Data Sheet IMD-2002

Version 2.1 - 2023-01-26

PRODUCT FAMILY

InnoSenT Motion Detector
with Angle Measurement Capability

APPLICATIONS

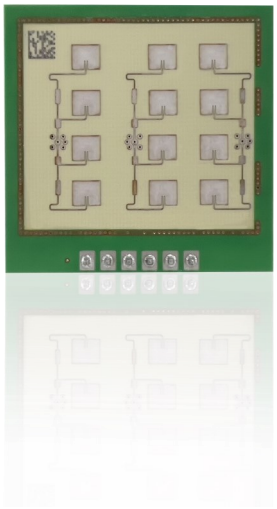
Industrial Applications

Security Applications

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

FEATURES:

- FSK-radar working in the 24 GHz ISM band
- Worldwide certification possible
- Incorporates digital signal processing to output a filtered target list via UART
- Detection of direction, range, velocity and angle of moving objects
- Velocity range from -23 km/h to +23 km/h
- Outline dimensions 33 x 33 x 13 mm



DESCRIPTION

The IMD-2002 radar system with an intelligent µC pre-processing unit detects moving targets and measures their speed, direction of movement, range and angle of arrival. This information is provided in a target list that can be used to implement individual security, door opener or proximity applications. Individual programming and adjustment is easily done via the included GUI which is also available at www.innosent.de.

CERTIFICATES

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

See more information on our quality standards at:
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.

PARAMETERS

The IMD-2002 consists of a 24 GHz Radar front end (RFE) with FSK-modulation and a DSP-board for measurement of direction of radial movement, distance, velocity and angle of arrival of moving objects. The sensor outputs a target list.

PARAMETER	TYPICAL VALUE[1]	UNIT
Regulatory		
Transmit Frequency	24.05 .. 24.25	GHz
Output Power (EIRP)	12.7	dBm
Available Frequency Channels	4 (8^8)	
Range		
Standard Detection Range	0.5 .. 50 | 1.6 .. 164	m | ft
Typ. Detection Range: Pedestrian[2]	20.5 | 67.3	m | ft
Speed		
Min. Radial Speed	0.18 | 0.11	km/h | mph
Speed Range	-23.04 .. +23.04 | -14.32 .. +14.32	km/h | mph
Angle		
Field of View: Azimuth[3]	90	°
Field of View: Elevation[3]	42	°
Angular Accuracy	±5	°
Operational		
Update Rate[4]	125	ms
Maximum Amount of Targets	15	
Power supply		
Operating Voltage[5]	3.25 .. 3.35	V
Supply Current[6]	78	mA
Power Consumption[6]	0.26	W
Environment		
Temperature (Operating and Storage)	-30 .. +80	°C
Mechanical		
Dimensions (with connectors): H/W/D	33.0 x 33.0 x 3.7 (12.7) | 1.3 x 1.3 x 0.15 (0.5)	mm | in
Weight	4 | 0.14	g | oz

[1] typical specifications are for general understanding and may vary

[2] This value is derived from measurements which have been performed outdoors and with dry weather conditions. Please consider, that the detection range is highly dependent on the radome, object's RCS, surroundings, environmental and weather conditions.

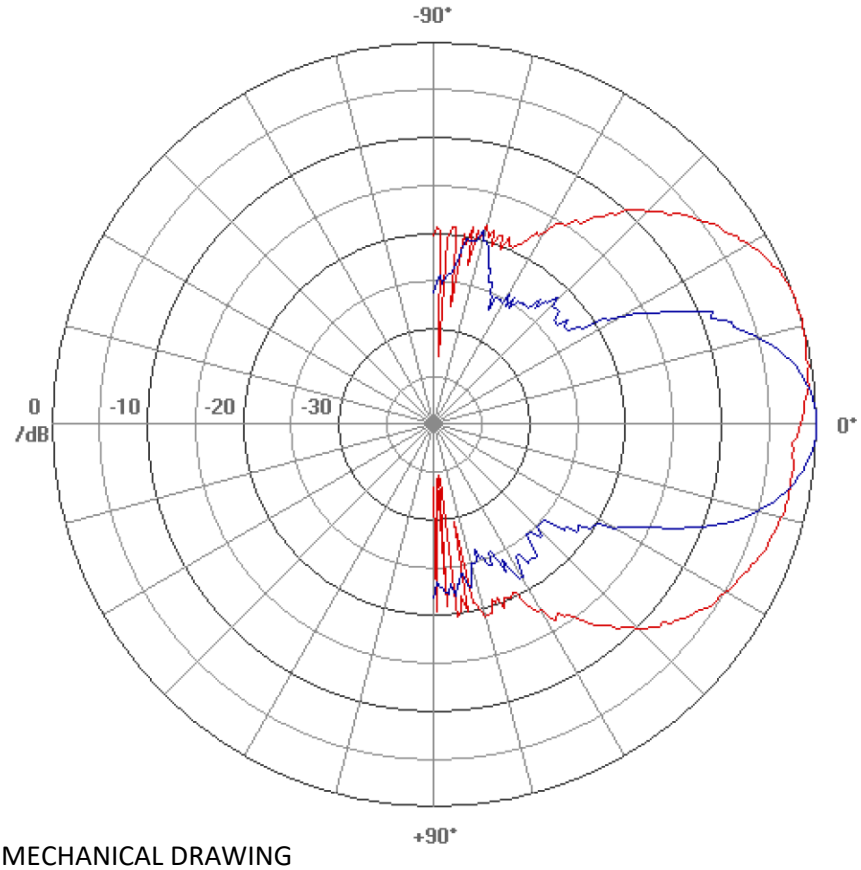
[3] standard detection field @-10dB beam width

