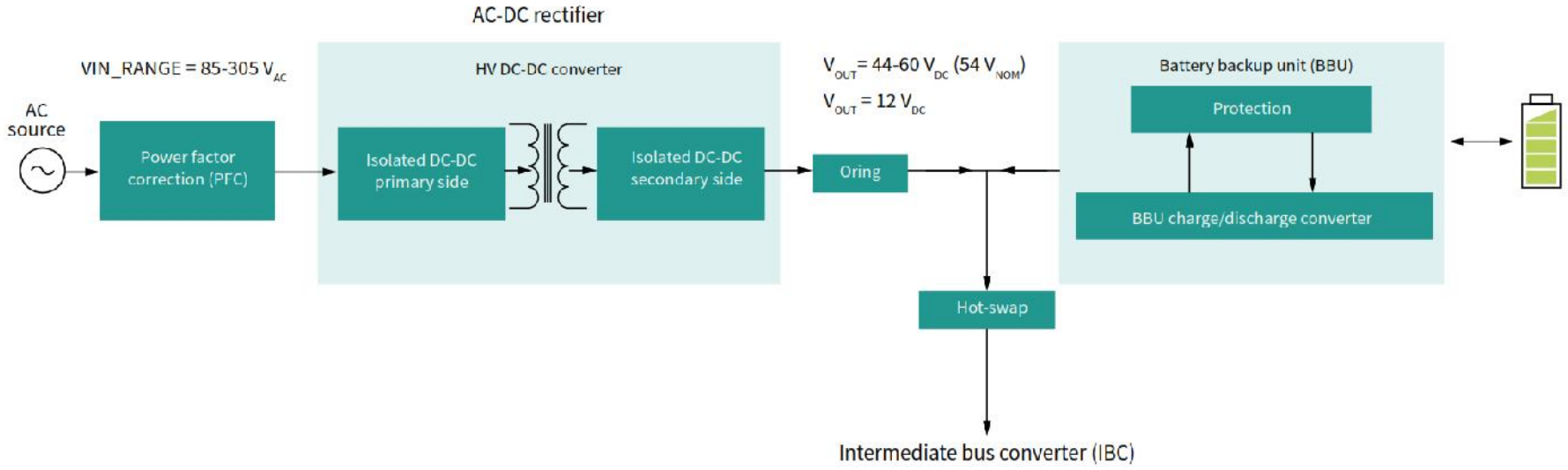
48V Networking Power Solution | 2025

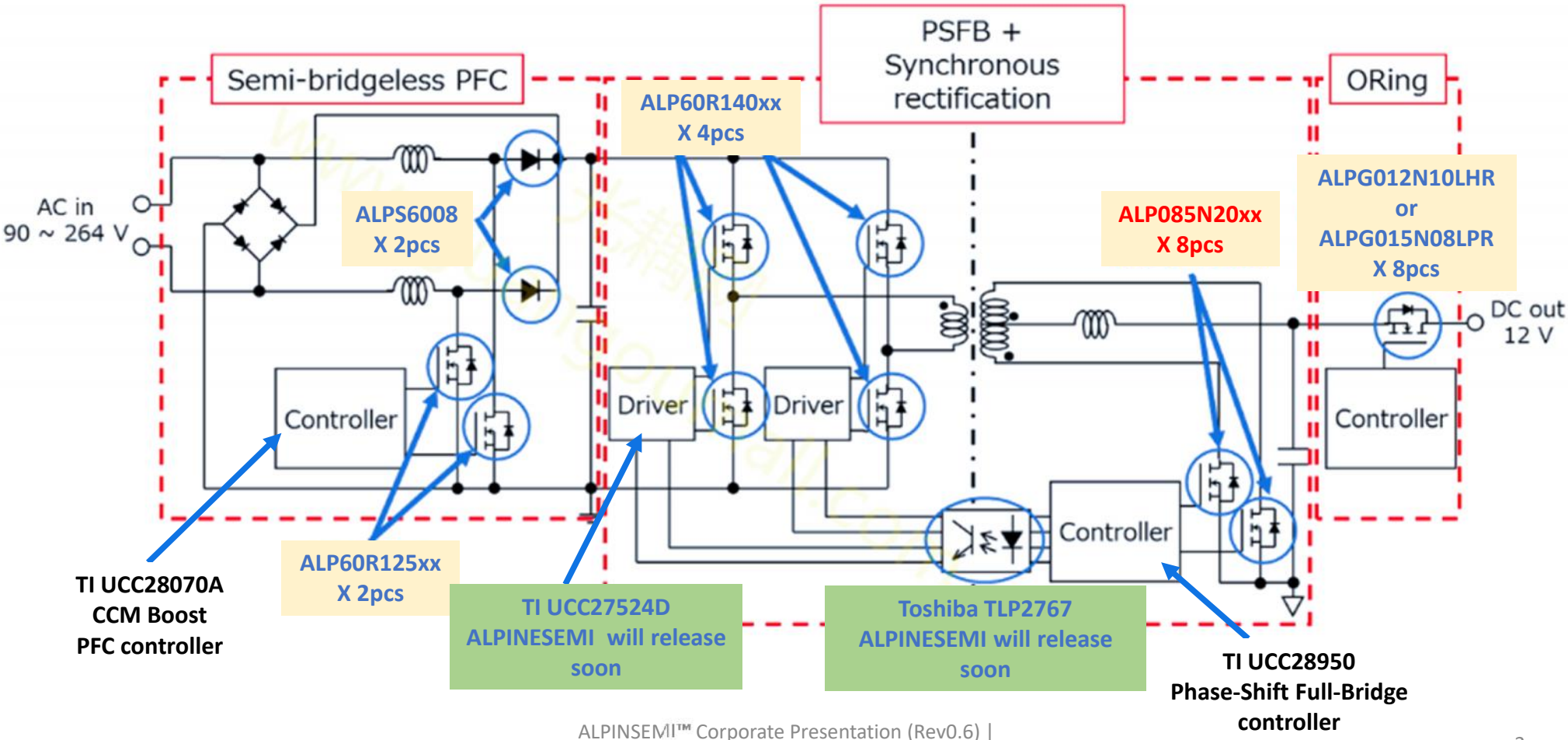
Applications & Solutions

Background for AI Data Center and Networking

The trend towards digitalization and rapid adoption of generative AI is creating exponential growth in global data generation, substantially impacting data center and computing infrastructure requirements. The chips performing the AI acceleration tasks are expected to complete training cycles faster. With each generation of AI processor, the power requirements are increasing to meet the required computational performances. This drives system power requirements up dramatically, creating significant power density challenges. Effective data center and computing designs must, hence, combine high power density with efficiency: our solutions enable green and efficient computing platforms that reduce the overall power consumption in data centers and actively contribute to the decarbonization of our world.

