

# User Manual IVS-234

Version 6.3 - 01.02.2018

## Product Family

PLL stabilized K-Band VCO Transceiver

## Applications

True Speed over Ground measurement

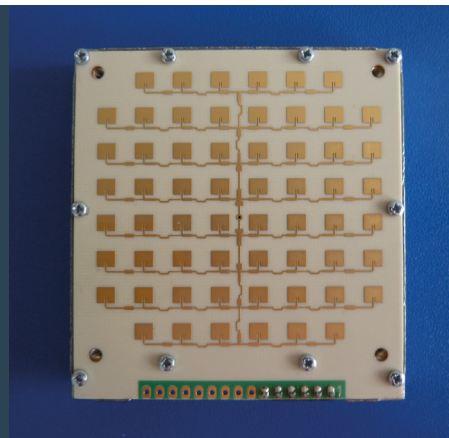
## Additional Information

Customer specific product for DEUTA-WERKE GmbH  
 DEUTA-WERKE GmbH has to be informed about all technical changes.

■	Movement
■	Velocity
■	Direction
■	Presence
■	Distance
■	Angle

### Features:

- » K-Band Transceiver
- » CW (continuous wave) mode
- » stereo (dual channel) operation for direction-of-motion identification
- » integrated PLL circuit for high frequency stability
- » programmable transmitter frequency
- » balanced mixer with reduced common mode noise for both channels (DOP and QDOP)



## Description

The IVS-234 is a MMIC based CW K-Band Transceiver with an integrated PLL-circuit for high frequency stability.

The PLL-circuit enables the customer to program its own transmit frequencies directly via SPI-Bus.

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



## Certificates

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



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## Electrical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Units	Comment
<b>Oscillator</b>						
transmit frequencies	$F_1$	24.008		24.243	GHz	can be adjusted by user <sup>(1)</sup>
temperature drift (frequency)	$ \Delta f $		10	30	kHz/°K	
output power (EIRP)	$P_{out}$		20		dBm	
<b>Receiver</b> (compare with amplifier circuit on page 4)						
IF-amplifier	bandwidth		10 - 1M		Hz	
	gain		46		dB	
I/Q balance	amplitude			6	dB	
	phase	70		110	°	reject criteria
<b>offset</b>						
reject criteria offset	$v_{offset_{I(DOP)}}$	-500		500	mV	@ InnoSenT test setup <sup>(2)</sup>
	$v_{offset_{Q(DOP)}}$	-500		500	mV	@ InnoSenT test setup <sup>(2)</sup>
<b>signal level</b>						
reject criteria signal level	$S_{I(DOP)}$	45	64	83	mV	@ InnoSenT test setup <sup>(2)</sup>
	$S_{Q(DOP)}$	45	64	83	mV	@ InnoSenT test setup <sup>(2)</sup>
<b>noise level</b>						
reject criteria noise level	$R_{I(DOP)}$	10		18	mV <sub>RMS</sub>	@ InnoSenT test setup <sup>(2)</sup>
	$R_{Q(DOP)}$	10		18	mV <sub>RMS</sub>	@ InnoSenT test setup <sup>(2)</sup>

<sup>(1)</sup> The user is responsible for the compliance of the transmit frequency!

<sup>(2)</sup> measured during end of line test according to InnoSenT instruction manual AA 7-7-29

<b>Power supply</b>						
supply voltage	$V_{cc}$	4.75		5.25	V	
	$V_{ss}$	-5.25		-4.75	V	
supply current	$I_{cc}$		150	200	mA	
	$I_{ss}$		20	50	mA	
refractory period <sup>(1)</sup>			1		s	
<b>Antenna pattern</b> (compare with antenna plot on page 4)						
full beamwidth @ -3dB	horizontal	11	13	15	°	
	vertical	11	13	15	°	
side-lobe suppression	horizontal	12			dB	
	vertical	12			dB	

