www.InnoSenT.de

User Manual iSYS-5010

Version 1.2 - 18.10.2016

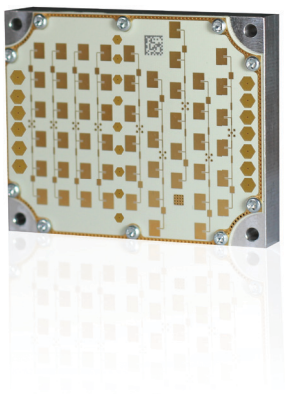
designed and manufactured in Germany

PRODUCT FAMILY	3D-MIMO-RADAR
APPLICATIONS	• Area Surveilance

- Movement
- Velocity
- Direction
- Presence
- Distance
- Angle

FEATURESP

» MIMO-Radar working in the 24GHz - ISM - Band
» Simultaneous capturing of speed, distance and angular deviation of an object
» Detection of objects up to 54m distance
» Detectable radial speed: up to 34.9 km/h
» FOV ±75° with an angular resolution of 16° in azimuth
» Object list on SPI
» UART command interface
» Compact design 71 x 57 x 16.6mm



DESCRIPTION

Detection and separation of moving and stationary objects according to their Speed , Range and Azimuth angle therefore the possibility to detect an object in a 2-dimensional environment.

High speed modulation concept for best signal to noise performance.

Simultaneous capturing of speed, distance and angular deviation of an object

Complete signal processing included. Target list output on SPI, UART

CERTIFICATES

InnoSenT GmbH has established and applies a quality system for: development, production and sales of radar sensors for industrial and automotive sensors.

ADDITIONAL INFORMATION

InnoSenT Standard Product. Changes will not be notified as long as there is no influence on form, fit and within this datasheet specified function of the product.

RoHS-INFO

This product is compliant to the restriction of hazardous substances (RoHS - European Union directive 2011/65/EU).

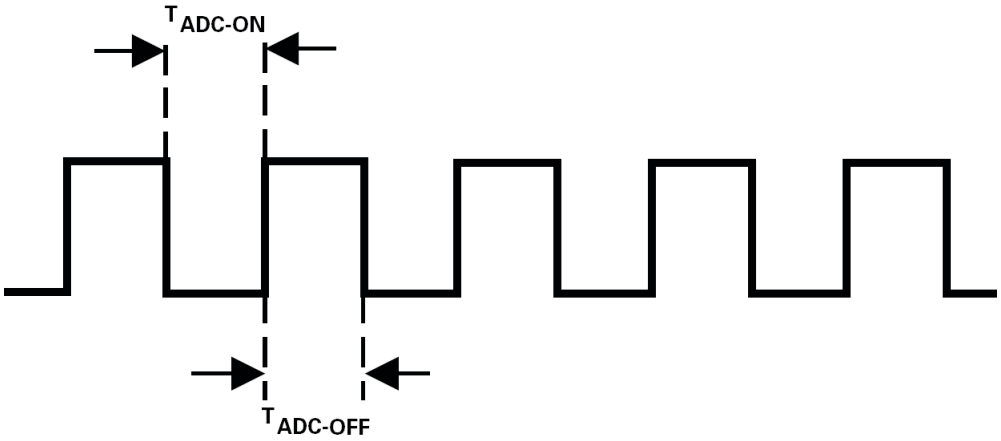
PARAMETERS

The iSYS-5010 consist of a 24GHz Radarfrontend (RFE) with DSP-Board for measuring of distance, radial velocity and angle of arrival of objects. The sensor offers an SPI, UART interface. The ouput of the sensor is a object list-

