FMC Wideband RF Transceiver AD9371 based

Overview

The **FMC-ZU1RF-A** is a FMC for RF wireless communications applications based on the AD9371 component from Analog Device Inc (ADI).

This FMC is fully hardware and software compatible with the ADRV9371 evaluation board from ADI.

The **AD9371** component is a highly integrated, wideband RF transceiver offering dual channel transmitters and receivers, integrated synthesizers, and digital signal processing functions. The IC delivers a versatile combination of high performance and low power consumption required by 3G/4G micro and macro base station equipment in both FDD and TDD applications.

The AD9371 operates from **300 MHz to 6000 MHz**, covering most of the licensed and unli-censed cellular bands. The IC supports receiver bandwidths up to **100 MHz**. It also supports observation receiver and transmit synthesis bandwidths up to 250 MHz to accommodate digital correction algorithms.

The transceiver consists of wideband direct conversion signal paths with state-of-the-art noise figure and linearity. Each complete receiver and transmitter subsystem includes dc offset correc-tion, quadrature error correction, and programmable digital filters, eliminating the need for these functions in the digital baseband.

Several auxiliary functions such as an auxiliary analog-to-digital converter (ADC), auxiliary digital-to-analog converters (DACs), and general-purpose input/outputs (GPIOs) are integrated to provide additional monitoring and control capability.

An observation receiver channel with two inputs is included to monitor each transmitter output and implement interference mitigation and calibration applications. This channel also connects to three sniffer receiver inputs that can monitor radio activity in different bands.

The high speed **JESD204B** interface supports lane rates up to 6144 Mbps. Four lanes are dedicated to the transmitters and four lanes are dedicated to the receiver and observation receiver channels.

The fully integrated phase-locked loops (PLLs) provide high performance, low power fractional-N frequency synthesis for the transmitter, the receiver, the observation receiver, and the clock sections. Careful design and layout techniques provide the isolation demanded in high perfor-mance base station applications. All voltage controlled oscillator (VCO) and loop filter components are integrated to minimize the external component count.

PanaTeQ offers the **VPX3-ZU1B-SDR-A** development system based on the VPX3-ZU1B 3U OpenVPX Zynq Ultrascale+ and the FMC-ZU1RF-A for typical Software Defined Radio application.

Key Features

- Vita 57.1-2010 specification compliant
- FMC High Pin Connector (HPC)
- JESD024B interface up to 6144 Mbps
  - 4x Tx
  - 4x Rx
- LA Bus LVDS and Singled-Ended
- Operates with VAdj = 2.5V to 1.5V
- Air and Conduction Cooled compatible
- Fully ADRV9371 HW/SW compatible
- Dual Transmitters (Tx)
- Dual Receivers (Rx)
- Observation Receiver (ORx) with 2 inputs
- Sniffer Receiver (SnRx) with 1 input
- TX Ext LO Input/Output
- RX Ext LO Input/Output
- Reference Clock Input or Output
- FPGA GPIO direct Input or Output
- RF Coverage 300MHz to 6.0 GHz
- Tx Synthesis Bandwidth (BW) to 250MHz
- Rx Bandwidth: 7MHz to 100MHz
- Support Time Division Duplex (TDD)
- Support Frequency Division Duplex (FDD)
- Fully integrated independent fractional-N radio frequency synthesizers
- On-board VCXO : 100.000MHz, 122.880MHz, 153.600MHz or 156.250MHz

Typical Applications

- Software Defined Radio
- Wireless Infrastructure 3G/4G
- FDD and TDD active Antenna Systems
- Electronic Warfare
- Drones and UAVs
- Military Communications

