

GE
Critical Power

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

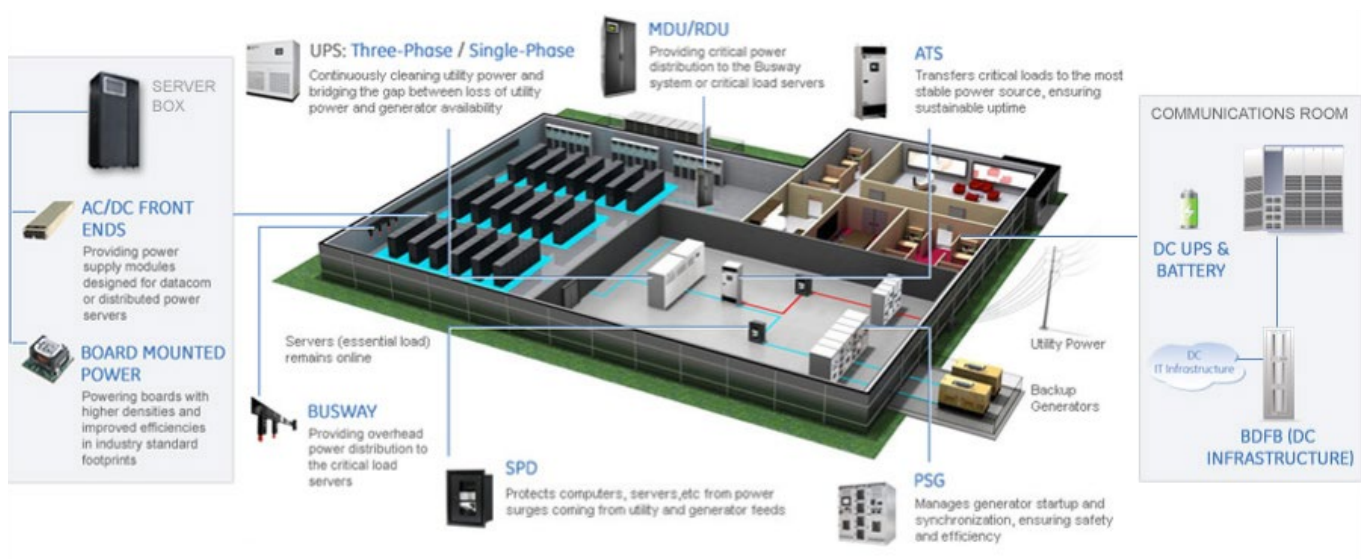
- Products for emergency standby, back-up power supply management and spike or surge protection plus installation and maintenance services for markets including datacenters, hospitals, telecommunications, financial institutions, transportation and industrial applications.

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

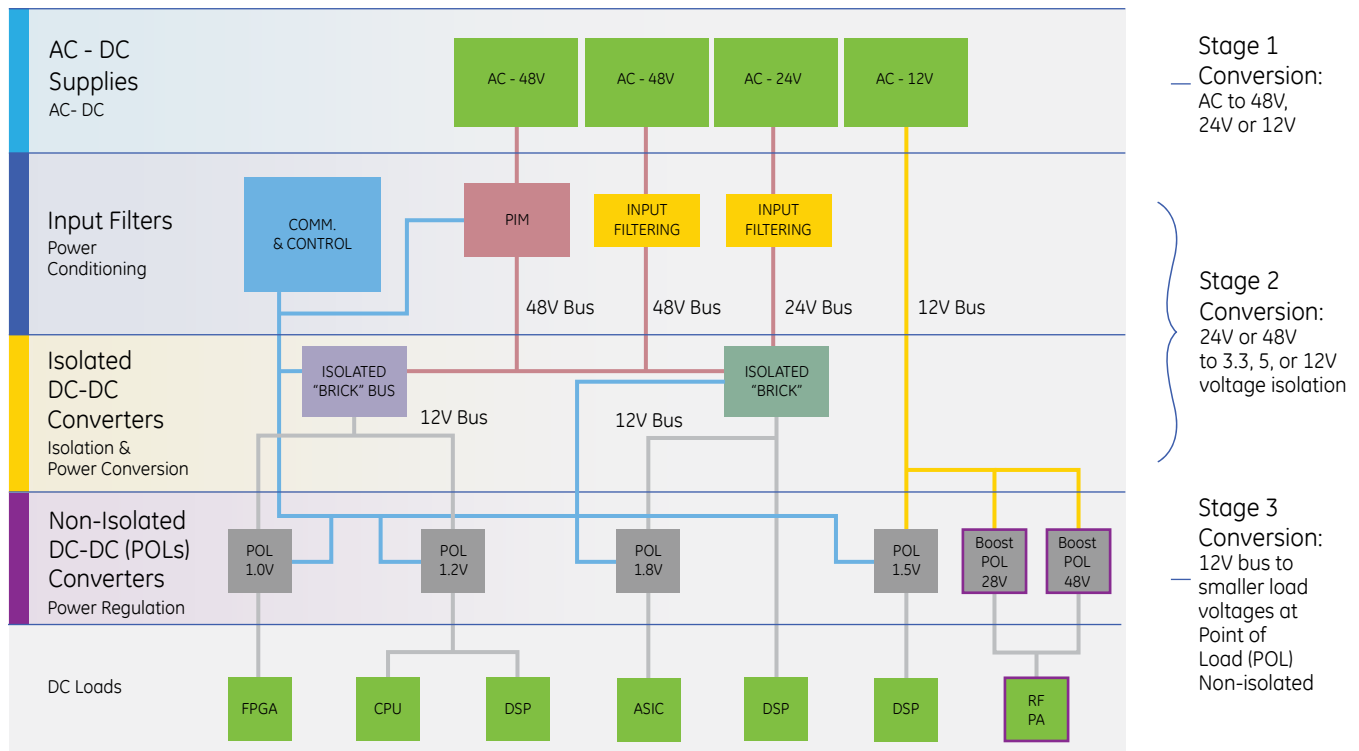
- Solutions for telecommunications, wireless and cable broadband service providers that leverage our extensive experience in turnkey project management, engineering, installation and maintenance services.



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
- Digital Signage
- Stadium Lighting
- Multimedia Displays
- Solar 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





Surge Protective Devices (SPD) UL Recognized

Surge related problems cost companies several billion dollars a year. The impact is far-reaching and affects just about every aspect of business. It drives up maintenance and production costs, causes production delays, lost sales, late deliveries, as well as increased spoilage and scrap. GE Tranquell* Series Surge Protective Devices (SPD) help minimize power-related problems by protecting sensitive electrical equipment from harmful transients.

