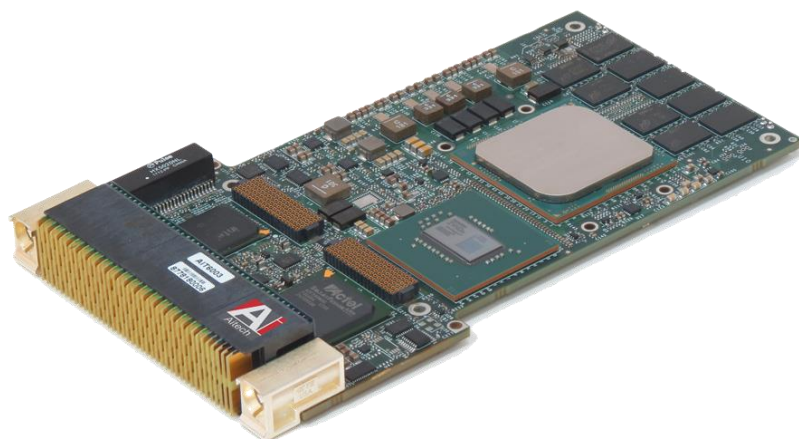


# U-C8770 | 3U VPX SBC

Intel® Xeon® D with Security & Zynq UltraScale+



*U-C8770 is based on our award-winning C877 SBC, and is aligned with the **Open Group SOSA™** technical standard*

- Rugged 3U VPX Single-Slot SBC
- Aligned with the SOSA™ standard
  - ▶ Supports I/O Intensive SBC slot profile
  - ▶ Both PCIe x4 and 40GE data plane options
  - ▶ PCIe x4 expansion plane
- Intel Xeon-D 1500 series CPU with up to 16 cores/32 threads
- Up to 32 GB DDR4 w/ECC @ 2133 MT/s
- Up to 1 TB On-Board SATA SSD, with Encryption, Quick Erase, and Secure Erase
- AiSecure™ Cyber Security Framework
- Xilinx UltraScale+ FPGA w/ARM CPU
  - ▶ Custom I/O and Security Features
  - ▶ PCIe x8 Gen3 Link to Xeon CPU
  - ▶ 40GE data plane via optional FPGA IP core
- XMC Slot w/PCIe x8 Gen3
  - ▶ P1w9-X12d+X16s+X8d XMC I/O mapping
- Versatile Board I/O
  - ▶ USB 3.0 & 2.0
  - ▶ Serial
  - ▶ 1GE
  - ▶ SATA III
  - ▶ Discrete
  - ▶ 10GE
- WWDT, ETR, RTC, Temp. Sensors
- IPMI, VITA 46.11 Tier 1 & Tier 2 Support
- Windows®, Linux®, VxWorks® Support
- 2LM Option per VITA 48.2
- Conduction and Air-Cooled Versions
- Vibration and Shock Resistant

**SOSA™**  
Sensor Open Systems Architecture

MEMBER

PRELIMINARY



[www.aitechsystems.com](http://www.aitechsystems.com)

