Advanced Energy

BATTLE CARD

MILITARY & AEROSPACE

POWER SUPPLIES (COTS)

SOLUTION OVERVIEW

Military and aerospace programs often take advantage of commercial off-the-shelf (COTS) power supplies instead of developing custom-made solutions. And while this approach offers several advantages, these off-the-shelf products may still require some modifications or integration to meet specific military requirements and standards.

Advantages of COTS:

- **Cost effective:** Usually mass produced and readily available in the commercial market. Even with modifications, the economies of scale result in lower costs compared to fully custom-built solutions.
- **Rapid procurement:** Quickly acquire and integrate the necessary technology without the need for lengthy development cycles.
- **Improved interoperability:** Designed to be compatible with standard industry protocols and interfaces, making it easy to integrate with existing infrastructure. This allows for versatility, flexibility, and scalability.
- **Technological advancements:** Commercial technology often evolves at a faster pace compared to military-specific technology, including advancements in areas such as computing power, communications, or sensors.
- **Reliability and support:** Backed by established manufacturers with a proven track record in commercial applications that may be challenging to achieve with custom-built solutions.

We excel in this space by having a large portfolio of proven solutions and the expertise to modify them with custom enclosures/configurations when necessary to meet different specifications.

Target Markets/Customers

The power supply specifications for military and aerospace commercial off-the-shelf programs can vary depending on the specific requirements of each program. Some common specifications include:

- Input voltage range
- Output voltage/current rating
- Efficiency
- Operating temperature range
- Electrical noise and ripple requirements
- EMI/EMC compliance
- Shock and vibration resistance
- Size and form factor constraints
- Reliability and mean time between failures (MTBF)
- Compliance with military standards and certifications (such as MIL-STD-810, MIL-STD-461, DO-160)

Some examples of military and aerospace applications for commercial off-the-shelf (COTS) programs include:

- Surveillance and reconnaissance systems
- Communication systems
- Unmanned aerial vehicles (UAVs)
- Navigation and guidance systems
- Radar and sonar systems
- Satellite communication systems
- Command and control systems
- Avionics systems.

These applications require robust and reliable hardware and software solutions that can be quickly deployed and easily integrated into existing military and aerospace infrastructure. COTS programs help to meet these requirements by providing standardized and proven technologies that can be readily adapted for these applications.

Where to Avoid

Mil/aero programs that must meet ITAR requirements. The International Traffic in Arms Regulations (ITAR) is a set of regulations implemented by the United States Department of State to control the export and import of defense-related items and services. Companies that want to meet ITAR requirements need to comply with specific rules and regulations, including obtaining the necessary licenses and registrations, controlling access to export-controlled information, implementing robust security measures, conducting regular training and compliance programs, and maintaining accurate records. Additionally, they need to ensure that their products, technologies, and services are properly classified and adhere to the strict ITAR guidelines.

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Audience – who to engage

- **Defense contractors:** These companies typically work closely with the military to develop and supply equipment, technology, and services. They often require COTS products to meet the specific requirements and standards set by the military.
- **Government agencies:** Various government agencies, such as the Department of Defense, law enforcement agencies, and intelligence agencies, may require COTS products to support their operations and missions.
- **Military organizations:** Different branches of the military, including the army, navy, air force, and marines, may use COTS products for various purposes, such as communication, surveillance, weaponry, and transportation.
- **Emergency services:** Organizations like fire departments and emergency medical services may require COTS products for their operations, especially if they need rugged and reliable equipment that can withstand harsh conditions.
- **Aerospace industry:** Companies involved in the aerospace and aviation sectors may need COTS products for their aircraft and spacecraft systems, especially those used for military purposes.
- **Security and surveillance companies:** Private security firms and companies that specialize in surveillance and monitoring may require COTS products for their systems and equipment.

Business Benefits

Defense contractors: Companies that work with the military to develop and manufacture equipment and systems can benefit from using COTS products. These products can help to reduce development time and costs, and ensure compatibility with existing systems.

Cost savings: COTS products are generally more affordable than custom-built solutions because they are mass-produced and readily available in the commercial market. This allows the military to save on development, production, and maintenance costs.

Rapid acquisition: COTS products are already developed, tested, and readily available, reducing the time required for acquisition. This enables the military to quickly incorporate new technologies into their operations.

Interoperability: COTS products are designed to be compatible with existing commercial systems and technologies. This allows the military to easily integrate COTS products into their existing infrastructure and network, enhancing interoperability and reducing the need for custom integration.

Innovation: The commercial market is often at the forefront of technological advancements. By leveraging COTS products, the military can benefit from the latest innovations and advancements in areas such as communications, computing, and sensors.

Reliability and support: COTS products are typically developed and supported by established commercial vendors with extensive resources. This provides the military with access to reliable products and ongoing technical support, reducing the risks associated with custom-built solutions.

