NEWER PRODUCTS ARE AVAILABLE

XP Power

Defense & Avionics

Power Supply Selector

The XPerts in Power for Defense and Avionics

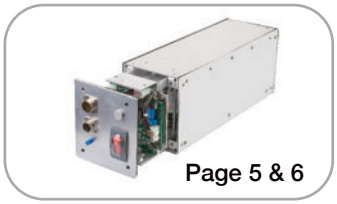
Power solutions for Defense & Avionics systems must comply with a wide range of challenging technical and logistical requirements to be installed and operated reliably in these demanding mission critical, land sea and air platforms. Our engineering and project management teams are experts in this area.

Thousands of XP Power products have been deployed in operational duties globally. Our products are designed to meet harsh requirements and undergo extensive environmental testing, safety approvals, design verification testing (DVT) and HALT testing. Our engineering teams are located worldwide to be close to our customers, they use only approved component suppliers and components that meet our conservative design guidelines, ensuring reliability is designed in from the ground up. Included in this brochure are a selection of standard products and examples of engineered solutions that are currently in production for Defense & Avionic customers.

Here are some of the requirements to be considered when selecting a power supply supplier.

- Compliance to national standards: DEF-STAN 59-411, 61-5 pt 6 issue 5 or 6, MIL-STD 1275, 704, 461 & 810
- Reliability by conservative component de-rating
- Full Design Verification Testing (DVT)
- Long product life cycle and End Of Life (EOL) management
- Dedicated project management
- Wide input voltage range for common DC battery inputs
- EMC/EMI control and immunity to spikes, surges
- Rugged build standard
- Wide operating temperature range (typical -40 °C to 70 °C)
- Convection or conduction-cooling
- Parallel and redundant operation
- Thermal, overvoltage, overcurrent protection

Defense & Avionics



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 $170 million
- Worldwide sales offices with engineering support centers
- London Stock Exchange listed
- ISO9001 certified quality management system
- Standard COTS
- Modified off-the-shelf (MOTS)

Contents

Military COTS Filters & Power Modules

50 Watts
MTF50

- Filter & Active Surge Protection (MTC05 - 30)
- MIL-STD-461E & DEF-STAN 59-411
- MIL-STD-1275, 704 & DEF-STAN 61-5
- Wide Input Voltage Range 10-50 VDC
- 100 G shock to MIL-STD-810D
- Wide Temperature Range -55 °C to +100 °C
- 3 Year Warranty

100 Watts
MTH100

- Designed for Extended Hold Up Applications
- 80% Less Hold Up Capacitance Required
- Reduces System Size and Weight
- 10 A Output Current
- Wide Input Range
- User Programmable
- 100 G shock to MIL-STD-810D
- 3 Year Warranty

100 to 500 Watts
DSF/FSO

- Defense Surge & EMC Filter (DSF100 & 226)
- Defense Surge Filter (DSF500)
- Defense EMC Filter (FSO)
- Up to 500 W Output Power
- MIL-STD 461 & DEF-STAN 59-411
- MIL-STD 1275, 704 & DEF-STAN 61-5 Pt. 6 Iss. 6
- MIL-STD 810 & MIL-STD 810F
- 3 Year Warranty

5 to 30 Watts
MTC05-30

- 10-50 VDC Input for Vetronic & Avionic Use
- Single & Dual Output Versions
- Baseplate-cooled
- -55 °C Operation Available
- MIL-STD 810D
- 100 g Shock
- External Clock SYNC
- 3 Year Warranty

35 to 150 Watts
MTC35-150

- Designed for Vetronic & Avionic Use
- 10-40 VDC Input Range
- Magnetic Feedback Technology
- -55 °C to +100 °C Operation
- MIL-STD 810F
- 75 g Shock
- External Clock SYNC
- 3 Year Warranty

65 Watts External
MCS65

- Rugged Desktop Design
- 65 W - Convection-cooled
- IP67 Ingress Protection
- Operating Temp. Range -40 °C to +70 °C
- MIL-STD 461F & MIL-STD 810F
- 40 g Shock
- <0.5 W No Load Input Power
- 3 Year Warranty

Product specifications available at: **www.xppower.com**

200 Watts

MCA200

- DEF-STAN 59-411 Land Class A
- DEF-STAN 61-5 Part 6 issue 6
- MIL-STD 1275
- MIL-STD 461
- MIL-STD 810G
- Conduction-cooled
- 3 Year Warranty

Application: Military vehicle control system

Customer Requirement: 200 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 VDC 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 the 28 VDC input to lower voltages required.