Most transients originate from within a facility and nearly 80% of today's overvoltage problems are caused by equipment and power disturbances within the plant or facility. These inner-facility transients can be caused by light load panels switching on and off, HVAC equipment, motors starting and stopping, and close conductor proximity. Less than 20% of transient problems originate outside of the facility due to lightning strikes, utility grid switching, switching of capacitor banks, and electrical accidents.

GE Tranquell* Series

GE Tranquell* Series SPD DIN Rail mount is a Type 2 surge protective device (for installation on the load side of the service equipment overcurrent device) that is modular and easy to install. DIN Rail mount housing allows for quick installation. Each unit has a compact footprint. Depending on the number of poles, each unit has a user-replaceable phase surge pluggable module with an IP20 finger-safe design. Both visual indicators and remote indicators (dry contact) provide SPD status to critical control circuits.

Most SPD are designed to function in tandem with fuses. If you need a space-saving option or are looking for ways to reduce costs, then consider an integrated system. GE's Tranquell* Series SPD DIN Rail Mounted features thermally protected metal oxide varistor technology, eliminating the need for dedicated overcurrent protection.

Industries

- Telecommunication
- Oil & Gas
- Transportation
- Utilities
- Wind Power
- Water Treatment

Applications

- AC Distribution
- Medium Voltage Power Supplies
- Industrial Automation Controls
- Telecom Equipment
- Motor Controls and
- Starter Systems
- Programmable Logic Controller
- PLC Applications
- Power Transfer Equipment
- HVAC Controls
- AC Drives
- Security Systems



Side View-User-Replaceable Pluggable Module



Assembly System: 4-Pole



Assembly System: on DIN Rail: 2-Pole



Base Module: 4-Pole



Rear View: 3-Pole

Surge Protective Devices (SPD) (Cont.)

GE Tranquell* Series Surge Protective Devices (SPD) DIN Rail Mounted- Part Numbers & Specifications

SYSTEM PART NUMBER	NOMINAL VOLTAGE (50/60 Hz)	PRODUCT CONFIGURATION				UL SPECIFICATIONS				VOLTAGE PROTECTION RATING (VPR) (UP @ I _n)						
		NO. OF WIRES	MAX DISCHARGE CURRENT (IMAX, 8/20 μ S, kA)	WIRING CONFIGURATION*	ELECTRICAL VOLTAGE CONFIGURATION	NOMINAL DISCHARGE CURRENT (I _n , kA)	MCOV (Vc) L-L	MCOV (Vc) L-G	MCOV (Vc) L-N	L-N	L-G	N-G	L-L	H-L1	H-N	H-G
TD120Y4025RMN	120 / 208V	5-Wire / 4 Pole	25kA	3 Phase Wye, plus N-G	Figure C	20	360	360	180	600	1200	600	1200	-		
TD120Y4050RMN			50kA			20	360	360	180	600	1200	600	1200	-		
TD220Y4025RMN	220 / 380V		25kA			20	640	500	320	1000	1500	600	1800			
TD220Y4050RMN			50kA			20	640	500	320	1000	1500	600	1800			
TD277Y4025RMN	277 / 480V		25kA			20	640	500	320	1000	1500	600	1800			
TD277Y4050RMN			50kA			20	640	500	320	1000	1500	600	1800			
TD347Y4025RMN	347 / 600V		25kA			10	840	695	420	1500	2000	900	2500			
TD347Y4050RMN			50kA			10	840	695	420	1500	2000	900	2500			
TD240H4025RMN	120 / 240V	4-Wire / 3 Pole	25kA	3 Phase High Leg Delta	Figure E	20	***			600	1200	600	1200	1500	900	1500
TD240H4050RMN			50kA			20				600	1200	600	1200	1500	900	1500
TD480H4025RMN	240 / 480V		25kA			10				900	1500	600	1800	2500	1800	2000
TD480H4050RMN			50kA			10				900	1500	600	1800	2500	1800	2000
TD120Y3025RMP	120 / 208V		25kA	3 Phase Wye, common N/G	Figure C	20	360	-	180	600	-	-	1200	-		
TD120Y3050RMP			50kA			20	360	-	180	600	-	-	1200	-	-	-
TD277Y3025RMP	277 / 480V		25kA			20	640		320	1000			1800			
TD277Y3050RMP			50kA			20	640		320	1000			1800			
TD347Y3025RMP	347 / 600V		25kA			10	840		420	1500			2500			
TD347Y3050RMP			50kA			10	840		420	1500			2500			
TD240D3025RMP	240V		25kA	3 Phase Delta	Figure D	20	550	275	-	-	900		1800			
TD240D3050RMP			50kA			20	550	275			900		1800			
TD480D3025RMP	480V		25kA			10	1100	550			1800		3000			
TD480D3050RMP			50kA			10	1100	550			1800		3000			
TD120S2025RMP	120/208V, 120/240V	3 Wire / 2 Pole	25kA	Split Phase	Figure B	20	360	-	180	600	-	-	1200	-	-	-
TD120S2050RMP			50kA			20	360	-	180	600	-	-	1200	-	-	-
TD240S2025RMP	240 / 480V		25kA			20	550		275	900			1800			
TD240S2050RMP			50kA			20	550		275	900			1800			
TD120S1025RMP	120V	2 Wire / 1 Pole	25kA	Single Phase	Figure A	20	-	-	180	600	-	-	-	-	-	-
TD120S1050RMP			50kA			20	-	-	180	600	-	-	-	-	-	-
TD240S1025RMP	240 V		25kA			20			275	900			-			
TD240S1050RMP			50kA			20			275	900			-			
TD277S1025RMP	277 V		25kA			20			320	1000			-			
TD277S1050RMP			50kA			20			320	1000			-			
TD347S1025RMP	347 V		25kA			10			420	1500			-			
TD347S1050RMP			50kA			10			420	1500			-			

*** Please contact your GE Sales Rep for details.

Surge Protective Devices (SPD) (Cont.)

GE TR5000 Series Wallmount Surge Protective Devices (SPD)

Voltage spikes and surges from both external and internal sources can cause damage to all electronics and directly affect the performance and life expectancy of connected equipment. From electronic lighting ballasts to computer servers, if there is a printed circuit board inside, it is susceptible to transient voltage surge damage. As microprocessors and components that make up this equipment grow smaller and faster with each new generation, their susceptibility to transient voltage surge damage becomes ever greater.



GE TR5000 Series Wallmount SPD

GE TR5000 Series Wallmount SPD are ideal for both new and retrofit commercial and industrial applications where basic monitoring is required and performance cannot be compromised. Available in ratings from 25kA - 100kA per mode, (50kA - 200kA per phase) the TR5000 series is the perfect surge suppression product for protecting your critical sensitive electronic equipment throughout your facility.

