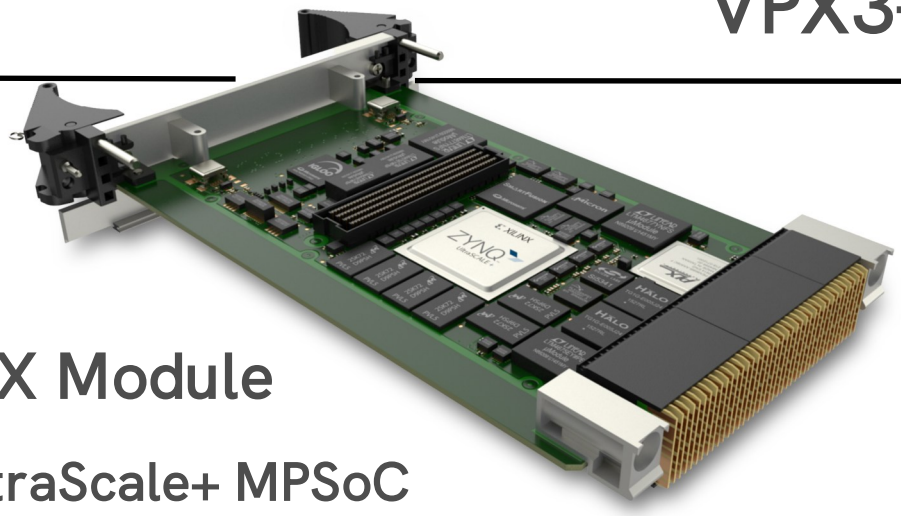
VPX3-ZU2



3U OpenVPX Module

AMD Zynq UltraScale+ MPSoC

with FMC HPC Site and Dual 1000BaseT

Overview

PanaTeQ's VPX3-ZU2 is a 3U OpenVPX module based on the Zynq UltraScale+ MultiProcessor SoC device from AMD.

This upgraded version provides a **dual Ethernet 1000BaseT** interfaces on the VPX P2 connector.

The Zynq MPSoC integrates a Quad-core ARM Cortex-A53 based Application Processing Unit (**APU**), a Dual-core ARM Cortex-R5 based Real-Time Processing Unit (**RPU**), a ARM MALI-400 based Graphic Processing Unit (**GPU**) and an UltraScale+ Programmable Logic (**PL**) in a single device. It also includes on-chip memory, external memory interfaces, and a rich set of peripheral connectivity interfaces.

The board can be ordered with different versions of the Zynq MPSoC family of devices, coupled up to 8GB 64-bit DDR4-2400 Processing Memory with 8-bit ECC.

Up to 2GB 16-bit of DDR4-2400 is also available as the Programmable Logic Memory, allowing data streaming applications such as video CODEC and signal processing. Up to **256GB** of soldered eMMC managed NAND Flash is available for local data storage.

The VPX3-ZU1B uses four advanced DC/DC power modules from Linear Technology using PMBus and PanaTeQ's **Smart Power Management** technology.

For front-end I/O interfaces, an on-board **FMC** site compliant to the Vita 57.1 HPC standard with 90 SE IO (45 Diff Pairs) and 10 MGT, allowing a wide range of applications such as Software Defined Radio, Video Camera Processing, advanced Multi-Axes Motors controller, Multi-Gig Ethernet Communications, LIDAR/RADAR/SONAR.

The board can act as a **Single Board Computer** in the VPX system thanks to its on-board PCIe Gen2 Switch. When the VPX3-ZU2 is System Controller, it can manage up to eight 3U OpenVPX slots with a PCIe x1 Gen2 link per slot. There is no need to add any SBC in the VPX System, improving **S**ize, **W**eight, **P**ower and **C**ost (SWaP-C).

A large number of the Zynq MSoC PS peripherals are available on the VPX backplane: 2x ETH 1000Base-T, 4x USB 2.0, 1x SATA 3.1, 1x CAN-2.0B, 2x RS-232/422/485, 4x MGT, 20x GPIO, Video Out Display Port 1.2.

The air cooled PanaTeQ System Development Kit **VPX3-ZU2-PSDK** is available for the developers and includes a lab chassis with 5-slots Full-Mesh backplane, the VPX3-ZU2-PSDK and RTM-ZU1 boards, a PentaLinux BSP, Reference designs and cables.

