

INTEL® XEON

ICE LAKE-D

Rugged Embedded
Computing Boards



EXTREME

ENGINEERING

SOLUTIONS

Extreme Engineering Solutions (X-ES) is a leader in the design, manufacture, and support of high-quality embedded computing solutions. X-ES products are trusted in compute-intensive military, communications, commercial, and industrial applications all over the world, providing unparalleled performance and reliability wherever they're needed.

Our product portfolio contains an array of solutions, including high-performance single board computers (SBCs), processor mezzanine modules, ruggedized chassis systems, FPGA modules, networking I/O modules, embedded routers, Ethernet switches, Solid-State Storage drives, and development chassis.

OUR MISSION:

To be the premier provider of mission-critical embedded products while delivering exceptional levels of customer and employee satisfaction.

X-ES HAS DECADES OF EXPERIENCE AS A TRUSTED PROVIDER OF RUGGED, EMBEDDED COMPUTING SOLUTIONS.

01

100% US-MADE

X-ES products are fully designed, configured, tested, and supported at our headquarters in Verona, WI, where we have built a dynamic team with wide-ranging expertise in embedded computing hardware and software.

02

SUPPORT GUARANTEE

We understand that your time is valuable and the harm that can come from unexpected downtime. Our four-hour support guarantee means you'll receive a rapid response from one of our talented Support Engineers to get your questions answered promptly.

03

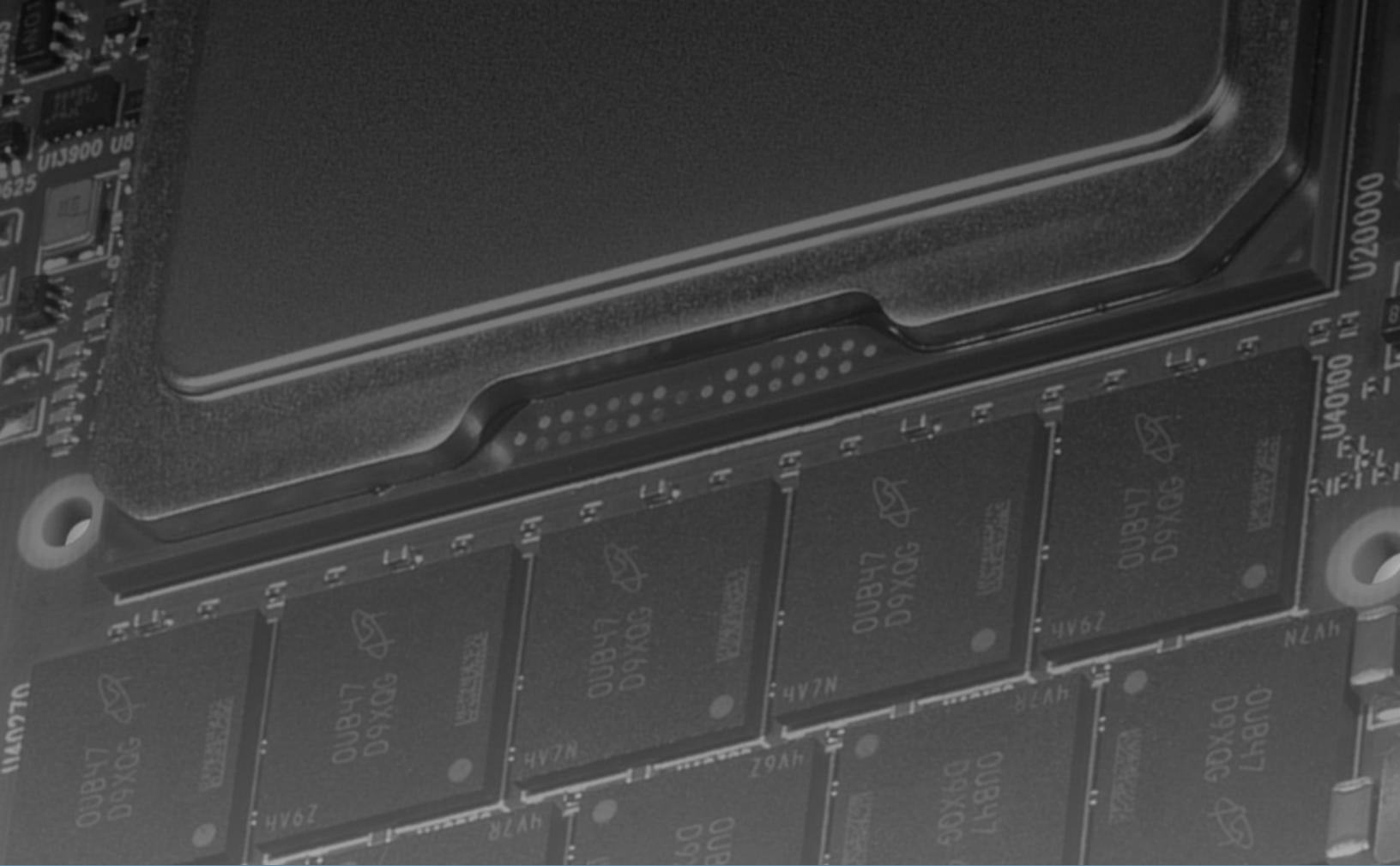
INTEL EXPERIENCE

Building on our extensive history with Intel® processor families, X-ES Ice Lake-D solutions provide next-generation performance paired with proven reliability and an unparalleled suite of features and capabilities.

04

CUSTOM ENGINEERING

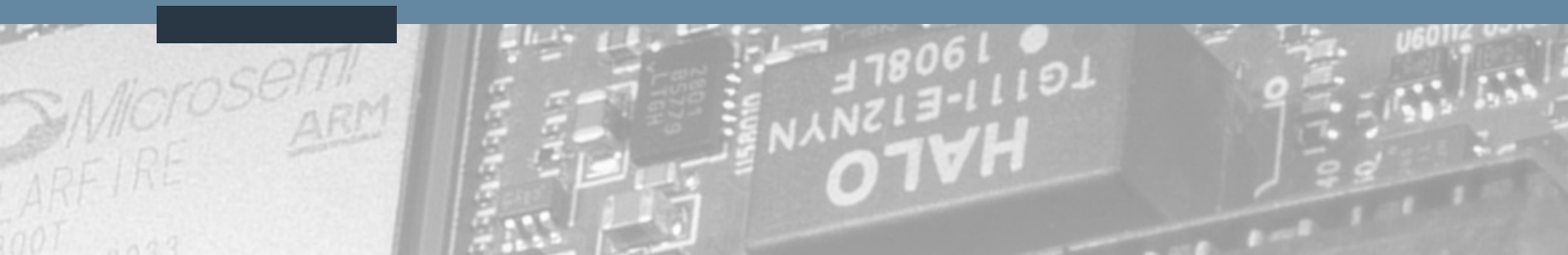
As a result of our reliable engineering and manufacturing practices and methodologies, X-ES has a proven track record of delivering cost-effective custom or derivative product designs that meet our customers' typically aggressive schedules.

