

GE



End-to-End Embedded Power

Product Selection Guide



Critical Power

Who We Are

At GE's Critical Power business we help our data center, computing, communications and digital content-provider customers wrestle with the exponential and insatiable demand for ever-increasing data, communications and processing capacity.

Our customers challenge us to efficiently and reliably power increasing capacity, and to quickly scale better and smarter data infrastructures – with power solutions that keep their energy costs in check and ensure that data and applications flow 24x7.

What We Do

Embedded Power

- Products for AC-DC OEM embedded power for datacom, telecom, medical and industrial applications.
- Products for DC-DC OEM conversion for board mounted power applications in communications, computing, storage, industrial, medical and military markets.
- Full custom capabilities in both AC-DC and DC-DC product lines.

Power Switching

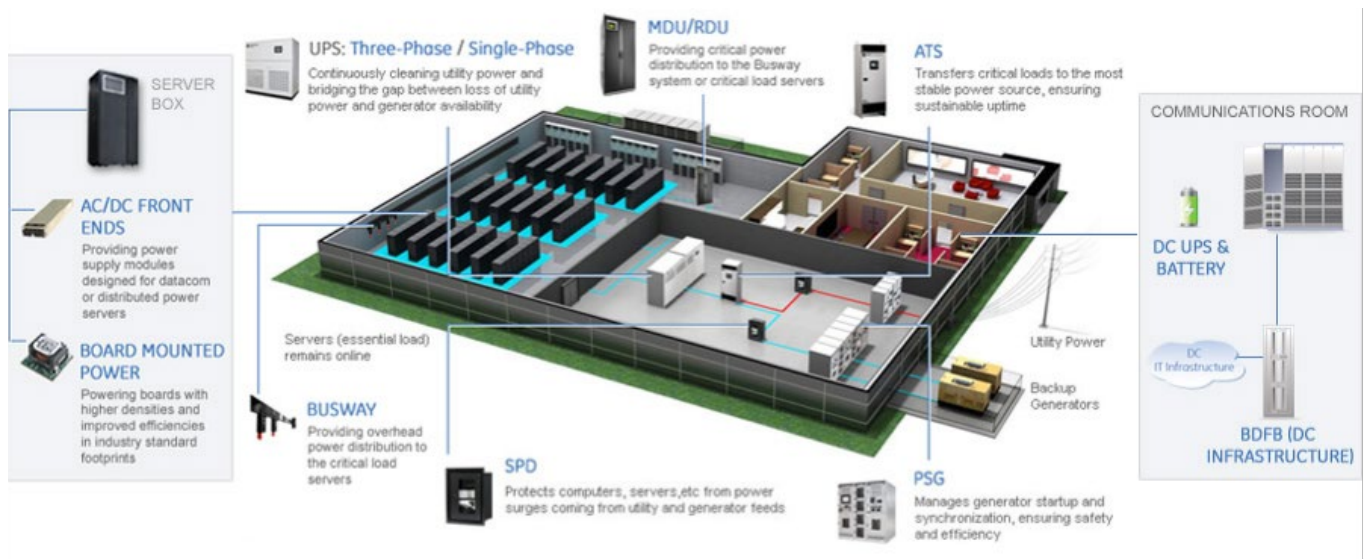
- Products for emergency standby, back-up power supply management and spike or surge protection plus installation and maintenance services for markets including datacenters, hospitals, telecommunications, financial institutions, transportation and industrial applications.

Uninterruptible Power Supplies (UPS)

- Products and services to provide a continuous supply of power and conditioning for mission-critical applications plus global installation and maintenance services in markets including datacenters, hospitals, financial institutions, telecommunications networks, wind energy, transportation and industrial.

DC Energy Systems

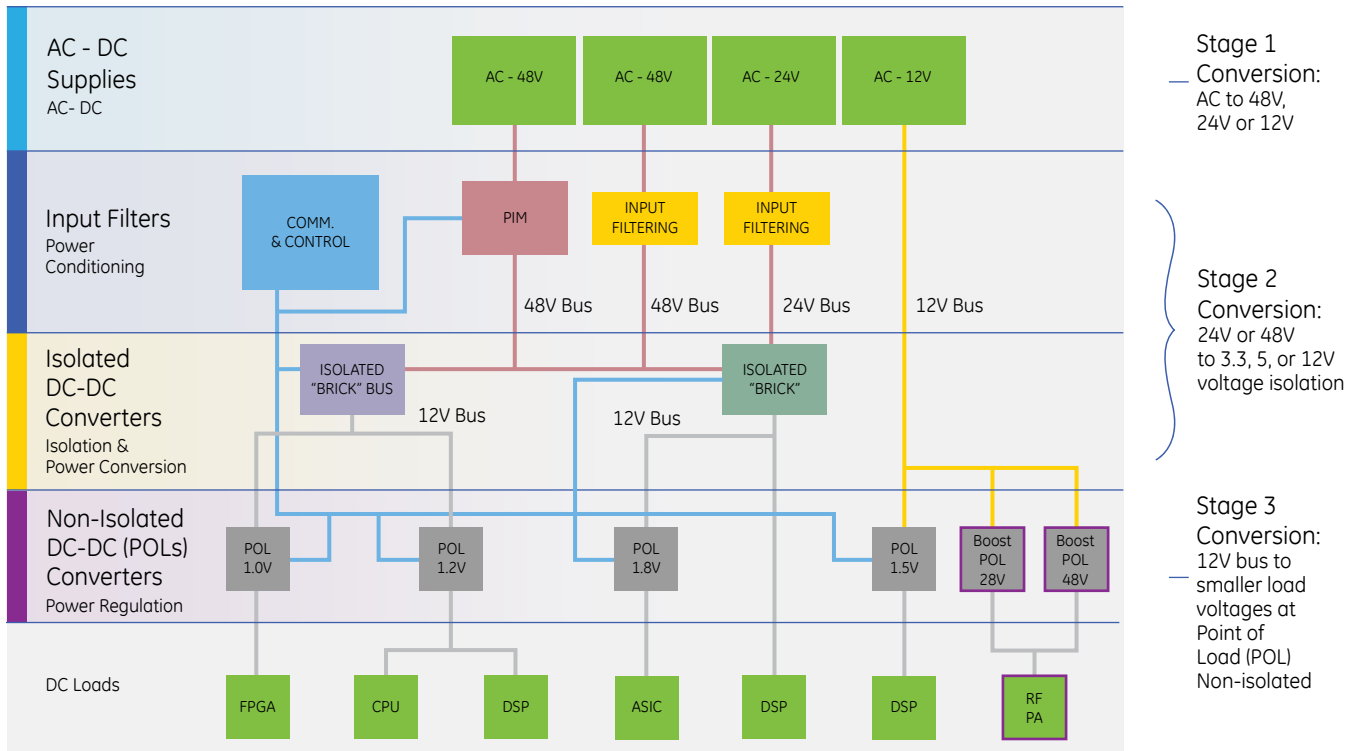
- Solutions for telecommunications, wireless and cable broadband service providers that leverage our extensive experience in turnkey project management, engineering, installation and maintenance services.



GE's Critical Power business brings end-to-end power solutions for a variety of markets including data centers, as in the example above.

Embedded Power Total Power Solution

GE's Critical Power business provides end-to-end power solutions that offer size, efficiency and cost advantages while reducing risk with standards-based power components.



Distributed Power Architecture (DPA)

- The Distributed Power Architecture (DPA) is commonly used on today's circuit pack designs. The DPA has replaced multiple isolated power supplies with one single power supply that feeds multiple point of load (POL) converters. The DPA has brought with it the benefits of lower cost, weight, and space along with a better quality of power. Shown above is a typical DPA architecture.
- In Stage 1 of power conversion, an AC-DC power supply is used to convert a line voltage to a DC bus voltage of 48V, 24V, or 12V to the circuit pack
- If 48 or 24V is fed to the circuit pack, the power rail is then converted to 12V or 5V through an isolated DC-DC converter. This is what we call stage 2 conversion. As a side note, if 12V is fed to the circuit pack as shown on the right side of the circuit pack, the isolated converter used in Stage 2 is not required. Conversion can proceed directly to Stage 3.
- Stage 3, the final conversion stage, is used to reduce the 12V or 5V bus to the various voltages required to drive the individual semiconductor loads.
- Total Efficiency is the product of efficiency from each stage multiplied together:
(Stage 2) 94% * (Stage 3) 93% = 89% Total Efficiency
- DPA is valuable because it
 - Provides customers with standard product solutions
 - High efficiency solutions are available that are competitive with older single-stage solutions
 - Provides greater system flexibility to mix and match load voltages from a single voltage bus

See How Our Line Of Embedded Power Solutions “Fit” Your Design Needs

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Total Cost of Ownership:

GE Critical Power Embedded Power products and solutions create AC-DC and DC-DC power solutions that give back valuable printed circuit board and server cabinet real estate to system designers.

In communications, data center and super computing markets, where exponential growth in processing capacity is matched with growing power requirements, we engineer many of the industry’s most compact and efficient power solutions – designed to take advantage of unusable board or cabinet space.



Vertical Industry Solutions

GE's Critical Power business power solutions are used in thousands of applications across a broad array of global industries:

- Data Centers
- Integrated Solutions
- Broadcasting
- Smart Buildings
- Displays, Lighting and Signage
- Aerospace and Aviation
- Industrial Automation and Process Control
- Medical Devices
- Instrumentation, Test and Measurement
- Robotics

Data Centers

With close to half the total cost of power for a data center being utilized for cooling, the importance of utilizing power products that are highly efficient takes on an ever more critical role. Operators demand not only efficiency and density, they also require their power solutions to be smart. The GE Total Efficiency* (TE) architecture reduces energy loss and lowers cooling costs, as well as addresses issues from the electrical service entrance to the building all the way down to the point of loads on the motherboard. GE Critical Power offers true end-to-end consideration of power optimization based on our proven experience and expertise in batteries, power distribution, surge protection, DC energy systems, AC-DC power supplies, and DC-DC board mounted power. Our goal is to deliver a solution that is more safe, reliable and energy efficient than alternatives from our competitors.

Integrated Solutions

Data Center power infrastructure can be complex to integrate and optimize. Data centers can also consume a large amount of space requiring big amounts of power to be distributed across long distances. In short, the power solutions must be tightly integrated and work seamlessly with the infrastructure, the network and the data equipment to not only help reduce operating costs, but to also help conserve space.

Whatever the requirements, GE engineers can help design a highly efficient and integrated solution that serves the entire data center, not just portions. By engaging with GE to integrate the entire solution, data center operators can be assured that care will be taken to make the entire data center efficient, not just the individual power conversion steps. For example, GE can evaluate the entire power budget and help design solutions that reduce conversion steps that result in unnecessary energy loss. GE can also recommend highly efficient power distribution schemes which result in a lowering of overall distribution energy losses while increasing network reliability.



Vertical Industry Solutions (Cont.)

Broadcasting

TV and radio transmitters are likely to be one of the more costly items that a typical station owns, not only in its initial purchase price, but also due to on-going operational costs. The electrical power efficiency of the transmitter plays an important part in the overall total cost of ownership (TCO) equation. Early digital TV transmitters had a power efficiency in the 15% to 18% range. This means that a 10kW transmitter consumed about 66kW of electrical energy, converting only 10kW of that energy to useful RF and 56kW as waste heat. For digital television, several power amplifier techniques have been developed that dramatically improve efficiency. Broadcast manufacturing industries are taking important steps and investing in new technologies to improve efficiency and reduce the TCO for TV and radio transmission systems. As newer and more efficient solid state RF devices become available, they allow designers to integrate them with other energy saving techniques to further improve overall efficiency. Today, advanced PA technology along with more efficient power supplies, optimized cooling systems and other techniques are combined for optimized solutions. On-going development will lead to even higher efficiency transmission systems in the future.

Smart Buildings

In many of today's smart buildings, power is being shifted from the devices that once required separate AC power, to devices that can both communicate and be powered over a single Power over Ethernet (PoE) cable. Enterprise devices such as badge scanners, 802.11n wireless access points, laptops, RFID device, pan-tilt-zoom security cameras, video phones and point-of-sale terminals take advantage of GE's PoE rectifiers, the CP2000AC54TEP, CP2725AC54TEP and MPR0854FP. These rectifiers provide 48 volt power required for smart building systems. The new solutions have a highly reliable, hot-pluggable and hot-swappable footprint and are easily integrated into switch architectures that support multiple redundant rectifiers on a common DC bus, in various redundancy schemes including N+1 or N+N arrangements. In addition, flexible communication interfaces allow the switch designer to choose the most effective way to communicate with the power supplies. Enterprise customers benefit from a solution specifically created for highly redundant environments, thereby reducing operating and service costs.

- Building Security Systems
- Fire Safety Systems
- HVAC Systems
- Video Surveillance

Displays, Lighting and Signage

With the ever increasing demand for more efficient lighting solutions, LED lighting requires both constant-voltage and constant-current for its products. GE's power modules for lighting applications feature shielding from power disturbances, ruggedized designs, high efficiencies and high reliability in a small form factor. The open frame and conduction cooled fanless AC-DC rectifiers such as CLP0224, CCR0512 are also suitable for outdoor lighting and signage applications, as are the wide-input voltage ProLynx* Point of Load modules.

- Backlighting
- Indoor Lighting
- Outdoor Multimedia Displays
- Solar Lighting
- Digital Signage
- Stadium Lighting

Vertical Industry Solutions (Cont.)

Aerospace and Aviation

Electronics in the aviation industry are rapidly requiring increased capability and complexity while demanding a more compact design. Ranging from cockpit avionics and lighting systems to elaborate multimedia entertainment systems for commercial jets, the need for small, efficient, and reliable power electronics modules is critical. These new systems need a mixture of voltages and control frequencies. As design engineers continue to integrate more functionality into their innovative designs, the ability to support a complex mixture of output voltages will become even more important. Using standard, commercially available power supplies yields space savings, simpler designs, and less cabling when the DC output is fed directly into the backplane as opposed to using an external power supply. GE's SlimLynx* Point of Load modules provide industry-leading power density and efficiency, in a slim and compact form factor.

