



# COMMERCIAL PRODUCT GUIDE

**VERSION 2.0 ■ APRIL 2024**

**ADDRESS**  
101 N. Wilmot Rd. Ste. 101  
Tucson, AZ 85711

**ORDER LINE**  
520.519.3131  
sales@rincon.com

**TECH SUPPORT**  
520.519.3132  
tech-line@rincon.com

**FAX/WEB**  
520.519.3120  
www.rincon.com

# PRODUCT GUIDE

**ADDRESS**  
101 N. Wilmot Rd. Ste. 101  
Tucson, AZ 85711

**ORDER LINE**  
520.519.3131  
[sales@rincon.com](mailto:sales@rincon.com)

**TECH SUPPORT**  
520.519.3132  
[tech-line@rincon.com](mailto:tech-line@rincon.com)

**FAX/WEB**  
520.519.3120  
[www.rincon.com](http://www.rincon.com)

INFORMATION SUBJECT TO CHANGE WITHOUT NOTICE.  
PRODUCTS ARE SUBJECT TO THE RESTRICTIONS OF THE ARMS EXPORT CONTROL ACT.  
VERSION 2.0.

# CONTENTS

## CONTENTS

|  |    |
|--|----|
| Advanced Signal Processor (ASP) .....      | 1  |
| AstroSDR.....                              | 3  |
| DLSR3.....                                 | 5  |
| Kestrel SDR .....                          | 7  |
| MB3 .....                                  | 9  |
| Pegasus .....                              | 11 |
| Predator SDR .....                         | 13 |
| Raptor .....                               | 15 |
| Scorpion .....                             | 17 |
| WASP Block DownConverter .....             | 19 |
| WASP Block UpConverter .....               | 21 |
| WASP LNA Preselector.....                  | 23 |
| Ordering Information.....                  | 25 |
| ISO 9001 Certificate of Registration ..... | 27 |
| Product Contact Information .....          | 29 |
| Engineering & Professional Services .....  | 30 |
| What We Do.....                            | 31 |

# ADVANCED SIGNAL PROCESSOR (ASP)

MODULAR DIGITAL SIGNAL PROCESSING (DSP) HARDWARE RACK

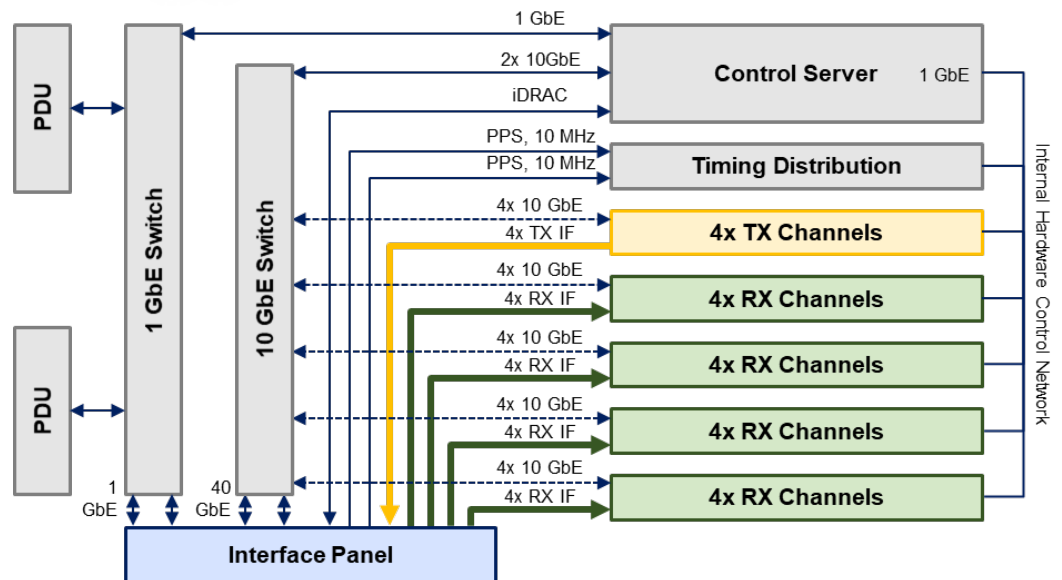
**THE ASP** provides 8 or 16 independent wideband receive channels and 4 independent wideband transmit channels in an 81" (H) x 23.6" (W) x 41.7" (D) rack. This system was rapidly built from our highly modular DSP hardware to address an extensive set of project-specific requirements. In less than one year after kickoff, we were able to design the ASP system and pass multiple Customer reviews; build, test, and deliver five units; and complete a rigorous acceptance test. We achieved this rapid schedule because of the modular nature of our hardware products and our expertise in FPGA, DSP, and software development.

### GENERAL SYSTEM CAPABILITIES

- Highly configurable to accommodate different mixes of Tx and Rx channels
- Control and status via ActiveMQ, WebSocket, or HTTP interfaces
- Continuous BIT with rapid detection and reporting of issues with network, timing signal, firmware, fans, hardware temperature, and more
- Dual-redundant power for all components
- Software and firmware can be readily updated, software is in containers, and firmware is loaded at run-time from config files to allow rapid reconfiguration
- The system is tested, accepted, and operational



## BLOCK DIAGRAM



**ASP**



# SPECIFICATIONS

## RECEIVE (RX) CHASSIS CAPABILITIES

- Four independent wideband receive channels per chassis
- Customized analog input circuit to meet program requirements
- Control board for HW BIT and power control for each card
- Integrated PPS and 10-MHz distribution system
- Each Rx channel has two independent tuners tunable from 950 to 1750 MHz with sample rates from 128 k to 50 MS/s
- Each Rx channel can provide direct ADC sample snapshots for full-bandwidth analysis of real-time 850-MHz spectrum
- Each Rx channel can output either pre-D data, demodulated/despread output, or both
- Rx channels support precise timing and use NTP as time reference
- V49 packets for output data and context

## RX SPECIFICATIONS

- **Dual Redundant Power:** 110/220 VAC 50/60 Hz, 300 Watts (max)
- **Command/Control:** 10/100/1000 Mbit Ethernet, RJ45
- **Operating Temperature:** 0° C to 50° C
- **Analog Input:** -35 dBm, 50 ohm, AC-coupled, 950 to 1750 MHz, SMA
- **10 MHz Reference:** 750 mVpp to 2 Vpp (1.5 dBm to 10 dBm), 50 ohm, AC-coupled, sine or square wave, SMA
- **1 PPS:** CMOS compatible, 50 ohm, SMA
- **Output Data:** One SFP+ port per channel, compatible with 10-Gigabit Ethernet, SR/LR fiber, or direct attach copper

## TRANSMIT (TX) CHASSIS CAPABILITIES

- Four independent wideband transmit channels per chassis
- Customized analog output circuit to meet program requirements
- Integrated PPS and 10-MHz distribution system
- Each Tx channel is tunable from 950 to 2200 MHz with sample rates from 32 k to 31.25 MS/s
- Tx sample rate matches requested values for extended, continuous transmission without significant timing error accumulation
- Each Tx channel includes an embedded spread-spectrum modulator
- Tx channels support precise timing and use NTP as a time reference
- V49 packet for input data, control, and context

## TX SPECIFICATIONS

- **Dual Redundant Power:** 110/220 VAC 50/60 Hz, 300 Watts (max)
- **Command/Control:** 10/100/1000 Mbit Ethernet, RJ45
- **Operating Temperature:** 0° C to 50° C
- **Analog Output Power:** -10 dBm
- **Analog Output:** 50 ohm, AC coupled, 950 to 2200 MHz, SMA
- **10 MHz Reference:** 750 mVpp to 2 Vpp (1.5 dBm to 10 dBm), 50 ohm, AC-coupled, sine or square wave, SMA
- **1 PPS:** CMOS compatible, 50 ohm, SMA
- **Input Data:** One SFP+ port per channel, compatible with 10-Gigabit Ethernet, SR/LR fiber, or direct attach copper

**ADDRESS**  
101 N. Wilmot Rd. Ste. 101  
Tucson, AZ 85711

**ORDER LINE**  
520.519.3131  
sales@rincon.com

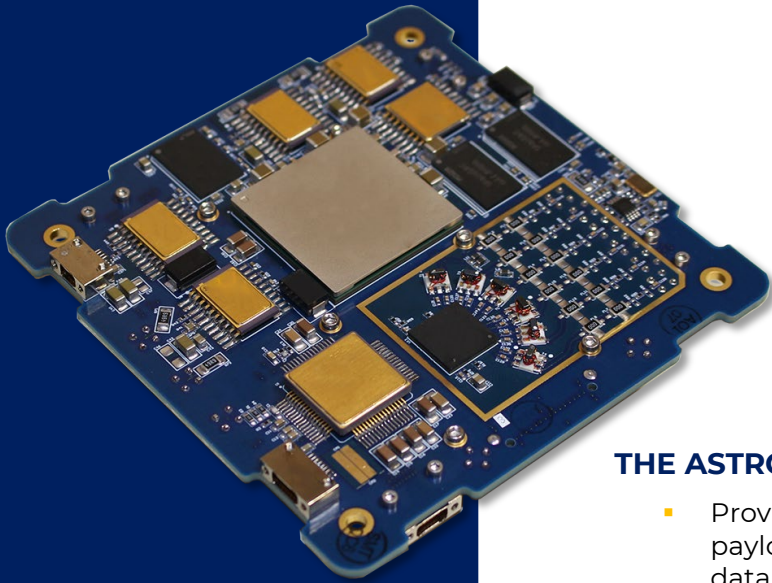
**TECH SUPPORT**  
520.519.3132  
tech-line@rincon.com

**FAX/WEB**  
520.519.3120  
www.rincon.com

INFORMATION SUBJECT TO CHANGE WITHOUT NOTICE.  
PRODUCTS ARE SUBJECT TO THE RESTRICTIONS OF THE ARMS EXPORT CONTROL ACT.  
VERSION 2.0.

# ADVANCED SIGNAL PROCESSOR

**RINCON  
RESEARCH**  
EMPLOYEE OWNED



# ASTROSDR

## ASTROSDR

### SDR AND DSP SYSTEM FOR SPACEFLIGHT

- Dual receivers & transmitters, 70 MHz to 6 GHz
- AMD Zynq Z-7045 FPGA & dual ARM SoC
- Daughter card interface for expansion, I/O, and custom applications
  - 64-Gbyte eMMC flash memory card
  - Gigabit Ethernet and flash memory card with GPIO
- 64-GByte embedded Multi-Media Card (eMMC) flash on daughter card for data storage

### THE ASTROSDR PRODUCT FAMILY

- Provides key components for a user-developed RF payload: receiver, transmitter, FPGA, ARM processor, data storage, and high-speed I/O
- Includes a board support package with pre-build functions for interfacing to the radio, ARM processor, and eMMC storage, as well as a Vivado project to assist users in developing their own unique applications

### ASTROSDR DEVELOPER-FRIENDLY FEATURES

- Developer-friendly features are found in our terrestrial software-defined radio (SDR) and digital signal processing (DSP) systems
- Onboard processor runs embedded Linux, providing a flexible and capable development environment
- APIs are provided for basic control of the FPGA, receivers, and transmitters

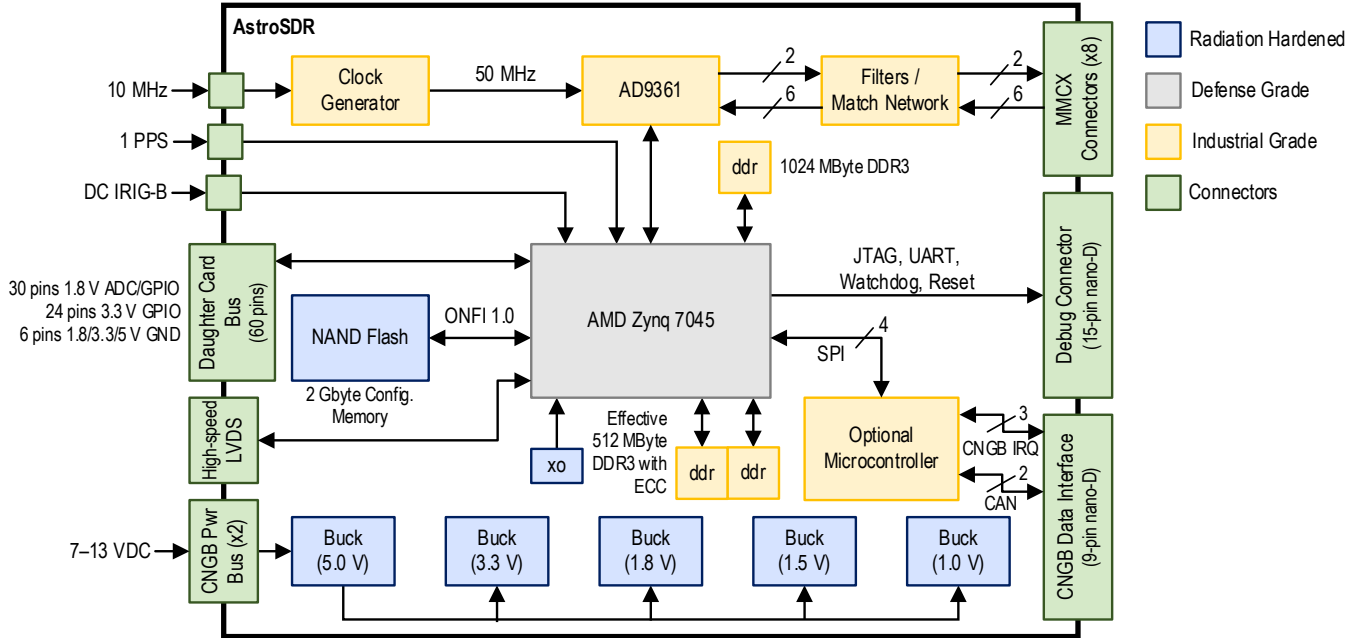
### ASTROSDR MULTIPLE INTERFACES

- Multiple interfaces are included for I/O and command/control: dual UARTs, two FPGA-attached low-voltage differential signaling (LVDS) pairs, and an Ethernet interface on an optional daughter card