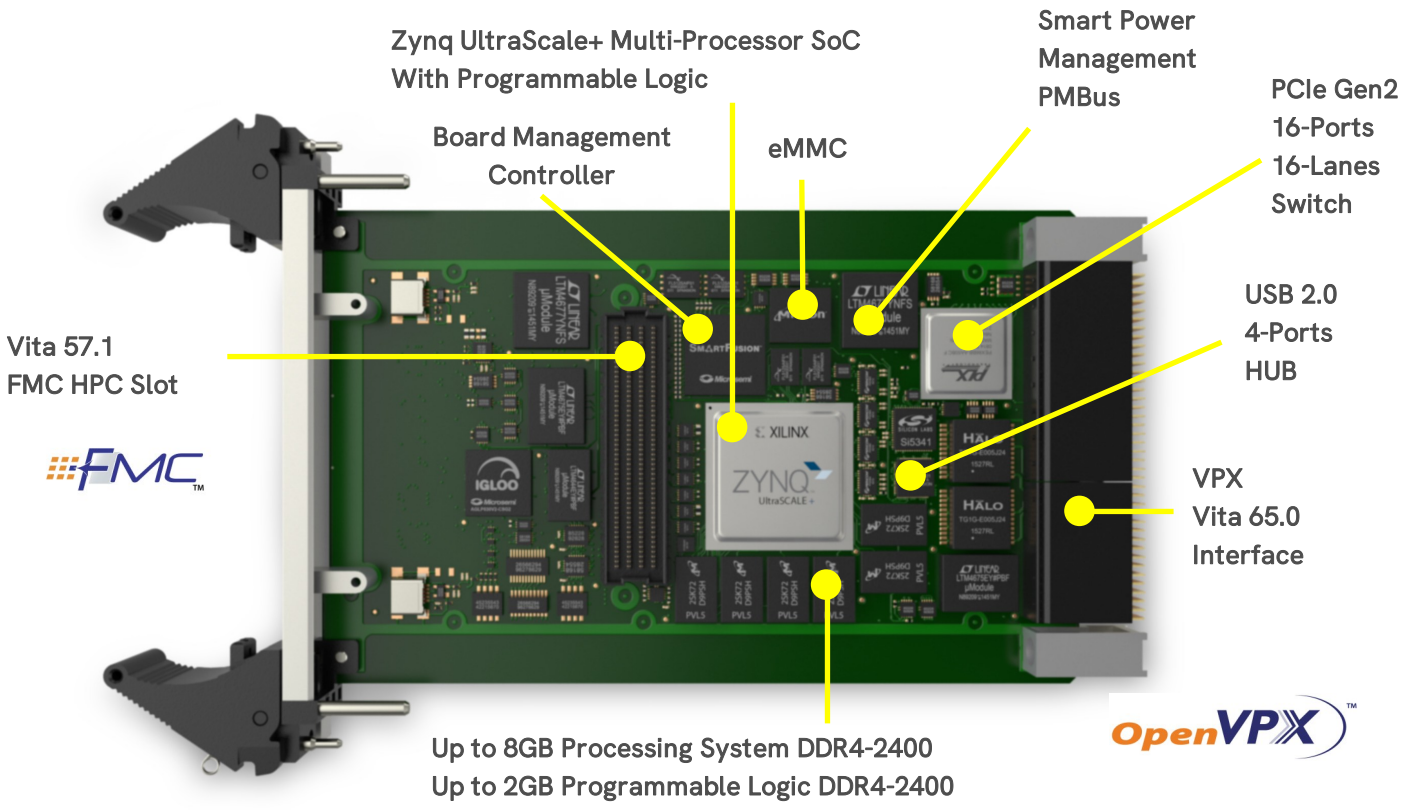
Key Features

- 3U Compliant to VITA 46.0, 46.4, 46.6, 65.0, 57.1 standards
- AMD Zynq UltraScale+ MPSoC
- ZU4/ZU5/ZU7 CG/EG/EV FBVB-900 Package
- Up to 8GB DDR4-2400 64-bit PS memory with 8-bit ECC
- Up to 2GB DDR4-2400 16-bit PL memory
- 128MB QSPI NOR, eMMC up to **256**GB, MRAM 512KB
- On-board PCIe Gen2 Switch 16-Lanes 16-Ports with NT support
- 4x MGT on VPX-P1 Expansion Plane
- 1x Display Port 1.2 Video Out on VPX-P2
- 2x ETH 1000Base-BX/SGMII on VPX-P1 Control Plane
- 2x ETH 1000Base-T on VPX-P2
- 4x USB 2.0, 1x SATA 3.1 on VPX-P2
- 20x LVCMOS or 10x LVDS GPIO on VPX-P2
- 2x RS-232/422/485, 1x CAN 2.0B on VPX-P2
- FMC HPC site with 90x IO / 45x LVDS, 10x MGT
- Smart Power Management using 4x LTM467x with PMBus
- Board Management Controller ARM Cortex-M3 based
- VPX System Controller
- Air Cooled and Conduction Cooled
- Optional **Conformal Coating** and **KVPX** Connectors