Applications

- Distribution Equipment
- Branch Panel
- Point of Use
- New Construction and Retrofits
- System Expansions

Features and Benefits

- TR5000 series provides maximum surge protection with outstanding clamping characteristics for medium and low exposure locations through the use of industrial grade MOV architecture.
- UL 1449 3rd Edition, Type 2
- Patented thermal fuse technology
- Maximum installation flexibility is achieved in the TR5000 through its high surge suppression ratings to small footprint size ratio.

Technical Specifications

- Nominal Discharge Current (In)
 - 25kA - 50kA rated units: 10kA
 - 65kA - 100kA rated units: 20kA
- Short Circuit Current Rating (SCCR)
 - 65kA (30A breaker required)
- Connection
 - 10 AWG Pre-wired Conductors, Parallel Connected
- Operating Temperature
 - 40° F to 149° F (-40° C to +65° C)

Surge Protective Devices (SPD) (Cont.)

Catalog Ordering Guide

Catalog # **TR5** _____ **WM** _

	NOMINAL VOLTAGE (VOLTS RMS)	SYSTEM VOLTAGE CONFIGURATION	MCOV % MAX. CONTINUOUS OPERATING VOLTAGE	SOURCE CONFIGURATION
120S	120/240	1 Ph, 3 W + G	150V	A
120Y	120V/208	3 Ph, 4 W + G	150V	B
220Y	220/380	3 Ph, 4 W + G	320V	B
240Y	240/415	3 Ph, 4 W + G	320V	B
277Y	277Y/480	3 Ph, 4 W + G	320V	B
240D	240 Delta	3 Ph, 3 W	270V	C
480D	480 Delta	3 Ph, 3 W	550V	D
240H	120/240 Delta HL	3 Ph, 4 W + G	see note	E

Note: 150V (L-N/G) Phase A&C; 270V (L-N-G) Phase B

	MAXIMUM SURGE CURRENT CAPACITY	
	PER MODE	PER PHASE
025	25kA	50kA
050	50kA	100kA
065	65kA	130kA
080	80kA	160kA
100	100kA	200kA

Phase Rating = (L-N + L-G)

SUFFIX*	ENCLOSURE DESCRIPTION	NEMA	MOUNTING
	Painted Steel	12	Surface
F	Painted Steel	12	Flush
4	Fiberglass	4X	Surface

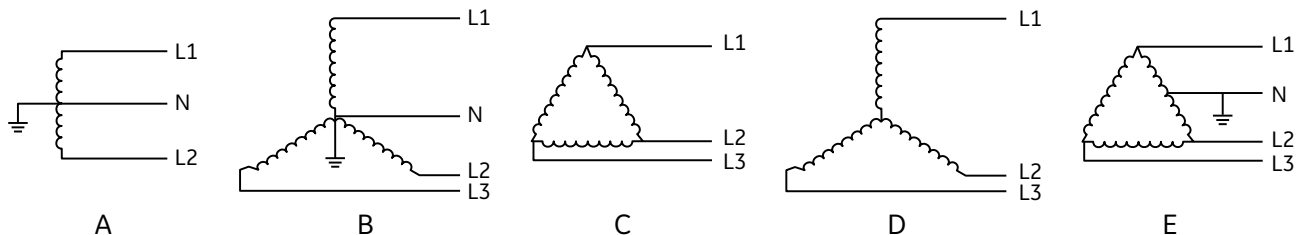
*All suffix features are mutually exclusive



Catalog# Example: TR5277Y100WM

- 277Y/480 V, 3 Ph, 4W + G
- 100kA per mode
- NMEA 12, surface mount

SOURCE CONFIGURATION DIAGRAMS





AC-DC and DC-DC Power Supplies

Product Matrix

OPEN FRAME AC-DC POWER SUPPLIES	MODEL	NOMINAL OUTPUT (NEGATIVE)	INPUT	DIGITAL COMM.	PROFILE	NOMINAL INPUT	MAX OUTPUT	200W	500W	1KW	1.5KW	2KW	2.5KW	3KW	3.5KW
	CLP0112FP	12V	Top	Not Available	Open Frame	1PH (110/220vac)	150W	<div></div>							
	CLP0212FP	12V	Top	Not Available	Open Frame	1PH (110/220vac)	200W	<div></div>							
	CLP0224FP	24V	Top	Not Available	Open Frame	1PH (110/220vac)	200W	<div></div>							
	CLP0412FP	12V	Top	Not Available	Open Frame	1PH (110/220vac)	450W	<div></div>							

AC-DC AND DC-DC FRONT ENDS (12 VOUT)	MODEL	NOMINAL OUTPUT (NEGATIVE)	INPUT	DIGITAL COMM.	PROFILE	NOMINAL INPUT	MAX OUTPUT	200W	500W	1KW	1.5KW	2KW	2.5KW	3KW	3.5KW
	CAR0512FP	12Vdc	Rear	I2C/PMBus	1U	1PH (110/220vac)	500W	<div></div>							
	SLP0712TE	12Vdc	Front	I2C/PMBus	1U	1PH (110/220vac)	750W	<div></div>							
	CAR0812FP	12Vdc	Front	I2C/PMBus	1U	1PH (110/220vac)	850W	<div></div>							
	CAR0812DC	12Vdc	Front	I2C/PMBus	1U	48Vdc	850W	<div></div>							
	CAR1212DC	12Vdc	Rear	I2C/PMBus	1U	48Vdc	1200W	<div></div>							
	CAR1212FP	12Vdc	Rear	I2C/PMBus	1U	1PH (110/220vac)	1250W	<div></div>							
	CAR1612FP	12Vdc	Front	I2C/PMBus	1U	1PH (110/220vac)	1600W	<div></div>							
	CAR1812FP	12Vdc	Front	I2C/PMBus	1U	1PH (110/220vac)	1800W	<div></div>							
	CAR2012TE	12Vdc	Front	I2C/PMBus	1U	1PH (110/220vac)	2000W	<div></div>							
	CAR2512TE	12Vdc	Front	I2C/PMBus	1U	1PH (110/220vac)	2500W	<div></div>							
	CAR2512DC	12Vdc	Front	I2C/PMBus	1U	48Vdc	2500W	<div></div>							

Product Matrix

AC-DC AND DC-DC FRONT ENDS (24 VOUT)	MODEL	NOMINAL OUTPUT (NEGATIVE)	INPUT	DIGITAL COMM.	PROFILE	NOMINAL INPUT	MAX OUTPUT	200W	500W	1KW	1.5KW	2KW	2.5KW	3KW	3.5KW
	CAR0424FP	24Vdc	Front	Not Available	1U	1PH (110/220vac)	400W								
	CAR0924FP	24Vdc	Rear	I2C/ PMBus	1U	1PH (110/220vac)	750W								
	CAR2024FP	24Vdc	Rear	I2C/ PMBus	1U	1PH (110/220vac)	2000W								

