InnoSenT
Innovative Sensor Technology

Data Sheet IPM-165

Version 8.5 - 02.04.2014

designed and manufactured in Germany

PRODUCT FAMILY

Low Cost K-Band Transceiver

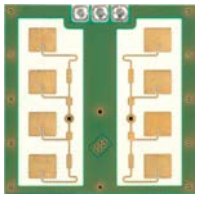
- Movement
- Velocity
- Direction
- Presence
- Distance
- Angle

APPLICATIONS

- Security applications
- Door openers
- Industrial applications

FEATURES:

» radar-based motion detector working in the 24GHz - ISM - Band
» available in different frequency ranges for worldwide use
» advanced LCO-oscillator with low current consumption
» split transmit and receive path for maximum gain
» very compact outline dimensions



DESCRIPTION

The IPM-165 is a 24GHz Doppler module with an asymmetrical wide beam for detection of moving objects.
Low power consumption components are quickly enabled supporting duty cycles for battery or solar panel operation.

Certified and approved according to

- ETSI EN 300 440
- FCC part 15.245 (UXS-IPM165)
- IC RSS210 Issue 7 (6902A-IPM165)

ADDITIONAL INFORMATION

InnoSenT Standard Product. Changes will not be notified as long as there is no influence on form, fit and within this datasheet 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.

RoHS-INFO

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

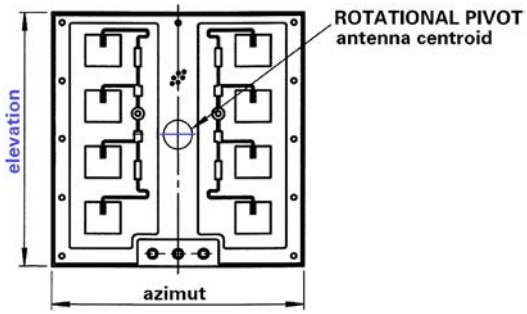
ELECTRICAL CHARACTERISTICS

PARAMETER	CONDITIONS	SYMBOL	MIN	TYP	MAX	UNITS
Oscillator						
transmit frequency[1]	@ 25°C	$f_{standard}$	24.050		24.250	GHz
	US-frequency band @ 25°C	f_F	24.075		24.175	GHz
	UK-frequency band @ 25°C	f_{UK}	24.150		24.250	GHz
output power		P_{out}		16	20	dBm
temperature drift		Δf		-1		MHz/°C
Receiver						
IF-output		voltage offset	-300		300	mV
Signal level[2]		category A	563		855	mV_{P-P}
		category B	856		1177	mV_{P-P}
		category C	1178		1819	mV_{P-P}
Noise level[2]		R			116	mV
Power supply						
supply voltage		V_{CC}	4.75	5.00	5.25	V
supply current		I_{CC}	18	30	40	mA
Environment						
operating temperature		T_{OP}	-20		+60	°C
storage temperature		$T_{storage}$	-20		+60	°C
Mechanical Outlines						
outline dimensions		length width height		25 25 7 (12.7)		mm

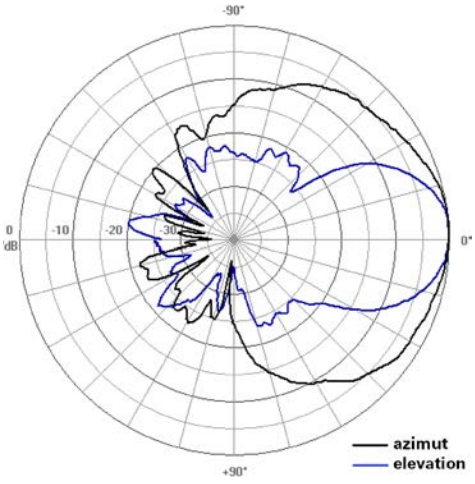
[1] Details to the frequency bands you can find in Annex A

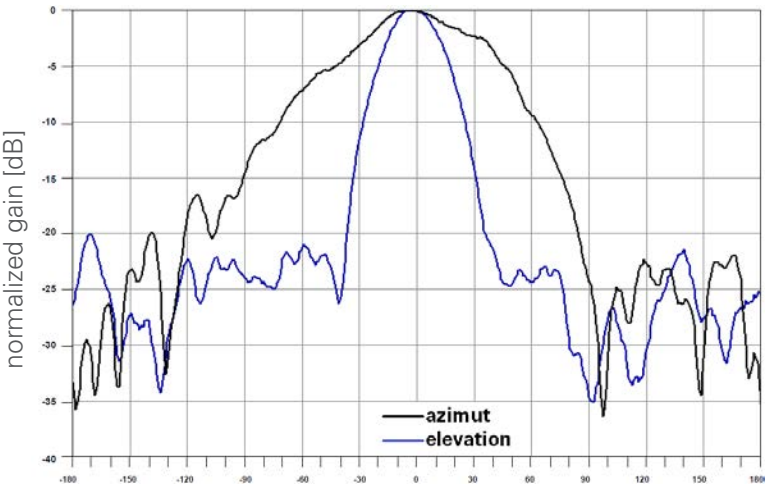
[2] Relative output signal level and noise is measured at room temperature in a dedicated InnoSenT test setup