<sup>(1)</sup> time between shut down and restart

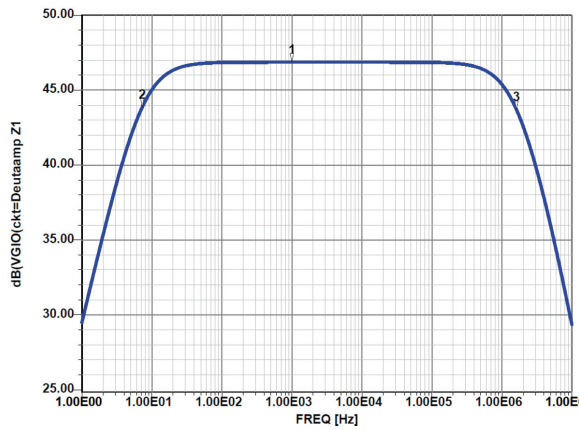
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## Electrical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Units	Comment
<b>Environment</b>						
operating temperature	T <sub>OP</sub>	-40		+80	°C	
storage temperature	T <sub>STG</sub>	-40		+85	°C	
outline dimensions	height		10.5 (11.8)		mm	tolerances according to DIN1687-4
	length		70.0			
	width		65.8			

## Bandwidth and Gain simulation

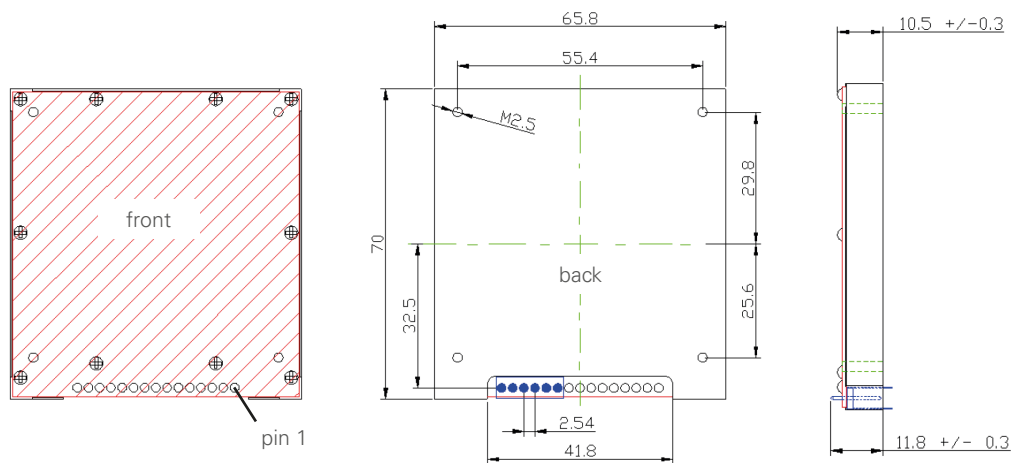


X1= 9.98E02Hz    X2= 7.28E00Hz    X3= 1.62E06Hz  
 Y1= 46.88        Y2= 43.89        Y3= 43.74

