HAMAMATSU
PHOTON IS OUR BUSINESS

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 (-01, -02, -03, -04)**
- **Cutoff frequency:**
  200 MHz (-01, -02), 400 MHz (-03, -04), 800 MHz (-05, -06)
- **Common-mode rejection ratio**
  (CMRR: common-mode rejection ratio):
  35 dB typ. (-01, -02), 30 dB typ. (-03, -04, -05, -06)
- **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	24 × 54.5 × 65	168	FC receptacle (APC polished)	SMA receptacle
C12668-02					
C12668-03		24 × 78 × 72	190		
C12668-04					
C12668-05		18 × 63 × 70	115		
C12668-06					

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

Type no.	Supply voltage (V)	Incident light level λ=1.55 µm (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		
C12668-05	±13.5	5		
C12668-06		4.5		

*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)

Type no.	Supply voltage*2 Vs (V)		
	Min.	Typ.	Max.
C12668-01	±11	±12	±13
C12668-02			
C12668-03			
C12668-04			
C12668-05	±11.9		±12.1
C12668-06			

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

Electrical characteristics (Ta=25 °C)

Type no.	Current consumption Ic Vs=±12 V (mA)			Output impedance Zo (Ω)	
	Min.	Typ.	Max.	OUT terminal	Monitor terminal
C12668-01	±52	±60	±64	50	220
C12668-02					
C12668-03	±50	±54	±60		
C12668-04					
C12668-05	+105/-3	+125/-6	+145/-9		
C12668-06					

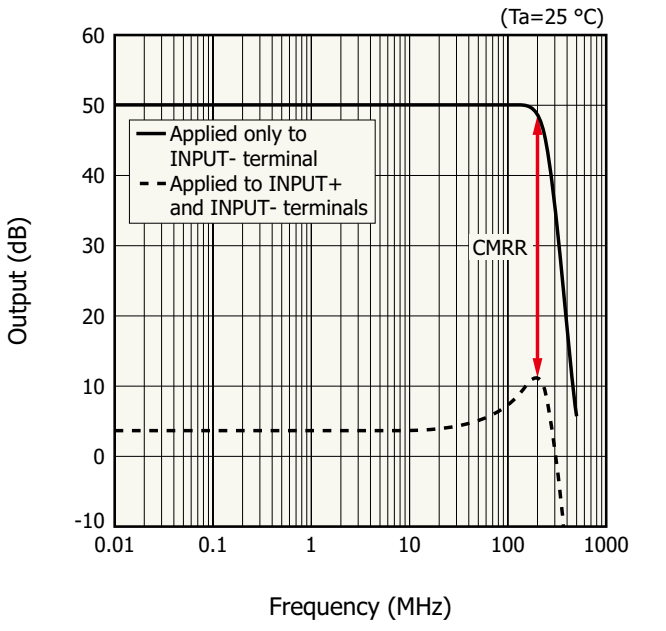
Electrical and optical characteristics (Typ. Ta=25 °C, Vs=±12 V, unless otherwise noted)

Type no.	Optimal wavelength band*3 λop (μm)	Photosensitivity SPD λ=λop (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	OUT terminal	Monitor terminal	OUT terminal	
								Typ.	Max
C12668-01	1.0	0.75	DC to 200	DC to 0.1	35	3×10^4	1×10^4	20	40
C12668-02	1.3	0.95							
C12668-03	1.0	0.75	DC to 400	DC to 1	30	1×10^4			
C12668-04	1.3	0.95							
C12668-05	1.0	0.60	0.1 to 800	DC to 1	30	5.8×10^4		80	160
C12668-06	1.3	0.85							

