

# User Manual IVS-362

Version 1.3 — 15.07.2022

## PRODUCT FAMILY

K-Band VCO Transceiver

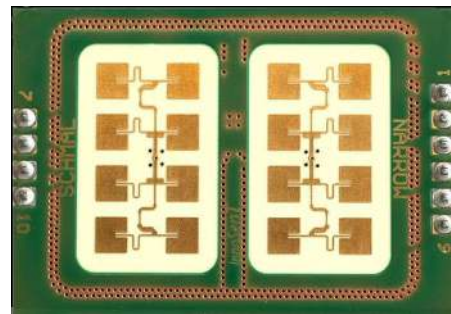
## APPLICATIONS

- Door Opener
- Industrial Applications

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

## FEATURES:

- VCO-Transceiver centered @ 24GHz
- FMCW/FSK capable; therefore enabling measurement of distance as well as recognition of stationary objects possible (depending on modulation)
- split transmit and receive path for maximum gain
- stereo (dual channel) operation for direction of motion detection
- IF-pre-amplifier, bandwidth limited for lowest noise performance
- compact outline dimensions



## DESCRIPTION

The IVS-362 is the FMCW/FSK-version of the IPS-354. The same outline dimensions as well as their identical antenna pattern make this product perfect for upgrading existing systems.

Certification possible on request.

## 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/>

## 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.

## RoHS-INFO

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

### CONFIDENTIAL AND PROPRIETARY

The information contained in this document shall remain the sole and exclusive property of InnoSenT GmbH and shall not be disclosed by the recipient to third parties without prior consent of InnoSenT in writing.