### RINCON RESEARCH SUPPORTS MISSIONS

- More than just hardware, we provide mission planning and operation services
- We have unique IP for digital signal processing, including interference cancelation, high-rate modems, adaptive beamforming, geolocation, and space situational awareness

# BLOCK DIAGRAM



## SPECIFICATIONS

### PROCESSING

- ARM Zynq 7045 FPGA and dual ARM SoC
- ARM Resources:
  - Dual-core ARM Cortex A9 with NEON, up to 733 MHz
  - Attached 512-MByte DDR3 RAM (with ECC)
  - Attached 2-GByte flash for radiation-tolerant OS storage
- FPGA Resources:
  - 350 k logic cells
  - 900 DSP slices
  - Attached 1-GByte DDR3 RAM (ECC capable)
  - Attached 64-GByte eMMC flash on daughter card, designed to support dual-channel recording at up to 8 MS/s (32 Mbytes/s)
  - Each eMMC supports sustained write speeds of 8 Ms/s

### MECHANICAL

- 90 mm x 90 mm (3.543" x 3.543")
- Approximately 95 grams (without heatsink or daughter card)

### ENVIRONMENT

- Operating temp: -25° C to 60° C (flight), 0° C to 60° C (eng.)
- Vibration: Passed GEVS proto-qualification levels
- Thermal vacuum: -20° C to +50° C operational
- Projected radiation performance report available upon request

### POWER

- Power: 7 VDC to 13 VDC
- System management: 3.5 W (no FPGA load, ARM booted)
- Idle: 4 W
- Passive collect: 5.5 W (includes recording to flash)
- Max: 30 W 6A available for 0.85V FPGA VCC\_INT rail

### DIGITAL INTERFACES

- GPIO/SPI/I2C:**
  - 9-pin nano-D connector (2x for pass-through)
- Timing Signals:** FPGA connected
  - 1 PPS, 5/10/50 MHz reference (MMCX)
  - Serial timecode (DC-IRIG-B) (MMCX)
- Daughter Card Interface:** 30 pins 1.8 V GPIO (includes 11 ADC channels)
  - 24 pins 3.3 V GPIO
  - Samtec LSHM-130 60-pin strip, available for connections to custom board or cables
- LVDS:** FPGA connected, 4-LVDS pairs up to 200 MHz operation (or 8 GPIO)
  - 9-pin nano-D connector
  - Supports HDLC (transmit only)
  - Supports SpaceWire link layer
- Development Interface:** External watch dog timer input, reset, JTAG, UART console
  - 15-pin nano-D connector

**ECCN 9A515**

|  |                                  |                                      |                                |
|--|----------------------------------|--------------------------------------|--------------------------------|
| <b>ADDRESS</b>                                 | <b>ORDER LINE</b>                | <b>TECH SUPPORT</b>                  | <b>FAX/WEB</b>                 |
| 101 N. Wilmot Rd. Ste. 101<br>Tucson, AZ 85711 | 520.519.3131<br>sales@rincon.com | 520.519.3132<br>tech-line@rincon.com | 520.519.3120<br>www.rincon.com |

INFORMATION SUBJECT TO CHANGE WITHOUT NOTICE.  
PRODUCTS ARE SUBJECT TO THE RESTRICTIONS OF THE ARMS EXPORT CONTROL ACT.  
VERSION 2.0.

**RINCON**  
**RESEARCH**  
EMPLOYEE OWNED



# DLSR3

## DLSR3

### DSPBRIK™ L-BAND SOFTWARE-DEFINED RADIO, 3RD GENERATION

#### INPUTS

- Extended L-band analog inputs, 750 MHz to 2150 MHz
- Two or four inputs per 1U chassis
- 4800 MSPS, 14-bit interleaved ADC (ENOB: 8 bits)
- Self-calibration and built-in test capabilities
- Programmable input attenuator (0 dB to 31.5 dB)
- Snapshot, histogram, bit-activity, and overload indicators to easily determine input signal levels
- 1PPS, 10 MHz, IRIG-B, and NTP inputs

#### PROCESSING

- AMD UltraScale+ MPSoC FPGA with 64-bit processor
- Wideband (4800 MSPS) snapshot capability (up to 5 GB per input)
- Eight digital sub-band tuners (SBTs) per ADC with configurable bandwidths: 80, 40, 20, 10, 5, 2.5 MHz
- Manual and automatic gain controls

#### OUTPUTS

- Two SFP+ 10-Gigabit Ethernet outputs per analog input
- SDDS packet format, VITA-49 option coming soon
- 8- or 16-bit, real or complex data formats (SI, SB, CB, CI)
- High-precision data time tags provided for DDC and snapshot outputs

#### CONTROL AND STATUS

- Command and control via embedded-Linux processor
- Front panel LCD interface for easy setup and configuration
- Boot from local flash storage or network file system (NFS)
- Transport Layer Security (TLS)-compliant control interface
- X-Midas option tree and Python API included

#### DLSR3 BUILDS ON THE DLSR AND DLSR2 LEGACY

- Upgraded digitizing architecture enables continuous frequency coverage from 750 to 2150 MHz and retains wideband snapshot, API, and X-Midas option-tree features—key elements of the DLSR family for over a decade
- Forward-looking DLSR3 design provides new features and capabilities with maximum backward compatibility

#### DLSR3 USES MULTI-RATE SIGNAL PROCESSING TECHNIQUES

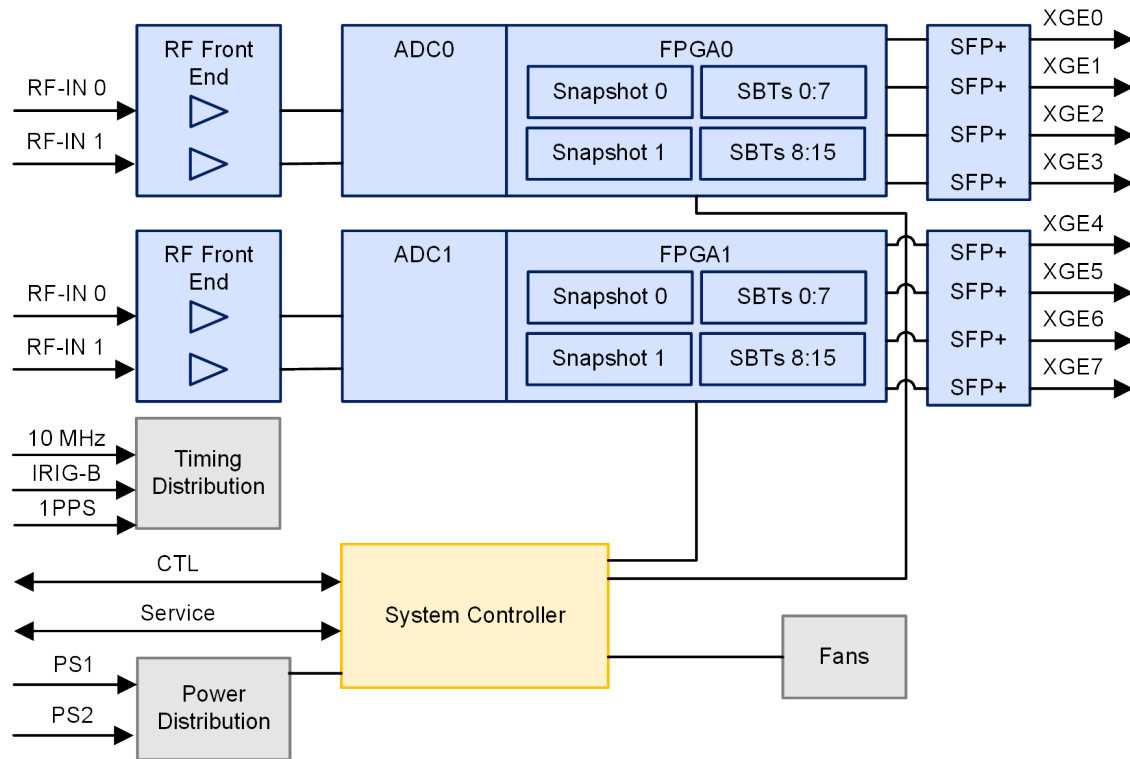
- DLSR3 digitizes multiple L-band inputs with up to eight independent digital sub-band tuner outputs per input
- Tuner data is provided on multiple 10-GbE interfaces for distribution to individual clients or broadcast to multiple recipients
- All outputs include high-precision, high-accuracy time tags supporting the most demanding downstream applications

#### DLSR3 HAS UNIQUE WIDEBAND SNAPSHOT FEATURE

- Wideband snapshot feature provides continuous surveys of the entire digitized input signal (up to 2150 MHz) to support downlink evaluation and signal discovery
- Snapshot size (up to 5 GB), output rate, and trigger modes are configurable



# BLOCK DIAGRAM



## SPECIFICATIONS

### GENERAL

- Power connector: IC 60320 C14 with NEMA5-15 cord
- Power: 110/220 VAC 50/60 Hz
- Power consumption: 200W, 2-input, 400 W 4-input, typical
- Number of inputs: Two or four
- Number of 10-GbE outputs: Two per input, maximum of 8
- Dimensions: 1U 19" rackmount, 26" depth
- Operating temperature: 0° C to 50° C

### INPUT/OUTPUT LEVELS

- Analog: -35 dBm (nom), 50 Ω, AC-coupled, 500 MHz to 2150 MHz, SMA connector
  - 0 to 31.5 dB input attenuator, 0.5 dB steps
- 10 MHz: 750 mVpp to 2 Vpp (1.5 dBm to 10 dBm) 50 Ω, AC-coupled sine-wave SMA connector
- 1PPS: CMOS compatible, 50 Ω, SMA connector
  - Timecode: IRIG-B: 0.5 Vpp to 6 Vpp, 50 Ω, 1 kHz AM, SMA
- Control: 10/100/1000BASE-T Ethernet, RJ-45
  - Static or DHCP IP address
- 10-GbE output media: SR fiber, LR fiber, or twinax copper patch cables

### ORDERING INFORMATION

- DLSR3-1U-2E4X-01
  - Two L-band inputs
  - Four 10-GbE outputs
- DLSR3-1U-4E8X-01 (coming soon)
  - Four L-band inputs
  - Eight 10-GbE outputs
- Units include two power supplies and power cords
- No-Cost configuration options include NFS or local boot modes and write protection on internal flash memories
- Rack slides and 10-GbE output media sold separately

**Call for availability and custom configurations.**

**RINCON**  
**RESEARCH**  
EMPLOYEE OWNED

**ADDRESS**  
101 N. Wilmot Rd., Ste. 101  
Tucson, AZ 85711

**ORDER LINE**  
520.519.3131  
sales@rincon.com

**TECH SUPPORT**  
520.519.3132  
tech-line@rincon.com

**FAX/WEB**  
520.519.3120  
www.rincon.com

## KESTREL SDR

ZYNQ ULTRASCALE & MPSOC SDR DEVELOPMENT KIT  
COMPACT, 2X2, MIMO-CAPABLE TRANSCEIVER, OPTIMIZED FOR  
SWAP-CONSTRAINED APPLICATIONS



