miRadar® 8

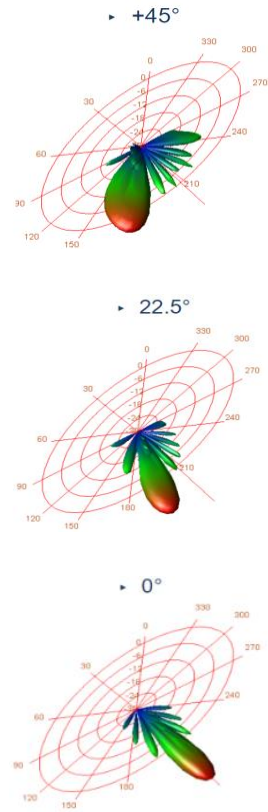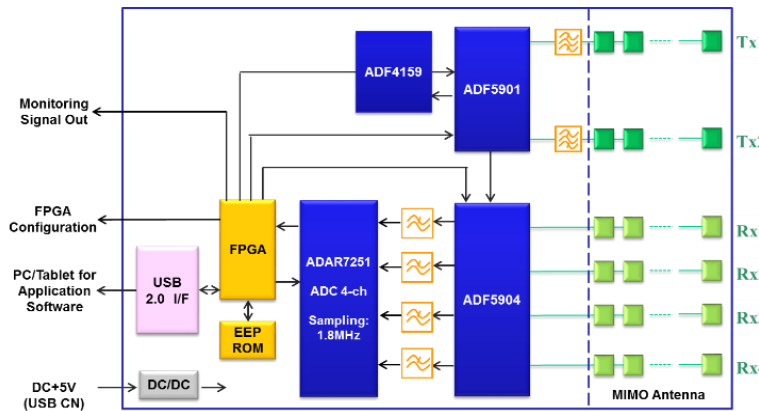# High Performance 24GHz FMCW MIMO Radar Platform

miRadar®8 module is highly integrated with a high-performance radar chip set, low electric power consumption FPGA, etc., and can be connected to signal processing devices such as a PC via USB interface.


+45°

22.5°

0°

miRadar®8 module consists of two elements of transmitting Tx antenna and four elements of Rx receiving antenna. The azimuth detection accuracy equivalent to eight elements can be obtained by MIMO radar signal processing, including the beamforming method, as shown in antenna simulation patterns in the figure below. MIMO radar signal processing software by Matlab is available and can be used as a reference.
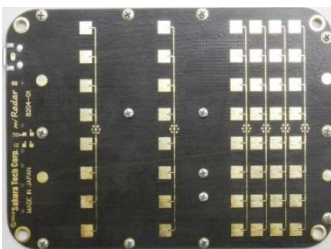
| H-plane module (standard)	H-plane module (custom)	V-plane module (custom)
miRadar®8 (B204-01)	**miRadar®8 (B204-06C01)**	**miRadar®8 (B204-03C01)**
Accessory: Document USB cable	Accessory: Document USB cable	Accessory: Document USB cable
Tx 2ch Rx 4ch	Tx 2ch Rx 4ch	Tx 2ch Rx 4ch
	A customized module with improved directivity of the Tx antenna of the standard module	A customized V polarization module with the polarization face rotated by 90º in the standard module
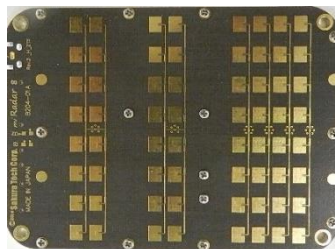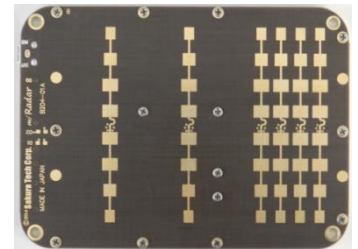
For those who purchase only modules and make their own software using the optional interface library, or those who purchase additional modules only.

