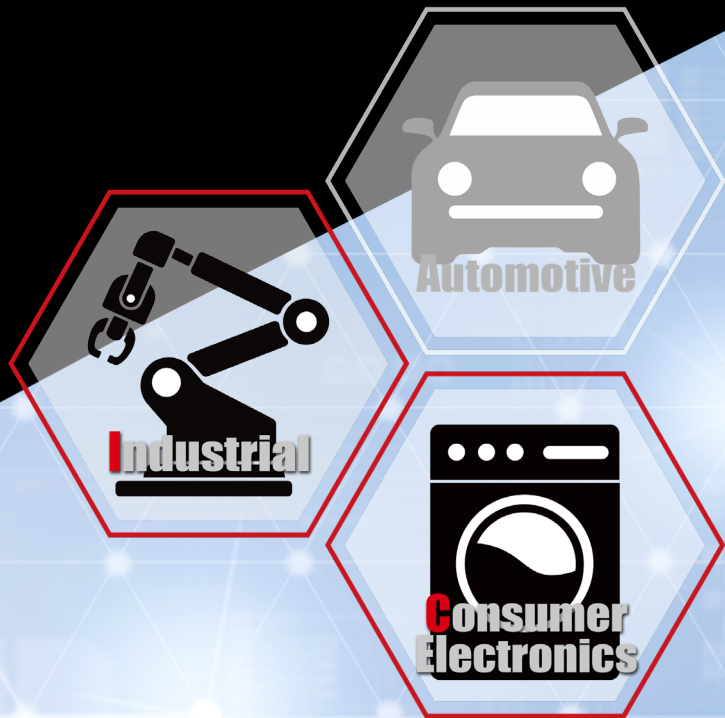**Detects fast-moving objects with high accuracy**

Ultra-Compact High-Speed Response Analog Output Optical Proximity Sensor (VCSEL Photoreflector)

RPR-0730

Automotive

Industrial

Consumer Electronics

ROHM SEMICONDUCTOR

The RPR-0730 is an ultra-compact optical proximity sensor (photoreflector) that integrates a proprietary 940nm VCSEL as the light-emitting element - offering superior directionality and lower power consumption than conventional LEDs – along with ROHM's high-speed phototransistor as the light-receiving element. This combination enables faster, more precise detection, making it ideal for demanding applications such as print detection in multifunction and label printers as well as rotation sensing in motors and gears - areas where conventional digital output types often fall short.

Features

· **Enables detection of ultra-fine widths as small as 0.1mm not possible with LEDs**
  Achieves high detection accuracy by adopting a VCSEL element with narrow beam angle as the light-emitting component

· **Capable of detecting fast-moving objects**
  Utilizing an analog-output phototransistor as the light-receiving element achieves a high-speed response of just 10μs

· **Compact surface-mount package enhances design flexibility across a variety of applications**
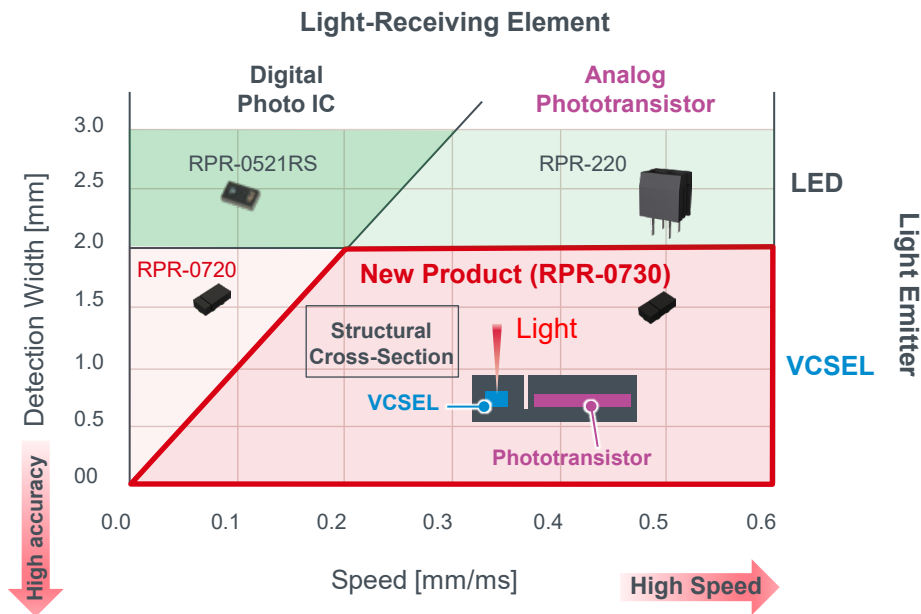 Small 2.0×1.0×0.55mm form factor supports mounting in confined spaces
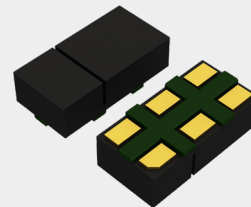
RPR-0730
2.0×1.0 t=0.55mm