400 to 600 Watts

MCC400-600

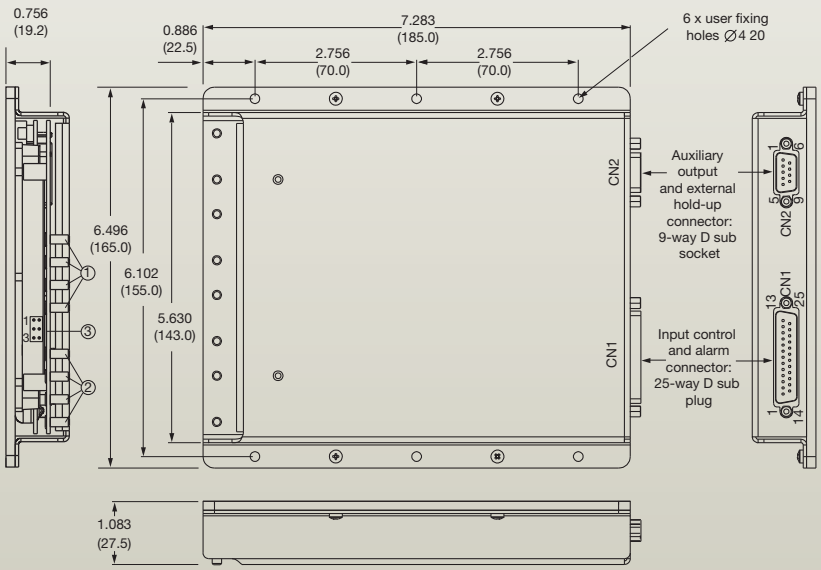
- 28 VDC Nominal Vehicle Input Voltage Range
- Baseplate-cooled
- 1-4 Regulated Outputs, Plus Optional Conditioned 28 V/200 W Unregulated Output
- MIL-STD 1275 and DEF-STAN 61-5
- MIL-STD 461 and DEF-STAN 59-411
- Rugged Construction to MIL-STD 810F
- 3 Year Warranty
- 8-10 Weeks For Typical Production Builds

Chassis Designations, Power & Sizes		
Code	Power	Slots
MCC4	400 W	4
MCC6	400 W + 200 W AUX	4

Modules Output Voltage / Current Rating				
Voltage	Current	Power	Slots	Code
3.3 VDC	22.70 A	75 W	1	2C
3.3 VDC	45.40 A	150 W	2	3C
3.3 VDC	80.00 A	264 W	4	4C [2]
5.0 VDC	20.00 A	100 W	1	2D
5.0 VDC	40.00 A	200 W	2	3D
5.0 VDC	80.00 A	400 W	4	4D [2]
12.0 VDC	8.30 A	100 W	1	2J
12.0 VDC	16.60 A	200 W	2	3J
12.0 VDC	33.30 A	400 W	4	4J [2]
15.0 VDC	6.60 A	100 W	1	2L
15.0 VDC	13.30 A	200 W	2	3L
15.0 VDC	26.70 A	400 W	4	4L [2]
24.0 VDC	4.10 A	100 W	1	2P
24.0 VDC	8.30 A	200 W	2	3P
24.0 VDC	16.70 A	400 W	4	4P [2]
28.0 VDC	3.50 A	100 W	1	2Q
28.0 VDC	7.10 A	200 W	2	3Q
28.0 VDC	14.30 A	400 W	4	4Q [2]
36.0 VDC	2.78 A	100 W	1	2T
36.0 VDC	5.56 A	200 W	2	3T
36.0 VDC	11.11 A	400 W	4	4T
48.0 VDC	2.10 A	100 W	1	2W
48.0 VDC	4.10 A	200 W	2	3W
48.0 VDC	8.30 A	400 W	4	4W [2]

