

# User Manual IPS-280 (UXS-IPS280)

Version 1.7—29.03.2022

## PRODUCT FAMILY

K-Band Transceiver

## APPLICATIONS

- Traffic Monitoring
- Industrial Applications

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

## FEATURES:

- Radar-based speed & motion sensor
- Advanced MMIC Technology
- Integrated Low Noise Amplifier
- Extended temperature range from – 40 °C up to + 85 °C
- Shutdown feature for low power operation



## DESCRIPTION

High sensitivity K-Band CW Doppler Radar with adjustable frequency and I Q- outputs.

The shutdown option can be used for intermittent operation in battery powered applications.

### ETSI / FCC

The IPS-280 module is compliant to ETSi 300 440 and FCC 15.245.

## 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).

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## APPLICATION INFORMATION

The IPS-280 is typically centred in the US Band 24.075...24.175. By adding a resistor (20k...30k $\Omega$ ) between 'R\_tune' and GND the transmit frequency can be tuned to a higher value, e.g. 24.150...24.250GHz.

The frequency can be monitored @ Pin 'DIV\_OUT' (frequency divider ratio 1 : 8192).

## ELECTRICAL CHARACTERISTICS

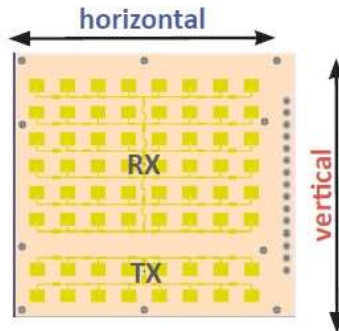
PARAMETER	CONDITIONS	SYMBOL	MIN	TYP	MAX	UNITS
<b>Radar</b>						
Transmit frequencies		f	24.075		24.175	GHz
Output power (EIRP)		P <sub>out</sub>			20	dBm
IF output DC-Offset		U <sub>DC-offset</sub>	1.4	1.8	2.2	V
IF-Bandwidth (-3dB)		B	0		1M	Hz
Signal level	(RCS = 10 m <sup>2</sup> @ 50 m)	IF <sub>IQ</sub>		0.25		mV (rms)
Noise level	100Hz...1kHz	N <sub>1/2</sub>		15		$\mu$ V (rms)
Quadrat. Phase imbalance		$\epsilon_p$	-25		25	°
Overall gain	Conversion gain + antenna gain	G <sub>OA</sub>		52		dB
<b>Divider</b>						
Divider ratio				8192		
Divider output voltage	Term with 50 $\Omega$			120		mV
<b>Power supply</b>						
supply voltage	transceiver	V <sub>cc</sub>	3.2	3.3	3.4	V
	divider	V <sub>CC_DIV</sub>	3.2	3.3	3.4	V
supply current	transceiver	I <sub>cc</sub>		53	65	mA
	divider	I <sub>CC_DIV</sub>		20		mA
<b>Environment</b>						
operating temperature		T <sub>OP</sub>	- 40		+ 85	°C
storage temperature		T <sub>STG</sub>	- 40		+ 85	°C
<b>Mechanical Outlines</b>						
outline dimensions	see drawing on page 5	Hight Length Width		10.2 70 65.8		mm

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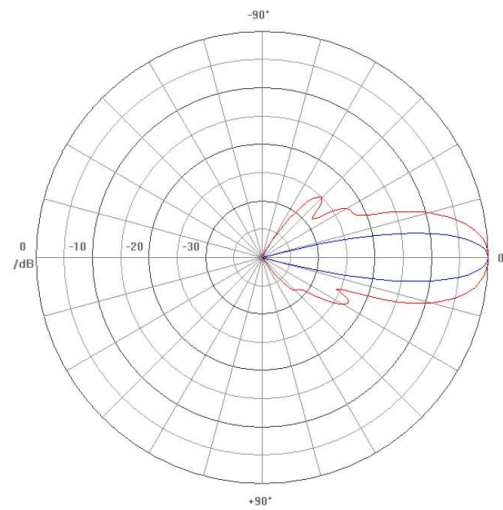
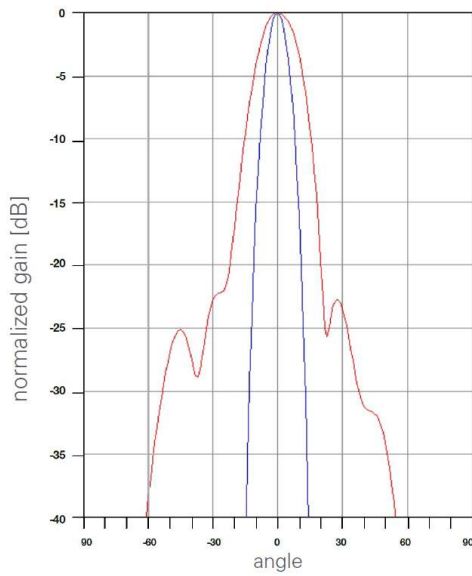
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### SIMULATED ANTENNA PATTERN

