

PHOTONIC DEVICES 2022

Electron Tube Devices and Applied Products

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By Application

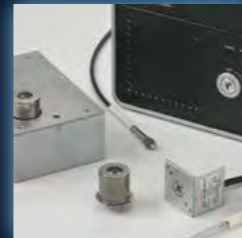
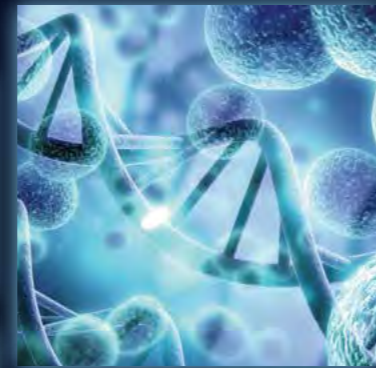
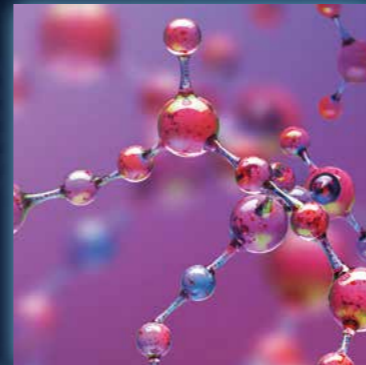
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- Underwater Optical Communication

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Electron tube devices, developed by harnessing technologies accumulated over long periods of time and involved in cutting-edge scientific research, are key devices for measuring the unobservable and capturing the undetectable. Our electron tube devices are still evolving, via the use of new technologies, into more compact, lightweight, sophisticated and versatile products optimized for specific uses and environments, and their evolution expands the application fields of the equipment where they are installed. Hamamatsu Photonics provides a wide range of electron tube devices that play active roles in a diverse array of fields including medical care, spectroscopy and analysis, semiconductor industry, biotechnology, and academic and scientific research. This brochure introduces innovative electron tube devices that we have newly designed and manufactured to push their performance even further.



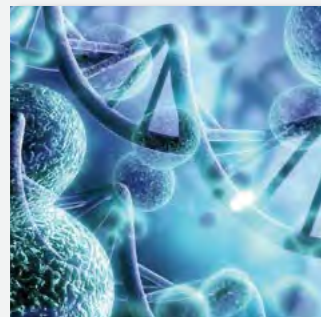
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By Application



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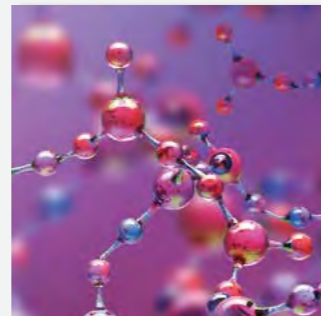
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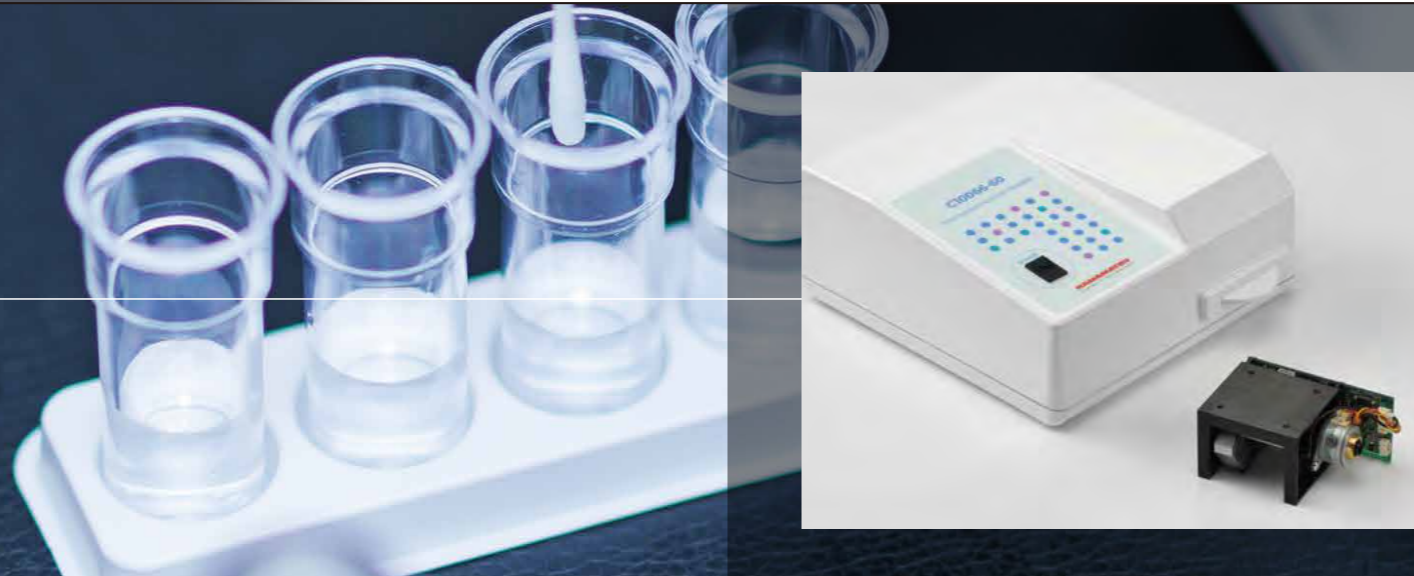
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In Vitro Diagnostics



In vitro diagnostics includes clinical tests for diagnosing diseases, disorders and infections by examining the cells, genes, components, bacteria and viruses contained in a specimen (sample to be inspected). In recent years, in vitro diagnostics contributes to supporting drug discoveries including development of COVID-19 vaccines and therapeutic drugs. To expand these diagnostic applications ever further, Hamamatsu Photonics provides high-sensitivity detectors with the various features needed to meet demands for rapid and accurate inspections.

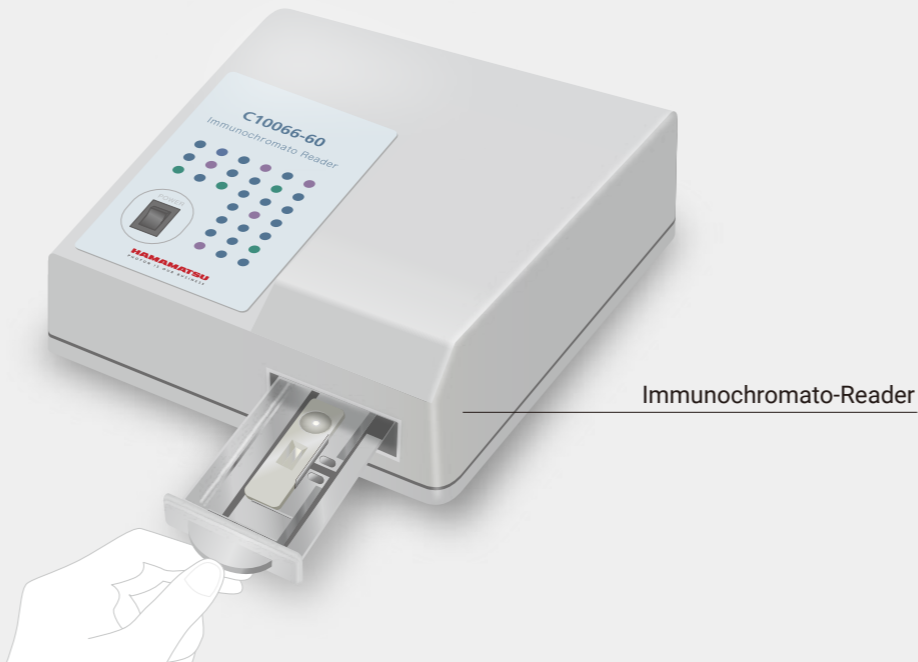
Immunochromato-Reader
C10066 Series

Immunochromato-Reader
C16171 Series

Dev.

