

2010

Product Catalog

ROHM
SEMICONDUCTOR

Opto Electronics

Optical Sensors



Optical Sensors

ROHM optical sensors are designed to meet a variety of sensing needs. The integrated manufacturing process, from die fabrication to final assembly, enables a wide degree of customization and ensures unsurpassed reliability.

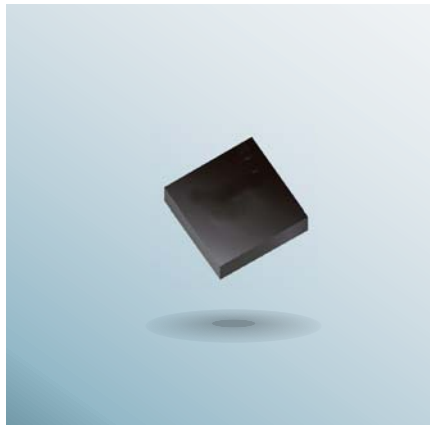


Table of Contents

| | |
|--|----|
| Optical Surface Mount 4-Direction Detection Sensor 3 RPI-1040 | |
| Surface Mount High Output Infrared LEDs 4 SIM-030ST / 040ST | |
| Product Lineup | 5 |
| Dimensions | 9 |
| Part No. Explanation | 11 |
| Application Examples | 13 |

Optical Surface Mount 4-Direction Detection Sensor

RPI-1040



4-way Detection in the World's Thinnest* (0.8mm) Package

*July 2009 Survey

Product Outline

4-way detection at 90° intervals is enabled utilizing an infrared diode, phototransistor, and shield. Integration is easy and makes instantaneous detection possible. In addition, the simple design and optical method minimizes malfunctions and ensures a high degree of precision. Conventional products often exhibit noise during rotation. The RPI-1040, however, utilizes a novel light shield that results in silent operation.

Broad Compatibility

Optically detects the orientation of devices, making it ideal for a variety of uses, including image orientation and fall detection.

Orientation Detection

Simplify preview for image correction (i.e. autofocus, white balance adjustment)

Video Devices

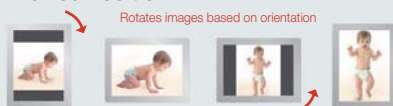
(Mobile Phones, Digital Cameras)



Image Rotation

Image Rotation Based On Device Position

Photo Display Devices (Projectors, Photo Frames)



Fall Detection

Movement Sensing

(LCD TVs)



Specifications

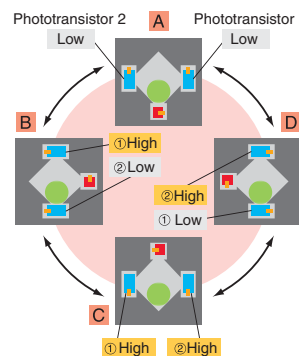
| | Typ. | Conditions |
|-------------------|------------|----------------------------------|
| Collector Current | 50µA(min.) | IF=5mA, VCE=5V (When Unshielded) |
| Leakage Current | 20µA(max.) | IF=5mA, VCE=5V (When Shielded) |

Optimally detects orientation in a wide range of applications

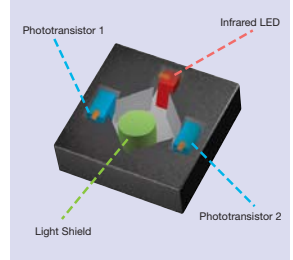
Visit our website for additional examples
www.rohm.com/products/opto_device/sensor/4_direction/uses.html

Operating Principle

An infrared LED and 2 phototransistors (High/Low) are utilized for 4-way detection



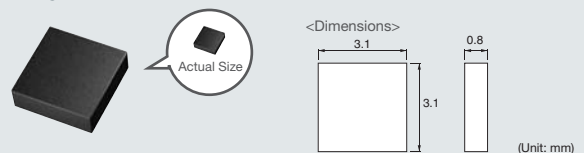
Structural Diagram



New Silent Construction Rotating sound eliminated

During operation the movement of the ball shield is suppressed for greater applicability.

Package



Volume and area reduced 79% and 37%, respectively, compared to conventional products



Surface Mount High Output Infrared LEDs

SIM-030ST / 040ST Series



Thin (0.9mm), compact, high power (60mw/sr) package contributes to smaller proximity sensors

Product Outline

Original optical technology is utilized to develop ultra-high-output surface mount infrared LEDs. In addition, the unique package design features an extremely low profile. The units are ideal for a wide range of applications, including proximity sensors requiring high output over a narrow angle. A broad lineup is available in a range of peak wavelengths (850 to 940nm), allowing the user to select the optimum solution based on set needs.

