



Innovations Embedded

Optical Sensors



■ Remote Controls

■ Copiers

■ Cell Phones

ROHM Infrared Optical Sensors operate in the near infrared range (700nm - 1400nm) of the electromagnetic spectrum and are ideal for optical sensing and optical communications since IR is easy to implement as the signal source. In this range, optical sensors are used in industrial, consumer and other applications for sensing movement, position, proximity, ambient light, speed (encoders) and direction of motion.

In particular, ROHM's product lineup includes both through-hole and surface mount parts in the following categories:

- Infrared emitters
- Infrared sensors/phototransistors
- Photointerrupters
- Tilt sensors
- IrDA communication modules
- Remote control module receivers

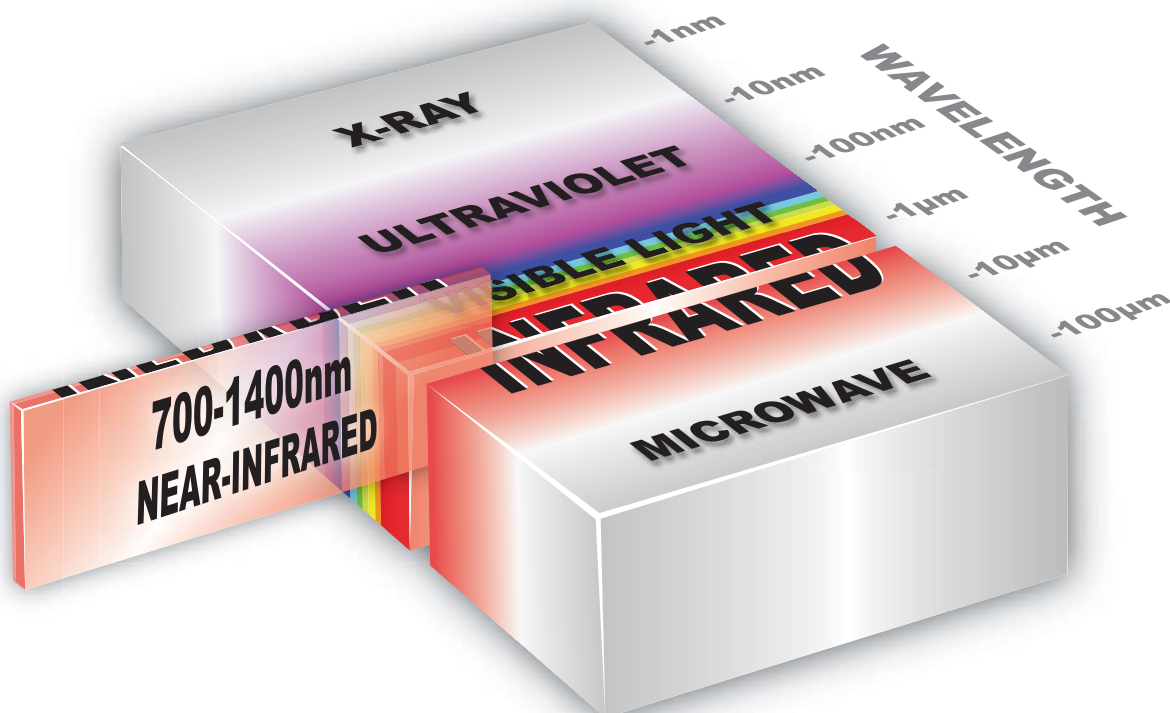
Optical wireless communication uses IR data transmission for short range applications such as computer peripherals and PDAs. Infrared Data Association (IrDA) standards are normally used for these signals.

For optical communication, a modulated IR light beam transmitted by an emitter LED is received by a silicon photodiode/transistor. Since IR does not penetrate walls, it does not interfere with other signals in indoor environments. This makes IR technology the most commonly used technique for remotely controlling appliances.

The following is a list of some general applications for Infrared PhotoOptics:

- Office Automation (OA) equipment such as copiers, fax machines and printers
- Vending machines
- Amusement and gaming products
- Home entertainment products
- Medical / healthcare equipment.
- Banking terminals such as ATMs
- Testing equipment such as IC/LSI testers, encoders and more

ROHM's Product Focus



Important Benefits of ROHM Optical Sensors

■ 40 years of IR Sensor Product Advancement

For over 40 years, ROHM has been a leading solution provider of photooptic sensors for consumers in the commercial and printer markets.

Recent advances in GaAIAs high energy band gap technology from ROHM have resulted in the development of IR emitters with 800-950nm wavelength and fast response times.

In addition, fully automated double molding THD and SMD packaging production lines designed and developed by ROHM Semiconductor contribute to high reliability and accurate mounting.

■ Industry's Widest Product Line

ROHM offers IR sensors including discrete IR LEDs and transistor sensors, fully integrated remote control receivers, IrDA transmitters, photointerrupters and customized sensor detection devices.

IR LEDs and transistor sensor products are offered in packages ranging from standard T1, T11/4 packages to very small low profile (0.9mm) SMD top view and side view packages, all featuring ambient light resistance with wide or narrow viewing angles. These devices are suitable for remote control transmitters, games, security, industrial applications and proximity detection.

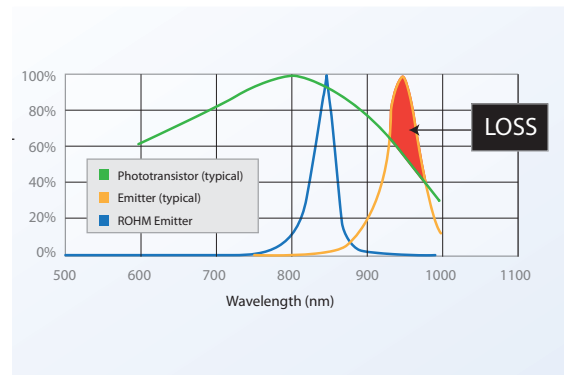
Integrated products such as photointerrupters and reflectors are offered in a variety of package sizes and different gap and slit widths. High accuracy detection due to double molding technology makes them ideal for printer applications, including paper/door detection and motor rotation/position sensing.

Tilt sensors offered in small, low profile, low noise SMD packages are applicable for orientation detection and image rotation in digital cameras, cell phones, tablet computers and other handheld devices.

ROHM IR receivers and IrDA communication devices with integrated LSI/IR components operate at low voltage and low power consumption, while internal filters and shielding contribute to low noise operation and greater EMI resistance.

■ Custom Product Development

ROHM is directly engaged with leading product manufacturers of consumer, medical, industrial and security products. By utilizing proprietary technologies and manufacturing expertise achieved over the years, ROHM is able to support special designs and custom solutions ranging from low power IR chips to custom packaging.