			Slot 1	Slot 2	Slot 3	Slot 4					
MCC	4	Q	2J	2J	2J	2J	E	X	X	X	X

- MCC: Chassis designation: MCC4, MCC6 (see table above for power & sizes)
- 4: Chassis designation: MCC4, MCC6 (see table above for power & sizes)
- Q: MCC400/600: Single (S), Dual (D), Triple (T) or Quad (Q) (4 slots max where all slots must be filled)
- 2J (Slot 1): MCC400/600: Single (S), Dual (D), Triple (T) or Quad (Q) (4 slots max where all slots must be filled)
- 2J (Slot 2): MCC400/600: Single (S), Dual (D), Triple (T) or Quad (Q) (4 slots max where all slots must be filled)
- 2J (Slot 3): MCC400/600: Single (S), Dual (D), Triple (T) or Quad (Q) (4 slots max where all slots must be filled)
- 2J (Slot 4): MCC400/600: Single (S), Dual (D), Triple (T) or Quad (Q) (4 slots max where all slots must be filled)
- E: S - Standard; E - Screening option[3]; A - Auxiliary turn off[5]
- X (1st): D - DC OK, leave blank if not required; Q - Low noise output; L - Passive filtering only[4]; P - Conformal coating
- X (2nd): D - DC OK, leave blank if not required; Q - Low noise output; L - Passive filtering only[4]; P - Conformal coating
- X (3rd): D - DC OK, leave blank if not required; Q - Low noise output; L - Passive filtering only[4]; P - Conformal coating
- X (4th): D - DC OK, leave blank if not required; Q - Low noise output; L - Passive filtering only[4]; P - Conformal coating



Engineered Solutions

application specific power solutions

from concept to fulfilment

XP Engineering Services provides solutions where applications cannot be fulfilled from our standard product range or where integrated products are required. We offer the world's strongest standard product range, which provides us with a vast selection of power platforms from which to deliver complex modified standards.

We design and manufacture cost effective application specific solutions that meet your electrical, mechanical, safety, EMC and thermal management requirements, while ensuring a fast time to market.

- **Low development cost**
- **Low risk, proven technology**
- **Local design & manufacture of world class designs**
- **Short development times**
- **Worldwide local engineering support**
- **Low cost manufacturing in Asia**
- **ISO 9001 certified quality management system**
- **Production to IPC Class 2 as standard , Class 3 on request**

Mechanical Design

- 3D-model, photo-rendering, animation
- Thermal, stress and mass simulation
- Environmentally sealed units

