VP831

3U VPX FPGA Processing Card Virtex UltraScale+, Zynq UltraScale+, FMC+

The VP831 is a 3U VPX high-performance FPGA processing board featuring Xilinx® Virtex UltraScale+™ and Zynq® UltraScale+™ technology. A technology upgrade from the existing VP889 product aligned with the Sensor Open Systems Architecture™ (SOSA) technical standard, it is designed for the most demanding, mission critical military/defense and commercial applications such as communications, sensor processing, radar, and electronic warfare just to name a few.

Secure

The Zynq UltraScale+ multiprocessor system-on-chip (MPSoC) brings advanced security to the forefront. The VP831 is capable of advanced encrypted bit streams and secure boot capability, enabled by Xilinx tools. This makes it an ideal tool for applications where IP security is a top concern.

Heterogeneous Processing Capability

Many RF and signal processing systems require both a streaming DSP with an FPGA and a general-purpose processor for decisions and control. Traditionally, these processing requirements were handled by separate processing cards. With the VP831, both functions in a single module are available by leveraging application and real-time processing ARM cores of the Zynq UltraScale+ MPSoC. Including the Zynq UltraScale+ MPSoC removes the need for a single board computer in some applications, providing customers an efficient way to maximize system performance while reducing complexity.

Flexibility You Need for the System You Want

The VITA 57.4-compliant FMC+ site allows users to take advantage of Abaco's industry-leading FMC I/O portfolio. Modular I/O built on an FMC+ standard interface enables engineers to easily upgrade to future technology without a complete system redesign. Availability of both low-latency LVDS data bus and JESD204B/C high-speed serial interface makes the VP831 a versatile solution for many RF data acquisition applications.

Offload Data More Efficiently

The VP831 has VPX backplane interfaces aligned with the SOSA RF payload slot profile, supporting 40/100 Gigabit Ethernet data plane, PCIe Gen3 x4 expansion plane and Ethernet control plane connections to a host computer or other payloads. With the flexibility of different RF front-ends and data converters, even these modern highspeed data connections might be too slow for a direct transfer. To overcome this challenge, the VP831 is available with an optional dual channel 100 Gigabit Ethernet fiber optic interface for transfers up to 25 GB/s.

The VP831 is available with two cooling options, air or conduction, making it an ideal COTS product for early designs and capable of being deployed into operational assets. When paired with Abaco's extensive portfolio of multi- architecture processing boards including SBCs, GPGPUs, and fabric switches the state of-the-art VP831 enables systems to be built from leading edge, interoperable components.

FEATURES:

- Two product releases
  - Gen1, first in a series
  - Gen2, family upgrade
- Dual FPGA architecture
  - Virtex UltraScale+
  - Zynq UltraScale+ MPSoC (ZU3EG in Gen1, ZU5EG in Gen2)
- Application Processing Unit
  - Quad-core ARM Cortex-A53
- Real-time Processing Unit
  - Dual-core ARM Cortex-R5
- Up to 18 GBytes DDR4
- FireFly™ Gen2 Optical Transceivers option
- I/O
  - 10/40G Ethernet (100G Ethernet support over copper in Gen2)
  - PCIe Gen3 x4
  - Gigabit Ethernet in Gen1,
- 10G Ethernet in Gen2
  - Dual 100G Ethernet optical
  - 8 LVDS GPIO
  - RF-to-backplane (NanoRF) in a conduction cooled configuration with an accompanying FMC; RF-thru-front-panel in an air cooled
- VITA 57.4 HSPC FMC+ site interfacing with the UltraScale+
- Aligned to SOSA standard
- Air-Cooled / Conduction Cooled configurations available
- MIL-I-46058C compliant conformal coating (optional)

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Specifications

Physical Specifications
- 3U VPX 1.0" pitch
- Air-cooled or conduction cooled

SOSA RF Payload Slot Profile
- SLT3-PAY-1F1U1S1S1U1U2F1H-14.6.11-n

Virtex UltraScale+ FPGA
- XCVU9P (default)
- XCVU5P

Zynq UltraScale+ MPSoC
- XCZU3EG (Gen1)
- XCZU5EG (Gen2)

Application Processing Unit (Zynq)
- Quad-core ARM Cortex-A53 MPCore
- Up to 1.5GHz