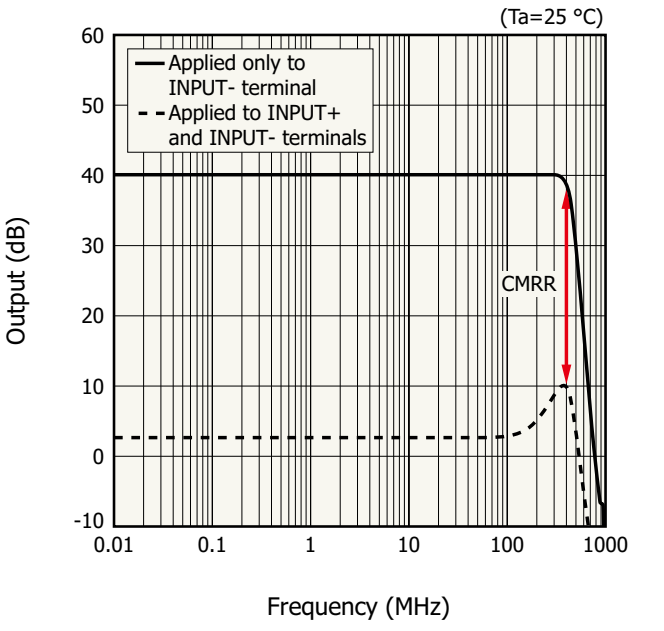
*3: Wavelength at which multiple reflections can be reduced the most
*4: Output difference when an approximately 70 μW light is applied to only the INPUT- terminal and when applied to INPUT+ and INPUT- terminals (see the frequency characteristics)
*5: Dark state, 50 Ω termination

Frequency characteristics (measured with network analyzer, typical example)

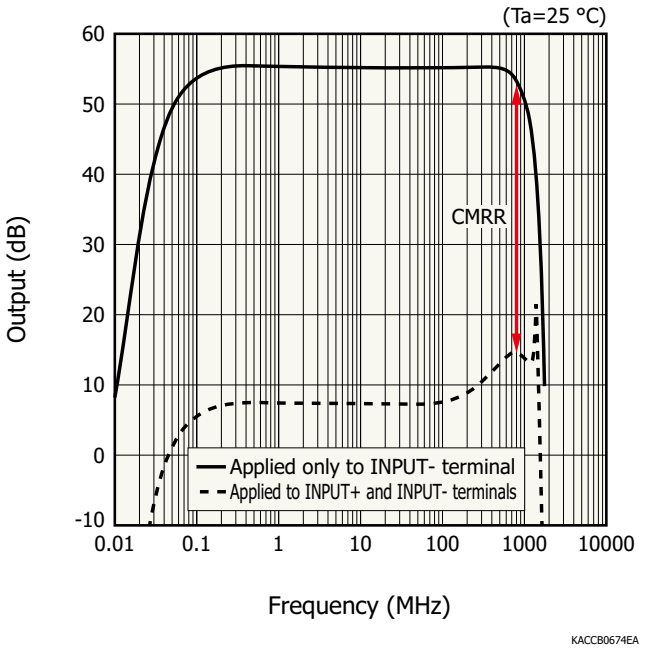
C12668-01/-02



C12668-03/-04



C12668-05/-06



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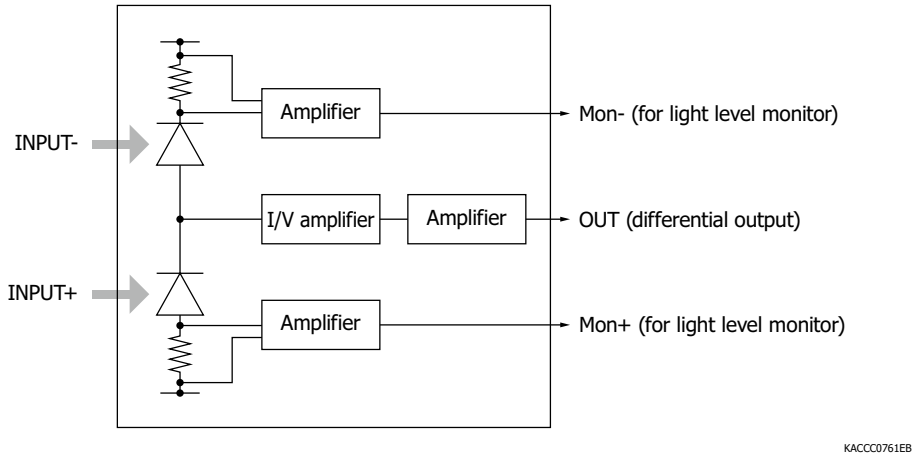
Block diagram