Ideal for a variety of sensors

Proximity Sensors

Mobile Phone LCDs



Signal Transmission Applications

3D TVs, Remote Controls, and more



Specifications : SIM-030ST

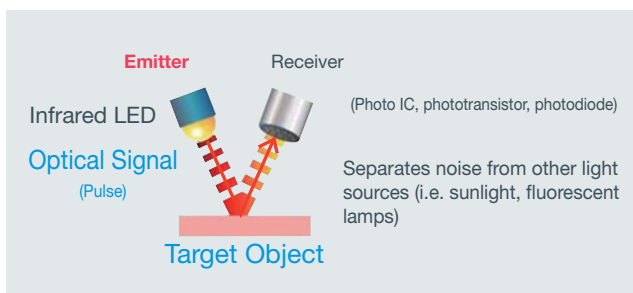
| | Symbol | Min. | Typ. | Max. | Unit | Conditions |
|--------------------|------------------|------|----------|-------|-----------|-------------|
| Emission Strength | I_E | 10 | 30 | — | mW/sr | $I_F=100mA$ |
| Peak Wavelength | λ_{peak} | — | 870 | — | nm | $I_F=100mA$ |
| Half Viewing Angle | ψ | — | ± 20 | — | Grad deg. | — |
| Forward Voltage | V_F | — | 1.7 | (2.5) | V | $I_F=100mA$ |

Specifications : SIM-040ST

| | Symbol | Min. | Typ. | Max. | Unit | Conditions |
|--------------------|------------------|------|----------|-------|-----------|-------------|
| Emission Strength | I_E | 25 | 40 | — | mW/sr | $I_F=100mA$ |
| Peak Wavelength | λ_{peak} | — | 870 | — | nm | $I_F=100mA$ |
| Half Viewing Angle | ψ | — | ± 20 | — | Grad deg. | — |
| Forward Voltage | V_F | — | 1.7 | (2.5) | V | $I_F=100mA$ |

Proximity Sensor : Operating Principle

Optical signals output from an emitting element (i.e. infrared LED) is reflected off a target object and detected by a receiving element (e.g. photo IC, photodiode, phototransistor)

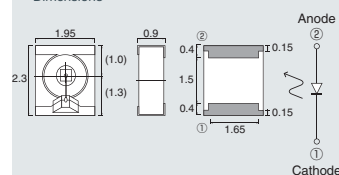


Package Size Comparison

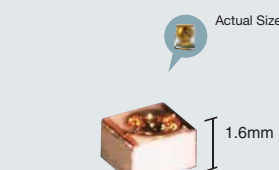
SIM-030ST



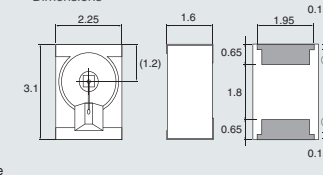
Dimensions



SIM-040ST



Dimensions





















Unit : mm

Product Lineup

Transmission Type Photointerrupters


■ Linear Phototransistor Output

| Package | Exterior | Part No. | Standard Characteristics | | | | | RoHS | |
|-------------------------|---|---------------------|-----------------------------|-----------------|----------------------|---------------------|---------------------|------|--------------------------------------|
| | | | Detection Groove Width (mm) | Slit Width (mm) | I _c (mA) | V _{CE} (V) | I _F (mA) | | t _r , t _f (μs) |
| Ultraminiature SMD Type |  | RPI-0125 | 1.2 | 0.3 | 0.45Min. 4.95Max. | 5 | 20 | 10 | Yes |
| |  | New RPI-0128 | 1.2 | 0.2 | 1Min. 5Max. | 5 | 5 | 10 | Yes |
| |  | New RPI-0129 | 1.2 | 0.7 | 0.95Min. 4.95Max. | 5 | 20 | 10 | Yes |
| Miniature SMD Type |  | RPI-0226 | 2.0 | 0.3 | 0.1Min. | 5 | 5 | 50 | Yes |
| Ultra-Compact Type |  | RPI-122 | 0.8 | 0.25 | 0.18Min. | 0.7 | 3 | 10 | Yes |
| |  | RPI-121 | 1.0 | 0.4 | 0.7Min. | 5 | 20 | 10 | Yes |
| |  | RPI-124 | 1.2 | 0.15 | 0.3Min. | 5 | 20 | 10 | Yes |
| |  | RPI-125 | 1.2 | 0.3 | 0.4Min. 5Max. | 5 | 20 | 10 | Yes |
| |  | New RPI-128 | 1.2 | 0.2 | 1Min. 5Max. | 5 | 5 | 10 | Yes |
| |  | RPI-129B | 1.2 | 0.7 | 0.95Min. 4.95Max. | 5 | 20 | 10 | Yes |
| |  | New RPI-130 | 1.2 | 0.3 | 2Min. 10Max. | 5 | 10 | 10 | Yes |
| Compact Type |  | RPI-131 | 1.2 | 0.4 | 0.7Min. | 5 | 20 | 10 | Yes |
| |  | RPI-221 | 2.0 | 0.4 | 0.2Min. | 5 | 20 | 10 | Yes |
| |  | RPI-222 | 2.0 | 0.2 | 0.18Min. | 5 | 10 | 10 | Yes |
| |  | RPI-243 | 2.0 | 0.4 | 0.5Min. | 5 | 20 | 10 | Yes |
| |  | RPI-246 | 2.0 | 0.2 | 0.35Min. | 5 | 20 | 10 | Yes |
| |  | RPI-352 | 3.0 | 0.4 | 0.2Min. | 5 | 20 | 10 | Yes |
| |  | RPI-441C1 | 4.0 | 0.5 | 0.2Min. | 5 | 20 | 10 | Yes |