Specifications:
- Radar methodology: MIMO FMCW 24 GHz (ARIB-STD-T73)
- Antenna: 2 Tx, 4 Rx
- Azimuth detection range: $\pm 45^\circ$
- Scan speed: 0.1 s (max)
- Range of detection: 60 m (min) within Car detection case
- Output power: -4/2/8 dBm (3 levels)
- Module size: 104 mm (W) $\times$ 76 mm (H) $\times$ 6 mm (D)
- Interface: USB2.0, Micro B connector
- Power supply: +5 VDC, 1.5 A (max), powered via USB
- Operating temp. range: -20ºC to 60ºC
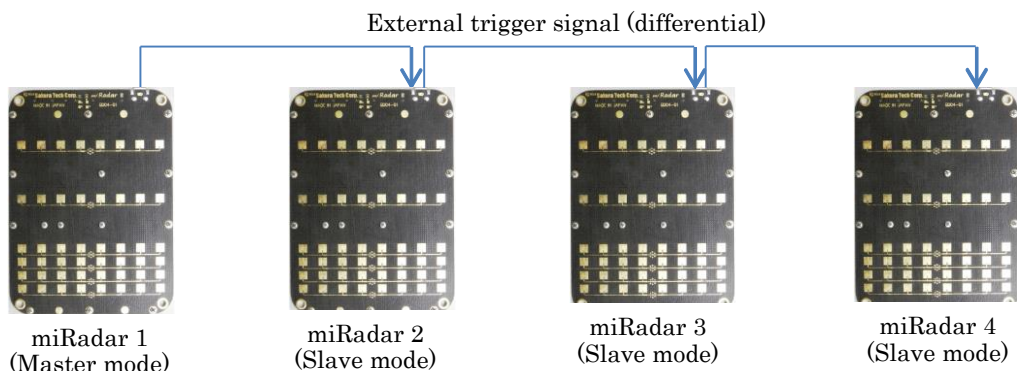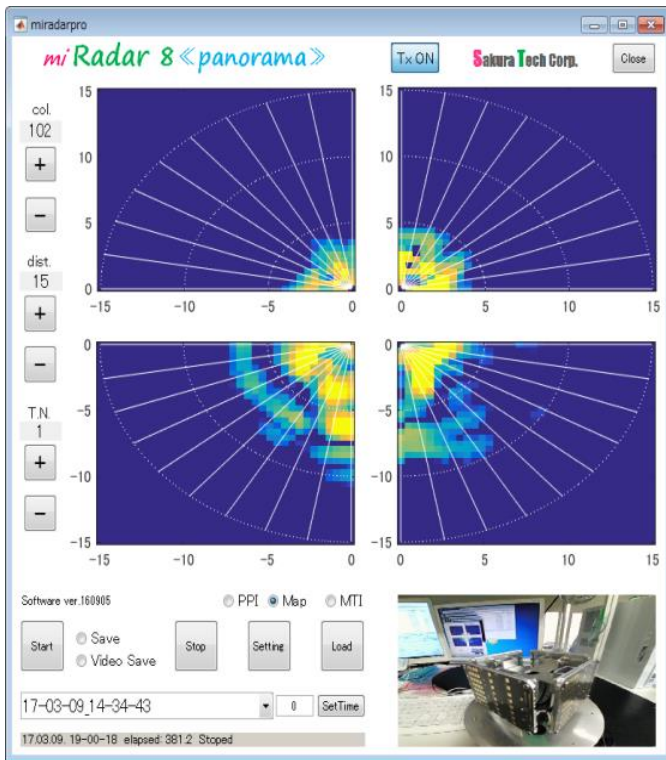
microUSB

Rx4ch

Tx2ch
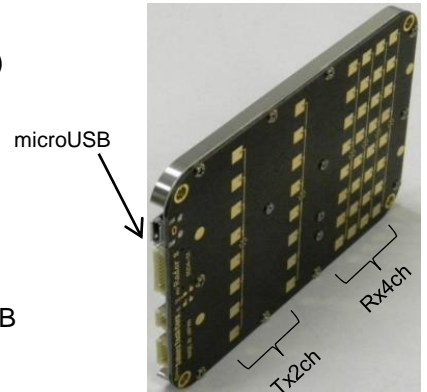
Evaluation software (Professional Version) (B204-SW004)

Although four miRadar8 modules can detect targets in an entire circumference (360º), simultaneously operating multiple radars at close range will generally produce radio wave interference. To prevent this, coordinating operation can be controlled to output transmissions of multiple miRadar8 with their timing shifted so they do not overlap.