IR Emitters

[See all IR Emitters](#)

SIM-040ST / SIM-041ST

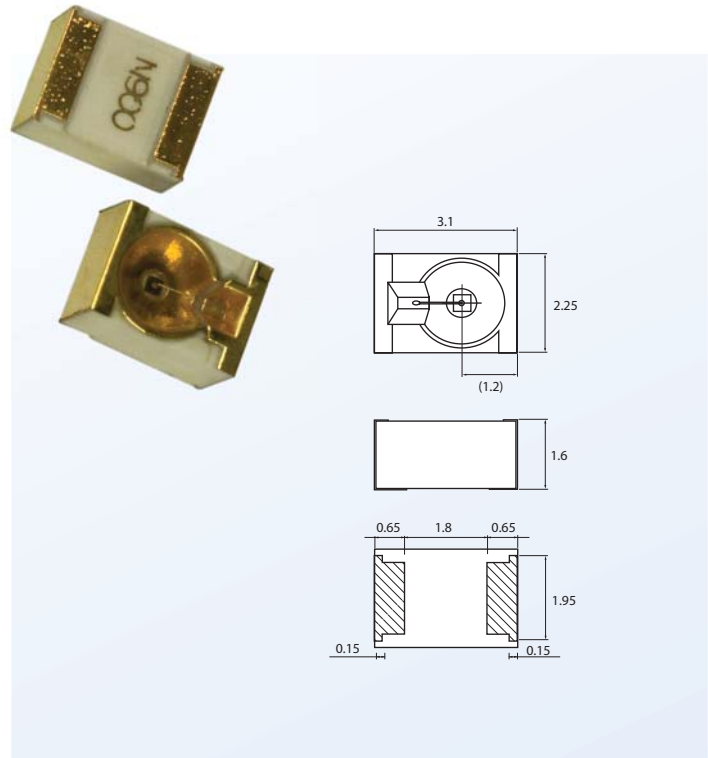
ROHM's latest low profile lineup of IR emitters is designed specifically with a peak wavelength of 870nm/850nm which is close to the peak wave sensitivity of phototransistors (sensors), resulting in higher efficiency output and up to 66% in energy savings.

Applications

- Light source for proximity sensors
- Signal transmission

Important Features

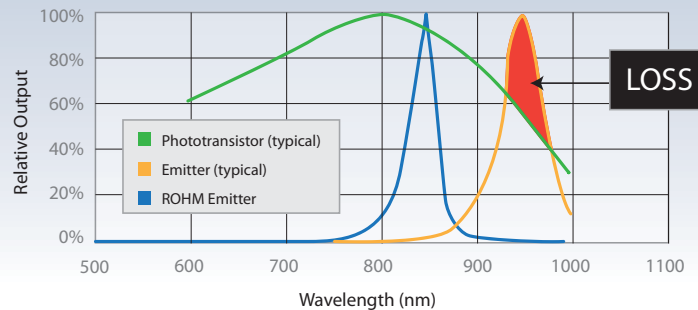
- Improved peak wavelength of 870nm/850nm
- Compact and low profile (1.6mm x 3.1mm x 2.25mm)
- High output (40mW typical)
- Narrow viewing angle (± 17.5 degrees)
- Excellent temperature characteristics
- Long life, high reliability



DESIGN NOTE

66% More Efficient

With energy losses minimized, the SIM-040ST infrared emitter is 66% more efficient than traditional components.



Part No.	Forward Current (I _F)	Power Dissipation (V _R)	Operating Temperature (T _{OPR})	Minimum Emitting Strength (I _E)	Forward Voltage (V _F)	Peak Emitting Wavelength (λ _P)	Half Viewing Angle (φ _{1/2})	Response Time (tr,tf)
	mA	mW	°C	mW/sr	V	nm	deg	μs
SIM-040ST	100	180	-25 to 85	40	1.7	870	±20	0.1
SIM-041ST	100	180	-25 to 85	40	1.7	850	±20	0.1

IR Emitters

[See all IR Emitters](#)

SIM-030ST / SIM-031ST

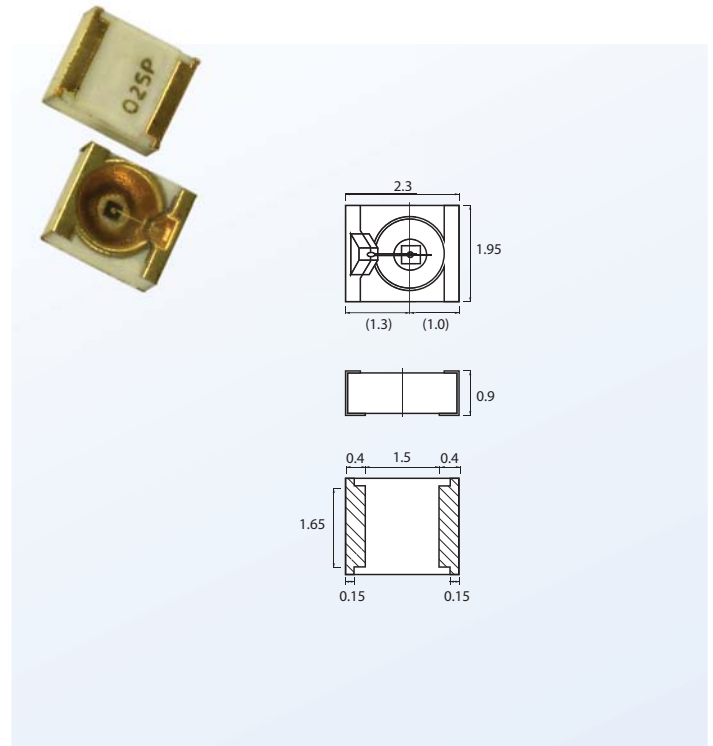
ROHM's latest low profile lineup of IR emitters is designed specifically with a peak wavelength of 870nm/850nm which is close to the peak wave sensitivity of phototransistors (sensors), resulting in higher efficiency output and up to 66% in energy savings.

Applications

- Light source for proximity sensors
- Signal transmission

Important Features

- Improved peak wavelength of 870nm/850nm
- Compact and low profile (0.9mm x 2.3mm x 1.95mm)
- High output (30mW typical)
- Narrow viewing angle (± 17.5 degrees)
- Excellent temperature characteristics
- Long life, high reliability



DESIGN NOTE

Ultra Low Profile (0.9mm)

At 0.9mm, the SIM-030ST is the thinnest surface mount component of its kind. Similar to the SIM-040ST, this chip is 66% more efficient than traditional infrared emitters.



Part No.	Forward Current (I _F)	Power Dissipation (V _R)	Operating Temperature (T _{OPR})	Minimum Emitting Strength (I _E)	Forward Voltage (V _F)	Peak Emitting Wavelength (λ _P)	Half Viewing Angle (φ _{1/2})	Response Time (tr,tf)
	mA	mW	°C	mW/sr	V	nm	deg	μs
SIM-030ST	100	180	-25 to 85	30	1.7	870	±20	0.1
SIM-031ST	100	180	-25 to 85	30	1.7	850	±20	0.1

IR Phototransistor/Sensor (top-view type)

[See all IR Phototransistors/Sensors](#)

■ SCM-014TB

The SCM-014TB features high gain and collector current. This top-view molded chip is designed for automatic mounting and SMD reflow assemblies.