## ELECTRICAL CHARACTERISTICS

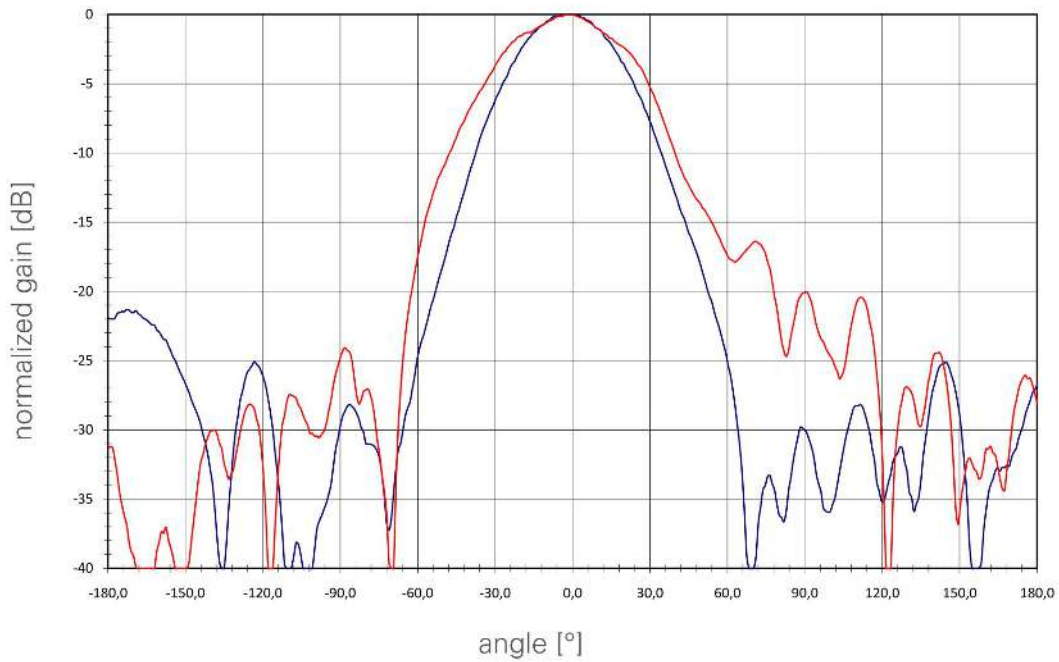
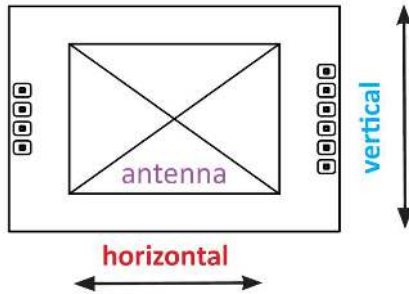
PARAMETER	CONDITIONS	SYMBOL	MIN	TYP	MAX	UNITS
<b>Transmitter</b>						
VCO frequency range	depending on $V_{\text{tune}}$	$f_{\text{VCO}}$	24.000		24.250	GHz
Tuning voltage	to cover VCO frequency range	$V_{\text{tune}}$	0.7		2.5	V
VCO tuning sensitivity	within VCO frequency range	$K_{\text{VCO}}$		720		MHz/V
Settling Time Pulsed Oscillator				10		$\mu\text{s}$
output power (EIRP)		$P_{\text{out}}$		12.7		dBm
<b>Receiver</b>						
IF output DC-offset		$IF_{1/2\_DC\text{-offset}}$		2.8		V
I/Q  balance amplitude			0		6	dB
phase			60	90	120	$^{\circ}$
signal level (RCS = $8.4 \cdot 10^{-4} \text{m}^2$ )		$IF_{1/2\_IVS-362}$		4.6		mV
noise level	100 Hz ... 1 kHz	$N_{1/2}$		33		$\mu\text{Vrms}$
<b>Frequency Divider</b>						
Prescaler divider ratio		$D_{\text{DIV}}$		8192		
Prescaler output voltage	Peak to peakvoltage Terminated with $50\Omega$ DDIV= 8192	$V_{\text{DIV}}$		190		mV
Prescaler supply voltage		$V_{\text{CC\_DIV}}$	3.2	3.3	3.4	V
Prescaler supply current		$I_{\text{CC\_DIV}}$	13	19	25	mA
Antenna System Pattern (compare with antenna plot on page 3) full beam width @ -3dB azimuth horizontal $45^{\circ}$ elevation vertical $38^{\circ}$ side-lobe suppression azimuth horizontal 15 dB elevation vertical 20 dB						
<b>Power supply</b>						
supply voltage		$V_{\text{CC}}$	4.25	5.0	5.75	V
supply current	IF-amp included	$I_{\text{CC}}$		48	60	mA
<b>Environment</b>						
operating temperature		$T_{\text{OP}}$	-30		+60	$^{\circ}\text{C}$
storage temperature		$T_{\text{STG}}$	-30		+60	$^{\circ}\text{C}$
<b>Mechanical Outlines</b>						
outline dimensions	compare drawing	Height Length Width		8.3 (19) 44.0 30.0		mm

CONFIDENTIAL AND PROPRIETARY

The information contained in this document shall remain the sole and exclusive property of InnoSenT GmbH and shall not be disclosed by the recipient to third parties without prior consent of InnoSenT in writing.

## ANTENNA PATTERN

Antenna Orientation:




PARAMETER	CONDITIONS	SYMBOL	MIN	TYP	MAX	UNITS
full beam width @-3 dB		horizontal		45		°
		vertical		38		°
side-lobe suppression		horizontal		15		dB
		vertical		20		dB

**CONFIDENTIAL AND PROPRIETARY**

The information contained in this document shall remain the sole and exclusive property of InnoSenT GmbH and shall not be disclosed by the recipient to third parties without prior consent of InnoSenT in writing.

