

Systems · Electronics · Intelligence · Semiconductors

WE MAKE RF SMART

# PRODUCT BROCHURE

Nanjing · Shanghai · Suzhou · Shenzhen



# ICLEGEND MICRO

ICLEGEND MICRO is committed to developing high-performance wireless SoC and making RF technology smart. Our products and technologies cover broad wireless applications such as millimeter wave sensors, next generation mobile communication, satellite internet, etc.

The team of the company consists of senior technical and management experts, with rich experience of globe leading IC technology R&D, management, and entrepreneurship, and accelerates the high-end RFIC product development.

Upholding the principle of technological innovation as core value, the company develops revolutionary chip and micro-system products, grants smart devices with wireless perception, cognition, and communication abilities, and makes every effort to promote wireless technology breakthrough in high-end applications with the integration of system-on-chip, modules, software, and algorithms, etc.

## Contents

### Breakthrough Metric boost

#### Power consumption

low power consumption, battery powered

#### SoC Size

Compact size in 4mm x 4mm

#### Cost-effective

Rapid development reduces costs

SoC Selection Table	2
SoC   AiP series	3
SoC   S3 series	4
SoC   S5 series	5
EZ-XENSOR Product Selection Table	7
Module Product   D series	8
Module Product   G series	12
Module Product   P series	14
ONELAB Development Tool	16
Evaluation Board Selection Table	17
Evaluation Board   EVB series	18
Development Kit Selection Table	21
Development Kit   DEV series	23



**Motion & Human Presence**



**Range & Velocity Measurement**



**Gesture Recognition**



**Vital Signs Monitoring**



1T1R 1T2R

nTnR

24 GHz

24 GHz MIMO

60GHz MIMO

24 GHz

60GHz 77GHz

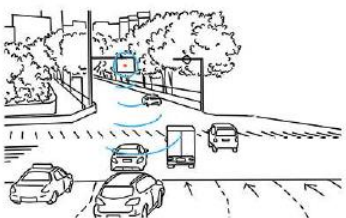
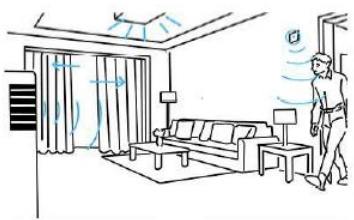
### S3 series 24 GHz



#### Lightweight and Easy to use

1T1R

- Intelligent Space Management
- Human Presence Detection
- Range Measurement
- Gesture Recognition



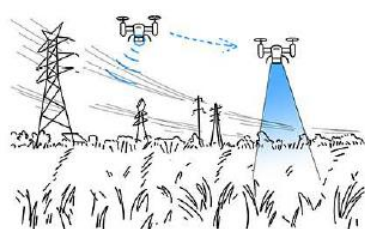
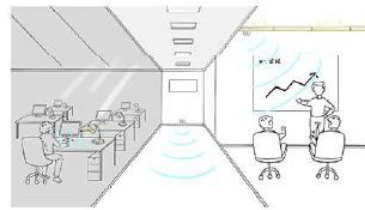
### S5 series 24 GHz



#### Flexible and practical

1TnR

- Positioning and Tracking
- Body sensing
- Space division
- High-accuracy, wide coverage



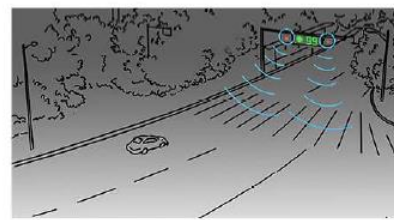
### S7 series 24 GHz



#### Extreme performance

nTnR

- Long-range detection
- Multi-target tracking
- 4D imaging
- Large-scale space management



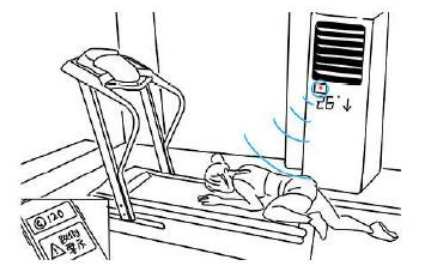
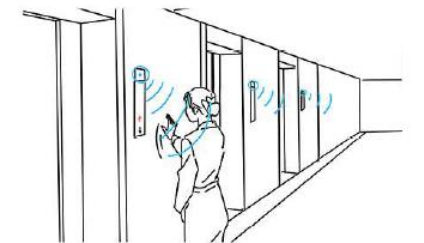
### S7 series 60GHz



#### Ultra-high precision

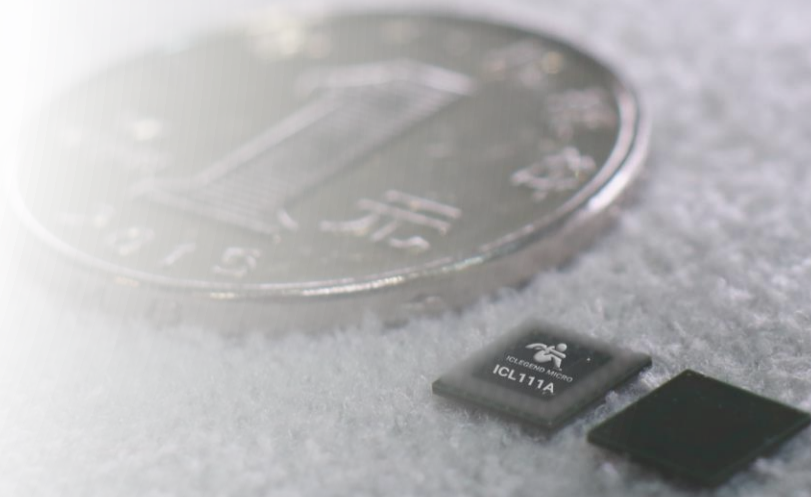
nTnR

- Precise Space Management
- Gesture Recognition
- Fall Detection



## Sensor SoC series | Selection Table

Category	Parameter Indicator	ICL111A	ICL1112	ICL1122	S5KM312CL
Chip Architecture	Transceiver channels	1T1R AiP	1T1R	1T2R	
	AiP Antenna	Support		/	
	Low Power Mode	Support 55 $\mu$ A @0.3% duty cycle	Support	Support 70 $\mu$ A @0.3% duty cycle	/
Receiver	Cascading Extension <small>includes RF and synchronization signals</small>	No		Support	
	Noise figure	10 dB (E.I.N.F)	10 dB		10.5 dB
Transmitter	Power control range	1~9 dBm (E.I.R.P.)	0~12 dBm		9~12dBm
	High precision power control	1dB	MIN. 0.25dB		MIN. 1dB
	Transmission power detection		Support		/
Frequency Synthesizer	Frequency modulation bandwidth		24~25 GHz		23~27 GHz
	Phase noise <small>includes fractional division</small>		-97 dBc/Hz		-91dBc/Hz
	rms frequency modulation error 250MHz @24GHz FCC/CE		<0.045%		<0.5%
DSP/ADC	Zero-padding super resolution		Support		/
	Maximum 1D/2D FFT points		256/1024		
	On-chip target detection mechanism		CFAR		2D FFT peak value
Data Interface	16-bit ADC sampling rate		312.5K~2.5MHz programmable		2.5MHz
	SPI interface type		Slave/Master		Slave
Chip Appearance	SPI transmission rate		2 x 25 Mbps		2 x 16.67 Mbps
	Package type and size	FCCSP 5.5 x 5.5 mm		QFN32 4 mm x 4 mm	
Single chip operation		Yes		No	



# ICL111A 1T1R

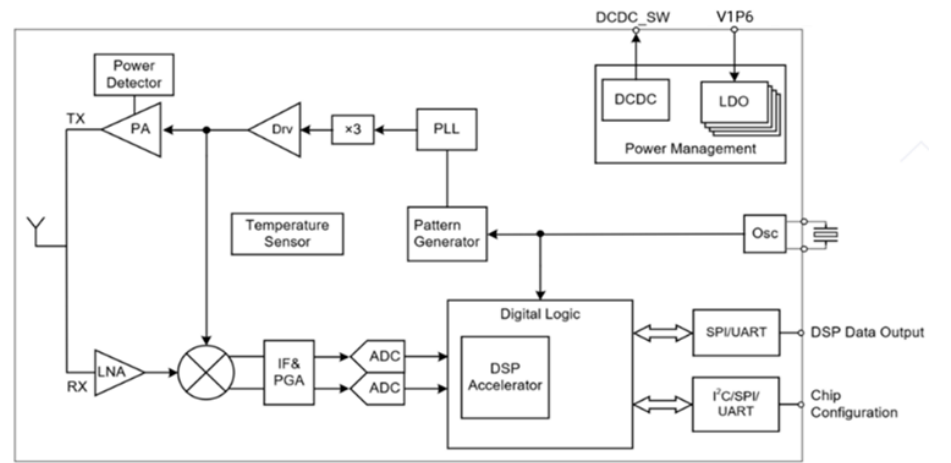
24GHz 1T1R mmWave AIP Sensor SoC

The ICL111A stands as an unique advantageous 24 GHz mmWave AIP sensor SoC with patent protected AIP antenna design and  $\mu\text{A}$ -level ultra-low power consumption. This chip presents a fully integrated mmWave sensing solution, consisting of mmWave antenna, full transceiver and signal processing system. ICL111A requires fewer external peripherals, brings much smaller size of sensor modules, provides more convenience for design and production, has better environmental adaptability.

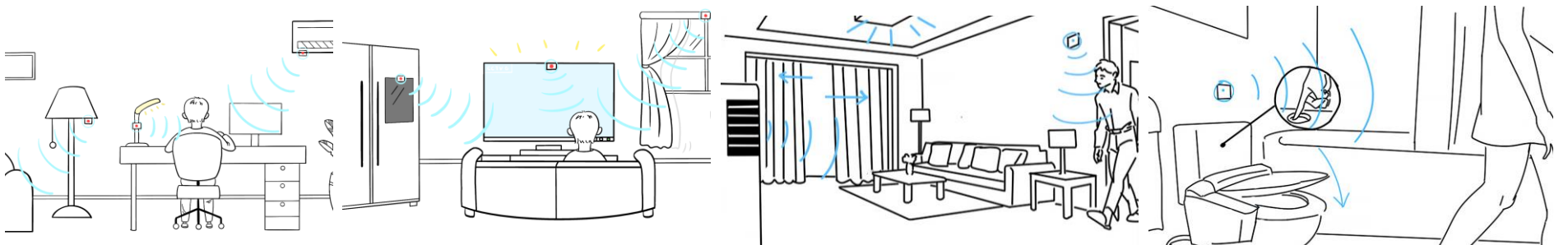
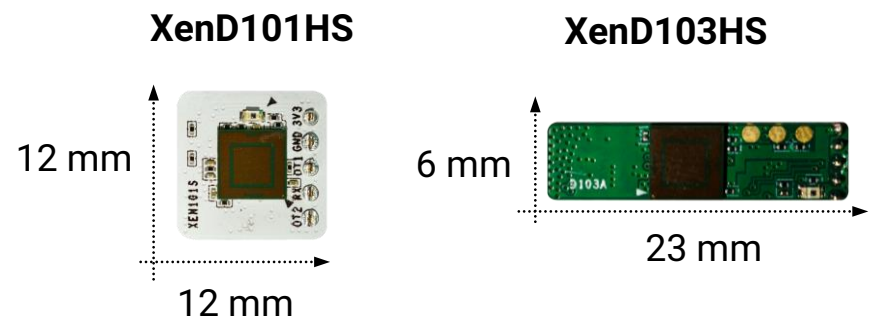
Key Parameters	ICL111A
Channel	1T1R
Typical Operation Frequency	24 - 24.25 GHz
Modulation Bandwidth	250 MHz
Max TX E.I.R.P effective isotropic radiated power	9 dBm
Beam width	90° @-3 dB   120° @-6 dB
FMCW Ramp Rate	Max. 20 MHz/ $\mu\text{s}$
Frequency Error	0.045% @250 MHz FCC/CE compliant
E.I.N.F. effective isotropic noise figure	10 dB
PLL Phase Noise	-97 dBc @1 MHz
ADC	2.5 MHz/16 bit
DSP	Super-Resolution/ Filter/CFAR Detection etc.
Interface	I2C/SPI/UART
Operating Voltage	3.0 - 3.6 V
Average Current	55 $\mu\text{A}$ @0.3% duty cycle
Power control precision	(Minimum) 0.5 dB
High-precision TX Power Control/Detection	Support
Package	5.5 x 5.5 mm, FCCSP

## Features

- Smaller sensor module size:** the sensor module can be as narrow as 6mm, enabling integration into various compact spaces.
- Convenient for design and production:** no antenna development or high frequency board processing is required, which significantly shortens time to market.
- Good for mass production:** no mass production experience of mmWave modules is required, which enables the rapid mass production.
- Supper low power consumption:** capable of  $\mu\text{A}$ -level battery-powered operation



ICL111A Block Diagram



Smart Application      Screen wakeup      Space management      Human machine interaction

# ICL1112 1T1R

## 24GHz 1T1R mmWave Sensor SoC



The ICL1112 stands as an industry-leading  $\mu$ A-level 24 GHz mmWave sensor SoC, boasting an impressive combination of ultra-low power consumption (a mere 55  $\mu$ A in a typical working scenario) and remarkable long-range detection capability (extending beyond 150 meters). This chip presents a fully integrated mmWave sensing solution, with all transceiver and signal processing paths consolidated onto a single, robust CMOS chip. With fewer external peripherals and enhanced user-friendliness, it ushers in a new era of convenience. The latest enhancements not only cater to battery-powered applications but also empower extended-range monitoring in consumer scenarios. This innovative solution offers an ideal fit for a wide spectrum of sensor applications, facilitating the detection of human movement and even life presence. The ICL1112 is set to redefine sensor technology.

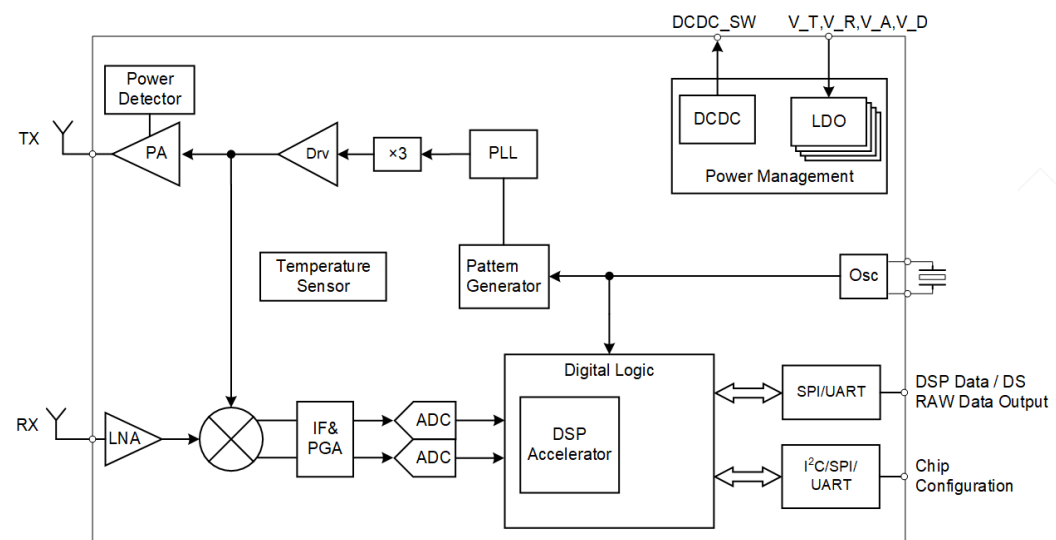
Key Parameters	ICL1112
RF Channel	1T1R
Operating Frequency Range	24 ~ 25 GHz
Max. TX Output Power	12 dBm
FMCW Ramp Rate	Max. 20 MHz/ $\mu$ s
Frequency Modulation Error	0.045% @250 MHz, FCC/CE compliant
RX Noise Figure	10 dB
PLL Phase Noise	-97 dBc @1 MHz
ADC	2.5 MHz/16 bit
DSP	Super-Resolution/Filter/CFAR Detection etc.
CFAR	Support
Interface	I2C/SPI/UART
Supply Voltage	3.0 ~ 3.6 V
Average Current Consumption	55 $\mu$ A @0.3% duty cycle
High-precision TX Power Control/Detection	Support
Temperature	QFN32/4 mm x 4 mm

### Features

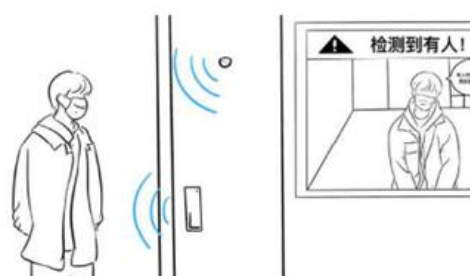
Single-chip SoC solution, with integration of 1 Tx, 1 Rx, ADC, PLL, DSP, PMIC. Powerful on-chip algorithms such as super-resolution, filtering and CFAR object detection for real-time detection of target's distance and velocity.

