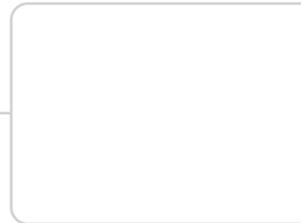
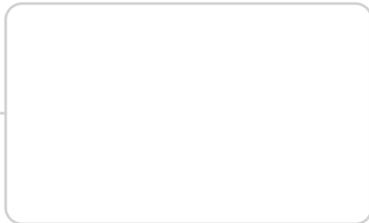
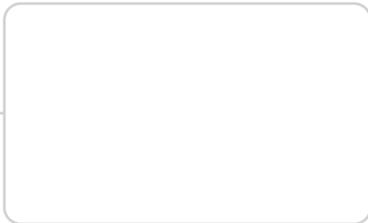




XP COTS Power Solutions *2009*
PRODUCT SELECTION GUIDE



The XPerts in Power for Defense and Avionics



COTS: A definition, advantages and disadvantages

Commercial off-the-shelf (COTS) is a term for components which are manufactured commercially, readily available, and are non-development items. This term is most often used in military systems. COTS systems are in contrast to systems that are produced entirely and uniquely for the specific application therefore offering potentially large cost and time savings.

Most COTS items are not produced for the defense market. This means they either need to be modified or the user must accept some level of commercial or technical risk such as obsolescence, process changes, environmental, electrical performance or EMI when designing them into a system. Also, due to the relatively small volumes used in the defense industry, compared with industrial, consumer or telecoms markets, companies are finding it increasingly difficult to obtain the level of technical support they demand for high reliability programs.

XP Power provides COTS products designed specifically for the defense and avionics market, our systems and people are geared to support these markets.

XP Power also has a wide range of standard power products sold to medical, industrial and telecoms customers— many of these products can be used or adapted for defense and avionics applications – these products can be found at www.xppower.com.

Our mission

To inspire our people to be the experts in power delivering genuine value to our customers

- Exclusive focus on power conversion, EMC filtering & related issues
- Group revenue of \$140 million
- Worldwide sales offices with engineering support centers
- London Stock Exchange listed
- ISO9001 certified quality management system
- Standard COTS
- Modified off-the-shelf (MOTS)

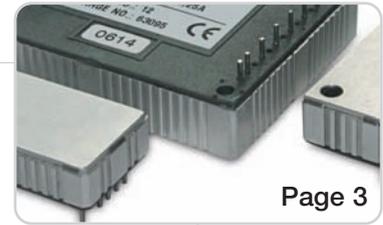
Considerations in deploying COTS components in high reliability applications

- Reliability
- Long service life
- Input voltage
- Electromagnetic compatibility
- Environmental factors
- Stringent space and weight requirements
- Industry knowledge and support available from manufacturer

MTC Series

DC-DC Converters for Defense and Avionic Applications

- 5-150 Watts
- 10-50 VDC input voltage
- -55 °C to +100 °C operating range
- High power density
- Rugged construction



Page 3

MTF Series

EMI Filter and Surge Suppression for MTC Series

- 50 Watts
- 10-50 VDC input voltage
- -55 °C to +100 °C operating range
- Immunity to MIL-STD 1275A-D, 704A-F and DEF STAN 61-5
- EMI to MIL-STD 461F and DEF STAN 59-41



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MCC Configurable

Baseplate Cooled Configurable DC-DC Converter

- 75-600 Watts
- 28 V MIL-STD 1275A-D input
- -40 °C to +90 °C operating range
- 1-5 factory configurable outputs
- EMI to MIL-STD 461F



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Contents

DSF Series

Active DC Filter Modules for Military Vetricon Electrical Environments

- 100-500 Watts
- Active surge protection meeting MIL-STD 1275A-D
- -40 °C to +100 °C operating range
- MIL-STD 810F shock, vibration, salt atmosphere
- EMI to MIL-STD 461F and DEF STAN 59-41



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XP Engineering Services

Non-Standard Power for Defense and Avionic Applications

- Short development timescales
- Based on proven COTS building blocks
- 3D CAD modelling
- Vast experience of defense programs
- Cost effective



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MTC & MTF Series



MTC & MTF: Product Outline

The MTC and MTF Series has been specifically developed for 28 VDC input defense and avionic systems – enabling a COTS modular power system to be built using the minimum of external components and design time.