PARAMETER	CONDITIONS	SYMBOL	MIN	TYP	MAX	UNITS
Radar						
transmit frequencies		$f_{iSYS-5010}$	24.050		24.250	GHz
output power	according to ETSI 300 440	P_{out_ETSI}			20	dBm
	according to FCC 15.249	P_{out_FCC}			12.7	dBm
Sensor						
detection range	depending on RCS	d_r	1		54	m
distance error		d_{error}			±1	m
distance resolution		d_{res}		0.9		m
velocity range		v_r	-34.9		+34.9	km/h
velocity error		v_{error}			±0.55	km/h
velocity resolution		v_{res}		0.55		km/h
antenna pattern (10dB width)	compare with plot on page 4	azimuth		166		°
		elevation		36		°
angle detection				±75		°
angle error	within ±55° FOV			±1		°
angle resolution				16		°
Power supply						
supply voltage		V_{CC}	6.1	6.25	6.4	V
ripple		V_{ripple}			10	mV
supply current	details compare to page 3	I_{CC}		650	1000	mA
Environment						
operating temperature		T_{OP}	-40		+85	°C
storage temperature		T_{STG}	-40		+85	°C
Mechanical Outlines						
outline dimensions	compare to schematic on page 6	height length width		16.6 71.0 57.0		mm

TRANSIENT CURRENT

The analog-frontend operates in a duty cycle mode to save energy and to avoid a strong heating of the iSYS-5010 RADAR-Sensor.



T_{ADC-ON} = 40.50ms

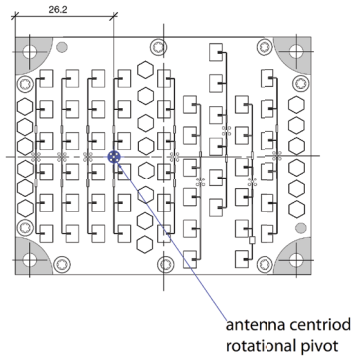
$T_{ADC-OFF}$ = 59.50ms

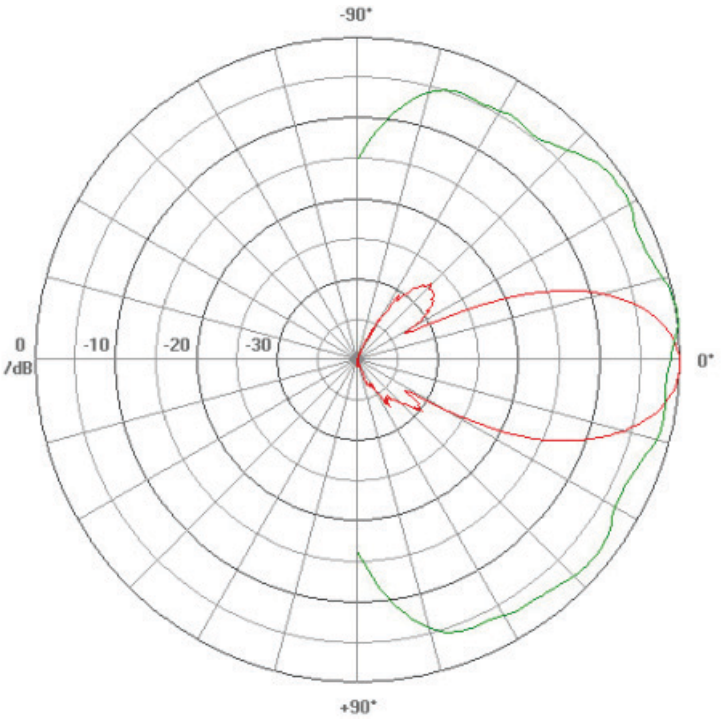
I_{ADC-ON} = typ. 685mA (@6.25V)

$I_{ADC-OFF}$ = typ. 527mA (@6.25V)

I_{supply} = typ. 591mA (@6.25V)