AC-DC AND DC-DC FRONT ENDS (48 VOUT OR GREATER)	MODEL	NOMINAL OUTPUT (NEGATIVE)	INPUT	DIGITAL COMM.	PROFILE	NOMINAL INPUT	MAX OUTPUT	200W	500W	1KW	1.5KW	2KW	2.5KW	3KW	3.5KW
	CAR0548TN	(54Vdc)	Rear	I2C/PMBus	1U	1PH (110/220vac)	500W								
	MPR0854FP	54Vdc	Front	I2C/PMBus	1U	1PH (110/220vac)	800W								
	CAR1248FP	48Vdc	Rear	I2C/PMBus	1U	1PH (110/220vac)	1200W								
	CAR1248TN	(54Vdc)	Rear	I2C/PMBus	1U	1PH (110/220vac)	1200W								
	MPR1348FP	48Vdc	Rear	I2C/PMBus	1U	1PH (110/220vac)	1350W								
	CAR2548FP	48Vdc	Rear	I2C/PMBus	1U	1PH (110/220vac)	2500W								
	CAR2548TN	(54Vdc)	Rear	I2C/PMBus	1U	1PH (110/220vac)	2500W								
	CAR2548DC	48Vdc	Front	I2C/PMBus	1U	48Vdc	2500W								

AC-DC and DC-DC Power Supplies (Cont.)

Product Matrix

AC-DC FRONT ENDS & RECTIFIERS DC-DC CONVERTERS	MODEL	NOMINAL OUTPUT	INPUT	DIGITAL COMM.	PROFILE	NOMINAL INPUT	MAX OUTPUT	200W	500W	1KW	1.5KW	2KW	2.5KW	3KW	3.5KW	4KW	6KW				
	EP0500UTE	48-52V	Rear	RS485	1U	1PH (110/ 220vac)	500W														
	EP0500V	24V	Rear	RS485	1U	1PH (110/ 220vac)	500W														
	EP1000TE	48-52V	Rear	RS485	1U	1PH (110/ 220vac)	1000W														
	EP1600TE	48-52V	Rear	RS485	1U	1PH (110/ 220vac)	1600W														
	CP2000DC	48-54V	Rear	I2C/ PMBus/ RS485	1U	48/50Vdc	2000W														
	CP2000TE	48-54V	Rear	I2C/ PMBus/ RS485	1U	1PH (110/220/ 277vac)	2000W														
	CP2500DC	48-54V	Rear	I2C/ PMBus/ RS485	1U	48/50Vdc	2500W														
	CP2500DC-F	48-54V	Front	I2C/ PMBus/ RS485	1U	48/50Vdc	2500W														
	CP2725TE	48-54V	Rear	I2C/ PMBus/ RS485	1U	1PH (110/ 220/277vac)	2725W														
	EP3000TE	48-52V	Rear	RS485	1U	1PH (110/ 220vac)	3000W														
	CP3000TE	48-54V	Rear	I2C/ PMBus/ RS485	1U	1PH (110/ 220/277vac)	3000W														
	CP3000TE-F	48-54V	Front	I2C/ PMBus/ RS485	1U	1PH (110/ 220vac)	3000W														
	CP3500TE	48-54V	Rear	I2C/ PMBus/ RS485	1U	1PH (110/ 220/277vac)	3500W														
	GP100RTE-IN	48-54V (48V Default)	Rear	RS485	1U	3PH (380/ 380Vac)	6000W														
	GP100RTE	48-54V (52V Default)	Rear	RS485	1U	3PH (380/ 480vac)	6000W														
	GP100MTE	48-54V (54V Default)	Rear	I2C/PMBus	1U	3PH (380/ 480vac)	6000W														

AC-DC
FRONT ENDS
& RECTIFIERS
DC-DC
CONVERTERS

Open Frame Power Supply

CLP0212 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%
CLP0212FP	2" x 4" x 1.4"	90-264V	12V	200W	90%
CLP0224FP	2" x 4" x 1.4"	90-264V	24V	200W	90%
CLP0412FP	3" x 5" x 1.4"	90-264V	12V	450W	91%

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

CAR1248TN

- 1,200 watts / -48V out
- 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

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)

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

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

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

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

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



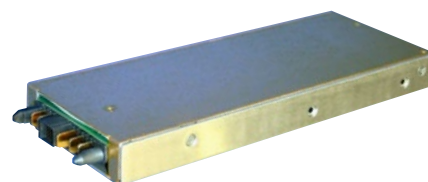
Fanless 0.5U High Front Ends

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

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

- 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
- 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

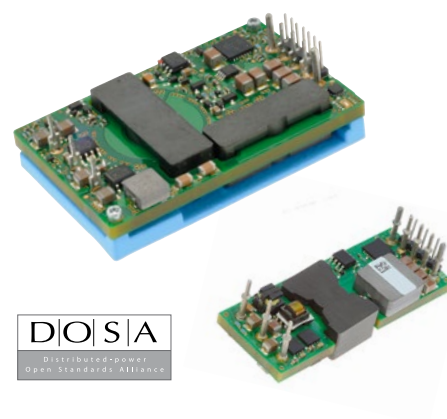
Product Matrix

FULLY REGULATED BUS CONVERTERS	MODEL	INPUT VOLTAGE	ISOLATION	FOOTPRINT	OUTPUT VOLTAGE	MAX CURRENT/ POWER	0W	100W	200W	300W	400W	500W	600W	700W	800W			
	EBDW (digital)	36 - 75V	2250Vdc	1/8 brick	12V	25A / 300W	<div></div>											
	EBVW	36 - 75V	2250Vdc	1/8 brick	12V	25A / 300W	<div></div>											
	QBDW025 (digital)	36 - 75V	2250Vdc	1/4 brick	12V	25A / 300W	<div></div>											
	QBVW025	36 - 75V	2250Vdc	1/4 brick	12V	25A / 300W	<div></div>											
	QBDW033 (digital)	36 - 75V	2250Vdc	1/4 brick	12V	33A / 400W	<div></div>											
	QBVW033	36 - 75V	2250Vdc	1/4 brick	12V	33A / 400W	<div></div>											
	QSDW035 (digital)	36 - 75V	2250Vdc	1/4 brick	12V	35A / 420W	<div></div>											
	QSVW035	36 - 75V	2250Vdc	1/4 brick	12V	35A / 420W	<div></div>											
	QSDW042 (digital)	36 - 75V	2250Vdc	1/4 brick	12V	42A / 500W	<div></div>											
	QSDW042	36 - 75V	2250Vdc	1/4 brick	12V	42A / 500W	<div></div>											
	QSDW050 (digital)	36 - 75V	2250Vdc	1/4 brick	12V	50A / 600W	<div></div>											
	QSVW050	36 - 75V	2250Vdc	1/4 brick	12V	50A / 600W	<div></div>											
	QBVE067	40 - 60V	2250Vdc	1/4 brick	12V	67A / 800W	<div></div>											

