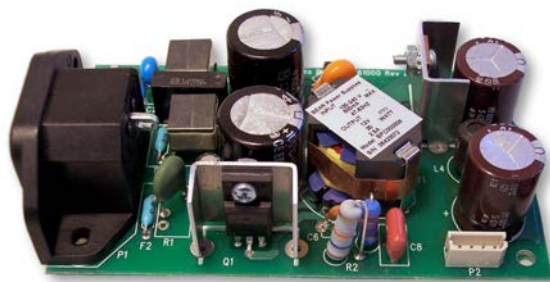
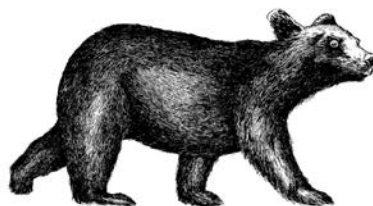


# Commercial, Industrial & Medical Power Supplies



■ standard products ■ custom designs ■ 2013



**BEAR**  
POWER SUPPLIES

1-800-551-BEAR ■ [www.bearpwr.com](http://www.bearpwr.com)

# Rely on BEAR for expertise in power

**Made in USA** - OEM power supplies for commercial, industrial & medical applications

## Experts in power design and manufacturing

When you work with BEAR, you work with people who understand power supply design and manufacturing. Working in our ISO 9001:2008 certified design and manufacturing center, our engineers average more than 14 years of experience in commercial, industrial and medical system design.

Our design, manufacturing, purchasing, sales and support are all co-located in our modern, 32,000 square foot facility in western New York. This gives us unique advantages in design for manufacturing (DFM), quality and customer support.

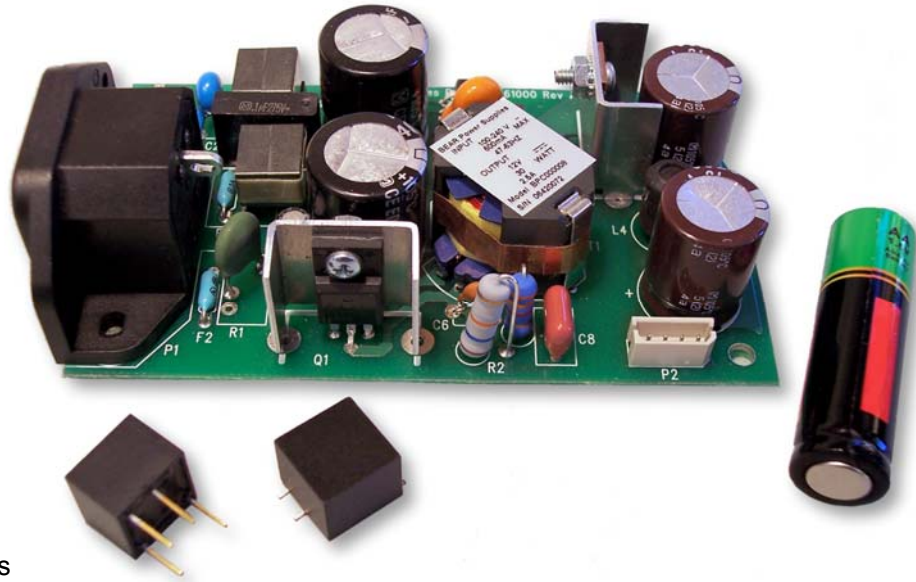
Our standard products include a rugged line of compact, encapsulated AC/DC and DC/DC power converters. We also excel at full-custom power supply design and manufacturing to meet our OEM customers' most unusual requirements.

Our production capabilities include fast-turn prototypes, pre-production runs, and low- to mid-volume manufacturing in our US facility.

BEAR gives you:

- High quality
- Predictable lead times
- Expert custom design services
- Closed-loop DFM processes
- Prototype and production for nearly any volume
- Real-time technical support and rapid response to your requests





**RoHS compliance**

All standard BEAR power supplies are RoHS compliant. Our custom supplies are lead-free unless you specify a leaded process.