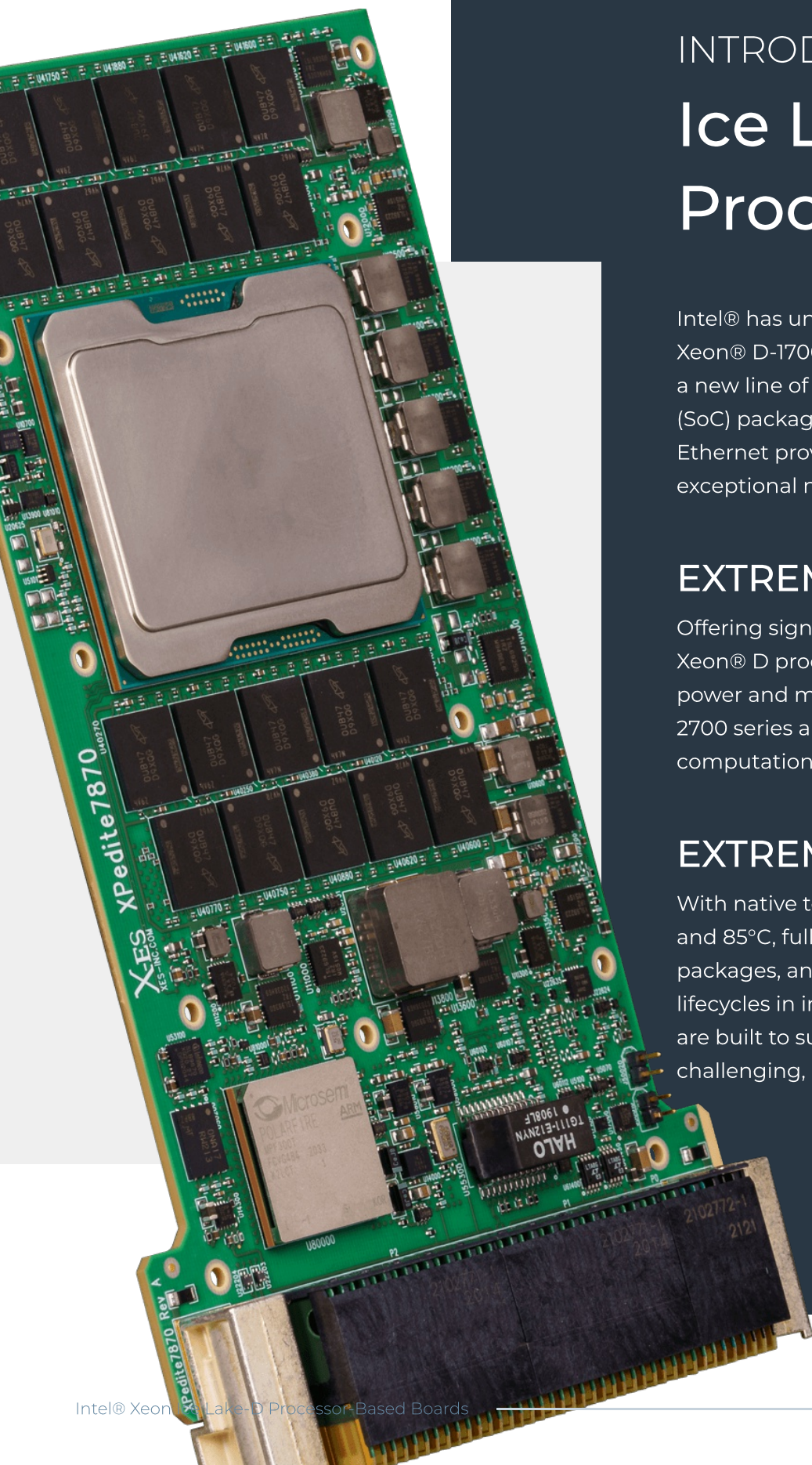


01

Ice Lake-D Introduction

X-ES is proud to be at the forefront of the latest advancements in computing performance and rugged reliability for a range of embedded applications.





INTRODUCING Ice Lake-D Processors

Intel® has unveiled their eagerly awaited Xeon® D-1700 and D-2700 series processors: a new line of power-efficient System-on-Chip (SoC) packages with integrated 40 Gigabit Ethernet providing incredible speed and exceptional networking performance.

EXTREME POWER

Offering significant improvements over existing Xeon® D processors in terms of sheer processing power and memory density, the D-1700 and D-2700 series allows for dynamic solutions ideal for computationally heavy applications.

EXTREME DURABILITY

With native temperature support between -40°C and 85°C, fully solderable, high-density BGA packages, and a high-reliability design for long lifecycles in industrial systems, these processors are built to support rugged applications in more challenging, diverse conditions than ever before.

PROCESSOR

Low Core Count (LCC)

X-ES processor boards featuring the Intel® Xeon® D-1700 series processor offer optimized computing performance with up to 10 processor cores and up to 48 GB of DDR4 memory in three channels all in one, power-efficient package.

In addition to highly capable 40 Gigabit Ethernet and dual 10 Gigabit Ethernet, X-ES' LCC processor-based boards provide an XMC site for expansion and Microsemi PolarFire FPGA for hosting custom functions - ideal when stringent security capabilities are required.

Native extended temperature support from -40°C to 85°C allows embedded applications utilizing these Intel® Xeon® D processors to excel in thermally challenging environments.



3

MEMORY CHANNELS

10

PROCESSOR CORES

85°

MAX. OPERATING TEMP (C)

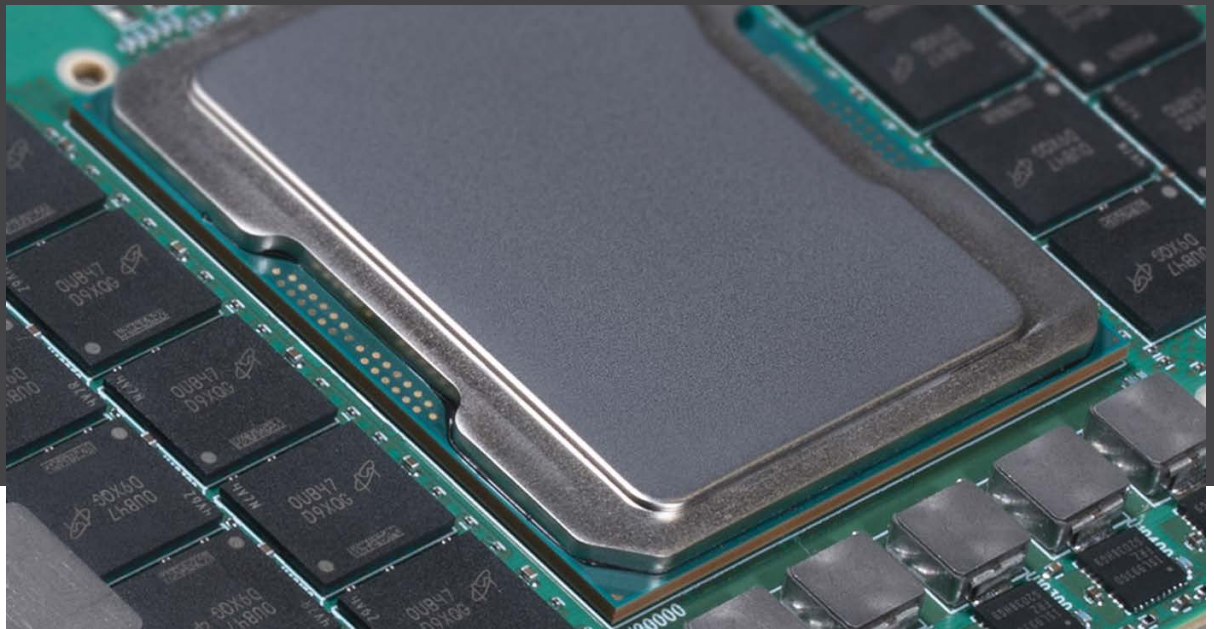
PROCESSOR

High Core Count (HCC)

The X-ES line of Intel® Xeon® D-2700 series processor-based boards provide maximum computing power with up to 20 cores for high-performance networking.

Supercharge compact, deployable systems with 3U VPX single board computers offering the full capability provided by the HCC processors, with dual 40 Gigabit Ethernet ports and up to 64 GB of DDR4 memory in four channels.

Integrated SecureCOTS™ technology is available with the Microsemi PolarFire FPGA. Native extended temperature support from -40°C to 85°C allows embedded applications utilizing these Intel® Xeon® D processors to excel in thermally challenging environments.



