NDR818

EPIQ

8 Channel, 6 GHz High Performance Rackmount SDR

CE

The NDR818 is rack mount 8-channel wideband high performance VITA 49 streaming SDR that converts the HF/VHF/UHF spectrum to digital IF (I/Q or Real) data over 10 Gigabit Ethernet interfaces. It includes 8 independent tuners that cover signals from 2 MHz to 6 GHz with a 40 MHz instantaneous bandwidth. Each channel can tune independently operate phase coherently for applications such as beam forming or direction finding (the unit supports both 4-channel and 8-channel phase coherent operation). To enable geolocation applications, the NDR818 includes an on-board GPS receiver, an external 1PPS input, precision time-tagged digital IF data (formatted based on the VITA 49 standard) and a tunable calibration signal that covers 25 MHz to 6 GHz.

The NDR818 SDR includes an FPGA-based digital processor board that receives 8 channels of wideband ADC data, performs narrowband filter and decimation, forms time-stamped digital IF data packets, and transmits streaming data over the two 10 Gigabit Ethernet output ports. The dual 10 Gigabit Ethernet output ports support full bandwidth (8 x 40 MHz) data streaming. The unit is controlled via a 10/100 Ethernet interface. Multiple lower Digital IF bandwidths are also supported for applications that don't require the full 40 MHz.

Key Features

- 8 Channel High Performance VITA 49 Streaming SDR
- 2 MHz to 6 GHz Frequency Coverage
- 40 MHz Bandwidth
- Independent and Phase Coherent Tuning
- 2x 10GBE for Digital IF Data
- Integrated FPGA with Selectable DDCs
- Geolocation enabled with an Embedded GPS receiver
- 10/100 Ethernet for Command & Control
- Software tools and API for easy integration
- 65 W Power Consumption
- CE-Marked

Applications

- SIGINT
- Beam Forming, DF
- Satcom
- Test & Measurement

Specifications at a Glance

Category	Output	F_{Min}	F_{Max}	LO Tuning	Timing Inputs	CPU Enabled	GPU Enabled
Rack-mount	Digital	2 MHz	6 GHz	Indep. Pairs & Coherent	10 MHz	No	No

Max Rx Channels	Max Tx Channels	IBW_{Max}	$SFDR_{Typ.}$	Weight	Typ. Power Consumption	Interfaces	ADC bits/ DAC bits
8	0	40 MHz	90 dB	22 lb. 10 kg	65 W	Ethernet	14/ -

Specifications

Environmental Specifications	
Temperature (Operating)	–20 to +55 °C (<10,000 ft.)
Size	Standard 1U 19 inch rackmount
Weight	22 lb./ 10 kg
Supply Voltage	100–230 VAC, 50/60 Hz
Power (Typ.)	65 W
Vibration	Suitable for airborne, designed to MIL standards.
Humidity	5% to 95% non–condensing
Digital Specifications	
FPGA	Xilinx Kintex 7 325T (not user accessible). FPGA–based digital down–converters (DDCs) with the following characteristics: • Bandwidths: 40 MHz, 20 MHz, 10 MHz, 1.2 MHz, 160 kHz, 80 kHz, 40 kHz • Sample Rates: 51.2 Msps, 25.6 Msps, 12.8 Msps, 1.6 Msps, 200 ksps, 100 ksps, 50 ksps
CPU	Not user–accessible
Control Interface	10/100 Ethernet TCP/IP
Other Control I/O	8–lines of GPIO to FPGA; USB serial I/O to processor
Digital IF Interface	Dual 10 Gigabit Ethernet UDP – SFP+ supporting 10GBase–SR, 10GBase–LR, or Direct Attach Copper
Digital IF Data Format	16–bit complex I & Q or Real In VITA–49 compliant format
Other	
Export Classification	5A991.b
CE–Marked	Yes

| RF Specifications	
All	
Connector Types	SMA, field replaceable
Frequency Range	2 MHz to 6 GHz
Channel Bandwidth	40 MHz per channel
Tuning Operation	Supports combination of independent and phase coherent channels including multiple sets of coherent channels. See diagram on opposite page.
Tuning Speed	700 µs (typical)[1]
Receivers	
Channels	8
Noise Figure (Typ.)	20 MHz to 3 GHz: 10 dB (typical) 3 GHz to 5.5 GHz: 14 dB (typical)
Input in–band IIP3 (Typ.)	0 dBm[2]
Spurious Free Dynamic Range (Typ.)	90 dB
Gain Control Range	40 dB in 1 dB steps
A/D Bits	14
Transmitters	
Channels	None
Clocking	
Internal Reference	10 MHz input/ output (software controlled)
Stability	+/– 1.0 ppm over 0 to +50 °C
Reference Input/ Output	10 MHz, BNC
PPS Input	Yes, BNC
GPS Input	Yes, antenna SMA

