

VPX3-ZU1B-SDR Products Brief

3U OpenVPX Solutions for SDR/EW with ADI's RadioVerse RF Transceivers

June 2025

Version 3.0

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Overview

PanaTeQ's VPX3-ZU1B-SDR are 3U OpenVPX modules based on the Zynq UltraScale+ MPSoC device from AMD coupled to RadioVerse Analog Devices RF Wideband Transceivers **AD9361, AD9371, AD9375, ADRV9009, ADRV9026, ADRV9029 or ADRV9002** for a broad range of applications such as Software Defined Radio, MILCOM, massive MIMO, Phase Array Radar and Electronic Warfare.

PanaTeQ provides solutions for **Ruggedized Air-Cooled** and **Conduction Cooled** systems.

These VPX3-ZU1B-SDR modules are based on the following PanaTeQ's sub-modules (boards):

The **VPX3-ZU1B** is a 3U OpenVPX module based on a AMD Zynq Ultrascale+ MPSoC with a FMC 57.1 site, HW/SW compatible with ZCU102 Evaluation board from AMD.

The **FMC-ZU1RF-A** is a FMC based on an Analog Devices AD9371, HW/SW compatible with ADRV9371 Evaluation Board from Analog Devices.

The **FMC-ZU1RF-B** is a FMC based on an Analog Devices AD9375, HW/SW compatible with ADRV9371 Evaluation board from Analog Devices.

The **FMC-ZU2RF-A** is a FMC based on an Analog Devices ADRV9009, HW/SW compatible with ADRV9009 Evaluation board from Analog Devices.

The **FMC-ZU3RF-A** is a FMC based on an Analog Devices ADRV9029.

The **FMC-ZU3RF-B** is a FMC based on an Analog Devices ADRV9026.

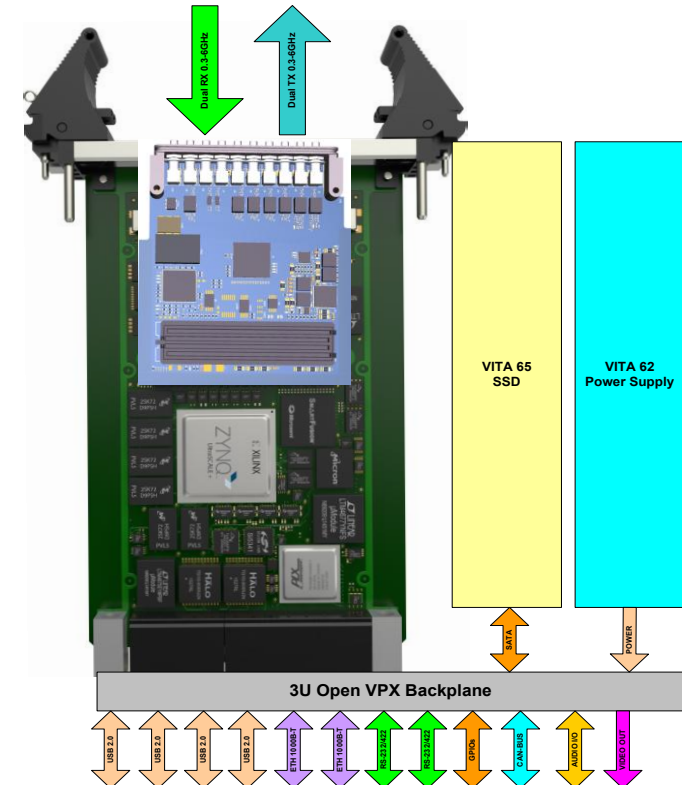
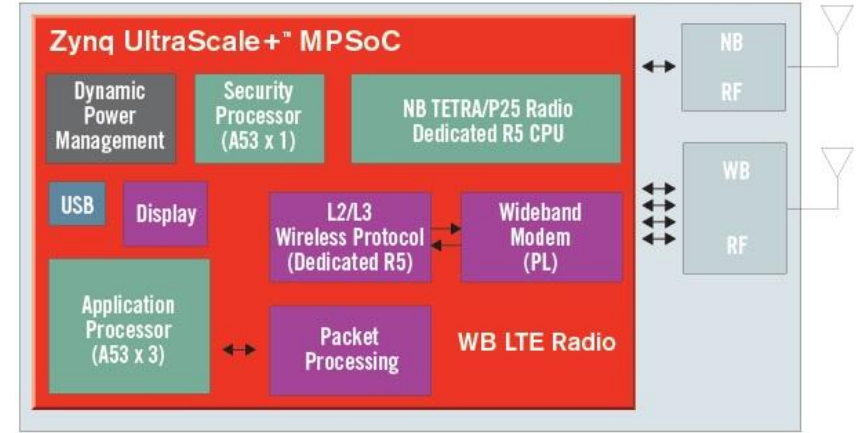
The **FMC-ZU4RF-A** is a FMC based on an Analog Devices ADRV9002.

The **FMC-ZU4RF-B** is a FMC based on dual Analog Devices ADRV9002.

The **FMC-SDR400** is a FMC based on an Analog Devices AD9361.

VPX3-ZU1B-SDR-PSDK

Air Cooled Development Systems



Analog Devices RF Transceivers Comparison

Part #	RF Tuning Range	Channels	Tunable Channel Bandwidth	Interface	Digital Pre Distorsion (DPD)	TDD/FDD
AD9361	70MHz - 6GHz	2Rx, 2Tx	200KHz - 56MHz	LVDS JESD207	N/A	Both
AD9371	300MHz - 6GHz	2Rx, 2Tx	8MHz - 100MHz	6Gbps JESD204B	N/A	Both
AD9375	300MHz - 6GHz	2Rx, 2Tx	8MHz - 100MHz	6Gbps JESD204B	Linearization BW up to 40MHz	Both
ADRV9009	75MHz - 6GHz	2Rx, 2Tx	200MHz	12Gbps JESD204B	N/A	TDD Only
ADRV9026	75MHz - 6GHz	4Rx, 4Tx	200MHz	24Gbps JESD204C	N/A	Both
ADRV9029	75MHz - 6GHz	4Rx, 4Tx	200MHz	24Gbps JESD204C	DPD + DPE	Both
ADRV9002	30MHz – 6GHz	2Rx, 2Tx	12 KHz - 40 MHz	LVDS	Linearization BW up to 20MHz	Both

