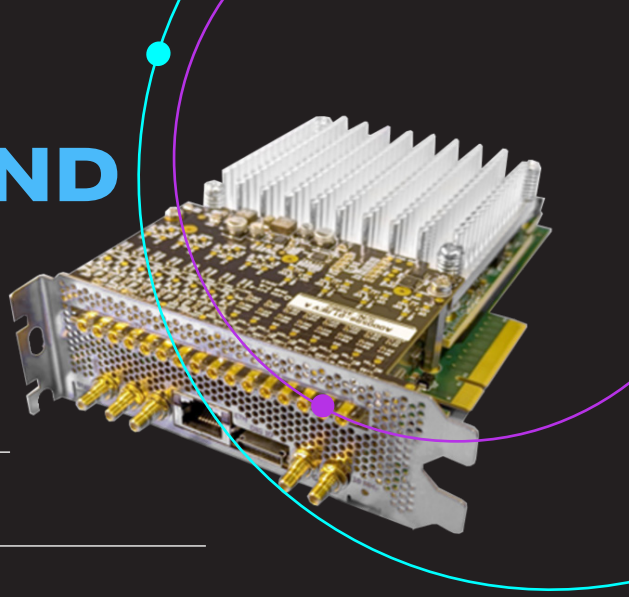
ARKA

wave:IQ M1 WIDEBAND DIGITIZER



Simultaneous Narrow and Wide band signal capture

Configurable bandwidths and rates per channel

RF Digitizing and software processing in one unit

High signal density with up to 8 receive and 8 transmit channels

wave:IQ M1 WIDEBAND DIGITIZER OVERVIEW:

Part of our satTRAC suite of ground station digitizer solutions, wave:IQ M1 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. The wave:IQ M1 is 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, wave:IQ M1 leverages proven RFSoC technology developed for LTE / 5G, DOCSIS, and RADAR applications. The wave:IQ M1 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. With eight independent I/O channels and built-in gain control, filtering and step attenuation, wave:IQ M1 supports scalable bandwidth processing in advanced ground station modem configurations.

When integrated with our WAN-EX RF over IP technology, the wave:IQ M1 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 up to 1250 MHz of RF signal data that is processed into VITA-49 IP packets in alignment with the DIFI DigIF (Digital IF) standard and transported over public or private IP networks.

RF FRONT-END MODULE OPTIONS	
A000599-01	
Transmit Band	*50 MHz to 2450 MHz*
Receive Band	*50 MHz to 2150 MHz*
Noise Figure*	*11 dB*
A000619-01	
Transmit Band	*50 MHz to 6000 MHz*
Receive Band	*50 MHz to 6000 MHz*
Noise Figure*	*13 dB*

* Includes contribution from RFSoC ADC.

SCALABILITY AND COST-EFFECTIVENESS:

wave:IQ M1 is scalable, 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.

THE ARKA wave:IQ M1 IS THE WIDEBAND RF DIGITIZER 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

SPECIFICATIONS

PHYSICAL INFORMATION[1]	
Physical Interfaces	*A000610 1U I/O Panel (recommended) or individual cables can be provided*
Server Dimensions	*Typical Dell R760 Server: 2U, 3.4 H x 17.08 W x 29.03 D (in) 46 lbs*

DIGITAL I/O	
Connector Type	*One (1) 42-pin Molex Nano Pitch*
Single-Ended GPIO	*6 bi-directional 3.3V LVCMOS 10 MHz max data rate*
LVDS GPIO	*4 Rx pairs, 4 Tx pairs 100 MHz max data rate per pair*
I2C Bus	*One (1) bus, 100 kbps max data rate*

RF INPUT[2]	
Architecture	*14-bit RFSoC ADC*
Number of Input Channels	*8, independently configurable*
Sample Rate	*Up to 5000 MS/s*
Frequency Range[3]	*50 - 6000 MHz*
Typical Power Range	*-80 dBm to +18 dBm*
Damage Level	*+20 dBm*
AGC Range	*58 dB*
Input Impedance	*50 Ohms*
Input P1dB (no AGC)	*-5 dBm (typical)*
Instantaneous Bandwidth	*1250 MHz shared across all channels*
Total Dynamic Range (with AGC)	*TBD*
Instantaneous Dynamic Range	*60 dB*
Spurious Free Dynamic Range (100MHz BW)	*65 dB*
Tuning Step Size	*< 1 Hz*
VSWR	*< 1.5:1*
Channel Isolation (typical)	*60 dB*

Notes:

[1]Environmental specifications of the wave:IQ M1, 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.

[2] These specifications are based on the A000619 RF FEM Module.

[3]Total available frequency range. RF front-end modules will limit usable range. See the table located on the front of this sheet.

TIMING & REFERENCE			
10 MHz Input:		**IRIG-B Input:**	
Connector Type	*SMB jack*	Connector Type	*SMB Jack*
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	*SMB jack*	Connector Type	*SMB Jack*
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[2]	
Architecture	*14-bit RFSoC DAC*
Number of Output Channels	*8, independently configurable*
Sample Rate	*Up to 6800 MS/s*
Frequency Range[3]	*50 - 6000 MHz*
Typical Power Range	*-80 dBm to -10 dBm*
Max Output Power	*-5 dBm*
Instantaneous Bandwidth	*1250 MHz shared across all channels*
Total Dynamic Range (with AGC)	*80 dB*
Instantaneous Dynamic Range	*60 dB*
Spurious Free Dynamic Range (100MHz BW)	*76 dB*
Impedance	*50 Ohms*
Phase Noise at 2.3 GHz	
100Hz Offset	*-71 dBc/Hz*
1 kHz Offset	*-87 dBc/Hz*
10 kHz Offset	*-96 dBc/Hz*
100 kHz Offset	*-106 dBc/Hz*
1 MHz Offset	*-130 dBc/Hz*
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 Hz*
VSWR	*< 1.5:1*
Channel Isolation (typical)	*55 dB*

FOR ADDITIONAL INFORMATION:

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