



C16531 series

1 ch SPAD module (for VIS to NIR region)

The C16531 series is a photon counting module that can detect low-level light. These modules consist of a thermoelectric cooled single photon avalanche diode (SPAD), an amplifier, a comparator, a SPAD bias circuit, and a temperature controller. The photosensitive area is available in two sizes of $\phi 50 \mu\text{m}$ and $\phi 100 \mu\text{m}$, and such small photosensitive areas offer a low dark count. These modules operate by simply connecting to an external power supply ($\pm 5 \text{ V}$).

Features

- Single photon counting is possible.
- High sensitivity in the long wavelength range
- Low dark count
- Low afterpulses

Applications

- Low-light-level measurement
- Particle diameter measurement
- Fluorescence measurement
- Analytical instrument

Structure

Parameter	Symbol	C16531-050GD	C16531-100GD	Unit
Built-in photosensor	-	SPAD		-
Effective photoseinsitive area	-	$\phi 50$	$\phi 100$	μm

Absolute maximum ratings

Parameter	Symbol	Condition	Value	Unit
Supply voltage	V_s		± 6	V
Operating temperature	T_{opr}	No dew condensation*1	-10 to +40	$^{\circ}\text{C}$
Storage temperature	T_{stg}	No dew condensation*1	-20 to +70	$^{\circ}\text{C}$

*1: 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.

Electrical and optical characteristics ($T_a=25 \text{ }^{\circ}\text{C}$, $\lambda=630 \text{ nm}$, $V_s=\pm 5 \text{ V}$, unless otherwise noted)

Parameter	Symbol	Condition	C16531-050GD			C16531-100GD			Unit	
			Min.	Typ.	Max.	Min.	Typ.	Max.		
Spectral response range	λ		400 to 1000			400 to 1000			nm	
Peak sensitivity wavelength	λ_p		-	630	-	-	630	-	nm	
Chip temperature (setting temperature)*2 *3	T_{chip}		-	-20	-	-	-20	-	$^{\circ}\text{C}$	
Photon detection efficiency	PDE		55	65	-	55	65	-	%	
Dark count	-		-	20	60	-	150	450	cps	
Afterpulse probability	-	100 ns to 500 ns	-	0.1	-	-	0.1	-	%	
Comparator output	-		TTL compatible			TTL compatible			-	
Maximum count rate	-		-	20	-	-	7	-	Mcps	
Current consumption	Positive power supply	I_c	$V_s=+5 \text{ V}$	-	+200	+1000	-	+200	+1000	mA
	Negative power supply		$V_s=-5 \text{ V}$	-	-20	-40	-	-20	-40	

*2: When the chip temperature strays from the setting temperature by $5 \text{ }^{\circ}\text{C}$, cooling automatically stops, and signals are no longer output.

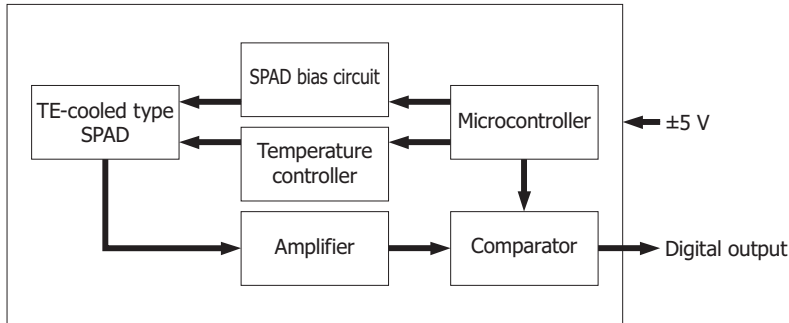
*3: The setting temperature cannot be changed.

Recommended operating conditions

Parameter		Symbol	Min.	Typ.	Max.	Unit
Supply voltage*4	Positive power supply	Vs	+4.75	+5	+5.25	V
	Negative power supply		-4.75	-5	-5.25	

*4: A power supply with 1.5 A or higher output must be used.