| Package | Exterior | Part No. | Standard Characteristics | | | | | RoHS | |
|---------------------|---|--------------------|-----------------------------|-----------------|---------------------|---------------------|---------------------|------|-------------|
| | | | Detection Groove Width (mm) | Slit Width (mm) | I _c (mA) | V _{CE} (V) | I _F (mA) | | tr, tf (μs) |
| General Type |  | RPI-392 | 4.0 | 0.5 | 0.5Min. | 5 | 20 | 10 | Yes |
| |  | RPI-579 | 5.0 | 0.5 | 0.5Min. | 5 | 20 | 10 | Yes |
| |  | RPI-579N1 | 5.0 | 0.5 | 0.5Min. | 5 | 20 | 10 | Yes |
| Eco-Friendly Type |  | ★ RPI-352E | 3.0 | 0.4 | 0.18Min. | 5 | 10 | 10 | Yes |
| |  | RPI-441C1E | 4.0 | 0.5 | 0.2Min. | 5 | 10 | 10 | Yes |
| |  | RPI-579N1E | 5.0 | 0.5 | 0.5Min. | 5 | 10 | 10 | Yes |
| High Profile Type |  | RPI-303 | 3 | 0.4 | 0.5Min. 2.0Max. | 5 | 20 | 10 | Yes |
| Actuator Type |  | RPI-5100 | Actuator Type | | 0.2Min. | 5 | 20 | 10 | Yes |
| 2-Phase Output Type |  | New RPI-151 | 1.5 | (2.2) | 0.25Min. | 5 | 5 | 10 | Yes |
| With Connector |  | ★ RPI-2500 | 5 | 0.5 | 1.0Min. | 2 | 10 | 40 | Yes |




★ : Under development

Digital Phototransistor Output



| Package | Exterior | Part No. | Standard Characteristics | | | | | RoHS | |
|--------------|---|----------|-----------------------------|-----------------|--------------------|---------------------|------------------------------|---------------------------------------|-------------|
| | | | Detection Groove Width (mm) | Slit Width (mm) | V _F (V) | V _{OL} (V) | Threshold Input Current (mA) | | Output Type |
| Compact Type |  | RPI-1133 | 1.1 | 0.3 | 1.2 | 0.35Max. | 2.5 * | ON When light beam is interrupted. | Yes |

* I_{FHL} Max. value




Reflective Type Photosensors (Photoreflectors)

| Package | Exterior | Part No. | Standard Characteristics | | | | | | RoHS |
|-----------|---|---------------------|--------------------------|-------------------------|------------------------|---------------------|---------------------|----------------------|------|
| | | | LED λ_P (nm) | Ptr λ_P (nm) | I _c (mA) | V _{CE} (V) | I _F (mA) | tr, tf (μ s) | |
| Case Type |  | RPR-220 | 940 | 800 | 0.08Min. 0.8Max. | 2 | 10 | 10 | Yes |
| |  | RPR-220UC30N | 630 | 600 | 0.08Min. 0.8Max. | 5 | 10 | 10 | Yes |
| |  | RPR-220PC30N | 470 | 800 | 0.08Min. 0.8Max. | 5 | 10 | 10 | Yes |





4-Direction Detector


| Package | Exterior | Part No. | Standard Characteristics | | | | | | RoHS |
|--------------------|---|---------------------|--------------------------|-------------------------|------------------------|---------------------|---------------------|----------------------|------|
| | | | LED λ_P (nm) | Ptr λ_P (nm) | I _c (mA) | V _{CE} (V) | I _F (mA) | tr, tf (μ s) | |
| Surface Mount Type |  | RPI-1031 | 940 | 800 | 0.1Min. | 5 | 5 | 10 | Yes |
| |  | New RPI-1040 | 940 | 800 | 0.05Min. | 5 | 5 | 10 | Yes |

Phototransistors

| Package | Exterior | Part No. | Features | Visible Light Filter | Absolute Maximum Ratings | | | Standard Characteristics | | | | | RoHS |
|-----------------------------------|---|-------------------|---|----------------------|--------------------------|-----------------------------|-------------------------------------|--------------------------|------------------------|---------------------|----------------------|-------------------------|------|
| | | | | | V _{CEO} (V) | P _c Max. (mW) | I _{CEO} Max. (μ A) | V _{CE} (V) | I _c (mA) | λ_P (nm) | tr, tf (μ s) | $\theta_{1/2}$ (deg) | |
| Surface Mount Type (Side-view) |  | RPM-012PB | Ultra-small size, High sensitivity, Automatic mounting, Reflow-compatible | ○ | 32 | 75 | 0.5 | 10 | 0.56Min. | 800 | 10 | 12 | Yes |
| $\phi 3$ Resin |  | RPT-34PB3F | Visible light filter | ○ | 32 | 150 | 0.5 | 10 | 2.0Min. | 800 | 10 | 36 | Yes |
| | | RPT-37PB3F | Visible light filter, Polarity discrimination | ○ | 32 | 150 | 0.5 | 10 | 2.0Min. | 800 | 10 | 36 | Yes |
| | | RPT-38PB3F | Visible light filter | ○ | 32 | 150 | 0.5 | 10 | 2.0Min. | 800 | 10 | 36 | Yes |
| Resin Side View Type |  | RPM-20PB | Visible light filter | ○ | 32 | 100 | 0.5 | 10 | 0.5Min. | 800 | 10 | 14 | Yes |
| | | RPM-22PB | Visible light filter, Wide viewing angle | ○ | 32 | 100 | 0.5 | 10 | 0.48Min. | 800 | 10 | 32 | Yes |

