

# WIDEBAND MMWAVE RADIO DEVELOPMENT KIT FOR RFSOC GEN-3

## Prototype with Xilinx RFSoc Gen-3 in the mmWave spectrum

The Avnet Wideband mmWave Radio Development Kit for RFSoc Gen-3 is ideal for prototyping RF applications in mmW bands including 5G NR FR2, wireless backhaul, as well as K/Ka band radar and SATCOM. This platform combines the Otava DTRX2 Dual Transceiver mmWave Radio Card - jointly developed by Otava and Avnet - with the Xilinx Zynq® UltraScale+™ RFSoc ZCU208 Evaluation Kit.

Explore the entire signal chain from millimeter wave RF to IF sampling with RFSoc Gen-3 data converters reaching 6 GHz. Native connection to MATLAB® and Simulink® is provided by Avnet's RFSoc Explorer®, featuring graphical control of the platform and intuitive APIs for programmatic access.

### Features

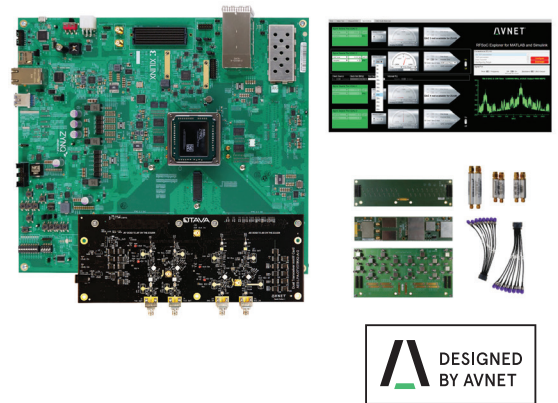
#### Xilinx Zynq UltraScale+ RFSoc ZCU208 Evaluation Kit

- Complete OEM kit including CLK104, XM650, and XM655 add-on cards
- Features the Zynq UltraScale+ RFSoc ZU48DR with integrated gigasample data converters and programmable gain control
- 8x 14-bit 5 GSPS ADCs
- 8x 14-bit 10 GSPS DACs
- 4GB 64-bit DDR4 programmable logic memory
- 4GB 64-bit DDR4 processor system memory
- RF Mezzanine Card 2.0 interface for RF expansion
- FPGA Mezzanine Card (FMC+) interface for I/O expansion

#### Otava DTRX2 mmWave Radio Card for Xilinx RFSoc ZCU208 Evaluation Kit

- 2 TX channels up convert from high IF frequencies to mmWave frequencies
- 2 RX channels down convert from mmWave frequencies to high IF frequencies
- Independent TX and RX LO PLLs with integrated frequency synthesizer, on-chip VCO, and common reference from the Xilinx ZCU208 CLK104 module
- Digital Step Attenuators (DSA) for gain control
- Independent signal chain enable/disable for TDD operation
- TDD and FDD modes supported
- RF band select filters can be added externally based on operating frequency
- Powered from a single 12V DC connector

To purchase this kit, visit: [www.avnet.com/rfsoc-mmw](http://www.avnet.com/rfsoc-mmw)



### Kit includes

- Xilinx Zynq UltraScale+ RFSoc ZCU208 Evaluation Kit
- Otava DTRX2 mmWave Radio Daughtercard
- Avnet RFSoc Explorer for MATLAB and Simulink
- Free MATLAB Trial Package for RFSoc

