

## 3D TOF Sensor Module **B5L**

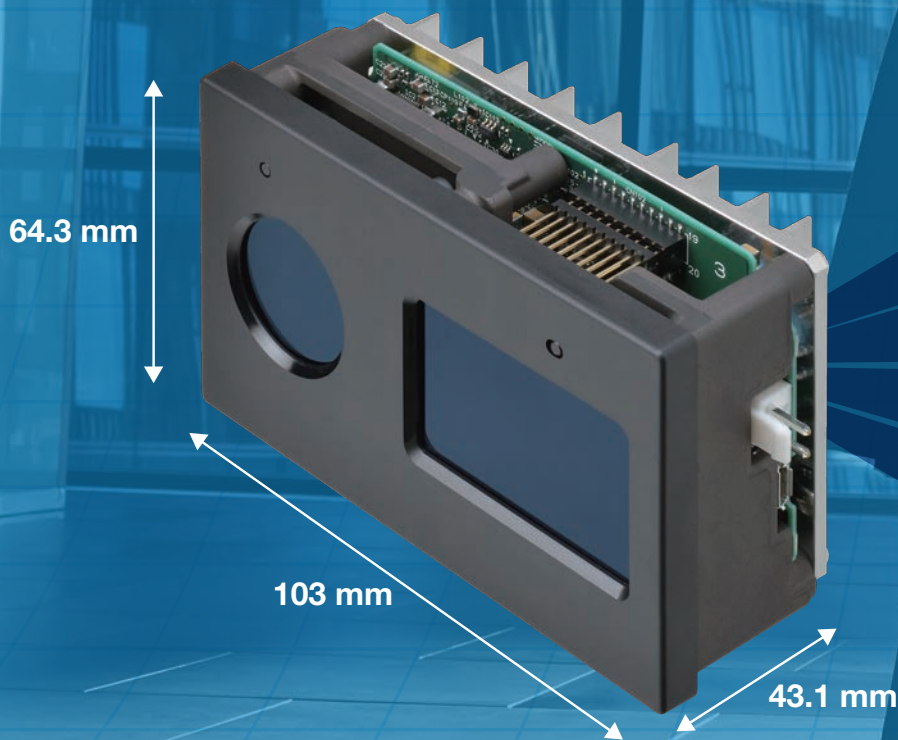
TOF Sensor Module ideal for 3D distance measurement  
High ambient light immunity and flexible assembly



*Time of Flight*

# Introducing the assembly type TOF Sensor, a product

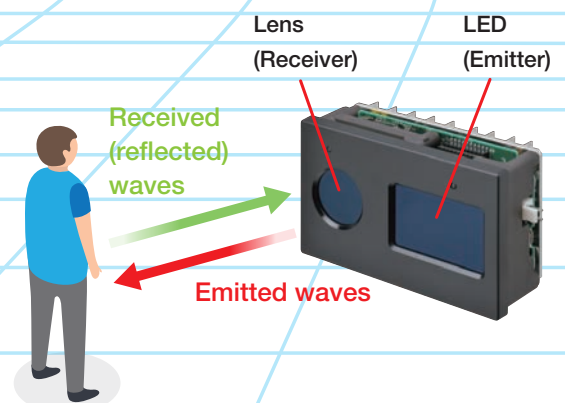
Real-time 3D sensing of distance to humans or objects.  
TOF method-based distance image sensor module.



## Time of Flight Sensor

### What is a TOF Sensor?

A TOF (Time of Flight) sensor uses the flight time of light to measure distances to objects. As well as being able to turn captured images into 3D images, it can also measure at a speed of 20 frames per second, allowing it to track the movement of objects three-dimensionally.





# that brings together all of OMRON's technologies.

## Interfering light immunity

Ambient light immunity equivalent to 100,000 lx!

Its powerful ambient light immunity ensures stable detection performance free from saturation even in bright places.

## High precision

$\pm 2\%$  (2 m)

Achieves high output accuracy for compensated signals.

## Long life

Long life equivalent to 5 years under continuous driving.

