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LOSSLESS INDUCTOR CURRENT SENSING METHOD WITH IMPROVED FREQUENCY RESPONSE

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Abstract

The lossless inductor current sensing method is well known and is frequently applied in the measurement of output current in dc–dc converters due to its low cost and simplicity. This technique uses a low-pass filter that is matched to the inductance (L) and winding resistance to compensate for induced voltages due to the inductor. However, the waveform fidelity above the corner frequency of the inductor is generally poor due to large production tolerances and thermal drift. In this letter, we propose the use of a coupled sense winding, which increases the corner frequency of the sensing circuit by more than two orders of magnitude. We show, as an example, that for a 3.85 μH inductor the corner frequency of the measurement circuit can be increased from 36 Hz using the conventional approach to 5.8 kHz using the coupled sense winding method. Above the new corner frequency, a low-pass filter is still required but may now be constructed using a smaller capacitor and with improved high-frequency response.

Keywords : Current measurement, current sharing, dc–dc power converter, mutual coupling.