

Balanced detector

C13888-01



Balanced detector supporting a wide temperature range

This is a differential amplification type photoelectric conversion module containing two Hamamatsu photodiodes with balanced characteristics. The photodiodes are connected in a direction that cancels out the photocurrent of each photodiode. This configuration cancels out the common mode noise of the two incident light rays. The minute difference in light levels is treated as a displacement signal, converted into an electrical signal, and output. This product supports wide operating and storage temperature ranges. It can be applied to Doppler LiDAR, which measures wind speed and direction.

Features

- **Cutoff frequency: 200 MHz**
- **Common-mode rejection ratio (CMRR): 30 dB typ.**
- **Input section: FC receptacle (APC polished)**
A single-mode fiber with an FC connector can be connected.
- **Output section: SMA receptacle**
- **Compact**
- **Wide temperature range**
Operating temperature: 0 to +60 °C
Storage temperature: -40 to +70 °C

Applications

- **Doppler LiDAR**
- **Various measurements**

Structure

Parameter	Specification	Unit
Built-in element	InGaAs PIN photodiode	-
Dimensions	24 × 54.5 × 65	mm
Weight	168	g
Input section	FC receptacle (APC polished)	-
Output section	SMA receptacle	-

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

Parameter	Symbol	Condition	Value	Unit
Supply voltage	Vs		±17	V
Incident light level	Pin	λ=1.55 μm	10	mW
Operating temperature*1	Topr		0 to +60	°C
Storage temperature*1	Tstg		-40 to +70	°C

*1: No dew condensation

When there is a temperature difference between a product and the surrounding area in high humidity environments, 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 (Ta=25 °C)

Parameter	Symbol	Min.	Typ.	Max.	Unit
Supply voltage*2	Vs	±11	±12	±13	V

*2: Use a power supply with 200 mA or higher output.

Electrical characteristics (Ta=25 °C)

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Current consumption	Ic	Vs=±12 V	+35/-43	+40/-48	+45/-53	mA
Output impedance	OUT terminal	Zo	-	50	-	Ω
	Monitor terminal		-	220	-	

Electrical and optical characteristics (Typ. Ta=25 °C, Vs=±12 V, unless otherwise noted)

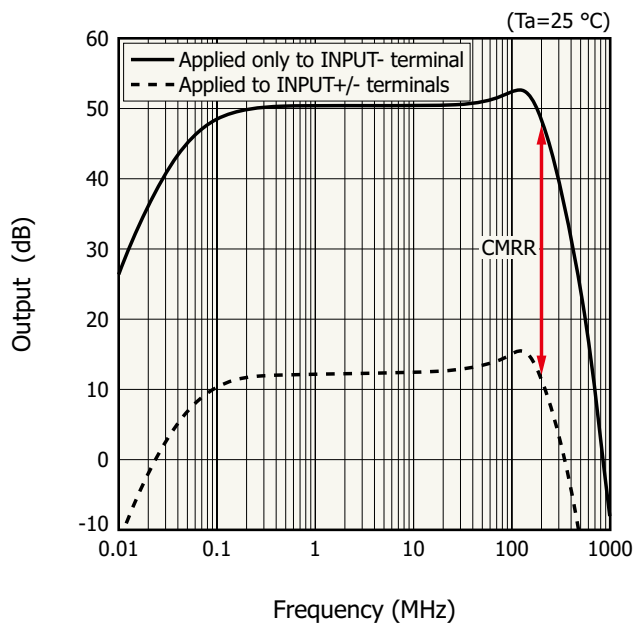
Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Optimal wavelength band*3	λ_{op}		-	1.55	-	μm
Photosensitivity	SPD	$\lambda = \lambda_{op}$	-	1.0	-	A/W
Frequency bandwidth	OUT terminal	fc	-3 dB	0.1 to 200	-	MHz
	Monitor terminal			DC to 1	-	
Common-mode rejection ratio*4	CMRR		-	30	-	dB
Conversion impedance	OUT terminal	Zt	-	3×10^4	-	V/A
	Monitor terminal		-	1×10^3	-	
Output noise voltage*5	Vn		-	25	40	mVp-p

