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Find the *Aitech Defense Systems TM877* at our website: *Click HERE*

C877 | 3U VPX SBC

Intel® Xeon® D with Security & Zynq UltraScale+

Aitech
Embedded Computing *without* Compromise



BEST IN SHOW AWARDS

Cyber Solutions Category
4-Star Best in Show Award
at
DSEI

Military EMBEDDED SYSTEMS

- **Rugged 3U VPX Single-Slot SBC**
- **Intel CPU Options**
  - Xeon D-1577 – 16 cores/32 threads, @ 1.3 GHz/2.1 GHz Turbo Boost
  - Xeon D-1559 – 12 cores/24 threads, @ 1.5 GHz/2.1 GHz Turbo Boost
  - Pentium D-1519 – 4 cores/8 threads, @ 1.5 GHz/2.1 GHz Turbo Boost
- **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**
- **Versatile Board I/O**
  - USB 3.0 & 2.0
  - Serial
  - 10GbE
  - SATA III
  - Discrete
  - GbE
- **XMC Slot w/PCIe x8 Gen3**
- **Xilinx UltraScale+ FPGA w/ARM CPU**
  - Custom I/O and Security Features
  - PCIe x8 Gen3 Link to Xeon CPU
- **8 Lane PCIe Gen3 VPX Data Plane**
- **AiSecure™ - Aitech Cyber Security Architecture**
- **WWDT, ETR, RTC, Temp. Sensors**
- **IPMI, VITA 46.11 Tier 1 & Tier 2 Support**
- **Windows®, Linux®, VxWorks® Support**
- **OpenVPX Compliant**
- **2LM Option per VITA 48.2**
- **Conduction and Air-Cooled Versions**
- **Vibration and Shock Resistant**



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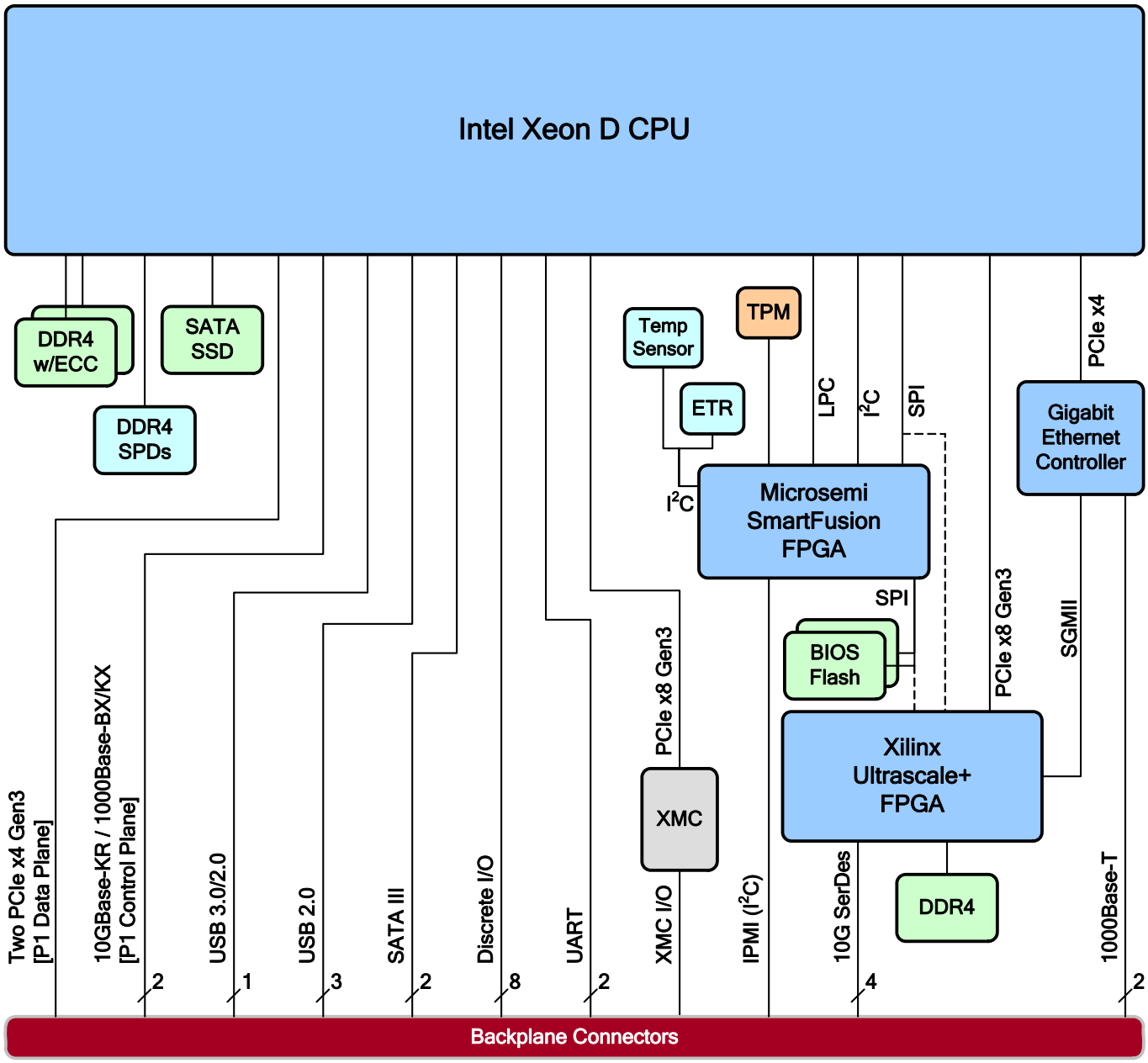
Intel® Xeon® D with Security & Zynq UltraScale+

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The C877 packs Xeon level processing capabilities into the rugged and compact 3U VPX form factor. 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 C877 provides a comprehensive Cyber Security platform – AiSecure™ (Aitech Cyber Security Architecture) including standard Intel CPU security features (TXT, AES-NI, etc.), as well as an on-board TPM 2.0 (Trusted Platform), SSD options with AES 256 Encryption, Quick Erase, and Secure Erase features, Security Manager, tamper detection, and a variety of FPGA protection tools. Aitech has also included options for board security features and encryption that can be customized in the optional Xilinx UltraScale+ FPGA.

The C877 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.



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Board Architecture

Processor	The C877 is available with the following Intel CPU options: • Xeon D-1577 – 16 cores/32 threads (Hyper-Threading) @ 1.3 GHz, 2.1 GHz Turbo Boost, 24 MB Cache • Xeon D-1559 – 12 cores/24 threads (Hyper-Threading) @ 1.5 GHz, 2.1 GHz Turbo Boost, 18 MB Cache • Pentium D-1519 – 4 cores/8 threads (Hyper-Threading), @ 1.5 GHz, 2.1 GHz Turbo Boost, 6 MB Cache Note: The Pentium D-1519 CPU option supports only PCIe Gen2 maximum speeds and does not support PCIe Gen3 Supports Virtualization Technology (VT-x), AES-NI, Secure Key RNG, Trusted Execution Technology (TXT), AVX2
Xilinx UltraScale+ FPGA	Optional Xilinx UltraScale+ FPGA w/ARM CPU, linked to the Xeon CPU via PCIe x8 Gen3, enables implementation of customized I/O interfaces and on-board security features. Available options include: • ZU4CG – 192k System Logic Cells • ZU7CG – 504k System Logic Cells
Board Resources	• Watchdog Timers (Windowed & Standard) • Real Time Clock • PCIe Non-Transparent (NT) Port support • Temperature Sensors • Elapsed Time Recorder • General Purpose DMA Engine • VITA 46.11 Tier 1 & Tier 2 IPMI (Intelligent Platform Management Interface)
OpenVPX (VITA 65) Slot Profiles	The following OpenVPX slot profiles are supported by standard configurations of the C877: • **SLT3-PAY-2F2U** Payload board, 2 PCIe x4 ports, 2 1000Base-BX/KX ports • **SLT3-PAY-2F** Payload board, 2 PCIe x4 ports • **SLT3-PAY-1D** Payload board, PCIe x8 port PCIe ports support up to Gen3 speeds depending on system capabilities

Aitech Cyber Security

Intel & BIOS Security	• Secure Boot based on Intel TXT, TPM 2.0 • Trusted Platform with SmartFusion™ Security Manager • BIOS Modification Protection • Boot Guard
FPGA Security	• Xilinx Device DNA • Bitstream Encryption • Bitstream Authentication • Readback/JTAG Disable • Readback CRC • Keyclear and IPROG
On-board SSD Security	• Secure Erase • Quick Erase • Disk Data Encryption utilizing AES 256 keys (Self Encrypted Disk), TCG OPAL 2.0
Anti-Tamper Protection	• Battery backed tamper detection signal for system level protection • Tamper resistant FPGAs with bit stream authentication and read back limitation

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

Memory Resources

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

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I/O

		I/O Variant (1)	
		Variant #1	Variant #2
USB 2.0		3	3
USB 3.0/2.0		1	1
SATA III		2	2
Ethernet	1000Base-T	2	1
	1000Base-BX/KX / 10GBase-KR (2)	2	2
Serial Ports (RS-232/422/485)		2	1
Discrete I/O Lines (Single-Ended)		8 (3)	2 (4)
XMC I/O Routed per VITA 46.9 pattern X8d+X12d		9 Diff. Pairs	19 Diff. Pairs
Custom I/O from UltraScale+ FPGA (5)	10G SerDes Interfaces	4	

Notes:
(1) C877 I/O Variants offer different combinations/quantities of on-board and XMC I/O via factory configuration; additional I/O options may be available per customer request, contact an Aitech representative for more information
(2) Port mode is software configurable
(3) Software configurable as 8 outputs, 8 inputs, or 4 outputs + 4 inputs
(4) Software configurable as 2 outputs or 2 inputs
(5) Available only in boards equipped with the optional Xilinx UltraScale+ FPGA (see *Ordering Information* below)

