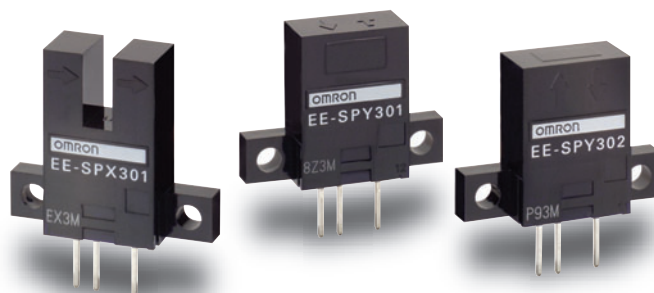



## Photomicrosensor with light modulation is not influenced by external light.

- Voltage-output models with wide operating voltage range (5 to 24 VDC).
- Fitted with an easy-to-adjust optical axis mark.
- Easy adjustment and optical axis monitoring with a light indicator.









 Be sure to read *Safety Precautions* on page 5.

## Ordering Information

### Sensors

 Infrared light

Appearance	Sensing method	Sensing distance		Output type	Output configuration	Model
	Through-beam type (with slot)		3.6 mm (slot width)	NPN output	Dark-ON	<b>EE-SPX301</b>
					Light-ON	<b>EE-SPX401</b>
Horizontal type 	Reflective type		5 mm		Dark-ON	<b>EE-SPY301</b>
					Light-ON	<b>EE-SPY401</b>
Vertical type 	Reflective type		5 mm		Dark-ON	<b>EE-SPY302</b>
					Light-ON	<b>EE-SPY402</b>

### Accessories (Order Separately)

Type	Cable length	Model	Remarks
Connector		<b>EE-1002</b>	
	Connector with Cable	1 m	<b>EE-1003</b>
NPN/PNP Conversion Connector	0.46 m (total length)	<b>EE-2001</b>	
Connector Hold-down Clip		<b>EE-1003A</b>	For EE-1003 only.

\* Refer to *Accessories* for details.

## Ratings and Specifications

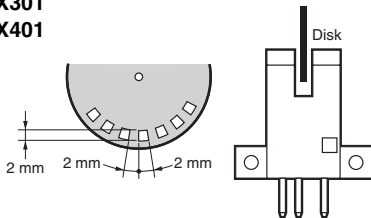
Sensing method		Through-beam type (with slot)	Reflective type
Item	Models	EE-SPX301, EE-SPX401	EE-SPY301, EE-SPY401 EE-SPY302, EE-SPY402
Sensing distance		3.6 mm (slot width)	5 mm (Reflection factor: 90%; white paper 15 × 15 mm) *1
Sensing object		Opaque: 1 × 0.5 mm min.	---
Differential distance		0.05 mm max.	0.2 mm max. (with a sensing distance of 3 mm, horizontally)
Light source		GaAs infrared LED with a peak wavelength of 940 nm	
Indicator *2		Light indicator (red)	
Supply voltage		5 to 24 VDC ±10%, ripple (p-p): 5% max.	
Current consumption		Average: 15 mA max., Peak: 50 mA max.	
Control output		NPN voltage output: Load power supply voltage: 5 to 24 VDC Load current: 80 mA max. OFF current: 0.5 mA max. 80 mA load current with a residual voltage of 1.0 V max. 10 mA load current with a residual voltage of 0.4 V max.	
Response frequency *3		500 Hz min.	100 Hz min.
Ambient illumination		3,000 lx max. with incandescent light or sunlight on the surface of the receiver	
Ambient temperature range		Operating: -10 to +55°C Storage: -25 to +65°C (with no icing)	
Ambient humidity range		Operating: 5% to 85% Storage: 5% to 95% (with no condensation)	
Vibration resistance		Destruction: 10 to 55 Hz, 1.5-mm double amplitude for 2 h each in X, Y, and Z directions	
Shock resistance		Destruction: 500 m/s <sup>2</sup> for 3 times each in X, Y, and Z directions	
Degree of protection		IEC IP50	
Connecting method		Special connector (soldering not possible)	
Weight		Approx. 2.6 g	
Material	Case	Polycarbonate	

\*1. Operation may not be possible near the Sensor.