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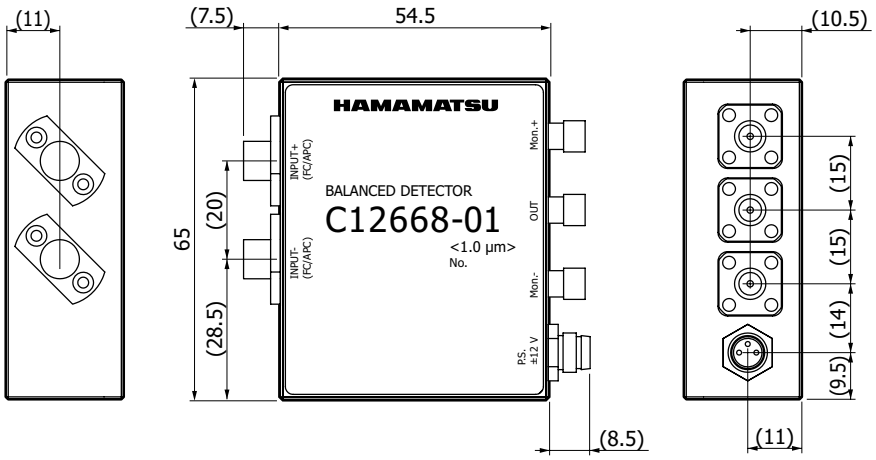
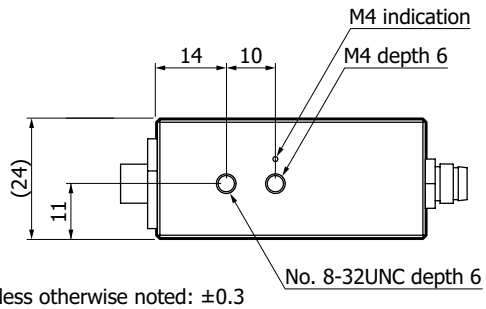
Dimensional outlines (unit: mm)

C12668-01/-02





Tolerance unless otherwise noted: ±0.3

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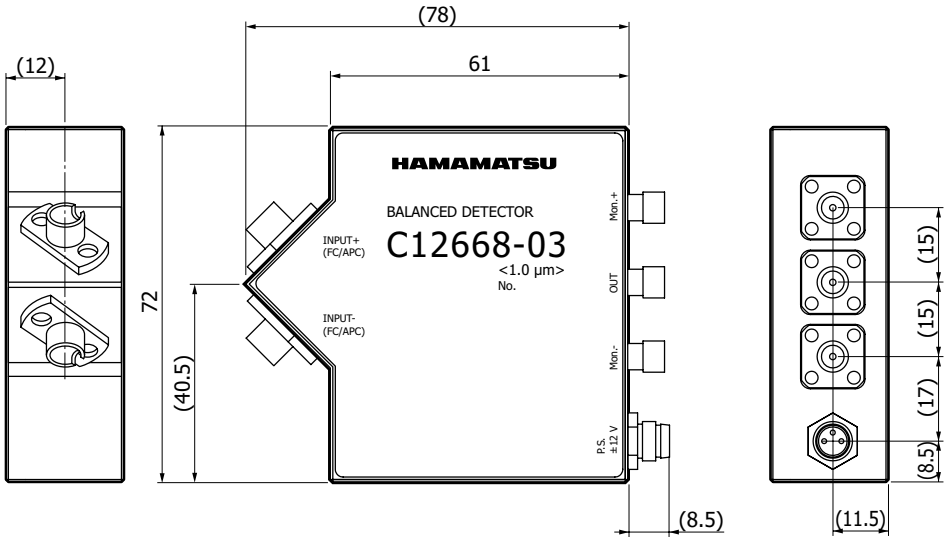
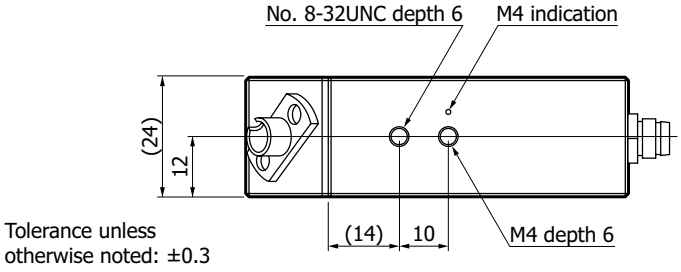
C12668-03/-04





Tolerance unless otherwise noted: ±0.3

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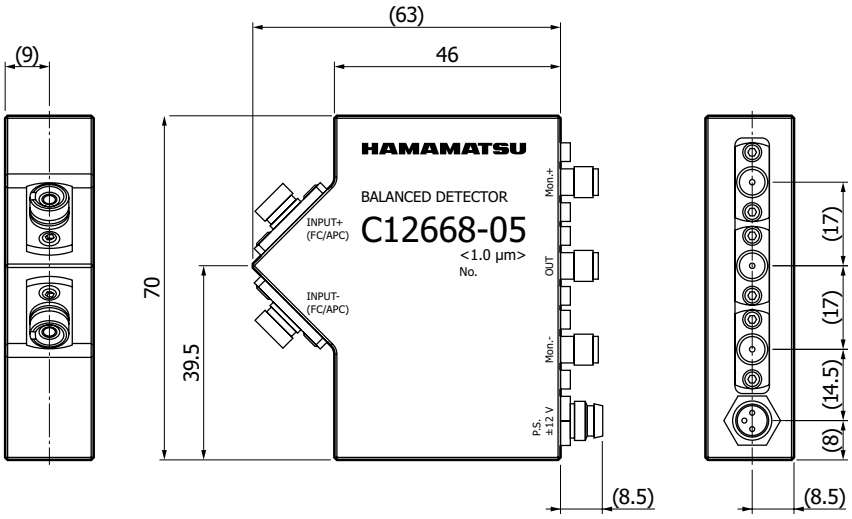
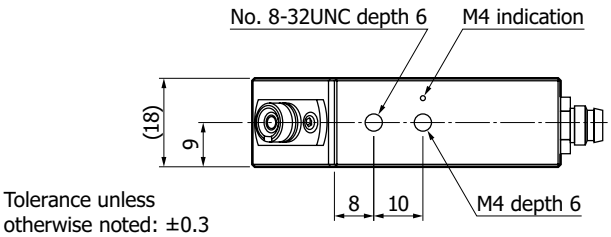
C12668-05/-06





Tolerance unless otherwise noted: ±0.3

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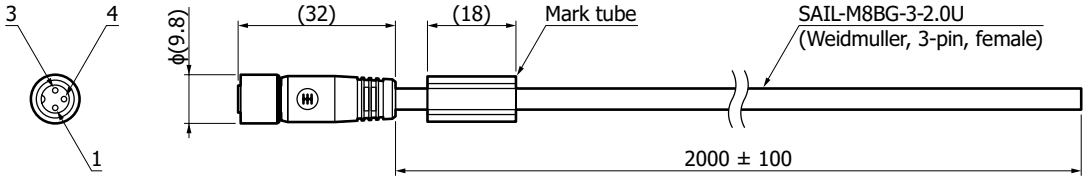
Accessory (unit: mm)

Cable for power supply (no connector on one end)



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

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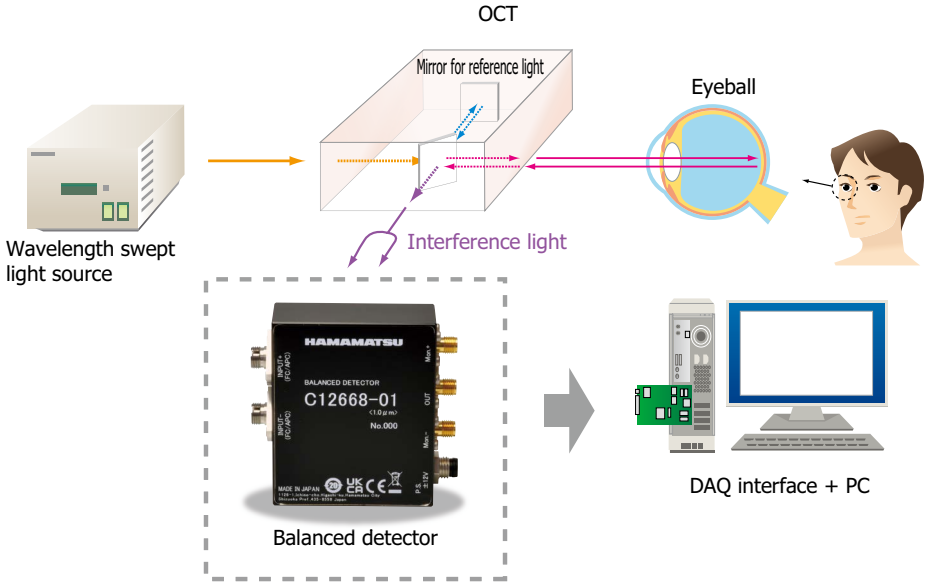
Connection example (ophthalmic medical OCT)



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Related information

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

■ Precautions

・Disclaimer

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