[1] Measured from receipt of command to within 1 kHz of final frequency

[2] Referenced to RF Input and measured at maximum gain with both test tones within the final IF passband

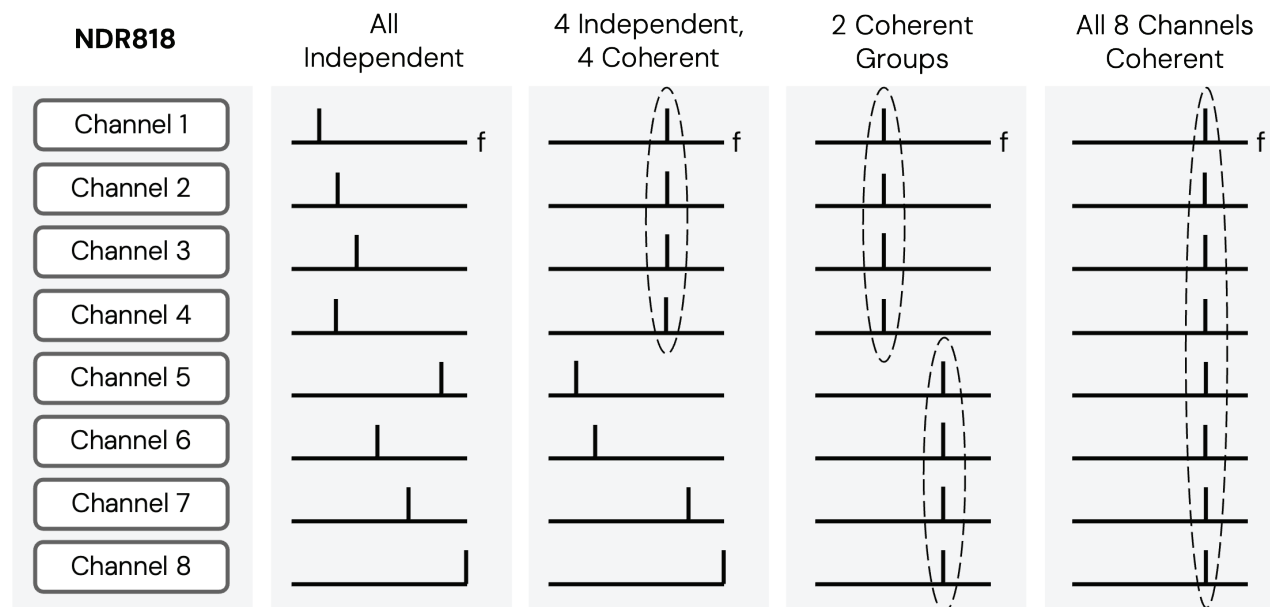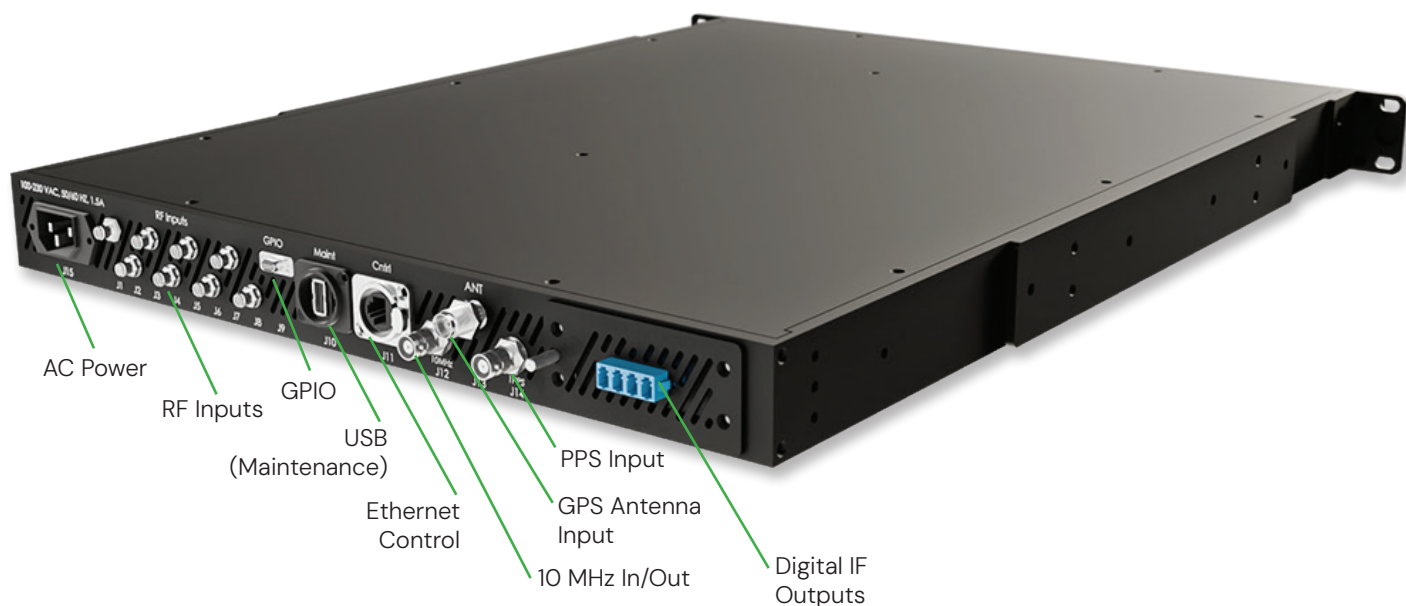*Data subject to change without notice.*

