

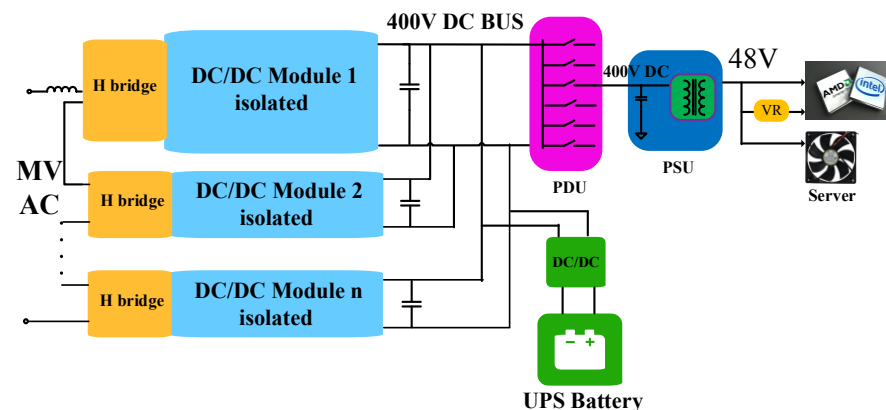
Infineon & Virginia Tech

Project Title: **MV AC to Low Voltage DC Power Conversion for Data Center**

Objectives: Develop a SiC and GaN based cascade high frequency isolated converter to directly step down MVAC to 400VDC, then from 400V to 48V DC.

Major Milestones: 1. 1200V SiC full bridge circuit with high frequency (>400kHz) driver
2. Matrix transformer with 99% efficiency and MV insulation capability

Deliverables: 1. DC/DC module with 98% efficiency and MV insulation capability.
2. 1MHz 380V/48V converter with 98% efficiency



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WBG Technology Impact

Due to the increasing use of cloud computing and big data, the power consumption of data center alone will reach 10% of the total electrical power consumption in the world by 2020. The current AC data center power architecture has too many stages, which cause excessive power loss. Furthermore the 480V AC distribution bus also leads to a very bulky and costly transmission bus and also large conduction losses.

In this proposed work, we will develop a SiC and GaN devices based cascade high frequency isolated rectifier to directly step down MV AC to 400V DC, then from 400V to 48V DC. The proposed system is modular and easily scalable, and have much higher power density. The proposed system will not only use MV AC as distribution bus and but also eliminate several power stages in conventional data center. Totally, it can save more than 15% of the energy consumption in the data centers.

Additional impacts

The proposed cascade high frequency isolated converter is basically a power conditioning system block with bi-directional power flow capability. Its applications is not only limited to DC data center. It can be used for a broad range of applications, such as EV charge stations, energy storage systems, PV farms and other micro-grids related applications.