

iBS09/ R/ PIR/ IR Specification

iBS09/ R/ PIR/ IR Sensor

iBS09 is an IPX7 waterproof Bluetooth® beacon which supports various sensors, including PIR for human detection, TOF for consumable detection, and IR for occupancy detection. It supports **Bluetooth Low Energy (BLE)** in Bluetooth 5.

The typical battery usage time is 2.6~5.6 years in default settings for different models



Features

General

- Powered by one CR2450 battery or USB port(5V, type-C)
- Battery life(default settings.):
iBS09: 4.9~5.6y
iBS09R: 3.1~3.6y
iBS09PIR: 3.8~4.4y
iBS09IR: 2.6~3y
- Android and iOS APP for monitoring sensor data
- Power on/off by a single button
- Main unit Size:
34.8mmx66.8mmx8.4mm(iBS09/ iBS09R/iBS09IR)
34.8mmx66.8mmx16.2mm(iBS09PIR)

Environment

- IPX7
- Operating temperature:
-20°C to 60°C
- Operating humidity: 0 to 95%RH

Certification

- Bluetooth
- FCC/Giteki: Ready in Dec, 2025
- CE/NCC: Ready in Jan, 2026

Sensor

- iBS09R: ToF sensor for distance measurement from 1 cm to 250 cm.
- iBS09PIR: Passive Infrared SensorPIR sensor for human detection within the 5M range
- iBS09IR: Infrared(IR) proximity sensor for object detection from 1cm to 50cm.(TBD)

BLE

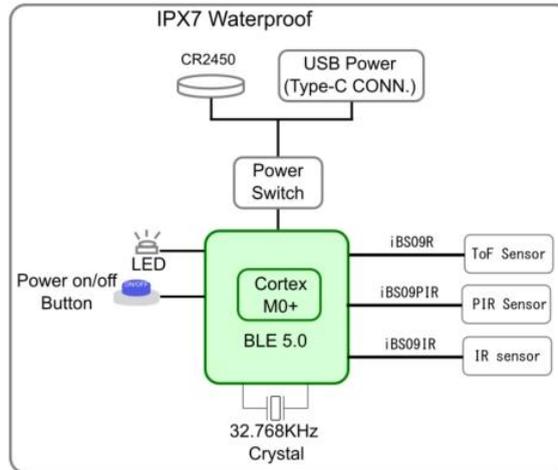
- 2.4GHz frequency band
- Support Bluetooth Low Energy in **Bluetooth 5** standard
- Maximum transmit power +8dBm
- Receiver sensitivity: -96.5 dBm @1Mbps, 0.1% BER
- On board PCB antenna
- >100M range in open space

Applications

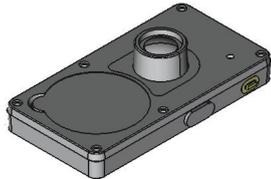
- Trash can monitoring
- human detection
- Consumables monitoring
- Inventory monitoring
- Industrial automation

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Block Diagram



Models

Model	iBS09	iBS09R	iBS09PIR	iBS09IR
				
FOV	NA	30° *1	110° X 110°	45° *2
Application	Beacon	Distance detection	Human detection	Object detection
Detection distance	NA	Low : 1cm~170cm *3 Mid : 1cm~210cm *3 High : 1cm~250cm *3 (measured with A4-sized white 88 paper)	10cm~5M	1cm~50cm (measured with A4-sized white 88 paper)
Battery life *4	4.9~5.6y	Low : 3.1~3.6y Mid : 2.5~2.9y High : 1.6y~1.8y	3.8~4.4y	2.6~3y

*1 The maximum detection angle varies depending on the object size

*2 Recommended placement: Perpendicular to the Device Under Test

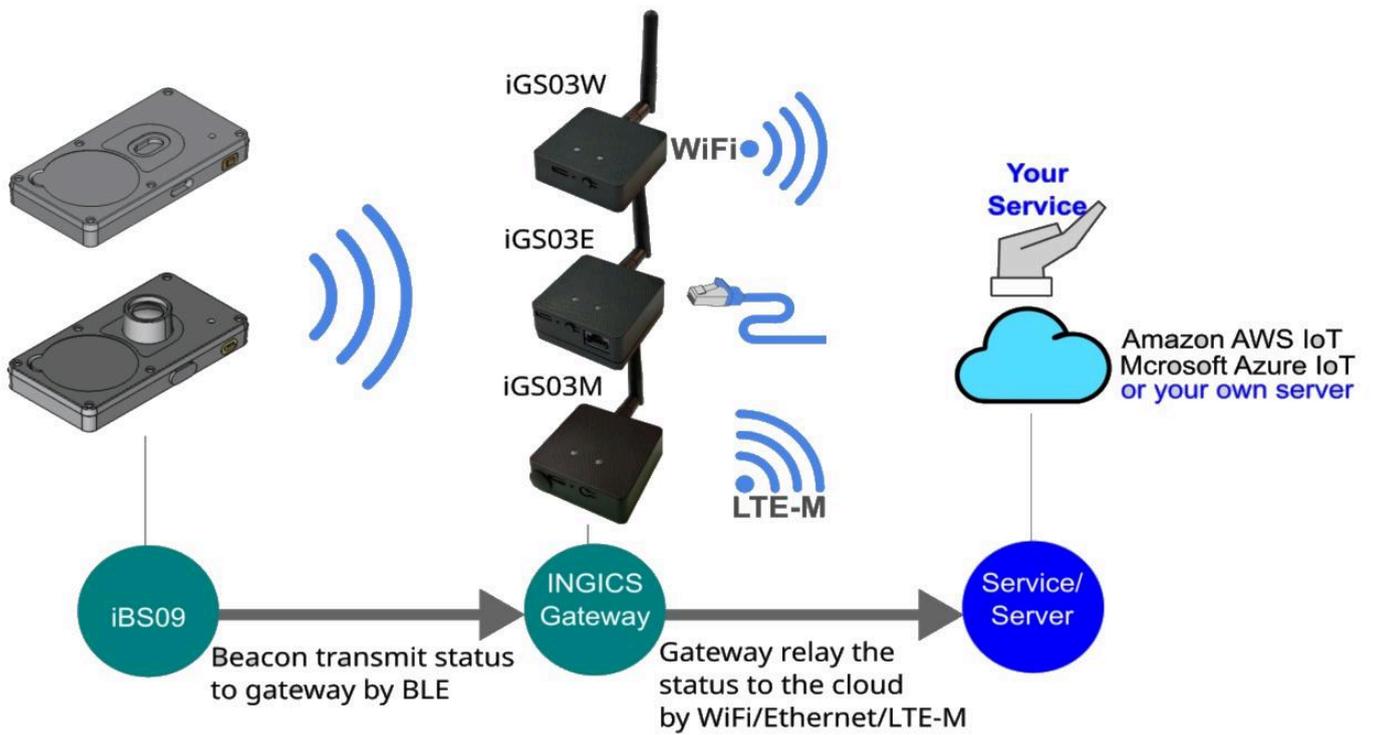
*3 The iBS09R has three configurable modes, each with different power consumption and maximum detection distance.

