

Zero Voltage Switched Full Bridge Converters for the Battery Charger of Electric Vehicle

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Abstract : This paper illustrates the study of three isolated zero voltage switched (ZVS) PWM full bridge (FB) converters to charge the high voltage battery in the charger of electric vehicle (EV). EV battery chargers have several challenges such as high efficiency, high reliability, low cost, isolation, and high power density. The cost of magnetic and filter components in the battery charger is reduced when switching frequency is increased. The increase in the switching frequency increases switching losses. ZVS is used to reduce switching losses and to operate the converter in the battery charger at high frequency. The performance of each of the three converters is evaluated on the basis of ZVS range, dead times of the switches, conduction losses of switches, circulating current stress, circulating energy, duty cycle loss, and efficiency. The limitations and merits of each PWM FB converter are reviewed. The converter with broader ZVS range, high efficiency and low switch stresses is selected for battery charger applications in EV.

Keywords : electric vehicle, PWM FB converter, zero voltage switching, circulating energy

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