4

MEMORY CHANNELS

20

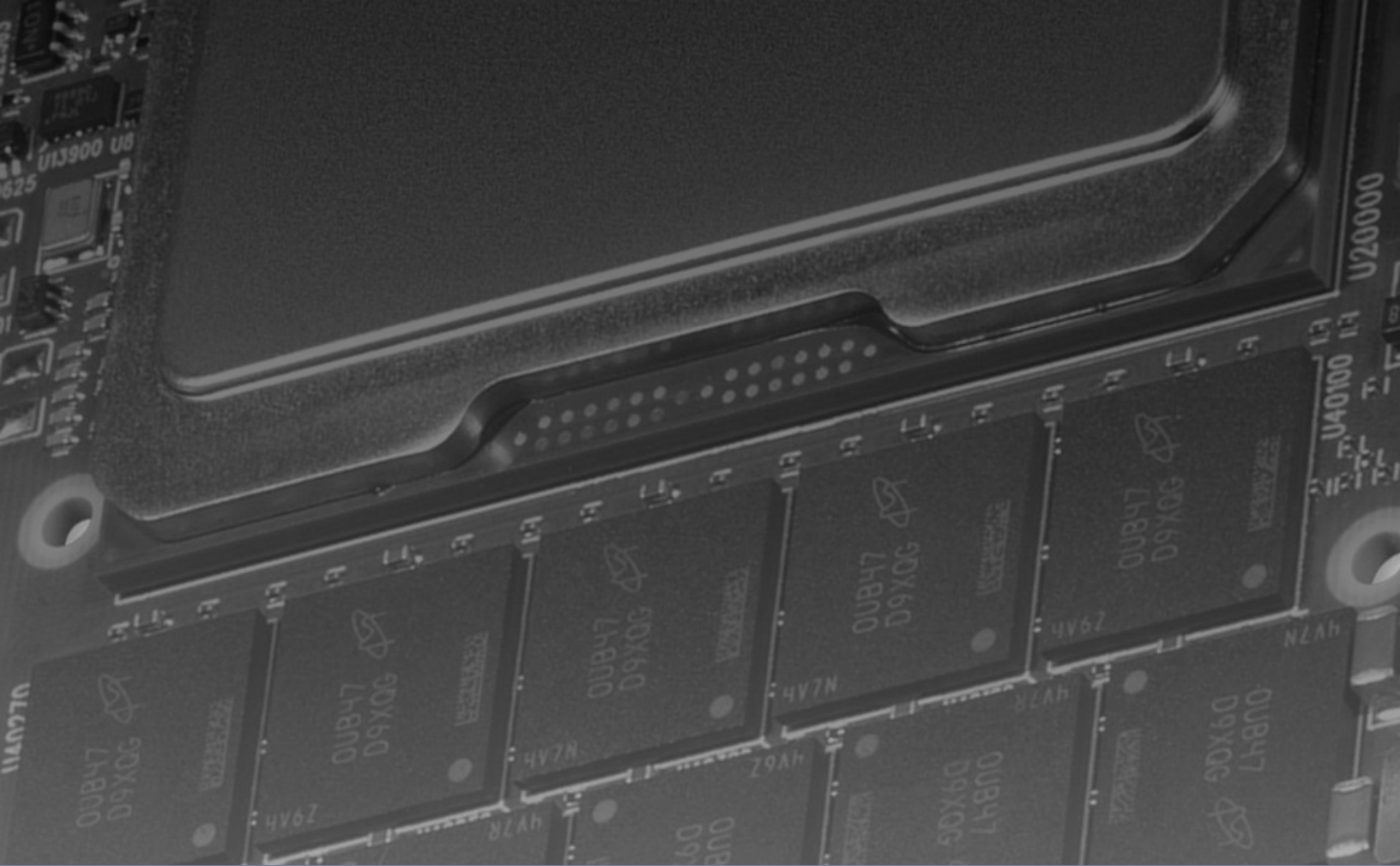
PROCESSOR CORES

85°

MAX. OPERATING TEMP (C)

Fully ruggedized, purpose-built solutions designed to withstand the rigorous demands of deployable, mission-critical applications.





02

Advanced Features

Building on the capabilities of the previous generation of Xeon® D processors, Ice Lake-D processors extend performance and reliability to a whole new level.





NATIVE

Extended Temperature

Fully operational ranging from lows of -40°C to the extreme heat of 85°C, these conduction-cooled products can be deployed almost anywhere and don't let up even under prolonged exposure to thermally severe conditions.

X-ES engineers thoroughly evaluate performance with a variety of tests at constant temperatures, cycling temperatures, and shock temperatures.

Building the most advanced, rugged embedded computing boards and systems is at the core of X-ES' identity and our Intel® Xeon Ice Lake-D processor-based boards are no exception.

The Ice Lake-D line features soldered-down, high-density BGA packages for enhanced shock and vibration protection, a level of durability verified through our typically rigorous qualification testing and environmental stress screening (ESS).

Using industrial-grade parts for long product life cycles, these products are ready to support the toughest missions in the roughest conditions for years to come.

EXTREME Ruggedization

Soldered Memory

Highly optimized memory layout supports industry standard, extended temperature, DRAM components with long life cycle support

Extended Temp.

Native operating temperature support for -40°C to 85°C

40 GbE Networking

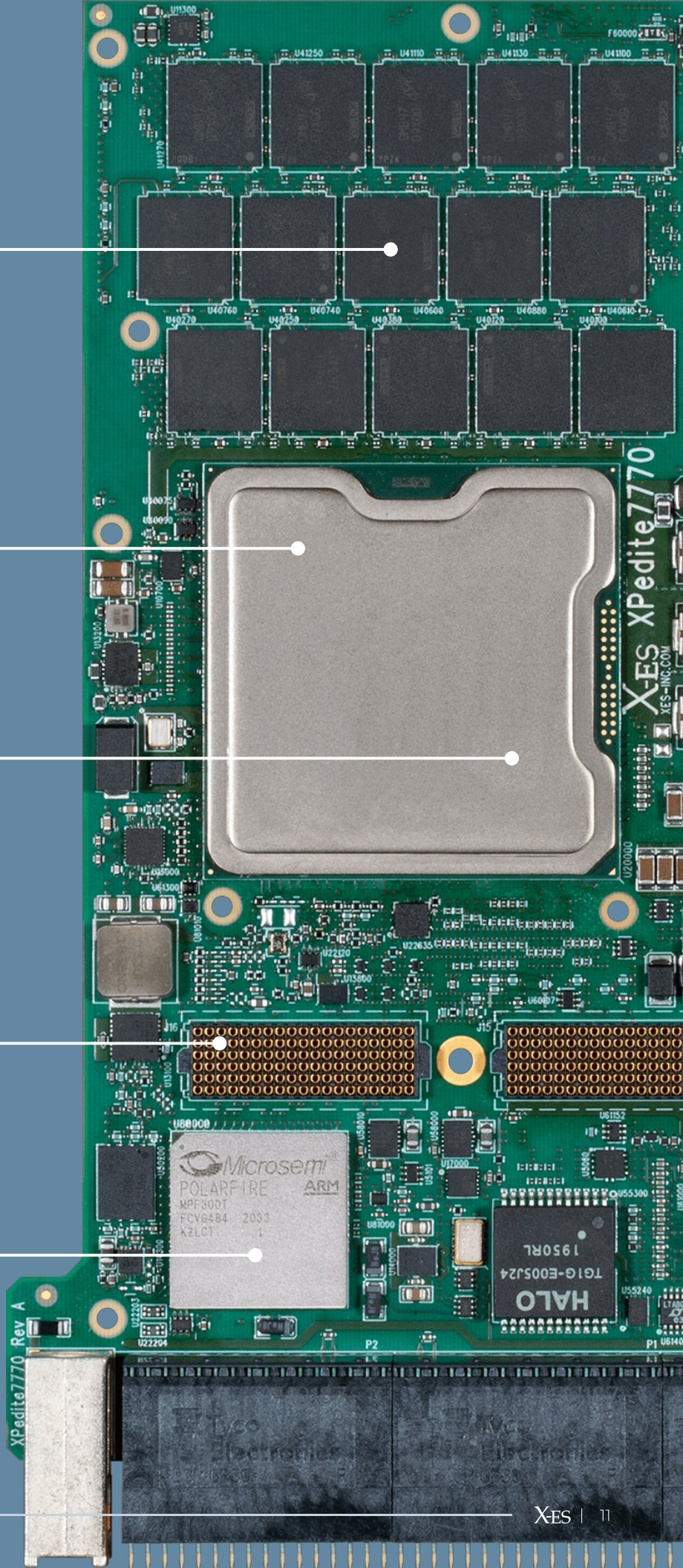
Integrated 40 Gigabit Ethernet connectivity for incredible speed and throughput

