


POWERBOX
Mastering Power

Defense



P
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B
X



Power supplies for defense applications

From watts to kilowatts

Defense applications are among the most demanding applications in the world, therefore the successful design of defense power systems demands a full understanding of the complex performance requirements, testing, and environmental conditions to which the intended product must achieve.

Very high reliability expectations are frequently combined with harsh environments and aggressive expectations concerning the size, weight and power profiles required. The need to satisfy demanding specifications from the defense sector, combined with increasing competitive market pricing requirements, often leads us to utilise high power DC/DC bricks within our designs, effectively like using building blocks. This ensures we take a more pragmatic COTS (commercial off the shelf) approach to producing customized design solutions for the aerospace and defense market. This practice of combining standard products to accomplish optimized solutions has been a Powerbox hallmark for decades, as we have worked with many of the markets leading defense manufacturers.

Our experience of producing power solutions for aerospace and defense applications, comprises of products from a few watts to many kilowatts, being incorporated in single, multiple and redundant systems. Inputs are from AC, single or 3 phase and up to 880Hz., or DC from small to many 1000's volts. Some customers have required dual AC and DC feeds, sometimes battery backed up, proving totally secure power. Typical requests are for 1 to 5 output voltages, but we have made solutions with as many as 14 for complex systems.

There are many different mechanical options, to suit a wide variety of applications, open frame, enclosed, sealed box, often requiring high IP ratings (Ingress Protection), which provides for a degree of protection against intrusion, like body parts (such as hands and fingers), dust and water.

Managing the thermal considerations is also an important aspect when designing a power supply. We incorporate convection, fan, baseplate, cold wall and water cooled designs, offering maximum flexibility, depending upon the actual requirements. Our military grade products are intended for direct installation in a military environment or to be integrated as a part into a complete defense system. We take an innovative approach to connectability of the product, making integration simpler.

International standards

We understand and work to the standards required within the aerospace and defense industry. These standards, often called a military standard, "MIL-STD", "MIL-SPEC", or (informally) "MilSpecs", are used to help achieve standardization objectives by the international aerospace and defense industry, providing benefits in achieving interoperability, ensuring products meet certain requirements, commonality, reliability, total cost of ownership, compatibility with logistics systems, and similar defense-related objectives.

Among standards often called upon within the aerospace and defense world, Powerbox is used to working within the constraints of DEF STAN 61-5, DEF STAN 59-411, DO-160, DO-254/DO-178B, MIL STD 1275, MIL STD 704, MIL STD 810E/F, MIL STD 461E, MIL STD 901C, EN61000-3-2 as well as RTCA DO 160 (Airbus). Certification can be a costly and time consuming affair, so why not contact Powerbox and utilize our working knowledge of power design, to help reduce your certification risks, project costs and accelerate your time to market.

Defense solutions

Standard products

Our range of standard converters for defense applications comprises of our own products, designed by our qualified engineers, and manufactured at world class manufacturing facilities; as well as products from our leading power design partners. Successful system design requires a holistic view of the entire system architecture and power input envelope requirements.

Custom products

When a suitable product cannot be found from our standard product range, we can consider providing a modified standard, semi or full customized solution to meet your exacting system requirements. Our custom design capability and reputation is second to none. After working in the defense market for 30+ years the chances are good that Powerbox will be able to produce a power supply to meet your systems exact requirements.

Services

The right product is essential, but it is not everything. In addition to product offerings we include a comprehensive range of services, from analysis and qualification in the development stage, demand planning and special logistics in the production phase, to RMA handling and end user support in the after-market. We aim to serve you with simplicity to ensure your customers return time and again.

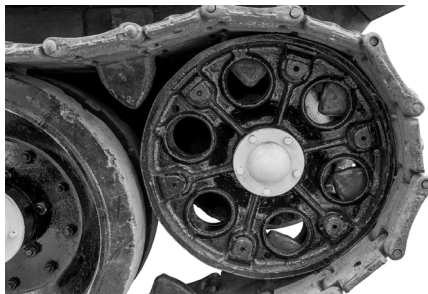
Systems

An application might require more than a single converter. We have experience in utilizing our product range and custom capability to build systems. These can feature multiple standard, semi-custom, and/or full-custom converters, battery backup, communications, remote control, intelligent charging, distribution panels, sub racks, enclosure etc. We lean confidently on over 40 years of expertise to identify the best means of solving each particular power conversion challenge.

