KANAGAWA HIGH-TECH. GRAND-PRIX

METI 300 SMEs Japan's SME Awards

Yokohama Chizai Mirai Enterprise 横浜知財みらい企業

SakuraTech Human-friendly Sensors Anytime™

miRadar®

MIMO Radar Platform

English Edition

Healthcare

Autonomous Machines

Security

Safety

＊”miRadar®8” was registered Trademark at 8 countries.

https://sakuratech.jp

miRadar® Family/Reflector List

24GHz Radar series

	Page
miRadar®8 <Handy> Handheld Vital Radar Sensor	6
miRadar®8 <IoT> Vital Signs Monitor Sensor	8
miRadar®8 <gRadar> Rear Monitoring system for snow removal machines	10
Radar operation evaluation kit Vital Signs Monitor (VSM) evaluation kit	12
miRadar®8 FMCW MIMO Radar Platform	14
miRadar®128<3D> 24GHz FMCW MIMO 3D Radar Platform	20

79GHz Radar series

miRadar®12e 79GHz MIMO Millimeter Wave Radar Platform	22
miRadar®48e-EV 79GHz MIMO Radar Platform	24
miRadar® <CbM> 79GHz Contactless CbM Sensor with mm-wave radar	26
miRadar® <Scope> 79GHz Millimeter Wave Radar Distance Sensor	28

Reflector

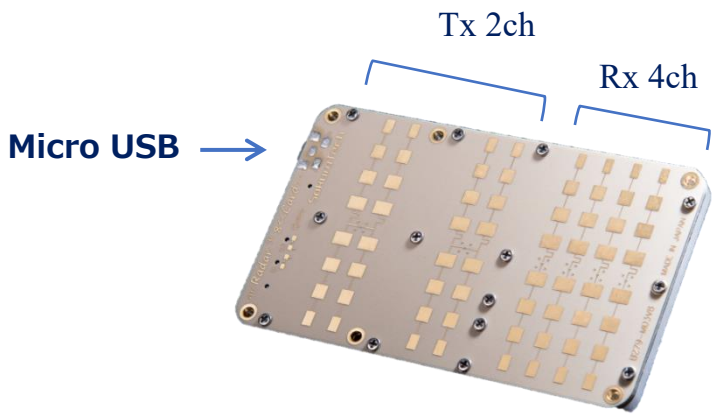
DsA004-T	Triangular pyramid corner reflector series	30
DsA004-SPH	Spherical Reflector series	31

Origin of the name miRadar

マイ レーダー
miRadar®8

MIMO
Multi function
Millimeter Imaging

Number of Virtual Arrays
Tx2ch × Rx 4ch=8ch



91 (W)×55(H)×6(D) mm

Registered trademark“miRadar” : Registered in 8 countries worldwide

About Sakura Tech

- **Establish** **Oct. 7th, 2008**
- **Head Quarter** **Shin-Yokohama, Kohoku-ku, Yokohama**
- **Capital** **10 million yen**
- **Employee** **10**
- **CEO** **Fuminori Sakai, Ph.D**

Development and Sales of Millimeter-wave / Microwave imaging sensors using MIMO technology

CEO Message

Since its founding in October 2008, Sakura Tech has been developing imaging sensors and high-performance microwave / millimeter wave components using ultra wideband technology. In particular, we have developed a compact, high-performance radar platform (miRadar®8) that uses Multiple-Input Multiple-Output (MIMO) technology and commercialized it as an obstacle monitoring radar. Using the same radar platform, we have developed an algorithm that can measure the vital signs (heartbeat, respiration) of multiple people at the same time, and we are the first in the world to sell an evaluation kit, which has been evaluated by many manufacturers. Radio wave sensors are becoming indispensable in the fields of autonomous driving in the IoT society, the security field aiming for a safe and secure society, and the field of watching over the elderly. Sakura Tech will continue to contribute to society by providing human-friendly, high-performance sensors that use radio waves.

Fuminori Sakai / CEO & Founder

Head Quarter: Yokohama, Kanagawa, Japan

ISO 9001 CERTIFIED ISA JAB MS CM034

KANAGAWA HIGH-TECH. GRAND-PRIX

ALLIANCE PARTNERS

ANALOG DEVICES AHEAD OF WHAT'S POSSIBLE™ ASSOCIATE PARTNER

RENESAS PARTNER Alliance

MathWorks Partner

Healthcare Solution

In addition to distance and azimuth, heart and respiration rates can be measured and detected at the same time even when blanket and clothing exist, and the results can be monitored through an internet and smartphone. In the healthcare applications, the primary areas are a watching over people in need of long-term care and monitoring the condition at the care houses.
 * This product is not a medical device. It cannot be used for medical treatment

Security Solution

Since the system can detect a human by monitoring of Heart and Respiration rates, it can be used as a sensor for intruder detection in a house or any unauthorized area.

Safety Solution

Regulations are beginning to take place due to the social problem of leaving children in the car. There is also an increasing demand for detecting the health of drivers and passengers. By using a non-contact sensor that can detect the heartbeat and respiration of a person using our millimeter-wave radar, it is possible to monitor the condition of the person in the car.

Autonomous Solution

We can provide obstacle detection with smaller size and higher accuracy for AGVs, drones, and autonomous driving. Backward Monitoring to prevent collision of Grader machine is one of specific application.

miRadar® Family Roadmap

2024

mi Radar® 《Scope》

2023

miRadar®12e «Card»

miRadar®8 «handy»

2022

mi Radar® 《CbM》

miRadar®8 «IoT»

2021

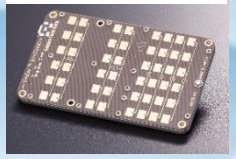
miRadar®8-EV2

miRadar®48e-EV

miRadar®128 «3D»

2020

miRadar®8 «Card»



2019

miRadar®8 «VSM»

miRadar®8 «IMU»

2018

miRadar®8 «gradar»

Sensor

Signal processor

Display

miRadar®8 «Panorana»

2017

miRadar®8-EV2

miRadar®8

2016

miRadar®8 «Handy» - With Tracking -

Industry's first

Handheld Vital Radar Sensor

Handy (B293-03C/S) With tracking function

FEATURES

- Vital information (heartbeat, respiration, body movement) can be measured without contact through clothes and sheets.
- Easy-to-operate all-in-one vital sensor with touch display.
- Foldable, the direction of radio wave radiation can be changed back and forth.
- It can detect not only adults, children, and babies, but also dogs and cats.

Applications

- Intrusion / People detection system without camera.
- Nursing care service 24/7 monitoring for daily Health check.
- Checking your physical condition in wellness and fitness.
- Pet physical condition management.

Radiate radio waves forward
Measure the target person

Home care monitor

Pet status monitorツ

Emits radio waves forward
to measure the target

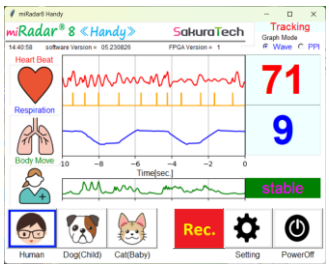
Wi-Fi /
Internet

Tracking screen
Get location information
of the person receiving care

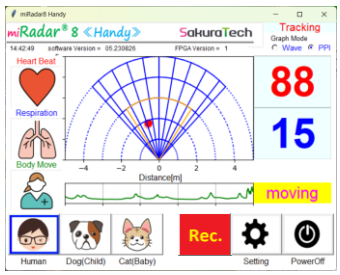
Home health care

Specifications

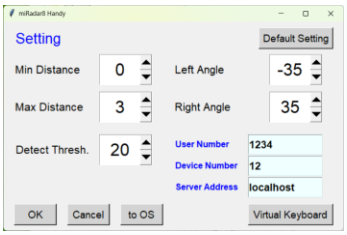
- 24GHz FMCW Radar, certified ARIB-STD-T73 (Japan), optional support for FCC and CE.
- Detection Range: 5m max.
- Field of View: ±40° Horizontal, ±8° Vertical
- Number of detection: one person (4 or more positions can be set by external PC.)
- Power: 5 Vdc
- Temperature range:5～35℃
- Interface: Wi-Fi, LAN
- Display: 3.5” color with touch function
- Size: 122 x 78 x 43 mm
- Weight: 280g



Normal Mode



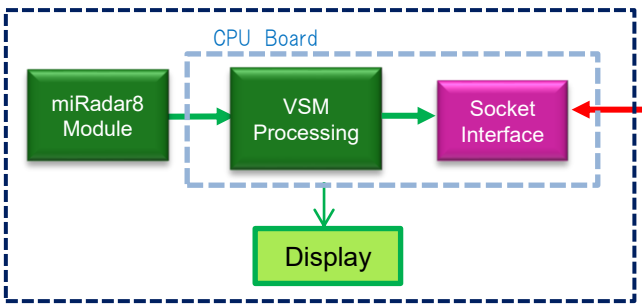
Tracking Mode



Setting screen

Communication function

It has a built-in interface that enables Socket communication with external PCs via LAN / WiFi.
This allows Handy to connect to server systems and the cloud.



