Inductorless DC-DC Converter for 42/14 V Automotive Systems

Objectives:
To develop a 1 kW compact, high efficiency 42/14 V DC-DC converter for dual voltage (42/14 V) automotive system.

New Automotive Needs:
1. More electric power will be needed in the future cars at a higher voltage.
2. 14 V is still needed for the electronics and lights.
3. Reliability improvement.

Advantages:
- No or minimal need for inductance
- Easy to integrate because of minimal-magnetic requirement, compact size, and lightweight
- High efficiency (98% was achieved)
- Low frequency switching and low EMI
- Low cost because of the use of low voltage MOSFETs

New DC-DC converter designed for the dual voltage system

Photograph of the prototype

The measured efficiency.