

## GDRX® DIGITAL RECEIVER AND SIGNAL PROCESSOR

GDRX® represents the SELEX-Gematronik family of digital receiver and signal processor. GDRX® continues the success of the Aspen DRX series making optimum use of latest innovations from the IT industry. As the only manufacturer to develop all radar system components in-house we have been particularly keen at SELEX-Gematronik to enhance our realtime data processing capabilities of radar returns. We are proud to present GDRX® as the highly sophisticated result of our efforts. GDRX® combines state-of-the-art IC chip technologies with development tools based on commercially available computer components as well as common protocols and standards.

The design of GDRX® separates the digital receiver and the signal processor completely, meaning each unit is available individually. Customers may choose to purchase the digital receiver as a standalone unit to be combined with an existing signal processor, which receives I/Q data via a gigabit Ethernet input. The signal processing module can also be adapted to fit third-party digital receivers. This makes GDRX® an ideal upgrade solution, which allows existing systems to benefit from cutting-edge signal processing capabilities.

GDRX® demonstrates outstanding performance against common CPU benchmarks. The processing power of GDRX® is the key to the implementation of modern algorithms, which require high computation capacity. GDRX® uses dual-channel Dynrex technology – another innovation brought to the market by SELEX-Gematronik. The digital receiver features an independent channel for weak and strong signals. A dedicated algorithm selects the appropriate channel, which ensures optimum data quality. With a second digital receiver and signal processing channel already on-board, GDRX® also

supports dual polarization techniques. Because Dynrex technology is applied to both polarizations GDRX® features four receiver input channels in total.

### DESIGN PRINCIPLES

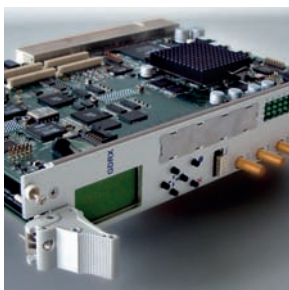
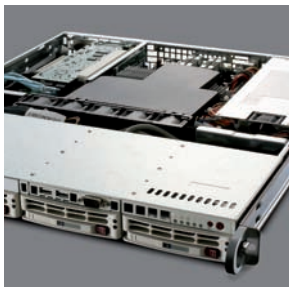
GDRX® consists of a CPCI-based digital receiver front-end called GDRX®-RX and a signal processing backend, called GDRX®-SP. The main tasks of GDRX®-RX include: digitization of weather returns, down conversion and matched filtering. It includes a wave-form generator and supports special functions such as multi-trip echo recovery. GDRX®-RX delivers I/Q data to the GDRX®-SP high performance PC via a gigabit Ethernet interface.

GDRX®-SP performs the conventional signal processing tasks associated with radar meteorology including: frequency domain clutter filtering, thresholding and covariance processing. GDRX®-SP provides high resolution and accurate realtime data consisting of: uncorrected/corrected reflectivity, radial velocity and spectral width. The hardware used for GDRX®-SP consists of a high performance COTS PC with no proprietary hardware extensions. The use of COTS PC ensures easy migration to the latest advances in IT.

### KEY FEATURES

- High sensitivity and excellent linearity over an enlarged dynamic range that is comparable to an 18 bit digitizer. This is achieved by using dual-channel, high-precision 14 bit A/D Converter Input Stages.
- Dual polarization ready via 2x dual-channel input stages
- Software-configurable FIR filter cascades allowing for optimal IF matched filtering
- Continuous burst sample monitoring of signal spectrum, power for phase correction and compensation of RF power variations

## GDRX® DIGITAL RECEIVER AND SIGNAL PROCESSOR



- Supporting coherent-on-receive radar systems (magnetron type) via:
  - AFC output for control of the STALO frequency
  - On-board digital AFC
- On-board waveform generator for coherent transmitter types supporting frequency and phase agility, phase coding and pulse-compression
- Central radar system trigger timing by means of various configurable trigger output ports
- Full remote software diagnostics and update capabilities

### GDRX®-SP SIGNAL PROCESSOR

- Reflectivity processing including r2 range correction and gas attenuation correction
- Time domain pulse-pair technique for Doppler processing
- Frequency domain DFT processing
- Computation of spectrum width using second lag autocorrelation technique
- Dual PRF mode at 3/2, 4/3 and 5/4 staggering ratio
- Clutter rejection by IIR Time-Domain Doppler clutter filters with adjustable filter depth and width
- Clutter rejection by DFT based Frequency-Domain Doppler clutter filters with adjustable filter width
- Various signal level thresholds and speckle removal options
- Fast and easy, automated calibration techniques
- Full remote software diagnostics and update capabilities
- RAID-1 with 2x80 GB SSD discs for maximum data safety
- Extendable to RAID-0 for add-on discs

### GDRX® OPTIONS

- GLP, Gaussian Iterative clutter filter processing
- Interference filter
- Statistical clutter filter
- Mapped 3D capability for frequency and time-domain filters
- Multi-trip recovery processing for random and systematic phase-coding
- Dual PRF range extension
- Dual pol. ZDR,  $\phi_{DP}$ ,  $K_{DP}$ ,  $\rho_{HV}$  and LDR processing
- Sector blanking
- I/Q Data Recording/Replay Module for diagnostic and offline post-evaluation purposes
- Advanced I/Q volume recording simultaneous to online signal processing with a RAID-0 record capability of up to 3.5 Tbytes

### TECHNICAL DATA

<b>GDRX® - Digital Receiver and Signal Processor</b>	Model	GDRX®
	Signal Processing	Intel® Multi-Core CPUs
	Computational performance	> 30 Gflops
<b>Data Acquisition Specification</b>	RX IF sampling	four channels, 14 bit, 80 MHz
	TX IF sampling	14 bit, 80 MHz
	Dynamic range	> 105 dB
	Minimum range bin spacing	30 m, higher resolution on request
	Range gates per pulse	2500, higher numbers on request
	Waveform Generator IF out	16 bit, 80 MHz, Interpolation capability
	Intermediate Frequency	60 MHz standard, other values on request
<b>Control Specification</b>	Triggers	16, individually programmable
	Pulse repetition frequency	max. 250 - 2500 Hz, software controlled, actual settings depending on selected pulse width
	Number of different pulse modes:	3 pulse modes 4 modes on request
	<b>Operational Specification</b>	Doppler and reflectivity mode
Dual PRF Doppler mode		3/2, 4/3 and 5/4 staggering
Doppler channel clutter filters		- 4-pole Elliptical IIR, 16 filters - DFT based filters
Reflectivity channel clutter filter		statistical filter, site adaptable
Range bin averaging		2 to 16 successive bins
Time averaging		2 to 512 (1024) pulses
<b>Communication</b>	Host and inter-connection	TCP/IP 100/1000 BT