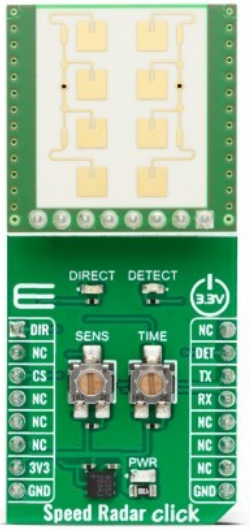
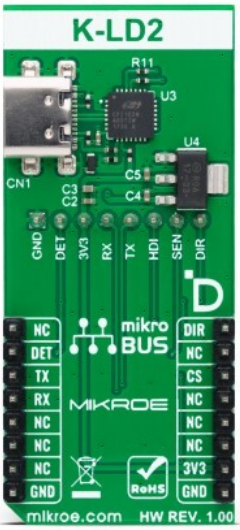
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Speed Radar Click





PID: MIKROE-5869

Speed Radar Click is a compact add-on board that comes with a radar speed detector. This board features the K-LD2, a radar transceiver from RFbeam. It is a 24GHz radar with a detection distance for humans of up to 15m and cars of up to 30m. Its digital structure makes it easy to use in an MCU-based application or as a standalone device where movement detection or a speed measurement of any moving object is required. This Click board™ makes the perfect solution for the development of general movement applications, door openers, illumination of advertising boards, touch-free switches, security systems, and more.

Speed Radar Click is supported by a mikroSDK compliant library, which includes functions that simplify software development. This Click board™ comes as a fully tested product, ready to be used on a system equipped with the mikroBUS™ socket.

How does it work?

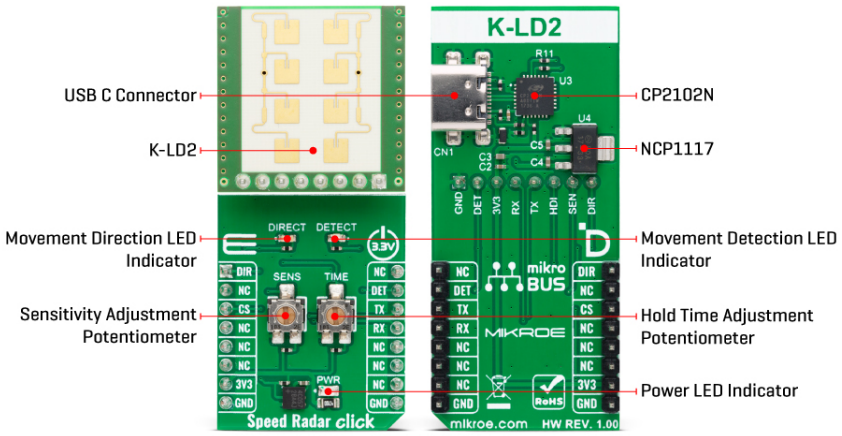
Speed Radar Click is based on the K-LD2, a radar transceiver from RFbeam. The sensor includes a 2x4 patch radar front-end antenna with an asymmetrical 80°/34° beam aperture and a powerful signal processing unit with two digital outputs for signal detection information. The sensitivity and the hold time are adjustable using analog inputs with 10K potentiometers labeled SENS and TIME. The serial interface features a powerful command set to read out advanced detection data or fully customize the detection algorithm.

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Its internal I/Q Doppler signal is processed by using a complex fast Fourier transform (FFT) measurement method, which is important in the science of audio and acoustic measurements. This measurement method features easy detection of the direction of a movement, increased detection range with better SNR, efficient interference suppression, and vibration suppression. The signal processing unit samples the analog I/Q Doppler signals of the antenna and calculates a complex FFT in real-time, after which the noise and interference suppression is done. The detection algorithm looks for valid detection and digital outputs for the length of the hold time setting. I/Q Doppler signals are phase-shifted by +90° or -90° depending on the direction of a movement in the front of the sensor.

The Speed Radar Click can work as a standalone or host-driven device. It can detect the speed of any moving object, can filter out slow and fast speeds, and even detect micro speeds (very low speeds). If developing a standalone device, you can set the sensitivity and the hold time by the potentiometers. The sensitivity can be achieved in a range of 0 up to 34dB, approximately 2 to 20 meters for a walking human. The hold time can be set at 0.2 up to 160s. The sensor will filter the interferences and look for a movement with a magnitude higher than the threshold set by the sensitivity. The K-LD2 will output its detection state over the DET pin and the direction over the DIR pin of the mikroBUS™ socket along the appropriate DETECT and DIRECT LEDs. In addition, Speed Radar Click is equipped with the CP2102N, a USB-to-UART bridge from Silicon Labs, and a USB C connector for connecting this Click board™ to a PC.