Gain	Bandwidth
46dB	10Hz - 1MHz

## Mechanical Outlines

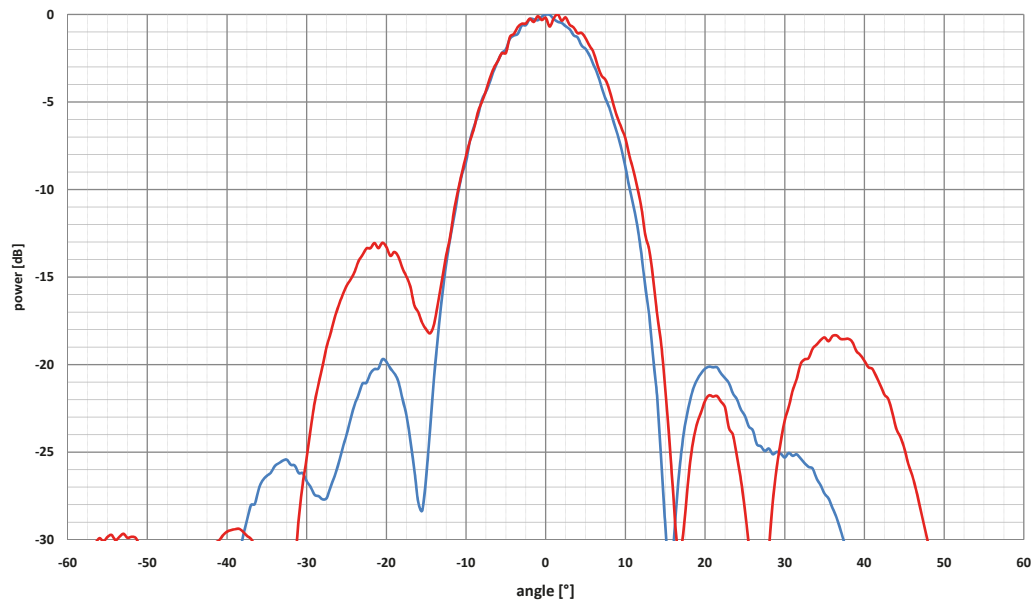
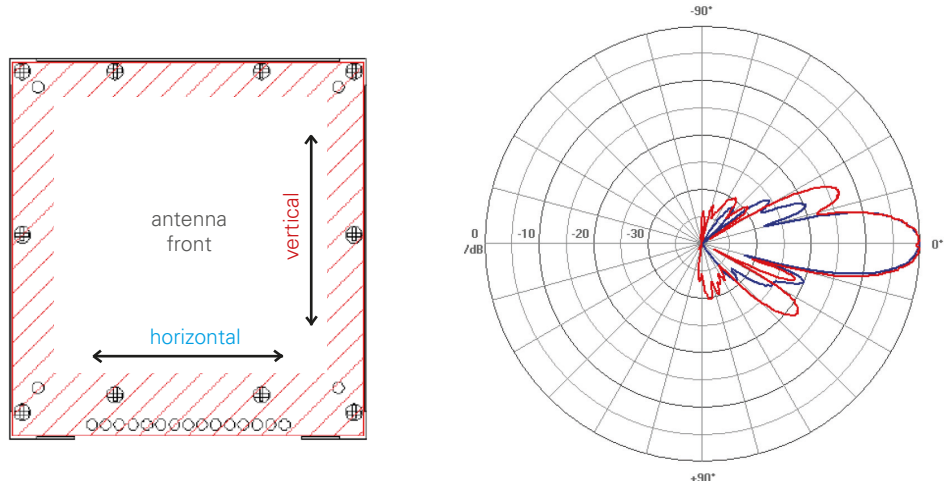
All dimensions in mm / all tolerances according DIN1687-4



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Tx - antenna pattern



Parameter	Symbol	Min.	Typ.	Max.	Units	Comment
full beam width @ -3dB	horizontal	11	13	15	°	
	vertical	11	13	15	°	
side-lobe suppression	horizontal	12			dB	
	vertical	12			dB	

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## Interface

The sensor provides a 6-PIN Berg connector and 2.54mm grid pads for programming

Pin #	Description	In / Out	Comment
1	$V_{cc}$	input	positive supply voltage for VCO
2	$V_{ss}$	input	negative supply voltage for VCO, LNA, IF-amplifier
3	GND	input	analog ground
4	TUV	output	open collector
5	DOP	output	I (DOP / -S2-S1)
6	QDOP	output	Q (QDOP / S2-S1)
7	NC		not connected
8	SCK	input	programming input <sup>1</sup>
9	MISO	in- / output	programming input / output
10	MOSI	input	programming input
11	RES	input	programming input
12	NC		not connected
13	NC		not connected
14	$V_{tune}$	output	control output varactor voltage
15	GND	input	analog ground

<sup>1</sup> Programming according to „AA 8-5-10 Bedienungsanleitung Programmierung IVS-234“

## 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 technical specifications of this Data Sheet are approved:

### FCC approval

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 IVS-234 modules are authorized to use the FCC Grants and IC Certificates of the IVS-234 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-IVS-234 " and contains "IC: 6902A-IVS234"

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.

This equipment complies with FCC and IC 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. Cet équipement est conforme aux limites d'exposition aux rayonnements IC établies pour un environnement non contrôlé. Cet équipement doit être installé et utilisé avec un minimum de 20 cm de distance entre la source de rayonnement et votre corps. Ce transmetteur ne doit pas être placé au même endroit ou utilisé simultanément avec un autre transmetteur ou antenne.



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