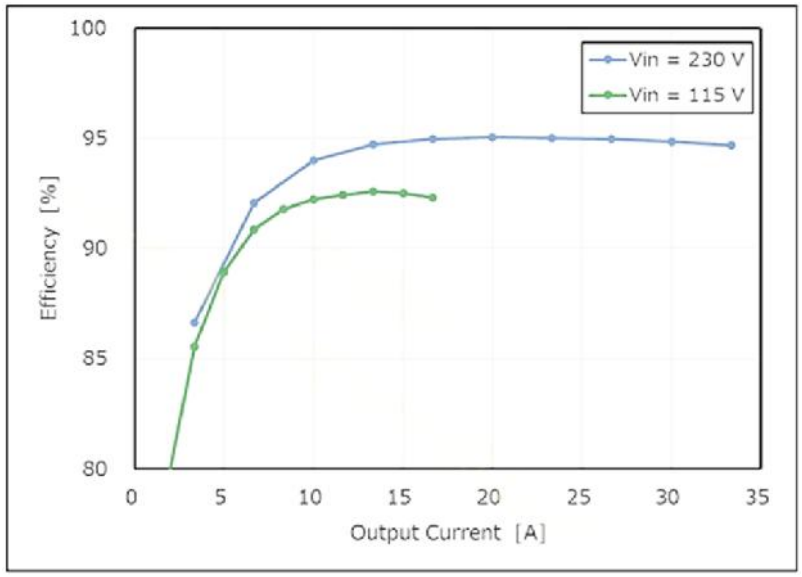


Fantastic Design 1.6KW 48V Networking Power Solution



PSFB, Synchronous Rectification for 48V Power System

Output Data Comparison



Input Characteristic	Parameter	Min	Typical	Max	Unit
AC Input Voltage (effective value)		90		264	V
AC Input Current (effective value)	VinAC = 90 V, Iout = 16.67 A		10	10	A
AC Input Frequency		47		63	hZ
Half-Bridge Passive Power PFC Output Characteristic					
Output Voltage	VinAC = 230 V		390		V
Output Current	VinAC = 115 V		4.5		A
VinAC = 115 V		2.2			
Frequency			60		kHz
Output Characteristic (PSFB, synchronous rectification)					
Output Voltage			48	50.4	V
Output Current	VinAC = 230 V			33.33	A
VinAC = 115 V			16.67	A	
Output Power	VinAC = 230 V			1.6	kW
VinAC = 115 V			0.8	kW	
Output Ripple Vwoltage+	Ta=25℃			480	mV
Frequency			97.05		kHz

