



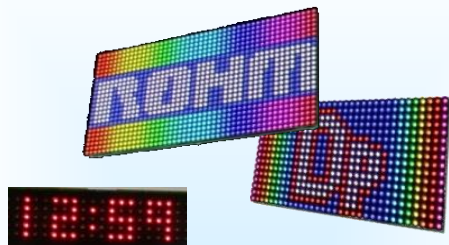
Optical Module Introduction

optical sensor

Aug 2014
Module FAE division

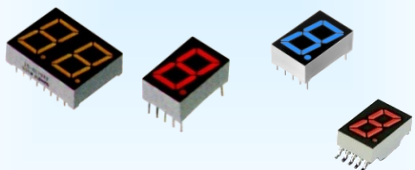
Optical Module

Dot Matrix module



LED Dot Matrix with excellence
in contrast, visibility, high
brightness

7segment

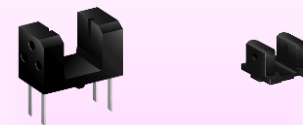


Newly developed extensive
bright light type of product

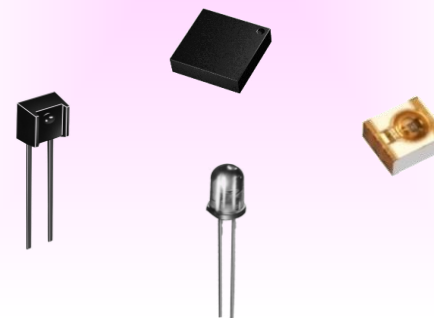
Developed module
using visible/invisible
light technology.

Infrared Module

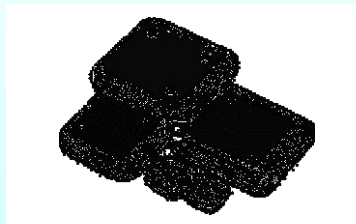
Optical sensor



Accomplish super small size
of interrupter by double mold
technology.



◆LSI division

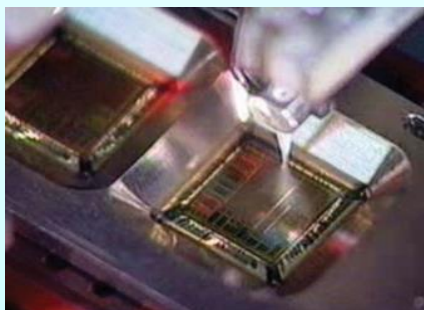


Develop customized LSI for Display

◆Own production line



Automatic assembly process

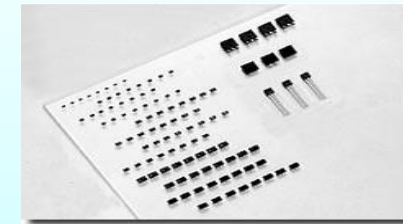


Wire Bonding Process

Optical Module Line Up



◆Discrete division



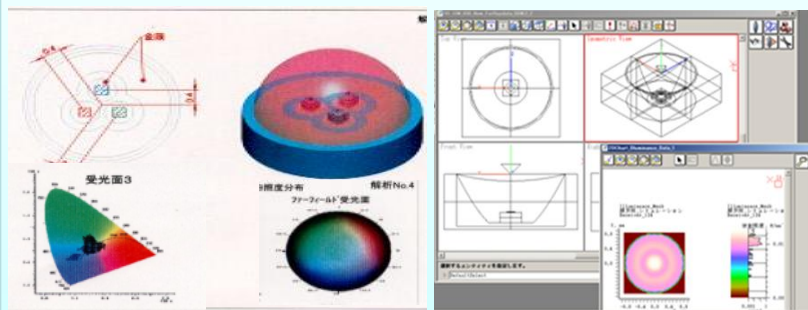
TR/DI/R/TC development

◆LED division



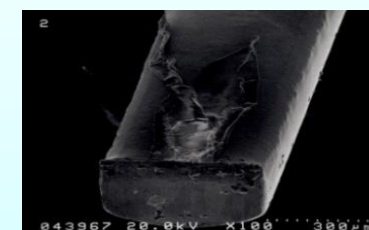
LED development

◆Own technology for Optical Design



Utilize CAE method for Optical Design

◆R&D for new material



SEM
EDX

Production location

3



Optical Sensor Lineup

4









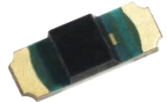

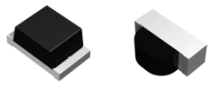
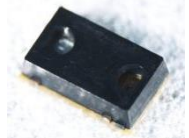
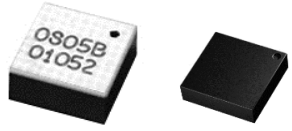
Optical sensor	Photo Interrupter		
	Mold Transmission type  RPI series	Case Transmission type  RPI series	Case Reflective type  RPR series
	IR-LED		SMD IR-LED
	Injection mold type  SIM series	Casting mold type  SIR series	 SIM series
	Photo Transistor		
	Injection mold type  RPM series	Casting mold type  RPT series	LED Div SML-810TB  SCM-014TB 
	Photo Diode	All-in-ONE: Proximity Sensor, ALS, and IrLED	
	 RPMD series	 RPR series	 RPI series
	4 Direction Detector		

Photo Interrupter Package Lineup

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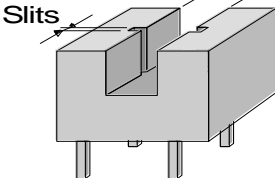