Capable of  $\mu$ A-level battery-powered operation with the integration of power management and multiple low-power mode and suitable for ultra-low power consumption AIoT applications.

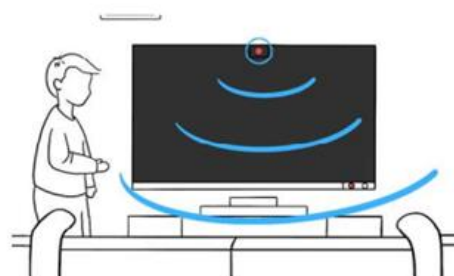
Extremely low-frequency modulation error, large dynamic range and excellent RF performance. Capable of high precision and wide range detection, suitable for human presence detection.



ICL1112 SoC block diagram



Low Energy Smart Homes Devices and Smart Lock



Human Presence Sensor Smart Appliances



Distance and Velocity Detection Radar for Two-wheelers

# ICL1122 1T2R

## 24GHz 1T2R mmWave Sensor SoC



The ICL1122 represents a cutting-edge  $\mu$ A-level 24 GHz mmWave sensor SoC, ushering in the next generation of sensor technology. This remarkable SoC boasts several outstanding features, including ultra-low power consumption (typically operating at a mere  $70\mu\text{A}$ ), exceptional positioning and detection capabilities across extended ranges and vast areas. The SoC seamlessly integrates the full functionality of a robust sensor into a single CMOS chip, encompassing everything from the mmWave transceiver to baseband signal processing. Moreover, its limitless cascading functionality allows for the unlimited expansion of sensing arrays, with other ICL1122s providing support. With fewer external peripherals and enhanced user-friendliness, this chip heralds a new era of convenience. These latest enhancements cater not only to battery-powered applications but also empower extended-area monitoring and positioning in various consumer scenarios. This innovative solution is ideally suited for a wide range of sensor applications, including multiple indoor object tracking and traffic vehicle pedestrian monitoring.

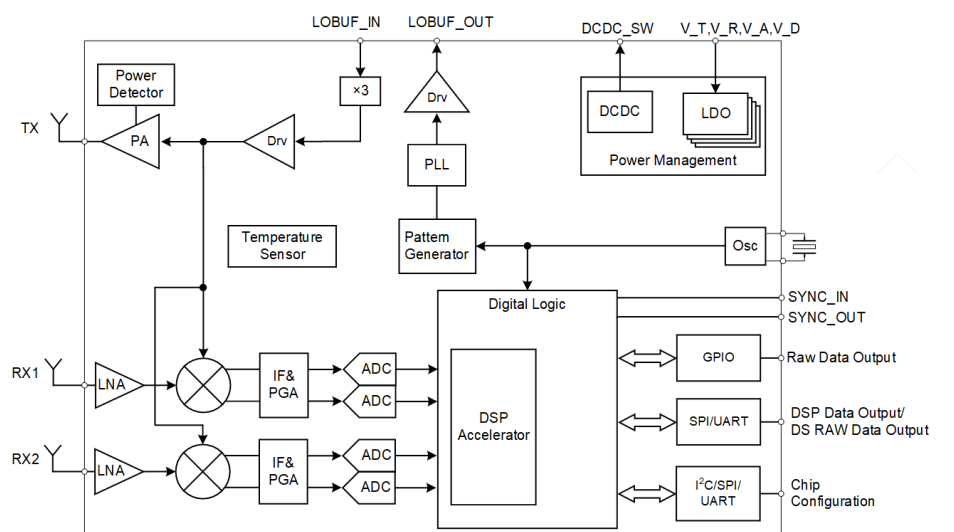
Key Parameters	ICL1122
RF Channel	1T2R
Operating Frequency Range	24 ~ 25 GHz
Max. TX Output Power	12 dBm
FMCW Ramp Rate	Max. 20 MHz/ $\mu\text{s}$
Frequency Modulation Error	0.045% @250 MHz, FCC/CE compliant
RX Noise Figure	10 dB
PLL Phase Noise	-97 dBc @1 MHz
ADC	2.5 MHz/16 bit
DSP	Super-Resolution/Filter/ CFAR Detection etc.
CFAR	Support
Interface	I2C/SPI/UART
Supply Voltage	3.0 ~ 3.6 V
Average Current Consumption	70 $\mu\text{A}$ @0.3% duty cycle
High-precision TX Power Control/Detection	Support
Temperature	QFN32/4 mm x 4 mm

### Features

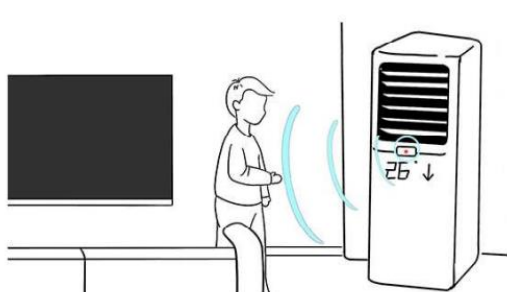
Single chip SoC solution, with integration of 1 Tx, 2 Rx, ADC, PLL, DSP, PMIC. Powerful on-chip algorithms such as super-resolution, filtering and CFAR object detection for real-time detection of multiple target distances, velocities, and angles.

Extremely low frequency modulation error, large dynamic range, capable of detecting both far and near targets. Excellent RF performance, combined with multiple-chip cascading capability, enables high-precision multiple target localization over 150 meters.

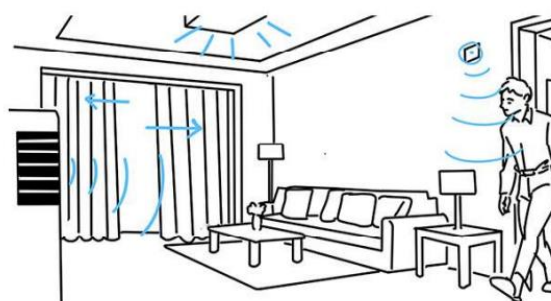
Capable of  $\mu\text{A}$ -level battery-powered operation with the integration of power management and multiple low-power mode.



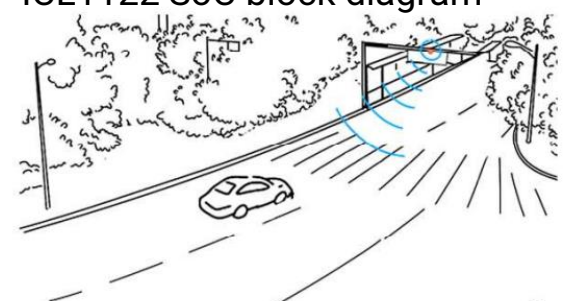
ICL1122 SoC block diagram



Multi-persons Tracking Detection  
Smart Appliances



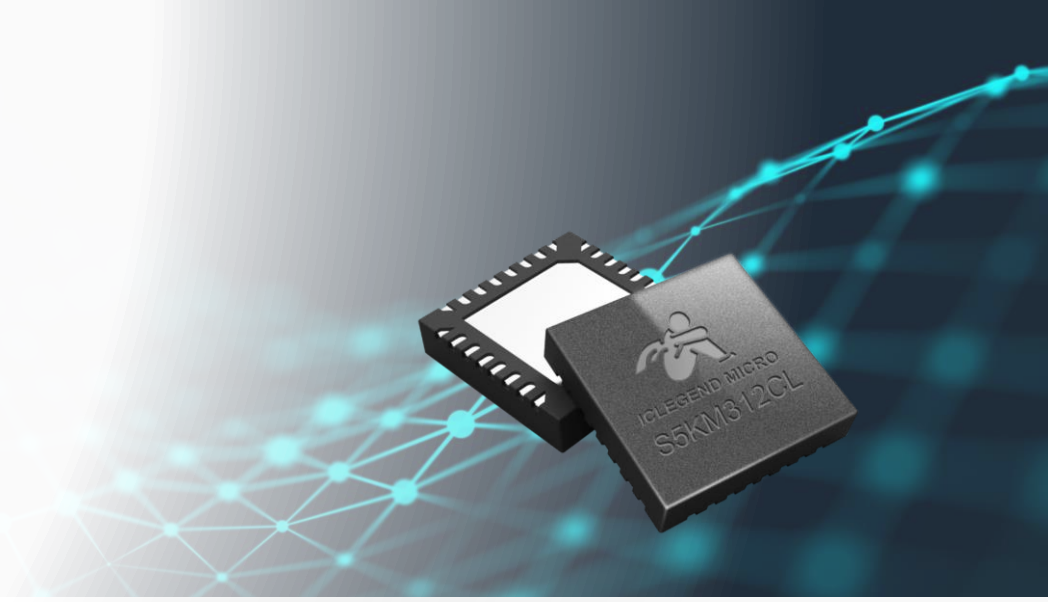
Human Position Perception  
Smart Home



Long-range Distance and Velocity Detection  
Intelligent Transportation

# S5KM312CL 1T2R

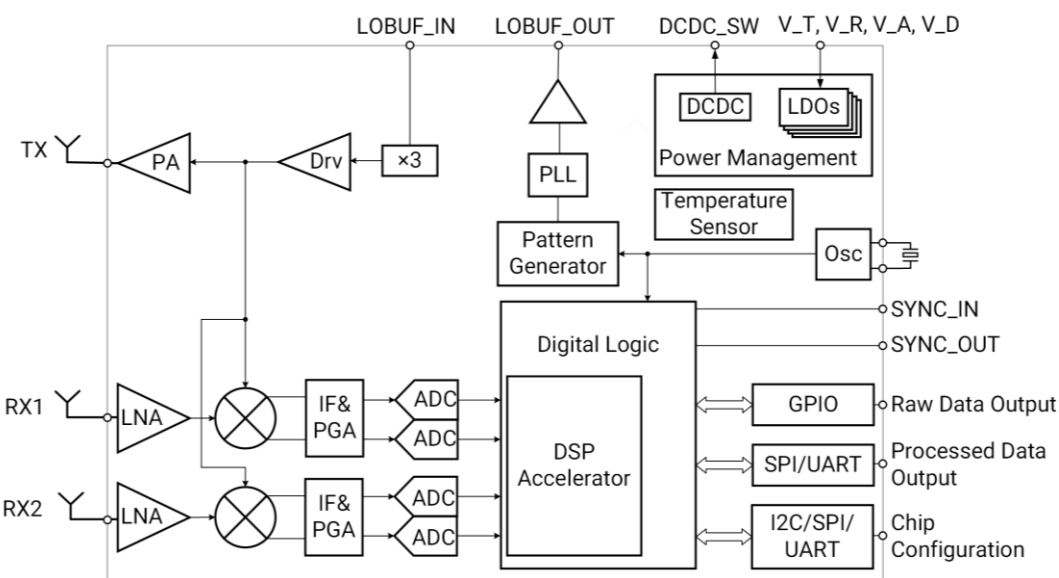
## S5 series | mmWave Sensor SoC



S5KM312CL is an 1T2R mmWave sensor SoC features high-performance mmWave DSP, ultra-high detection precision satisfying requirements of various AIoT applications, and over 4 GHz sweeping bandwidth providing centimeter level high resolution. S5KM312CL supports cascading applications, presenting supreme performance in compact size.

Key Parameters	S5KM312CL
Channels	1T2R
Frequency	22.5 ~ 27.5 GHz
Bandwidth	4 GHz
Cascade	Support
TX Max. power* (including ADC)	12 dBm
RX noise figure (RF/BB/ADC)	10.5 dB
Adjustable receive gain	15~31 dB
PLL phase noise @ 1mhz offset	-97 dBc @ 1 MHz
ADC Sample Rate	2.5 MSPS
ADC Precision	16 bits
Interface	IIC/SPI/UART
Operating voltage	3.0 ~ 3.6 V
Operating current	78 mA
Package	4 mm x 4 mm QFN
Temperature	-40°C~85°C

\*The power consumption is measured @ 50% chirp duty cycle with all circuits on.



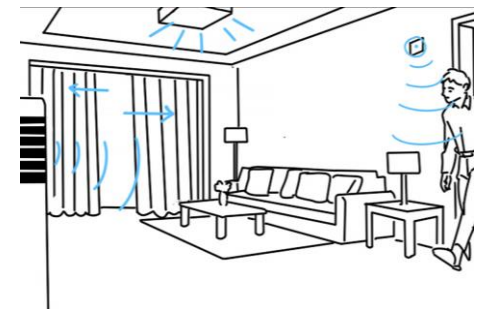
S5KM312CL SoC block diagram

### Features

- Two integrated Rx channels for 2D positioning
- Wide 4 GHz FMCW bandwidth for high resolution applications
- Capable of multiple-chip cascading to expand the number of channels
- Compact CMOS design with PLL, TRX and ADC integrated on chip
- On-chip DSP accelerator, minimalizing off-chip processing resource
- Built-in power management module, supporting 3.3 V single power supply
- Peripheral interfaces including I2C, SPI, UART, etc.



Trajectory Tracking  
Smart Toilet



Human Positioning  
Smart Home



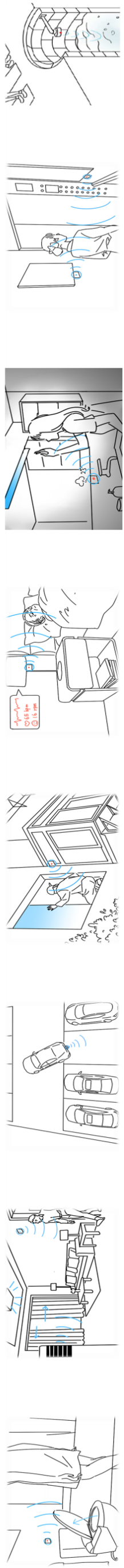
Space Partition  
Smart Business

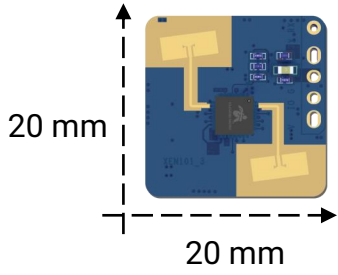


Collision Avoidance  
Drones & Robots

## EZ-XENSOR Product series | Selection Table

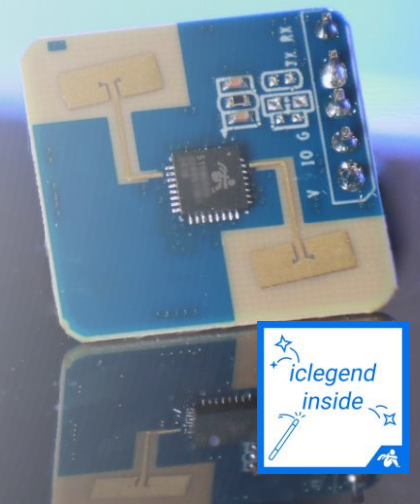
Category	Product ID	Sensor SoC	Full Name	Field of View	Hardware Size	Interface	Operating Voltage	Average Current	Applications
Human Presence Detection	XenD101H	S1 series 1T1R	Stationary Human Presence	120 ° x 120 °	20 mm x 20 mm	UART, GPIO	3.3 V, 5 V	50 mA	Smart Lighting, Smart Appliances, Smart Home, Smart Hotel
Human Presence Detection	XenD103H	S1 series 1T1R	Narrow Frame-Embeddable Human Presence Detection	120 ° x 90 °	35 mm x 7 mm	UART, GPIO	3.3 V, 5 V	50 mA	TV Screen, Monitor, Conference Panel, Advertising
Human Presence Detection	XenD101HS	ICL111A 1T1R	AiP Human Presence Detection	120 ° x 120 °	12 mm x 12 mm	UART, GPIO	3.3 V	42 mA	Smart Lighting, Smart Appliances, Smart Home, Smart Hotel
Human Presence Detection	XenD103HS	ICL111A 1T1R	Narrow-Edge Ultra-Compact AiP Human Life Presence	120 ° x 120 °	23 mm x 6 mm	UART, GPIO	3.3 V	42 mA	TV Screen, Monitor, Conference Panel, Advertising
Gesture Recognition Control	XenG101G	S1 Series 1T1R	Hand Wave Gesture Recognition (Counting)	75 ° x 75 °	20 mm x 20 mm	UART,GPIO	3.3 V	100 mA	Smart TV Screens, Smart Appliances, Smart Lighting, Smart Kitchen and Bath
Gesture Recognition Control	XenG202G	ICL1122 1T2R	Hand Wave Gesture Recognition (2D)	80 ° x 80 °	30 mm x 7 mm	UART, TTL	3.3 V	78 mA	Smart TV Screens, Smart Appliances, Smart Lighting, Smart Kitchen and Bath
Liquid Level and Position Detection	XenP108Y	S5KM312CL 1T2R	Miniaturized High-precision Liquid Level and Position Detection	24 ° x 24 ° (-6 dB, round trip)	36 mm x 44 mm	UART	3.3 V	6 mA @1Hz 15 mA @6Hz	Industrial application, Intelligent Cities, Smart Transportation
Multi-Human Tracking	XenP202TE	Vertically installation		140 ° x 60 °	15 mm x 40 mm		5 V	50 mA	Smart Appliances, Smart bathrooms, Health and Wellness, Smart Lighting
	XenP202TH	Horizontally installation		140 ° x 70 °	34 mm x 15 mm				
	XenP202TV	Horizontally installation	High Precision Multi-Human Tracking		15 mm x 25 mm	UART, TTL			
	XenP202TS	Horizontally installation		120 ° x 100 °	30 mm x 7 mm		3.3 V	75 mA	