VPX3-ZU1B-SDR Products Table

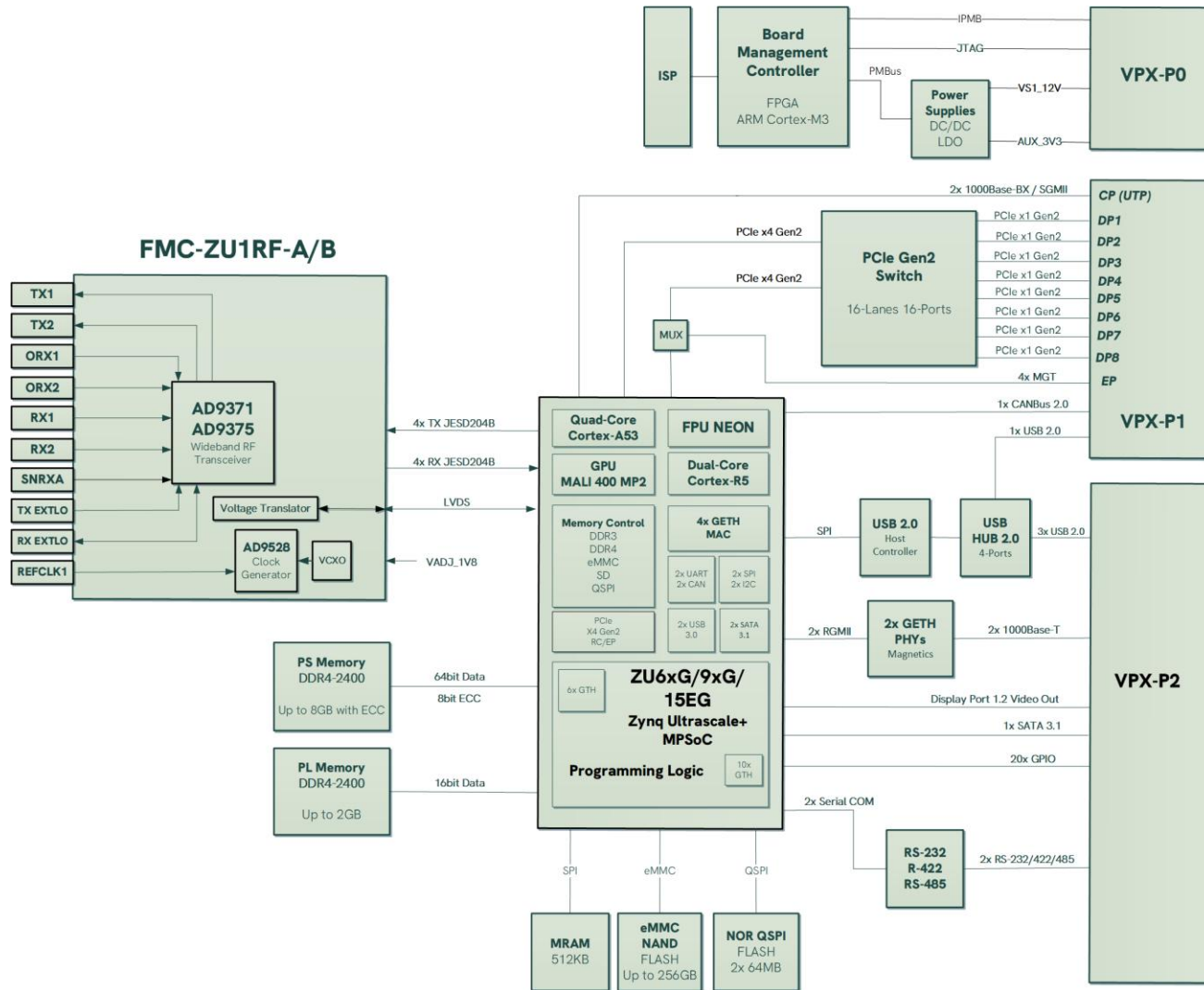
Product Name	Zynq MPSOC	RF Transceiver	MIMO	ADI Eval Board	Availability
VPX3-ZU1B-SDR-A	ZU6/ZU9/ZU15	AD9371	2T2R	ADRV9371-W	Now
VPX3-ZU1B-SDR-B	ZU6/ZU9/ZU15	AD9375	2T2R	ADRV9375-W	Now
VPX3-ZU1B-SDR-C	ZU6/ZU9/ZU15	ADRV9009	2T2R	ADRV9009-W	Now
VPX3-ZU1B-SDR-DA	ZU6/ZU9/ZU15	ADRV9029	4T4R	ADS9-V2EBZ	Contact Us
VPX3-ZU1B-SDR-DB	ZU6/ZU9/ZU15	ADRV9026	4T4R	ADS9-V2EBZ	Contact Us
VPX3-ZU1B-SDR400	ZU6/ZU9/ZU15	AD9361	2T2R	AD-FMCOMMS3-EBZ	Now
VPX3-ZU1B-SDR-FA	ZU6/ZU9/ZU15	ADRV9002	2T2R		Contact Us
VPX3-ZU1B-SDR-FB	ZU6/ZU9/ZU15	2x ADRV9002	4T4R		Contact Us

VPX3-ZU1B-SDR-A/B Features

Technical Specifications

- 3U VPX (**VITA 46.0**) and OpenVPX (**VITA 65**) specifications compliant
- Compatibility with ADI Eval boards **ADRV9371** (-A model), **ADRV9375** (-B model)
- **AD9371** (-A model), **AD9375** (-B model) RF Wideband Transceivers
- Two TX and Two RX coherent channels synchronized in frequency and phase
- Wide tuning range 300MHz to 6GHz
- Max receiver BW 100MHz. Up to 200MHz using 2 receivers
- Max transmitter synthesis BW 250MHz
- On-board AMD **Zynq UltraScale+ MPSoC** as Baseband processor
- Compatibility with AMD Eval Board **ZCU102**
- **ZU6/ZU9/ZU15** FFVC-900 Package
- Up to 8GB DDR4-2400 64-bit Processing System (PS) memory with 8-bit ECC
- Up to 2GB DDR4-2400 16-bit Programmable Logic (PL) memory
- eMMC 64GB (V4.51), MRAM 512KB
- On-board **PCIe Gen2 Switch** PEX8619, 16-Ports 16-Lanes. No SBC required in the VPX System
- 2x 1000Base-T on VPX-P2 and 2x 1000Base-X/SGMII on VPX-P1
- 2x RS-232/422/485, 2x CAN 2.0B and 20x GPIOs (LVCMOS 2.5V or LVDS 2.5V) on VPX-P2
- 4x USB 2.0, 1x SATA 3.1 and DisplayPort 1.2 Video Out on VPX-P2
- Advanced PanaTeQ Board Management Controller (BMC) ARM M3 based and Power Management Bus (PMBus)
- Industrial Air Cooled and Conduction Cooled (**VITA 48.0**) versions available

