

# VP461

## 6U VPX Multicore Xilinx RFSoc, Virtex and MPSoC Processing System

The VP461 is a SOSA -Aligned 6U VPX multicore processing system with industry-leading performance that consolidates multiple RF and processing boards into a single slot. This gives system architects greater freedom in optimizing their applications around size, weight and power constraints such as communications, sensor processing, radar, electronic warfare, autonomous vehicles, renewable energy stations and semiconductor processing equipment.

Featuring dual Xilinx® Zynq® Ultrascale+™ RF system-on-chip technology (RFSoc), dual Xilinx Virtex™ Ultrascale+ FPGA devices and system management using a Xilinx Zynq multiprocessor system-on-chip (MPSoC), the VP461 offers 16 integrated high-bandwidth, high-resolution analog-to-digital converters (ADC) at 5GSPS, 16 digital-to-analog converters (DAC) at 9.85GSPS, high-density user programmable FPGA fabric, and a multi-core Arm processing subsystem, with multiple 100G Ethernet data paths to the backplane.

### Reduce RF Signal Chain Complexity

RF systems with multiple channels suffer from a cost- and complexity challenge. More channels mean more expensive and large RF signal up/down conversion and signal conditioning. As a solution, the VP461 enables high-speed, high-bandwidth, direct RF sampling which can be implemented in the digital domain, bringing greater flexibility to the signal processing chain. Additionally, close integration with RF sampling devices removes the complexity of JESD204B/C high-speed serial interface and reduces processing latency.

### Maximize Input/Output Channel Density

The VP461 is one of the densest 6U VPX analog FPGA carrier boards available with the ability to synchronize all 32 channels as well as multiple boards for even larger system applications.

### Revolutionary processing capability

The VP461 perfectly balances the need for high performance FPGA processing, the ease of a hardened embedded processor and the ultra-low latency of integrated analog interfaces. The revolutionary RF and DSP technology enables a user to create the most advanced multi-channel electronic warfare systems, radar, and SDR applications today.

### Offload Data More Efficiently

The VP461 has VPX backplane interfaces aligned with the SOSA RF payload slot profile, supporting multiple 100 Gigabit Ethernet and PCIe Gen3 x8 paths that support connections to a host computer or other payloads. Optional dual-channel 100 Gigabit Ethernet fiber optic interfaces are available for up to 50GB/s transfer rates.

### Chip-to-Chip and System Management

The MPSoC is the VP461 board manager that efficiently controls each of the four FPGA devices and connects with backplane peripherals, and can be used as a single-board computer (SBC), further optimizing slot-count. The MPSoC allows the VP461 to be configured with either single/dual RFSocs or single/dual Virtex FPGA devices, giving developers additional options to further optimize their systems.

It can operate standalone, or paired with multiple VP461 or with Abaco's extensive portfolio of boards including SBC's, GPGPUs and fabric switches.

### FEATURES:

- Aligned to SOSA standard
- Multicore FPGA Architecture:
  - Dual Zynq UltraScale+ RFSoc
  - Dual Virtex UltraScale+
  - Zynq UltraScale+ MPSoC
- 16-channel ADC: 5GSPS @ 14-bit
- 16-channel DAC: 9.85GSPS @ 14-bit
- 36 RF-to-backplane (NanoRF)
- Independent clock generation circuits for the ADC and DAC front ends
- Application Processing Unit
  - Quad-core Arm Cortex-A53
- Real-Time Processing Unit
  - Dual-core Arm Cortex-R5F
- Up to 24 GB DDR4 memory available to the RFSoc
- Up to 32 GB DDR4 memory available to the Virtex UltraScale+
- Multiple 100 Gigabit Ethernet over copper
- Optional dual-channel 100 Gigabit optical interface
- Dual PCIe Gen3 x8
- High-speed low-latency chip-to-chip communication and data transfers
- Optional MORA, VITA 49.2, REDHAWK and GNU Radio support available

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Specifications

**Physical Specifications**

- 6U VPX 1.0" pitch

**SOSA RF Payload Slot Profile**

- SLT6-PAY-4F2Q1H4U1T1S1S1TU2U2T1H-10.6.4-4

**RF/FPGA/Processing**

- Single or Dual Xilinx Zynq UltraScale+ RFSoc XCZU47DR
- Single or Dual Xilinx Virtex UltraScale+ XCVU9P or XCVU13P
- Xilinx MPSoC UltraScale+ XCZU11EG

**Memory**

- RFSoc: Up to 12GBytes DDR4 each (24GB total) at up to 2400Mb/s
- Virtex: Up to 16GBytes DDR4 each (32GB total) at up to 2400Mb/s
- MPSoC: Up to 12GB DDR4 at up to 2400Mb/s

**ADC and DAC**

- ADC: Up to 16-channels, 14-bit, 5GSPS with DDC
- DAC: Up to 16-channels, 14-bit, 9.85GSPS with DUC

**Programmable FPGA Logic**

**RFSoc**

- 930K System Logic Cells
- 425K CLB LUTs
- 4,272 DSP Slices

**Virtex UltraScale+ VU9P/VU13P**

- 2,586K/3780K System Logic Cells
- 2,364K/3456K CLB LUTs
- 6,840/12,288 DSP Slices

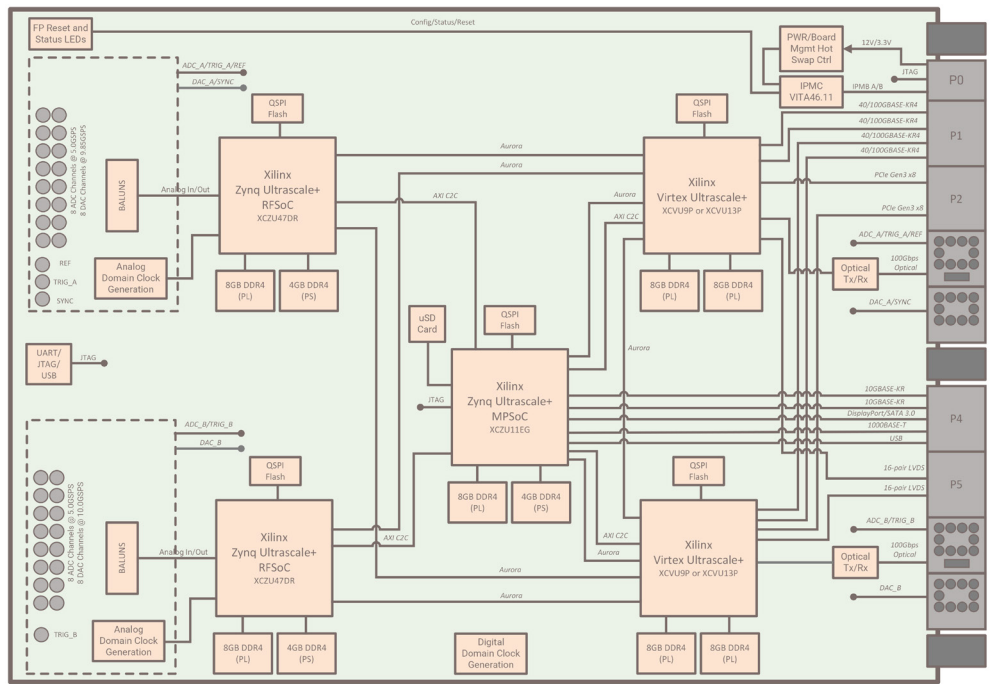
**Application Processing Unit**

- Quad-core ARM Cortex-A53 MPCore
- Up to 1.5GHz

**Real-time Processing Unit**

- Dual-core ARM Cortex-R5F MPCore
- Up to 600MHz

Block diagram



**Board Support Package**

- 40/100G Ethernet with optional RoCEv2 (RDMA over Converged Ethernet) available
- Xilinx PCIe DMA engine included
- 100G Ethernet over optical interface available (optional 100Gbps Aurora)
- Optional MORA, VITA 49.2 Radio Transport (VRT), REDHAWK and GNU Radio support available
- Open source Linux API
- For Windows and VxWorks support, please contact Abaco.

**Environment**

- Operating Temperature: -40°C to +70°C



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Abaco Systems is a business unit of AMETEK, Inc., a leading global manufacturer of electronic instruments and electromechanical devices with 2021 sales of more than \$5.5 billion.