# XenD101H Human Presence Detection

## Stationary Human Presence mmWave Sensor



### Features

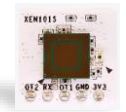
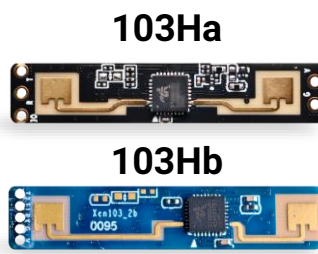
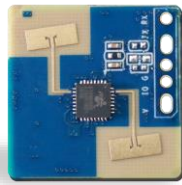
- Wider Coverage: Compatible with both top- and wall-mounted detection methods
- Accurate Detection: Human presence detection in both lying and sleeping states
- Easy Deployment: Automatically generate parameters, adapted to various scenarios quickly
- Worry-free Manufacturing: Easy-to-use supporting resources for quick mass production
- Scenario Optimization: Integrated commonly used application scenarios
- Minimalist Cost: Well-adapted new algorithms improve performance and lower costs

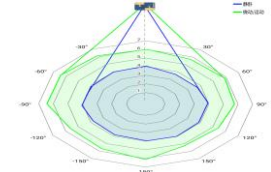
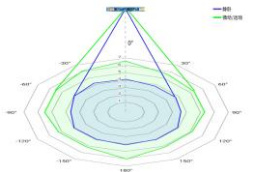
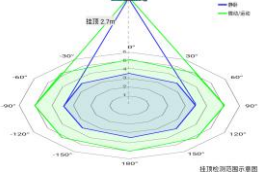
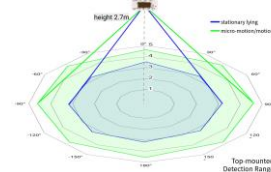
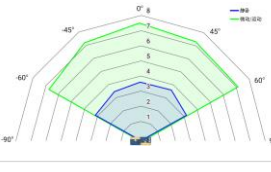
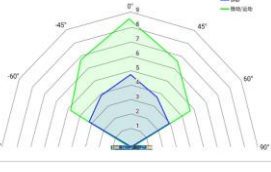
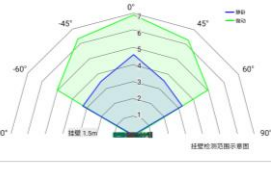
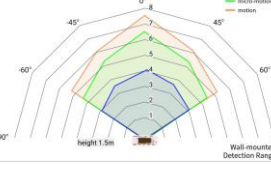


Visualization Tools



1 - Yuan Coin Size Comparison



Specifications	XenD101H	XenD103H	XenD103HS	XenD101HS
Top-mounted Projection radius @ height 2.7 m	Stationary Lying 8 m Micro-motion/Motion 12 m 	Stationary Lying 7 m Micro-motion/Motion 10 m 	Stationary Lying 7 m Micro-motion/Motion 10 	Stationary Lying 7 m Micro-motion/Motion 9 m 
Wall-mounted Detection Range @ height 1.5 m	Stationary Lying 3.5 m Micro-motion/Motion 7 m 	Stationary Lying 4.5 m Micro-motion/Motion 8.5 m 	Stationary Lying 4.5 m Micro-motion/Motion 6.8 	Stationary Lying 4 m Micro-motion 6.35 
Hardware Size	20 mm x 20 mm	7 mm x 35 mm	6 mm x 23 mm	12 mm x 12 mm
Operating Voltage	3.3 V 、 5V		3.3 V	
Operating Current	50 mA		42 mA	
Sensor SoC	S1 series 1T1R		ICL111A (1T1R AiP)	
Installation Methods	Top-mounted/Wall-mounted			
Detection Angle	±60°			
Operating Frequency	24 ~ 24.25 GHz, SRRG/FCC/CE compliant			
Detection Capability	human motion/micromotion/stationary states			
IAP Function	Supports serial port upgrades			
Interface	UART, GPIO			

Note: The detection range is affected by the environment and the user's RCS, so the actual performance is subject to the test results in the application environment.

Utilizing FMCW technology, this sensor detects stationary, slightly moving, and actively moving human. Through precise human presence sensing and ranging algorithms, it allows independent configuration of zone-specific sensitivity and automated generation of sensor parameters while enhancing anti-interference capabilities. With a top-mounted detection projection radius of 5 meters and wall-mounted detection range of up to 8.5 meters, it can detect seated individuals and possesses the ability to identify lying and sleeping human states. It achieves true stationary human life presence detection.



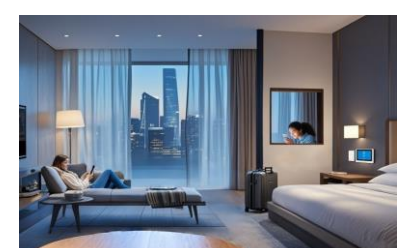
Smart Lighting



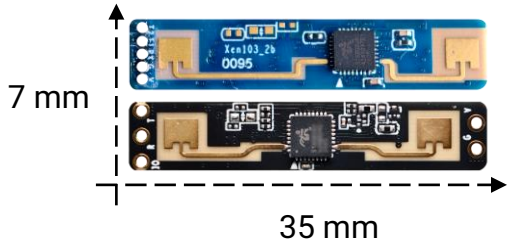
Smart Appliances



Smart Homes

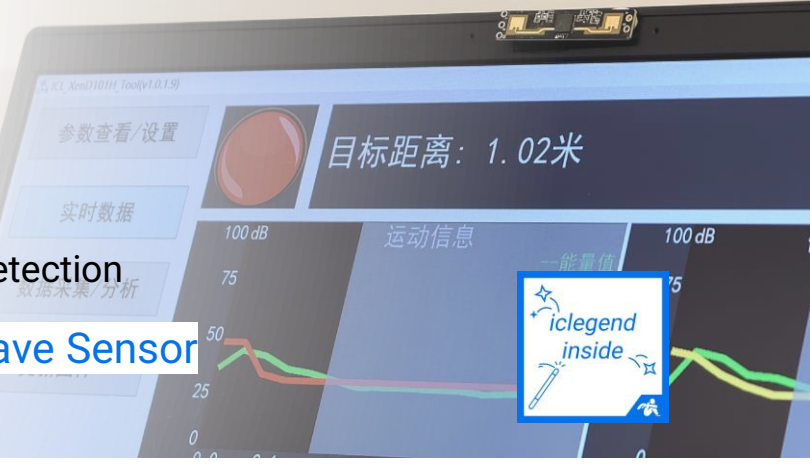


Smart Hotels



# XenD103H Human Presence Detection

## Narrow Frame Human Presence mmWave Sensor



### Features

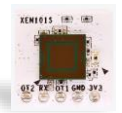
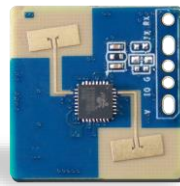
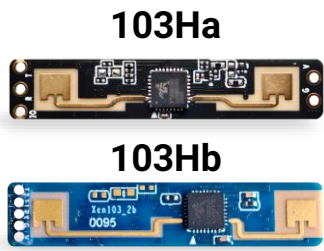
- Wider Coverage: Compatible with both top- and wall-mounted detection methods
- Accurate Detection: Human presence detection in both lying and sleeping states
- Easy Deployment: Automatically generate parameters, adapted to various scenarios quickly
- Worry-free Manufacturing: Easy-to-use supporting resources for quick mass production
- Scenario Optimization: Integrated commonly used application scenarios
- Minimalist Cost: Well-adapted new algorithms improve performance and lower costs



Visualization Tools



1 - Yuan Coin Size Comparison



Specifications	XenD103H	XenD101H	XenD103HS	XenD101HS
Top-mounted Projection radius @ height 2.7 m	Stationary Lying 7 m Micro-motion/Motion 10 m 	Stationary Lying 8 m Micro-motion/Motion 12 m 	Stationary Lying 7 m Micro-motion/Motion 10 	Stationary Lying 7 m Micro-motion/Motion 9 m 
Wall-mounted Detection Range @ height 1.5 m	Stationary Lying 4.5 m Micro-motion/Motion 8.5 m 	Stationary Lying 3.5 m Micro-motion/Motion 7 m 	Stationary Lying 4.5 m Micro-motion/Motion 6.8 	Stationary Lying 4 m Micro-motion 6.35 
Hardware Size	7 mm x 35 mm	20 mm x 20 mm	6 mm x 23 mm	12 mm x 12 mm
Operating Voltage	3.3 V 、 5V		3.3 V	
Operating Current	50 mA		42 mA	
Sensor SoC	S1 series 1T1R		ICL111A (1T1R AiP)	
Installation Methods	Top-mounted/Wall-mounted			
Detection Angle	±60°			
Operating Frequency	24 ~ 24.25 GHz, SRRC/FCC/CE compliant			
Detection Capability	human motion/micromotion/stationary states			
IAP Function	Supports serial port upgrades			
Interface	UART, GPIO			

Note: The detection range is affected by the environment and the user's RCS, so the actual performance is subject to the test results in the application environment.

Utilizing FMCW technology, this sensor detects stationary, slightly moving, and actively moving human. Through precise human presence sensing and ranging algorithms, it allows independent configuration of zone-specific sensitivity and automated generation of sensor parameters while enhancing anti-interference capabilities. With a top-mounted detection projection radius of 5 meters and wall-mounted detection range of up to 8.5 meters, it can detect seated individuals and possesses the ability to identify lying and sleeping human states. It achieves true stationary human life presence detection.



Smart Lighting



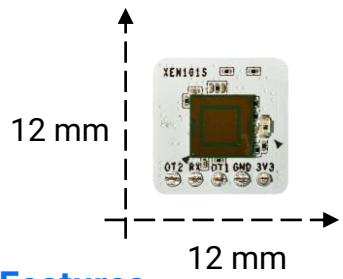
Smart Appliances



Smart Homes



Smart Hotels



# XenD101HS Human Presence Detection

## AiP Human Presence mmWave Sensor



### Features

**Minimalist Design:** 12mm x 12mm ultra-compact size for seamless integration into any space.

**All-in-One Integration:** Antenna-in-SoC design eliminates PCB constraints, shortening production cycles and simplifying mass production testing.

**Robust Durability:** Resists moisture, corrosion, and static electricity, ensuring reliable operation in harsh installation environments.

**Wider Coverage:** Compatible with both top- and wall-mounted detection methods

**Accurate Detection:** Human life presence detection in both lying and sleeping states

**Easy Deployment:** Automatically generate parameters, adapted to various scenarios quickly

**Worry-free Manufacturing:** Easy-to-use supporting resources for quick mass production

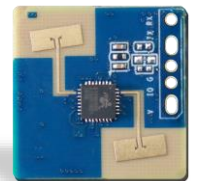
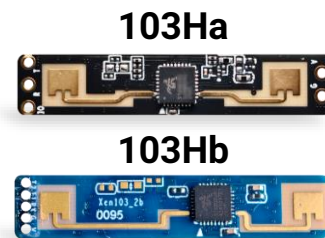
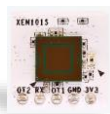
**Scenario Optimization:** Integrated commonly used application scenarios

**Minimalist Cost:** Well-adapted new algorithms improve performance and lower costs

ICLEGEND's 1T1R AiP SoC integrates the antenna into an ultra-compact 12 mm x 12 mm package. This direct system-board integration, compatible with any PCB, accelerates development and reduces processing time. Engineered for harsh environments with resistance to moisture and static electricity, it utilizes FMCW technology to reliably detect humans from stationary to sleeping states. Offering flexible ceiling (4.5m) or wall-mounted (7.5m) deployment, it features configurable sensitivity and strong anti-interference performance.



1 - Yuan Coin Size Comparison



Specifications	XenD103HS	XenD101HS	XenD103H	XenD101H
Top-mounted Projection radius @ height 2.7 m	Stationary Lying 7 m Micro-motion/Motion 9 m 	Stationary Lying 7 m Micro-motion/Motion 10 m 	Stationary Lying 7 m Micro-motion/Motion 10 m 	Stationary Lying 8 m Micro-motion/Motion 12 m 
Wall-mounted Detection Range @ height 1.5 m	Stationary Lying 4 m Micro-motion 6.35 	Stationary Lying 4.5 m Micro-motion/Motion 6.8 m 	Stationary Lying 4.5 m Micro-motion/Motion 8.5 m 	Stationary Lying 3.5 m Micro-motion/Motion 7 m 
Hardware Size	12 mm x 12 mm	6 mm x 23 mm	7 mm x 35 mm	20 mm x 20 mm
Operating Voltage	3.3 V		3.3 V 、 5V	
Operating Current	42 mA		50 mA	
Sensor SoC	ICL111A (1T1R AiP)		S1 series 1T1R	
Installation Methods	Top-mounted/Wall-mounted			
Detection Angle	±60°			
Operating Frequency	24 ~ 24.25 GHz, SRRC/FCC/CE compliant			
Detection Capability	human motion/micromotion/stationary states			
IAP Function	Supports serial port upgrades			
Interface	UART, GPIO			

Note: The detection range is affected by the environment and the user's RCS, so the actual performance is subject to the test results in the application environment.



Visualization Tools



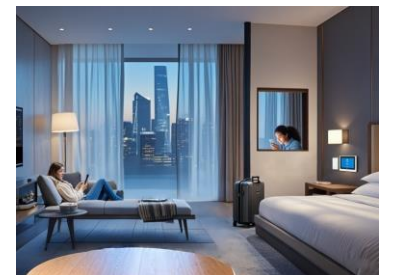
Smart Lighting



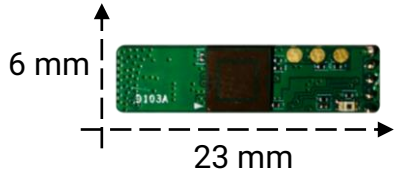
Smart Appliances



Smart Homes



Smart Hotels



# XenD103HS Human Life Presence Detection

## Narrow-Edge Ultra-Compact AiP Human Life Presence Sensor

### Features

**Ultra-Compact Size:** A miniaturized device measuring just 6 x 23 mm.

**Easy Producing:** The SoC integrates an antenna internally, facilitating convenient design and shorter processing cycles.

**Enhanced Environmental Resistance:** Resistant to moisture, corrosion, and static electricity, offering superior environmental adaptability.

