!||||**InnoSenT**
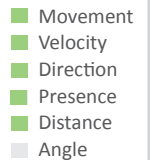*Innovative Sensor Technology*

Installation Manual   IVS-979

Version 1.0 - 15.03.2012

Product Family	K-Band VCO Transceiver with advanced MMIC technology

	◼ Movement
	◼ Velocity
	◼ Direction
	◼ Presence
	◼ Distance
	◻ Angle

Applications	» Traffic Monitoring

Features:

» K-Band VCO Transceiver with advanced SiGe MMIC technology

» FSK / FMCW modes

» 1/x divider for reference frequency output

» stereo (dual channel) operation to detect direction of motion

» integrated RF-pre-amplifier

Description

The IVS-979 is a K-Band VCO Transceiver with advanced SiGe MMIC technology that can be operated in FSK and FMCW mode.

The sensor provides a special RF-design for maximum sensitivity in long range applications such as traffic monitoring or speed enforcement.

Another smart new feature is the 1/x divider output for VCO tuning slope linearization.

Certificates

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.

TÜV CERT
DIN EN ISO 9001:2000
Zertifikat: 01 100 010350

This product is compliant to the restriction of hazardous substances (RoHS - European Union directive 2002/95/EG)

RoHS compliant 2002/95 EG

Handling Precautions

This InnoSenT sensor is sensitive to damage from ESD.

Normal precautions as usally applied to CMOS devices are sufficient when handling this 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	Symbol	Min.	Typ.	Max.	Units	Comment
Oscillator						
transmit frequencies	f	24.000 - 24.250			GHz	depending on V_{tune}
varactor tuning voltage	V_{tune}	0		3	V	
tuning bandwidth fine		DC		500k	Hz	
tuning bandwidth coarse		DC		0.4	Hz	
input impedance Vtune fine			1		kΩ	200pf ESD protection
input impedance Vtune coarse			1		kΩ	200pf ESD protection
tuning slope coarse		340	552	766	MHz/V	
tuning slope fine		59	96	133	MHz/V	
temperature drift frequency	Δf		-4	-5	MHz/°C	
ouput power (EIRP)	$P_{ou-ETSI}$			20	dBm	@ room-temperature
out of band radiation (EIRP)	$P_{out of band}$			-30	dBm	@ room-temperature
divider ratio factory setting			1,280			for example 24.200GHz lead to 1.18MHz
Receiver						
IF-amplifier	gain		40		dB	part number LT6204
	bandwidth	100		2.5M	Hz	
output impedance			100		Ω	
signal level	$S_{I/Q}$		t.b.d.		mV	@ InnoSenT Test setup
	$R_{I/Q}$		t.b.d.		mV	@ InnoSenT Test setup
IF-output	voltage offset		1.65		V	
I/Q balance	amplitude			6	dB	
	phase	70	95	120	°	
Antenna pattern (compare with antenna pattern on page 4)						
antenna pattern (@3dB)	horizontal		7		°	azimuth
	vertical		28		°	elevation
side lobe suppression	horizontal		15		dB	azimuth
	vertical		15		dB	elevation
Power Supply						
supply voltage	V_{CC}	5.3	5.5	6	V	max. 1mV$_{PP}$ ripple
supply current	I_{CC}			170	mA	
Environment						
operating temperature	T_{OP}	-30		+60	°C	
storage temperature	T_{STG}	-30		+85	°C	
outline dimensions		120 x 72.5 x 10.65 (17.7)			mm	compare drawing

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Tx - antenna pattern
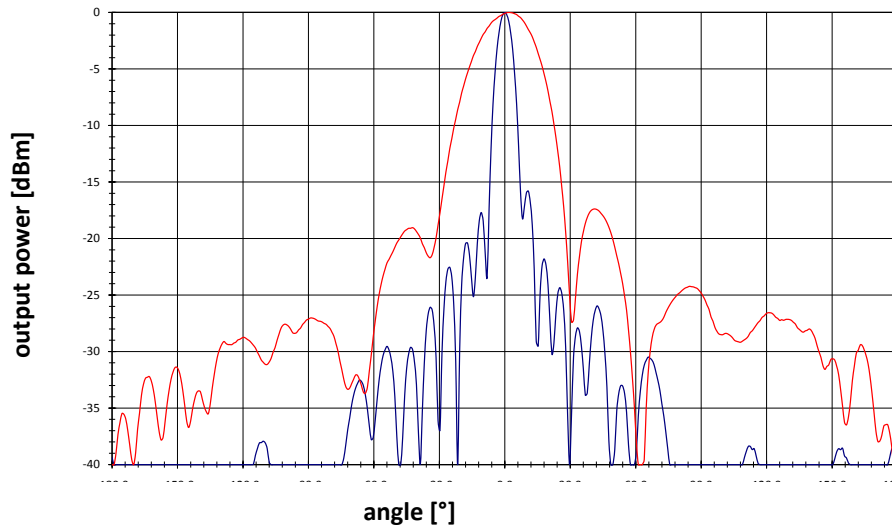
Parameter	Symbol	Min.	Typ.	Max.	Units	Comment
full beam width @ -3dB	horizontal		7		°	
	vertical		28		°	
side-lobe suppression	horizontal		15		dB	
	vertical		15		dB	

Interface

The sensor provides a 2.54mm grid pin header.

