

EMI Noise Reduction for PFC Converter with Improved Efficiency and High Frequency Clock

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This paper proposes a power factor correction (PFC) converter with electro-magnetic interference (EMI) noise reduction and efficiency improvement using 500kHz clock. A conventional PFC has a problem of large EMI noise generation. For electronic appliances which use switching power supplies, EMI noise should be suppressed to meet the regulations, so that they prevail as products in the market.

To satisfy the requirements for EMI reduction and efficiency improvement, we employ Schottky Barrier Diodes (SBDs) of Silicon Carbide (SiC) and noise spread spectrum technique. Using SiC SBD, the efficiency is improved with suppression of recovery currents of freewheel diodes. Thanks to this suppression, the operating clock frequency can be as high as 500kHz, which enables to use very small inductors and capacitors in the low-pass filter (LPF) located in the front-end. By modulating the clock frequency, the EMI noise is reduced by -18.8 dB using the triangular modulation signal with 0.75V amplitude and 500 kHz frequency.

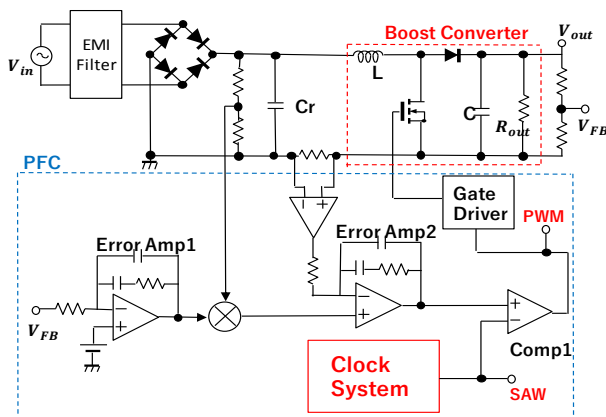


Fig.1 PFC power supply circuit

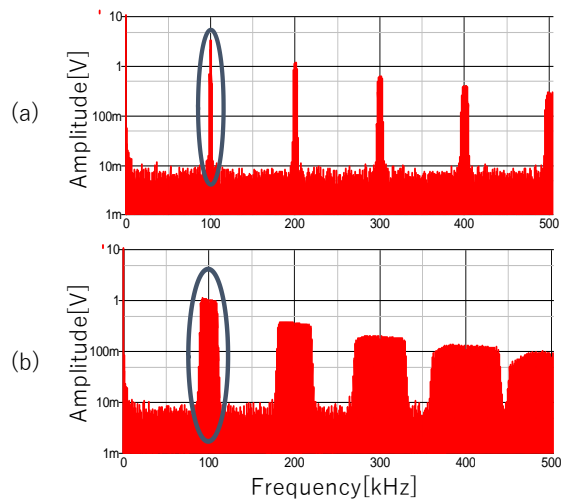


Fig.2 EMI noises reduction.

(a) Fixed frequency Clock. (b) Modulated clock.

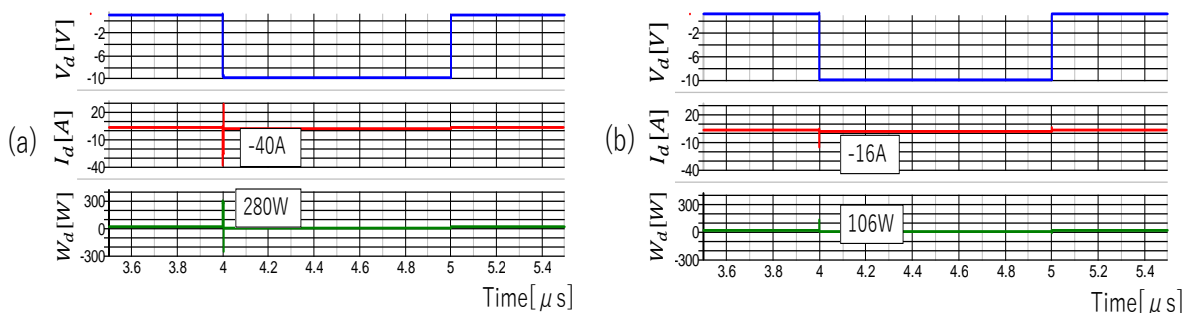


Fig.3 Comparison of diode usages. (a) PN-Diode usage case. (b) SiC-SBD usage case.

References

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