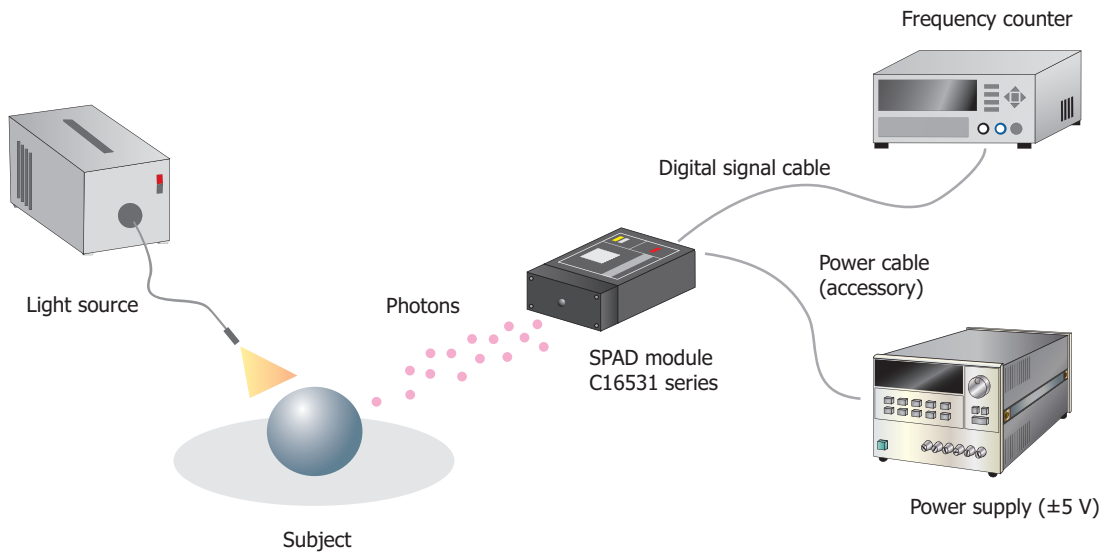
Block diagram



KACCC1167EA

Connection example

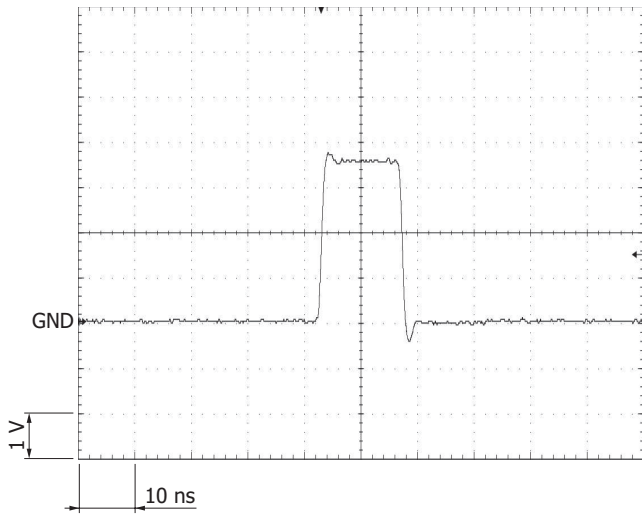
Using the supplied power cable, connect the SPAD module to a power supply. You can count output pulses by connecting the SPAD module to a frequency counter.



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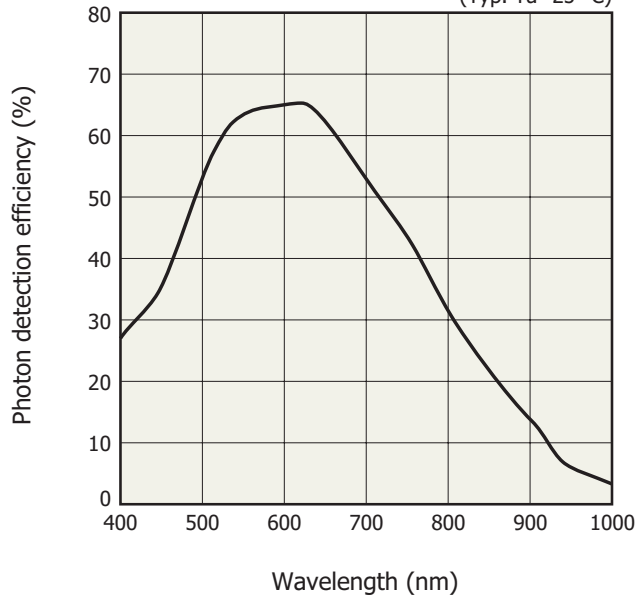
Measurement example

Comparator output



Photon detection efficiency vs. wavelength

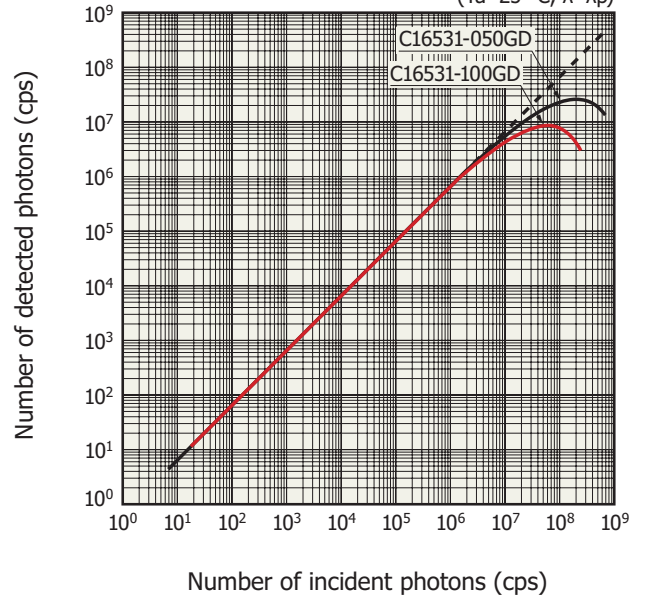
(Typ. $T_a=25\text{ }^\circ\text{C}$)



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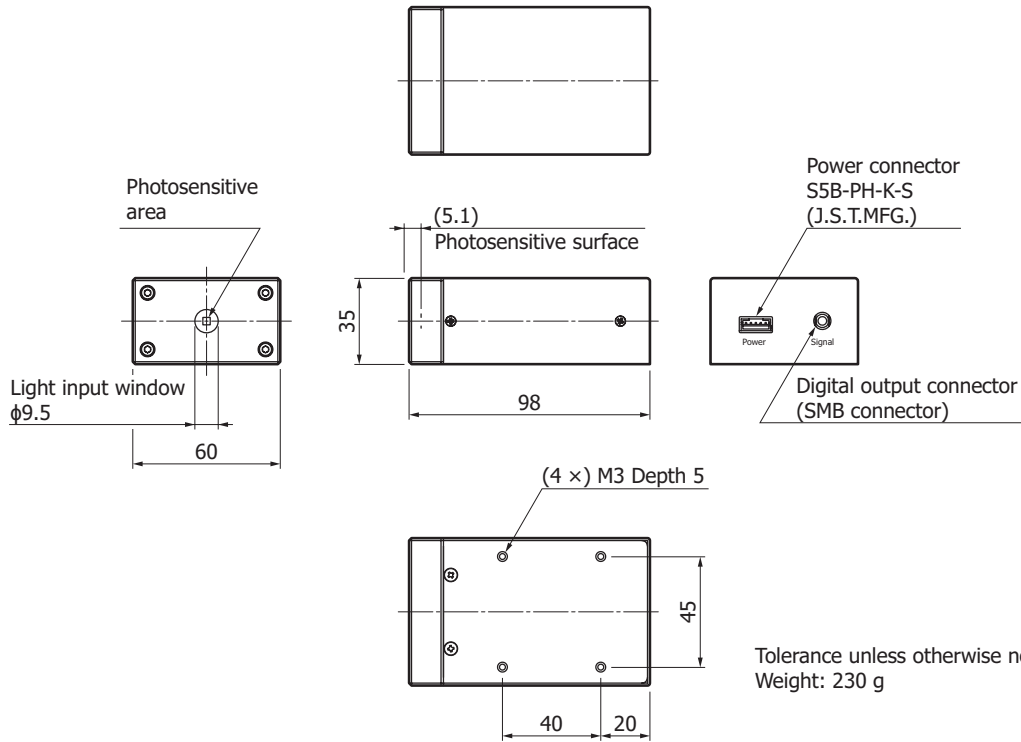
Linearity (typical example)

($T_a=25\text{ }^\circ\text{C}$, $\lambda=\lambda_p$)



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Dimensional outline (unit: mm)



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Accessories

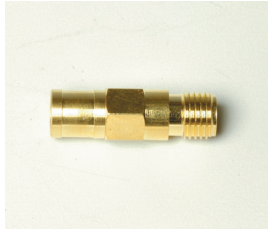
- Power cable
- Instruction manual

Options (sold separately)

Coaxial converter adapter A10613 series



A10613-01 (SMB-BNC)



A10613-02 (SMB-SMA)

The A10613 series is a coaxial adapter that converts the SMB coaxial connector for signal-output on the photon counting module to a BNC or SMA coaxial connector. This adapter allows connecting a BNC or SMA cable to the photon counting module.

Precautions

- For cleaning the product, wipe using a clean, soft, dry cloth. Do not use organic solvents such as thinner and acetone.
- Do not cover the unit with a dark cloth or something similar while the product is running. Covering the product can cause the internal temperature to rise and prevent it from operating normally.

Related information

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

- Precautions
- Disclaimer

Information described in this material is current as of November 2023.

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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