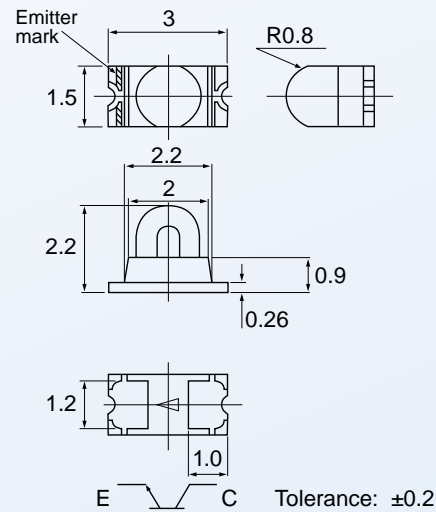


Applications

- Automatic mounting
- Photo sensing
- Motion sensing
- SMD reflow assembly

Important Features

- Remarkably high sensitivity
- 800nm peak wavelength
- Outstanding ambient light filtering



Key FACTS

Why IR and not Bluetooth?



IR Advantages

1. Higher security: beam directionality helps ensure that data isn't detected by nearby devices as it's transmitted
2. High noise immunity: not as likely to have interference from signals from other devices
3. Few international regulatory constraints
4. Low power requirements: ideal for laptops, cell phones, and personal digital assistants
5. Simple design implementation

IR Disadvantages

1. Line of sight: transmitters and receivers must be almost directly aligned
2. Blocked by common materials: people, walls, plants, and other objects can block transmission
3. Short range: performance drops off with longer distances
4. Light and weather sensitive: direct sunlight, rain, fog, dust, and pollution can affect transmission
5. Speed: data rate transmission is lower than typical wired transmission

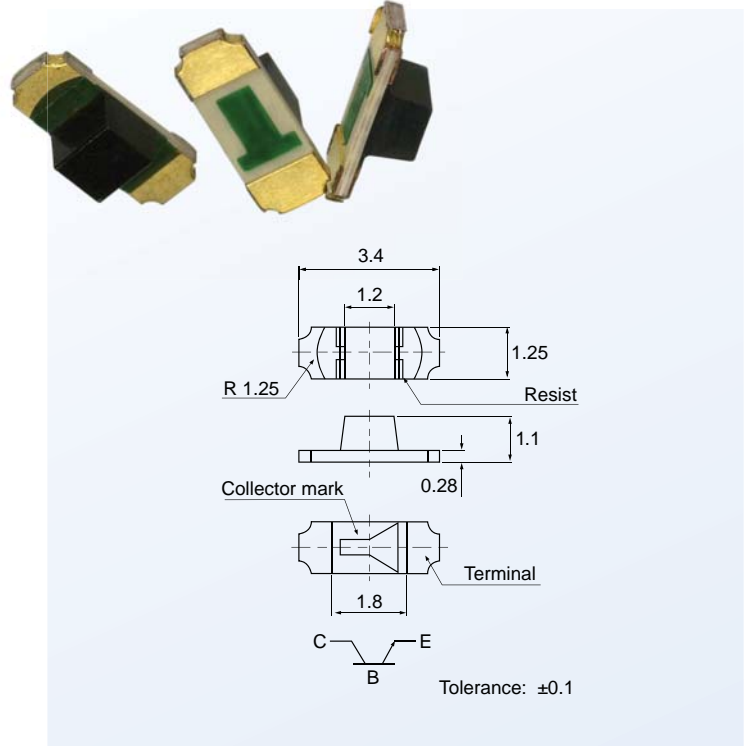
Part No.	Collector Current (I _c)	Power Dissipation (P _c)	Operating Temperature (T _{OPR})	Min. Photoelectric Current (I _c)	Collector-Emitter Voltage (V _{CE0})	Peak Sensitivity Wavelength (λ _P)	Max. Dark Current	Response Time (tr,tf)
	mA	mW	°C	mA	V	nm	μA	μs
SCM-014TB	30	100	-30 to 85	0.5	32	800	0.5	10

IR Phototransistor/Sensor (molded type)

[See all IR Phototransistors/Sensors](#)

SML-810TB

The SML-810TB features high gain and collector current. This molded type chip is ideal for reverse mounting.



Applications

- Reverse mounting
- SMD reflow assembly

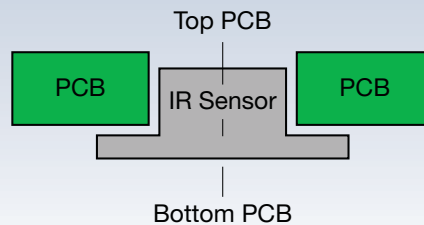
Important Features

- Low profile
- Accurate positioning
- Saves board space

DESIGN NOTE

Ideal for Reverse Mounting

Reverse mounting is optimized for space saving, low profile applications.



Part No.	Collector Current (I _c)	Power Dissipation (P _c)	Operating Temperature (T _{OPR})	Min. Photoelectric Current (I _c)	Collector-Emitter Voltage (V _{CE0})	Peak Sensitivity Wavelength (λ _P)	Max. Dark Current	Response Time (tr,tf)
	mA	mW	°C	mA	V	nm	μA	μs
SML-810TB	30	80	-30 to 85	2.3	32	800	0.5	10

IR Phototransistor/Sensor and Emitter (side-view type)

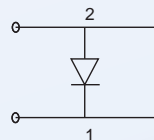
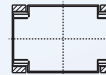
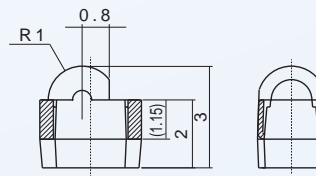
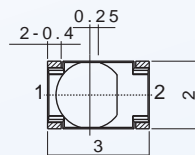
[See all IR Phototransistors/Sensors](#)

RPM-012PB Sensor

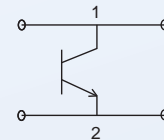
The RPM-012PB is an ultra-compact side-view chip sensor. Ideal for high sensitivity optical remote control applications when used in combination with the SIM-012SB emitter.

SIM-012SB Emitter

The SIM-012SB is an ultra-compact side-view chip emitter compatible with the RPM-012PB sensor.