Bloc Diagram
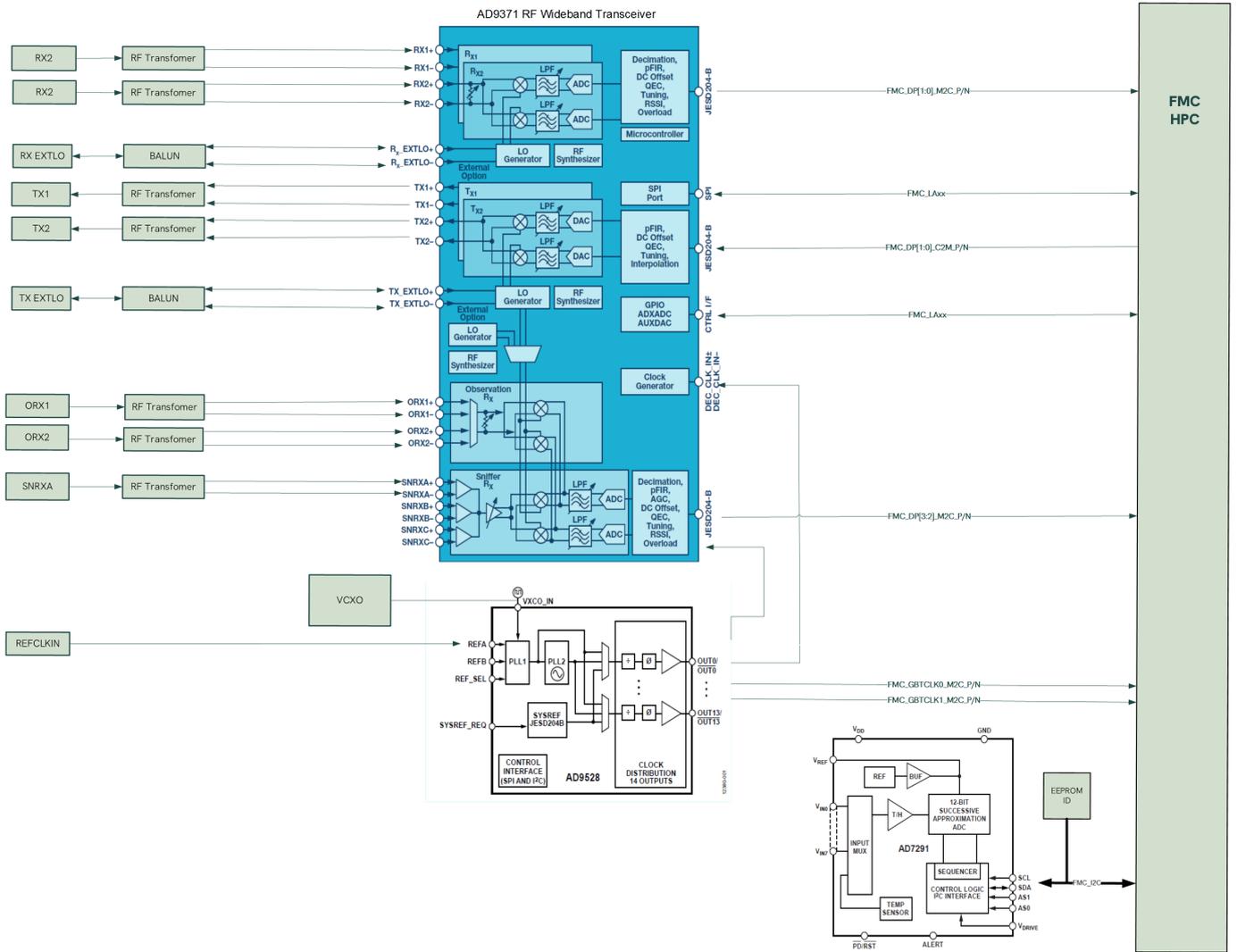
Board Picture
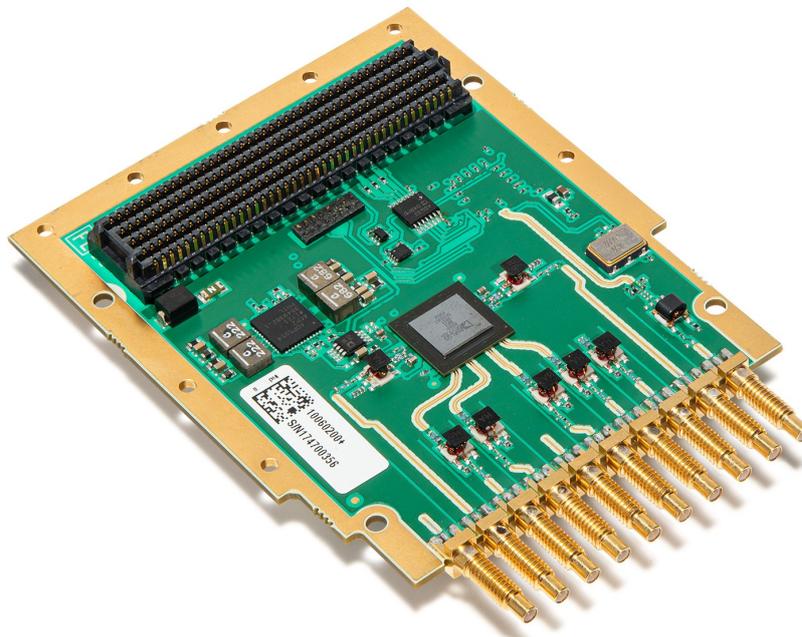
Board Specifications