**Standards and certifications**

BEAR is ISO 9001:2008 certified. We adhere to manufacturing standards including IEC 950; IPC 610, J-STD-001; UL1950, 2601, 508; CSA-C22.2 950 and European standards.

All BEAR standard products have industry standard certifications for safety, and many have medical certifications as well.

We will work with you to obtain whatever certifications you need for your custom power supplies.



## Product Index

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**BP Series | Reliable, rugged** and long lasting with an extremely wide operating temperature range. Made in USA.

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**BPS Series | High-voltage isolated** 1.5 W converters with high efficiency. Miniature through-hole and SMT packages. Made in USA

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**Full custom** power supply design and manufacturing to meet your most unusual requirements.

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# BP Series Encapsulated AC/DC Power Supplies

Rugged, encapsulated modules built for performance, reliability and long life



- 5 to 30 Watt models
- Universal AC input
- Single output 3.3 to 48 V
- TÜV certified and CE marked
- Wide operating temperature -40 to +70°C
- Low inrush current
- Long life in harsh environments (MTBF 250,000 hours)
- RoHS compliant

BP Series power supplies help you get smaller, high-reliability products to market faster. They are ideal for:

- Medical
- Telecom
- Transportation
- Communications
- Outdoor lighting & security
- Industrial automation
- Utilities

...and many other commercial, industrial and medical applications.

## How long do you want your power supply to last?

When you need reliable, long lasting power... you need BP Series encapsulated power supplies from BEAR. These rugged, compact power supplies offer long life, over wide operating temperature ranges, in harsh environments.

## Quality and innovation for long life

We start with high-quality components. Then we use innovative design techniques to achieve compact form factors while minimizing stress on the components. Finally, our production team adheres to rigorous manufacturing standards including IPC 610.

This combination of quality components, innovative design techniques and world-class manufacturing yields power supplies that you can count on for years of reliable, trouble-free operation.





**Operating specifications  
for BP Series encapsulated AC/DC power supplies**

	Condition	Min	Typ	Max
<b>Input</b>				
Input frequency (Hz)		47		63
Input current (A)			▼	
5W output	110/220 VAC		0.1 / 0.06	
10W output	110/220 VAC		0.2 / 0.11	
15W output	110/220 VAC		0.28 / 0.19	
30W output	110/220 VAC		0.55 / 0.37	
Inrush current (A peak)	264 VAC			8
Leakage current (µA)				500
Input voltage (VAC)		90		264
<b>Output</b>				
Hold-up time (ms)	115 VAC full load		10	
Output voltage		See product charts pages 5-6		
Output current		See product charts pages 5-6		
Output voltage accuracy (%)				+/- 3
Line regulation (%)				+/- 0.5
Noise & ripple pk-pk (%)			0.7	1
Temperature coefficient (%)			+/- 0.1	+/- 0.3
Over-voltage protection (%)	3.3 V output	105	115	140
Over-voltage protection (%)	5 to 48 V output	105	115	130
Overload protection (%)			130	
Load regulation (%)	90-264 VAC			+/- 0.5
<b>General / Environmental</b>				
Efficiency (%)			75	
Isolation voltage (VAC)		3000		
Switching frequency (kHz)			▼	
5W and 10W output			100	
15W and 30W output			60	
Humidity (%)		0		95
Operating temp range (°C)	Full load	- 40		+ 60
Operating temp range (°C)	Half load	- 40		+ 70
Storage temp range (°C)		- 40		+ 85
Cooling			convection	
EMI			FCC Class B	

**Simplify your power design challenges**

BP Series power supplies are packed with innovations to simplify the power design challenge for OEM product designers.

Our patented modules with **mini IEC input connectors** accept standard line cords and allow you to eliminate exposed high voltage traces from your system board. This improves safety and makes your system easier to design, test and certify.

Use our **remote enable function** to activate the supply remotely. For example, you may mount the power supply at the rear of your chassis, near the line input, and use a front panel switch to turn the supply on and off — without routing primary AC power to the panel.

Our standard, compact BP Series modules incorporate **active inrush current limiting, fused input** and **Class B EMI filtering** to save you design time and board space.

These modules are built for reliability and long life in the most demanding environments.