# U-C8770 | 3U VPX SBC

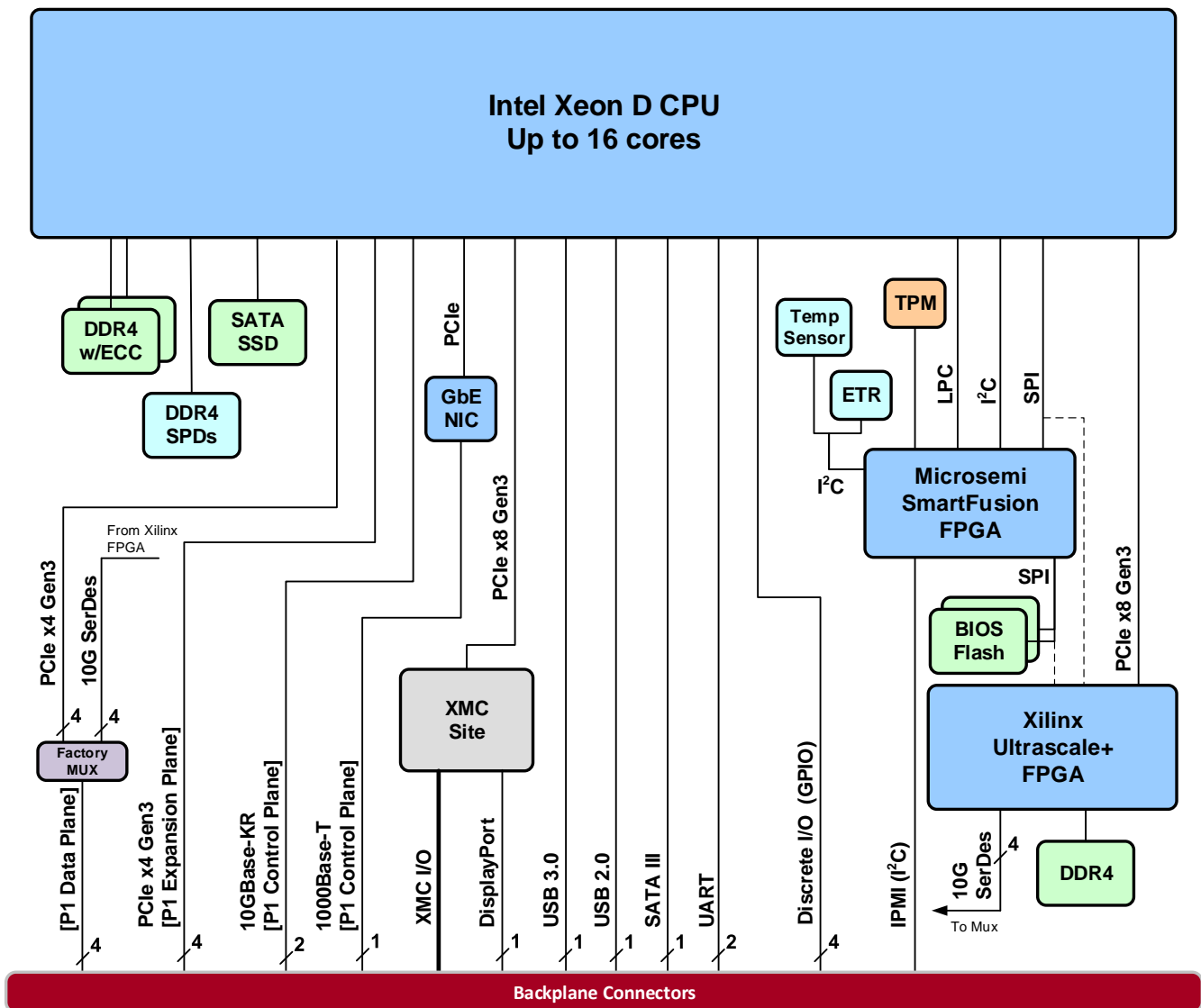
Intel® Xeon® D with Security & Zynq UltraScale+



The U-C8770 is based on our cutting-edge, award-winning C877 SBC, retaining all of its features and major benefits, while adding full alignment to the Open Group SOSA™ technical standard for easier interoperability, faster time to market and lower integration costs. The U-C8770 also adds optional support for 40GE data plane connectivity to support high-bandwidth video and sensor data transport over Ethernet backplane.

The SBC packs high-end multi-core Intel Xeon-D embedded processor into the rugged and compact 3U VPX form factor. Supporting up to 16 cores/32 threads, it is perfect for applications that require a high level of processing parallelism. Several Intel Xeon D and Pentium CPU options are available, to provide the balance of CPU throughput and board power consumption that are best for your system.

Designed from the ground up with security in mind, the U-C8770 provides a comprehensive custom Cyber Security framework – AiSecure™, which includes both standard and advanced security features, such as Intel CPU security (TXT, AES-NI, etc.), on-board TPM 2.0 (Trusted Platform Module), SSD security with AES 256 Encryption, Quick Erase, and Secure Erase features, Security Manager, tamper detection, and a variety of FPGA protection tools. AiSecure™ also includes board security features and encryption that can be implemented using the optional Xilinx UltraScale+ FPGA. The U-C8770 is designed with a modern, high-bandwidth bus architecture and a versatile assortment of on-board I/O interfaces, with an XMC site for additional I/O options. The board is available in both air-cooled and conduction-cooled versions.



