

# Data Sheet IMD-2000

Version 1.7 — 28.01.2022

## PRODUCT FAMILY

InnoSenT Motion Detector

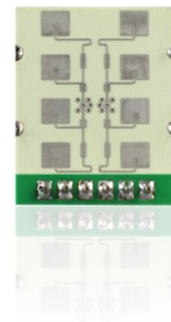
## APPLICATIONS

- Industrial Applications
- Security Applications

<span style="color: green;">■</span>	Movement
<span style="color: green;">■</span>	Velocity
<span style="color: green;">■</span>	Direction
<span style="color: gray;">■</span>	Presence
<span style="color: green;">■</span>	Distance
<span style="color: gray;">■</span>	Angle

## FEATURES:

- FSK-radar working in the 24 GHz—ISM—band
- Worldwide certification possible
- Including digital signal processing to output a target list via UART
- Detection of direction, range and velocity of moving objects
- Configurable distance up to 50m
- Velocity range from 0.2 to 28 km/h
- Small outline dimensions (25 x 20 x 13 mm)



## DESCRIPTION

The IMD-2000 radar system with an intelligent  $\mu$ C preprocessing unit detects moving targets and measures their speed, direction and range. This information is provided in a target list that can be used to implement individual security, door opener or proximity applications. The sensor detects targets in a speed range from 0.2 to 28 km/h. Individual programming and adjustment is easily done via the included GUI which is also available at [www.innosent.de](http://www.innosent.de).

## CERTIFICATES

InnoSenT GmbH has established and applies a quality system for: development, production and sales of radar sensors for industrial and automotive sensors. See more information on our quality standards:

<https://www.innosent.de/en/company/certifications/>

## ADDITIONAL INFORMATION

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

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## PARAMETERS

The IMD-2000 consists of a 24 GHz Radar front end (RFE) with FSK-modulation and a DSP-board for measurement of distance, velocity and direction of radial movement. The sensor outputs a target list.

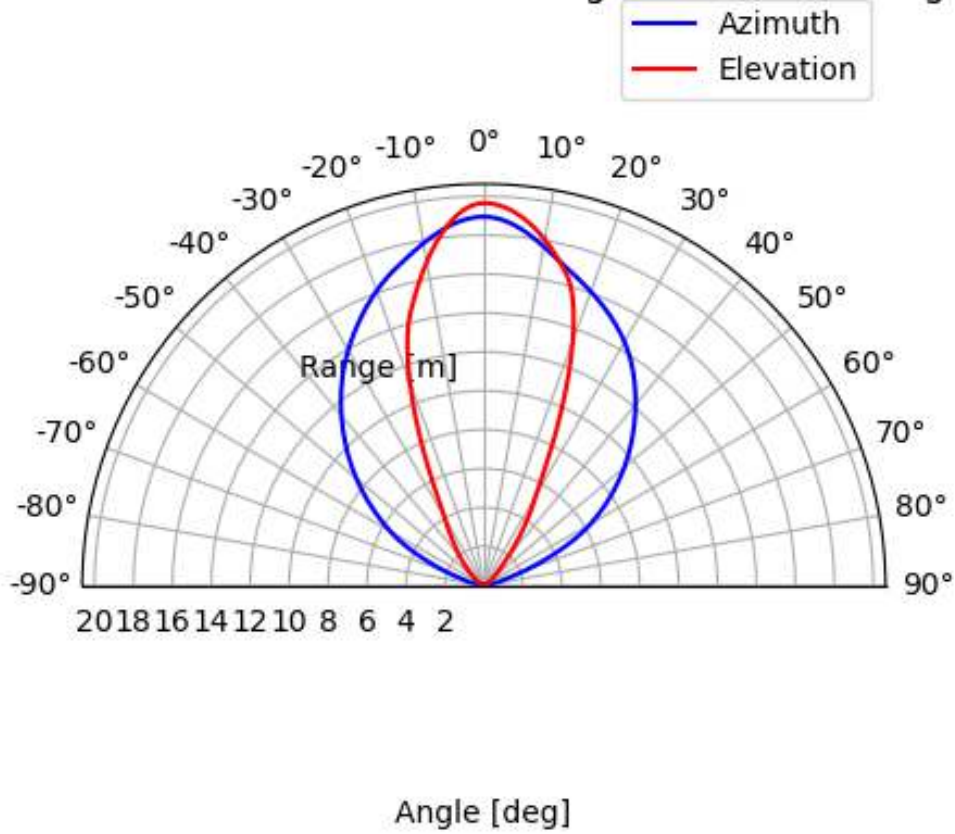
PARAMETER	SYMBOL	MIN	TYP	MAX	UNITS
<b>Radar</b>					
transmit frequencies (see ANNEX B for available channels)	$f_t$	24.150		24.250	GHz
output power (EIRP)	$P_{out}$			12.7	dBm
<b>Sensor</b>					
typical detection range for human being	$d_{r\_human}$		20		m
standard detection range (depending on RCS of target)	$d_r$	0.5		50	m
standard detection field	azimuth		98		°
	elevation		48		°
velocity range		0.23		28.43	km/h
velocity resolution	$v_{res}$		0.23		km/h
update rate			100		msec
latency for false alarm suppression			additional 200 ms		
<b>Power supply</b>					
supply voltage	$V_{CC}$	3.8		7.2	V
supply current @4V	$I_{CC}$		74		mA
<b>Environment</b>					
operating temperature	$T_{OP}$	-30		+80	°C
storage temperature	$T_{STG}$	-30		+80	°C
<b>Mechanical Outlines</b>					
outline dimensions	height		25.0		mm
	length		20.0		
	width		12.7		