ANTENNA PATTERN

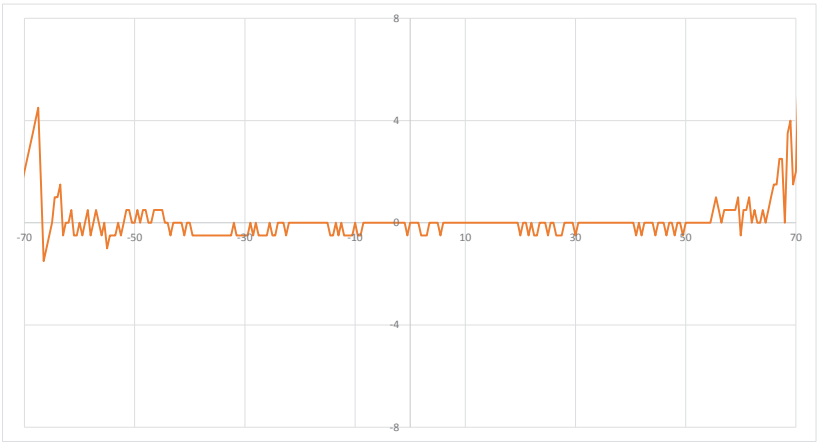




	Red graph ELEVATION ANGLE	Green graph AZIMUTH ANGLE
3 dB – Width [°]	20	97
10 dB – Width [°]	36	166

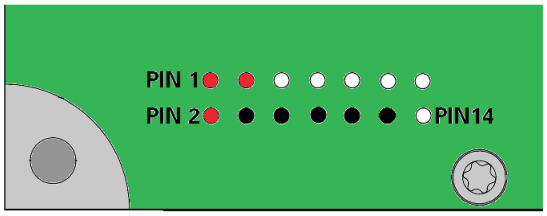
ANGLE MEASUREMENT (measurement without radom)

Measurement range	Resolution	Error
± 55 °	16 °	± 1.0 °
± 75 °	16 °	not specified



INTERFACE

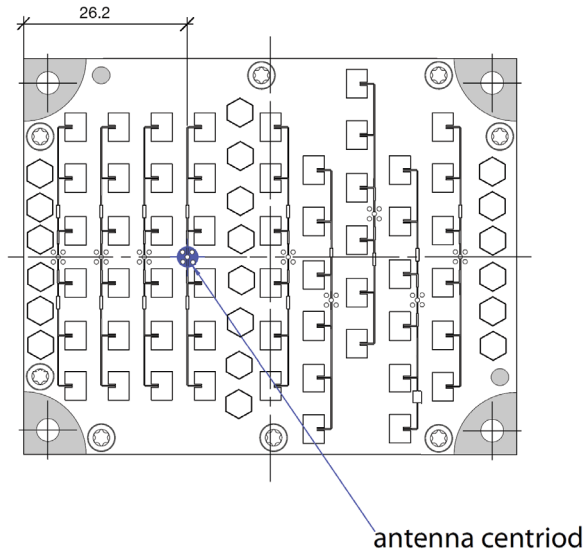
The iSYS-5010 provides a 14 Pin 2.54 mm pitch female header. This connector is a dual entry type and is mounted on the inner side of the DSP PCB. InnoSenT uses a gold-plated connector. The length of the mating connector should be 5.5mm ± 0.5mm (e.g. W+P 3132-12-14-00-0-ST).



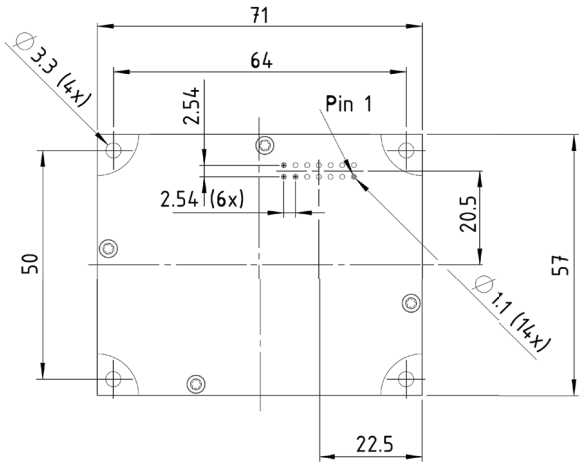
PIN #	DESCRIPTION	COMMENT
1	6V25_IN	Power Supply, 900mA max.
2	6V25_IN	
3	6V25_IN	
4	GND	
5	SPI_CLK	SPI -> interface for object list output, CLK 5 MHz max.
6	GND	
7	SPI_CS	SPI -> interface for object list output
8	GND	
9	SPI_MOSI	SPI -> interface for object list output
10	GND	
11	SPI_MISO	SPI -> interface for object list output
12	GND	
13	UART_RX	UART -> command interface for configuration
14	UART_TX	

