Data Sheet IDR-2050 A1-Sample

PRELIMINARY

☐ Movement
☐ Velocity
☐ Direction
☐ Presence
☐ Distance
☐ Angle

PRODUCT FAMILY

APPLICATIONS

- 60 GHz Distance Measurement Sensor
- Level Measurement
- Industrial Applications

FEATURES:

- Radar-based distance measurement sensor operating at 60 GHz
- Distance measurement with millimeter accuracy
- Output of distance, velocity, direction and signal strength of a target via UART
- Small form factor for easy integration into customer housing
- Configurable detection range
- Narrow beamwidth (azimuth and elevation)
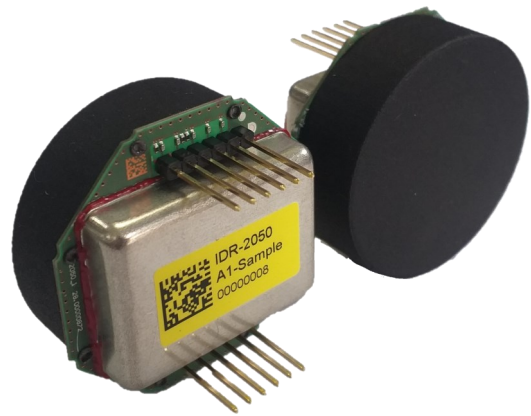
DESCRIPTION

The IDR-2050 is a radar sensor operating at 60 GHz. The integrated µC unit provides customers an easily integrable sensor for level measurement and other industrial applications. The sensor allows precise distance measurement to stationary and moving objects within a narrow beam. The small, flat design allows integration even into off-the-shelf housings.

With an innovative DSP algorithm and advanced calibration techniques the sensor is able to reach millimeter accuracy.

CERTIFICATES

InnoSenT GmbH established a quality system for development, production and sales of radar sensors for industrial and automotive sensors. You will get more information on our quality standards by using the following link:

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 and within this data sheet specified function of the product.

IIII InnoSenT

SPECIFICATION

PARAMETER	CONDITIONS	SYMBOL	MIN	TYP	MAX	UNITS
Radar						
transmit frequencies		f_t	61		63.5	GHz
output power (EIRP)	ETSI regulation mode	P_{out}		30	30	dBm
	FCC regulation mode			10	10	dBm
Sensor						
detection distance	ETSI mode[1], smallest target: powder	d_r	0		10	m
detected target velocity			0		15	m/sec
accuracy	Depending on the surface of the illuminated object, starting at 0.25 m range. Measurements closer typically have an accuracy of ± 5 cm. Over the suitable temperature range, the measured value varies by ± 1 cm.			± 5		mm
range resolution[2]		Δd		15		cm
speed resolution[2]	Fast Measurement Mode			4		m/sec
	Normal Mode			1		m/sec
	Long Integration Mode			0.25		m/sec
start up time	Sensor powered up, measurement performed; Fast Measurement Mode			190		msec
Power supply						
supply voltage		V_{cc}	4	12	16	V
average current	@ 5 V, Normal Mode, ETSI regulation mode	I_{cc}		379 [3]		mA

[1] detection range can be lower for FCC mode, depending on RCS of target

[2] seperability of two targets with equal RCS

[3] expected to be lower in series product

Note:

- These values are for constant measurement acquisition. Average sensor power is dependent on measurement interval. Average power can be calculated by ($t_{powercycle}$ / $t_{measinterval}$) $* P_{cc}$.

SPECIFICATION

PARAMETER	CONDITIONS	SYMBOL	MIN	TYP	MAX	UNITS
Environment						
operating temperature		T_{OP}	- 40		+ 85	°C
storage temperature		T_{STG}	- 40		+ 85	°C
Mechanical Outlines						
outline dimensions		Height Length Width		27.3 43.5 43.5		mm
Weight						
Sensor weight				26		g

MEASUREMENT MODES

Depending on your needs, the IDR-2050 offers three measurement modes to perfectly fit your application.