- Cockpit Avionics
- Aircraft Control Panels
- In-Flight Entertainment (IFE)
- Navigation Systems
- Lighting Systems



Vertical Industry Solutions (Cont.)

Industrial Automation and Process Control

Industrial automation uses information technology and control systems to manage machinery, valves, actuators and assembly lines, therefore reducing the need for human intervention and eliminating costly errors. Power supplies for industrial automation and control applications require a wide operating temperature range and extended shock and vibration testing. GE's power modules offer sequencing, reliability, and remote on/off facilities to ensure continuous efficient operation in the power design. Our ruggedized power supplies meet MIL STD 810F for extended shock and vibration testing, up to 50Grms, offer excellent thermal management up to 105°C, and maintain low ripple/noise operation. The industrial AC-DC rectifiers from GE such as the CAR0424 and CLP0224 deliver 24V as output voltage suited to operate valves and actuators, and work with the wide input ProLynx* Point of Load modules to simplify board design. GE's Tranquell* DIN Rail Series Surge Protective Devices help minimize power-related problems by protecting sensitive automation control equipment from harmful transients.

- Conveyor Systems
- Motor Control Applications
- Factory Automation (PLCs)
- Switching Systems
- Transportation / Railway
- Remote Monitoring Equipment
- Security Systems
- Human Machine Interface

Medical Devices

Sophisticated power solutions for ultrasound, dialysis, and diagnostic equipment require stringent parameters such as low output ripple and EMI noise, which, if left unconditioned, can disrupt the performance and accuracy of the end equipment. These highly sensitive systems require more sophisticated power solutions – a key strength for GE's Critical Power business. Given the sometimes long FDA approval cycles in the healthcare industry, our expertise in powering medical products provides solutions to complex system requirements which enable designers to improve product cycle times while reducing their time-to-market. The DLynx* Point of Load modules efficiently power circuit board electronics and accelerate product development schedules.

- Laboratory and Analytical
- Eye Care Equipment
- Medical Imaging
- Dental Equipment

Instrumentation, Test and Measurement

Test and measurement systems are ubiquitous in electronic devices and maximize the productivity of engineers and technicians responsible for packaged-part characterization in applications ranging from early device research through development, quality verification, and failure analysis. Automated test equipment systems are routinely used in electronics manufacturing operations, the semiconductor industry, and factory environments. GE's DLynx* and DLynx II* Point of Load power modules provide the power designer the latest tools and performance for power, with key features such as increased current, increased accuracy, and extended PMBus™ command set.

- Semiconductor Test Equipment
- Automated Test Equipment
- Oscilloscopes
- Microscopes

Robotics

Power supplies for robotics applications require small size, high levels of shock and vibration resistance and a wide operating temperature range. A high degree of efficiency and reliability is also necessary. The GE DLynx* family provides some of the most compact Point of Load DC-DC converters available with outstanding performance, control, and reliability.

- Manufacturing Systems
- Gantry Robots
- Industrial Robots
- Packaging Systems
- Warehouse Management





ATENÇÃO:
NÃO ABRA QUANDO
ENERGIZADO

TESTE DE RICO
Tecla F4

Controlador Programável

→	7	8	9	↑
←	4	5	6	↓
F1	1	2	3	F3
F2	N/S	0	EV	F4

PST + EXT
- RST

PST + EXT
- RST

PST + EXT
- RST

PST + EXT
- RST

EMERGÊNCIA



NÍVEL BAIXO



TANQUE



Industrial Products

CC1600 (1600W, 52Vout) AC-DC Fanless, Sealed, Potted & Conduction Cooled

Features

- Compact form factor with 16W/in³ density
- 11.52" (L) x 5.29" (W) x 1.83" (H) (includes connector length)
- Rugged for outdoor and indoor applications
- Standalone and mountable
- Input and Output Connector block for easy connections
- Efficiency greater than 94% (for high line)
- 1600W from nominal 200-240Vac @ 55C baseplate
- 1200W from nominal 120-120Vac @ 45C baseplate
- Output voltage programmable from 42V-58Vdc
- Floating output for positive and negative polarity
- DC-OK external LED signal
- Over-temp protection, Under voltage, Over-voltage protections
- Remote ON/OFF control of the main output via RS485
- Precision measurement reporting of input/output voltage and current
- Power factor correction meets EN/IEC 61000-3-2 and EN60555-2
- Redundant, parallel operation with active load sharing
- UL ,CSA C22.2 , VDE/TUV compliance
- CE & RoHS2 compliant
- ESD Level4: 8KV_{contact}/15KV_{air}
- Lightning surge Level4: 4KV_{common}/2KV_{diff}



Comcode: CC1600AC52SXZ01A

Applications:

- Outdoor Lighting
- Telecom
- Broadcast
- Laser

Industrial Products (Cont.)

CC3500

The CC3500AC52FB family of power supplies have an extremely wide programmable output voltage capability. Featuring high-density, fully enclosed, fan-less conduction-cooled packaging, it is designed for minimal space utilization and is highly expandable for future growth. This completely silent power supply incorporates both RS485 and dual-redundant I2C communications busses that allow it to be used in a broad range of applications.



Feature-set flexibility makes this power supply an excellent choice for applications requiring operation over a wide output-voltage range. It's robust design is intended for rugged applications where temperature extremes may be experienced. Electrical user interfaces are designed for extreme simplicity and quick installation.

MODEL	INPUT	COOLING	INPUT RANGE(V)	VOUT	IOUT	EFFICIENCY
CC3500AC52FB	AC Rear, Blind Mate	Fanless Conduction	80-185V 185-265V	18-53V	Low Line 28.3/28.9A @ 52V High Line 66/67.3A @ 52V Folds Back below 42V	96%
CC3500AC52FB-ES	AC Rear, Direct Wire	Fanless Conduction	80-185V 185-265V	18-53V	Low Line 28.3/28.9A @ 52V High Line 66/67.3A @ 52V Folds Back below 42V	96%
CC3500AC52FB-EC	AC Rear, C19	Fanless Conduction	80-185V 185-265V	9518-53V	Low Line 28.3/28.9A @ 52V High Line 66/67.3A @ 52V Folds Back below 42V	96%

Features and Benefits

- Conduction Cooled Fan-less Operation
- Ruggedized for Temperature Extremes
- Silent Running
- Wide Range Output
- Can be Paralleled for Load Sharing
- Designed for Adaptation to Cold Plate or Heat Sink
- Blind-Mate version
- Simple Screw Terminal Version
- Ability to Charge Batteries
- PMBus/I2C or RS485 Communications Capable
- High Efficiency 95%+

Industrial Products (Cont.)

Hornet Voltage Regulator

Hornet family of non-isolated board mounted switching regulators are easy to use, fully integrated power modules for demanding industrial conditions. With highly accurate output voltage setting, high efficiency, exceptional power density, extended temperature range for extreme environments and proven high reliability, Hornet switching voltage regulators are well suited for industrial applications.



Hornet series includes step-down/buck regulators that deliver 11 to 108W maximum power and step-up/boost regulators that deliver 65W maximum power.

Step Down SMT

MODEL	INPUT RANGE(V)	OUTPUT RANGE(V)	TEMP. RANGE / MIL. ST 810F	MAX POWER (W)	MAX CURRENT (UP TO) (A)	FOOTPRINT (MM)	EFFICIENCY (UP TO)
IND016	12V±20%	0.6-5.5	-40 - 105°C / 40G	16.5	3	12.2x12.2	94%
IND033	12V±20%	0.6-5.5	-40 - 105°C / 40G	33	6	12.2x12.2	94%
IND066	12V±20%	0.6-5.5	-40 - 105°C / 40G	66	12	12.2x12.2	95%
IND072	12V±20%	0.6-3.3	-40 - 105°C / 40G	72.6	20	12.2x12.2	94%
IND080	12V±20%	0.6-2.0	-40 - 105°C / 40G	80	40	13.5x33	92%
IND027W	12V±20%	3.0-9.0	-40 - 105°C / 40G	27	3	11.4x20.3	96%
IND045W	12V±20%	3.0-9.0	-40 - 105°C / 40G	45	5	11.4x20.3	94%
IND108W	12V±20%	3.0-9.0	-40 - 105°C / 40G	108	12	13.5x33	95%
IND027XW	24V±20%	3.0-18.0	-40 - 105°C / 40G	27	3	11.4x20.3	96%
IND045XW	24V±20%	3.0-18.0	-40 - 105°C / 40G	45	5	11.4x20.3	96%
IND108XW	24V±20%	3.0-18.0	-40 - 105°C / 40G	108	12	13.5x33	97%

Step Down Through Hole

MODEL	INPUT RANGE(V)	OUTPUT RANGE(V)	TEMP. RANGE	MAX POWER (W)	MAX CURRENT (A)	FOOTPRINT (MM)	EFFICIENCY (UP TO)
IND011SIP	12V±15%	0.6-5.5	-40 - 85°C	11	10	8.1x10.4	93%
IND060SIP	12V±15%	0.6-5.5	-40 - 85°C	60	2	8.4x10.4	93%

Boost / Step Up SMT

MODEL	INPUT RANGE(V)	OUTPUT RANGE(V)	TEMP. RANGE	MAX POWER (W)	MAX CURRENT (A)	FOOTPRINT (MM)	EFFICIENCY (UP TO)
ND065BHV	12V±20%	32-54	-40 - 85°C	65	4.06	11.4x27.9	94.5%
IND065BLV	12V±20%	16-34	-40 - 85°C	65	2.03	11.4x27.9	94%

Industrial Products (Cont.)

Hornet Voltage Regulator (Cont.)

Features and Benefits

- Suitable for extreme environments (-40°C to 105°C extended temperature range, operating shock per Mil Std. 810F to ±40G, and operating vibration per Mil Std. 810F for selected SMT parts)
- High reliability (qualified with 1000h High Temperature Operating Bias (HTOB), 1000h 85RH/85°C Temperature Humidity Bias (THB), 700 cycle -40 to 125°C Thermal Cycling (TC) testing.)
- Suitable for conformal coating with dip or vapor deposition. Conformal coating can provide the protection to meet Salt Fog Test per IEC 60068-2-52 (Severity 3) and Mixed Gas Flow Test per Telcordia GR-3108 Outdoor Levels
- Outstanding transient response for powering demanding loads
- High efficiency (up to 97%)
- Easy to use complete modules enabled fast design cycle and rapid TTM (Time To Market)
- Planned availability for a minimum of 10 years from product launch
- 3 year warranty, backed by GE's proven quality processes

Applications

Automation equipment, factories and manufacturing, water treatment facilities, energy exploration and refineries, building and process controls systems and automation equipment, control cabinets and rooms, conveying equipment, vending machines, material handling and packaging equipment, chemical processing plants, HVAC (heating, ventilating and air conditioning) equipment, machinery and irrigation technology.

Industrial Products (Cont.)

Resilient 3000

The RESILIENT 3000 power supply has extremely robust capability yet is easy to use, economical and has low up-front cost. Featuring high-density, ruggedized enclosure, it features an oversize high reliability fan, conformal coating and it is designed to operate over a wide temperature range. It can function either as a stand-alone power supply or it can be connected in parallel with other power supplies and managed by RS485.



Feature-set flexibility makes this power supply an excellent choice for applications requiring operation over a wide output-voltage range or for charging batteries. Its solid design is intended for rugged applications where poor AC grid conditions and temperature extremes may be experienced. The electrical user interfaces are designed for extreme simplicity for quick installation and turn-up.

MODEL	INPUT	COOLING	INPUT RANGE (V)	VOUT	IOUT	EFFICIENCY
EP3000AC48INZ	AC Rear, C19	Fan, Front to Back Airflow	90-290V	48-58V	55.5A @ 54V	95%

Features and Benefits

- Low Cost of Ownership
- Oversized high reliability fan
- Conformal Coated for use in dirty environments
- Ruggedized for Temperature Extremes
- Ruggedized for dirty AC grid conditions
- Wide Range Output
- Can be Paralleled for Load Sharing
- Simple Installation, Simple Operation
- Ability to Charge Batteries
- RS485 Communications Capable
- High Efficiency 95%+

High Voltage DC Power Family

Introducing a new family of High Voltage DC Power ready for work in the most demanding Data, Computing and Industrial applications. The family supports those applications where power density and efficiency is most critical. Standards based 380V power provides the energy needed while minimizing infrastructure costs by reducing power distribution costs and enabling energy to travel greater distances without incurring voltage drop. Designers will appreciate the density gains that using less copper will facilitate.

The CC12500 and CH12500 rectifier convert readily available 3-phase Industrial power to 380V DC for distribution to your system. These rectifiers are highly efficient and are optimized for being configured into dense power distribution solutions. For example, both power supplies are completely fanless and conduction cooled. The CH12500 is designed to be mated to a customer supplied cold plate or a finned heatsink kit is available for field installation allowing customers to use their own system fan for cooling. On the other hand, customers who already have liquid cooling in their application will appreciate the CC12500 which has a fully integrated liquid cooled built in.

The downstream component of the family consists of high voltage DC Power Entry Modules which convert the 380V DC power to 48V for use with most of today's data and Industrial equipment. We call this family the "CP-short" because it contains the familiar topology used in the CP product line which has proven so reliable, but it is packaged in a much more dense 280mm footprint. These fan cooled modules are not only compact, they are versatile as well. First, they are ready for future migration to 380V because they can be power by Universal AC Line voltage or by 380V DC input. They are ready to switch over from AC to High Voltage DC whenever you are, thereby minimizing your HVDC upgrade costs. They add further versatility by having airflow direction agility. They support front to back or back to front airflow direction. The model names are CP3000HV54TEZ-FSG (back to front airflow) and CP3000HV54TEZ-FSGR (front to back airflow).

Finally, the family is being rounded out by adding 380V DC board mounted bus converter modules in the near future.