External PC

miRadar8 <<Handy>> (B293)

Server Sample Software

Ordering Number

Product Name	Product Number	Comments
miRadar®8<Handy>	B293-03C	Vital sensor with tracking (with CSV saving function)
	B293-03S	Vital sensor with tracking (with RawData storage function)
USB memory	B293-OP01	
Small camera stand	B293-OP02	

Notes:

- The data and display information collected by this product cannot be used as medical information or critical decision of human life.
- Any product appearances, specifications, etc. are subject to change for improvement without prior notice. When exporting the product, confirm the country of destination, application, and customer. If any of them falls into an objective requirement, please take the necessary procedures, including export certificate application.

miRadar®8 «IoT»

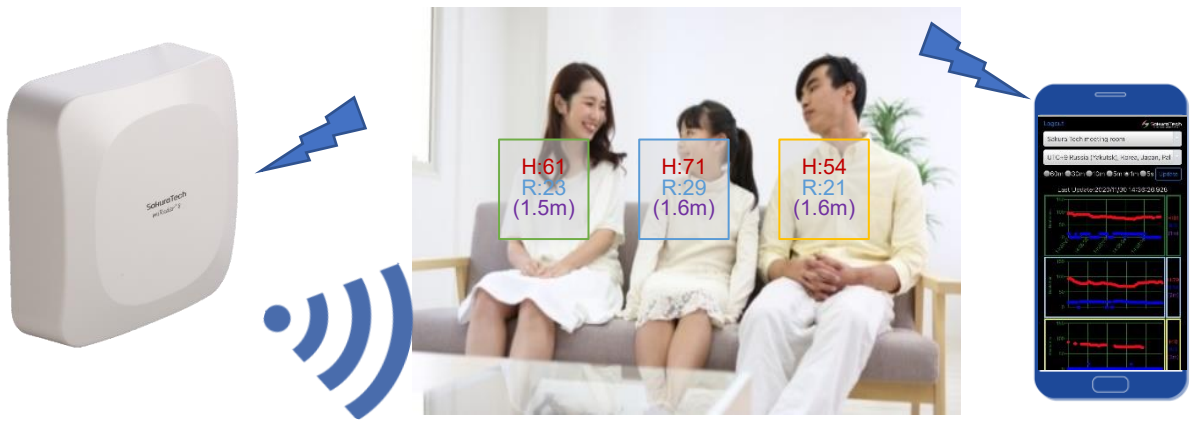
Vital Radar Sensor (Vital Sign Monitor)

FEATURES

- Integrated the miRadar®8 Radar sensor module and Signal Processing unit
- Can simultaneously measure four human data including heart rate and breathing rate
- Works with IoT Could system
- Ethernet / WiFi interface for remote monitoring

Applications

- Intrusion / People detection system without camera for Security
- Nursing care service 24/365 day monitoring for daily Health check
- Wellness / Fitness Health monitoring



Specifications

- 24GHz FMCW Radar, certified ARIB-STD-T73 (Japan)
- Detection Range: less than 5 meters (up to 10m dependent upon environment)
- Field of View: ±40°Horizontal, ±8° Vertical
- Number of detection: 4
- Power: 5 Vdc
- Interface: Wireless-LAN, TCP/IP
- Size: 125 x 125 x 45 mm

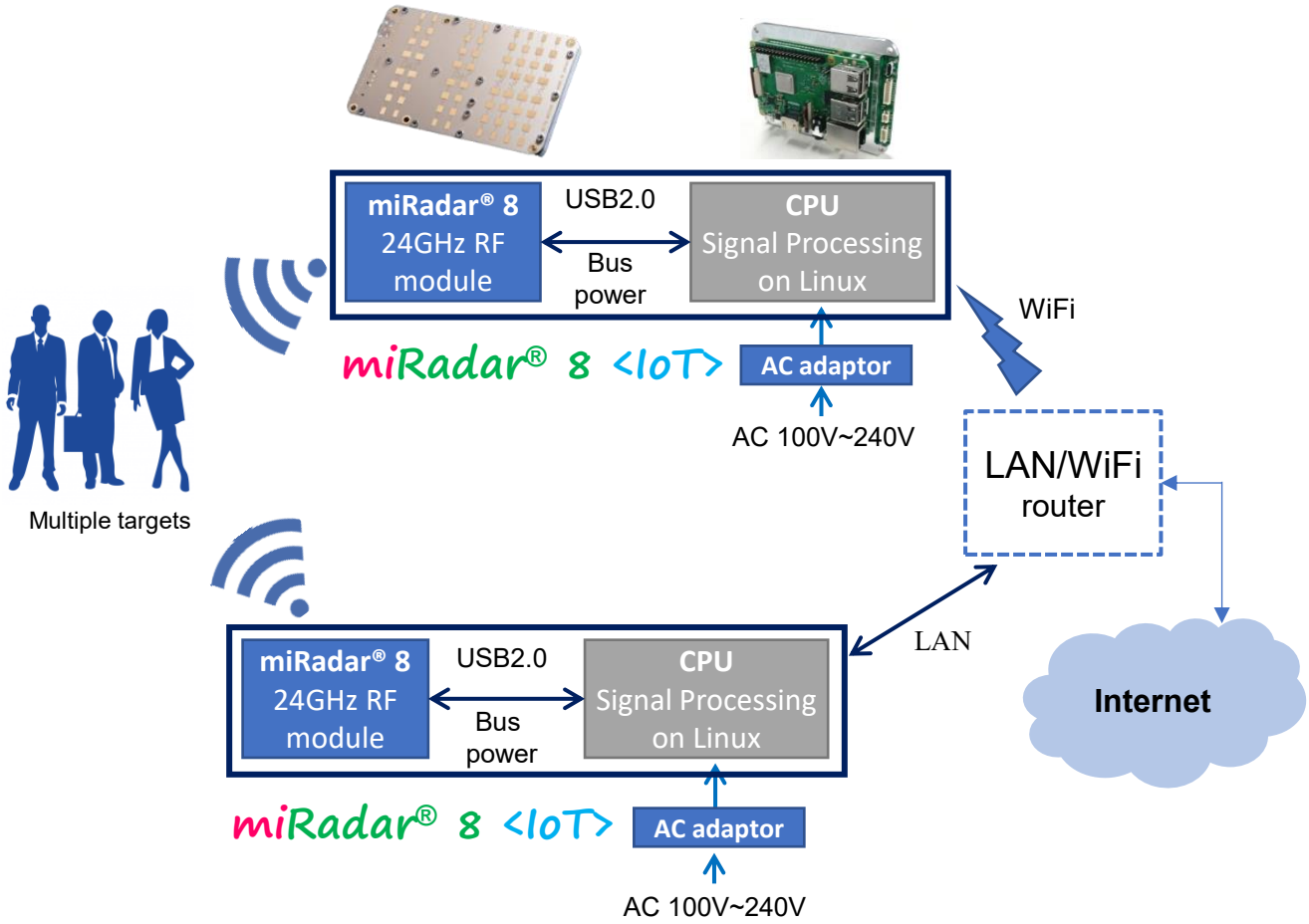
Host Interface

- Ethernet TCP/IP
- WiFi 2.4GHz

Software

- API command-based control over TCP/IP
- Sensor parameter settings for measurement mode
- Detects data such as distance, direction, heart rate, breathing rate, etc.
- Data storing and restoring (CSV format)

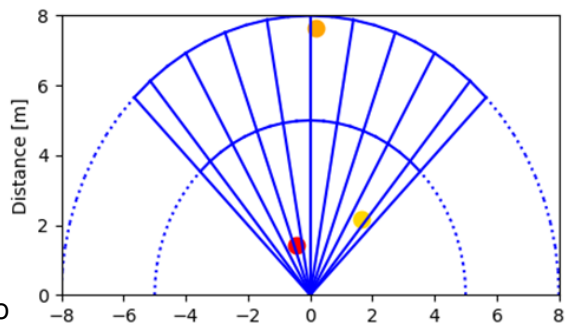
Application Example



IoT sensor terminal [B278-03] with tracking function

Tracking multiple people to measure heart rate and breathing simultaneously.

- Communication function with IoT server/cloud system.
- 24/7 nursing care services
- We provide sample PC server software (Python) to enable customers to check the operation of the communication functions of server systems and cloud systems they develop.



Server sample software **Tracking Screen**
(Tracking target position is displayed as a colored circle)

Ordering Guide

Product Name	Product Number	Comments
miRadar®8<IoT>	B278-03C	Vital sensor with tracking (with CSV saving function)
	B278-03S	Vital sensor with tracking (with RawData storage function)
Desk Stand	DsM-009	B278 dedicated desk stand

Backward Monitoring System for Grader Machine

Feature

- prevent collisions with vehicles approaching from behind or objects in the driver's blind spot.
- The miRadar®8 24GHz FMCW MIMO radar platform detects the precise distance and direction of vehicles.
- Can be used for construction and agriculture machines.

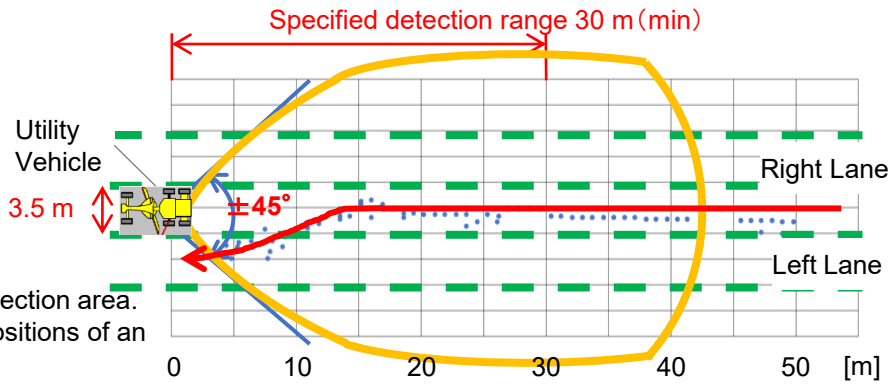
1. Sensor Unit: DsB229S
   - Installed in rear side with an attachment for absorption of vibration
   - Mounted the miRadar®8 Radar sensor module
   - W 150mm x D 110mm x H 40mm

2. Signal Processing Unit: DsB229P
   - Installed in cabin
   - W 228mm x D 180mm x H 50mm

3. Alarm unit: DsB229A
   - Installed in a front of driver's seat.
   - W 100 mm x D 40 mm x H 80 mm

Functionality

- Measurement of positions and speed of approaching vehicles from back and detects collision risk
- Alarming to the driver with a buzzer and a LED when the collision risk is detected



- A solid yellow line indicates the detection area.
- Blue dots indicate the measured positions of an approaching vehicle.
- A solid red line indicates the route of the vehicle approaching from behind.

