

# Solution Brief

Edge Computing  
Defense and Aerospace



## Optimizing Performance, Security, and SWaP at the Tactical Edge



**Optimized for performance, speed, security, and SWaP, Curtiss-Wright CHAMP-XD1 processor cards leverage Intel® Xeon® D processor architecture to meet the high demands of modern defense missions.**

*"We evaluated different processor options on the market, and a few attributes made the Intel® Xeon® D processor stand out from the rest, including support for expanded temperature ranges, the high core count, and its extended product life cycle, all vitally important to defense applications."*

—Denis Smetana, senior product manager,  
Curtiss-Wright Corporation

The threats facing today's defense and aerospace personnel are more diverse and sophisticated than ever. This has implications for the many systems and applications they use. Ruggedized components must perform in the harshest of environmental conditions and extreme temperature ranges. To help keep military assets and personnel safe from compromises, embedded defense electronics also need protection from physical attacks, remote data breaches, and hardware and software failures as well. This takes layers of advanced, integrated cybersecurity technologies, given the vast amounts of confidential data generated, stored, and transmitted at the tactical edge.

Designed with Intel® Xeon® D processor architecture, Curtiss-Wright's CHAMP-XD1 processor card is well suited for compute-intensive aerospace and defense applications, meeting the high performance, reliability, and security standards these industries require. A fully ruggedized, compact solution, the CHAMP-XD1 performs well in harsh environments, on aircraft, on ships, in submarines, or in transport vehicles.

### **Challenges: Delivering security, durability, and near-real-time edge computing wherever missions occur**

Processor cards offer expansive functionality and are foundational to today's defense systems and applications. In fact, use cases for processor cards are vast and growing, ranging from expanding memory and bandwidth to accelerating processing and embedding applications in existing computer systems. For aerospace and defense contractors, processor cards must withstand the high vibrations and extreme temperature ranges encountered on military jets, equipment, ships, and vehicles. Defense personnel also need these ruggedized solutions to support a range of data-intensive applications used in missions, including radar signal processing, signal intelligence, electronic defense systems, and sensor processing. To address the extensive range of issues military personnel encounter, tremendous processing power—enabled by several processing cores—is essential.



### Problem 1: Harsh environmental factors

Aerospace, industrial, defense, and naval operations often occur in extreme environmental conditions that require the processor card to maximize signal performance processing when impacted by shock, vibration, temperature, and humidity, and other elements.

### Problem 2: Need for compact servers to drive near-real-time edge computing

To fit into tiny spaces within transport vehicles, equipment, submarines, and fighter jets, processor cards need to be configured for the smallest of servers, with reduced size, weight, and power (SWaP). Yet, to perform the time-sensitive analytical tasks driving defense missions, these compact edge compute systems must transfer volumes of data from sensor devices to the CPU in near-real time.

### Problem 3: Security

System security is important to protecting today's defense operations from sophisticated remote and physical threats. And a cohesive security strategy requires more than individual hardware and software components. These components must integrate seamlessly and leverage one another to deliver the protection needed to fully secure defense systems, personnel, and equipment deployed at the edge.

## The solution: Curtiss-Wright Defense Solutions' CHAMP-XD1 processor card

Curtiss-Wright Defense Solutions delivers rugged, high-performance compute systems that are fully optimized for performance, safety, durability, and security. More than 80 years of continuous innovation has made Curtiss-Wright an industry leader in designing and manufacturing defense solutions that are strong, smart, fast and small.

Built on the leading-edge Intel Xeon D processor architecture, Curtiss-Wright's CHAMP-XD1 is a high-performance processor card designed for compute-intensive industrial, aerospace, and defense applications. Designed to meet the defense industry's performance standards for deployment on aircraft, land vehicles, submarines, ships, and equipment, the CHAMP-XD1 is embedded in multiple platforms.

#### Extended temperature range

Available in a variety of ruggedized configurations, the CHAMP-XD1 delivers optimal performance in the harshest of deployed environments, including air-cooled and conduction-cooled variants.<sup>1</sup> The board includes a core function FPGA for critical processes, a general-purpose I/O, and a dedicated Intelligent Platform Management Interface (IPMI) for system monitoring and health.