Working to defend lives & livelihoods



Air



Land



Sea

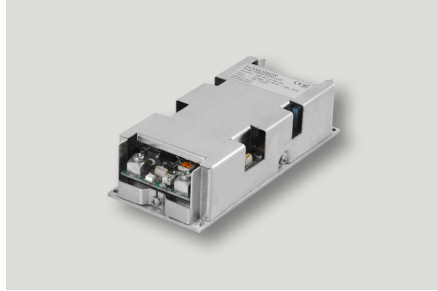
Whilst often working across the same field of operations, the world of sailors, pilots and ground troops (tri-service) can be very different, requiring differing demands for powering their equipment. Powerbox has attained much

experience in the last 40 years, playing our part in helping to protect lives and livelihoods and providing peace of mind, through power technology and innovation.

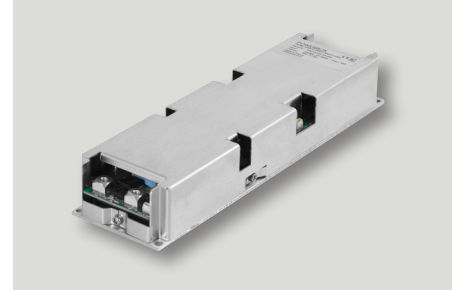
Standard products – Defense line



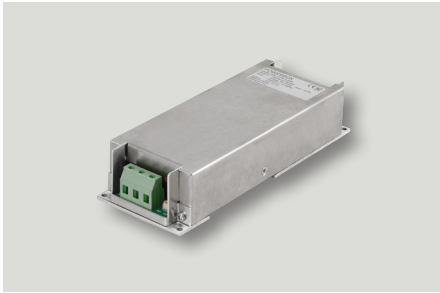
Defense line 150
150W, Enclosed, rugged design
DC/DC converter
12, 24, 48, 72, 110VDC inputs
Output from 3V3 to 48VDC



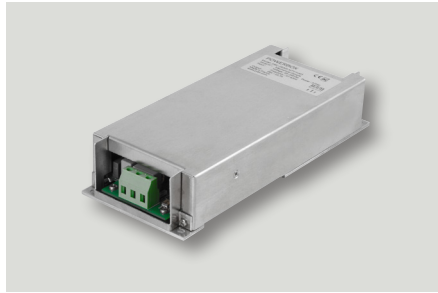
Defense line 300
300W, Enclosed, rugged design
DC/DC converter
12, 24, 48, 72, 110VDC inputs
Output from 3V3 to 48VDC



Defense line 500
500W, Enclosed, rugged design
DC/DC converter
12, 24, 48, 72, 110VDC inputs
Output from 3V3 to 48VDC



Defense line 150
150W, Enclosed, rugged design
AC/DC switch mode power supply
85-264VAC input with PFC
Isolated output



Defense line 300
300W, Enclosed, rugged design
AC/DC switch mode power supply
85-264VAC input with PFC
1-2 isolated outputs

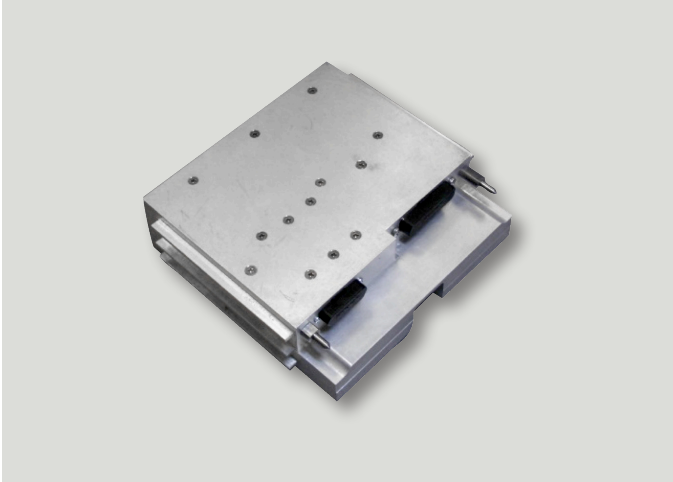


Defense line 600
600W, Enclosed, rugged design
AC/DC switch mode power supply
85-264VAC input with PFC
1-3 isolated outputs



Defense line 1200
1200W, Enclosed, rugged design
AC/DC switch mode power supply
85-264VAC or 120-350VDC input voltage
1-6 isolated outputs