**Broader Coverage:** Compatible with both ceiling-mounted and wall-mounted detection methods for extensive coverage.

**Precise Detection:** Capable of perceiving human life presence in lying-down and sleeping states.

**Effortless Deployment:** Automates parameter configuration for rapid adaptation to diverse scenarios.

**Mass Production Ready:** User-friendly supporting resources facilitate quick integration into mass production.

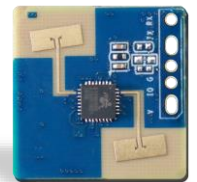
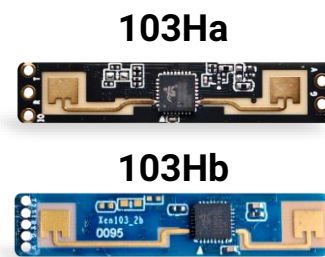
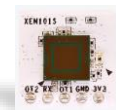
**Scene Optimization:** Integrates functions tailored for common application scenarios.

**Ultimate Cost-Effectiveness:** New algorithm adaptations deliver improved performance at a lower cost.

This 6 x 23 mm ultra-miniaturized device is equipped with a 1T1R AiP SoC and employs FMCW (Frequency-Modulated Continuous Wave) technology to detect stationary, slightly moving, and moving human targets. Through precise life presence sensing and ranging algorithms, it allows for independent configuration of interval sensing sensitivity, automated generation of sensor configuration parameters, and enhanced anti-interference performance. The projection radius for ceiling-mounted detection reaches 5 meters, while the maximum range for wall-mounted detection is 6.8 meters. It can detect seated individuals and is capable of sensing humans in lying-down and sleeping states. It represents true perception of stationary human life presence.



1 - Yuan Coin Size Comparison



Specifications	XenD103HS	XenD101HS	XenD103H	XenD101H
Top-mounted Projection radius @ height 2.7 m	Stationary Lying 7 m Micro-motion/Motion 10 m 	Stationary Lying 7 m Micro-motion/Motion 9 m 	Stationary Lying 7 m Micro-motion/Motion 10 m 	Stationary Lying 8 m Micro-motion/Motion 12 m 
Wall-mounted Detection Range @ height 1.5 m	Stationary Lying 4.5 m Micro-motion/Motion 6.8 	Stationary Lying 4 m Micro-motion 6.35 m/Motion 	Stationary Lying 4.5 m Micro-motion/Motion 8.5 m 	Stationary Lying 3.5 m Micro-motion/Motion 7 m 
Hardware Size	6 mm x 23 mm	12 mm x 12 mm	7 mm x 35 mm	20 mm x 20 mm
Operating Voltage	3.3 V		3.3 V、5V	
Operating Current	42 mA		50 mA	
Sensor SoC	ICL111A (1T1R AiP)		S1 series 1T1R	
Installation Methods	Top-mounted/Wall-mounted			
Detection Angle	±60°			
Operating Frequency	24 ~ 24.25 GHz, SRRC/FCC/CE compliant			
Detection Capability	human motion/micromotion/stationary states			
IAP Function	Supports serial port upgrades			
Interface	UART, GPIO			

Note: The detection range is affected by the environment and the user's RCS, so the actual performance is subject to the test results in the application environment.



Visualization Tools



Smart Lighting



Smart Appliances



Smart Homes



Smart Hotels



# XenG202G Gesture Recognition Control

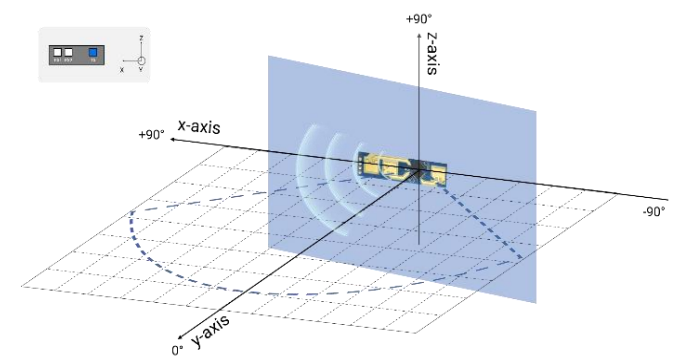
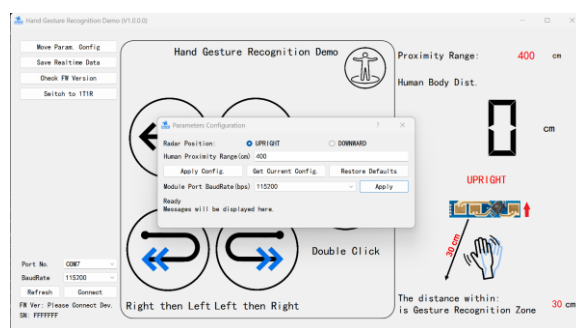
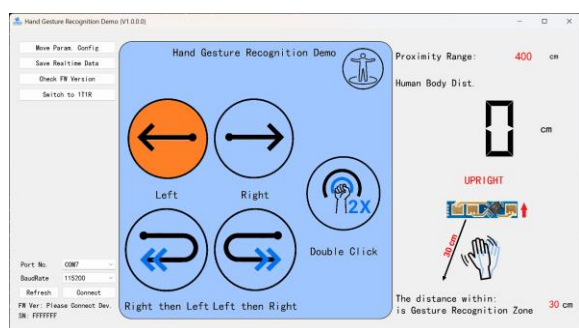
Hand Wave Gesture Recognition (2D)  
mmWave Sensor



The XenG202G is a high-precision 24GHz millimeter-wave sensor reference design. It integrates gesture recognition and human proximity wake-up functions. Based on FMCW (Frequency Modulated Continuous Wave) technology and target recognition algorithms, it enables proximity wake-up of smart devices and gesture control functions such as left wave, right wave, left-right wave, right-left wave, and tap. It is suitable for applications such as smart screens, smart lighting, smart home appliances, and smart kitchen and bathroom appliances.

Specifications	
Human Proximity Range	0.2 ~ 7 m
Hand Gesture Range	Waving 1 ~ 20 cm
Human Detection Accuracy	± 20 cm
Horizontal FOV (Proximity)	80 °
Azimuth FOV (Proximity)	150 °
Operating Frequency	24 ~ 24.25 GHz SRRC/FCC/CE compliant
Operating Voltage	3.3 V
Average Operating Current	78 mA
Max. Sweep Bandwidth	250 MHz
Max. EIRP	15 dBm
Refresh Cycle	50 ms

- | Features                                                                                                                                                                                     |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Gesture recognition:</b> Non-contact control, high-precision gesture recognition, capable of identifying five gestures: left wave, right wave, left-right wave, right-left wave, and tap. |
| <b>Convenient development:</b> Integrated human sensing and ranging function, with multi-parameter configuration available.                                                                  |
| <b>Precise ranging:</b> Human ranging accuracy ±20 cm, with adjustable sensing range.                                                                                                        |
| <b>Interference shielding:</b> Outputs distance and speed, with user-configurable response distance and speed thresholds for secondary development.                                          |



Visualization Tool for Hand Gesture Recognition

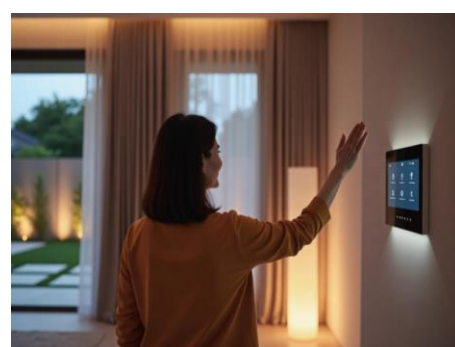
Illustration of Detection Range



Smart screens



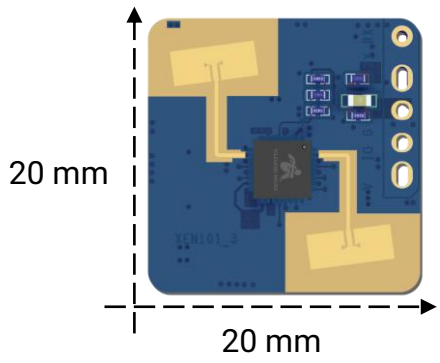
Smart home appliances



Smart Lighting



Smart kitchen and bathroom



# XenG101G Gesture Recognition Control

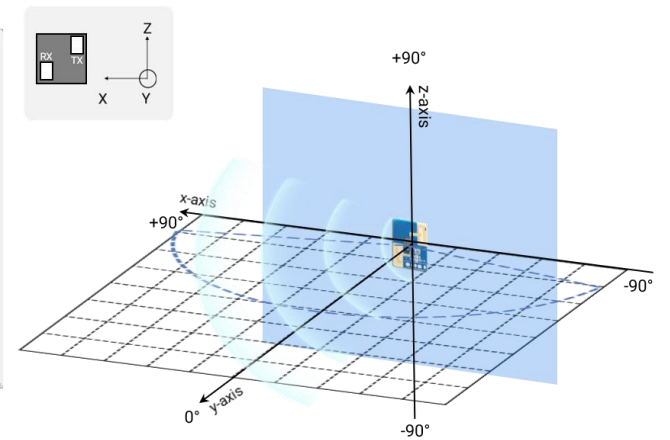
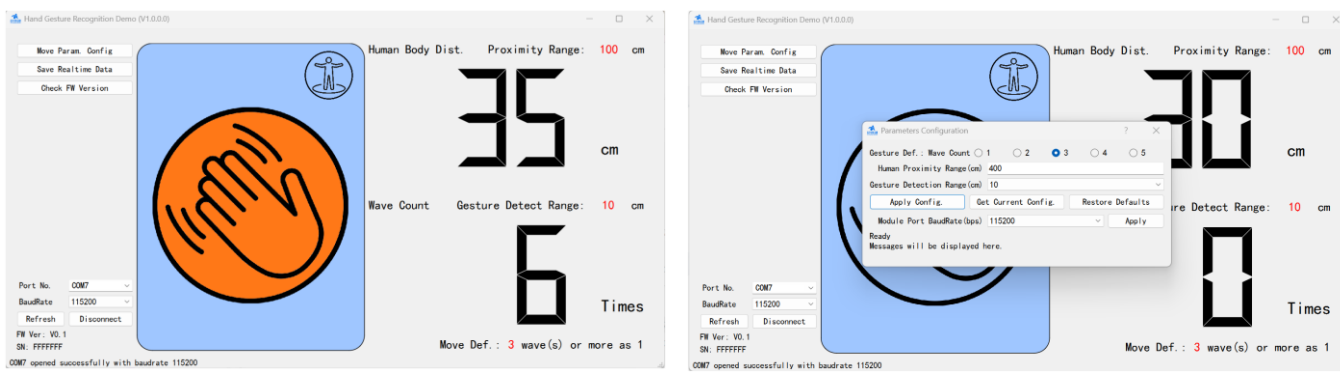
Hand Wave Gesture Recognition(Counting)  
mmWave Sensor



XenG101G is a high-precision 24GHz mmWave sensor reference design, integrating hand wave recognition and human proximity wake-up functionality. Based on FMCW technology and target recognition algorithms, it accurately detects hand wave gestures (1~20 cm) and measures human distance (0.2 ~ 4 m). It enables proximity-based wake-up and gesture control for smart devices, making it ideal for applications such as smart displays, smart home systems, smart appliances, and smart kitchen and bath products.

Specifications	
Human Proximity Range	0.2 ~ 4 m
Hand Gesture Range	Wave 1 ~ 20 cm
Human Detection Accuracy	± 20 cm
Horizontal FOV	150 °
Azimuth FOV	150 °
Operating Frequency	24 ~ 24.25 GHz SRRC/FCC/CE compliant
Operating Voltage	3.3 V
Average Operating Current	100 mA
Max. EIRP	11 dBm
Refresh Cycle	50 ms

- ### Features
- Gesture recognition:** Non-contact control with high-precision hand wave detection.
  - Convenient Development:** Integrated human sensing and distance measurement function with multi-parameter configuration.
  - Accurate Ranging:** Human distance measurement accuracy of ±20 cm with configurable sensing range.
  - Interference Shielding:** Precisely defined gesture recognition zone to block out interference beyond the designated area.



Visualization Tool for Hand Gesture Recognition

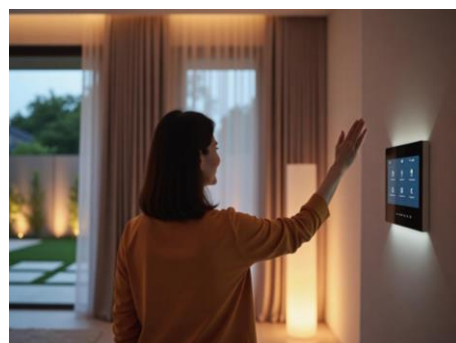
Illustration of Detection Range



Smart TV Screens



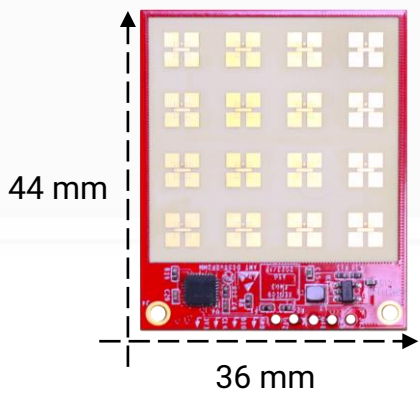
Smart Appliances



Smart Lighting



Smart Kitchen & Bath



# XenP108Y Liquid Level and Position Detection

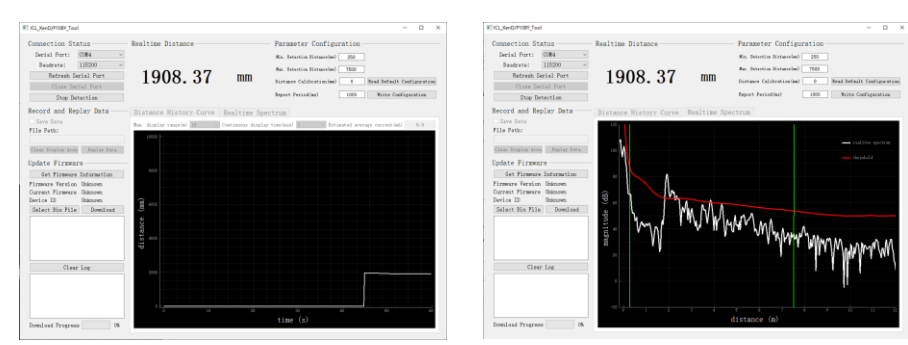
Miniaturized High-precision Liquid Level and Position Detection



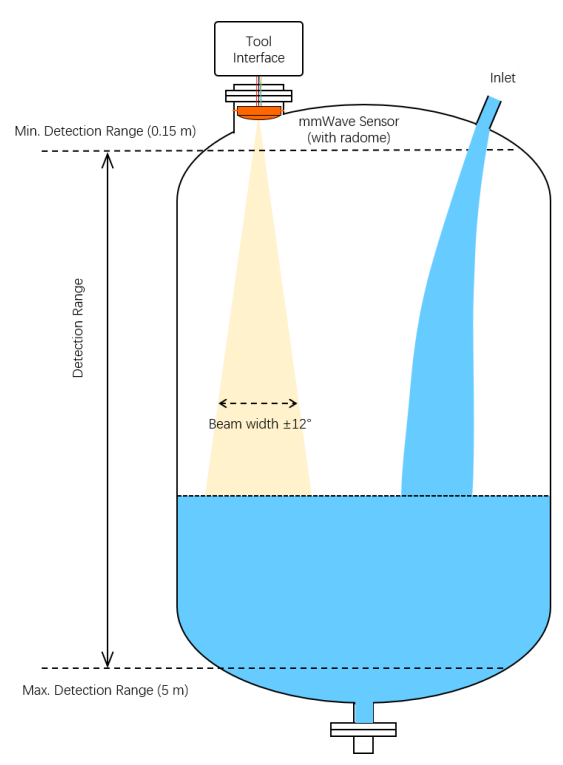
XenP108Y is a compact high-precision liquid level and position detection sensor reference design developed based on the ICL S5KM312CL SoC. The sensor utilizes miniaturized narrow-beam antennas, ultra-wideband FMCW waveforms, along with proprietary radar signal processing and an embedded high-precision liquid level and position detection algorithm. This combination enables millimeter-level accurate detection of target distances within a specified area, with real-time reporting of results. With this reference design, users can swiftly develop compact and high-precision liquid level detection sensing products.

