

EV On-Board Charger Block Diagram

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1 Block Diagram

The block diagram of the EV on-board charger design is shown in Figure 1. The charger takes input from the Electric Vehicle Supply Equipment (EVSE) and performs various stages of processing before delivering power to the battery pack.

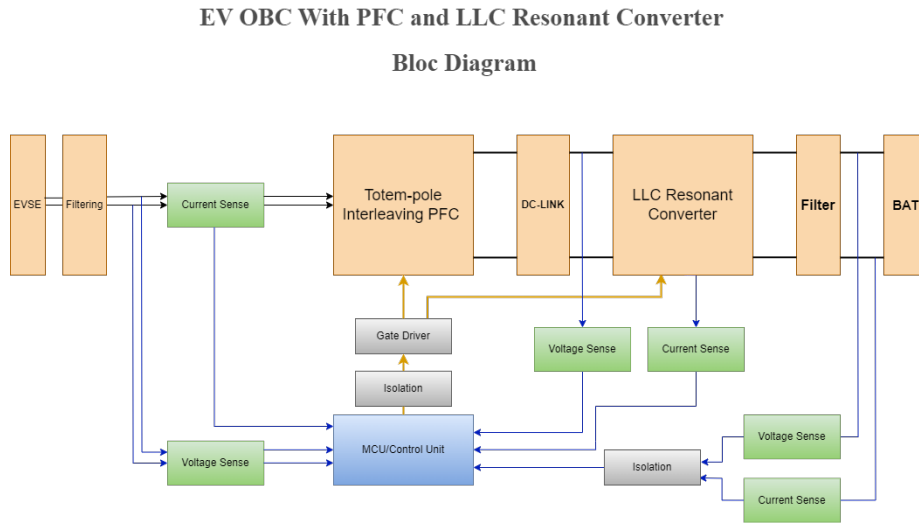


Figure 1: EV On-Board Charger Block Diagram

2 Block Description

2.1 EVSE Input

The EVSE (Electric Vehicle Supply Equipment) provides the input power to the on-board charger. It supplies AC power from the external power source. In our case it could be the Home AC mains.

2.2 Filter

The Filter stage is responsible for eliminating any high-frequency noise and harmonics from the input AC power.

2.3 Current and Voltage Sensing (AC)

Current and voltage sensing modules measure the input AC current and voltage values, providing feedback for control and protection purposes.

2.4 Power Factor Correction (PFC)

The PFC stage ensures that the input current waveform follows the input voltage waveform, reducing harmonic distortion and improving power factor.

2.5 Totempole Interleaving PFC

The Totempole Interleaving PFC is a specific PFC topology that enhances efficiency and reduces switching losses by interleaving multiple power stages.

2.6 DC-Link

The DC-Link stage acts as an intermediate buffer, smoothing out the output from the PFC stage before passing it to the subsequent stages.

2.7 Voltage Sensing (DC-Link)

Voltage sensing at the DC-Link provides feedback to the control circuitry for maintaining the required voltage levels.

2.8 Parallel LLC Resonant Converter

The LLC resonant converter could be a modular design with two parallel stages each capable of 3.5Kw or a simple one stage with output power of 7Kw. LLC resonant converter is used for high efficiency and reduced switching losses.

2.9 Current Sensing (LLC)

Current sensing in the LLC stage provides feedback for controlling and regulating the output current.

2.10 Filter

The Filter stage at the output stage ensures that the output power is free from any unwanted noise or ripple.

2.11 Current and Voltage Sensing

Current and voltage sensing modules before the battery pack provide feedback to the charger control system.

3 Conclusion

The presented block diagram outlines the system architecture of the EV on-board charger design. It demonstrates the various stages involved in processing the input power from the EVSE and delivering it to the battery pack for efficient and safe charging.