Capable of Detecting Small, Fast-Moving Objects with Widths as Narrow as 0.1mm

ROHM Optical Photoreflector and Detection Performance

Light-Receiving Element

Digital Photo IC

Analog Phototransistor

Light Emitter

LED

VCSEL

- RPR-0521RS
- RPR-220
- RPR-0720
- **New Product (RPR-0730)**

Detection Width [mm]: 3.0, 2.5, 2.0, 1.5, 1.0, 0.5, 00

Speed [mm/ms]: 0.0, 0.1, 0.2, 0.3, 0.4, 0.5, 0.6

High accuracy

High Speed

Structural Cross-Section

Light

VCSEL

Phototransistor

Application Examples
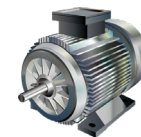
[Paper/Label Detection]

Multifunction printers, etc.

Label printers

[Rotation Detection]

Industrial equipment, motors, etc.

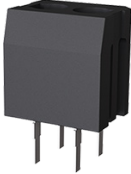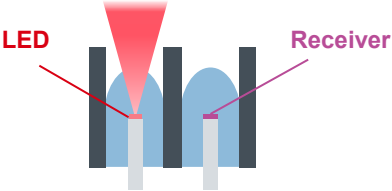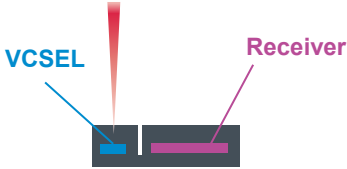[Object Detection in Industrial Equipment and Conveyance Systems]

Package conveyor

Specimen transport

Ideal for a wide range of applications that demand high-speed, high-accuracy detection

Conventional Product RPR-220	New Product RPR-0730
LED + Analog Phototransistor (Leaded)	Laser (VCSEL) + Analog Phototransistor (Surface Mount)

Package area reduced approx. 93%

6.4×4.9×6.5mm (not including the leads)

2.0×1.0×0.55mm

LED Receiver

VCSEL Receiver

Detection range: 5 to 100mm

Detection range: 0 to 10mm

ROHM SEMICONDUCTOR

Fine Line Detection Measurement Environment

Paper feed in parallel with the photoreflector

Distance from the photoreflector
d=2.5mm

Photoreflector

Detection Width
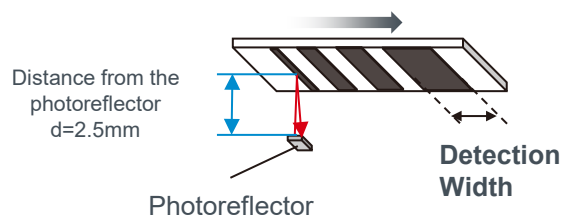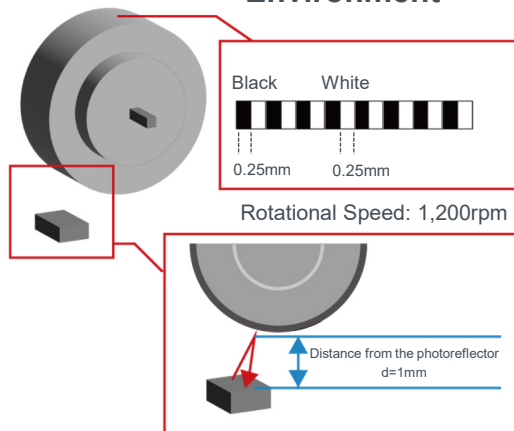
Light emitted from the light source is reflected off the target object and then detected by the receiver