ANTENNA ORIENTATION:



TX / RX-ANTENNA PATTERN:





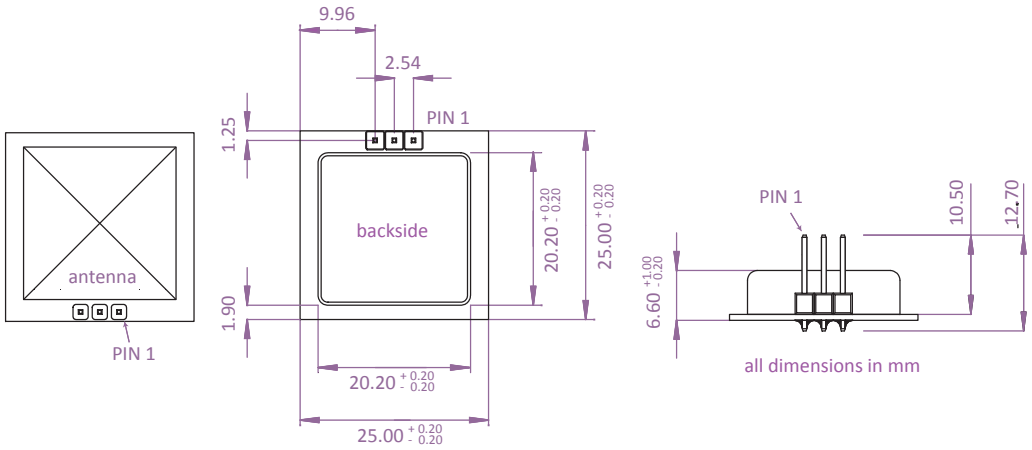
PARAMETER	CONDITIONS	SYMBOL	MIN	TYP	MAX	UNITS
TX-antenna pattern / RX-antenna pattern						
Tx antenna pattern (3dB width)	horizontal	azimuth		80		°
	vertical	elevation		35		°
side-lobe suppression	horizontal	azimuth		12		dB
	vertical	elevation		13		dB
squinting angle				0		°
Antenna gain				9.5		dBi

INTERFACE

The sensor provides a 2.54mm grid, single row pin header (square pin 0.635mm)

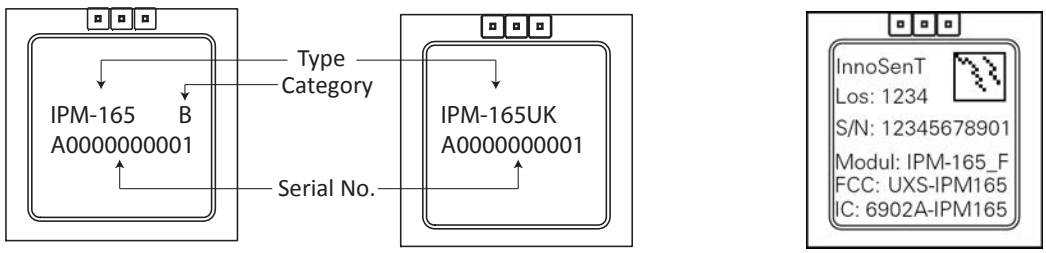
PIN #	DESCRIPTION	IN / OUT	COMMENT
1	V_{CC}	input	supply voltage (4.75 - 5.25V)
2	IF1	output	signal I(nphase)
3	GND	input	analog ground

MECHANICAL OUTLINES



top view **bottom view** **side view**

Labeling



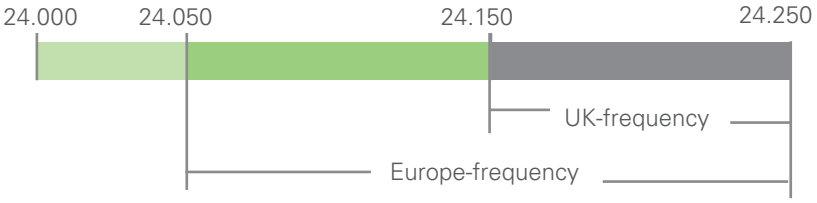
IPM-165 **IPM-165_UK** **IPM-165_F**

Annex A

The IPM-165 is available in different frequency ranges for worldwide use. Depending on the country in which the product is intended to be used, different frequency ranges can be ordered at InnoSenT.
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

Frequency Bands in Europe

Generally the IPM-165 standard version can be used for all countries in Europe except for the UK. For the UK market you have to order the IPM-165_UK modules to be conform with the regulations of the UK-Approval-Agency.



Frequency Bands in US

For the US-market the IPM-165_F version has to be used!

InnoSenT has a limited modular approval for the IPM-165_F with the following grant: UXS1

FCC approval
This device complies with Part 15 of the FCC Rules and with RSS-210 of Industry Canada.
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 IPM-165 modules are authorized to use the FCC Grants and IC Certificates of the IPM-165 modules 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-IPM165F" and „Contains IC: 6902A-IPM165".

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. 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
8.2	06.03.2013	new layout
8.3	24.10.2013	FCC ID updated
8.4	06.12.2013	Max. output power added + Min. supply current added + modified format
8.5	02.04.2014	Antenna orientation + system pattern

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