CC12500 and CH12500 Rectifiers Features and Benefits

- 12.5kW, 360-380V DC Output, 96% Efficiency
- AC Input 3-wire, 3ph-400/480VAC
- Hot Plug, Hot Swap, with Redundant Safety Interlock
- Conduction Cooled with Optional Finned Heatsink
- Water Cooled with Dripless Quick Disconnect

- High Resistance Mid-Point Ground (HRMG) ± 190 VDC Output
- Internal HRMG Fault detector circuit
- RS-485 Communication Protocol
- Integrated heatplate, ready for mounting to cold wall

CP3000 "Short" Features and Benefits

- 3.0kW, 48-56V DC Output, 97% Efficiency
- Dual Rated AC or HVDC Input
- AC Input, 1ph, 80-264VAC
- DC Input, 180-400VDC
- Input Connector Rated for Both AC and HVDC

- Hot Plug, Hot Swap
- Super Compact Design
- Front to Back or Back to Front Airflow
- PMBus/I2C Communications

MODEL	INPUT	COOLING	INPUT RANGE (V)	VOUT	IOUT	EFFICIENCY
CH12500H3C380TEZ-GM	AC REAR	CONDUCTION	360-509VAC 3PH D	365-400VDC	33A	96%
CC12500H3C380TEZ-GM	AC REAR	WATER	360-509VAC 3PH D	365-400VDC	33A	96%
CP3000HV54TEZ-FSG	"AC or DC, Front, Anderson Saf-D-Grid"	FAN, BACK TO FRONT AIRFLOW	"90-264VAC 1PH or 180-400VDC"	48-56VDC	55A	96%
CP3000HV54TEZ-FSGR	"AC or DC, Front, Anderson Saf-D-Grid"	FAN, FRONT TO BACK AIRFLOW	"90-264VAC 1PH or 180-400VDC"	48-56VDC	55A	96%

AC-DC and DC-DC Power Supplies

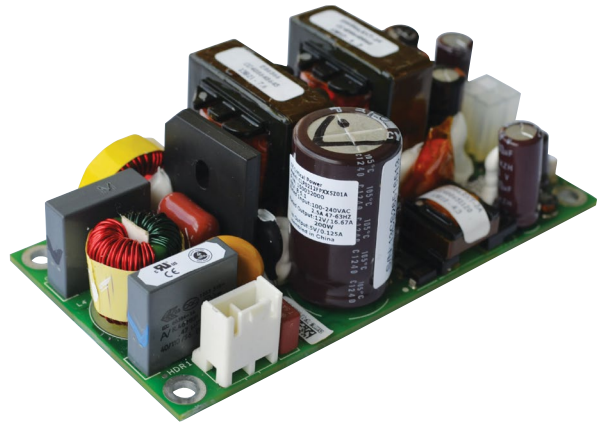
Product Matrix

	MODEL	NOMINAL OUTPUT (NEGATIVE)	INPUT	DIGITAL COMM.	PROFILE	NOMINAL INPUT	MAX OUTPUT	200W	500W	1KW	1.5KW	2KW	2.5KW	3KW	3.5KW
OPEN FRAME AC-DC POWER SUPPLIES	CLP0112FP	12V	Top	Not Available	Open Frame	1PH (110/220vac)	150W	■							
	CLP0205FP	5V	Top	Not Available	Open Frame	1PH (110/220vac)	200W	■							
	CLP0212FP	12V	Top	Not Available	Open Frame	1PH (110/220vac)	200W	■							
	CLP0228FP	28V	Top	Not Available	Open Frame	1PH (110/220vac)	200W	■							
	CLP0224FP	24V	Top	Not Available	Open Frame	1PH (110/220vac)	200W	■							
	CLP0412FP	12V	Top	Not Available	Open Frame	1PH (110/220vac)	450W	■							
	CLP0424FP	24V	Top	Not Available	Open Frame	1PH (110/220vac)	450W	■							
	CLP0448FP	48V	Top	Not Available	Open Frame	1PH (110/220vac)	450W	■							
	FLP0412FP	12V, 24V 5V, 3.3V	Top	Not Available	Open Frame	1PH (110/220vac)	450W	■							
	CLP0512FP	12V	Top	Not Available	Open Frame	1PH (110/220vac)	450W	■							
AC-DC AND DC-DC FRONT ENDS (12 VOUT)	CAR0512FP	12Vdc	Rear	I2C/PMBus	1U	1PH (110/220vac)	500W	■							
	MPR0712TE	12Vdc	Rear	I2C/PMBus	1U	1PH (110/220vac)	700W	■							
	SLP0712TE	12Vdc	Front	I2C/PMBus	1U	1PH (110/220vac)	750W	■							
	CAR0812FP	12Vdc	Front	I2C/PMBus	1U	1PH (110/220vac)	850W	■							
	CAR0812DC	12Vdc	Front	I2C/PMBus	1U	48Vdc	850W	■							
	CAR1212DC	12Vdc	Rear	I2C/PMBus	1U	48Vdc	1200W	■							
	CAR1212FP	12Vdc	Rear	I2C/PMBus	1U	1PH (110/220vac)	1250W	■							
	CAR1612FP	12Vdc	Front	I2C/PMBus	1U	1PH (110/220vac)	1600W	■							
	CAR1812FP	12Vdc	Front	I2C/PMBus	1U	1PH (110/220vac)	1800W	■							
	CAR2012TE	12Vdc	Front	I2C/PMBus	1U	1PH (110/220vac)	2000W	■							
	CAR2512TE	12Vdc	Front	I2C/PMBus	1U	1PH (110/220vac)	2500W	■							
	CAR2512DC	12Vdc	Front	I2C/PMBus	1U	48Vdc	2500W	■							
	CAR3012FP	12Vdc	Front	I2C/PMBus	1U	1PH (110/220vac)	3000W	■							

Open Frame Power Supply

CLP Open Frame Power Supply

In a 2 x 4 inch footprint smaller than an iPhone®, the 12Vdc single-output CLP0212 open frame power supply delivers 80 PLUS® Gold energy efficiency. Half the size of other power supplies in this segment, the CLP series is specifically designed to handle power challenges associated with tight space and low airflow. Offering a leading 18W/in³ power density in a 1U high, fanless form factor, the CLP series addresses a broad range of applications in new products from communications, computing and data storage original equipment manufacturers.



MODEL	SIZE (W x L x H)	INPUT VOLTAGE	OUTPUT VOLTAGE	OUTPUT CURRENT	EFFICIENCY
CLP0112FP	2" x 4" x 1.4"	90-264V	12V	150W	90%
CLP0205	2" x 4" x 1.4"	90-264V	5V	200W	90%
CLP0212FP	2" x 4" x 1.4"	90-264V	12V	200W	90%
CLP0224FP	2" x 4" x 1.4"	90-264V	24V	200W	90%
CLP0228	2" x 4" x 1.4"	90-264V	28V	200W	90%
CLP0412FP	3" x 5" x 1.4"	90-264V	12V	450W	91%
CLP0424FP	3" x 5" x 1.38"	90-264V	24V	450W	91%
CLP0428FP	3" x 5" x 1.38"	90-264V	48V	450W	90%
CLP0512FP	3" x 6" x 1.38"	90-264V	12V	550W	90%
FLP0412FP	3" x 7" x 1.45"	90-264V	12V/24V/5V/3.3V	450W	90%

Metal cover for the Open Frame CLP products are available. Please contact your GE Sales Team for more details.

1 Breakthrough Compact Design
GE's breakthrough design is 2x4. Less space but more power.

2 Reliable Fanless Cooling Feature
Conduction and convection cooling. No moving parts to fail.

3 High Power Density Solution
It can power a small router or a large outdoor billboard.

4 Wide Operating Temp For Harsh Conditions
Extended operating temperature range of -40C to 70C.

5 High Efficiency
Higher efficiency leads to lower operating expenses.

6 Integrates Easily Into Your Product Design
Compatible, compact, flexible and safe. Easily mounted in chassis.

Front End Power Supplies



CAR0812FP

- 850 watts / 12Vout
- Efficiency of 92%
- Power density of 18W/in³
- Universal AC input range with active PFC
- 8.73 x 3.38 x 1.65" / 221.7 x 85.9 x 41.9mm
- I²C / PMBus™ digital interface

CAR0812DC

- 850 watts / 12Vout
- Efficiency of 92%
- Power density of 18W/in³
- 36 – 75Vdc input range
- 8.73 x 3.38 x 1.65" / 221.7 x 85.9 x 41.9mm
- I²C/PMBus™ digital interface

CAR1212FP

- 1,200 watts / 12Vout
- High efficiency operation - up to 89%
- Power density of 16W/in³
- Universal AC input range with active PFC
- 11.20 x 4.00 x 1.65" / 284.5 x 101.6 x 41.9mm
- I²C / PMBus™ digital interface

CAR1212DC

- 1,200 watts / 12Vout
- High efficiency operation - up to 90%
- Power density of 16W/in³
- 36 - 75Vdc input range
- 11.20 x 4.00 x 1.65" / 284.5 x 101.6 x 41.9mm
- I²C / PMBus™ digital interface

CAR1612FP

- 1,600 watts / 12Vout
- Efficiency of 94.5%
- Power density of 20W/in³
- Universal AC input range with active PFC
- 12.45 x 4.00 x 1.65" / 316.23 x 101.6 x 41.9mm
- I²C / PMBus™ digital interface
- Mates with ACE164 shelf

CAR1812FP

- 1,800 watts / 12Vout
- Efficiency of 94%
- Power density of 22W/in³
- Universal AC input range with active PFC
- 12.45 x 4.00 x 1.65" / 316.23 x 101.6 x 41.9mm
- I²C / PMBus™ digital interface
- Mates with ACE184RUW shelf

CAR2012TE

- 2,000 watts / 12Vout
- Efficiency of 94.5%
- Power density of 22W/in³
- Universal AC input range with active PFC
- 12.89 x 4.00 x 1.61" / 327.46 x 101.6 x 40.89mm
- I²C / PMBus™ digital interface
- Mates with ACE184RUW shelf

CAR2012DC

- 2,500 watts / 12Vout
- High efficiency operation - up to 92%
- Power density of 25W/in³
- 36-75Vdc input range
- 15.38 x 4.00 x 1.65" / 390.5 x 101.6 x 41.9mm
- I²C / PMBus™ digital interface

Front End Power Supplies (Cont.)



CAR2512TE

- 2,500 watts / 12Vout
- Efficiency up to 94%
- Power density of 25W/in³
- Universal AC input range with active PFC
- 15.38 x 4.00 x 1.65" / 378.0 x 102.0 x 41.9mm
- I²C / PMBus™ digital interface

CAR0424FP

- 400 watts / 24Vout
- Efficiency up to 91% peak
- Top side fan
- Acoustic noise 45dbA
- 8.1 x 3.94 x 1.58" / 205.7 x 100.0 x 40.1mm
- Class B EMI (Conducted & Radiated)

CAR2024FP

- 2,000 watts / 24Vout
- High efficiency operation - up to 90.5%
- Power density of 21W/in³
- Universal AC input range with active PFC
- 14.25 x 4.00 x 1.65" / 316.2 x 101.6 x 41.9mm
- I²C / PMBus™ digital interface
- Mates with ACE204 shelf

CAR1248FP

- 1,200 watts / 48Vout
- High efficiency operation - up to 91%
- Power density of 19W/in³
- Universal AC input range with active PFC
- 11.20 x 3.44 x 1.65" / 284.5 x 87.4 x 41.9mm
- I²C / PMBus™ digital interface
- Mates with ACE125 shelf

CAR3012TE

- 3,000 watts / 12V out
- Efficiency - up to 96%
- Power density of 30W/in³
- 15.38 x 4.00 x 1.65" / 378.0 x 102.0 x 41.9mm
- I²C / PMBus™ digital interface

CAR2548FP

- 2,500 watts / 48Vout
- High efficiency operation - up to 91%
- Power density of 27W/in³
- Universal AC input range with active PFC
- 14.25 x 4.00 x 1.65" / 362.0 x 102.0 x 40.9mm
- I²C / PMBus™ digital interface
- Mates with ACE254 shelf

CAR2548TN

- 2,500 watts / -48Vout
- High efficiency operation - up to 91%
- Power density of 27W/in³
- Universal AC input range with active PFC
- 14.25 x 4.00 x 1.61" / 362.0 x 102.0 x 40.9mm
- I²C / PMBus™ digital interface
- Mates with ACE254 shelf

CAR2548DC

- 2,500 watts / 48Vout
- High efficiency operation - up to 91%
- Power density of 27W/in³
- 36-75Vdc input range
- 14.25 x 4.00 x 1.61" / 362.0 x 102.0 x 40.9mm
- I²C / PMBus™ digital interface
- Mates with ACE254 shelf



Fanless Conduction Cooled Front Ends

The industry's first half U height fanless AC-DC rectifier offers an alternative means for thermal management that lends itself to conduction, convection, forced air or even liquid cooling applications. This shift towards alternative cooling capability allows system engineers to innovate and explore new thermal-mechanical options opening up considerable new opportunities. Eliminating fans reduces unwanted audible noise while synonymously increasing system MTBF (mean time between failure) and extending system reliability. In a sleek form factor, the CCR0512 reduces the real estate needed for use in hard-to-reach applications and low clearance areas.

With a universal AC input, this 12Vdc, 500W output fanless solution supports N+N redundant capability and current sharing allowing end system scalability or fault tolerant operation. The CCR0512 is the perfect low-to-mid power platform geared for 12V applications with low profile constraints such as networking, test equipment and thin client server applications.