## BP Series PCB mountable

We offer an “industry standard” five-pin package, along with our patented mini IEC input modules for improved safety and convenience. Package pins are lead-free and withstand wave solder without contaminating lead-free processes.

### BP1 Series

The BP1 is pin- and footprint-compatible with a number of industry-standard commercial power supplies. It incorporates functions such as EMI filtering, inrush current limiting and double-fused input – to give you more features and convenience in the same space as competing supplies.



### BP2 and BP3 Series

These patented modules feature a mini IEC input connector and detachable line cord. This unique feature allows you to eliminate exposed high voltage traces from your circuit board. Access Vout and the Remote Enable function through the package pins.



**For operating specifications see page 4.**  
**For drawings call us or visit [www.bearpwr.com](http://www.bearpwr.com).**

### PCB mountable models

Part Number	Power	V/i	Dimensions (inches)
<b>BP1 Series</b>			
<i>AC line, AC GND, AC neutral, +Vout, -Vout pins on package bottom (no Enable)</i>			
BP11005xxx	5 W	see chart	1.75 x 2.25 x 0.75
BP11010xxx	10 W	see chart	1.75 x 2.50 x 0.75
BP11015xxx	15 W	see chart	1.89 x 2.75 x 0.92
<i>AC-in (2 pins), +Vout, -Vout and Enable* pins on package bottom</i>			
BP11030xxx	30 W	see chart	2.50 x 3.50 x 0.92
<b>BP2 Series</b>			
<i>Universal AC input (2-pin IEC connector) +Vout, -Vout and Enable* pins on package bottom</i>			
BP21005xxx	5 W	see chart	1.75 x 2.89 x 0.75
BP21010xxx	10 W	see chart	1.75 x 3.14 x 0.75
BP21015xxx	15 W	see chart	1.89 x 3.39 x 0.92
BP21030xxx	30 W	see chart	2.50 x 4.14 x 0.92
190203380	2-pin line cord, 18 AWG		6' long
<b>BP3 Series</b>			
<i>Universal AC input (3-pin IEC connector) +Vout, -Vout and Enable* pins on package bottom</i>			
BP31005xxx	5 W	see chart	1.75 x 2.64 x 0.75
BP31010xxx	10 W	see chart	1.75 x 2.89 x 0.75
BP31015xxx	15 W	see chart	1.89 x 3.14 x 0.92
BP31030xxx	30 W	see chart	2.50 x 3.89 x 0.92
190203390	3-pin line cord, 18 AWG		6' long

\* Enable pin connected to (-) terminal=OFF; enable pin open=ON

### BP Series voltage and current (V / i)

Part Number Suffix (xxx)	033	050	120	150	240	480	
Voltage (V)	3.3	5	12	15	24	48	
							Current (A)
5 W	1.52	1.00	0.42	0.33	0.21	n/a	
10 W	3.03	2.00	0.83	0.67	0.42	n/a	
15 W	4.55	3.00	1.25	1.00	0.63	n/a	
30 W	9.09	6.00	2.50	2.00	1.25	0.625	

### Line cords

Line cords for the BP2, BP3, BP5 and BP6 are sold separately. Standard 6-foot cords with North American plugs are available from stock. Other lengths and power plugs are available on request.

## BP Series chassis and DIN rail mountable

Chassis mountable encapsulated power supplies are available with mini IEC or terminal block input. All have terminal block connections for +Vout, -Vout and Enable.

### Chassis and DIN rail models

Part Number	Power	V/i	Dimensions (inches)
-------------	-------	-----	---------------------

#### BP4 Series

Chassis mount package with terminal block connections for AC line, AC GND, AC neutral, +Vout, -Vout, Enable\*

BP41005xxx	5 W	see chart	1.75 x 3.15 x 0.82
BP41010xxx	10 W	see chart	1.75 x 3.41 x 0.82
BP41015xxx	15 W	see chart	1.89 x 3.66 x 0.99
BP41030xxx	30 W	see chart	2.50 x 4.15 x 0.99

#### BP5 Series

Universal AC input (2-pin IEC connector) terminal block connections for +Vout, -Vout, Enable\*