Applications

- Backward monitoring system for Grader machines
- Rear monitoring of Construction and/or Agriculture machines, and obstacle detection

Ordering Number

Product Name	Product Number	Comments
miRadar®8 <gradar>	B229S	Sensor unit
	B229P	Signal Processing Unit
	B229A	Alarm unit
	B229R	Connection cable

miRadar®8-EV2 / miRadar®8-VSM

Radar operation evaluation kit
Vital Signs Monitor (VSM) evaluation kit

miRadar®8 evaluation kit includes the miRadar®8 module and evaluation software, enabling quick and easy experiments in the field.

miRadar ® 8-EV2 / miRadar ® 8-VSM

miRadar ® 8-EV2 <Card> / miRadar ® 8-VSM <Card>

- This product is intended for those who wish to verify radar operation in detail for research and development, etc., and those who are using radar for the first time. Operation can be checked by installing the evaluation software included in the included DVD on a Windows PC. Camera images and radar detection signals can be recorded and played back simultaneously.
- Signal processing on a high-speed PC shortens the target detection cycle.
- The miRadar® 8-EV2 and miRadar® 8-EV2<Card> for evaluating radar operation such as obstacle detection come with evaluation software (standard version) [B204-SW002 / B279-SW002].
- In addition, miRadar ® 8-VSM and miRadar ® 8-VSM<Card> come with evaluation software [B204-SW007 / B279-SW007] for evaluating vital information detection operation.

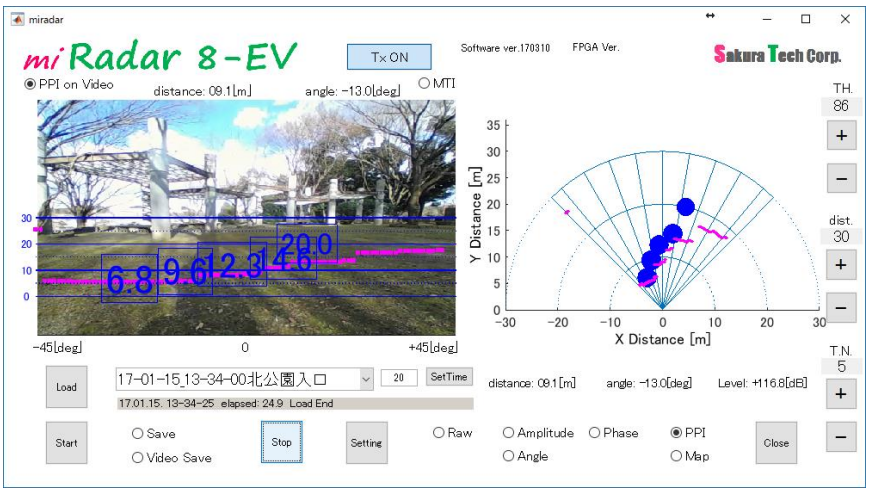
Accessories: Evaluation software, manual, USB cable

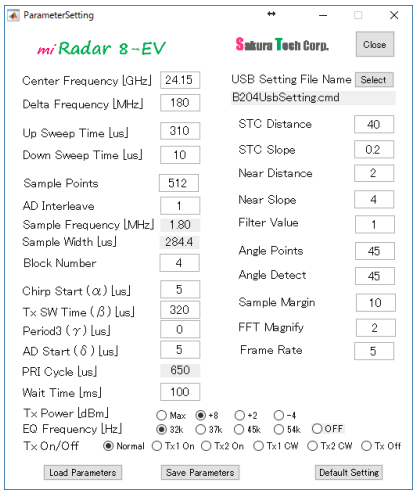
Ordering Guide

Product Name	Product Number	Comments	Remarks
miRadar® 8-EV2	B204-01-EV2	Evaluation software B204-SW002 included	Obstacle Detection
miRadar ®8-EV2 <Card>	B279/312-01-EV2	Evaluation software B279-SW002 included	Obstacle Detection
miRadar ®8-VSM	B204-01-VSM	Evaluation software B204-SW007 included	
miRadar ®8-VSM <Card>	B279/312-01-VSM	Evaluation software B279-SW007 included	

Radar operation evaluation software （B204-SW002/B279-SW002）

- This is the Standard Version of the evaluation software included with the miRadar8-EV2 and miRadar® 8-EV2<Card> evaluation kits. It is a Matlab executable file and can display various processing results in real time as graphs and overlay the processing results on the camera image. In addition, images and radar raw data signals can be saved simultaneously, and then loaded for reprocessing.

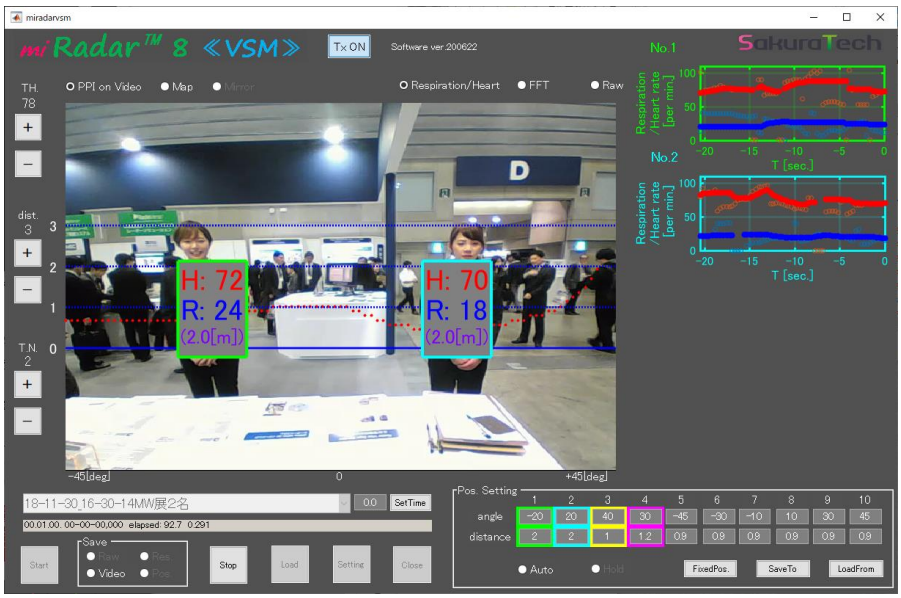




- The software menu has a settings screen where you can change the parameters for various radar operation settings. In addition, the chipset used in the module has register settings that allow for more detailed parameter settings, and the register settings are in a text file that can be freely edited.
- The processing results are output to a file, and a mechanism is provided to interface with other software, making it possible to create software that post-processes the radar detection results.

Vital Signs Monitor Evaluation Software（B204-SW007 / B279-SW007）

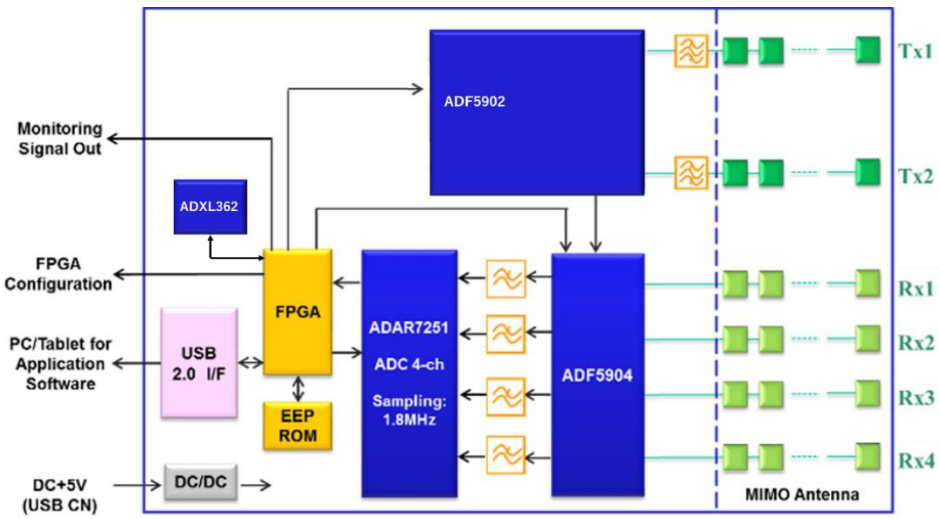
- This is the evaluation software included with the miRadar ® 8-VSM and miRadar8-VSM<Card> evaluation kits. As with the Standard Version above, it allows you to save and load data along with vital information that is overlaid on the camera image.

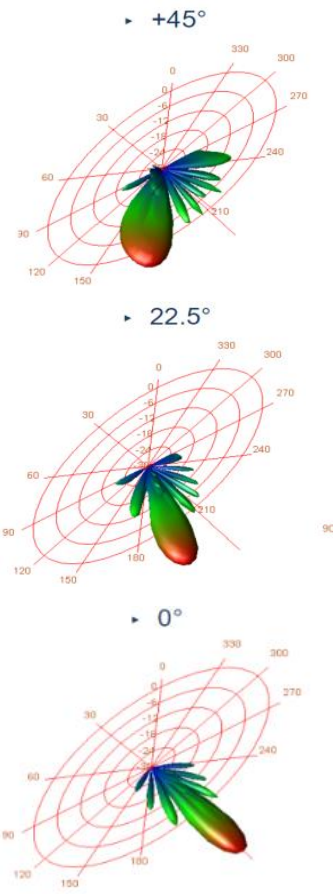


24GHz FMCW MIMO Radar Platform

miRadar®8 is a 24GHz radar sensor module that can identify the azimuth angle of a target. It is suitable for a variety of applications, including safe driving, building security, and social welfare service robots. In particular, the MIMO (multi input multi output) radar technology used in this radar module enables highly accurate and wide-range azimuth detection.

The miRadar®8 module is densely integrated with a high-performance radar chipset and a low-power FPGA. It can be connected to a signal processing device such as a PC via a USB interface.