*4 Calculated with one CR2450 battery with 600mAH capacity in default settings. Considering the battery discharge characteristic, only 70%-80% of capacity is used for calculation. This value is just for reference and may be varied with component tolerance and different environments.

Typical Usage

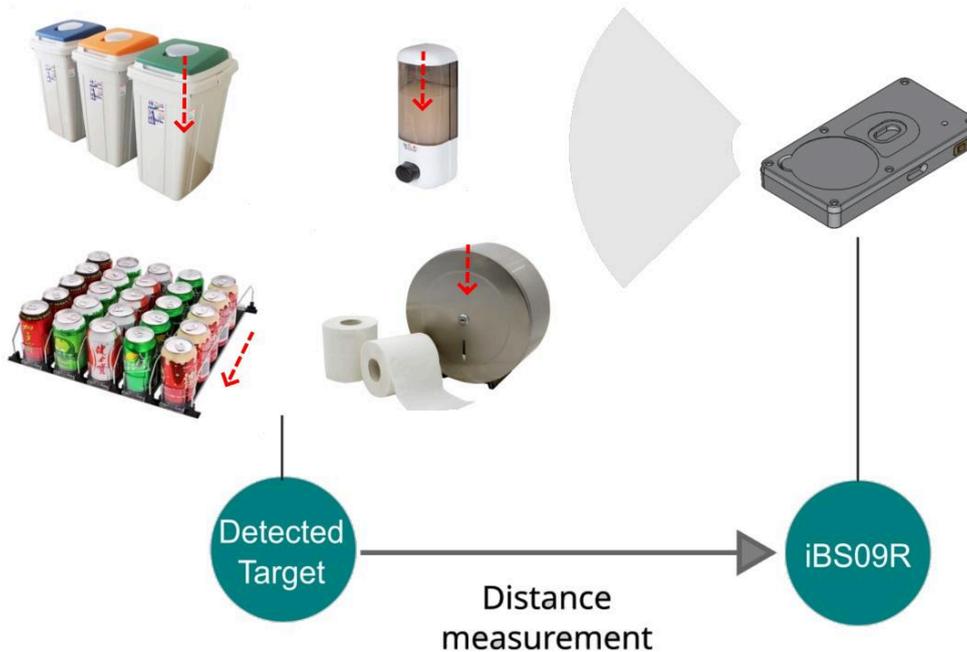
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The beacon information can be received by our gateway (iGS03W/iGS03M/iGS03E) and then sent to the cloud server. Users can access and manage the data on their cloud.



iBS09R

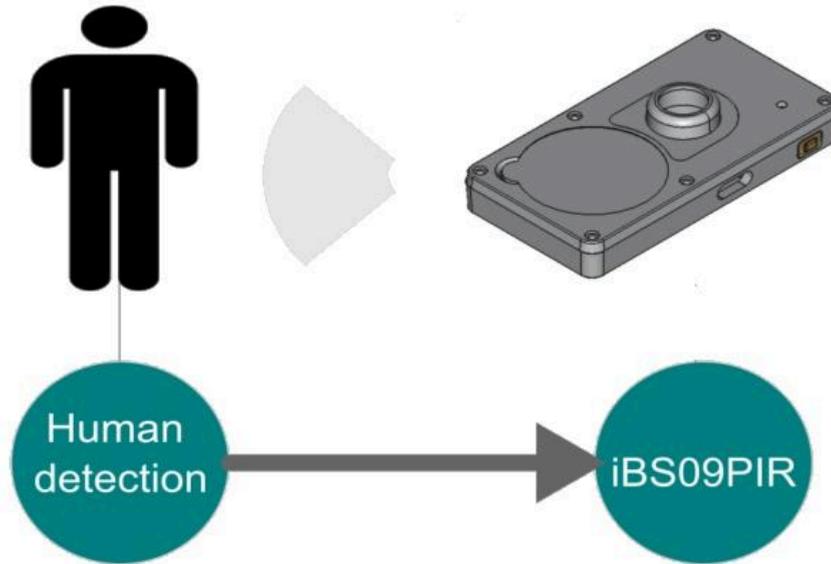
By measuring distance, iBS09R can be used for waste container full/empty monitoring, toilet paper utilization or inventory monitoring.