According to OMRON's research in March, 2020 <sup>\*1</sup>

Long life thanks to OMRON's unique circuit design and heat emission design.

## Interference prevention

With interference prevention function (up to 17 units Industry's top class)

According to OMRON's research in March, 2020 <sup>\*2</sup>

Ideal for applications that require the use of multiple devices such as robots at the same time.

Note: Functionality and performance may decrease under certain operating conditions. Refer to User's Manual (manual number: E596) for details.

\*1. According to OMRON's evaluation method (reliability acceleration test at the ambient temperature of 20°C and the humidity of 65%RH)

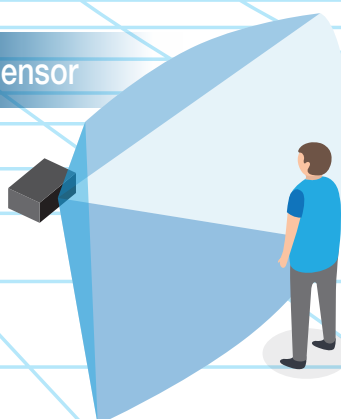
\*2. However, product specifications are not guaranteed.

## Differences from a conventional camera sensor

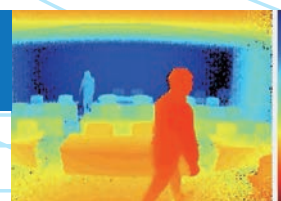
The use of extensive distance information enables the sensor to identify its peripheral environment



Watch a demonstration video here



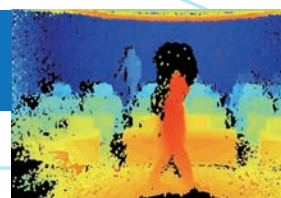
2D image



Far

Near

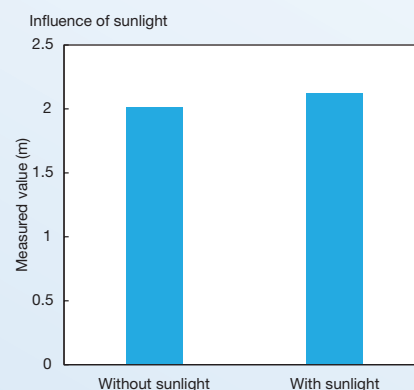
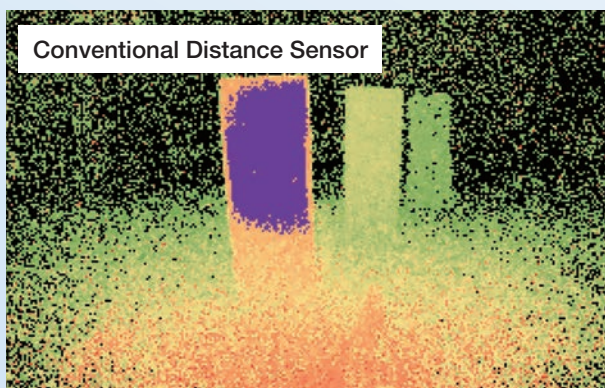
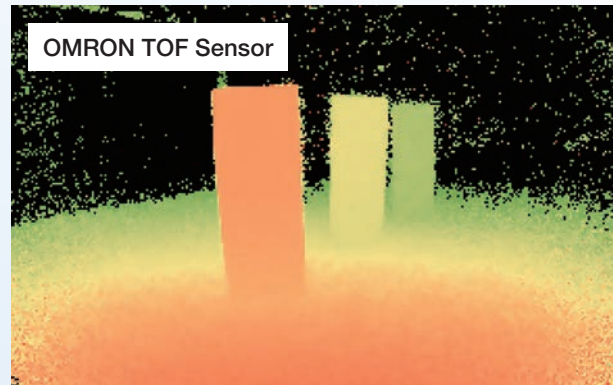
3D image



# Three Features of OMRON's 3D TOF Sensor Module

## Ambient light immunity

Capable of delivering stable detection performance even in direct sunlight.



