



Innovationszentrum Telekommunikations-
technik GmbH

IZT R3600/9

Version 1.0



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1 Overview

The IZT R3600/9 offers up to nine channels with 24 MHz instantaneous bandwidth each and covers the frequency range from 9 kHz to 30 MHz. The innovative multi-channel receiver system enables users to combine direction finding and monitoring by using free channels as individual monitoring channels.

The IZT R3600/9 is ideal for both fixed and mobile applications and can easily be synchronized with an external GPS reference. The scalable multi-channel receiver system reduces the number of external devices and minimizes overall system costs. The modular concept makes the device extremely easy to maintain. The compact design in one 19-inch, 8U chassis facilitates easy transport and set-up. With the IZT R3600/9, IZT meets the requirements of a multitude of applications such as ITU-R spectrum monitoring measurements, real-time signal analysis, spectrum allocation analysis, automatic signal detection, search, intercept and direction finding, strategic and tactical reconnaissance.

The IZT R3600/9 provides integrated frequency and clock conditioning. An internal calibration unit reduces downtime to a minimum. Providing a high stability reference, the IZT R3600/9 performs high-precision direction finding and can take bearings of all signals. It allows to analyze and demodulate modern digital wideband signals as well as to track or intercept frequency agile systems over a wide range of bandwidths.

The single modules are based on the IZT R3000. Please check the latest revision of the IZT R3000 series product description for additional information on functionality.

- Scalable multi-channel receiver system
- Up to 9 channels with 24 MHz instantaneous bandwidth each
- Suitable for direction finding (DF)
- Combined DF and monitoring possible
- Frequency range 9 kHz - 30 MHz
- Internal calibration, synchronization and high stability reference
- Can be synchronized to an external GPS reference
- For fixed and mobile systems

2 System Components

2.1 Receiver Channels

The IZT R3600/9 can be configured with up to nine individual receive channels.

These channels can be synchronized for phase coherent 9-channel DF applications, they can be fully independent channels for monitoring systems or a mixture of both providing for example a 3-channel DF system with two additional independent monitoring receivers.

It is also possible to leave receiver slots unpopulated.

2.2 Noise Source

The IZT R3600/9 contains a noise source which can be applied to all RF inputs instead of the antenna signals. This can be used by external software processing to calibrate the individual channels with respect to each other. The power level of the noise source is adjustable to match the receiver's wide dynamic range.

2.3 Local Oscillator Distribution

The IZT R3600/9 features an internal clock and local oscillator distribution system to provide phase coherent channels for optimum direction finding performance.

An internal generated synchronization pulse assures synchronized data retrieval from all nine receiver channels.

2.4 10 MHz Reference

The IZT R3600/9 contains a high stable oven controlled crystal oscillator (OCXO). After a warm-up phase of approximately 5 minutes the OCXO has reached its steady state.

The internal OCXO can be locked to an external 10 MHz reference by connecting the reference to the 10MHZ_IN input.

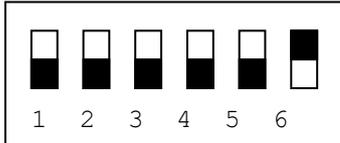
The IZT R3600/9 automatically detects the presence of an external signal and will synchronize to this reference.

Please note that the possibility to lock the internal OCXO to an external 10 MHz is not available by default.

2.5 Synchronization Pulse

The IZT R3600/9 generates synchronization pulses internally. Interval lengths from 125 milliseconds up to 8 seconds can be chosen. The default configuration is 1 second.

Alternatively it is possible to feed an external synchronization pulse. Any rising edge on the SYNC_IN connector will be used as a basis for the internal sync mechanism. To enable the R3600/9 for external synchronization it is necessary to configure the jumper settings on the backplane of the chassis.



Default setting for internal 1 sec synchronization pulse: switch 1-5 down, switch 6 up

The DIP positions 1 – 3 define the duration of the internal synchronization pulse:

DIP 1	DIP 2	DIP 3	Pulse duration
down	down	down	1 second / 1 Hertz
up	up	up	125 milliseconds / 8 Hertz
up	up	down	250 milliseconds / 4 Hertz
up	down	up	500 milliseconds / 2 Hertz
up	down	down	1 second / 1 Hertz
down	up	up	2 seconds / 0,5 Hertz
down	up	down	4 seconds / 0,25 Hertz
down	down	up	8 seconds / 0,125 Hertz

The DIP positions 4 and 5 are reserved and must remain in position "down" for normal operation.

The DIP position 6 defined the source for the synchronization output signals SYNC OUT 1-8:

- DIP position 6 = up : internal pulse generation as source
- DIP position 6 = down : external pulse as source

2.6 Additional Antenna Inputs

Optional the additional antenna inputs can be used to provide the possibility for the first three receiver slots to switch between two antenna signals.