Electrical Design

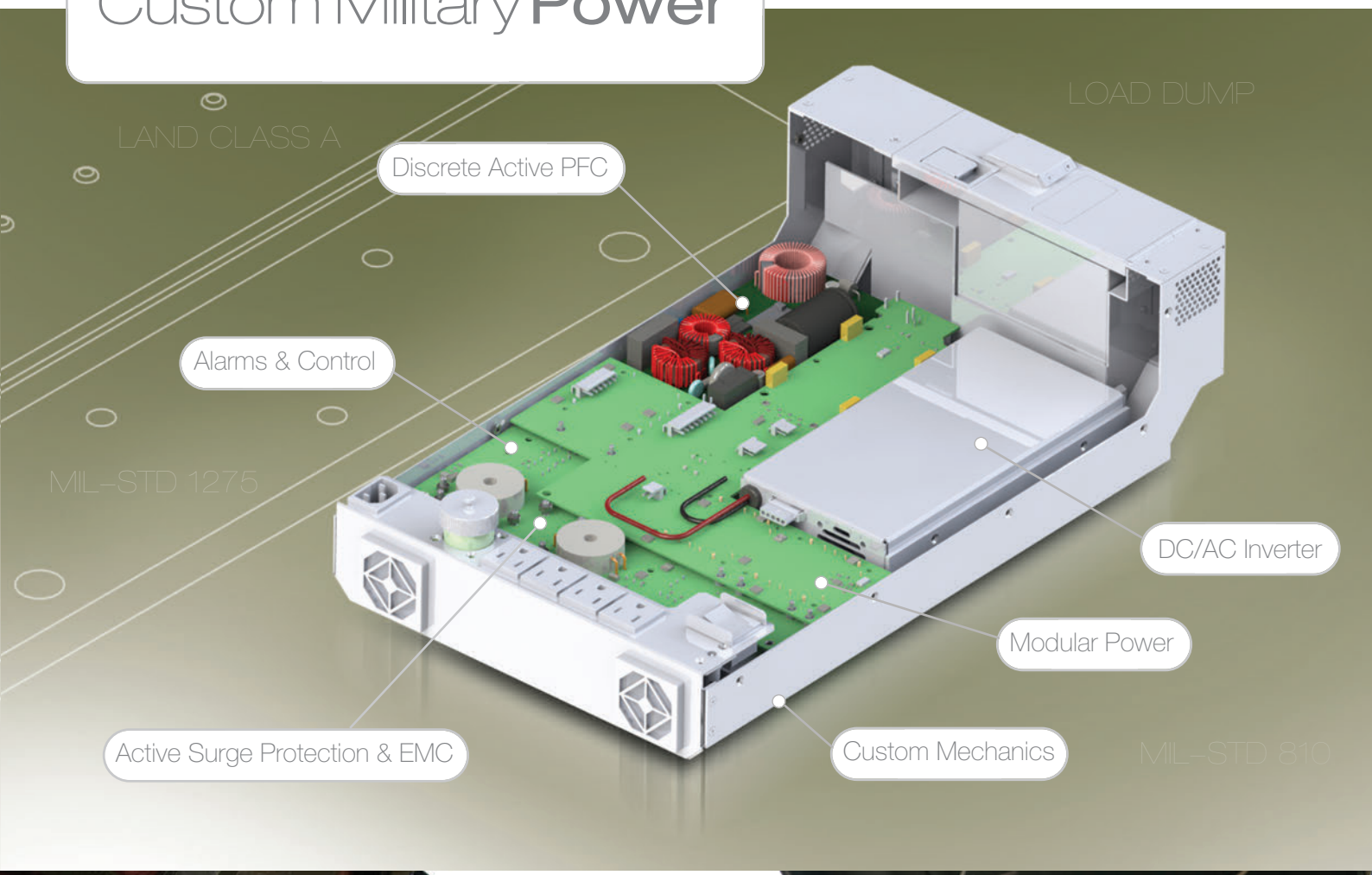
- Filter design for specific noise and ripple standards
- I^2C interface requirements for power supply health and control
- Blind-mate, hot-swap experts
- Embedded micro-processor based design
- Schematic capture / simulation
- Compliance with defense specifications

Quality and Test

- 100% parametric DVT testing
- In-system troubleshooting
- System specific testing can also be provided
  - Turnkey EMC certification
  - HALT / HASS integrity testing
  - Burn-in

Customer Requirements → Proposal & Specification → Customer Design Review → Prototyping → Design Verification → Customer Approval

Custom Military **Power**



Printed Circuit Board Design

- Timely electrical assemblies improving customer time-to-market
- Safety specific creepage and clearance
- Design for manufacturability
- PCB modeling & layout

Software Programming

- In-house software / firmware development
- Serial bus interfaces - I^2C & RS232 / 422
- Software / firmware functionality
  - Smart battery interface (SMBus)
  - Battery charging
  - Power supply sequencing
  - Power supply alarm and control

Safety & Compliance

- Compliance engineering
- Expert knowledge of UL, TUV, CSA, CE & CB schemes
- NEBS & ETSI compliance
- IT, industrial & medical safety standards
- IT, industrial & medical EMC compliance
- MIL STD & DEF STAN EMC compliance

0.25 to 60 Watts

I and J series

- 0.25 to 60 Watt Power Range
- 2:1 & 4:1 Options in Nom. 3.3-24 V Input
- Single, Dual & Triple Outputs
- SIP & DIP Packages
- Surface Mount Versions
- 1000/1500/1600 V Isolation
- Optional 3000+ V Isolation
- 3 Year Warranty