[4] If false alarm suppression is activated, a filtering algorithm is applied to the point cloud. In this case, the point cloud is output with a latency of additional 250ms.

[5] required voltage noise: < 50µVrms (10Hz - 100kHz)

[6] the typical value is given for 3.3V at 25°C

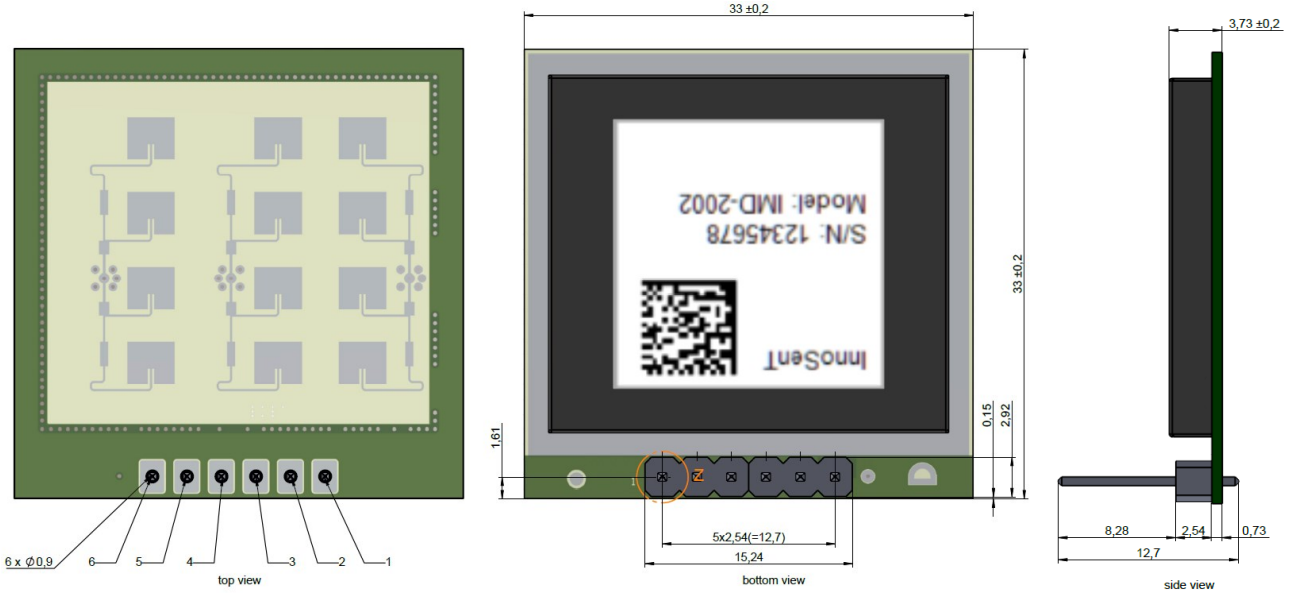
STANDARD DETECTION FIELD



LEGEND
Azimuth
Elevation

MECHANICAL DRAWING

Note: All dimensions in mm

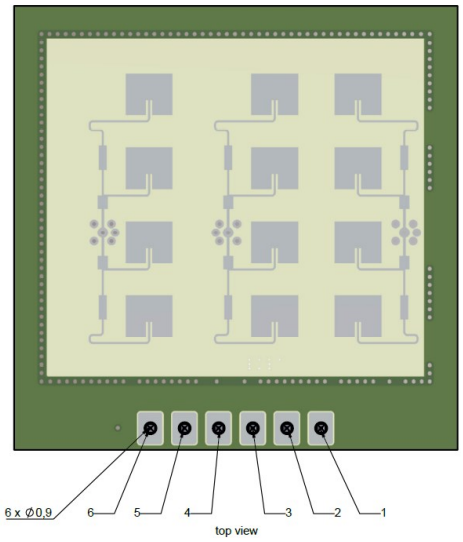


INTERFACE

The IMD-2002 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.