VPX3-ZU1B-SDR-A/B Block Diagram

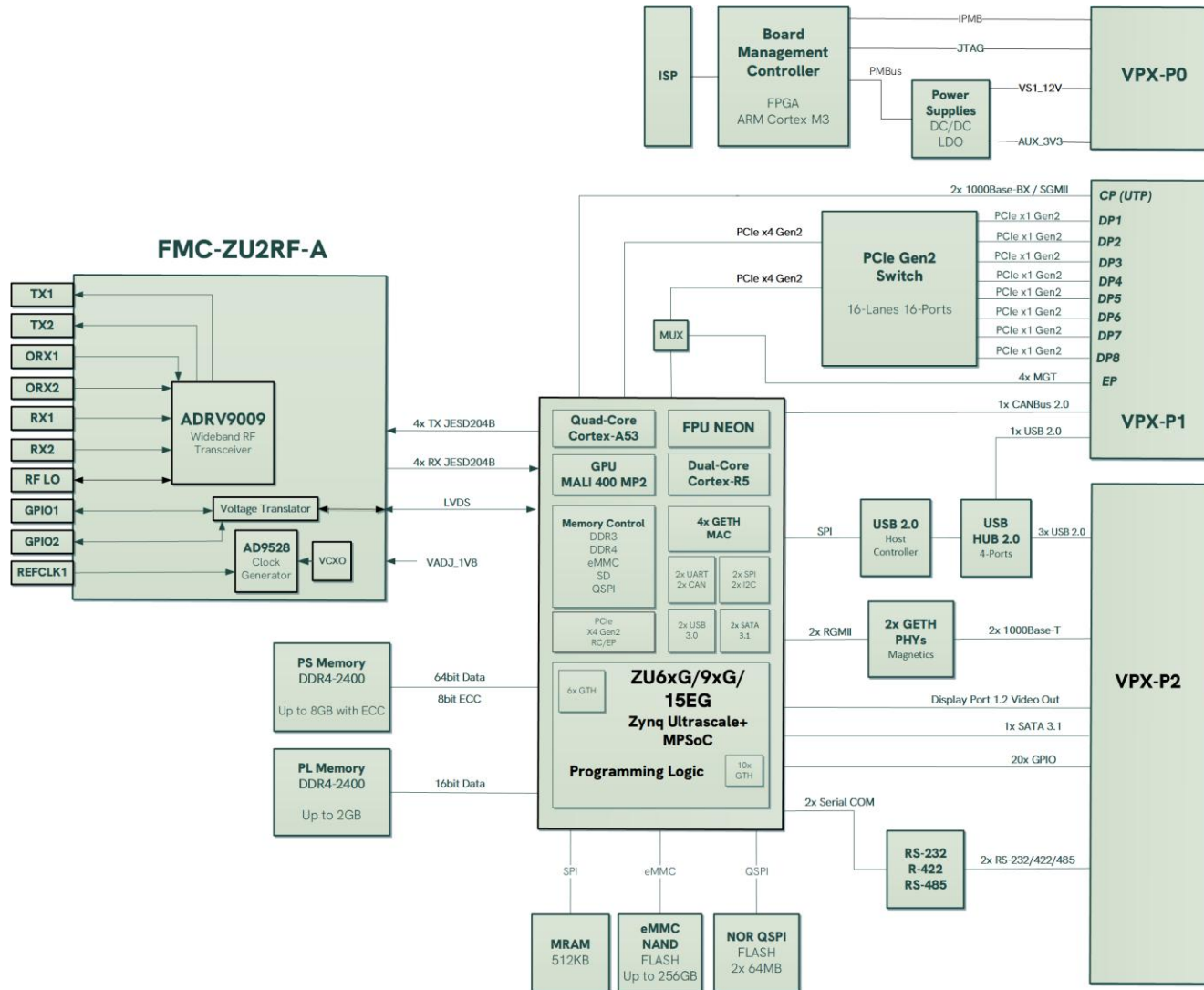


VPX3-ZU1B-SDR-C Module Features

Technical Specifications

- 3U VPX (**VITA 46.0**) and OpenVPX (**VITA 65**) specifications compliant
- Compatibility with ADI Eval boards **ADRV9009**
- **ADRV9009** RF Wideband Transceiver
- Two TX and Two RX coherent channels synchronized in frequency and phase
- Wide tuning range 75MHz to 6GHz
- Max receiver BW 200MHz. Up to 400MHz using 2 receivers
- Max transmitter synthesis BW 450MHz
- On-board AMD **Zynq UltraScale+ MPSoC** as Baseband processor
- Compatibility with AMD Eval Board **ZCU102**
- **ZU6/ZU9/ZU15** FFVC-900 Package
- Up to 8GB DDR4-2400 64-bit Processing System (PS) memory with 8-bit ECC
- Up to 2GB DDR4-2400 16-bit Programmable Logic (PL) memory
- eMMC 64GB (V4.51), MRAM 512KB
- On-board **PCIe Gen2 Switch** PEX8619, 16-Ports 16-Lanes. No SBC required in the VPX System
- 2x 1000Base-T on VPX-P2 and 2x 1000Base-X/SGMII on VPX-P1
- 2x RS-232/422/485, 2x CAN 2.0B and 20x GPIOs (LVCMOS 2.5V or LVDS 2.5V) on VPX-P2
- 4x USB 2.0, 1x SATA 3.1 and DisplayPort 1.2 Video Out on VPX-P2
- Advanced PanaTeQ Board Management Controller (BMC) ARM M3 based and Power Management Bus (PMBus)
- Industrial Air Cooled and Conduction Cooled (**VITA 48.0**) versions available

