

# Photo IC for optical link



S13174-01SR

## Receiver photo IC for DC to 10 Mbps optical link

The S13174-01SR is a receiver photo IC for plastic optical fiber (POF) communication. It has monolithically integrated PIN photodiode and signal processing circuit. It features small size and strong resistance to electromagnetic induction noise. High-speed optical communication is possible over a wide range from DC up to 10 Mbps. It provides CMOS-compatible digital output.

### Features

- ➔ Receiver photo IC
- ➔ DC to 10 Mbps data communications
- ➔ Monolithic photo IC featuring strong resistance to electromagnetic induction noise
- ➔ Digital output (CMOS)

### Applications

- ➔ Data transmission in harsh, noisy environments, such as in FA, OA, and digital audio
- ➔ High-speed, short-distance data transmission
- ➔ Highly bursty data transmission

### Absolute maximum ratings (Ta=25 °C, unless otherwise noted)

Parameter	Symbol	Condition	Value	Unit
Supply voltage	Vcc		-0.5 to +4.0	V
Output voltage	Vo		-0.5 to Vcc + 0.5	V
Power dissipation*1	Pmax		250	mW
Operating temperature	Topr	No dew condensation*2	-20 to +85	°C
Storage temperature	Tstg	No dew condensation*2	-40 to +85	°C
Soldering conditions	Tsol		230 °C, within 5 s, at least 1.5 mm away from lead roots	-

\*1: Power dissipation decreases at a rate of 1.75 mW/°C above Ta=25 °C.

\*2: When there is a temperature difference between a product and the surrounding area in high humidity environment, dew condensation may occur on the product surface. Dew condensation on the product may cause deterioration in characteristics and reliability.

Note: Exceeding the absolute maximum ratings even momentarily may cause a drop in product quality. Always be sure to use the product within the absolute maximum ratings.

### Recommended operating conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit
Supply voltage	Vcc	3.135	3.3	3.465	V
High level output current	Ioh	-4	-	0	mA
Low level output current	Iol	0	-	4	

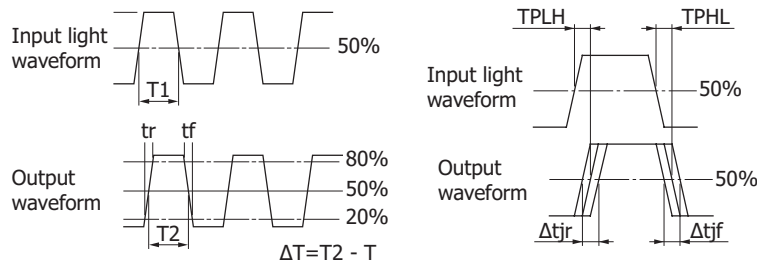
**Electrical and optical characteristics (Ta=25 °C, Vcc=3.135 to 3.465 V, unless otherwise noted)**

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Data rate	fD	Biphase signal (NRZ conversion)	DC	-	10	Mbps
Current consumption	Icc	No optical input	-	-	40	mA
Maximum reception level	Pi max	Peak value*3	0	-	-	dBm
Minimum reception level	Pi min	Peak value, Pe=10 <sup>-7</sup> *3	-	-	-24	dBm
Output voltage	High level output voltage	Voh Ioh=-150 μA	2.7	-	-	V
	Low level output voltage	Vol Iol=1.6 mA	-	-	0.4	V
	Rise time	tr 20% to 80%*4 *5	-	-	20	ns
	Fall time	tf 20% to 80%*4 *5	-	-	20	ns
Pulse width distortion	Δt	*3 *4 *5	-25	-	+25	ns
Jitter	Δtj	*3 *4 *5	-	-	20	ns

\*3: A signal generated by a Hamamatsu’s standard signal generator is assumed for the optical input signal.

\*4: For the input signal, a 10 Mbps pseudo-random biphase signal is assumed.

\*5: CL=5 pF (including parasitic capacitance of probe, connector, and printed circuit board)

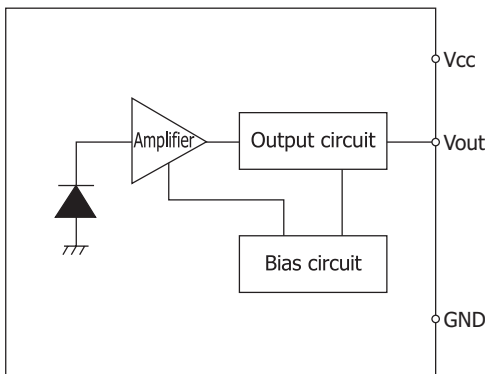


Parameter	Symbol	Measurement method
Rising edge jitter	Δtjr	Set the trigger to PPG CLK, and measure the jitter in the rising edge of the output.
Falling edge jitter	Δtjf	Set the trigger to PPG CLK, and measure the jitter in the falling edge of the output.
Jitter	Δtj	Set Δtj to the larger of the two jitter values: Δtjr and Δtjf.

KPIC0250EA

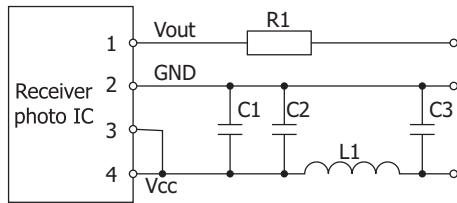
Note: Connect a 0.1 μF bypass capacitor within 3 mm of this element’s lead (between Vcc and GND). In addition, connect a 10 μF capacitor.  
 · Align the center axes of the fiber and package lens, and make the gap between the fiber and the optical reference plane of the lens surface 0.1 mm.

**Block diagram**



KPIC0304EA

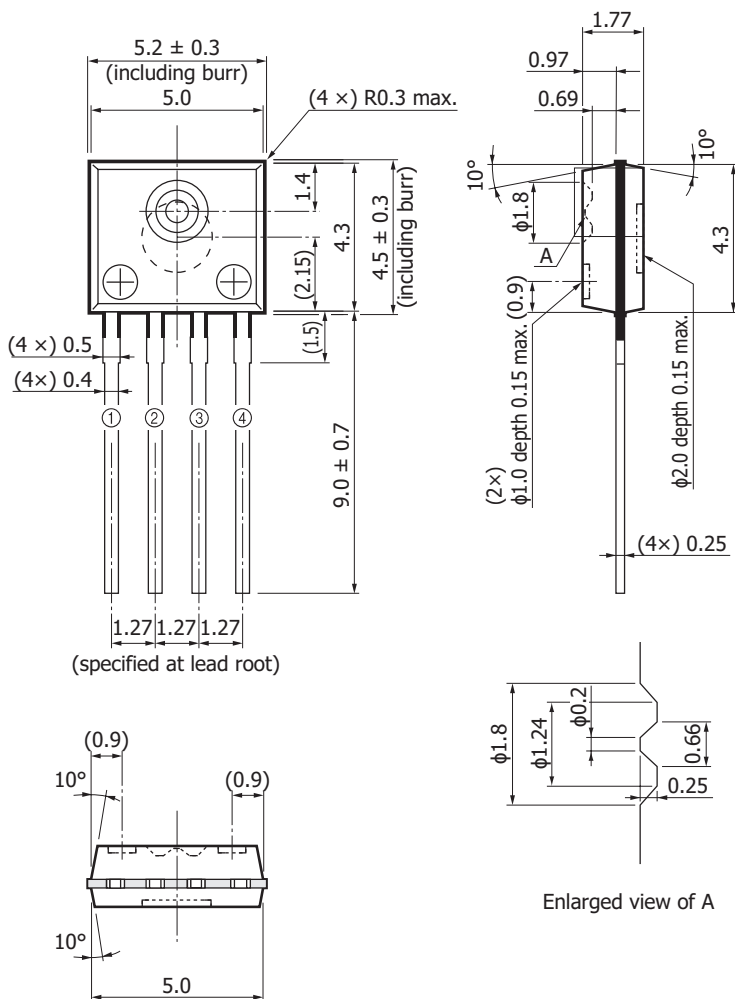
**Connection example**



Symbol	Component	Constant	Rating	Remarks
R1	Resistor	50 Ω to 150 Ω	60 mW or more	For overcurrent protection
L1	Inductance	0.1 μH	50 mA or more	
C1	Capacitor	0.1 μF	10 V or more	Bypass capacitor for noise suppression Connect near the lead (3 mm or less).
C2	Capacitor	10 μF	10 V or more	Bypass capacitor for noise suppression
C3	Capacitor	10 μF	10 V or more	Bypass capacitor for noise suppression

KPIC0305EA

**Dimensional outline (unit: mm)**



Pin no.	S13174-01SR
①	Vout
②	GND
③	Vcc
④	Vcc

Tolerance unless otherwise noted: ±0.1, ±2°  
 Shaded area indicates burr.  
 Values in parentheses indicate reference values.

Standard packing type  
 Plastic tray (100 pcs/tray)  
 Material: PVC (conductive)

KPICA0105EA

## Related information

[www.hamamatsu.com/sp/ssd/doc\\_en.html](http://www.hamamatsu.com/sp/ssd/doc_en.html)

### ■ Precautions

- Disclaimer
- Metal, ceramic, plastic products

Information described in this material is current as of July 2018.

Product specifications are subject to change without prior notice due to improvements or other reasons. This document has been carefully prepared and the information contained is believed to be accurate. In rare cases, however, there may be inaccuracies such as text errors. Before using these products, always contact us for the delivery specification sheet to check the latest specifications.

The product warranty is valid for one year after delivery and is limited to product repair or replacement for defects discovered and reported to us within that one year period. However, even if within the warranty period we accept absolutely no liability for any loss caused by natural disasters or improper product use. Copying or reprinting the contents described in this material in whole or in part is prohibited without our prior permission.

# HAMAMATSU

[www.hamamatsu.com](http://www.hamamatsu.com)

HAMAMATSU PHOTONICS K.K., Solid State Division

1126-1 Ichino-cho, Higashi-ku, Hamamatsu City, 435-8558 Japan, Telephone: (81) 53-434-3311, Fax: (81) 53-434-5184

U.S.A.: Hamamatsu Corporation: 360 Foothill Road, Bridgewater, N.J. 08807, U.S.A., Telephone: (1) 908-231-0960, Fax: (1) 908-231-1218, E-mail: [usa@hamamatsu.com](mailto:usa@hamamatsu.com)

Germany: Hamamatsu Photonics Deutschland GmbH: Arzbergerstr. 10, D-82211 Herrsching am Ammersee, Germany, Telephone: (49) 8152-375-0, Fax: (49) 8152-265-8, E-mail: [info@hamamatsu.de](mailto:info@hamamatsu.de)

France: Hamamatsu Photonics France S.A.R.L.: 19, Rue du Saule Trapu, Parc du Moulin de Massy, 91882 Massy Cedex, France, Telephone: 33-(1) 69 53 71 00, Fax: 33-(1) 69 53 71 10, E-mail: [infos@hamamatsu.fr](mailto:infos@hamamatsu.fr)

United Kingdom: Hamamatsu Photonics UK Limited: 2 Howard Court, 10 Tewin Road, Welwyn Garden City, Hertfordshire AL7 1BW, United Kingdom, Telephone: (44) 1707-294888, Fax: (44) 1707-325777, E-mail: [info@hamamatsu.co.uk](mailto:info@hamamatsu.co.uk)

North Europe: Hamamatsu Photonics Norden AB: Torshamnsgatan 35 16440 Kista, Sweden, Telephone: (46)8-509 031 00, Fax: (46)8-509 031 01, E-mail: [info@hamamatsu.se](mailto:info@hamamatsu.se)

Italy: Hamamatsu Photonics Italia S.r.l.: Strada della Moia, 1 int. 6, 20020 Arese (Milano), Italy, Telephone: (39)02-93 58 17 33, Fax: (39)02-93 58 17 41, E-mail: [info@hamamatsu.it](mailto:info@hamamatsu.it)

China: Hamamatsu Photonics (China) Co., Ltd.: B1201, Jiaming Center, No.27 Dongsanhuan Beilu, Chaoyang District, Beijing 100020, China, Telephone: (86) 10-6586-6006, Fax: (86) 10-6586-2866, E-mail: [hpc@hamamatsu.com.cn](mailto:hpc@hamamatsu.com.cn)

Taiwan: Hamamatsu Photonics Taiwan Co., Ltd.: 8F-3, No. 158, Section2, Gongdao 5th Road, East District, Hsinchu, 300, Taiwan R.O.C. Telephone: (886)03-659-0080, Fax: (886)03-659-0081, E-mail: [info@hamamatsu.com.tw](mailto:info@hamamatsu.com.tw)