# Data Sheet iSYS-5010
Version 1.7 - 05.12.2018

designed
and manufactured
in Germany

| PRODUCT FAMILY | 3D-MIMO-RADAR |
| --- | --- |

| APPLICATIONS | • Area Surveillance |
| --- | --- |

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

## FEATURES

» MIMO-Radar working in the 24GHz - ISM - Band

» Simultaneous capture of speed, distance and angular deviation of a target

» Detection of targets up to 54.9m in distance

» Unambiguous velocity: 34.9 km/h

» FOV ±75° with an angular resolution of 16° in azimuth

» Target list on SPI

» UART command interface

» Compact design 71 x 57 x 16.6mm
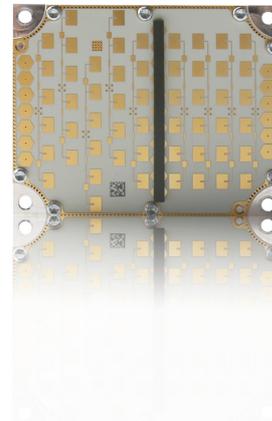
## DESCRIPTION

Detection and separation of moving and stationary targets according to their speed, range and azimuth angle allows the possibility to detect a target in a 2-dimensional environment.

High speed modulation concept for best signal to noise performance.

Simultaneous capture of speed, distance and angular deviation of a target.

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

## ADDITIONAL INFORMATION

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

## CERTIFICATES

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

## RoHS-INFO

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

iSYS
www.InnoSenT.de

## PARAMETERS

The iSYS-5010 consist of a 24GHz Radar Front End (RFE) with a DSP-Board for measure of distance, radial velocity and angle of arrival of targets. The sensor offers an SPI, UART interface. The ouput of the sensor is a target list.

| PARAMETER | CONDITIONS | SYMBOL | MIN | TYP | MAX | UNITS |
|---|---|---|---|---|---|---|
| **Radar** | | | | | | |
| transmit frequencies | | $f_{iSYS-5010}$ | 24.050 | | 24.250 | GHz |
| output power | | $P_{out}$ | | | 12.7 | dBm |
| **Sensor** | | | | | | |
| detection range | depending on RCS | $d_r$ | 1 | | 54.9 | m |
| distance error | | $d_{error}$ | | | ±1 | m |
| distance resolution | | $d_{res}$ | | ±0.93 | | 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 | | ° |
| update rate | | | | 100 | | ms |
| **Power supply** | | | | | | |
| supply voltage[1] | | $V_{CC}$ | 6.1 | 6.25 | 6.4 | V |
| supply current | details compare to page 3 | $I_{CC}$ | | 650 | 1000 | mA |

[1] stable power supply required

| PARAMETER | CONDITIONS | SYMBOL | MIN | TYP | MAX | UNITS |
|---|---|---|---|---|---|---|
| **Environment** | | | | | | |
| operating temperature | | $T_{OP}$ | -40 | | +85 | °C |
| storage temperature | | $T_{STG}$ | -40 | | +85 | °C |

**Mechanical Outlines**

| PARAMETER | CONDITIONS | SYMBOL | MIN | TYP | MAX | UNITS |
|---|---|---|---|---|---|---|
| outline dimensions | compare to schematic on page 6 | height length width | | 16.6 71.0 57.0 | | mm |

