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

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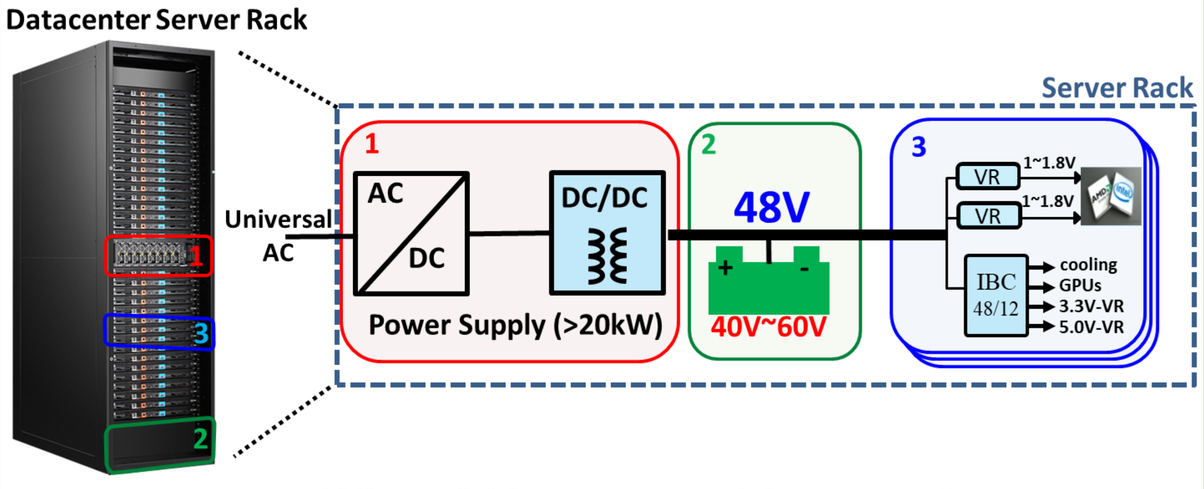
48 V Power Architecture



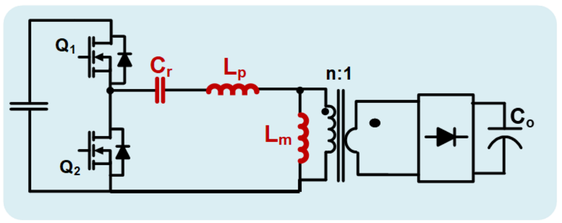
Why 48 V power architecture ?

- 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

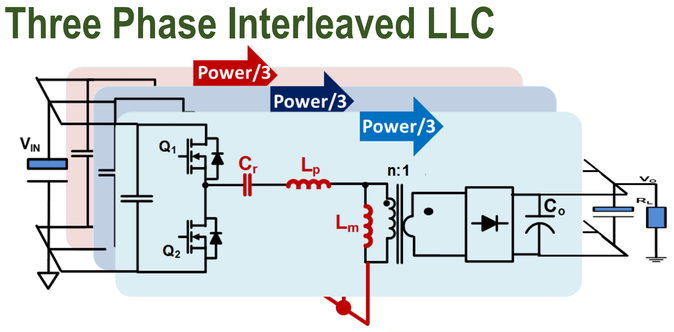
- **Half Bridge LLC**



✓ Mature topology
✓ Easy to design and control

❖ Limited power (<1kW)

- **Three Phase Interleaved LLC**

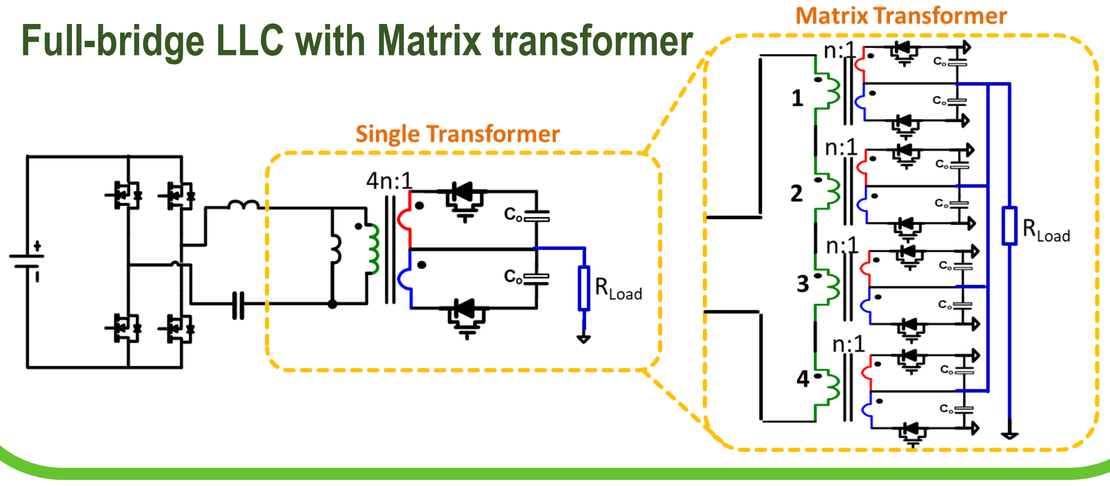


✓ Parallel phases
✓ Handle more power

❖ Complex magnetic structure

CPES Solution

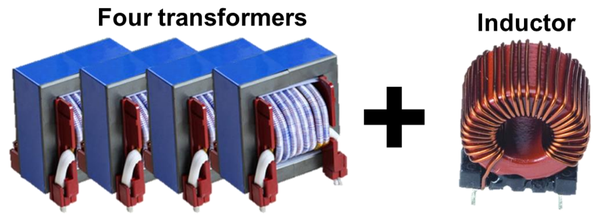
- **Full-bridge LLC with Matrix transformer**



