

# Data Sheet IPM-165

Version 8.4 - 06.12.2013

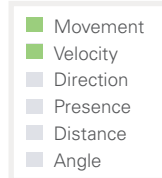
designed and manufactured in Germany

## PRODUCT FAMILY

Low Cost K-Band Transceiver

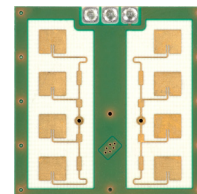
## APPLICATIONS

- 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).

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### ESD Info

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.

### ELECTRICAL CHARACTERISTICS

PARAMETER	CONDITIONS	SYMBOL	MIN	TYP	MAX	UNITS
<b>Oscillator</b>						
transmit frequency <sup>1</sup>	@ 25°C	$f_{\text{standard}}$	24.050		24.250	GHz
	US-frequency band @ 25°C	$f_{\text{F}}$	24.075		24.175	GHz
	UK-frequency band @ 25°C	$f_{\text{UK}}$	24.150		24.250	GHz
output power		$P_{\text{out}}$		16	20	dBm
temperature drift		$\Delta f$		-1		MHz/°C
<b>Receiver</b>						
IF-output		voltage offset	-300		300	mV
Signal level <sup>2</sup>		category A	563		855	mV <sub>p-p</sub>
		category B	856		1177	mV <sub>p-p</sub>
		category C	1178		1819	mV <sub>p-p</sub>
Noise level <sup>2</sup>		R			116	mV
<b>Antenna Pattern</b>						
full beam width @ -3dB	azimuth	horizontal		80		°
	elevation	vertical		35		°
side-lobe suppression	azimuth	horizontal		12		dB
	elevation	vertical		13		dB
Antenna gain				9.5		dBi
<b>Power supply</b>						
supply voltage		$V_{\text{CC}}$	4.75	5.00	5.25	V
supply current		$I_{\text{CC}}$	18	30	40	mA
<b>Environment</b>						
operating temperature		$T_{\text{OP}}$	-20		+60	°C
storage temperature		$T_{\text{storage}}$	-20		+60	°C
<b>Mechanical Outlines</b>						
outline dimensions		height length width		25 25 7 (12.7)		mm

<sup>1</sup> Details to the frequency bands you can find in Annex A

<sup>2</sup> Relative output signal level and noise is measured at room temperature in a dedicated InnoSenT test setup

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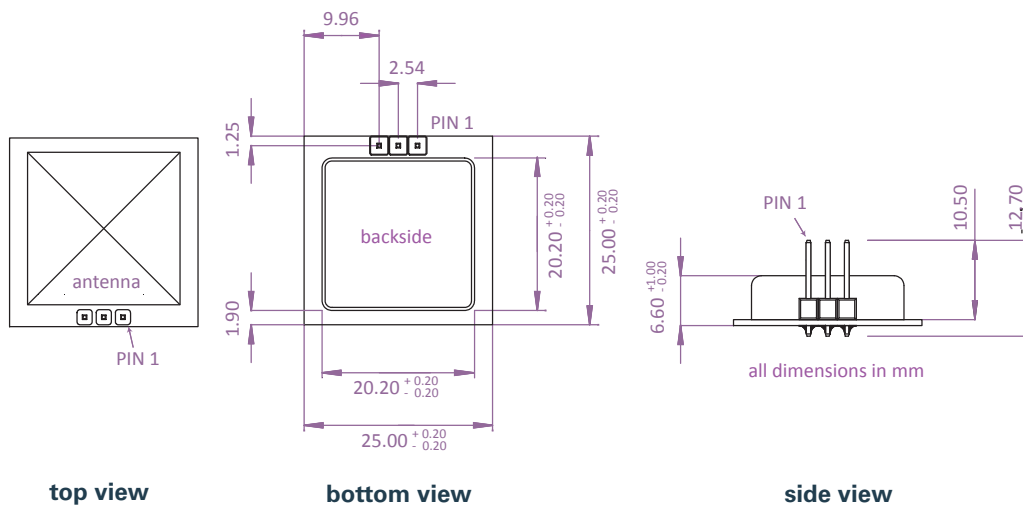
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### INTERFACE

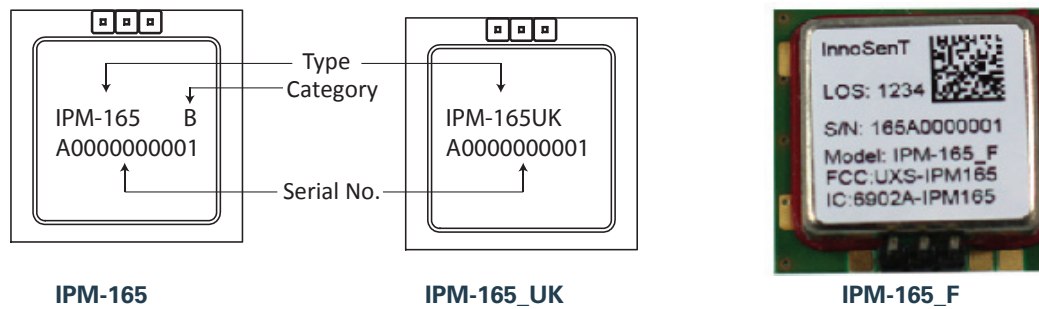
The sensor provides a 2.54mm grid, single row pin header (square pin  $\square 0.635\text{mm}$ )

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

### MECHANICAL OUTLINES



### Labeling



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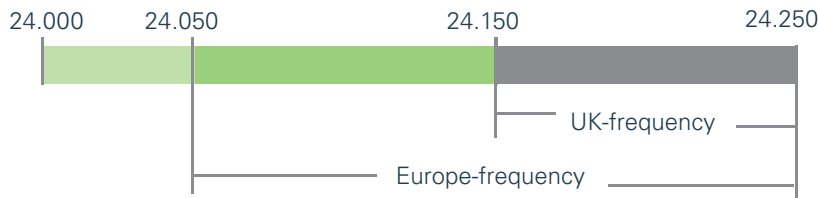
## Annex A

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

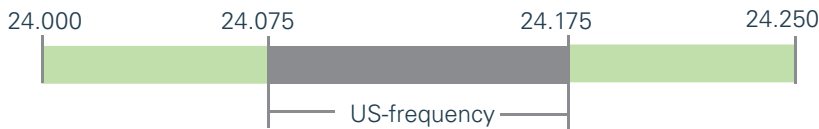
### Frequency Bands in Europe

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“.

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### 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