Internal connection diagram (SIM-012SB)



Internal connection diagram (RPM-012PB)

Applications

- Optical control equipment
- Remote control devices

Important Features

- High power lens
- Ultra-compact surface mount package (3mm x 3mm x 2mm)
- Reflow possible

Emitter

Part No.	Forward Current (I _F)	Power Dissipation (P _D)	Operating Temperature (T _{OPR})	Minimum Emitting Strength (IE)	Forward Voltage (V _F)	Peak Emitting Wavelength (IP)	Half Viewing Angle (f1/2)	Response Time (tr.tf)
	mA	mW	°C	mW/sr	V	nm	deg	μs
SIM-012SB	40	60	-30 to 85	0.9	1.2	950	12	1

Sensor

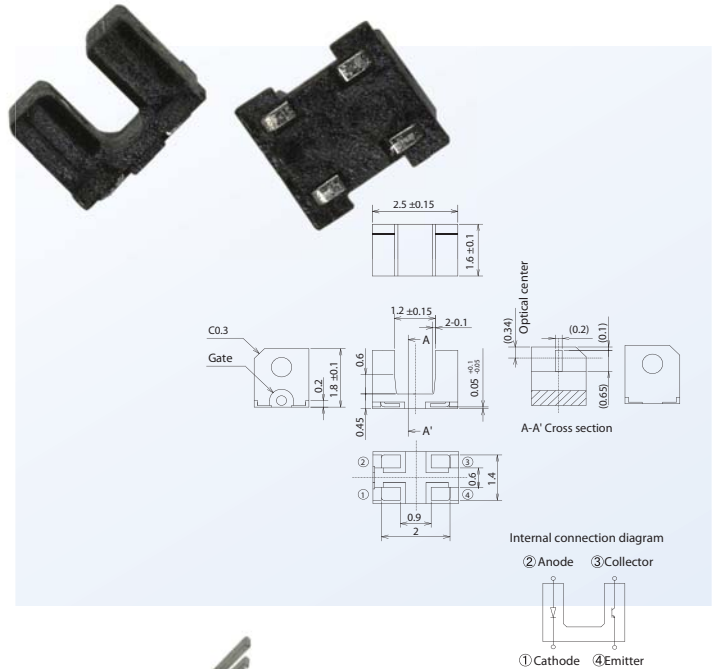
Part No.	Collector Current (I _C)	Power Dissipation (P _C)	Operating Temperature (T _{OPR})	Min. Photoelectric Current (I _C)	Collector-Emitter Voltage (V _{CEO})	Peak Sensitivity Wavelength (IP)	Max. Dark Current	Response Time (tr.tf)
	mA	mW	°C	mA	V	nm	mA	μs
RPM-012PB	20	75	-30 to 85	0.56	32	800	0.5	10

Photointerrupters (double mold type)

[See Photointerrupters \(Transmission\)](#)

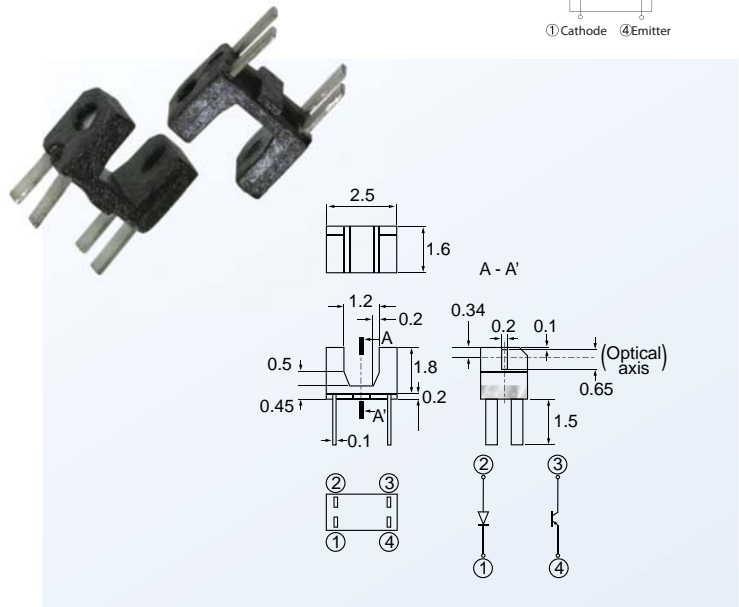
RPI-0128

The RPI-0128 is a double mold type photointerrupter in an ultraminiature surface mount package featuring a 1.2mm gap width and accurate 0.2mm narrow beam detection.



RPI-128

The RPI-128 is a double mold type photointerrupter in an ultraminiature through hole package featuring a 1.2mm gap width and accurate 0.2mm narrow beam detection.



Applications

- Digital cameras
- Digital video cameras
- Mini industrial sensors

Important Features

- Ultra-compact (2.5mm x 1.6mm x 1.8mm)
- 1.2mm gap
- Vertical Slit
- Available in DIP and SMD packages

Emitter

Part No.	Forward Current (I _F)	Power Dissipation (P _D)	Operating Temperature (T _{OPR})	Forward Voltage (V _F)	Peak Emitting Wavelength (λ _P)	Switching Time
	mA	mW	°C	V	nm	μs
RPI-0128/128	30	80	-25 to 85	1.35	850	1

Sensor

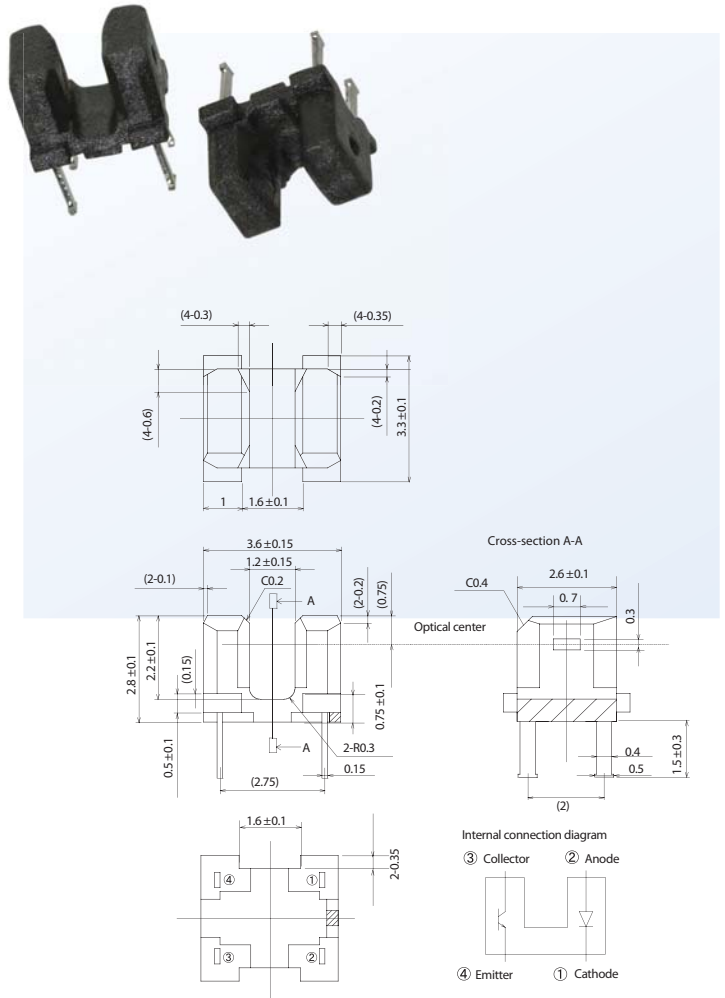
Part No.	Collector Current (I _C)	Power Dissipation (P _C)	Operating Temperature (T _{OPR})	Min. Photoelectric Current (I _C)	Collector-Emitter Voltage	Peak Sensitivity Wavelength (λ _P)	Max. Dark Current	Response Time (tr,tf)
	mA	mW	°C	mA	V	nm	μA	μs
RPI-0128/128	30	80	-25 to 85	1.00	30	800	0.1	10

Photointerrupter (double mold type)

[See Photointerrupters \(Transmission\)](#)

RPI-129BN

The RPI-129BN is a double mold type photointerrupter in an ultraminiature through hole package configured with horizontal slits featuring a 1.2mm gap width and accurate 0.3mm narrow beam detection.