75 to 300 Watts

QSB75-300

- 2:1 & 4:1 Options in Nom. 24 & 48 VDC Input
- Quarter / Half Brick Standard Packages
- Single Output
- High Efficiency - up to 92%
- -40 °C to +100 °C Operating Temperature
- Remote On/Off and Remote Sense
- Baseplate-cooled
- 3 Year Warranty

350-600 Watts

QSB350-600

- 2:1 & 4:1 Options in Nom. 24 & 48 VDC Input
- Half / Full Brick Standard Packages
- Single Output
- High Efficiency - up to 92%
- -40 °C to +100 °C Operating Temperature
- Remote On/Off and Remote Sense
- Baseplate-cooled
- 3 Year Warranty

85 to 250 Watts

AHM85-250

- Worldwide Safety Approvals
- Energy Efficiency Level V
- CEC2008 and EISA 2007 Compliant
- <0.5 W No Load Input Power
- Class I and II Models (Except AHM250)
- High Efficiency - 92% Typical
- IP21 Environmental Rating
- 3 Year Warranty

10 to 500 Watts

Non-standard Solutions

- Use of COTS Module
- Proven Performance
- Low Risk / Reduced Time to Market
- Reduced NRE Exposure
- Local & Offshore Production Options
- In-house Qualification
- System Level EMC Support
- 3 Year Warranty

Application: Civil avionics application

Customer Requirement: 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. Baseplate-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.

Rugged AC-DC Converters

5 to 60 Watts

ECE05-60

- Ultra Compact Size
- Single Outputs from 3.3 to 48 VDC
- <0.3 W No Load Input Power
- 130% Peak Load Capability for 30 Secs
- EN55022 Class B Conducted & Radiated
- No external Components Required
- PCB, Chassis & Din Rail Mounting Options
- 3 Year Warranty

110 Watts

ASB110

- Complete AC-DC Power Supply
- No Extra Components Required
- Baseplate-cooled
- -40 to +85 °C Baseplate Temperature
- Low Profile in Full Brick Package
- High Efficiency - up to 91%
- <0.3 W No Load Input Power
- 3 Year Warranty

250 Watts

CCM250

- 250 W Convection-cooled
- 300 W Peak Rating for 500 ms
- Very High Efficiency - up to 95%
- EN55022 Class B Conducted & Radiated
- 80 to 275 VAC Input
- Additional 5V / 0.5 A Standby Output
- Worldwide Safety Approvals
- 3 Year Warranty

400 to 600 Watts

CCH400-600

- Baseplate-cooled
- High Efficiency - up to 90%
- -40 °C to +70 °C Operation
- Industrial & MIL-STD461E EMC Compliance
- Power Fail, Inhibit and Current Share
- Overtemperature Protection
- Additional 5V / 0.5 A Standby Output
- 3 Year Warranty

650 Watts

HHP650

- 85 to 305 VAC Input
- MIL-STD 810F Shock & Vibration
- -40 °C to +70 °C Operation
- SEMI F47 Compliant
- 6 kV Surge Rating IEEEStdC62.41
- UL508, ANSI/ISA 12.12.01 Class I, Div II
- Conformal Coating
- 3 Year Warranty

400 to 2500 Watts

fleXPower

- Single & Three Phase AC Input Models
- Configurable for Fast Time to Market
- Worldwide Safety Approvals
- SEMI F47 Compliant
- Flexible Series & Parallel Capability
- -20 °C to +70 °C Operation
- Optional Fan Speed Control
- 3 Year Warranty

Rack Mount / High Power

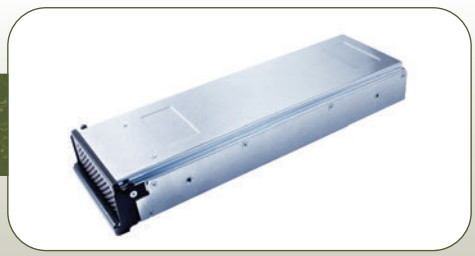
1.5 kWatts

HPU

- Low Profile 1.7" (43.2 mm), Industrial Supply
- Industrial Heavy Duty Terminals
- Output Power up to 1500 W
- Variable Speed Fans for Noise Reduction
- High Power Density 18W/in^3
- Additional 5V / 1 A Standby Output
- SEMI F47 Compliant
- 3 Year Warranty