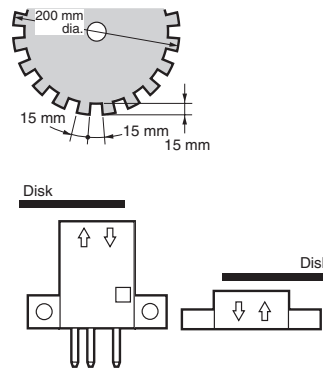
\*2. The indicator is a GaP red LED (peak wavelength: 700 nm).

\*3. The response frequency was measured by detecting the following rotating disk.

EE-SPX301  
EE-SPX401



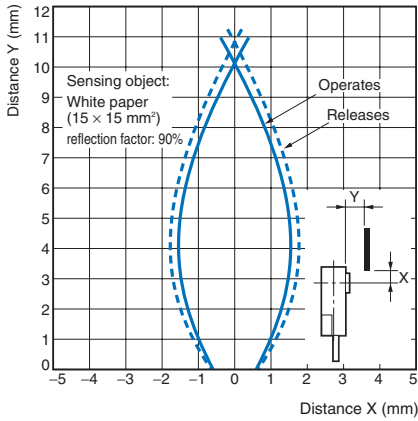
EE-SPY30  
EE-SPY40



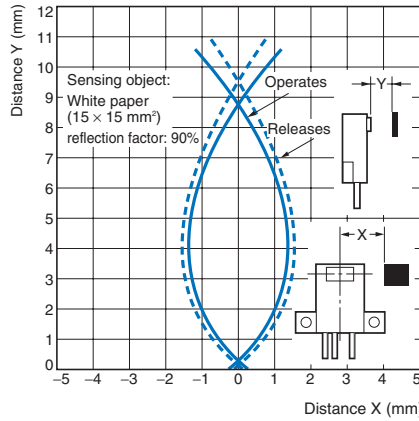
Engineering Data (Typical)

Operating Range Characteristics

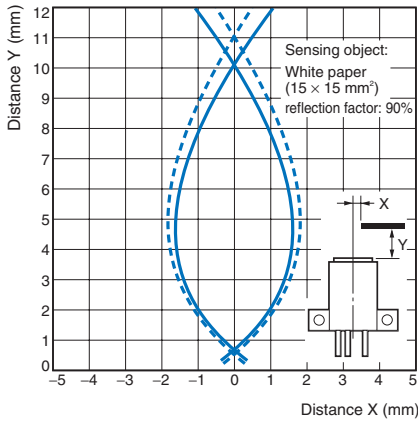
EE-SPY301, EE-SPY401



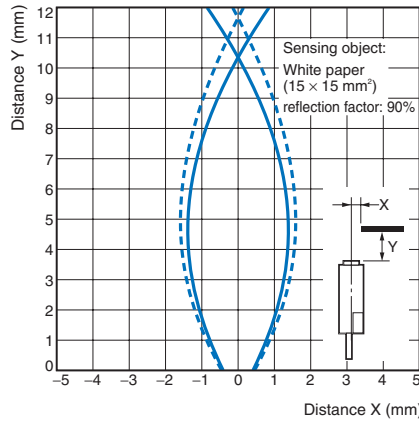
EE-SPY301, EE-SPY401



EE-SPY302, EE-SPY402

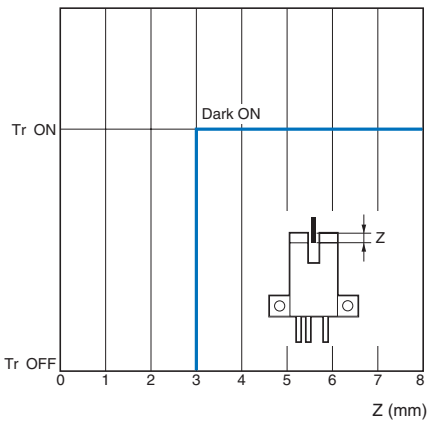


EE-SPY302, EE-SPY402

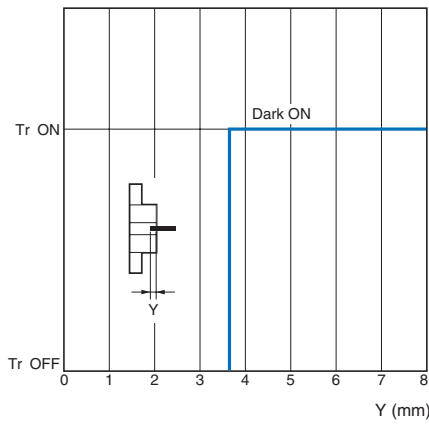


Sensing Position Characteristics

EE-SPX301 (Z Direction)

