



TECHNOLOGY

On-Board Electric/Hybrid-Electric Vehicle Universal Plug-in Charger with Active Power Filtering

OVERVIEW

Background

On-board battery charging power circuits will be commonplace in next generation vehicles, especially electric (EV), hybrid-electric (HEV), and fuel cell vehicles. These circuits can be external, isolated, or integrated with the battery and allow simple plug-in connections to the power grid for charging. Current battery charging circuits have drawbacks including an inefficient three stage (AC/DC-DC/AC-AC/DC) design, bulky and numerous capacitors, and high switch ratings due to voltage boosting.

Innovative Technology

Researchers at the University of Maryland have developed a novel onboard universal charger topology consisting of only two conversion stages (AC/AC & AC/DC) with an active power filter (APF). This design eliminates the need for an additional rectification stage in comparison to conventional chargers, effectively reducing overall size, weight, and cost of the charger while increasing the feasibility of ultra-capacitor assisted vehicles. Further unique advantages include universal charging capability, galvanic isolation, power factor correction, and reduced components, including a bulky DC link capacitor and an inductive output filter. Furthermore, since grid voltage is applied to the switches, switch ratings are reduced considerably in comparison to conventional topologies where the voltage is first boosted at the front-end PFC converter.

Applications

- AC/DC Battery Chargers
- Smart Grid Battery Systems
- Electric/Hybrid-Electric Vehicles

Advantages

- Smaller/Lighter/Cheaper Conversion Circuit
- Universal Compatibility
- Galvanic Isolation
- Power Factor Correction
- Active Power Filtering

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Additional Information

INSTITUTION

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PATENT STATUS

Patent(s) pending

LICENSE STATUS

Available for exclusive license

CATEGORIES

- Power Electronics

EXTERNAL RESOURCES

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