Antenna Orientation:



System Pattern (without radome)



PARAMETER	CONDITIONS	SYMBOL	MIN	TYP	MAX	UNITS
System beam width @ -3dB		horizontal		9		°
		vertical		18		°

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## INTERFACE

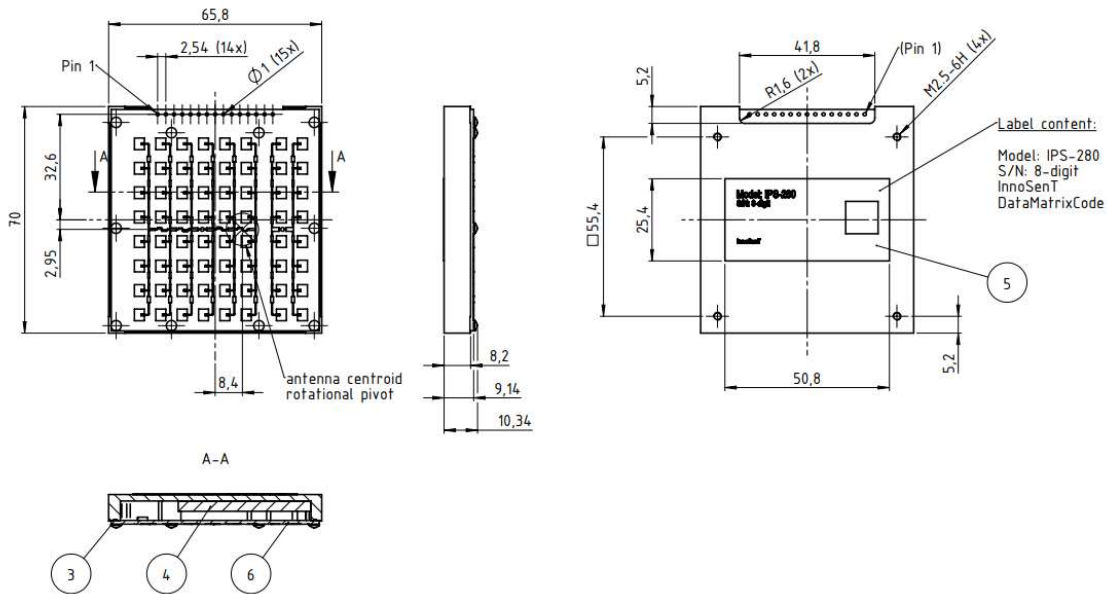
The sensor provides a 2.54 mm hole grid

PIN #	DESCRIPTION	IN/OUT	COMMENT
1	GND	Input	Analog ground
2	R_Tune		Frequency tuning by adding a resistor to GND
3	D.n.c.		Do not connect
4	VP	D.n.c.	Test output, do not connect
5	Enable	Input	Active low, enables power supply
6	V <sub>cc</sub>	Input	Supply voltage 3.3 V
7	VCCP	D.n.c.	Test output, do not connect
8	VCC_DIV	Input	Divider supply voltage (optional) 3.3 V
9	TX_ON	Input	Active high, enables transmit power
10	GND	Input	Analog ground
11	Q	Output	Analog output quad phase
12	I	Output	Analog output in phase
13	GND	Input	Analog ground
14	DIV_OUT	Output	Divider signal / 1:8192
15	GND	Input	Analog ground

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## MECHANICAL DRAWING



### 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](http://www.ero.dk)

Frequency Bands in US FCC 15.245

For the US-market the IPS-280 can be used

24.075 ... 24.175 GHz US-frequency bandwidth.

### FCC approval

This device complies with Part 15 of the FCC Rules. 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 IPS-280 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-IPS280“.

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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.

## 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.

The sensor uses Hydrocarbon based material which may change its dielectric properties when used in an oxidative environment. This may vary based on temperature. Therefore InnoSenT recommends evaluating this influence within the specific environment.

VERSION	DATE	COMMENT
1.0	03.05.2016	initial issue
1.1	06.06.2016	changing antenna position / interface
1.2	16.09.2016	changing in signal level, overall gain, interface and product picture
1.3	13.02.2017	changing in mechanical
1.4	08.03.2019	transfer to publisher, add FCC-ID
1.5	26.05.2021	changing in mechanical
1.6	13.07.2021	changing in signal level, noise level and overall gain
1.7	29.03.2022	changing in electrical characteristics and interface

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