## INTERFACE

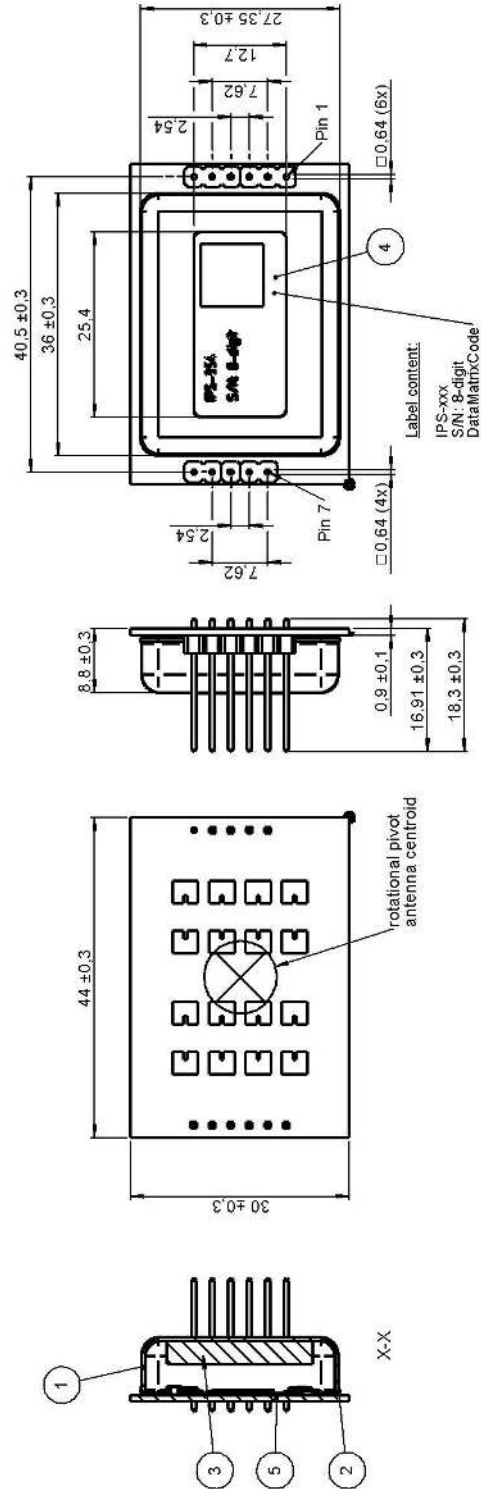
The sensor provides a 2.54 mm grid, single row pin header (square pin  0.635 mm).

PIN #	DESCRIPTI- ON	IN/OUT	COMMENT
1	$V_{\text{tune}}$	input	varactor tuning voltage
2	enable	input	active low, the enable pin is used to switch off the power supply of the VCO. enable on: 0—0.8 V eneble off: 2.8—3.3 V
3	$V_{\text{cc}}$	input	supply voltage (+ 5 V) +/- 15%
4	GND	input	analog ground
5	IF 1	output	signal I(nphase)
6	IF 2	output	signal Q(uadrature)
7	div_out	output	fequency divider output, divide by 8192
8	$V_{\text{CC\_DIV}}$	input	supply voltage of prescaler (3.3 V—3.4 V)
9	d.n.c.		do not connect
10	$V_{\text{CC\_PTAT}}$	input	must be connected to $V_{\text{CC\_DIV}}$ if the counter is used

### CONFIDENTIAL AND PROPRIETARY

The information contained in this document shall remain the sole and exclusive property of InnoSenT GmbH and shall not be disclosed by the recipient to third parties without prior consent of InnoSenT in writing.

MECHANICAL DRAWING



**CONFIDENTIAL AND PROPRIETARY**

The information contained in this document shall remain the sole and exclusive property of InnoSenT GmbH and shall not be disclosed by the recipient to third parties without prior consent of InnoSenT in writing.

## 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	05.12.2018	initial release
1.1	11.12.2019	user manual redesign, update machanical darwing
1.2	30.07.2020	new layout
1.3	15.07.2022	small changes in electrical characteristics

### InnoSenT GmbH

Am Roedertor 30	Tel.:	+49 (0) 9528-9518-0
97499 Donnersdorf	E-Mail:	info@innosent.de
GERMANY	URL:	www.innosent.de

### CONFIDENTIAL AND PROPRIETARY

The information contained in this document shall remain the sole and exclusive property of InnoSenT GmbH and shall not be disclosed by the recipient to third parties without prior consent of InnoSenT in writing.