- Smaller package: dimensions are 1.75" x 1.8" x 1.375" with heatsink installed
- Ideal for footprint- and volume-constrained applications
- Low power consumption, 4 W to 5 W idle
- Fractional-N reference PLL
- 2 Rx/2 Tx MIMO solution, covering 70 MHz to 6 GHz
- AMD Zynq UltraScale+ XCZU5EG-2SFVC784I

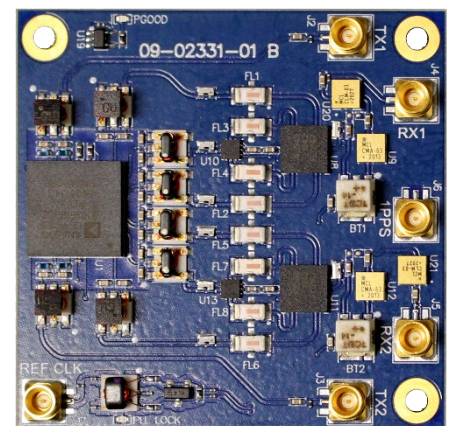
- Consists of two circuit cards—the Kestrel Processor and the Kestrel Radio
- The Kestrel software-defined radio (SDR) design is based on the Raptor SDR Development Kit and shares the same radio IC, the same family of AMD SoC, and the same embedded-Linux operating system

### THE KESTREL'S RF TRANSCEIVER

- Transceiver is MIMO-capable from 70 MHz to 6 GHz
- The configurable transmit path supports 70 MHz to 6 GHz
- Receiver performance is enhanced by a four-band preselector and wideband low-noise amplifier (LNA)

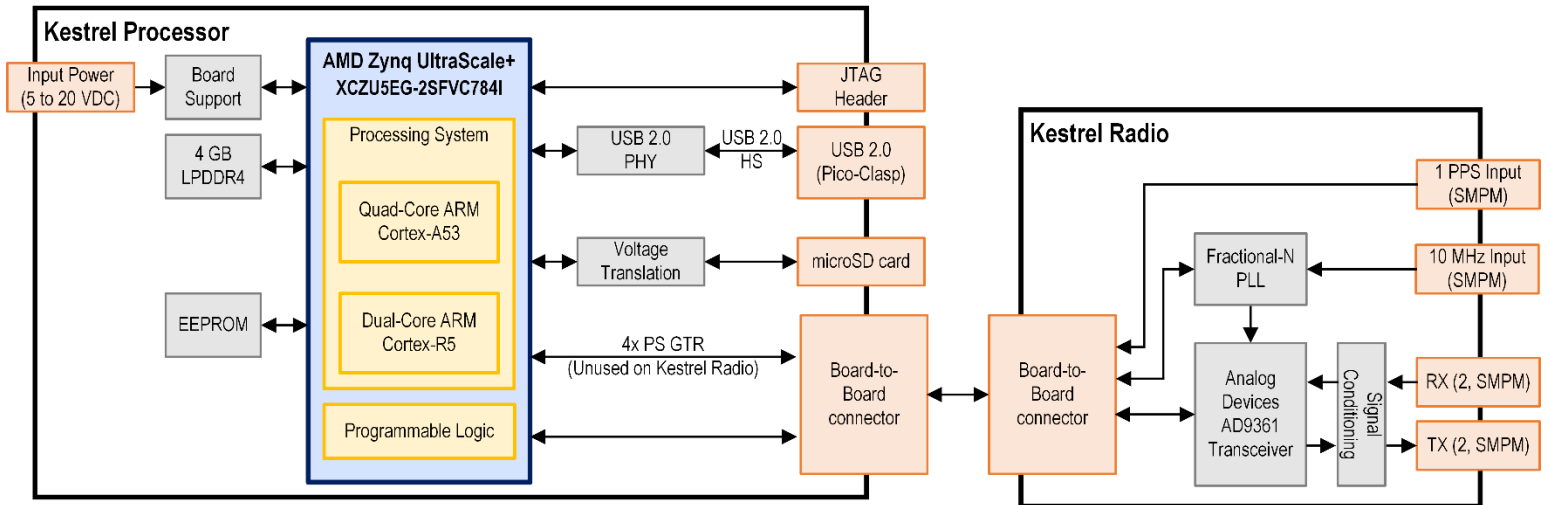


**KESTREL PROCESSOR**



**KESTREL RADIO**

# BLOCK DIAGRAM



## SPECIFICATIONS

### GENERAL

- Transceiver: Analog Devices AD9361
- Tuning range: 70 MHz to 6 GHz
- Bandwidth: Up to 56 MHz, 61.44 MSPS complex, 12-bit resolution
- Receive path: On-board limiter, LNA, and four-band preselector per receiver; preselector is run-time configurable; LNA can be bypassed at hardware build time
- Transmit path: Low-power (>7.5 dBm typ) path per transmitter
- Connectors: All RF connectors are subminiature push on micro (SMPM)
- Timing signal: 1PPS, 10 MHz reference (10 MHz reference port can accept other reference frequencies)
- Development interface: board support package (BSP), drivers, JTAG, and COTS tool support
- Dimensions: 1.75" x 1.8" x 1.375" with heatsink installed
- Mass: 33.2g (1.17 oz) without heatsink; 100g (3.53 oz) with heatsink
- Power: External 5.5–20V supply, ~12W max; reverse-polarity protected

### SoC

- AMD Zynq Ultrascale+ XCZU5EG-2SFVC784I
- FPGA: 256k system logic cells, 1248 DSP slices
- Application processor: Quad-core ARM Cortex-A53 1.3 GHz, 64 bit
- Real-Time processor: Dual-core ARM Cortex-R5 533 MHz
- Memory: 4 GB of LPDDR4 attached to processing system
- USB: 1x USB 2.0 via Molex Pico-Clasp (device mode only)
- Storage: MicroSD
- Runs embedded Linux
- Command and control available over USB



|  |                                  |                                      |                                |
|--|----------------------------------|--------------------------------------|--------------------------------|
| <b>ADDRESS</b>                                 | <b>ORDER LINE</b>                | <b>TECH SUPPORT</b>                  | <b>FAX/WEB</b>                 |
| 101 N. Wilmot Rd. Ste. 101<br>Tucson, AZ 85711 | 520.519.3131<br>sales@rincon.com | 520.519.3132<br>tech-line@rincon.com | 520.519.3120<br>www.rincon.com |

**RINCON**  
**RESEARCH**  
EMPLOYEE OWNED



**MB3**

## MB3

### MOUNTAINBRIK™ 3 WIDEBAND RECORDER

#### Wideband **RF RECORDER (THIRD GENERATION)**

- The MountainBrik 3 (MB3) comes in three packages: a portable plastic case, a metal caddy, and a 1U rack mount to meet your mission needs
- Wideband RF can be recorded to and played back from removable storage

## BASE HARDWARE

- AMD Zync Ultrascale+ MPSoC processor
- Choice analog FPGA mezzanine card
- 4x SFP28 ports, supporting 10 GbE or 25 GbE
- GPSDO: GPS disciplined timing signals for time tags
- 1PPS and 10 MHz reference
- 1 GbE command and control interface
- USB serial maintenance port
- Removable media for OS storage
  - Redundant boot options (micro SD cards)
  - Removable without tools to facilitate updates
  - Security sealed

## RECORDER SPECIFICATIONS

### MB3-PRT-REC-WBD-02 — PORTABLE PLASTIC CASE

- Watertight, airtight, and dustproof
- Size: 12.0" x 14.0" x 6.9"
- Input power: AC 110/220 V, 50/60 Hz
- LCD display

### MB3-MPK-REC-WBD-02 — METAL CADDY

- Size: 3.25" x 6.75" x 10"
- Input power: 9–30 VDC

### MB3-1U — METAL RACK MOUNT

- Size: Standard 19"-1U rack mount
- Input power: AC 110/220 V, 50/60 Hz
- LCD display



### ALL MB3 RECORDERS

- Recording bandwidth: > 4.8 GBytes/s
- Command and control: 1 GbE, USB UART via the BrikVision web application
- USB UART serial port for troubleshooting



# MB3 VERSIONS

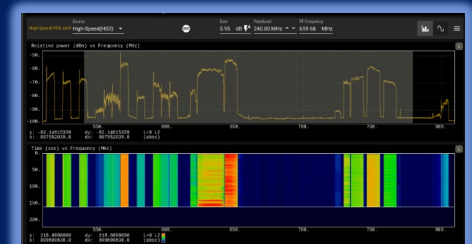
| CHASSIS   | MB3-PRT       |                 |                | MB3-MPK       | MB3-1U         |
|---|---------------|-----------------|----------------|---------------|----------------|
| Variant   | "02"          | "03"            | "05"           | "02"          | "01"           |
| <b>RECORDING</b>  |               |                 |                |               |                |
| Baseband 2.4-GHz* IBW 8b Real                           | 1             | —               | 1              | 1             | 1              |
| Baseband 1.2-GHz* IBW 8/16b Real                        | 2/1           | —               | 2/1            | 2/1           | 2/1            |
| 10-MHz to 2.4-GHz SBT up to 480-MHz* IBW 8/16b Complex  | 2             | —               | 4              | 2             | 4              |
| 10-MHz to 1.2-GHz SBT up to 480-MHz* IBW 8/16b Complex  | 4             | —               | 4              | 4             | 4              |
| 10-MHz to 6-GHz SBT up to 45.00-MHz** IBW 8/16b Complex | —             | 4               | —              | —             | —              |
| Dynamic ADC Clock                                       | 2.0–5.0 GHz   | —               | 2.0–5.0 GHz    | 2.0–5.0 GHz   | 2.0–5.0 GHz    |
| <b>PLAYBACK</b>   |               |                 |                |               |                |
| Baseband 2.4-GHz* IBW 8b Real                           | 1             | —               | 1              | 1             | 1              |
| 600-MHz to 2.4-GHz Tunable 1.2-GHz* IBW 8/16b Real      | 2/1           | —               | 2/1            | 2/1           | 2/1            |
| 10-MHz to 2.4-GHz SBT up to 480-MHz* IBW 8/16b Complex  | 2             | —               | 4              | 2             | 4              |
| 10-MHz to 6-GHz SBT up to 450-MHz** IBW 8/16b Complex   | —             | 4               | —              | —             | —              |
| Dynamic DAC Clock                                       | 4.0–5.0 GHz   | —               | 4.0–12.0 GHz   | 4.0–5.0 GHz   | 4.0–12.0 GHz   |
| Storage***  | 4 x U.2, 7 mm | 4 x U.2, 7 mm   | 4 x U.2, 15 mm | 3 x M.2       | 4 x U.2, 15 mm |
| Analog FPGA Mezzanine Card (FMC)****                    | DS (01943-01) | Epiq Sideiq™ X4 | BW (02871-01)  | DS (01943-01) | BW (02871-01)  |

- \* All shown bandwidths assume the default 2.4-GHz or 4.8-GHz ADC/DAC clock configuration for DS or BW systems
  - Adjusting the ADC or DAC clock adjusts all available IBW (For more information, see the BrikVision manual Sample Rate section)
- \*\* The MB3-PRT-03 uses the Epiq Sideiq X4 card to support discrete sample rates ranging from 50 MHz to 500 MHz
  - The highest available passband is 450 MHz, which is limited to two channels for both recording and playback
- \*\*\* The only drives qualified for use in an MB3 system are the following:
  - PM983 (EOL U.2 up to 7.68 TB)—Drive endurance: 10,000 TB total data written for the 7.68-TB drives
  - PM9A3 (U.2 up to 15.3 TB)—Drive endurance: 14,000 TB total data written for the 7.68-TB drives
  - 970 PRO (M.2 up to 1 TB)—Drive endurance: 1200 TB total data written for the 1-TB drives
- \*\*\*\* Three distinct FMC cards are used: Rincon Deathstalker (DS), Rincon BlackWidow (BW), Epiq Sideiq X4

## FEATURES

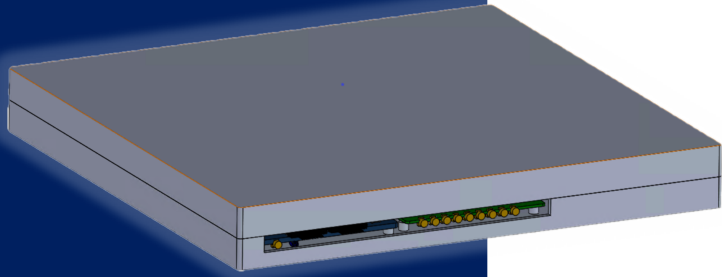
- Web-based control application (BrikVision) runs record and playback applications and allows downloading of recording files directly from the web browser as RAW or BLUE files
- Recordings are timestamped with GPS time when available or system time
  - Time-aligned recordings play back coherently
- Network transfer data offload application allows moving data from MB3 to a server at 800 MB/s by running a containerized application on the server
- Mountain Transfer application allows uploading or downloading of RAW or BLUE data files
- Mountain View application presents a spectral view of the entire recording and allows annotating in time and frequency
  - Each annotation can be downloaded as an individual RAW or BLUE file

### MB3 BRIKVISION DISPLAY



**RINCON**  
RESEARCH  
EMPLOYEE OWNED

|  |                                  |                                      |                                |
|--|----------------------------------|--------------------------------------|--------------------------------|
| <b>ADDRESS</b>                                 | <b>ORDER LINE</b>                | <b>TECH SUPPORT</b>                  | <b>FAX/WEB</b>                 |
| 101 N. Wilmot Rd. Ste. 101<br>Tucson, AZ 85711 | 520.519.3131<br>sales@rincon.com | 520.519.3132<br>tech-line@rincon.com | 520.519.3120<br>www.rincon.com |



# PEGASUS

## PEGASUS

### RF MISSION-PROCESSING PLATFORM FOR SMALLSATS

Pegasus builds on the successful space flight approach for ASDR — radiation hardening of system-critical components combined with careful selection, monitoring, and recovery of the latest generation of processors and sensors.

#### Processor

- AMD Versal™ Adaptive SoC

#### Converter

- 4x4 multi-GSPS RF channels
- Customizable front end
- UHF through K-band options

#### Targeted Applications

- Wideband spectrum survey
- RF signal detection and classification
- Phased-array communications and processing
- Extended frequency band access
- Geolocation
- Synthetic-aperture radar (SAR)
- 5G appliance
- Wideband communications

#### Orbits

- Qualification plans to support missions in LEO and GEO

## PRODUCT DESCRIPTION

### MODULAR DESIGN

- Customization is available to meet mission needs
- Processor and converter are integrated on a single card to minimize costs
- RF front end is a separate card to allow for mission-specific customization

### FLAT SYSTEM ARCHITECTURE

- Single thermal plane simplifies thermal interfacing requirements
- Flat interface simplifies integration

### FLEXIBLE AND EXTENDABLE DESIGN

- Multiple high-speed interfaces are available
- Several common input/output (I/O) interfaces allow for integration with other satellite subsystems and between multiple Pegasus cards for coherent RF sampling

# SYSTEM SPECIFICATIONS

- Expected power (dependent on configuration/application)
  - Typical: 50 W, Peak: 120 W
- GPIO, I2C, UART, RS-422, Ethernet, SpaceWire
- 16 high-speed serial interfaces for data transport
  - Supports PCIe, 10/40/100GbE, custom
- 256-MB single-event upset (SEU)-immune MRAM
- 16-GB ECC-protected DDR4
- SEU mitigated design
- Upset immune operating system/file system (OS/FS) storage
- Rincon-development environment and board support package
- +28 V power input
- Enclosure dimensions: 250 mm x 250 mm x 50 mm
- Weight: Expecting 10 kg

## ADDITIONAL RINCON SERVICES

### CUSTOMIZATION

- Hardware modifications
- User-defined modules
- Mission app development
- Additional screening/qualification

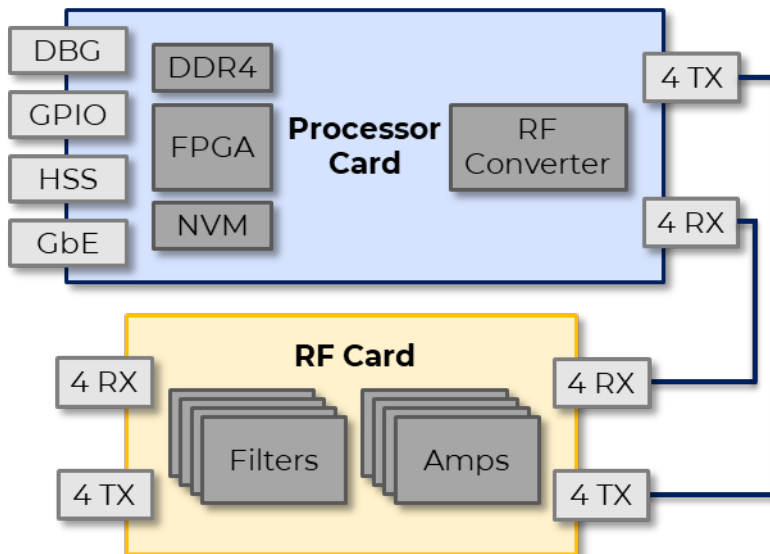
## ORBIT OPTIONS

Contact us for options on additional orbits, screening, qualification, and customizations to meet your requirements.

## STATUS

Prototype units available in late 2024

# BLOCK DIAGRAM



**ADDRESS**  
101 N. Wilmot Rd. Ste. 101  
Tucson, AZ 85711

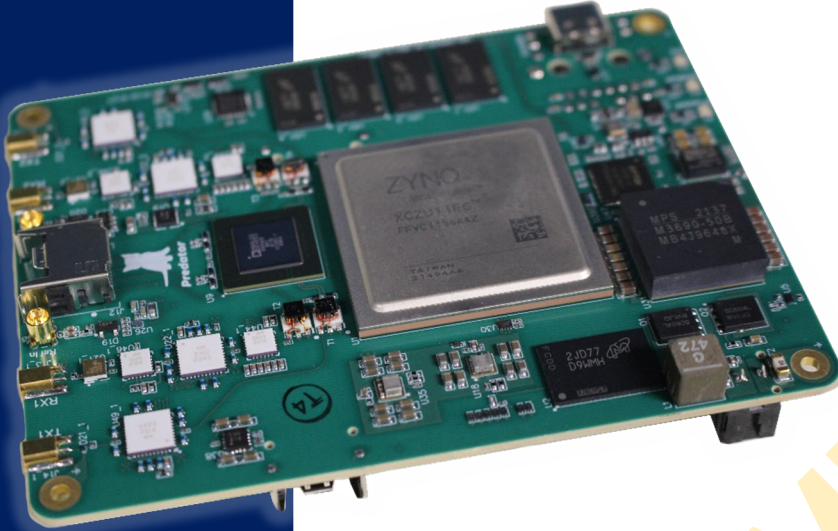
**ORDER LINE**  
520.519.3131  
sales@rincon.com

**TECH SUPPORT**  
520.519.3132  
tech-line@rincon.com

**FAX/WEB**  
520.519.3120  
www.rincon.com

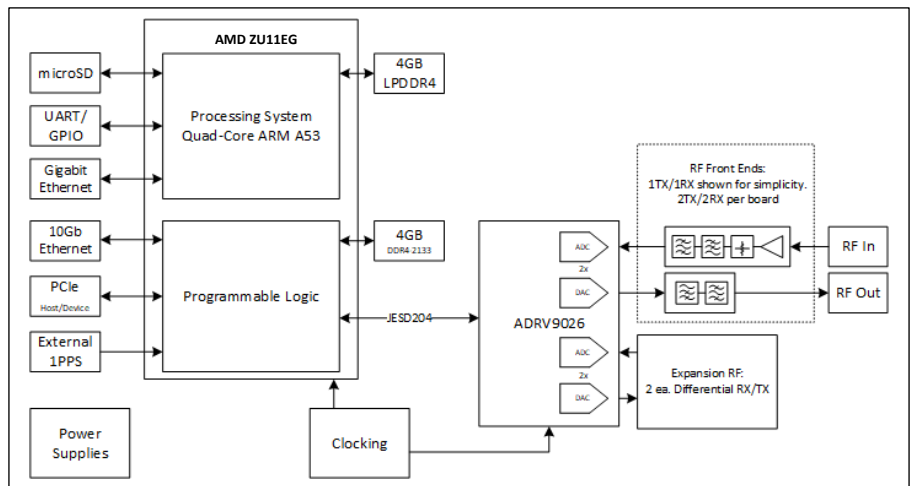
**RINCON**  
**RESEARCH**  
EMPLOYEE OWNED

**PREDATOR SDR**  
LOW-SWAP, HIGH-PERFORMANCE, ALL-IN-ONE RADIO



- The Predator SDR leverages the latest in Analog Devices' RF technology and AMD field-programmable gate array (FPGA) processing capabilities
- The ADRV9026 paired with an XCZU11EG provide ample onboard processing capabilities while the many digital inputs/outputs (I/Os) allow offloading data for host-side processing

**BLOCK DIAGRAM**



**PREDATOR  
SDR**



# SPECIFICATIONS

- FPGA XCZU11EG-1FFVC1156E
  - 4-GB RAM FPGA processor (PS)
  - 4-GB RAM FPGA programmable logic (PL)
- RF Transceiver ADRV9026
  - 75 MHz to 6 GHz RX and TX
  - 245.76-Msps maximum sample rate
  - Up to 200 MHz instantaneous bandwidth
  - Two independent tuners
  - 4 RX channels
    - 2 SMPM RX with preselect filter, gain, attenuation
    - 2 RX channels over differential cable via ARF
  - 4 TX channels
    - 2 SMPM TX with preselect filters
    - 2 TX channels over differential cable via ARF
  - JESD204c Digital Interface
- Command and control: 1 GbE RJ45
- 10 GbE
  - Cabled to external 4x SFP interface
  - Samtec ARF6-RA Slim Socket for ARC6
- PCIe Gen3x4
  - Samtec Razor Beam™ LSHM high-speed terminal/socket strip
  - Either host or endpoint configurable
- Expansion connector
  - 20-pin Pico-Clasp header
  - 8 GPIO (differential pair capable pins)
  - Dedicated I2C bus for external board control
  - SFP management controls for 10 GbE
  - Logic-level UART connection for GPS-NMEA messages
- Fractional-N reference clock
  - Configurable external reference frequency
  - Internal reference operation
  - SMPM 50 Ω connector
- 1PPS: SMPM 50 Ω connector
- FPGA JTAG, processor UART console: USB 2.0, Type-C connector
- SWaP
  - Dimensions: 106 mm x 80 mm (4.2" x 3.15")
  - Weight: 3 oz. (est)
  - Power: 70 Watts peak
- Power supply: 9–16VDC
  - 50 A core supply

# PREDATOR

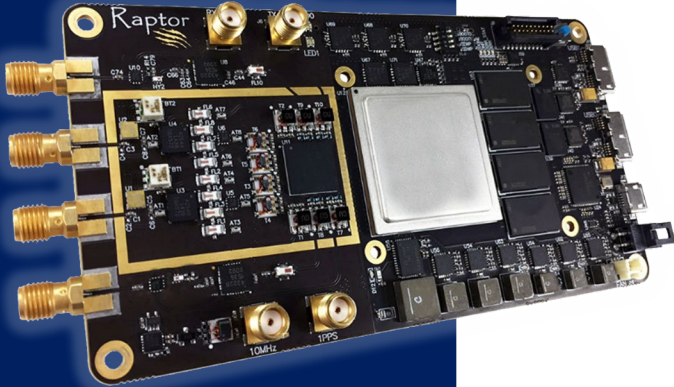
**ADDRESS**  
101 N. Wilmot Rd. Ste. 101  
Tucson, AZ 85711

**ORDER LINE**  
520.519.3131  
sales@rincon.com

**TECH SUPPORT**  
520.519.3132  
tech-line@rincon.com

**FAX/WEB**  
520.519.3120  
www.rincon.com

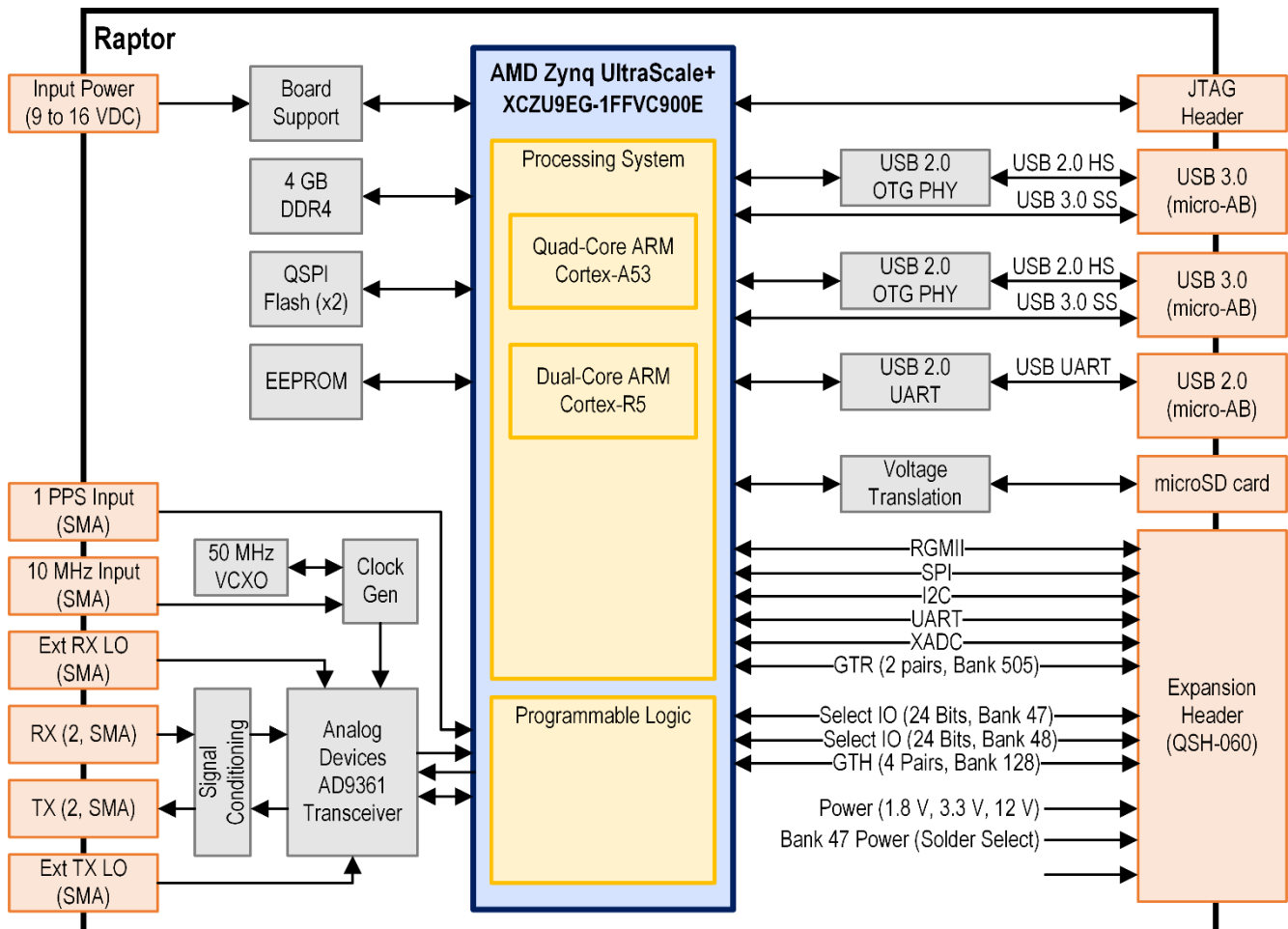
**RINCON**  
**RESEARCH**  
EMPLOYEE OWNED



**THE RAPTOR SDR DEVELOPMENT KIT** combines the latest-generation FPGA SoC technology with a MIMO-capable RF transceiver. The kit includes an RF shield, heatsinks, USB cables, standoffs, and a power supply to make it easy to get started. The open-source BSP, available on GitLab, includes support for streaming data to Gnu Radio and MATLAB so you can launch your ideas right out of the box.

**THE RAPTOR'S RF TRANSCEIVER IS MIMO-CAPABLE** from 70 MHz to 6 GHz. The configurable transmit path supports 70 MHz to 6 GHz and includes a 2.4-GHz, 500-mv power amplifier. Receiver performance is enhanced by a four-band preselector and wideband low-noise amplifier (LNA).

**BLOCK DIAGRAM**



# SPECIFICATIONS

## PROCESSING

|                       |  |
|-----------------------|--|
| <b>SoC</b>            | AMD Zynq UltraScale+ XCZU9EG-1FFVC900E FPGA                    |
| <b>FPGA</b>           | 600 logic cells (K)<br>2,520 DSP slices                        |
| <b>Application</b>    | Quad-core ARM Cortex-A53                                       |
| <b>Processor</b>      | 1.2 GHz, 64 bits   |
| <b>Memory</b>         | 4 GB of DDR4   |
| <b>USB</b>            | 2x USB 3.0 micro-AB  |
| <b>Storage</b>        | MicroSD card and quad serial peripheral interface (QSPI) flash |
| <b>Timing Signals</b> | 1PPS, 10-MHz reference, IRIG-B (requires Expansion Mezzanine)  |

## DOCUMENTATION

|                   |   |
|-------------------|---|
| <b>User Guide</b> | <a href="http://raptor.rincon.com">raptor.rincon.com</a>                                |
| <b>GitLab</b>     | <a href="https://gitlab.com/rinconresearch/raptor">gitlab.com/rinconresearch/raptor</a> |

## RF

|                      |   |
|----------------------|---|
| <b>Transceiver</b>   | Analog Devices AD9361   |
| <b>Tuning</b>        | 70 MHz to 6 GHz   |
| <b>Range</b>         | Accepts optional external local oscillators (LOs)                       |
| <b>Bandwidth</b>     | Up to 56 MHz<br>61.44 MSPS complex<br>12-bit resolution                 |
| <b>Receive Path</b>  | Onboard LNA and four-band preselector                                   |
| <b>Transmit Path</b> | Low-power, full tuning range path and high-power 500-mW 2.4-GHz PA path |
| <b>Connectors</b>    | All RF connectors are subminiature version A (SMA)                      |

## EXPANSION MEZZANINE\*

|                   |   |
|-------------------|---|
| <b>Ethernet</b>   | Dual SFP+ 10 Gb<br>10/100/1000 BASE-T   |
| <b>Storage</b>    | M.2 SATA connector<br>(80 mm)   |
| <b>Video</b>      | Mini Display Port interface   |
| <b>SerDes</b>     | FireFly connector,<br>2-GTH pairs   |
| <b>I/O Header</b> | I2C, SPI, UART<br>GPIO: 16 bits, FPGA attached<br>Analog: 8-channel<br>ADC/DAC/GPIO |
| <b>IRIG-B</b>     | Accepts AM or DC level shift  |

\* Mezzanine Card sold separately

## MECHANICAL

|                   |   |
|-------------------|---|
| <b>Dimensions</b> | L x W: 5" x 2.675"<br>(127 mm x 68 mm)<br>H: 0.681" (17.3 mm)<br>(Raptor only)<br>H: 1.5" (38 mm)<br>(with Expansion Mezzanine) |
| <b>Mass</b>       | Raptor with heatsinks: 115 g<br>Raptor, board only: 85 g<br>Raptor, Expansion Mezzanine, heatsinks: 175 g<br>(no SSD, SFP+)     |

## INCLUDED ACCESSORIES

|                     |   |
|---------------------|---|
| <b>Cables</b>       | USB 3.0, USB 2.0 (UART), JTAG adapter cable for AMD USB 2.0     |
| <b>Heatsinks</b>    | SoC and RF Pas  |
| <b>Power Supply</b> | 12 VDC, 36 W, universal AC input, North American cable included |



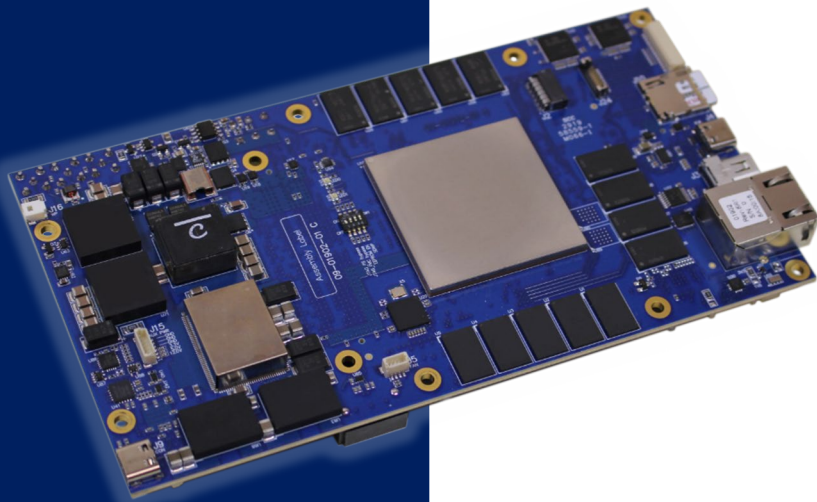
# RAPTOR

|   |  |  |  |
|---|--|--|--|
| <b>ADDRESS</b>                                  | <b>ORDER LINE</b>  | <b>TECH SUPPORT</b>  | <b>FAX/WEB</b>   |
| 101 N. Wilmot Rd., Ste. 101<br>Tucson, AZ 85711 | 520.519.3131<br><a href="mailto:sales@rincon.com">sales@rincon.com</a> | 520.519.3132<br><a href="mailto:tech-line@rincon.com">tech-line@rincon.com</a> | 520.519.3120<br><a href="http://www.rincon.com">www.rincon.com</a> |

**RINCON  
RESEARCH**  
EMPLOYEE OWNED

# SCORPION

## DYNAMIC RF PROCESSING PLATFORM

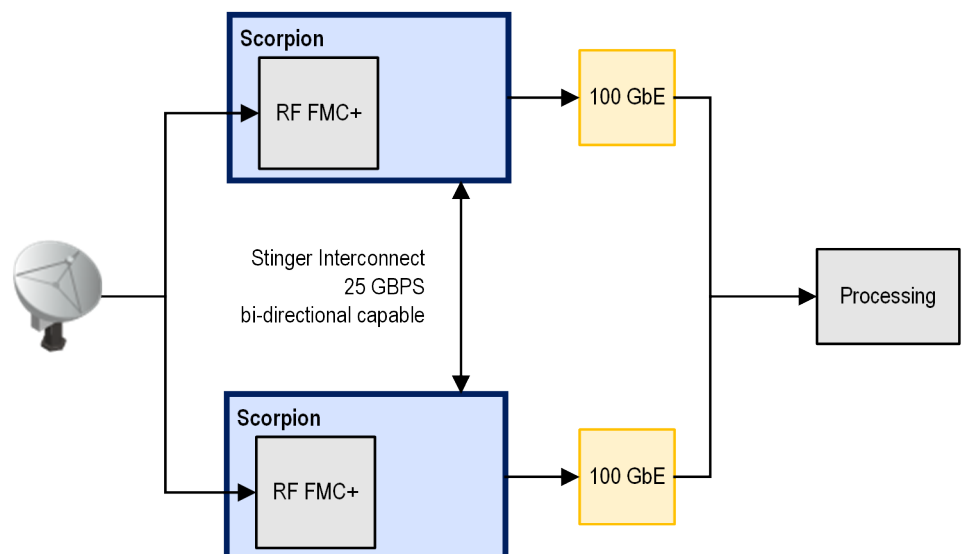


- FMC+ connector for next-generation RF front ends
- 100-Gb Ethernet for high-speed network integration
- 4x4 lane peripheral component interconnect express (PCIe) custom interface for attaching nonvolatile memory express (NVMe) SSDs or other high-speed devices
- AMD Zynq Ultrascale+ MPSoC: enables Linux-managed display port, USB 3.0, SATA, and 1 GbE
- 10-GB FPGA-attached double-data rate 4 (DDR4) for signal processing and data buffering

### DIGITIZATION AND PROCESSING WITH MORE CHANNELS, MORE BANDWIDTH, AND MORE SAMPLES PER SECOND

- Flexible digital signal processing (DSP) system designed to operate in multiple configurations and environments, including rack-mounted chassis, portable systems, and bench-top enclosures
- Built around the Zynq Ultrascale+ MPSoC with an embedded quad-core Cortex-A53 ARM processor
- Can record 4.8 GBPS (analogous to recording the content of a classic DVD every second)