ISOLATED AND REGULATED DC-DC CONVERTERS	MODEL	INPUT VOLTAGE	ISOLATION	FOOTPRINT	OUTPUT VOLTAGE	MAX CUR- RENT/POWER	0W	50W	75W	100W	200W	300W	400W	500W	600W
	SHHD	18 - 75V	2250Vdc	1 x 1	3.3 - 12V	5A / 15W	<div></div>								
	SSTW	36 - 75V	2250Vdc	1 x 1	3.3 - 12V	5A / 15W	<div></div>								
	KHHD	18 - 75V	2250Vdc	1/16 brick	3.3 - 12V	10A / 30W	<div></div>								
	KSTW	36 - 75V	2250Vdc	1/16 brick	3.3 - 12V	10A / 30W	<div></div>								
	KHHD	18 - 75V	2250Vdc	1/16 brick	3.3 - 12V	15A / 50W	<div></div>								
	KSTW	36 - 75V	2250Vdc	1/16 brick	3.3 - 12V	15A / 50W	<div></div>								
	KNW	36 - 75V	2250Vdc	1/16 brick	3.3 - 5V	20A / 66W	<div></div>								
	KBVW	36 - 75V	2250Vdc	1/16 brick	12V	6A / 72W	<div></div>								
	ERCW	36 - 75V	2250Vdc	1/8 brick	28V	3.6A / 100W	<div></div>								
	EHHD	18 - 75V	2250Vdc	1/8 brick	3.3 - 12V	36A / 120W	<div></div>								
	ESTW	36 - 75V	2250Vdc	1/8 brick	3.3 - 15V	36A / 120W	<div></div>								
	QHHD	18 - 75V	2250Vdc	1/4 brick	12V	19A / 228W	<div></div>								
	JNCW	36 - 75V	1500Vdc	1/2 brick	28V	16A / 445W	<div></div>								
	JRCW	36 - 75V	1500Vcd	1/2 brick	28 - 48V	16A / 450W	<div></div>								
	JRCK	36 - 60V	1500Vcd	1/2 brick	32V	17A / 544W	<div></div>								

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%

High Power Barracuda* (Cont.)

Barracuda* Digital Series

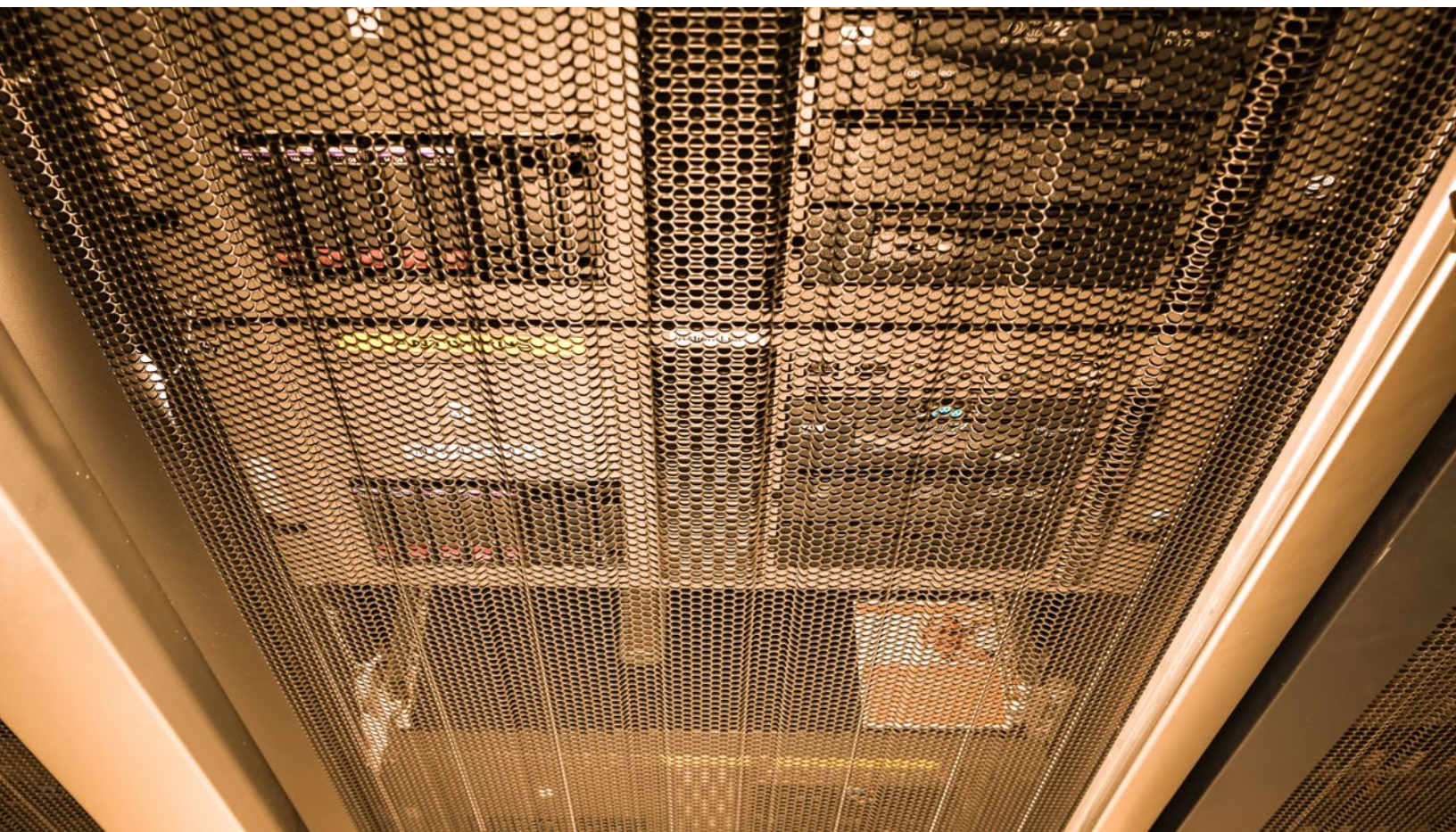
- Conforms to new DOSA standard for Second Generation Single Output Pin DC-DC Converters with Digital Connections
- Fully backwards compatible with other Barracuda* series
- Digital interface with PMBus™
- Two user configurable pins for remote sense or output trim

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%



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.