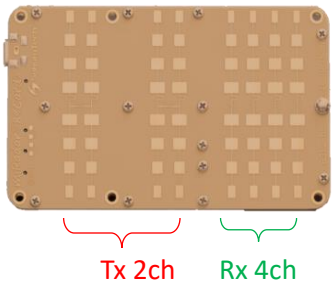


The miRadar®8 module has two transmitting Tx antenna elements and four receiving Rx antenna elements. By performing MIMO radar signal processing such as the beamformer method shown in the antenna simulation pattern above, it is possible to obtain azimuth detection accuracy equivalent to that of eight elements. Various MIMO radar signal processing software is available for your reference.

The miRadar®8 module is available in various types depending on the application. We can also design your desired antenna pattern as a custom order, so please contact us.

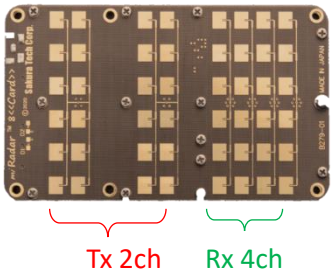
V-plane module Card size version (stnadard)

miRadar®8 (B312-01)



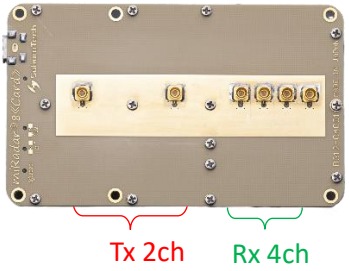
V-plane module Card size version（custom）

miRadar®8 (B279-01)



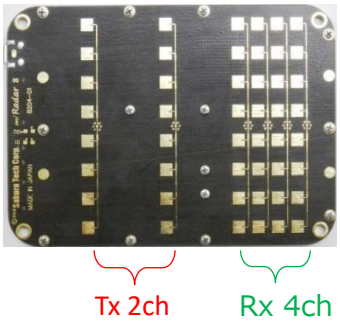
Connector version Card size version（custom）

miRadar®8 (B312-04C01)



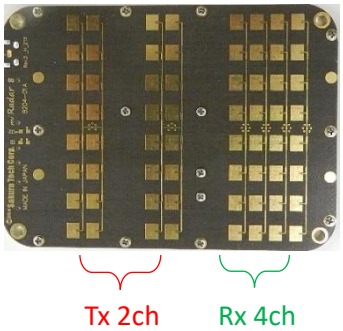
H-plane module(standard)

miRadar®8 (B204-01)



H-plane module（custom）

miRadar®8 (B204-06C01)

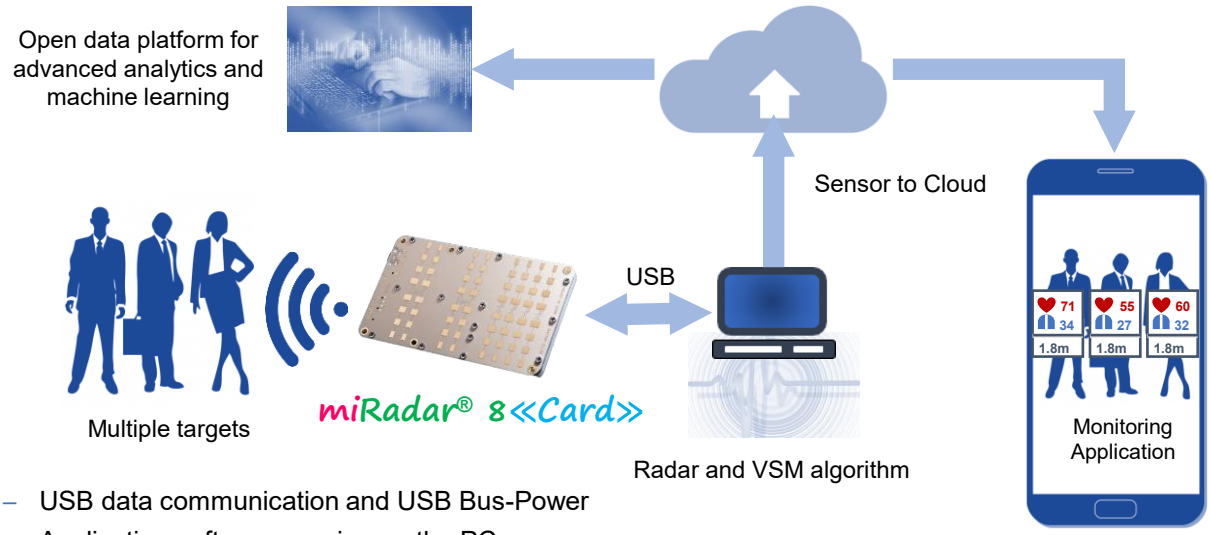


For those who purchase only modules and make their own software using the optional interface library, or those who purchase additional modules only.

Specifications:

- Radar methodology: MIMO FMCW 24 GHz (ARIB-STD-T73)
- Antenna: 2 Tx, 4 Rx
- Azimuth detection range: ±45°
- 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: B204 : 104×76×6mm
  B204 : 104×76×6mm
  B279/B312 : 91×55×6mm
- Interface: USB2.0, Micro B connector
- Power supply: +5 VDC, 1.5 A (max), powered via USB
- Operating temp. range: -20ºC to 60ºC

System configuration (example)



- USB data communication and USB Bus-Power
- Application software running on the PC

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

Visual Studio 2015 C++ version
The C++ SDK comes with a USB interface library for the module, along with a manual on how to use it. If you are creating your own signal processing software, you will need the SDK to interface with the USB module.
Compatible with Windows Visual Studio 2015. The SDK is a static library. If necessary, the library part is also available with source code, so please use it.

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

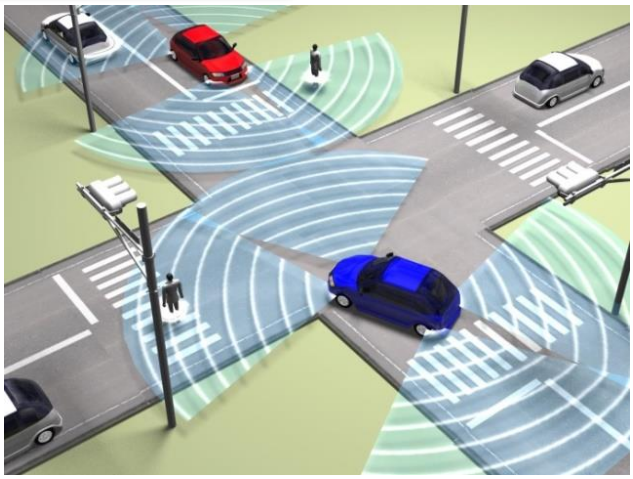
Linux (ubuntu x86/64) g++ version
This is the Linux version of the above C++ SDK. It is compatible with Ubuntu x86/x64. The Linux version is sold with source only.

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

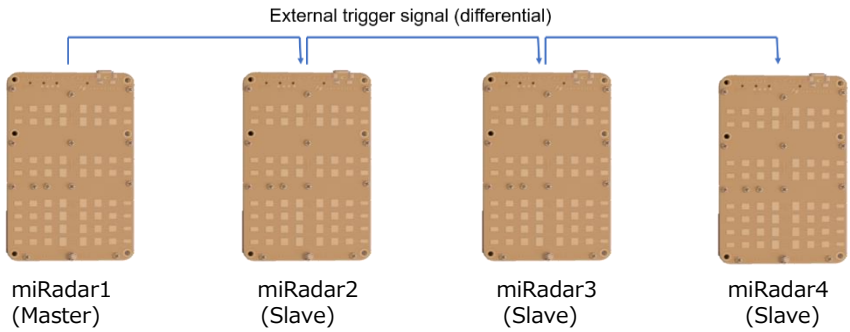
It is possible to develop a system software prototype using the results of signal processing for multiple radars.This SDK is a release that includes both Matlab p-code and m-code for the Professional version evaluation software mentioned above. The signal processing core is p-code, and the interface is m-code. By adding the system software code, it is possible to develop a prototype in a short period of time.

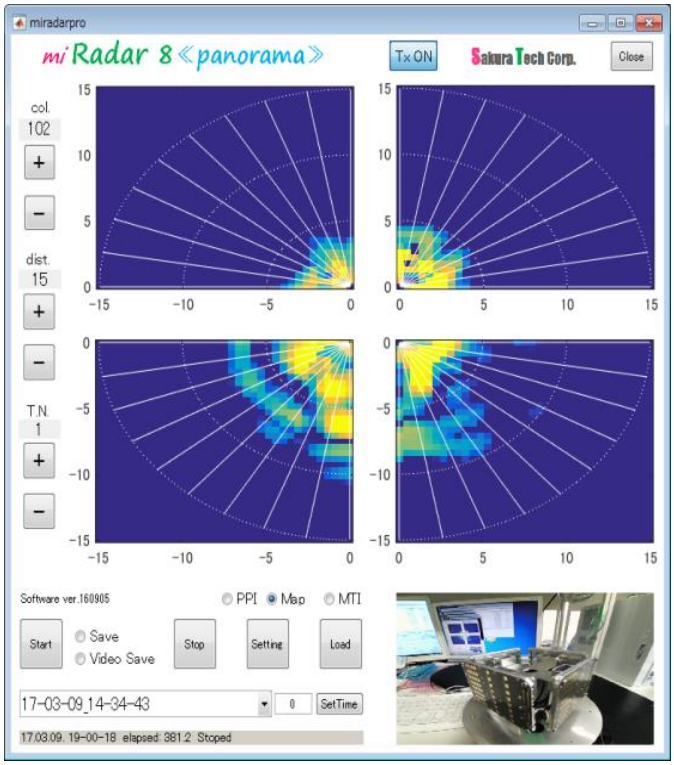
Evaluation software (Professional Version) (B204-SW004)

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.





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.