In Vitro Diagnostics Diagram

Immunochromato-Reader





In Vitro Diagnostics

Immuno-chromato-Reader
C10066 Series

Immuno-chromato-Reader
C16171 Series

Dev.

Immuno-chromato-Reader

Immuno-chromato-Reader C10066 Series



▲ C10066-60

► [Click here](#) for more information on this product.

Lateral flow reader ideal for development and quality control of immunoassay reagents

The immuno-chromato-reader is a lateral flow reader that achieves high sensitivity and reproducibility by applying our advanced photonics technology for measuring light. The immuno-chromato-reader can detect reagent reactions with high sensitivity and accuracy and thus improves the reliability in research and development of immunoassay reagents. We also welcome OEM inquiries so please feel free to consult us.

Features

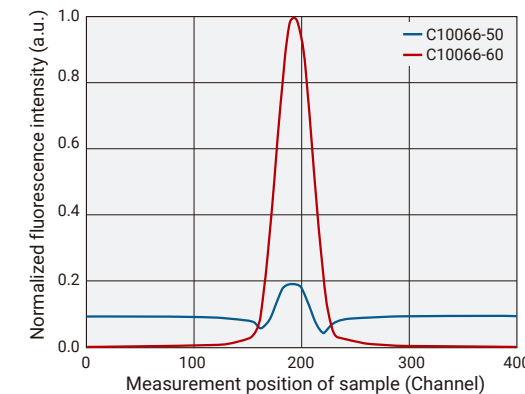
- High sensitivity: Detects lines impossible for human eyes to identify
- High reproducibility: Measurement variations less than 3 %
- Reagent compatibility: Detects color development and fluorescence lines

Product lineup

Model	Type No.	Measurement method	Measurement target
Standard absorption	C10066-10	Absorption method	Red-based color lines Blue-based color lines
Standard fluorescence	C10066-50	Fluorescence method	Europium
High-sensitivity fluorescence	C10066-60		

The C10066-60 offers a significantly improved signal-to-noise ratio achieved by reducing noise to one-third that of the C10066-50 while amplifying the signal up to about 8.6 times.

● Waveform when sample was scanned with C10066-60 (Typ.)





In Vitro Diagnostics

Immuno-chromato-Reader
C10066 Series

Immuno-chromato-Reader
C16171 Series

Dev.

Immuno-chromato-Reader

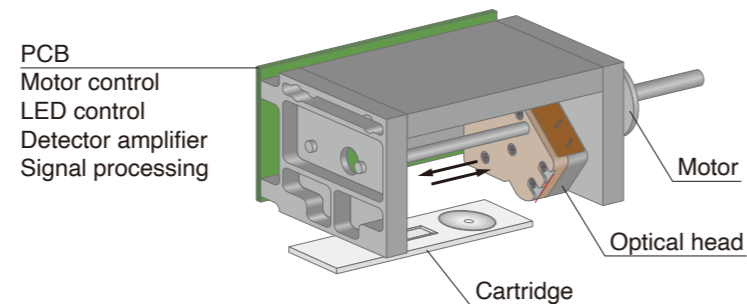
Immuno-chromato-Reader C16171 Series

Dev.



Lateral flow reader engine optimized for installation into equipment

The C16171 series is a lateral flow reader engine designed for a small footprint allowing installation into other equipment and with functions spanning measurement to analysis. The C16171 series offers the same high performance as the C10066 series and is optimized for installation into equipment, contributing to rapid customer development of lateral flow readers. We also support OEM supply so please feel free to consult us.



Product lineup

Model	Type No.	Measurement method	Measurement target
Standard absorption	C16171-10	Absorption method	Red-based color lines (ex. colloidal gold)
Standard absorption	C16171-11		Blue-based color lines
Standard fluorescence	C16171-50	Fluorescence method	Europium
High-sensitivity fluorescence	C16171-60		



Flow Cytometry



A flow cytometer is an analytical instrument extremely useful in biological applications such as cell cycle analysis, cell analysis by cell surface antigen and cell sorting. Recently, flow cytometers are using multicolor fluorescent dyes and becoming more compact and lightweight yet deliver a higher throughput. At Hamamatsu Photonics we are developing unique products to meet the new needs of rapidly evolving flow cytometers.

Photosensor Modules (GaAsP / GaAs / InGaAs Photocathode)
H16200 / H16201 / H16204 Series

NEW
Dev.

Spectrum Detector Module
H15441-20

NEW
Dev.

