Background & Motivation

- Future data centers will contain 48V power supplies & extreme high current loads (CPUs, GPUs, TPUs)

Traditional Two-Stage Hybrid Switched-Cap. Based Design

- Resonant inductors ($L_R$) → Additional loss & low power density
- Decoupling capacitor ($C_D$) → Low power density

Merged Two-Stage Linear Extendable Group Operated (LEGO) – Point of Load (PoL) Architecture

- One Submodule of the Merged Two-Stage LEGO-PoL Architecture

Scalable and Modular LEGO-PoL Architecture (N-Submodules)

A 48 V-1.5 V/300 A Example Design with Experimental Results & 3D Packaging LEGO-PoL Converter

- Three-submodules LEGO-PoL design

Prototype (577 W/in³) & Measured Performance

3D Packaging LEGO-PoL Converter (work ongoing)