VPX3-ZU1B-SDR-C Block Diagram

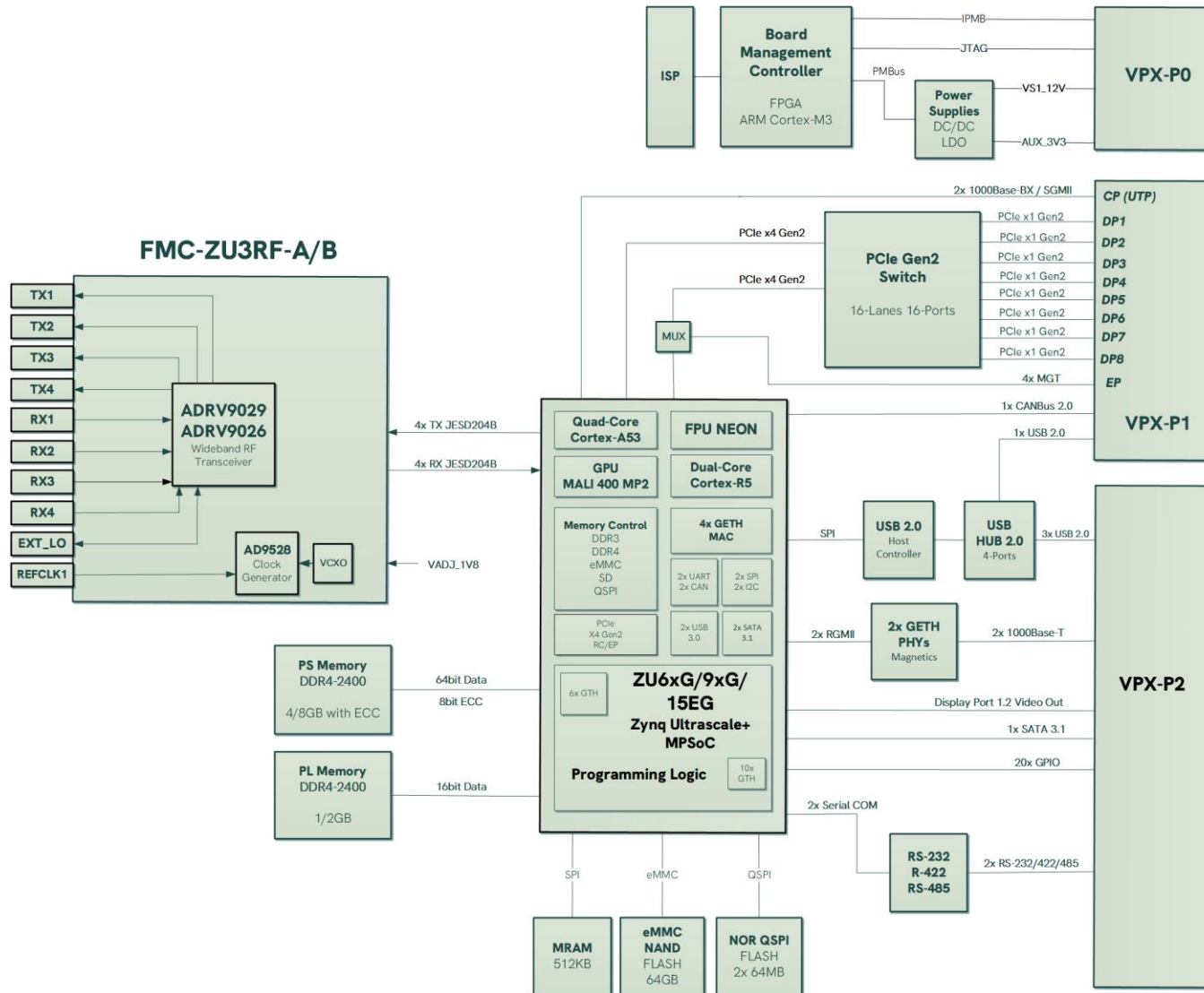


VPX3-ZU1B-SDR-DA/DB Module Features

Technical Specifications

- 3U VPX (**VITA 46.0**) and OpenVPX (**VITA 65**) specifications compliant
- Compatibility with ADI Eval boards **ADRV9029/ADRV9026** (single Transceiver)
- **Analog Devices ADRV9029 (-DA) or ADRV9026 (-DB) RF Transceiver**
- Four TX and Four RX coherent channels synchronized in frequency and phase
- Wide tuning range 75MHz to 6GHz
- Max receiver BW 200MHz
- Max transmitter synthesis BW 450MHz
- On-board AMD **Zynq UltraScale+ MPSoC** as Baseband processor
- Compatibility with AMD Eval Board **ZCU102**
- **ZU6/ZU9/ZU15** FFVC-900 Package
- Up to 8GB DDR4-2400 64-bit Processing System (PS) memory with 8-bit ECC
- Up to 2GB DDR4-2400 16-bit Programmable Logic (PL) memory
- eMMC 64GB (V4.51), MRAM 512KB
- On-board **PCIe Gen2 Switch** PEX8619, 16-Ports 16-Lanes. No SBC required in the VPX System
- 2x 1000Base-T on VPX-P2 and 2x 1000Base-X/SGMII on VPX-P1
- 2x RS-232/422/485, 2x CAN 2.0B and 20x GPIOs (LVCMOS 2.5V or LVDS 2.5V) on VPX-P2
- 4x USB 2.0, 1x SATA 3.1 and DisplayPort 1.2 Video Out on VPX-P2
- Advanced PanaTeQ Board Management Controller (BMC) ARM M3 based and Power Management Bus (PMBus)
- Industrial Air Cooled and Conduction Cooled (**VITA 48.0**) versions available