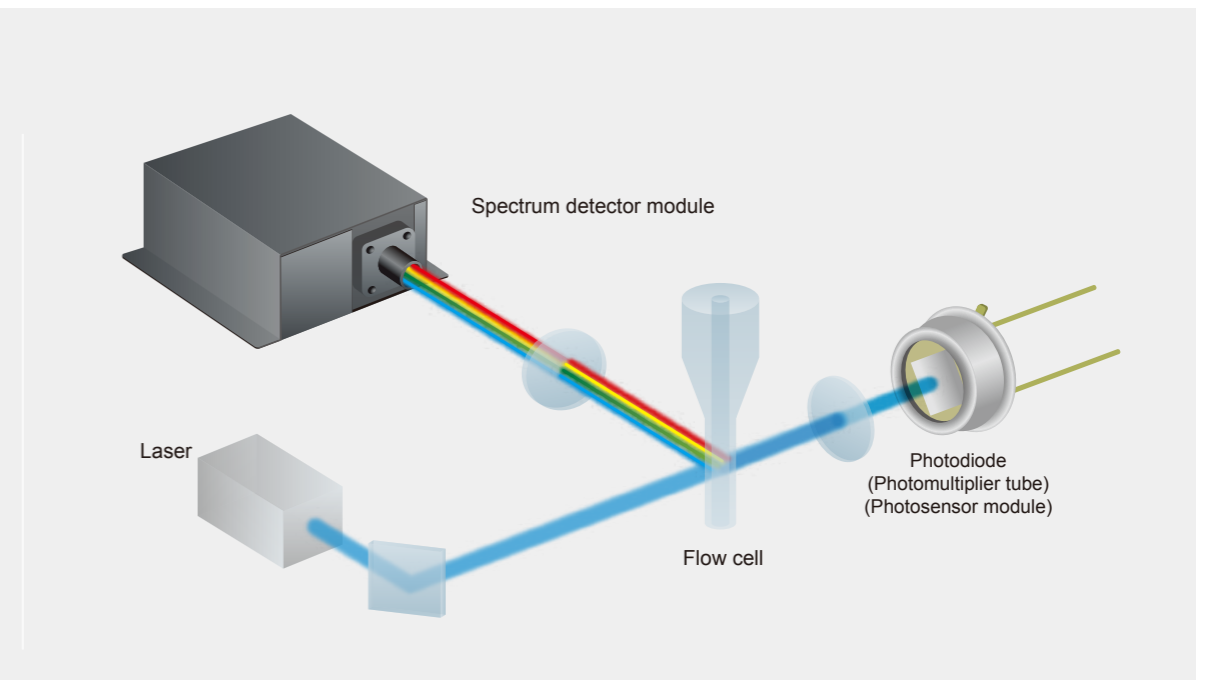
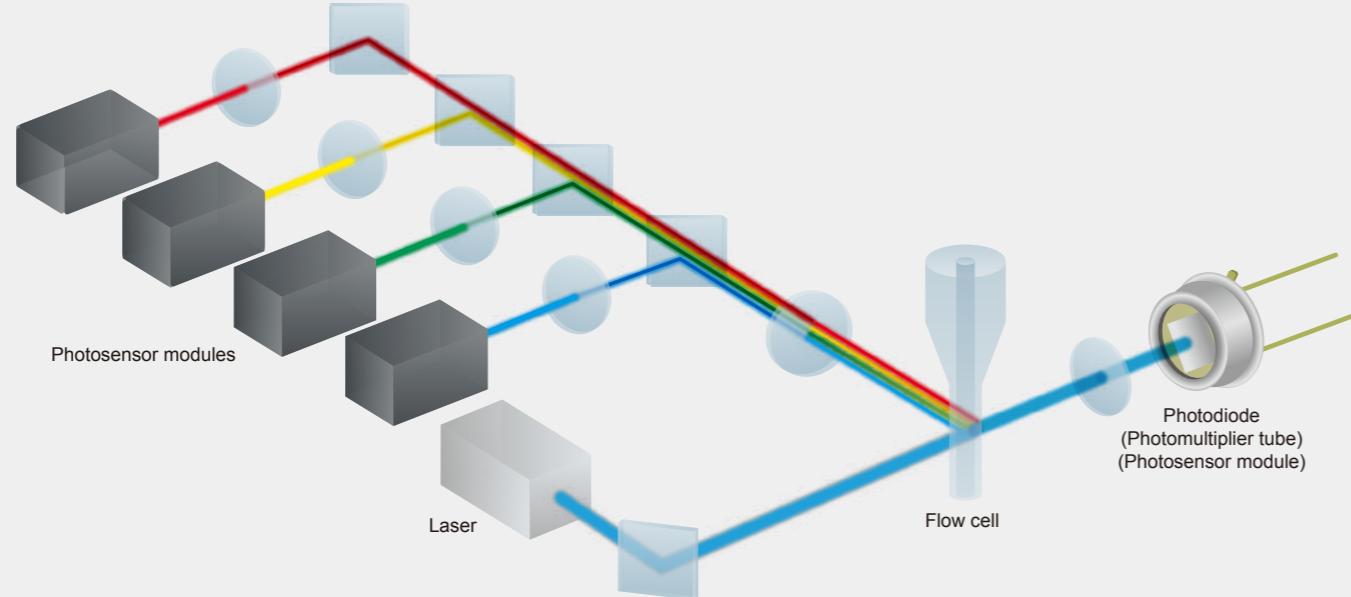
Flow Cells – AR (Antireflection) Coating

Dev.

Flow Cell Assemblies
J12800 Series

NEW
Dev.

Flow Cytometry Structure



Flow Cytometry

Photosensor Modules (GaAsP / GaAs / InGaAs Photocathode)
 H16200 / H16201 / H16204 Series

NEW
 Devt.

Spectrum Detector Module
 H15441-20

NEW

Flow Cells – AR (Antireflection) Coating

Devt.

Flow Cell Assemblies
 J12800 Series

NEW

Devt.

Photosensor Modules (GaAsP / GaAs / InGaAs Photocathode) H16200 / H16201 / H16204 Series

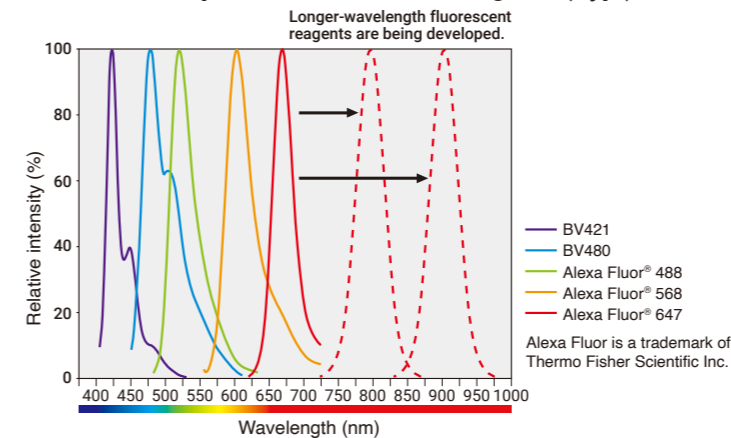
NEW Devt.



High-sensitivity photomultiplier tube modules that help boost flow cytometer performance

These are photosensor modules with a GaAsP photocathode, GaAs photocathode and InGaAs photocathode ideal for multicolor flow cytometry where fluorescent reagents for longer wavelengths are increasingly being used and high sensitivity detectors are required to measure the narrowed bandwidths of fluorescence wavelengths. These photosensor modules have been newly developed to keep pace with these new trends and requirements. We will keep aiming for even higher sensitivity to help boost flow cytometer performance.

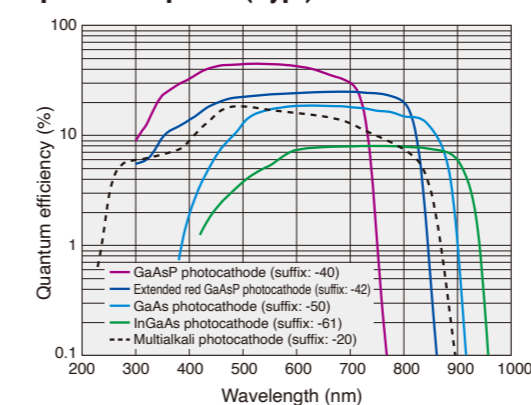
Fluorescence spectra of fluorescent reagents (Typ.)