1.5 to 6 kWatts

GFR1K5



- Up to 6 kW in 1U Rack Available
- 1U Blind Mate Hotswap Redundant
- All Models Share the Same Compact Size
- 56V POE Compatible Model
- Variable Speed Fans for Noise Reduction
- High Power Density 18 W/in^3
- I^{2}C Interface
- 3 Year Warranty

100 to 5 kWatts

Rack Mount

Standard
Power Modules

- DC-DC Converters, AC-DC Power Supplies & Battery Chargers
- DC Input Voltage Range 10 - 800 VDC
- AC Input 115 / 230 VAC
- AC Input 200 / 400 / 480 VAC 3 Phase
- Output Voltages 5 - 400 VDC
- 3 Year Warranty

5 to 40 kWatts

High Power

Non-standard
Power Modules

- Application Specific Mechanics, Connectivity, Cooling & BITE Interface
- DC-DC Converters, AC-DC Power Supplies, Battery Chargers & Inverters
- DC Input Voltage Range 10 - 800 VDC
- AC Input Single & 3 Phase Operating 47-400 Hz
- Output Voltages 5 - 800 VDC
- Conduction, Convection, Fan & Liquid Cooling Options
- 3 Year Warranty

Application: Naval communications system

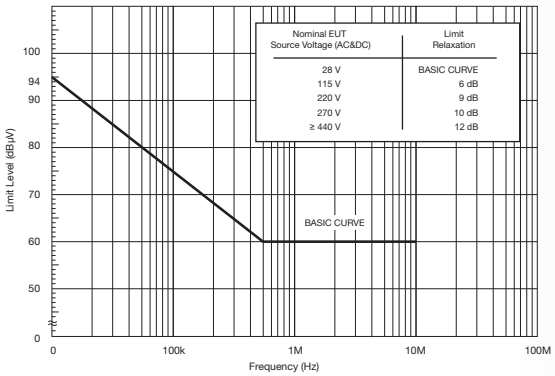
Customer Requirement: A rack mounted modular power system for a high power RF transmitter, operating from 440 VAC 3 Phase supply and conforming to MIL-STD-461 EMC.

Solution: Working in partnership, XP tailored 5 kW fan-cooled power modules mounted in 2 or 3 module rack design to allow for system scalability and compliancy with MIL-STD ratings. The end solution was compliant to MIL-STD 810F Environmental conditions including low pressure, high & low temperatures, humidity and operational altitude & vibration to MIL-STD-167-1

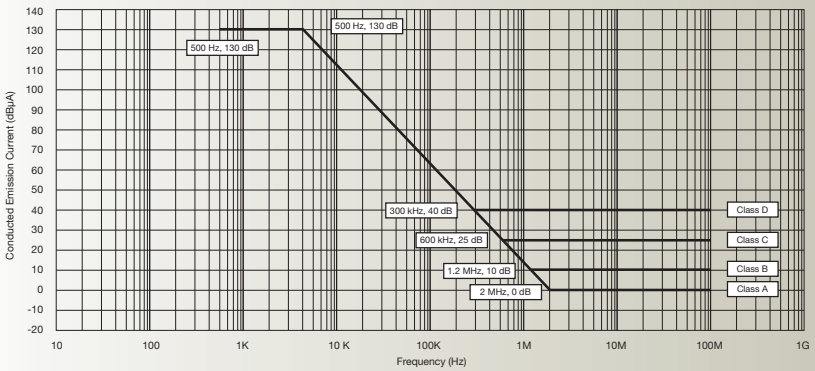
EMC Standards

MIL-STD 461F is commonly specified for conducted emissions and, in the UK, DEF STAN 59-41 and more recently DEF STAN 59-411 is required. The test requirements for these standards are quite unique using different Line Impedance Stabilization Networks and different measurement or detection techniques.