Applications

- Digital photography cameras
- Digital video cameras
- Cell phones

Important Features

- Ultra-compact (3.6mm x 2.8mm x 3.3mm)
- 1.2mm gap
- Horizontal slit
- Available in DIP and SMD packages

Emitter

Part No.	Forward Current (I _F)	Power Dissipation (P _D)	Operating Temperature (T _{OPR})	Forward Voltage (V _F)	Peak Emitting Wavelength (IP)	Response Time (tr.tf)
	mA	mW	°C	V	nm	μs
RPI-129BN	50	80	-25 to 85	1.3	950	1

Sensor

Part No.	Collector Current (I _C)	Power Dissipation (P _C)	Operating Temperature (T _{OPR})	Min. Photoelectric Current (I _C)	Collector-Emitter Voltage	Peak Sensitivity Wavelength (IP)	Max. Dark Current	Response Time (tr.tf)
	mA	mW	°C	mA	V	nm	μA	μs
RPI-129BN	30	80	-25 to 85	0.95	30	800	0.5	10

Photointerrupter (transmission type)

[See Photointerrupters \(Transmission\)](#)

RPI-151

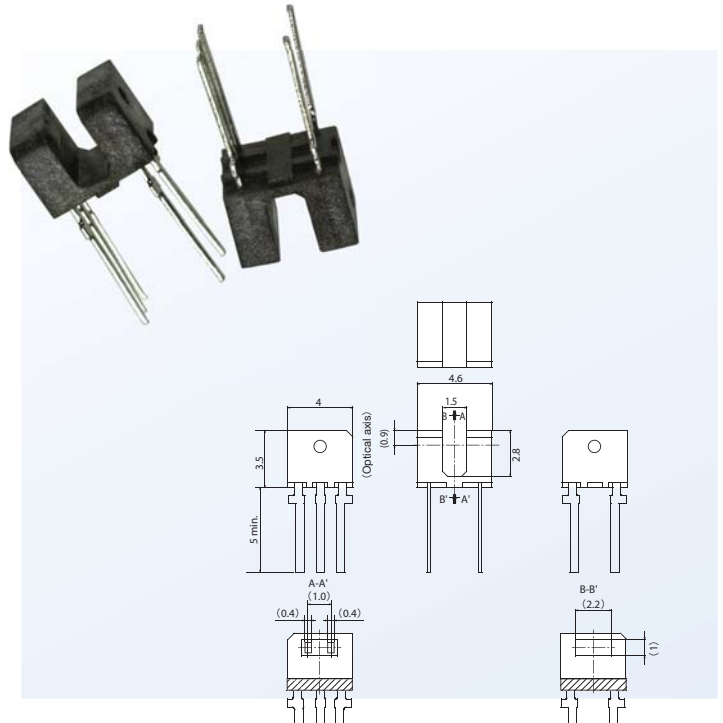
The RPI-151 is a two-phase photointerrupter that integrates two sensors in a single package, contributing to greater space savings.

Applications

- Motor speed and direction detection
- Encoders

Important Features

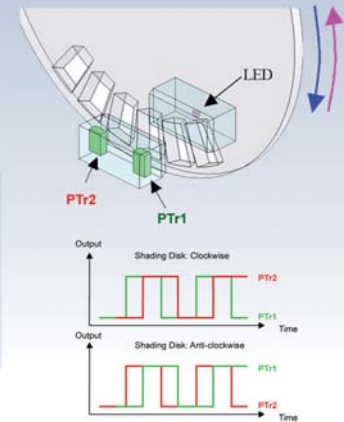
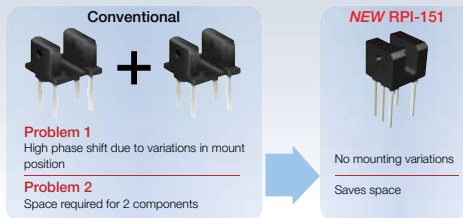
- Two sensors in one package
- 1.5mm gap



DESIGN NOTE

Two Sensors in One Package

The dual-sensor configuration makes the RPI-151 ideal for detecting both the speed and direction of a motor with high accuracy, eliminating the need for a second sensor.



Emitter

Part No.	Forward Current (I _f)	Power Dissipation (P _d)	Operating Temperature (T _{OPR})	Forward Voltage (V _f)	Peak Emitting Wavelength (λ _P)	Switching Time
	mA	mW	°C	V	nm	μs
RPI-151	50	70	-25 to 85	1.2	950	1

Sensor

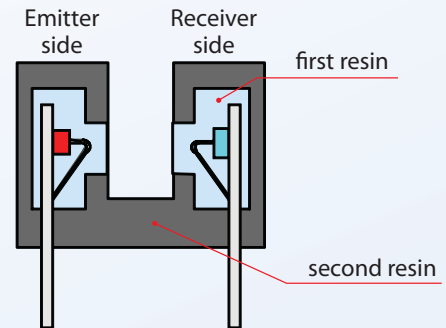
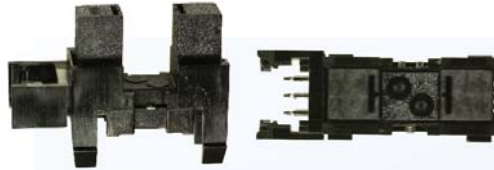
Part No.	Collector Current (I _c)	Power Dissipation (P _c)	Operating Temperature (T _{OPR})	Min. Photoelectric Current (I _c)	Collector-Emitter Voltage	Peak Sensitivity Wavelength (λ _P)	Max. Dark Current	Response Time (tr,tf)
	mA	mW	°C	mA	V	nm	μA	μs
RPI-151	30	80	-25 to 85	0.25	30	800	0.5	10

Photointerrupter (transmission type)

[See Photointerrupters \(Transmission\)](#)

RPI-2501

The RPI-2501 is a high accuracy photointerrupter designed as a lower-cost alternative to conventional products.



Double-mold construction contributes to higher output.

