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DATASHEET

RVP10

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Digital Receiver and Signal Processor RVP10



Features

- 240 MHz, 16-bit IF sampling for improved sensitivity and dynamic range in 6 independent channels
- Increased processing power brings improved FIR filter length and new processing algorithms
- 10 Gbit/s Ethernet
- Wide dynamic range, pulse compression ready, and dual-transmitter ready

IF Digital Receiver and Signal Processor RVP10 provides a full suite of weather radar signal processing functionality to support implementing a new weather radar or upgrading an existing system to the latest signal processing technology.

Benefits

- State-of-the-art security
- Easy to update and maintain
- Improved support for solid-state transmitters through pulse compression, hybrid pulsing, blending, and calibration
- Independent and parallel FIR filtering enables dual-pulsewidth and dual-frequency strategies on each receive channel

RVP10 architecture

RVP10 consists of IF Digital Receiver IFDR10 and Signal Processor RVP10SRV. This new processing platform brings more range bins, better resolution, increased processing power, and flexibility to the post-processing.

The flexible architecture provides modular, highly configurable hardware, and an open software design with public APIs.

The state-of-the-art security through TrustZone technology keeps your data safe.

IF Digital Receiver IFDR10

IFDR10 provides receive, transmit, and IF detection functionality in a compact, network-attached FPGA-based product.

Signal Processor RVP10SRV

RVP10SRV is a server-class computer running RDA software. It computes the radar data moments from the `I` and `Q` data provided by IFDR10.

Improved performance

RVP10 offers better data quality through improved clutter cancellation, interference cancellation algorithm, correction for velocity aliasing, and flexible data thresholding.

Flexibility

RVP10 system provides flexible pulsewidth selection and public APIs. Users can also save unfiltered data without any data corrections.

Easy upgrade and maintenance

RVP10 supports an easy upgrade from RVP8/RVP900 systems. Thanks to the modern, standard technologies, including USB-C, 10 Gbit Ethernet, and latest FPGA technology, the system is easy to update and maintain. The system can always be upgraded to use the latest and fastest servers. RVP10 can also be easily updated with new processing algorithms developed by Vaisala.

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Technical data

IF inputs

A/D and D/A conversion	Resolution: 16 bit Sampling rate: 190 … 240 MHz (software-selectable)
Dynamic range (dependent on matched filter)	104 dB without compression (1 µs pulse) 107 dB without compression (2 µs pulse)
IF range	10 … 120 MHz
Impulse response	200 µs
Input signals	• IF received signal: 50 Ω, +12.0 dBm full-scale, absolute max +20 dBm • IF burst or STALO: 50 Ω, +12.0 dBm full-scale, absolute max +20 dBm • Optional reference clock: 9 – 100 MHz with 0.5 MHz resolution, 9.0 dBm … +19.0 dBm
Master clock jitter	< 0.5 picosec, integrated over 200 Hz … 2 MHz offset
Multiply/accumulate cycles per second	448 billion
Pulse repetition frequency (PRF)	50 Hz … 20 kHz, +0.1 %, continuously selectable
Saturation level (1 dB compression point)	+13.3 dBm at 50 Ω
Optional wide dynamic range	>120 dB

RVP10 I/O

Inputs (IFDR10)	Only digital inputs
Data output through Ethernet (IFDR10)	32-bit floating point I and Q values
I/O interface (IFDR10)	8 independent GPIO pairs Each pair can be configured as one differential input/output, or as two single-ended inputs/outputs (max 16 single-ended lines)
AFC output (RVP10SRV)	Serial control output Automatic 2D (time/frequency) burst pulse search and fine-tracking algorithms
IFDR10 to RVP10SRV link	Optical link (10 Gbit)

Physical and environmental characteristics

Dimensions (w × l × h)	246 mm × 136 mm × 51 mm With mounting brackets: 270 mm × 136 mm × 52.5 mm
Input power	20 … 30 VDC
Power consumption	Typical: 44 W ± 10 % Maximum: 56 W
Environment	-40 °C … +55 °C 0 %RH … 95 %RH (non-condensing) with a minimum airflow of 0.6 m^3/min
Reliability (IFDR10)	MTBF > 100,000 hours (at 25 °C) < 1 hour MTTR

Signal processing

Signal processor	Vaisala RVP10
Azimuth averaging	2–1024 pulses
IF digitizing	16 bits
Clutter filters	Fixed/Adaptive GMAP in frequency domain
Data outputs (8 and 16 bit)	`Ah/v`, `Azdr`, `CCOR`, `CSP`, `CSR`, `dBT`, `dBZ`, `dBZt`, `KDP`, `LDR`, `LOG`, `PHIH/V`, `PHIDP`, `PMI`, `R`, `RHOHV`, `SNR`, `SQI`, `T`, `V`, `VC`, `W`, `Z`, `ZC`, `ZDR`, `ZDRC`, `Zh`, `Zv`, `Zhv`
Optional data outputs	`HCLASS`, `I/Q`
Dual-polarization	Simultaneous (STAR), H only
Dual PRF velocity de-aliasing	2:3, 3:4, or 4:5 for 2X, 3X, or 4X velocity unfolding
Enhanced reflectivity processing (Zhv)	> 3 dB improvement detection gain
Processing modes	PPP, FFT/DFT, Random phase coding / SZ 8/64 phase coding for 2nd trip filtering and recovery
Maximum number of range bins	15,000
Minimum range resolution	Down to 15 m (accuracy of ±1.0 m)
Maximum range	Up to 1024 km

Digital waveform synthesis

Analog waveform applications	• Digitally synthesized IF transmit waveform for pulse compression, frequency agility, and phase modulation applications. • Master clock or STALO signal to the radar, either phase-locked or free-running frequency.
TxDAC analog output waveform characteristics	Two independent, digitally synthesized, analog output waveforms (SMA) Max output power +10 dBm Frequency range 10 MHz … 120 MHz

IF bandpass filter

IF bandpass filter	Programmable digital FIR with software-selectable bandwidth, including pulse compression. Built-in filter design software with user interface.

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