IZT R5010
Wideband Receiver

Product Announcement

- Highest signal quality in the frequency range up to 18 GHz
- Up to 120 MHz instantaneous bandwidth
- Six independent digital downconverters
- Up to 64 narrow-band DDCs
- Real-time spectrum calculation
- Large internal buffer memory

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Overview

The IZT R5010 is a wideband receiver with frequency range up to 18 GHz, up to 120 MHz instantaneous bandwidth and powerful internal signal processing. Typical applications are COMINT Systems, satellite monitoring, broadband RF recorders or quality measurements in mobile communication networks.

FIGURE 1: IZT R5010 RECEIVER

Key Features

HIGHEST RECEPTION QUALITY

The IZT R5010 uses IZT's latest generation of tuners with sub-octave preselectors, dual conversion and a variable 1st IF for maximum robustness against false reception and high-power mixers for maximum linearity. A low-noise preamplifier can be activated for maximum sensitivity. Built-in test equipment allows for end-to-end verification and alignment of the receiver. The receiver can be operated in manual or automatic gain control mode. All internal clocks can be sychronized to an external source or the built-in GNSS receiver. The available frequency range will be determined by the installed tuner modules:

- Configurable preselector with 16 high-/lowpass filters for direct sampling from 9 kHz to 140 MHz for highest performance up to the lower VHF range or alternatively
- Configurable preselector with 16 high-/lowpass filters for direct sampling from 9 kHz to 40 MHz for highest flexibility and performance in the HF range
- Superhet tuner for 20 MHz to 6000 MHz
- Microwave frontend for 6 GHz to 18 GHz

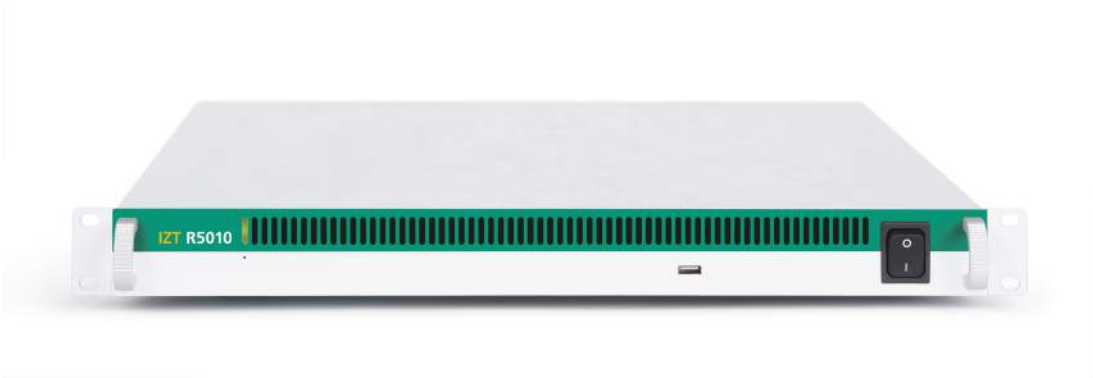

FIGURE 2: IZT R5010 RECEIVER

LARGE INSTANTANEOUS BANDWIDTH AND SIX DDCS

IZT R5010 uses latest FPGA technology for signal processing.

In its baseline configuration the IZT R5010 offers an instantaneous bandwidth of 60 MHz. Software option IZT R5010-BW1 increases the available bandwidth to 80 MHz. With option IZT R5010-BW2 the maximum bandwidth of 120 MHz will be activated.

Up to six DDC channels can be set up within the instantaneous bandwidth of the receiver. Each DDC can handle the full bandwidth, so the only limitation is the maximum output streaming capacity of 20 Gb per second. The decimation is continuously variable and can be choosen independently for all six DDCs. With maximum decimation, the sample rate can be set as low as 10 kHz at the output of a DDC. The IZT R5010's flexible job control allows the user to define complex scan scenarios that will be executed by the receiver. The output data is provided via UDP as complex I/Q data with embedded meta data very similar to the proven IZT R3000 data format. Accurate time stamps allow for calculating the reception time for each sample down to sub-nanosecond accuracy.