Scalability: COTS products are often designed to be scalable.

uMP Series

CoolX1800

AIF Series

iHP Series

UltraVolt

iMP Series

NeoPower Series

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Qualifying Questions

The power supply specifications for military and aerospace commercial off-the-shelf programs can vary depending on the specific requirements of each program.

Some common specifications include:

- Input voltage range
- Output voltage/current rating
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- Operating temperature range
- Electrical noise and ripple requirements
- EMI/EMC compliance
- Shock and vibration resistance
- Size and form factor constraints
- Reliability and MTBF (Mean Time Between Failures)
- Compliance with military standards and certifications (such as MIL-STD-810, MIL-STD-461, DO-160)

Customer Challenges

Compatibility: Military systems often have different requirements and standards compared to commercial systems. COTS products may not seamlessly integrate into the existing military infrastructure.

Security: Military systems are often highly sensitive and require stringent security measures. COTS products may not meet the same level of security standards as custom-built military solutions, leading to potential vulnerabilities and risks.

Longevity: Military systems are designed to have long lifespans and often require support and maintenance for several years or even decades. The fast-paced nature of the commercial market means that COTS products may become obsolete or no longer supported by the manufacturer, making it difficult for defense contractors to ensure long-term sustainability and reliability.

Customization: Military systems often require customizations to meet their unique needs and requirements. COTS products are generally mass-produced and may not offer the same level of flexibility for customization compared to custom-built military solutions.

Compliance: Military systems need to adhere to various industry standards and regulations, such as MIL-STD, DoD directives, and cybersecurity guidelines. COTS products may not have been specifically designed to meet these compliance requirements.

Key Features & Specs (high-level differentiators)

1. **Input voltage range:** The power supply should be able to accept a wide range of input voltages, including different AC or DC power sources commonly found in military applications.
2. **Output voltage and current:** The power supply should be able to provide the required voltage and current levels needed by the military equipment it is powering.
3. **Environmental specifications:** Military power supplies often need to operate in harsh environments, so they may have to meet specific ruggedness and environmental standards such as shock, vibration, temperature, humidity, and electromagnetic interference (EMI) resistance.
4. **Efficiency and power factor correction:** Military power supplies may need to meet certain efficiency standards to minimize power losses and maximize energy efficiency. Power factor correction (PFC) may also be required to ensure the power supply operates properly with different input power sources.
5. **Safety and reliability:** Military power supplies must meet stringent safety and reliability standards to ensure safe and dependable operation in various mission-critical applications. This may include compliance with MIL-STD-461 for electromagnetic compatibility and MIL-STD-810 for environmental testing.
6. **Size, weight, and form factor:** Military power supplies often have size, weight, and form.

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COMPETITIVE ANALYSIS

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Listed below are some of the competitors that sell commercial off the shelf power supplies for military and aerospace applications:

- Vicor Corporation
- TDK-Lambda Corporation
- SynQor
- Astrodyne TDI
- Murata Power Solutions
- XP Power
- COSEL Co., Ltd.
- Crane Aerospace & Electronics

Competitor	Competitor Strengths	Competitor Weakness
Vicor	▪ Exceptional packaging power density (patented processes) ▪ Established market presence ▪ Mil/aero product portfolio	▪ Typically, Single sourced solutions ▪ Typically, Higher cost solutions. ▪ Potential increase of price following design-in.
TDK	▪ Robust and quality products with high power density ▪ Leader in AC-DC Combi-bricks	▪ Can be Long development cycles (>2yrs) ▪ Typically, Higher cost product
XP	▪ Extensive medical portfolio ▪ Organic and inorganic growth of products offering ▪ Low-cost own-designed product	▪ Currently minimal portfolio of own-design product ▪ Currently minimal market position
Cosel	▪ Diverse DC-DC and AC-DC combi-bricks are strong ▪ Strong in Japanese Market ▪ Position with Advantest in mem-test in Japan	▪ Limited portfolio ▪ Weakening marketing position (outside Japan).

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Value Add Examples

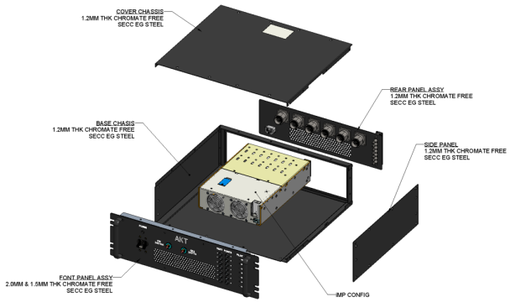
When our standard products aren't enough, they can be installed into **custom enclosures** for different configurations and ruggedization.

