3kW Power Supply Design with Easy Manufacturability for 48 V Bus Power Architecture

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**48 V Power Architecture**

- Why 48 V power architecture?
  - Less dissipation Loss from power supply to Load
  - No UPS or battery charger needed
  - More Efficient than 12V architecture
  - More power per server rack

**Ecosystem for Datacenter and Telecom**

**400V/48V 3kW DC-DC**

- Half Bridge LLC
  - Mature topology
  - Easy to design and control
  - Limited power (<1kW)

- Three Phase Interleaved LLC
  - Parallel phases
  - Handle more power
  - Complex magnetic structure

- Full-bridge LLC with Matrix transformer

**Easier Manufacturability**

**Challenge:** Low frequency design with Litz wire magnetics (more labor more cost)

- **100kHz Litz Wire Magnetics**
  - Solution #1
  - Four transformers
  - Inductor

- **1MHz PCB Magnetics**
  - Solution #2
  - 5 Leg Transformer with Leakage

**CPES Solution**

- Utilize Transformer leakage as resonant inductor
- Smaller footprint and high power density solution

**Hardware Demonstration**

- Efficiency 97.4%
- Power Density 400W/in³