

Micro PMT





World's smallest and lightest photomultiplier tube

micro μ PMT[®] HAMAMATSU

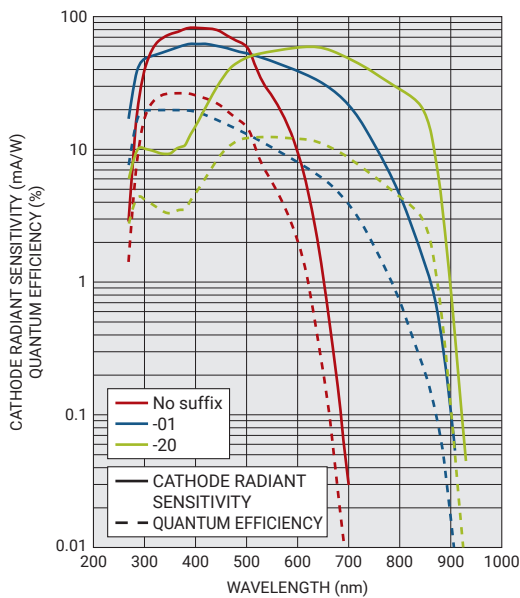
High sensitivity and fast response

We take advantage of our unique microfabrication technology to design and develop a variety of micro PMTs that are amazingly small and light yet maintain the high performance that photomultiplier tubes are known to provide.

High shock resistance

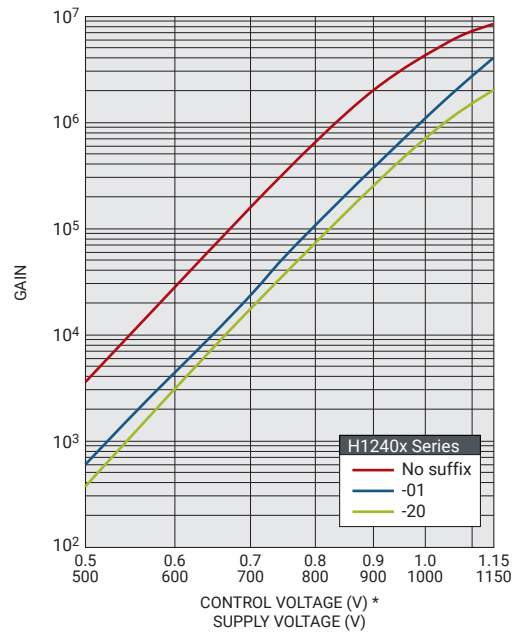
Micro PMT devices offer strong shock resistance since anodic bonding by MEMS technology is utilized to join the silicon substrate to the glass substrates. This high cushioning or shock resistance makes them ideal for developing high-performance, hand-held testing and analysis devices.

Spectral response



* Photocathodes having extended red sensitivity (-20) cannot be selected for the H14066.

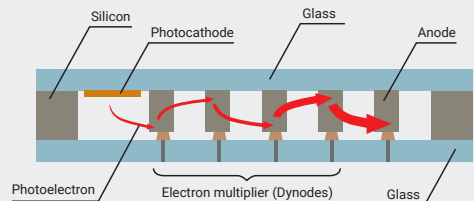
Gain



* Micro PMT module control voltage
* The H14066 series has different gain characteristics. See page 5.

What is a photomultiplier tube?

Photomultiplier tubes are photodetectors with extremely high sensitivity and fast response that outperform other types of optical sensors. Photomultiplier tubes make use of the secondary emission effect to achieve electron multiplication that delivers outstanding sensitivity and low noise among sensors currently used to measure light in the UV, visible and near-infrared regions. These features make photomultiplier tubes usable over a broad spectrum of applications including state-of-the-art medical equipment and environmental monitors, etc.



Micro PMT internal structure:
Basically, the same as ordinary photomultiplier tubes



Medical diagnosis in the home or at the bedside

Bringing high-tech closer to the patient via compact and portable medical devices

Micro PMTs help reduce the size of sophisticated medical devices that up to now could only be found in examination rooms at large hospitals or research laboratories. This means that advanced medical testing and diagnosis can now be made in emergency rooms and even in small clinics by using portable yet sophisticated devices. Moreover, if such devices become widespread in home medical testing, these could detect serious diseases while still in their early stage as well as carry out daily health management and healthcare tasks.



Making environmental pollution measurements on an individual or regional scale

Measurements under various environments and any type of location

Recently, the world has been experiencing environmental problems such as extreme weather and widespread disasters which create an increasing demand for on-site measurement of environmental conditions. If compact high-performance measurement devices using a micro PMT become available, then swift detection of environmental changes at various near and remote sites will become a reality, helping to minimize disaster damage and reduce the burden of performing measurement tasks.

Lineup

Type	Assembly			Module			Photon counting
Model No.	H12400	H14066	H12402	H12403	H12404	H12405	H12406
Appearance							
Output type	Current output	Current output	Current output	Current output	Voltage output	Voltage output	Photon counting
Output method	Cable	Pin	Cable	Cable	Cable	Cable	Cable
Effective area (mm)	1 x 3	1 x 4	1 x 3	1 x 3	1 x 3	1 x 3	1 x 3
Number of available photocathodes *	3 types	2 types	3 types	3 types	3 types	3 types	3 types
Page No.	P.04	P.05	P.06	P.06	P.07	P.07	P.08

* Extended red multialkali photocathode cannot be selected for the H14066 series.

Three types of micro PMT

Micro PMTs have a simple structure but are not sold separately since their signal output requires careful processing. All micro PMTs are available in an easy-to-use configuration that is selectable from the following three types according to the application.



Assembly type

This type includes a voltage divider circuit to ensure ease-of-use and design flexibility.

Modular type includes:

- Micro PMT
- Divider circuit



Module type

This is the most widespread standard type and has a built-in high-voltage power supply. The voltage output type also includes an amplifier.

Modular type includes:

- Micro PMT
- Divider circuit
- High voltage power supply circuit
- Amplifier (Voltage output type only)



Photon counting type

This type has an internal photon counting circuit.