Relative Output Comparison

d=2.5mm

Relative Output

100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%

2.1mm   1.2mm   0.6mm   0.3mm

0   5   10   15

[mm]

RPR-220 Lamp LED Photoreflector

The output does not fully drop when detecting a black line (Failure due to insufficient S/N ratio)

RPR-0730 VCSEL Photoreflector

The output drops when detecting a black line (Detection possible due to adequate S/N ratio)

The narrower the line width, the greater the difference in detection accuracy

Capable of accurately detecting even fine lines, enabling not only paper presence detection but also black/white distinction and identification of labels and films

Rotation Detection Measurement Environment

Black   White

0.25mm   0.25mm

Rotational Speed: 1,200rpm

Distance from the photoreflector
d=1mm

Light emitted from the light source is reflected off a high-speed rotating (1200rpm) black-and-white disk and then detected by the receiver

Output Waveform Comparison

Conventional Product
LED/PTr

100µs/div
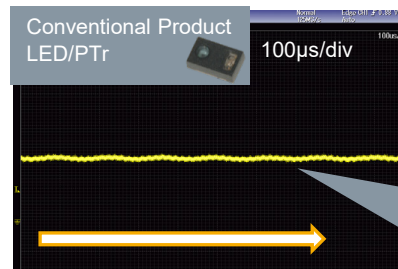
Conventional sensors fail to detect due to inadequate output differentiation between the white and black areas

RPR-0730
VCSEL/PTr

100µs/div

White   White   White

Black   Black   Black
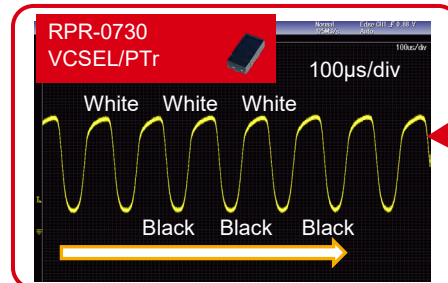
Capable of clearly distinguishing white and black areas even during high-speed rotation with line widths as narrow as 0.25mm

Enables easy detection of high-speed rotating objects and their rotational states

Optical Proximity Sensor Lineup (Photoreflectors)

■ Analog Output

Part No.	Interface	Light Emitter	Sensor Type	Detection Range [mm]	Forward Current I_F [mA]	V_{CEO} [V]	Dark Current [µA]	Collector Current [mA]	Operating Temperature Range [°C]	Package Size [mm]
New **RPR-0730** [PDF]	Analog	VCSEL (940nm)	Proximity	0 to 10	5	30	0.1	0.69 to 1.79	-30 to +85	2.0×1.0×0.55
RPR-220 [PDF]	Analog	LED (940nm)	Proximity	5 to 50	50	30	0.5	0.08 to 0.8	-25 to +85	6.4×4.9×6.5 (not including the leads)
RPR-220UC30N [PDF]	Analog	LED (630nm)	Proximity	5 to 12	30	30	10	0.08 to 0.8	-25 to +85	6.4×4.9×6.5 (not including the leads)

■ Digital Output

Part No.	Interface	Light Emitter	Sensor Type	Detection Range [mm]	Operating Voltage [V]	Light Source Voltage [V]	Current Consumption [µA]	Operating Temperature Range [°C]	Package Size [mm]
RPR-0720 [PDF]	I²C (12bit)	VCSEL (940nm)	Proximity	0 to 15	1.7 to 3.6	2.7 to 4.5	up to 35	-30 to +85	2.0×1.0×0.55
RPR-0521RS [PDF]	I²C (12bit)	LED (940nm)	Ambient light, Proximity	5 to 100	2.5 to 3.6	2.8 to 5.5	10 to 300	-25 to +85	3.94×2.36×1.35

Click on the [PDF] icon to view the datasheet on ROHM's website.

Notes