PARAMETER	TYP	UNITS
FAST MEASUREMENT MODE		
number of targets	10	targets
update rate	100	Hz
output format	single-target or target-list	
NORMAL MODE		
number of targets	100	targets
update rate	40	Hz
output format	single-target or target-list	
LONG INTEGRATION MODE		
number of targets	100	targets
update rate	20	Hz
output format	single-target or target-list	

Note: The Long Integration Mode has the longest integration time and therefore the best signal-to-noise ratio. This mode is best for targets with low RCS.
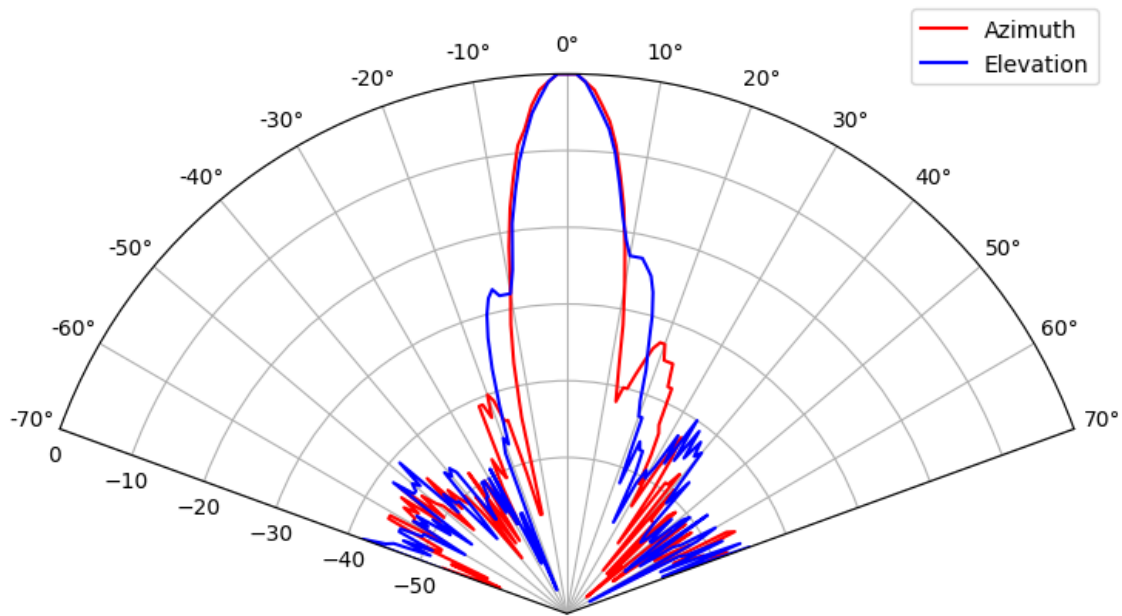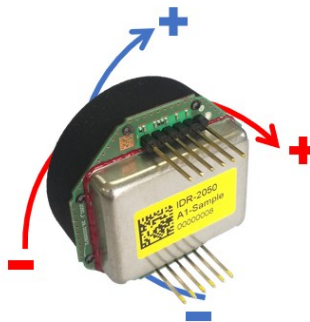
DETECTION FIELD OF VIEW

The antenna beamwidth in degrees specifies the off-boresight angle where the transmitted or received energy has dropped down to 50 percent of the maximum value (3dB-beamwidth). It does not mean that beyond this point no transmission or reception is possible. For instance, an object with a very large radar cross-section (truck, metallic door) might very well compensate the loss of the antenna pattern and provide a significant radar return signal. Due to this fact, the detection range of the sensor can vary depending on the RCS (radar cross section) of the detected object.