Modular type includes:

- Micro PMT
- Divider circuit
- High voltage power supply circuit
- Photon counting circuit

Micro PMT assembly H12400 series



Specifications

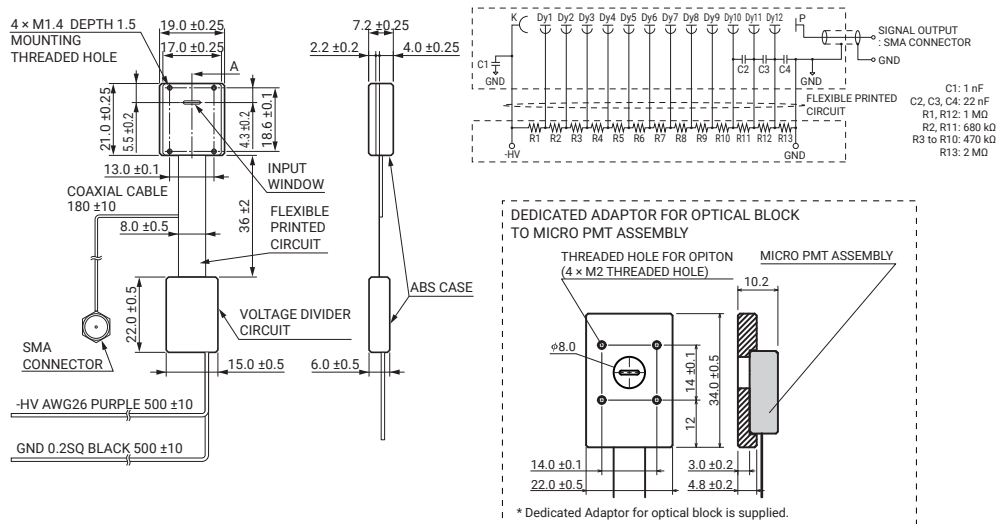
(at +25 °C)

Parameter		H12400-00-01	H12400-01-01	H12400-20-01	Unit
Spectral response		300 to 650	300 to 850	300 to 920	nm
Peak sensitivity wavelength		420			nm
Window material		Borosilicate glass			—
Photocathode material		Bialkali	Multialkali	Extended red multialkali	—
Effective area		1 × 3			mm
Dynode number of stages		12			—
Operating ambient temperature ^①		+5 to +50			°C
Storage temperature ^①		-20 to +50			°C
Maximum supply voltage (Between anode and cathode)		-1150			V
Maximum divider current		126			μA
Maximum average output signal current ^②		5			μA
Cathode	Luminous sensitivity	Min. 50	100	300	μA/lm
		Typ. 80	200	400	μA/lm
	Radiant sensitivity ^③	Typ. 80	62	60	mA/W
	Blue sensitivity index	Typ. 8.0	—	—	—
	Red / White ratio	Typ. —	0.2	0.45	—
Anode ^②	Luminous sensitivity	Min. 30	15	30	A/lm
		Typ. 160	70	100	A/lm
	Radiant sensitivity	Typ. 1.6×10^5	2.1×10^4	1.5×10^4	A/W
Gain ^②	Typ.	2.0×10^6	3.5×10^5	2.5×10^5	—
Anode dark current ^{②④}	Typ.	0.3		0.6	nA
	Max.	3		6	nA
Time response	Rise time	1.2			ns
	Transit time	8			ns
	T.T.S. ^⑤	1.3			ns

- ① No condensation ② Supply Voltage: -900 V ③ Measured at the peak sensitivity wavelength ④ After 30 min storage in darkness
 ⑤ T.T.S.=Transit Time Spread (FWHM)

Dimensional outlines (Unit: mm)

• H12400 Series



Micro PMT module current output type H14066 series



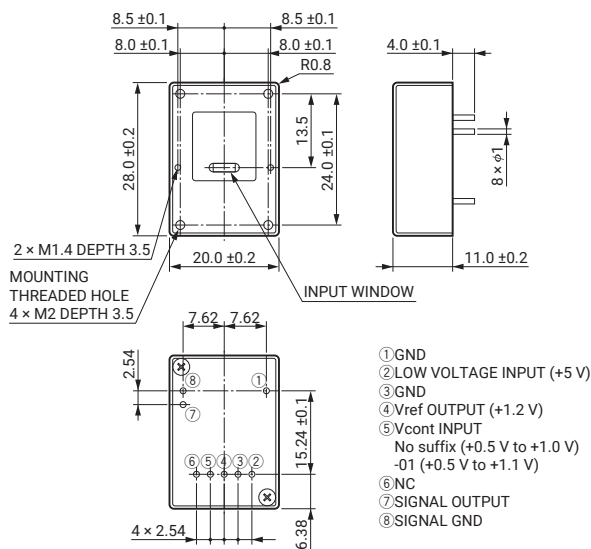
Specifications

(at +25 °C)

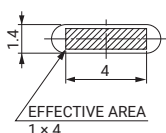
Parameter		H14066	H14066-01	Unit
Spectral response		300 to 650	300 to 850	nm
Peak sensitivity wavelength		420		nm
Window material		Borosilicate glass		—
Photocathode material		Bialkali	Multialkali	—
Effective area		1 × 4		mm
Dynode number of stages		10		—
Operating ambient temperature ^①		+5 to +50		°C
Storage temperature ^①		-20 to +50		°C
Input voltage		+4.75 to +5.25		V
Maximum input voltage		+5.5		V
Maximum input current ^②		5		mA
Maximum average output signal current ^③		5		μA
Maximum control voltage		+1.15		V
Recommended control voltage adjustment range		+0.5 to +1.0	+0.5 to +1.1	V
Control voltage input impedance		1		MΩ
Cathode	Luminous sensitivity	Min.	70	μA/lm
		Typ.	100	μA/lm
	Radiant sensitivity ^④	Typ.	93	mA/W
	Blue sensitivity index	Typ.	11.5	—
Red / White ratio	Typ.	—	0.2	—
Anode ^③	Luminous sensitivity	Min.	30	A/lm
	Radiant sensitivity ^④	Typ.	200	A/lm
Gain ^③	Typ.		1.9×10^5	2.2×10^4
			2.0×10^6	3.5×10^5
Anode dark current ^{③⑤}	Typ.	0.3		nA
	Max.	3		nA
Time response	Rise time	1.2		ns
Ripple noise ^{③⑥} (peak to peak)		0.3		mV
Settling time ^⑦		10		s

① No condensation ② At +5 V input voltage, +0.9 V control voltage, and output current equal to dark current ③ Supply Voltage: -900 V ④ Measured at the peak sensitivity wavelength ⑤ After 30 min storage in darkness ⑥ Cable RG-174/U, Cable length 450 mm, Load resistance=1 MΩ, Load capacitance=22 pF ⑦ The time required for the output to reach a stable level following a change in the control voltage from +1.0 V to +0.5 V.