TUNABLE
LOOP

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%
JRCW017A0R	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



Non-Isolated DC-DC (Point-of-Load) Converters

Surface Mount Modules Product Matrix

	MODEL	INPUT VOLTAGE	OUTPUT VOLTAGE	OUTPUT CURRENT	COMM.	DIMENSIONS	2A	5A	10A	15A	20A	30A	40A	50A	60A	80A	120A	170A
PicoDLynx*	PNVX002	3.0-14.0V	0.6-5.5V	2A	Analog	12.2 x 12.2 x 4.5 mm	<div></div>											
	PDT003	3.0-14.4V	0.45-5.5V	3A	Digital	12.2 x 12.2 x 6.25 mm	<div></div>											
	PVX003	3.0-14.4V	0.6-5.5V	3A	Analog	12.2 x 12.2 x 6.25 mm	<div></div>											
	PDT006	3.0-14.4V	0.45-5.5V	6A	Digital	12.2 x 12.2 x 7.25 mm	<div></div>											
	PVX006	3.0-14.4V	0.6-5.5V	6A	Analog	12.2 x 12.2 x 7.25 mm	<div></div>											
	PDT012	3.0-14.4V	0.45-5.5V	12A	Digital	12.2 x 12.2 x 8.5 mm	<div></div>											
	PVX012	3.0-14.4V	0.6-5.5V	12A	Analog	12.2 x 12.2 x 8.5 mm	<div></div>											
MicroDLynx*	UVT020	3.0-14.4V	0.60-5.5V	20A	Analog	20.32 x 11.43 x 8.5 mm	<div></div>											
	UDT020	3.0-14.4V	0.45-5.5V	20A	Digital	20.32 x 11.43 x 8.5 mm	<div></div>											
MegaDLynx*	MVT040	4.5-14.4V	0.60-2.0V	40A	Analog	33.02 x 13.46 x 10.9 mm	<div></div>											
	MDT040	4.5-14.4V	0.45-2.0V	40A	Digital	33.02 x 13.46 x 10.9 mm	<div></div>											
GigaDLynx II*	GDT080	4.5-14.0V	0.5-2.0V	80A	Digital	33 x 22.9 x 12.7 mm	<div></div>											
TeraDLynx II*	TJT120	7.0-14.0V	0.1-1.5V	120A	Digital	54 x 31.8 x 13.6 mm	<div></div>											
	TJT170	7.0-14.0V	0.1-1.5V	170A	Digital	54 x 31.8 x 13.6 mm	<div></div>											
Dual DLynx*	UDXS0606	4.5-14.4V	0.51-5.5V	2 x 6A	Digital	20.32 x 11.43 x 8.5 mm	<div></div>											
	UVXS0606	4.5-14.4V	0.6-5.5V	2 x 6A	Analog	20.32 x 11.43 x 8.5 mm	<div></div>											
	UDXS1212	4.5-14.4V	0.51-5.5V	2 x 12A	Digital	20.32 x 11.43 x 8.5 mm	<div></div>											
	UVXS1212	4.5-14.4V	0.6-5.5V	2 x 12A	Analog	20.32 x 11.43 x 8.5 mm	<div></div>											
SlimLynx*	UNDT006	3.0-14.4V	0.45-5.5V	6A	Digital	20.32 x 11.43 x 2.8 mm	<div></div>											
	UNVT006	3.0-14.4V	0.6-5.5V	6A	Analog	20.32 x 11.43 x 2.8 mm	<div></div>											
	ULDT006	3.0-14.4V	0.45-5.5V	6A	Digital	20.32 x 11.43 x 3.0 mm	<div></div>											
	ULVT006	3.0-14.4V	0.6-5.5V	6A	Analog	20.32 x 11.43 x 3.0 mm	<div></div>											
	UNDT012	3.0-14.4V	0.45-5.5V	12A	Digital	20.32 x 11.43 x 2.8 mm	<div></div>											
	UNVT012	3.0-14.4V	0.6-5.5V	12A	Analog	20.32 x 11.43 x 2.8 mm	<div></div>											
	ULDT012	3.0-14.4V	0.45-5.5V	12A	Digital	20.32 x 11.43 x 3.0 mm	<div></div>											
	ULVT012	3.0-14.4V	0.6-5.5V	12A	Analog	20.32 x 11.43 x 3.0 mm	<div></div>											
	PNDT003	3.0-14.4V	0.45-5.5V	3A	Digital	12.2 x 12.2 x 2.9 mm	<div></div>											
	PNVT003	3.0-14.4V	0.6-5.5V	3A	Analog	12.2 x 12.2 x 2.9 mm	<div></div>											
	PNDT006	3.0-14.4V	0.45-5.5V	6A	Digital	12.2 x 12.2 x 2.9 mm	<div></div>											
	PNVT006	3.0-14.4V	0.6-5.5V	6A	Analog	12.2 x 12.2 x 2.9 mm	<div></div>											
	PNDT012	3.0-14.4V	0.45-5.5V	12A	Digital	12.2 x 12.2 x 2.9 mm	<div></div>											
	PNVT012	3.0-14.4V	0.6-5.5V	12A	Analog	12.2 x 12.2 x 2.9 mm	<div></div>											

Surface Mount Modules Product Matrix (Cont.)

[illegible]

Single In-line Package (SIP) Product Matrix

[illegible]

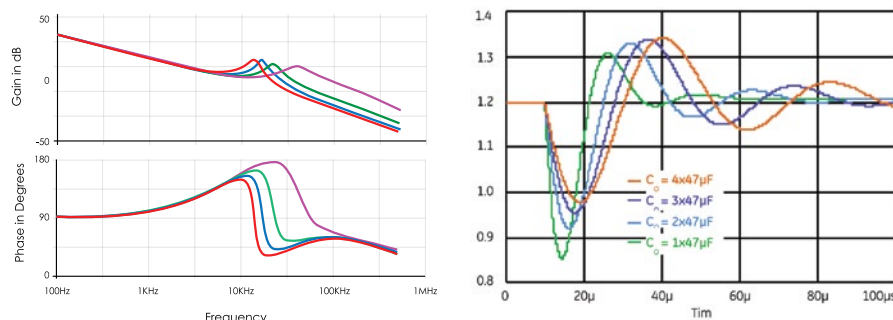
Tunable Loop* Technology

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*:

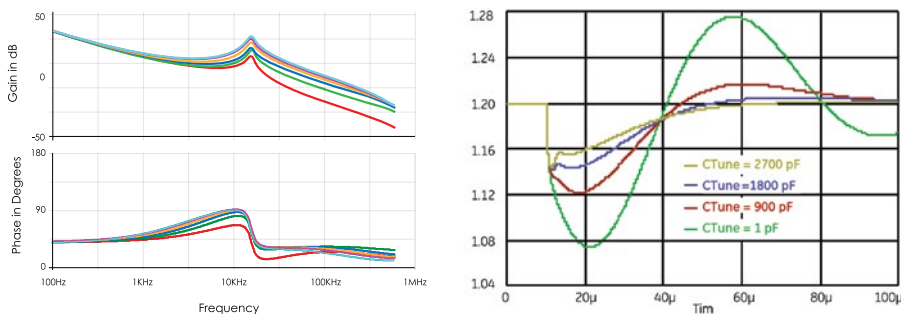
High deviation and reduced control bandwidth with increased output capacitance.