Infrared Light Emitting Diodes

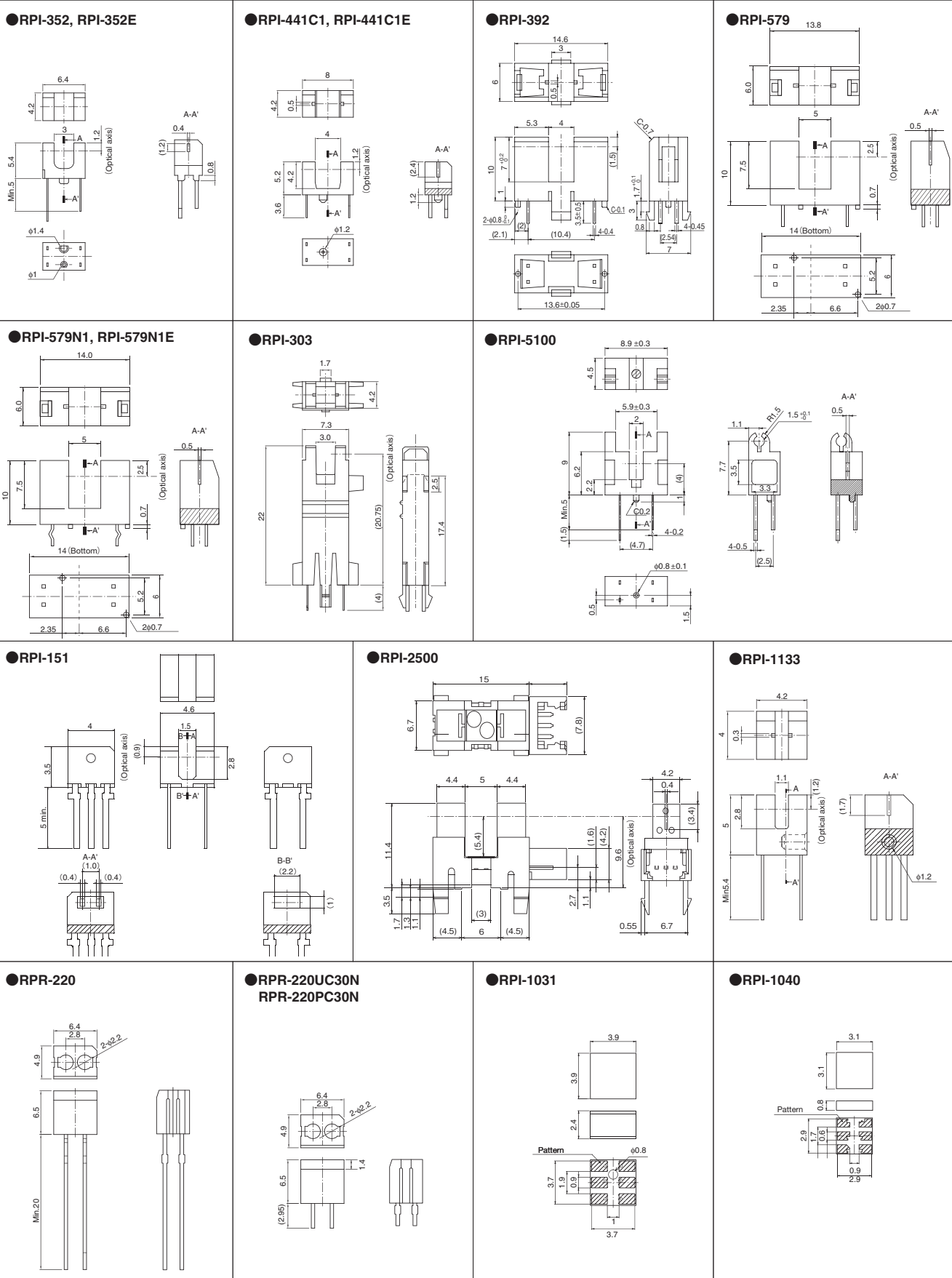
| Package | Exterior | Part No. | Features | Absolute Maximum Ratings | | Standard Characteristics | | | | | | RoHS |
|--------------------------------|---|---------------------|---|--------------------------|------------|--------------------------|-----------|------------|------------------|------------|--------------------|------|
| | | | | I_F (mA) | P_o (mW) | I_F (mA) | V_F (V) | I_F (mA) | λ_P (nm) | tr,tf (μs) | θ 1/2 (deg) | |
| Surface Mount Type (Side-view) |  SIR-012SB | SIM-012SB | Ultra-small size, High power, Automatic mounting, Reflow-compatible | 40 | 3.5 | 20 | 1.2 | 20 | 950 | 1 | 12 | Yes |
| φ3 Resin |  SIR-341ST3F | SIR-320ST3F | Optimized for card remote controls | 75 | 9.0 | 50 | 1.2 | 50 | 940 | 1 | 18 | Yes |
| | | SIR-34ST3F | Optimized for remote controls | 100 | 8.0 | 50 | 1.3 | 100 | 950 | 1 | 27 | Yes |
| | | SIR-341ST3F | Compact, high power | 75 | 8.4 | 50 | 1.3 | 100 | 940 | 1 | 16 | Yes |
| φ5 Resin |  SIR-568ST3F | SIR-505STA47 | Direct mount type | 100 | 8.0 | 50 | 1.38 | 100 | 950 | 1 | 15 | Yes |
| | | SIR-56ST3F | Optimized for remote controls | 100 | 8.0 | 50 | 1.3 | 100 | 950 | 1 | 15 | Yes |
| | | SIR-563ST3F | High output, Optimized for remote controls | 100 | 11.0 | 50 | 1.34 | 50 | 940 | 1 | 15 | Yes |
| | | SIR-568ST3F | High speed LED for optical communications | 100 | 13.0 | 50 | 1.6 | 50 | 850 | fc=50MHz | 13 | Yes |
| Resin Side View Type |  SIM-20ST | SIM-20ST | General purpose molded type | 50 | 7.0 | 50 | 1.3 | 50 | 950 | 1 | 15 | Yes |
| | | SIM-22ST | General purpose molded type | 50 | 7.0 | 50 | 1.3 | 50 | 950 | 1 | 30 | Yes |