## Bringing together the best

### Optical design technology

- Lens design that corresponds to the wavelength of the emitter LEDs
- Arrangement of emitters and receivers minimizing the effect of suspended particles of dust
- Optical simulation technology

### Circuit design

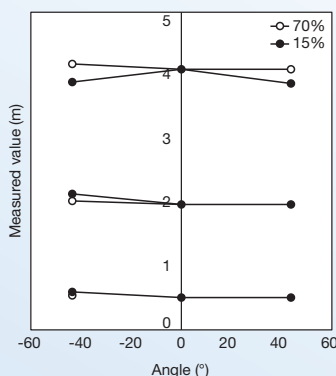
- High-current LED driver
- High-speed transmission technology

The 3D TOF sensor module incorporates a wide range of OMRON's proprietary technologies in a single product

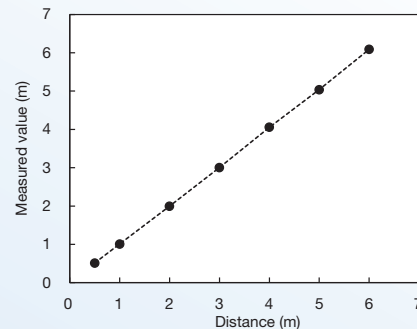
## High precision

Outputs compensated signals to minimize control processing on the end user's actual machine

Distance accuracy in angle direction

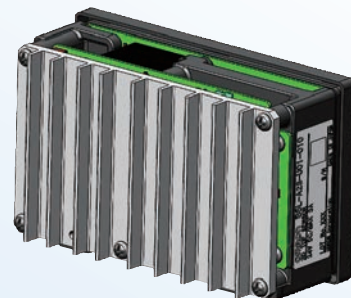
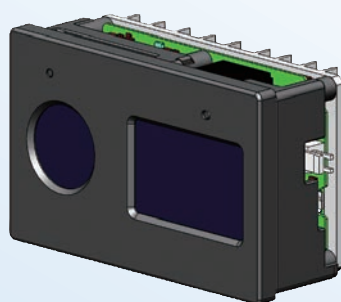


Distance accuracy



## Long life

Long life is ensured thanks to OMRON's proprietary circuit design, heat emission design and the adoption of LEDs for the emission elements



## of OMRON technologies

### technology

circuit  
circuit design

### Software technology

- Calculation processing
- Compensation processing
- 3D conversion processing
- Image filtering



# Example applications

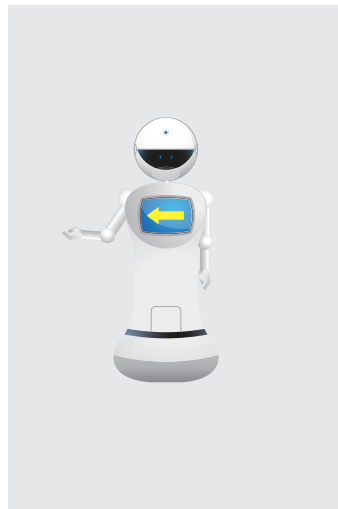
Ideal for applications that require extensive distance information.

The inclusion of interference prevention function allows the use of multiple devices at once.

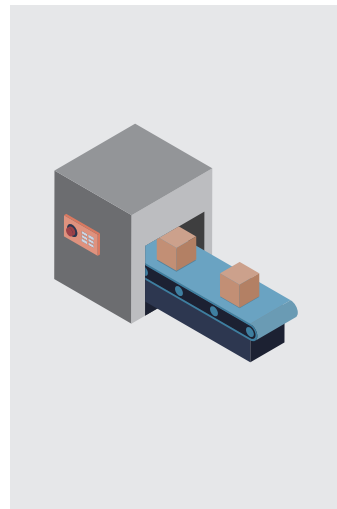
## AMR/ Service robots



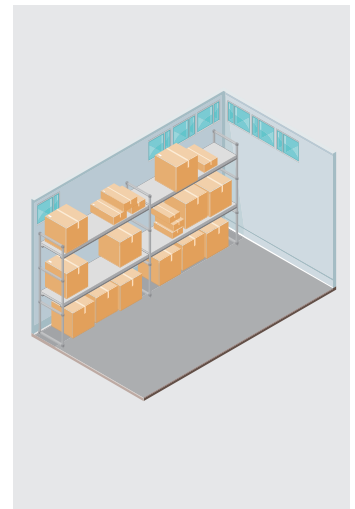
Drop detection/  
Environment recognition