*3: Wavelength at which multiple reflections can be reduced the most

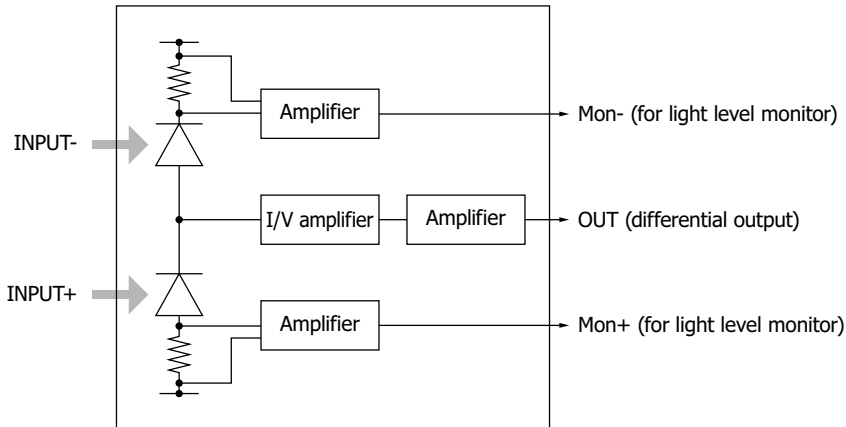
*4: Output difference when an approximately 70 μW light is applied to only the INPUT- terminal and when applied to INPUT+/- terminals (see the frequency characteristics)

*5: Dark state, 50 Ω termination

Frequency characteristics (typical example, measured with a network analyzer)

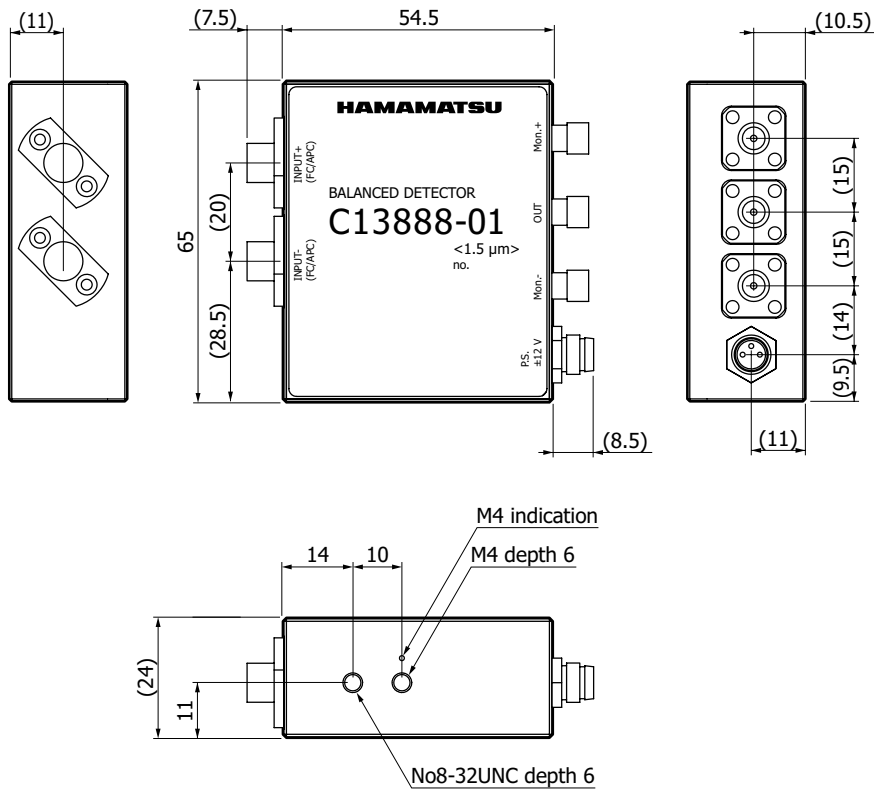


Block diagram



KACCC0761EB

Dimensional outline (unit: mm)

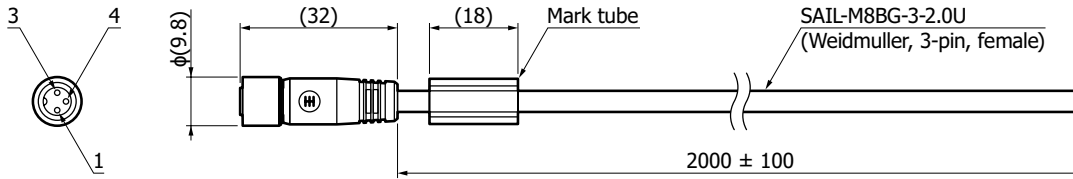


Tolerance unless otherwise noted: ±0.3

KACCA0481EA

Accessory (unit: mm)

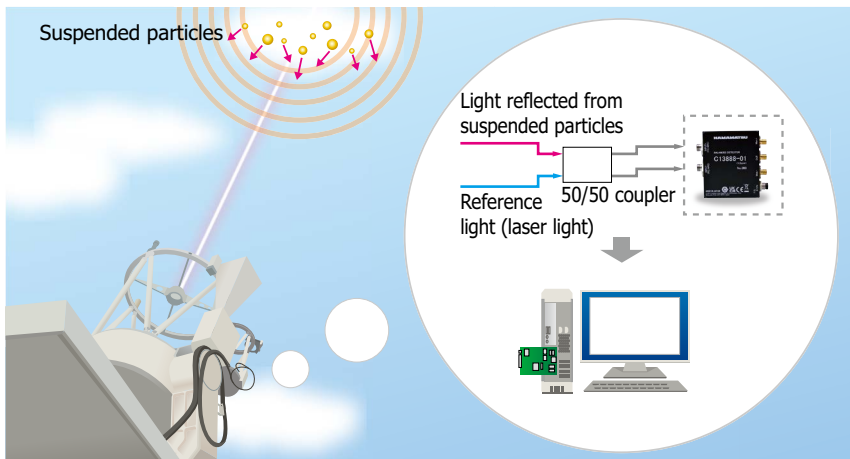
- Cable for power supply (no connector on one end)



Pin no.	Wire color
1	Brown (+12 V)
3	Blue (-12 V)
4	Black (GND)

KACCA0352EB

Application example



Doppler LiDAR

KACCC1096EA

Related information

www.hamamatsu.com/sp/ssd/doc_en.html

- Precautions
- Disclaimer

The content of this document is current as of November 2021.

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

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

Germany: Hamamatsu Photonics Deutschland GmbH: Arzbergerstr. 10, 82211 Herrsching am Ammersee, Germany, Telephone: (49)8152-375-0, Fax: (49)8152-265-8, E-mail: 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

United Kingdom: Hamamatsu Photonics UK Limited: 2 Howard Court, 10 Tewin Road, Welwyn Garden City, Hertfordshire AL7 1BW, UK, Telephone: (44)1707-294888, Fax: (44)1707-325777, E-mail: 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

Italy: Hamamatsu Photonics Italia S.r.l.: Strada della Moia, 1 int. 6, 20044 Arese (Milano), Italy, Telephone: (39)02-93 58 17 33, Fax: (39)02-93 58 17 41, E-mail: info@hamamatsu.it

China: Hamamatsu Photonics (China) Co., Ltd.: 1201 Tower B, Jiaming Center, 27 Dongsanhuan Beilu, Chaoyang District, 100020 Beijing, P.R.China, Telephone: (86)10-6586-6006, Fax: (86)10-6586-2866, E-mail: 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)3-659-0080, Fax: (886)3-659-0081, E-mail: info@hamamatsu.com.tw