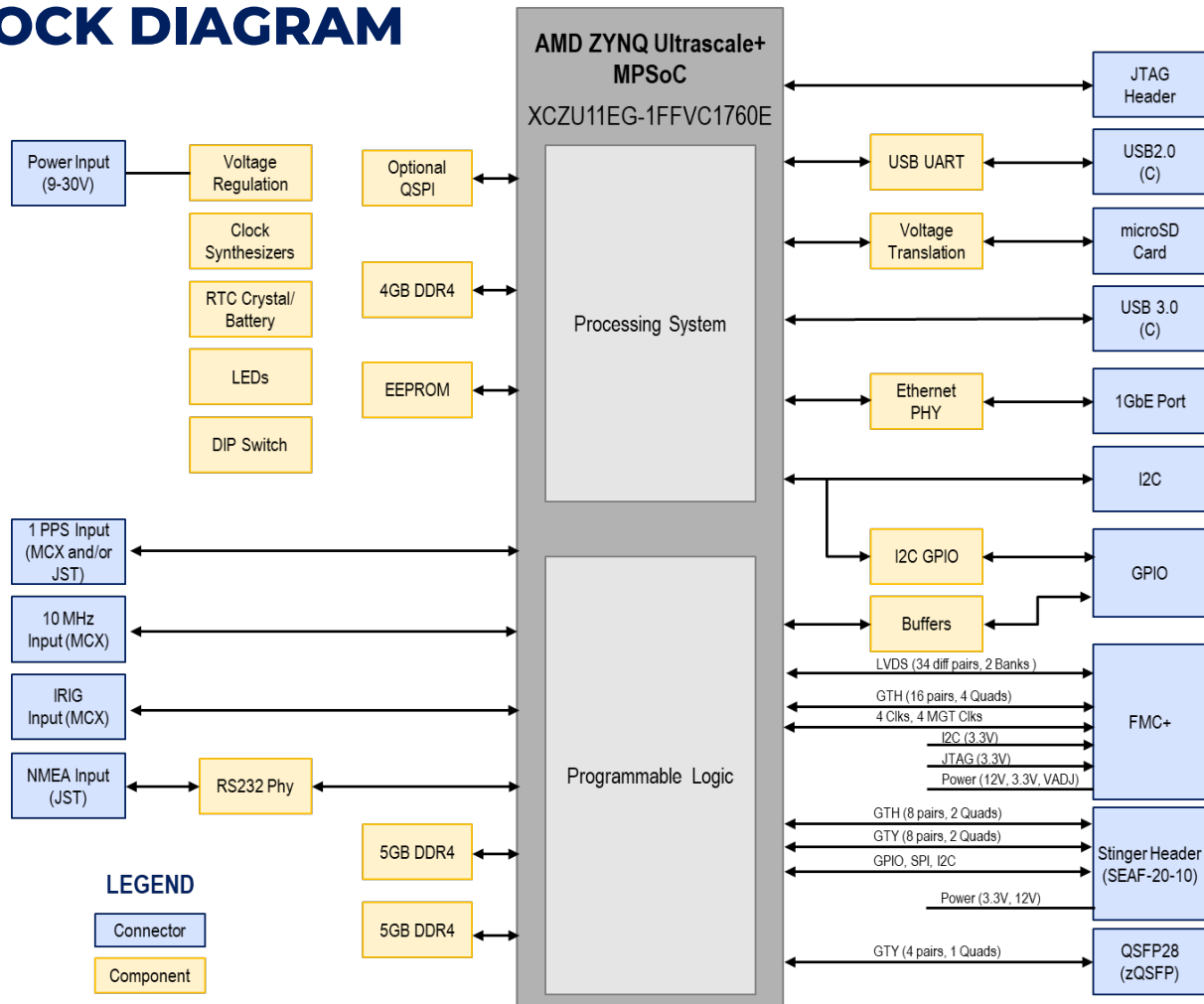
### WIDEBAND CROSS-POLE COMBINER



**SCORPION**



# BLOCK DIAGRAM



## SPECIFICATIONS

### GENERAL

- RRC part number: SCORP-ZU11EG-1E-01
- AMD Zynq Ultrascale+ MPSoC: XCZU11EG-1F1517E
- 4-GB DDR4 attached to ARM Core processors
- Two 5-GB DDR4 banks attached to the FPGA fabric
- MicroSD
- QSPI NAND Flash

### I/O

- NMEA, IRIG, and 10-MHz timing inputs
- USB 3.0/2.0 (USB-C)
- Display port
- 1 GbE
- 10 GbE/40 GbE/100 GbE (QSFPz)
- SATA (PS attached)
- 16 GPIO
- Input voltage: 9V–30V

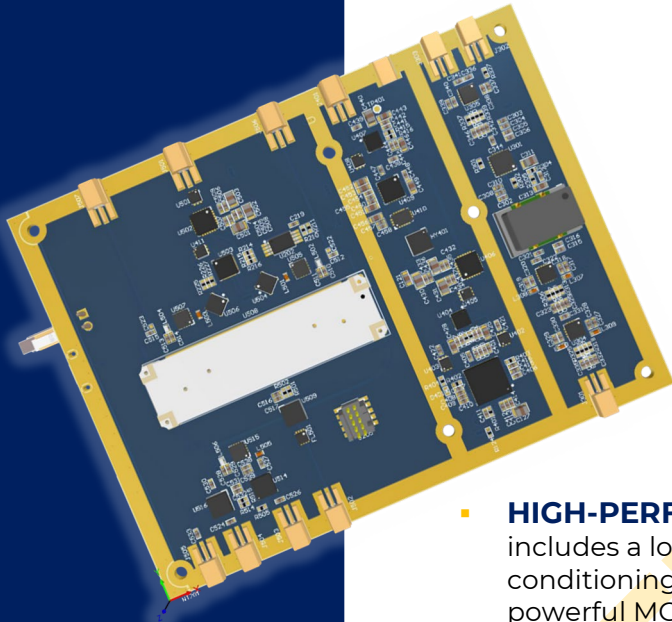
**ADDRESS**  
101 N. Wilmot Rd., Ste. 101  
Tucson, AZ 85711

**ORDER LINE**  
520.519.3131  
sales@rincon.com

**TECH SUPPORT**  
520.519.3132  
tech-line@rincon.com

**FAX/WEB**  
520.519.3120  
www.rincon.com

**RINCON**  
**RESEARCH**  
EMPLOYEE OWNED

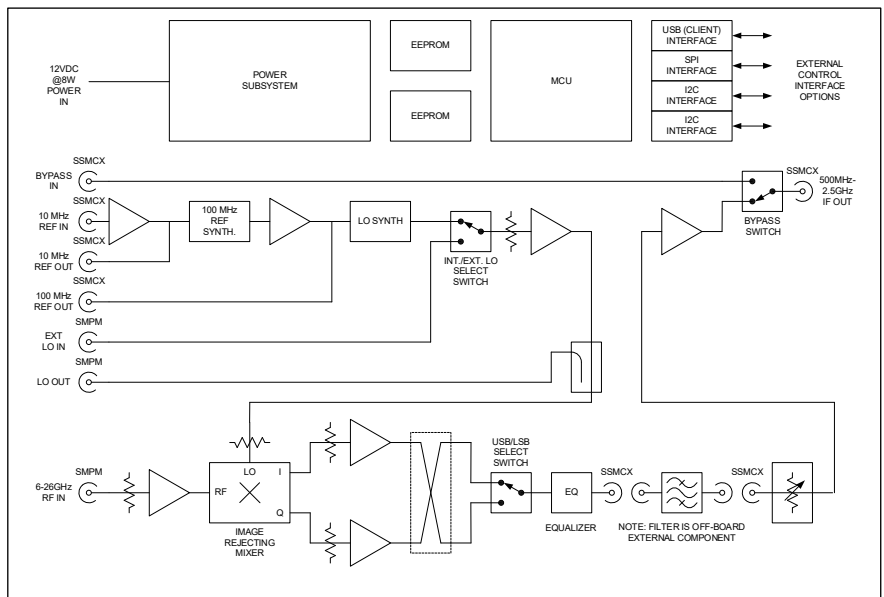


## WASP BLOCK DOWNCONVERTER

CONVERTS 2-GHZ BLOCK IN 6-GHZ – 26.5-GHZ TO L-BAND IF

- WASP board downconverts a 2-GHz-wide frequency block in any portion of the 6-GHz to 26.5-GHz frequency range to a 500-MHz to 2500-MHz L-band intermediate frequency (IF)
  - Low phase noise local-oscillator (LO) synthesizer has available LO output
  - Onboard reference conditioning is available for 10-MHz external reference with 10-MHz and 100-MHz reference outputs
  - Onboard power distribution accepts any input voltage between +8 VDC and +34 VDC
  - Onboard microcontroller unit (MCU) provides external USB, serial peripheral interface (SPI), and I2C communication interfaces for communication and control
- HIGH-PERFORMANCE, SELF-CONTAINED UNIT** includes a low phase noise LO synthesizer, reference input conditioning, high-efficiency power conditioning, and a powerful MCU for communications and control
  - IMAGE-REJECTING MIXER DESIGN** has a digital attenuator on the output side of the mixer for adjustment of the conversion gain
  - OFF-BOARD CONNECTORS** break the IF signal path to provide access for an external (off-board) IF filter
  - Unit can be used in conjunction with the WASP Block Upconverter to make phase-coherent frequency translation systems
  - Optimized to work with software-defined radios (SDRs)

## BLOCK DIAGRAM

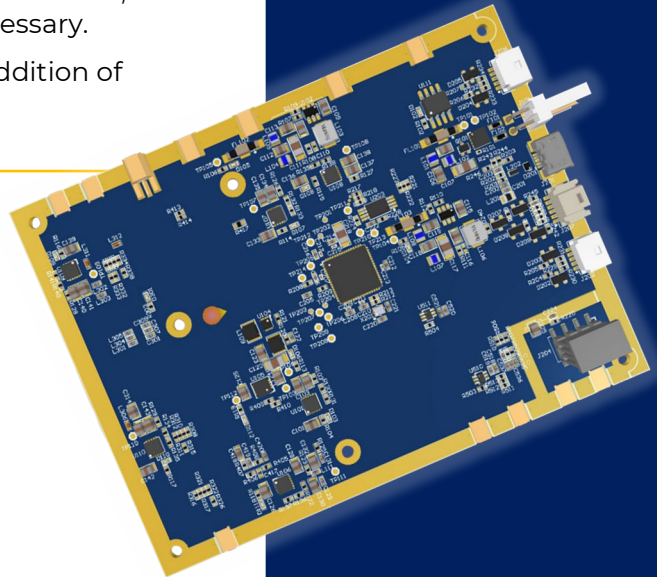


# SPECIFICATIONS

- Input frequency range: 6 GHz to 26.5 GHz
- LO tuning range: 8.5 GHz to 24 GHz in TBD steps<sup>1</sup>
- Input impedance: 50 Ohms
- Input return loss: 16 dB typical
- LO leakage: -67 dBm
- Output IF: 1500 MHz  $\pm$ 1 GHz (500 MHz to 2500 MHz)
- Output impedance: 50 Ohms
- Return loss: 13 dB minimum
- Power output: +4 dBm minimum
- Noise figure: 10 dB typical, 12 dB maximum
- Conversion gain: -0 dB to +30 dB in 0.5 dB steps
- Amplitude flatness:  $\pm$ 1.5 dB
- Image rejection: 30 dB typical, 20 dB minimum<sup>2</sup>
- Group delay: TBD (depends on off-board IF filter)
- Phase noise: TBD
- IP3: +25 dBm (third-order  $\leq$ 50 dBc for two tones @ +0 dBm)
- AM/PM conversion: TBD
- Gain slope: TBD (adjusted by choice of onboard equalizer)
- Spurious outputs:
  - Signal related: TBD (target: 60 dBc minimum)
  - Signal independent: TBD (target: -90 dBm max)
- Power: ~8 W @ 7-36 VDC
- Size: 80 mm x 106 mm x 12.8 mm

<sup>1</sup> LO can be commanded to tune from 8 GHz to 32 GHz, but other components limit useful range. Step size can be as small as 1 kHz, but for best phase noise, a larger step size might be necessary.

<sup>2</sup> Image rejection can be improved to >60 dB with the addition of an optional switched filter bank board.