iBS09PIR

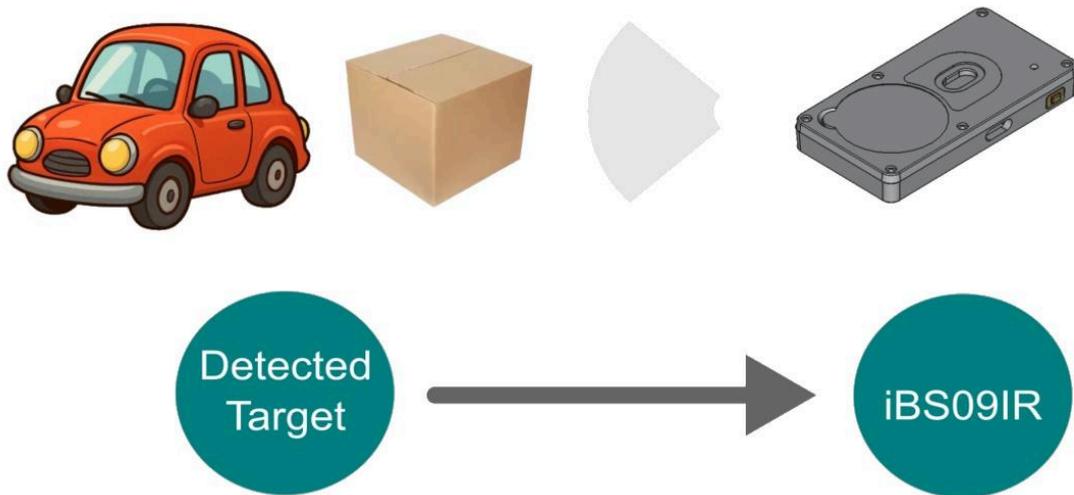
For human detection within the 5M range

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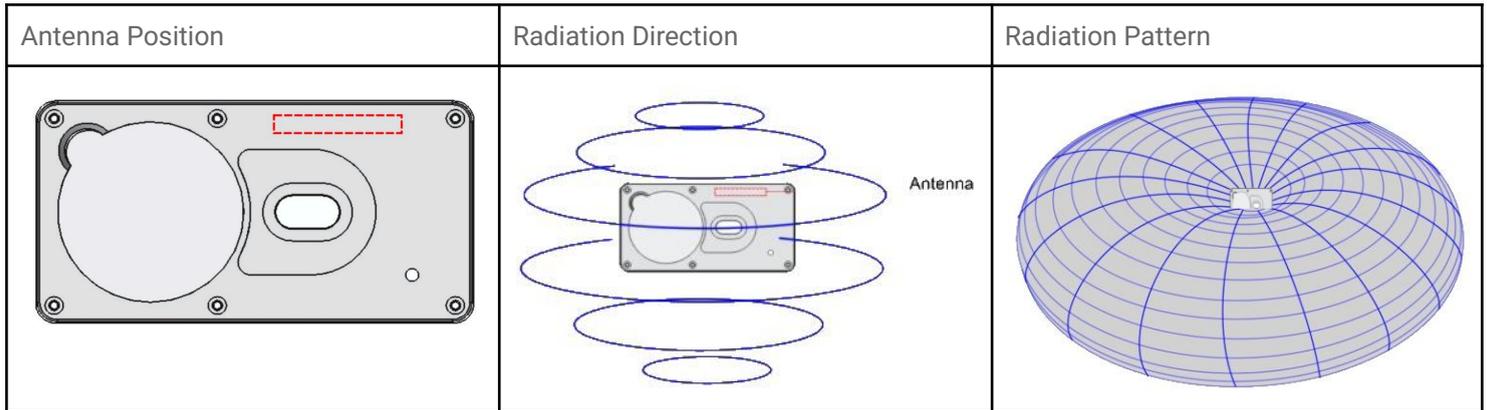
iBS09IR

For object detection from 1cm to 50cm.(TBD)



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Antenna



BLE Payload Format

* Endianness: Little endian

Prefix	MFG Code (2 bytes)	Beacon Code (2 bytes)	Tag Batt (2 bytes)	Event Status (1 byte)	Sensor 1 (2 bytes)	Sensor 2 (2 bytes)	Lux/Aux (2 bytes)	Aux 1 (2 bytes)	Aux 2 (2 bytes)	Aux 3 (2 bytes)	Aux 4 (2 bytes)	Sub Type (1 byte)	Reserved (3 bytes)
0201061AF F	2C08	88BC	XXXX	XX	XXXX	XXXX	XXXX	XXXX	XXXX	0000	0000	XX	000000

Field	Description
MFG Code	Manufacturer vendor code, fixed to 0x082C
Beacon Code	Magic Code to identify packet format, fixed to 0xBC88 (Extended Payload for iBS08/09 series)
Tag Batt	Battery voltage of tag in 0.01V unit
Event Status (Bitmask)	8-bit bitmask: * 0x01: Button pressed * 0x10: PIR active * 0x20: IR proximity/Presence detected
Sensor 2	2 bytes. iBS09R: ToF distance reading (mm). iBS09IR / iBS09PIR: Event counter. Also used for Humidity (0.1%) in models like iBS09PS.
Sub Type	Model identification code: * 0x42: iBS09R * 0x44: iBS09PIR * 0x47: iBS09IR * 0x54: iBS09 Standard

Specification

Absolute Maximum Rating

Supply Power	CR2450 battery X1 USB Type-C , Max. +5.5 Volt
Storage Temperature	-40° to 85° Celsius

Recommendable Operation Condition

Operating Temperature	-20°C to 60°C
VDD	+3V by CR2450 battery or USB Type-C
IPX7	30min.@1 Meter water(TBD)

Average Current Consumption

iBS09-5s	9.6A*, in default 5sec transmit period@1Mbps.
iBS09R-Low/30s	15.2A*, in default 30sec transmit period@1Mbps.
iBS09PIR-30s	12.3uA*, in default 30sec transmit period@1Mbps.
iBS09IR-30s	17.9uA*, in default 30sec transmit period@1Mbps.