Speed Radar uses a standard UART interface to communicate with the host MCU with commonly used UART RX and TX pins, supporting a baud rate of 38400bps. It will output a High logic state over the DET pin if there is a detection, and a Low if there is not. The direction output will be over the DIR pin with a Low logic state for backward/receding movement and a High logic state for forward/approaching movement. This pin is a digital miscellaneous output and can be configured for many purposes, such as detection, direction, range, and micro-detection.

This Click board™ can be operated only with a 3.3V logic voltage level. The board must perform appropriate logic voltage level conversion before using MCUs with different logic levels. Also, it comes equipped with a library containing functions and an example code that can be used as a reference for further development.

K-LD2 Radar Speed Detector GUI

The K-LD2 radar speed detector stands out for its intuitive Graphical User Interface (GUI) that

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simplifies parameter settings. Thanks to the onboard USB Type-C connector, users can effortlessly adjust K-LD2 parameters through the GUI. Its powerful Control Panel software sets the K-LD2 apart, dramatically reducing development time. This software allows users to modify all parameters without consulting a command list, making configuration a breeze.

For more information, software download, and in-depth GUI details, please visit RFbeam's product page.

Specifications

Type	Motion
Applications	Can be used for the development of general movement applications, door openers, illumination of advertising boards, touch-free switches, security systems, and more
On-board modules	K-LD2 - radar transceiver from RFbeam
Key Features	24GHz radar motion detector detects humans, and cars, detects movement, and even micro movement, detects direction, stand-alone or host-driven device, patch antenna, adjustable sensitivity and hold time, USB-to-UART bridge, and USB C connector for connecting to a PC, and more
Interface	UART,USB
ClickID	Yes
Compatibility	mikroBUS™
Click board size	L (57.15 x 25.4 mm)
Input Voltage	3.3V

Pinout diagram

This table shows how the pinout on Speed Radar Click corresponds to the pinout on the mikroBUS™ socket (the latter shown in the two middle columns).

Notes	Pin	mikroBUS				Pin	Notes
Movement Direction	**DIR**	1	AN	PWM	16	NC	
	NC	2	RST	INT	15	**DET**	Movement Detection
	NC	3	CS	RX	14	**TX**	UART TX
	NC	4	SCK	TX	13	**RX**	UART RX
	NC	5	MISO	SCL	12	NC	
	NC	6	MOSI	SDA	11	NC	
Power Supply	**3.3V**	7	3.3V	5V	10	NC	
Ground	**GND**	8	GND	GND	9	**GND**	Ground

Onboard settings and indicators

Label	Name	Default	Description
LD1	PWR	-	Power LED Indicator

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-	DIRECT	-	Movement Direction LED Indicator
-	DETECT	-	Movement Detection LED Indicator
VR1	SENS	-	Sensitivity Adjustment Potentiometer
VR2	TIME	-	Hold Time Adjustment Potentiometer

Speed Radar Click electrical specifications

Description	Min	Typ	Max	Unit
Supply Voltage	-	3.3	-	V
Operating Frequency Range	24.050	-	24.250	GHz

Software Support

We provide a library for the Speed Radar Click as well as a demo application (example), developed using MIKROE compilers. The demo can run on all the main MIKROE development boards.

Package can be downloaded/installed directly from NECTO Studio Package Manager (recommended), downloaded from our LibStock™ or found on Mikroe github account.

Library Description

This library contains API for Speed Radar Click driver.

Key functions

- speedradar_send_command Speed Radar send command function.
- speedradar_get_direction Speed Radar get direction function.
- speedradar_get_detection Speed Radar get detection function.

Example Description

This example demonstrates the use of Speed Radar Click board™ by processing the incoming data and displaying them on the USB UART.

The full application code, and ready to use projects can be installed directly from NECTO Studio Package Manager (recommended), downloaded from our LibStock™ or found on Mikroe github account.

Other Mikroe Libraries used in the example:

- MikroSDK.Board
- MikroSDK.Log
- Click.SpeedRadar

Additional notes and informations

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Depending on the development board you are using, you may need USB UART click, USB UART 2 Click or RS232 Click to connect to your PC, for development systems with no UART to USB interface available on the board. UART terminal is available in all MIKROE compilers.

mikroSDK

This Click board™ is supported with mikroSDK - MIKROE Software Development Kit. To ensure proper operation of mikroSDK compliant Click board™ demo applications, mikroSDK should be downloaded from the LibStock and installed for the compiler you are using.

For more information about mikroSDK, visit the official page.

Resources

mikroBUS™

mikroSDK

Click board™ Catalog

Click Boards™

ClickID

Downloads

Speed Radar click example on Libstock

NCP1117 datasheet

K-LD2-RFB-00H-02 datasheet

CP2102N datasheet

Speed Radar click schematic

Speed Radar click 2D and 3D files

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