Specifications	
Detection range	0.15 ~ 10 m
Accuracy	0.5 mm
Precision	0.03 ~ 0.15 mm
Operating Frequency	23 ~ 27 GHz
Operating Voltage	3.0 ~ 3.6 V
Average Current	6 mA (report period: 1 s) 15 mA (report period: 160 ms) *refer to section 9.5 of UM10036P.
Sensor SoC	S5KM312CL
Hardware Size	36 mm × 44 mm
Beam Width	±12° (-6 dB, round trip)
Interface	UART
IAP Function	In-application programming (IAP) using UART

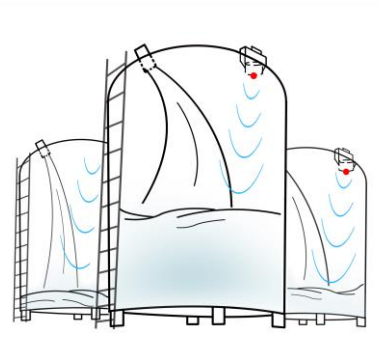
- ### Features
- Wide Range, High Precision:** The detection precision within the range of 0.15 to 10 meters is 0.03 ~ 0.15 millimeters.
  - Energy-efficient and Easy to Adapt:** Low operating current reduces power consumption and heat generation.
  - Compact and Easy to Deploy:** Small size for convenient installation.
  - Flexible and Easy to Develop:** Real-time reporting of results with configurable parameter settings.



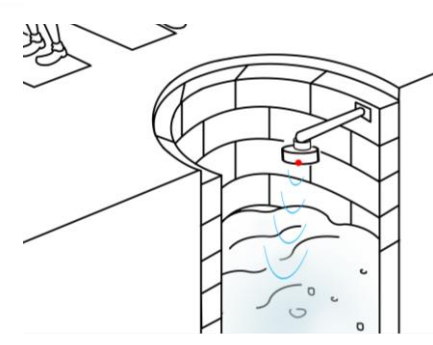
Liquid level and position detection demonstration tool  
Real-time display of distance history curves and detection waveforms



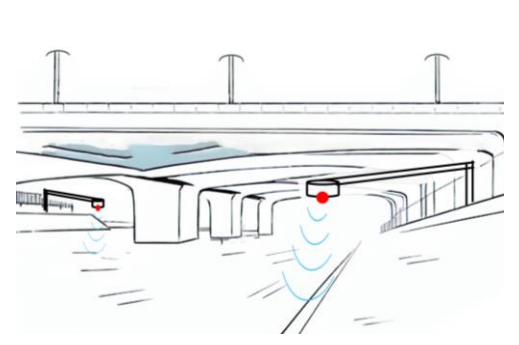
Recommended Installation Illustration



Industrial Application Tank Level Detection



Intelligent Cities Well Cellar Level Detection



Hydrological Monitoring Bridge Tunnel Water Level Detection

# XenP202T series Multi-Person Trajectory Detection

## High-Precision Multi-Person Trajectory mmWave Sensor



Featuring the ICL1122 mmWave sensor SoC and movement tracking algorithms, it enables real-time detection of multiple human positions, distinguishes individual movements, and predicts motion trends. With a detection range of up to 10 meters and 55 mA low power consumption, it supports accurate multi-person separation and consistent movement tracking updates. Equipped with AI enhanced human sensing, it identifies motion, micromovements, and stationary presence. Applications include Smart Appliances, Smart Bathrooms, Health & Wellness, and Smart Lighting.

**Multitarget Detection:** Realtime detection of multiple human targets

**Stable Tracking:** High sensitivity trajectory information of human motion/micromotion

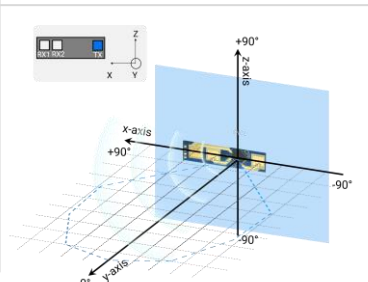
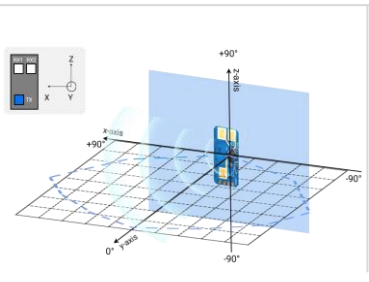
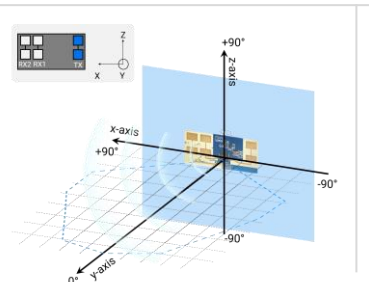
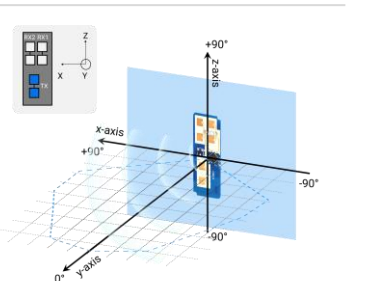
**Low Power Consumption:** Smart power management for prolonged, efficient operation

**Accurate Positioning:** Range accuracy of 15 cm, angle accuracy of 10°

**Minimalist Size:** Compatible with various product designs

**Compact Design:** Flexible horizontal and vertical mounting for enhanced installation convenience

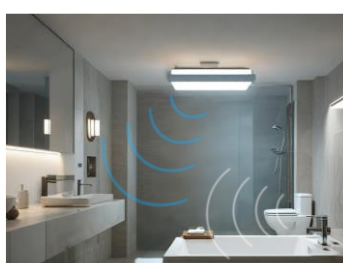


Specifications	XenP202TS v3	XenP202TV v3	XenP202TH v3	XenP202TE v3
Development Platform	ARM Cortex M4			
Operating Voltage	3.3 V		5 V	
Operating Current	75 mA		50 mA	
Installation Methods	Horizontally	Vertically	Horizontally	Vertically
Detection Angle (azimuth)	120° x 100°		140° x 70°	140° x 60°
Hardware Size	30 x 7 mm	15 x 25 mm	34 x 15 mm	15 x 40 mm
Operating Frequency	24 ~ 24.25 GHz, SRRG/FCC/CE compliant			
Sensor SoC	ICL1122 (1T2R)			
Tracked Targets	Up to 3 persons			
Detection Range	Up to 10 meters			
Response Time	0.18 seconds			
Detection Capability	human motion/micromotion/stationary states			
IAP Function	Supports serial port upgrades			
Interface	UART, TTL			
Data Refresh Rate	16 Hz (maximum)			
Detection Range				

Note: The detection range is affected by the environment and the user's RCS, so the actual performance is subject to the test results in the application environment.



Smart Appliances



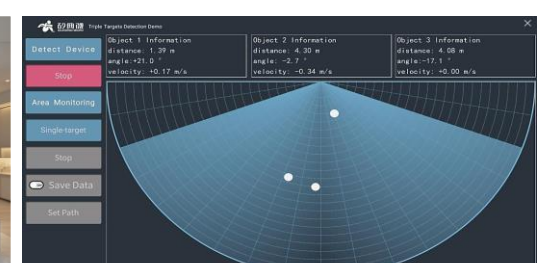
Smart Bathrooms



Health & Wellness



Smart Lighting



Visualization tool for multitarget detection

# mmWave Sensor Development Tool

ONELAB Development Kit



ICL mmWave Sensor Development Tool enables real-time interaction with ICL development boards. Developers can intuitively view live data from millimeter-wave sensors and monitor target status information.

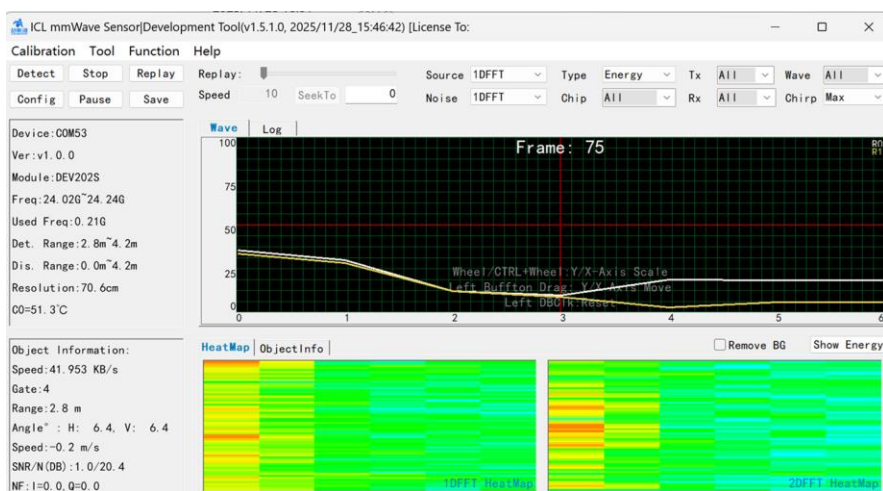
The tool supports waveform configuration, data export, and data analysis, simplifying the debugging process and helping users validate algorithms and scenario performance more efficiently.

## Key Features

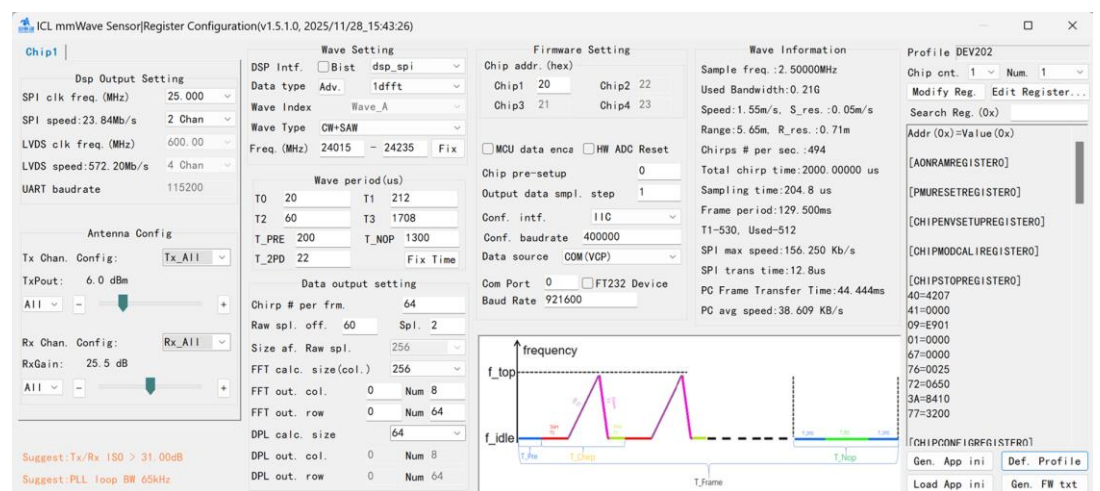
**Waveform Interaction:** Effortlessly switch between multiple waveform modes and inspect details via mouse drag – intuitive and beginner-friendly.

**Scenario Adaptation:** Smart parameter recommendations and near-field heatmap assistance enable even non-experts to fine-tune radar configurations.

**Closed-Loop Data:** Combines data acquisition, processing, and diagnostics in one platform – no need to switch tools for a seamless, end-to-end development experience.



Tool Demonstration Interface



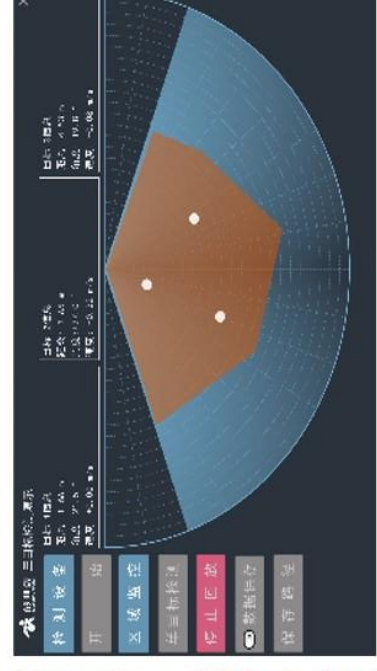
Configuration Interface

# Evaluation Board series | Optional Selection Table

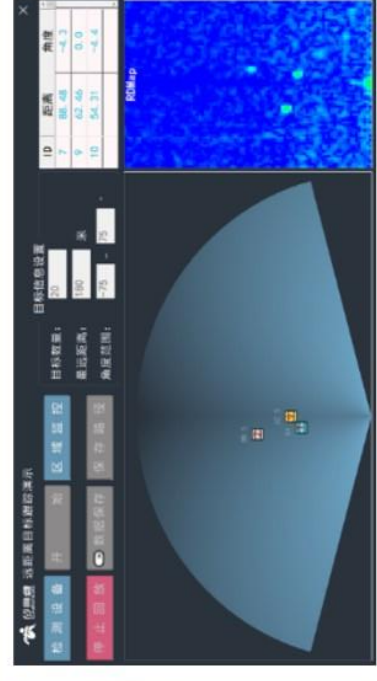
Category	EVBKS5	EVBKS5-E	EVB1122
Full Name	S5KM312CL SoC evaluation board with wide bandwidth antennas	ICL1122 SoC evaluation board with wide bandwidth antennas	ICL1122 SoC evaluation board with high-gain antennas
Sensor SoC	S5KM312CL (1T2R)		ICL1122 (1T2R)
Sweeping Bandwidth	23.5~27.5 GHz	24~25 GHz	24 GHz
Equivalent Isotropic Radiated Power		Max. 16 dBm (reconfigurable)	22 dBm(reconfigurable)
Field of View		115° x 114°	86° x 28°
Hardware Size			43 mm x 41 mm
Interface			UART/Type-C USB
Operating Voltage			5 V
IAP Function	In-application programming(IAP) using UART		
Applications	Human Presence Detection Indoor Multi-Human Tracking		



Parameter Configuration Interface

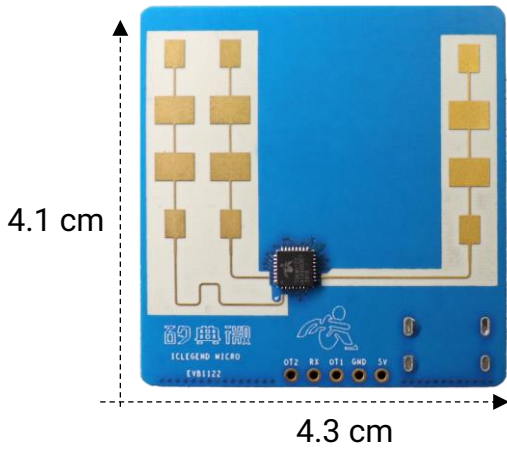


Human Presence Detection Tool



Indoor Multi-Human Tracking Tool

Parameter Configuration Interface



# EVB1122 mmWave Sensor Evaluation Board

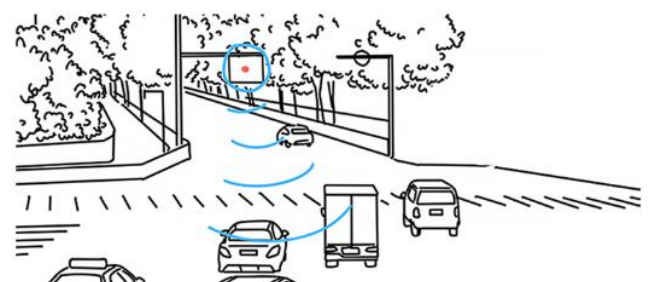
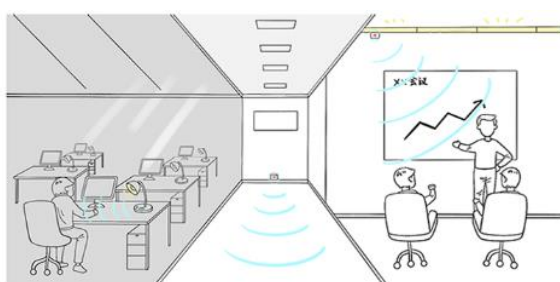
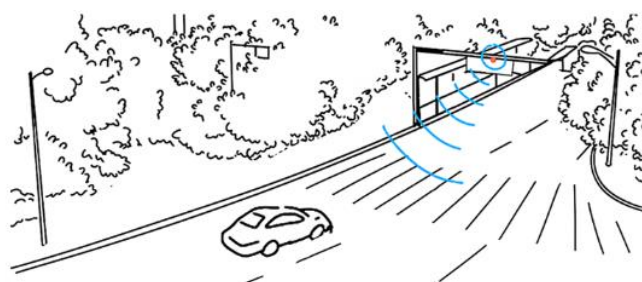
ICL1122 SoC evaluation board with high-gain antennas



The EVB1122, equipped with the ICL1122 SoC, 1T2R multi-patch high-gain antennas, and ARM Cortex-M4 MCU, is designed to streamline the evaluation of SoC's long-range detection performance for developers. This advanced platform automatically generates SoC register configurations tailored to mmWave sensor parameter settings, simplifying the development process. It empowers developers to effortlessly craft algorithms for a wide range of applications by providing real-time data gathering and analysis capabilities. Additionally, the EVB1122 offers multiple intuitive application demonstrations, including indoor multi-human tracking and outdoor long-range (>100 m) target tracking.

