

# Data Sheet iSYS-4004

Version 1.6 - 20.07.2020

## PRODUCT FAMILY

K-Band Distance Measurement System

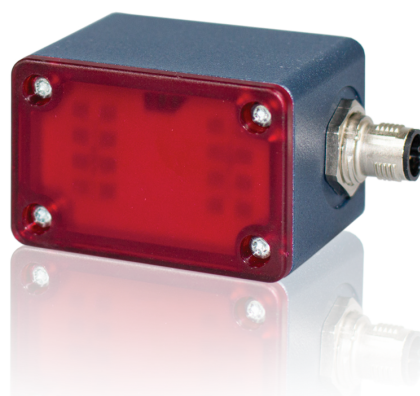
## APPLICATIONS

- Level Measurement
- Industrial Applications

	Movement
	Velocity
	Direction
	Presence
	Distance
	Angle

## FEATURES:

- » Radar-based distance measurement system working in the 24GHz - ISM - Band
- » Distance measurement of stationary objects
- » Measuring distance from 1.1 to 35m with an accuracy of  $\pm 3\text{cm}$  for EU (available Bandwidth 250MHz)
- » Measuring distance from 2.7 to 35m with an accuracy of  $\pm 7.5\text{cm}$  for US, UK, France (available Bandwidth 100MHz)
- » Detection range configurable
- » Robust metal housing designed for outdoor use



## DESCRIPTION

K-Band distance measurement system with intelligent  $\mu\text{C}$  decision unit. The system is based on modern MMIC technology, therefore best measurement stability over temperature and aging is given. Depending on the available bandwidth the system can detect stationary objects in a distance between 1.1m (3.6ft) / 2.7m (8.9ft) to 35m (115ft) (depending on the RCS of the object). The sensor provides 3 programmable output pins that offers a wide area of individual configurations, to be sure that the sensor fits to your individual requirements. The programming can be easily done by a GUI (Graphical User Interface).

## 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. More information on our quality standards:

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

## RoHS-INFO

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

## CONFIDENTIAL AND PROPRIETARY

The information contained in this document shall remain the sole and exclusive property of InnoSenT GmbH and shall not be disclosed by the recipient to third parties without prior consent of InnoSenT in writing.

## PARAMETERS

The iSYS-4004 consists of a 24GHz MMIC based Radarfrontend (RFE) with DSP-Board for measuring the distance to stationary objects. Due to the used MMIC technology there is nearly no influence on measurement accuracy over temperature and aging. The sensor offers 3 outputs that can be configured within the specified ranges:

distance area (EU):	1.1....35m	(reachable distance depending on RCS of detected object)
distance area (US, UK, F):	2.7....35m	(reachable distance depending on RCS of detected object)

The communication is be done by RS232 interface in case of PWM output signals or as digital output (open drain). The configuration of the sensor can be done by an GUI.