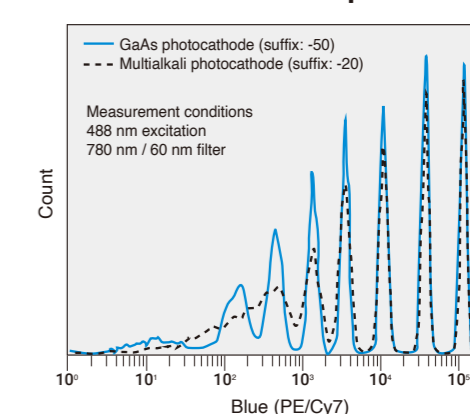
Product lineup

Type	Type No.	Photocathode
Side-on type with pin output	H16200-40	GaAsP
	H16200-50	GaAs NEW
	H16200-61	InGaAs Devt.
Head-on type with cable output	H16201-40	GaAsP
	H16201-50	GaAs NEW
	H16201-61	InGaAs Devt.
Side-on type with cable output	H16204-40	GaAsP Devt.
	H16204-50	GaAs Devt.
	H16204-61	InGaAs Devt.

Spectral response (Typ.)



Detector simulation with 8 peak beads (Typ.)





Flow Cytometry

Photosensor Modules (GaAsP / GaAs / InGaAs Photocathode)
H16200 / H16201 / H16204 Series

NEW
Dev.

Spectrum Detector Module
H15441-20

NEW

Flow Cells – AR (Antireflection) Coating

Dev.

Flow Cell Assemblies
J12800 Series

NEW
Dev.

Spectrum Detector Module H15441-20

NEW



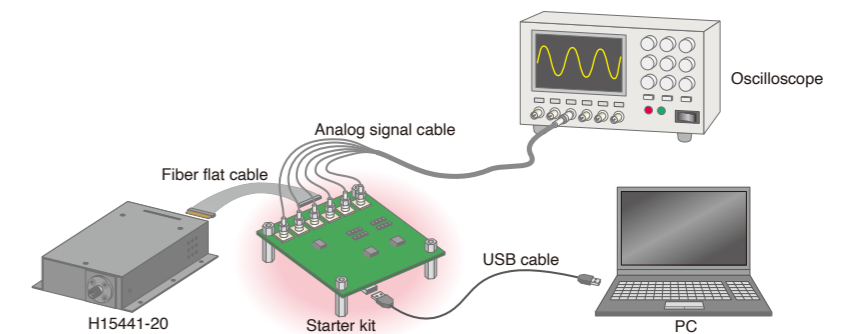
Photomultiplier tube module that performs simultaneous multi-wavelength measurements with high accuracy

The H15441-20 is a palm-sized 6-channel spectrum detector module capable of simultaneous multi-wavelength measurements. The internal filters can also be customized according to the fluorescence and scattered light to be measured.



Starter Kit for Simple Evaluation

We also offer a starter kit that includes a drive circuit for the H15441-20. This starter kit has a USB port for connecting to a PC to use the supplied sample software that controls a ± 5 V power supply, operating voltage, gain adjustment of each channel, and data acquisition. It also has an SMB terminal that outputs a signal for making measurements with an oscilloscope, etc.



Flow Cytometry

Photosensor Modules (GaAsP / GaAs / InGaAs Photocathode)
 H16200 / H16201 / H16204 Series

NEW
 Devt.

Spectrum Detector Module
 H15441-20

NEW

Flow Cells – AR (Antireflection) Coating

Devt.

Flow Cell Assemblies
 J12800 Series

NEW
 Devt.

Flow Cells – AR (Antireflection) Coating

Devt.

Flow Cell Assemblies J12800 Series

NEW
 Devt.



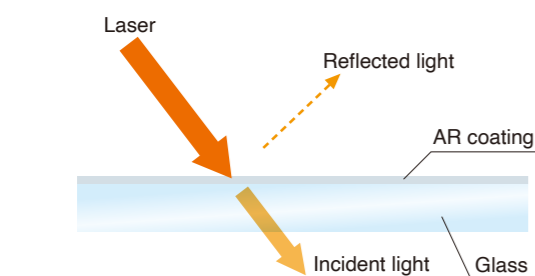
Flow cells with low reflectance over a broad spectral range

A flow cell is a glass product having an optical surface capable of optical measurement as well as having a flow path for the samples. The laser wavelength range for flow cytometers is expanding to cover a broad spectrum from the UV to near infrared region. To keep up with this broader wavelength range, we have added new products to our flow cell lineup which have an AR coating to exhibit low reflectance over a broad spectral range. This will reduce laser noise or namely stray light, and improve the flow cytometer's measurement sensitivity.



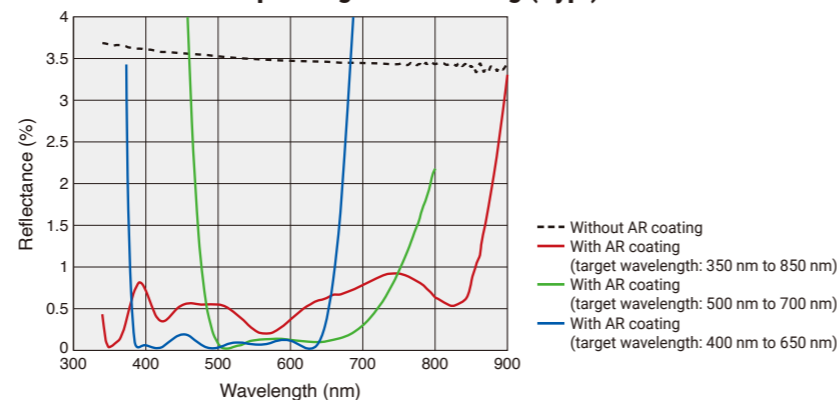
Easy-to-use flow cell assemblies with high performance

The J12800 series flow cell assemblies are made with the plastic and metal parts essential for delivering fluid to the flow cell. Besides repeated stability and stable laminar flow, the J12800 series has other great features including alignment-free operation, use of commercially available tubes, and easy mounting. Each assembly offers easy use along with high performance.