## ADDRESS

101 N. Wilmot Rd. Ste. 101  
Tucson, AZ 85711

## ORDER LINE

520.519.3131  
sales@rincon.com

## TECH SUPPORT

520.519.3132  
tech-line@rincon.com

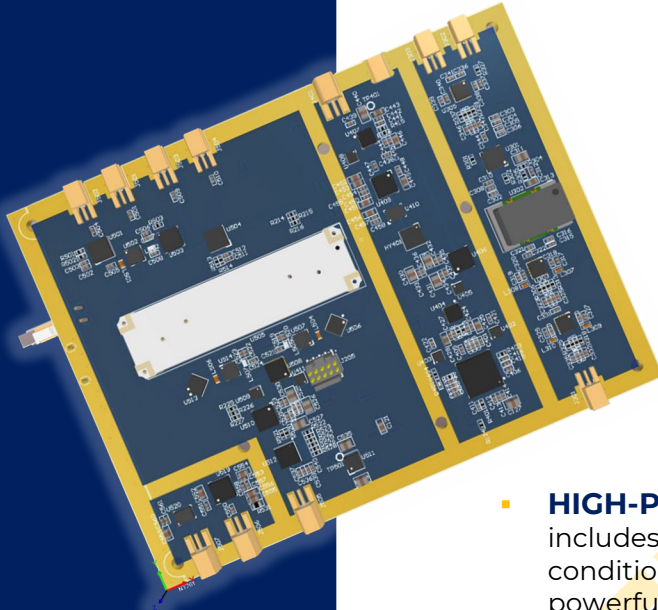
## FAX/WEB

520.519.3120  
www.rincon.com

# WASP BLOCK UPCONVERTER

CONVERTS L-BAND TO 6-GHZ TO 26.5-GHZ

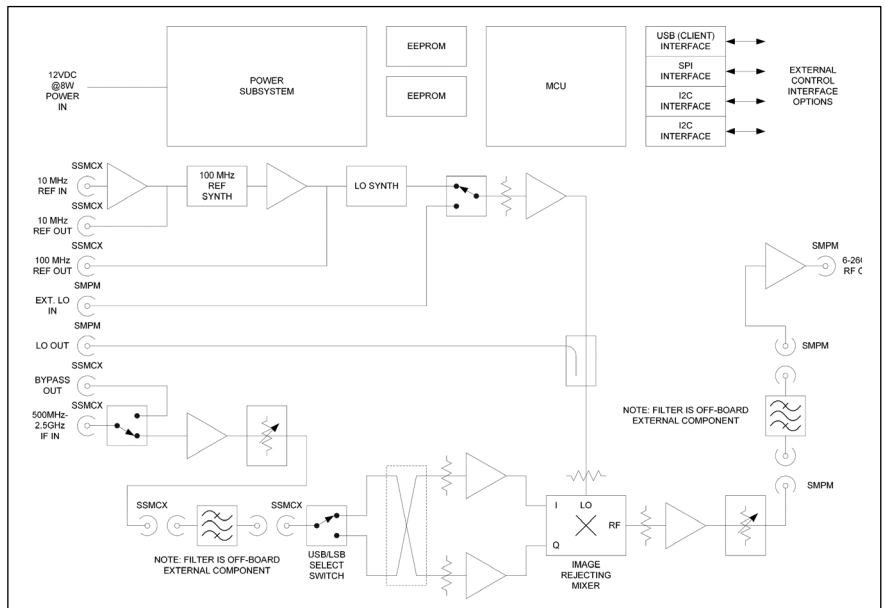
# BLOCK UPCONVERTER WASP



- WASP board upconverts a 500-MHz to 2500-MHz frequency block to any portion of the 6-GHz to 26.5-GHz frequency range
- Low phase noise local-oscillator (LO) synthesizer has available LO output
- Onboard reference conditioning is available for 10-MHz external reference with 10-MHz and 100-MHz reference outputs
- Optional output buffer delivers up to +10 dBm to drive power amplifiers
- Onboard power distribution accepts any input voltage between +8 VDC and +34 VDC
- Onboard microcontroller unit (MCU) provides external USB, SPI, and I2C communication interfaces for communication and control

- HIGH-PERFORMANCE, SELF-CONTAINED UNIT** includes a low phase noise LO synthesizer, reference input conditioning, high-efficiency power conditioning, and a powerful MCU for communications and control
- IMAGE-REJECTING MIXER DESIGN** has digital attenuators on the input and output side of the mixer to obtain maximum dynamic range for any configuration
- OFF-BOARD CONNECTORS** break the input and output signal paths to provide access for optional external filters
- Unit can be used with the WASP Block Downconverter to make phase-coherent frequency translation systems

## BLOCK DIAGRAM



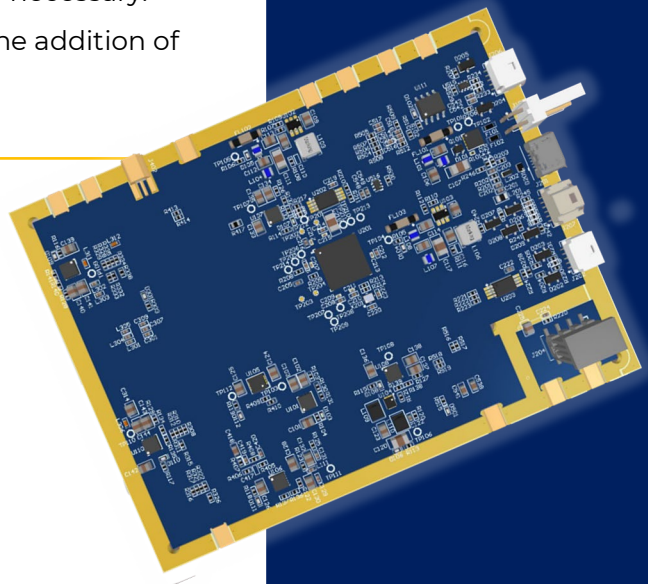
# SPECIFICATIONS

- Input frequency range: 500 MHz to 2500 MHz ("standard" L-band IF range)<sup>1</sup>
- LO tuning range: 8.5 GHz to 24 GHz<sup>2</sup>
- Input impedance: 50 Ohms
- Input return loss: 20 dB typical
- LO leakage: -8 dBm
- Output RF: 6 GHz to 26.5 GHz
- Output impedance: 50 Ohms
- Output return loss: 15 dB minimum
- Power output: -8 dBm (+10 dBm with optional post amplifier)
- Conversion gain: -25 dB to +35 dB in 0.5 dB steps
- Noise figure: TBD dB typical
- Image rejection: 30 dB typical 20 dB minimum<sup>3</sup>
- Group delay: TBD (depends on off-board IF filter)
- Phase noise: TBD
- IP3: TBD dBm (third-order  $\leq 50$  dBc for two tones @ +0 dBm)
- AM/PM conversion: TBD
- Gain slope: TBD (adjusted by choice of onboard equalizer)
- Spurious outputs:
  - Signal related: TBD
  - Signal independent: TBD
- Power: ~8 W @ 7-36 VDC
- Size: 80 mm x 106 mm x 12.8 mm

<sup>1</sup>Upconverter input frequency range can be extended to cover 500 MHz to 6 GHz by changing the hybrid.

<sup>2</sup>LO can be commanded to tune from 8 GHz to 32 GHz, but other components limit useful range. Step size can be as small as 1 kHz, but for best phase noise, a larger step size might be necessary.

<sup>3</sup>Image rejection can be improved to >60 dB with the addition of an optional switched filter bank board.



## ADDRESS

101 N. Wilmot Rd. Ste. 101  
Tucson, AZ 85711

## ORDER LINE

520.519.3131  
sales@rincon.com

## TECH SUPPORT

520.519.3132  
tech-line@rincon.com

## FAX/WEB

520.519.3120  
www.rincon.com

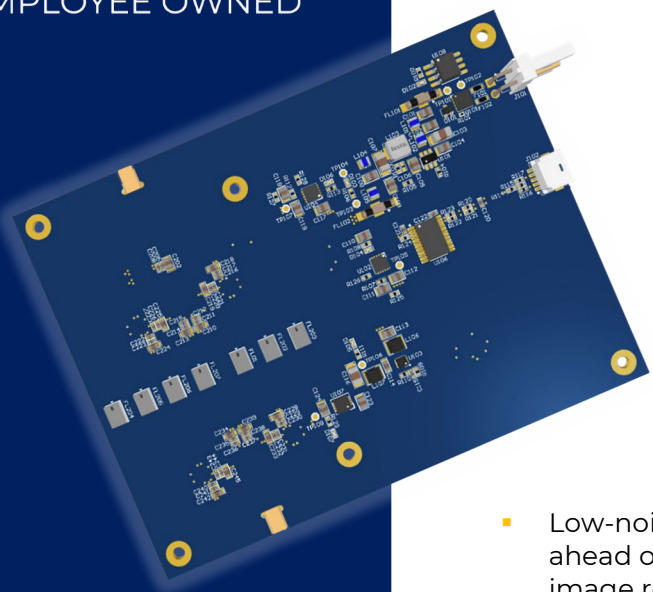
INFORMATION SUBJECT TO CHANGE WITHOUT NOTICE.  
PRODUCTS ARE SUBJECT TO THE RESTRICTIONS OF THE ARMS EXPORT CONTROL ACT.  
VERSION 2.0.

**RINCON**  
**RESEARCH**  
EMPLOYEE OWNED



# WASP LNA PRESELECTOR

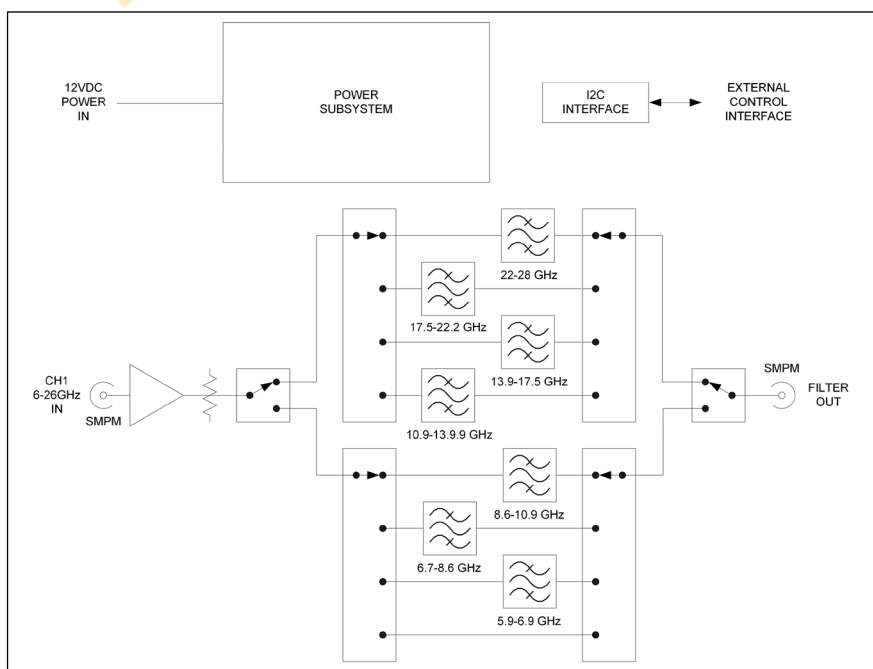
LOW-NOISE AMPLIFIER  
SWITCHED FILTER BANK PRESELECTOR



- Covers 6-GHz to 26.5-GHz range for WASP Block Downconverter to improve image rejection and noise figure (NF)
- Eight selectable signal paths:
  1. Pass through
  2. 5.9–6.9 GHz
  3. 6.7–8.6 GHz
  4. 8.6–10.9 GHz
  5. 10.9–13.9 GHz
  6. 13.9–17.5 GHz
  7. 17.5–22.2 GHz
  8. 22–28 GHz

- Low-noise amplifier and switched filter bank can be inserted ahead of the WASP Block Downconverter input to improve image rejection and NF
- Board is controlled by the MCU on the downconverter board through an I2C interface connection
- Preselector board can also be used with the WASP Block Upconverter board output to reduce harmonics and spurious frequencies

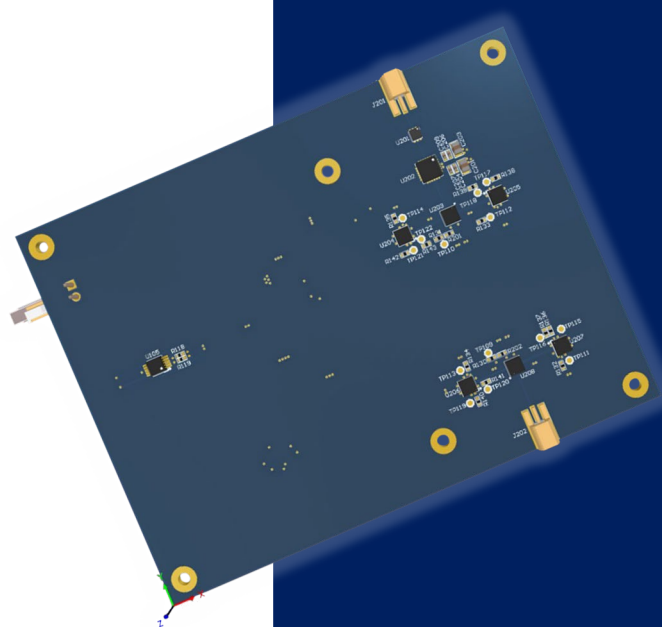
## BLOCK DIAGRAM



# SPECIFICATIONS

- Through gain: +4.8 dB to +9.8 dB
- Input noise figure: 2.5 dB
- Input impedance: 50 Ohms
- Input return loss: 10 dB typical
- Output impedance: 50 Ohms
- Output return loss: TBD
- IP3 (third-order intercept point): +18 dBm
- Power: 0.16 W @ 7–36 VDC

PRELIMINARY



#### ADDRESS

101 N. Wilmot Rd. Ste. 101  
Tucson, AZ 85711

#### ORDER LINE

520.519.3131  
sales@rincon.com

#### TECH SUPPORT

520.519.3132  
tech-line@rincon.com

#### FAX/WEB

520.519.3120  
www.rincon.com

INFORMATION SUBJECT TO CHANGE WITHOUT NOTICE.  
PRODUCTS ARE SUBJECT TO THE RESTRICTIONS OF THE ARMS EXPORT CONTROL ACT.  
VERSION 2.0.