* Measured with Panasonic CR2450 battery.

* default setting

Battery Life Simulation

iBS09-5s	4.9~5.6y in default 5sec transmit period@1Mbps.
iBS09R-Low/30s	3.1~3.6y in default 30sec transmit period@1Mbps.
iBS09PIR-30s	3.8~4.4y in default 30sec transmit period@1Mbps.
iBS09IR-30s	2.6~3y in default 30sec transmit period@1Mbps.

* Calculated with one CR2450 battery with 600mAH capacity. Considering the battery discharge characteristic, only 70%-80% of capacity is used for calculation. This value is just for reference and may be varied with component tolerance and different environments.

BLE RF Specification

Transmit Power	High: +8dBm Mid: +4 dBm(default) Low: -4dBm
Frequency band	2.360 – 2.510 GHz
Antenna	on board PCB antenna
Range	>100M in open space

TOF Sensor error

Object distance $\geq 500\text{mm}$	$\pm 3\%$
$50\text{mm} \leq \text{Object distance} < 500\text{mm}$	$\pm 15\text{mm}$

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Object distance < 50mm

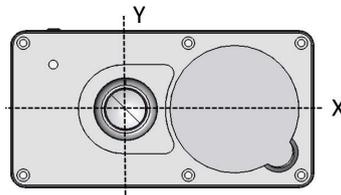
+5mm
-20mm

* Detection rate is a statistical value indicating the worst case percentage of measurements that return a valid ranging. For example, taking 1000 measurements with 90% detection rate gives 900 valid distances. The 100 other distances may be outside of the specification and are flagged with an error status.

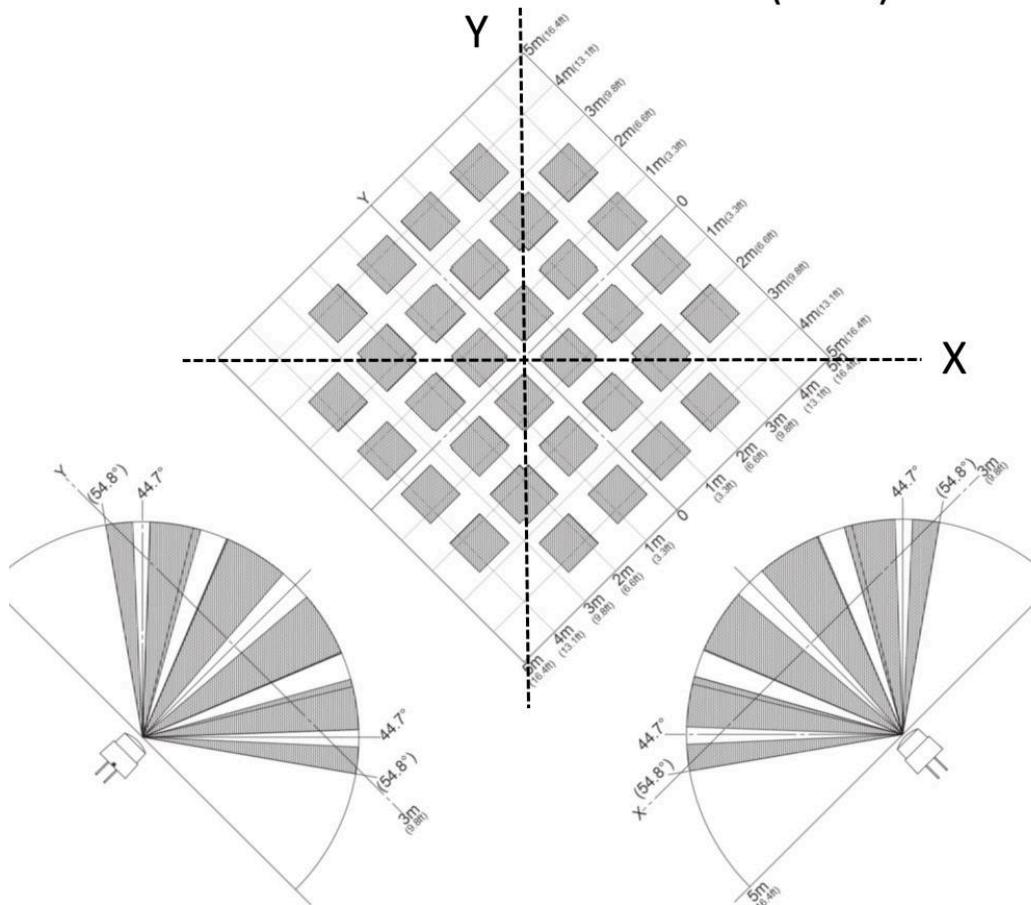
PIR Sensor Characteristic

Detection distance	5M
Detection Range (Horizontal X Vertical)	110° X 110°
Detection zone	32 zones

PIR Detection Range



X-Y cross section at 3m (9.8ft)



IR Sensor Characteristic(TBD)

Detection distance	50cm: A4 size white paper
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Actual measurement result

