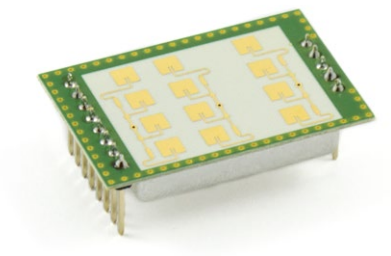
RFbeam Microwave GmbH

product information

K-LD7

digital radar transceiver



Features

- Small and low cost digital 24 GHz radar motion detector
- Measures speed, direction, distance and angle of moving objects
- Low current consumption
- Typical detection distance: 15 m for persons / 30 m for cars
- Target list output over serial interface
- Integrated FFT signal processing with tracking
- 4 configurable digital outputs
- Power supply range from 3.2 to 5.5 V
- 3×4 patch antenna with 80°/34° beam aperture

Applications

- Distance triggered movement detection applications
- Simple gesture recognition
- Indoor and outdoor lighting control applications
- Pedestrian counting
- Traffic counting

Description

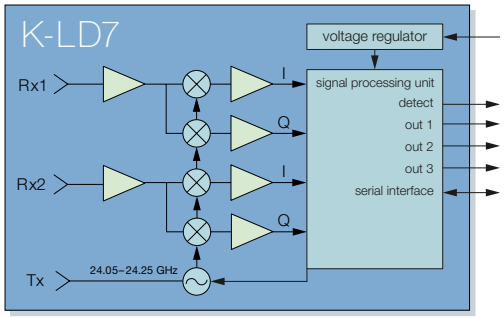
The K-LD7 is a fully digital low cost Doppler radar that can measure speed, direction, distance and angle of moving objects in front of the sensor. The digital structure and wide power supply range make it very easy to use this sensor in any stand-alone or MCU based application.

The sensor includes a 3×4 patch antenna radar front-end with an asymmetrical beam and a powerful signal processing unit with four configurable digital outputs for signal detection information. A built-in tracking filter makes the sensor output even easier to use. The serial interface features the possibility to read out a target list with speed, direction, distance and angle information of all moving objects in front of the sensor or to digitally configure the sensors detection parameters.

There is no need to write own signal processing algorithms or handle small and noisy signals. This module contains everything what is necessary to build a simple but powerful motion detector with distance and angle information. A very small footprint of 38×25×13.5 mm gives maximum flexibility in the product development process. For fast prototyping an evaluation kit (K-LD7-EVAL) is available which features powerful signal visualization on a PC.

Block Diagram

Figure 1: Block diagram



Characteristics

Parameter	Conditions/Notes	Symbol	Min	Typ	Max	Unit
Operating Conditions						
Supply voltage		V_{cc}	3.2		5.5	V
Supply current	Depending on speed range setting	I_{cc}	25		60	mA
Peak current	At start-up	I_{pp}		160	200	mA
Operating temperature		T_{Op}	-20		+85	°C
Storage temperature		T_{St}	-40		+105	°C
Transmitter						
Transmitter frequency	T_{amb} = -20 °C .. +85 °C	f_{TX}	24.050		24.250	GHz
Output power	EIRP	P_{TX}		6		dBm
Spurious emissions	According to ETSI 300 440	P_{spur}			-30	dBm
Receiver						
LNA gain		G_{LNA}		19		dB
Mixer conversion loss	f_{IF} = 1 kHz	D_{mixer}		10		dB
Antenna gain	f_{TX} = 24.15 GHz	G_{Ant}		8.6		dBi
Receiver sensitivity	f_{IF} = 500 Hz, B = 1 kHz, S/N = 6 dB	P_{RX}		-112		dBm
Overall sensitivity	f_{IF} = 500 Hz, B = 1 kHz, S/N = 6 dB	D_{system}		-127		dBc
Detection distance	σ = 1 m² (Person)	R		15		m
Signal Processing						
Modulation				FSK		
Velocity processing				256 point complex FFT		
Speed range	Max value adjustable	r_{speed}	0.1		100	km/h
Speed resolution	Depending on speed range setting	Δr_{speed}	0.1		0.8	km/h
Distance range	Max value adjustable	$r_{distance}$	0.005		100	m
Distance resolution	Depending on distance range setting	$\Delta r_{distance}$	5		100	cm
Angular resolution		Δr_{angle}		1		deg
Tracking range	Limited to one target	$r_{tracking}$	0.005		30	m
Antenna						
Horizontal –3dB beam width	E-Plane	W_{φ}		80		°
Vertical –3dB beam width	H-Plane	W_{θ}		34		°
Horiz. side lobe suppression		D_{φ}	-12	-20		dB
Vertical side lobe suppression		D_{θ}	-12	-20		dB
Rx1/Rx2 spacing		l		6.223		mm
Interface						
Digital output high level voltage		$V_{OH@8mA}$	2.4		3	V
Digital output low level voltage		$V_{OL@8mA}$	0		0.4	V
Digital output high level voltage		$V_{OH@20mA}$	1.7		3	V
Digital output low level voltage		$V_{OL@20mA}$	0		1.3	V
Digital input high level voltage		V_{IH}	1.7		4	V
Digital input low level voltage		V_{IL}	-0.3		1.3	V
Digital I/O source/sink current		I_{OH}, I_{OL}	-20		20	mA
Body						
Outline dimensions				37 × 25 × 13.5		mm³
Weight				5		g
Connector				3pin 2.54mm / 8pin 2.54mm		