CCR0512

- Conduction cooling for fanless operation
- Compact 0.5U Profile
- Overall Dimensions: 0.877" x 3.35" x 8.790" / 223.2 x 85.1 x 22.3mm
- 12Vdc, 500W Output
- 10.8 to 13.2Vdc Output Voltage Programmability
- Universal AC input with Active PFC
- Hot Plugability
- Redundant Parallel Operation
- Active Load Sharing (Single Wire)
- Analog, I²C or PMBus™ means of control and monitoring
- Remote On/Off
- Remote Sense (up to 0.25V of total compensation)
- No Minimum Load Requirements
- Three visual LED Indicators; Input, Output and Fault status
- 3.3 or 5.0Vdc 2A Standby Output
- UL certified to UL60950-1, CAN/CSA⁺ C22.2
- No.60950-1 and EN60950-1(VDE⁺ 0805-1) Licensed
- CE mark meets 2006/95/EC directives
- ISO 9001 and ISO 14001 certified manufacturing facility
- Compliant to RoHS EU Directive 2002/95/EC
- CCR0512FPS: Stand Alone version with AC/DC Terminals



Rack Mount Version

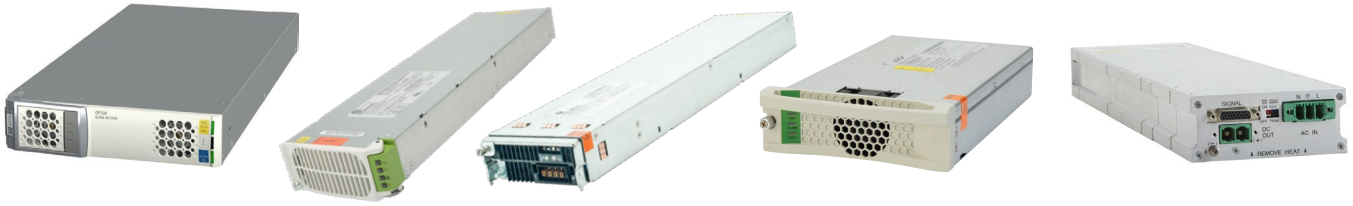


Stand Alone Version

CC1600

- Potted, fan-less and conduction cooled
- 11.52" L x 5.29" W x 1.83" H
- 1600W @ 200V - 240Vac and baseplate temp < 50 ° C
- Remote ON/OFF control of the main output using R5485
- Supports redundant and parallel operation

Rectifiers and Converters



EP1000TE / EP1600TE

- 1,000 or 1,600 watts / 54V out
- High efficiency operation - up to 95%
- Power density up to 27W/in³
- Universal AC input range with active PFC
- 8.19 x 4.58 x 1.58" / 208.0 x 116.5 x 40.2mm
- RS485 communication interface
- Mates with SPS shelf family
- RoHS6

CP3000TE / CP3500TE / CC3500

- 3,000, 3,500 / 54V out
- Higher power, same footprint
- High efficiency operation - approaching 97%
- Power density of up to 40W/in³
- 13.85 x 4.00 x 1.63" / 356.0 x 101.6 x 41.4mm
- I2C and RS485 communication interface
- "CP" mates with Higher Power CPL shelf family

CP2000DC / CP2500DC

- 2,000 or 2,500 watts / 54V out
- 40-60Vdc input range
- High efficiency operation - up to 92%
- Power density up to 27.6W/in³
- 13.85 x 4.00 x 1.63" / 352.0 x 101.6 x 41.4mm
- I2C and RS485 digital interface
- Mates with CPL PEM shelf

CP3000TE-F / CP2500PE-F

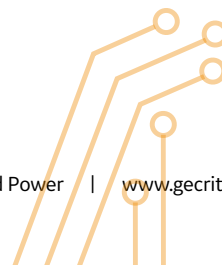
- Front Connector AC Rectifier / DC Converter Pair
- Rectifier 3,000W, Front AC Input, 54V out
- Converter 2,500W, Front DC Input, 54V out
- Slot Swappable
- 17.207 x 4.00 x 1.63" / 437.06 x 101.6 x 41.4mm
- I2C communication interface

CP2000TE / CP2500TE / CP2725TE

- 2,000, 2,500 or 2,725 watts / 54V out
- High efficiency operation - approaching 97%
- Power density of up to 30W/in³
- 13.85 x 4.00 x 1.63" / 356.0 x 101.6 x 41.4mm
- I2C and RS485 communication interface
- Mates with CPL shelf family

GP100R / GP100M / GP100R-IN

- Compact Three Phase Delta Rectifier
- 6,000W, 54V out, RS485 Comm (GP100R)
- 6,000W, 54V out, PMBus™/I2C Comm (GP100M)
- 6,000W, 48V out, RS485 Comm (GP100R-IN)
- 1 RU form factor, 12kW/RU in 19in
- 17.53 x 7.975 x 1.61" / 445.26 x 202.5 x 40.89mm
- High efficiency operation - approaching 97%
- I2C and RS485 communication interface
- Mates GP shelf family



Energy Systems

SPS Platform

- 48V Embedded or available rectifier shelf
- Mates with EP1000/1600 rectifier modules
- 1U High 19" / 483.0mm rack mount
- Maximum 10.37" / 264.0mm depth
- Adjustable mounting ears (flush or mid-mount)
- Rear / front panel DC distribution options
- Breaker and fuse panel options
- Optional Pulsar Edge Controller
- Advanced Rectifier (and battery) management



CPL Platform

- 48V rectifier shelf
- I²C or RS485 control options
- Mates with CP2000TE / CP2500TE / CP2725TE rectifier modules
- 1U High 19" / 483.0mm rack mount
- Maximum 17.21" / 487.0mm depth
- Adjustable mounting ears (flush or mid-mount)
- Rear / front panel DC distribution options
- Breaker and fuse panel options
- Optional Pulsar Edge Controller
- Advanced Rectifier (and battery) management



The CP2000TE and CP2725TE are both 80 PLUS Platinum certified in a compact 1U footprint with up to 40W/in³. The CPL is a highly flexible solution, which has two communications protocols on board every power supply increasing its flexibility for use in embedded OEM applications or in external rackmounted applications. The I²C protocol used in OEM embedded applications helps fully integrate the power supply into a platform and the RS485 communications using Galaxy Protocol allows standalone systems full alarm and communication capability, as well as battery management. The CPL provides AC to 48V power conversion downstream of an AC UPS system or as the primary power conversion step in DC UPS systems with direct connected battery backup. Versions are also available with PoE isolation.

GP Platform

- 48V rectifier shelf
- I²C or RS485 control options
- Mates with GP100 48V rectifier modules
- 3ph Delta AC Power (Neutral not Required)
- 1U High 19" / 483.0mm rack mount
- Maximum 21.47" / 62.738mm depth
- Optional Pulsar Edge Controller



Power Shelves



ACE125

- 48V front end or rectifier shelf
- Mates with CAR1248 modules
- 5 bay power shelf
- 5 x 1,200W power modules
- 4,800W N+1 redundant
- 6,000W total power
- 1U High 19" / 483.0mm rack mount
- 14.98" / 380.5mm depth
- Class B emissions with fully-populated shelf

ACE254

- 48V front end or rectifier shelf
- Mates with CAR2548
- 4 Bay power shelf
- 4 x 2,500W power modules
- 7,500W N+1 redundant
- 10,000W total power
- 1U High 19" / 483.0mm rack mount
- 18.07" / 459.0mm depth
- Class B emissions with fully-populated shelf

ACE164

- 12V front end or rectifier shelf
- Mates with CAR1612 modules
- 4 bay power shelf
- 4 x 1,600W power modules
- 4,800W N+1 redundant
- 6,400W total power
- 1U High 19" / 483.0mm rack mount
- 16.4" / 416.6mm depth
- Class A emissions with fully-populated shelf

ACE204

- 24V front end or rectifier shelf
- Mates with CAR2024FP modules
- 4 bay power shelf
- 4 x 2000W power modules
- 6000W N+1 redundant
- 8,000W total power
- 1U High 19" / 483.0mm rack mount
- 18.07" / 459.0mm depth
- Class B emissions with fully-populated shelf

ACE184

- 12V front end or rectifier shelf
- Mates with CAR1812 modules
- 4 bay power shelf
- 4 x 1,800W power modules
- 5,400W N+1 redundant
- 7,200W total power
- 1U High 19" / 483.0mm rack mount
- 16.4" / 416.6mm depth
- Class A emissions with fully-populated shelf

Isolated DC-DC Converters

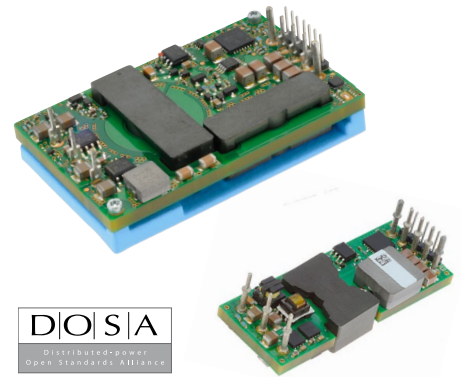
Product Matrix

	MODEL	INPUT VOLTAGE	ISOLATION	FOOTPRINT	OUTPUT VOLTAGE	MAX CURRENT/ POWER	Power Rating									
							0W	100W	200W	300W	400W	500W	600W	700W	800W	1000W
FULLY REGULATED BUS CONVERTERS	EBDW (digital)	36 - 75V	2250Vdc	1/8 brick	12V	25A / 300W	0W	100W	200W	300W	400W	500W	600W	700W	800W	1000W
	EBVW	36 - 75V	2250Vdc	1/8 brick	12V	25A / 300W	0W	100W	200W	300W	400W	500W	600W	700W	800W	1000W
	QBDW025 (digital)	36 - 75V	2250Vdc	1/4 brick	12V	25A / 300W	0W	100W	200W	300W	400W	500W	600W	700W	800W	1000W
	QBVW025	36 - 75V	2250Vdc	1/4 brick	12V	25A / 300W	0W	100W	200W	300W	400W	500W	600W	700W	800W	1000W
	QBDW033 (digital)	36 - 75V	2250Vdc	1/4 brick	12V	33A / 400W	0W	100W	200W	300W	400W	500W	600W	700W	800W	1000W
	QBVW033	36 - 75V	2250Vdc	1/4 brick	12V	33A / 400W	0W	100W	200W	300W	400W	500W	600W	700W	800W	1000W
	QSDW035 (digital)	36 - 75V	2250Vdc	1/4 brick	12V	35A / 420W	0W	100W	200W	300W	400W	500W	600W	700W	800W	1000W
	QSVW035	36 - 75V	2250Vdc	1/4 brick	12V	35A / 420W	0W	100W	200W	300W	400W	500W	600W	700W	800W	1000W
	QSDW042 (digital)	36 - 75V	2250Vdc	1/4 brick	12V	42A / 500W	0W	100W	200W	300W	400W	500W	600W	700W	800W	1000W
	QSVW042	36 - 75V	2250Vdc	1/4 brick	12V	42A / 500W	0W	100W	200W	300W	400W	500W	600W	700W	800W	1000W
	QSDW050 (digital)	36 - 75V	2250Vdc	1/4 brick	12V	50A / 600W	0W	100W	200W	300W	400W	500W	600W	700W	800W	1000W
	QSVW050	36 - 75V	2250Vdc	1/4 brick	12V	50A / 600W	0W	100W	200W	300W	400W	500W	600W	700W	800W	1000W
	QBDE055 (digital)	40 - 60V	2250Vdc	1/4 brick	12V	55A/660W	0W	100W	200W	300W	400W	500W	600W	700W	800W	1000W
	QBDE067 (digital)	40 - 60V	2250Vdc	1/4 brick	12V	67A/800W	0W	100W	200W	300W	400W	500W	600W	700W	800W	1000W
	QBVE067	40 - 60V	2250Vdc	1/4 brick	12V	67A / 800W	0W	100W	200W	300W	400W	500W	600W	700W	800W	1000W
	QBVE094	45-56V	750Vdc	1/4 brick	10.4V	98A/1000W	0W	100W	200W	300W	400W	500W	600W	700W	800W	1000W

	MODEL	INPUT VOLTAGE	ISOLATION	FOOTPRINT	OUTPUT VOLTAGE	MAX CURRENT/POWER	Power Rating								
							1W	50W	75W	100W	200W	300W	400W	500W	600W
ISOLATED AND REGULATED DC-DC CONVERTERS	SHHD	18 - 75V	2250Vdc	1 x 1	3.3 - 12V	5A / 15W	1W	50W	75W	100W	200W	300W	400W	500W	600W
	SSTW	36 - 75V	2250Vdc	1 x 1	3.3 - 12V	5A / 15W	1W	50W	75W	100W	200W	300W	400W	500W	600W
	KHHD	18 - 75V	2250Vdc	1/16 brick	3.3 - 12V	10A / 30W	1W	50W	75W	100W	200W	300W	400W	500W	600W
	KSTW	36 - 75V	2250Vdc	1/16 brick	3.3 - 12V	10A / 30W	1W	50W	75W	100W	200W	300W	400W	500W	600W
	KHHD	18 - 75V	2250Vdc	1/16 brick	3.3 - 12V	15A / 50W	1W	50W	75W	100W	200W	300W	400W	500W	600W
	KSTW	36 - 75V	2250Vdc	1/16 brick	3.3 - 12V	15A / 50W	1W	50W	75W	100W	200W	300W	400W	500W	600W
	KNW	36 - 75V	2250Vdc	1/16 brick	3.3 - 5V	20A / 66W	1W	50W	75W	100W	200W	300W	400W	500W	600W
	KBVW	36 - 75V	2250Vdc	1/16 brick	12V	6A / 72W	1W	50W	75W	100W	200W	300W	400W	500W	600W
	ERCW	36 - 75V	2250Vdc	1/8 brick	28V	3.6A / 100W	1W	50W	75W	100W	200W	300W	400W	500W	600W
	EHHD	18 - 75V	2250Vdc	1/8 brick	3.3 - 12V	36A / 120W	1W	50W	75W	100W	200W	300W	400W	500W	600W
	ESTW	36 - 75V	2250Vdc	1/8 brick	3.3 - 15V	36A / 120W	1W	50W	75W	100W	200W	300W	400W	500W	600W
	QHHD	18 - 75V	2250Vdc	1/4 brick	12V	19A / 228W	1W	50W	75W	100W	200W	300W	400W	500W	600W
	JNCW	36 - 75V	1500Vdc	1/2 brick	28V	16A / 445W	1W	50W	75W	100W	200W	300W	400W	500W	600W
	JRCW	36 - 75V	1500Vdc	1/2 brick	28 - 48V	16A / 450W	1W	50W	75W	100W	200W	300W	400W	500W	600W
	JRCK	36 - 60V	1500Vdc	1/2 brick	32V	17A / 544W	1W	50W	75W	100W	200W	300W	400W	500W	600W

High Power Barracuda*

The high power Barracuda* series of DC-DC converters is a new generation of DC-DC power modules designed to support 10.4 -12Vdc intermediate bus applications where multiple low voltages are subsequently generated using point of load (POL) converters, as well as other application requiring a tightly regulated output voltage. The converter incorporates digital control, synchronous rectification technology, and innovative packaging techniques to achieve higher efficiencies, leading to lower power dissipation. Standard features include on/off control, output overcurrent and overvoltage protection, overtemperature protection, input under and overvoltage lockout. The output is fully isolated from the input, allowing versatile polarity configurations and grounding connections. Built-in filtering for both input and output minimizes the need for external filtering.