NDR818 Block Diagram
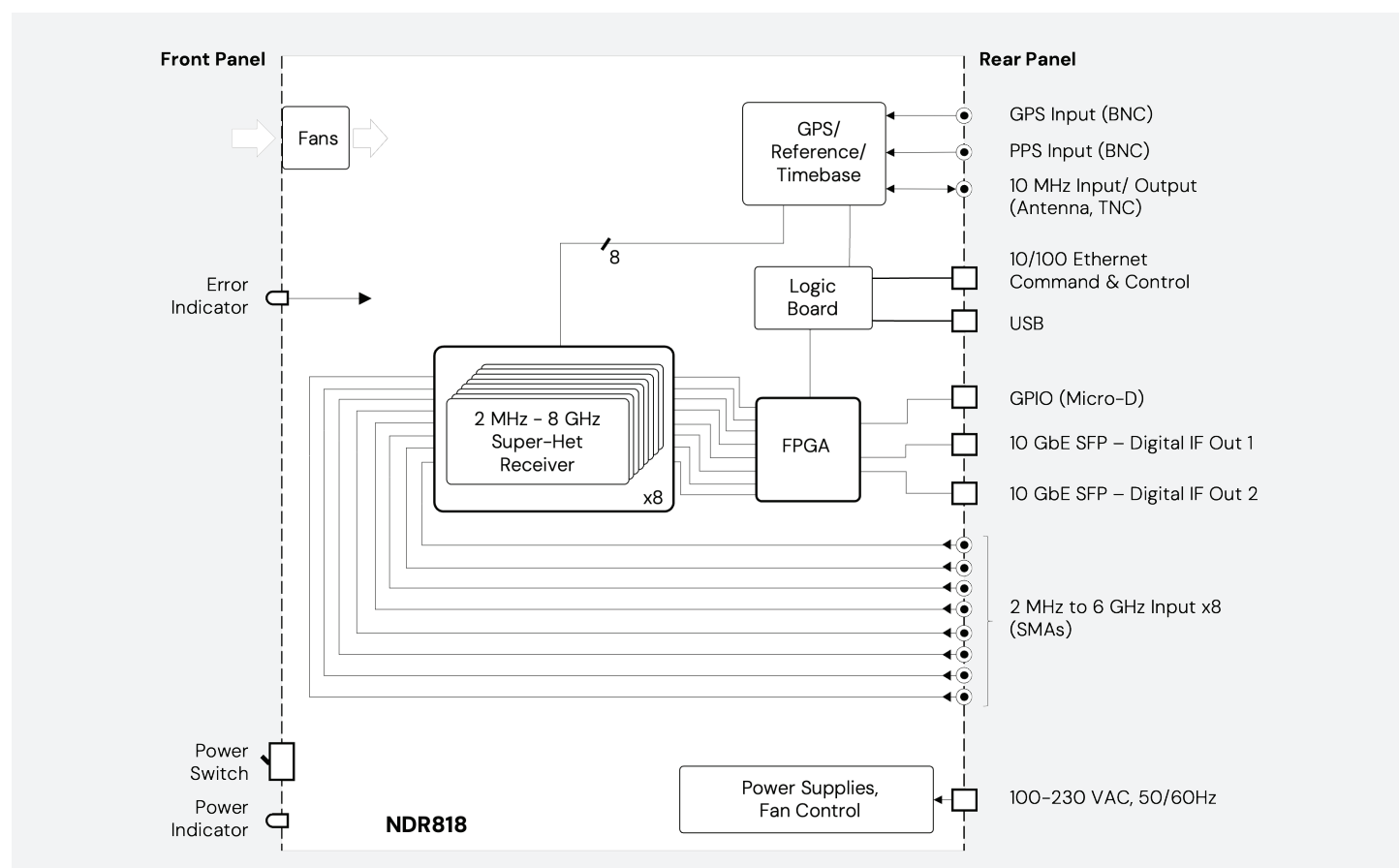
Tuning Examples

The NDR818 has independent channels that are combinable into phase coherent groups for applications such as direction finding (DF). Illustrations of some examples are given below.