Applications

- Printers

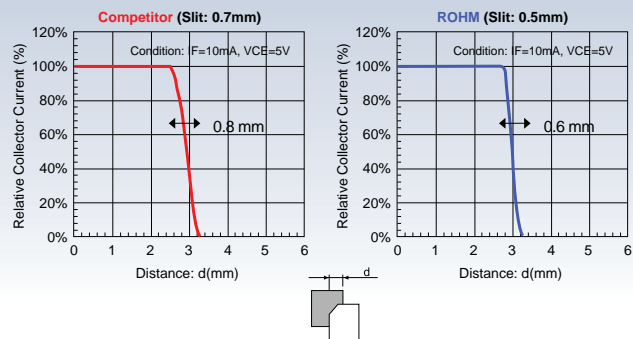
Important Features

- Built-in mini CT connector
- High accuracy narrow slit design (0.4mm)
- High collector output current
- 850nm emitter wavelength
- Double-mold package
- Compatible with connector types 353293-3 and 353908-3 (26-28 AWG)

DESIGN NOTE

25% Improved Detection Accuracy (0.4mm)

The RPI-2500's narrow slit design of 0.5mm is suitable for a wide range (0.8 - 1.6mm) to PCB thickness assemblies.



Emitter

Part No.	Forward Current (I _F)	Power Dissipation (P _D)	Operating Temperature (T _{OPR})	Forward Voltage (V _F)	Peak Emitting Wavelength (IP)	Switching Time
	mA	mW	°C	V	nm	μs
RPI-2501	50	80	-25 to 85	1.3	850	1

Sensor

Part No.	Collector Current (I _C)	Power Dissipation (P _C)	Operating Temperature (T _{OPR})	Min. Photoelectric Current (I _C)	Collector-Emitter Voltage	Peak Sensitivity Wavelength (IP)	Max. Dark Current	Response Time (tr.tf)
	mA	mW	°C	mA	V	nm	μA	μs
RPI-2501	10	80	-25 to 85	0.5	30	800	0.5	10

Photointerrupter (reflective type)

[See Photointerrupters \(Reflective\)](#)

RPR-220C1

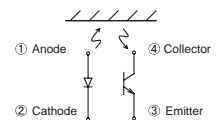
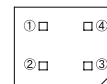
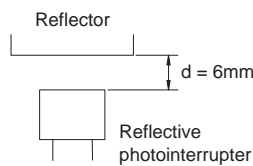
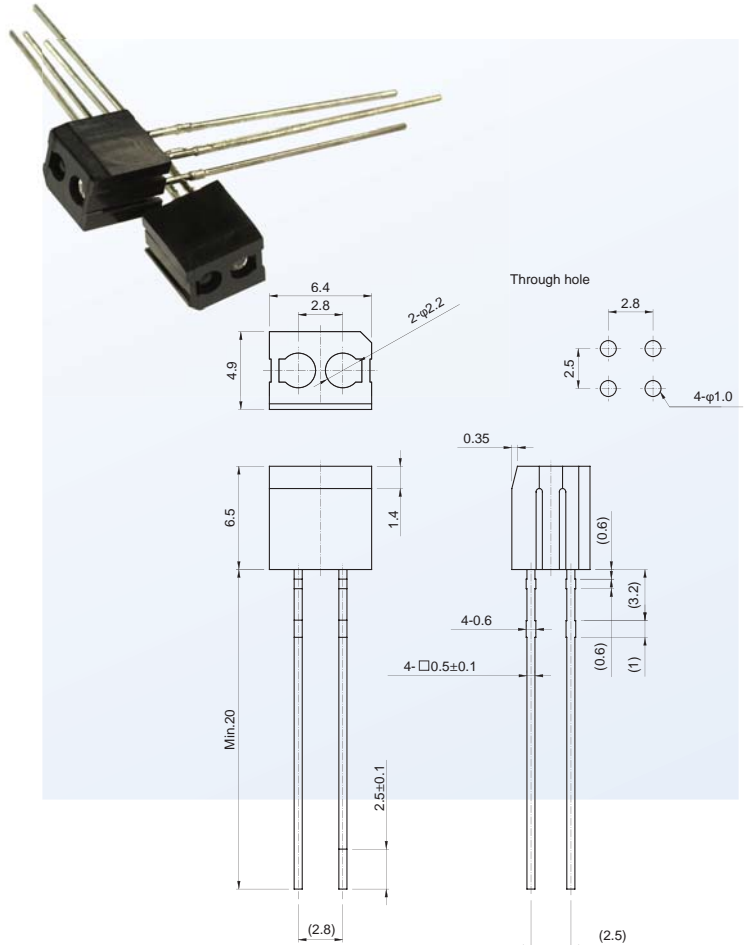
The RPR-220C1 is a reflective type photointerrupter with a focal length of 6mm and a wavelength of 940nm.

Applications

- Printers
- CD players
- Gaming machines

Important Features

- 940nm wavelength
- Plastic lens yields high sensitivity
- Built-in visible light filter minimizes stray light influence
- Light & compact
- Excellent reflection sensitivity (3-6mm)



Notes:
 1. Unspecified tolerance shall be ± 0.2 .
 2. Dimension in parenthesis are show for reference.

Emitter

Part No.	Forward Current (I _F)	Power Dissipation (P _D)	Operating Temperature (T _{OPR})	Forward Voltage (V _F)	Peak Emitting Wavelength (λ _P)	Switching Time
	mA	mW	°C	V	nm	μs
RPR-220C1	50	80	-25 to 85	1.34	940	1

Sensor

Part No.	Collector Current (I _C)	Power Dissipation (P _C)	Operating Temperature (T _{OPR})	Min. Photoelectric Current (I _C)	Collector-Emitter Voltage	Peak Sensitivity Wavelength (λ _P)	Max. Dark Current	Response Time (tr,tf)
	mA	mW	°C	mA	V	nm	μA	μs
RPR-220C1	30	80	-25 to 85	0.08	30	800	0.5	10

Photointerrupters (reflective type)

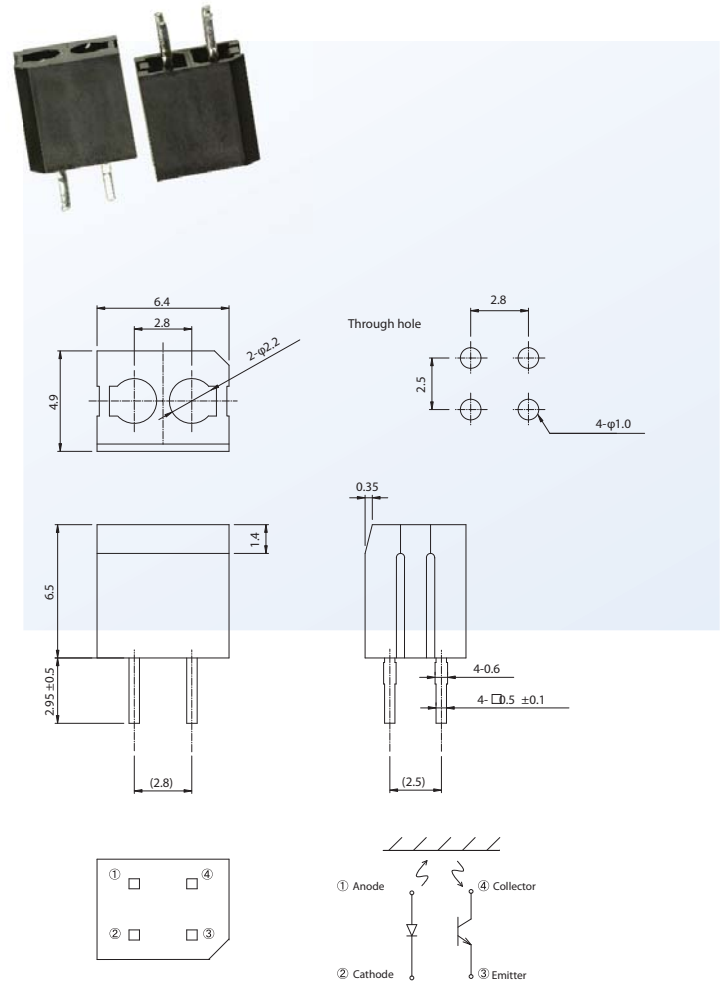
[See Photointerrupters \(Reflective\)](#)