Pin #	Description	In / Out	Comment
1	MUXOUT	OUT-digital	reference signal VCO frequency already divided by prescaler
2	GND		ground
3	V_{cc}	IN-analog	5.5V supply voltage
4	SPI_CLOCK	IN-digital	SPI-clock
5	SPI_DATA	IN-digital	SPI-data
6	PLL_LE	IN-digital	latch enable PLL
7	d.n.c.		do not connect
8	CUST_PROG_LE	IN-digital	enable customer programming (active low)
9	d.n.c.	IN-digital	do not connect
10	d.n.c.		do not connect
11	d.n.c.		do not connect
12	Q-SIGNAL	OUT-analog	IF-output-signal
13	I-SIGNAL	OUT-analog	IF-output-signal
14	V_{tune} coarse	IN-analog	tuning voltage for coarse tuning VCO
15	V_{tune} fine	IN-analog	tuning voltage for fine tuning VCO

Mechanical Outlines

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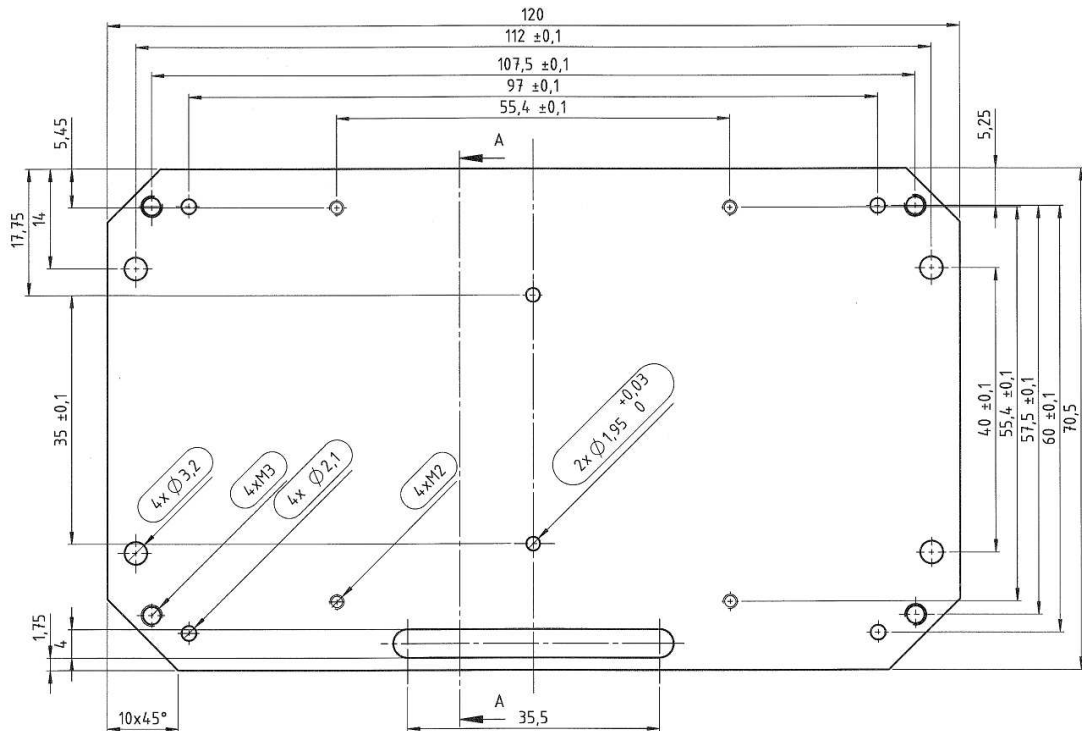
Changes or modifications made to the equipment not expressly approved by InnoSenT GmbH may void the FCC / IC authorization to operate this equipment.

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 require-ments.

• 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:AAABBBBB' and 'Contains IC:AAAA-BBBB' 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 inst-ructions 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 inclu-de 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.

• 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.

Feel free to contact us if additional guidance is required.

Manual Requirements according 15.19 / RSS-GEN

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.

Manual Requirements according 15.21

Changes or modifications made to this equipment not expressly approved by (manufacturer name) may void the FCC authorization to operate this equipment.

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 by:

InnoSenT GmbH
Am Rödertor 30
97499 Donnersdorf
GERMANY