Barracuda* Series

- High efficiency operation up to 96%
- Remote sense and output voltage trim
- DOSA-standard quarter and eighth brick
- Negative remote on/off logic
- Output overcurrent/overvoltage protection
- Overtemperature protection
- Wide operating temperature range (-40°C to °85C)
- 1/8 Brick - 2.30 x 0.90 x 0.44" / 58.4 x 22.8 x 11.3mm
- 1/4 Brick - 2.30 x 1.45 x 0.46" / 58.4 x 36.8 x 11.7mm
- Optional baseplate

1/8 Brick

MODEL	INPUT VOLTAGE	OUTPUT VOLTAGE	OUTPUT CURRENT	EFFICIENCY
EBVW012A7B	48V (36-75V)	12V	12.7A	95%
EBVW020A0B	48V (36-75V)	12V	20A	95%
EBVW025A0B	48V (36-75V)	12V	25A	95%

1/4 Brick

MODEL	INPUT VOLTAGE	OUTPUT VOLTAGE	OUTPUT CURRENT	EFFICIENCY
QBVW025A0B	48V (36-75V)	12V	25A	96%
QBVW033A0B	48V (36-75V)	12V	33A	96%
QSVW035A0B	48V (36-75V)	12V	35A	96%
QSVW042A0B	48V (36-75V)	12V	42A	95%
QSVW050A0B	48V (36-75V)	12V	50A	96%
QBVE067A0B	48V (40-60V)	12V	67A	96%
QBVE094A0S	50/54 (45-56V)	10.4V	94A	97%

High Power Barracuda* (Cont.)

Barracuda* Digital Series

- Conforms to new DOSA standard for Second Generation Single Output Pin DC-DC Converters with Digital Connections
- Fully backwards compatible with other Barracuda* series
- Digital interface with PMBus™
- Two user configurable pins for remote sense or output trim

1/8 Brick

MODEL	INPUT VOLTAGE	OUTPUT VOLTAGE	OUTPUT CURRENT	EFFICIENCY
EBDW020A0B	48V (36V-75V)	12V	20A	95%
EBDW025A0B	48V (36V-75V)	12V	25A	95%

1/4 Brick

MODEL	INPUT VOLTAGE	OUTPUT VOLTAGE	OUTPUT CURRENT	EFFICIENCY
QBDW025A0B	48V (36-75V)	12V	25A	96%
QBDW033A0B	48V (36-75V)	12V	33A	96%
QSDW035A0B	48V (36-75V)	12V	35A	96%
QSDW042A0B	48V (36-75V)	12V	42A	95%
QSDW050A0B	48V (36-75V)	12V	50A	96%
QBDE055A0B	48 (40-60V)	12V	55A	96%
QBDE067A0B	48 (40-60V)	12V	67A	96%



Polaris* Direct Drive

The Polaris DD (Direct Drive) power module converts 48V direct to power XPU (CPU or GPU), DDR and ASIC. It delivers up to 230A output current. This module operates over a wide range of input voltage ($40\text{Vdc} \leq V_{in} \leq 59.5\text{Vdc}$) and provides a precisely regulated output voltage from 0.6Vdc to 2Vdc, which is programmable via PMBus™. Features include remote On/Off, adjustable output voltage, over-current and over-temperature protection. The Polaris DD module's digital implementation of the Tunable Loop™ feature allows the user to optimize the output voltage dynamic response at the load thus reducing external output capacitance requirements and system PWB area leading to additional cost savings.

HVDS230A0Y Polaris DD Series

- High peak efficiency > 94% at $V_{in}=48\text{Vdc}$
- Output voltage programmable from 0.6Vdc to 2Vdc via PMBus™
- Fully regulated output voltage at V_{in} minimum
- Low output ripple and noise
- Digital Tunable Loop™ to optimize dynamic output voltage response via PMBus™
- Output over current/voltage protection
- Over temperature protection
- Wide operating temperature range -40°C to 85°C , continuous
- 500Vdc Input-to-Output Isolation
- Quarter Brick (Approximate dimensions):
 - 58.4mm x 36.83mm x 18.5mm
 - (2.3in x 1.45in x 0.728in)
- Base plate (-H option; Height=20.32mm/0.800in)

MODEL	INPUT VOLTAGE	OUTPUT VOLTAGE	OUTPUT CURRENT	EFFICIENCY
HVDS230A0Y	40-59.5V	0.6-2V	230A	94%



Hammerhead*

The Hammerhead* series power modules are isolated DC-DC converters that operate over an ultra-wide input voltage range of 18 - 75Vdc and provide a single precisely regulated output voltage. This series is a low cost, smaller size replacement for our legacy products, LW/LAW/LC/SC/SW with enhanced performance parameters. The output is fully isolated from the input, allowing versatile polarity configurations and grounding connections. The modules exhibit high efficiency and built-in filtering for both input and output, which minimizes the need for external filtering. The module is fully self-protected with output overcurrent and overvoltage, overtemperature and input under voltage shutdown control.

- Ultra-wide Input Voltage Range, 18 to 75Vdc
- No minimum load
- High efficiency
- Constant switching frequency
- Low output ripple and noise
- Small Size and low profile, follows industry standard footprints
- Surface mount (SMT) or Through hole (TH)
- Reflow process compliant, both SMT and TH versions
- Positive Remote On/Off logic
- Output overcurrent/voltage protection (hiccup)
- Overtemperature protection
- Output Voltage adjust: 90% to 110% of Vo, nom
- Wide operating temperature range (-40°C to 85°C)
- Meets the voltage and current requirements for ETSI 300-132-2 and complies with and licensed for Basic insulation rating per EN60950-1
- 2250Vdc Isolation tested in compliance with IEEE 802.3 PoE standards
- ISO 9001 and ISO 14001 certified manufacturing facilities

SHHD Hammerhead* Series

15W / 5A Max Power

- 1.10 x 0.96 x 0.34" / 27.94 x 24.38 x 8.5mm
- Surface mount or through-hole



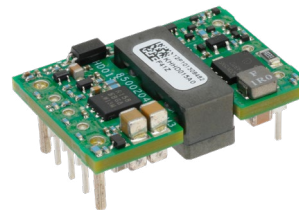
MODEL	INPUT VOLTAGE	OUTPUT VOLTAGE	OUTPUT CURRENT	EFFICIENCY
SHHD001A3B	18 - 75V	12V	1.3A	88%
SHHD003A0A	18 - 75V	5V	3A	87%
SHHD005A0F	18 - 75V	3.3V	5A	88%

2250Vdc Isolation for PoE Applications

KHHD Hammerhead* Series

50W / 15A Max Power

- 1.30 x 0.90 x 0.37" / 33.0 x 22.9 x 9.3mm
- Surface mount or through-hole



MODEL	INPUT VOLTAGE	OUTPUT VOLTAGE	OUTPUT CURRENT	EFFICIENCY
KHHD002A5B	18 - 75V	12V	2.5A	90%
KHHD006A0A	18 - 75V	5V	6A	91%
KHHD010A0F	18 - 75V	3.3V	10A	91%
KHHD004A2B	18 - 75V	12V	4.2A	90%
KHHD010A0A	18 - 75V	5V	10A	91%
KHHD015A0F	18 - 75V	3.3V	15A	91%

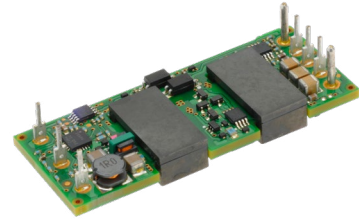
2250Vdc Isolation for PoE Applications

Hammerhead* (Cont.)

EHHD Hammerhead* Series

75W / 20A Max Power

- 2.28 x 0.90 x 0.30" / 57.9 x 22.8 x 7.6mm
- Surface mount or through-hole



MODEL	INPUT VOLTAGE	OUTPUT VOLTAGE	OUTPUT CURRENT	EFFICIENCY
EHHD006A0B	18 - 75V	12V	6A	93%
EHHD015A0A	18 - 75V	5V	15A	91%
EHHD020A0F	18 - 75V	3.3V	20A	91%
EHHD010A0B	18 - 75V	12V	10A	93%
EHHD024A0A	18 - 75V	5V	24A	91%
EHHD036A0F	18 - 75V	3.3V	36A	90%

2250Vdc Isolation for PoE Applications

QHHD Hammerhead* Series

228W / 19A Max Power

- 2.30 x 1.45 x 0.46" / 58.4 x 36.8 x 11.7mm
- Through-hole



MODEL	INPUT VOLTAGE	OUTPUT VOLTAGE	OUTPUT CURRENT	EFFICIENCY
QHHD019A0B	18 - 75V	12V	19A	93%

2250Vdc Isolation for PoE Applications

SHHN Dual Output Hammerhead* Series

9W / 0.3A Max Power

- 1.10 x 0.96 x 0.34" / 27.9 x 24.4 x 8.5mm
- Through-hole

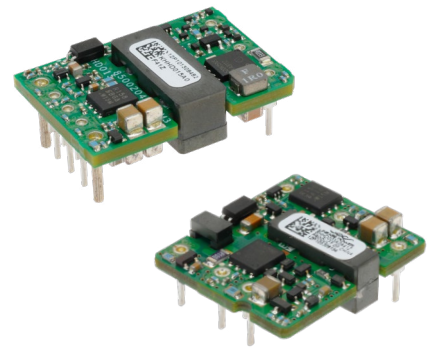


MODEL	INPUT VOLTAGE	OUTPUT VOLTAGE	OUTPUT CURRENT	EFFICIENCY
SHHN000A3CL	9-36V	+15V, -15V	0.3A	84%

2250Vdc Isolation for PoE Applications

Low Power Barracuda*

Offering optimum efficiency, the low power modules are targeted at a broad range of communications equipment. These modules can be used in powering distributed power and intermediate bus architectures, as well as the latest integrated circuits or microprocessors. These isolated DC-DC converters can deliver up to 120W of output power and provide a precisely regulated output voltage over a wide range of input voltages ($V_{in} = 36-75Vdc$). Convenient packaging options, combined with open-frame construction, enable designers to develop cost- and space-efficient solutions. Additional features include remote On/Off, remote sense, output voltage adjustment, overcurrent/voltage protections and overtemperature protection.



Applications

- Distributed power architectures
- Wireless networks
- Access and optical network equipment
- Microprocessor powered applications
- Enterprise networks
- Latest generation IC's (DSP, FPGA, ASIC)

SSTW Barracuda* Low Power Series

15W / 5A Max Power

- 1.10 x 0.96 x 0.34" / 27.94 x 24.38 x 8.5mm
- Surface mount or through-hole

MODEL	INPUT VOLTAGE	OUTPUT VOLTAGE	OUTPUT CURRENT	EFFICIENCY
SSTW001A3B	48V (36 - 75V)	12V	1.3A	88%
SSTW003A0A	48V (36 - 75V)	5V	3A	87%
SSTW005A0F	48V (36 - 75V)	3.3V	5A	88%

2250Vdc Isolation for PoE Applications

KSTW Barracuda* Low Power Series

50W / 15A Max Power

- 1.30 x 0.90 x 0.37" / 33.0 x 22.9 x 9.3mm
- Surface mount or through-hole

MODEL	INPUT VOLTAGE	OUTPUT VOLTAGE	OUTPUT CURRENT	EFFICIENCY
KSTW002A5B	48V (36-75V)	12V	2.5A	90%
KSTW006A0A	48V (36-75V)	5V	6A	90%
KSTW010A0F	48V (36-75V)	3.3V	10A	90%
KSTW004A2B	48V (36-75V)	12V	4.2A	90%
KSTW010A0A	48V (36-75V)	5V	10A	91%
KSTW015A0F	48V (36-75V)	3.3V	15A	91%

2250Vdc Isolation for PoE Applications

Low Power Barracuda* (Cont.)

KNW Barracuda* Low Power Series

66W / 20A Max Power

- 1.30 x 0.90 x 0.40" / 33.0 x 22.9 x 10.2mm
- Surface mount or through-hole

MODEL	INPUT VOLTAGE	OUTPUT VOLTAGE	OUTPUT CURRENT	EFFICIENCY
KNW013A0A	48V (36-75V)	5V	13A	91%
KNW020A0F	48V (36-75V)	3.3V	20A	91%

2250Vdc Isolation for PoE Applications

ESTW Barracuda* Low Power Series

120W / 36A Max Power

- 2.3 x .90 x 0.34" / 58.4 x 22.8 x 11.3 mm
- Surface mount or through-hole

MODEL	INPUT VOLTAGE	OUTPUT VOLTAGE	OUTPUT CURRENT	EFFICIENCY
ESTW004A2C	48V (36-75V)	15V	4.2A	90%
ESTW010A0A	48V (36-75V)	5V	10A	91%
ESTW015A0F	48V (36-75V)	3.3V	15A	91%
ESTW006A0B	48V (36-75V)	12V	6A	90%
ESTW015A0A	48V (36-75V)	5V	15A	91%
ESTW025A0F	48V (36-75V)	3.3V	25A	92%
ESTW010A0B	48V (36-75V)	12V	10A	93%
ESTW020A0S6R0	48V (36-75V)	6V	20A	92.5%
ESTW024A0A	48V (36-75V)	5V	24A	92%
ESTW036A0F	48V (36-75V)	3.3V	36A	92%

2250Vdc Isolation for PoE Applications

KBVW Barracuda* Low Power Series

70W / 6A Max Power

- 1.30 x 0.90 x 0.37" / 33.0 x 22.9 x 9.3mm
- Surface mount or through-hole

MODEL	INPUT VOLTAGE	OUTPUT VOLTAGE	OUTPUT CURRENT	EFFICIENCY
KBVW006A0B	48V (36-75V)	12V	6A	91%

2250Vdc Isolation for PoE Applications

Power Amplifiers

A new generation of power modules designed for maximum cost effectiveness and power density, the industry standard half-brick series DC-DC converter is an ideal choice for high voltage and power amplifier applications.