BP51005xxx	5 W	see chart	1.75 x 3.19 x 0.82
BP51010xxx	10 W	see chart	1.75 x 3.44 x 0.82
BP51015xxx	15 W	see chart	1.89 x 3.69 x 0.99
BP51030xxx	30 W	see below	2.50 x 4.49 x 0.99
190203380	2-pin line cord, 18 AWG		6' long

#### BP6 Series

Universal AC input (3-pin IEC connector) terminal block connections for +Vout, -Vout, Enable\*

BP61005xxx	5 W	see chart	1.75 x 2.94 x 0.82
BP61010xxx	10 W	see chart	1.75 x 3.19 x 0.82
BP61015xxx	15 W	see chart	1.89 x 3.44 x 0.99
BP61030xxx	30 W	see chart	2.50 x 4.24 x 0.99
190203390	3-pin line cord, 18 AWG		6' long

#### BP7 Series

DIN rail mount package with terminal block connections for AC line, AC GND, AC neutral, +Vout, -Vout, Enable\*

BP71005xxx	5 W	see chart	1.75 x 3.15 x 0.84**
BP71010xxx	10 W	see chart	1.75 x 3.40 x 0.84**
BP71015xxx	15 W	see chart	1.89 x 3.65 x 1.01**
BP71030xxx	30 W	see chart	2.50 x 4.15 x 1.01**

\* Enable pin connected to (-) terminal=OFF; enable pin open=ON

\*\*BP7 height measured from base

### BP Series voltage and current (V / I)

Part Number Suffix (xxx)	033	050	120	150	240	480	
Voltage (V)	3.3	5	12	15	24	48	
5 W	1.52	1.00	0.42	0.33	0.21	n/a	Current (A)
10 W	3.03	2.00	0.83	0.67	0.42	n/a	
15 W	4.55	3.00	1.25	1.00	0.63	n/a	
30 W	9.09	6.00	2.50	2.00	1.25	0.625	

### BP4 Series

Chassis mountable package with terminal block connections.



### BP5 and BP6 Series

Chassis mountable package with mini IEC input connector for safe, convenient universal AC line input. Terminal block for output and Enable connections.



### BP7 Series

DIN rail mountable supply with terminal block connections.



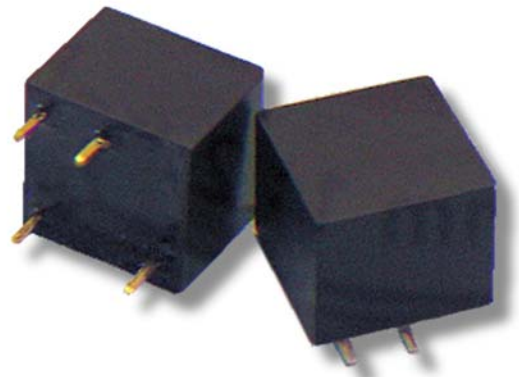
### BP Series certifications

Certifications for safety and performance, including use in medical instruments, include UL2601-1, UL60950-1, CAN/CSA-C22.2 (No.601.1-M90), CAN/CSA-C22.2 (No.60950-1-03), EN 61000-3, EN 61000-4, EN 60601-1-2, IEC 601-A/A2 and EN 55011.

# BPS Series DC/DC Converters

High-voltage isolated 1.5 W converters have high efficiency for powering PIN diodes, APDs, piezoelectric devices and more

- Ultra-miniature size
- 90% efficiency
- Superior load regulation
- Wide operating temperature -55°C to +85°C
- No heat sink or electrical derating required
- 1.5 W output @ 85°C ambient
- Excellent input-output isolation



## High reliability and efficiency in a low-profile package

BPS Series high-voltage DC-DC converters feature up to five times better efficiency and ten times better load regulation than similar products on the market.

These high-reliability isolated converters operate from -55°C to +85°C with no heat sink or electrical derating required.

Use these miniature, low-profile converters in RF transceivers, programmable filters and industrial or scientific instruments.

BPS Series converters have a single input voltage (configurable from 3 VDC to 15 VDC) and a single output voltage (configurable from 50 VDC to 300 VDC). They are unregulated; output voltage is directly proportional to input voltage.