VPX3-ZU1B-SDR-DA/DB Block Diagram

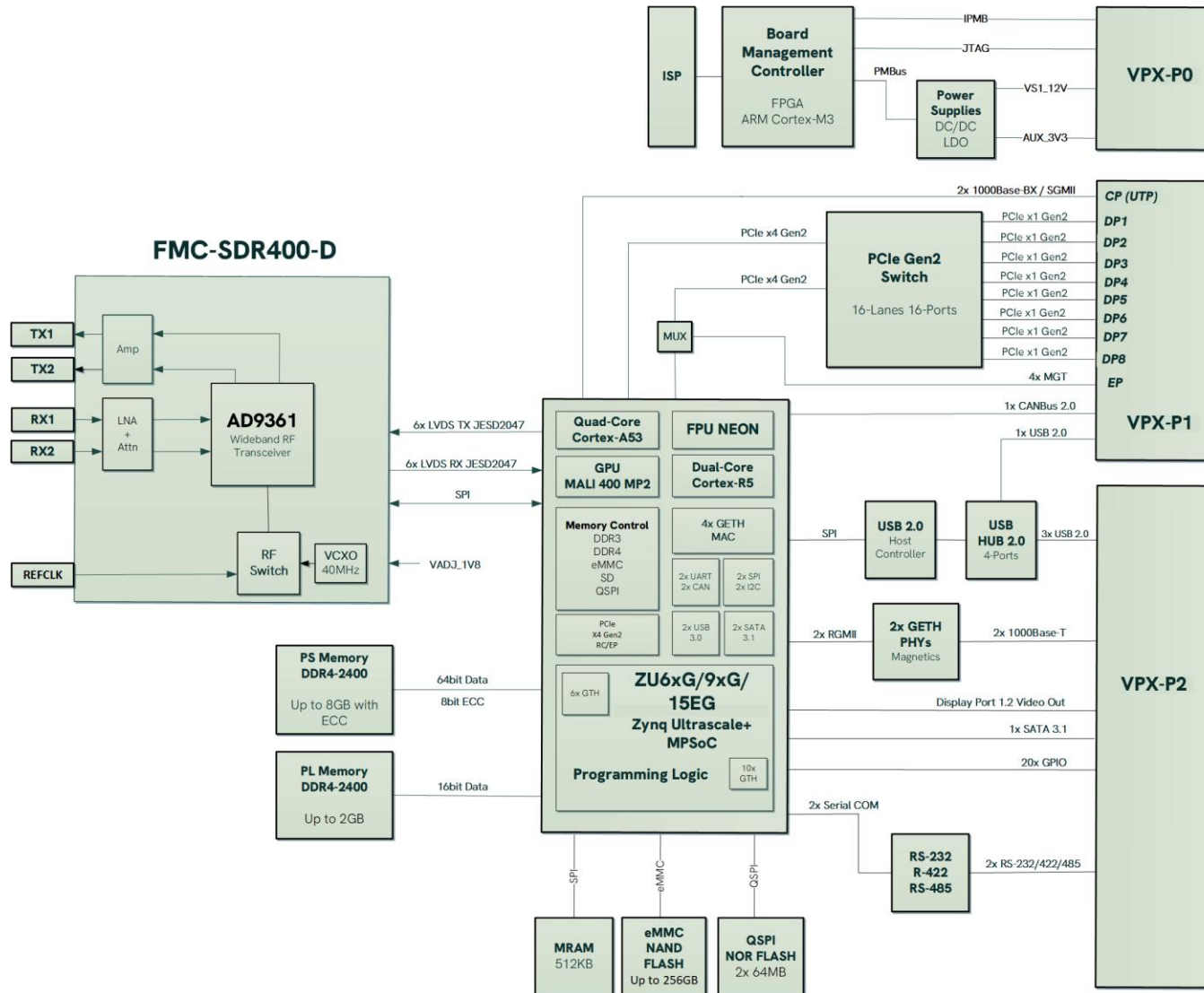


VPX3-ZU1B-SDR400 Module Features

Technical Specifications

- 3U VPX (**VITA 46.0**) and OpenVPX (**VITA 65**) specifications compliant
- Compatibility with ADI Eval boards **AD9361** (single Transceiver)
- **AD9361** RF Wideband Transceiver
- Dual TX and Dual RX coherent channels synchronized in frequency and phase
- Wide tuning range 70MHz to 6GHz
- Min receiver BW 200KHz. Max receiver BW 56MHz
- On-board AMD **Zynq UltraScale+ MPSoC** as Baseband processor
- Compatibility with AMD Eval Board **ZCU102**
- **ZU6/ZU9/ZU15** FFVC-900 Package
- Up to 8GB DDR4-2400 64-bit Processing System (PS) memory with 8-bit ECC
- Up to 2GB DDR4-2400 16-bit Programmable Logic (PL) memory
- eMMC 64GB (V4.51), MRAM 512KB
- On-board **PCIe Gen2 Switch** PEX8619, 16-Ports 16-Lanes. No SBC required in the VPX System
- 2x 1000Base-T on VPX-P2 and 2x 1000Base-X/SGMII on VPX-P1
- 2x RS-232/422/485, 2x CAN 2.0B and 20x GPIOs (LVCMOS 2.5V or LVDS 2.5V) on VPX-P2
- 4x USB 2.0, 1x SATA 3.1 and DisplayPort 1.2 Video Out on VPX-P2
- Advanced PanaTeQ Board Management Controller (BMC) ARM M3 based and Power Management Bus (PMBus)
- Industrial Air Cooled and Conduction Cooled (**VITA 48.0**) versions available