Real-time Processing Unit (Zynq)
- Dual-core ARM Cortex-R5 MPCore
- Up to 600MHz

Memory
- Two 64-bit 8GBytes DDR4 (16GB total) memory blocks; up to 2400 Mb/s to FPGA
- 32-bit 2GBytes DDR4 memory to Zynq

FPGA Mezzanine Card (FMC) Support
- 1x HSPC FMC+ site (Gen2)
- Configurable with Abaco's FMC portfolio

SOSA Aligned VPX Backplane Options
- P1.1 to P1.4, 4x MGT @ 25.78125 Gb/s (10.3125 Gb/s in Gen1) line rate
- P1.5, 1x MGT @ 10.3125 Gb/s
- (1.25 Gb/s in Gen1) line rate
- P1.8, 1x MGT @ 10.3125 Gb/s
- (1.25 Gb/s in Gen1) line rate
- P1.9 to P1.12, 4x MGT @ 16.0 Gb/s
- (8.0 Gb/s in Gen1) line rate

### Flexible RF/Optical Backplane Options
- Dual NanoRF 10 port connector option in conduction cooled for ADC/DAC/ CLK/ TRIG (when used with an FMC)
- Dual 4-lane bidirectional optical interface via FireFly Gen2 (optional) - 100G Ethernet or Aurora independent channels up to 25 GB/s

Operating Temperature
- 0°C to +55°C (Level 1 air-cooled environment with 400 LFM mean airflow)
- -40°C to +70°C (Level D conduction cooled environment at the card thermal interface)

Block diagram*

* Intended as a reference for basic features and connections and not an actual product layout or design
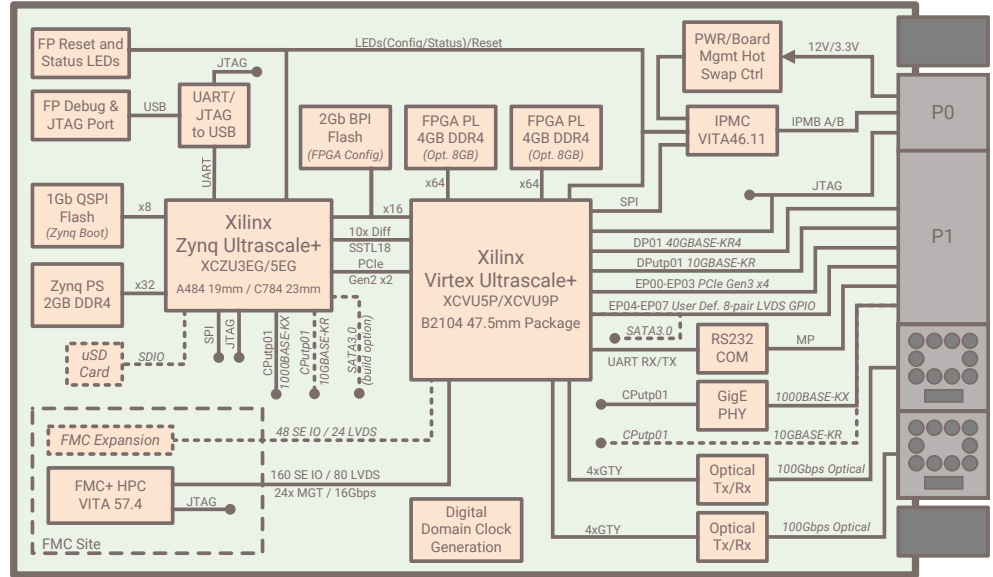
Ordering information

For available product part numbers, contact your local product expert.

Board Support Package (BSP)
- Open Source access to most of the firmware
  - 40G Ethernet with optional RoCEv2 (RDMA over Converged Ethernet) available
  - Xilinx PCIe DMA engine included
  - 100G Ethernet over optical interface available (optional 100Gbps Aurora)
  - Optional ANSI/VITA 49.2 VITA Radio Transport (VRT) subset protocol support for Software Defined Radios
- Open source Windows and Linux API
- For VxWorks, please contact Abaco Systems

Applications
- Electronic Warfare (EW)
- Signal Intelligence (SIGINT)
- Radar/Sonar
- Software Defined Radio (SDR)
- Multi-Function Communication Systems
- Telecommunications/Broadband Wireless
- Networking and Base Stations Equipment
- Ultra-Wide-Band Satellite Digital Receiver
- Optical and Photonics Instrumentation
- RF and EMI Test Instrumentation
- Biomedical Imaging – Medical Equipment

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