ARKA

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	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	> 60 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.

FOR ADDITIONAL INFORMATION:

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