Specifications	Features	
Operating Frequency	24 GHz	Complete hardware system: Integrated 1T2R mmWave SoC, multi-patch high-gain antennas, high-performance MCU, and high-rate USB type-C interface.
Sweeping Bandwidth	24 ~ 25 GHz (reconfigurable)	
Equivalent Isotropic Radiated Power	22 dBm (reconfigurable)	Agile developing tools: Comprehensive SoC evaluation system, intuitive radar configuration and real-time signal waveform analysis tools.
Operating Voltage	5V	
Sensor SoC	ICL1122 (1T2R)	Diverse user experience: Built-in typical application demos, i.e. indoor multi-human tracking, and outdoor long-range target tracking.
Hardware Size	43 mm x 41 mm	
Field of View (6 dB beamwidth)	86° x 28°	
IAP Function	In-application programming (IAP) using UART	

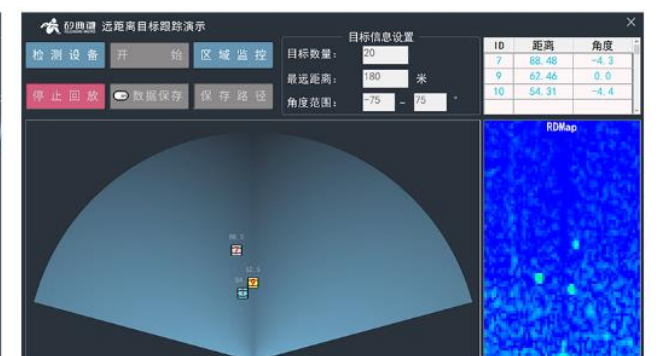
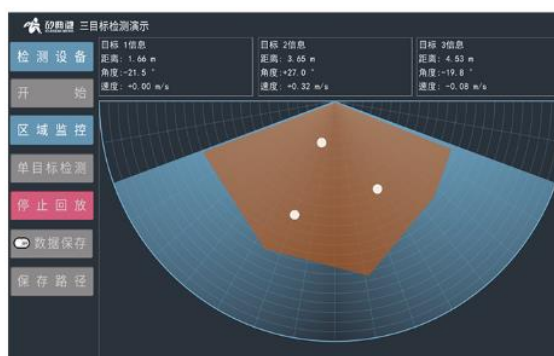
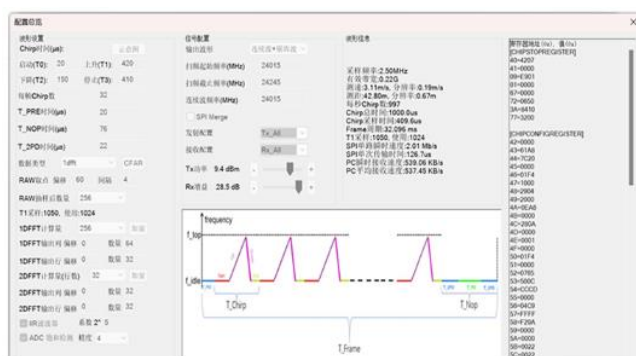
Power Supply and Interfaces	Support debugging and programming via SWD
Support UART/USB Type-C/ I/O interface communication	Support USB power supply (default) or external power supply via J1
Maximum data transfer rate 34 Mbps	

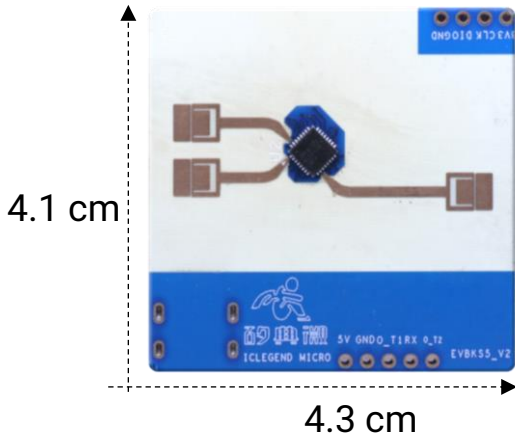


Parameter Configuration Interface

Indoor Multi-Human Tracking

Outdoor Long-Range Target Tracking





# EVBKS5-E mmWave Sensor Evaluation Board

ICL1122 SoC evaluation board equipped with wide bandwidth antennas

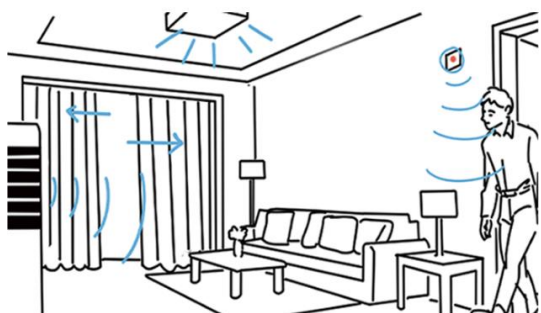


The EVBKS5-E, equipped with the ICL1122 SoC, 1T2R wide bandwidth antennas, and ARM Cortex-M4 MCU, is designed to streamline the evaluation of SoC performance for developers. This advanced platform automatically generates SoC register configurations tailored to mmWave sensor parameter settings, simplifying the development process. It empowers developers to effortlessly craft algorithms for a wide range of applications by providing real-time data gathering and analysis capabilities. Additionally, the EVBKS5-E offers multiple intuitive application demonstrations, including human presence detection and multi-human tracking.

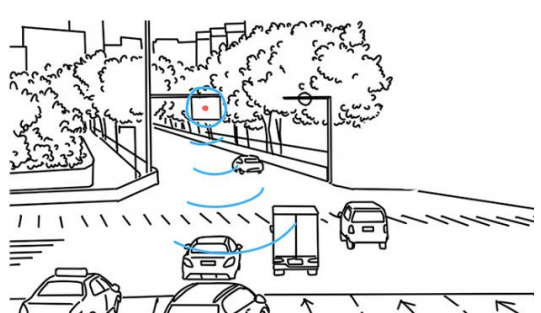
Specifications	
Sweeping Bandwidth	Max. 1 GHz (adjustable)
Equivalent omnidirectional radiated power	Max. 16 dBm (adjustable)
Operating Voltage	5 V
Operating Frequency	24 ~ 25 GHz
Sensor SoC	ICL1122 (1T2R)
Hardware Size	43 mm x 41 mm
FoV (6 dB beamwidth)	115 ° H x 114 ° V
IAP function	In-application programming (IAP) using UART

Features
Complete hardware system: Integrated 1T2R mmWave SoC, wide bandwidth antennas, high-performance MCU, and high-rate USB type-C interface.
Agile developing tools: Comprehensive SoC evaluation system, intuitive radar configuration and real-time signal waveform analysis tools.
Diverse user experience: Built-in typical application demos, i.e. human presence detection and multi-human tracking.

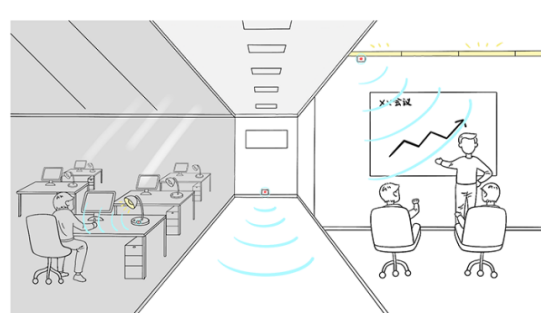
Power Supply and Interfaces	
Support UART/USB Type-C/ I/O interface communication	Support debugging and programming via SWD
Maximum data transfer rate 34 Mbps	Support external power supply via USB (default) or J1



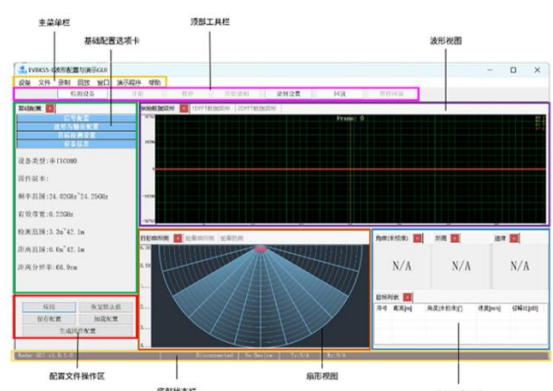
Human Presence Detection



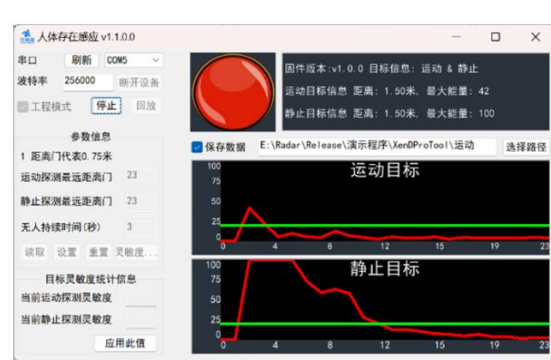
Accurate Range Velocity and Angle Measurement



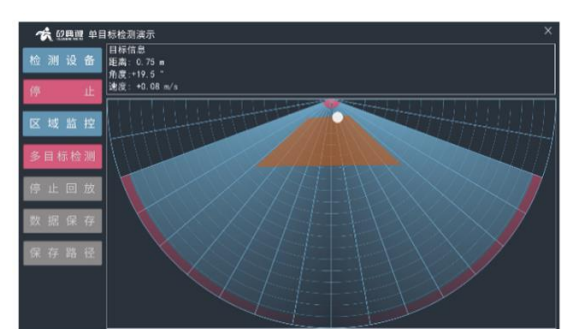
Multi-Human Tracking



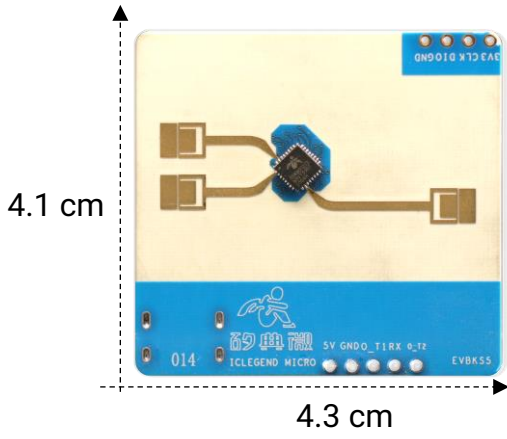
Visualization Tool



Human Presence Detection Tool



Multi-Human Tracking Tool



# EVBKS5 mmWave Sensor Evaluation Board

S5KM312CL SoC evaluation board with wide bandwidth antennas



The EVBKS5, equipped with the S5KM312CL SoC, 1T2R wide bandwidth antennas, and ARM Cortex-M4 MCU, is designed to streamline the evaluation of SoC performance for developers. This advanced platform automatically generates SoC register configurations tailored to mmWave sensor parameter settings, simplifying the development process. It empowers developers to effortlessly craft algorithms for a wide range of applications by providing real-time data gathering and analysis capabilities. Additionally, the EVBKS5 offers multiple intuitive application demonstrations, including human presence detection and human tracking.

## Specifications

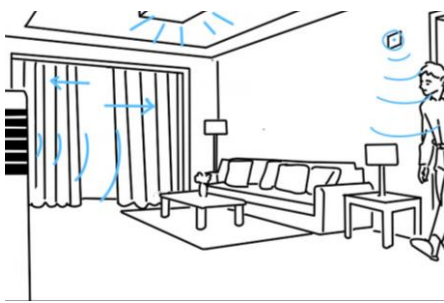
Operating Frequency	24 GHz
Sweeping Bandwidth	Max. 4 GHz (adjustable)
Equivalent omnidirectional radiated power	Max. 16 dBm (adjustable)
Operating Voltage	5 V
Sensor SoC	S5KM312CL (1T2R)
Hardware Size	43 mm x 41 mm
Field of View 6 dB beamwidth	115° x 114°
IAP function	In-application programming (IAP) using UART

## Features

- Highly integrated: 1T2R mmWave sensor SoC
- Complete hardware system: Integrated 1T2R mmWave SoC, wide bandwidth antennas, high-performance MCU, and high-rate USB type-C interface.
- Agile developing tools: Comprehensive SoC evaluation system, intuitive radar configuration and real-time signal waveform analysis tools
- Diverse user experience: Built-in typical application demos, i.e. human presence detection and human tracking

## Power Supply and Interfaces

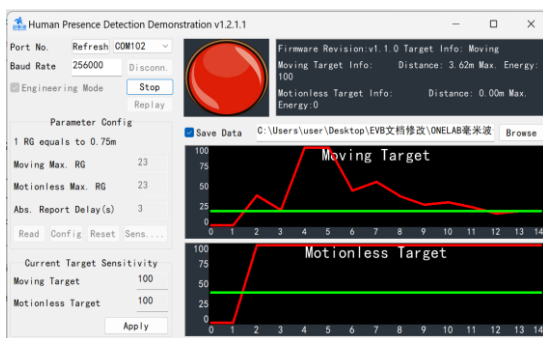
- Built-in 24 GHz 1T2R wide bandwidth micro-strip antennas
- Support UART/ USB Type-C communication
- Max. transfer rate 34 Mbps
- Support debugging and programming via SWD
- Support two ways of power supply



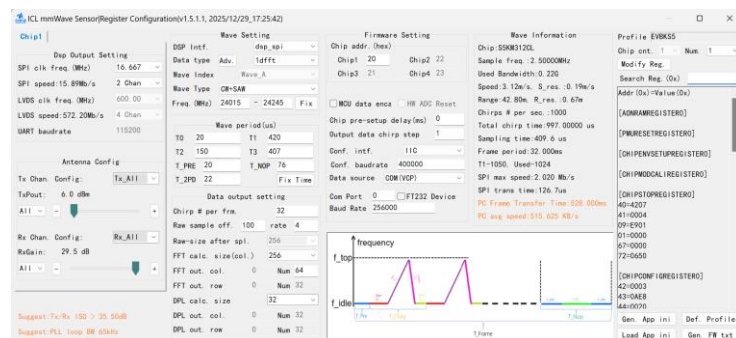
Human Presence Detection



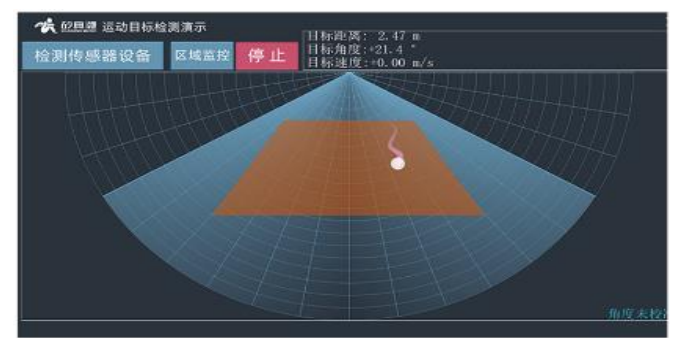
Moving Target Detection



Human Presence Detection Tool



Register Configuration Tool

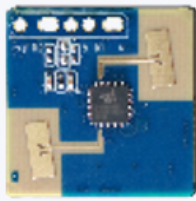


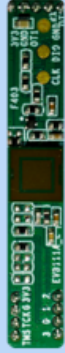


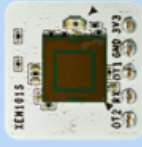


Moving Target Detection Tool



**ONELAB**  
Open & Empower Development Tool


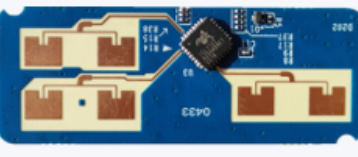
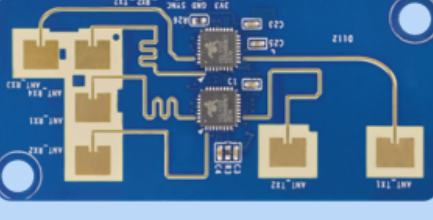