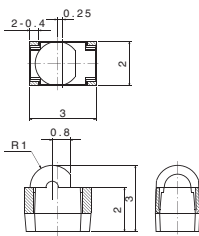
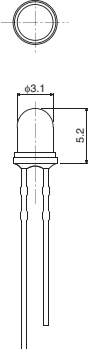
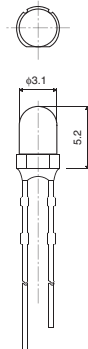
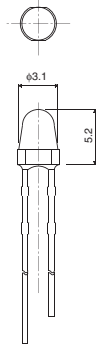
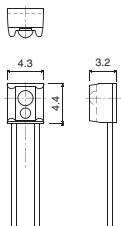
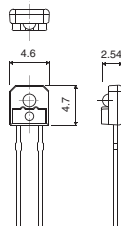
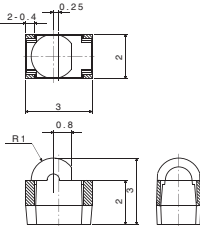
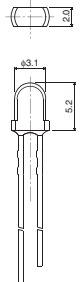
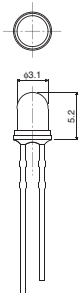
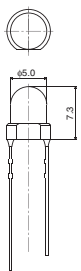
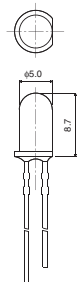
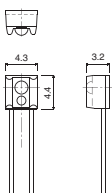
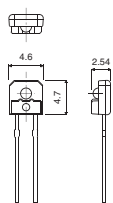
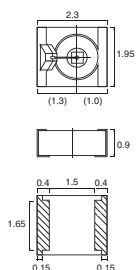
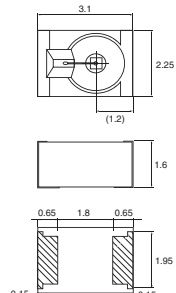
| Package | Exterior | Part No. | Features | Absolute Maximum Ratings | | Standard Characteristics | | | | | | RoHS |
|-------------------------------|--|--------------------|--|--------------------------|---------------|--------------------------|-----------|------------|------------------|------------|--------------------|------|
| | | | | I_F (mA) | I_E (mW/sr) | I_F (mA) | V_F (V) | I_F (mA) | λ_P (nm) | tr,tf (μs) | θ 1/2 (deg) | |
| Surface Mount Type (Top view) |  SIM-040ST | ★ SIM-030ST | Low profile (0.9mm), Ideal for proximity sensors | 100 | 30 | 100 | 1.7 | 100 | 870 | 0.1 | 20 | Yes |
| | | ★ SIM-040ST | High power, Ideal for proximity sensors | 100 | 40 | 100 | 1.7 | 100 | 870 | 0.1 | 20 | Yes |

★ : Under development

Dimensions (Unit : mm)

| | | | |
|-------------------|-------------------|-------------------|-------------------|
| <p>● RPI-0125</p> | <p>● RPI-0128</p> | <p>● RPI-0129</p> | <p>● RPI-0226</p> |
| <p>● RPI-122</p> | <p>● RPI-121</p> | <p>● RPI-124</p> | <p>● RPI-125</p> |
| <p>● RPI-128</p> | <p>● RPI-129B</p> | <p>● RPI-130</p> | <p>● RPI-131</p> |
| <p>● RPI-221</p> | <p>● RPI-222</p> | <p>● RPI-243</p> | <p>● RPI-246</p> |