PRELIMINARY

# U-C8770 | 3U VPX SBC

Intel® Xeon® D with Security & Zynq UltraScale+



## Board Architecture

|                                |  |
|--------------------------------|--|
| <b>Processor</b>               | <p>The U-C8770 is available with the following Intel CPU options:</p> <ul style="list-style-type: none"><li>Xeon D-1577 – 16 cores/32 threads (Hyper-Threading) @ 1.3 GHz, 2.1 GHz Turbo Boost, 24 MB Cache</li><li>Xeon D-1559 – 12 cores/24 threads (Hyper-Threading) @ 1.5 GHz, 2.1 GHz Turbo Boost, 18 MB Cache</li><li>Pentium D-1519 – 4 cores/8 threads (Hyper-Threading), @ 1.5 GHz, 2.1 GHz Turbo Boost, 6 MB Cache</li></ul> <p>Note: The Pentium D-1519 CPU option supports only PCIe Gen2 maximum speeds and does not support PCIe Gen3</p> <p>Supports Virtualization Technology (VT-x), AES-NI, Secure Key RNG, Trusted Execution Technology (TXT), AVX2</p>   |
| <b>Xilinx UltraScale+ FPGA</b> | <p>Optional Xilinx Zynq UltraScale+ FPGA w/ARM CPU, linked to the Xeon CPU via PCIe x8 Gen3, enables implementation of 40GE data plane, I/O customizations and on-board security features. Available options include:</p> <ul style="list-style-type: none"><li>ZU4CG – 192k System Logic Cells</li><li>ZU7CG – 504k System Logic Cells</li></ul>  |
| <b>Board Resources</b>         | <ul style="list-style-type: none"><li>Watchdog Timers (Windowed &amp; Standard)</li><li>Real Time Clock</li><li>PCIe Non-Transparent (NT) Port support</li><li>Temperature Sensors</li><li>Elapsed Time Recorder</li><li>General Purpose DMA Engine</li><li>VITA 46.11 Tier 1 &amp; Tier 2 IPMI (Intelligent Platform Management Interface)</li></ul>  |
| <b>SOSA™ Slot Profiles</b>     | <p>The following SOSA™ slot profiles are supported by standard configurations of the U-C8770:</p> <ul style="list-style-type: none"><li><b>SLT3-PAY-1F1F2U1TU1T1U1T-14.2.16</b> 3U I/O Intensive SBC PICP</li></ul> <p>Supports all 4 associated module profiles (Dash Num options) of MOD3-PAY-1F1F2U1TU1T1U1T-16.2.15-n</p> <ul style="list-style-type: none"><li>PCIe data/expansion plane supports up to Gen2 or Gen3, depending on the CPU option selected</li><li>Ethernet data plane support uses the optional Xilinx UltraScale+ FPGA (it must be installed). An FPGA IP core for 10GE/40GE Ethernet support can be provided upon customer request</li><li>Support for DisplayPort interface requires a compatible add-on graphics XMC</li></ul> <p>Note: please contact your Aitech sales representative to get more information on the above capabilities and ordering options</p> |

## AiSecure™ Cyber Security

|                                  |   |
|----------------------------------|---|
| <b>Intel &amp; BIOS Security</b> | <ul style="list-style-type: none"><li>Secure Boot based on Intel TXT, TPM 2.0</li><li>Trusted Platform with SmartFusion™ Security Manager</li><li>BIOS Modification Protection</li><li>Boot Guard</li></ul>   |
| <b>FPGA Security</b>             | <ul style="list-style-type: none"><li>Xilinx Device DNA</li><li>Bitstream Authentication</li><li>Readback CRC</li><li>Bitstream Encryption</li><li>Readback/JTAG Disable</li><li>Keyclear and IPROG</li></ul> |
| <b>On-board SSD Security</b>     | <ul style="list-style-type: none"><li>Secure Erase</li><li>Quick Erase</li><li>Disk Data Encryption utilizing AES 256 keys (Self Encrypted Disk), TCG OPAL 2.0</li></ul>                                      |
| <b>Anti-Tamper Protection</b>    | <ul style="list-style-type: none"><li>Battery backed tamper detection signal for system level protection</li><li>Tamper resistant FPGAs with bit stream authentication and read back limitation</li></ul>     |

Note: For more information on AiSecure™, please see the Aitech Cybersecurity Whitepaper.

## Memory Resources

|                   |   |
|-------------------|---|
| <b>RAM</b>        | Up to 32 GB of DDR4 SDRAM in dual channel configuration with ECC, operating at 2133MT/s   |
| <b>SATA SSD</b>   | Up to 1 TB on-board SATA SSD, SLC & MLC Flash options with AES 256 Encryption, Quick Erase, and Secure Erase<br>Standard options are listed in <i>Ordering Information</i> below (additional SLC & MLC options may be available per customer request, contact an Aitech representative for more info) |
| <b>Boot Flash</b> | Dual BIOS Flash devices (Primary device for normal board operation, alternate device for board maintenance)   |