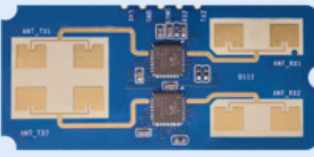
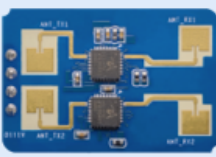
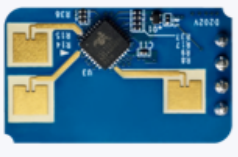
**DEV Series**

	1T1R		AiP 1T1R	
<b>M4 MCU</b> 64KB • 144MHz Enhanced Memory/ Clock Speed	<b>DEV101Pro</b> 1 dBi   20 x 20 mm Ultimate Cost-Efficiency <a href="#">ICL1112</a> 	<b>DEV103Pro</b> 5.5 dBi   35 x 7 mm Ultra-Narrow Bezel <a href="#">ICL1112</a> 	<b>DEV101A Pro</b> 4 dBi   15 x 15 mm Ultra-Mini <a href="#">ICL111A</a> 	<b>DEV103A Pro</b> 4 dBi   35 x 6mm Ultra-Mini + Ultra-Narrow Bezel <a href="#">ICL111A</a> 
	<b>M0 MCU</b> 8KB • 24MHz High Cost- Effectiveness	<b>DEV101</b> 1 dBi   20 x 20 mm Ultimate Cost-Efficiency <a href="#">ICL1112</a> 	<b>DEV103</b> 5.5 dBi   35 x 7 mm Ultra-Narrow Bezel <a href="#">ICL1112</a> 	<b>DEV101A</b> 4 dBi   12 x 12mm Ultra-Mini <a href="#">ICL111A</a> 



**ONELAB**  
Open & Empower Development Tool

**DEV Series**

	1T2R	2T2R	2T4R
<b>M4 MCU</b> 64KB-144MHz Enhanced Memory/ Clock Speed	<b>DEV202H</b> 14 dBi   34 x 15 mm Horizontal Installation Optimized ICL1122 	<b>DEV202E</b> 15 dBi   15 x 40 mm Long-Distance Ranging for Large Spaces ICL1122 	<b>DEV112P</b> 6.5 dBi   50 x 23 mm Large Space + 4D Performance ICL1122 
	<b>DEV202S</b> 7 dBi   30 x 7 mm Ultra-Thin Long-Distance Detection ICL1122 	<b>DEV111E</b> 15 dBi   20 x 44 mm Large Space + High Angle Accuracy ICL1122 	<b>DEV111V</b> 7 dBi   20 x 30 mm Small Size + High Angle Accuracy ICL1122 
	<b>DEV202V</b> 6 dBi   15 x 25 mm Small Size + Vertical Installation ICL1122 		

# DEV101 | 1T1R

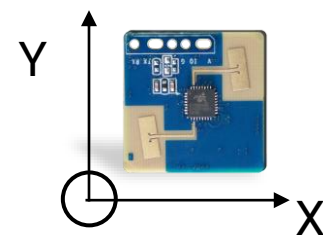
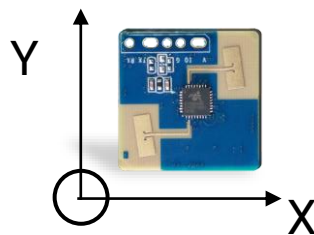
ONELAB | 24G mmWave Sensor Development Kit



DEV101/101Pro development kits are equipped with ICL1112 (1T1R) mmWave sensor SoC. Users can select between the M0 MCU Standard Edition or the M4 MCU High-Performance Edition. The module adopts a compact 20 mm x 20 mm hardware design.

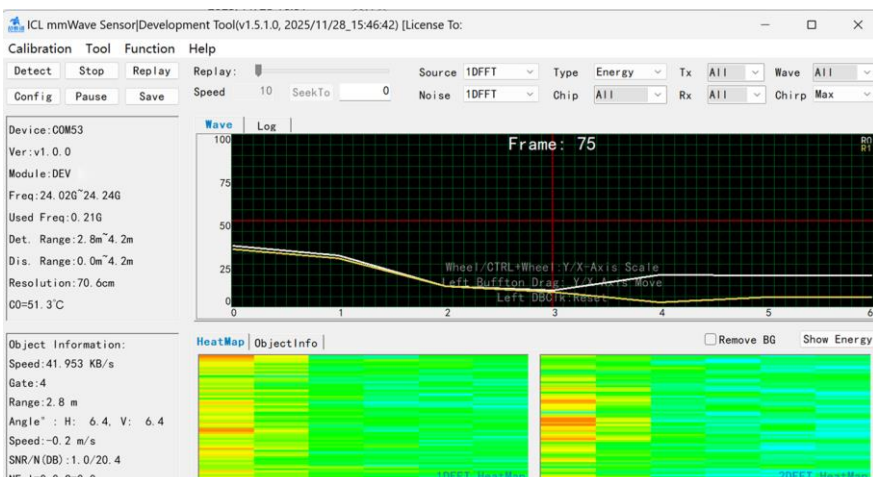


1 - Yuan Coin Size Comparison

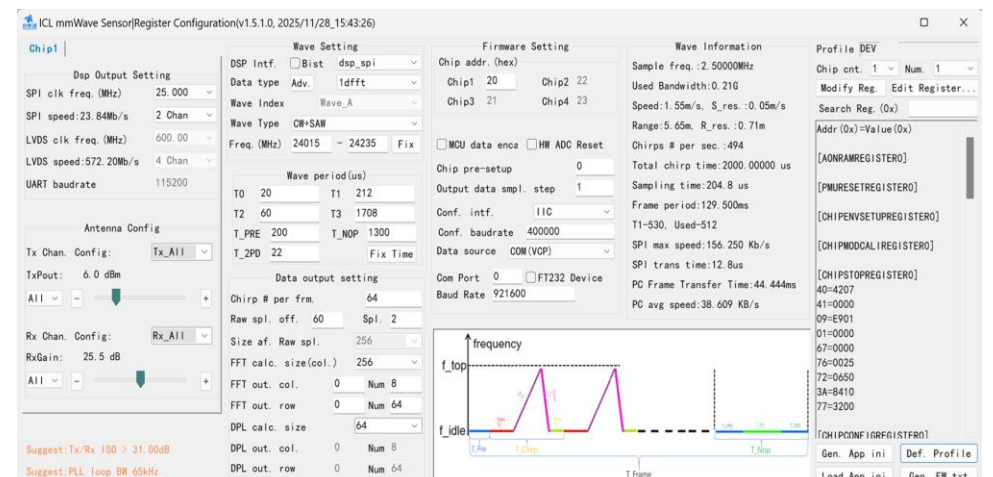


Specifications	DEV101 (1T1R)	DEV101Pro (1T1R)
MCU	M0 MCU Standard Edition	M4 MCU High-Performance Edition
Sensor SoC	ICL1112	
Beamwidth (6 dB)	X: -70°~70° Y: -70°~70°	
Antenna Gain	1 dBi	
Data Interface	UART, GPIO	
Power Interface	Compatible with 2.54 mm and 2 mm pitch headers	
Hardware Size	20 mm x 20 mm	

\* The above specifications are for reference only. Performance and features may be updated according to specific project requirements.



Tool Demonstration Interface



Configuration Interface



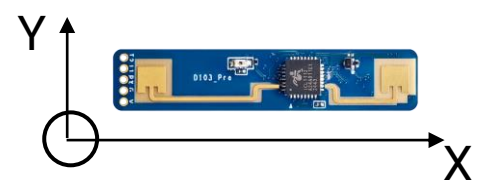
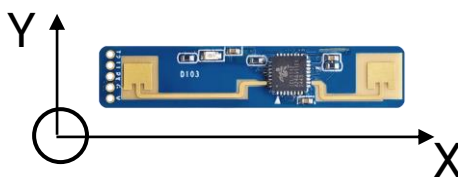
# DEV103 | 1T1R

ONELAB | 24G mmWave Sensor Development Kit

DEV103/103Pro development kits are equipped with ICL1112 (1T1R) mmWave sensor SoC. Users can select between the M0 MCU Standard Edition or the M4 MCU High-Performance Edition. The module features a 35 mm x 7 mm narrow-bezel compact design.

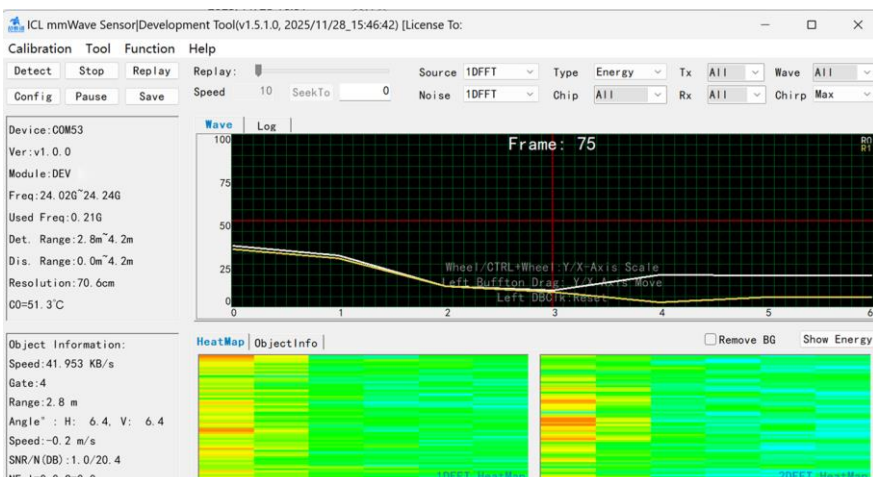


1 - Yuan Coin Size Comparison

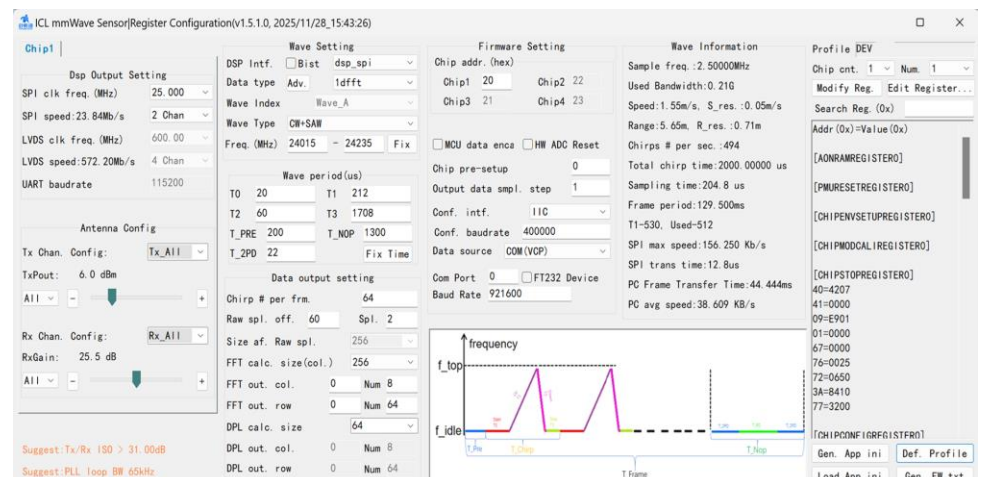


Specifications	DEV103 (1T1R)	DEV103Pro (1T1R)
MCU	M0 MCU Standard Edition	M4 MCU High-Performance Edition
Sensor SoC	ICL1112	
Beamwidth (6 dB)	X: -35 °~35 ° Y: -50 °~50 °	
Antenna Gain	5.5 dBi	
Data Interface	UART, GPIO	
Power Interface	1.27 mm pin headers	
Hardware Size	35 mm x 7 mm	

\* The above specifications are for reference only. Performance and features may be updated according to specific project requirements.



Tool Demonstration Interface



Configuration Interface

# DEV202 | 1T2R

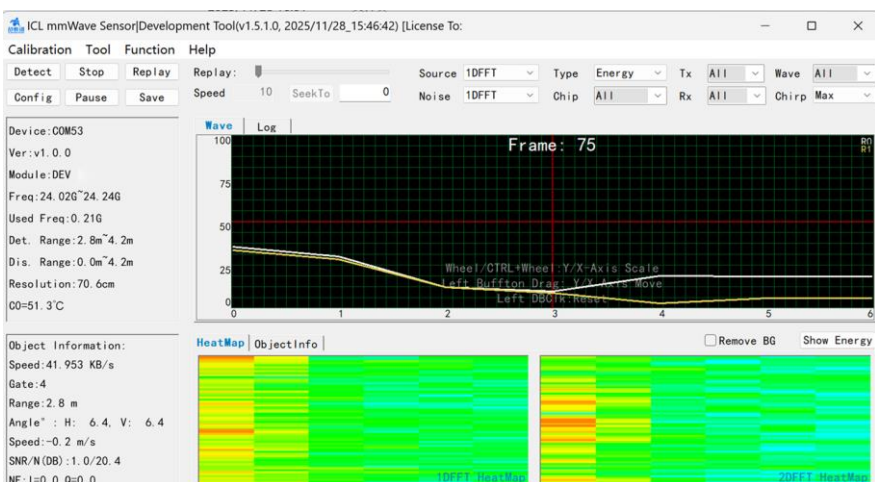
ONELAB | 24G mmWave Sensor Development Kit



DEV202 series development kits are based on ICL1122 1T2R mmWave sensor SoC, offering M4 MCU High-Performance configurations. They come in 15 mm x 40 mm / 15 mm x 34 mm / 7 mm x 30 mm / 15 mm x 25 mm layout options.

Specifications	DEV202E (2T2R)	DEV202H (2T2R)	DEV202S (2T2R)	DEV202V (2T2R)
MCU	M4 MCU High-Performance Edition			
Sensor SoC	ICL1122			
Beamwidth (6 dB)	X: -55°~55° Y: -20°~20°	X: -45°~45° Y: -25°~25°	X: -50°~50° Y: -50°~50°	X: -60°~60° Y: -45°~45°
Antenna Gain	15 dBi	14 dBi	7 dBi	6 dBi
Data Interface	UART		UART	
Power Interface	1.5 mm (ZH1.5) connectors		1.27 mm pin headers	
Hardware Size	15 mm x 40 mm	34 mm x 15 mm	30 mm x 7 mm	15 mm x 25 mm

\* The above specifications are for reference only. Performance and features may be updated according to specific project requirements.



Tool Demonstration Interface



Configuration Interface

# DEV101A | AiP 1T1R

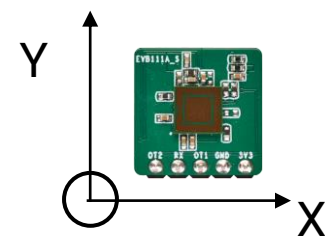
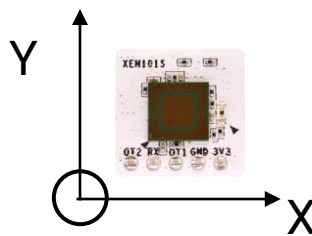
ONELAB | 24G mmWave Sensor Development Kit



DEV101A development kits are integrated with ICL111A AiP 1T1R mmWave sensor SoC, with options for the M0 MCU Standard Edition or M4 MCU High-Performance Edition. The module adopts an ultra-mini 12 mm x 12 mm / 15 mm x 15 mm form factor, supporting flexible integration into compact systems.