Periphery recognition/  
Human recognition

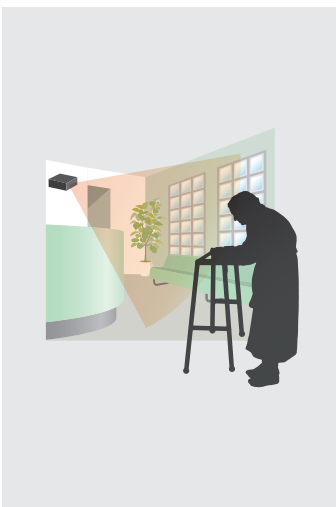


Volume and shape  
measurement

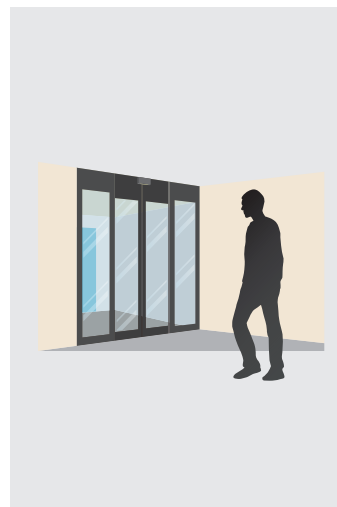
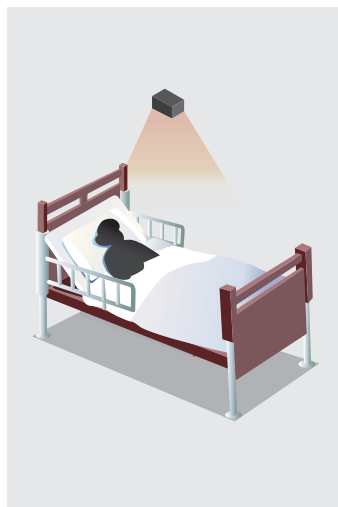


Empty space detection

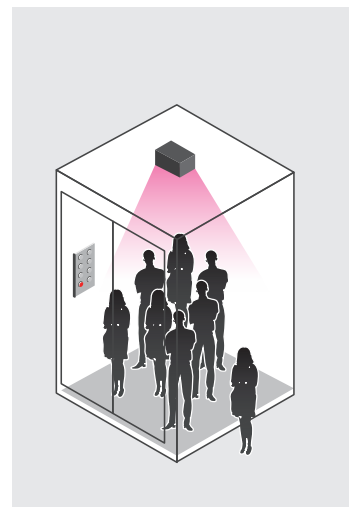
## Monitoring and observation



Behavioral understanding and observation  
of patients under long-term care



## Automatic doors/elevators




Counting people and tracking traffic flows

Note: The example applications shown are for reference only. Systems must be constructed separately. Be sure to check the actual operating conditions before use.

# Type

## ■ Device

Detection principle	Detection range (white paper)	NIR transmission filter	Model	Minimum delivery unit
TOF		Available (Built-in)	B5L-A2S-U01-010	1 pc

## Ratings/Specifications

### ■ Ratings

Item	Specifications
Light source	LED NIR 940 nm
Power supply voltage	VDC24+/-10%
Power consumption (current consumption)	Average during measuring: 0.3 A *1 Maximum: 3 A (Reference) *1
Ambient temperature	Operation: 0 to +50°C *2 Storage: -20 to +60°C *2
Ambient humidity	Operation/storage: 35 to 85%RH or less *3
Tightening torque of mounting hole	0.91 to 1.37 N·m
Vibration (durability)	10 to 150 Hz, 50 m/s <sup>2</sup> , complex amplitude of 0.7 mm or less Scanning 3 times each in X, Y, Z directions for 8 min
Impact (durability)	300 m/s <sup>2</sup> 3 times each in X, Y, Z directions
Appearance	Approx. 103×64.3×43.1 mm Approx. 108.6×64.3×43.1 mm (including the Connector)
Protective structure	IEC60529 IP10
Weight	Approx. 305 g
Materials	Frame: die-cast aluminum Cover: polycarbonate (PC) Filter: acrylic resin (PMMA) Heat sink: aluminum