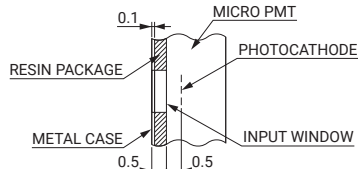
Dimensional outlines (Unit: mm)



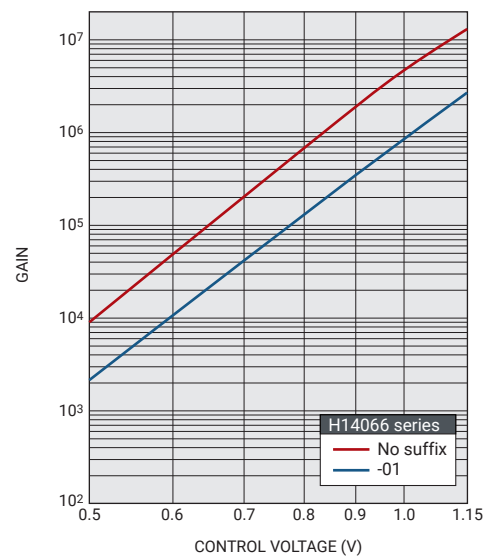
DETAILS OF INPUT WINDOW



CROSS SECTION



Gain



Micro PMT module current output type H12402 / H12403 series



Specifications

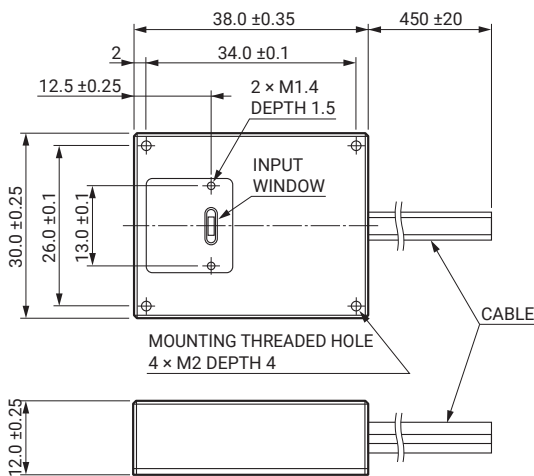
(at +25 °C)

Parameter		H12402 / H12403	H12402-01 / H12403-01	H12402-20 / H12403-20	Unit	
Spectral response		300 to 650	300 to 850	300 to 920	nm	
Peak sensitivity wavelength		420			nm	
Window material		Borosilicate glass			—	
Photocathode material		Bialkali	Multialkali	Extended red multialkali	—	
Effective area		1 × 3			mm	
Dynode number of stages		12			—	
Operating ambient temperature ^①		+5 to +50			°C	
Storage temperature ^①		-20 to +50			°C	
Input voltage		+4.5 to +5.5			V	
Maximum input voltage		+5.5			V	
Maximum input current ^②		20			mA	
Maximum average output signal current ^③		5			μA	
Maximum control voltage		+1.15			V	
Recommended control voltage adjustment range		+0.5 to +1.0	+0.5 to +1.1		V	
Control voltage input impedance		1			MΩ	
Cathode	Luminous sensitivity	Min.	50	100	300	μA/lm
		Typ.	80	200	400	μA/lm
	Radiant sensitivity ^④	Typ.	80	62	60	mA/W
	Blue sensitivity index	Typ.	8.0	—	—	—
Anode ^③	Luminous sensitivity	Min.	30	15	30	A/lm
		Typ.	160	70	100	A/lm
Gain ^③	Radiant sensitivity ^④	Typ.	1.6×10^5	2.1×10^4	1.5×10^4	A/W
		Typ.	2.0×10^6	3.5×10^5	2.5×10^5	—
Anode dark current ^{③⑤}		Typ.	0.3	0.6	nA	
		Max.	3	6	nA	
Time response	Rise time	1.2			ns	
Ripple noise ^{③⑥} (peak to peak)		0.3			mV	
Settling time ^⑦		10			s	

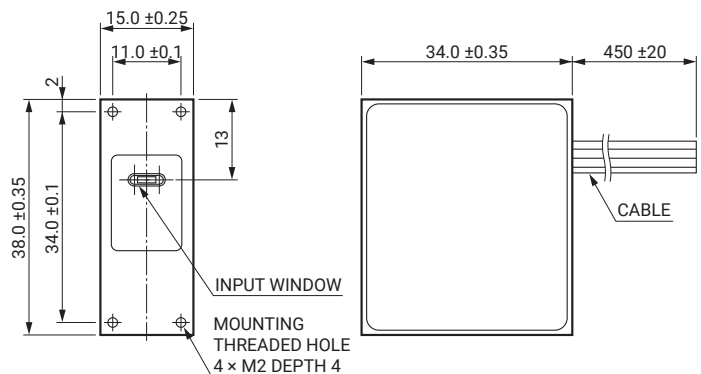
① No condensation ② At +5 V input voltage, +0.9 V control voltage, and output current equal to dark current ③ Supply Voltage: -900 V ④ Measured at the peak sensitivity wavelength
 ⑤ After 30 min storage in darkness ⑥ Cable RG-174/U, Cable length 450 mm, Load resistance=1 MΩ, Load capacitance=22 pF
 ⑦ The time required for the output to reach a stable level following a change in the control voltage from +1.0 V to +0.5 V.

Dimensional outlines (Unit: mm)

● H12402 Series



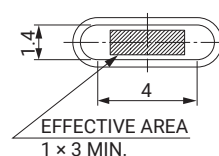
● H12403 Series



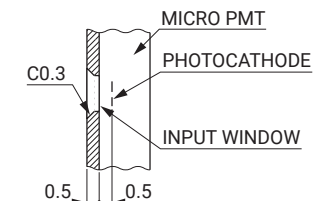
■ SIGNAL INPUT/OUTPUT

- UL1430 AWG26
- RG-174/U
- Black: GND
- Signal output /
- Red: Low voltage input (+5 V)
- Signal GND (Coaxial)
- Blue: Vref output (+1.2 V)
- White: Vcont input
- No suffix (+0.5 V to +1.0 V)
- 01, -20 (+0.5 V to +1.1 V)

■ DETAILS OF INPUT WINDOW



■ CROSS SECTION



Micro PMT module voltage output type H12404 / H12405 series



Specifications

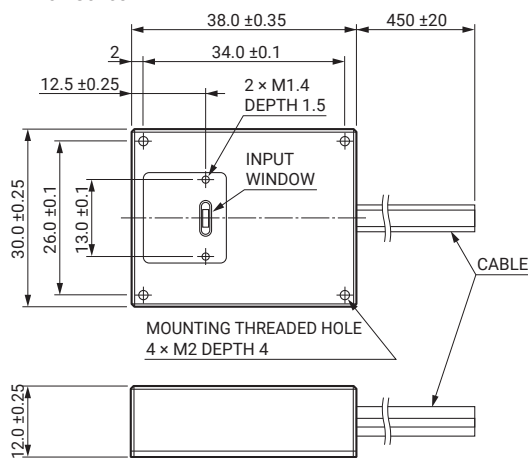
(at +25 °C)