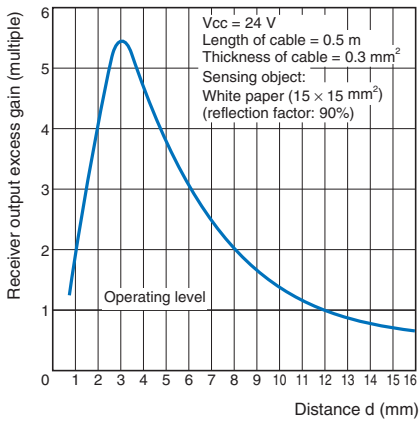


EE-SPX301 (Y Direction)



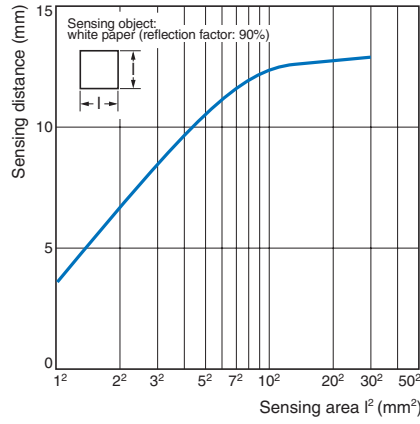
**Receiver Output Excess Gain vs. Sensing Distance Characteristics**

EE-SPY□□□



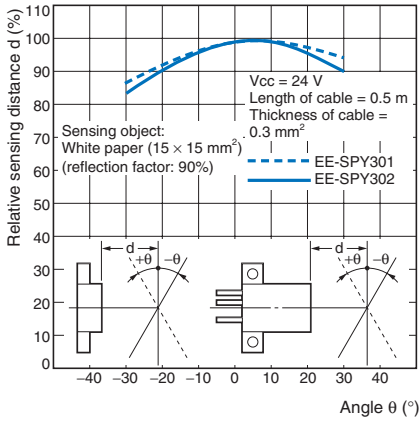
**Sensing Distance vs. Object Area Characteristics**

EE-SPY□□□



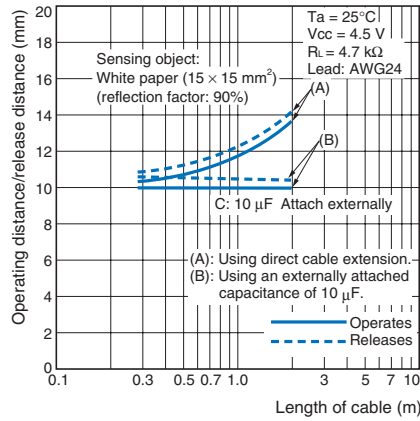
**Sensing Angle vs. Sensing Distance Characteristics**

EE-SPY□□□



**Dependency on Cable Length for Operation Distance/Release Distance**

EE-SPY□□□



I/O Circuit Diagrams

NPN Output

Model	Output configuration	Timing charts	Output circuit
EE-SPX401 EE-SPY401 EE-SPY402	Light-ON		
EE-SPX301 EE-SPY301 EE-SPY302	Dark-ON		

Safety Precautions

Refer to *Warranty and Limitations of Liability*.

**WARNING**

This product is not designed or rated for ensuring safety of persons either directly or indirectly. Do not use it for such purposes

**Precautions for Correct Use**

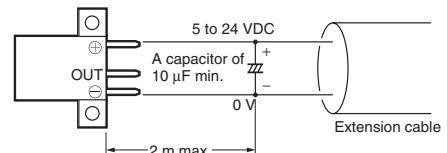
Make sure that this product is used within the rated ambient environment conditions.

● **Mounting**

The sensing distance for the EE-SPY Reflective-type Photomicrosensor with built-in amplifier varies from 8 to 20 mm depending on the product (90% reflective white paper). Do not place glossy objects in the background of the sensing object.