A detailed block diagram is shown in chapter 2.8 with the additional antenna input option shown in blue.

2.7 Antenna Control Interface

Receiver slots of the IZT R3600/9 can optionally provide an RS422 compliant interface to control external equipment such as antenna matrixes.

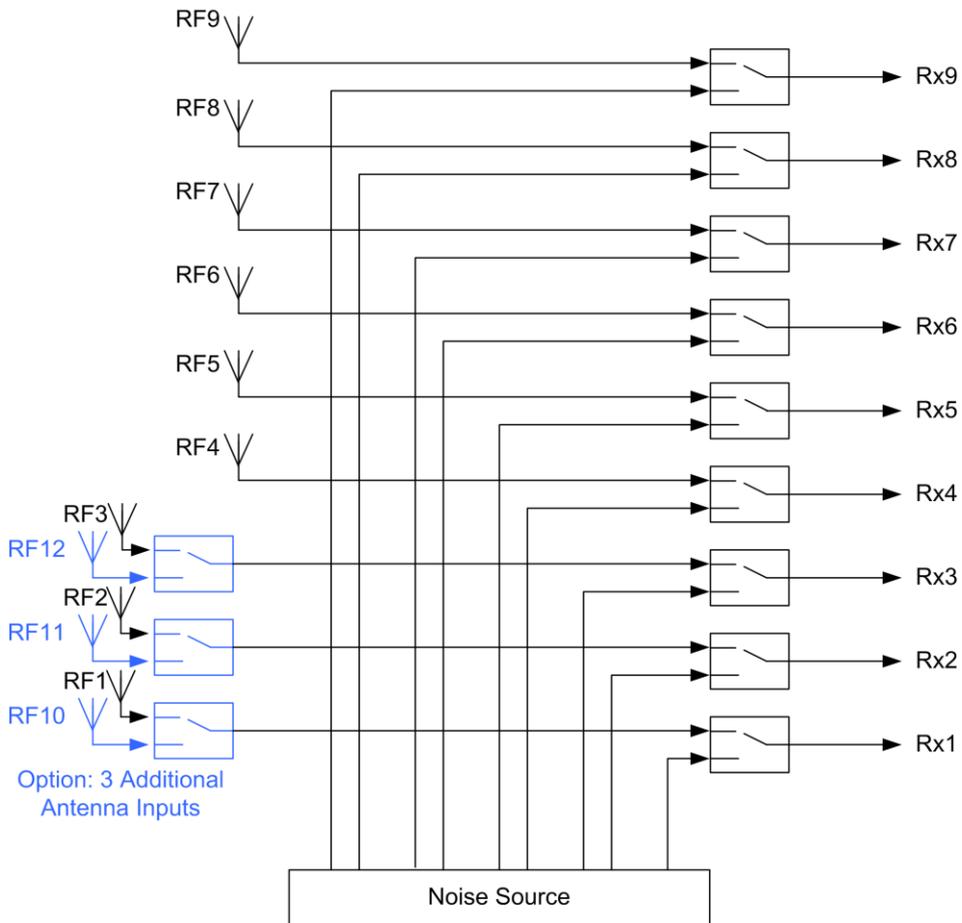
Pin	Signal		Pin	Signal		Pin	Signal
1	OUT1_P		6	OUT3_P		11	OUT5_P
2	OUT1_N		7	OUT3_N		12	OUT5_N
3	OUT2_P		8	OUT4_P		13	*
4	OUT2_N		9	OUT4_N		14	*
5	*		10	*		15	*

* Pins 5, 10, 13, 14, 15 are linked together and coupled to GND with 100 Ohms.

2.8 Chassis Signal Distribution

The following block diagram shows the signal distribution within the chassis. Either the antenna signals RF1 ... RF9 or the internal noise generator signal can be routed to the individual receivers Rx1 ... Rx9.

The optional additional antenna inputs RF10 ... RF12 can be routed to the receivers Rx1 ... Rx3 using a software command.

