# ARKA

# satTRAC® Wideband Modem

**High-rate payload Software Defined Radio (SDR)**

**Software programmable direct sampling up to 6 GHz**

**High-density to support multiple uplinks / downlinks**

**Versatile processing applications deployed in chassis, on prem, or in the Cloud**

**Robust payload waveform support**

## OVERVIEW

Our Wideband Modem is the industry's most configurable solution to support the expanding landscape of high-bandwidth signals, networks, and satellite links. It is a direct RF-to-digital and digital-to-RF signal converter that captures and processes high bandwidth data through modular software applications hosted on a Commercial Off-the-Shelf server or through services / microservices hosted in a cloud architecture.

We lead the industry at delivering speed-to-capability for our customers. Choose from a broad library of TRL 9 software applications or work with us to develop a bespoke solution that meets your specific mission requirements.

The wideband modem leverages a Dell server to run processing applications and our wave:IQ wideband digitizer for ingesting and digitizing wideband signals. wave:IQ uses proven RFSoC technology uses only a small PCIe Digital IO card formfactor installed on a server that is co-located with the digitizer at the edge for a complete wideband modem solution. The RFSoC technology is a revolutionary digitizer chip that provides significantly greater access to RF signals versus conventional Application Specific Integrated Circuits. It provides eight individual input / output channels and is fully software programmable.

When optionally integrated with our WAN-EX RF over IP technology, wave:IQ provides reliable data transport of multi-Gbps data streams via any IP network, over any distance, and with a reduced hardware footprint. The result is real-time digitization of 1000 MHz of RF signal data that is processed into VITA-49 IP packets and transported over public or private IP networks.

## satTRAC CAPABILITIES

### BASEBAND PROCESSING

- CCSDS/TDM
- COP-1
- Crypto interfaces
- G3RUH
- HDLC
- SLE
- Randomization/scrambling
- RS-422/TTL/ECL/LVDS
- FEC (Viterbi, RS, LDPC, Turbo, BCH, CRC)

### INTERFACES AND APIs

- Control and monitoring through standard REST APIs.
- Support for Simple Network Management Protocol (SNMP).
- Customizable UI.

### satTRAC MODERN SOFTWARE

#### COMMUNICATION / PAYLOAD WAVEFORMS:

- BPSK/QPSK
- 8PSK
- 16APSK
- 32APSK
- DVB-S2 (including LDPC)

#### OPERATIONAL WAVEFORMS:

- BPSK/PM, BPSK/FM
- BPSK/QPSK
- FSK
- FSK/AM
- GMSK
- SQPSK/OQPSK
- UAQPSK

Compatible with most small satellite radios and vehicles

#### NASA WAVEFORMS:

- C2V2
- TDRS
- DSSS

#### RANGING:

- ESA, ESA-like tone ranging
- CCSDS PRN
- SGLS PRN
- TDRS

Ask about your custom waveforms

#### INSPECTION:

- Signal Monitoring

#### TEST:

- Channel Emulation
- Noise Injection

**BEYOND BEGINS HERE**

## wave:IQ SPECIFICATIONS

| PHYSICAL INFORMATION | |
|---|---|
| Physical Interfaces | A000567 1U I/O Panel (recommended) or individual cables can be provided |
| Server Dimensions | Typical Dell R740 Server: 2U, 3.4 H x 17.08 W x 29.03 D (in) 46 lbs |

| DIGITAL I/O | |
|---|---|
| Connector Type | Two (2) 42-pin Molex Nano Pitch |
| Single-Ended GPIO | 12 bi-directional 3.3V LVCMOS 10 MHz max data rate |
| LVDS GPIO | 8 Rx pairs, 8 Tx pairs 100 MHz max data rate per pair |
| I2C Bus | Two (2) buses, Two (2) addresses 100 Kbps max data rate per bus |

| RF INPUT | |
|---|---|
| Architecture | 14-bit RFSoC ADC |
| Number of Input Channels | 8, independently configurable |
| Sample Rate | Up to 5000 MS/s |
| Frequency Range | 50 - 6000 MHz |
| Power Range | -100 to -10 dBm |
| Damage Level | -7 dBm |
| AGC Range | 58 dB |
| Alias Rejection | > 75 dB |
| Input Impedance | 50 Ohms |
| Input P1dB | -4 dBm |
| Instantaneous Bandwidth | 1250 MHz across all channels 600 MHz max per channel |
| Instantaneous Dynamic Range | > 74 dB |
| Noise Figure | < 9 dB |
| RF Gain | 20 dB |
| Tuning Step Size | < 1 MHz |
| VSWR | 2:1 (typical) |
| SFDR | TBD |
| Channel Isolation | 56 dB (typical) |

| TIMING & REFERENCE | | | |
|---|---|---|---|
| **10 MHz Input:** | | **IRIG-B Input:** | |
| Connector Type | SSMB jack | Connector Type | SMA female |
| Input Impedance | 50 ohms | Input Impedance | 10K ohms |
| Input Range | -10 to +10 dBm | Input Range | 0.3 to 5.0 Vpp |
| Input Damage Level | +17 dBm | Input Damage Level | 6.6 Vpp |
| **10 MHz Output:** | | **1PPS Input:** | |
| Connector Type | SSMB jack | Connector Type | SMA female |
| Internal Reference Accuracy | < 0.1 ppm | Input Impedance | 10k ohms |
| Output Impedance | 50 ohms | Input Range | TTL levels |
| Output Level | + 7 dBm | Input Damage Level | 6.5 V |

| RF OUTPUT | |
|---|---|
| Architecture | 14-bit RFSoC DAC |
| Number of Output Channels | 8, independently configurable |
| Sample Rate | Up to 6800 MS/s |
| Frequency Range | 50 - 6000 MHz |
| Power Range | -40 to +10 dBm |
| Dynamic Range | > 74 dB |
| Instantaneous Bandwidth | 1250 MHz across all channels 600 MHz max per channel |
| Instantaneous Dynamic Range | > 65 dB |
| Impedance | 50 Ohms |
| Phase Noise | TBD |
| Power Accuracy | +/- 0.5 dB |
| Sweep Modes | Triangle, Return to 0 |
| Sweep Rates | 10 kHz/s max |
| Sweep Limits | center-500 to center+500 kHz |
| Tuning Step Size | < 1 MHz |
| VSWR | < 1.8:1 |
| SFDR | TBD |
| Channel Isolation | TBD |

Environmental specifications of the wave:IQ, including operating / storage temperature and relative humidity, are derived from the server that is selected for the wave:IQ system. Consult the server manufacturer specifications for this information.

Note: Specification values listed here are preliminary and subject to change. All measurements are taken between 50 - 2150 MHz and 0 dB attenuation level.
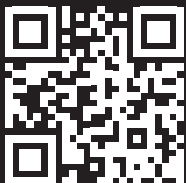
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