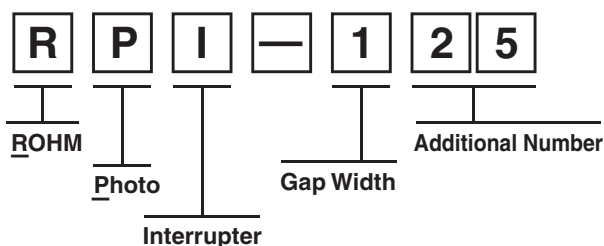
| | | | |
|--|--|---|--|
| <p>●RPM-012PB</p>  | <p>●RPT-34PB3F</p>  | <p>●RPT-37PB3F</p>  | <p>●RPT-38PB3F</p>  |
| <p>●RPM-20PB</p>  | <p>●RPM-22PB</p>  | <p>●SIM-012SB</p>  | <p>●SIR-320ST3F</p>  |
| <p>●SIR-34ST3F/341ST3F</p>  | <p>●SIR-505STA47</p>  | <p>●SIR-56ST3F/563ST3F/568ST3F</p>  | <p>●SIM-20ST</p>  |
| <p>●SIM-22ST</p>  | <p>●SIM-030ST</p>  | <p>●SIM-040ST</p>  | |

Part No. Explanation

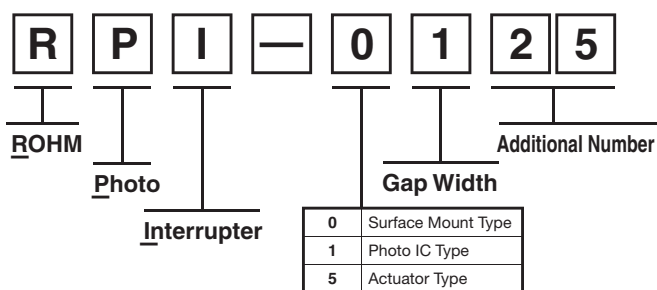
Part No. Explanation (Optical Sensors)

Transmission Type

7 characters :

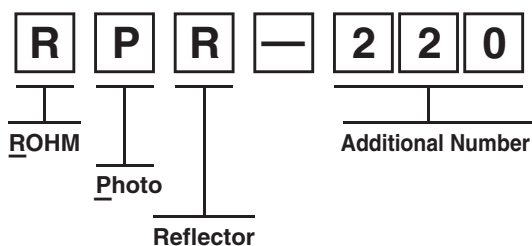


8 characters :

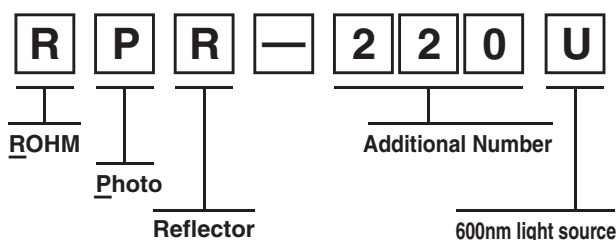


Reflective Type

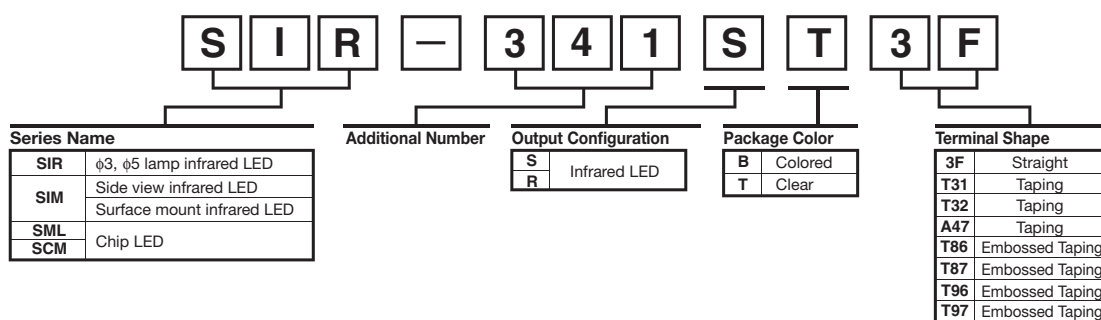
7 characters :



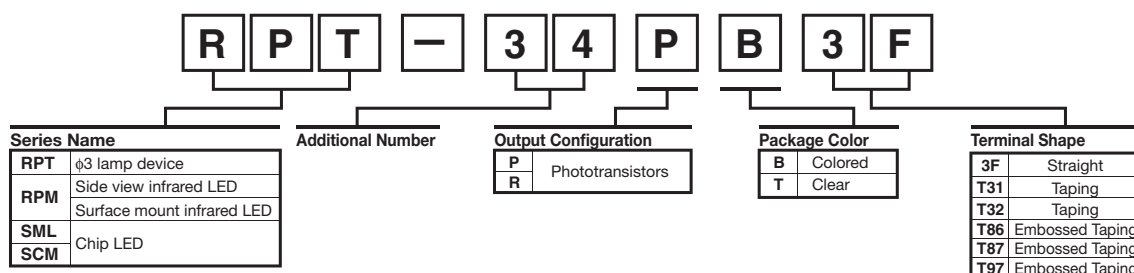
8 characters :



