Eclipse RF™ Products

DRAGONS™ SYS74XX
with Lunar SDR

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DRAGONS™ SYS74XX

The SYS74XX is a 1U multichannel rackmount transceiver system that offers affordable transceiver configurations in the Eclipse Lunar (RXT7406) Series while providing at the highest levels of RF performance.

The SYS74XX is a versatile, high-performance transceiver designed for ground, sea, and airborne applications. Leveraging modern 10/40/100-gigabit Ethernet networks, it simultaneously streams full-bandwidth digitized intermediate frequency (IF) data alongside filtered narrow-band data across multiple channels, ensuring high data throughput for demanding scenarios. This modular design separates the transceiver functions from core processing, providing system designers with enhanced performance, improved reliability and greater flexibility for future upgrades and technology choices.

The SYS74XX supports both independent and coherent transmit and receive modes, offering adaptable functionality for a wide range of applications. Multiple radio frequency (RF) channels can operate as a phase-coherent group, enabling capabilities like digital beamforming. Phase coherency can be extended across multiple modules through synchronized clocking, and each module features a single 100-gigabit Ethernet QSFP28 transceiver port, allowing for up to four 100-gigabit optical Ethernet connections. A stable 10- or 100-megahertz reference signal with 1-PPS timing is required for internal distribution to all transceivers.

Offering a cost-effective alternative to VPX-based solutions, the SYS74XX delivers superior RF performance within a network-connected, rackmount server architecture. This makes it an ideal solution for customers seeking a balance of performance, flexibility and value.

For nearly three decades, Eclipse has been a leading provider of open-standards, high-performance signal intercept receivers and transmitters. BAE Systems is committed to working closely with its customers to ensure optimal product deployment and maximize system performance for their specific platform and application, providing expert support throughout the process.

Features

- 16 wideband RF TX/RX channels per 1U chassis with up to four RXT7406 transceivers
- RF channels can each be configured during run-time as either receive or transmit
- 10 MHz to 6000 MHz RF band coverage per channel
- Up to 150 MHz and 1.4GHz Instantaneous BW
- Supports SIGINT and EW applications in same affordable design
- Low Noise Figure, High Spur Free Dynamic Range
- AC Power Input, 115VAC 47-63 Hz (400Hz optional)
- 35 lbs max, 500 W Typical power dissipation (32W/ch)
- NVMRO (Non-volatile Memory Read Only) switch accessible on front panel

Transceiver specifications

Size	1U 19" Chassis: 1.74"(H) x 19"(W) x 22"(D) max
Weight	23lbs + (Number of transceivers x 2.83 lbs), 35lbs max
Power Draw	500W Typical (varies based on FPGA load)
Power Supply Voltage	110-127VAC, 47-63 Hz (400Hz optional)

Internal Interfaces

Number of RXT7406 Transceivers	1 to 4
RXT7406 Capabilities	Refer to datasheet of RXT7406
Synchronization	Ref clock, PPS input and distribution
Power Supply Capability	900W
RXT Serial Port Access	x4 USB accessible at top panel for direct RXT COM port access

External Interface - Front Panel

NVMRO / Write Protect Switch	Selectible NVMRO
ETI (Elapsed time indicator)	Power on time meter in hours
Power On/Off Switch	Power control
Power indicator	Power on LED

External Interfaces - Rear Panel

E1 - Chassis Ground	Terminal stud, size 10-32
J4 - Fiber Optic Ctrl/Data Plane	38999 Circular, x8 100GbE Fiber per transceiver MPO breakout
Control / Data plane 100GbE	x4 100GbE (One per embedded RXT7406)
J8 - RF Input Connector 1	38999 Circular w/coaxial contacts
RXT3,4 Ch1-Ch4	Transceivers 3 and 4, x4 RF TX or RX I/O each
3.8, 5.0 Gsps	Sample clock distribution
External Reference Input	10/100 MHz
1PPS In	1PPS clock (associated with external REF CLK)
J10 - Input Power Connector	38999 Circular, 115/230 VAC 10A input

Environmental

Operating Temperature	-10 deg C to less than or equal to 50 deg C
Storage Temperature	-40 deg C to less than or equal to 70 deg C, MIL-STD-810H method 502.7 low temperature procedure I - storage
Blowing/Settling Dust	MIL-STD-810G method 510.5. (designed to}
Fungus	MIL-STD-810G method 508.6. (designed to)
EMI	In accordance with MIL-STD-461G (TBD)
Noise	less than or equal to 65 dBA
Sound Pressure	MIL-STD-1474E
Humidity	95% non-condensing greater than or equal to 25°C to less than or equal to 50°C for 8 hours in accordance with MIL-STD-810H method 507/6 humidity procedure I (designed to)

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

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 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[1]	+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)[2]	
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[3]	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	LVTTL, +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[4]	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[5]	3.9" W x 8.4" L x 1.62" D

[1]Two-tone Input signal of –32 dBm each tone (–26 dBm single tone)
[2]Sample clock generated using 100MHz reference
[3]Preselector Band 18 - 800MHz available in -101 version, 1200MHz available in -102 version
[4]Custom IP will vary Max Power in FPGA
[5]Depth includes 0.72" heatsink

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