Golden Part Number of PSFB, Synchronous Rectification

ALPINESEMI	Product Family	PCB Layout Qty	Remark
ALP60R125xx	Super Junction MOSFET	Semi-bridgeless PFC · 2pcs	N-Channel MOSFET, 600V, 0.125Ω@10V, TO-247/TO-220/TOLL package
ALPS6008	SiC Schottky Diodes	Semi-bridgeless PFC · 2pcs	650V/8A SiC Schottky diodes,TO-220F-2L
ALP60R140xx	Super Junction MOSFET	Primary(PSFB) · 4pcs	N-Channel MOSFET, 600V, 0.14Ω@10V, TO-247/TO-220/TOLL
ALP085N20xx	Si MOSFET	Secondary(PSFB) · 8pcs	N-Channel MOSFET, 200V 0.0085Ω@10V, TO-3P/TO-247/TOLL package
ALPG012N10LHR or ALPG015N08LPR	Si MOSFET 100V/80V	Oring · 4pcs	N-Channel MOSFET, 100V, 1.2mΩ@10V, LFPAK88, /N-Channel MOSFET, 80V, 1.5mΩ@10V, LFPAK56

Key Performance Point of PSFB, Synchronous Rectification

beyond boundaries…

1. Fantastic Efficient Design: Adopting “Semi-bridgeless” and a phase-shifting full bridge (PSFB) topology, this solution focuses on high efficiency, which means reducing power loss and heat growing fast, that is very important for energy conservation and system reliability.
2. Power Factor Correction (PFC): PFC controllers such as Texas Instruments UCC28070A help improve the power factor of the power supply, making it more efficient and environmentally friendly by reducing reactive power in the grid.
3. Advanced Control ICs, such as the UCC28950, demonstrate that this solution can precisely control switch characteristics, thereby achieving better regulation and optimization performance under different loads.
4. Safety Features: By carefully designing the creepage distance and gap distance, as well as components such as fuses and varistors, this power solution has strong protection against overcurrent, surge, and other electrical safety risks.
5. Electromagnetic interference (EMI) considerations: Specific measures are included in the design to handle EMI, which is crucial for maintaining power performance and ensuring that it does not interfere with other electronic devices.
6. Soft start capability: The ability to control the soft start time can prevent inrush currents that may cause system stress or damage, which helps to improve the durability of the power supply and ensure the safety of the final usage environment.
7. Modular design: Based on detailed component layout and specifications, the power supply may be designed to be modular, suitable for various applications, and easy to customize for specific needs.
8. Zero Voltage Switching (ZVS): Adopting ZVS technology can minimize switching losses, improve thermal performance, and is particularly important for high-power applications.
9. Compact design: Providing a 1U rack size indicates a compact design, suitable for space constrained applications.
10. Compliance with safety standards: The document indicates that safety standards have been considered, which is crucial for user safety and regulatory compliance.
11. Thermal management: Incorporating thermal considerations into the design, particularly in the selection and arrangement of components such as capacitors and inductors, demonstrates an understanding of the importance of thermal management in power supply reliability.

48V Best PFC Solution in the Various Market

- Telecom Equipment: provides stable power supply for communication base stations, routers, switches, and other equipment.
- Industrial Automation: suitable for automatic machines and control systems that require precise control and efficient energy management.
- Data Center: Due to its modular and 1U rack size design, it is suitable for use in server racks with limited space.
- Medical Equipment: Medical equipment has extremely high requirements for power safety and reliability, and this solution may meet these requirements.
- Testing and Measurement Equipment: Provide stable power supply for precision equipment to ensure measurement accuracy.
- Advanced Consumer electronics, such as audio amplifiers and high-resolution displays, require high-quality power to maintain performance.
- Backup power system: In uninterruptible power supply (UPS) and emergency power supply systems, ensure that critical systems continue to operate in the event of a power outage.
- Renewable energy systems, such as solar inverters, require efficient power management.