MIL-STD 461F



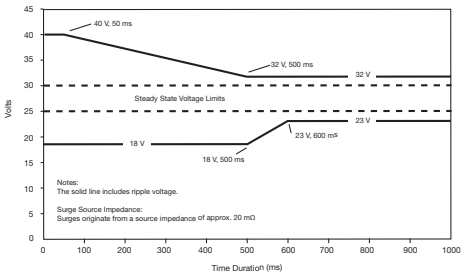
DEF STAN 59-41 & 59-411



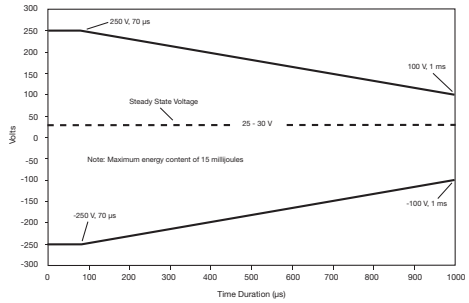
Input Conditions

The key elements for power supplies are the conducted immunity and conducted emissions standards. MIL-STD 1275, MIL-STD 704 & DEF STAN 61-5 are commonly used immunity standards. MIL-STD 1275 covers requirements for military vehicle applications, MIL-STD 704 covers military aircraft applications and DEF STAN 61-5 covers military vehicles, naval vessels and aircraft.

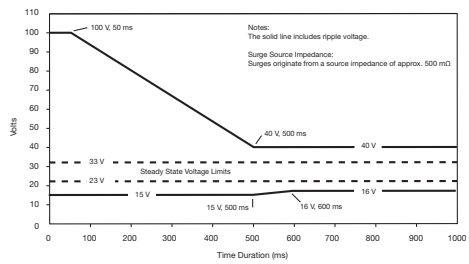
MIL-STD 1275-D



Envelope of surges in normal operating mode for 28 VDC systems

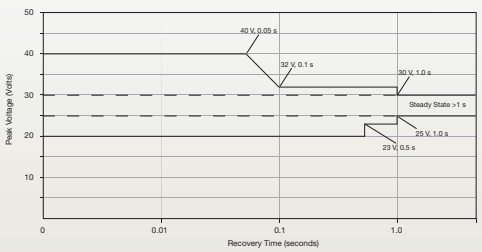


Envelope of spikes in normal operating mode for 28 VDC systems

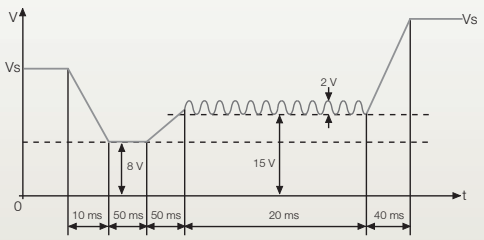


Envelope of surges in generator only mode for 28 VDC systems

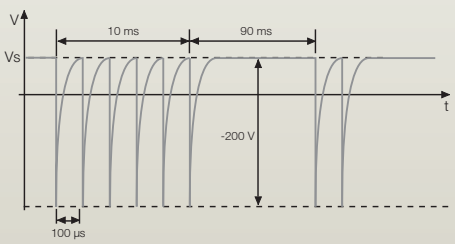
DEF STAN 61-5 pt 6 iss 6



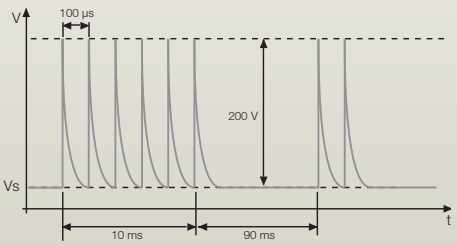
Envelope of spikes in normal operating mode for 28 VDC systems



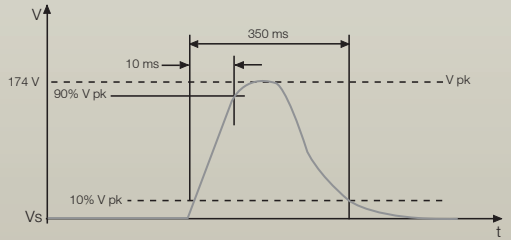
Typical Test Configuration



Negative Test Pulse - Pulse Train A



Positive Test Pulse - Pulse Train B



Surge (Load Dump)

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