

wave:IQ WIDEBAND DIGITIZER

High-speed Analog to Digital Converter (ADC) for high bandwidth signals

Software programmable signal filtering and bandwidth selection

Multiple independent input and output RF channels for additional space and cost savings

System simplification via software applications / services and edge devices

OVERVIEW

Part of our satTRAC® suite of modem solutions, wave:IQ Wideband Digitizer developed by ARKA is the industry's most flexible and 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 (COTS) server or through services / microservices hosted in a Cloud architecture for greater scalability and resiliency.

While typical RF interfaces require hardware down conversion, our wave:IQ leverages proven RFSoc technology developed for LTE / 5G, DOCSIS, and RADAR applications. The wave:IQ uses only a small PCIe Digital IO card form-factor installed on a server that is conveniently co-located at the edge for a complete wideband modem solution. The RFSoc technology is beyond evolutionary—it is a revolutionary digitizer chip that provides significantly greater access to RF signals over conventional Application Specific Integrated Circuits (ASICs) that are used in commodity digitizers today. It provides eight (8) individual input / output channels and offers the advantages of gain, filtering, and step attenuation.

When integrated with our WAN-EX RF over IP technology, the wave:IQ provides reliable data transport of critical and continuous multi-Gbps data streams via any IP network, over any distance, and without the need for costly hardware. The result is reliable, real-time digitization of 1250 MHz of RF signal data that is processed into VITA-49 IP packets and transported over public or private IP networks.

THE ARKA wave:IQ IS THE SOLUTION OF CHOICE WHEN:

- the mission link's bandwidth requirement is greater than 100 MHz;
- multiple channels are required;
- space and power savings are needed when compared to discrete hardware digitizers.

SCALABILITY AND COST-EFFECTIVENESS:

wave:IQ offers scalability, allowing satellite ground architectures to scale their processing capabilities based on their specific needs. It supports the integration of RFSOC devices, enabling parallel processing and increased system capacity. This scalability helps optimize system performance while minimizing costs, making it an attractive solution for satellite ground architectures with varying processing requirements.

SPECIFICATIONS

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

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

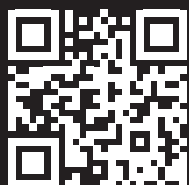
RF INPUT	
Architecture	<i>14-bit RFSoc ADC</i>
Number of Input Channels	<i>8, independently configurable</i>
Sample Rate	<i>Up to 5000 MS/s</i>
Frequency Range	<i>50 - 6000 MHz</i>
Power Range	<i>-100 to -10 dBm</i>
Damage Level	<i>-7 dBm</i>
AGC Range	<i>58 dB</i>
Alias Rejection	<i>> 75 dB</i>
Input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

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.

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

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

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


FOR ADDITIONAL INFORMATION:

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