

Balanced detectors



C12668 series

Balanced detectors with reduced multiple reflections

These are differential amplification type photoelectric conversion modules 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. Moreover, the adoption of our unique structure that suppresses multiple reflections of incident light has made it possible to reduce the noise caused by the reflections. These products can be applied to optical coherence tomography (OCT) used in ophthalmologic examinations and the like. The balanced detector can convert into electrical signals the minute difference in the signal light produced when the back scattering light from the subject is made to interfere with the reference light.

Features

- Employs our unique (patented) structure that reduces multiple reflections at the incident light wavelength of 1.0 μm or 1.3 μm
- Cutoff frequency: 200 MHz (-01, -02), 400 MHz (-03, -04)
- Common-mode rejection ratio (CMRR: Common-Mode Rejection Ratio): 35 dB typ. (-01, -02), 30 dB typ. (-03, -04)
- Input section: FC receptacle (APC polished)
A single-mode fiber with an FC connector can be connected.
- Output section: SMA receptacle
- Compact

Application

- OCT

Structure

Type no.	Built-in element	Dimensions (mm)	Weight (g)	Input section	Output section
C12668-01	InGaAs PIN photodiode	25 × 54.5 × 65	168	FC receptacle (APC polished)	SMA receptacle
C12668-02					
C12668-03		25 × 78 × 72	190		
C12668-04					

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

Type no.	Supply voltage (V)	Incident light level $\lambda=1.55 \mu\text{m}$ (mW)	Operating temperature*1 (°C)	Storage temperature*1 (°C)
C12668-01	±17	5	0 to +50	-10 to +60
C12668-02		4.5		
C12668-03		5		
C12668-04		4.5		

*1: No dew condensation

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.

Electrical characteristics (Ta=25 °C unless otherwise noted)

Type no.	Supply voltage*2 Vs (V)			Current consumption Ic Vs=±12 V (mA)			Output impedance Zo (Ω)	
	Min.	Typ.	Max.	Min.	Typ.	Max.	OUT terminal	Monitor terminal
C12668-01	±11	±12	±13	±52	±60	±64	50	220
C12668-02								
C12668-03								
C12668-04				±50	±54	±60		

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

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

Type no.	Optimal wavelength band*3 λ_{op} (μm)	Photosensitivity SPD $\lambda=\lambda_{op}$ (A/W)	Cutoff frequency fc -3 dB (MHz)		Common-mode rejection ratio CMRR*4 (dB)	Conversion impedance Zt (V/A)		Output noise voltage*5 Vn (mVp-p)	
			OUT terminal	Monitor terminal		OUT terminal	Monitor terminal	OUT terminal	
								Typ.	Max.
C12668-01	1.0	0.75	200	0.1	35	3 × 10 ⁴	1 × 10 ⁴	20	40
C12668-02	1.3	0.95							
C12668-03	1.0	0.75	400	1	30	1 × 10 ⁴	1 × 10 ⁴	20	40
C12668-04	1.3	0.95							

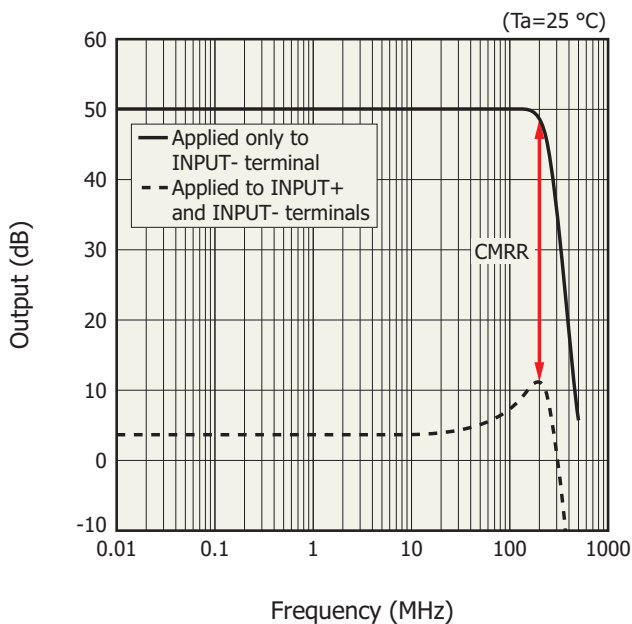
*3: Wavelength at which multiple reflections can be reduced the most

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

*5: Dark state, 50 Ω termination

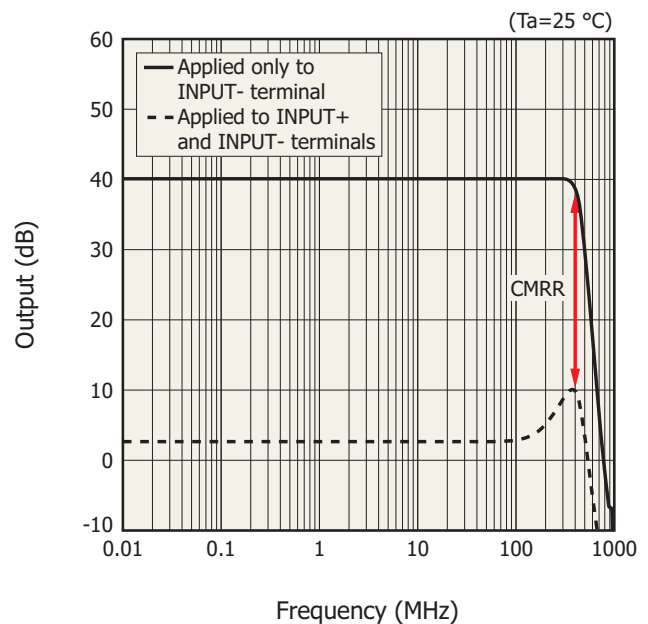
Frequency characteristics (typical example)

C12668-01/-02



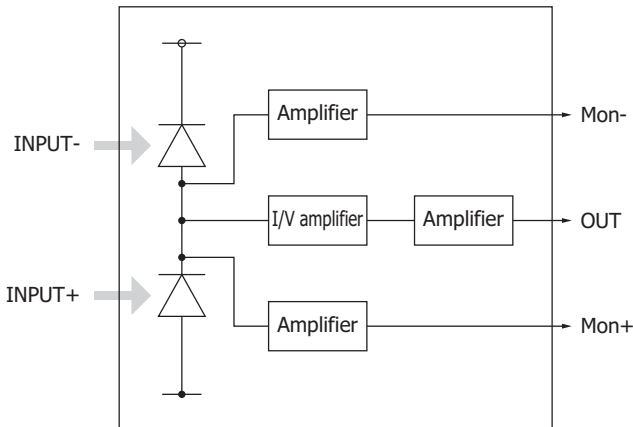
KACCB0358EA

C12668-03/-04



KACCB0463EA

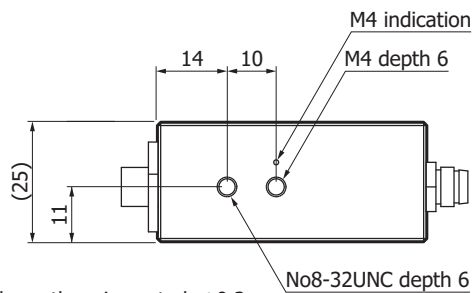
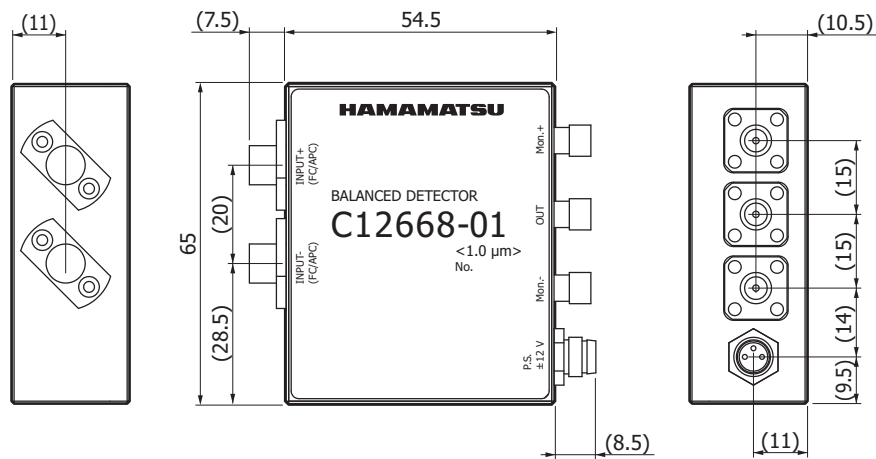
Block diagram



KACCC0761EA

Dimensional outlines (unit: mm)

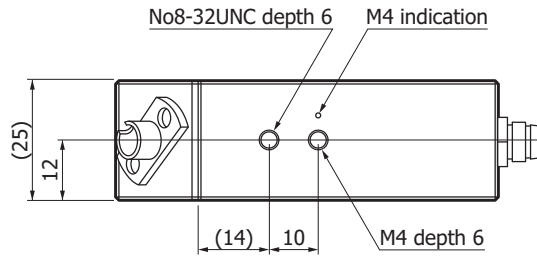
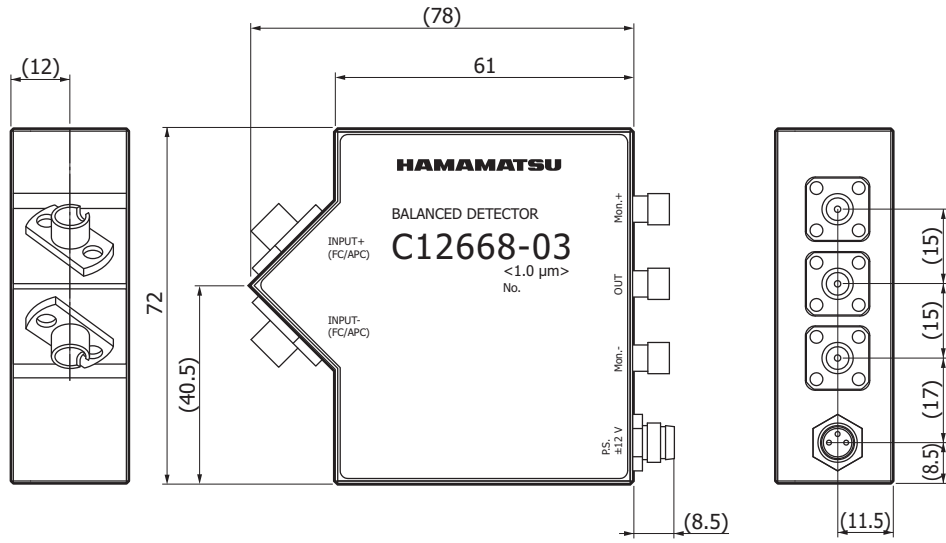
C12668-01/-02



Tolerance unless otherwise noted: ±0.3

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C12668-03/-04

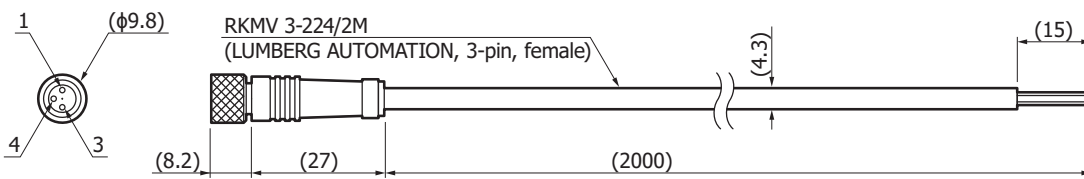


Tolerance unless otherwise noted: ± 0.3

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Accessory (unit: mm)

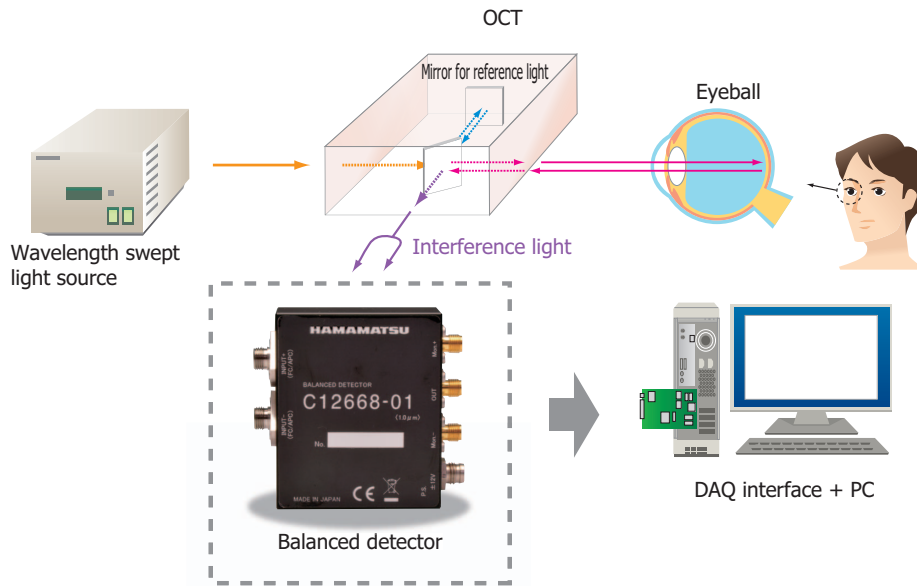
- Cable for power supply (no connector on one end)



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

KACCA0352EA

Connection example (ophthalmic medical OCT)



KACCC0762EA

Related information

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

- Precautions
- Disclaimer

Information described in this material is current as of February 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.

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