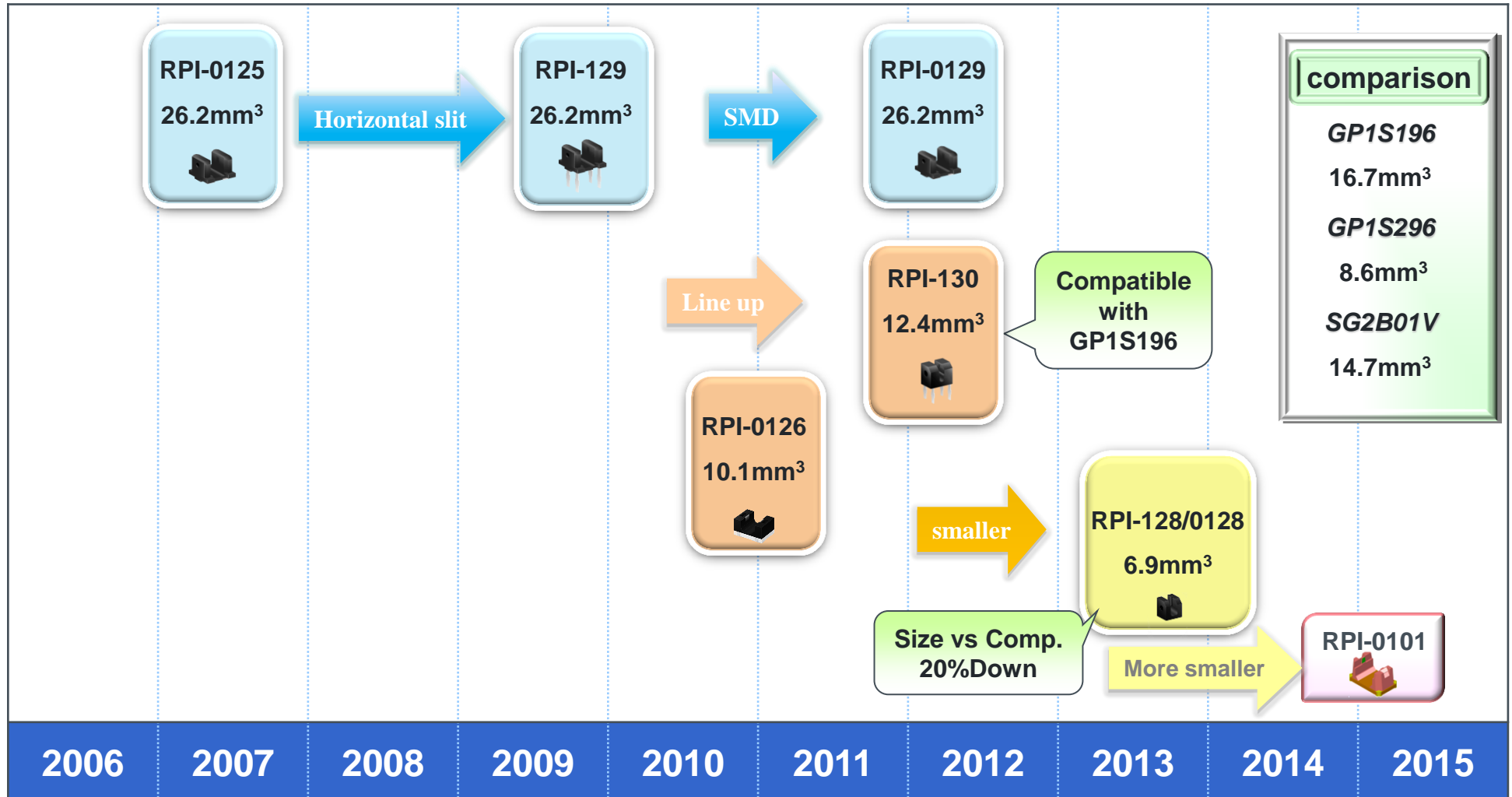
		Gap				
Slits		1mm	2mm	3mm	4mm	5mm
	0.15mm	RPI-124 			 Photo interrupters Slits Gap	
	0.2mm	RPI-122 	RPI-222 			
		NEW  Making to Two elements	RPI-246 	NEW 		
	0.3mm	RPI-125  Horizontal aperture	RPI-129B 	RPI-130 	Reflective type reflection type Photo Interrupter	
		RPI-0125  small	RPI-0126  small	RPI-0128  Surface Mount		
	0.4mm	RPI-121 	RPI-221 	RPI-352 	Focus distance 6mm	RPR-220C1(940nm) 
		RPI-131 	RPI-243 	RPI-303 		RPR-220UC30(630nm) 
	0.5mm		RPI-5100 		RPI-392 	RPI-441C1  RPI-579 

Photo Interrupter Road Map

6

Keeping always 1.2mm GAP, we are challenging on down size



What is Photo Interrupter ?

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Non-contact optical switch

Photo interrupter is the optical switch which can detect existence of object by shutting out the light when it pass through emission element and receive element.

Due to non-contact, no need to concern on short life-time caused by abrasion.