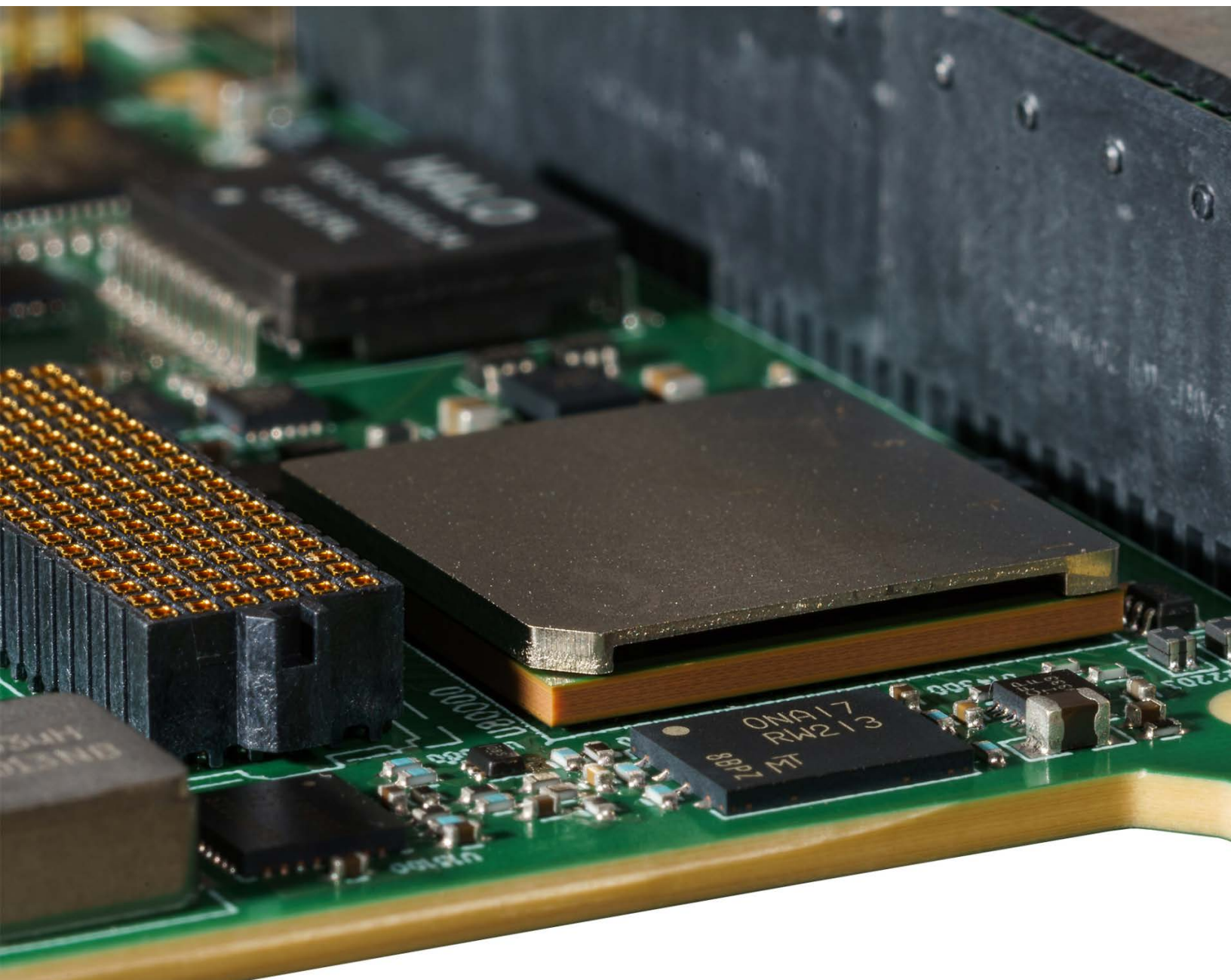
XMC Site

Extend system functionality with highly configurable hosted mezzanine modules

Security FPGA

Integrated SecureCOTS™ technology to protect sensitive data from being modified or observed





XMC Site

X-ES offers a competitive advantage with XMC site availability to extend system functionality beyond these new products' already-formidable offerings.

With highly configurable expansion capabilities and remarkable I/O throughput, optional XMC capabilities offer tremendous growth potential for the systems they're integrated with.

PolarFire Security FPGA

Our Intel® Ice Lake-D processor boards use the enhanced security features offered by Microsemi® PolarFire™ FPGAs to support our SecureCOTS™ framework.

Offering the lowest power at mid-range densities in the industry, PolarFire™ FPGAs are tightly coupled to the CPU and boost the products' ability to resist, detect, record, and respond to potential attacks.



MAXIMIZE NETWORKING PERFORMANCE

HIGHLY CONFIGURABLE ETHERNET OPTIONS

LAYER 2 SWITCHING FOR 40 GIGABIT ETHERNET

3U VPX ETHERNET SWITCH XChange3030

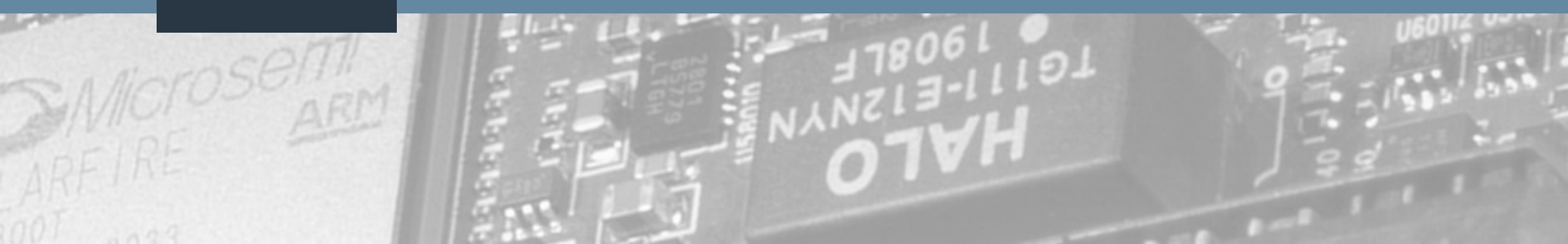
The increased networking capabilities of the Intel® Xeon® D-1700 and D-2700 series processors demand new, more capable switches — X-ES is ready to deliver with the XChange3030.

The XChange3030 is a conduction-cooled 3U VPX Ethernet switch module providing six backplane 40GBASE-KR4 Ethernet ports, six backplane 10GBASE-KR Ethernet ports, two backplane 10GBASE-T Ethernet ports, and one front panel optical Ethernet port.

The 40GBASE-KR4 Ethernet ports may optionally be configured as 24 10GBASE-KR Ethernet ports.

The XChange3030 delivers full wire-speed across all of its ports and supports jumbo packets up to 12 kB. It also supports IPv6, Energy Efficient Ethernet™ (EEE), and a comprehensive set of IETF RFCs and IEEE protocols.

As a fully managed Layer 2 switch, the XChange3030 has support for features such as VLANs (IEEE 802.1Q), LACP, STP, RSTP, PVRST+ MSTP, SNMP, flow control, port mirroring, port authentication (IEEE 802.1x), Quality of Service (QoS), ACL, IGMP, MLD, LLDP, and static routing.



Available Boards

Choose from a wide selection of industry-standard form factors paired with an Intel® Ice Lake-D LCC or HCC processor to provide best-in-class performance.



FORM Factors

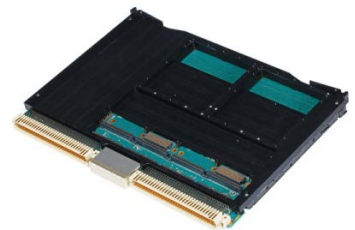
X-ES has integrated Intel® Xeon® D-1700 (LCC) and D-2700 (HCC) series processors into single board computers and mezzanine modules across a variety of standard form factors. You can also reach out to our expert engineering team to develop custom solutions tailored to your program's specific needs.