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DETECTION RANGE FOR HUMAN BEING

IMD 2000 Radial Detection Range for Human Being

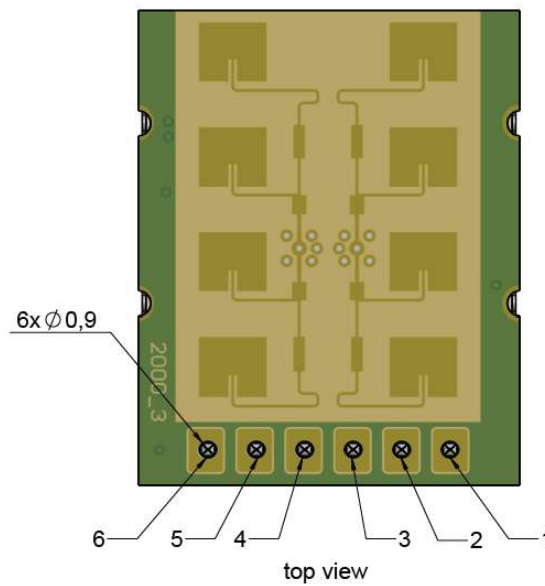
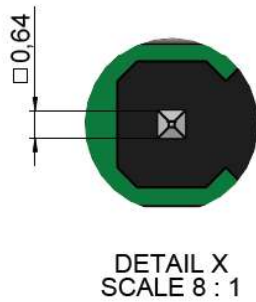
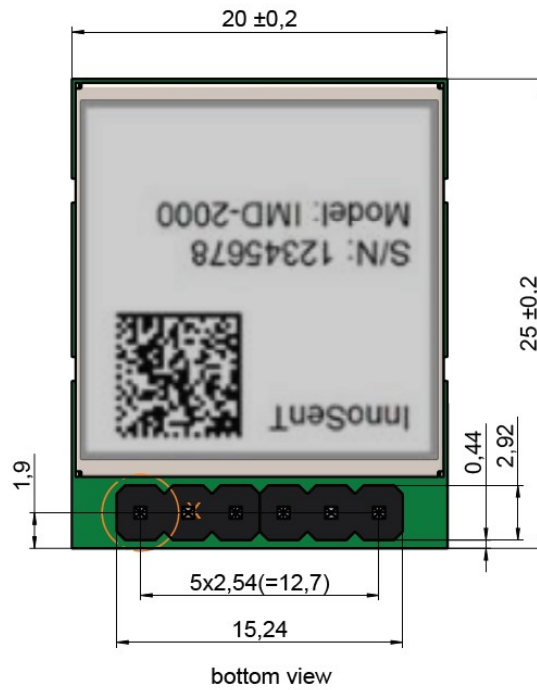
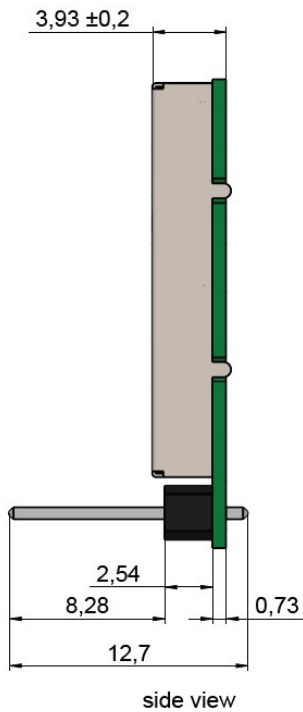


Note: In order to acquire the data for elevation, the sensor module has been turned by 90° clockwise with perspective from the sensor to the FoV.