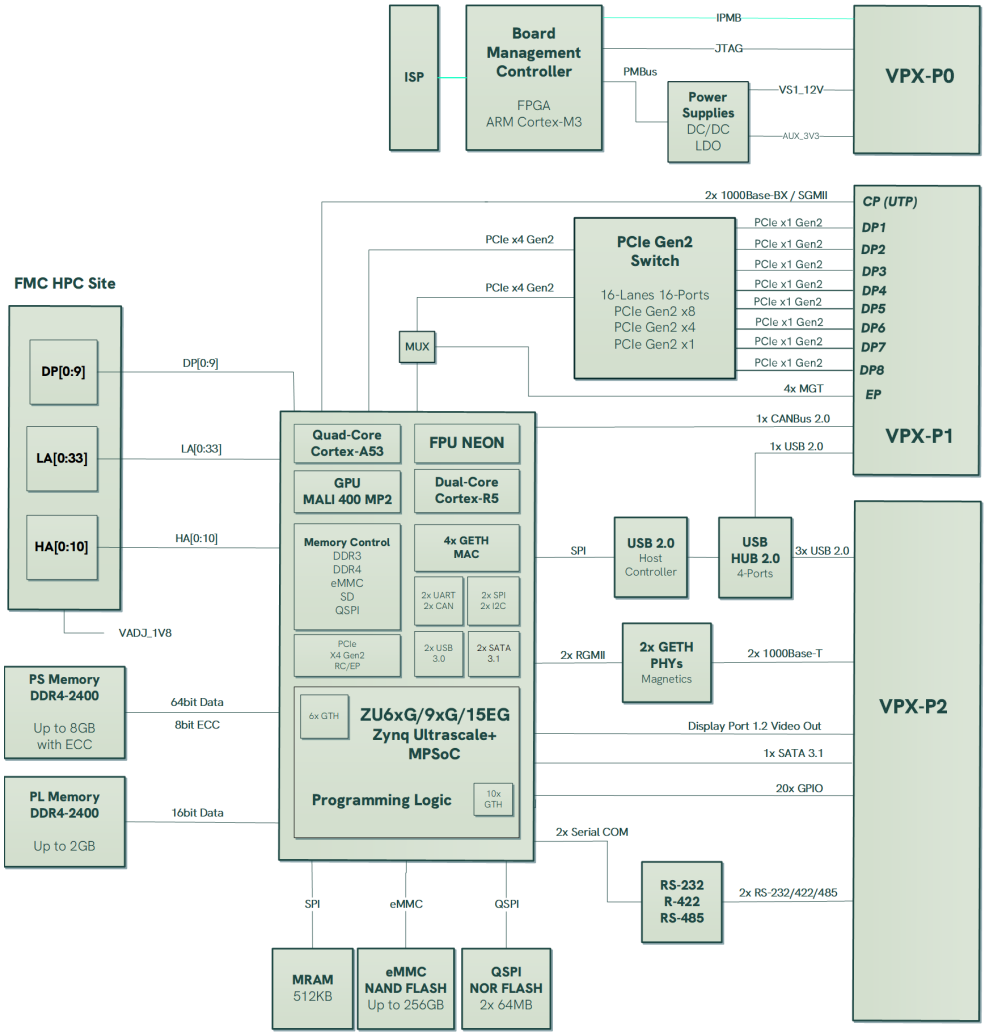
Typical Applications

- MILCOM, Software Defined Radio, MIMO
- Situational Awareness Systems
- Electronic Warfare, Signal Intelligence
- LIDAR/RADAR/SONAR Systems
- Advanced Multi-Axes Motors Control
- Video CODEC and Signal Processing

