

Common mode noise in three-level DC-DC converters

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Abstract

This paper demonstrates how conducted Electromagnetic Interference (EMI) can be easily analysed utilising an inexpensive and user friendly software package called Micro Cap 9 developed by Spectrum Software®. Other software packages generally used for accurate conducted EMI simulation purposes, such as SABER® is inaccessible to the general designer due to cost. The buck converter is shown as an example. Comparison is made between common mode currents in a standard two-level converter and also three-level derivations. Advantages of three-level converters include reduced switch voltage stress, lower distortion reactive power demand and improved dynamic response. The lower dv/dt should lead to lower electromagnetic noise generation. This paper will show that three-level buck DC-DC converters in general generate much lower common mode currents than conventional two-level buck converters. Further, reductions in common mode currents are achieved by using the improved three-level topologies that have been recently proposed.