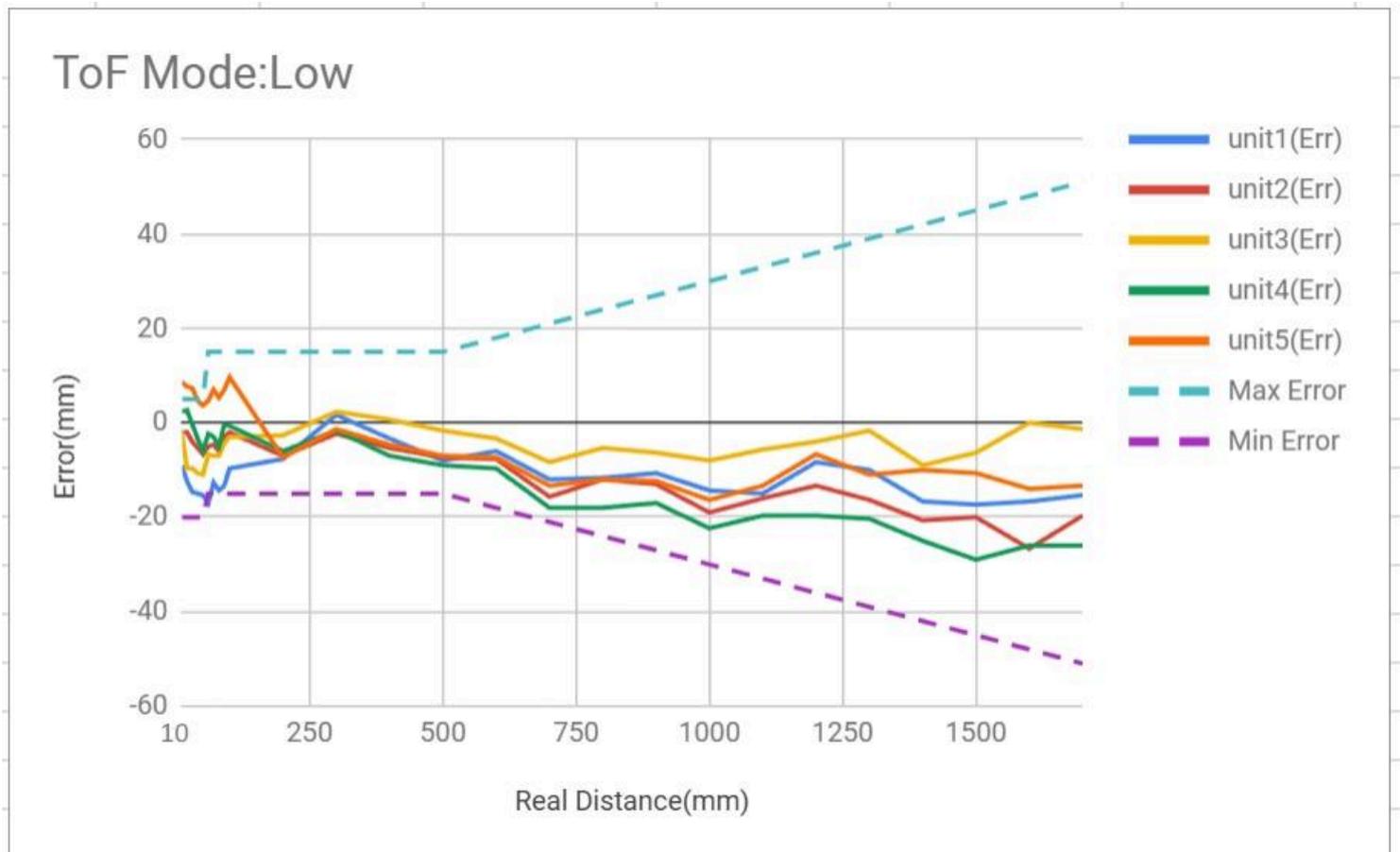
iBS09R

Test conditions

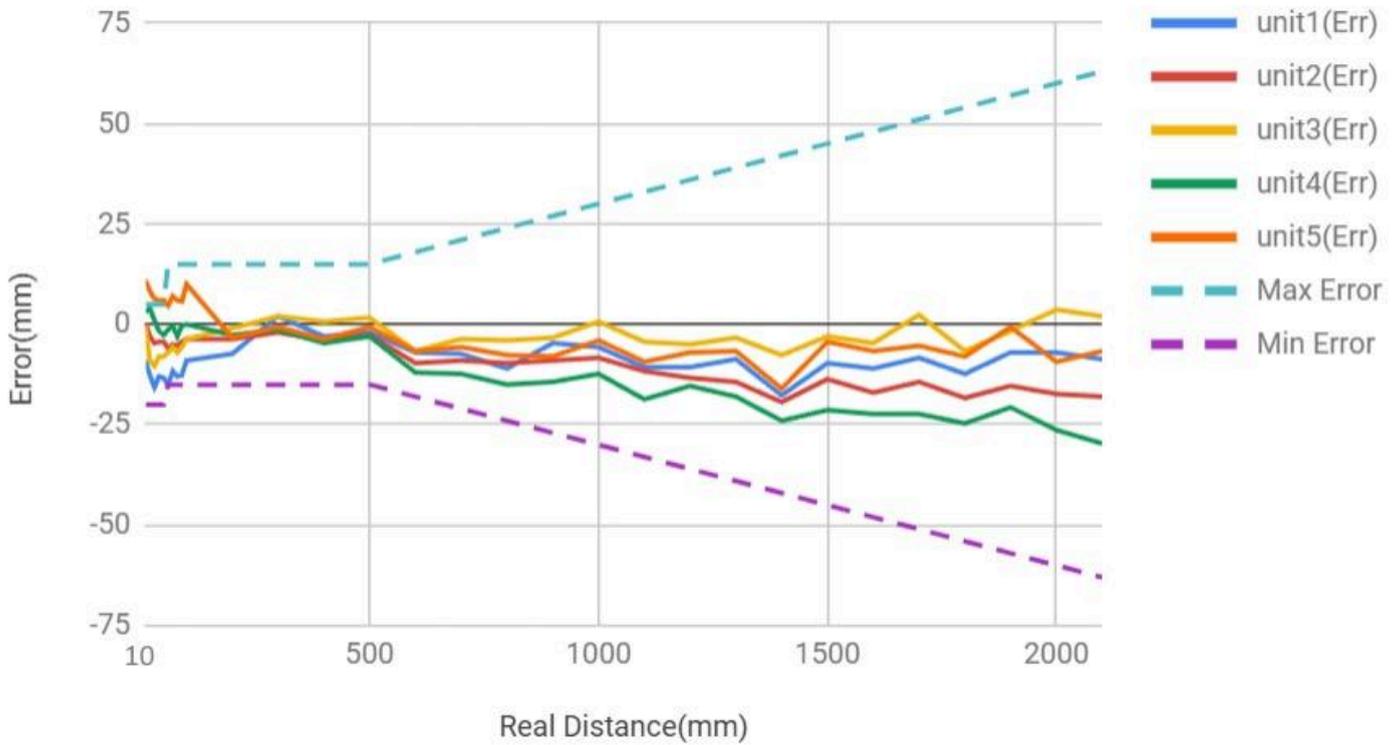
1. 5 units of iBS09R are used for the test.
2. Each number takes 3 averages.
3. Tested under office light.
4. Use an A4-sized white 88 paper angle 0° for the test.