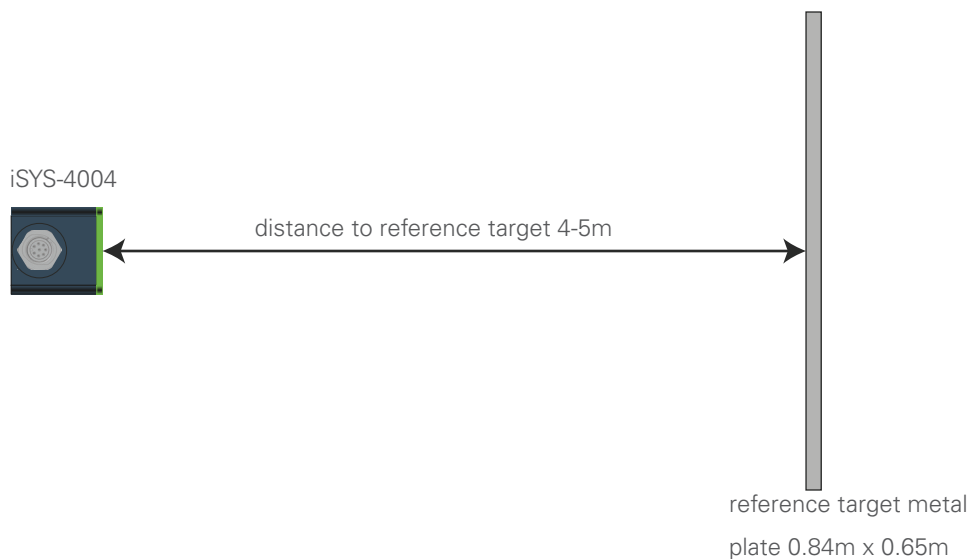
PARAMETER	CONDITIONS	SYMBOL	MIN	TYP	MAX	UNITS
<b>Radar</b>						
transmit frequency		f	24.000		24.250	GHz
occupied bandwidth	EU-version	B <sub>EU</sub>			250	MHz
	US/UK/France - version	B <sub>US</sub>			100	MHz
output power (EIRP)	@ 25°C	P <sub>out</sub>			20	dBm
<b>Sensor</b>						
detection distance	EU-version	d <sub>r,EU</sub>	1.1		35	m
	US/UK/F - version	d <sub>r,US</sub>	2.7		35	m
accuracy @ 250MHz band-width	compare test conditions on page 3	A <sub>EU</sub>		±3		cm
accuracy @ 100MHz bandwidth		A <sub>US</sub>		±7.5		cm
update rate				75		ms
resolution	@ 250MHz	r <sub>EU</sub>			60	cm
	@ 100MHz	r <sub>US</sub>			150	cm
standard detection field	compare with plot on page 4	horizontal		34		°
		vertical		49		°
<b>Power supply</b>						
supply voltage		V <sub>CC</sub>	10		30	V
supply current	@ 12V without digital out current	I <sub>CC,12V</sub>		135	150	mA
supply current	@ 24V without digital out current	I <sub>CC,24V</sub>		76	85	mA
<b>Digital Output Current</b>						
OUT1	open drain	I <sub>Out</sub>			-400	mA
OUT2	open drain	I <sub>Out</sub>			-400	mA
OUT3	open drain	I <sub>Out</sub>			-400	mA
digital total current		I <sub>Out</sub>			-800	mA
<b>Environment</b>						
operating temperature		T <sub>OP</sub>	-25		+60	°C
storage temperature		T <sub>STG</sub>	-25		+60	°C
<b>Mechanical Outlines</b>						
outline dimensions	compare to schematic on page 5	height length width	43.4 75.6 40.0			mm

### CONFIDENTIAL AND PROPRIETARY

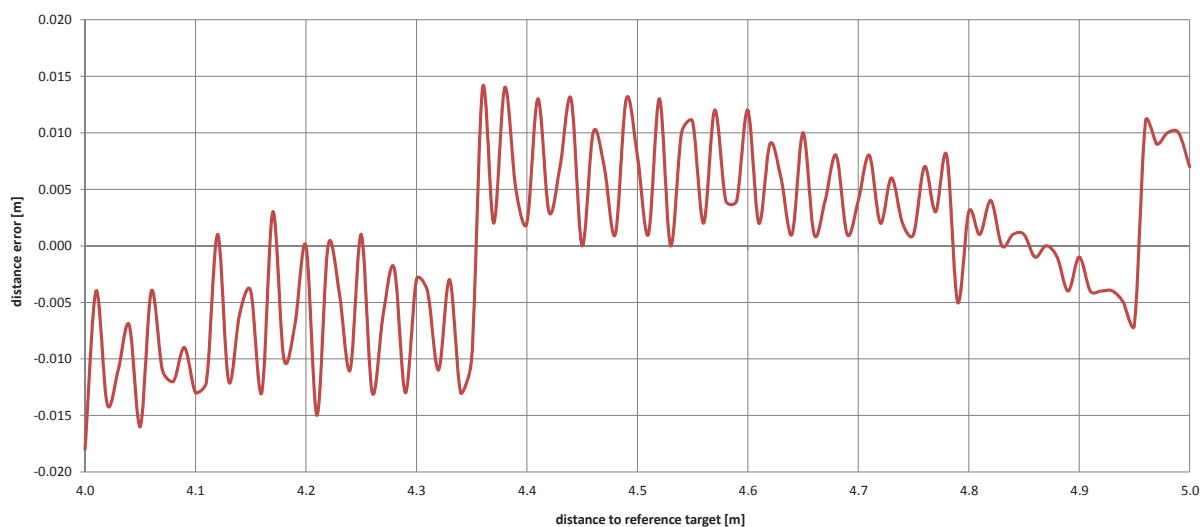
The information contained in this document shall remain the sole and exclusive property of InnoSenT GmbH and shall not be disclosed by the recipient to third parties without prior consent of InnoSenT in writing.