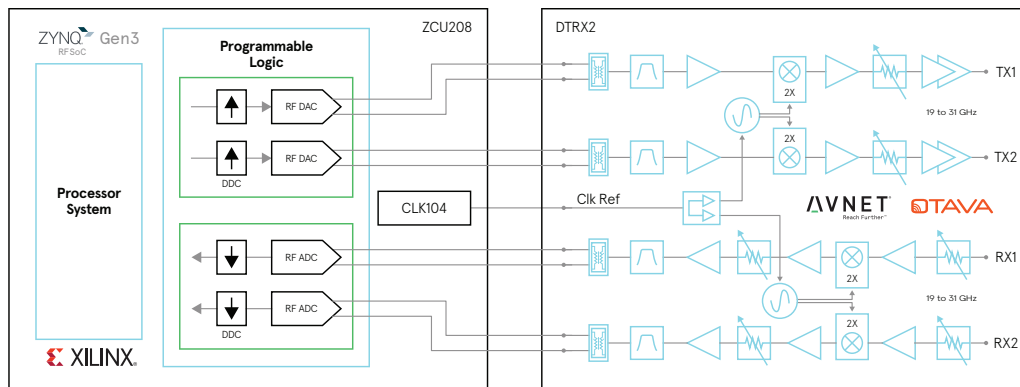
### Target applications

- 5G NR FR2 bands
- K/Ka band radar & SATCOM
- Aerospace and defense

## System specification - REV B

General		
Number of identical TX channels	2	
Number of identical RX channels	2	
Number of LO PLLs	2	1x for TX, 1x for RX
mmW frequency range	19 – 31 GHz	Recommended
IF center frequency	3.6 – 4.6 GHz	Recommended
DTRX2 connectors		
DC power	12V, Barrel Jack	
mmW TX out and RX in	2.92mm mmW edge-mount	1x per radio channel
TX & RX IF + GPIOs connectors	SAMTEC 8x50 LPAM (2x)	direct board-to-board connection to ZCU208
IF & RF access points	2.92mm top-launch	Unpopulated by default
Reference clock input	Top Launch SMA	
Test conditions		
DAC sampling rate	6.144 GSPS	Max RFSoc Gen3 DAC rate = 10 GSPS
ADC sampling rate	4.9152 GSPS	Max RFSoc ADC rate = 5.0 GSPS
Reference clock frequency	122.88 MHz	Generated by CLK104 or External CW source
System Synchronization Clock	10 MHz	Feed to CLK104 module
Transmitter specs		
Peak CW output power	+14 to +19dBm	At Max gain setting and depending on RF frequency
Pass-band ripple over 400MHz	<1dB	
Pass-band ripple 19 – 31GHz	5 dB	
RF Gain control	15 dB	
LO injection mode	High-side or Low-side	Depending on IF and RF frequencies
Sideband Image level	[-5.5, 2.5] dBc	Ext filter required to any front-end circuits
50MHz 5GNR TM1.1 ACLR	-51dBc at +3dBm out RMS	At 24GHz
100MHz 5GNR TM3.1 EVM	2.9% rms at +3dBm out	At 24GHz
TX Channel-to-Channel Isolation	≥45 dB typ	
Receiver specs		
RF Gain control Range	14 dB, 2 dB step	
IF Gain control range	31.75 dB, 0.25 dB step	
Max Power Gain	21 to 28dB	DSAs at min Attenuation
Pass-band Gain ripple 19 to 31GHz	7 dB	
LO injection mode	High-side or Low-side	Depending on IF and RF frequencies
Single-tone SFDR	>70dB	Near ADC full scale
Noise Figure at Max gain	10.5 dB	At 26GHz
Electrical and mechanical		
DTRX2 Total power	15.1 Watts	All channels ON
DTRX2 P <sub>diss</sub> TX only	9 Watts	
DTRX2 P <sub>diss</sub> RX only	6.1 Watts	
DTRX2 radio card Dimensions	240 x 94 mm	
ZCU208+DTRX2 total Dimensions	320 x 320mm	
Visual Indicators	DC power ON, PLLs Lock Detect LEDs, SW Comms LED	

## Block diagram



## Featured manufacturers



## Parts

Part number	Description	Price
AES-ZCU208-DTRX2-SK-G	Multi-purpose high performance radio kit for mmWave applications, built on Xilinx Zynq UltraScale+ RFSoc Gen-3 ZCU208 evaluation kit	\$19,995.00 USD

## Related parts

Part number	Description	Price
AES-LPA-OTVDTRX2-B-G	Otava DTRX2 mmWave Radio Daughtercard for Xilinx RFSoc ZCU208 evaluation kit	\$10,995.00 USD
EK-U1-ZCU208-G	Xilinx Zynq UltraScale+ RFSoc ZCU208 evaluation kit	\$10,995.00 USD
AES-ZU-RFSOC-SK-G	Avnet Zynq UltraScale+ RFSoc Development Kit with Qorvo RF Front End	\$9,495.00 USD
AES-XRF16-ZU39-G	Xilinx RFSoc System-on-Module 16-channel / Gen-2 / 5 GHz	\$21,999.00 USD
AES-XRF8-ZU47-G	Xilinx RFSoc System-on-Module 8-channel / Gen-3 / 6 GHz	\$22,995.00 USD
AES-XRF16-ZU49-G	Xilinx RFSoc System-on-Module 16-channel / Gen-3 / 6 GHz	\$24,995.00 USD

Countries available for purchase: Americas, EMEA, Asia, Japan

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