Photoelectric conversion element

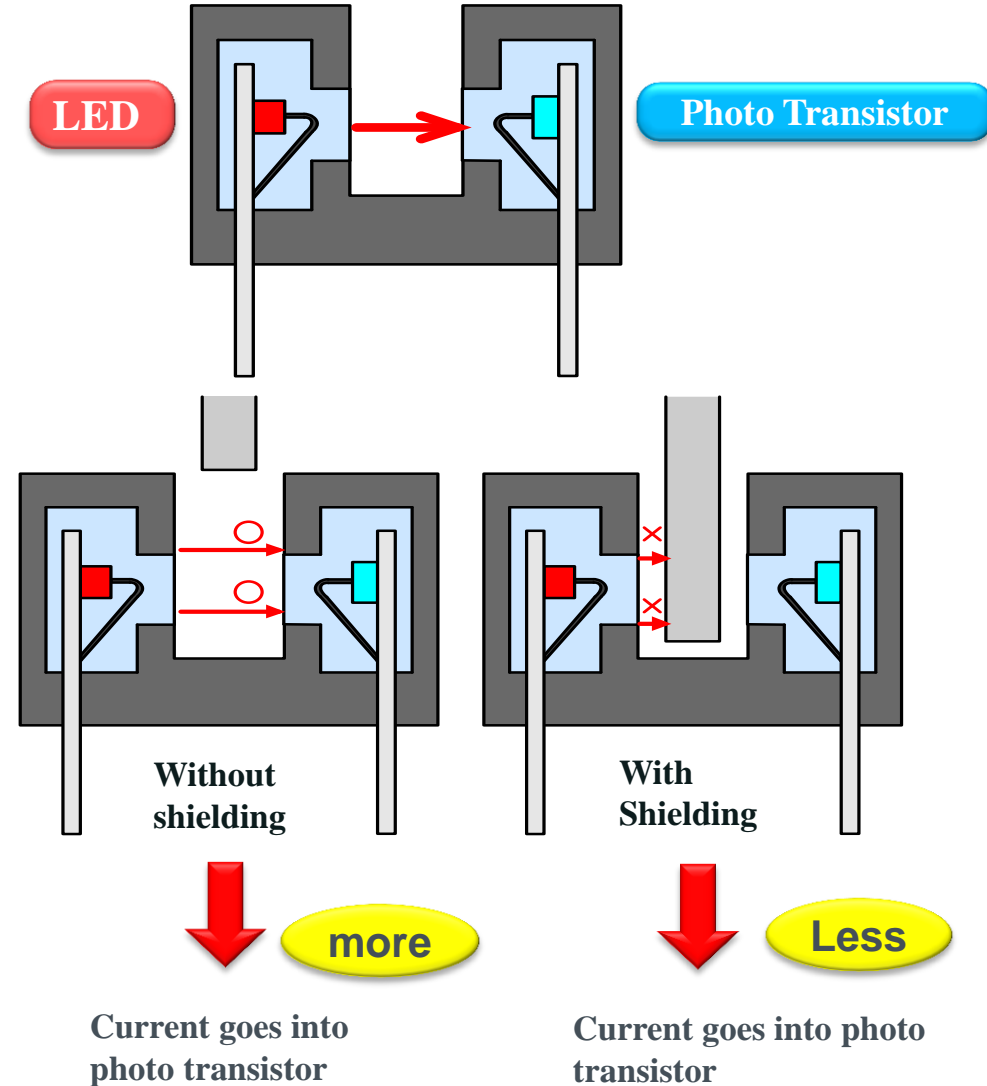
Infrared LED

=「Current」 to 「Light」

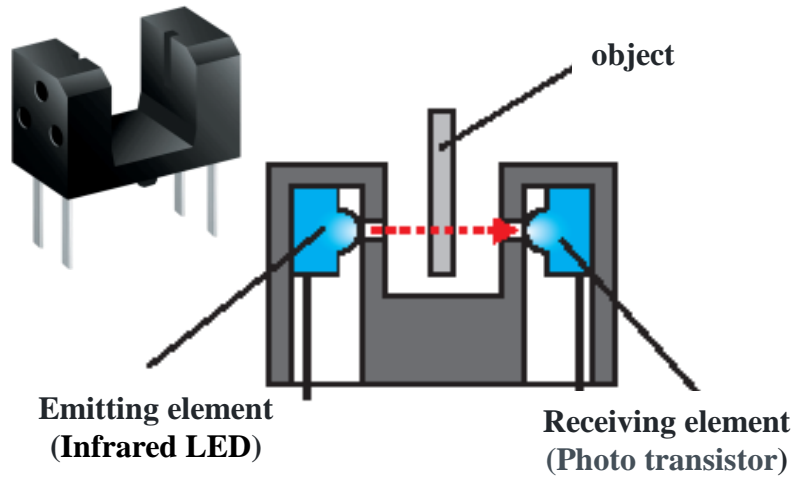
Photo Transistor

= 「Light」 to 「Current」

When LED emits, the light goes to photo transistor with current. By detecting shift of current in the transistor, object detection can be achieved.

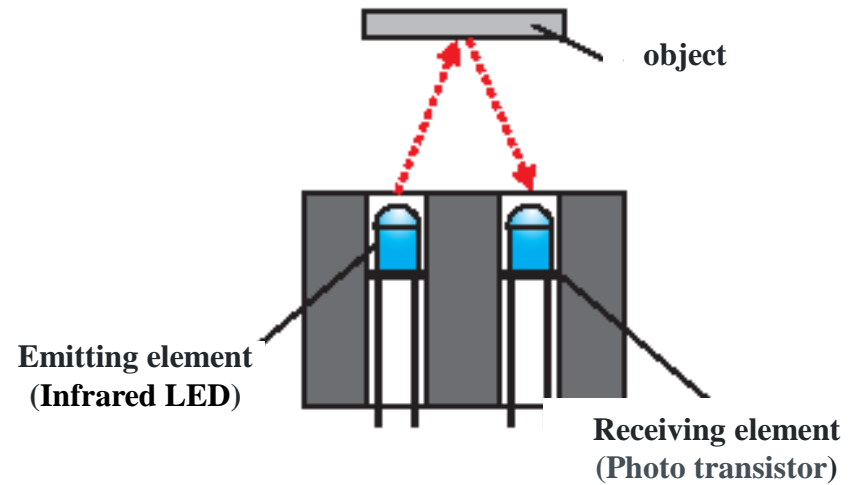


Transmission type



Detect object existence by shutting down Infrared-light emitted by emitting element.

Reflector type



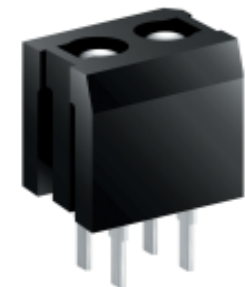
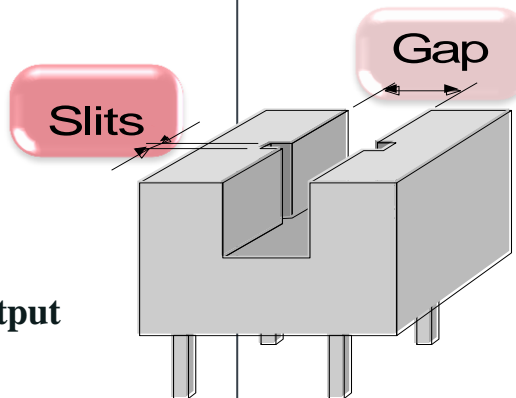
Detect object existence by receiving reflected Infrared-light against object.

