

PNA4U31F (Tentative)

Photodiode with amplifier functions

For optical control systems

■ Features

- Small package, × 52 speed
- Reflow soldering possible

■ Absolute Maximum Ratings $T_a = 25^\circ\text{C}$

Parameter	Symbol	Rating	Unit
Operating supply voltage	V_{CC}	6	V
Power dissipation	P_D	250	mW
Operating ambient temperature	T_{opr}	-20 to +70	$^\circ\text{C}$
Storage temperature	T_{stg}	-40 to +85	$^\circ\text{C}$

■ Operating Condition

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Operating supply voltage	V_{CC}		4.5	5.0	5.5	V
Reference voltage	V_{REF}	$V_{CC} = 5.0\text{ V}$	1.60	1.70	1.80	V

■ Electrical Characteristics $T_a = 25^\circ\text{C} \pm 3^\circ\text{C}$, $V_{CC} = 5.0\text{ V}$, $R_L = 10\text{ k}\Omega$, $C_L = 20\text{ pF}$, $V_R = 300\ \Omega$

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
SW change voltage range	V_{SW2}	CD Gain1 / Gain2 → Gain1	2.4	—	V_{CC}	V
	V_{SW1}	DVD Gain1 / Gain2 → Gain2	0	—	0.99	V
Output offset voltage	V_{OFF}	$[V_{OP} - V_{ON}]$ No signal condition	-20	0	20	mV
Drift of output offset voltage by operating supply voltage *4	dV_{OFF} / V_{CC}	$[V_{OP} - V_{ON}]$, $V_{CC} = 5.0\text{ V} \pm 0.5\text{ V}$	-3	-5	0	mV/V
Drift of output offset voltage by temperature *4	dV_{OFF} / T_a	$[V_{OP} - V_{ON}]$, $T_a = 20^\circ\text{C}$ to 70°C	-25	—	25	$\mu\text{V}/^\circ\text{C}$
Maximum output voltage *3	V_{OM}	$[V_{OP} - V_{ON}]$ Max. Reference to GND	1.9	2.1	—	V
Output sensitivity *1, 2	Gain1	$[V_{OP} - V_{ON}]$ $\lambda = 780\text{ nm}$	1.68	2.24	2.8	V/mW
	Gain2	$[V_{OP} - V_{ON}]$ $\lambda = 650\text{ nm}$	3.6	4.8	6.0	V/mW
Supply current	I_{CC}	No signal condition	—	26.0	29.9	mA
Cutoff frequency *4	$f_{C(-3dB)}$	CD Gain1 $20 \log (V_O(f_C \text{ MHz}) / V_O(1 \text{ MHz})) = -3$	65	75	—	MHz
		DVD Gain2 $20 \log (V_O(f_C \text{ MHz}) / V_O(1 \text{ MHz})) = -3$	75	85	—	MHz
Rise time *4, 5	t_r	CD $V_{OP} - V_{ON} = 2\text{ V[p-p]}$, 10% to 90%, Gain1	—	7	(9.5)	ns
		DVD $V_{OP} - V_{ON} = 2\text{ V[p-p]}$, 10% to 90%, Gain2	—	6	(8.5)	ns
Fall time *4, 5	t_f	CD $V_{OP} - V_{ON} = 2\text{ V[p-p]}$, 10% to 90%, Gain1	—	7	(9.5)	ns
		DVD $V_{OP} - V_{ON} = 2\text{ V[p-p]}$, 10% to 90%, Gain2	—	6	(8.5)	ns

Note) 1. Measuring methods are based on JAPANESE INDUSTRIAL STANDARD JIS C 7031 measuring methods for diodes.

2. *1: Standard voltage level; V_{REF} (Exclude output offset voltage)

*2: Limitation to the difference of sensitivity will be defined individually after confirmation, when it is necessary.

*3: Full saturation value

*4: Guarantee item on design.

*5: The numerical in parenthesis is design reference value.

■ Electrical Characteristics (Continued) $T_a = 25^\circ\text{C} \pm 3^\circ\text{C}$, $V_{CC} = 5.0\text{ V}$, $R_L = 10\text{ k}\Omega$, $C_L = 20\text{ pF}$, $V_R = 300\text{ }\Omega$

Parameter	Symbol	Conditions		Min	Typ	Max	Unit
Slew rate ^{*4}	SR	CD	$V_{OP} - V_{ON} = 2\text{ V[p-p]}$ at Gain1	200	300	—	V/ μs
		DVD	$V_{OP} - V_{ON} = 2\text{ V[p-p]}$ at Gain2	200	300	—	V/ μs
Settling time ^{*4, 5}	t_{set}	CD	$V_{OP} - V_{ON} = 2\text{ V[p-p]}$ at Gain1, $\pm 3\%$	—	12	(15)	ns
		DVD	$V_{OP} - V_{ON} = 2\text{ V[p-p]}$ at Gain2, $\pm 3\%$	—	10	(14)	ns
Mode selecting time	t_{sel}	Gain-high \leftrightarrow Sleep \leftrightarrow Low		—	150	200	ns

Note) 1. Measuring methods are based on JAPANESE INDUSTRIAL STANDARD JIS C 7031 measuring methods for diodes.

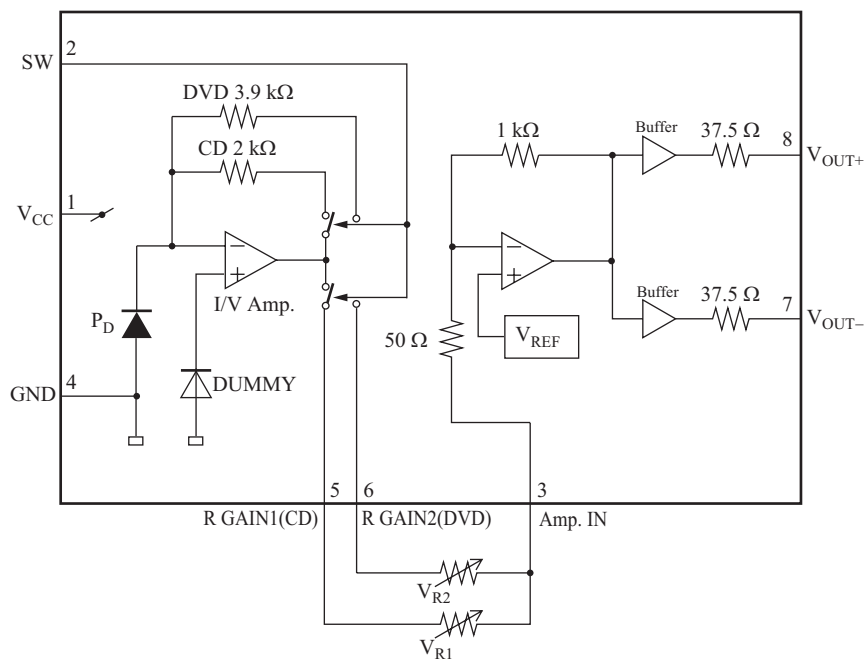
2. ^{*4}: Guarantee item on design.

^{*5}: The numerical in parenthesis is design reference value.

■ Electrical Characteristics (Reference values for design) $T_a = 25^\circ\text{C} \pm 3^\circ\text{C}$, $V_{CC} = 5.0\text{ V}$, $V_R = 300\text{ }\Omega$

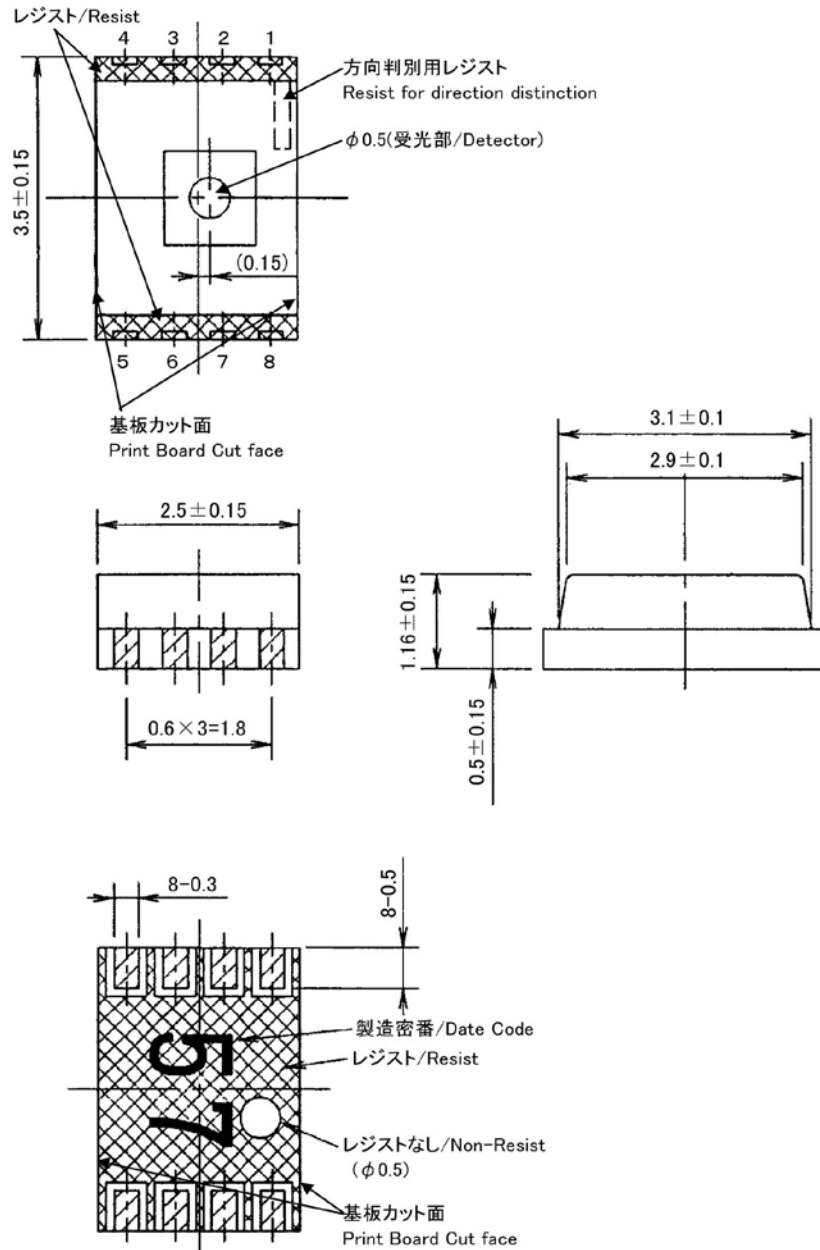
Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Load resistance	R_L	Terminated voltage = 1.70 V	1	10	—	k Ω
Load capacitor	C_L	$R_L = 10\text{ k}\Omega$	—	20	(40)	pF

Note) Measuring methods are based on JAPANESE INDUSTRIAL STANDARD JIS C 7031 measuring methods for diodes.

■ Block Diagram


■ Package (Unit: mm)

KPTFTN6K0005



• Pin name

- | | |
|-------------|---------------|
| 1: V_{CC} | 5: R GAIN1 |
| 2: SW | 6: R GAIN2 |
| 3: Amp.IN | 7: V_{OUT-} |
| 4: GND | 8: V_{OUT+} |

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