



USU Technology Highlight:

QUASI-SINGLE STAGE AC-TO-DC CONVERTER

Wireless power transfer (WPT) systems are typically two-stage systems comprising a power factor correction rectifier input stage followed by a DC-DC converter. In two-stage systems, all the power is processed and filtered twice. By omitting the two-fold filtering and switching of two-stage solutions and designing a single-stage AC-to-DC converter with a high-frequency WPT link, researchers at USU have developed a novel method to make efficiency and power gains in converters.

PROBLEM

Though well understood, two-stage AC-to-DC converters have relatively complex power and control circuits, and two-fold power conversion reduces efficiency. Additionally, two-stage converters suffer from high switching losses and reverse recovery losses, and require a large number of modules, increasing production costs. By and large, existing single-stage AC-to-DC converters are unreliable and have limited to no soft-switching capabilities.

SOLUTION

By developing and implementing a quasi-single stage design where the tasks of both power control and power factor correction, each of which require high frequency switching, are done in one stage, researchers at USU have created a more efficient method of AC-to-DC conversion using soft DC links, limited filtering, and eliminating the need for pulse width modulation in the rectifier, eliminating disadvantages of both two-stage and single-stage converters.

BENEFITS

This technology increases power conversion efficiency, simultaneously leading to higher power density and lower specific weight and space requirements. Additionally, the increased efficiency results in lower air conditioning requirements, further reducing operating and production costs, benefiting both manufacturers and consumers.

APPLICATIONS

Application of the quasi-single stage AC-to-DC converter is especially suited for use in electric vehicle charging.

CONTACT

Questions about this technology including licensing availability can be directed to:

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INVENTORS

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DEVELOPMENT STAGE

TRL 3

PATENT STATUS

Patents applied for.

WEBSITE

[rgs.usu.edu/techtransfer/
resonant-switch-power-converter](http://rgs.usu.edu/techtransfer/resonant-switch-power-converter)

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