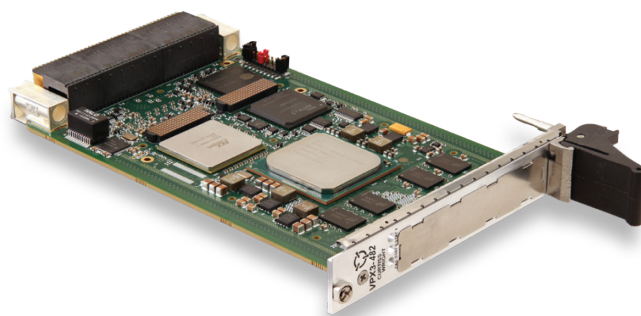


Figure 1: Curtiss-Wright CHAMP-XD1 processor card.

Equipped with Intel Xeon D processors featuring either 8 or 12 cores, the CHAMP-XD1 achieves a peak performance of 410 GFLOPS or 576 GFLOPS respectively. The CHAMP-XD1's performance is further enhanced with up to 32 GB of high capacity DDR4-2133 DRAM, which is embedded on each of the processor's two memory channels. In optimizing the high core count and floating-point performance of the Intel Xeon D processors, the CHAMP-XD1 delivers substantial memory bandwidth and optimizes the key performance features of the VITA 3U OpenVPX form factor.

## The Intel advantage: High-density computing with low power consumption

The Intel Xeon D processor delivers the performance, flexibility, and scale required to power high-density edge solutions. The processor's transformative architecture leverages the advanced functionality of the family of Intel® Xeon® processors in a system-on-a-chip (SoC) design that integrates essential network, security, and acceleration functions while minimizing power consumption.

A flexible, software-programmable platform, the Intel Xeon D processor supports robust virtualization with low latency and high bandwidth. As a result, the processor can power a breadth of solutions and service deployments in both space- and power-constrained environments.

The Intel Xeon D processor embedded in the CHAMP-XD1 offers a thermal design point range of 35 to 45 watts, making it well suited to perform with air- or conduction-cooled technology. The processor's high core counts and dual fused multiply adders (FMAs) provide rapid floating-point processing.

#### SoC design for single-socket high-performance computing

Intel Xeon D processors ensure workload-optimized performance in space- and power-constrained environments. These innovative SoC processors enable high-density, single-socket edge computing solutions to perform optimally. These processors are designed for the high processing demands of defense applications, including radar, signal intelligence, cyber security, and electro-optical/infra-red processing.

## Securing missions with a layered approach

For compute-intensive industrial, aerospace, and defense applications, the CHAMP-XD1 processor card provides additional trusted computing features, as well as leading-edge processing technology. Security features include:

- Intel® Trusted Execution Technology (Intel® TXT)
- Intel® Virtualization Technology (Intel® VT-x)
- Trusted Platform Module (TPM) 1.2
- UEFI Secure Boot
- Non-volatile memory sanitization
- TrustedCOTS Trusted Boot protections