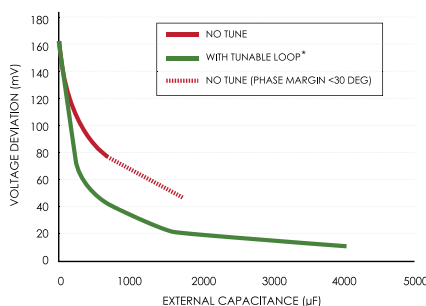
The goal of Tunable Loop* is to regain the bandwidth lost with increased capacitance. If we fix the value of R_{Tune} to 330ohms and vary C_{Tune} from 1pF to 2700pF, we regain control bandwidth back to 82KHz and achieve a **4.8x reduction in voltage deviation**.

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*
- 80 to 170A output current DLynx II*
- 3 to 14.4Vdc input models
- 0.45 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.	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	
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 2.8-3.0mm. 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
- High technology encapsulation for improved thermal performance, electrical insulation, and easy manufacturing
- Bottom side placement
- Digital interface through the PMBus™ protocol
- Small footprint: 12.2 x 12.2 x 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* (Non-Encapsulated)	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	
	UNDT006 (Micro)	3.0-14.4V	0.45-5.5V	6A	Digital	96%	20.32 x 11.43 x 2.8 mm	
	UNVT006 (Micro)	3.0-14.4V	0.6-5.5V	6A	Analog	96%	20.32 x 11.43 x 2.8 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	
SlimLynx* (Encapsulated)	ULDT006 (Micro)	3.0-14.4V	0.45-5.5V	6A	Digital	96%	20.32 x 11.43 x3 mm	
	ULVT006 (Micro)	3.0-14.4V	0.6-5.5V	6A	Analog	96%	20.32 x 11.43 x3 mm	
	ULDT012 (Micro)	3.0-14.4V	0.45-5.5V	12A	Digital	96%	20.32 x 11.43 x 3 mm	
	ULVT012 (Micro)	3.0-14.4V	0.6-5.5V	12A	Analog	96%	20.32 x 11.43 x 3 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 65W boost converter
- 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 34Vdc 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	

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	

Tunable Loop* POL Converter Modules (Cont.)






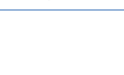

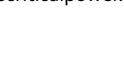
TLynx* Surface Mount Models

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	
MegaTLynx*	APTS030	6.0-14.0V	0.80-3.63V	30A	96%	33 x 13.46 x 10 mm	
GigaTLynx*	APTS050	4.5-14.0V	0.70-2.0 V	50A	95%	33 x 22.9 x 10 mm	

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	
	NSR050	5.0-14.0V	0.60-2.0V	50A	93%	36.8 x 27.9 x 20.1 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 80A, 120A, and 170A modules.

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 new series of low profile, digital and analog, non-isolated, DC-DC converters from GE's Critical Power business. The ultra-slim 2.8-3.0 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 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.

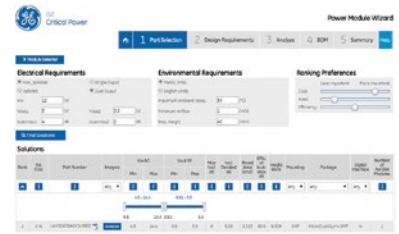
As a leading power provider, we offer our customers low-risk, leading-edge technology and consistent, high-quality product produced around the world and backed up by responsive local support.



Engineering Resources & Tools

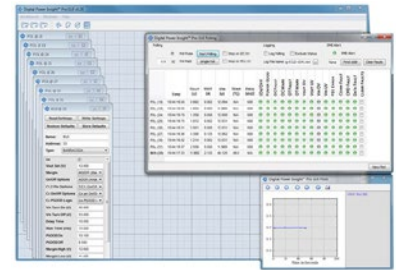
Power Module Wizard

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.

