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Use of Primary Side FET Shunt Capacitors on Fly Back AC/DC Converter to Increase AC Line Conducted Noise Immunity

Abstract: A technique is disclosed that improves immunity to conducted AC line noise through the use of primary-side FET shunt capacitors on fly back AC/DC converters to provide a second filtering stage.
This disclosure relates to the field of AC/DC converters.

A technique is disclosed that improves immunity to conducted AC line noise through the use of primary-side FET shunt capacitors on fly back AC/DC converters.

In many applications where the DC output of an AC-to-DC power converter is used to power highly noise-sensitive systems, these systems can become inoperative in the presence of AC line noise. The standard practice is to use X and Y capacitors along with common and differential mode chokes for filtering conducted noise disturbances. In some cases, one can also use common mode chokes on the AC power cord as well as on the DC output, but these techniques dramatically increase the system cost. The typical use of X and Y capacitors along with common and differential mode chokes may not be enough to prevent these problems.

According to the present disclosure, increased conducted immunity robustness to these AC line noise disturbances for AC/DC fly back power converters can be achieved through the use of primary-side PFC and switch FET source/drain shunt capacitors across the source/drain nodes of all primary FETs to act as further filtering devices. The capacitors act as low pass filters for noise frequencies well above the FET's switching frequency. As a result, any DC side noise sensitive systems enjoy a higher degree of performance.

The key to an AC/DC converter's immunity to AC line conducted noise is the converter's primary side input impedance behavior. The impedance behavior to be realized in more than one stage. Prior use of X and Y capacitors, as well as differential and common mode chokes, provides only one filtering stage. By also connecting capacitors across the drain and source of primary side switching FETs, a second stage of filtering that advantageously provides improved immunity robustness can be achieved.

Disclosed by Bill Meyer, HP Inc.