5. Max./min. ranging error(mm) comes from the specification of the TOF sensor.
6. Working Voltage and temperature:: 3 V & 27 °C.

Conclusion

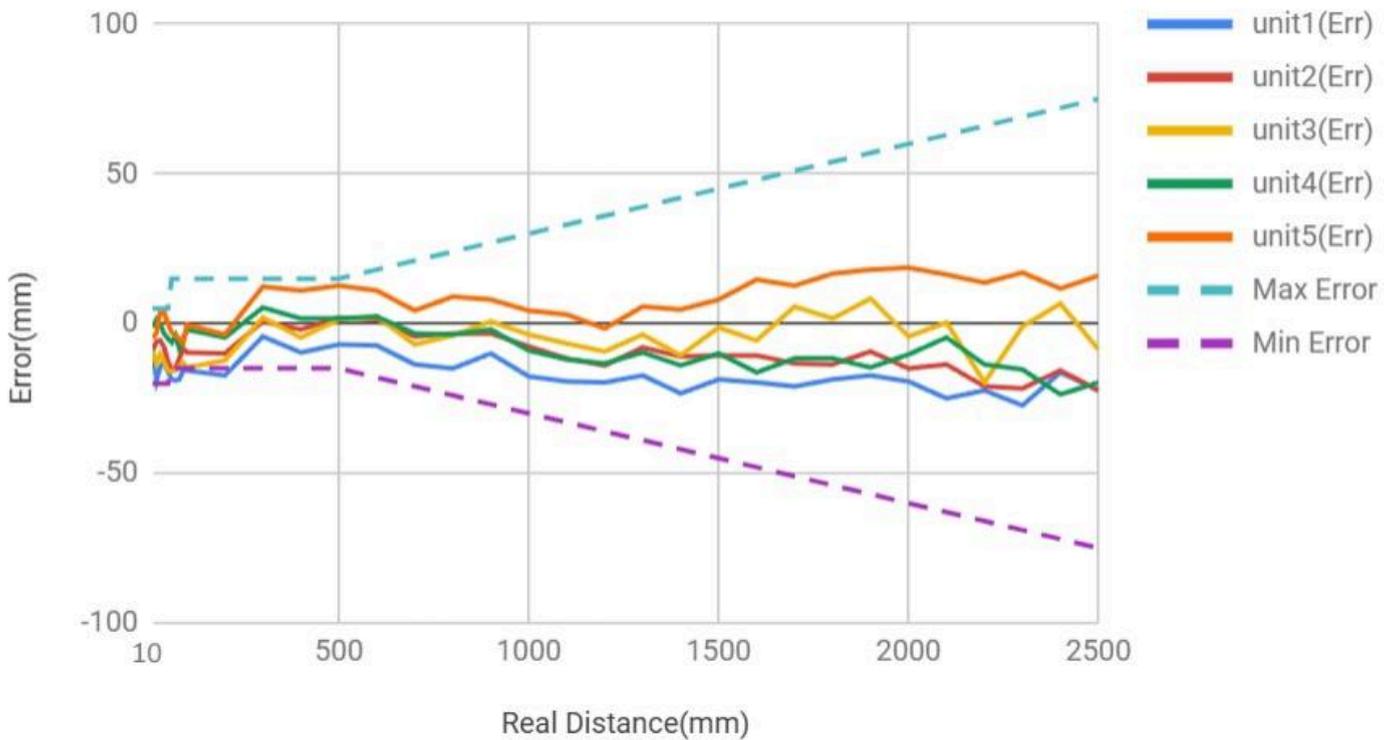
Distance detection across different modes meets specification in over 90% of cases. Deviations may occur within a 10 cm range