XMC Slot

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

Software

Operating Systems	Windows®, WindRiver VxWorks®, and Linux® are supported
Drivers	Operating system specific device drivers for board resources are available
BIT	Built-In Tests are available

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	+12 V	+5 V	+3.3 V	+3.3 V_AUX	±12 V_AUX (3)	Total (1) (2)	PassMark CPUMark
Pentium D-1519 (4 core)	1.7 A	0.2 A	1.09 A	0.27 A	0 A	25.90 W	3230
Xeon D-1559 (12 core)	4.0 A	0.2 A	1.09 A	0.27 A	0 A	53.49 W	10116
Xeon D-1577 (16 core)	4.1 A	0.2 A	1.09 A	0.27 A	0 A	54.70 W	10335

Notes:
(1) Power measured during PassMark CPUMark test at room temperature
C877 tested with 16 GB RAM, with on-board SATA SSD, without optional Xilinix 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.
(3) ±12V_AUX required for XMC only (not installed during test)

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Environmental

Specs per VITA 47	Air-Cooled			Conduction-Cooled	
	Commercial	**Rugged**	**Military**	**Rugged**	**Military**
Operating Temp.	AC1 (0 to +55ºC) (2)	AC3 (-40 to +70ºC) (2)	AC4 (-40 to +85ºC) (1,2)	CC3 (-40 to +70ºC) (3)	CC4 (-40 to +85ºC) (1,3)
Non-Operating Temp.	C1 (-40 to +85ºC)	C3 (-50 to +100ºC)	C4 (-55 to +125ºC)	C3 (-50 to +100ºC)	C4 (-55 to +125ºC)
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 (4)	0 - 90%	0 - 95% with Acrylic (Standard),			
Conformal Coating	N/A	0 - 100% with Urethane (Optional)			

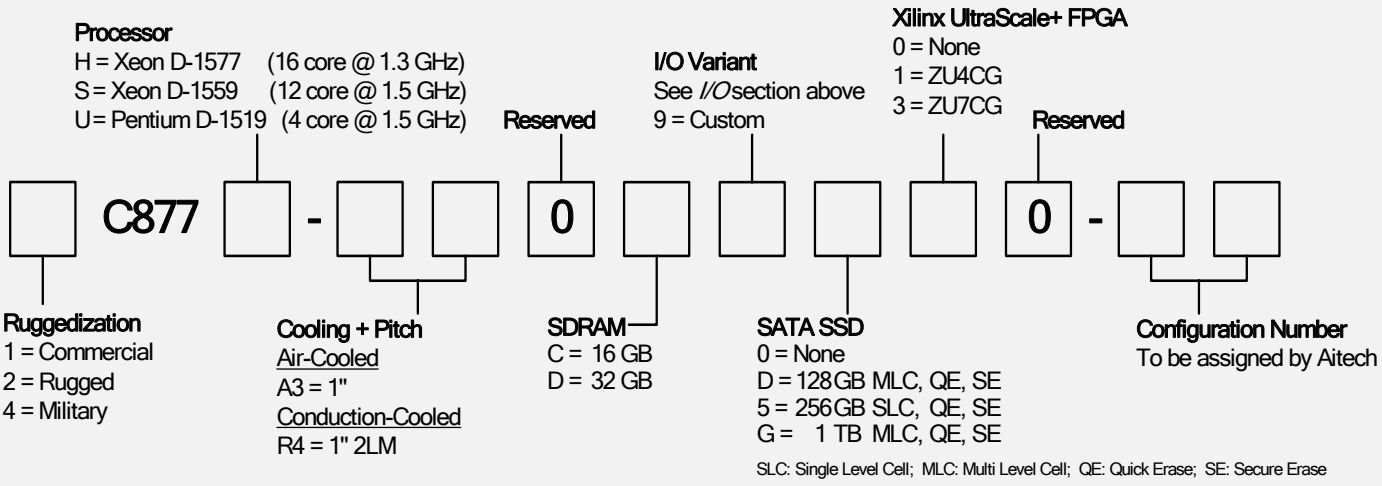
Notes:
(1) -55ºC available, contact an Aitech representative for more information
(2) Operating ambient air temperature (with sufficient airflow)
(3) Operating card edge temperature
(4) Non-condensing

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Ordering Information



SLC: Single Level Cell; MLC: Multi Level Cell; QE: Quick Erase; SE: Secure Erase

Example: 4C877S-R40D1530-00

Optional Accessories

TM877	Rear Transition Module (RTM) providing convenient access to C877 I/O interfaces via standard connectors and to all XMC I/O via headers. Supports both air and conduction-cooled C877 when installed in a compatible system. See the TM877 datasheet for more information.
CM870	3U VPX PMC/XMC carrier board. Using one or more CM870s, system functionality can be significantly expanded, enabling the C877 to control additional PMCs/XMCs over the VPX backplane. See the CM870 datasheet for more information.

Contact Aitech

Contact your Aitech sales representative for additional product information, and for inquiries regarding customized configurations of the C877 and additional software support.



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