## TRANSIENT CURRENT

The Analog Front End (AFE) operates in a duty cycle mode to save energy and to avoid a strong heating of the iSYS-5010 RADAR-Sensor.
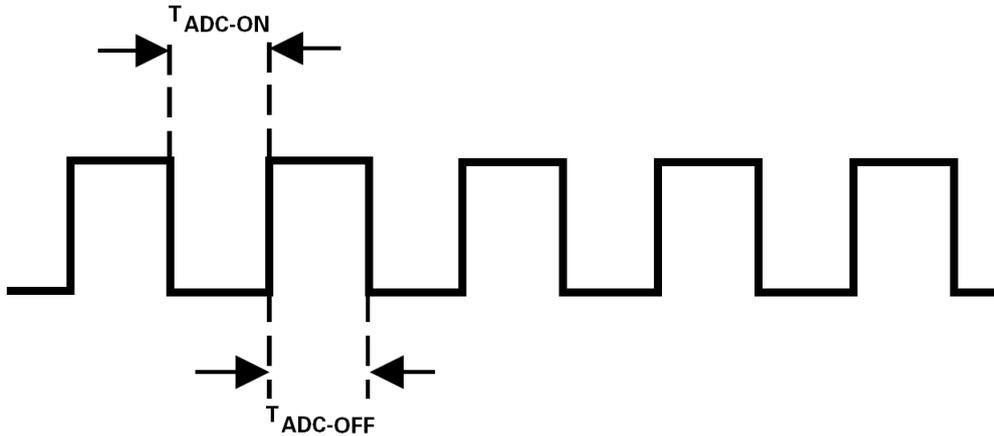


$T_{ADC-ON}$ = 40.50ms

$T_{ADC-OFF}$ = 59.50ms

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

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

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

## ANTENNA PATTERN



antenna centriod
rotational pivot
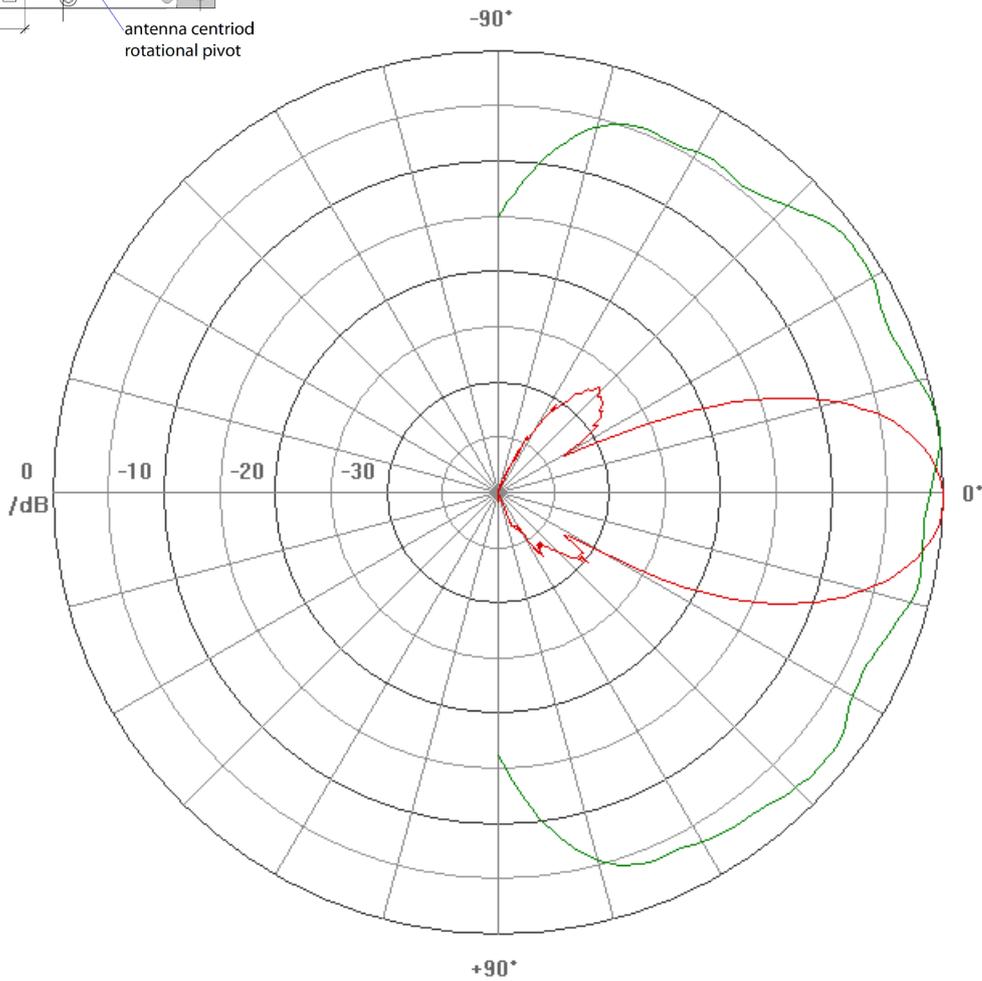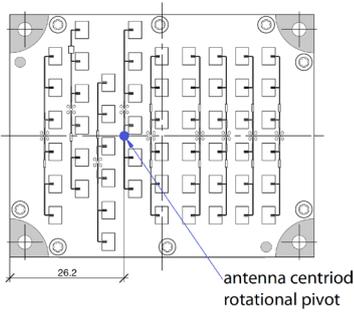