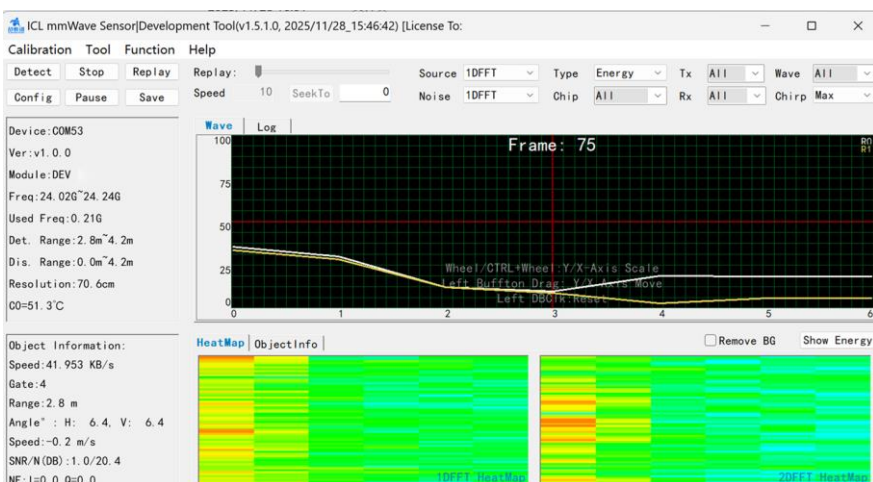


1 - Yuan Coin Size Comparison

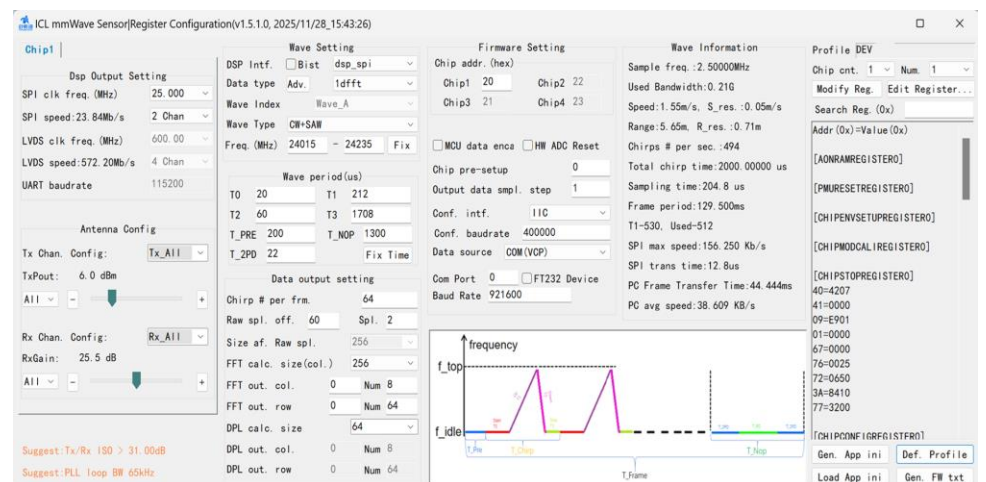


Specifications	DEV101A (AiP 1T1R)	DEV101A Pro (AiP 1T1R)
MCU	M0 MCU Standard Edition	M4 MCU High-Performance Edition
Sensor SoC	ICL111A	
Beamwidth (6 dB)	X: -60°~60° Y: -70°~70°	
Antenna Gain	4 dBi	
Data Interface	UART, GPIO	
Power Interface	2 mm pitch headers	2.54 mm pitch headers
Hardware Size	12 mm x 12 mm	15 mm x 15 mm

\* The above specifications are for reference only. Performance and features may be updated according to specific project requirements.



Tool Demonstration Interface



Configuration Interface

# DEV103A | AiP 1T1R

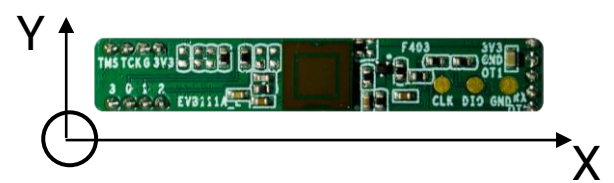
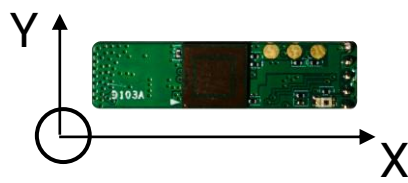
ONELAB | 24G mmWave Sensor Development Kit



DEV103A/103A Pro development kits are equipped with ICL111A AiP 1T1R mmWave sensor SoC. Users can select between the M0 MCU Standard Edition or the M4 MCU High-Performance Edition. It features an ultra-compact 23 mm x 6 mm / 35 mm x 6 mm narrow-bezel design, ideal for space-constrained applications.

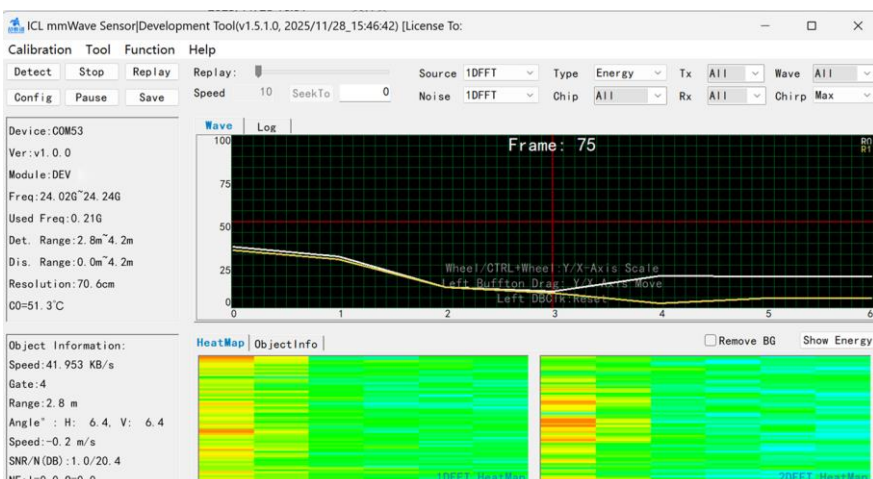


1 - Yuan Coin Size Comparison



Specifications	DEV103A (AiP 1T1R)	DEV103A Pro (AiP 1T1R)
MCU	M0 MCU Standard Edition	M4 MCU High-Performance Edition
Sensor SoC	ICL111A	
Beamwidth (6 dB)	X: -50 °~50 ° Y: -60 °~50 °	
Antenna Gain	4 dBi	
Data Interface	UART, GPIO	
Power Interface	1.27 mm pitch headers	
Hardware Size	23 mm x 6 mm	35 mm x 6 mm

\* The above specifications are for reference only. Performance and features may be updated according to specific project requirements.



Tool Demonstration Interface



Configuration Interface



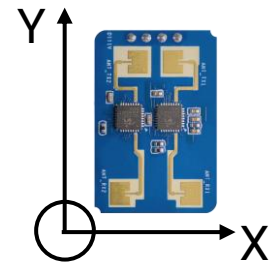
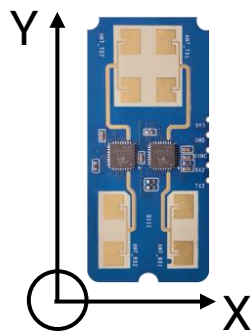
# DEV111 | 2T2R

ONELAB | 24G mmWave Sensor Development Kit

DEV111E / DEV111V development kits are based on two ICL1112 1T1R mmWave sensor SoCs, offering M4 MCU High-Performance configurations. They come in 20 mm x 44 mm / 20 mm x 30 mm layout options.

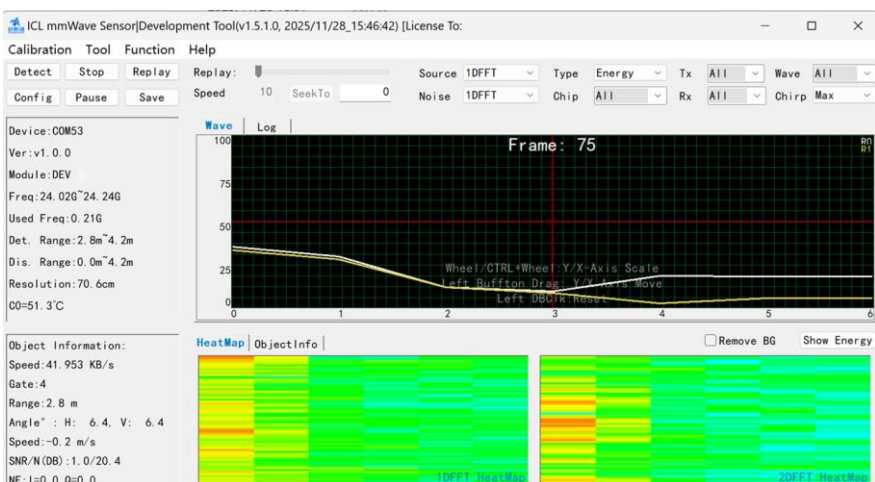


1 - Yuan Coin Size Comparison

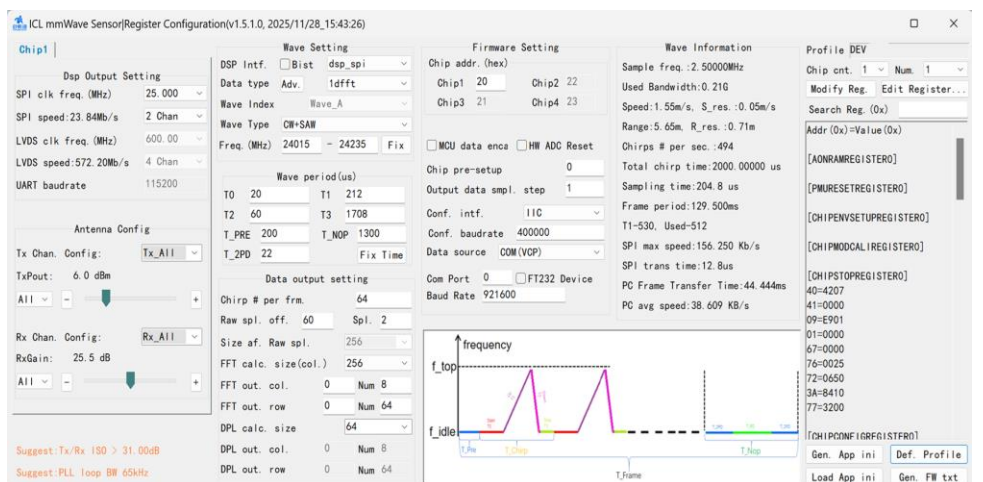


Specifications	DEV111E (2T2R)	DEV111V (2T2R)
MCU	M4 MCU High-Performance Edition	
Sensor SoC	ICL1112	
Beamwidth (6 dB)	X: -55°~55° Y: -20°~20°	X: -60°~60° Y: -30°~30°
Antenna Gain	15 dBi	7 dBi
Data Interface	UART	
Power Interface	1.5 mm (ZH1.5) connectors	
Hardware Size	20 mm x 44 mm	20 mm x 30 mm

\* The above specifications are for reference only. Performance and features may be updated according to specific project requirements.



Tool Demonstration Interface



Configuration Interface

# DEV112P | 2T4R

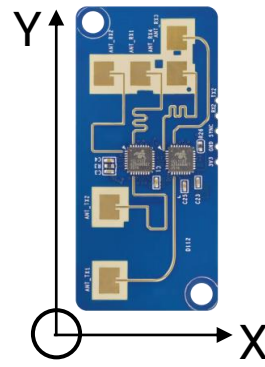
ONELAB | 24G mmWave Sensor Development Kit



DEV112P development kit is based on two ICL1122 1T2R mmWave sensor SoCs, offering M4 MCU High-Performance configurations. It comes in 23 mm x 50 mm layout options.

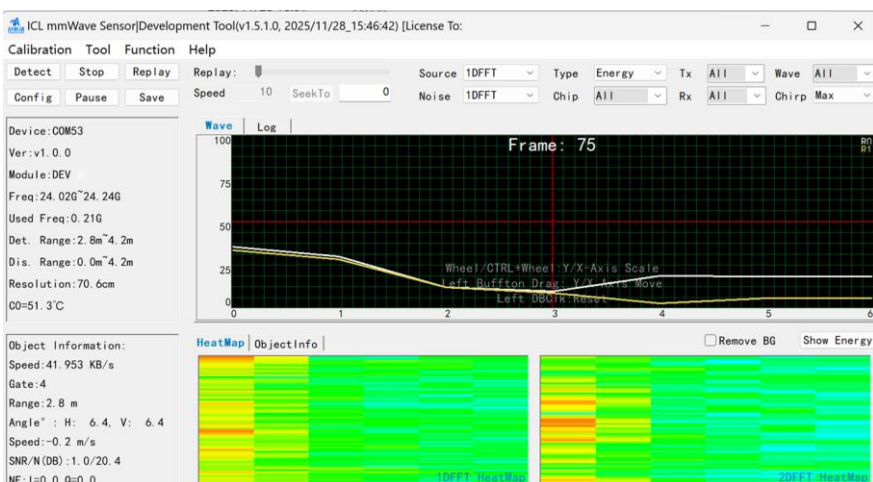


1 - Yuan Coin Size Comparison

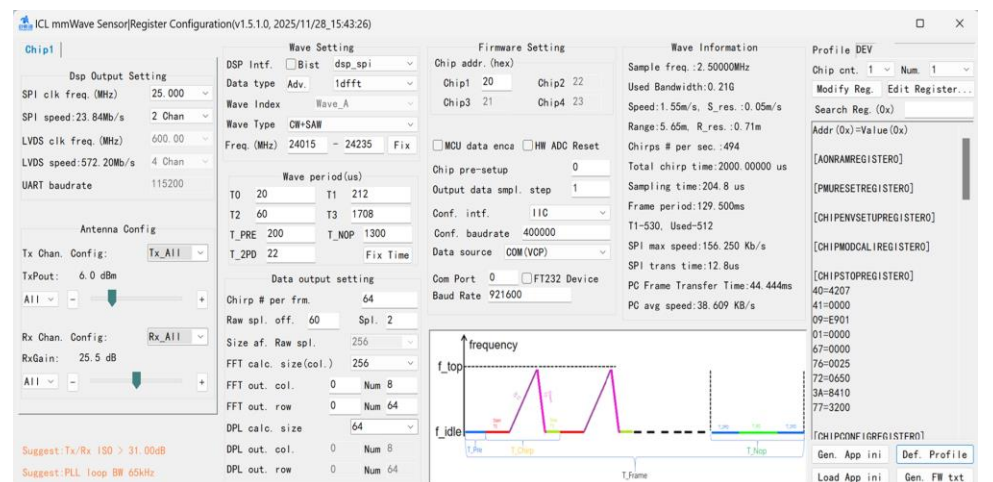


Specifications	DEV112P (2T4R)
MCU	M4 MCU High-Performance Edition
Sensor SoC	ICL1122
Beamwidth (6 dB)	X: $-50^{\circ} \sim 50^{\circ}$ Y: $-40^{\circ} \sim 40^{\circ}$
Antenna Gain	6.5 dBi
Data Interface	UART
Power Interface	1.5 mm (ZH1.5) connectors
Hardware Size	23 mm x 50 mm

\* The above specifications are for reference only. Performance and features may be updated according to specific project requirements.



Tool Demonstration Interface



Configuration Interface



Wechat



Online shop

**ICLEGEND MICRO**

[info@iclegend.com](mailto:info@iclegend.com)

[iclegend.com](http://iclegend.com)

### **Nanjing**

1F, Building 3, Zhongke Innovation Plaza, 150 Pubin Road, Jiangbei, Nanjing, Jiangsu, China (211800)

### **Suzhou**

Suzhou | Office 808, Building 1-A, 116 Chengyang Road, Xiangcheng District, Suzhou, China (215134)

### **Shanghai**

Shanghai | Office A301, Building 1, 95 Lane 85, Cailun Road, Pudong New Area, Shanghai, China (201203)

### **Shenzhen**

Shenzhen | Office 602, Block A, No.268 Chuangye 2nd road, Bao'an District, Shenzhen, China (518133)