

GDRX[®] 5



METEOROLOGY

GDRX[®] 5 DIGITAL RECEIVER AND SIGNAL PROCESSOR

GDRX[®] 5 is an integral part of all METEOR weather radar systems from LEONARDO Germany. It is composed of a digital receiver module connected to a high performance commercial PC via high speed Ethernet. The GDRX[®] 5 with its unique characteristics demonstrates the market leading position of LEONARDO Germany in the weather radar market. It features a numerical AFC for pseudo continuous tuning of magnetron based radar systems, an innovation introduced to the market in 2006 by LEONARDO Germany. GDRX[®] 5 is the first digital receiver and signal processor to offer freely selectable pulse widths and as a result ending limitations on the supported number of pulse widths. It offers a dynamic pulse-to-pulse online matched filter design for the benefit of phase coherency and SNR optimization. Last but not least GDRX[®] 5 offers the first operational implementation of Transmitter Noise Compensation (TNC) as an add-on to dynamic matched filters. TNC corrects for transmitter inter and intra pulse variations and opens the door to a unique system phase coherency. GDRX[®] 5 includes an ultra-sensitive multi-channel digital receiver design, which in combination with the patent protected dual channel design of the analog receiver provides an excellent noise figure and the highest operational dynamic range in the market.

KEY FEATURES

- High sensitivity and excellent linearity over an extremely wide dynamic range
- On-board numerical AFC for pseudo continuous tuning of magnetron transmitter types
- Freely selectable pulse widths
- Dynamic pulse-to-pulse matched filter design
- Transmitter Noise Compensation (TNC)
- Highest processing performance on the market

BENEFITS

- Strict modular separation of digital receiver and commercial off-the-shelf signal processor hardware by means of high speed Ethernet
- Easy upgrade to next generation signal processor hardware in the future
- In-house development and support for the complete digital receiver and signal processor processing chain
- Easy remote software upgrade by means of standard Ethernet tools

GDRX® 5

- Operational safety of the signal processor extended by means of RAID mirrored solid state OS disks and redundant power supplies
- Built-in environment monitoring of RAID, power supplies, blowers, temperatures and processing load
- Easy extendibility of signal processor for on-board high performance TByte I/Q data recording
- Modular design of signal processing chain allows easy future enhancements



TECHNICAL DATA

GDRX® 5 - DIGITAL RECEIVER

IF input channels	6 channels, 2x horizontal, 2x vertical, 2x TX Burst
IF output channels	1 channel, waveform generator
Channel resolution (ADC, DAC)	16 bit
IF sampling rate	180 MHz
Master clock jitter	<0.01 ps RMS
Minimum range resolution	15* m (accuracy of +- 0.84 m)
Maximum number of range bins	10.000* per polarization @ fully activated algorithm chain
Maximum range	700* km
Dynamic Range	>125 dB @ 1 MHz band width
Triggers	18 triggers individually programmable
Antenna Tag Input	parallel and SSI
PRF	180 Hz to 100 kHz
Supported pulse widths	300, freely selectable in increments of 10 ns within a 0.5 to 3.5 µs pulse width interval
Sector Blanking	32 sectors, freely configurable
AFC	on board numerical NAFC with frequency deviation <10kHz in all conditions
Communication Interfaces	1/10 Gbit Ethernet
Misc I/O	GPIO 32 bit, JTAG, USB, I2C, Status-LEDs, SD-Card

*standard values, not an absolute limitation

GDRX® 5 - SIGNAL PROCESSOR

HARDWARE

Architecture	Commercial-off-the-shelf 19" server rack
Processor type	Intel Multi-core processor
Memory	64 GB DDR4
Disk	2 x 480 GB SSD in RAID1 (Mirror, redundancy)
Add disks	6 slots for 6x 2 TB in RAID0 or RAID5
Power supply	redundant

SOFTWARE

Processing modes	PPP, FFT/DFT, Trip recovery and filtering
Clutter filters	IIR, DFT linear or GIP (Gaussian iterative) interpolation
Clutter detection	CMD (Clutter Mitigation Decision)

Matched filter	pulse-to-pulse dynamic, TNC (Transmitter Noise Compensation)
Speckle filters	1D and 2D filter
Interference filter	three configurable modes
Dual PRF modes	2:3, 3:4, 4:5, 5:7 ratios supported
Dual PRF syncing modes	Fixed (Ray to Ray), Standard (angular 50% of Ray), Adaptive (equal weighted pulses within Ray)
Dual PRF range extension	data up to maximum range of low PRF for all moments and DP variables except Velocity
Trip recovery/filtering	1st, 2nd, 3rd trip recovery, 1st trip filtering for 2nd 3rd
Trip recovery modes	random phase and systematic phase coding
Time, pulse integration	8 to 4096 pulses
Range gate integration	2 to 16 gates
Data resolution	8 or 16 bit for moments and DP variables, individually configurable

DATA TYPES:

Reflectivity	UZh, Uzv; Zh, Zv
Velocity	UVh, UVv; Vh, Vv
Spectral Width	UWh, UWv; Wh, Wv
Clutter Power	CCORh, CCORv
Signal Quality Index	USQlh, USQlv; SQlh, SQlv
Signal to Noise Ratio	USNRh, USNRv; SNRh, SNRv
Inphase/Quadrature	lh, Qh, lv, Qv
Logarithmic Power	LOGh, LOGv
Power Spectrum	POWSPECTh, POWSPECTv
Differential Reflectivity	UZDR; ZDR
Differential Phase	UPHIDP; PHIDP
Specific Differential Phase	UKDP; KDP
Linear Depolarization Ratio	ULDR; LDR
Cross Correlation Coefficient	URHOHV; RHOHV

OPTIONAL:

Clutter phase alignment	CPAh, CPAv
Degree of polarization	UDOP, DOP
Threshold flag indication	FLAGS

Numerous additional specialized data types are available on request

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