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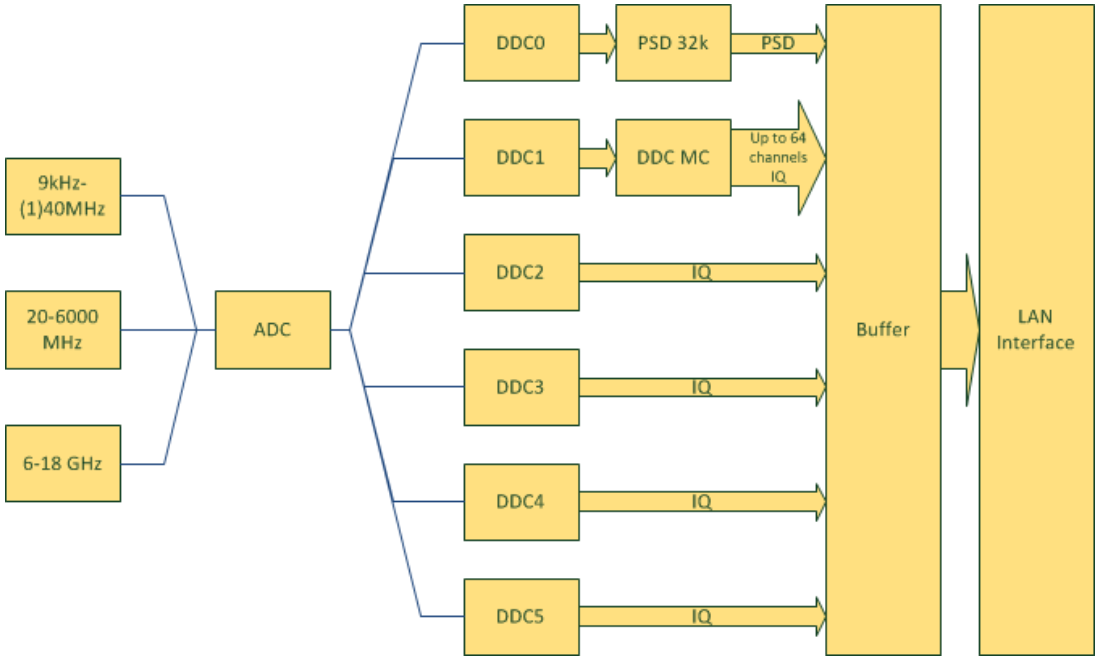

FIGURE 3: IZT R5010 RECEIVER BLOCK DIAGRAM

BROADBAND PSD

With option IZT R5010-PSD the receiver calculates a PSD with 32678 points in FPGA with very high frequency selectivity. The PSD is always connected to DDC0. By adjusting the variable decimation rate of the DDC, the bin spacing of the PSD can be set to an arbitrary value in the range of 1 kHz to 5 kHz. The bandwidth observed by the PSD will change accordingly from 29 MHz to up the full instantaneous bandwidth. To reduce the data rate, a RMS detector can accumulate frames before the result is sent to the host computer via the digital interface. The number of averages can be set between 1 and 4096.

MULTICHANNEL DDC

The option IZT R5010-DDCMC allows to further break down the output of DDC1 into up to 64 DDCs. The sum of the output sample rates of these 64 DDCs can be as high as the output sample rate of DDC1. The decimation factor in the Multichannel DDC can be set in powers of two between 2 and 64 and their center frequency can be arbitrarily set within the available bandwidth at the output of DDC1. In the examples below, DDC1 is set to an output sample rate of 128 megasamples per second. If the relative center frequency of DDC1 is set to 0, it will cover the full receiver instantaneous bandwidth. Possible configurations of the Multichannel DDC are:

- 2 DDCs with an output sample rate of 64 MSps or
- 4 DDCs with an output sample rate of 32 MSps or
- 8 DDCs with an output sample rate of 16 MSps or
- 16 DDCs with an output sample rate of 8 MSps or
- 32 DDCs with an output sample rate of 4 MSps or
- 64 DDCs with an output sample rate of 2 MSps

Combinations of the aforementioned sample rates will be possible as well, as long as the total sample rate is not exceeded, for example:

- 1 DDC with 64 MSps and one DDCs with 32 MSps or
- 1 DDC with 64 MSps, 1 DDCs with 32 MSps and two DDCs with 16 MSps or
- 2 DDCs with 32 MSps, one DDC with 16 MSps and eight DDCs with 2 MSps

The center frequencies of the DDCs are always independent and only constrained by the output bandwidth of DDC1. If the Multichannel DDC is deactivated, the output stream of DDC1 can be routed directly to the buffer and LAN interface.

INTERNAL MEMORY BUFFER

Not all use cases require or even support the continuous streaming of the large bandwidth. Therefore the IZT R5010 can be equipped with an optional internal RAM buffer. With this option, the user can configure, which of the DDC channels will be routed to the buffer instead of the data output. Once the buffer is full, the respective stream will stop. Commanded by the user the content of the buffer will be streamed to the client at a data rate set by the user. With option IZT R5010-BUF1 a maximum number of 256 megasamples can be stored. The maximum available memory depth is 1280 megasamples with option IZT R5010-BUF2. Operation through the buffer and continuous streaming may happen in parallel, as long as the maximum capacity of the output interface is not exceeded.

Specifications

Option	Description
Frequency range	20 MHz – 6000 MHz
Noise figure	15 dB
Instantaneous bandwidth	Up to 120 MHz
Number of DDCs	Up to six
Preselector	14 bands, electronic switching
Conversion scheme	Dual conversion with variable 1st IF
Data output	UDP via two 10 Gbps optical LAN outputs
PSD	32768 points
Mechancial size	19”, 1U
Power consumption	Approx. 100 W

Ordering Guide

Option	Description
IZT R5010-CHS	Base Unit, 60 MHz bandwidth, 1 channel (DDC)
IZT R5010-HF	HF Frontend frequency range 9 kHz – 40 MHz
IZT R5010-HVHF	HVHF Frontend frequency range 9 kHz – 140 MHz
IZT R5010-RF6	Frontend frequency range 20 MHz – 6 GHz
IZT R5010-RF18	Frequency Range Extension 6 GHz – 18 GHz [1]
IZT R5010-REF	Internal GNSS Receiver for synchronization
IZT R5010-BUF1	256 MS Internal Snapshot Memory
IZT R5010-BUF2	1280 MS Internal Snapshot Memory [2]
IZT R5010-BW1	80 MHz receiver bandwidth
IZT R5010-BW2	120 MHz receiver bandwidth [3]
IZT R5010-MC	Six Independent Channels (DDC) within receiver bandwidth
IZT R5010-DDC	Up to 64 DDCs within receiver bandwidth
IZT R5010-PSD	32768-point PSD Spectrum

[1] Requires R5010-RF6
[2] Option BUF2 includes BUF1
[3] Option BW2 includes BW1

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About IZT The Innovationszentrum fuer Telekommunikationstechnik GmbH IZT specializes in the most advanced digital signal processing and field programmable gate array (FPGA) designs in combination with high frequency and microwave technology.

The product portfolio includes equipment for signal generation, receivers for signal monitoring and recording, transmitters for digital broadcast, digital radio systems, and channel simulators. IZT offers powerful platforms and customized solutions for high signal bandwidth and real-time signal processing applications. The product and project business is managed from the principal office located in Erlangen/Germany. IZT distributes its products worldwide together with its international strategic partners. The IZT quality management system is ISO 9001:2015 certified.

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