**RINCON**  
**RESEARCH**  
EMPLOYEE OWNED

## ORDERING INFORMATION

| SPEC / FAMILY           | PRODUCT  | PART NUMBER                                    | DESCRIPTION  |
|-------------------------|--|--|--|
| ASP                     | Advanced Signal Processor                            | ASP-PROD-01<br>ASP-EDU-01                      | Modular Digital Signal Processing (DSP) hardware rack with 8 or 16 independent wideband RX channels and 4 independent wideband TX channels |
| AstroSDR                | AstroSDR Flight and Engineering                      | ASDR-RF-S-00<br>ASDR-RF-E-00<br>ASDR-RF-CFG-00 | S = Flight model<br>E = Engineering model<br>CGF = Commercial model<br>00 = standard configuration, others available on request            |
| AstroSDR Optional Cards | Gigabit Ethernet and Flash Memory Daughter Card      | ASDR-DC-GE32G-01                               | 01 = Optional card   |
|                         | Flash Memory Daughter Card                           | ASDR-DC-64G-01                                 | 01 = Optional card   |
| DLSR3                   | DSPBRIK™ L-Band SDR, 3 <sup>rd</sup> Generation      | DLSR3-1U-2E4X-02                               | Two Extended-L-Band Inputs, Four 10GbE Outputs   |
|                         |  | DLSR3-1U-4E8X-02                               | Four Extended-L-Band Inputs, Eight 10GbE Outputs   |
|                         |  | DLSR3-MU-DS-01                                 | MET1 deathstalker configuration, Two In, Two Out   |
| Kestrel SDR             |  | RPTR-KESTREL-PROC-01                           | Mini raptor SDR processor  |
|                         |  | RPTR-KESTREL-RADIO-01                          | Mini raptor SDR radio  |
| MountainBrik™ (MB3)     | Manpack Recorder, Scorpion base                      | MB3-MPK-REC-WBD-02                             | Wideband I/O Digitizer, Dual Speed RF Front End, w/RF Gain; 3x1TB m.2 NVMe   |
|                         | Portable Recorder, Scorpion base                     | MB3-PRT-REC-WBD-02                             | Wideband I/O Digitizer, Dual Speed RF Front End, w/RF Gain; 4x7.68TB U.2 NVMe  |
|                         | Portable Recorder, Wideband I/O Digitizer            | MB3-PRT-REC-WBD-03                             | 4 tunable (up to 6GHZ) inputs and outputs. RF channel bandwidth 200MHz; 4x7.68TB U.2 NVMe w/ Sidekiq                                       |
|                         | Manpack Recorder, Scorpion base and WB I/O Digitizer | MB3-PRT-REC-WBD-0X                             | 25Gbps, with DLSR3 Functions   |
|                         | Portable Recorder Unit                               | MB3-PRT-REC-WBD-05                             | Quad HS I/O Digitizer, 32 TB   |
|                         | Recorder w/Scorpion base and WB I/O Digitizer        | MB3-CC-REC-WBD-01                              | Conduction Cooled  |
|                         | BlackWidow upgrade                                   | MB3-PRT-BW-UPG-01                              | For MB3-PRT units  |
|                         | BlackWidow upgrade                                   | MB3-MPK-BW-UPG-01                              | For MB3-MPK units  |
|                         | MB3 System w/BlackWidow Digitizer                    | MB3-1U-01                                      | In 1U Chassis  |
|                         | 16 TB Disk Pack                                      | MB3-DP4-16T                                    | For MB3 units  |
|                         | 32 TB Disk Pack                                      | MB3-DP4-32T                                    | For MB3 units  |
|                         | Pegasus  | Space SDR Payload                              | PEGASUS-01   |
| Predator                | SDR  | PRD-01   | Predator SDR, -01 Variant, CCA, power cables, and basic BSP  |

**ADDRESS**  
101 N. Wilmot Rd. Ste. 101  
Tucson, AZ 85711

**ORDER LINE**  
520.519.3131  
sales@rincon.com

**TECH SUPPORT**  
520.519.3132  
tech-line@rincon.com

**FAX/WEB**  
520.519.3120  
www.rincon.com

| SPEC / FAMILY           | PRODUCT                         | PART NUMBER         | DESCRIPTION  |
|-------------------------|---------------------------------|---------------------|--|
| Raptor                  | Raptor SDR Development Kit      | RPTR-ZU9EG-1E-4G-01 | Raptor Main board and accessories  |
|                         | Expansion Mezzanine             | RPTR-XPANS-01       | Raptor I/O Expansion Mezzanine with dual SFP+ connectors, 1 GbE, M.2 SATA SSD connector, and Mini DisplayPort interfaces |
| Scorpion                | Dynamic RF Processing Platform  | SCORP-ZU11EG-1E-01  | Contact <a href="mailto:sales@rincon.com">sales@rincon.com</a> for configuration information                             |
| Scorpion Optional Cards | Stinger Interface Card          | SCORP-3X1TB-01      | * Break-out card modules sold separately   |
|                         | Wideband Analog I/O Digitizer   | FMC-WAIO-01         |  |
|                         | Scorpling QSFP+ Break-Out Card* | SCORP-QSFP-01       |  |
|                         | SFP+ Quad Break-Out Card*       | 04-02191-01         |  |
| WASP                    | Block DownConverter             | —                   | 2-GHz bandwidth 6 – 26.5 GHz to L-Band downconverter with internal local oscillator synthesizer                          |
|                         | Block UpConverter               | —                   | 2-GHz bandwidth L-Band to 6 – 26.5-GHz upconverter with internal local oscillator synthesizer                            |
|                         | LNA PreSelector                 | —                   | Switched filter bank preselector with LNA (for use with WASP upconverter and downconverter units)                        |

**ADDRESS**  
101 N. Wilmot Rd. Ste. 101  
Tucson, AZ 85711

**ORDER LINE**  
520.519.3131  
[sales@rincon.com](mailto:sales@rincon.com)

**TECH SUPPORT**  
520.519.3132  
[tech-line@rincon.com](mailto:tech-line@rincon.com)

**FAX/WEB**  
520.519.3120  
[www.rincon.com](http://www.rincon.com)



# CERTIFICATE OF

**R  
E  
G  
I  
S  
T  
R  
A  
T  
I  
O  
N**

This is to certify that the management systems of  
**Rincon Research  
Corporation-ISBU**

have been formally assessed by  
**TCB Audit Services, LLC** and found to comply with  
the requirements of:

**ISO 9001:2015**

*Quality Management Systems-Requirements*

**Scope of Registration:**

*Manufacture of Electronic assemblies/chassis & design of  
circuit card assemblies and integrated systems.*

*IAF Code(s)-19*

**Registered Site(s):**

*101 N Wilmot Road. Ste 101, Tucson, AZ 85711*

**March 3, 2023**

ISSUE DATE

**March 2, 2026**

EXPIRY DATE

**ERIC HINSON,**  
CHIEF EXECUTIVE OFFICER  
TCB AUDIT SERVICES, LLC



This certificate of registration is issued by TCB Audit Services, LLC, 11 Klondike Ct. O'Fallon, MO, 63368 (www.tcbaudits.com). This certificate remains the property of TCB Audit Services, LLC and must be returned upon request. It must not be altered or defaced in any way and deliberate misuse of the certificate will result in cancellation without notification.



**EMAIL** sales@rincon.com

**PHONE** 520.519.3131

**FAX** 520.519.3120

**MAIL** Rincon Research Corporation  
ATTN: Sales  
101 North Wilmot Road, Suite 101  
Tucson, AZ 85711

## PRODUCT CONTACT INFORMATION

**PRODUCT ORDERS** may be placed via email, telephone, fax, or mail.

**OTHER CONFIGURATIONS** are possible. Please contact us if you are interested in customizing a product to your specific requirements.

**WARNING:** Commodities, including associated software, firmware, and technical data, offered for sale in this guide are controlled for export by the U.S. Dept. of State under the International Traffic in Arms Regulations (ITAR) or by the Dept. of Commerce under the Export Administration Regulations (EAR). Purchaser is required by U.S. law to comply with these regulations. Export, re-export, and retransfer of these commodities by any means without the required licenses or other U.S. Government authorization is prohibited by U.S. law.

# ENGINEERING & PROFESSIONAL SERVICES

SMALL COMPANY, GLOBAL REACH

**AT RINCON RESEARCH CORPORATION,** our core business is to design, build, test, and field digital signal processing (DSP) products and services. We use our superior expertise to serve our customers with a range of technologies.

**WITH YEARS OF EXPERIENCE,** Rincon Research Corporation provides results that go above and beyond expectations. Our hardware and software products impact the future of digital signal processing.

**WITH OUR WIDE-RANGING EXPERTISE,** Rincon Research Corporation can help you successfully complete challenging missions with innovative and cost-effective solutions.

## SIGNAL COLLECTION, ANALYSIS, AND PROCESSING

Rincon Research Corporation has teams of experts researching and developing signal-processing algorithms, general-purpose signals analyses, and prototypes for a range of mission-critical systems to support our customers' signals technology objectives.

## GEOLOCATION APPLICATIONS

As a pioneer in RF geolocation, Rincon Research Corporation continues to develop unique techniques and applications, including time-based, frequency-based, and interferometric techniques.

## MISSION-ORIENTED SMALL-SAT SERVICES

Rincon Research Corporation has experience designing and integrating small-sat payloads to solve challenging RF problems. Our experienced engineers design, analyze, and plan missions to achieve maximum results with the latest small-sat technology.

## DSP INFRASTRUCTURE DEVELOPMENT

Many of our DSP systems are built upon the Midas family of software that we helped pioneer and that is still in use today. Rincon Research Corporation continually evaluates and offers the latest software tools and hardware platforms to enable our customers' applications.

## HIGH-PERFORMANCE ELECTRONICS DEVELOPMENT AND PRODUCTION

Our line of high-performance electronics includes FPGA-based SDRs and high-performance signal recorders. Our COTS products can be used as-is or customized to implement systems that perform to extraordinary standards.

## CUBESAT PAYLOAD FOR HIRE

Our AstroSDR is a complete RF processing payload: configurable radio, FPGA signal processor, ARM processor, and data storage. AstroSDR combines state-of-the-art capabilities with a flexible design, resulting in a compact, efficient solution for multiple mission requirements.

## DSP SYSTEM DEVELOPMENT

We have a 30-year history of developing cutting-edge applications that turn general-purpose computers into software-driven DSP powerhouses. Our DSP systems are deployed around the world by the U.S. Government in sea-, air-, and land-based applications.

## SPACE SITUATIONAL AWARENESS AND ORBIT ANALYSIS

Our orbit engineers have a history of innovative and cost-effective solutions for high-accuracy orbit and maneuver determination. Our passive RF technology is ready to provide all-weather, 24/7 support to your mission.

## GROUND TERMINAL OPERATIONS

Need a ground system solution? Rincon Research Corporation has a rich legacy of ground network digital-RF technology and antenna expertise to achieve scalable, cost-effective, command, control, and mission data links.

### ADDRESS

101 N. Wilmot Rd., Ste. 101  
Tucson, AZ 85711

### ORDER LINE

520.519.3131  
sales@rincon.com

### TECH SUPPORT

520.519.3132  
tech-line@rincon.com

### FAX/WEB

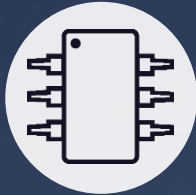
520.519.3120  
www.rincon.com

# RINCON RESEARCH

EMPLOYEE OWNED



**RF SIGNAL  
PROCESSING**



**HIGH-PERFORMANCE  
ELECTRONICS  
DEVELOPMENT**



**SPACE  
SYSTEMS**



**HIGH-PERFORMANCE  
COMPUTING**



**LiDAR  
TECHNOLOGY**

**SDR**

**ADVANCED ANTENNA ARRAYS**

**FPGA HARDWARE**

**SYSTEM DESIGN**

**SIGNAL EXPLOITATION**

**OFDM**

**GNSS/GPS ANALYSIS**

**CYCLOSTATIONARY TECHNIQUES**

**DIGITAL SIGNAL PROCESSING**

**PASSIVE RF SATELLITE TRACKING**

**ORBIT DETERMINATION**

**VHDL**

**ADAPTIVE BEAMFORMING**

**SPACE SITUATIONAL AWARENESS**

**GEOLOCATION ALGORITHMS**

**SIGNAL ANALYSIS/SIMULATION**

**SYSTEM ENGINEERING & INTEGRATION**

**DIGITAL COMMUNICATIONS SYSTEMS**

**MACHINE LEARNING APPLICATIONS**

**SMALLSAT PAYLOAD DESIGN & INTEGRATION**

**COMPLEX PROBLEMS    ADVANCED SOLUTIONS**

[www.rincon.com](http://www.rincon.com)