

# Eclipse RF™ Products

## Solar SDR | RXT7306

The Solar SDR is a quad-channel 3U VPX wideband digital receiver/transmitter packaged in a rugged, conduction-cooled module.

The Solar SDR is the latest open-standards based 3U VPX software-defined receiver/transmitter in our 7000 series of radio frequency (RF) products. The module uses the same subassembly as our Lunar SDR brick, which provides four RF channels that configure during run-time as either receive or transmit. The channels can operate independently or as part of a phase coherent group. Phase coherency extends across multiple modules through the sharing of sample clocks from a group master.

The Solar SDR operates between 10 MHz and 6 GHz and features 18 front end pre-select filters, which are implemented per channel. Those filters 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 module uses the latest in Xilinx® Ultrascale™ architecture to make it possible. The Solar SDR module uses the ZU47DR Radio Frequency System on a Chip (RFSoc) to sample the analog input and generate wideband complex outputs supporting 150 MHz to 1.4GHz 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.

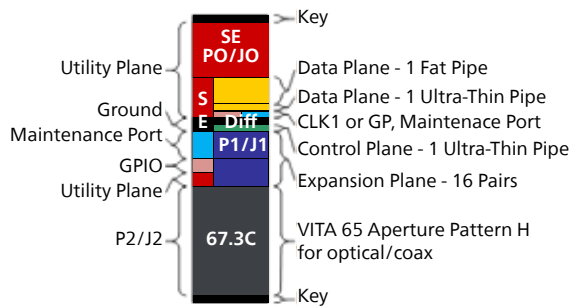
BAE Systems has been designing and delivering open standard and high performing signal intercept receivers and transmitters for more than 30 years. Our 7000-series of products builds on that experience, as we give customers a flexible combination of RF and digital capabilities that span the spectrum of features to meet emerging system requirements. We deliver that value all in a package that supports Modular Open Radio Frequency Architecture (MORA) and aligns to the Sensor Open Systems Architecture (SOSA) standards.

### Features

- Four channels in a 3U SOSA aligned VPX module that can configure to transmit or receive information, supporting embedded systems optimized for size, weight, power and cost.
- Direct-sample architecture provides reduced size, weight, and power (SWaP) and complexity, which creates twice the channel density for a greater cost savings per channel.
- 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 supports high-speed scanning and collection of frequency agile transmitters.



The Solar SDR is ideal for applications that require high channel density and reliable performance at a more affordable price per channel.



The Solar SDR conforms to ANSI/VITA 65.0 with the payload slot profile SLT3-PAY-1F1U1S1S1U1U2F1H-14.6.11-n.

## 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	18 Total plus 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

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## Basic features

Timing reference	1PPS or GPS
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
Wide band sample rate	190, 100 and 80cMSPS, 1.9/2.5 cGSPS
Number of narrow band of DDCs	32
Data plane interface	100Gb Ethernet, 10Gb Ethernet
Expansion plane interface	8x PCIe Gen3
Control plane	10Gb Ethernet
Attenuation range	70 dB in 0.25 dB steps
FPGA Loads Available	4 selectable by software
Custom IP, FDK ready	Yes, Reference load available
Transmit / Receive switching time	Industry leading time (contact factory)
REF Clk	100MHz LVDS per SOSA
Software Compatibility	Previous generations
MORA, VITA49.2 Compatible	Yes
1 PPS	LVDS per SOSA

## Mechanical Specifications

Cooling method	Conduction to Rail
Power consumption	67W typical, 76W max
Environmental class <sup>3</sup>	ANSI/VITA 47.1-2019 ECC3SL1/VITA 47.2
Rail operating temp	ANSI/VITA 47.1-2019 Class CC3; -40° to +70° C
Vibration profile	ANSI/VITA 47.1-2019 Class V3
Weight	1.58 +/- 0.25 lbs
Size / Form Factor	3U VPX 1 inch pitch (VITA 46)

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

<sup>2</sup>Preselector Band 18 - 800MHz in -101 version and 1200MHz in -102 version

<sup>3</sup>Custom IP will vary Max Power in FPGA

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