DATA INTERFACE

Data interface is UART +3.3V TTL level with 256000 Baudrate.



PIN #	DESCRIPTION	COMMENT
1	D.N.C.	do not connect
2	UART_TX	UART -> command interface 256000 Baud
3	UART_RX	UART -> command interface 256000 Baud
4	V_{CC}	operating voltage
5	D.N.C.	do not connect
6	GND	ground

COMMUNICATION

The sensor outputs a list with a maximum of 15 targets via UART protocol with a baudrate of 256000 Baud.
It can easily be configured with the supplied Target Viewer software or the IMD-2002_radarAPI.dll. The dll is pre-compiled for different compilers and comes with an example project for easy integration.

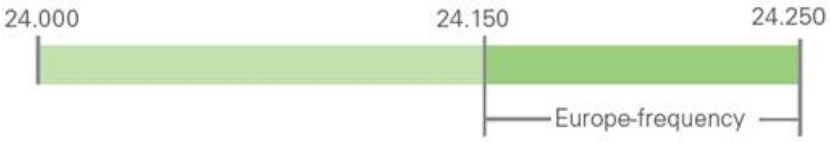
Available commands can be found in the accompanying IMD-2002_RadarAPI_readMe.pdf.

FREQUENCY INFORMATION

The information that will be given below is only a broad overview; for details please contact the regional approval agency. An overview over the frequency bands in Europe can also be found in the REC 70-03 which is available under www.cept.org.

FREQUENCY BANDS IN EUROPE

In general, the IMD-2002 can be used in all European countries.



FREQUENCY BANDS IN US FCC 15.249

CONFIGURABLE FREQUENCY BANDS

The IMD-2002 provides a configurable set of transmit frequency channels. These can be used to achieve interference mitigation.

Regulatory Limitations

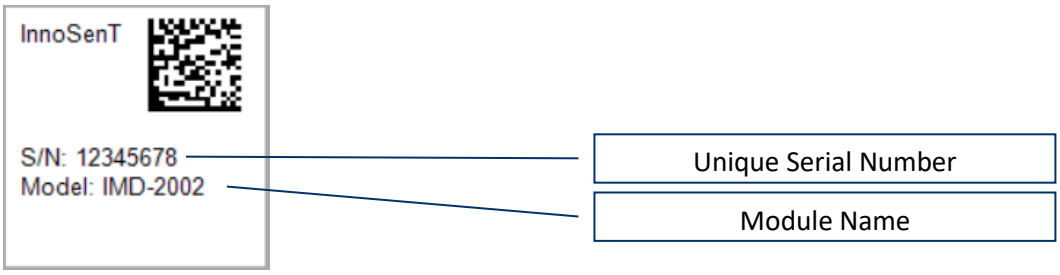
Channels f_1 to f_8 can legally be used in markets, regulated by FCC (USA) and ISED (Canada).
Channels f_1 to f_4 can legally be used in markets, regulated by RED (EU).

CHANNEL #	TYPICAL VALUE[1]	UNIT
channel f_5[8]	24.074[8]	GHz
channel f_6[8]	24.097[8]	GHz
channel f_7[8]	24.120[8]	GHz
channel f_8[8]	24.143[8]	GHz
channel f_1	24.166	GHz
channel f_2[7]	24.189	GHz
channel f_3	24.214	GHz
channel f_4	24.232	GHz

[7] channel f_2 is preconfigured

[8] channel not available yet; center frequency value is preliminary

LABEL



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	07.04.2022	Initial release
2.0	11.01.2023	**INTRODUCTION** 3.3V voltage supply introduced Updates - outlines increased - interfacing updated Addition - frequency channels f_5 to f_8 (not available yet) - added weight - UART TTL level **DISCONTINUATION** 5V voltage supply discontinued
2.1	26.01.2023	Correction - Field of View: Elevation corrected from 48° to 42° Addition - clarification in footnote 4 for better understanding - available frequency channels in parameter table