3U VPX
LCC • HCC



6U VPX
LCC • HCC



6U VME
LCC



6U cPCI
LCC



COM EXPRESS
LCC



COMING SOON

ATX
HCC

3U VPX

XPedite7770

The XPedite7770 is a secure, high-performance, 3U VPX-REDI, single board computer based on the Intel® Xeon® D-1700 series of processors.

It supports up to 48 GB of DDR4 ECC SDRAM in three channels, 40 Gigabit Ethernet, and SecureCOTS™ technology with a Microsemi® PolarFire™ FPGA.

The XPedite7770 is an optimal choice for computationally heavy applications requiring maximum data and information protection.



PROCESSOR

Intel® Xeon® D-1700 series (formerly Ice Lake-D) processor
Up to 10 Xeon®-class cores in a single, power-efficient SoC package
SKUs available with native extended temperature support

MEMORY

48 GB of DDR4 ECC SDRAM in three channels
32 GB of SLC NAND flash
64 MB NOR boot flash
64 kB EEPROM

SECURITY AND MANAGEMENT

Microsemi® PolarFire™ FPGA with 128 MB SPI flash
Designed with SecureCOTS™ technology to support enhanced security and trusted computing
System voltage monitor, power-on/reset control, non-volatile write-protection control
Trusted Platform Module (TPM)

VPX (VITA 46) P0 I/O

Two IPMB connections to an IPMI Controller

VPX (VITA 46) P1 I/O

One 40GBASE-KR4 Ethernet port to P1.A
One x4 PCI Express Gen3-capable interface to P1.B
XMC P16 I/O, mapping P1w9-X12d per VITA 46.9
One 10GBASE-KR Ethernet port
One 10GBASE-KR Ethernet port (optional)

VPX (VITA 46) P2 I/O

One 10/100/1000BASE-T Ethernet port
One x4 PCI Express Gen3-capable interface
One x4 PCI Express Gen2-capable interface
Two x2 PCI Express Gen2-capable interfaces
Two USB 2.0 ports
Two RS-232/422/485 serial ports
Four single-ended FPGA GPIOs

XMC SITE

One x8 PCI Express Gen3-capable interface

3U VPX

XPedite7870

The XPedite7870 is a secure, high-performance, 3U VPX-REDI, single board computer based on the Intel® Xeon® D-2700 series of processors.

It supports up to 64 GB of DDR4 ECC SDRAM in four channels, dual 40 Gigabit Ethernet, and SecureCOTS™ technology with a Microsemi® PolarFire™ FPGA.

The XPedite7870 is an optimal choice for computationally heavy applications requiring maximum data and information protection.



PROCESSOR

Intel® Xeon® D-2700 series (formerly Ice Lake-D) processor
Up to 20 Xeon®-class cores in a single, power-efficient SoC package
SKUs available with native extended temperature support

MEMORY

64 GB of DDR4 ECC SDRAM in four channels
32 GB of SLC NAND flash
64 MB NOR boot flash
64 kB EEPROM

SECURITY AND MANAGEMENT

Microsemi® PolarFire™ FPGA with 128 MB SPI flash
Designed with SecureCOTS™ technology to support enhanced security and trusted computing
System voltage monitor, power-on/reset control, non-volatile write-protection control
Trusted Platform Module (TPM)

VPX (VITA 46) P1 I/O

Two 40GBASE-KR4 ports to P1.A and P1.B
One x4 PCI Express Gen3-capable interface to P1.C

VPX (VITA 46) P2 I/O

One 10/100/1000BASE-T Ethernet port
One x4 PCI Express Gen3-capable interface
One x4 PCI Express Gen2-capable interface
Two x2 PCI Express Gen2-capable interfaces
Two USB 2.0 ports
Two RS-232/422/485 serial ports
Four single-ended FPGA GPIOs

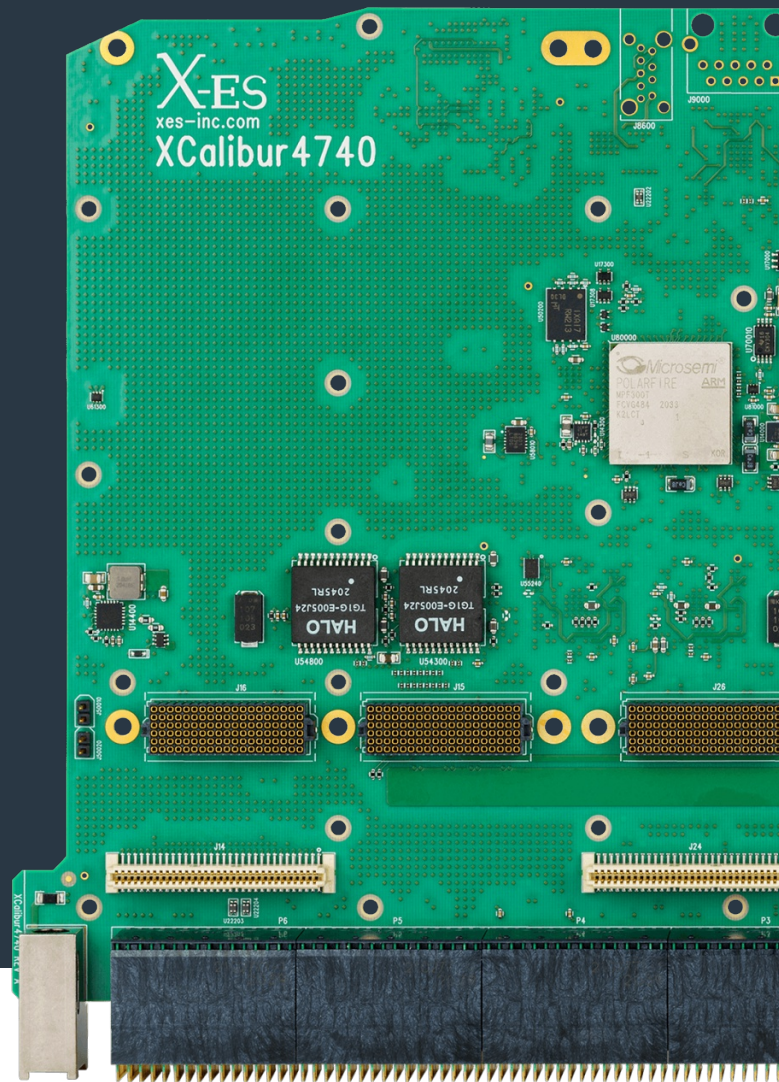
6U VPX

XCalibur4740

The XCalibur4740 is a secure, high-performance, 6U VPX-REDI, single board computer based on the Intel® Xeon® D-1700 series (formerly Ice Lake-D) of processors.

The XCalibur4740 provides incredible speed with two 40GBASE-KR4, two 1000BASE-X, and two 10/100/1000BASE-T Ethernet ports.

The XCalibur4740 is an optimal choice for computationally heavy applications requiring maximum data protection.