VSM evaluation software with tracking function(B279-SW016)

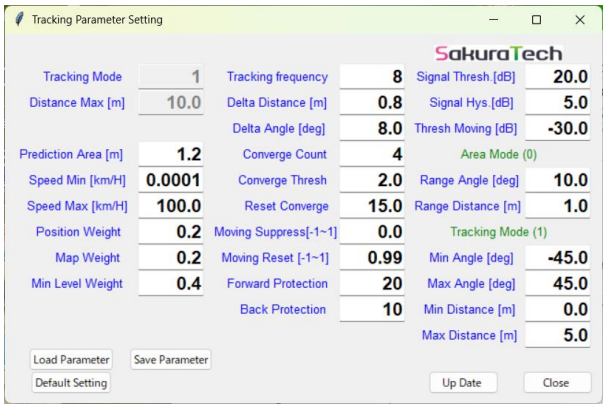
This is PC evaluation software that can perform the same signal processing as the Handy Vital Radar Sensor (B293-03) and the Vital Signs Monitor Sensor (B278-03).

・This evaluation software is included with the B293-03S and B278-03S, and allows you to play back raw data stored on a USB memory stick.

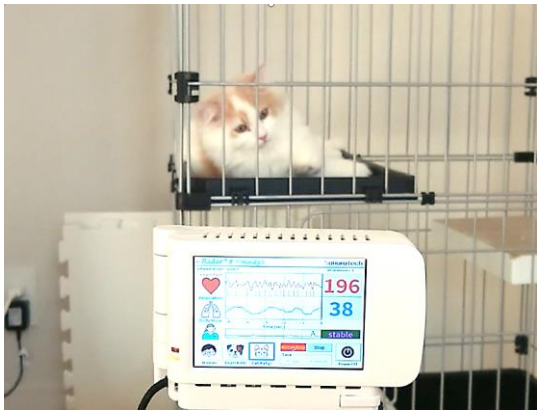
・If you purchase the B279/B312 radar sensor module separately and connect it via USB, you can process vital signals on your PC and simultaneously save raw data to the HDD.

Main Screen

VSM setting screen



Tracking settings screen



・Possible applications include monitoring the movements of residents and pets in care homes.

Ordering Guide

Product Name	Product Number	Comments	remarks
■miRadar®8　B204/B279/B312　module			
H-polarized module	B204-01	Standard Modules	
H-polarized module	B204-06C01	Custom module, Send 2 columns	
V-polarized module	B312-01	Standard Modules<<Card>>	
H-polarized module	B279-01	Custom module<<Card>>	
Connector module	B312-04C01	Custom module・No antenna<<Card>>	
■miRadar®8　B204/B279/B312　software			
Radar Evaluation Software	B204/B279-SW002	Obstacle detection Matlab executable	
VSM Evaluation software	B204/B279-SW007	For evaluating vital signs monitorsMatlab executable format	
Radar Evaluation Software	B204/B279-SW004	Professional Version　Matlab Execution format	
Radar Evaluation Software SDK	B204/B279-SW005	Professional Version　Matlab Source & P Code	
Interface SDK [Win版]	B204-OP001-01	C++ USB Interface SDK [Windows版] (Source included)	
Interface SDK [Win版]	B279/B312-OP001-01	C++ USB Interface SDK [Windows版] (Source included)<<Card>>	
Interface SDK [Linux版]	B204-OP001-02	C++ USB Interface SDK [Linux版] (Source included)	
Interface SDK [Linux版]	B279/B312-OP001-02	C++ USB Interface SDK [Linux版] (Source included)<<Card>>	
Interface SDK [Win版]	B204-OP001-01	C++ USB Interface SDK [Win版] (Source included)	
Interface SDK [Win版]	B279/B312-OP001-01	C++ USB Interface SDK [Linux版] (Source included)<<Card>>	
Interface SDK [Linux版]	B204-OP001-02	C++ USB Interface SDK [Linux版] (Source included)	
Interface SDK [Linux版]	B279/B312-OP001-02	C++ USB Interface SDK [Linux版] (Source included)<<Card>>	
B279 Calibration Software	B279-Comp01	Compensation tool Matlab<<Card>>	

miRadar®128 «3D»

24GHz MIMO
3D Radar Platform

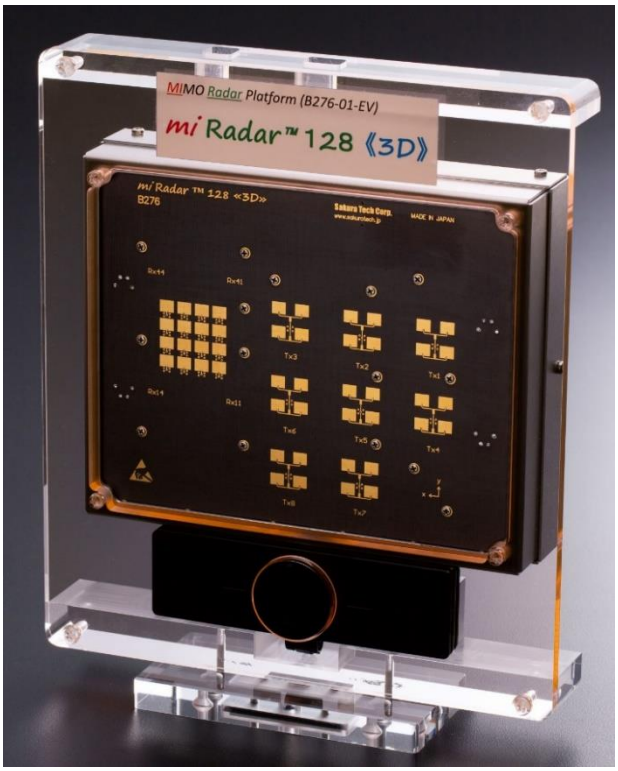
Preliminary

Overview

- miRadar®128 «3D» is a 24GHz 3D Radar platform with 3 dimensions Electric beam scan.
- With MIMO (Multi Input Multi Output) radar method, it makes possible to detect with accurate and wide 3 dimensions
- miRadar®128 ≪3D≫-EV is an evaluation kit is an evaluation platform and transmits receiving signal to the PC via high speed USB3.0, and it makes possible quick evaluation at field.
- Certified Japan Radio regulation

Application

- Obstacle avoidance (Drone, AGV, etc)
- Service Robot
- Vital sign detection
- People's flow line monitoring



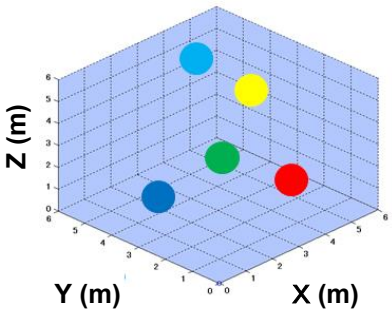
Overlayed Radar data into the camera image (Photo is a sample image)

- In the Up/Down/Left/Right 90° range, the system detects Heartbeat and Respiration data
- Detection distance: about 5m

Specifications

Radar Type:	MIMO FMCW 24GHz (ARIB-STD-T73)
Antenna:	8Tx, 16Rx
Electric Beam Range:	Azimuth (horizontal) ±45°, Elevation (Vertical) ±45°
Beam width:	Azimuth 10°, Elevation (Vertical) 10°
Scanning speed:	0.1s (at maximum speed) with Intel CORE i7 or equivalent MPU performance
Detection Range:	60m (max) @car, 5m (max) @Vital detection
Output Power:	1/7/13dBm, 3-levels
Module size:	117mm (W)×105mm (H) × 35mm (L) Including MIMO Patch Antenna and FPGA boards
Interface:	USB Type-C, USB camera: USB2.0 micro-B
Power Suplly:	DC+12V, 10W (average)
Option:	Customized version of originated Antenna layout and an IP in FPGA.

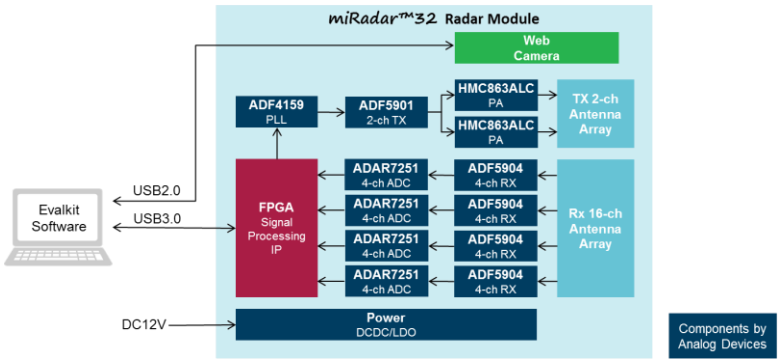
3 Dimension Target detection algorithm



Note: indicate the peak signal

Evaluation Kit block diagram

miRadar®128 «3D» EV



Ordering Guide

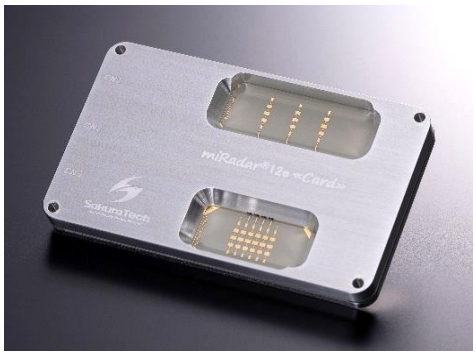
Product Name	Product Number	Comments
miRadar®128<3D>	B276-01	24GHz 3D radar platform

miRadar®12e

79GHz MIMO
Millimeter wave Radar Platform

Overview

- 79GHz millimeter wave Radar Sensor module
- Onboard Radar signal processing
- Multiple target detections with distance, azimuth, and velocity data
- High resolution (azimuth and distance): 10° , 0.1m
- USB/RS485/Ethernet(PoE) interface
- IP67 case option
- ROS compatible (ROS1 Noetic ROS2 Jazzy)



USB/RS485 I/F

Applications

- Collision avoidance
  Obstacle detection
- Target's Flow monitoring
  Intrusion detection