| | Red graph ELEVATION ANGLE | Green graph AZIMUTH ANGLE |
|---|---|---|
| 3 dB – Width [°] | 20 | 97 |
| 10 dB – Width [°] | 36 | 166 |

## ANGLE MEASUREMENT (measurement without radom)

| Measurement range | Resolution | Error |
|---|---|---|
| ± 55 ° | 16° (@ 0° azimuth) | ± 1.0° |
| ± 75 ° | 16° (@ 0° azimuth) | not specified |

## INTERFACE

The iSYS-5010 provides a 14 Pin 2.54 mm pitch female header. This connector (W+P 3492-14-3- 00-00) is a dual entry type and is mounted on the inner side of the DSP-board. InnoSenT uses a gold-plated connector. The length of the mating connector should be 5.32mm ± 0.5mm (e.g. W+P3132-12-14-00-0-ST).
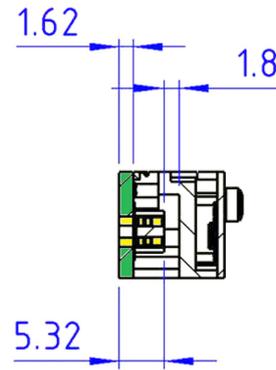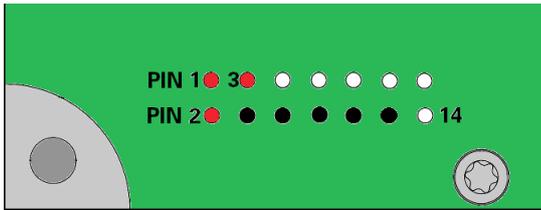




| PIN # | DESCRIPTION | COMMENT |
|-------|-------------|---------|
| 1 | 6V25_IN • | Power Supply, 900mA max. |
| 2 | 6V25_IN • | |
| 3 | 6V25_IN • | |
| 4 | GND • | |
| 5 | SPI_CLK | SPI -> interface for target list output, CLK 5 MHz max. |
| 6 | GND • | |
| 7 | SPI_CS | SPI -> interface for target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

## MECHANICAL SCHEMATIC

**side view**

The module must be installed with label up-side in an inaccessible housing to prevent accidental contact.