PROCESSOR

Intel® Xeon® D-1700 series (formerly Ice Lake-D) processor
Up to 10 Xeon®-class cores in a single, power-efficient SoC package
SKUs available with native extended temperature support

MEMORY

48 GB of DDR4 ECC SDRAM in three channels
32 GB of SLC NAND flash
64 MB NOR boot flash
64 kB EEPROM

SECURITY AND MANAGEMENT

Microsemi® PolarFire™ FPGA with 128 MB SPI flash
Designed with SecureCOTS™ technology to support enhanced security and trusted computing
System voltage monitor, power-on/reset control, non-volatile write-protection control
Trusted Platform Module (TPM)

VPX (VITA 46) P0 I/O

Two IPMB connections to an IPMI Controller (IPMC)

VPX (VITA 46) P1 I/O

Two 40GBASE-KR4 Ethernet ports to P1.A and P1.B
Two general-purpose interrupts

VPX (VITA 46) P2 I/O

One x8 PCI Express Gen2-capable interface

VPX (VITA 46) P3 I/O

Build option for PMC P24 I/O per VITA 46.9 P64s, or XMC P26 I/O per VITA 46.9 X38s

VPX (VITA 46) P4 I/O

XMC P26 I/O per VITA 46.9 x12d+x8d
Two 10/100/1000BASE-T, two 1000BASE-X Ethernet ports
Six single-ended FPGA GPIOs

VPX (VITA 46) P5 I/O

Two RS-232/422/485 serial ports
Build option for PMC P14 I/O per VITA 46.9 P64s, or XMC P16 I/O per VITA 46.9 X38s

VPX (VITA 46) P6 I/O

XMC P16 I/O per VITA 46 x12d+x8d
Two USB 2.0 ports
One x4 PCI Express Gen2-capable interface

XMC

x8 PCI Express Gen3-capable port to J15 and J25
Pn6 I/O to VPX connectors per VITA 46.9 X8d+x12d
Build option for Pn6 I/O to VPX connectors, per VITA 46.9 X38s

PRPMC

Build option for Pn4 I/O to VPX connectors per VITA 46.9 P64s

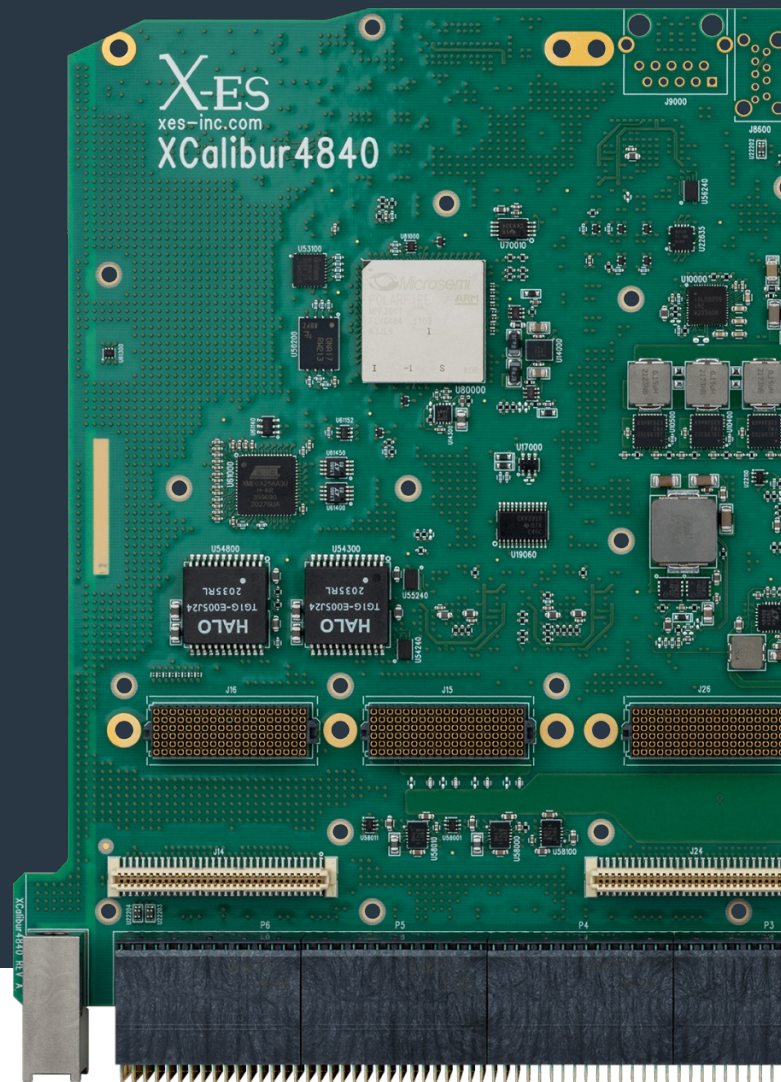
6U VPX

XCalibur4840

The XCalibur4840 is a secure, high-performance, 6U VPX-REDI, single board computer based on the Intel® Xeon® D-2700 series (formerly Ice Lake-D) of processors.

The XCalibur4840 provides incredible speed with two 40GBASE-KR4, two 1000BASE-X, and two 10/100/1000BASE-T Ethernet ports.

The XCalibur4840 is an optimal choice for computationally heavy applications requiring maximum data protection.



PROCESSOR

Intel® Xeon® D-2700 series (formerly Ice Lake-D) processor
Up to 20 Xeon®-class cores in a single, power-efficient SoC package
SKUs available with native extended temperature support

MEMORY

64 GB of DDR4 ECC SDRAM in four channels
32 GB of SLC NAND flash
64 MB NOR boot flash
64 kB EEPROM

SECURITY AND MANAGEMENT

Microsemi® PolarFire™ FPGA with 128 MB SPI flash
Designed with SecureCOTS™ technology to support enhanced security and trusted computing
System voltage monitor, power-on/reset control, non-volatile write-protection control
Trusted Platform Module (TPM)

VPX (VITA 46) P0 I/O

Two IPMB connections to an IPMI Controller (IPMC)

VPX (VITA 46) P1 I/O

Two 40GBASE-KR4 Ethernet ports to P1.A and P1.B
Two general-purpose interrupts

VPX (VITA 46) P2 I/O

One x16 PCI Express Gen3-capable interface

VPX (VITA 46) P3 I/O

Build option for PMC P24 I/O per VITA 46.9 P64s, or XMC P26 I/O per VITA 46.9 X38s

VPX (VITA 46) P4 I/O

XMC P26 I/O per VITA 46.9 x12d+x8d
Two 1000BASE-T, two 1000BASE-X Ethernet ports
Eight single-ended FPGA GPIOs

VPX (VITA 46) P5 I/O

Two RS-232/422/485 serial ports
Build option for PMC P14 I/O per VITA 46.9 P64s, or XMC P16 I/O per VITA 46.9 X38s

VPX (VITA 46) P6 I/O

XMC P16 I/O per VITA 46 x12d+x8d
Two USB 2.0 ports
One x4 PCI Express Gen2-capable interface

XMC

x8 PCI Express Gen3-capable port to J15 and J25
Pn6 I/O to VPX connectors per VITA 46.9 X8d+X12d
Build option for Pn6 I/O to VPX connectors, per VITA 46.9 X38s

