SOLUTION BRIEF

12 kW BBU for AI data centers

REF_48V_12KW_BBU_PPC_Si

Data centers' power demand is accelerating with the growth of cloud, AI/ML, and high-performance workloads, pushing rack-level power while space, airflow, and energy constraints tighten. This intensifies the need to deliver more compute per watt and per cubic centimeter without compromising reliability or sustainability. To meet these requirements, high efficiency, and high-power density solutions are essential across the rack power chain. Battery backup units (BBUs) are integral rack components, and must deliver both.
BBUs have short-duration energy storage and provide fast support for the rack power bus. These are implemented using a bidirectional power converter to charge batteries during regular operation and discharge during disturbances. Effective BBU designs ensure bus stability, provide ride-through during grid events, and enable smooth UPS transfers.

REF_48V_12KW_BBU_PPC_Si reference design is a compact and high-efficiency BBU solution. It combines high power density with fast dynamic performance, robust protection, and seamless integration into rack management, making it ideal for modern, space- and energy-constrained deployments.

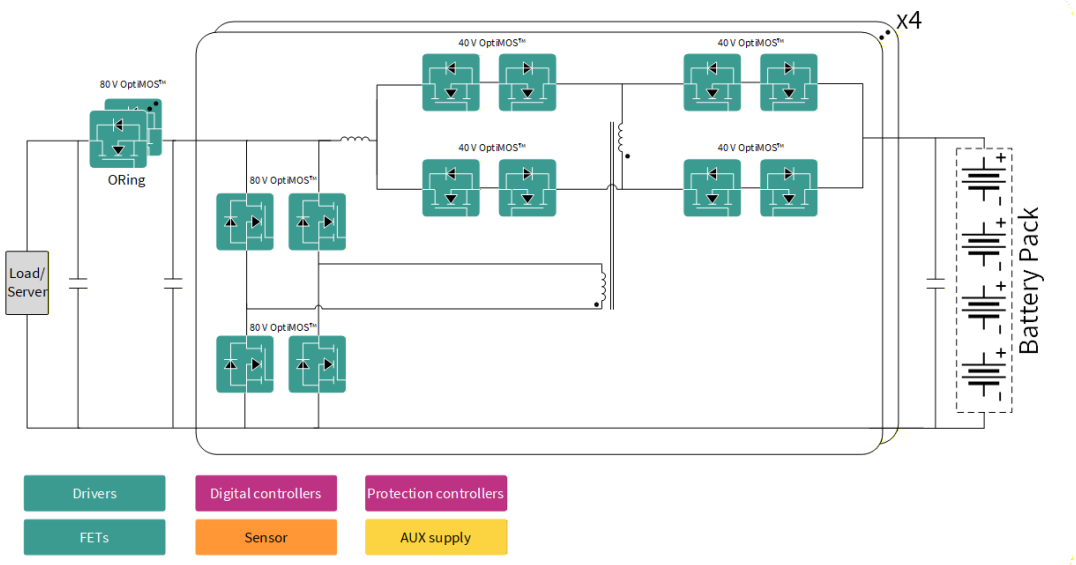
Key features

- Partial Power Conversion topology
- Peak efficiency > 99%
- High power density of PB > 1.3kW/in^3
- Modular & scalable design
- Fast transient response
- Bi-directional – charge/discharge
- Charging operations – CC / CV mode
- Interleaved 4 phase operation

Highlighted products

- OptiMOS™ 7 Power MOSFET 40 V
- OptiMOS™ 6 Power MOSFET 80 V
- XENSIV™ high accuracy coreless current sensor
- PSOC™ microcontroller
- EiceDRIVER™ 2EDB, 2EDL, 2EP, 1EDL
- OPTIREG™ switches

Functional block diagram of the 12 kW BBU solution



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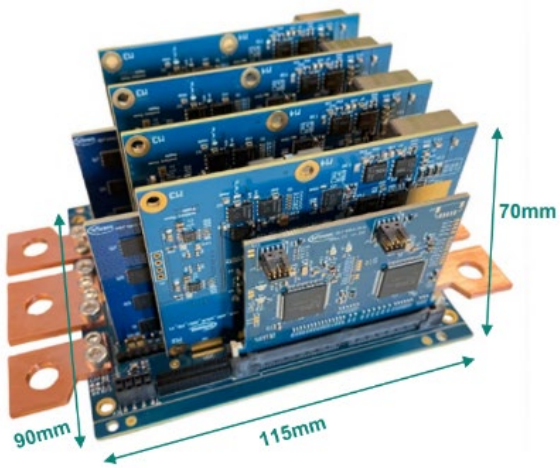
REF_48V_12KW_BBU_PPC_Si comprises one main board, one controller board, two protection boards, and four power boards. These power boards are capable of handling 3 kW each and can be connected in parallel to support up to 12 kW. The BBU is implemented using an innovative bidirectional Partial Power Processing (PPP) topology to achieve high efficiency, high-power density, and fast transient response. The BBU board supports a battery voltage range of 36 V to 60 V and provides a tightly regulated 48 V output voltage. End-to-end discharge efficiency exceeds 99% across typical data center load profiles. The firmware is designed to handle transient load jumps as required by the Open Compute Project (OCP) standards. Comprehensive layered protection including over-voltage, under-voltage, over-current, and over-temperature have been implemented to safeguard the BBU.

Key benefits

- Modular & scalable architecture
- Data center–ready design
- High efficiency and high-power density
- Accelerates time-to-market

BBU hardware setup



BBU specifications

Parameter	Value
Maximum output power	12.000 W
Peak efficiency	> 99%
Battery voltage	36 V – 60 V

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