ToF Mode:Mid



ToF Mode:High

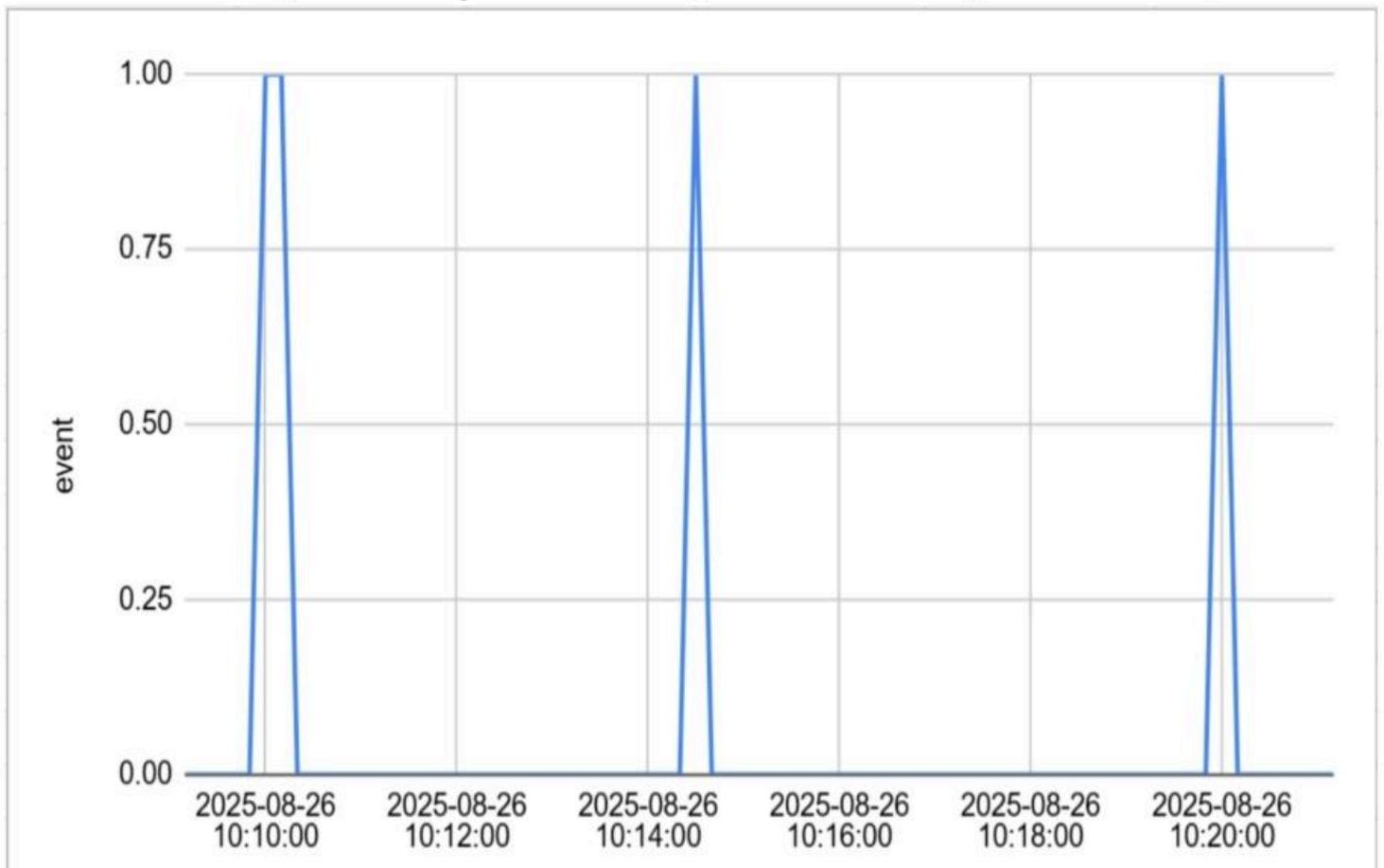
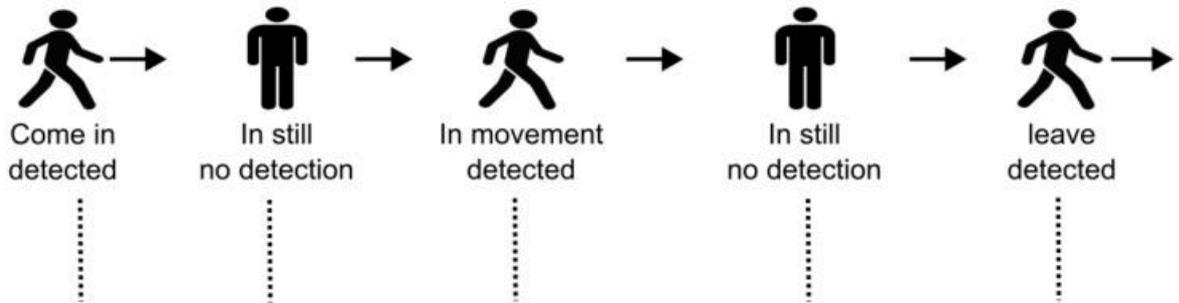


