

To our customers,

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## Old Company Name in Catalogs and Other Documents

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Renesas Electronics website: <http://www.renesas.com>

April 1<sup>st</sup>, 2010  
Renesas Electronics Corporation

Issued by: Renesas Electronics Corporation (<http://www.renesas.com>)

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## IC BUILT-IN PHOTO DIODE

— NEPOC SERIES —

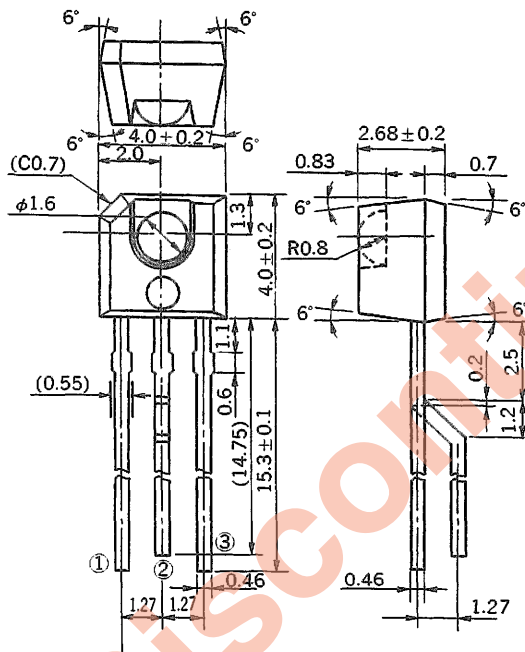
The PH502HC is a digital-output light receiving IC integrating a photo diode and signal processing circuit in a chip. And the direct connection with an IC without using a processing circuit simplifies the circuit configuration. It is the most suitable as various sensors in OA and AV equipment.

The combination with the small infrared LED SE308 allows the digital-output photo interrupter to be composed of. In addition, the PH502HC is ideally suited for the application for the light-receiving module internal elements of a simplified optical transmission link.

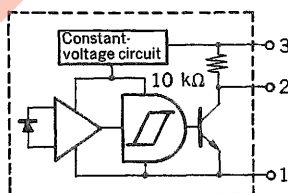
At the time of receiving-light shielding, the output is set at the low level.

### OUTLINE DIMENSIONS

(Unit : mm)



### TERMINAL CONNECTION



1. GND
2.  $V_O$
3.  $V_{CC}$

### FEATURES

- Schmidt trigger circuit incorporated
- Low threshold irradiance  
( $H_{LH} = 50 \mu W/cm^2$  MAX.)
- Direct connection with TTL, LSTTL and CMOS allowed
- Wide-range operating source voltage ( $V_{CC} = 4.5$  to  $17$  V)
- High-speed response  
( $t_{PLH}, t_{PHL} = 3.3 \mu s$  TYP.)  
( $t_r = 100$  ns,  $t_f = 50$  ns TYP. @  $R_L = 280 \Omega$ )
- Active high type
- Open collector output

### QUALITY GRADE

Standard

Please refer to "Quality grade on NEC Semiconductor Devices" (Document number IEI-1209) published by NEC Corporation to know the specification of quality grade on the devices and its recommended applications.

### APPLICATIONS

- Sensors for PPCs, FAXs, printers, electronic typewriters, FDDs and OA equipment
- Sensors for VTRs, VDs, CDs, and AVs
- Hook sensor for telephones

**ABSOLUTE MAXIMUM RATINGS ( $T_a = 25\text{ }^\circ\text{C}$ )**

Source Voltage	$V_{CC}$	17	V
Low Level Output Current	$I_{OL}$	50	mA
Power Consumption	$P_D$	250	mW
Operating Temperature	$T_{opt}$	-30 to +85	$^\circ\text{C}$
Storage Temperature	$T_{stg}$	-40 to +100	$^\circ\text{C}$

**RECOMMENDED OPERATING CONDITIONS**

ITEMS	SYMBOL	MIN.	TYP.	MAX.	UNIT
Operating temperature	$T_{opt}$	-10		+60	$^\circ\text{C}$
Source voltage	$V_{CC}$	4.5	5	12	V
Irradiance	H	50			$\mu\text{W}/\text{cm}^2$

**ELECTRICAL CHARACTERISTICS ( $T_a = 25\text{ }^\circ\text{C}$ )**

ITEMS	SYMBOL	MIN.	TYP.	MAX.	UNIT	CONDITIONS
Operating source voltage	$V_{CC}$	4.5		17	V	
Low level output voltage	$V_{OL}$		0.15	0.4	V	$I_{OL} = 16\text{ mA}, V_{CC} = 5\text{ V}$
High level output voltage	$V_{OH}$	4.9			V	$V_{CC} = 5\text{ V}, H = 50\text{ } \mu\text{W}/\text{cm}^2$
Low level supply current	$I_{CCL}$		2.5	5	mA	$V_{CC} = 5\text{ V}, H = 0$
High level supply current	$I_{CCH}$		1	3	mA	$V_{CC} = 5\text{ V}, H = 50\text{ } \mu\text{W}/\text{cm}^2$
Threshold irradiance	$H_{LH}$		24	50	$\mu\text{W}/\text{cm}^2$	$V_{CC} = 5\text{ V}, \lambda = 940\text{ nm}, R_L = 280\text{ } \Omega$
Hysteresis	$H_{HL}/H_{LH}$		0.7			$V_{CC} = 5\text{ V}, \lambda = 940\text{ nm}, R_L = 280\text{ } \Omega$
Transmission delay time	$t_{PLH}$		3.3	9	$\mu\text{s}$	$V_{CC} = 5\text{ V}$ $H = 50\text{ } \mu\text{W}/\text{cm}^2$ $R_L = 280\text{ } \Omega$
	$t_{PHL}$		3.3	9	$\mu\text{s}$	
Rise time	$t_r$		100	300	ns	
Fall time	$t_f$		50	150	ns	

PH502 SERIES

TYPE NUMBER	FEATURES	FUNCTION	ELECTRICAL CHARACTERISTICS	
			THRESHOLD IRRADIANCE	RESPONSE
PH502HR	Schmidt trigger circuit incorporated (IC output type)  Small-sized type	Active high type, Pull-up resistance incorporated	$H_{LH} = 50 \mu W/cm^2$ (MAX.) ( $\lambda = 940$ nm)	$t_{PHL}, t_{PLH} = 3.3 \mu s$ (TYP.)
PH502HC		Active high type, Open-collector output		
PH502LR		Active low type, Pull-up resistance incorporated	$H_{HL} = 50 \mu W/cm^2$ (MAX.) ( $\lambda = 940$ nm)	$t_r = 100 \mu s$ (TYP.) $t_f = 50 \mu s$ (TYP.) @ $R_L = 280 \Omega$
PH502LC		Active low type, Open-collector output		

Discontinued Product

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Application examples recommended by NEC Corporation

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