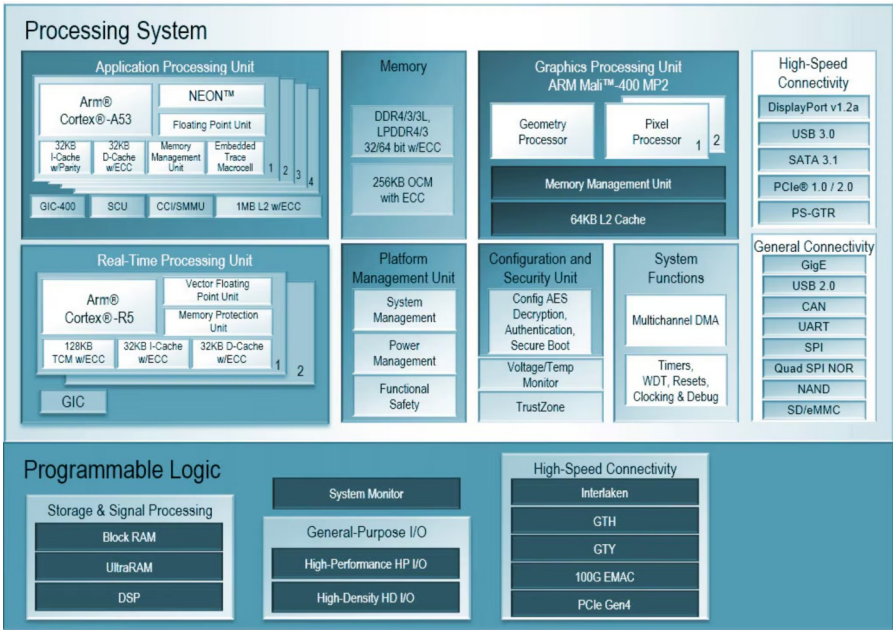
VPX3-ZU2 3U VPX Zynq Ultrascale+ MPSoC



Block Diagram



AMD Zynq Ultrascale+ MPSoC Processing System Highlights



Applications processing unit (APU) with quad-core ARM® Cortex™-A53 processors up to 1.5GHz:

- Next-generation ARMv8 architecture supporting 32- or 64-bit data widths
- Ideal for Linux and bare-metal SMP/AMP application systems

Real-time processing unit (RPU) with dual-core ARM Cortex-R5 processors up to 600MHz:

- Low-latency, highly deterministic performance APU offloading

New integrated hardened multimedia blocks up to 667MHz:

- Graphics processing unit (GPU) [ARM Mali™-400MP2]
- 4Kx2K 60fps video encoder/decoder (VCU) [in select devices]
- 4Kx2K 30fps DisplayPort interface

New integrated high-speed peripherals:

- PCIe® Gen1 or Gen2 root complex and integrated Endpoint block in x1, x2, and x4 lanes
- USB 3.0/2.0 with host, device, and OTG modes
- Gigabit Ethernet with jumbo frames and precision time protocol
- SATA 3.1 host
- Dedicated quad transceivers up to 6Gb/s

General and boot peripherals:

- CAN, I2C, QSPI, SD, eMMC, and NAND flash interfaces
- GPIO, UART, and trace ports
- 6-port DDR controller with ECC, supporting x32 and x64 DDR3, DDR3L, LPDDR3, LPDDR4, DDR4
- Integrated platform management unit (PMU) supporting multiple power domains
- Integrated configuration security unit (CSU)
- TrustZone support
- Peripheral and memory protection

Board Specifications

3U VPX Interfaces

- VITA 46.0/46.4/46.6/65.0 VPX/OpenVPX Specifications compliant
- On-board PCIe Gen2 NT Switch 2x PCIe x4 or 8x PCIe x1 Gen2 links connected to Zynq MPSoC Processing System
- 4x MGT GTH @ up to 6.3 Gb/s connected to/from Zynq MPSoC Programming Logic
- 2x Ethernet 1000BASE-X/SGMII links on VPX Control Plane
- 2x Ethernet 1000BASE-T, 2x RS-232/422/485, 4x USB 2.0, 1x SATA 3.1, 1x CAN 2.0B, 20x GPIO (or 10x LVDS)
- 1x Display Port 1.2 VIDEO OUT
- Board Management Controller (BMC) Interface. VITA 46.11 Ready
- System Controller capability, JTAG
- Optional KVPX Connectors (Contact us)

OpenVPX VITA 65.0 Profiles

- MOD3-PAY-2F2U-16.2.3-2, MOD3-PAY-2F2U-16.2.3-3
- MOD3-PAY-8U-16.2.9-1, MOD3-PAY-8U-16.2.9-2
- MOD3-PAY-2F4F2U-16.2.10-3, MOD3-PAY-2F4F2U-16.2.10-4