## TEST CONDITIONS FOR DISTANCE MEASUREMENT

To verify the accuracy of the iSYS-4004 the following test condition apply:



Measurement results (Bandwidth: 250MHz):

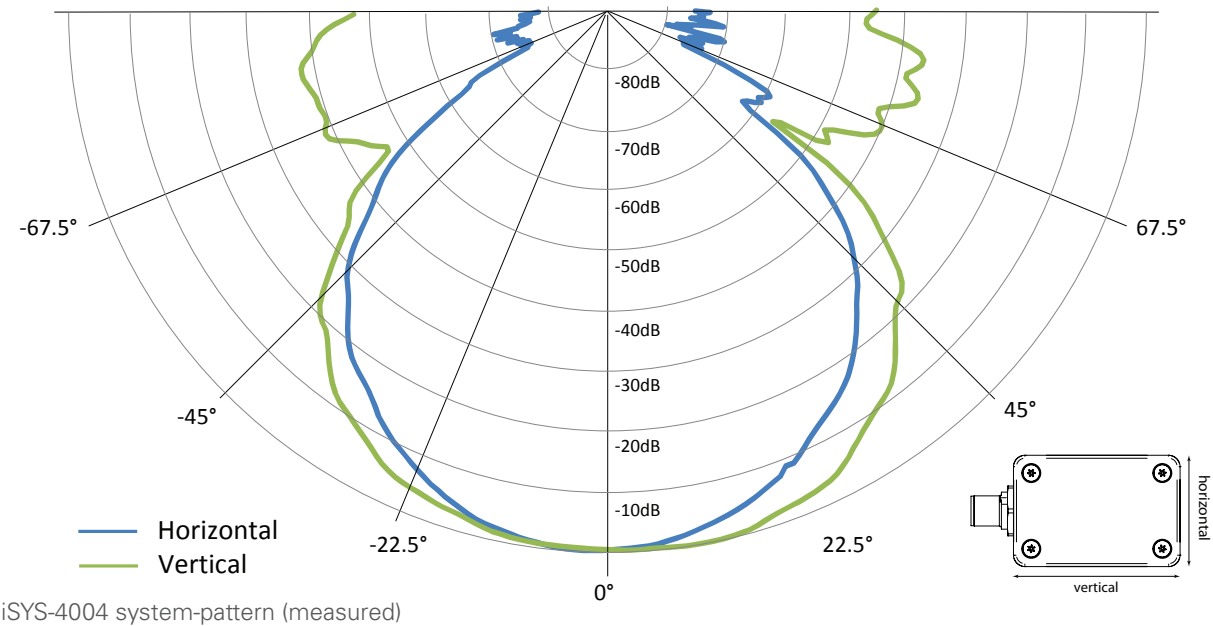


## CONFIDENTIAL AND PROPRIETARY

The information contained in this document shall remain the sole and exclusive property of InnoSenT GmbH and shall not be disclosed by the recipient to third parties without prior consent of InnoSenT in writing.

# DETECTION FIELDS

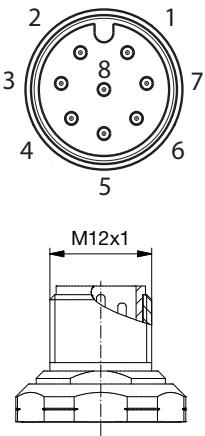
Something about detection fields: Providing the width of the antenna in degrees just says, that the transmitted or received energy has dropped at this point down to 50 percent of the maximum value (3dB - beam width). It does definitely not mean that beyond that point no transmission or reception is possible anymore. An object for instance with huge radar cross section (truck, metallic door) might very well compensate the loss of the antenna pattern and provide a significant radar signal. Due to this fact the detection range of the sensor can vary depending on the RCS (radar cross section) of the detected object. The shown schematics below are theoretical detection fields for a person (typ. RCS 0.5 - 1 m<sup>2</sup> @24GHz) walking towards the sensor and should only be a guidance for first installations.