Orca* Series Half Brick Modules

- 450 watts maximum power
- 36-75Vdc input/28 - 48Vdc output model
- Output voltage adjustment trim, 16.0 to 35.2Vdc or 28.8 - 57.6Vdc
- High efficiency operation up to 94%
- Integral metal baseplate with optional threaded inserts
- Optional Tunable Loop* for optimized output capacitance
- Operates at full power to case temperatures of 100°C
- 2.27 x 2.39 x 0.5" / 57.7 x 60.7 x 12.7mm

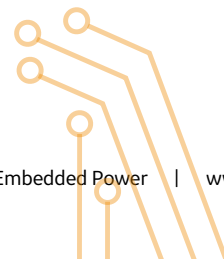
MODEL	INPUT VOLTAGE	OUTPUT VOLTAGE	OUTPUT CURRENT	EFFICIENCY
JRCW016A0R	48V (36-75V)	28V	16A	94%
JNCW016A0R	48V (36-75V)	28V	16A	94%
JRCW450R	48V (36-75V)	32V	14A	94%
JRCK017A0R	48V (36-60V)	32V	17A	95%
JRCW450U	48V (36-75V)	48V	9.4A	94%

Orca* Series Eighth Brick Modules

- 100 watts maximum power
- 36-75Vdc input/28Vdc output model
- Output voltage adjustment trim, 15.0 to 35.2Vdc
- Very high efficiency operation up to 93.4% at full load
- Optional integral metal baseplate with optional threaded inserts
- Operates at full power to case temperatures of 85°C
- 2.3 x 0.9 x 0.35" / 58.4 x 23.0 x 8.8mm



MODEL	INPUT VOLTAGE	OUTPUT VOLTAGE	OUTPUT CURRENT	EFFICIENCY
ERCW003A6R	48V (36-75V)	28V	3.6A	93%





Filter & PIM Modules

Filter Modules

The internal operation of DC-DC converters utilizes pulsed voltages and currents, which can generate broad-spectrum noise that results in electromagnetic emissions. To ease the task of meeting International Standards that limit emissions, GE offers a range of input filter modules with current ratings of 5A, 7A, 10A, 12A, and 20A. One properly sized filter module can be used with one or multiple DC-DC converter modules. Our filter modules reduce the levels of conducted common-mode and differential-mode noise, providing high insertion loss throughout the frequency range regulated by such bodies as the International Special Committee on Radio Interference (CISPR) and the U.S. Federal Communications Commission (FCC). All of our filter modules are rated for differential input voltages up to 75Vdc and common-mode input voltages up to 1500Vdc. For further details on managing EMC, refer to individual DC-DC module and filter datasheets.



FLT007A0Z
25.4 x 25.4 x 12.2 mm



FLT012A0Z
48.3 x 25.4 x 11.7 mm



FLTR75V05Z
25.4 x 25.4 x 10.2 mm



FLTR100V10Z
51 x 28 x 12 mm



FLTR100V20Z
50.8 x 40.6 x 12.7 mm

MODEL	RATED VOLTAGE	RATED CURRENT	COMMON-MODE INSERTION LOSS	DIFFERENTIAL-MODE INSERTION LOSS	RESISTANCE PER LEG (MOHMS)
FLT007A0Z	0-75V	7A max	60dB	66dB	25
FLT012A0Z	0-75V	12A max	56dB	57dB	20
FLTR75V05Z	0-75V	5A max	28dB	25dB	20
FLTR100V10Z	0-75V	10A max	36dB	44dB	14
FLTR100V20Z	0-75V	20A max	32dB	36dB	6.6

Filter & PIM Modules (Cont.)

ATCA Power Input Modules (PIM)

The PIM400 series of Power Input Modules is designed to greatly simplify the task of implementing dual redundant, hot swappable -48Vdc power distribution with EMI filtering on an ATCA or other telecom boards. The PIM400 with optional digital interface (I2C capability, when used with a variety of GE's series of Bus converters (e.g. Barracuda* Series) and POLs (e.g. DLynx* Series), provides for a simple, elegant power architecture solution for a wide variety of intelligent power architectures.



MODEL	INPUT VOLTAGE	CURRENT RATING	AUXILIARY OUTPUT 1	AUXILIARY OUTPUT 2	OPTIONS
PIM400Z	-36 to -75 V	10A	3.3V/3.6A	5.0V/0.15A	-
PIM400KZ	-36 to -75 V	10A	3.3V/3.6A	5.0V/0.15A	I2C Digital Interface

Features

- Digital interface options with I2C
- Delivers up to 400W of rated power
- -48V/10A Dual redundant input power distribution
- High efficiency : 98% typical
- Integral EMI filter designed for minimal external filtering
- OR'ing FETs for A&B feeds
- A&B Feed Loss or open fuse alarm
- Hot swap capability
- Inrush current protection
- Industry Standard Quarter brick size

Specifications

- Input voltage range -36 to -75V
- Management power 3.3V/3.6A & 5.0V/150mA
- Operating temperature range : -40°C to 85°C
- Independent holdup capacitor charging voltage trimmable from 50 to 95V

Protection Features

- Reverse polarity protection
- Input undervoltage lockout
- Input transient overvoltage protection
- Overcurrent and temperature protection



Next-Generation Non-Isolated / POL



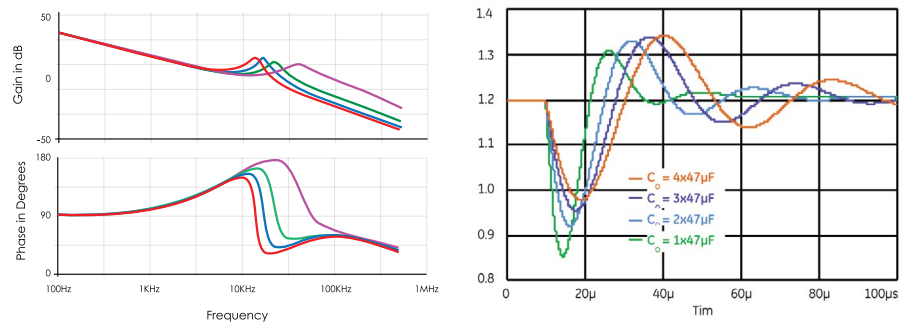
Tunable Loop* Technology

Improved footprints, transient response, and cost.

When GE Critical Power first patented Tunable Loop*, it was simple analog implementation of a resistor and capacitor in series across the point-of-load (POL) Trim and Output pins to optimize POL modules for multiple applications of varying demands. With the first implementation of Digital Tunable Loop*, GE now extends the effectiveness fully into the digital world of DLynx II* and eliminates yet another component. The figure below illustrates the transient response of a 12A PicoDLynx* module at a 50% load step with varying external capacitance. In the example below, the maximum voltage deviation improves from 347 mV (1x47uF) to 222mV (4x47uF) but the control loop bandwidth drops from 51kHz to 24kHz, increasing the duration of the voltage excursion. This is consistent with the reduction in control bandwidth and poorer phase margin caused by increased capacitance.

Without Tunable Loop*:

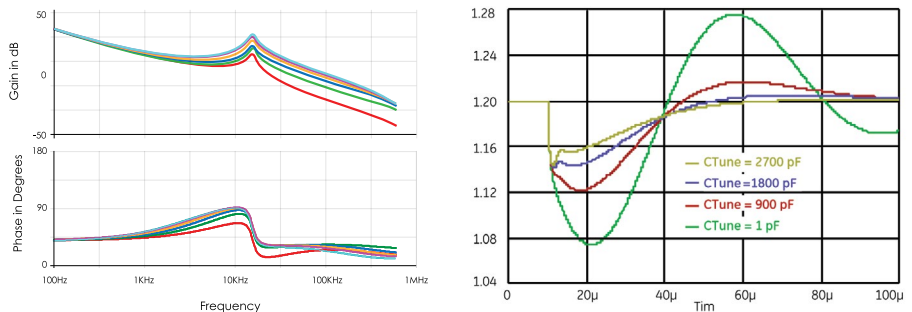
High deviation and reduced control bandwidth with increased output capacitance.



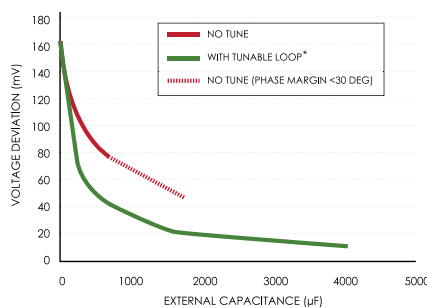
The goal of Tunable Loop* is to regain the bandwidth lost with increased capacitance. If we fix the value of R_{Tune} to 330ohms and vary C_{Tune} from 1pF to 2700pF, we regain control bandwidth back to 82KHz and achieve a **4.8x reduction in voltage deviation**.

With Tunable Loop*:

Substantially reduced deviation through improved control bandwidth and reduced output capacitance.



Tunable Loop* achieves lower voltage deviation with significantly reduced capacitance. As an example, the 12A PicoDLynx* model (5Vin / 1.2Vout @ 8A), with a step load of 4A and deviation <4% (48mV) would require 3 ceramic caps + 4 electrolytic caps versus 1 ceramic cap + 1 electrolytic cap with Tunable Loop*. This results in a \$1.45 reduction in external capacitor cost and a footprint reduction of 190mm² achieving **4X the effective current density**.



Tunable Loop* POL Converter Modules



DLynx* Series

The GE DLynx* offers digital control and communication in ultra-compact industry standard footprints. Multiple devices can use industry standard PMBus™ communication to monitor and optimize power conversion, even during operation, making Adaptive Voltage Scaling (AVS) a reality. A minimum of three external components are needed to implement these modules, which leads to shortened design time. The GE DLynx* family provides some of the most compact Point of Load DC-DC converters available with outstanding performance, control, and reliability at a cost competitive rate.

DLynx II* Series

The new GE DLynx II* extends our commitment to providing the digital power designer the latest tools and performance for power. Increased current, increased accuracy, extended PMBus™ command set and increased performance are all welcome tools for a dynamic and demanding industry. Ultimate density and competitive cost keep these new products at the forefront of the demanding designer.

- 2 to 40A output current DLynx*
- 3 to 170A output current DLynx II*
- >300A with current sharing version TJT120P
- 4.5-14.4Vdc input models
- 0.51 to 5.5Vdc output models
- Dual offering – both digital & analog versions
- Standards-based DOSA footprint
- Tunable Loop*
- Digital communication (PMBus™)
- Total Efficiency* architecture
- Superior thermal performance
- EZ-Sequence*
- Cost efficient open frame design


	MODEL NUMBER	INPUT VOLTAGE	OUTPUT VOLTAGE	OUTPUT CURRENT	COMM.	PEAK EFFICIENCY	DIMENSIONS	PHOTO
PicoDLynx*	PNVX002	3.0-14.0V	0.6-5.5V	2A	Analog	96%	12.2 x 12.2 x 4.5 mm	
	PVT003	3.0-14.4V	0.45-5.5V	3A	Digital	94%	12.2 x 12.2 x 6.25 mm	
	PVX003	3.0-14.4V	0.6-5.5V	3A	Analog	92%	12.2 x 12.2 x 6.25 mm	
	PDT006	3.0-14.4V	0.45-5.5V	6A	Digital	94%	12.2 x 12.2 x 6.25 mm	
	PVX006	3.0-14.4V	0.6-5.5V	6A	Analog	94%	12.2 x 12.2 x 6.25 mm	
	PDT012	3.0-14.4V	0.45-5.5V	12A	Digital	96%	12.2 x 12.2 x 6.25 mm	
	PVX012	3.0-14.4V	0.6-5.5V	12A	Analog	95%	12.2 x 12.2 x 6.25 mm	
MicroDLynx*	UDT020	3.0-14.4V	0.45-5.5V	20A	Digital	96%	20.32 x 11.43 x 8.6 mm	
	UVT020	3.0-14.4V	0.6-5.5V	20A	Analog	96%	20.32 x 11.43 x 8.6 mm	
MegaDLynx*	MDT040	4.5-14.4V	0.45-2.0V	40A	Digital	91.5%	33.02 x 13.46 x 10.9 mm	
	MVT040	4.5-14.4V	0.6-2.0V	40A	Analog	91.5%	33.02 x 13.46 x 10.9 mm	
FemtoDLynx II*	FKX003	4.5-14.0V	0.6-5.5V	3A	Analog	93.5%	6.8 x 9 x 7.2 mm	
	FKX006	4.5-14.0V	0.6-5.5V	6A	Analog	93.5%	6.8 x 9 x 7.2 mm	
PicoDLynx II*	PJT004	4.5-14.4V	0.51-5.5V	4A	Digital	97.5%	12.2 x 12.2 x 7.5mm	
	PJT007	4.5-14.4V	0.51-5.5V	7A	Digital	97.5%	12.2 x 12.2 x 7.5mm	
	PKX007	4.5-14.4V	0.6-5.5V	7A	Analog	97.5%	12.2 x 12.2 x 7.5mm	
	PJT014	4.5-14.4V	0.51-5.5V	14A	Digital	97%	12.2 x 12.2 x 7.5mm	
	PKX014	4.5-14.4V	0.6-5.5V	14A	Analog	97%	12.2 x 12.2 x 7.5mm	
	PJT020	4.5-14.4V	0.51-3.63V	20A	Digital	97%	12.2 x 12.2 x 8.5mm	
	PKX020	4.5-14.4V	0.6-3.63V	20A	Analog	97%	12.2 x 12.2 x 8.5mm	
MicroDLynx II*	UJT035	4.5-14.4V	0.51-3.63V	35A	Digital	97.25%	20.3 x 11.4 x 11mm	
GigaDLynx II*	GDT080	4.5-14.0V	0.6-2.0V	80A	Digital	93%	33.02 x 22.86 x 12.7 mm	
TeraDLynx II*	TJT120	7.0-14.0V	0.1-1.5V	120A	Digital	96%	54 x 31.8 x 13.6 mm	
	TJT170	7.0-14.0V	0.1-1.5V	170A	Digital	96%	54 x 31.8 x 13.6 mm	

Tunable Loop* POL Converter Modules (Cont.)