VPX3-ZU1B-SDR400 Block Diagram

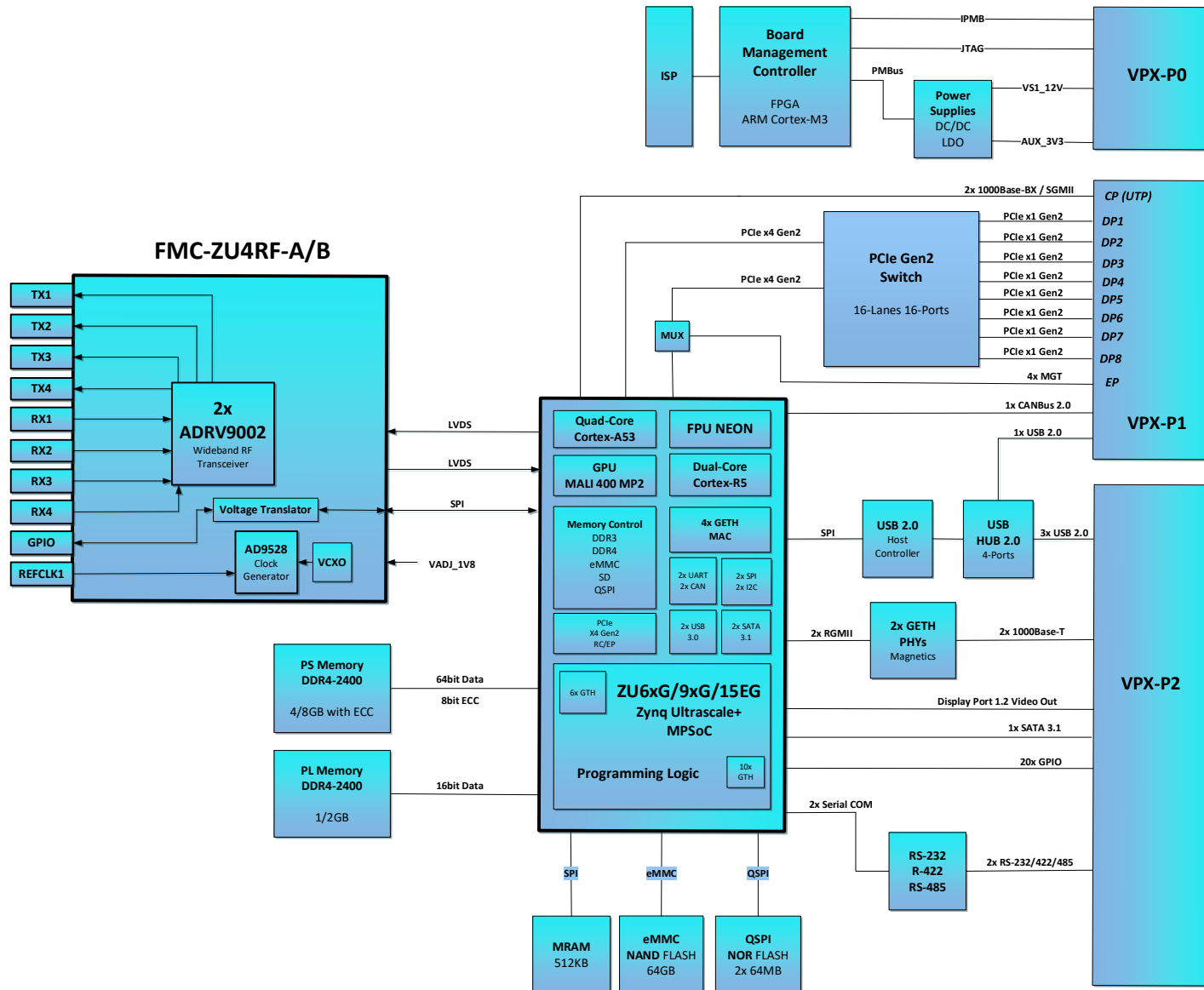


VPX3-ZU1B-SDR-FA/FB Module Features

Technical Specifications

- 3U VPX (**VITA 46.0**) and OpenVPX (**VITA 65**) specifications compliant
- **Single ADRV9002 (FA) or Dual ADRV9002 (FB)** RF Wideband Transceiver
- Dual TX and Dual RX coherent channels synchronized in frequency and phase
- Wide tuning range 30MHz to 6GHz
- Min receiver BW 12KHz. Max receiver BW 40MHz
- On-board AMD **Zynq UltraScale+ MPSoC** as Baseband processor
- Compatibility with AMD Eval Board **ZCU102**
- **ZU6/ZU9/ZU15** FFVC-900 Package
- Up to 8GB DDR4-2400 64-bit Processing System (PS) memory with 8-bit ECC
- Up to 2GB DDR4-2400 16-bit Programmable Logic (PL) memory
- eMMC 64GB (V4.51), MRAM 512KB
- On-board **PCIe Gen2 Switch** PEX8619, 16-Ports 16-Lanes. No SBC required in the VPX System
- 2x 1000Base-T on VPX-P2 and 2x 1000Base-X/SGMII on VPX-P1
- 2x RS-232/422/485, 2x CAN 2.0B and 20x GPIOs (LVCMOS 2.5V or LVDS 2.5V) on VPX-P2
- 4x USB 2.0, 1x SATA 3.1 and DisplayPort 1.2 Video Out on VPX-P2
- Advanced PanaTeQ Board Management Controller (BMC) ARM M3 based and Power Management Bus (PMBus)
- Industrial Air Cooled and Conduction Cooled (**VITA 48.0**) versions available

VPX3-ZU1B-SDR-FA/FB Block Diagram



Estimated Power Budget (VPX 12V)

Estimated Worst Case Power Budget

- AMD Zynq UltraScale+ ZU9G = 10-30 W
- 6 x 4 Gbit DDR4-2400 (2 GB + 512MB) = 4W
- PCIe Switch = 3W
- Miscellaneous = 4W
- DC/DC = 4W
- FMC RF = 10W

Summary

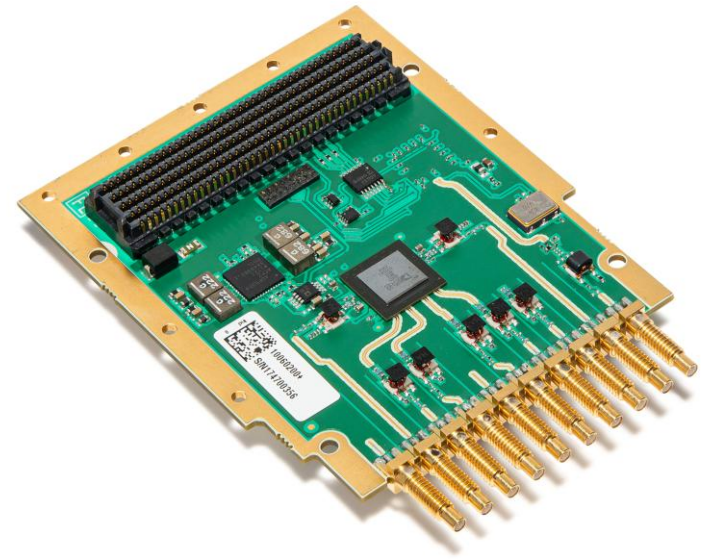
- Low Power configuration = 35 W
- Standard configuration = 45W
- High-performance configuration = 55W

FMC-ZU1RF-A/B

FMC Wideband RF Transceiver AD9371/AD9375 based

Technical Specifications

- Vita 57.1-2010 specification compliant
- FMC High Pin Connector (HPC)
- Analog Devices AD9371 (-A) or AD9375 (-B) RF Transceiver
- JESD024B interface up to 6144 Mbps (4x TX, 4x RX)
- LA Bus LVDA and Single-Ended
- Operates with $V_{Adj} = 2.5V$ to $1.8V$
- ADRV9371 (-A) ADRV9375 (-B) ADI eval boards HW/SW
- Dual Receivers (Rx)
- Observation Receiver (ORx) with two input
- Sniffer Receiver (SnRx) with 1 input
- TX Ext LO Input/Output. RX Ext LO Input/Output
- Reference Clock Input
- RF Coverage 300MHz to 6.0 GHz. Tx Synthesis Bandwidth (BW) to 250MHz. Rx Bandwidth: 7MHz to 100MHz
- Industrial Air Cooled and Conduction Cooled versions

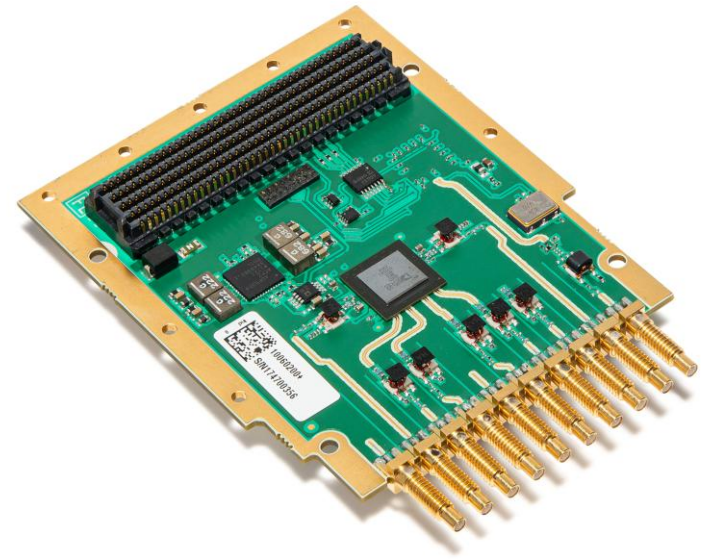


FMC-ZU2RF-A

FMC Wideband RF Transceiver ADRV9009 based

Technical Specifications

- Vita 57.1-2010 specification compliant
- FMC High Pin Connector (HPC)
- Analog Devices ADRV9009 RF Transceiver
- JESD024B interface up to 12288 Mbps (4x TX, 4x RX)
- LA Bus LVDA and Single-Ended
- Operates with $V_{Adj} = 2.5V$ to $1.8V$
- ADRV9009 ADI eval board HW/SW compatible
- Dual Transmitters (Tx)
- Dual Receivers (Rx)
- Observation Receiver (ORx) with two input
- RF Ext LO Input/Output. RX Ext LO Input/Output
- Dual FPGA GPIO Input/Output 3.3V to/from FMC
- Reference Clock Input
- RF Coverage 75MHz to 6.0 GHz. Tx Synthesis Bandwidth (BW) to 450MHz. Rx Bandwidth: 7MHz to 200MHz
- Industrial Air Cooled and Conduction Cooled versions

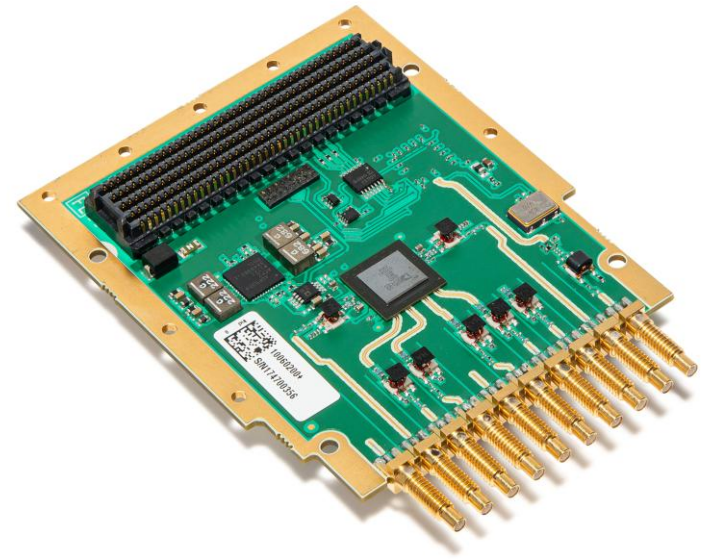


FMC-ZU3RF-A/B

FMC Wideband RF Transceiver ADRV9029/ADRV9026 based

Technical Specifications

- Vita 57.1-2010 specification compliant
- Analog Devices ADRV9029 (-A) or ADRV9026 (-B) RF Transceiver
- FMC High Pin Connector (HPC)
- JESD024B interface up to 12288 Mbps (4x TX, 4x RX)
- LA Bus LVDA and Single-Ended
- Operates with $V_{Adj} = 2.5V$ to $1.8V$
- ADRV9029 (single chip) ADI eval board HW/SW compatible
- Quad Transmitters (Tx)
- Quad Receivers (Rx)
- Four TX and Four RX coherent channels synchronized in frequency and phase
- RF Ext LO Input/Output. RX Ext LO Input/Output
- Reference Clock Input
- RF Coverage 75MHz to 6.0 GHz. Tx Synthesis Bandwidth (BW) to 450MHz. Rx Bandwidth: 7MHz to 200MHz
- Industrial Air Cooled and Conduction Cooled versions

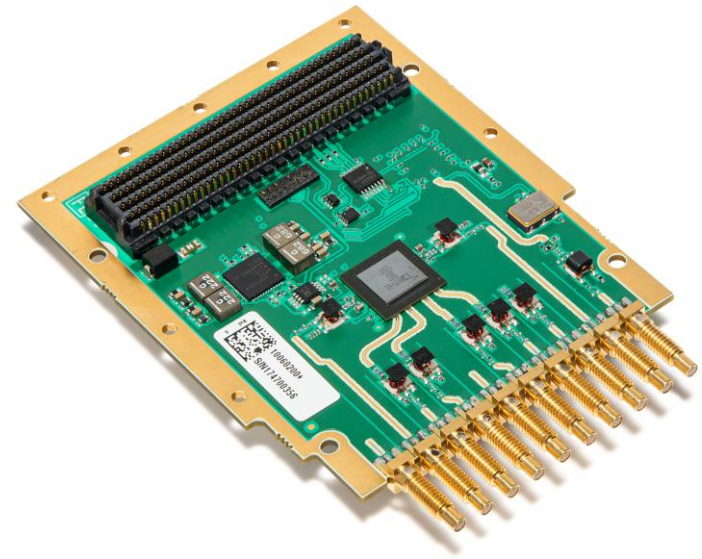


FMC-ZU4RF-A/B

FMC Wideband RF Transceiver ADRV9002 based

Technical Specifications

- Vita 57.1-2010 specification compliant
- Single (-A) or Dual (-B) Analog Devices ADRV9002 RF Transceivers
- FMC High Pin Connector (HPC)
- LVDS (4x TX, 4x RX)
- LA Bus LVDA and Single-Ended
- Operates with $V_{Adj} = 2.5V$ to $1.8V$
- Dual or Quad Transmitters (Tx)
- Dual or Quad Receivers (Rx)
- Four TX and Four RX coherent channels synchronized in frequency and phase
- Reference Clock Input
- RF Coverage 30MHz to 6.0 GHz. Tunable Bandwidth: 12KHz to 40MHz
- Industrial Air Cooled and Conduction Cooled versions