AMD Zynq Ultrascale+ MPSoC

- Supported Devices:XCZU4 CG/EG/EV XCZU5 CG/EG/EV XCZU7 CG/EG/EV Speed Grade -1/2 FBVB900 Package
- Processing System : Quad-Core ARM A53, Dual-Core ARM R5, GPU Mali-400, 2x SATA, 2x USB, 4x GETH MACs
- Programmable Logic: 192K Logic Cells (ZU4) / 256K Logic Cells (ZU5) / 504K Logic Cells (ZU7)
- On-Chip Memories: 18.5Mb (ZU4) / 23.1Mb (ZU5) / 38.0Mb (ZU7)
- DSP Slices: 728 (ZU4) / 1248 (ZU5) / 1728 (ZU7)
- High Speed Serial Links: 16 full duplex, high performance, GTH Multi-Gigabit Tranceivers (MGT) @ up to 16.3 Gb/s
- 2x 10-bit, 1MSPS ADCs for System Monitoring
- Supported by PanaTeQ's reference designs and Petalinux BSP

External Memories

- Up to 8GB of DDR4-2400 Processor System (PS) memory, 64-bit data, 8-bit ECC
- Up to 2GB of DDR4-2400 Programmable Logic (PL) memory, 16-bit data, no ECC
- Up to 256GB eMMC of managed NAND Flash memory. HS200 support @ up to 100MB/s
- 512KB of SPI MRAM (NVRAM)
- 2x 512Mb (128MB) of QSPI NOR Flash memory for booting Zynq MPSoC PL and Firmware PS

VITA 57 FMC Slot

- Compliant to the High Pin Count (HPC) VITA 57.1 specification
- 10x high-performance MGT @ up to 16.3 Gb/s to/from Zynq MPSoC Programmable Logic
- 90 LVCMOS_18 or 45 LVDS_18 (LA [0:33], HA[0:10]) to/from Zynq MPSoC Programmable Logic
- 2x clocks FMC to Zynq MPSoC Programmable Logic
- 2x clocks FMC to Zynq MPSoC GTH Transceivers
- VADJ = 1V8 (default). 2V5 not supported by Zynq MPSoC HP Banks

Board Management Controller (BMC)

- .Based on Microsemi SmartFusion Customizable System-on-Chip (**cSoC**) with on-chip ARM Cortex-M3 at up to 100MHz
- Real-Time Monitoring+Alarms: Voltages, Currents, Temperatures, 6-Axis Accelerometer, Magnetometer and Humidity
- Reset Management, Power-Up and Power-Down Sequencing. Buit-In Test (**BIT**)
- Watchdogs (Avionics type)
- Large private 32MB Event Log Flash Memory.
- UART communication with host using RTM-ZU1 Rear-Transition Module
- Smart Power Management using four LTM467x Linear Technology DC/DC modules with Digital Power System Management
- Hardware Ready for full Vita 46.11 compliance

Environnemental Specifications

- Compliant with VITA 47 specification. Please contact PanaTeQ for more information

Product Codification

The VPX3-ZU2 can be assembled with different versions of the Zynq Ultrascale+ MPSoC devices and various amounts of memory storage. The cooling technique et ruggedization level are also available options. The following table shows the product coding for all these options.

VPX3-ZU2- abc-d-rl-e-k

a	Device	ARM A53 Cores	GPU	Video CODEC	System Logic Cells	DSP Slices	Memory
A	XCZU4CG	2	No	No	192K	728	18.5 Mb
B	XCZU5CG	2	No	No	256K	1248	23.1 Mb
C	XCZU7CG	2	No	No	504K	1728	38.0 Mb
D	XCZU4EG	4	Yes	No	192K	728	18.5 Mb
E	XCZU5EG	4	Yes	No	256K	1248	23.1 Mb
F	XCZU7EG	4	Yes	No	504K	1728	38.0 Mb
G	XCZU4EV	4	Yes	Yes	192K	728	18.5 Mb
H	XCZU5EV	4	Yes	Yes	256K	1248	23.1 Mb
I	XCZU7EV	4	Yes	Yes	504K	1728	38.0 Mb

b	Device Speed Grade
1	Standard
2	Faster

c	PS / PL Memory Size
M	4GB/1GB
P	8GB/2GB

d	eMMC Size
	64GB
E	128GB
F	256GB

rl	Ruggedization Level	VITA 47
AS	Air Standard	EAC4
AR	Air Rugged	EAC6
CC	Conduction Cooled	ECC3
CR	Conduction Rugged	ECC4

e	Tropicalization
C	Conformal Coating

k	Backplane Connectors
K	KVPX Connectors

Ordering Information

The following product references are offered by PanaTeQ as standard products. Other combinations of devices, speed grade, memory and cooling can be specially ordered. Please contact us for details

Associated Products

The following product references are related to the VPX3-ZU2. Please contact us for details

Reference	Description
RTM-ZU1-A	Rear Transition Module for VPX3-ZU2
VPX3-ZU2-PSDK-A	VPX3-ZU2 System Development Kit

PanaTeQ Contact

info@panateq.com

Available from: