

PD410PI

High Speed Photodiode

■ Features

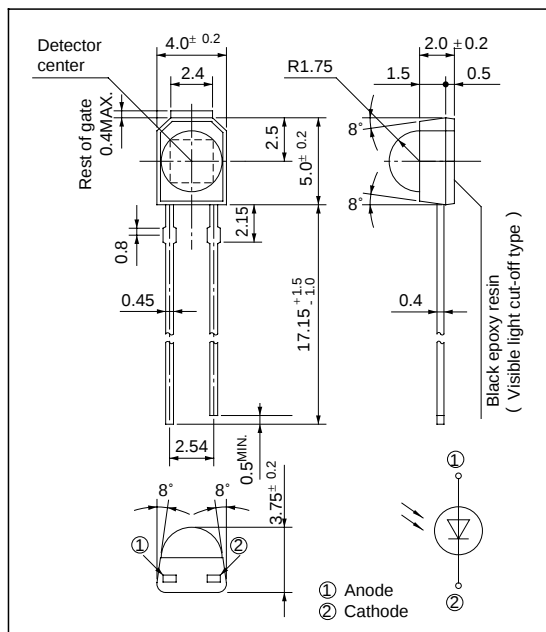
1. Peak sensitivity wavelength matching with infrared LED($\lambda_p = 1000\text{nm}$)
2. Built-in visible light cut-off filter

■ Applications

1. Infrared remote controllers for TVs, VCRs, audio equipment and air conditioners, etc.

■ Outline Dimensions

(Unit : mm)



■ Absolute Maximum Ratings

(Ta = 25°C)

Parameter	Symbol	Rating	Unit
Reverse voltage	V_R	32	V
Power dissipation	P	150	mW
Operating temperature	T_{opr}	- 25 to + 85	°C
Storage temperature	T_{stg}	- 40 to + 100	°C
*1 Soldering temperature	T_{sol}	260	°C

*1 For 5 seconds at the position of 2.15mm from the bottom face of resin package

■ Electro-optical Characteristics

(Ta = 25°C)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Shortcircuit current	I_{SC}	$E_v = 100\text{ lx}$	2.5	3.0	4.5	μA
Short-circuit current temperature coefficient	β_T	$E_v = 100\text{ lx}$	-	0.2	-	%/°C
Dark current	I_d	$V_R = 10\text{V}, E_v = 0$	-	0.5	10	nA
Dark current temperature coefficient	α_T	$V_R = 10\text{V}, E_v = 0$	-	3.5	5.0	times/10°C
Terminal capacitance	C_t	$V_R = 3\text{V}, f = 1\text{MHz}$	-	20	35	pF
Peak sensitivity wavelength	λ_p	-	-	1000	-	nm
Peak spectral sensitivity	K	$\lambda = 1000\text{nm}$	-	1	-	A/W
Half intensity angle	$\Delta\theta$	-	-	± 45	-	°
Response time	t_r, t_f	$R_L = 1\text{k}\Omega, V_R = 10\text{V}$	-	200	-	ns

* In the absence of confirmation by device specification sheets, SHARP takes no responsibility for any defects that occur in equipment using any of SHARP's devices, shown in catalogs, data books, etc. Contact SHARP in order to obtain the latest version of the device specification sheets before using any SHARP's device. "

The graph shows the power dissipation P in milliwatts (mW) as a function of ambient temperature T_a in degrees Celsius ($^{\circ}\text{C}$). The power is constant at 150 mW for temperatures from -25°C to 25°C. Beyond 25°C, the power decreases linearly, reaching 40 mW at 85°C, and then drops to 0 mW at 90°C.

Ambient temperature T_a ($^{\circ}\text{C}$)	Power dissipation P (mW)
-25	150
0	150
25	150
50	100
75	50
85	40
90	0

The graph shows the relative sensitivity of a photodiode as a function of wavelength at a temperature of $T_a = 25^\circ\text{C}$. The x-axis represents the wavelength λ in nanometers (nm), ranging from 600 to 1200 nm. The y-axis represents the relative sensitivity in percent (%), ranging from 0 to 100%. The curve starts at 0% at approximately 830 nm, rises to a peak of 100% at 1000 nm, and then decreases to approximately 18% at 1150 nm.

Wavelength λ (nm)	Relative sensitivity (%)
830	0
850	10
900	65
950	95
1000	100
1050	75
1100	40
1150	18

Figure 1 is a semi-logarithmic plot showing the Dark current I_d (A) on the y-axis versus Ambient temperature T_a (°C) on the x-axis. The y-axis is logarithmic, ranging from 10^{-12} to 10^{-6} A. The x-axis is linear, ranging from -25 to 100 °C. A solid black line represents the dark current, which increases exponentially with temperature. A label $V_R = 10V$ is present in the upper left of the plot area.

Figure 1 is a log-log plot showing the dark current I_d (A) versus the reverse voltage V_R (V) for a GaAs p-n junction at $T_a = 25^\circ\text{C}$. The y-axis ranges from 10^{-11} to 10^{-7} A, and the x-axis ranges from 10^{-2} to 5 V. The curve shows a sharp increase in current at low reverse voltages, followed by a plateau around 3×10^{-10} A between 0.2 V and 1 V, and then a gradual increase at higher voltages.

Graph showing Terminal capacitance C_t (pF) versus Reverse voltage V_R (V) for $f = 1\text{MHz}$ and $T_a = 25^\circ\text{C}$. The capacitance decreases as the reverse voltage increases.

Reverse voltage V_R (V)	Terminal capacitance C_t (pF)
0.05	30
0.1	25
0.2	20
0.5	15
1	12
2	10
5	8
10	6
20	5
50	4

(Test circuit)

GL537
GL538

PD410PI

Distance between infrared light emitting diode and photodiode shall be fixed when $I_{SC} = 100\mu A$ at $I_F = 20mA$ and $T_A = 25^\circ C$.

Ambient temperature T_A ($^\circ C$)	Relative output (%)
-25	132
0	118
25	104
50	90
75	76
85	60

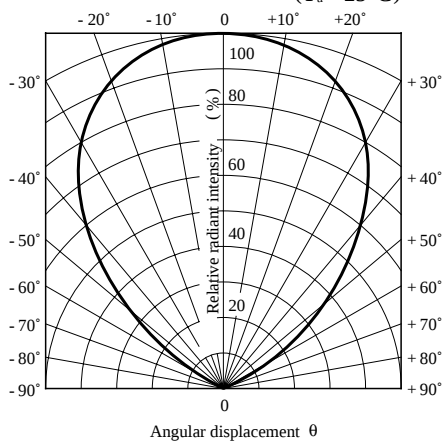
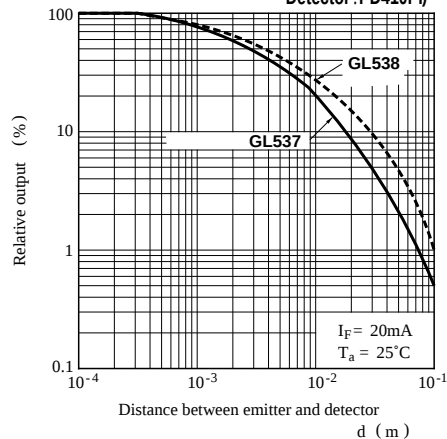
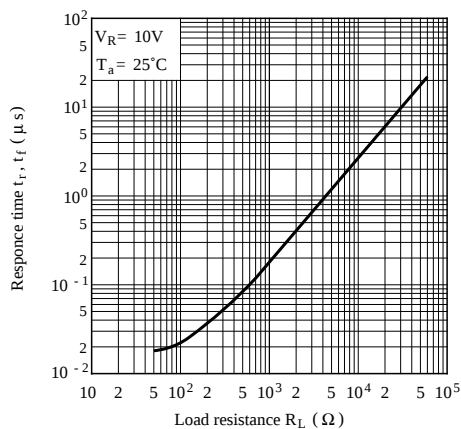
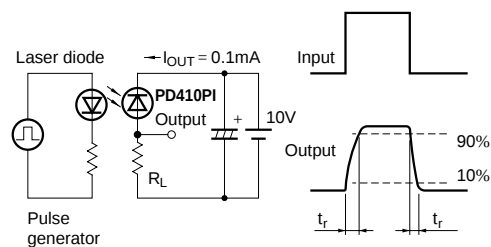
Fig. 7 Sensitivity Diagram ($T_a = 25^\circ\text{C}$)Fig. 8 Relative Output vs. Distance
(Emitter: GL537/ GL538,
Detector: PD410PI)

Fig. 9 Response Time vs. Load Resistance



Test Circuit for Response Time



● Please refer to the chapter “Precautions for Use.”