Connecting external trigger I/O signals enables multiple miRadars to operate in synchronization. miRadar1 is set to master mode because it does not have an external trigger signal input. miRadar2, 3, and 4 are set to slave mode, which operates in synchronization by an external trigger signal input. Please contact us to order a trigger signal cable.

External trigger signal (differential)

miRadar 1
(Master mode)

miRadar 2
(Slave mode)

miRadar 3
(Slave mode)

miRadar 4
(Slave mode)

Evaluation software (Professional Version) is a Matlab execution file that controls coordinating operation for a maximum of four miRadar8 and displays processing results.

A chart for the following data can be displayed:

(1) Color mapping data after azimuth detection processing

(2) PPI data symbolized from azimuth detection results.

As with the Standard Version, a mechanism is provided to output processing results in files to interface them with other software. This enables software to be created for conducting post-processing of radar detection results.

Note 1) When miRadar module is connected via a USB hub, self-power feeding of 3A or more is required per four ports.

Note 2) With an increased number of modules, a PC with a higher processing capacity of Core-i7, etc., and a larger number of cores is required.

C++ USB Interface SDK [Windows] (B204-OP001-01)

Visual Studio 2015 C++ edition

The instruction manual for C++ SDK is included in the USB interface library of the module. If a unique signal processing software is created, SDK is required to use the USB interface for module.

This supports Windows Visual Studio 2015. SDK is Static Library. SDK with source code for Library section is available. Please use it if necessary.

C++ USB interface SDK [Linux] (B204-OP001-02)

Linux(ubuntu x86/64) g++ edition

Linux edition for the above C++ SDK. This supports x86/x64 Ubuntu. Only Linux edition with source code is available.

Matlab SDK software (Professional Version) (B204-SW005)

This allows a system software prototype to be developed with signal processing results of multiple radars.

This SDK is a release for which Matlab p-code and m-code are mixed in the above Professional edition. The signal processing core section, etc. are in p-code and the interface section, etc. are in m-code. Adding the system software code allows prototypes to be developed in a short time.

Matlab SDK software (Pro1 Version) (B204-SW006)

Software limited to one radar processing for Professional Version of software supporting multiple radars. This allows system software prototypes to be developed with radar signal processing results of evaluation software.

This is a release for which Matlab p-code and m-code are mixed. The signal processing core section, etc. are in p-code and the interface section, etc. are in m-code. Adding the system software code allows prototypes to be developed in a short time.

Note) The above Matlab SDK software requires Image Acquisition Toolbox and Image Processing Toolbox. Matlab functions have been checked for R2015b (32-bit) and R2016a (64-bit) versions.

▪ Ordering Guide

Model	Description	Comments
B204-01	miRadar8 H-plane module (Standard)	
B204-06C01	miRadar8 H-plane module (Custom, Tx 2ch)	
B204-03C01	miRadar8 V-plane module (Custom)	
B204-04C01	No Antenna	
B204-07C01	miRadar8 V-plane module (Custom,, Tx 2ch)	
B204-SW004	Evaluation software (Professional Version)	
B204-SW005	MATLAB SDK software (Professional Version)	
B204-SW006	MATLAB SDK software (Pro1 Version)	
B204-OP001-01	C++ USB interface SDK [Windows]	
B204-OP001-02	C++ USB interface SDK [Linux]	
B204-OP101	Sync. Trigger standard cable (50cm x 3)	
B204-OP102	Sync. Trigger cable for Waterproof case (5m x 1)	
B204-01-WP01	miRadare8 module in waterproof case	

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