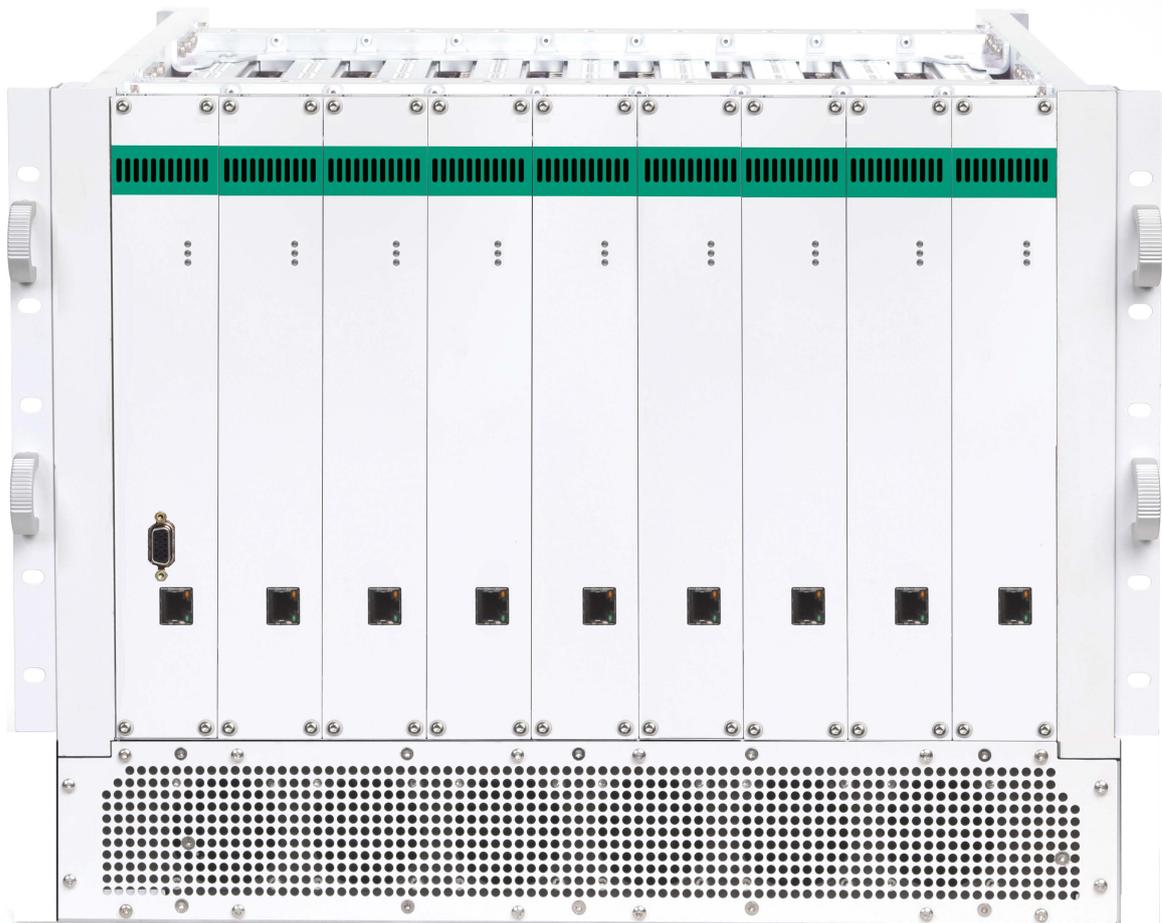


3 Specifications

3.1 Front Panel

LAN1 ... LAN9: LAN interfaces for up to 9 channels

ANTENNA: Antenna control interface (optional)



3.3 Technical Specifications

The following specifications are for one single channel

Frequency range 9 kHz – 30 MHz

Frequency range	9 kHz to 30 MHz
Conversion concept	direct sampling
Maximum input power	+15 dBm
Tuning resolution	1 Hz
Tuning accuracy	< 0.2 Hz
VSWR	< 2.1
Internal reference stability	< 1×10^{-7}
Oscillator phase noise	-130 dBc/Hz typical @ 1 kHz offset -140 dBc/Hz typical @ 10 kHz offset
Sweep time	< 3 ms
Scanning speed	> 4 GHz /sec
3 rd -order intercept point	+40 dBm, typical
Noise figure	9 dB, typical
IF rejection	> 120 dB, typical
Image rejection	> 110 dB, typical
Oscillator reradiation at antenna output	< -110 dBm, typical

The following specifications are for the complete IZT R3600/9 unit

External 10 MHz Reference

Frequency	10 MHz ± 10 Hz maximum
Power Level	0 ... +10 dBm

External Synchronization Pulse

Low Level	0.5 Volt, maximum
High Level	2.0 Volt, minimum – 3.3 Volt, typical
Rise or Fall Time	1 ns / Volt
Operating Temperature	0°C to +50°C
Storage Temperature	-20°C to +70°C
Humidity	max. 85%, non-condensing

Mechanical

Width	19 Inch
Height	8 U
Depth	500 mm / 527mm with handles
Weight	Approx 40 kg

External Interfaces

RF1 to RF 12.....	50 Ohm, N-female
SYNC IN	CMOS 3.3 Volt (5 Volt tolerant input), SMA-female
10MHZ IN	50 Ohm, 10 MHz, 0 dBm ... +10 dBm, SMA-female
ANTENNA	RS422, DSUB-15 female
LAN	RJ45
Power Supply	IEC320, 100 - 250 VAC, 50-60 Hz
Power Consumption	300 VA

Specification subject to change without prior notice.