● **Wiring**

- Connection is made using a connector. Do not solder to the pins (leads).
- When extending the cable, use an extension cable with conductors having a total cross-section area of 0.3 mm<sup>2</sup>. The total cable length must be 2 m maximum.
- To use a cable length longer than 2 m, attach a capacitor with a capacitance of approximately 10 μF to the wires as shown below. The distance between the terminal and the capacitor must be within 2 m.  
(Use a capacitor with a dielectric strength that is at least twice the Sensor's power supply voltage.)



- Make sure the total length of the power cable connected to the product is less than 10 m even if a capacitor is inserted.

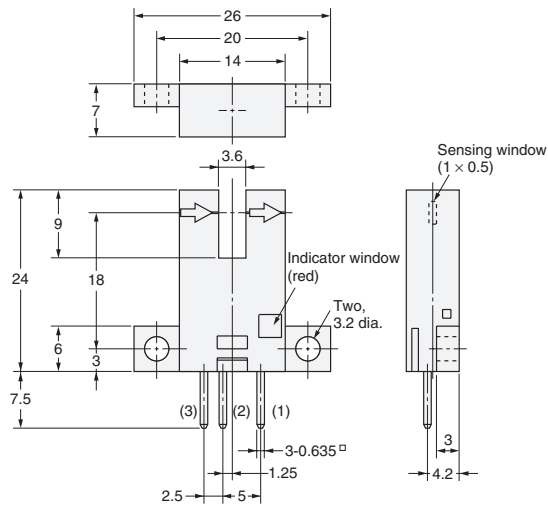
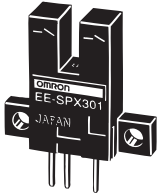
(Unit: mm)

## Dimensions

Tolerance class IT16 applies to dimensions in this datasheet unless otherwise specified.

### Sensors

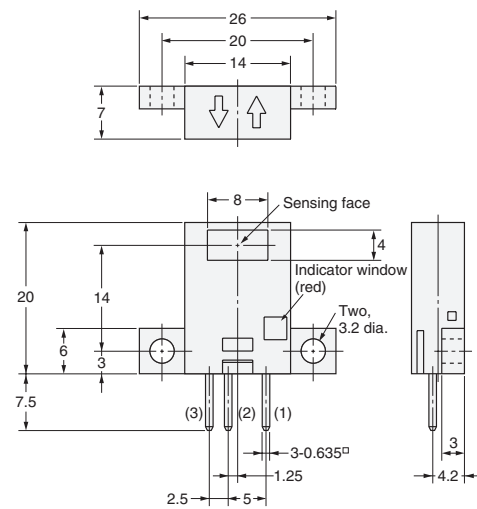
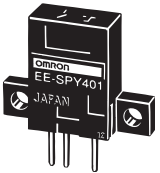
EE-SPX301  
EE-SPX401



#### Terminal Arrangement

(1)	⊕	Vcc
(2)	OUT	OUTPUT
(3)	⊖	GND (0 V)

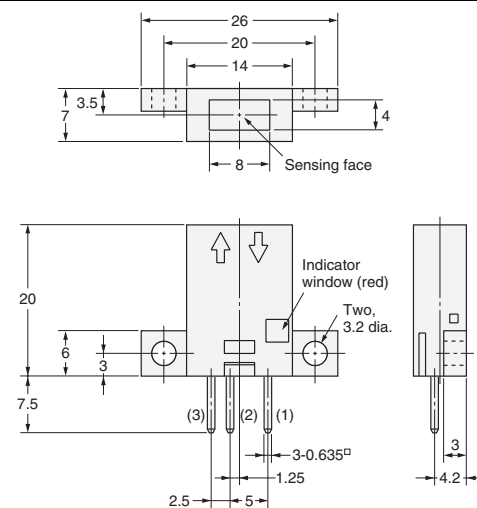
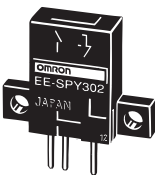
EE-SPY301  
EE-SPY401



#### Terminal Arrangement

(1)	⊕	Vcc
(2)	OUT	OUTPUT
(3)	⊖	GND (0 V)

EE-SPY302  
EE-SPY402



#### Terminal Arrangement

(1)	⊕	Vcc
(2)	OUT	OUTPUT
(3)	⊖	GND (0 V)

## Accessories (Order Separately)

\* Refer to *Accessories* for details.

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