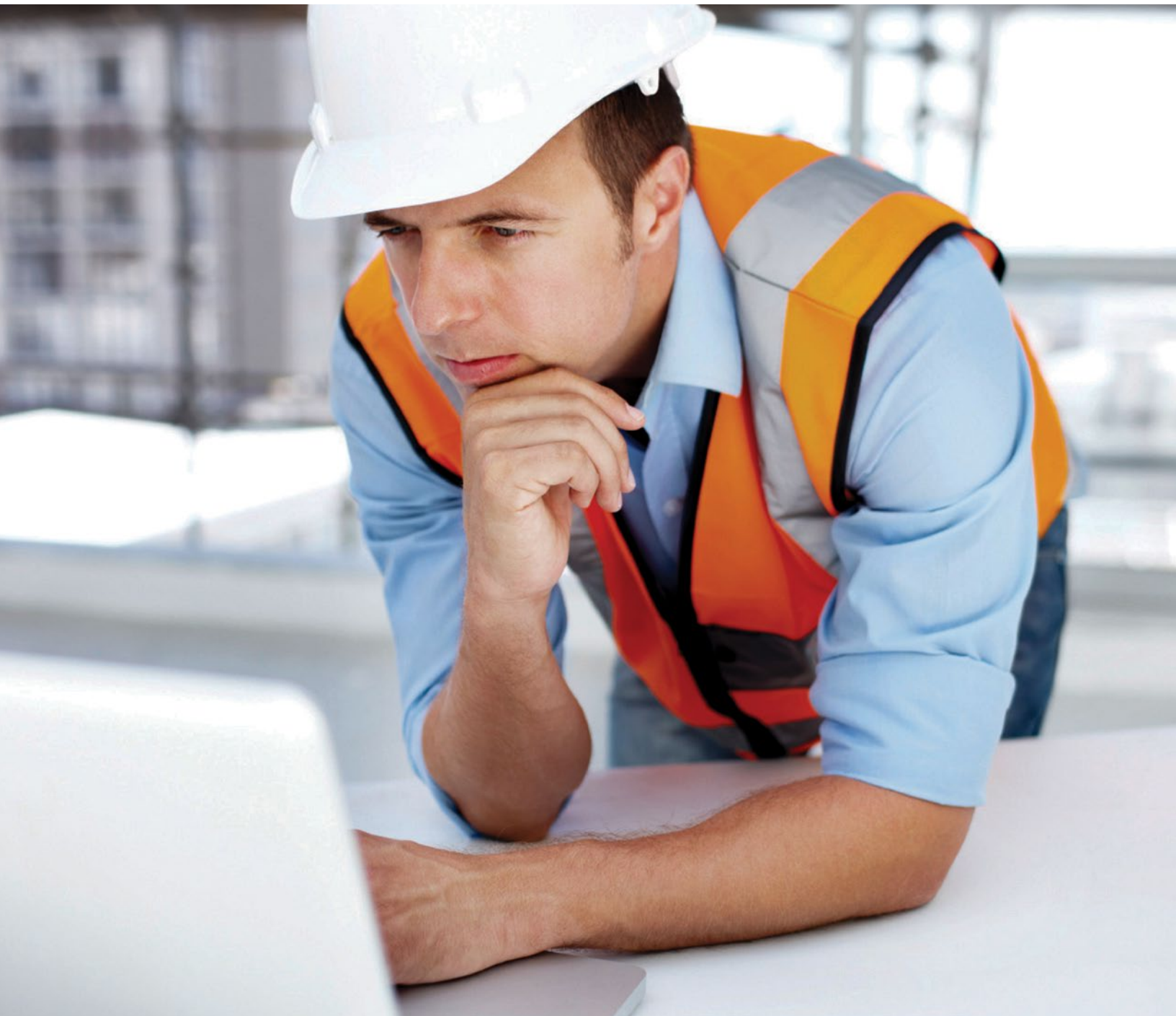
For more information on our tools, go to www.gecriticalpower.com

Engineering Resources & Tools (Cont.)

Digital Evaluation Kits

Digital Power Insight Kit and SlimLynx Evaluation Kit

GE Critical Power Insight* (DPI) kit and SlimLynx* Evaluation kit provide 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.



AC-DC and DC-DC Power Supplies

I _{OUT} \ V _{OUT}	54V	52V	48V	32V	28V	24V	12V
208A							CAR2512TE
							CAR2512FP
							CAR2512DC
166A							CAR2012TE
150A							CAR1812FP
133A							CAR1612FP
100A	GP100H3R48TEZ* (3 phase, RS485) 1.61in x 7.98in x 17.53in						CAR1212FP
	GP100H3M54TEZ (3 phase, I2C) 1.61in x 7.98in x 17.53in						CAR1212DC
83.3A						CAR2024FP	
70.8A							CAR0812FP
							CAR0812DC
65A	CP3500AC54TEZ/CZ 1.63in x 4in x 13.85in						
62.5A							SLP0712TE
60A		EP3000AC48 4.84in x 3.25in x 11.16in					
55A	CP3000AC54TEZ/CZ 1.63in x 4in x 13.85in						
	CP3000AC54TEPZ-F 1.63in x 4in x 16.80in						
52A			CAR2548FP				
			CAR2548TN				
			CAR2548DC				
50A	CP2725AC54TEZ/P 1.63in x 4in x 13.85in						
			CP2725AC48TEZ-FB 1.63in x 4in x 13.85in				
45A	CP2500DC54PEZ 1.63in x 4in x 13.85in						
	CP2500DC54PEZ-F 1.63in x 4in x 16.80in						
41.6A							CAR0512FP
							CCR0512FP
40A	CP2000AC54TEZ/P 1.63in x 4in x 13.85in						
	CP2000DC54PEZ 1.63in x 4in x 13.85in						
31.25A						CAR0924FP	
30A		EP1600UTEZ 1.64in x 4.59in x 8.11in					
25A			CAR1248FP				
			CAR1248TN				
20A		EP1000UTEZ 1.64in x 4.59in x 8.11in				EP0500V 1.64in x 4.59in x 8.11in	
16.6A	MPR0854FP					CAR0424FP	CLP0212
12.5A							CLP0112
10A		EP0500U 1.64in x 4.59in x 8.11in				CLP0224	
6.0A							

* 48V or 54V default Vout available

EP Rectifier (AC in)	CLP (Open Frame, AC in)	CCR (1/2 U)
CP Rectifier (AC in)	CP Converter (DC in)	GP Rectifier (AC in)
CAR Rectifier (AC in)	CAR Converter (DC in)	SLP (1Ux1U)

Isolated DC-DC Converters

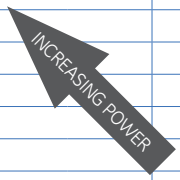


FIRST LETTER	PACKAGE	FIRST LETTER	PACKAGE	THIRD LETTER	COMM INTERFACE
S	1x1 brick	Q	1/4 brick	D	DOSA PMBus
K	1/16th brick	J	1/2 brick	V and all others	DOSA Analog
E	1/8th brick	F	full brick		

BARRACUDA [®] HIGH ($V_{in} = 45 - 56V$)	BARRACUDA [®] HIGH ($V_{in} = \text{other}$)
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	18V	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					
								NSR050					
40A								MDT040†					
								MVT040					
								NSR040					
20A								UDT020†					
								UVT020					
12 + 12A								UDXS1212†					
								UVXS1212					
		APXW012											
								PNDT012†					
								PNVT012					
								ULDT012† (encapsulated)					
								ULVT012 (encapsulated)					
								UNDT012†					
								UNVT012					
								PDT012†					
								PVX012					
10A								NQR010					
6 + 6A								UDXS0606†					
								UVXS0606					
								PNDT006†					
								PNVT006					
								ULDT006† (encapsulated)					
								ULVT006 (encapsulated)					
								UNDT006†					
								UNVT006					
								PDT006†					
								PVX006					
5A		APXW005											
4A			APXK004										
		APXW003											
								PNDT003†					
								PNVT003					
								PDT003†					
								PVX003					
								APXS002					
								PNVX002					
								NQR002					
		ABXS002											
1A	ABXS001												



FIRST LETTER	PACKAGE
A	Varies
P	Pico (12x12mm)
U	Micro (20x11mm)
M	Mega (33x13mm)

FIRST LETTER	PACKAGE
N	SIP, varies
G	Giga (33x23mm)
T	Tera (54x32mm)

†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)

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

[illegible]



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

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EmbeddedPower, Rev. 01/2016