PRPMC

Build option for Pn4 I/O to VPX connectors per VITA 46.9 P64s

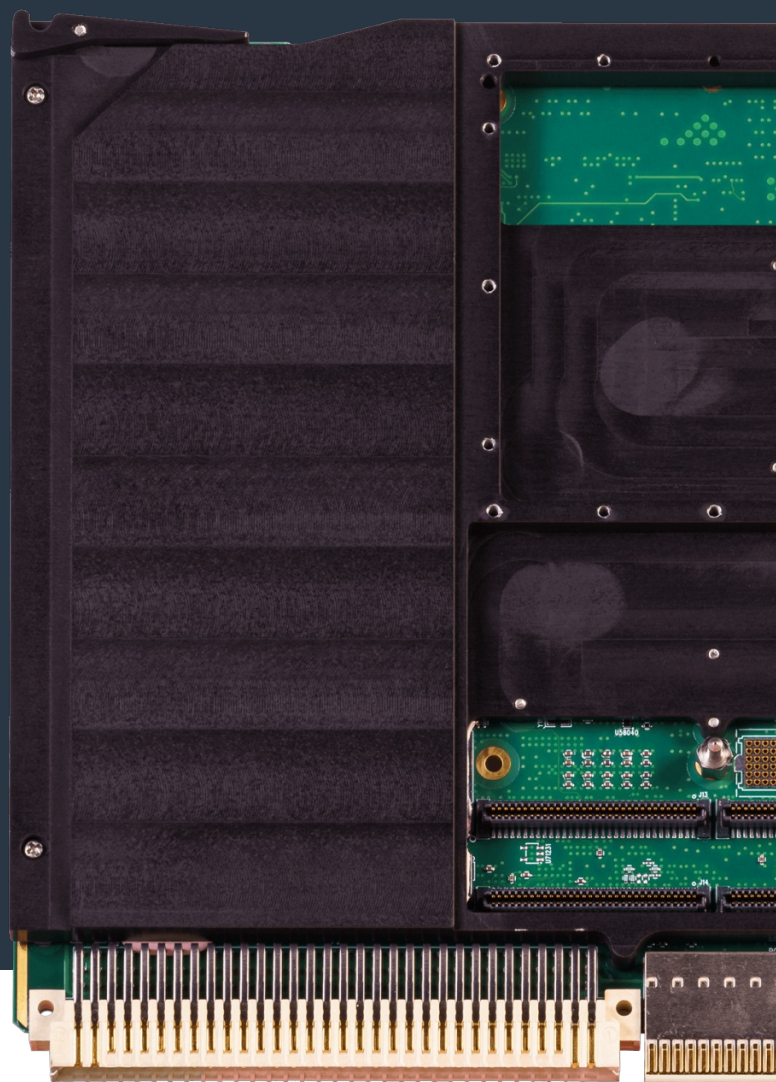
6U VME

XCalibur4730

The XCalibur4730 is a secure, high-performance, 6U VME, single board computer based on the Intel® Xeon® D-1700 series (formerly Ice Lake-D) of processors.

In addition to providing three 10/100/1000BASE-T Ethernet ports, XCalibur4730 accommodates up to 48 GB of DDR4 ECC SDRAM in three channels and up to 32 GB of onboard SLC NAND flash.

The XCalibur4730 is an optimal choice for computationally heavy applications requiring maximum data protection.



PROCESSOR

Intel® Xeon® D-1700 series (formerly Ice Lake-D) processor
Up to 10 Xeon®-class cores in a single, power-efficient SoC package
SKUs available with native extended temperature support

MEMORY

48 GB of DDR4 ECC SDRAM in three channels
32 GB of SLC NAND flash
64 MB NOR boot flash
64 kB EEPROM

SECURITY AND MANAGEMENT

Microsemi® PolarFire™ FPGA with 128 MB SPI flash
Designed with SecureCOTS™ technology to support enhanced security and trusted computing
System voltage monitor, power-on/reset control, non-volatile write-protection control
Trusted Platform Module (TPM)

VME

VME64 (VITA 1-1994 R2002)
VME64x (VITA 1.1-1997 R2003)
2eSST (VITA 1.5-2003)
Ethernet on VME64x (VITA 31.1-2003)
PMC I/O on VME (VITA 35-2000)

XMC

x8 PCI Express Gen3-capable interface to J15 and J25

FRONT PANEL I/O (OPTIONAL)

Two 10/100/1000BASE-T Ethernet ports
One USB 3.0 port
One USB 2.0 port for USB-to-UART
General-purpose LEDs

REAR PANEL I/O

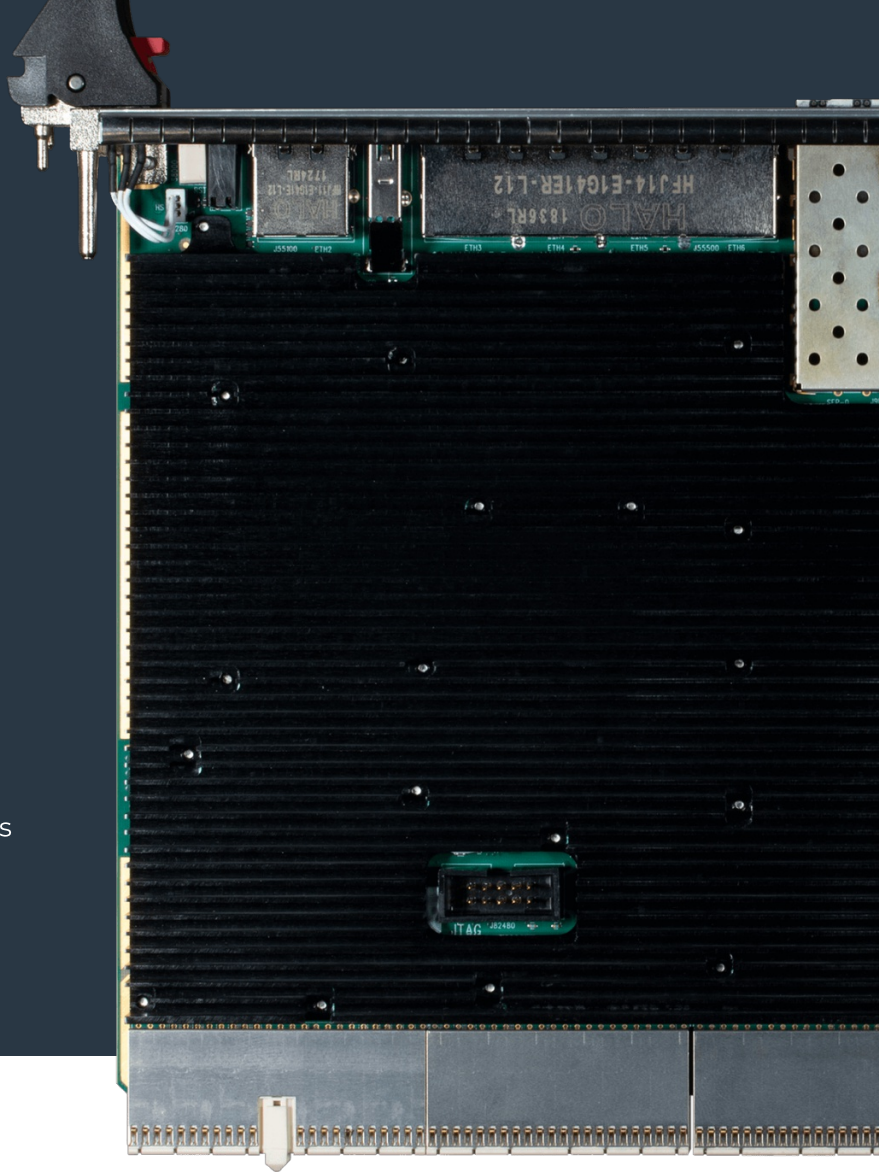
Three 10/100/1000BASE-T Ethernet ports
Two USB 2.0 ports
Two RS-232/422/485 serial ports
PMC I/O

6U cPCI

XCalibur4702

The XCalibur4702 is a high-performance 6U CompactPCI single board computer based on the Intel® Xeon® D-1700 series (formerly Ice Lake-D) of processors.

With support for up to 48 GB of DDR4 ECC SDRAM in three separate channels, numerous I/O ports, a Microsemi® PolarFire™ FPGA, one XMC/PrPMC slot, and up to 32 GB of SLC NAND flash, XCalibur4702 is ideal for ruggedized systems requiring high-bandwidth processing and low power consumption.



PROCESSOR

Intel® Xeon® D-1700 series (formerly Ice Lake-D) processor
Up to 10 Xeon®-class cores in a single, power-efficient SoC package
SKUs available with native extended temperature support

MEMORY

48 GB of DDR4 ECC SDRAM in three channels
32 GB of SLC NAND flash
64 MB NOR boot flash
64 kB EEPROM

SECURITY AND MANAGEMENT

Microsemi® PolarFire™ FPGA with 128 MB SPI flash
Designed with SecureCOTS™ technology to support enhanced security and trusted computing
System voltage monitor, power-on/reset control, non-volatile write-protection control
Trusted Platform Module (TPM)

cPCI

PICMG 2.3 (PMC I/O to P3 and P5)
PICMG 2.9 (dedicated IPMI controller)
PICMG 2.16 (two 10/100/1000BASE-T Ethernet ports)