RPR-220UC30

The RPR-220UC30 is a reflective type photointerrupter with a focal length of 6mm and a wavelength of 630nm (red light).

RPR-220PC30N

The RPR-220PC30N is a reflective type photointerrupter with a focal length of 6mm and a wavelength of 470nm (blue light).

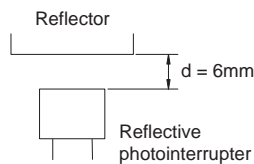


Applications

- Printers
- Medical
- Games

Important Features

- Plastic lens yields high sensitivity
- Built-in visible light filter minimizes stray light influence
- Light & compact



Notes:
 1. Unspecified tolerance shall be ± 0.2 .
 2. Dimension in parenthesis show for reference.

Emitter

Part No.	Forward Current (I _F)	Power Dissipation (P _D)	Operating Temperature (T _{OPR})	Forward Voltage (V _F)	Peak Emitting Wavelength (λ _P)	Switching Time
	mA	mW	°C	V	nm	μs
RPR-220UC30	30	80	-25 to 85	2	630	1
RPR-220PC30N	30	80	-25 to 85	2	470	1

Sensor

Part No.	Collector Current (I _C)	Power Dissipation (P _C)	Operating Temperature (T _{OPR})	Min. Photoelectric Current (I _C)	Collector-Emitter Voltage (V _{CE0})	Peak Sensitivity Wavelength (λ _P)	Max. Dark Current	Response Time (tr,tf)
	mA	mW	°C	mA	V	nm	μA	μs
RPR-220UC30	30	80	-25 to 85	0.08	30	800	10	10
RPR-220PC30N	30	80	-25 to 85	0.08	30	800	10	10

Tilt Sensor (4-way detection)

[See all Tilt Sensors](#)

RPI-1040

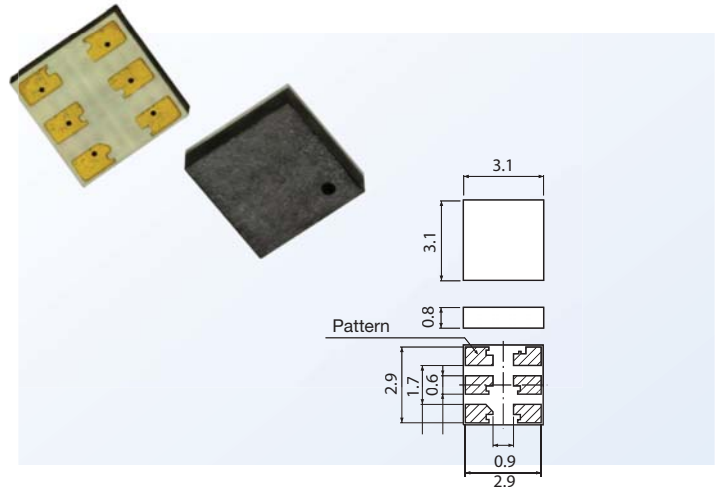
The RPI-1040 is an optical surface mount 4-way detection sensor with one IR LED and two phototransistors for detecting orientation, rotation, or fall in a variety of applications.

Applications

- Cell phones
- Digital cameras
- Portable audio
- Irons
- Heating Fans

Important Features

- Industry's thinnest package (3.1mm x 3.1mm x 0.8mm thick)
- Silent, noise-free operation
- Shielded from vibration, magnetic, and RF noise
- High precision detection



Orientation Detection

Video Devices
(Mobile Phones,
Digital Cameras)

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

Filming



Previewing

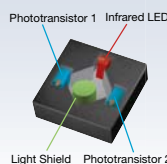


DESIGN NOTE

79% Less Volume

(a) RPI-1040 integrates an IR LED, 2 phototransistors, and a light shield, into a single package.

(b) The optimized configuration reduces volume and area by 79% and 37% over conventional tilt sensors.



(a)

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



(b)



Emitter

Part No.	Forward Current (I _f)	Power Dissipation (P _D)	Operating Temperature (T _{OPR})	Forward Voltage (V _f)	Peak Emitting Wavelength (λ _P)	Switching Time
	mA	mW	°C	V	nm	μs
RPI-1040	50	70	-25 to 85	1.1	950	10

Sensor

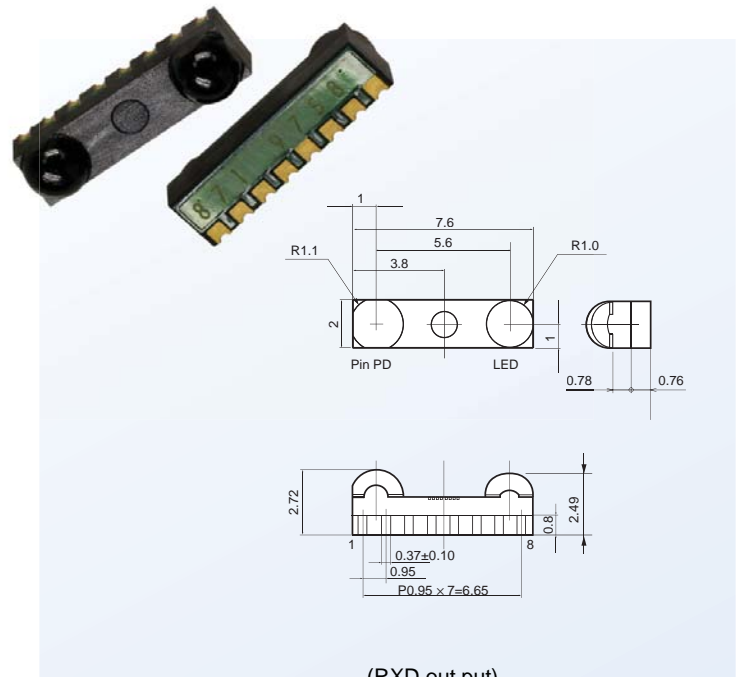
Part No.	Collector Current (I _c)	Power Dissipation (P _C)	Operating Temperature (T _{OPR})	Min. Photoelectric Current (I _c)	Collector-Emitter Voltage (V _{CE0})	Peak Sensitivity Wavelength (λ _P)	Max. Dark Current	Response Time (tr,tf)
	mA	mW	°C	mA	V	nm	μA	μs
RPI-1040	30	80	-25 to 85	0.05	30	800	0.5	10

IrDA Communication Modules

[See all IrDA Communication Modules](#)

RPM871

The RPM871 is a micro infrared module based on the IrDA1.2 standard. The SIR-compatible unit operates at a distance of 60cm. It contains an infrared LED, a PIN photodiode and LSI circuitry in an ultra-compact, 8-pin package. In addition to low power consumption (73µA typical), the module has a built-in power down function that reduces the current consumption to 0.01µA (typical).