Easier Manufacturability

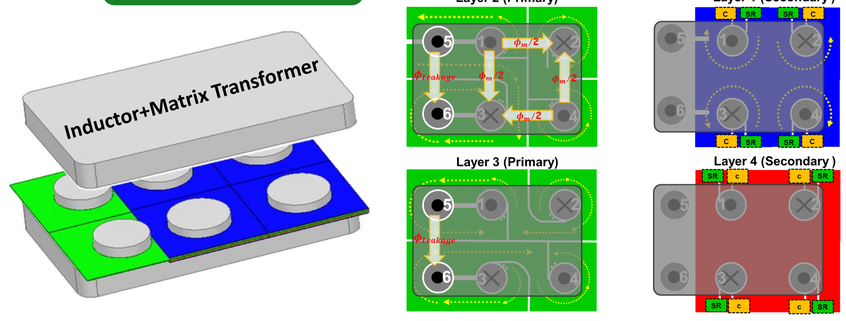
Challenge: Low frequency design with Litz wire magnetics (more labor more cost)

100kHz
Litz Wire Magnetics



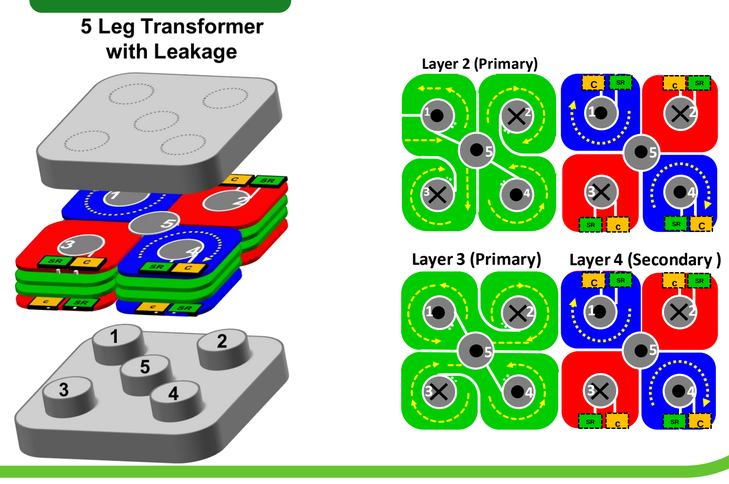
Solution #1

1MHz
PCB Magnetics

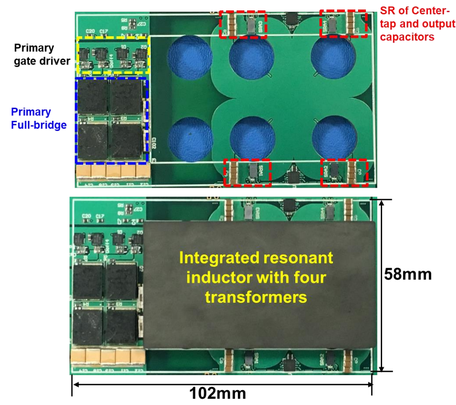


Solution #2

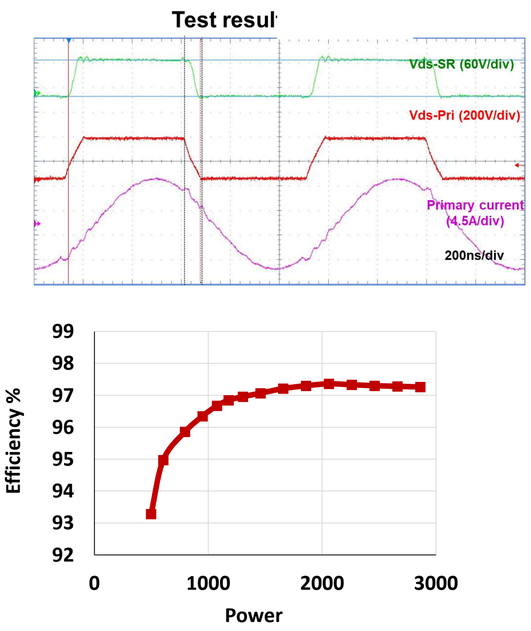
- Utilize Transformer leakage as resonant inductor
- Smaller footprint and high power density solution



Hardware Demonstration



Efficiency 97.4%
Power Density 400W/in^3



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