XMC (VITA 42.3)

x8 PCI Express Gen3-capable

FRONT PANEL I/O

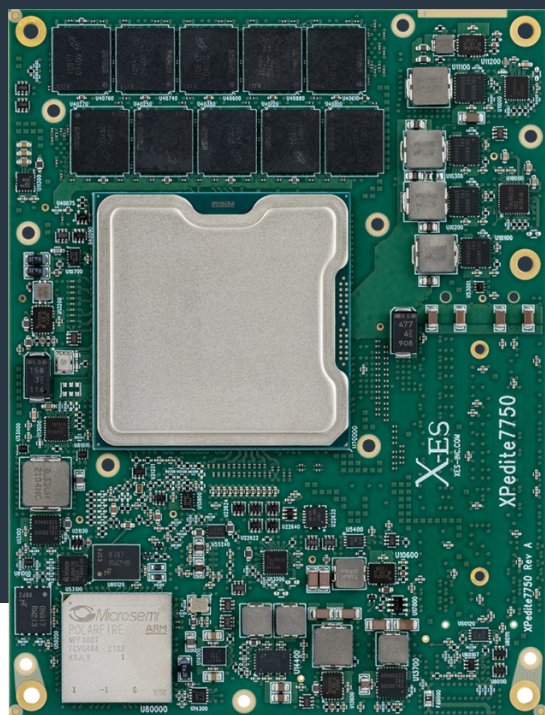
Five 10/100/1000BASE-T Ethernet ports
One USB 2.0 port
General-purpose LEDs
Two SFP+ cages

REAR PANEL I/O

Two 10/100/1000BASE-T Ethernet ports
Two USB 2.0 ports
Two RS-232/422/485 serial ports
3.3 V GPIO signals
PMC I/O

COM EXPRESS

XPedite7750



The XPedite7750 is an enhanced, Type 7 COM Express® module based on the Intel® Xeon® D-1700 series (formerly Ice Lake-D) of processors.

It accommodates up to 32 GB of DDR4-2133 ECC SDRAM in two channels to support memory-intensive applications, as well as four 10GBASE-KR Ethernet ports.

The small footprint and standards-based form factor make the XPedite7750 perfect for portable and rugged environments, while providing an upgrade path for the future.

PROCESSOR

Intel® Xeon® D-1700 series (formerly Ice Lake-D) processors
Up to 10 Xeon®-class cores in a single, power-efficient SoC package
SKUs available with native extended temperature support

MEMORY

Up to 32 GB of DDR4 ECC SDRAM in two channels
Up to 32 GB of SLC NAND flash
32 MB NOR boot flash
64 kB EEPROM

COM EXPRESS®

Basic form factor (95 mm x 125 mm)
Enhanced Type 7 pinout
Adds non-volatile write protect
Adds two external interrupts
Adds boot flash select

ADDITIONAL FEATURES

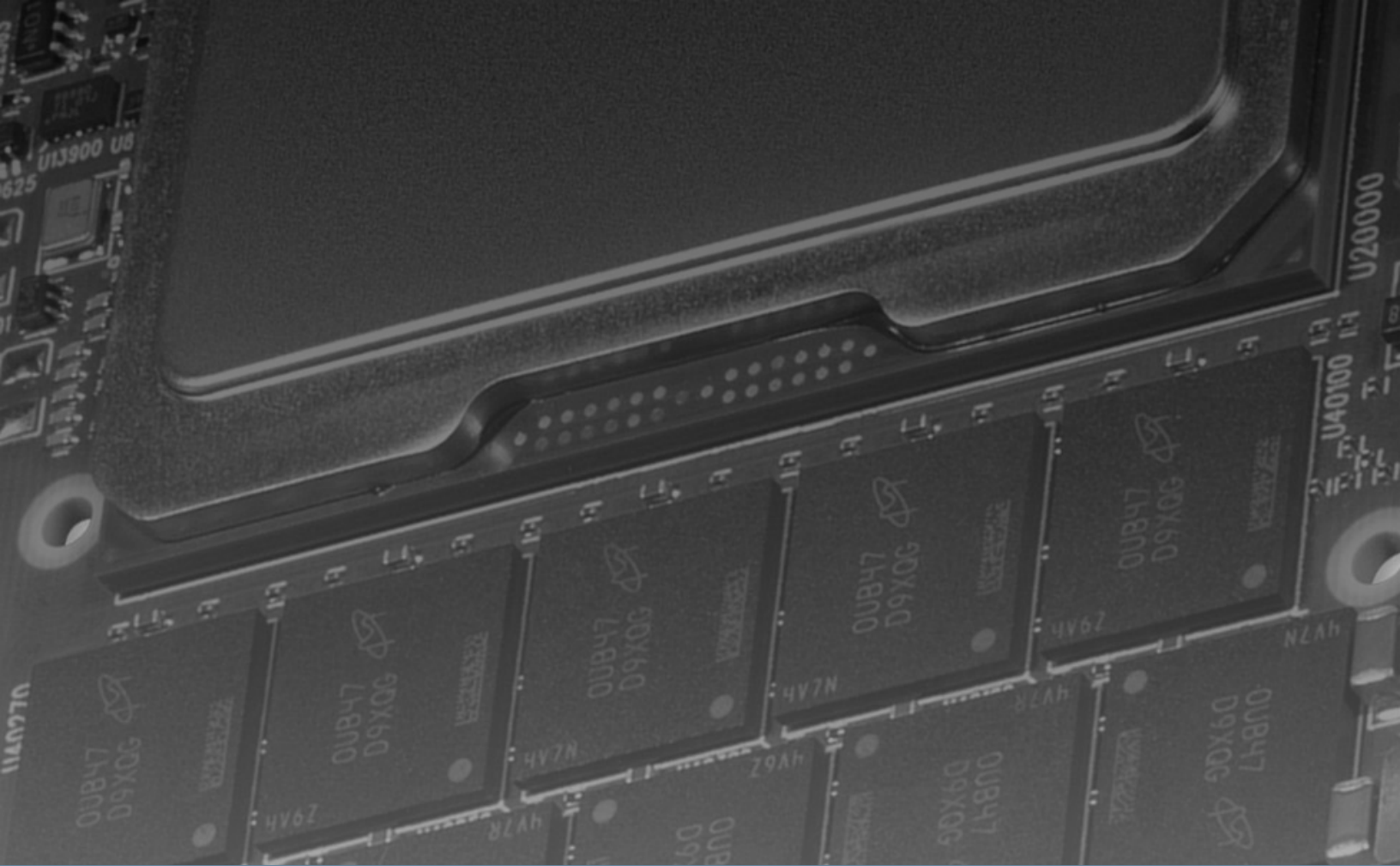
Non-volatile memory write protection
Trusted Platform Module (TPM)

RUGGEDIZATION AND RELIABILITY

Class III PCB fabrication and assembly
Soldered DDR4 ECC SDRAM
Tin whisker mitigation
Designed and tested for extended solder joint reliability
Additional mounting holes for rugged and conduction-cooled environments
BIT support

INTERFACE

Four USB 3.0 ports
Four 10GBASE-KR Ethernet ports with optional management sideband signals (availability dependent on firmware and drivers); can be configured as one 40GBASE-KR4 Ethernet port
One 10/100/1000BASE-T Ethernet port
One x16 PCI Express Gen3-capable interface
Two x8 PCI Express Gen2-capable interfaces
Two LVTTTL serial ports
Four GPI and four GPO pins



04

Product Line Overview

X-ES' highly capable Intel® Ice Lake-D processor-based solutions provide an unparalleled suite of features on a high-performance, ruggedized board for trusted reliability.



AVAILABLE

Intel® Ice Lake-D Products

Low Core Count Processor-Based Boards



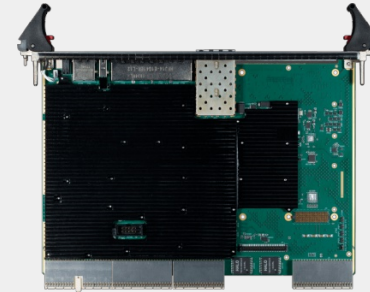
XPedite7770
3U VPX



XCalibur4740
6U VPX



XCalibur4730
6U VME



XCalibur4702
6U cPCI



XPedite7750
COM EXPRESS

High Core Count Processor-Based Boards



XPedite7870
3U VPX



XCalibur4840
6U VPX



EXTREME ENGINEERING SOLUTIONS

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