Custom option

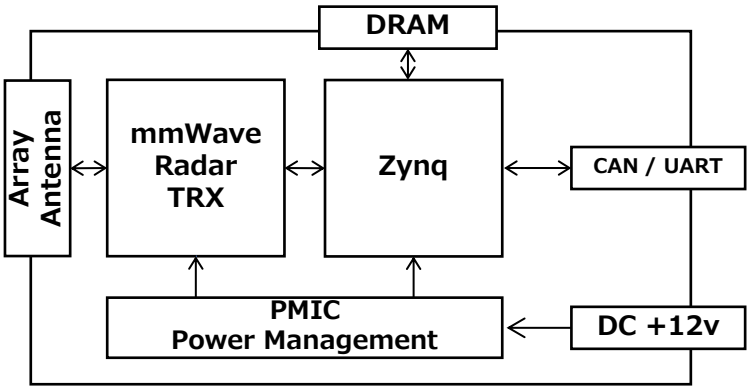
- 76GHz band (ARIB-T48) certification
- FoV modification / Antenna layout change

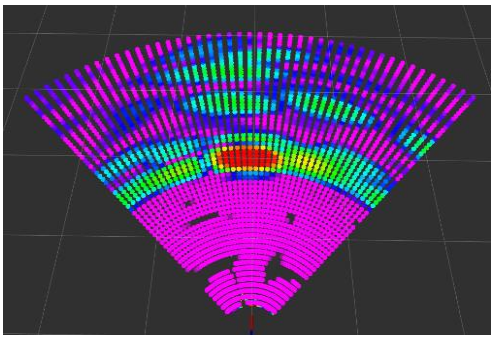
Ethernet(PoE) I/F

Specifications

	USB / RS485	PoE
Frequency	79GHz (ARIB STD-T111) certified	
Tx Power	10dBm (no license required)	
Radar type	MIMO FMCW	
MIMO virtual channels	Tx 3ch, Rx 4ch (12 elements)	
Detection Range	100m @car	
FoV	Elevation±12°, Azimuth±60°	
Resolution	Distance 0.1m, Azimuth 10°	
Number of Simultaneous detection	8	
Detection Speed	50km/h (@default condition)	
Update rate	10Hz	
Power supply	USB/DC12V, 10W (average)	PoE, 10W (average)
Interface	USB type-C / RS485	100Base-T + PoE
Size and weight	91 x 55 x 10mm 70g	210 x 150 x 55mm 580g

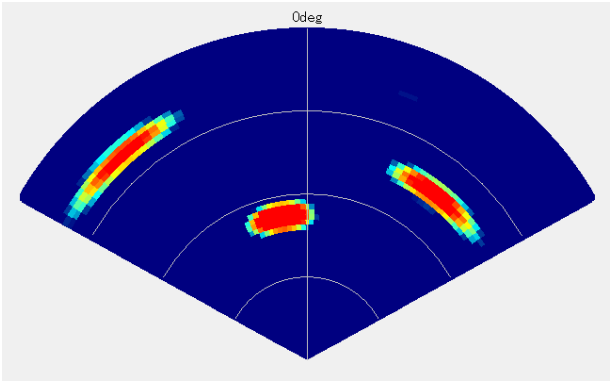
Hardware block diagram



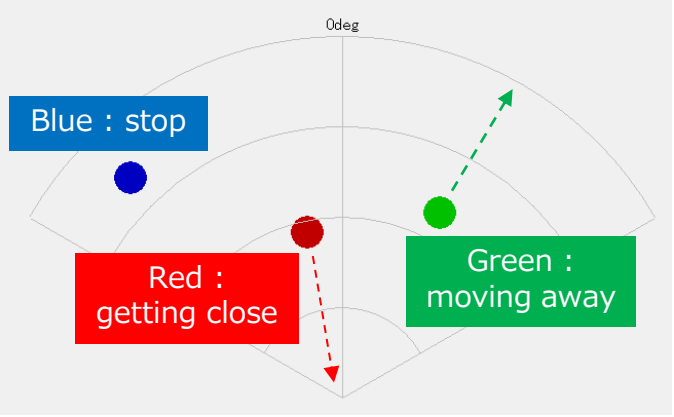


ROS RViz Point cloud

Sample software display example



MAP



PPI

Ordering Guide

Product Name	Product Number	Comments
miRadar®12e-USB	B290-021	79GHz MIMO Radar module, USB/RS485 interface
miRadar®12e-PoE	B290-051	79GHz MIMO Radar module, Ethernet(PoE) interface, with IP67 case
Mounting bracket	B290-OP06	for B290-021
Mounting bracket	DSU-026	for B290-051
Evaluation software	B290-SW001	includes source code

Note : Any product appearances, specifications, etc. are subject to change for improvement without prior notice. When exporting the product, confirm the country of destination, application, and customer. If any of them falls into an objective requirement, please take the necessary procedures, including export certificate application.

miRadar®48e-EV

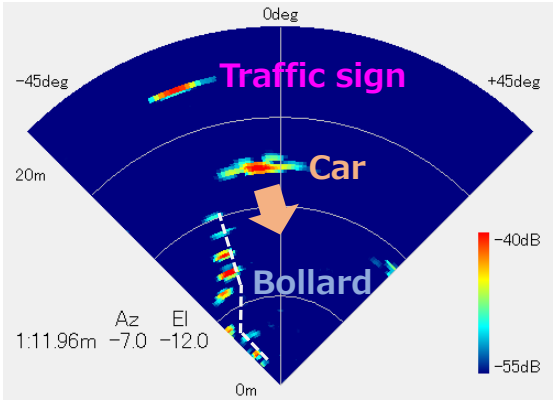
79GHz MIMO Radar Platform

FEATURES

- miRadar®48e is a 79GHz radar sensor module that can identify distance, azimuth angle, elevation angle, and speed of the target.
- High accuracy 3D detection by 48elements virtual array using MIMO technology
- Excellent distance resolution by 4GHz wide bandwidth
- USB3.0 super speed interface

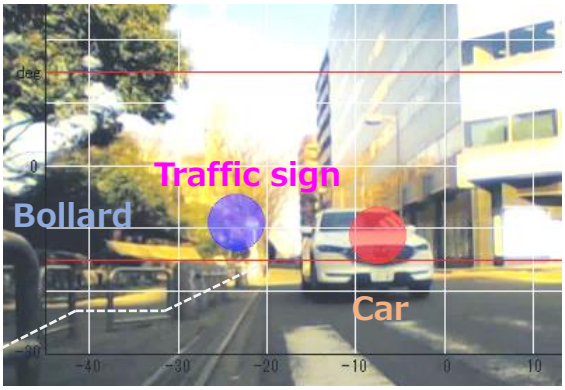
APPLICATIONS

- Obstacle detection system for drone and AGV
- Traffic monitoring system
- Blind spot monitoring system for construction machine
- Social welfare service robot
- Respiratory monitor human sensor
- Human tracking system …etc

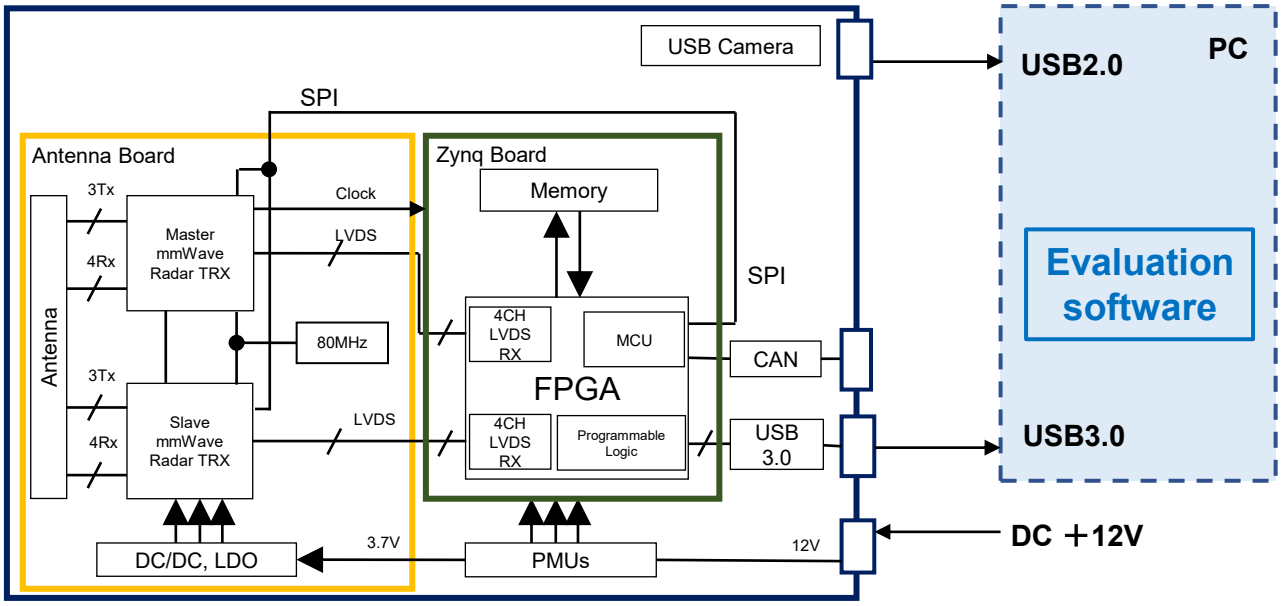


SPECIFICATIONS

– Frequency:	79GHz
– Type of radar system:	MIMO FMCW 79GHz (ARIB-STD-T111 Japan)
– Output power:	10 dBm
– Number of antenna:	Tx 6ch, Rx 8ch
– Detection angle:	Elevation ±10° & Azimuth ±45°
– Resolution:	Distance 0.1m & Azimuth 3°/6°
– Size(mm):	150 x 205 x 60
– Interface:	USB Type-C for radar USB 2.0 for camera
– Power:	DC+12V, 15w