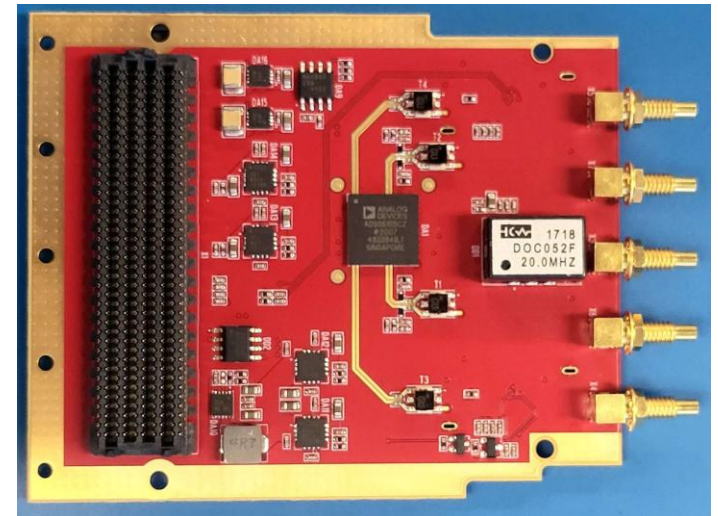


FMC-SDR400

FMC Wideband RF Transceiver AD9361 based

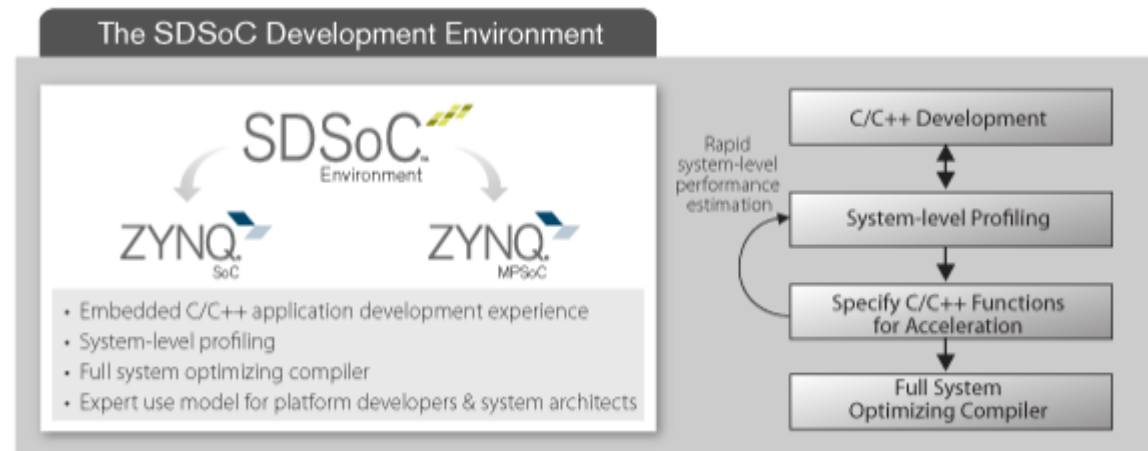
Technical Specifications

- Vita 57.1 FMC LPC connector for interfacing with VPX3-ZU1B carrier
- 5 SSMC 2x TX, 2x RX, 1x REFCLK In
- RF Input frequency range 0.1 GHz – 6 GHz, input Bandwidth –up to 56 MHz;
- Input LNA HMC8410LP2FE
- Input tunable attenuator is HMC624A
- RF Output specifications: Output frequency range 50MHz – 6 GHz
- TX path contains 22 dB TX amplifier ADL5611
- 1 external reference clock input connector. Input range: 10 – 80 MHz;
- Internal 40 MHz VCXO, +-100ppb, as option can be used 40 MHz TCXO
- Preliminary power consumption: 12V – Max 0.6A, 3V3 – Max 2A, VADJ – Max 0.1A
- VADJ supported 1.8V, 2.5V.



AMD Development Tools Support

AMD SDSoC: Familiar Embedded C/C++ Application Development Experience for SoCs and MPSoCs



AMD Vivado HLx: Accelerating High Level Design



Third Party Development Tools Support

Platform development environment support includes Industry Standard :

- Linux Industrial I/O Applications
- MATLAB
- SIMULINK
- GNU RADIO
- Streaming Interface for custom C, C++ , PYTHON and C#

Analog Devices (Open Source) HDL reference design and driver to allow optimized Time To Market

Software BSP Support

LINUX

AMD PetaLinux (from PanaTeQ and free of charge)

Yocto Linux

Mentor Embedded Linux

Windriver Linux

RTOS & Bare Metal

AMD SDK

Green Hill Software Integrity 11

FreeRTOS

Wind River VxWorks 7

Sysgo PikeOS

QNX

Product Codification for Ordering

VPX3-ZU1B-SDR- a - b c d – rl – k - e

a	RF Transceiver	b	Device Size	ARM A53 Cores	GPU Mali	Logic Cells	DSP Slices	Memory
A	AD9371	A	XCZU6EG	4	Yes	469K	1973	25.1 Mb
B	AD9375	B	XCZU9EG	4	Yes	600K	2530	32 Mb
C	ADRV9009	C	XCZU15EG	4	Yes	747K	3528	57.7 Mb
DA	ADRV9029	D	XCZU6CG	2	No	469K	1973	25.1 Mb
DB	ADRV9026	E	XCZU9CG	2	No	600K	2530	32 Mb
SDR400	AD9361	c	Speed Grade	rl	Ruggedization Level		Vita 47	
FA	ADRV9002	1	Standard	AS	Air Standard		EAC4	
FB	2xADRV9002	2	Fast	AR	Air Rugged		EAC6	
		d	PS / PL DDR4	CC	Conduction Cooled		ECC3	
		M	4GB / 1GB	CR	Conduction Rugged		ECC4	
		P	8GB / 2GB	k	Backplane Connectors		e	Tropicalization
				k	KVPX Connectors		e	Conformal Coating

Thank You

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