The isolated MTC DC-DC converter uses a forward converter topology switching at 450 kHz, and utilizes synchronous rectification for lower output voltages to boost efficiency. The units are packaged with a cooling plate that enables operation over extreme ambient temperatures. The MTC has mounting holes that can be used to mechanically secure the unit, improving thermal conductivity and also shock and vibration performance.

The MTC has an extensive signal and control set including: inhibit, voltage trim, thermal warning signal, remote sense and ability to synchronize switching frequency to an external source.

The MTF Filter module is available to condition the input to meet a wide range of military EMI and immunity specifications. This product contains an active surge and spike protection circuit as well as a passive EMI filter.

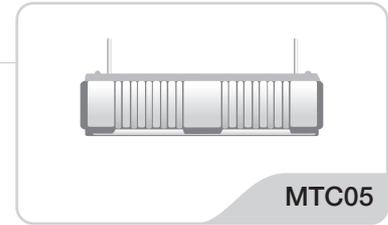
Both MTC and MTF have been extensively qualified for the key environmental parameters associated with high reliability applications such as shock, vibration, bump, humidity, salt-fog and altitude.

Key features of the MTC Series

- 15-40 VDC input voltage
- 10-50 VDC transient input meets MIL-STD 704 B-F
- 5-150 Watts output power
- Standard outputs: 3.3, 5, 12, 15 and 28 VDC
- Standard dual outputs: ±12 and ±15 VDC
- -55 °C to 100 °C operating range
- Defense EMI, immunity and environmental performance
- High power density
- Inhibit
- Frequency synchronization
- Voltage trim
- Thermal warning (Battle Mode)
- Remote sense
- Removable OVP and OTP
- Filter available to meet MIL-STD 704A/1275A-D

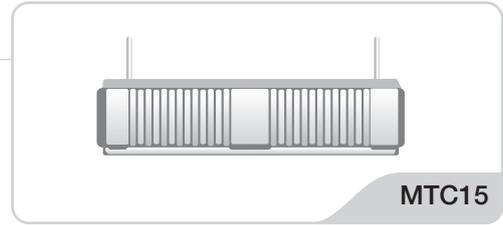
MTC05

- 5 Watts output power
- Sub-miniature case
- Extensive signals and control set
- Optional mounting ears
- Spacer to equalize height with MTC15/30/MTF50
- Weight: 10 g Dimensions: 32 x 18 x 7.5 mm



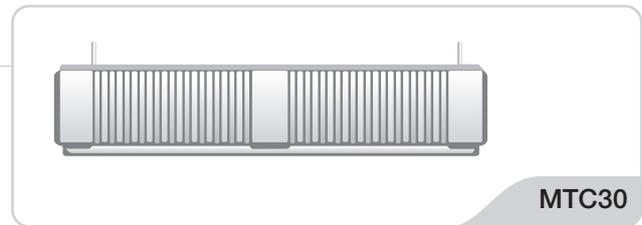
MTC15

- 15 Watts output power
- Single and dual outputs
- Meets MIL-STD 704 B-F
- Low profile
- Spacer to equalize height with MTC30/MTF50
- Weight: 20 g Dimensions: 40 x 18 x 9.7 mm