MECHANICAL SCHEMATIC

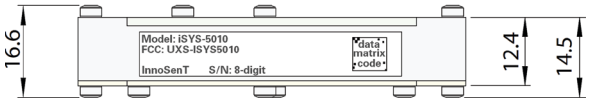
top view



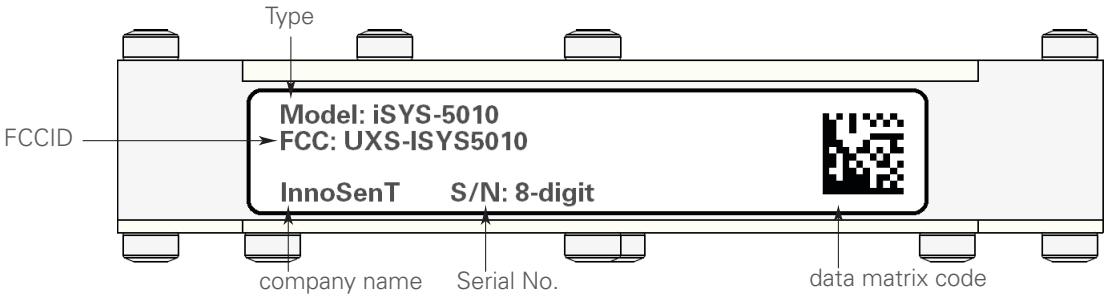
bottom view



side view



LABELING

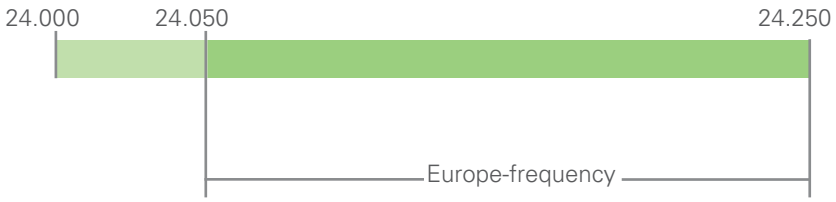


Annex A

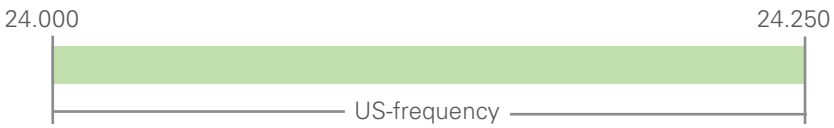
The information that will be given below is only a rough overview; for details please contact the local approval agencies. An overview over the frequency bands in Europe can also be found in the REC 70-03 (Annex 6) which is available under www.ero.de

Frequency Bands in Europe

Generally the iSYS-5010 standard version can be used for all countries in Europe.



Frequency Bands in US FCC 15.249



FCC approval

Operation is subject to the following two conditions:

(1) this device may not cause harmful interference, and

(2) this device must accept any interference received, including interference that may cause undesired operation.

Warning: Changes or modifications made to this equipment not expressly approved by InnoSenT GmbH may void the FCC authorization to operate this equipment.

Manufacturers of mobile or fixed devices incorporating iSYS-5010 modules are authorized to use the FCC Grants for their own final products according to the conditions referenced in these documents. In this case, the FCC label of the module shall be visible from the outside, or the host device shall bear a second label stating „Contains FCC ID: UXS-ISYS5010".

ESD-INFORMATION

This InnoSenT sensor is sensitive to damage from ESD. Normal precautions as usually applied to CMOS devices are sufficient when handling the device. Touching the signal output pins has to be avoided at any time before soldering or plugging the device into a motherboard.

APPROVAL

This Data Sheet contains the technical specifications of the described product. Changes of the specification must be in written form. All previous versions of this Data Sheet are no longer valid.

VERSION	DATE	COMMENT
1.0	30.08.2016	initial release
1.1	28.09.2016	definition of mating connector; supply voltage set to typ. 6.25V; Transient and ESD information added
1.2	18.10.2016	adding labeling, adding frequency band US and Europe; changing in powersupply; changing the length of the mating connector

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