HAMAMATSU

Encoder module

P11159-01AS

Small package and high resolution encoder module

The P11159-01AS is an optical encoder module that consists of a photo IC and red LED. The photo IC incorporates a 4-element photodiode and a 2-phase digital signal output circuit. When using 0.2 mm pitch slits, the P11159-01AS produces a 2-phase digital signal output matching the slit movement.

Features

- **High resolution: 0.05 mm (2-phase output)**
- **Positioning pin for easy alignment**
- **Small package**
- **Suitable for lead-free flow soldering**

Applications

- **Rotary encoder**
- **Linear encoder**

Absolute maximum ratings (Ta=25 °C)

Parameter		Symbol	Value	Unit
Input (LED)	Forward current*1	IF max.	25	mA
	Reverse voltage	VR max.	5	V
	Power dissipation	P	100	mW
Output (photo IC)	Supply voltage	Vcc max.	-0.5 to +7	V
	Output voltage	Vo max.	-0.5 to Vcc + 0.5	V
	Output current	Io max.	4	mA
	Power dissipation*2	P	250	mW
Operating temperature		Topr	-40 to +85	°C
Storage temperature		Tstg	-40 to +90	°C
Soldering		Tsol	260 °C, 3 s Max., at least 1 mm away from case surface	-

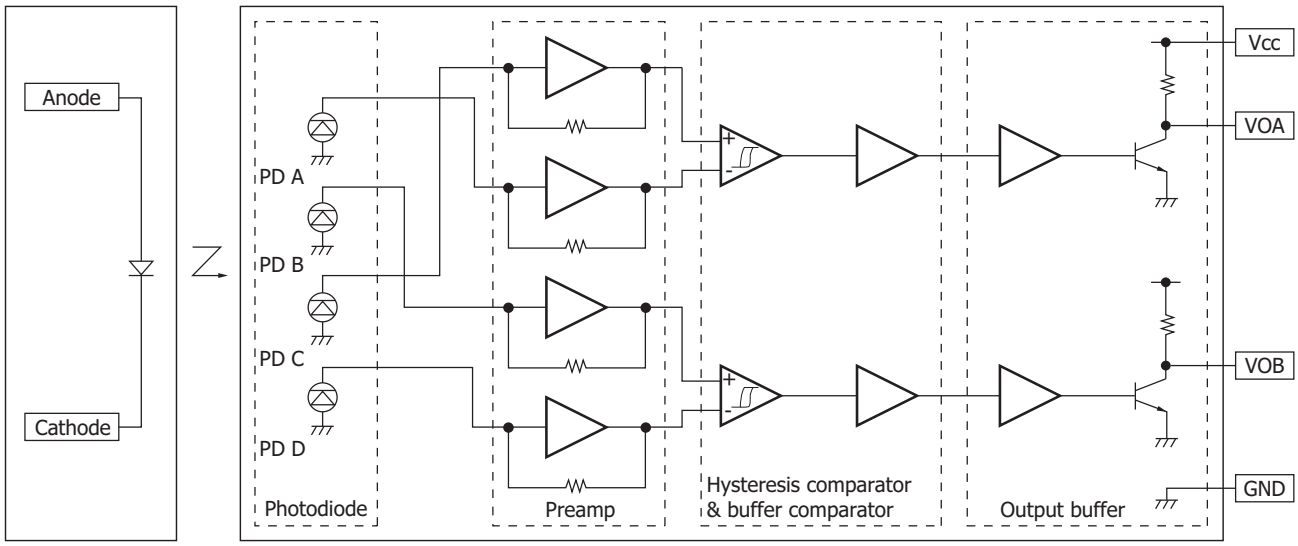
*1: Forward current decreases at a rate of 0.5 mA/°C above Ta=55 °C
*2: Power dissipation decreases at a rate of 3.1 mW/°C above Ta=25 °C
Note: The P11159-01AS is not suitable for reflow soldering.

Electrical and optical characteristics (Ta=25 °C, Vcc=5 V, unless otherwise noted)

Parameter		Symbol	Condition	Min.	Typ.	Max.	Unit
Input (LED)	Forward voltage	VF	IF=10 mA	-	1.9	2.4	V
	Reverse current	IR	VR=5 V	-	-	10	µA
	Peak emission wavelength	λp	IF=10 mA	-	650	-	nm
Output (photo IC)	Operating supply voltage	Vcc		3.0	-	7.0	V
	Low level output voltage	VOL	IOL=1 mA	-	-	0.4	V
	High level output voltage	VOH		4.5	-	-	V
	Supply current	Icc	VOA=VOB=L	-	6.0	10	mA
Transfer characteristics	Duty ratio*3	tAH/tAP	IF=5 mA, f=10 kHz	35	50	65	%
		tBH/tBP		35	50	65	%
	Phase difference*3	θAB	IF=5 mA, f=10 kHz	60	90	120	degree
	Rise time	tr	IF=5 mA, CL=10 pF	-	0.5	2	µs
	Fall time	tf	IF=5 mA, CL=10 pF	-	0.04	0.3	µs
	Maximum response frequency*3 *4	f max.	IF=5 mA	50	-	-	kHz

*3: Measured when recommended slits are used in specified position
Response frequency f is the reciprocal of the time required to move one pitch.
*4: Maximum frequency at which no error occurs in the output transition sequence (See operation timing diagram.)
Note: Connect a capacitor of 0.1 µF or more between Vcc and GND terminal.

Block diagram



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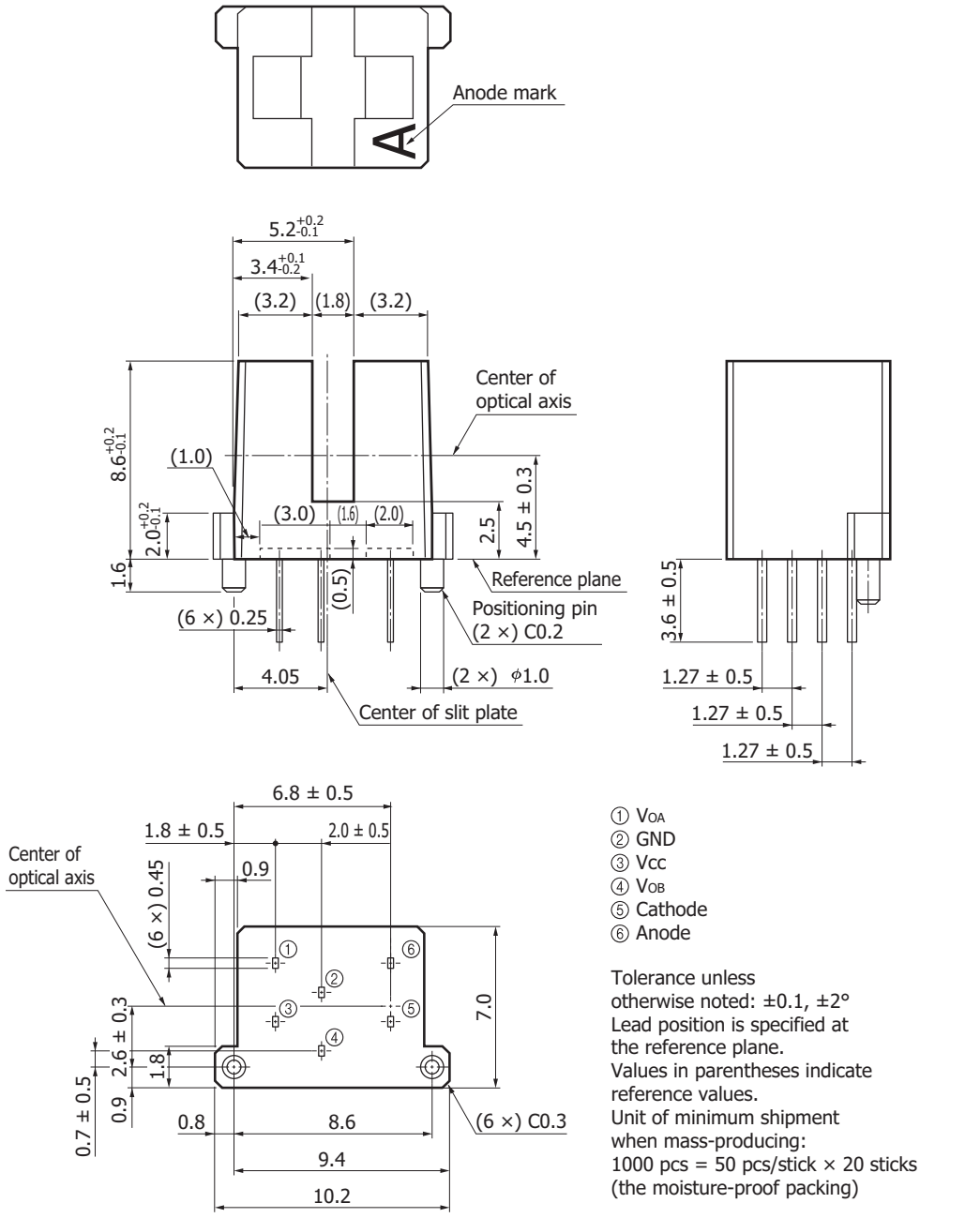
Dimensional outline (unit: mm)