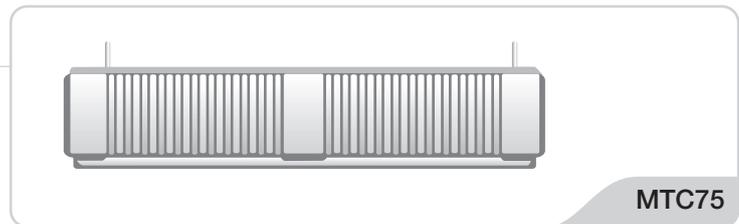
MTC30

- 35 Watts output power
- Single and dual outputs
- Thermal warning pin (Battle Mode)
- Frequency synchronization
- High efficiency
- Weight: 70 g Dimensions: 46 x 58 x 12.7 mm



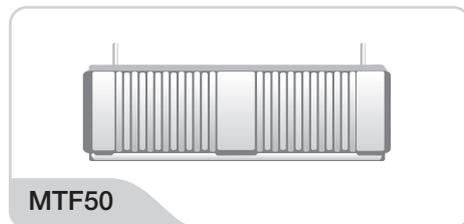
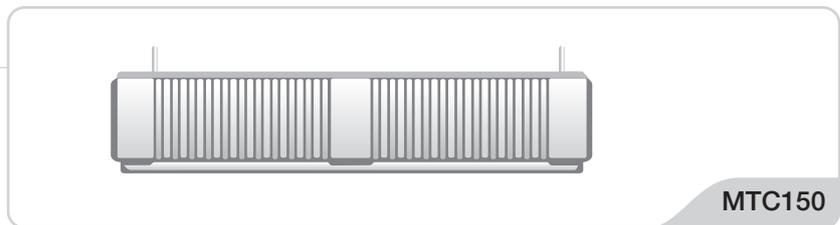
MTC75

- 75 Watts output power
- Single and dual outputs
- Thermal warning (Battle mode)
- Frequency synchronization
- Magnetic feedback
- Weight: 107 g Dimensions: 61 x 57.5 x 13 mm



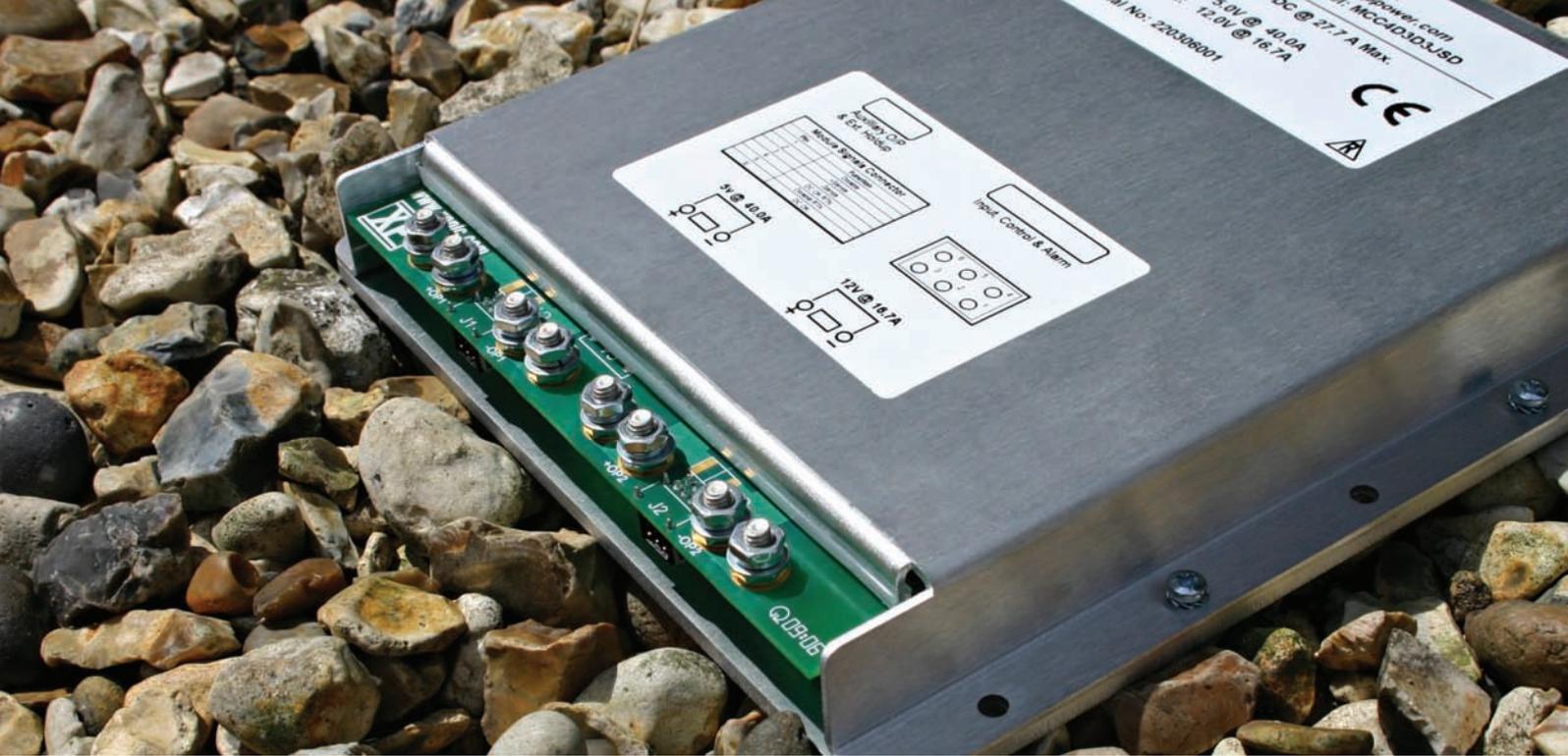
MTC150

- 150 Watts output power
- Single and dual outputs
- Permanent short circuit protection
- EMI performance to MIL-STD 461F
- Magnetic feedback
- Weight: 107 g Dimensions: 61 x 57.5 x 13 mm



MTF50 - EMI Filter and Surge Protection

- 50 Watts output power
- Inhibit function
- MIL-STD 1275A-D for military vehicles
- MIL-STD 704A-F for aircraft
- MIL-STD 461F EMI CE101, 102, CS101, 114, 115, 116
- Weight: 25 g Dimensions: 40 x 26 x 12.7 mm



MCC Series



Configurable and Flexible Power Solutions

The MCC Series is a 28 VDC input power system developed from proven technology for defense applications. The MCC provides a standard power supply platform that is configurable at time of order. This type of power solution has been available from XP Power for its defense customers for many years.

The MCC Series has a high performance filter qualified to meet MIL-STD 1275A-D and MIL-STD 704A-F. It has been qualified to the CE and CS requirements of MIL-STD 461F. Extensive environmental qualification provides a proven product which is sufficiently robust for applications such as tracked and wheeled vehicles, military communications, naval systems and aerospace.

The MCC was developed by XP Power's design team, with extensive experience of military power supply design. Unlike other DC-DC converters, the MCC platform is easily customizable for relatively low NRE and production volumes. This modification could be as simple as providing a non-standard output voltage, increasing a power limit, adding a parallel connection or making mechanical changes.

Key features of the MCC Series

- 28 VDC input (10-40 VDC continuous)
- 75 to 600 Watts
- 1 – 5 outputs
- Output voltages 1.8 to 48 VDC
- Operating temperature: -40 °C to 90 °C baseplate
- Military EMI, immunity and environmental performance
- Global inhibit
- Factory trimmable outputs
- Remote sense
- OVP and overload protection

MCC Configurations

Product Name	Input	Regulated Output Power	Output 1	Output 2	Output 3	Output 4	Additional Filtered Output
MCC75	10-40 VDC	75 W	X	X			
MCC175	10-40 VDC	75 W	X	X			100 W
MCC150	10-40 VDC	150 W	X	X			
MCC250	10-40 VDC	150 W	X	X			100 W
MCC200	10-40 VDC	200 W	X	X			
MCC300	10-40 VDC	200 W	X	X			100 W
MCC400	18-36 VDC	400 W	X	X	X	X	
MCC600	18-36 VDC	400 W	X	X	X	X	200 W



Modified Standard MCC solutions

The MCC, with its separate input and output PCBs and COTS modular design approach, provides extensive flexibility and can be used as a platform to develop custom MCC based solutions, fast!

Here are some examples from recent programs.

Application: Military vehicle

Customer Requirement: Higher output power required

Solution: Output PCB changed to accommodate 800 W, MCC enclosure extended and input power upgraded.

Application: Aircraft communications

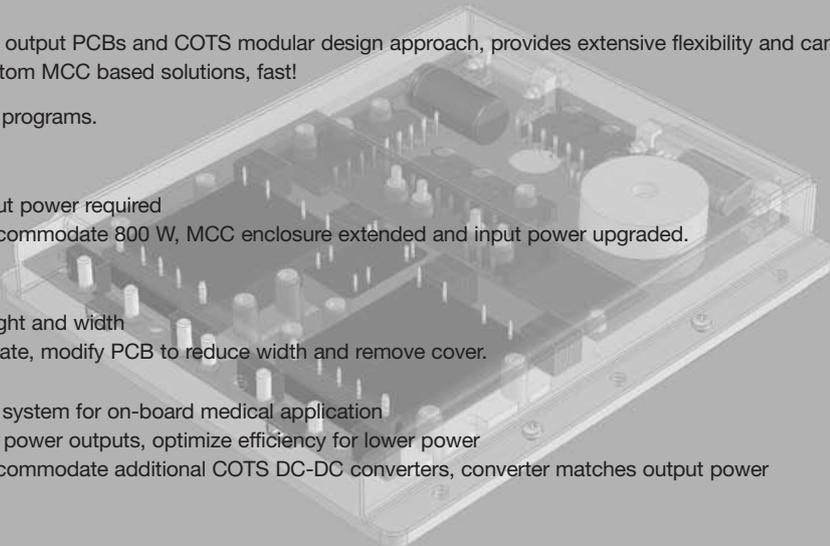
Customer Requirement: Reduce weight and width

Solution: Reduce thickness of baseplate, modify PCB to reduce width and remove cover.

Application: Space shuttle, flight test system for on-board medical application

Customer Requirement: Multiple low power outputs, optimize efficiency for lower power

Solution: Output PCB changed to accommodate additional COTS DC-DC converters, converter matches output power and improves efficiency.

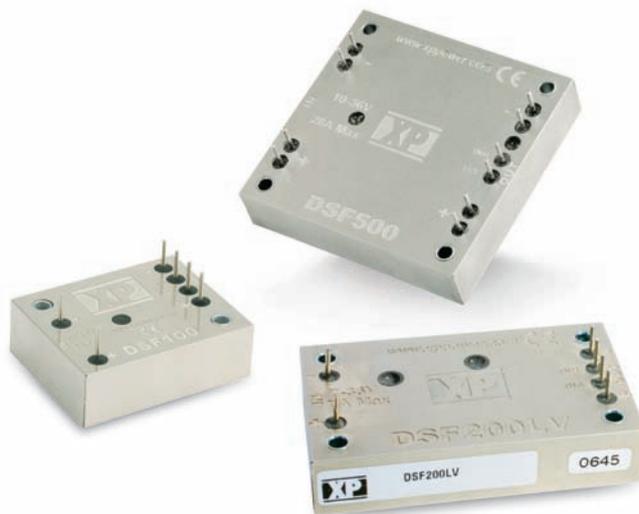


Power Conditioning & COTS Power Solutions

DSF & FSO Series 100, 200 & 500 W EMI and Transient Solution

There are numerous applications where there is a requirement to design a COTS DC-DC converter into a military application where it could potentially be damaged by surges or spikes. The DSF range modules provides up to 28 A of conditioned power which enables the user to meet MIL-STD 1275A-D, 704A-F and MIL-STD 461F with XP Power's series of DC-DC converters. The FSO461 provides passive filtering to MIL-STD 461F.

- 7 A to 28 A output current
- 9-36 VDC input voltage
- MIL-STD 1275A-D immunity
- MIL-STD 461F EMI CE requirements
- -40 °C to +100 °C operating range
- Input enable and module disable functions



MTH Hold Up Module

Many defense & avionics applications in aircraft and vehicles have short term power dropouts that can cause the system to turn off unless energy is stored. Typically energy is stored in capacitors which can occupy significant volume in the customers system. The MTH Series charges capacitors off-line at a charge voltage of up to 45 VDC - this higher charging voltage reduces the amount of hold up capacitance required by up to 66%. For maximum system flexibility the MTH allows the system designer to program both the charge voltage, power fail point and also provides a power fail warning.

- 10 A output
- Reduce hold up capacitance by 66%
- Enables compliance to D0160 power dropouts
- Sub-miniature size





MCM60

The MCM series is a rugged, metal-cased convection cooled power supply that is ideal for deployment in harsh and physically demanding environments. In addition, the series offers EMI performance to MIL-STD 461E/F standards, conducted and radiated, for emissions and susceptibility. Sealed against dust and water, the unit's metal case is equipped with fixing holes for mounting on an equipment shelf or fitting inside customer equipment. The casing also helps remove heat, allowing the unit to operate at higher temperatures.

- 60 Watt output power
- Universal input 90-264 VAC
- Rugged construction
- Compact size - high power density
- Wide operating temperature
- EMI performance to MIL-STD-461E/F
- Convection-cooled
- Optional 28 VDC input



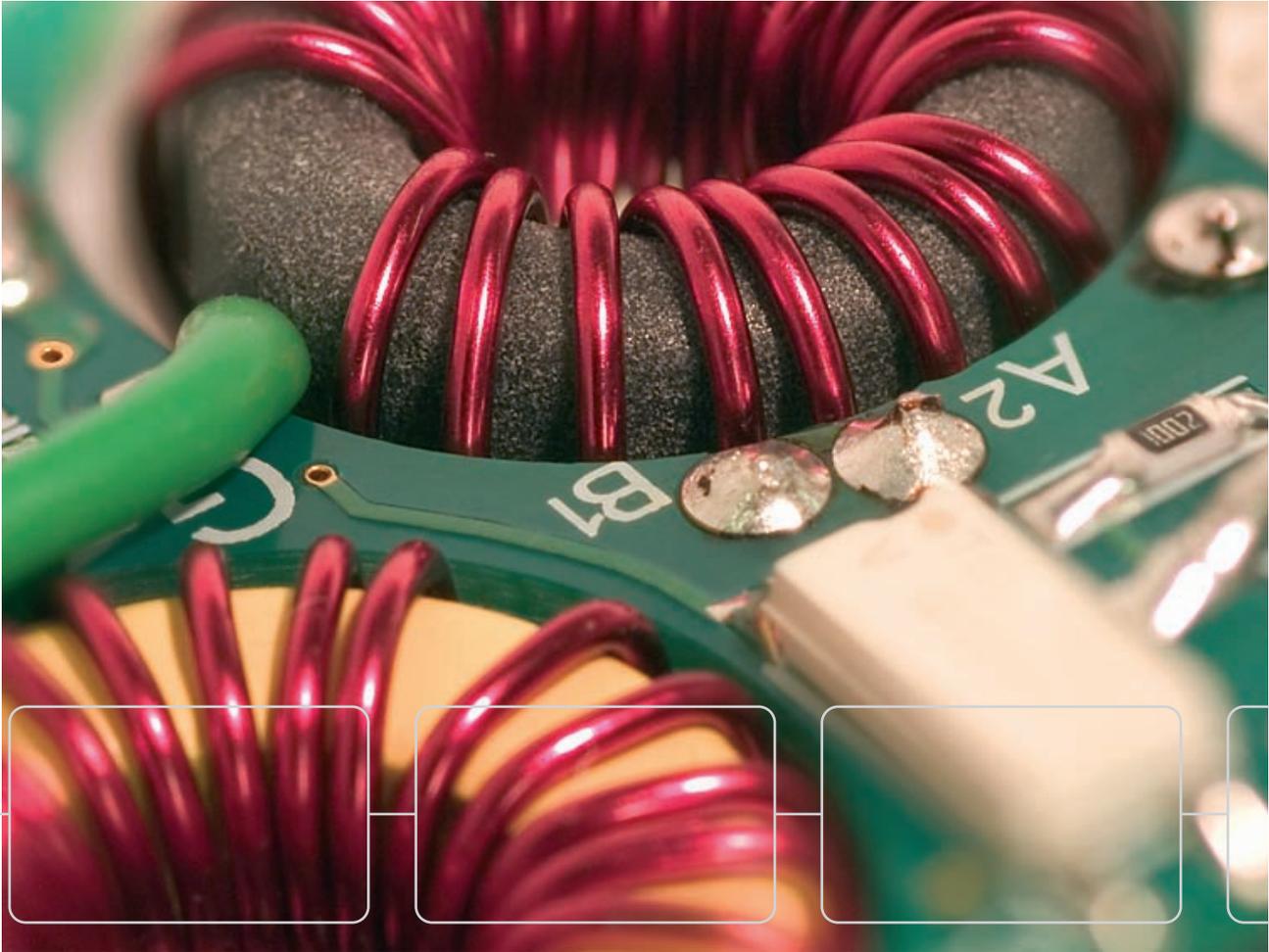
BCC Series

Many military communications and charging applications require the PSU to operate within a sealed enclosure in high ambient temperatures. For these applications XP offer the BCC series, with a baseplate connected to the heat generating components within the PSU. This is typically mounted to the customers enclosure or heatsink in order to remove waste heat.

- 200 – 600 Watt output power
- 90 – 264 VAC input voltage
- 3.3 V to 28 VDC output voltage
- Multiple output units available
- High power density
- Low noise
- Shock: tested to 30 g



Engineering Services



Our philosophy is to design non-standard power solutions from our comprehensive range of commercial off-the-shelf (COTS) power supplies, many of which were developed specifically as building blocks for use in military applications. These power supplies and modules are manufactured in volume for numerous customers, allowing us to pass on the advantage of economies of scale and proven manufacturing.

- **Low Development Costs**

We use standard or modified standard products as building blocks, to lower costs

- **Low Risk**

Proven technology with known performance and space envelope

- **Short Development Times**

We will often have an existing design that can be adapted to meet a new requirement

- **Low Unit Cost**

Take advantage of the economies of scale generated by thousands of customers worldwide

Technical Overview

- AC (Single and Three Phase) and DC inputs
- Power factor correction
- EMI filtering to MIL-STD 461F and DEF STAN 59-41
- Surge and transient suppression to MIL-STD 704A-F, 1275A-D and DEF STAN 61-5
- Low profile, high power density solutions
- High conversion efficiency
- Lightweight
- Application specific signals and control
- Power sequencing
- Inrush limiting
- Reverse voltage protection
- Built-in test
- Ruggedized for harsh environments
- -55 °C to +100 °C operating temperature

Applications:



Application: Civil avionics application

Customer Requirement: 150 W output power. Sealed enclosure and wide ambient temperature range. Compliant to DO-160F for input frequency, harmonics, surges and transients.

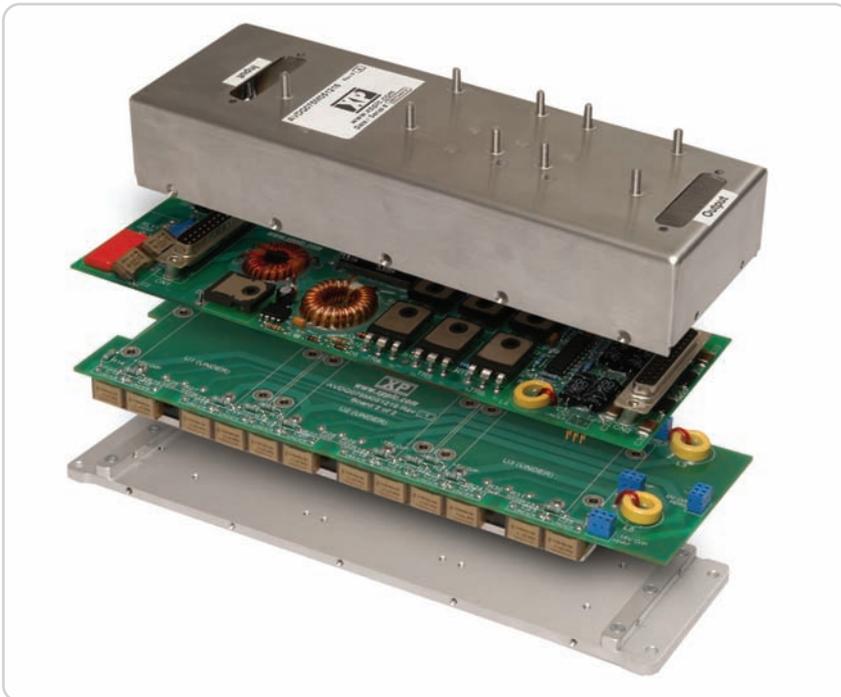
Solution: The input PFC circuit was lifted from a XP standard product and adapted to comply with DO-160F. Base plate cooled DC-DC converter provides the safety isolation and output voltage conversion. The heat generated components are secured to an aluminium baseplate in order to enable the customer to extract heat from their enclosure.



Application: Remote weapons system

Customer Requirement: Low cost 1.5 kW DC-DC converter that meets MIL-STD 1275A, 461F and DEF STAN 61-5 pt 6, 59-41 DCE01/02 with multiple outputs to power digital and high power motors. This weapons application has high levels of shock and vibration and is considered mission critical by the end user.

Solution: The product was designed using 3D CAD to interface with the customer enclosure with tight tolerances. All components are ruggedized and heat-bonded where necessary to the converter base to survive 100 g shock requirement. The product makes extensive use of SMT components and automated manufacturing techniques.



Application: Military vehicle control system

Customer Requirement: 150 W DC-DC converter with high power density, suitable for high levels of shock generated by tracked vehicle motion and gunfire, power is a vehicle 28 V source that has high levels of voltage surges, ripples and spikes.

Solution: The input filtering was adapted from a previous design to provide protection from surges and spikes, as well as high performance EMI filtering to meet MIL-STD 461E RE, CE, RS and CS requirements. This conditioned power is fed to multiple DC-DC converters in order to provide isolation, regulation and transformation from 28 V_{in} to lower voltages required.



North American HQ

XP Power
 990 Benecia Avenue
 Sunnyvale, CA
 94085
 Phone: +1 (408) 732-7777
 Fax: +1 (408) 732-2002
 Email: nasales@xppower.com

European HQ

XP Power
 Horseshoe Park
 Pangbourne
 Berkshire, RG8 7JW
 Phone: +44 (0)118 984 5515
 Fax: +44 (0)118 984 3423
 Email: eusales@xppower.com

Asian HQ

XP Power
 401 Commonwealth Drive
 Haw Par Technocentre
 Singapore 149598
 Phone: +65 6411 6900
 Fax: +65 6741 8730
 Email: apsales@xppower.com
 Web: www.xppowerchina.com

Distributors

Australia +61 2 9809 5022 Amtex
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 www.xppower.com

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