◆Name of each part



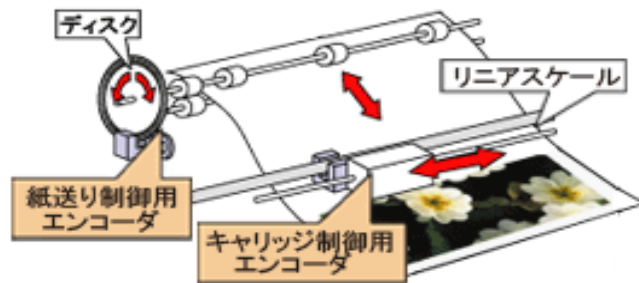
Gap = distance between receiving and emitting side

Slits = Range of light input/output

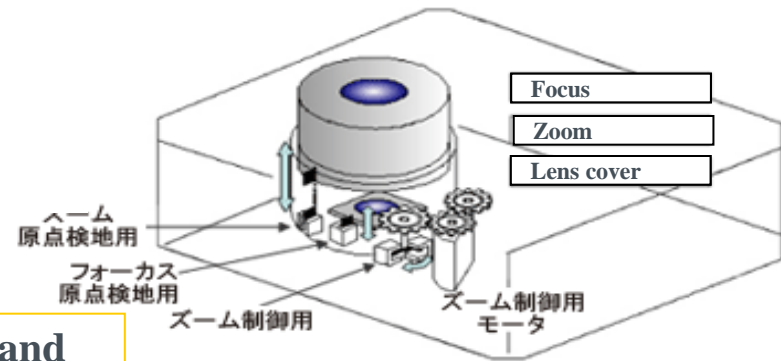


Printer

Feeding paper, detection ink ribbon end, timing control of printing head.

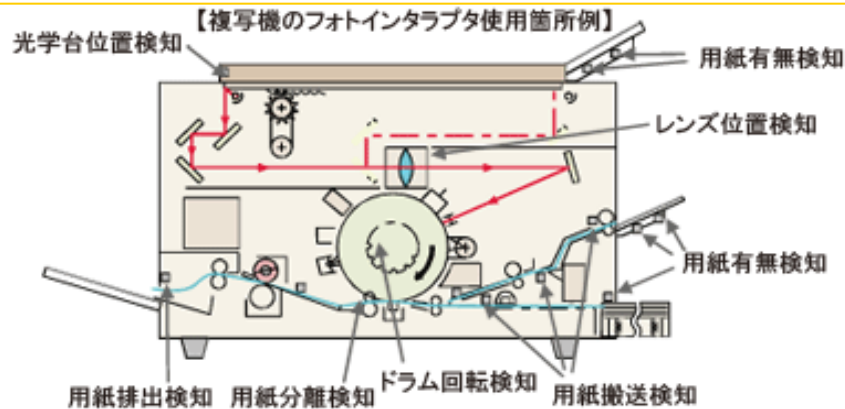


Digital Camera



Copier

Timing control of duplicate drum, detecting paper and amount of toner.



Proximity Sensor Road map

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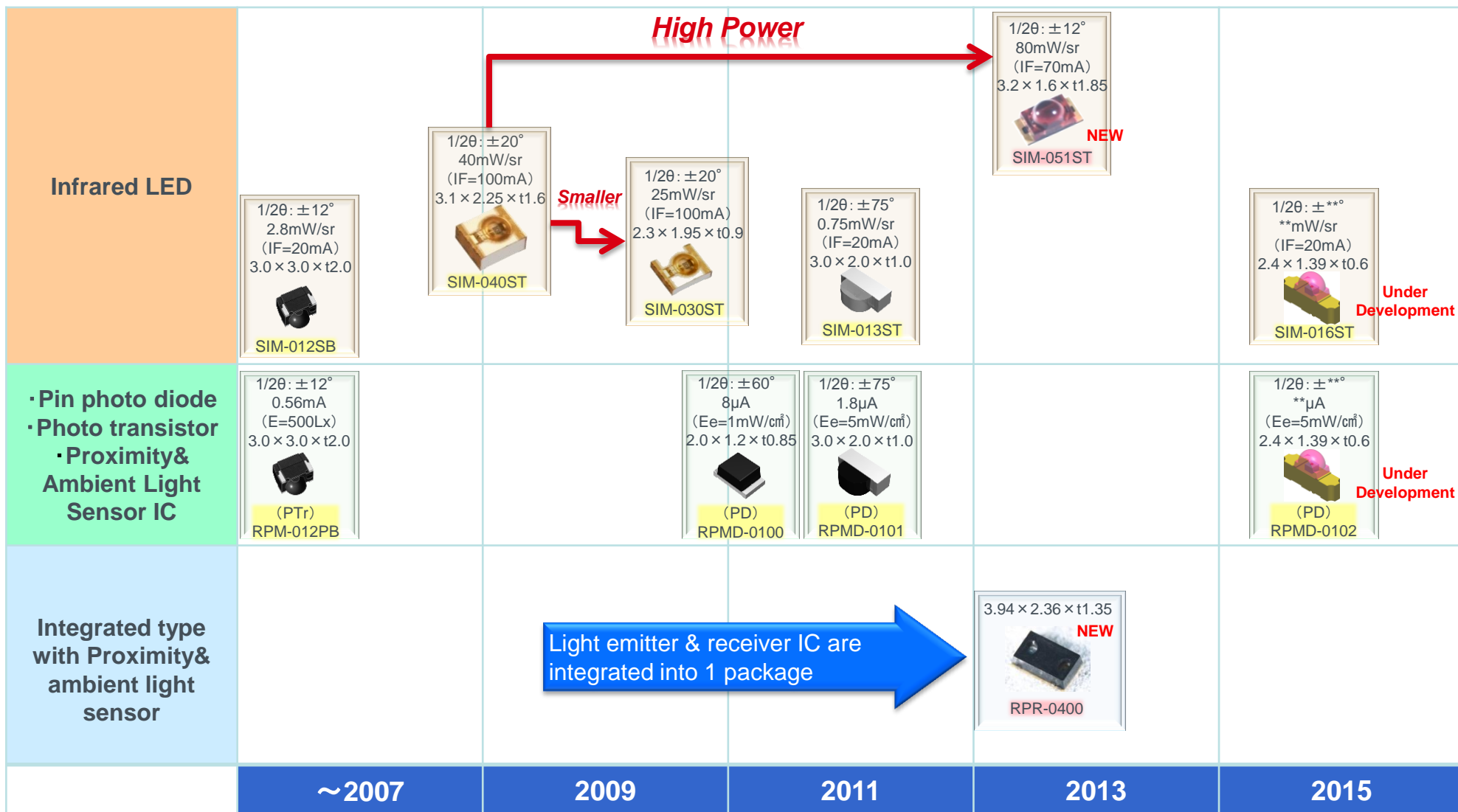