Parameter		H12404 / H12405	H12404-01 / H12405-01	H12404-20 / H12405-20	Unit	
Spectral response		300 to 650	300 to 850	300 to 920	nm	
Peak sensitivity wavelength		420			630	nm
Window material		Borosilicate glass			—	
Photocathode material		Bialkali	Multialkali	Extended red multialkali	—	
Effective area		1 × 3			mm	
Dynode number of stages		12			—	
Operating ambient temperature ^①		+5 to +50			°C	
Storage temperature ^①		-20 to +50			°C	
Input voltage		±4.5 to ±5.5			V	
Maximum input voltage		±5.5			V	
Maximum input current ^②		+23.5 / -3.5			mA	
Maximum average output signal current		+4 (Load resistance 10 kΩ)			V	
Maximum control voltage		+1.15			V	
Recommended control voltage adjustment range		+0.5 to +1.0	+0.5 to +1.1		V	
Control voltage input impedance		1			MΩ	
Cathode	Luminous sensitivity	Min.	50	100	300	μA/lm
		Typ.	80	200	400	μA/lm
	Radiant sensitivity ^③	Typ.	80	62	60	mA/W
	Blue sensitivity index	Typ.	8.0	—	—	—
Anode ^④	Luminous sensitivity	Min.	3.0×10^7	1.5×10^7	3.0×10^7	V/lm
		Typ.	1.6×10^8	7.0×10^7	1.0×10^8	V/lm
	Radiant sensitivity ^③	Typ.	160	21	15	V/nW
Voltage output depending on PMT dark current ^{④⑤}		Typ.	0.3	0.6	mV	
		Max.	3	6	mV	
PMT gain		Typ.	2.0×10^6	3.5×10^5	2.5×10^5	—
Frequency bandwidth		DC to 20 kHz			—	
Current-to-voltage conversion factor		1			V/μA	
Output offset voltage		Typ.	±1		mV	
Ripple noise ^{⑥⑦} (peak to peak)		Max.	1.5		mV	
Settling time ^⑦		Max.	10		s	

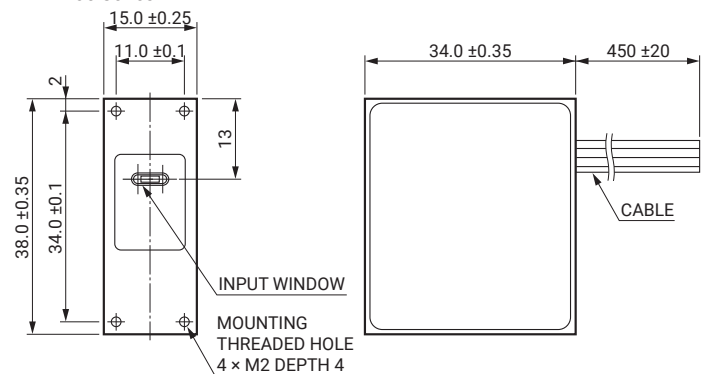
① No condensation ② At +5 V input voltage, +0.9 V control voltage, and output current equal to dark current ③ Measured at the peak sensitivity wavelength ④ Supply Voltage: -900 V
 ⑤ After 30 min storage in darkness ⑥ Cable RG-174/U, Cable length 450 mm, Load resistance=1 MΩ, Load capacitance=22 pF
 ⑦ The time required for the output to reach a stable level following a change in the control voltage from +1.0 V to +0.5 V.

Dimensional outlines (Unit: mm)

● H12404 Series



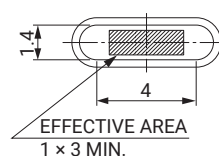
● H12405 Series



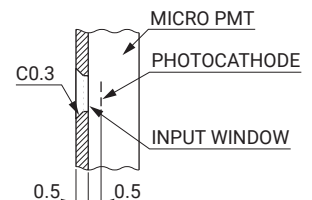
■ SIGNAL INPUT/OUTPUT

- UL1430 AWG26
- Black: GND
- Red: Low voltage input (+5 V)
- Green: Low voltage input (-5 V)
- Blue: Vref output (+1.2 V)
- White: Vcont input
- No suffix (+0.5 V to +1.0 V)
- 01, -20 (+0.5 V to +1.1 V)
- RG-174/U
- Signal output /
- Signal GND (Coaxial)

■ DETAILS OF INPUT WINDOW



■ CROSS SECTION





Micro PMT photon counting head H12406 series

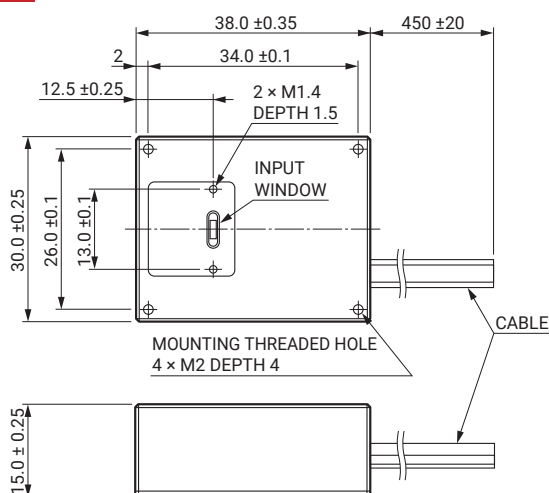
Specifications

(at +25 °C)