FMC HPC Interface

- VITA 57.1 Specifications compliant
- Single Module Width 69mm, Depth 76.5mm
- Fully Hardware compatible with ADRV9371 Evaluation Board from ADI
- 4x MGT DP[3:0]_M2C, 4x MGT DP[3:0]_C2M for JESD204B interfaces up to 6Gbps
- 2x MGTCLK[1:0]_M2C
- LA Bus for LVDS and Single-Ended signals
- VADJ = 2.5V to 1.5V

Board Main ADI Components

- Fully compatible design HW/SW with ADRV9371 Evaluation Board from ADI
- AD9371 : Integrated, Dual RF Transceiver with Observation Path
- AD9528 : JED204B Clock Generator with 14 LVDS/HSTL Outputs
- AD7291 : 8-Channel, I2C, 12-bit SAR ADC with Temperature Sensor

RF Performances

- RF coverage 300MHz to 6.0GHz
- Tx synthesis bandwidth to 250MHz
- Rx bandwidth 8MHz to 100MHz

On-board VCXO Options

- 100.000MHz
- 122.880MHz
- 153.600MHz
- 156.250MHz

Front Panel I/O: 10x micro SSMC Connectors

- TX Transmitter Channel 1 Output
- TX Transmitter Channel 2 Output
- RX Receiver Channel 1 Input
- RX Receiver Channel 2 Input
- Observation Receiver Channel 1 Input
- Observation Receiver Channel 2 Input
- Sniffer Receiver Channel A Input
- TX EXT LO Input/Output
- RX EXT LO Input/Output
- User Connector: External Reference Clock Input or Output, FPGA GPIO

Environnemental Specifications

- Commercial Ruggudized 0-50C
- Conduction Cooled –40C to 70C at Thermal Interface

Product Codification

The FMC-ZU1RF-A can be assembled with different versions. The cooling technique et ruggedization level are also available options. The following table shows the product coding for all these options.

FMC-ZU1RF-A– W 1 A – AS

	Tuning Frequency Range	
W	Wide	300MHz - 6GHz

	VCXO Frequency
1	122.880 MHz
2	100.000 MHz
3	153.600 MHz
4	156.250 MHz

	User FP SSMC
A	REFCLKIN
B	REFCLKOUT
C	FMC FPGA GPIO

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

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

Reference	Tuning Range	VCXO	Front User SSMC	Ruggedization Level
FMC-ZU1RF-A-W1A-AS	300MHz - 6GHz	122.880MHz	REFCLKIN	Air Standard Cooled
FMC-ZU1RF-A-W1A-CC	300MHz - 6GHz	122.880MHz	REFCLKIN	Conduction Cooled
FMC-ZU1RF-A-W2A-AS	300MHz - 6GHz	100.000MHz	REFCLKIN	Air Standard Cooled
FMC-ZU1RF-A-W2A-CC	300MHz - 6GHz	100.000MHz	REFCLKIN	Conduction Cooled

Reference	SDR System Development
VPX3-ZU1B-SDR-A	4U Desktop Chassis Air Cooled, VPX3-ZU1B, RTM-ZU1-A, FMC-ZU1RF-A, Linux BSP, Cables

PanaTeQ