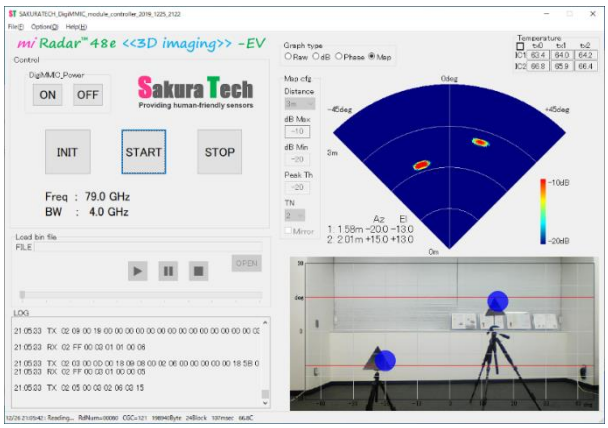


BLOCK DIAGRAM



EVALUATION SOFTWARE

- Hardware setup & control
- Indicate status information, Raw data, FFT, and distance vs Amplitude & Phase
- Load and Save data function, and CSV file conversion
- Polar chart
- Target detection, distance and angle (Az & El)
- Speed detection
- Overlayed Radar data into the camera image



GUI

Ordering Guide

Product Name	Product Number	Comments
miRadar®48e SK1	B283-01	79GHz MIMO Radar Eval Kit, Antenna Pattern SK1, 2Tx / 8Rx (virtual 16ch)
miRadar®48e SK2	B283-02	79GHz MIMO Radar Eval Kit, Antenna Pattern SK2, 4Tx / 8Rx (virtual 32ch)
miRadar®48e SK3	B283-03	79GHz MIMO Radar Eval Kit, Antenna Pattern SK3, 6Tx / 8Rx (virtual 48ch)

miRadar® ≪CbM≫

Contactless CbM Sensor with millimeter wave radar

Features

- Using 79GHz millimeter wave radar technology
- On-board SoC FPGA for embedded radar processing to improve data throughput
- Contactless measurement regardless any mechanical resonance
- Wideband vibration measurement up to 40KHz
- Spot vibration sensing with narrow FoV
- Available to detect around 0.03um vibration (peak-to-peak amplitude)
- Measuring high temperature machine due to contactless
- PoE (Power over Ethernet)

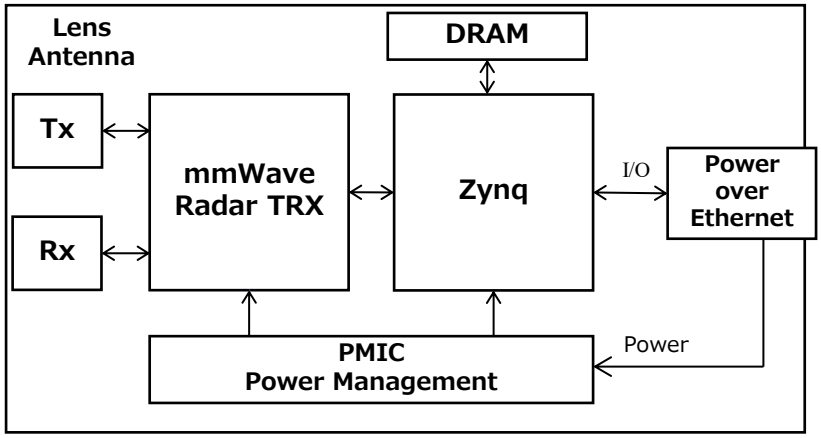
Applications

- CbM (Conditional Based Maintenance)
  - 24/7 continuous condition monitoring for precision equipment
  - Periodic inspection
  - Remote monitoring
- Research and development

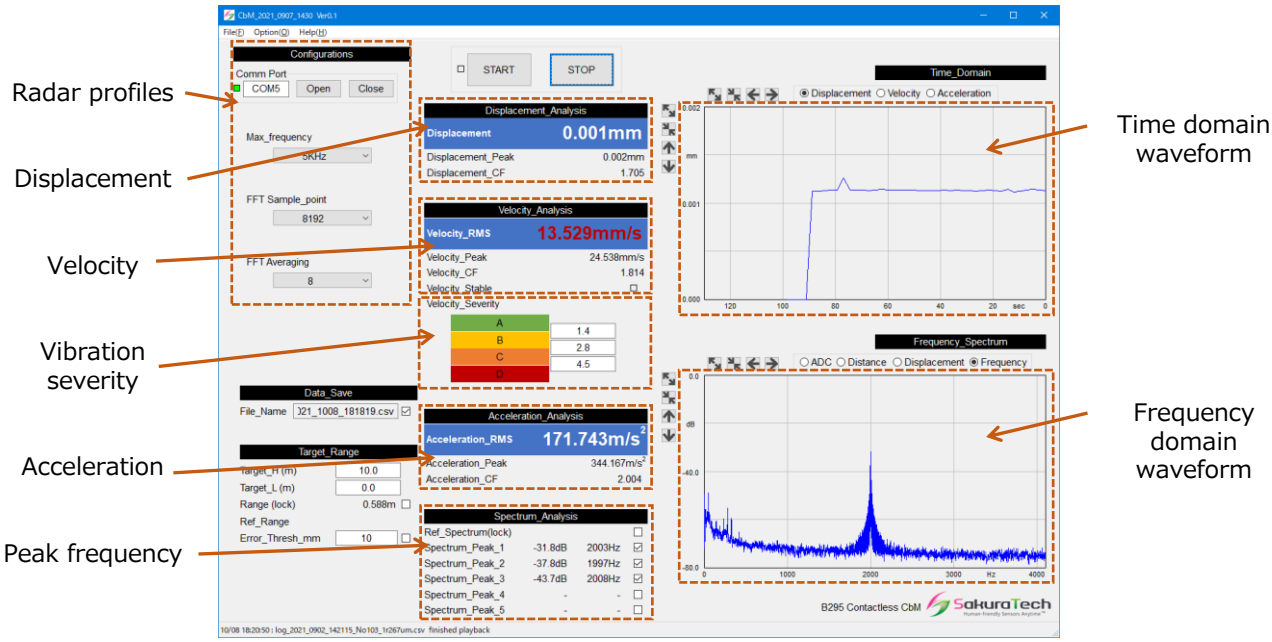
Specifications

Frequency	79GHz (ARIB STD-T111) certified
Tx Power	10dBm (no license required)
Radar type	FMCW
Detection range	<5m (for vibration sensing)
FoV	±3°
Range accuracy	<20mm
Displacement accuracy	<0.5um (0-Pk)
Vibration peak detection accuracy	<0.05um (@Frequency response 0-Pk)
Vibration frequency	max. 10KHz (B295-01) / 40KHz (B295-02)
Protection	IP65
Power	PoE 10Watts avg.
Interface	100BASE-T + PoE
Size (W x H x D)	139 x 150 x 80 mm

Hardware block diagram



Reference application software



Saves data to CSV file.

Ordering Guide

Product Name	Product Number	Comments
miRadar® CbM	B295-01	Vibration frequency range <10KHz
miRadar® CbM	B295-02	Vibration frequency range <40KHz
miRadar® CbM	B295-03	Vibration frequency range 0.05 to 20Hz

Note : Any product appearances, specifications, etc. are subject to change for improvement without prior notice. When exporting the product, confirm the country of destination, application, and customer. If any of them falls into an objective requirement, please take the necessary procedures, including export certificate application.

miRadar® ≪Scope≫

79GHz mm-wave Radar Distance Sensor

Features

- Using 79GHz millimeter wave Radar technology
- On-board SoC FPGA for embedded radar processing to increase data throughput
- Built-in lens antenna enables narrow range measurement
- Detection distance range 200m< （@20dB Trihedral Corner Reflector）
- Range accuracy <±10mm
- IP65 case
- Ethernet interface
- PoE （ Power over Ethernet ）

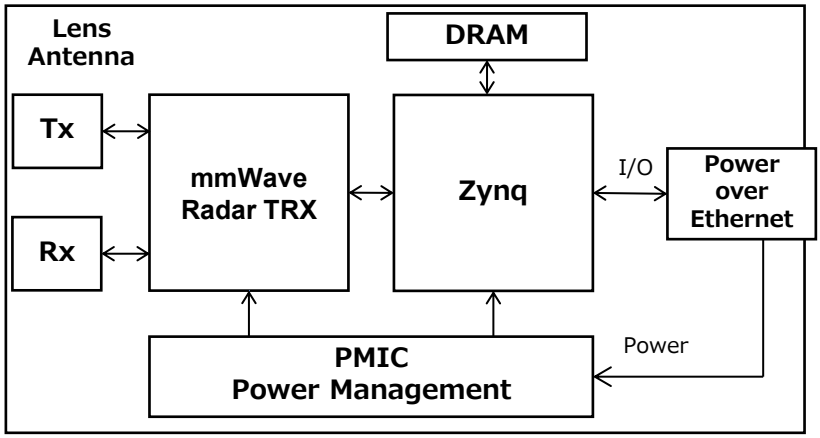
Applications

- Distance measurement
- Water level measurement
- Displacement measurement of structures …etc

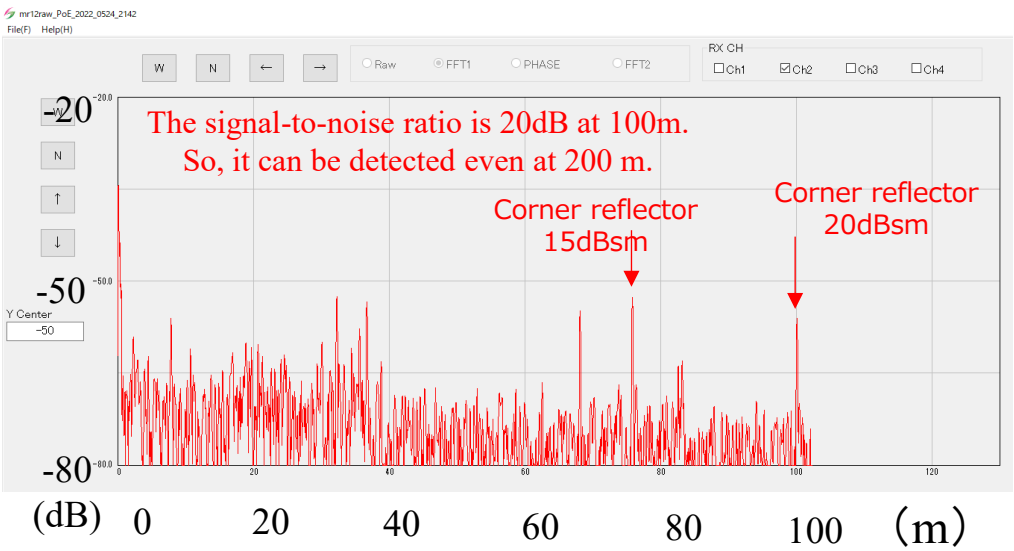
Specifications

Frequency	79GHz (ARIB STD-T111) certified
Tx Power	10dBm (no license required)
Radar type	FMCW
Detection distance range	200m< @20dB Trihedral Corner Reflector
FoV	±3°
Range accuracy	<10mm
Protection	IP65
Power	PoE 10Watts avg.
Interface	100BASE-T + PoE
Size （ W x H x D ）	139 x 150 x 80 mm

Hardware block diagram



Target detection example （distance 100m）



The measurement data is saved to a CSV file.