**top view**
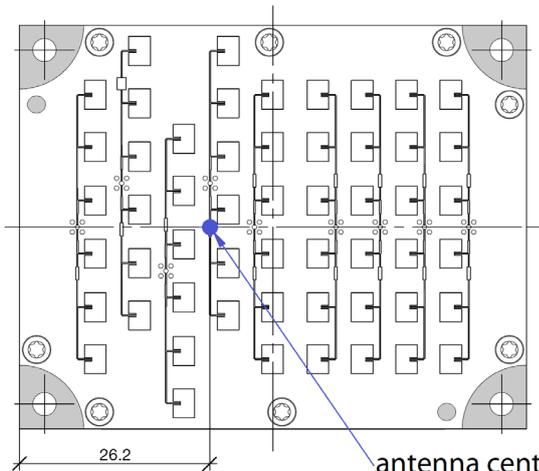
antenna centriod
rotational pivot

**bottom view**
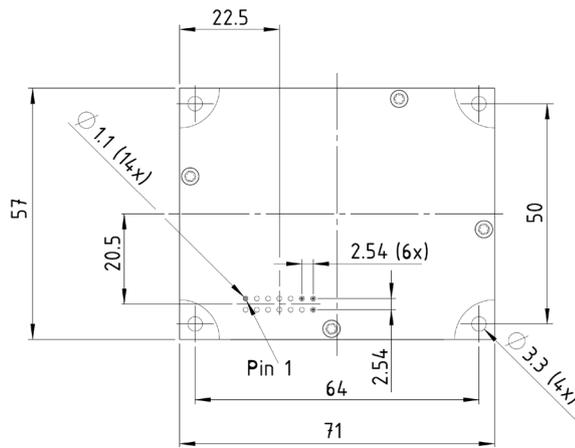
## LABELING
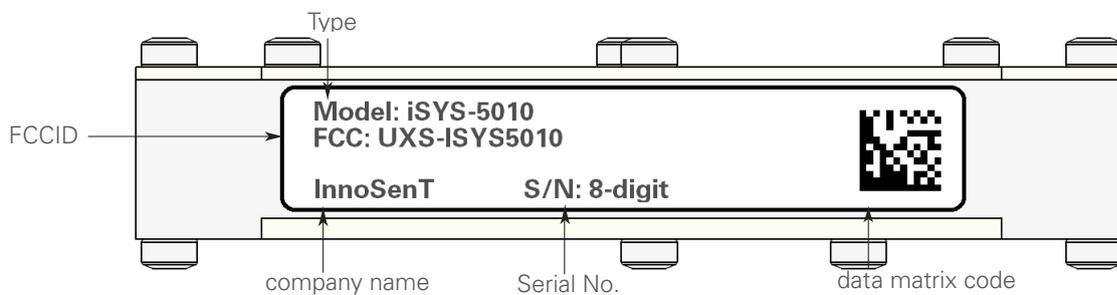
Type

Model: iSYS-5010
FCC: UXS-ISYS5010

InnoSenT          S/N: 8-digit

FCCID

company name          Serial No.          data matrix code

## 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.dk

## Frequency Bands in Europe

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

| 24.000 | 24.050 | | 24.250 |
|---|---|---|---|

Europe-frequency
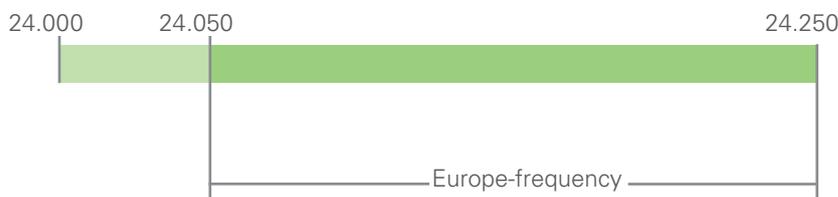
## Frequency Bands in US FCC 15.249

| 24.000 | | 24.250 |
|---|---|---|

US-frequency

**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".

## SETUP-INFORMATION

The module must be installed with label up-side in an inaccessible housing to prevent accidental contact.

## 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 | 01.12.2016 | adding labeling, adding frequency band US and Europe; changing in powersupply; changing the length of the mating connector |
| 1.3 | 07.12.2016 | adding setup information |
| 1.4 | 01.02.2017 | changing label information |
| 1.5 | 13.02.2017 | changing label information |
| 1.6 | 06.07.2017 | adding in setup-information |
| 1.7 | 05.12.2018 | changing parameter information |

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