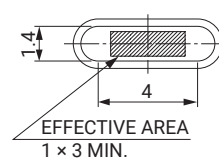
Parameter		H12406	H12406-01	H12406-20	Unit
Spectral response		300 to 650	300 to 850	300 to 920	nm
Peak sensitivity wavelength		420			nm
Window material		Borosilicate glass			—
Photocathode material		Bialkali	Multialkali	Extended red multialkali	—
Effective area		1 × 3			mm
Dynode number of stages		12			—
Operating ambient temperature ^①		+5 to +50			°C
Storage temperature ^①		-20 to +50			°C
Input voltage		+4.75 to +5.25			V
Maximum input voltage		+6			V
Maximum input current ^②		40			mA
Count sensitivity	300 nm	Typ. 1.7×10^5	2.1×10^5	4.4×10^4	$s^{-1} \cdot pW^{-1}$
	400 nm	Typ. 3.6×10^5	2.7×10^5	6.6×10^4	$s^{-1} \cdot pW^{-1}$
	500 nm	Typ. 2.6×10^5	2.3×10^5	2.1×10^5	$s^{-1} \cdot pW^{-1}$
	600 nm	Typ. 4.3×10^4	1.7×10^5	2.6×10^5	$s^{-1} \cdot pW^{-1}$
	700 nm	Typ. 1.4×10^2	9.6×10^4	2.1×10^5	$s^{-1} \cdot pW^{-1}$
	800 nm	Typ. —	2.1×10^4	1.2×10^5	$s^{-1} \cdot pW^{-1}$
	900 nm	Typ. —	—	3.9×10^3	$s^{-1} \cdot pW^{-1}$
Count linearity ^③		5.0×10^6			s^{-1}
Dark count ^④	Typ.	10	100	500	s^{-1}
	Max.	50	500	2500	s^{-1}
Pulse-pair resolution		20			ns
Output pulse width		10			ns
Output pulse height (at load resistance 50 Ω)	Min.	+2.0			V
	Typ.	+2.2			V
Recommended load resistance		50			Ω
Signal output logic		Positive logic			—
Excessive light detection output ^⑤	Excessive light incident	Min.	+3.5		V
	Normally	Max.	+0.5		V

① No condensation ② Output count, at $5 \times 10^6 s^{-1}$ ③ Random pulse, at 10% count loss ④ After 30 min storage in darkness ⑤ Load resistance 10 kΩ

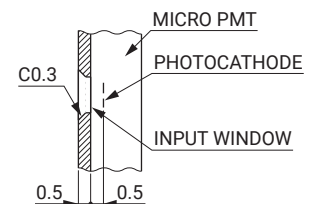
Dimensional outlines (Unit: mm)



DETAILS OF INPUT WINDOW



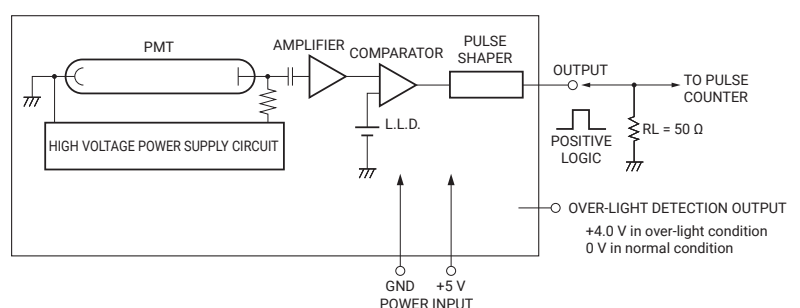
CROSS SECTION



SIGNAL INPUT/OUTPUT

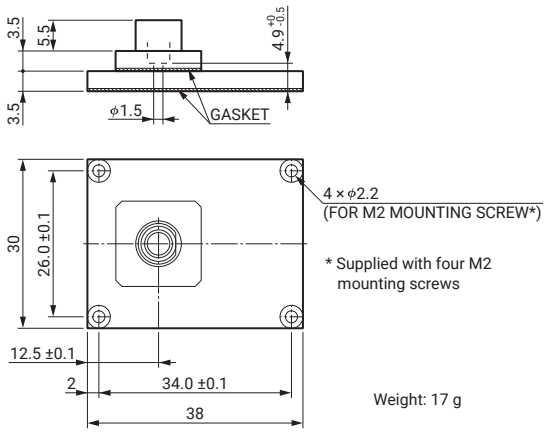
- UL1430 AWG26
- RG-174/U
- Black: GND
- Red: Low voltage input (+5 V)
- Blue: Over light detection output
- Signal output /
- Signal GND (Coaxial)

BLOCK DIAGRAM

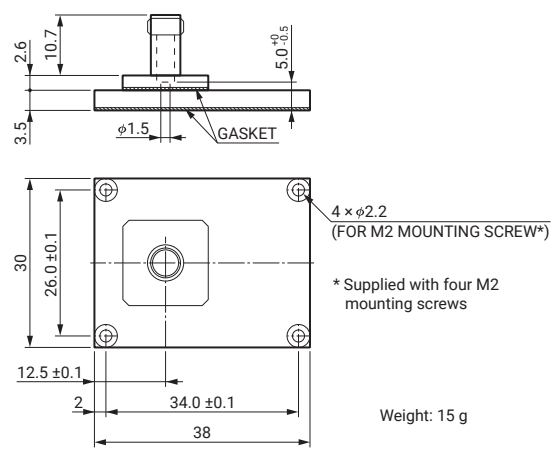


Option: Optical fiber adapter

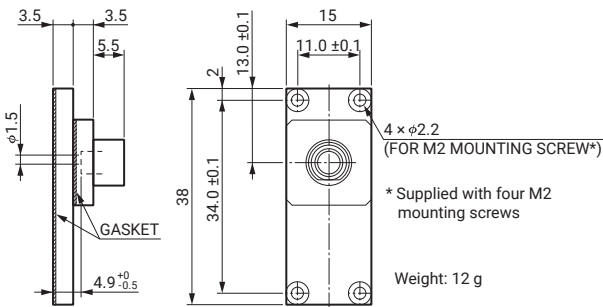
● E13561 (FC type)



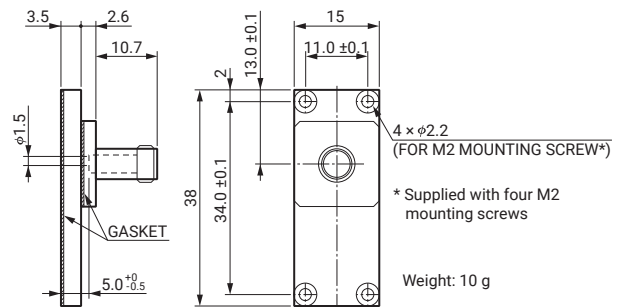
● E13562 (SMA type)



● E13563 (FC type)

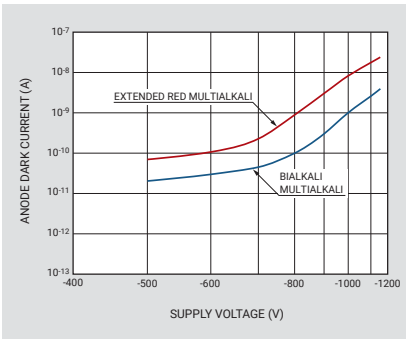


● E13564 (SMA type)



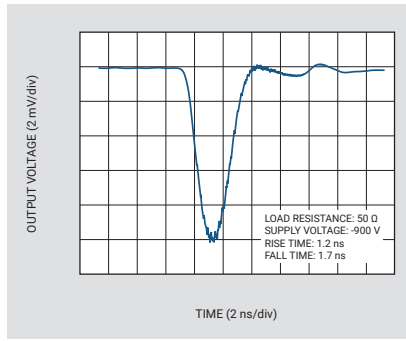
* E13561 and E13562 are exclusive options for H12402/H12404/H12406 series. E13563 and E13564 are exclusive options for H12403/H12405 series.

Characteristics (Micro PMT)



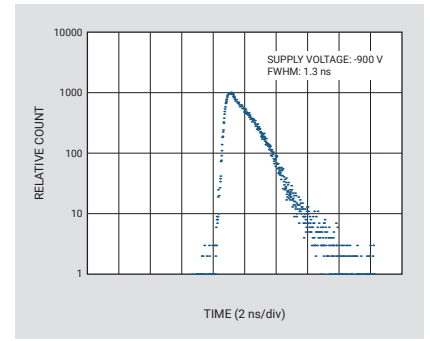
Dark current

Photomultiplier tubes output a small amount of current even when operated in a completely dark state. This output is called the dark current and the resultant noise is an important factor in determining the lower detection limit. The above graph shows typical dark currents from micro PMTs.



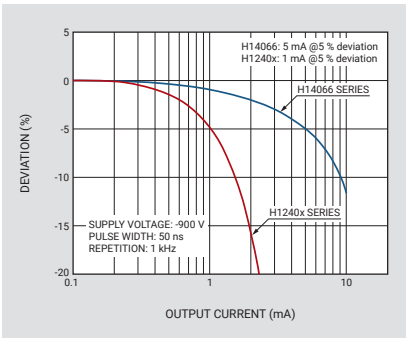
Output waveform

Photomultiplier tubes have a fast time response and can capture very short events. The above graph shows a typical output waveform when a light pulse with a width of 70 ps is input to a micro PMT.



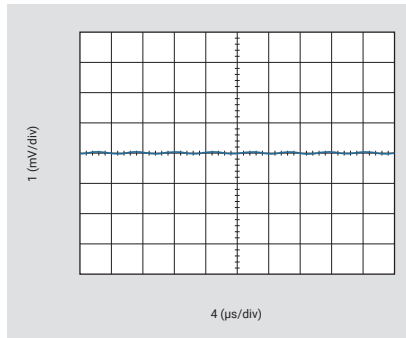
T.T.S. (transit time spread)

The time interval between the arrival of light at the photocathode and the instant when the anode output current reaches its peak amplitude is called the electron transit time. The transit time spread usually called T.T.S., indicates fluctuations in the electron transit time measured when the photocathode is fully illuminated with single photons and is defined as the FWHM (full width at half maximum) of the fluctuations in the histogram.



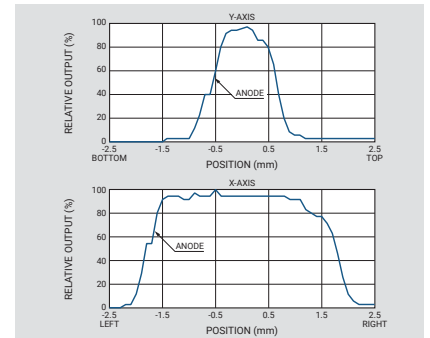
Pulse linearity

An intense light pulse input to the photocathode causes a large current to flow in the latter dynode stages that induces current saturation. This causes the output current to deviate from its ideal linearity. The above graph shows pulse linearity characteristics of micro PMTs.



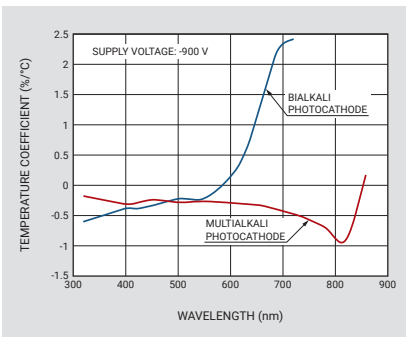
Ripple noise

Ripple noise is caused by the electronic oscillator of the built-in power supply. This noise signal can be observed on an oscilloscope along the baseline in a low voltage range by feeding the output signal to the oscilloscope while no light is incident on the micro PMT.



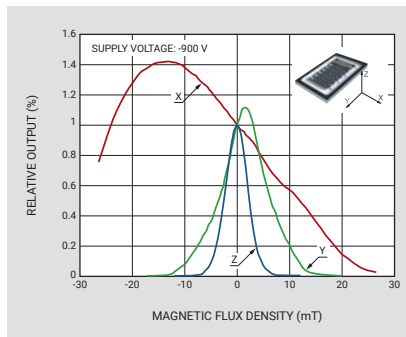
Uniformity (H1240x series)

This uniformity is the variation in sensitivity relative to the incident light position on the photocathode. The above graph shows an example of anode output measured by scanning a 1 mm diameter light spot over the photocathode surface of a micro PMT at a pitch of 0.1 mm in the X and Y axis directions.



Temperature characteristics

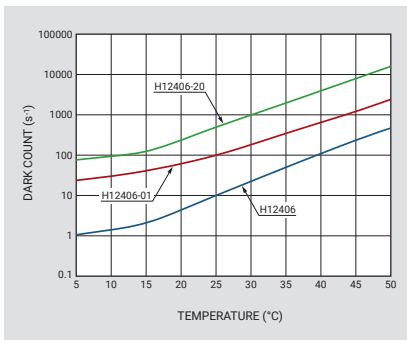
The anode sensitivity of photomultiplier tubes is affected by the ambient temperature. Temperature characteristics for anode sensitivity are wavelength-dependent and the temperature coefficient generally changes from a negative value to a positive value near the long wavelength limit. The above graph shows temperature coefficient data for each photocathode.



Magnetic characteristics (H1240x series)

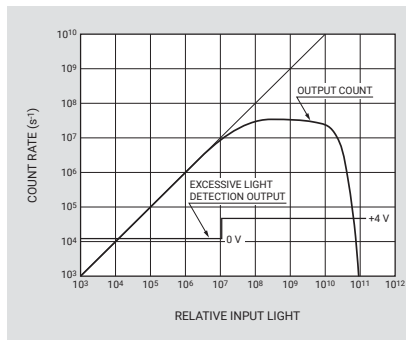
An external magnetic field causes photoelectrons in a photomultiplier tube to deviate from their normal trajectories, causing a loss of gain. The extent of the loss of gain depends on the direction of the magnetic field. The above graph shows effects from magnetic fields on the output of a micro PMT, indicating that the magnetic field in the Z direction has the largest effect on the output.

Characteristics (Micro PMT photon counting head)



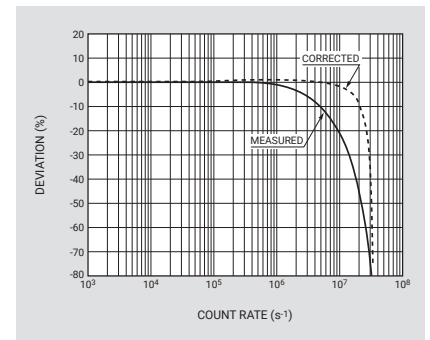
Dark count

Some dark current pulses are generated in a photomultiplier tube during operation even if no light is incident on it. Dark count is the number of dark current pulses per second (s^{-1}) and indicates the approximate lower limit of signal detection.



Count linearity and excessive light detection characteristics

When light is randomly incident on a photomultiplier tube, the output pulses begin to overlap each other as the light level increases and the count value is no longer proportional to the light level. If the incident light level greatly exceeds the count linearity, a signal is output to indicate an excessive light input.



Count rate correction

When the number of measured pulses exceeds $10^6 s^{-1}$, counting errors start to appear due to pulse overlap. One method for improving the count linearity utilizes a correction formula to find the approximate values. The above graph shows improved count linearity characteristics obtained by applying this correction formula.

Related products (for Micro PMT assembly)

High voltage power supply C14210-14 (0.4 W output, 1100 V / 0.4 mA)



The C14210-14 is a surface-mount high-voltage power supply module with a stabilizing circuit. Its compact and low-profile package is ideal as a power source for H12400 series micro PMT assemblies and also supports reflow soldering.

(at +25 °C)

Parameter		Value	Unit
Input voltage		+3.0 to +5.0	V
Input current ^①	Typ.	140 (Vdd=+5 V) / 235 (Vdd=+3 V) (full load)	mA
Specification guaranteed output voltage range ^②		-200 to -1100	V
Output current	Max.	0.4	mA
Input voltage regulation (for input variations of ±0.5 V) ^{①③}	Typ.	±0.01	%
Load regulation (for load changes from 0 to 100 %) ^①	Typ.	±0.01	%
Ripple / Noise (p-p) ^{①③}	Typ.	50	mV
Output voltage rise time (Rise time 0 %/99 %)		150	ms
Temperature coefficient ^{①③}	Typ.	±0.02	%/°C
Operating ambient temperature ^{①③}		0 to +50	°C
Weight	Typ.	4	g
Dimensions (W × H × D)		15 × 7 × 15	mm
Protective functions		Output overloaded protection / Excessive controlling voltage input	—

^① VDD=+3 V, at maximum output voltage and current ^② Malfunctions might occur if used beyond the guaranteed output voltage range. ^③ At maximum output current
* This product is supplied 50 pcs/lot.

High voltage power supply C10940 series (0.7 W output, 1200 V / 0.6 mA)



The C10940 series are a high voltage power supply module developed for compact size and high performance. This is designed to mount on a printed circuit board, making it ideal for use with the H12400 series micro PMT assembly. Besides high performance and low power consumption, a variety of protective functions are also included.

(at +25 °C)

Parameter		C10940-03	C10940-03-R2*	C10940-53	C10940-53-R2*	Unit
Input voltage		+5.0 ±0.5				V
Input current ^①	with no load	60				mA
	with full load	230				
Specification guaranteed output voltage range ^②		-200 to -1200		+200 to +1200		V
Output current	Max.	0.6				mA
Input voltage regulation (for input variations of ±0.5 V) ^{①③}	Typ.	±0.02				%
Load regulation (for load changes from 0 to 100 %) ^①	Typ.	±0.01				%
Ripple / Noise (p-p) ^{①③}	Typ.	50				mV
Output voltage rise time (Rise time 0 %/99 %) ^{①③}		120	300	120	300	ms
Temperature coefficient ^{①③}	Typ.	±0.01				%/°C
Operating ambient temperature ^{①③}		0 to +50				°C
Weight	Typ.	7.7				g
Dimensions (W × H × D)		15 × 18 × 15				mm
Protective functions		Units protected against reversed power input, Reversed / excessive controlling voltage input, Output overloaded protection				—

^① At maximum output voltage ^② Malfunctions might occur if used beyond the guaranteed output voltage range. ^③ At maximum output current
* -R2 type: RS-485 control

Related products (for Micro PMT module)

Amplifier units, Amplifier modules



These are amplifier units and amplifier modules for photomultiplier tubes and current output type PMT modules. Output signal from photomultiplier tubes can be directly input into these amplifiers.

● Frequency bandwidth 100 MHz or less

Parameter	C7319	C12419	C9999	C9999-01	C6438	C6438-01	C6438-02	M7279	Unit
Frequency bandwidth (-3 dB)	DC to 20 kHz DC to 200 kHz (Switchable) ①	DC to 1 MHz	DC to 10 MHz		DC to 50 MHz			DC to 10 MHz	—
Signal connector	BNC-R							On-board mounting	—
Current-to-voltage conversion factor	0.1 V/μA, 1 V/μA, 10 V/μA (Switchable) ①	1 V/μA	50 mV/μA	10 mV/μA	0.5 mV/μA	25 mV/μA	5 mV/μA	10 mV/μA	—
Signal input polarity	Positive / Negative								—
Signal output polarity	Inverting	Inverting	Non-inverting	Switchable	Non-inverting	Non-inverting	Switchable	Non-inverting	—
Supply voltage	±5 to ±15	±15	±5		±5			±5 to ±6.5	V

① Frequency bandwidth is limited to DC to 100 kHz at conversion ratio of 10 V/μA

● Frequency bandwidth 100 MHz or higher

Parameter	C9663	C11184	C5594-12	C5594-22	C5594-44	M8879	Unit
Frequency bandwidth (-3 dB)	DC to 150 MHz	DC to 300 MHz	50 kHz to 1.5 GHz			DC to 150 MHz	—
Signal connector	BNC-R	MCX-R (MCX-BNC adapter is supplied)	Input: SMA-P Output: SMA-R	SMA-R	BNC-R	On-board mounting	—
Current-to-voltage conversion factor	4 mV/μA	1.25 mV/μA	3.15 mV/μA			4 mV/μA	—
Signal input polarity	Positive / Negative						—
Signal output polarity	Non-inverting						—
Supply voltage	±5	±5	+12 to +16			±5 to ±6	V

Related products (for Micro PMT module)

Power supply for PMT module C10709



The C10709 is a power supply unit for photomultiplier tube modules. Input voltage and control voltage for photomultiplier tube modules can be supplied by this power supply unit alone.

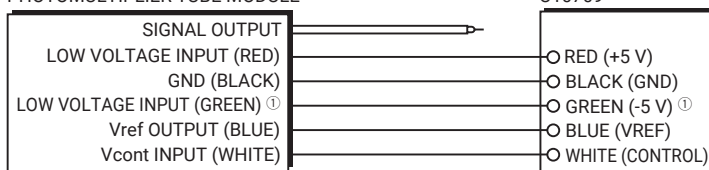
Parameter		C10709	Unit
Output voltage		±5	V
Output current	Max.	2.0 (+5 V) / -0.2 (-5 V)	A
Control voltage ^① (variable voltage range)		+0.25 to +1.8	V
Output connector		Binding post	—
Input voltage		100 to 240 (50 Hz / 60 Hz)	V

(at +25 °C)

① Adjust within the recommended control voltage range for the photosensor module being used.

CONNECTION DIAGRAMS

PHOTOMULTIPLIER TUBE MODULE



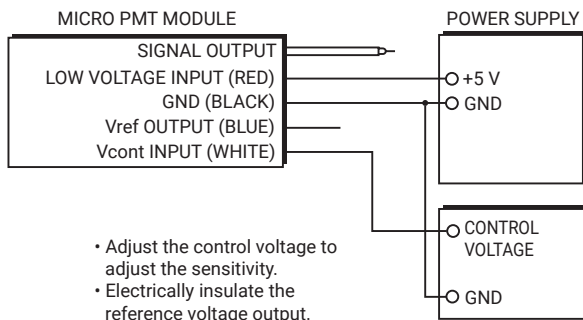
① Low voltage output type only

* The connection of the photomultiplier tube module must be made while the unit power is "OFF". Please make proper wiring connection otherwise the photomultiplier tube module may be damaged.

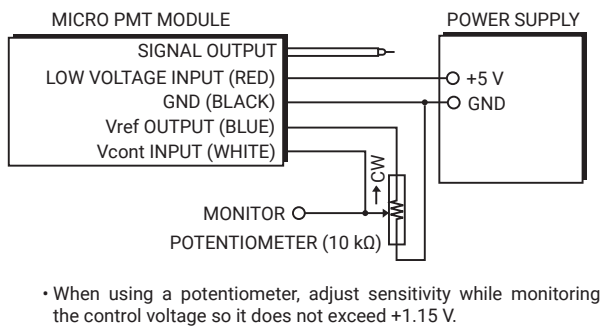
Sensitivity adjustment method (for Micro PMT module)

• Current output type

VOLTAGE PROGRAMMING

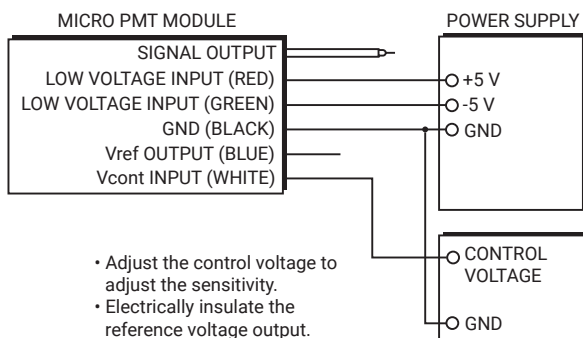


RESISTANCE PROGRAMMING

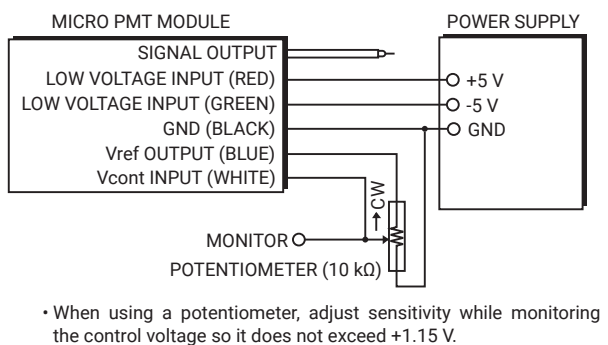


• Voltage output type

VOLTAGE PROGRAMMING



RESISTANCE PROGRAMMING



Related products (for Micro PMT photon counting head)

Counting unit C8855-01

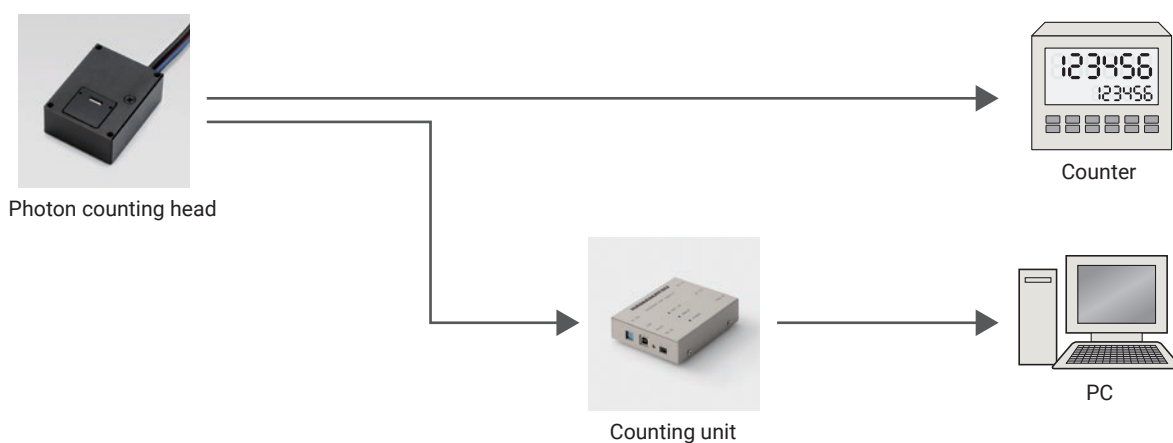


The C8855-01 is a counting unit with a USB interface port. The counter of the C8855-01 has two counter circuits (double counter method) capable of counting input signals with no dead time. The sample software that comes with the C8855-01 helps you start measurement easily and quickly.

(at +25 °C)

Parameter	C8855-01	Unit
Number of input signals	1	ch
Signal input level	CMOS positive logic	—
Signal pulse width	8 or longer	ns
Input impedance	50	Ω
Max. count rate	50	MHz
Internal counter gate time	50 μ s to 10 s	—
Trigger method	Software / External trigger	—
External trigger signal	TTL negative logic	—
OS	Windows® 8.1/10 Pro	—
Interface	USB (Type B)	—
Supply voltage	+7 V / 1.6 A (AC adapter included)	—

Example of photon counting measurement



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