

## C13852 series (GD type)

### Optical measurement modules for very-low-level light detection, digital output

The C13852 series (GD type) are optical measurement modules capable of detecting low-level light using its built-in TE-cooled MPPC. It consists of a TE-cooled MPPC, amplifier, comparator circuit, high-voltage power supply circuit, and temperature control circuit. The photosensitive area is available in two sizes of 1.3 × 1.3 mm and 3 × 3 mm, and the signal output is digital. The modules operate by supplying an external power supply (±5 V). As this product is compact and lightweight, it is suitable for integration into devices.

#### Features

- High sensitivity in the short wavelength range
- Built-in temperature control function
- Low dark count
- Low afterpulses
- Digital output

#### Applications

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

#### Structure

Parameter	Symbol	C13852-1350GD	C13852-3050GD	Unit
Built-in MPPC	-	S13362-1350DG	S13362-3050DG	-
Effective photosensitive area	-	1.3 × 1.3	3 × 3	mm
Pixel pitch	-	50		μm
Number of pixels	-	667	3600	-

#### Absolute maximum ratings

Parameter	Symbol	Condition	Value	Unit
Supply voltage	Vs		±6	V
Operating temperature	T <sub>opr</sub>	No dew condensation*1	-10 to +40	°C
Storage temperature	T <sub>stg</sub>	No dew condensation*1	-20 to +70	°C

\*1: 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	Condition	Min.	Typ.	Max.	Unit
Supply voltage*2	+Vs	Positive power supply	+4.75	+5	+5.25	V
	-Vs	Negative power supply	-4.75	-5	-5.25	

\*2: A power supply with 2 A or higher output must be used.

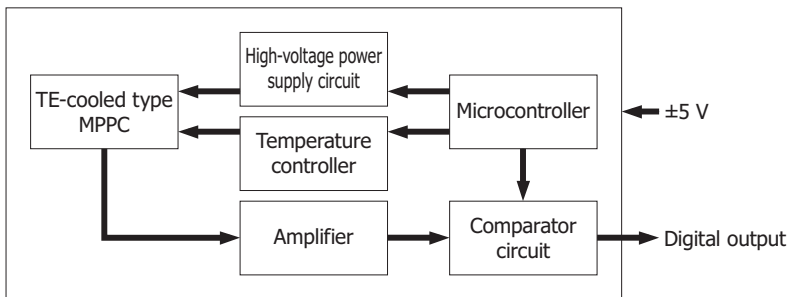
**Electrical and optical characteristics (Ta=25 °C, λ=λp, Vs=±5 V, unless otherwise noted)**

Parameter	Symbol	Condition	C13852-1350GD			C13852-3050GD			Unit
			Min.	Typ.	Max.	Min.	Typ.	Max.	
Spectral response range	λ		320 to 900			320 to 900			nm
Peak sensitivity wavelength	λp		-	450	-	-	450	-	nm
Chip temperature (setting temperature) <sup>*3 *4</sup>	Tchip		-	-20	-	-	-20	-	°C
Photon detection efficiency	PDE	Threshold: 0.5 p.e.	-	40	-	-	40	-	%
Dark count	CD	Threshold: 0.5 p.e.	-	2.5	7	-	12	36	kcps
Comparator output	-		TTL compatible						-
Comparator threshold level	-		0.5			0.5			p.e.
Current consumption	Ic	+5 V	-	+200	+1500	-	+200	+1500	mA
		-5 V	-	-20	-40	-	-20	-40	

\*3: When the chip temperature strays from the setting temperature by 5 °C, cooling automatically stops, and signals are no longer output.

\*4: The setting temperature cannot be changed.

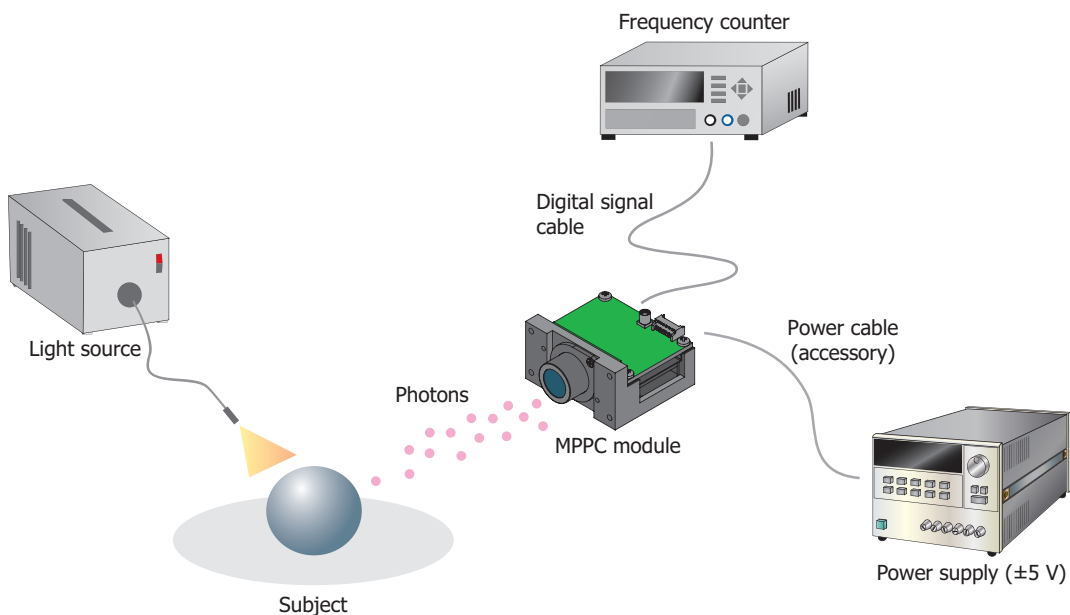
**Block diagram**



KACCC0933EA

**Connection example**

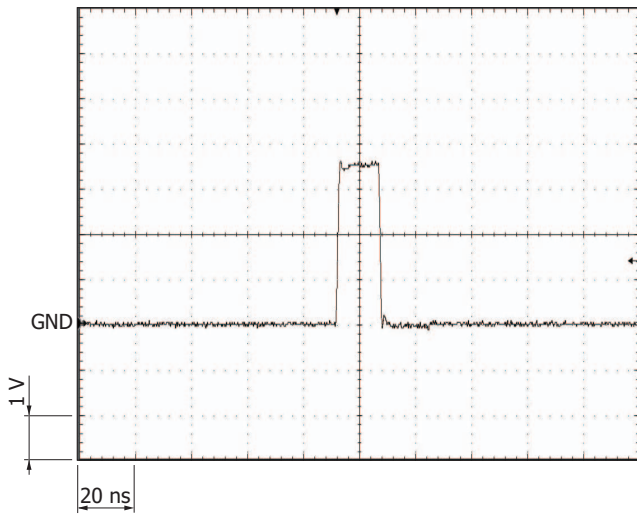
Using the supplied power cable, connect the MPPC module to a power supply. You can count output pulses by connecting the MPPC module to a frequency counter.



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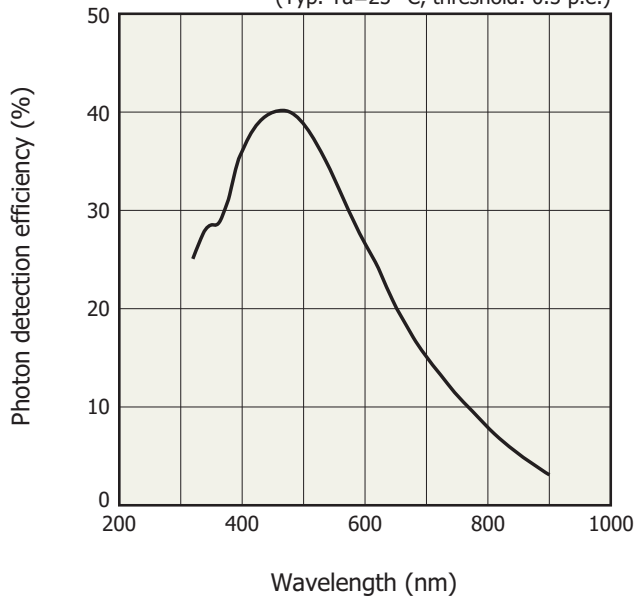
Measurement example

Digital output



Photon detection efficiency vs. wavelength

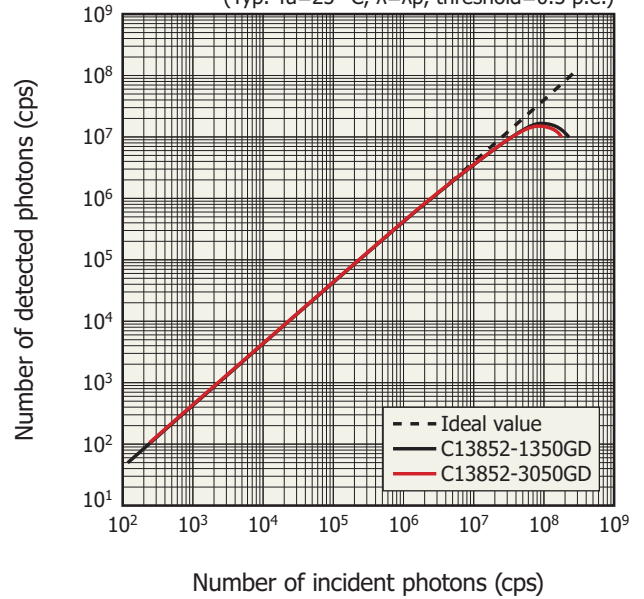
(Typ.  $T_a=25\text{ }^\circ\text{C}$ , threshold: 0.5 p.e.)



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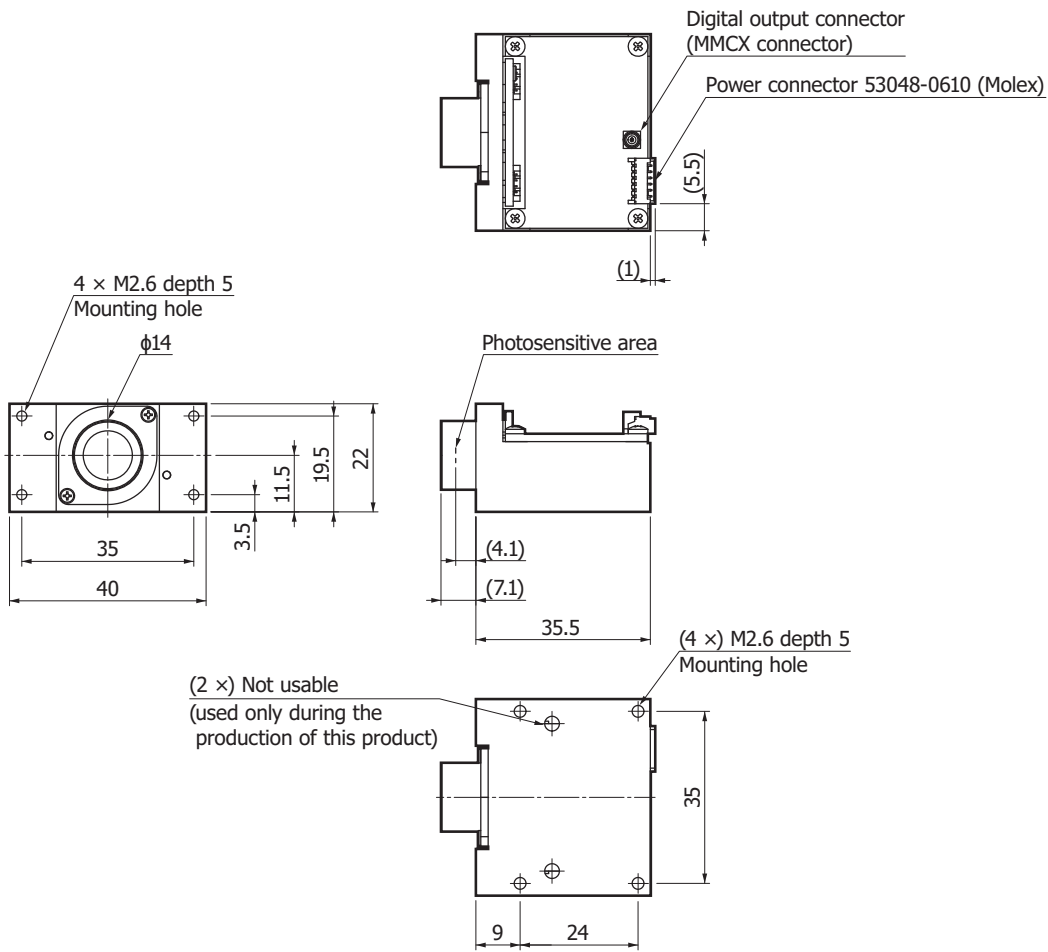
Linearity

(Typ.  $T_a=25\text{ }^\circ\text{C}$ ,  $\lambda=\lambda_p$ , threshold=0.5 p.e.)



KACCB0550EA

Dimensional outline (unit: mm)



KACCA0452EA

Note: When using this product, provide heat dissipation measures by using heatsinks or through thermal coupling with the enclosure that you will use. Keep the thermal resistance to 3 °C/W or less.

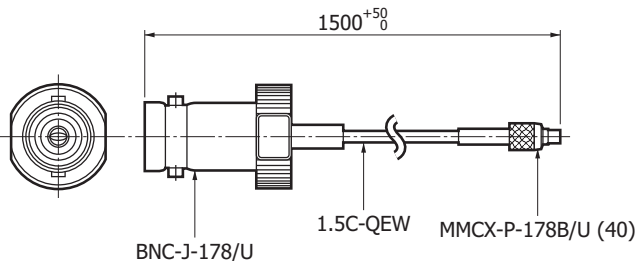
### Accessories

- Power cable
- Instruction manual

### Options (sold separately)

MMCX-BNC cable A12763

Dimensional outline (unit: mm)



### Precautions

- Use the product by referring to the supplied instruction manual.

### Related products

MPPC modules C13366 series (GD type)

The C13366 series (GD type) is a module for evaluating thermoelectrically cooled MPPCs. It consists of a TE-cooled MPPC, amplifier, comparator circuit, high-voltage power supply circuit, and temperature control circuit. The photosensitive area is available in two sizes of 1.3 × 1.3 mm and 3 × 3 mm, and the signal output is digital. The module operates by supplying an external power supply (±5 V). The C13366 series has nearly the same functions as the C13852 series. The C13366 series does not require heat dissipation measures.



### Related information

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

- Precautions
- Disclaimer

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Information described in this material is current as of March 2020.

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