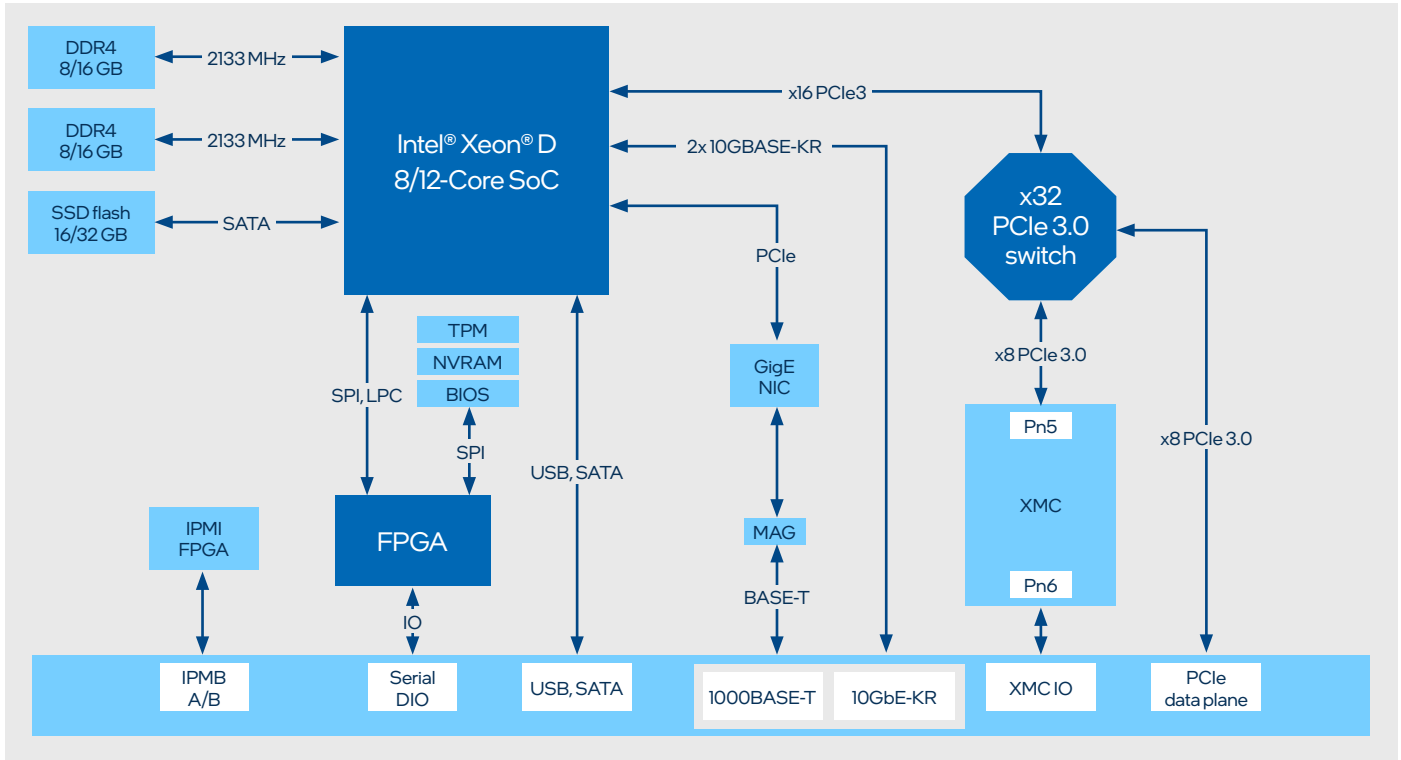


Figure 2: CHAMP-XD1 block diagram.

## Collaborating with Intel: A partnership dedicated to excellence

Curtiss-Wright collaborates with Intel engineers to better understand the processor’s design at a much deeper level and to optimize product performance. Additionally, Curtiss-Wright works with Intel to design security into its products, identifying vulnerabilities and validating and analyzing product reliability so technical issues can be preempted or promptly resolved.

*“The support we get from Intel is top notch. As a technology leader, Intel provides both the high performance processors and technical features we require. We’re looking forward to future Intel technologies, so we can take full advantage of their capabilities and grow our market share in the defense and aerospace markets.”*

—Denis Smetana, senior product manager

## Conclusion: Equipping our military for safety and success

The technologies powering defense platforms in the air, on the ground, and at sea are critical components of every mission. To help enable high computing platform performance, every module and subsystem across a military deployment’s infrastructure must perform reliably and securely in extreme temperatures and in harsh environments. Backed by Intel Xeon D processing technology, Curtiss-Wright’s CHAMP-XD1 processor card helps address the unique challenges facing aerospace, industrial, defense, and naval personnel today.

The Intel Xeon D SoC, with its high computing performance, advanced security, and extended temperature ranges, along with its flexible, ruggedized design, helps meet the ever-changing demands of military missions. Optimized for SWaP, the CHAMP-XD1, with the Intel Xeon D SoC, is ideally suited to drive the most data-intensive military applications at the edge, anywhere troops need to operate with precision and performance.

## Learn more

### Curtiss-Wright CHAMP-XD1

Built with Intel Xeon D processors, the CHAMP-XD1 processor card delivers high performance for AI applications, ruggedness for field deployments, and flexibility for customization.

[Learn more >](#)

### Intel Xeon D processors

Get great performance, memory bandwidth, and hardware-enabled security features to enable and enhance AI and IoT deployments.

[Learn more >](#)

### About Curtiss-Wright Corporation

Curtiss-Wright Corporation is an innovative global company that delivers highly engineered, critical-function products and services to the aerospace and defense markets, and to the commercial markets including power, process, and general industrial.

[curtiswright.com](http://curtiswright.com)



1. <https://www.curtiswrightds.com/products/computing/processors/>

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