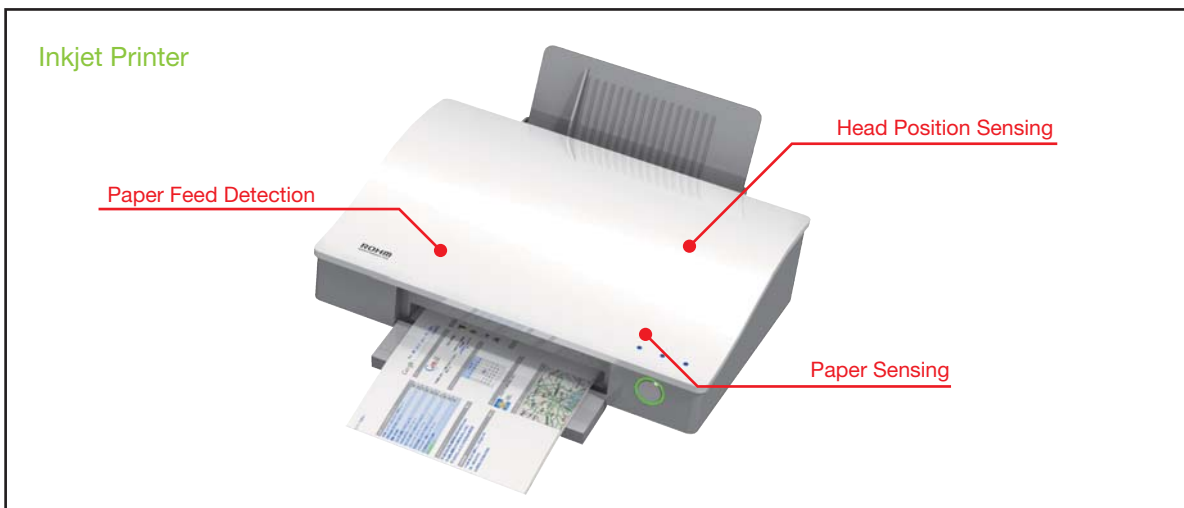
Part No. Explanation (Infrared Light Emitting Diodes)

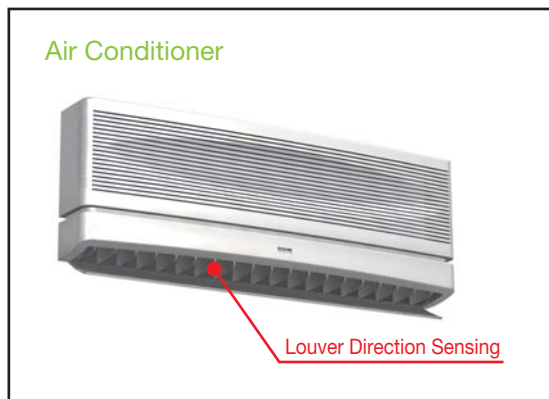
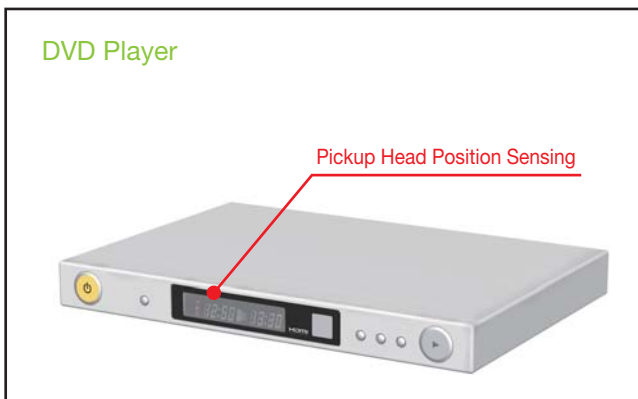
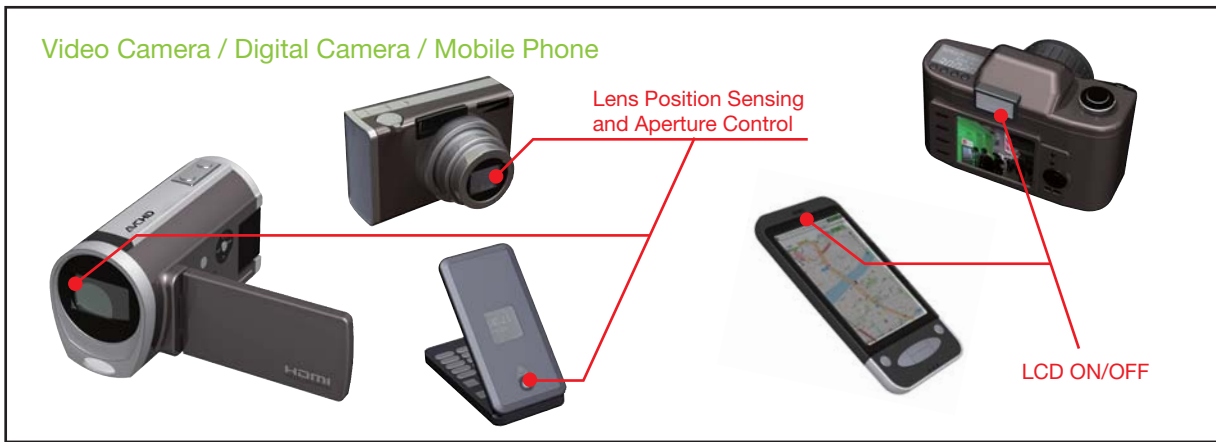


Part No. Explanation (Phototransistors)



Application Examples





Others

| Classification | Device | Applications |
|----------------------------|---|---|
| Home electronic appliances | Massage chairs | Internal structure position sensing |
| | Sewing machines | Motor rotation sensing Sensing of vertical motion of the needle and fabric feed timing |
| Industrial equipment | Automated production equipment | Internal structure position sensing |
| Others | Gaming devices (pinball machines, etc.) | Internal structure position sensing |

The content specified in this document is correct as of 1st February, 2010.