IDR-2050 System Pattern Measurement

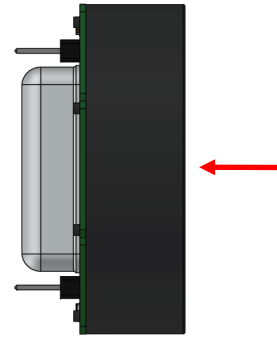The arbitrary definition of azimuth and elevation.

PARAMETER	CONDITIONS	SYMBOL	MIN	TYP	MAX	UNITS
STANDARD DETECTION FIELD						
system pattern (3dB width)	horizontal	azimuth		6.5		°
	vertical	elevation		6		°

MEASUREMENT DISTANCE DEFINITION

The measurements provided by the sensor are in reference to the tip of the lense, as shown in the graphic to the right (red arrow).

BOARD-TO-BOARD INTERFACE

For customers looking to design their own PCB to interface with the sensor, 2 pin headers 6-pin board-to-board connector is provided. 2 Pin Headers, 2,54mm Pitch.

The sensor's connector type: W+P 943-18,3-006-00
Compatible Female Header is: W+P 153-006-1-50-00

Pay attention to the correct orientation of the sensor—Pin header 2 is next to the PCB data matrix code
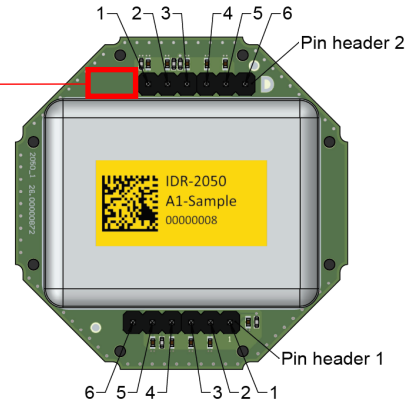
PIN-HEADER 2

| PIN #	DESCRIPTION	IN/OUT	COMMENT
1	D.N.C.		Do not connect (RSC_SOP_2)
2	COM_TX	OUT	UART transmit, 3.3 V level, default baud rate is 1412000
3	COM_RX	IN	UART receive, 3.3 V level, default baud rate is 1412000
4	V_IN	IN	Supply voltage (4V-16V)
5	D.N.C.		Do not connect - Reserved
6	GND		Ground

PIN-HEADER 1

Pin-Header 1 is only available for mechanical installation, so do not connect any of the pins.

EVALUATION INTERFACE (USB)