Example of L-shaped mounting bracket installation

Ordering Guide

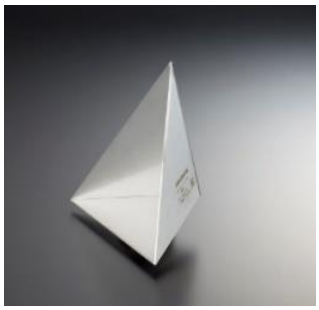
Product Name	Product Number	Comments
miRadar® Scope	B314-01	79GHz mm-wave radar distance measure
L-shaped mounting bracket	DSU-026	

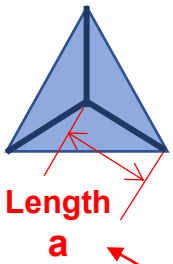
Note : Any product appearances, specifications, etc. are subject to change for improvement without prior notice. When exporting the product, confirm the country of destination, application, and customer. If any of them falls into an objective requirement, please take the necessary procedures, including export certificate application.

Trihedral Corner Reflector
DsA004-T Series

Features

- Stainless construction.
- Radar system calibration
- Camera Tripod connection
- Gold plate finish available

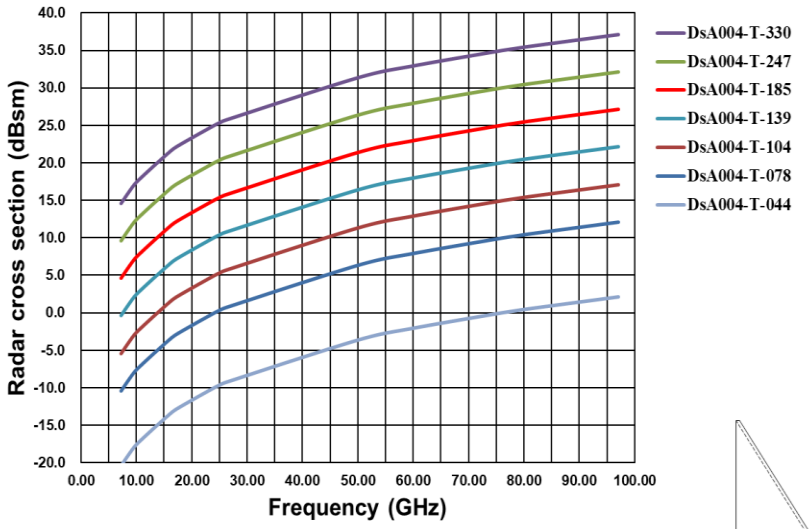


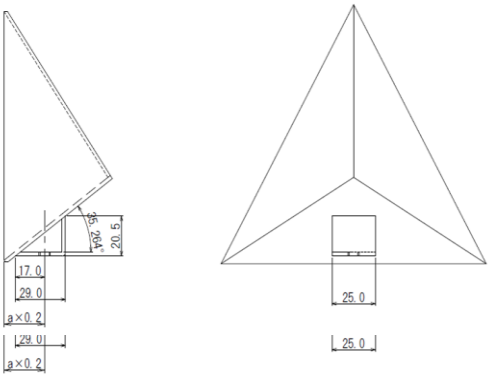


Specifications

Trihedral Corner Reflector

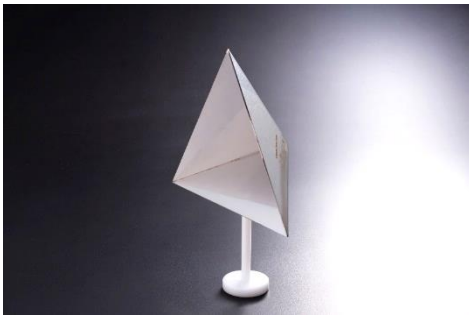
型名	DsA004-T-044		DsA004-T-078		DsA004-T-104		DsA004-T-139		DsA004-T-185		DsA004-T-247		DsA004-T-330	
長さ a [m]	0.0439		0.078		0.104		0.139		0.185		0.247		0.33	
重さ [kg]	0.06		0.15		0.25		0.4		0.65		1.3		2.2	
[GHz]	[m^2]	[dBSm]	[m^2]	[dBSm]	[m^2]	[dBSm]	[m^2]	[dBSm]	[m^2]	[dBSm]	[m^2]	[dBSm]	[m^2]	[dBSm]
7.25	0.009	-20.4	0.1	-10.4	0.3	-5.4	0.9	-0.4	2.9	4.6	9.1	9.6	29.0	14.6
8.75	0.013	-18.8	0.1	-8.8	0.4	-3.8	1.3	1.2	4.2	6.2	13.3	11.2	42.3	16.3
10.25	0.018	-17.4	0.2	-7.4	0.6	-2.4	1.8	2.6	5.7	7.6	18.2	12.6	58.0	17.6
16.00	0.044	-13.5	0.4	-3.6	1.4	1.4	4.4	6.5	14.0	11.4	44.3	16.5	141.3	21.5
18.00	0.056	-12.5	0.6	-2.5	1.8	2.5	5.6	7.5	17.7	12.5	56.1	17.5	178.8	22.5
24.15	0.101	-10.0	1.0	0.0	3.2	5.0	10.1	10.1	31.8	15.0	101.0	20.0	321.9	25.1
25.00	0.108	-9.7	1.1	0.3	3.4	5.3	10.9	10.4	34.1	15.3	108.3	20.3	345.0	25.4
26.00	0.117	-9.3	1.2	0.7	3.7	5.7	11.7	10.7	36.9	15.7	117.1	20.7	373.1	25.7
50.00	0.432	-3.6	4.3	6.3	13.6	11.3	43.4	16.4	136.3	21.3	433.1	26.4	1379.8	31.4
60.00	0.622	-2.1	6.2	7.9	19.6	12.9	62.5	18.0	196.3	22.9	623.6	27.9	1987.0	33.0
76.00	0.998	0.0	10.0	10.0	31.4	15.0	100.4	20.0	314.9	25.0	1000.6	30.0	3188.0	35.0
77.00	1.025	0.1	10.2	10.1	32.3	15.1	103.0	20.1	323.2	25.1	1027.1	30.1	3272.4	35.1
79.00	1.079	0.3	10.8	10.3	34.0	15.3	108.4	20.4	340.2	25.3	1081.1	30.3	3444.6	35.4
81.00	1.134	0.5	11.3	10.5	35.7	15.5	114.0	20.6	357.7	25.5	1136.6	30.6	3621.3	35.6
97.00	1.626	2.1	16.2	12.1	51.2	17.1	163.5	22.1	512.9	27.1	1629.9	32.1	5193.2	37.2



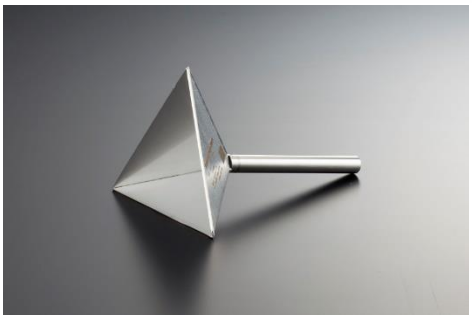


Mounting section diagram a=0.078~0.139m example

▪ Option



Example of POM dedicated stand installation (optional)
Note: Can be installed up to DsA004-T-139



With handheld shaft (optional)

In addition to standard products, we can custom-make sizes that are optimal for the frequency you use. Please contact us.

Gold-plated brass cut version for higher frequency measurement. Photo showsDsA004-T-044P,
DsA004-T-033P, DsA004-T-025PPOM stand is optional.

Spherical Reflector DsA004-SPH Series

Features

- Used as a reference for radar systems.
- High sphericity, error ±0.5mm
- Aluminum material (lightweight)
- Because it is spherical, it reflects accurately regardless of the angle (omnidirectional).
- The radar cross section is constant and has no frequency dependence
- Can be attached to a camera tripod

Specification

Product Name	diameter (mm)	Weight(g)	Radar cross section	
			m^2	dBsm
DsA004-SPH-50	50	177	0.002	-27.07
DsA004-SPH-100	100	1,360	0.008	-21.05
DsA004-SPH-200	200	4,300	0.031	-15.03

miRadar®8 Optional Services

Custom design service for GUI and signal processing software

We accept special signal processing and application software development.
Please contact us.

Customized design services for hardware (antenna, outer shape, etc.)

Please contact us a customization requirement in terms of different antenna design such as layout change and/or increasing number of elements such as from 4ch to 8ch and 16ch.

E-mail Technical Support (Bxxx-OP100)

We recommend to add Technical Support package in case of first-time usage of the evaluation board



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SAKURA TECH CORPORATION

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