No copying or reproduction of this document, in part or in whole, is permitted without the consent of ROHM Co., Ltd.

The content specified herein is subject to change for improvement without notice.

The content specified herein is for the purpose of introducing ROHM's products (hereinafter "Products"). If you wish to use any such Product, please be sure to refer to the specifications, which can be obtained from ROHM upon request.

Examples of application circuits, circuit constants and any other information contained herein illustrate the standard usage and operations of the Products. The peripheral conditions must be taken into account when designing circuits for mass production.

Great care was taken in ensuring the accuracy of the information specified in this document. However, should you incur any damage arising from any inaccuracy or misprint of such information, ROHM shall bear no responsibility for such damage.

The technical information specified herein is intended only to show the typical functions of and examples of application circuits for the Products. ROHM does not grant you, explicitly or implicitly, any license to use or exercise intellectual property or other rights held by ROHM and other parties. ROHM shall bear no responsibility whatsoever for your use of any Product outside of the prescribed scope or not in accordance with the instruction manual.

The Products specified in this document are intended to be used with general-use electronic equipment or devices (such as audio visual equipment, office-automation equipment, communication devices, electronic appliances and amusement devices).

The Products specified in this document are not designed to be radiation tolerant.

While ROHM always makes efforts to enhance the quality and reliability of its Products, a Product may fail or malfunction for a variety of reasons.

Please be sure to implement in your equipment using the Products safety measures to guard against the possibility of physical injury, fire or any other damage caused in the event of the failure of any Product, such as derating, redundancy, fire control and fail-safe designs. ROHM shall bear no responsibility whatsoever for your use of any Product outside of the prescribed scope or not in accordance with the instruction manual.

The Products are not designed or manufactured to be used with any equipment, device or system which requires an extremely high level of reliability the failure or malfunction of which may result in a direct threat to human life or create a risk of human injury (such as a medical instrument, transportation equipment, aerospace machinery, nuclear-reactor controller, fuel-controller or other safety device). ROHM shall bear no responsibility in any way for use of any of the Products for the above special purposes. If a Product is intended to be used for any such special purpose, please contact a ROHM sales representative before purchasing.

If you intend to export or ship overseas any Product or technology specified herein that may be controlled under the Foreign Exchange and the Foreign Trade Law, you will be required to obtain a license or permit under the Law.

ROHM Sales Offices

Contact us for further information about the products.

| | | | | | | | |
|-------------------|------------------|-----------------------|-------------------|------------------|-------------------|---------------------|------------------|
| San Diego | +1-858-625-3630 | United Kingdom | +44-1-908-272400 | Shanghai | +86-21-6279-2727 | Zhuhai | +86-756-3232-480 |
| Atlanta | +1-770-754-5972 | Espoo | +358-9725-54491 | Hangzhou | +86-571-87658072 | Hong Kong | +852-2-740-6262 |
| Boston | +1-978-371-0382 | Salò | +358-2-7332234 | Nanjing | +86-25-8689-0015 | Taipei | +886-2-2500-6956 |
| Chicago | +1-847-368-1006 | Oulu | +358-8-5372930 | Ningbo | +86-574-87654201 | Kaohsiung | +886-7-237-0881 |
| Dallas | +1-972-473-3748 | Barcelona | +34-9375-24320 | Qingdao | +86-532-8577-9312 | Singapore | +65-6332-2322 |
| Denver | +1-303-708-0908 | Hungary | +36-1-4719338 | Suzhou | +86-512-6807-1300 | Philippines | +63-2-807-6872 |
| Detroit | +1-248-348-9920 | Poland | +48-22-5757213 | Wuxi | +86-510-82702693 | Thailand | +66-2-254-4890 |
| Nashville | +1-615-620-6700 | Russia | +7-495-739-41-74 | Guangzhou | +86-20-3878-8100 | Kuala Lumpur | +60-3-7958-8355 |
| Mexico | +52-33-3123-2001 | Seoul | +82-2-8182-700 | Huizhou | +86-752-205-1054 | Penang | +60-4-2286453 |
| Dusseldorf | +49-2154-9210 | Masan | +82-55-240-6234 | Fuzhou | +86-591-8801-8698 | Kyoto | +81-75-365-1218 |
| Munich | +49-8999-216168 | Dalian | +86-411-8230-8549 | Dongguan | +86-769-8393-3320 | Yokohama | +81-45-476-2290 |
| Stuttgart | +49-711-7272-370 | Beijing | +86-10-8525-2483 | Shenzhen | +86-755-8307-3008 | | |
| France | +33-1-4060-8730 | Tianjin | +86-22-23029181 | Xiamen | +86-592-238-5705 | | |

R1021A

ROHM Co., Ltd.

21 Saiin Mizosaki-cho, Ukyo-ku,
Kyoto 615-8585 Japan

TEL : +81-75-311-2121 FAX : +81-75-315-0172

www.rohm.com

ROHM
SEMICONDUCTOR