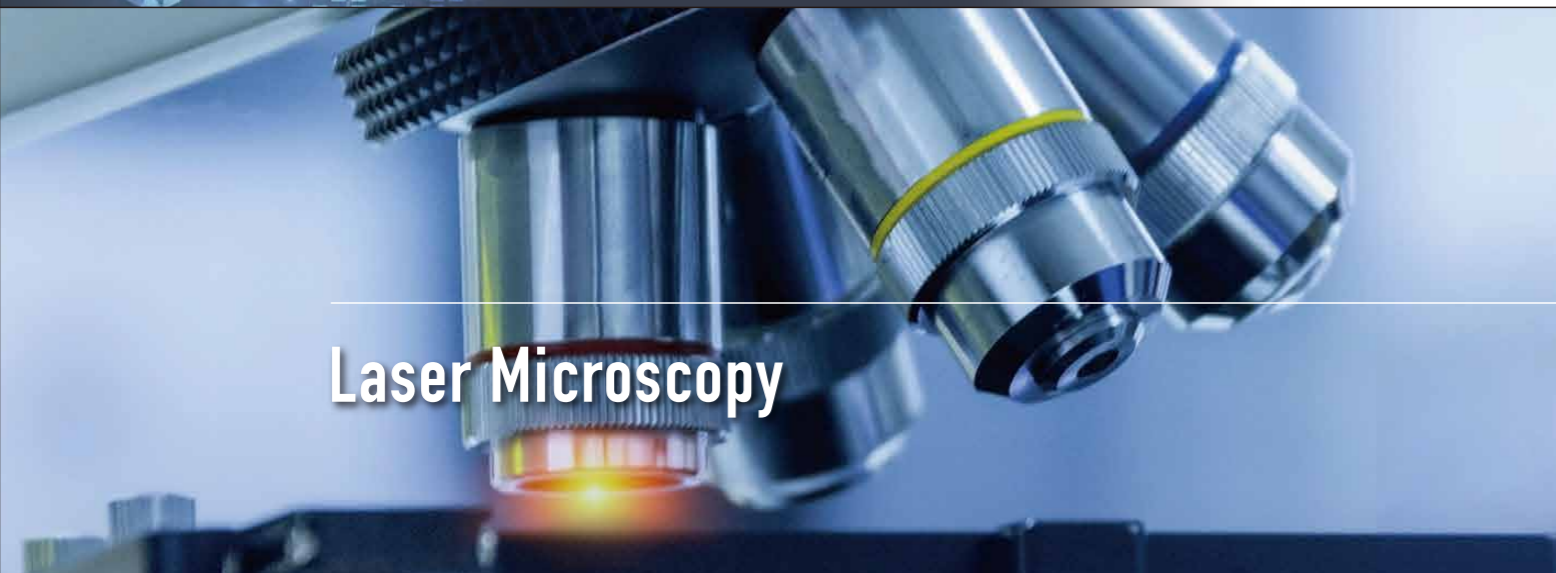
[Click here](#) for more information on this product.

Reflectance after depositing an AR coating (Typ.)



Product lineup

Type	Type No.	Flow channel size (mm)
Square type	J12800-000-A3A Devt.	□ 0.15 ± 0.025
	J12800-000-A4A Devt.	□ 0.2 ± 0.025
	J12800-000-A5A Devt.	□ 0.25 ± 0.025
Thin type	J12800-000-B3A NEW	□ 0.15 ± 0.025
	J12800-000-B4A NEW	□ 0.2 ± 0.025
	J12800-000-B5A NEW	□ 0.25 ± 0.025



Laser Microscopy



In laser microscopy using confocal laser scanning microscopes and multiphoton excitation microscopes, photosensor modules incorporating photomultiplier tubes are becoming widely used to detect fluorescence and scattered light from samples. Hamamatsu Photonics is constantly working to improve on this technology for compound semiconductor photocathodes to enhance photomultiplier tube sensitivity to still higher levels.

Photosensor Module (GaAsP Photocathode)
H15460-40

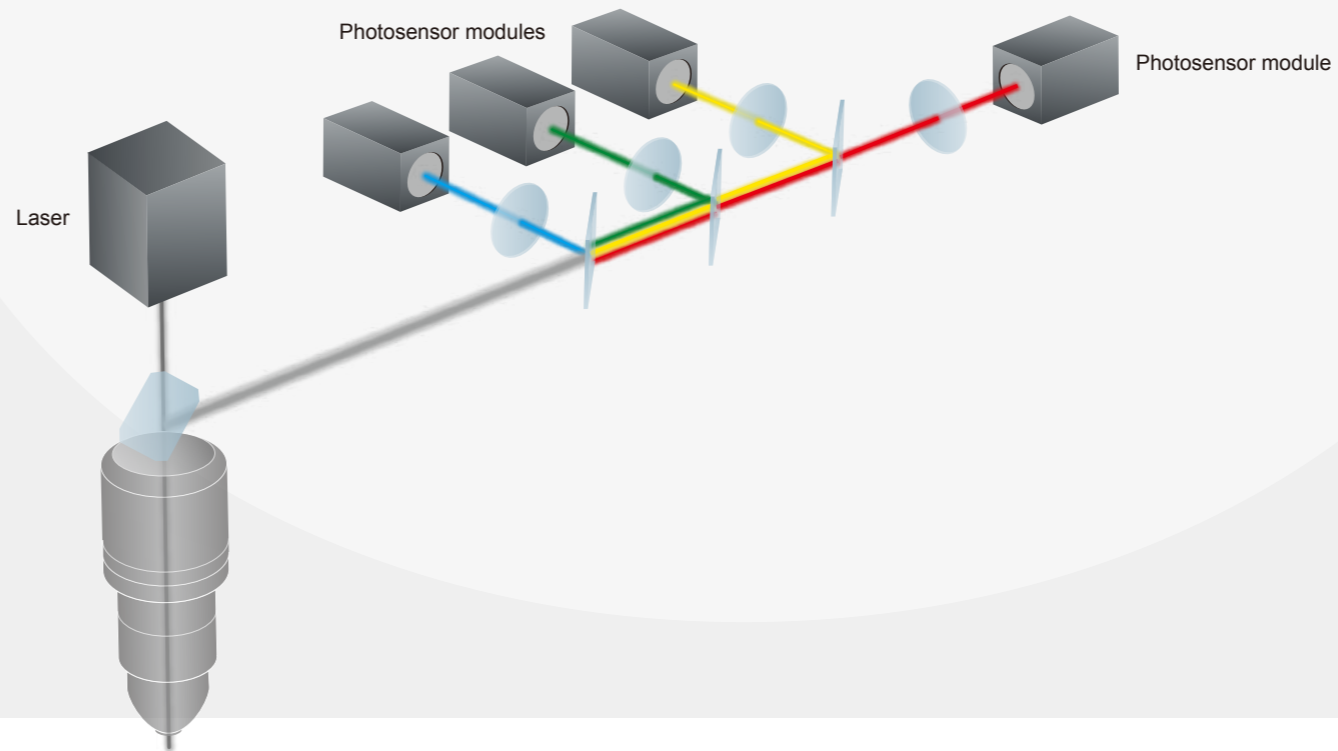
Photosensor Modules (GaAsP / GaAs Photocathode)
H16200 / H16201 / H16204 Series

NEW
Dev.

Photosensor Modules (InP/InGaAsP Photocathode)
H15620-25/-45

NEW

Laser Microscopy Structure





Laser Microscopy

Photosensor Module (GaAsP Photocathode)
H15460-40

Photosensor Modules (GaAsP / GaAs Photocathode)
H16200 / H16201 / H16204 Series

NEW
Dev.