Photo Frame



RPI-1035

So

DSC Lens module



RPI-0128

Ni

RPI-0127.1030

So

Smart phone

Proximity Sensor



SIM-030ST

F

Digital Camera

Rolling Detection

RPI-0226



RPI-0128

RPI-129B

Pa

RPI-0128

RPI-1040

Ca

ROHM Photo Interrupter
Production Capability; 80,000kpcs/M

Touch Screen

Position Tracking


SIM-012SB
RPM-012PB

EI

Touch Screen

Position Tracking



SIM-013ST

RPM-0101

So

Blue Ray DISC

Pick up detection

RPI-0128



Pi

LBP

Paper/Carriage position tracking



Br

IJP Paper Detection



RPI-441C1E
RPR-220U

Ca

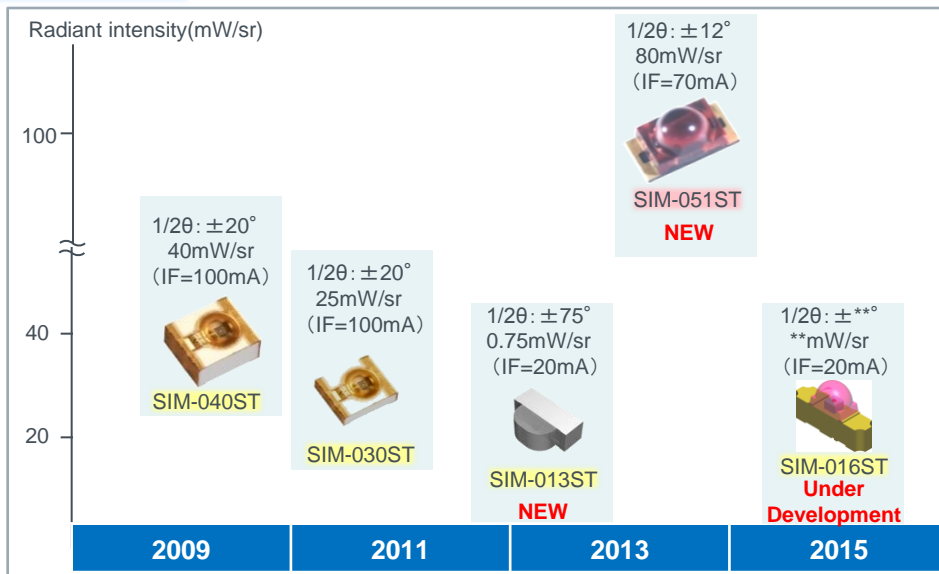
Infra-red LED line-up

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Product Outline

		 NEW
P/N	SIM-051ST	SIM-013ST
Specification	Available	Available
Sample	Available	Available
Mass Prod.	Already MP	Already MP

Roadmap



Line-up / Characteristics

Wide variation of package

SIM-03* series

2.3 × 1.95mm
t=0.9mm
Top View

SIM-04* series

3.1 × 2.25mm
t=1.6mm
Top View

SIM-013ST

3.0 × 2.0mm
t=1.0mm
Side View

SIM-051ST

3.2 × 1.6mm
t=1.85mm
Top View

*Various wavelength product available (850nm , 940nm , etc.)

Electrical characteristics

P/N	Condition IF(mA)	VF(V)	IE(mW/sr)	λP(nm)	1/2θ(deg)
SIM-030ST	100	1.7	25	870	20
SIM-040ST		1.7	40	870	20
SIM-051ST	70	1.6	80	850	12
SIM-013ST	20	1.25	0.75	940	75

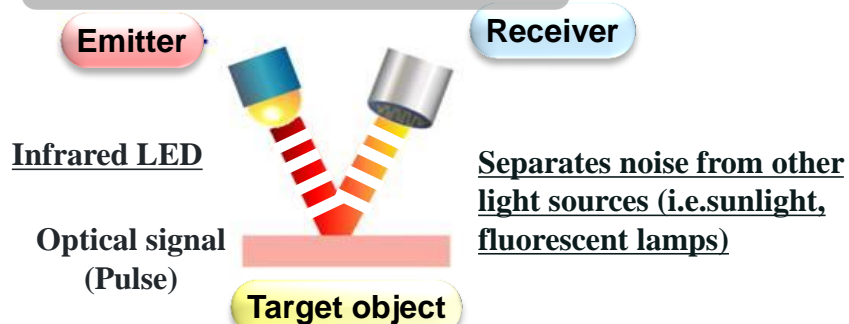
Application

- Smartphone/Car navigation (Proximity Sens)
- Security camera (Night vision, Photo aid light)
- Digital signage (Infra red touch panel)
- ATM (Finger print authentication)



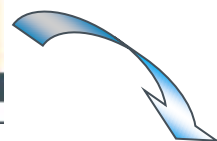
Surface Mount High Output Infrared LEDs : SIM-030ST/040ST ¹³

Operation principle



LCD ON
during standby

When using it while talking over the telephone, the power consumption loss on the liquid crystal screen is prevented.