Physical Views

AC Power

RF Inputs

GPIO

USB
(Maintenance)

Ethernet
Control

10 MHz In/Out

PPS Input

GPS Antenna
Input

Digital IF
Outputs

Compatibility

The NDR818 outputs VITA 49 formatted streaming data, making it ideal to feed platforms such as 3dB Labs' Sceptre.

The Epiq Family of Products

The tables below show some examples of the Epiq portfolio, with the full range available in the comparison table here.
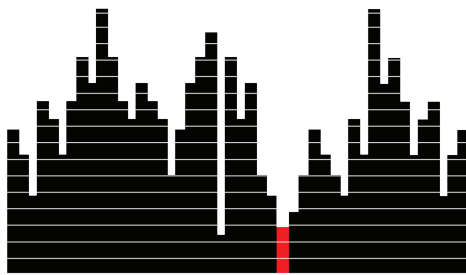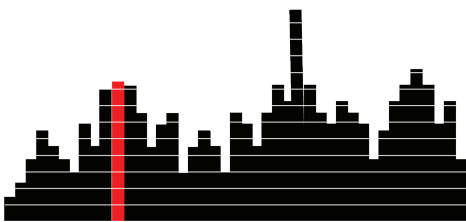

Example 8 Channel Products from Epiq Solutions

Product	NDR818	NDR318	NV800	NDR358	NDR888
Description	High Performance 8 Channel 6 GHz Rackmount SDR	High Performance 8 Channel 6 GHz SDR	Compact 8 Channel 6 GHz Fast Scanning SDR[1]	High Performance 8 Channel 6 GHz Rackmount SDR	High Performance 18 GHz Rack Mount Tuner
Output	Digital				RF
Max Channels Rx/ Tx	8/ 0		8/ 1	8/ 0	
Frequency Range	2 MHz – 6 GHz		10 MHz – 6 GHz	20 MHz – 6 GHz	20 MHz – 18 GHz
IBW Max	40 MHz		50 MHz	80 MHz	500 MHz, Centered on 1 GHz IF
SFDR Typ.	90 dB		75 dB	90 dB	
CPU?	–				
GPU?	–				
Typ. Power Consumption	65 W	47 W	25 W	145 W	140 W
Interface e.g.	Ethernet (Control) 10 GbE SFP VITA 49 Data				Ethernet (Control)

Maximum number of Rx, Tx channels, often not simultaneously. SFDR = Spurious Free Dynamic Range. IBW = Instantaneous Bandwidth. Interface example, often others present also.

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1   Optionally 1 channel can be extended to 18 GHz.

High Performance Applications

Performance means different things in different situations, driving different trade–offs in product design. For some applications, the highest performance comes from optimizing low size, weight and power in design above all other parameters to allow spectrum awareness on the smallest platforms. In others, outright RF performance might be the priority. The table below illustrates some common scenarios with typical differentiating characteristics; Epiq provides solutions for these and many others, even up in space.

Metric	High Performance Platforms	Low SWaP Platforms
Key Use Case	Long Range & High Standoff Linearity Dominated Applications	Short Range & Tactical Noise Dominated Applications
RF Environment	Very Congested Multiple Strong Signals In & Out of Band	Targeted Signal Set
SWaP vs Performance	Performance Dominated	SWaP Dominated
SDR Integrated Processing	Large FPGAs and CPUs Multiple Parallel Channelizers	Defined by Available SWaP
Domains	Airborne/ Maritime/ Land	Dismounted/ Unmanned/ Attritable
Example Standard Form Factors	1U Rack Mounted, 3U VPX	M.2, VNX+, Mod Payload

Specifications subject to change without notice.

Epiq Solutions exports its products strictly in accordance with all US Export Control laws and regulations which shall apply to any purchase or order.

ABOUT EPIQ

Epiq Solutions develops high performance tools for engineering teams and government–focused organizations requiring situational awareness and detailed insight into their RF environments in order to identify and act against wireless threats.

11th June, 2025

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