## Typical characteristics for standard DC/DC converters

at 25°C ambient and input voltage at nominal value unless noted

BPS Series	
Models	<b>BPS0xxyyy</b> – SMT package <b>BPS1xxyyy</b> – thru-hole package (xx=input voltage, yyy=output voltage)
Input voltage (VDC)	<b>3 to 15 VDC</b> (Single input, factory configurable)
Output voltage (VDC)	<b>50 to 300 VDC</b> (Single output, factory configurable)
Line regulation	Unregulated / output directly proportional to input
Load regulation	<b>3% Δ</b> from no load to full load
Efficiency	<b>90%</b> typical
Input voltage range	± 10% of configured input voltage
Output voltage tolerance at full load (nominal)	Input ± 3% ( <i>tighter tolerance available, please call</i> )
Input-output isolation	100 MΩ minimum at 1000 VDC
Output temperature coefficient	0.02% per °C
Operating temperature	-55 to +85°C ambient ( <i>no heat sink required</i> )
Storage temperature	-55 to +125°C
Dimensions	0.5 x 0.5 x 0.4 inches (12.7 x 12.7 x 10.2 mm)

The ultra-miniature encapsulated package is only 0.4" (10.2 mm) tall, with a total size of 0.1 cubic inches and weight of just 4 grams. It is available in both thru-hole and SMT versions. For drawings please call or visit our website.



# Custom Power Supplies

Full-custom designs, no minimums



## Why custom?

A custom design is usually not your low-cost option when you consider only the up-front costs. Done right, though, it can be highly cost-effective. With a custom design:

- You can have exactly what you need – less wasted time and fewer compromises than working around the limits of off-the-shelf supplies.
- You may potentially eliminate other components (e.g. fans) and their associated costs from your system.
- You have greater flexibility to optimize your electrical and mechanical design for performance, manufacturability or whatever matters most to you.

## Why BEAR for custom power?

Our US-based engineering team has the experience and will take the time to understand your system goals and requirements. Then we will work with you to create the “perfect” power supply for you.

**With our design and manufacturing center under one roof**, we have design for manufacture (DFM) in our DNA. We offer quick prototype delivery and easy transition from design to pilot to full production.

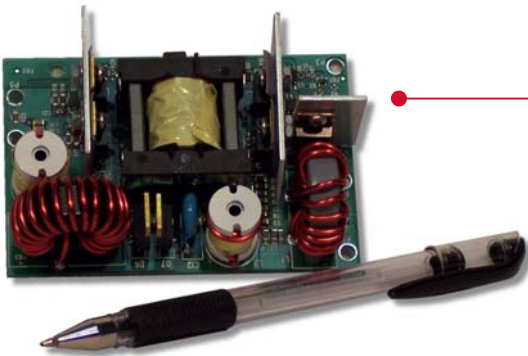
We’re here to support our products over their entire (and usually incredibly long) life. We are currently building and supporting products that we designed nearly 20 years ago, that are still going strong.

BEAR custom power supplies are used in a wide range of industrial, commercial and medical applications - from military and telecom to LED lighting and portable systems. **We specialize in meeting unusual requirements.**

Have a look at some of our recent projects on these pages. Then give us a call to find out what we can do for you.

**BEAR custom capabilities**

- Power range from mW to KW
- AC/DC
- DC/DC
- DC/AC
- Encapsulated and open frame
- Single and multiple output



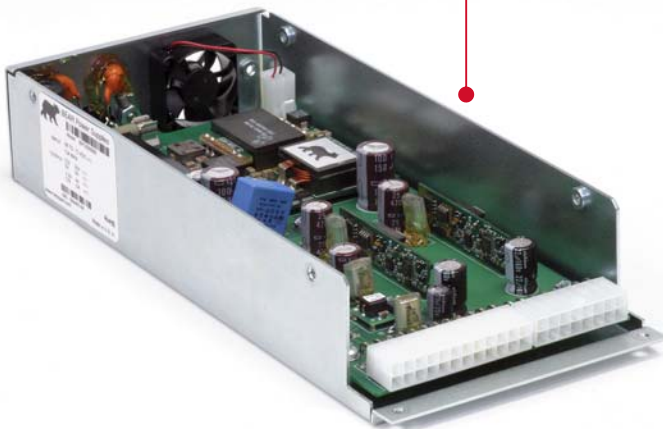
**BEAR custom power supplies - examples**

**180 W DC/DC converter**

Industry	ground transportation
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- Unique features**
- **4000 VAC input/output isolation**
  - **Very long life**
  - **Low input and output noise**

Designed to meet the customer's requirement for extremely high input/output isolation, this DC/DC converter also allowed the customer to reduce the size and cost of their existing system.



**300 W DC/DC converter**

Industry	commercial telecom
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- Unique features**
- **4 outputs**
  - **- 48 VDC input**
  - **High efficiency**

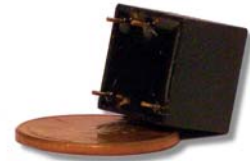
High efficiency allows this unit to be cooled with a single fan. It replaced an off-shore manufacturer's power supply that is less efficient and required two large cooling fans.

BEAR's design recommendations also allowed our customer to remove other hardware costs from their system, which has been NEBS 3 certified.

BEAR custom power supplies - examples

**1.5 W mini DC/DC converter**

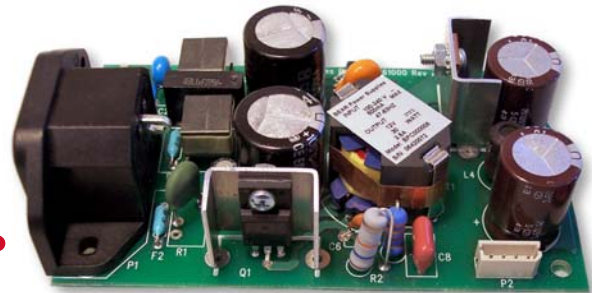
Industry	military (portable communications)
Unique features	<ul style="list-style-type: none"> <li>▪ High efficiency over wide load</li> <li>▪ 100 VDC output</li> <li>▪ Wide operating temp. range</li> <li>▪ Superior input/output isolation</li> </ul>



**30 W AC/DC converter**

Industry	medical
Unique features	<ul style="list-style-type: none"> <li>▪ High efficiency over very wide input and load range</li> <li>▪ Mechanically rugged</li> <li>▪ Entire heat load contained in a sealed unit</li> <li>▪ Sealed input connector for system wash-down and disinfecting</li> </ul>

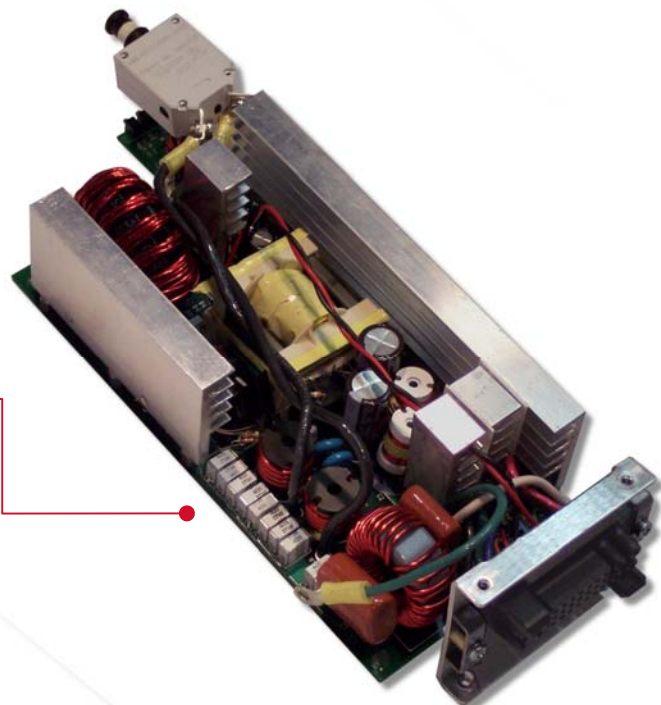
Designed for a portable medical system, this module meets very specific mechanical constraints. BEAR also met the challenge of achieving high efficiency over a wide range of input and load conditions.

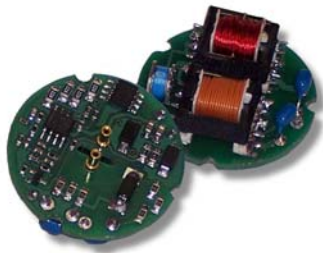


**850 W DC/DC converter**

Industry	communications
Unique features	<ul style="list-style-type: none"> <li>▪ 3 isolated outputs</li> <li>▪ Hot-swappable with load sharing</li> </ul>

Specific mechanical constraints guided this rugged design, destined for a rack-mounted system in a mobile communications unit.



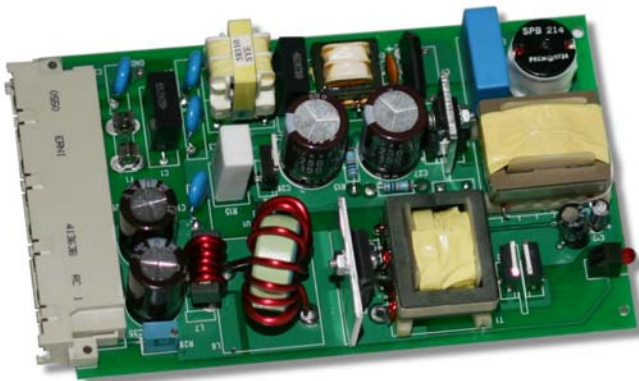


BEAR custom power supplies – examples

**10 W constant power DC/DC converter**

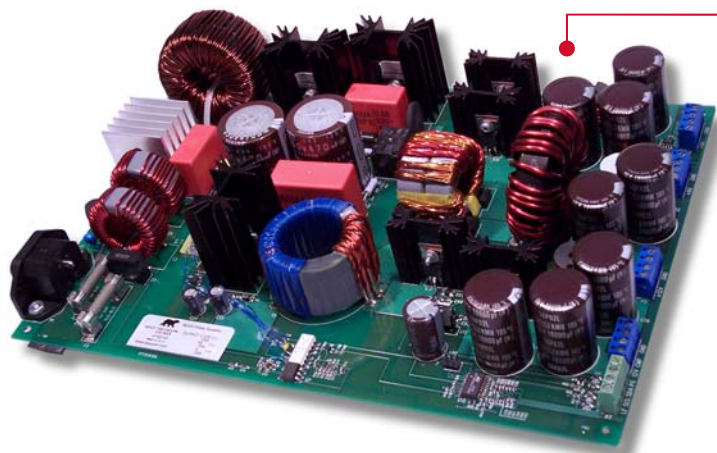
Industry	portable lighting
Unique features	<ul style="list-style-type: none"> <li>▪ High efficiency - 20% greater than customer's previous solution</li> <li>▪ Higher power density</li> <li>▪ Constant output power as input battery voltage changes</li> </ul>

Innovative design allows our customer to use one standard power supply unit across their entire product line, replacing four different power supplies and extending the input voltage range at the same time.



**60 W AC/DC converter with PFC input**

Industry	industrial monitoring
Unique features	<ul style="list-style-type: none"> <li>▪ Minimum 10-year life</li> <li>▪ 24/7 operation in fanless system</li> <li>▪ Specific mechanical configuration</li> <li>▪ Specific input connector requirements</li> </ul>



**660 W AC/DC power supply with PFC**

Industry	medical
Unique features	<ul style="list-style-type: none"> <li>▪ Very low leakage current (5 <math>\mu</math>A) exceeds standards for Type CF medical equipment</li> <li>▪ 3 isolated outputs</li> <li>▪ Universal input with PFC front end</li> <li>▪ Self-monitoring feature</li> </ul>

In addition to the ultra-low leakage current, this power supply's unique features include "self-monitoring" for built-in digital reporting of output voltages, current and operating temperature.



## Custom RFQ checklist: Ensure a successful custom project

Over years of designing custom power supplies, we've learned that good communication is the single biggest key to success. The more we know about your needs – the better we can meet them. For example:

- ❑ **What is your actual operating temperature?** If the power supply will be in an enclosed box, this is higher than the system ambient.
- ❑ **What is your load?** Watch out for motors (inductive sine waves), poorly-filtered digital logic, and DC/DC converters that pull large current pulses. High-reactive loads may require special design techniques for proper start-up, overshoot and stability.
- ❑ **What lifetime do you expect?** This will guide cost vs. quality tradeoffs in component selection.
- ❑ **What is your line quality?** Will there be high-voltage transients, such as from lightning? Will there be power dips, such as from large machinery on the same phase as your system?
- ❑ **What environmental factors should we consider?** Let us know where your system is going, and we can design with that in mind. For example, for portable systems we can choose low-profile components and consider potting or conformal coating for stability.

To learn more, download the article *"How to spec a reliable custom power supply: 5 essential tips"* at [www.bearpwr.com](http://www.bearpwr.com) or call **1 (800) 551-BEAR** for your free copy by email.

### BEAR custom power supplies - example

#### 30 W AC/DC power supply

Industry	utilities
<b>Unique features</b>	<ul style="list-style-type: none"> <li>▪ Extreme operating temperatures</li> <li>▪ High line surge capacity</li> <li>▪ Long life</li> </ul>

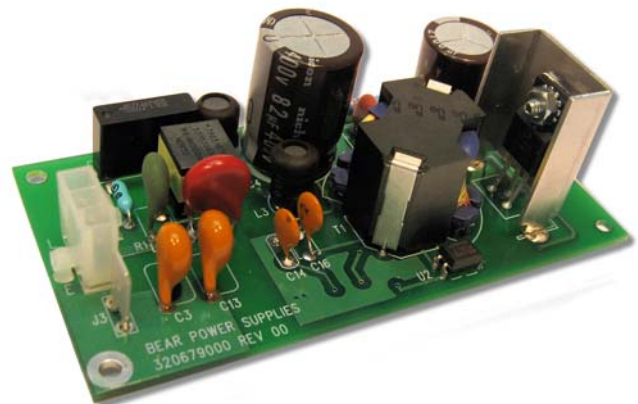
As part of a monitoring system that will be mounted on a utility pole, this power supply was designed to deliver years of reliable operation under extreme operating temperatures. It will also withstand high transient surges such as those caused by lightning.

### Meeting unusual requirements

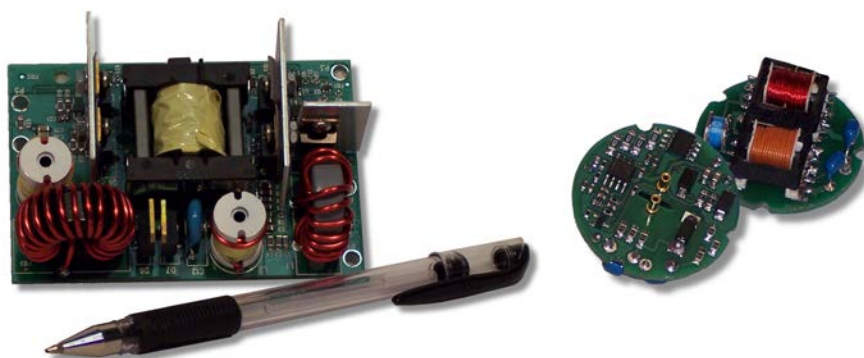
- Ultra-low leakage current
- Compact size
- Unusual form factors
- Extreme temperature ranges
- Long life
- High power density
- Unusual specifications
- **If you can't find it anywhere else... try BEAR**

### The BEAR advantage

- Experienced, responsive design team located in our US manufacturing center
- Rapid turn-around
- Reasonable NRE
- No minimum build quantity
- Design, prototype and pre-production in our US-based design and manufacturing center
- ISO 9001:2008 certified quality systems
- Design-for-manufacture built in at every step
- Any volume production — at our facility, yours, or a partner's







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**BEAR**  
POWER SUPPLIES

BEAR BP Series products ~ approx. actual size (BP1)