LCD OFF
while talking



reflection

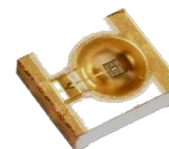
Feature



SIM-040



SIM-030



It is the thinnest

0.9mm

Usage

Outdoor use : High power goods

Smart Phone



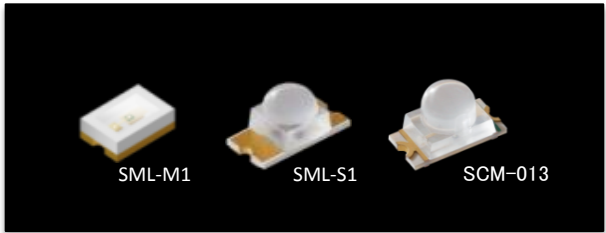
Infrared sensor that makes reflection object person.

Single lens reflex DSC

Image of proximity sensor



Power saving with display OFF of viewfinder body tube use.



Variety type of infrared LEDs line-up in compliance with the wishes.

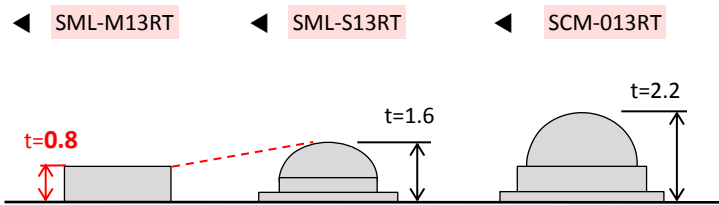
SML-M1series	SML-S1series	SCM-013series
2.0 × 1.25mm t=0.8mm	3.2 × 1.6mm t=1.6mm (reverse mount available)	3.0 × 1.5mm t=2.2mm

- Application
- DSC, Cellular phone
 - Proximity sensor for smart phone
 - Disc detector etc

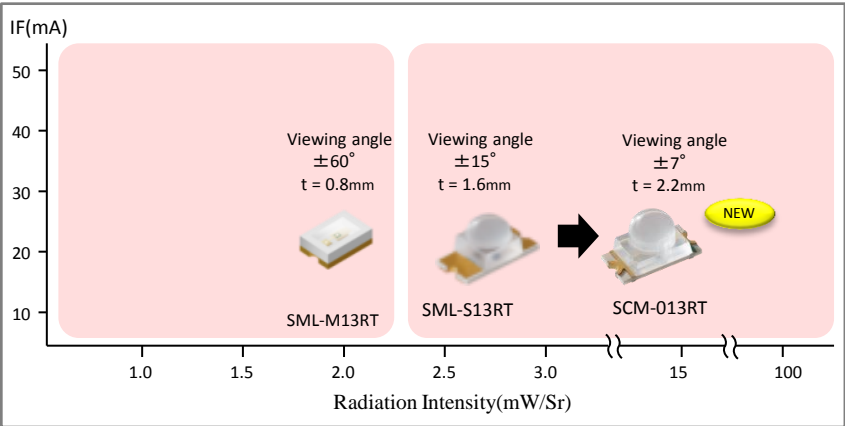
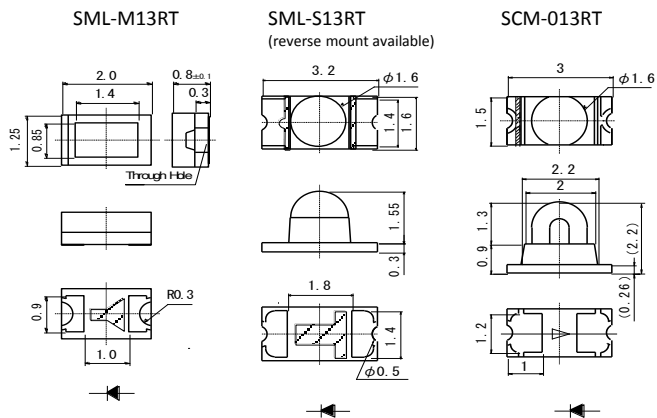
R

Smaller and Thinner

〈Comparison of package〉



Dimensions Unit(mm)

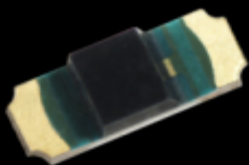


Electrical Characteristics

Part No.	IF (mA)	VF(V)	IR max. (μA)	λP(nm)	IE(mW/sr)
SML-M13RT	20	1.4	10	870	1.7
SML-S13RT				850	2.8
SCM-013RT				850	2.0

★:Under development * The products are under development thus the specification might change without notifications

SML-810TB



Reverse Mount Available Photo-Transistor

SML-81 series

3.4 × 1.25mm t=1.1mm
(Reverse mount available)

TR

Application

- DSC
- Automotive

etc



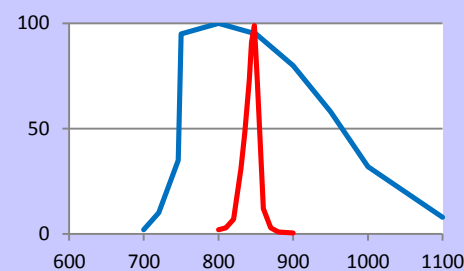
■ Usage example as sensor

Applications which require optical disc reading, such as car audios and CD players.

etc



■ Best matching, in-firm developed dice



$\lambda_P=850\text{nm}$

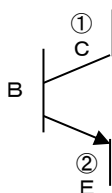
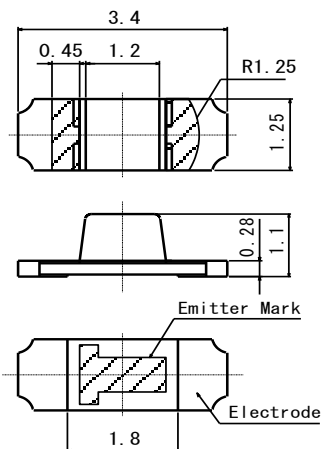


Lack of sensitivity in the visible light range will minimize the malfunctioning by outer light source such as sunlight.

