DATA SHEET

NEC
ELECTRON DEVICE

PHOTO DIODE
PH502HR

IC BUILT-IN PHOTO DIODE

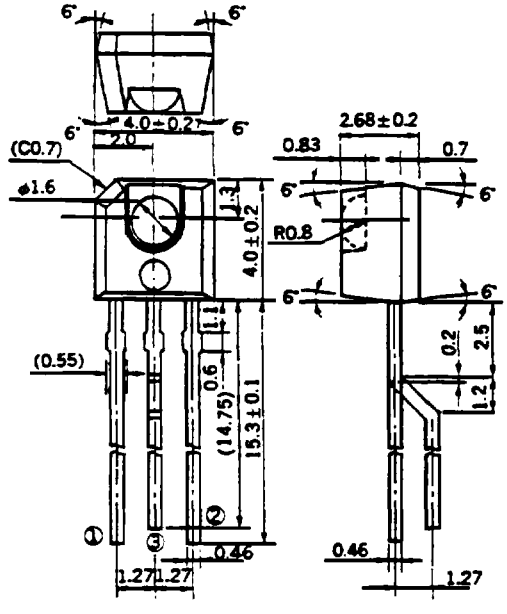
—NEPOC SERIES—

The PH502HR is a digital-output light receiving IC integrating a photo diode and a signal processing circuit in one 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.

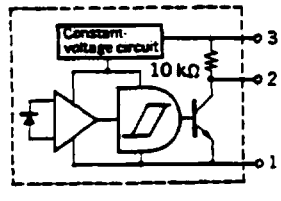
The combination with the small infrared LED SE308 allows the digital-output photo interrupter to be composed of. In addition, the PH502HR is ideally suited for the application for the light-receiving module internal elements of a simplified optical transmission link.

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 μW/cm² 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 μs TYP.)
  (t_r = 100 ns. t_f = 50 ns TYP. @ R_L = 280 Ω)
- Active high type

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

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ABSOLUTE MAXIMUM RATINGS (T_a = 25 °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	°C
Storage Temperature	T_{stg}	−40 to +100	°C

RECOMMENDED OPERATING CONDITIONS

ITEMS	SYMBOL	MIN.	TYP.	MAX.	UNIT
Operating temperature	T_{opt}	−10		+60	°C
Source voltage	V_{CC}	4.5	5	12	V
Irradiance	H	50			μW/cm²

ELECTRICAL CHARACTERISTICS (T_a = 25 °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 mA, V_{CC} = 5 V
High level output voltage	V_{OH}	4.9			V	V_{CC} = 5 V, H = 50 μW/cm²
Low level supply current	I_{CCL}		2.5	5	mA	V_{CC} = 5 V, H = 0
High level supply current	I_{CCH}		1	3	mA	V_{CC} = 5 V, H = 50 μW/cm²
Threshold irradiance	H_{LH}		24	50	μW/cm²	V_{CC} = 5 V, λ = 940 nm
Hysteresis	H_{HL}/H_{LH}		0.7			V_{CC} = 5 V, λ = 940 nm
Transmission delay time	t_{PLH}		3.3	9	μs	V_{CC} = 5 V H = 50 μW/cm² R_L = 280 Ω
	t_{PHL}		3.3	9	μs	
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 μW/cm² (MAX.) (λ = 940 nm)	t_{PHL}, t_{PLH} = 3.3 μs (TYP.)
PH502HC		Active high type, Open-collector output		
PH502LR		Active low type, Pull-up resistance incorporated	H_{HL} = 50 μW/cm² (MAX.) (λ = 940 nm)	t_r = 100 μs (TYP.) t_f = 50 μs (TYP.) @R_L = 280 Ω
PH502LC		Active low type, Open-collector output		