

V-MD3

digital 3D radar transceiver



Features

- 61 GHz 3D FMCW radar with digital signal processing
- Measures speed, direction, distance and angle of multiple static or moving objects
- Typical detection distance: 30 m for persons / 80 m for cars
- Target list output over 100BASE-T Ethernet
- Integrated range Doppler processing with tracking
- 2 configurable digital outputs with overcurrent protection
- Wide power supply range from 8 to 32V
- 3 TX and 4 RX patch antennas with 60°/36° beam aperture
- Rugged water-proof housing with M12 connectors for harsh conditions

Applications

- People counting
- Area surveillance
- Collision avoidance
- Security applications
- Industrial measurements
- Level measurements
- Traffic analysis and classification

Description

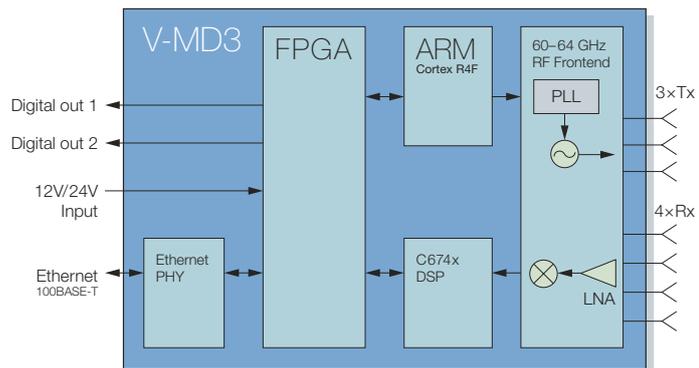
The V-MD3 is a high-end 3D radar transceiver with integrated signal processing and tracking algorithms. It can measure the speed, direction, distance and angle (in azimuth and elevation) of moving and static objects. The digital structure and wide power supply range make it very easy to use this sensor in any stand-alone or MCU based application.

The sensor contains a radar front end with 3 TX and 4 RX patch antennas paired with a powerful FPGA signal processing chain. It has an Ethernet connection for reading out data and for sensor configuration as well as two configurable digital outputs for simple area surveillance or collision avoidance systems. It is possible to read out sensor data from different processing stages, which offers maximum flexibility for easy integration in different customer environments.

There is no need to write own signal processing algorithms or handle small and noisy signals. This module comes with comprehensive functionalities for quick and simplified object detection, observation and measurements. The IP-65 housing with M12 plugs further simplifies integration in harsh environments.

Block Diagram

Figure 1: block diagram



CHARACTERISTICS

Parameter	Conditions/Notes	Symbol	Min	Typ	Max	Unit
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Operating Conditions

Supply voltage		V_{cc}	8.0	12.0/24.0	32.0	V
Supply current @ 12V	Depending on radar setting	$I_{cc@12V}$		300		mA
Peak current		$I_{peak@12V}$			600	mA
Operating temperature		T_{Op}	-20		+85	°C
Storage temperature		T_{St}	-40		+105	°C

Transmitter

Transmitter frequency	$T_{amb} = -20\text{ °C} \dots +85\text{ °C}$	f_{TX}	60.0		64.0	GHz
Output power	EIRP	P_{TX}		15	20	dBm
Frequency stability		Δf		50		ppm
Phase noise	@100 kHz	P_N		-80		dBc
Spurious emissions	According to ETSI 305 550	P_{Spur}		-30		dBm

Antenna

Polarisation					Vertical	
TX antenna gain	$f_{TX} = 62.0\text{ GHz}$	G_{antTX}		9.5		dBi
TX horizontal -3dB beamwidth	E-Plane	$W_{\phi TX}$		60		°
TX vertical -3dB beamwidth	H-Plane	$W_{\theta TX}$		36		°
RX antenna gain	$f_{TX} = 62.0\text{ GHz}$	G_{antRX}		9.5		dBi
RX horizontal -3dB beamwidth	E-Plane	$W_{\phi RX}$		60		°
RX vertical -3dB beamwidth	H-Plane	$W_{\theta RX}$		36		°
RX horizontal spacing	E-Plane	$l_{\phi RX}$		2.464		mm
RX vertical spacing	H-Plane	$l_{\theta RX}$		2.464		mm

Receiver

Receiver sensitivity		P_{RX}		-141		dBm
Overall sensitivity	S/N = 12 dB	S		-144		dBc

Signal Processing

Modulation				FMCW		
Speed range	Depending on radar setting	r_{speed}	0.1		100	km/h
Speed resolution	Depending on radar setting	Δr_{speed}	0.3		3.1	km/h
Distance range	Depending on radar setting	$r_{distance}$	0.3		100	m
Distance resolution	Depending on radar setting	$\Delta r_{distance}$	4.7		78.2	cm
Angular resolution		Δr_{angle}		1		°
Number of raw targets		N_{raw}	0		150	
Update rate	Depending on radar setting			130		ms

Output

Ethernet output				100BASE-T		
Digital output high level		$V_{OH@10mA}$		VCC-0.8V		V
Digital output low level		$V_{OL@10mA}$		0.8V		V
Digital output source/sink current		I_{OH}, I_{OL}	-300		300	mA
Electrostatic discharge	IEC 61000-4-2	V_{ESD}			6	kV
Surge immunity	IEC 61000-4-4	V_{Surge}			3	kV
Burst immunity	ICE 61000-4-5	V_{Burst}			1.5	kV

Body

Outline dimensions				76 × 56 × 27.6		mm ³
Weight				112		g
Connector				2 × 4pin M12		
Rating case				IP-65		