Photosensor Modules (InP/InGaAsP Photocathode)
H15620-25/-45

NEW

10x Larger Area for Multiphoton Excitation Microscopy

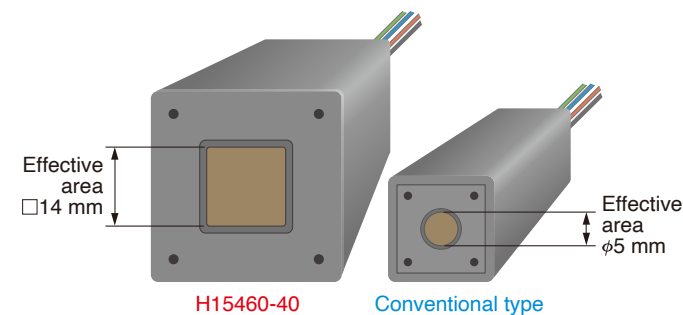
Photosensor Module (GaAsP Photocathode) H15460-40



[Click here](#) for more information on this product.

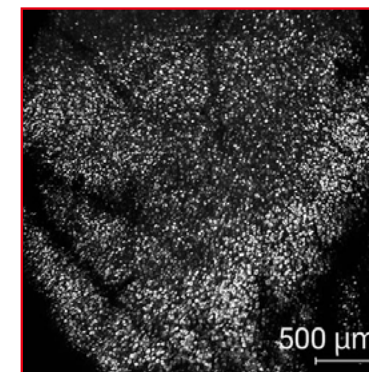
Photomultiplier tube module with a large effective area and built-in high-frequency band amplifier

The H15460-40 photosensor module employs a GaAsP photocathode photomultiplier tube. The effective area is 14 mm square making it ideal for multiphoton excitation microscopes. The H15460-40 also includes an amplifier with a frequency band of 30 MHz and a current-to-voltage conversion factor of 0.02 V/ μ A.



Imaging example

- Observation of deep mouse brain



Area: 3 mm x 3 mm
Depth: 500 μ m from brain surface

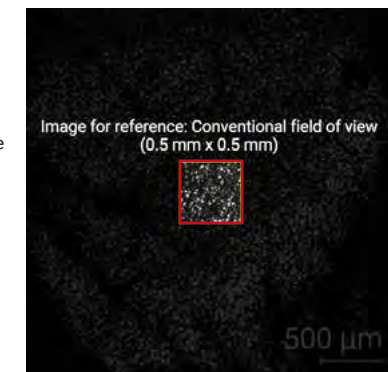
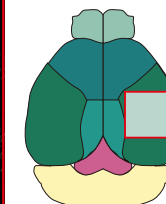
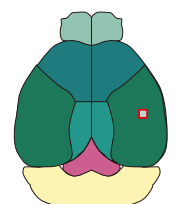


Image for reference: Conventional field of view (0.5 mm x 0.5 mm)



The large photosensitive area allows observation of deep tissues in a wide field-of-view which is one of the great features of multiphoton microscopes.

Provided by Masanori Murayama, Ph.D., RIKEN Center for Brain Science (CBS)



Laser Microscopy

Photosensor Module (GaAsP Photocathode)
H15460-40

Photosensor Modules (GaAsP / GaAs Photocathode)
H16200 / H16201 / H16204 Series

NEW
Dev.

Photosensor Modules (InP/InGaAsP Photocathode)
H15620-25/-45

NEW

For Better Image Contrast Without Protection Circuit

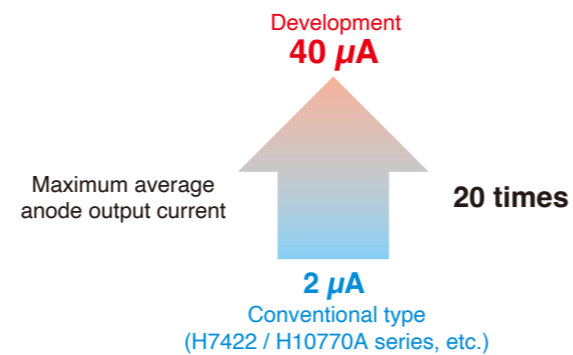
Photosensor Modules (GaAsP / GaAs Photocathode) H16200 / H16201 / H16204 Series

NEW Dev.

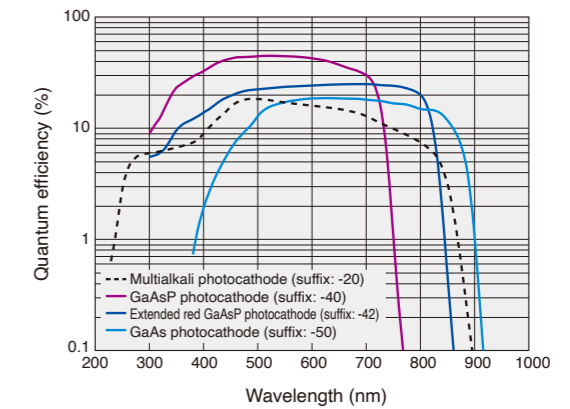


Easy-to-use photomultiplier tube modules with a wide dynamic range

These photosensor modules use a GaAsP photocathode photomultiplier tube. These achieve a wide dynamic range with a maximum output current of 40 μ A, providing clear images with sharp contrast and also ensuring stable operation without needing a protection circuit.



Spectral response (Typ.)





Laser Microscopy

Photosensor Module (GaAsP Photocathode)
H15460-40

Photosensor Modules (GaAsP / GaAs Photocathode)
H16200 / H16201 / H16204 Series

NEW
Dev.

Photosensor Modules (InP/InGaAsP Photocathode)
H15620-25/-45

NEW

For NIR Detection

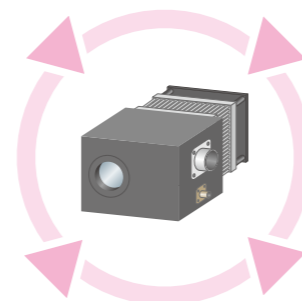
Photosensor Modules (InP/InGaAsP Photocathode) H15620-25/-45

NEW



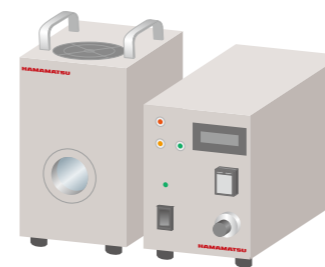
Compact, easy-to-install photomultiplier tube modules

The H15620-25 and H15620-45 photosensor modules employ an InP/InGaAsP photocathode photomultiplier tube. Compared to the conventional type (H10330C series), these photosensor modules are designed to be compact making them easier to install in laser microscopes.