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MECHANICAL DRAWING



All dimensions in mm

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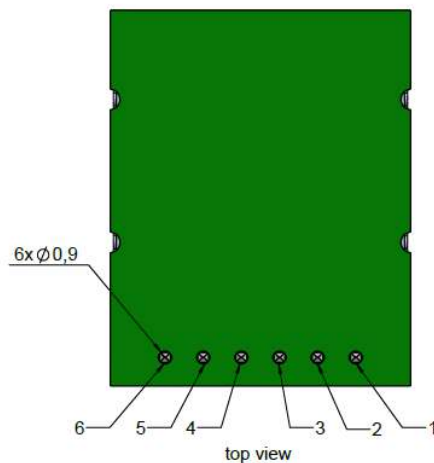
## INTERFACE

The IMD-2000 provides a 6x1, 2.54mm pitch Pin header. The connector (W+P 943-18,3-006-00) is mounted on the module facing backwards. InnoSenT uses a gold plated connector. A compatible female pin header is W+P 153-006-1-50-00.

## EVALUATION CONNECTION

For evaluation, you can connect the sensor via FTDI TTL-232R-3V3 cable to a PC's USB port.

*Note:* In order to achieve best performance for data transmission when using this cable, an additional configuration has to be made in its device settings. Please see the application note "Measurement of data transmission latency".



PIN #	DESCRIPTION	COMMENT
1	D.N.C.	Do Not Connect
2	UART_RX	UART -> command interface (module side view)
3	UART_TX	UART -> command interface (module side view)
4	V <sub>CC</sub>	3.8 V—7.2 V supply voltage
5	D.N.C.	Do Not Connect
6	GND	Ground

## COMMUNICATION

The sensor outputs a list of 20 targets via UART protocol with a baudrate of 256000 Baud.

It can easily be configured with the supplied Target Viewer software or the IMD-2000\_radarAPI.dll.

The dll is pre-compiled for different compilers and comes with an example project for easy integration.

Available commands can be found in the accompanying IMD-2000\_RadarAPI\_readMe.pdf.

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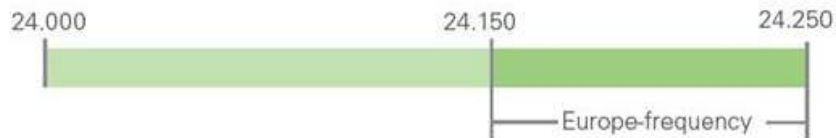
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## ANNEX A

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 B) which is available under [www.cept.org](http://www.cept.org)

### FREQUENCY BANDS IN EUROPE

Generally the IMD-2000 can be used in all countries in Europe.



### FREQUENCY BANDS IN US FCC 15.249



## ANNEX B

The IMD-2000 provides a configurable set of transmit frequency channels. These can be used to achieve interference mitigation.

All channels provided in this set apply to regulatory limitations according to RED (EU) and FCC (USA).

CHANNEL #	TYP	UNIT
channel f <sub>1</sub>	24.166	GHz
channel f <sub>2</sub>	24.189	GHz
channel f <sub>3</sub>	24.214	GHz
channel f <sub>4</sub>	24.232	GHz

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## 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.

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## 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	19.10.2020	Initial release
1.1	25.01.2021	Corrections: - spelling - <i>standard detection field</i> (no impact on performance): horizontal and vertical reversed, corrected 116° to 98° (caused by wrong value) - <i>supply current</i> : from 64 to 74 mA  Additions: - <i>typical detection range for human being</i>
1.2	28.01.2021	Added - Detection Range for Human being
1.3	24.02.2021	Updated - Detection Range for Human being (units added)
1.4	25.03.2021	Corrections - Pinout description in mechanical drawing on page 4 was wrong (Pinout description on page 5 was correct) - Dimensioning of pins in mechanical drawing on page 4 (side view) was wrong: Corrected from 12.19mm to 12.7mm  Updated - All Mechanical Drawings and dimensionings + label on backside - Pinout description: Renamed „Not Connected“ Pins 1, 5 with „Do Not Connect“
1.5	02.08.2021	Corrections - Dimensioning of width in parameters table corrected from 12.2 to 12.7mm - Changes in mechanical drawing on page 4
1.6	07.09.2021	Added - ANNEX B: available frequency channels - Note about configuration for proposed cable during evaluation phase (see interface description)  Corrections - Minor spelling corrections - Renamed Object Viewer to Target Viewer
1.7	28.01.2022	Updated - Increased typical detection range for human being from 15 to 20m - Updated plot with new detection range - Mechanical Drawings (no parameter change)  Added - Product picture

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