PRELIMINARY

# U-C8770 | 3U VPX SBC

Intel® Xeon® D with Security & Zynq UltraScale+



| I/O                             | I/O Variant <sup>(1)</sup>                       |  |
|---------------------------------|--|--|
|                                 | Variant #1                                       | Variant #2                               |
| Data Plane                      | PCIe Gen2/Gen3 <sup>(2)(3)</sup> x4              | 10GBase-KX4 / 40GBase-KR4 <sup>(4)</sup> |
| Expansion Plane                 | PCIe Gen2/Gen3 <sup>(2)</sup> x4                 |  |
| Control Plane                   | 2x 1000Base-KX / 10GBase-KR <sup>(2)</sup>       |  |
|                                 | 1x 1000BaseT                                     |  |
| Video                           | 1x DisplayPort <sup>(5)</sup>                    |  |
| USB                             | 1x USB 3.0/2.0 <sup>(2)</sup>                    |  |
|                                 | 1x USB 2.0                                       |  |
| SATA                            | 1x SATA Gen2/Gen3 <sup>(2)</sup>                 |  |
| Serial Ports                    | 2x RS-232/422/485 <sup>(2)</sup>                 |  |
| Discrete I/O (GPIO)             | 4x Single-Ended / 2x Differential <sup>(2)</sup> |  |
| XMC I/O Pattern (per VITA 46.9) | P1w9-X12d+X16s+X8d                               |  |

Notes: (1) The I/O Variants and port modes offer compatibility to different "Dash Num" options within the SOSA™ and VITA 65.0/65.1 MOD3-PAY-1F1F2U1TU1T1U1T-16.2.15-n module profiles; additional I/O options may be available per customer request, contact an Aitech representative for more information

(2) Port mode is software configurable

(3) PCIe Gen3 requires Xeon-D 1559 or 1577 CPU options (Pentium-D 1519 is limited to PCIe Gen2 only)

(4) Ethernet data plane connectivity requires the optional Xilinx UltraScale+ FPGA to be installed (see Ordering information below). An appropriate FPGA IP core is available per customer request. Please contact an Aitech representative for more information.

(5) DisplayPort requires a compatible add-on graphics XMC to function. Please contact an Aitech representative for more information.

## XMC Slot

PCIe x8 Gen3 port supporting x8/x4/x2/x1 port widths and Gen3/Gen2/Gen1 speeds (depending on XMC capabilities), 12V VPWR

## Software

|                   |  |
|-------------------|--|
| Operating Systems | Windows®, VxWorks®, and Linux® are supported<br>RedHawk™ Real-Time Linux support can be provided upon customer request |
| Drivers           | Operating system specific device drivers for board resources are available   |
| BIT               | Built-In Tests are available   |

# U-C8770 | 3U VPX SBC

Intel® Xeon® D with Security & Zynq UltraScale+



## Mechanical

|                       | Form Factor & Dimensions                                   | Pitch | Weight               |
|-----------------------|--|-------|----------------------|
| Air-Cooled            | 3U VPX REDI per ANSI/VITA 48.1                             | 1"    | < 800 g [1.77 lbs.]  |
| Conduction-Cooled 2LM | 3U VPX REDI 2LM (Two Level Maintenance) per ANSI/VITA 48.2 | 1"    | < 1130 g [2.49 lbs.] |

## Power

| CPU Option              | +12V   | +3.3V_AUX | Total <sup>(1) (2)</sup> | PassMark CPUMark |
|-------------------------|--------|-----------|--------------------------|------------------|
| Pentium D-1519 (4 core) | 2.23 A | 0.27 A    | 27.65 W                  | 3230             |
| Xeon D-1559 (12 core)   | 4.53 A | 0.27 A    | 55.25 W                  | 10116            |
| Xeon D-1577 (16 core)   | 4.63 A | 0.27 A    | 56.45 W                  | 10335            |

- Notes:
- (1) Power measured during PassMark CPUMark test at room temperature  
Tested with 16GB RAM, with on-board SATA SSD, without the optional Xilinx UltraScale+ FPGA, no XMC installed
  - (2) Power consumption is determined by CPU option, RAM capacity option, Xilinx UltraScale+ FPGA option, etc. and varies according to CPU load and utilization of CPU cores. Contact an Aitech representative for configuration specific power consumption.