\*1. Standard mode/exposure time setting=850 (default)

\*2. With no condensation or icing

\*3. With no condensation

### ■ Specifications

Item	Specifications
Measurement distance	0.5 to 4 m
Detection resolution	Approx. 0.3°
Horizontal detection range (angle of view)	87° or above
Vertical detection range (angle of view)	67° or above
Distance accuracy	±2% (±4 cm) or less *4*5 at 2 m central part 10×10 pixels
Repeating accuracy	1% (2 cm) or less *4*5 at 2 m central part 10×10 pixels
Frame rate	Approx. 10 fps *4
Starting time	30 seconds or less *6
Warm-up time	Approx. 30 minutes *7

\*4. Distance accuracy and repeating accuracy are obtained under the following conditions:

- Based on OMRON's measurement environment
- Ambient temperature: 25°C
- Standard mode/LED light projecting frequency ID=8 (default)

\*5. Target object: reflectance 70% (white paper)

- Distance accuracy: Average of 100 measurements (10,000 pieces of data in total) at the central part (10×10 pixels) 2 m away from this product
- Repeating accuracy: Standard deviation of 100 measurements (10,000 pieces of data in total) at the central part (10×10 pixels) 2 m away from this product

Standard mode/exposure time setting=850 (default)

\*6. Time from power ON until communication is possible

\*7. Time from power ON until performance is stable

### ■ Communication specifications

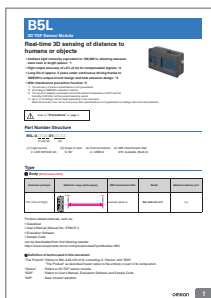
Item	Specifications
Function	Receive commands from the host and return execution results.
Interface	USB2.0 CDC class
Communication protocol	Unique specifications. Refer to User's Manual (manual number: E596-E1) for details.

### ■ Operation mode

Operation mode	Contents
Standard mode	Turn on the HDR function *8, and calculate the distance from two measurements.
High-speed mode	Turn off the HDR function *8, and calculate the distance from one measurement.

\*8. HDR function: A function that changes the shutter speed and performs the measurement multiple times.

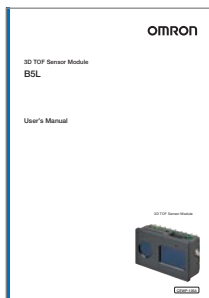
## Product information



### B5L 3D TOF Sensor Module Datasheet



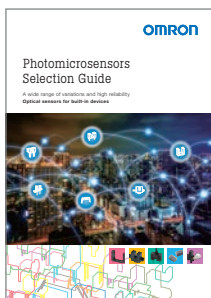
Catalog No.  
E597-E1



### B5L 3D TOF Sensor Module User's Manual



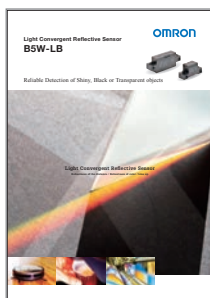
Manual No.  
E596-E1



### Photomicrosensors Selection Guide



Catalog No.  
Y211-E1



### Light Convergent Reflective Sensor



Catalog No.  
E589-E1



### Sensors Selector Guide



Catalog No.  
Y232-E1

Please check each region's Terms & Conditions by region website.

## OMRON Corporation Electronic and Mechanical Components Company

### Regional Contact

#### Americas

<https://www.components.omron.com/>

#### Asia-Pacific

<https://ecb.omron.com.sg/>

#### Korea

<https://www.omron-ecb.co.kr/>

#### Europe

<http://components.omron.eu/>

#### China

<https://www.ecb.omron.com.cn/>

#### Japan

<https://www.omron.co.jp/ecb/>