# INTERFACE

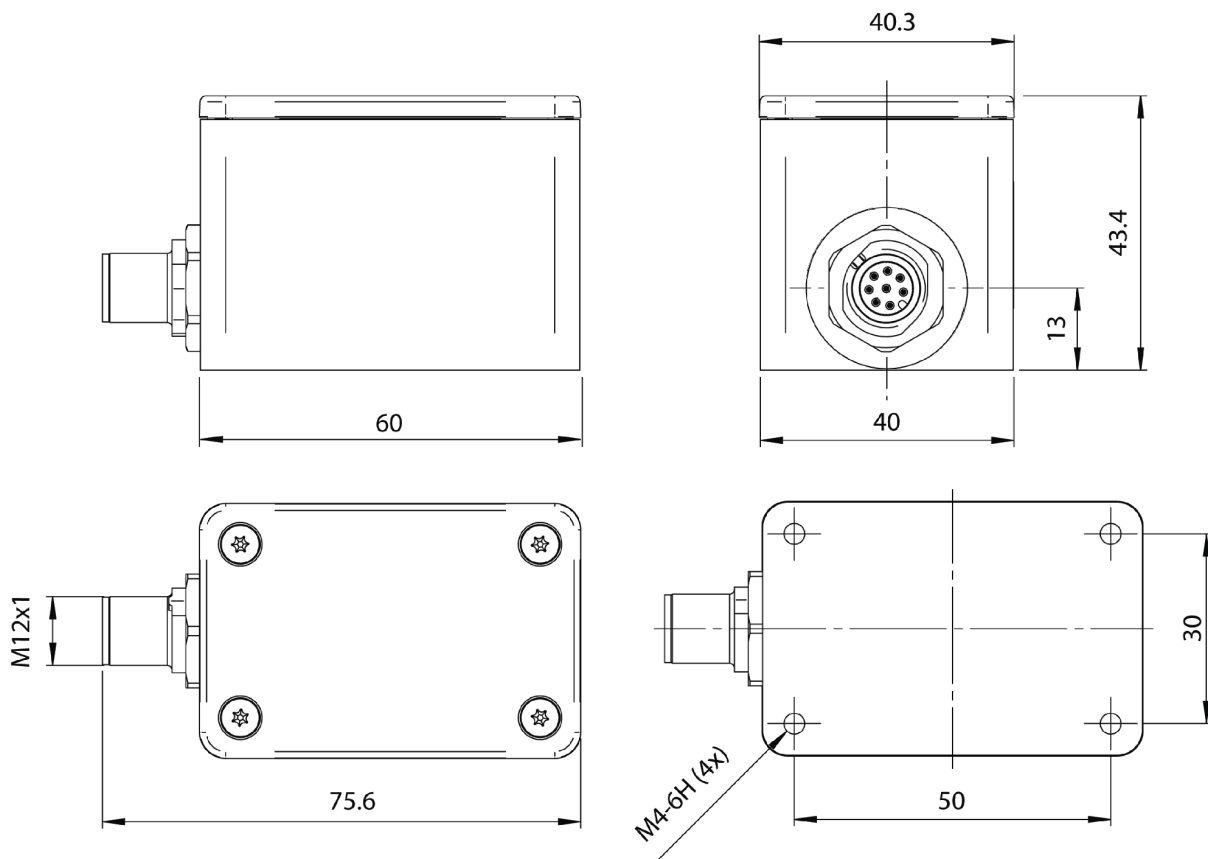
The sensor provides an M12x8 Conec type SAL - 12 - FSH8 - P5,5 - 9 (PN: 43-01071) with SAL - 12 - FKH8 - P5,5 - 9 PLUG (PN: 43-01063).

PIN #	DESCRIPTION	IN / OUT	COMMENT
1	OUT1	output	open drain
2	OUT2	output	open drain
3	OUT3	output	open drain
4	Boot Mode	input	do not connect in operation
5	VCC	input	supply voltage (DC 10...30V)
6	GND	input	
7	RS232_Rx	input	
8	RS232_Tx	output	



## MECHANICAL OUTLINES

For mounting the module we recommend to use standard M4 screws.