H15620-25/-45

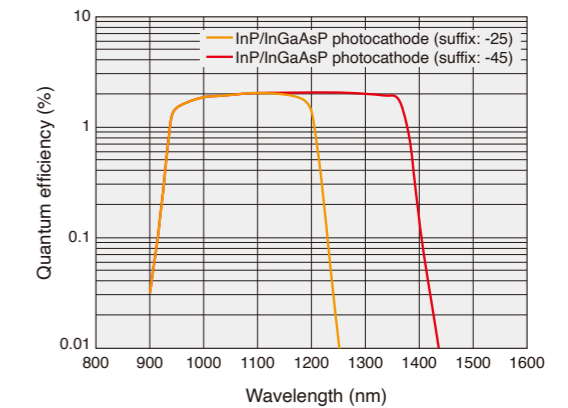
(W) 80 mm × (H) 60 mm × (D) 126 mm

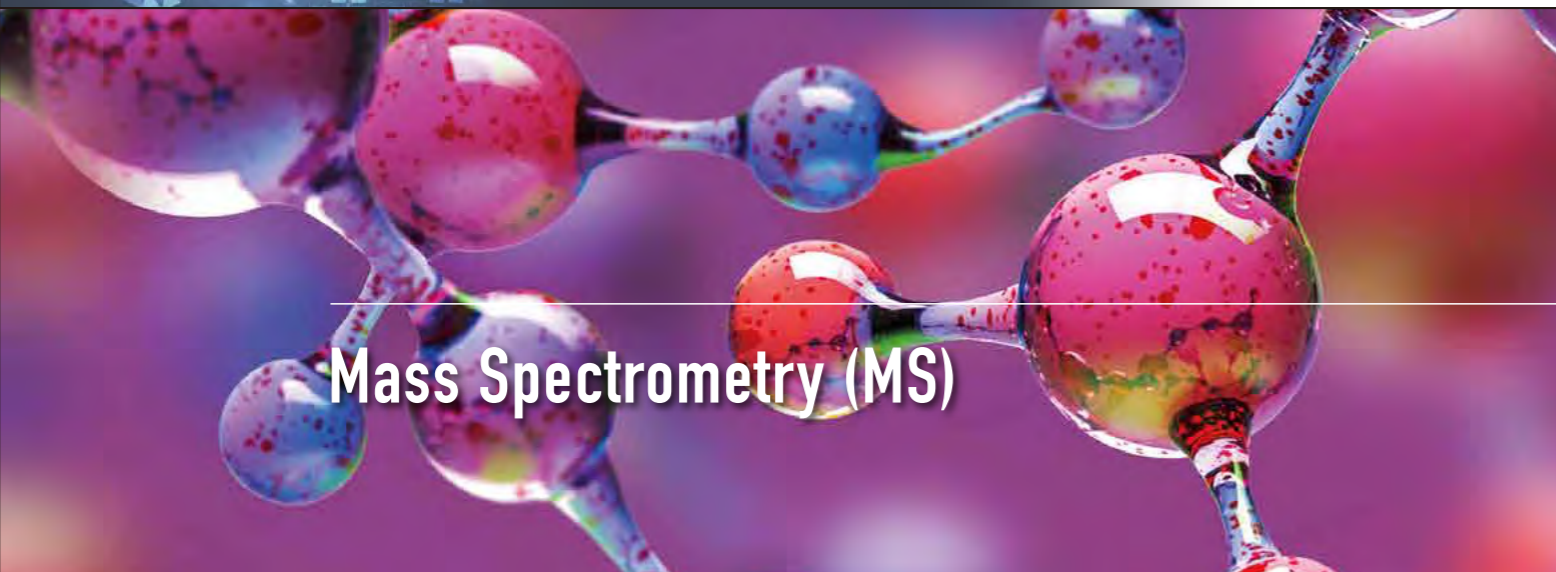


Conventional type
(H10330C series)

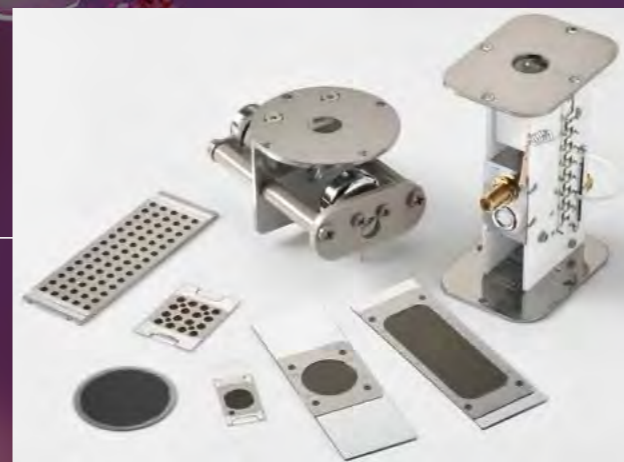
Main unit: (W) 100 mm × (H) 163 mm × (D) 150 mm
Controller unit: (W) 102 mm × (H) 131 mm × (D) 279.5 mm

Spectral response (Typ.)





Mass Spectrometry (MS)



To conform to recent environmental regulations, Hamamatsu Photonics is developing eco-friendly "lead (Pb) free" products. Next-generation ion detectors are also simultaneously under development that come assembled with a semiconductor AD (avalanche diode) capable of high current output, high-speed response, and long life.

Ion Detector with Lead-Free MCP

Dev.

Dual Mode Electron Multiplier EMADION™ R15244

Dev.

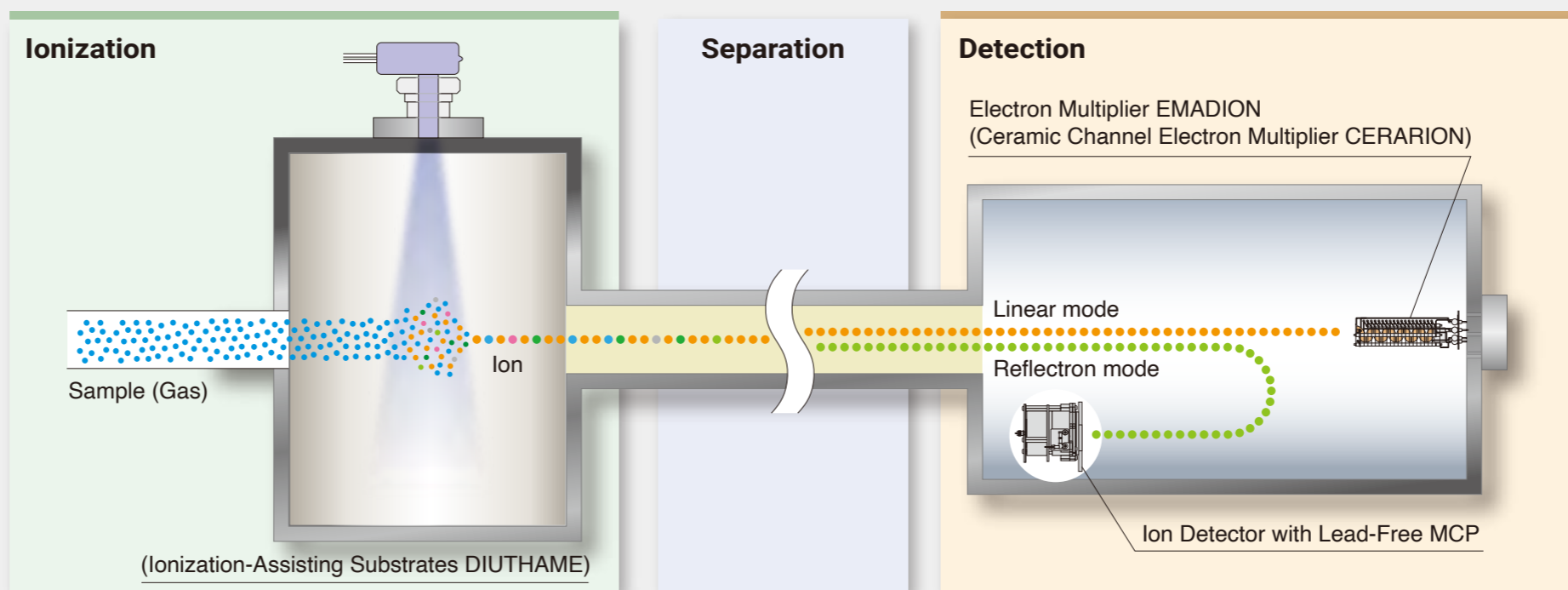
Ceramic Channel Electron Multiplier CERARION® R14747-80