SML-S13RT best matches the sensitivity of SML-810TB by peak wavelength of 850nm.

■ Dimensions Unit(mm)

Reverse mount available



■ Electrical Characteristics

Part No.	Photo Electric Current (I _c)	Dark Current (I _{CEO})	Peak Wave Length (λ _P)	Collector-Emitter Saturation Voltage(V _{CE(sat)})
Condition	V _{CE} =5V E=500Lx	V _{CE} =10V (Dark Box)	-	I _C =0.1mA E=500Lx
SML-810TB	3mA	0.5μA (max.)	800nm	0.4V (max.)

Photo Diode line-up

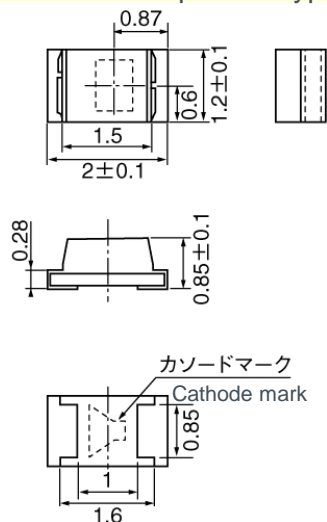
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Product line-up

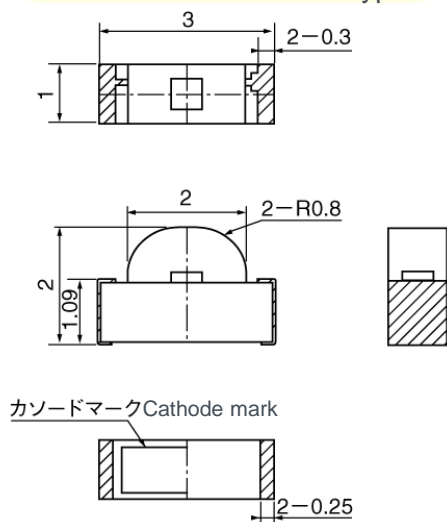
		 NEW
P/N	RPMD-0100	RPMD-0101
Specification	Available	Available
Sample	Available	Available
Mass Production	Already MP	Already MP

Dimensions

RPMD-0100 (Top View Type)



RPMD-0101 (Side View Type)



Electrical Characteristics

P/N	Ic (μA)	Condition	λP (nm)	1/2θ (deg)
RPMD-0100	8	Ee=1mW/cm ² VR=5V, λ=940nm	940	60
RPMD-0101	1.8	Ee=5mW/cm ² VR=5V, λ=940nm	900	75

Customer's merit

RPMD-0101 was developed together with Ir LED (SIM-013ST). ROHM's unique technology enables **high accuracy mounting** after reflow process. This will contribute to fewer re-work at customer's factory.

Application

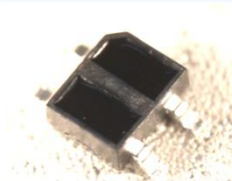
- Smartphone / Car navigation (Proximity sensor)
- Digital signage (Infra red touch panel)
- Optical communication device



Surface mount Photo reflector

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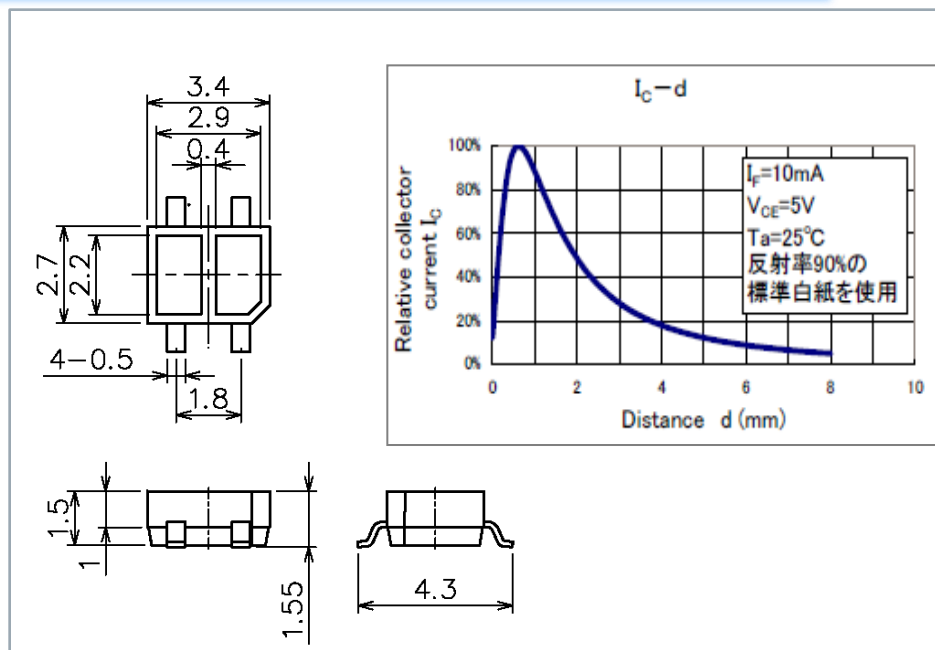
Product Outline



P/N	RPR-0180
Specification	Available
Sample	August, 2012 (DS)
Mass Production	December, 2012

ROHM's "1st" reflector type surface mount interrupter

Dimensions / Proximity sensor characteristics



Customer's merit / Characteristics

- Steady distance characteristics; good linearity of output change
- Less variation on output current between products
- Small package / High Power