DualDLynx* - Dual Output Digital DLynx*

The DualDLynx* non-isolated Point of Load (POL) DC-DC board-mounted power modules offer a new standard of power for space constrained boards. They offer up to 25 percent reduction in board space usage compared to previous and competing solutions. The Independent Power Train (IPT) feature provides two independent 12A or 6A outputs in a single module, enabling flexibility and reduced design time. Analog and digital options are available. The DualDLynx* has a PMBus™ digital interface for digital configuration, communication and control. Enhanced digital features reduce board space requirement and the need for external components.

- Independent Power Train Feature enables flexibility and reduces design time
- PMBus™ digital interface supports wide range of commands (on/off, trim, digital sequencing, margin, power good, rise time adjustment and input under-voltage lockout)
- The digital interface also offers output voltage, current and temperature measurement capabilities
- Ultra-tight voltage regulation (+/- 1 percent)
- Digital trim for power reduction and digital sequencing
- Over-temperature protection, output over-current protection (non-latching) and over-voltage protection
- Wide input voltage range: 4.5Vdc- 14.0Vdc on both inputs
- New synchronization features and remote sensing make designing for strict noise and set point requirements easier and more accurate
- Small Micro footprint module (20.32 mm x 11.43 mm x 8.5 mm)
- Precisely regulated output voltage range of 0.51 to 5.5 VDC
- Wide range of design tools and technical support to decrease design time and improve time to market
- Digital loop compensation decreases board space, external components and cost
- Reliability measured in decades provides peace of mind





	MODEL NUMBER	INPUT VOLTAGE	OUTPUT VOLTAGE	OUTPUT CURRENT	COMM.	DIMENSIONS	PHOTO
DualDLynx*	UDXS0606	4.5Vdc-14.4Vdc	0.51Vdc to 5.5Vdc	2 x 6A	Digital	20.32 mm x 11.43 mm x 8.5 mm	
	UVXS0606	4.5Vdc-14.4Vdc	0.51Vdc to 5.5Vdc	2 x 6A	Analog	20.32 mm x 11.43 mm x 8.5 mm	
	UDXS1212	4.5Vdc-14.4Vdc	0.51Vdc to 5.5Vdc	2 x 12A	Digital	20.32 mm x 11.43 mm x 8.5 mm	
	UVXS1212	4.5Vdc-14.4Vdc	0.51Vdc to 5.5Vdc	2 x 12A	Analog	20.32 mm x 11.43 mm x 8.5 mm	

Tunable Loop* POL Converter Modules (Cont.)

SlimLynx* Low Profile Series

The SlimLynx* series offers a slim, non-isolated dc-dc converter in a low profile height of 2.8-2.9mm. It allows engineers to utilize this power module in very tight spaces, such as underneath the boards, in mezzanine structures, and in other low profile applications. A digital POL in an industry standard DOSA footprint, the SlimLynx* delivers exceptionally high efficiency peaking at over 95%, which reduces energy consumption and heat dissipation.

- Ultra low height design for very dense power applications
- Bottom side placement
- Digital interface through the PMBus™ protocol
- Small footprint: 12.2 x 12.2 x 2.8/2.9 mm
- Output voltage programmable from 0.6 to 5.5Vdc via external resistor. Digitally adjustable down to 0.45Vdc
- Wide Input voltage range (3-14.4Vdc)
- Wide operating temperature range [-40°C to 85°C]
- DOSA approved footprint
- Tunable Loop* to optimize dynamic output voltage


	MODEL NUMBER	INPUT VOLTAGE	OUTPUT VOLTAGE	OUTPUT CURRENT	COMM.	EFFICIENCY	DIMENSIONS	PHOTO
SlimLynx*	PNDT003 (Pico)	3.0-14.4V	0.45-5.5V	3A	Digital	95%	12.2 x 12.2 x 2.9mm	
	PNVT003 (Pico)	3.0-14.4V	0.6-5.5V	3A	Analog	95%	12.2 x 12.2 x 2.9mm	
	PNDT006 (Pico)	3.0-14.4V	0.45-5.5V	6A	Digital	95%	12.2 x 12.2 x 2.9 mm	
	PNVT006 (Pico)	3.0-14.4V	0.6-5.5V	6A	Analog	95%	12.2 x 12.2 x 2.9 mm	
	PNDT012 (Pico)	3.0-14.4V	0.45-5.5V	12A	Digital	96%	12.2 x 12.2 x 2.9 mm	
	PNVT012 (Pico)	3.0-14.4V	0.6-5.5V	12A	Analog	96%	12.2 x 12.2 x 2.9 mm	
	UNDT012 (Micro)	3.0-14.4V	0.45-5.5V	12A	Digital	96%	20.32 x 11.43 x 2.8 mm	
	UNVT012 (Micro)	3.0-14.4V	0.6-5.5V	12A	Analog	96%	20.32 x 11.43 x 2.8 mm	

Tunable Loop* POL Converter Modules (Cont.)

BoostLynx*

With two available product variants, High Voltage and Low Voltage, GE Boost PoL provides voltage step-up from an input voltage of 8-16 Vdc to an output voltage of 16-34 or 32-54Vdc. Boost PoL is suitable for a wide range of electronics products where some components require higher voltage than the typical 12V bus. The Boost PoL can also be used to step up an existing 12V bus to a 24V or 48V bus. Designing different interface cards with boost enables exchangeability of interface cards from the main system and provides more flexibility to the designer.

- Small, compact, board mounted 65 and 130W boost converters
- Complete, easy to design module solution
- Optimized for conduction cooled applications for use in thermally demanding operating conditions with little or no airflow
- Wide Input voltage range (8Vdc-16Vdc)
- Output voltage programmable from 16 to 54Vdc via external resistor
- Tunable Loop* to optimize dynamic output voltage response
- Output overcurrent protection (non-latching)



	MODEL NUMBER	INPUT VOLTAGE	OUTPUT VOLTAGE	OUTPUT POWER	COMM.	DIMENSIONS	PHOTO
BoostLynx* HV	ABXS001	8Vdc -16Vdc	32Vdc to 54Vdc	65W	Analog	27.9 mm x 11.4 mm x 9.0 mm	
BoostLynx* LV	ABXS002	8Vdc -16Vdc	16Vdc to 34Vdc	65W	Analog	27.9 mm x 11.4 mm x 7.5 mm	
BoostLynx* HV	ABX003	8Vdc -16Vdc	32Vdc-54Vdc	130W	Analog	27.9 mm x 24 mm x 8.5 mm	
BoostLynx* LV	ABX005	8Vdc -16Vdc	16Vdc to 34Vdc	130W	Analog	27.9 mm x 24 mm x 8.5 mm	

Tunable Loop* POL Converter Modules (Cont.)

ProLynx* Wide Input Series



The ProLynx* series offers a wide input voltage range of 9 to 36V and an extended output range of 3 to 18V. It can also generate negative output voltages using an alternate connection scheme. These power modules simplify board design and accelerate new product development schedules by minimizing the designer's steps over choosing a discrete power solution. The ProLynx* can be used in a broad range of applications including automotive, industrial, medical, military, and wireless industries.

- Extra Wide Input voltage range (9 to 36Vdc)
- Output voltage programmable from 3 to 18Vdc via external resistor
- Tunable Loop* to optimize dynamic output voltage response
- Patent Pending AutoLimit automatic scaling of current limit with output voltage
- Can deliver 3A to 12A of output current
- Output overcurrent protection (non-latching)
- Wide operating temperature range [-40°C to 105°C (Ruggedized: -D), 85°C (Regular)]

	MODEL NUMBER	INPUT VOLTAGE	OUTPUT VOLTAGE	OUTPUT CURRENT	COMM.	EFFICIENCY	DIMENSIONS	PHOTO
ProLynx*	APXW003	9.0-36.0V 9.0-24V	3.0-18.0V -3.3 to -12V	3A	Analog	97%	20.32 x 11.43 x 8.5 mm	
	APXW005	9.0-36.0V 9.0-24V	3.0-18.0V -3.3 to -18V	5A	Analog	96%	20.32 x 11.43 x 8.5 mm	
	APXW012	9.0-36.0V 9.0-24V	3.0-18.0V -3.3 to -18V	12A	Analog	97%	33.02 x 13.46 x 10.0 mm	

TLynx* Surface Mount Models


The GE TLynx* transformed the industry with the patented Tunable Loop* technology that dramatically reduced the total board space requirement while continuing to improve transient performance. TLynx* provides small size, proven reliability, great thermal performance, and cost effectiveness. Only three external components are needed to complete a design thereby reducing design time and increasing reliability. GE TLynx* family provides a high performance Point of Load solution with a minimum of risk, time and cost.

	MODEL NUMBER	INPUT VOLTAGE	OUTPUT VOLTAGE	OUTPUT CURRENT	EFFICIENCY	DIMENSIONS	PHOTO
PicoTLynx*	APXS002	3.0-14V	0.6-5.5V	2A	96%	12.2 x 12.2 x 6.25 mm	
	APXK004	8.0-16V	0.6-8.0V	4A	96%	12.2 x 12.2 x 6.25 mm	
GigaTLynx*	APTS050	4.5-14.0V	0.70-2.0 V	50A	95%	33 x 22.9 x 10 mm	

Tunable Loop* POL Converter Modules (Cont.)

Naos Raptor* Single In Line Package (SIP)

The GE Naos Raptor* family offers the high performance features of Tunable Loop*, excellent thermal performance, and proven GE reliability in a SIP package, which requires a minimum of board space.

	MODEL NUMBER	INPUT VOLTAGE	OUTPUT VOLTAGE	OUTPUT CURRENT	EFFICIENCY	DIMENSIONS	PHOTO
Naos Raptor*	NQR002	3.0-14.0V	0.6-5.5V	2A	93%	10.4 x 16.5 x 8.1 mm	
	NSR003	4.5-14.0V	0.59-6.0V	3A	93%	10.4 x 16.5 x 7.84 mm	
	NSR006	4.5-14V	0.59-6.0V	6A	92%	10.4 x 16.5 x 7.84 mm	
	NQR010	4.5-14.0V	0.59-6.0V	10A	97%	10.4 x 16.5 x 8.4 mm	
	NSR020	4.5-13.8 V	0.59-6.0V	20A	97%	36.8 x 15.5 x 9.2 mm	
	NSR040	5.0-13.8V	0.60-5.0V	40A	95%	36.8 x 27.9 x 10.7 mm	
	NSR060	5.0-13.8V	0.60-5.0V	60A	95%	65.5 x 31.8 x 11.6 mm	



Digital Power Solutions

Digital Converters

GE's Critical Power business digitally controlled DC-DC power converters provide power engineers with a broad range of modules, supported by a suite of information and tools to innovate their designs. Digital models offer more flexibility, often require less real estate, and deliver higher performance at an attractive price. The true power of digital communication becomes apparent when measurements and adjustments can be made instantaneously. Digital modules provide the ability to diagnose and refine designs prior to final production, monitor and adjust running product and deliver exceptional thermal de-rating. Digital solutions combine voltage range accuracy while consuming less board space at competitive costs. The non-isolated DLynx* and DLynx II* families and the isolated Barracuda* family offer both an industry-standard DOSA footprint to ensure hardware compatibility and a standard PMBus™ interface to ensure software compatibility to minimize risk for future designs.

DLynx*

The DLynx* portfolio is available in 3A, 6A, 12A, 20A, and 40A digital and analog versions. The DC-DC POL converters efficiently power circuit board electronics such as processors, memory, application specific integrated circuits (ASICs), field programmable gate arrays (FPGAs) and other silicon devices. The standards-based DOSA footprints and analog/digital compatibility with existing circuit board designs shrinks the size, lowers the cost and improves the performance of DC-DC converter modules. An industry-standard PMBus™ interface and space-saving Tunable Loop* technology deliver leading current density. With proven tools to simplify design, DLynx* modules can be implemented with only three external components. Adaptive voltage scaling (AVS) leverages silicon performance to reduce power consumption through tight digital control (± 0.4 percent) of the output voltage and a ± 1 percent controller set point reference.

DLynx II*

The new, digital DLynx II* modules offer a glimpse into the future. GE Critical Power's second generation of digital POLs bring even tighter set point accuracy, tighter reporting accuracy, extended PMBus™ command set, and only one external component needed for the Digital Tunable Loop* compensation. New control schemes offer the ability to customize performance to tailor these modules to an even wider range of applications. DLynx II* are available in 3, 6, 7, 14, 20, 35, 80, 120, and 170A modules. 120A unit supports current sharing for up to 3 paralleling units.

Barracuda*

The cost-effective, high-efficiency Barracuda* series delivers digital power communication and control in a quarter-brick and eighth-brick DOSA standard footprint. Power design engineers can deploy the new Barracuda* modules in existing power designs as DOSA-compliant, drop-in upgrades for unregulated and semi-regulated bus converters. As part of the Total Efficiency* architecture, the new Barracuda* modules deliver peak efficiency of up to 96 percent. A new digital PMBus™ interface supports a wide range of commands to both control and monitor the Barracuda* modules with a full range of protections and warnings, digital on/off, trim, margin, power good, rise time adjustment, and input under voltage lockout.

SlimLynx*

The SlimLynx* is a series of low profile, digital and analog, non-isolated, DC-DC converters from GE's Critical Power business. The ultra-slim 2.8-2.9 mm module provides industry-leading power density to reduce heat dissipation inside industrial, networking and telecommunication devices, while also delivering exceptionally high energy efficiency, peaking at over 95%. The SlimLynx* modules were designed with space constraints in mind and are perfect for back-of-board placement and in places with limited height restrictions, like under daughter boards. The new Pico size SlimLynx* almost doubles the current density of the first generation.

Custom Capabilities

GE Global Research (GRC)

GE Global Research is one of the world's most diversified industrial research labs, providing innovative technology for all of GE's businesses. Global Research has been the cornerstone of GE technology for more than 100 years, developing breakthrough innovations in areas such as medical imaging, energy generation technology, jet engines and lighting. GE Global Research is headquartered in Niskayuna, New York with other multidisciplinary facilities in all corners of the world.

We employ researchers all searching to uncover the next technological breakthroughs that will change the landscape for the GE businesses. Our diverse set of technology expertise ranges from electronics to chemistry, biosciences to computing, metallurgy to fluid mechanics, materials to imaging - and everything in between.