In order to evaluate the sensor right out of the box, use an FTDI cable to connect the IDR-2050 to the PC. For detailed information, please refer to the Quick Start Guide included in the software package.
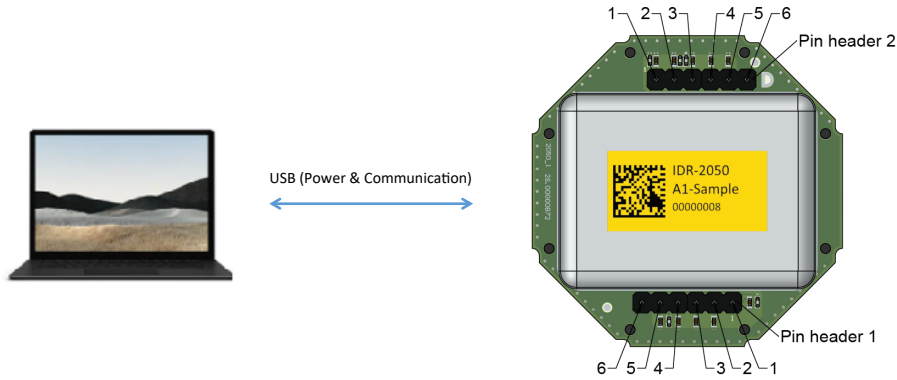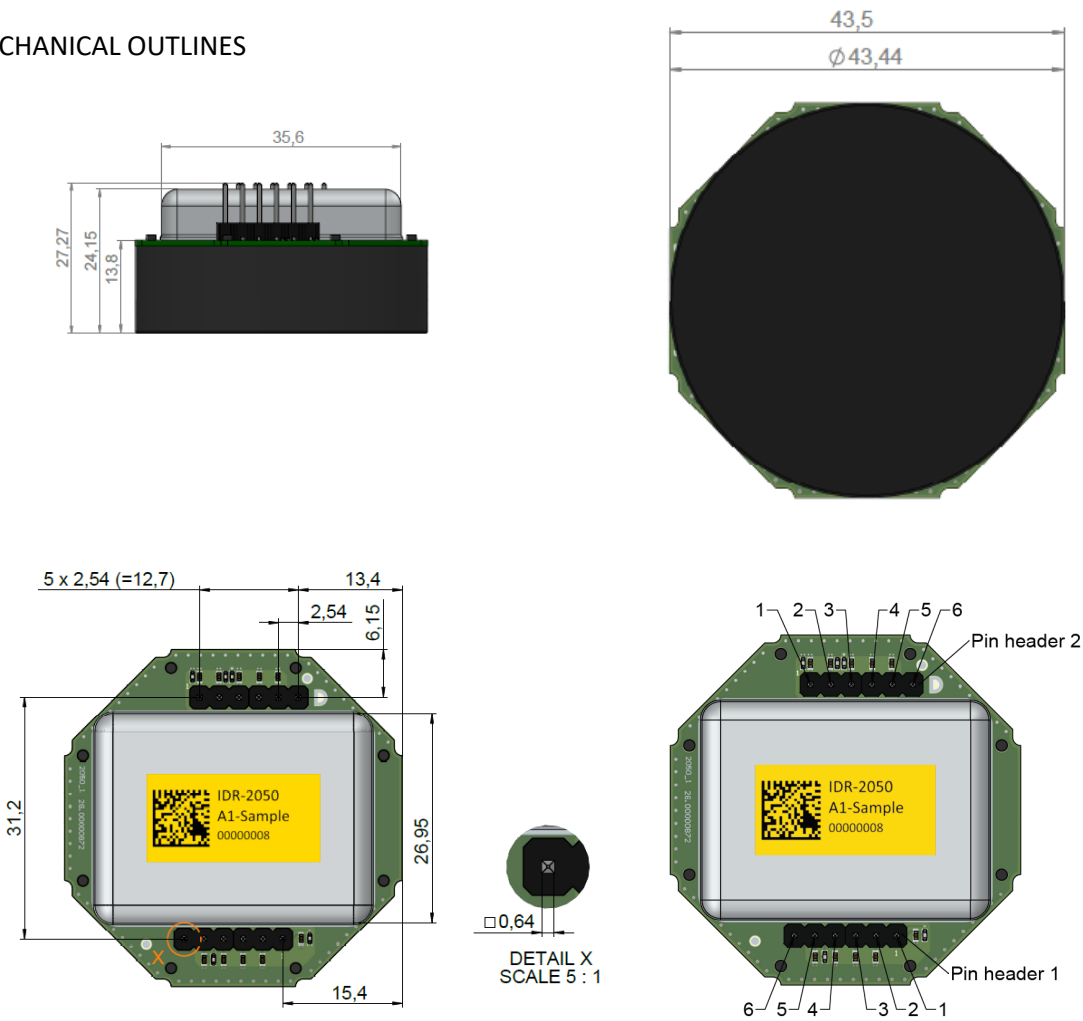
USB (Power & Communication)

MECHANICAL OUTLINES

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 preliminary datasheet describes a prototype sample of the product. Approvals are not yet available.

CUSTOMER INFORMATION

If the customer has any questions relating to the sensor or how to interface with it, do not hesitate to ask info@innosent.de for possible solutions. We gladly support you with schematic and/or layout recommendations.

HISTORY

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
0.1	27.06.2022	Preliminary release for A1 sample

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