	Symbol	Reference value	Unit	Condition
Forward Voltage	VF	1.4	(V)	IF=20mA
Collector current	Ic	0.5	(mA)	VCE=5V IF=10mA
Collector-Emitter saturation voltage	VCE (sat)	MAX0.4	(V)	IF=20mA Ic=0.1mA

Application

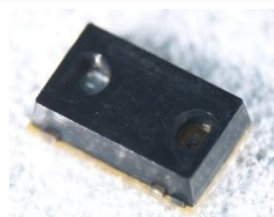
- Digital Still Camera (Origin detection; Zoom function)
- Printer (Paper detection)
- Other distance detection device



All-in-ONE: Proximity Sensor, ALS, and IrLED

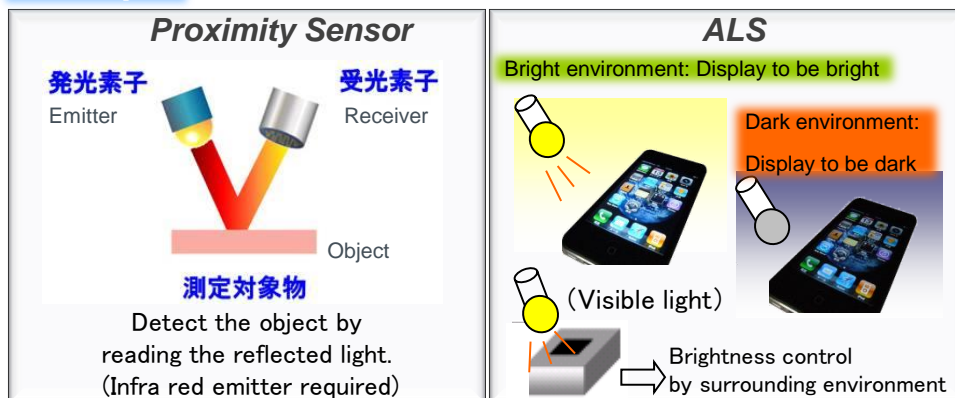
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Product Outline

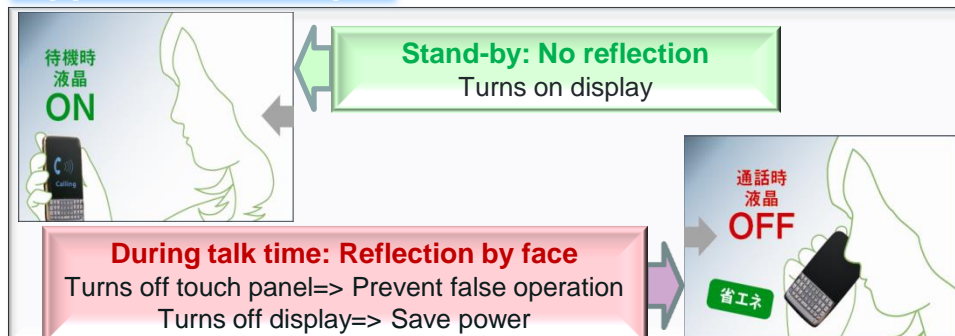


P/N	RPR-0400
Specification	Available
Sample	Available
Mass Production	December, 2012

Principle

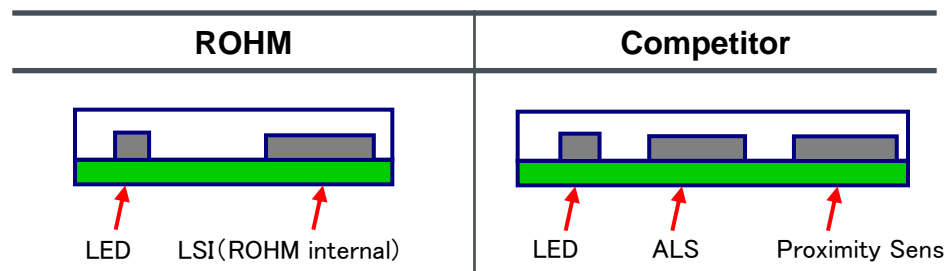


Application example



Customer's merit / Characteristics

- Reduced Optical cross talk: Easy optical design by customer
- All-in-ONE package: Reduces mounting area (See below)
- Mounting accuracy: No concern on mounting position (packaged)



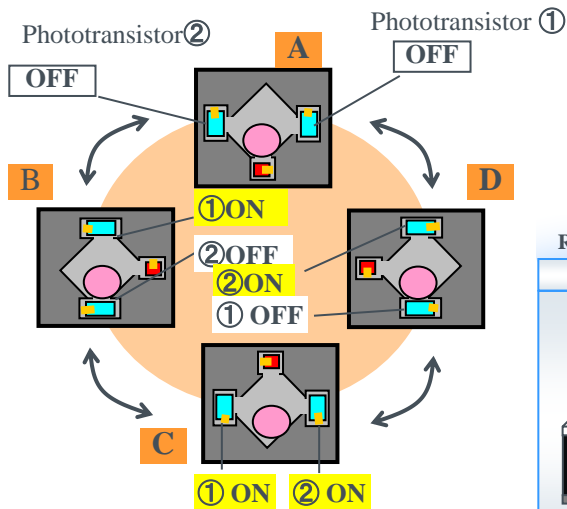
SET / Application

- Smartphone (Proximity sensor)
- SLR (Eyepiece sensor)
- Lighting devices (Non-contact switch)
- Variety of close distance detection



Operation principle

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



position	Phototransistor	
	①	②
A	OFF	OFF
B	ON	OFF
C	ON	ON
D	OFF	ON

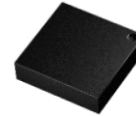
Feature

RPI-1031



New silent construction

RPI-1040



Volume reduced 79%
Area reduced 37% Miniaturization !

Usage



Digital Camera, Photo Frames, Projectors, TVs etc

RPI-1031 (Old goods)

Externals chart	Vertical cross section	Parallel cross section
	Three layers 	

RPI-1040 (Miniaturization)

Externals chart	Vertical cross section	Parallel cross section
	Two layers 	

Thank you very much