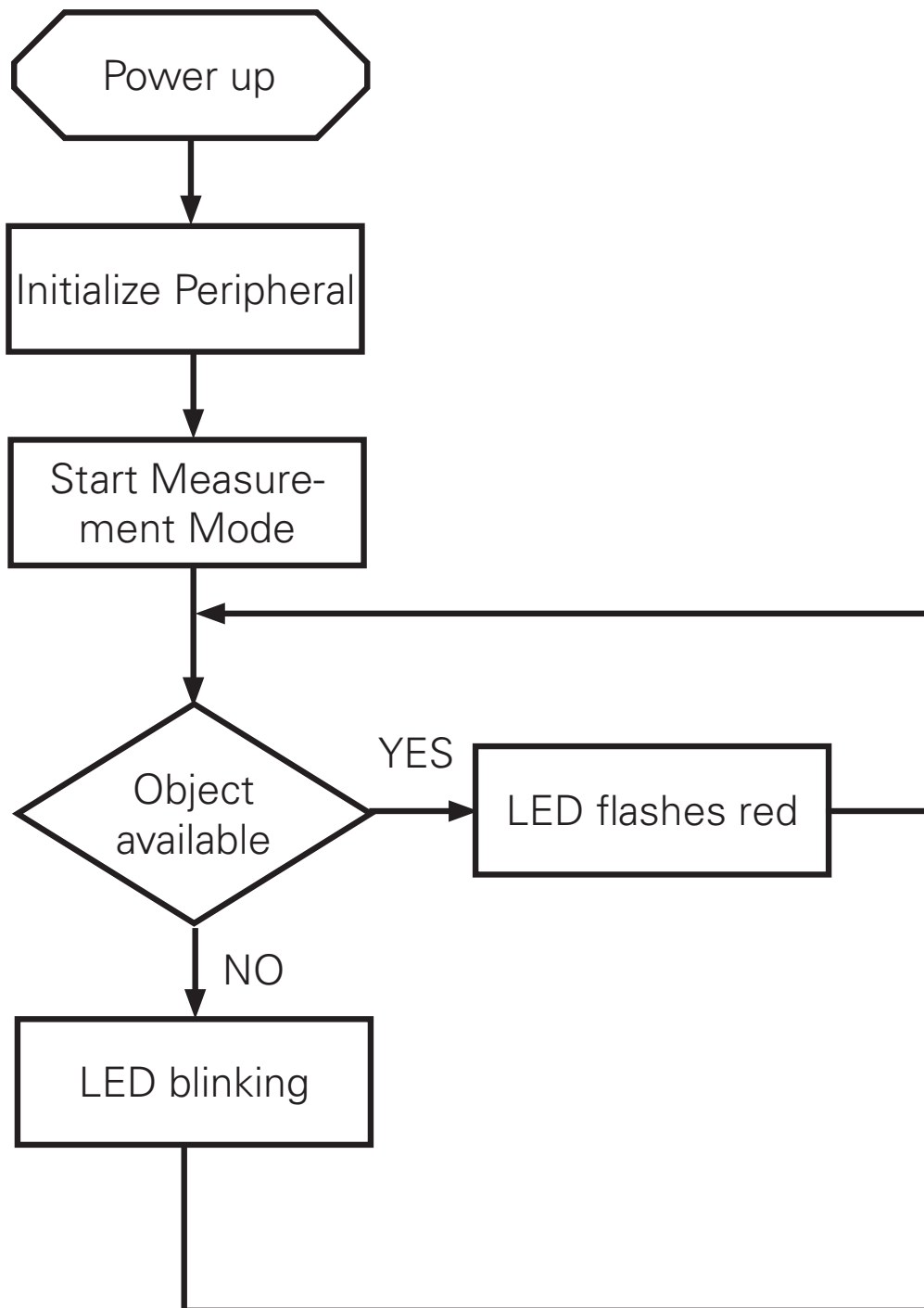


### CONFIDENTIAL AND PROPRIETARY

The information contained in this document shall remain the sole and exclusive property of InnoSenT GmbH and shall not be disclosed by the recipient to third parties without prior consent of InnoSenT in writing.

## START-UP SEQUENCE

The integrated LED indicates the status of the sensor on power up.

**CONFIDENTIAL AND PROPRIETARY**

The information contained in this document shall remain the sole and exclusive property of InnoSenT GmbH and shall not be disclosed by the recipient to third parties without prior consent of InnoSenT in writing.

## QUICK-START-GUIDE

For an easy start with the iSYS-4004 a quick-start-guide is available at [www.innosent.de](http://www.innosent.de)



## GUI - Graphical User Interface

The iSYS-4004 can be configured by using the corresponding GUI. The actual Software can be downloaded under [www.innosent.de](http://www.innosent.de).



## 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
0.9	14.10.2013	preliminary release
1.0	14.11.2013	initial release
1.1	25.04.2014	measuring distance
1.2	27.11.2014	changes in RoHS-Info
1.3	03.03.2015	changes in supply current
1.4	12.03.2015	changes in digital current
1.5	19.07.2016	outputs changed to open drain; adding start-up sequence
1.6	20.07.2020	new layout

## InnoSent GmbH

Am Rödertor 30  
97499 Donnersdorf  
GERMANY

Tel.: +49 (0)9528 - 9518 - 0  
E-Mail: [info@innosent.de](mailto:info@innosent.de)  
URL: [www.innosent.de](http://www.innosent.de)