## Environmental

| Specs per VITA 47                | Air-Cooled                      |   |                                     | Conduction-Cooled                 |                                     |
|----------------------------------|---------------------------------|---|-------------------------------------|-----------------------------------|-------------------------------------|
|                                  | Commercial                      | Rugged  | Military                            | Rugged                            | Military                            |
| Operating Temp.                  | AC1 (0 to +55°C) <sup>(2)</sup> | AC3 (-40 to +70°C) <sup>(2)</sup>                                     | AC4 (-40 to +85°C) <sup>(1,2)</sup> | CC3 (-40 to +70°C) <sup>(3)</sup> | CC4 (-40 to +85°C) <sup>(1,3)</sup> |
| Non-Operating Temp.              | C1 (-40 to +85°C)               | C3 (-50 to +100°C)  | C4 (-55 to +125°C)                  | C3 (-50 to +100°C)                | C4 (-55 to +125°C)                  |
| Vibration                        | V1                              | V2  | V2                                  | V3                                | V3                                  |
| Operating Shock                  | OS1                             | OS1   | OS1                                 | OS2                               | OS2                                 |
| Altitude                         | 15,000 ft.                      | 35,000 ft.  | 70,000 ft.                          | 35,000 ft.                        | 70,000 ft.                          |
| Relative Humidity <sup>(4)</sup> | 0 - 90%                         | 0 - 95% with Acrylic (Standard),<br>0 - 100% with Urethane (Optional) |                                     |                                   |                                     |
| Conformal Coating                | N/A                             |   |                                     |                                   |                                     |

- Notes:
- (1) -55°C available, contact an Aitech representative for more information
  - (2) Operating ambient air temperature (with sufficient airflow)
  - (3) Operating card edge temperature
  - (4) Non-condensing

PRELIMINARY

# U-C8770 | 3U VPX SBC

Intel® Xeon® D with Security & Zynq UltraScale+



## Ordering Information

|  |  |  |
|--|--|--|
| <p><b>Processor</b><br/>                 H = Xeon D-1577 (16 core @ 1.3 GHz)<br/>                 S = Xeon D-1559 (12 core @ 1.5 GHz)<br/>                 U = Pentium D-1519 (4 core @ 1.5 GHz)</p> | <p><b>I/O Variant</b><br/>                 See I/O section above<br/>                 1 = PCIe data plane<br/>                 2 = Ethernet data plane<br/>                 9 = Custom</p> | <p><b>Xilinx UltraScale+ FPGA</b><br/>                 0 = None<br/>                 Cannot be 0 if I/O Variant is 2<br/>                 1 = ZU4CG<br/>                 3 = ZU7CG</p> |
| <p><b>Reserved</b></p>   | <p><b>Reserved</b></p>   | <p><b>Reserved</b></p>   |

|   |  |   |   |  |
|---|--|---|---|--|
| <p><b>Ruggedization</b><br/>                 1 = Commercial<br/>                 2 = Rugged<br/>                 4 = Military</p> | <p><b>Cooling + Pitch</b><br/> <u>Air-Cooled</u><br/>                 A3 = 1"<br/> <u>Conduction-Cooled</u><br/>                 R4 = 1" 2LM</p> | <p><b>SDRAM</b><br/>                 C = 16 GB<br/>                 D = 32 GB</p> | <p><b>SATA SSD</b><br/>                 0 = None<br/>                 D = 128 GB MLC, QE, SE<br/>                 5 = 256 GB SLC, QE, SE<br/>                 G = 1 TB MLC, QE, SE<br/> <small>SLC: Single Level Cell; MLC: Multi Level Cell; QE: Quick Erase; SE: Secure Erase</small></p> | <p><b>Configuration Number</b><br/>                 To be assigned by Aitech</p> |
|---|--|---|---|--|

**Example:** 4U-C8770S-R40D1530-00

## Optional Accessories

**U-TM8770** Rear Transition Module (RTM) providing convenient access to U-C8770 I/O interfaces via standard connectors and to all XMC I/O via headers. Supports both air and conduction-cooled U-C8770 when installed in a compatible system. See the U-TM8770 datasheet for more information.

## Contact Aitech

Contact your Aitech sales representative for additional product information, and for inquiries regarding customized configurations of the U-C8770, as well as additional software support.

PRELIMINARY



**Aitech Defense Systems, Inc.**  
 Chatsworth, CA, USA  
 Toll Free: (888) Aitech-8 [248-3248]  
 Direct: +1 (818) 700-2000  
 Fax: +1 (818) 407-1502  
 Email: sales@aitechsystems.com

[www.aitechsystems.com](http://www.aitechsystems.com)

**Aitech Systems, Ltd.**  
 Herzlia, Israel  
 Tel: +972 (9) 960-0600  
 Fax: +972 (9) 954-4315  
 Email: sales@aitechsystems.com