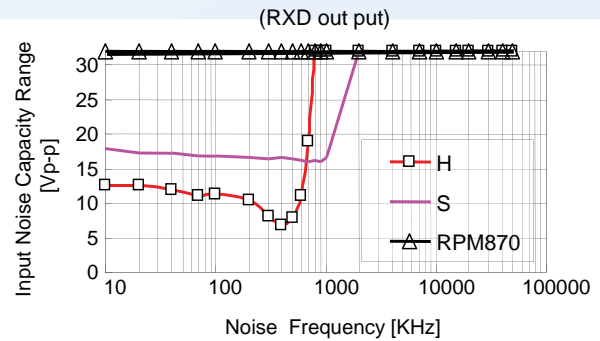


Applications

- Cell phones, PDAs

Important Features

- Excellent ambient light detection with superior resistance to electromagnetic noise
- Ultra-compact package saves space
- Low power consumption: 73µA (typ.)
- Broad power supply voltage range: 2.6V to 3.6V
- Integrated power down function results in a standby circuit current of only 0.01µA (typ.)
- Variable transmission distance range via constant LED load resistance (60cm max.)
- Available in top view and side view configurations



DESIGN NOTE

Anti-Magnetic Noise Characteristics

Household Appliances	Public Terminals
Financial Terminals	Industrial Equipment
Gaming Devices	Car Electronics
Consumer Electronics	Office Equipment (OA Equipment)
Transportation-Related Equipment	AV Equipment
Medical Equipment	

Remote Control Receiver Modules

[See all Remote Control Receiver Modules](#)

RPM5540 / RPM5340

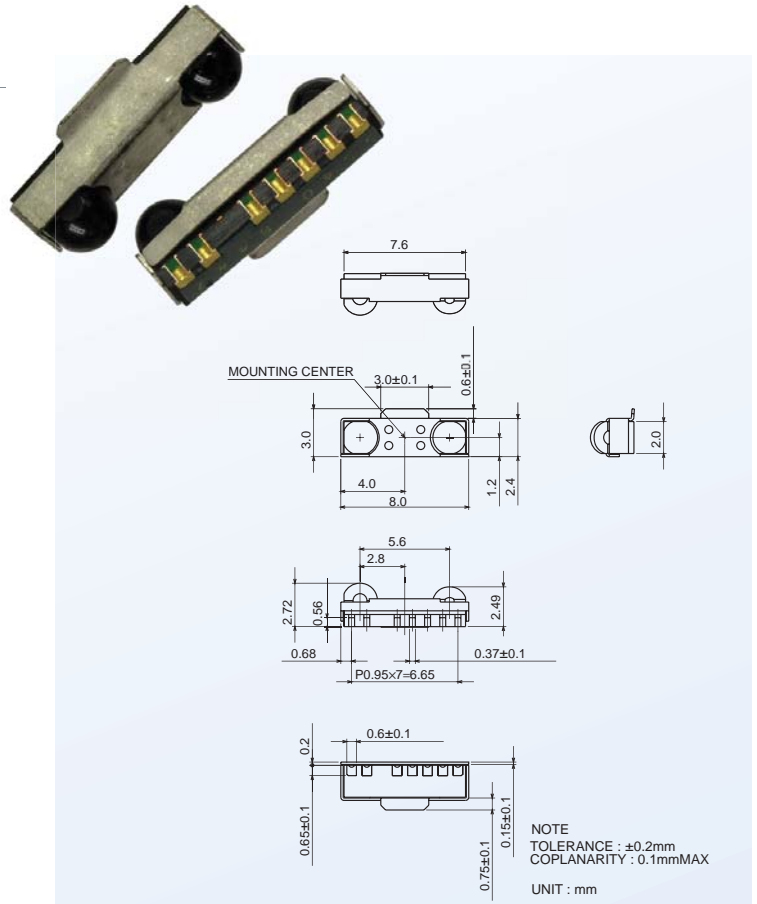
RPM5540 and RPM5340 are ultra-compact surface mount remote controller receiver modules ideal for AV equipment (i.e. TVs, digital cameras, car systems, gaming devices, toys), home electronics (e.g. air conditioners, lights, fans), and industrial applications.

Applications

- Home electronics, including TVs, DVD players, air conditioners, audio systems, and industrial equipment

Important Features

- Ultra-compact package (1/16th the size of existing products)
- Long effective distance and wide angle equivalent to existing products
- Low current consumption (300 - 950 μ A)
- Supports Pb-free soldering
- Side-view type also available (H14)
- Compatible with 3V and 5V operation

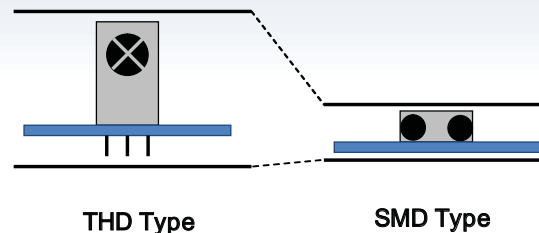
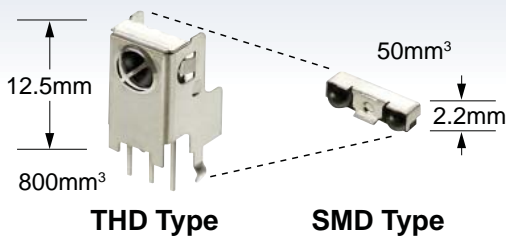


ETH658

DESIGN NOTE

Requires Only 1/16th the Volume of THDs

The RPM5540 and RPM5340 require 75% less volume than comparable Through Hole Devices (THDs).





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NOTE: For the most current product information, contact a ROHM sales representative in your area.

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The products listed in this catalog are designed to be used with ordinary electronic equipment or devices (such as audio visual equipment, office-automation equipment, communications devices, electrical appliances and electronic toys). Should you intend to use these products with equipment or devices which require an extremely high level of reliability and the malfunction of which would directly endanger human life (such as medical instruments, transportation equipment, aerospace machinery, nuclear-reactor controllers, fuel controllers and other safety devices), please be sure to consult with our sales representative in advance.

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