Custom products

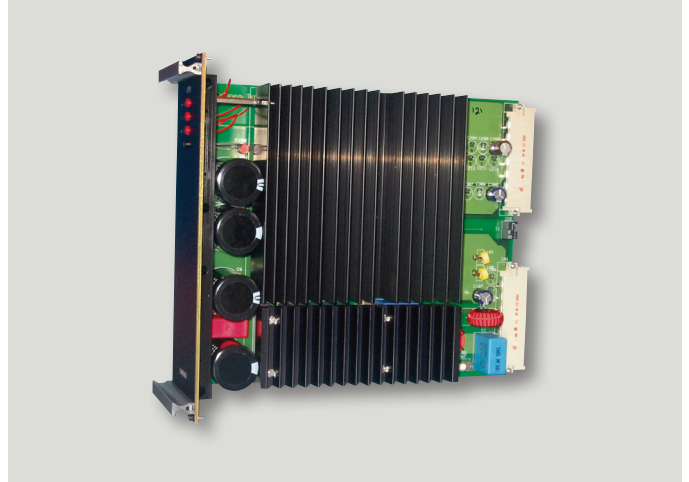


Application Military airborne application

Outline Specification 60W convection cooled DC/DC converter, 28VDC i/p, 3 o/p voltages. Solid extruded aluminum case.

Design Customized using standard brick converters

Reason for Success Powerbox success was due to a willingness to produce prototype units very quickly along with low NRE charges.

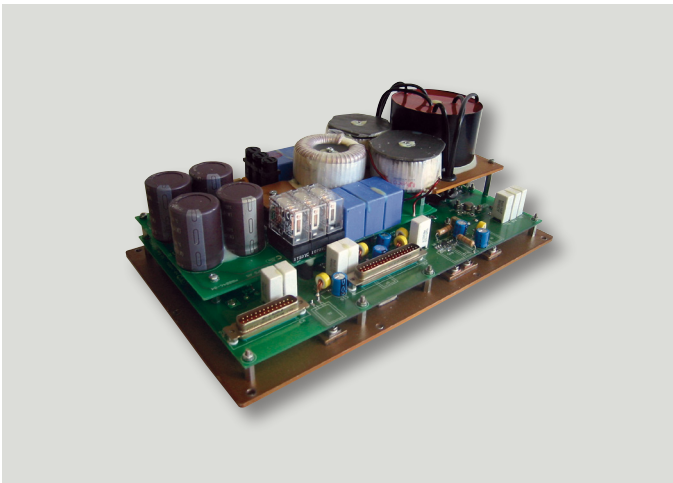


Application Naval sonar application

Outline Specification 800W AC/DC converter with outputs i.e 3.3VDC, 6VDC and 12VDC. Approved to MIL-STD-461E, MIL-STD-1676-1, MIL-STD-901C and EN61000-3-2

Design Customized using 3 standard brick converters with a discrete PFC stage

Reason for Success Powerbox success was due to providing a highly efficient power supply incorporating extremely low noise output voltages.

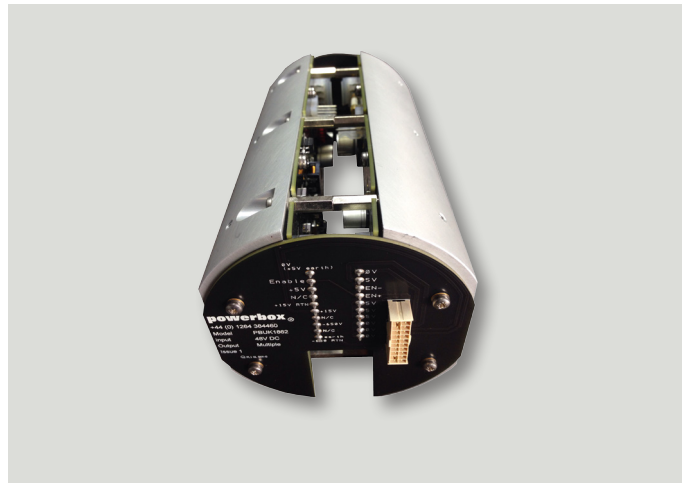


Application Anti-ship missile test system

Outline Specification 1kW convection cooled AC/DC converter. 115Vac three phase input with 5 output voltages.

Design Customized using 5 standard brick converters and 5 discrete outputs

Reason for Success The reason for Powerbox's success was simple – the customer could find no one else who would design & manufacture a unit to their specification!



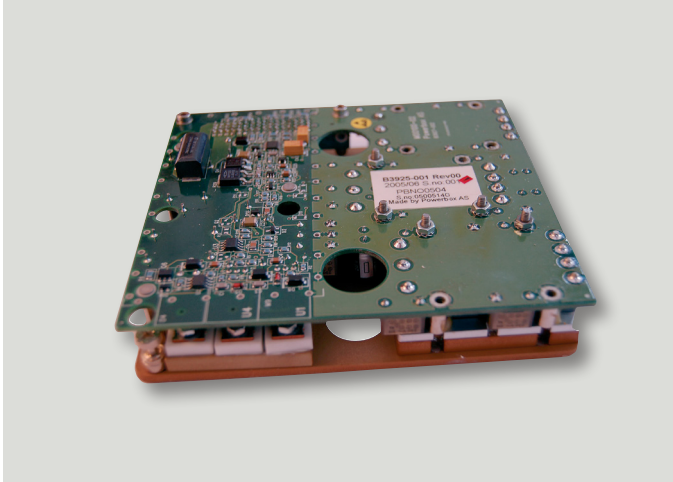
Application Power supply for antenna aerial

Outline Specification 60W DC/DC converter with 28VDC input and 3 DC output voltages.

Design Discrete component design.

Reason for Success Powerbox success was due to being able to produce a mechanically complex designed unit with a difficult high voltage rail delivered with low NRE charges.

Custom products



Application Vehicle mounted missile guidance system

Outline Specification 85W DC/DC converter, 22-33VDC input. Outputs: 24VDC, 5VDC, 3.3VDC with current limited filter output. Approved to MIL-STD1275B (Military vehicle voltage standard) MIL-STD461E (Military EMC standard) MIL-STD810F (Military environmental)

Design Customized design using Vicor modules

Reason for Success Powerbox success was due to quick time to market and compact size.



Application Mobile military VHF radio

Outline Specification AC/DC converter 28VDC@400W output, with customized mechanics. Approved to MIL-STD-461E, MIL-STD-810E/F

Design Customized Vicor module design

Reason for Success Powerbox success was due to quick time to approve and get to market.

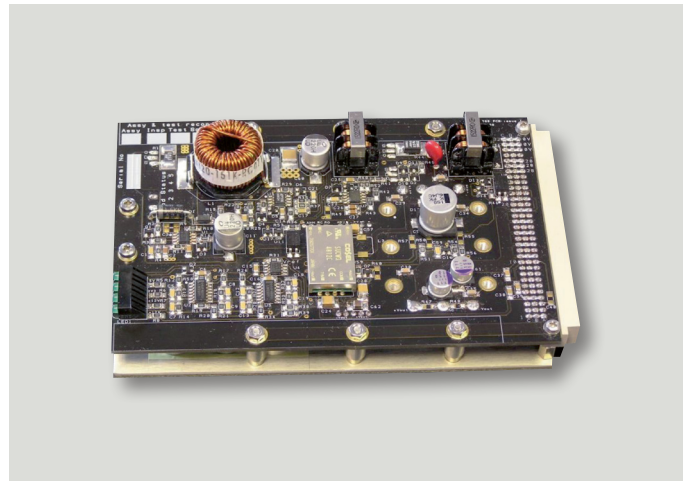


Application Missile launcher control module

Outline Specification 1.5KW DC/DC converter, several DC output voltages. Conformally coated designed unit with ruggedized chassis.

Design Customized using Vicor modules with some discrete design circuitry.

Reason for Success Powerbox success was due to fulfilling extreme specification requirements, with very high temperature/environmental conditions.



Application Powering a controller for embedded computing and sensor electronics on helicopters

Outline Specification 60W mini-CPCI DC/DC converter with 28VDC i/p and 3 DC voltage o/p's . The unit was a ruggedized, conformally coated, baseplate design incorporating a Calmark locking system.

Design Discrete component design, incorporating a Cosel DC/DC module and some Vicor power modules.

Reason for Success Powerbox success was due to being able to replace expensive custom power products by offering flexible customized units utilizing Cosel and Vicor modules.



Power solution examples

Shipboard lighting

The challenge: The US Navy is moving to Solid State Lighting (SSL) with very long life LEDs. Among the reasons are to avoid drawbacks of traditional lighting, such as the relatively short life of Incandescent bulbs, the too long warm up for HSP lights, and the mercury content in fluorescent lights. For being able to do this they needed LED drivers which not only meet the very demanding USN requirements and military specifications, but also are backwards compatible with existing lighting solutions. One example is fitting into the existing standard fixtures. Another is having three separate AC inputs which provide three levels of brightness in a LED array, depending on how many of the inputs are turned on. This is to replace an older fixture where three separate light bulbs were used for the same purpose.

The solution: Powerbox developed very rugged, cost effective, long lasting LED drivers that meet the rigorous requirements of USN ships, most notably MIL-DTL-16377, General Specification For Fixtures, Lighting, and Associated Parts for Shipboard Use, MIL-STD-461, Military Standard Requirement for the Control of Electromagnetic Interference Emissions and Susceptibility, and MIL-STD-1399/300A, Interface Standards for Shipboard Systems. Powerbox' drivers also meet all the compatibility requirements.

Added value: Powerbox' long-life, high efficiency supplies coupled with LEDs remove the drawbacks of traditional lighting, dramatically reduce maintenance activities and stock for "changing a light bulb," while simultaneously notably lowering the electrical load for lighting reducing fuel consumption.

Electronic surveillance measurement system for fighting aircraft

The challenge: The application was an ESM (Electronic Surveillance Measure) system for a fighting aircraft. Seven different DC outputs were required. In addition to all the requirements typical for an application like this our customer particularly highlighted size and weight as key parameters.

The solution: We developed a solution comprising one AC/DC front end and two different DC/DC converters, together providing the seven required outputs. Based on standard brick converters the power supply was made very component lean, with high efficiency.

Added value: The combination of component lean design and high efficiency, reducing heat generation, allowed for a uniquely compact and low weight solution. Basing the design on standard proven modules also shortened design lead time and reduced required testing and verification.

About Powerbox

Who we are

The combination of our extensive standard product range, our custom design capability, and our service offering, is truly unique. 40+ years of designing power supplies for demanding applications has built a rock solid experience. Our "Making the complex simple" business idea runs throughout our operation, from our customer interface and cooperation to how we design our products.

Improving your competitiveness

The power solution chosen for any electronics has an impact on competitiveness. Function and reliability are given basics. Size, weight and audible noise might be important. Cost is always a consideration. Standards fulfillment can open up new markets. Time to market might be critical. Well executed supply chain management can generate savings. Aftermarket support has a lasting long term impact. The list goes on.

Our extensive experience and market awareness makes it simple to explain to us what you need. Together we define which power solution will serve your application the best. This close cooperation continues from conception and design, throughout production and taking into operation, well into the aftermarket phases of your product life-cycle. We contribute to your competitiveness all the way.

Making the complex simple

With our global presence we are close to you, and our knowledge and experience of working with so many different applications helps to make life easier for you. We can assist at all stages of product development, including evaluations, validations, and the writing of specifications.

We aim for simplicity in design, referring both to lean design with fewer components and to a modular approach reusing proven circuits and building blocks, maybe with some modifications.

Our services for logistics, implementation and aftermarket support makes life simpler both for you and for your customers, and our endurance makes sure it stays that way.

Quality assurance and follow-up

Quality is an integrated part of everything we do. Our design process includes extensive testing, internal as well as external. Tests are also frequently run by our customers in their respective applications. In addition to the information we gain by tracking repairs and service requests, we also do regular quality follow up together with

our customers, all to ensure a long and trouble-free life for our products.

Powerbox is also certified by DNV according to ISO 9001:2008.

Manufacturing

We manufacture at selected CEMs (Contract Equipment Manufacturer), where we apply rigorous process and quality requirements. We aim for long-term relationship with our manufacturing partners. A dedicated team for CEM Management and Quality Assurance work closely with them. Both when selecting a new partner and in the ongoing relationship with our existing partners we evaluate a large number of parameters, covering company profile, organization, manufacturing processes, and quality assurance.

Caring for the environment

At Powerbox we take an active role in protecting our environment. Our contribution includes:

Streamlined solutions and lean design using fewer components reduces material used. RoHS, WEEE and REACH are among the standards governing choice of materials.

High efficiency reduces energy consumption both directly by reducing losses and indirectly by reducing the need for cooling.

Energy efficient transportation and well developed use of online meetings are important elements in our determination to meet or exceed international standards by sustaining ISO-14001 compliance or the equivalent.

Providing peace of mind

Even the best designed power solutions might require midlife support. Components involved in the design might be discontinued, or the application might be modified or changed, requiring changes in the power solution. In situations like this Powerbox' stability and endurance, and long term approach to customer relations, are true comforts.

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