① V_{OA}
② GND
③ Vcc
④ V_{OB}
⑤ Cathode
⑥ Anode

Tolerance unless otherwise noted: ±0.1, ±2°
Lead position is specified at the reference plane.
Values in parentheses indicate reference values.
Unit of minimum shipment when mass-producing:
1000 pcs = 50 pcs/stick × 20 sticks (the moisture-proof packing)

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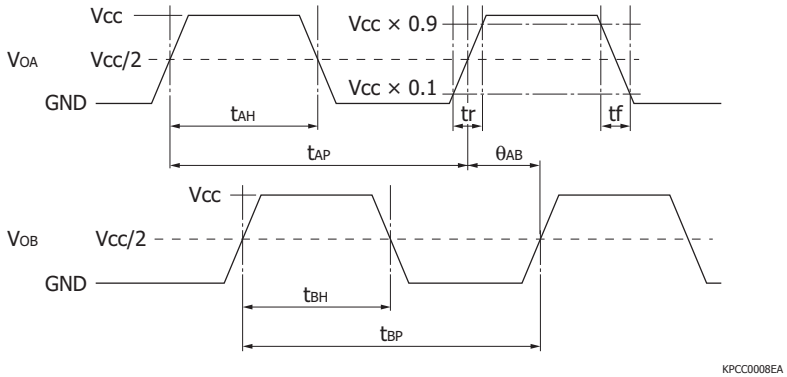
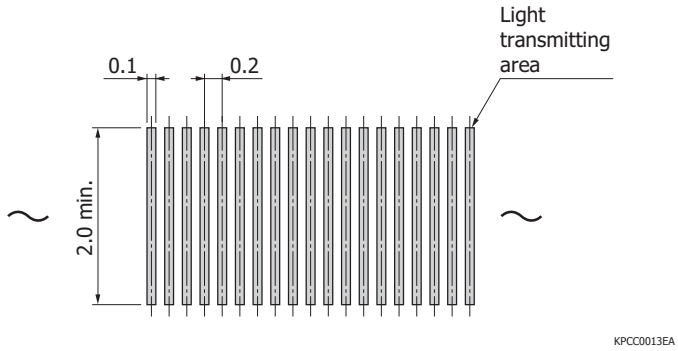
Operation timing diagram

Measured when the slits move at a constant speed towards you from the inner side as viewed from the front, in the middle left drawing in "Dimensional outline".



Recommended slit dimension (unit: mm, t=0.1)

(For recommended position, see "Dimensional outline.")



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