Our Customer Focus

GE's Critical Power business maintains a broad range of standard technologies that are the ideal building blocks to solve your application's power requirements. Many of our customers want us to re-package our technologies to develop an optimal solution that maximizes performance while reducing their total cost of ownership. We quickly and cost effectively employ our leading-edge technologies to deliver custom products that best fit our customer's unique power requirements—reducing their risk and time to market by utilizing proven technologies.

Talent

GE's Critical Power business retains independent Research & Development and Custom Product Development teams to ensure both continued development of next generation technology road maps as well as custom / modified designs. We are self-certified to support major safety agencies, further reducing product development schedules.

Our regional Field Application Engineers (FAEs) work closely with our customers to rapidly produce clean engineering prototypes, and, along with our design teams, provide ongoing sales and technical support throughout the life of each application. Our closed-loop engineering processes ensure continued process improvements and new technology trends are implemented into our future designs.

Research & Design

GE's Critical Power business maintains strategic alliances with key suppliers and global industry leaders to help define future technology direction and objectives. Our alliances allow us greater utilization of next generation technologies and topologies that we deploy into our custom power designs to drive leading power densities and efficiencies for our customers.

Product Development

Once a solution is proven at the prototype level, our product development teams execute a full development process finalizing the design and implementing improvements to the fabricated parts (such as PCBs, sheet metal, and magnetics), confirming the bill of materials, defining the quality assurance metrics, performing design verification tests, performing reliability tests (HALT / STRIFE), and testing for certification and EMI / safety qualification.

Custom Capabilities (Cont.)

Manufacturing & Quality Control

Our global operations and standardized processes enable us to build product at any of our global facilities utilizing consistent processes, equipment, training, and quality standards ensuring our customers receive exceptional products regardless of the country of design or manufacture. Our consistent approach ensures product quality, faster prototypes, and a reliable disaster recovery program.

Facilities

Our manufacturing strategy is to use the best of both internal and third party manufacturing, allowing us the flexibility to best fit each application's requirements. Our manufacturing processes, quality systems, data collection, and documentation are standardized across all facilities ensuring a smooth transition among locations to accommodate optimal capacity utilization and/or proximity of supply close to our end customer's manufacturing location. Employing a global procurement strategy further underscores our commitment to our customers. Managing a common AVL across all divisions allows us to leverage our cost structure with our supplier base, which contributes to competitive products with cost savings for our customers.

Quality / Reliability

Our Global Total Quality Management System ensures consistent measurement and collection of SPC data and deployment of controls of operation. Starting with the design and development phase, we apply stringent derating criteria of components and expose our designs to STRIFE and HALT testing. Our focus on reliability continues into production by using HASS screening and elevated temperature testing. Finally, we monitor the process using CPK and statistical analysis tools, forming a closed-loop process. All of our facilities are ISO 9001:2000 and ISO14001 Certified with many of our Quality Managers holding Green and Black Belt Six Sigma ratings.

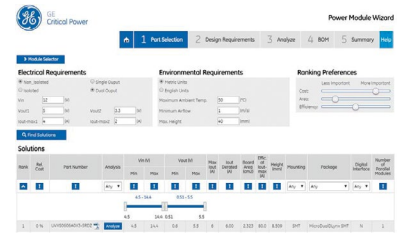
As a leading power provider, we offer our customers low-risk, leading-edge technology and consistent, high-quality product produced around the world and backed up by responsive local support.



Engineering Resources & Tools

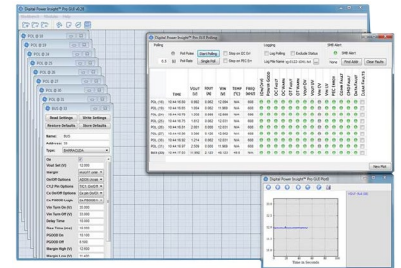
Power Module Wizard

This cloud-based tool helps board designers to easily select the best part for their design, thus improving design productivity and reducing design risk. From a simple set of requirements entered by the user, the tool quickly provides a list of suitable parts that can be sorted by different characteristics such as efficiency, size and/or cost. The results table also provides a summary of part parameters as well as links to the data sheet. For many parts, after selection, a simplified circuit schematic around the module can be created that is then analyzed via multiple simulation tools to evaluate important performance parameters such as efficiency, input and output ripple, static output voltage variation, transient response and circuit stability. Once satisfactory performance is obtained via simulation, a bill of materials with estimated pricing can be generated by the tool providing designers with the information needed to move towards production. Finally, the tool being Web-based allows for easy sharing of design information with designer colleagues and FAEs allowing for quick review and discussion.



Digital Power Insight* Tools

The Digital Power Insight (DPI) software suite allows customers to communicate with GE's latest Digital AC-DC and DC-DC power supplies, Digital Bus Converters and Point-of-Load (POL) modules, without having to write any software. With the GE USB-to-I2C adapter, and a set of four tools (command line interface based DPI-CLI; a simple, fixed-format graphical user interface DPI-GUI for modules and Bus Converters and CPGUI for the CP family products and the full-featured, multi-window ProGUI), the user has a rich set of capabilities to use in their system development and testing.



ProGUI

The new ProGUI enhances the capability of the Digital Power Insight* software suite with a powerful tool capable of communicating with up to 64 modules on the PMBus™. Features include configuring modules, logging and plotting data obtained from the modules, and saving data for further analysis and documentation. The ProGUI, along with the previously available GUI and Command Line Interface (CLI) software tools, provide the user with a wide range of capabilities to communicate with digital modules during the design phase as well as with production boards. The tool supports GE Critical Power digital DC-DC Modules, AC-DC & DC-DC Power Supplies. The ProGUI can also remotely update firmware and retrieve black box measurements from the newer generation GE Power Supplies that support this feature.

Evaluation Boards

Evaluation boards enable designers to evaluate the performance of our converters, either stand-alone or with our POL modules and optional input filters. Features such as on/off control, output voltage trim, and remote sense can be tested as well as external filtering components on both the input and output side.

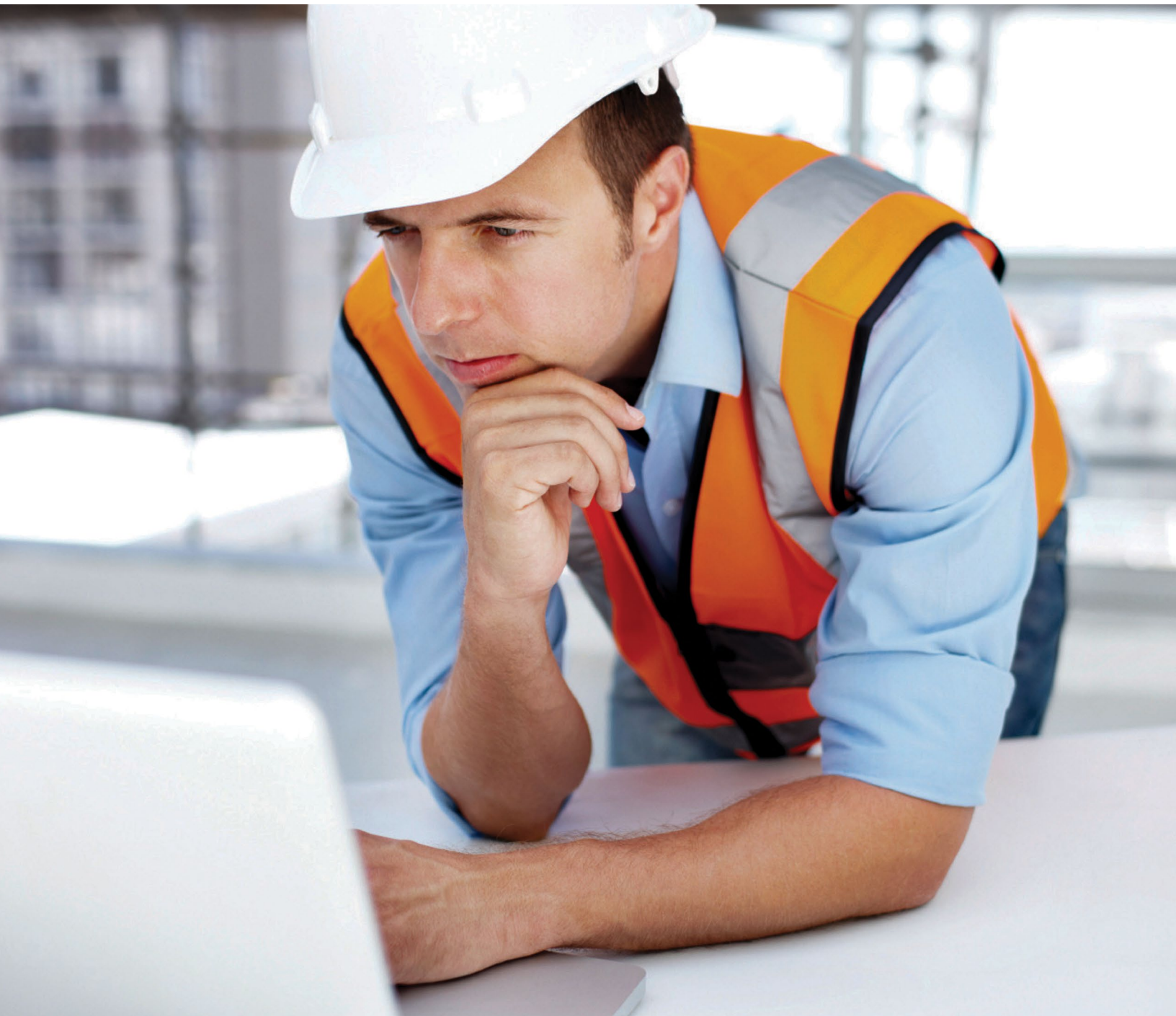
For more information on our tools, go to www.gecriticalpower.com

Engineering Resources & Tools (Cont.)

Digital Evaluation Kits

Digital Power Insight Kit

GE Critical Power Insight* (DPI) kit provides an easy to use vehicle for customers to explore the use of digital power and PMBus™. The hardware provides a set of example modules on evaluation boards along with a USB-to-I²C adapter and DPI software to experiment with monitoring of various module parameters (like input and output voltage, output current, module temperature) and module status. This kit provides an excellent way for new users to digital power to learn about this exciting new capability in GE power supplies.



Isolated DC-DC Converters

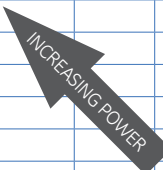


FIRST LETTER	PACKAGE	FIRST LETTER	PACKAGE	THIRD LETTER	COMM INTERFACE
S	1x1 brick	Q	1/4 brick	D	DOSA PMBus
K	1/16th brick	J	1/2 brick	V and all others	DOSA Analog
E	1/8th brick	F	full brick		

BARRACUDA* HIGH (V _{in} = 45 - 56V)	BARRACUDA* HIGH (V _{in} = other)
BARRACUDA* HIGH (V _{in} = 38 - 55V)	HAMMERHEAD* (18 - 75V _{in})
BARRACUDA* HIGH (V _{in} = 40 - 60V)	BARRACUDA* LOW (36 - 75V _{in})
BARRACUDA* HIGH (V _{in} = 36 - 75V)	ORCA* (36-75V _{in})

Non-Isolated DC-DC Converters

IOUT \ VOUT	54V	34V	32V	18V	16V	8V	6V	5.5V	5V	3V	2V	1.5V	0.7V	0.6V	0.51V	0.45V
170A													TJT170 [†]			
120A													TJT120 [†]			
80A												GDT080 [†]				
60A								NSR060								
50A											APTS050					
40A											MDT040 [†]					
											MVT040					
35A											NSR040					
											UJT035					
20A											PJT020					
											PKX020					
											UDT020 [†]					
14											UVT020					
											PJT014					
											PKX014					
12 + 12A											UDXS1212 [†]					
											UVXS1212					
12A				APXW012												
											PNDT012 [†]					
											PNVT012					
											UNDT012 [†]					
											UNVT012					
											PDT012 [†]					
											PVX012					
10A								NQR010								
6 + 6A											UDXS0606 [†]					
											UVXS0606					
7A											PJT007					
											PKX007					



FIRST LETTER	PACKAGE	FIRST LETTER	PACKAGE
A	Varies	N	SIP, varies
P	Pico (12x12mm)	G	Giga (33x23mm)
U	Micro (20x11mm)	T	Tera (54x32mm)
M	Mega (33x13mm)		

†PMBus Digital

ProLynx* (9-36Vin)	TLynx* (Vin varies)
SlimLynx* (3-14.4Vin)	Naos Raptor* (SIP, Vin varies)
DLynx II* (Vin varies)	Dual DLynx* (4.5-14.4Vin)
DLynx* (3-14.4Vin)	BoostLynx* (8-16Vin)

Non-Isolated DC-DC Converters (Cont.)

IOUT \ VOUT	54V	34V	32V	18V	16V	8V	6V	5.5V	5V	3V	2V	1.5V	0.7V	0.6V	0.51V	0.45V	
6A								FKX006									
								PNDT006†									
								PNVT006									
								PDT006†									
5A				APXW005													
								PJT004									
4A	ABXS005																
								APXK004									
3A				APXW003													
								FKX003									
								PNDT003†									
								PNVT003									
2A																	
1A	ABXS003																
1A	ABXS002																
	ABXS001																
1A																	

FIRST LETTER	PACKAGE	FIRST LETTER	PACKAGE
A	Varies	N	SIP, varies
P	Pico (12x12mm)	G	Giga (33x23mm)
U	Micro (20x11mm)	T	Tera (54x32mm)
M	Mega (33x13mm)		†PMBus Digital

ProLynx* (9-36Vin)	TLynx* (Vin varies)
SlimLynx* (3-14.4Vin)	Naos Raptor* (SIP, Vin varies)
DLynx II* (Vin varies)	Dual DLynx* (4.5-14.4Vin)
MicroDLynx II*	BoostLynx* (8-16Vin)
PicoDLynx II*	DLynx* (3-14.4Vin)

www.geindustrial.com/products/embedded-power/non-isolated-dcdc-converters





GE
601 Shiloh Road
Plano, TX 75074
+1 877 546 3243
www.gecriticalpower.com

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Embedded Power, Rev. 06/2018