Key Power Discrete Diodes Part Number for Reference In 48V Power System

beyond boundaries…

ALPINESEMI	Product Family	Parameter	Package	Competitive Part Number	Manufacture
ALP20P320	P-channel MOSFET	Vdc -200V, -3.2A	TO252	IRFR9220TRPBF	Infineon/IR
ALPG004N03LPR	N-channel MOSFET	Vdc 30V, 0.4mohm	LFPAK56		
ALP3406LXH	N-channel MOSFET	Vdc 30V, 38mohm	SOT-23	FDN359AN	Onsemi/Fairchild
ALP050N03LSD	N-channel MOSFET	Vdc 30V, 0.5mohm	TO252	IRLR8103VTRPBF	Infineon/IR
ALPG005N04LPR	N-channel MOSFET	Vdc 40V, 0.5mohm	LFPAK56		
ALP034N04LSU	N-channel MOSFET	Vdc 40V, 3.4mohm	PDFN56-8L	BSC050N04LS G	Infineon
ALP014N04LSU	N-channel MOSFET	Vdc 40V, 1.4mohm	PDFN56-8L	BSC014N04LS	Infineon
ALPM05N138H	N-channel MOSFET	Vdc 50V, 1.6ohm	SOT-23	BSS138	Infineon
ALPG007N06LPR	N-channel MOSFET	Vdc 60V, 0.7mohm	LFPAK56		
ALPGT06N009	N-channel MOSFET	Vdc 60V, 0.75mohm	TOLL		
ALP2N7002K	N-channel MOSFET	Vdc 60V, 250mA	SOT-23	2N7002	Onsemi/Fairchild
ALP071N06LSU	N-channel MOSFET	Vdc 60V, 7.1mohm	PDFN56-8L	BSC066N06NS	Infineon
ALPGT06N009	N-channel MOSFET	Vdc 60V, 0.67mohm（Typ）	TOLL	SiJH602E	Vishay
ALPG009N08TR	N-channel MOSFET	Vdc 80V, 0.9mohm	TOLL		
ALP034N08HSU	N-channel MOSFET	Vdc 80V, 3.4mohm	PDFN56-8L	BSC042NE7NS3 G	Infineon
ALPG015N08LPR	N-channel MOSFET	Vdc 80V, 1.5mohm	LFPAK56		
ALPG009N10TR	N-channel MOSFET	Vdc 100V, 0.9mohm	TOLL		
ALPG012N10LHR	N-channel MOSFET	Vdc 100V, 1.2mohm	LFPAK88		
ALPG025N10LPR	N-channel MOSFET	Vdc 100V, 2.5mohm	LFPAK56		
ALP10N050	N-channel MOSFET	Vdc 100V, 5.0mohm	PDFN56-8L	BSC060N10NS3 G	Infineon
ALP020N10HSE	N-channel MOSFET	Vdc 100V, 2.0mohm	TO263	CSD19536KTT	TI
ALP10N30LSV	N-channel MOSFET	Vdc 100V, 20mohm	PDFN33-8L	CSD19538Q3A	TI
ALP021N10HSP	N-channel MOSFET	Vdc 100V, 2.1mohm	TO220	STP310N10F7	STM
ALPM10N123H	N-channel MOSFET	Vdc 100V, 500mA	SOT-23	BSS123	Infineon
ALP045N10HSU	N-channel MOSFET	Vdc 100V, 4.5mohm	PDFN56-8L	MCAC90N10Y-TP	MCC
ALP180N10C	N-channel MOSFET	Vdc 120V, 4.4mohm	TO220	TK72E12N1,S1X(S	TOSHIBA
ALPESLVU2.8-8	TVS Diodes	Vbr 3.0V,600W, 6pf	SOP-8	SLVDA2.8LC	PROTEK
ALPSLC5VD2510L	TVS Diodes	Vbr 6.0V,150W, 0.7pf	DFN-10	PLR0524-T7	PROTEK
ALP15KPA75CA-LF	TVS Diodes	Vbr 83.3V, 15000W	R6	15KPA75CA-LF	PROTEK
ALPSRV05-4-P-SM	TVS Diodes	Vbr 6.0V,500W, 2.5pf	SOT23-6	SRV05-4-P-T7	PROTEK
ALP15KPA60CA-LF	TVS Diodes	Vbr 66.7V, 15000W	R6	15KPA60CA-LF	PROTEK
ALPLC6VP8U	TVS Diodes	Vbr 6.8V, 2000W,8pf	SOP-8	PLC03-6-LF-T13	PROTEK
ALPS712E	TVS Diodes	Vrrm -7V/12V, 600W, 75pf	SOT-23	PSM712-LF-T7	PROTEK