# User Manual
Product Family: K-Band Transceivers

**K-Band Transceiver
with two integrated patch antennas
IPM-165 (and variants IPM-165_UK / IPM-165_F)**

Description:

- radar-based motion detector
- available in different frequency ranges:
  Standard; _F and _UK variants
- Standard version selected by signal level
- advanced PHEMT-oscillator with low current consumption
- split transmit and receive path for maximum gain
- mono (single channel) operation
- very small outline dimensions
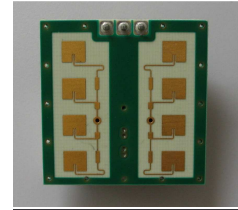
Environmental Tests and Handling Precautions:

- 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.
- Applying multimeters e.g. for resistance measurement between any of the connector pins may cause damage to the module.

Absolute Maximum Ratings:

| Parameter	Symbol	Rating	Units
supply voltage	V_{CC}	5.25	V
operating temperature (out of spec)	T_{OP}	- 40 / + 85	℃
storage temperature	T_{STG}	+ 90	℃

Electrical Characteristics:

Parameter	Symbol	min.	typ.	max.	units	comment
transmit frequency	$f_{Standard}$	24.000	24.125	24.250	GHz	
	$f_{IPM-165\_UK}$	24.150	24.200	24.250	GHz	
	$f_{IPM-165\_F}$	24.075	24.125	24.175	GHz	
output power (EIRP)	P_{out}		16		dBm	
temperature drift	Δf		- 1		MHz/℃	
antenna pattern Tx (3dB)	horizontal		80		°	azimuth
	vertical		32		°	elevation
side lobe suppression	horizontal		13		dB	azimuth
	vertical		13		dB	elevation
IF output	voltage offset	-300		300	mV	
signal level*	category A (low)	263		399	mV_{P-P}	
	category B or E (medium)	400		549	mV_{P-P}	
	category C(high)	550		850	mV_{P-P}	
supply voltage	V_{CC}	4.75	5.0	5.25	V	
supply current	I_{CC}		30	40	mA	
Pulse length	t_{pulse}		10		µs	
operating temperature	T_{OP}	- 20		+ 60	℃	
outline dimensions	~ 25 x 25 x 7 (12.7)				mm	compare drawing

*Relative output signal level/voltage measured at room temperature in a dedicated InnoSenT test setup.
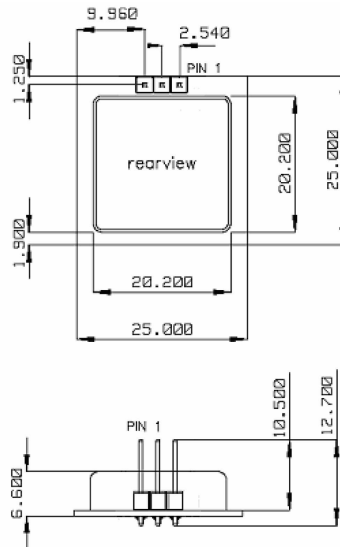
Interface:

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 (+5 V)
2	IF1	output	signal output
3	GND	input	analog ground
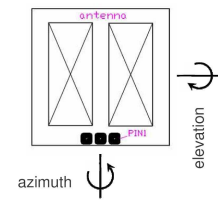
Mechanical Outlines:
(all dimensions in mm)

Approved pulsing conditions to fulfill the FCC requieremts:

- ASK modulation with 10kHz and 10% dutycycle (on-time 10µs min.)

- **Warning:** Any other pulsing condition with less than 10µs on-time may void the FCC authorization to operate this equipment.

Certification and environment protection:

InnoSenT GmbH has established and applies a quality system for: Development, production and sales of radar sensors for commercial and industrial sensors

An audit was performed, Report No. 010350 Proof has been furnished that the requirements according to DIN EN ISO 9001:2000 are fulfilled.

This InnoSenT product is compliant to the restriction of hazardous substances (RoHs – European Union directive 2002/95/EG).

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: 4012A-IPM165F".

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