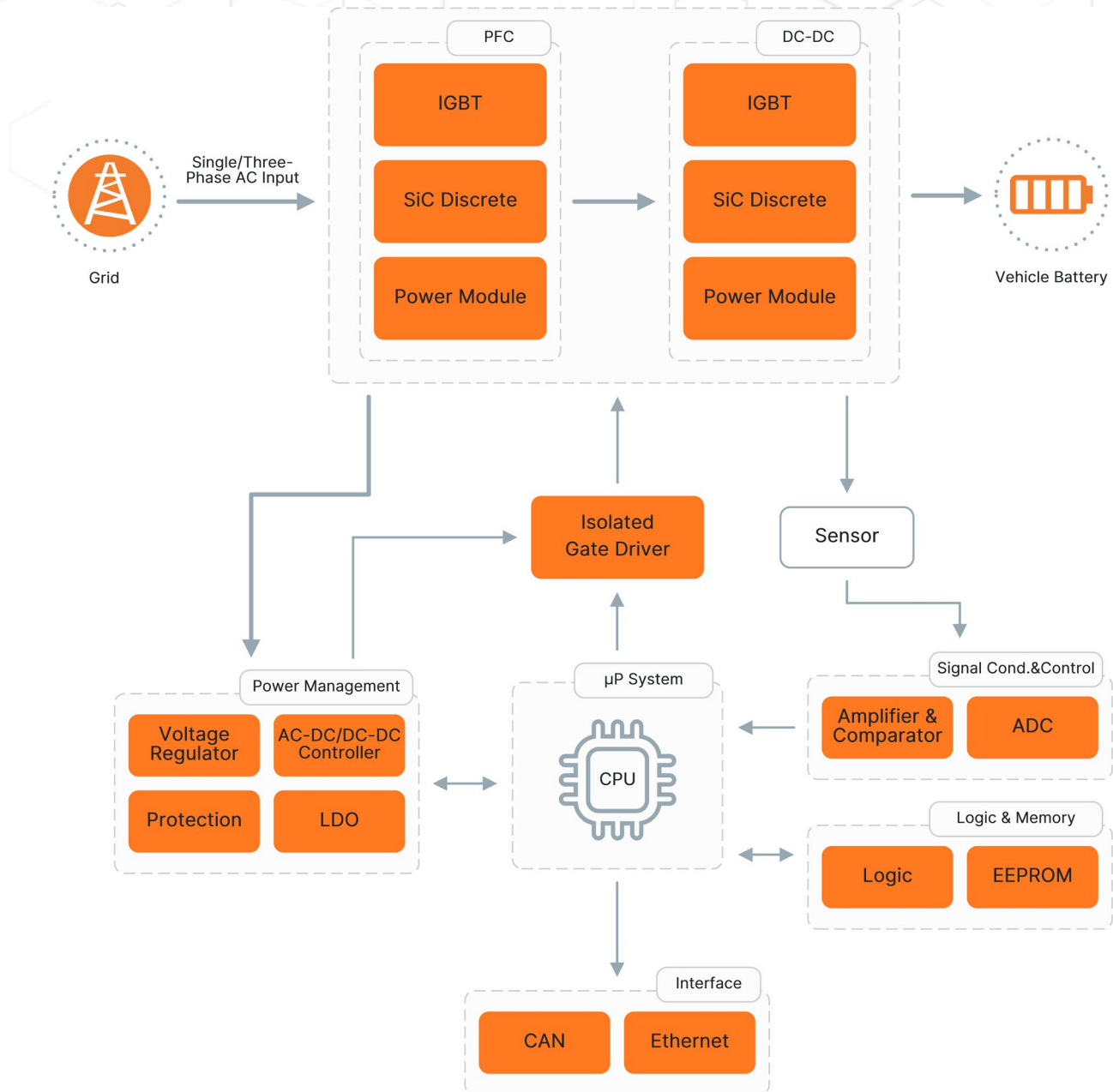
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Block Diagram - DC EV Charger

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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.



Use our Interactive Block Diagrams Tool



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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

[Find Evaluation Board](#)

Solution Recommendations






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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	<div style="display: flex; align-items: center;"> <div style="border: 1px solid black; padding: 5px; margin-right: 10px;">50-100kW</div> <div style="border: 1px solid black; padding: 5px; margin-right: 10px;">50-100kW</div> <div style="border: 1px solid black; padding: 5px;">50-100kW</div>  </div> <p>F2 PIM</p>	<div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;">NCP51563/ NCP51561</div> <ul style="list-style-type: none"> • Isolated • Dual channel - dual low side / high-side or half-bridge 	
150 - 350 kW	3-phase	Stacked Solutions	<div style="display: flex; align-items: center;"> <div style="border: 1px solid black; padding: 5px; margin-right: 10px;">30-40kW</div> <div style="border: 1px solid black; padding: 5px; margin-right: 10px;">30-40kW</div> <div style="border: 1px solid black; padding: 5px;">30-40kW</div>  </div>	<div style="display: flex; align-items: center;"> <div style="border: 1px solid black; padding: 5px; margin-right: 10px;">30-40kW</div> <div style="border: 1px solid black; padding: 5px; margin-right: 10px;">30-40kW</div> <div style="border: 1px solid black; padding: 5px;">30-40kW</div>  </div> <p>F1, F2</p>	<div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;">NCP51563/ NCP51561</div> <ul style="list-style-type: none"> • Isolated • Dual channel - dual low side / high-side or half-bridge
50 - 150 kW	3-phase		<div style="display: flex; align-items: center;"> <div style="border: 1px solid black; padding: 5px; margin-right: 10px;">20-30kW</div> <div style="border: 1px solid black; padding: 5px; margin-right: 10px;">20-30kW</div> <div style="border: 1px solid black; padding: 5px;">20-30kW</div>  </div>	<div style="display: flex; align-items: center;"> <div style="border: 1px solid black; padding: 5px; margin-right: 10px;">20-30kW</div> <div style="border: 1px solid black; padding: 5px; margin-right: 10px;">20-30kW</div> <div style="border: 1px solid black; padding: 5px;">20-30kW</div>  </div> <p>F1, F2</p>	<div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;">NCP51752/ NCP51152</div> <ul style="list-style-type: none"> • Isolated • Single channel (with integrated negative bias)
< 22 kW (DC Wallbox)	1-phase	<ul style="list-style-type: none"> • 1200V FS7 IGBT • 650V & 1200V M3S & M3P EliteSiC MOSFET 	Generally, not preferred for low power	<div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;">NCP57080/ NCP57090</div> <ul style="list-style-type: none"> • Isolated • Single channel 	

Ultra Fast EV Charger

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