InnoSenT
Innovative Sensor Technology

USER MANUAL IPM-165_F

Version 8.3 - 24.10.2013

designed and manufactured in Germany

PRODUCT FAMILY

Low Cost K-Band Transceiver

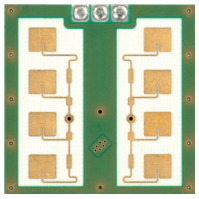
- Movement
- Velocity
- Direction
- Presence
- Distance
- Angle

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

CERTIFICATES

InnoSenT GmbH has established and applies a quality system for: development, production and sales of radar sensors for industrial and automotive sensors.

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.

RoHS-INFO

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

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
Oscillator						
transmit frequency[1]	US-frequency band@ 25°C	f_F	24.075		24.175	GHz
output power		P_{out}		16		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
Antenna Pattern						
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
Power supply						
supply voltage		V_{CC}	4.75	5.00	5.25	V
supply current		I_{CC}		30	40	mA
Environment						
operating temperature		T_{OP}	-20		+60	°C
storage temperature		$T_{storage}$	-20		+60	°C
Mechanical Outlines						
outline dimensions		height length width		25 25 7 (12.7)		mm

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

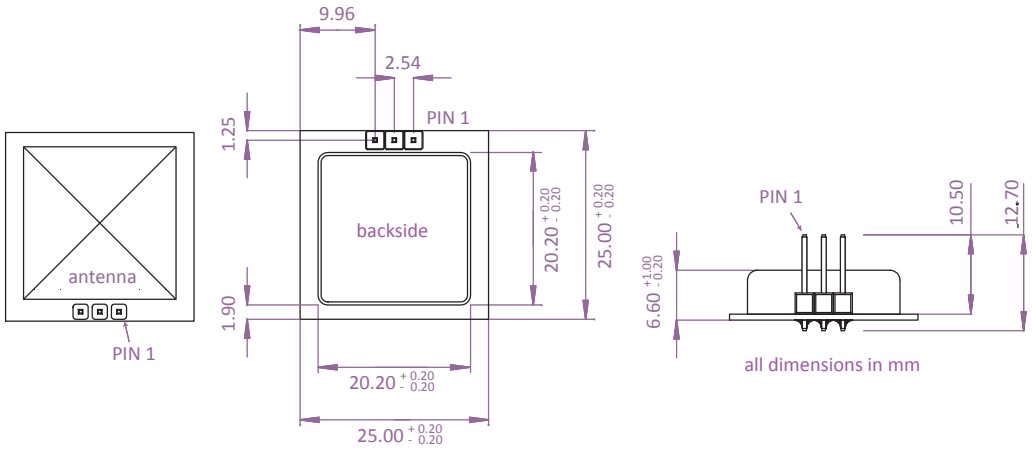
[2] Relative output signal level and noise is measured at room temperature in a dedicated InnoSenT test setup

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**

NOTICE:
This device complies with Part 15 of the FCC Rules [and with Industry Canada licence-exempt RSS standard(s)]. 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.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes:
(1) l'appareil ne doit pas produire de brouillage, et
(2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

NOTICE:
Changes or modifications made to this equipment not expressly approved by (manufacturer name) may void the FCC authorization to operate this equipment.
Text for User Manual (blue cursive text)
For a Class A digital device or peripheral, the instructions furnished the user shall include the following or similar statement, placed in a prominent location in the text of the manual:

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

FCC approval

Changes or modifications made to the equipment not expressly approved by InnoSenT GmbH may void the FCC / IC authorization to operate this equipment.

The use of the transceiver module is authorized in mobile or fixed host devices taking into account the conditions listed below:

• OEM Integrator must ensure that the end user manual may not contain any information about the way to install or remove the module from the final product.

• Depending on the final host device additional authorization requirements for the non-transmitter functions of the transmitter module may be required (i.e., Verification, or Declaration of Conformity) The OEM integrator is responsible for ensuring that after the module is installed and operational the host continues to be compliant with the Part 15B unintentional radiator requirements.

• The information on the label and in the user manual is required to be incorporated in the user manual of the final host. see 47 CFR15 requirements for more details (e.g. 15.19 / 15.21 / 15.101 / 15.105 / RSS-GEN / ICES)

• Additional label with the words 'Contains FCC ID: UXS-IPM165' and 'Contains IC: 6902A-IPM165' shall be applied and visible from the outside of the host product.

• The module must be installed and used in strict accordance with the manufacturer's instructions as described in the user documentation that comes with the module.

• The end user manual for the final host product operating with this transmitter must include operating instructions to satisfy RF exposure compliance requirements.
e.g

Radiofrequency radiation exposure Information:
This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance of 20 cm between the radiator and your body.
This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

• The antenna of the module may not be removed, replaced nor modified. The antenna must not be co-located or operating in conjunction with any other antenna or transmitter. No additional antenna must be used.

• When the final host product operating with this transmitter deviate from above, installation of this module into specific final hosts may require the submission of a Class II permissive change application containing data pertinent to RF Exposure, spurious emissions, ERP/EIRP, and host/module authentication, or new application if appropriate.

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