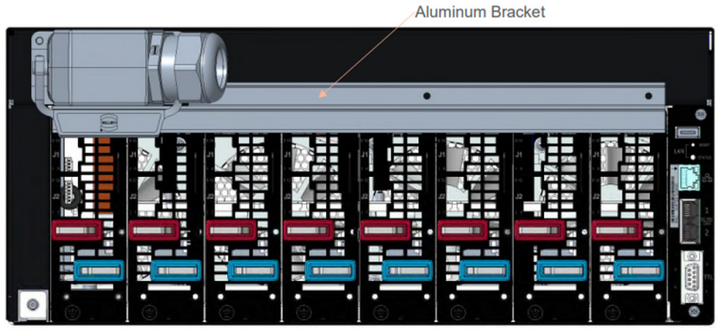
For example, we might take a standard iHP and put it in a stronger enclosure with different connectors and fans to achieve the desired outputs and withstand higher temperatures.

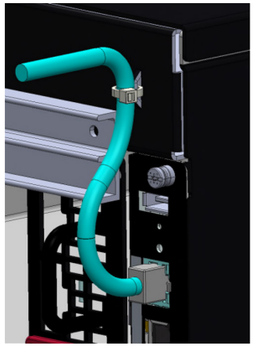
Examples shown include:

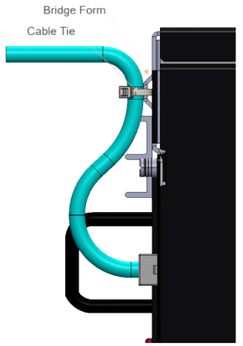
- Additional aluminum bracket for ruggedization
- Ruggedized Ethernet RJ45 cable
- Additional fan for relay and EMI cooling
- Industrial connector input receptacle

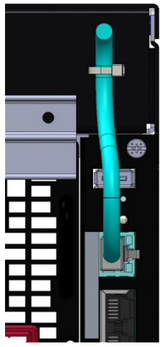
*AE legal will review modifications to standard products for Defense customers.

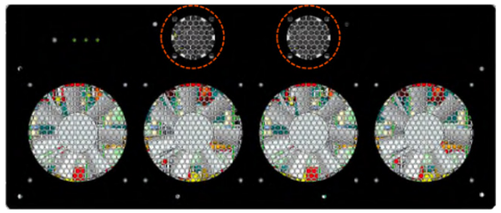


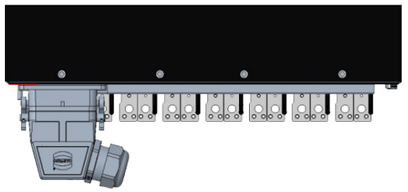


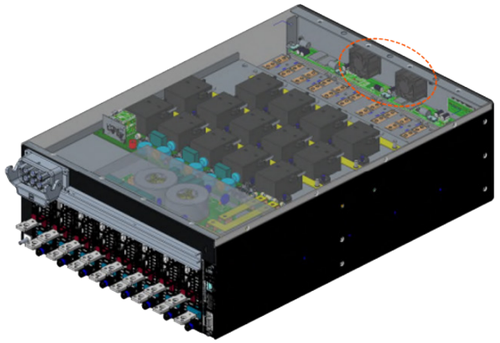


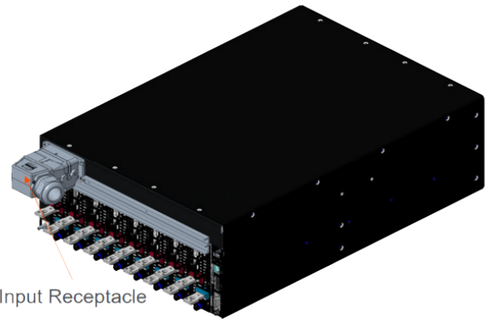


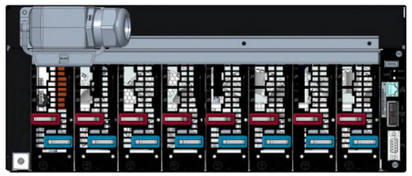












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Cross-Selling

In addition to the power supplies (COTS) covered in this battlecard, AE also offers a wide variety of critical sensing and control solutions for military and aerospace programs, including RF power Sensors, calibration, bond metering, and thermal sensing.

- RF power sensor calibration systems
- High power RF power meters
- Bond meters
- Pyrometers
- Thermal imagers
- Thermometers and temperature calibrators
- Blackbodies
- Fiber Bragg Grating
- Calorimeters

These products offer advanced measurement capabilities, high performance in tough conditions, and long-lasting durability for a range of applications.

- Metrology/Calibration Lab
- Aircraft Manufacturing & Maintenance/MRO
- Suppliers/Military GPETE

More information is available in a separate Military & Aerospace battlecard.

Paramount®Plus RF Generator

Paramount® RF Generator

eVerest™ RF Generator

ThermalSpection™ Series