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iBS09PIR

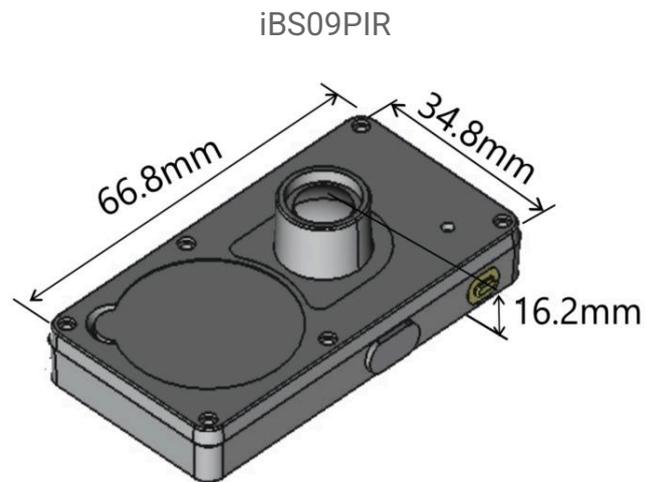
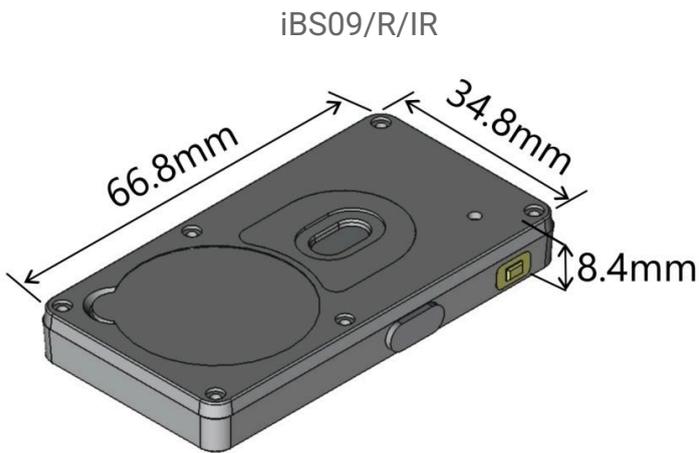
Test conditions

1. 1 unit of iBS09PIR is used for the test.
2. Captured from a top-down angle at a height of 3 meters above the ground.
3. Tested under office light.
4. Working Voltage and temperature:: 3 V & 27 °C.



Dimension

Dimensions L x W x H(mm)	34.8mmx66.8mmx8.4mm(iBS09R/iBS09IR) 34.8mmx66.8mmx16.2mm(iBS09PIR)
Weight(g)	iBS09R:21g iBS09R:22g iBS09IR:22g iBS09PIR:23g



Marking (TBD)



Serial Number: 2508750001

25: 2025

08: Aug

74: iBS09PIR product code

75: iBS09R product code

76: iBS09IR product code

0001: SN

MAC: BFC2D7, the last 6 digits of MAC address

QR code: full MAC address

Packaging

TBD

Waste Electrical and Electronic Equipment Recycling

Our product is compliant with the WEEE directive for re-use/recovery/recycling. This cross-out wheeled-bin symbol is a reminder that this product should not be treated as household waste. Instead, hand it over to the appropriate collection point for the recycling of electrical and electronic equipment in accordance with local environmental regulations for waste disposal.



Since our product is not sold directly to the end user and generally it is a part of our customer's solution, our customer is recognized as a professional seller. Our customer has the responsibility to comply with the requirement of the directive too. To help our customers, when necessary, we will provide a WEEE compliant assessment report for registering and communicating with the local authorities and recycling agency.

Certification(TBD)

Bluetooth SIG Qualification

Model number: iBS09
Declaration ID: Q364006
Description: Beacon

FCC Regulatory

Finished in Dec, 2025

CE Regulatory

Finished in Jan, 2026

NCC Regulatory

Finished in Jan, 2026

Giteki Regulatory

Finished in Dec, 2025

UKCA Regulatory

Finished in Jan, 2026

Statement

Federal Communication Commission Interference Statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures: . Reorient or relocate the receiving antenna. . Increase the separation between the equipment and receiver. . Connect the equipment into an outlet on a circuit different from that to which the receiver is connected. . Consult the dealer or an experienced radio/TV technician for help.

FCC Caution: To assure continued compliance, any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment. (Example - use only shielded interface cables when connecting to computer or peripheral devices).

FCC Radiation Exposure Statement This equipment complies with FCC RF radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20 centimeters between the radiator and your body.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter. The antennas used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) This device must accept any interference received, including interference that may cause undesired operation.

Industry Canada Statement

This device complies with Industry Canada licence-exempt RSS standard. Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including

interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence.

L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

IC Radiation Exposure Statement

This equipment complies with IC RSS-102 radiation exposure limit set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator and your body.

Cet équipement est conforme aux CNR-102 d'Industrie Canada. Cet équipement doit être installé et utilisé avec une distance minimale de 20 centimètres entre le radiateur et votre corps. Cet émetteur ne doit pas être co-localisées ou opérant en conjonction avec autre antenne ou émetteur. Les antennes utilisées pour cet émetteur doivent être installés et fournir une distance de séparation d'au moins 20 centimètre de toute personne et doit pas être co-située ni fonctionner en conjonction avec une autre antenne ou émetteur.

NCC 警語

「取得審驗證明之低功率射頻器材，非經核准，公司、商號或使用者均不得擅自變更頻率、加大功率或變更原設計之特性及功能。低功率射頻器材之使用不得影響飛航安全及干擾合法通信；經發現有干擾現象時，應立即停用，並改善至無干擾時方得繼續使用。前述合法通信，指依電信管理法規定作業之無線電通信。低功率射頻器材須忍受合法通信或工業、科學及醫療用電波輻射性電機設備之干擾。」

Revision History

DATE	REVISION	CHANGES
Aug 28, 2025	0a	Initial release
Dec 17, 2025	0b	Update operating temperature Update battery life Update iBS09PIR Size Update certification time Update iBS09IR FoV Update weight(g)
Feb 03, 2026	0c	Update Operating humidity Update iBS09 Spec Update Statement