

# Eclipse RF™ Products

## Lunar SDR | RXT7406

The Lunar SDR is the flagship product in the new Eclipse RF 7000 series of open standards based software-defined receivers, transmitters, and application-ready subsystems.

The Lunar SDR is a high performance module that provides four radio frequency (RF) channels, which can either receive or transmit information in the range of 10 MHz to 6 GHz. Each channel operates independently or as part of a phase-coherent group. Its phase coherency extends across multiple modules through the sharing of sample clocks from a group master. The module has 18 front-end pre-selected filters, which are implemented per channel, and are sub-octave above 90 MHz to mitigate the effects of second order intermodulation (IMD2). These filters are implemented in custom chip level filter banks for frequencies above 687 MHz, while discrete component filters are used below that mark. There is also the option to select a front end bypass filter instead, which provides 800 MHz direct to the A/D converter.



The Lunar SDR is the ideal choice for applications requiring high channel density and performance at a more affordable price per channel.

The module uses the latest in Xilinx® Ultrascale™ architecture to make it possible. The Lunar SDR module uses the XCZU47DR Radio Frequency System on a Chip (RFSoc) to sample the analog input and generate wideband complex outputs supporting 150 MHz to 1.4GHz instantaneous bandwidth independently selectable per channel instantaneous bandwidth as well as multiple narrowband digital down-converter (DDC) outputs at the same time. When configured for transmit, the RFSoc generates the output waveform through D/A conversion.

The Lunar SDR operates independently or within a 1U high 19-inch rackmount chassis. It is similar to our Solar SDR 3U VPX receiver and transmitter module. As such, it uses all of the same front-end RF sub-modules and most of the motherboard design. This gives system integrators an advantage, as they're able to put multiple embedded systems on the same network with ease.

BAE Systems has been designing and delivering open standard and high performing signal intercept receivers and transmitters for more than 30 years. We work closely with our customers to ensure that our products achieve the highest level of performance in the field for any platform and application.

## Features

- Four channels in a 3U brick form factor, dynamically configurable as either transmit or receive, supporting embedded systems optimized for size, weight, power, and cost.
- Each RF channel operates independently or as part of a phase-coherent group to support signal search and copy while also supporting spatial processing algorithms.
- Large Spur Free Dynamic Range (SFDR) captures weak signals in the presence of strong in-band and out-of-band interference.
- Built in narrow-band digital down converters filter and separate the signal of interest, while providing an optimal IQ sample rate.
- Low-latency tuning to support high speed scanning and collection of frequency agile transmitters.
- High-speed 100 GigE interface simultaneously transports multi-channel wideband digital data and filtered narrow-band streams over VITA 49.

## Receiver specifications

Rx tune range	10 MHz to 6 GHz
Rx tune resolution	1 MHz
Rx tune speed	2 to 10 Microseconds
RF input impedance	50 Ohms
Instantaneous bandwidth	150 MHz to 1.4GHz
VSWR	< 2.5:1
Max input level	+ 20 dBm (hot-switched)
Noise figure	14 dB typical
Single tone SFDR	72 dBc typical
IIP3 <sup>1</sup>	+5 dBm typical
Third-order intermodulation (IMD3)	>74 dBc typical
Second-order intermodulation (IMD2)	>90 dBc typical
Internal spurious	<-100 dBm
Channel to channel isolation	>70 dB
SSB phase noise (at offset) <sup>2</sup>	
100 Hz	-90 dBc/Hz
1 kHz	-95 dBc/Hz
10 kHz	-105 dBc/Hz
100 kHz	-110 dBc/Hz
1 MHz	-125 dBc/Hz
Pre-select filters <sup>3</sup>	18 Total and an 800 MHz Low Pass

## Transmitter specifications

Tx tune range	10 MHz to 6 GHz
Tx tune resolution	1 MHz
Tx tune speed	2 to 10 microseconds
Output power	+6 dBm single tone; +0 dBm two-tone
Modulation bandwidth	Up to 150MHz
TX Spurious products	< -60 dBc typical

## Basic features

Number of RF channels	4 simultaneous, configurable as RX or TX in half-duplex operation. Full duplex achieved by using 2 RF channels
ADC resolution	14 bit
DAC resolution	14 bit
Wideband data	32 bit complex
Wideband sample rate	190, 100 and 80cMSPS, 1.9/2.5 cGSPS
Number of narrowband DDCs	32 per RF channel
Custom IP, FDK ready	Reference load available
FPGA Loads Available	4 selectable by Software
Data Plane Interface	100GbE Ethernet
Software Compatibility	Previous Generations
MORA, VITA49.2 Compatible	Yes
Attenuation Range	70 dB in 0.25 dB steps
1 PPS	LVTTTL, +5V tolerant
Transmit / Receive switching time	Industry leading time (contact factory)
REF Clk	10/100MHz Sine wave

## Mechanical specifications

Cooling method	Conduction to Coldplate
Power consumption <sup>4</sup>	70W Typ, 80W Max
Environmental class	NA
Operating temp	-40° to 50°C ambient
Vibration profile	ANSI/VITA 47.1-2019 Class V3
Weight	2.58 +/- 0.25 lbs
Size/Form Factor <sup>5</sup>	3.9" W x 8.4" L x 1.62" D

<sup>1</sup>Two-tone Input signal of -32 dBm each tone (-26 dBm single tone)

<sup>2</sup>Sample clock generated using 100MHz reference

<sup>3</sup>Preselector Band 18 - 800MHz available in -101 version, 1200MHz available in -102 version

<sup>4</sup>Custom IP will vary Max Power in FPGA

<sup>5</sup>Depth includes 0.72" heatsink

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