NEW

Ionization-Assisting Substrates DIUTHAME®

Dev.

Mass Spectrometry (MS) Structure



Mass Spectrometry (MS)

Ion Detector with Lead-Free MCP

Dev.

Dual Mode Electron Multiplier EMADION™ R15244

Dev.

Ceramic Channel Electron Multiplier CERARION® R14747-80

NEW

Ionization-Assisting Substrates DIUTHAME®

Dev.

TOF-MS (Time of Flight MS)

Ion Detector with Lead-Free MCP

Dev.

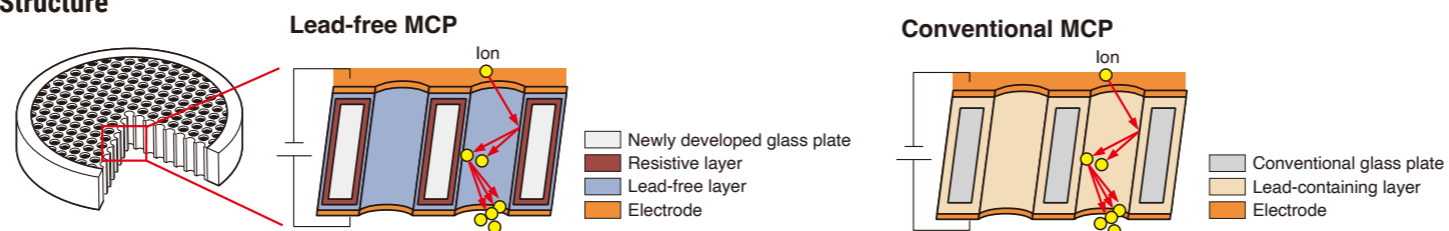


▲27 mm dia. lead-free MCP

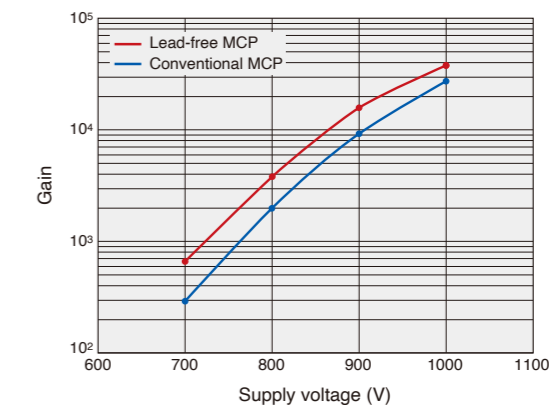
Lead (Pb) free ion detectors conforming to environmental regulations

Hamamatsu Photonics is developing a new type of ion detectors that incorporate a lead (Pb) free MCP (microchannel plate) designed and developed to conform to recent environmental regulations. These ion detectors exhibit the same performance as the current products and so will prove a satisfactory and eco-friendly replacement.

Structure



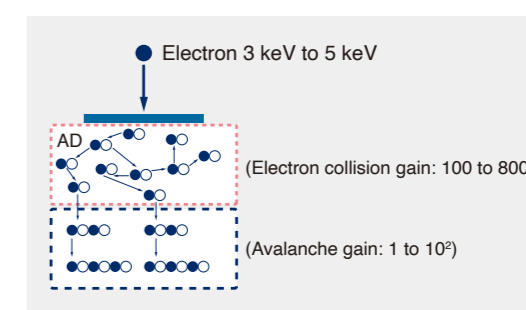
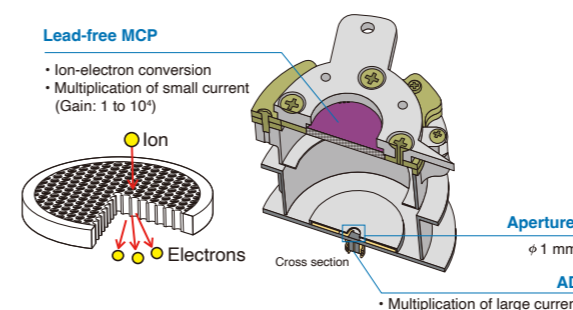
Gain (Typ.)



Installation example

MCP Assembly MIGHTION® with Lead-Free MCP

MIGHTION is an ion detector using a combination of lead-free MCP (microchannel plate) and semiconductor AD (avalanche diode).





Mass Spectrometry (MS)

Ion Detector with Lead-Free MCP

Dev.

Dual Mode Electron Multiplier EMADION™ R15244

Dev.

Ceramic Channel Electron Multiplier CERARION® R14747-80

NEW

Ionization-Assisting Substrates DIUTHAME®

Dev.

ICP-MS (Inductively Coupled Plasma MS)

Dual Mode Electron Multiplier EMADION™ R15244

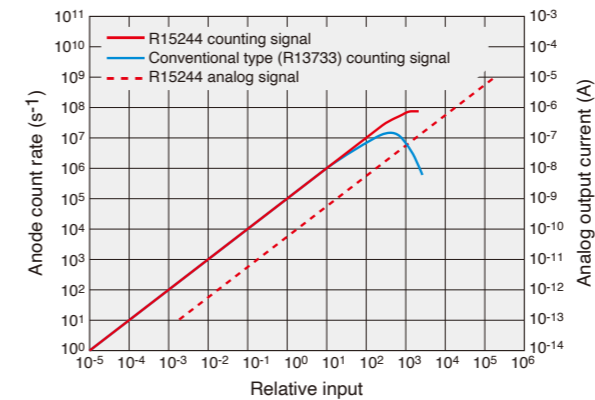
Dev.



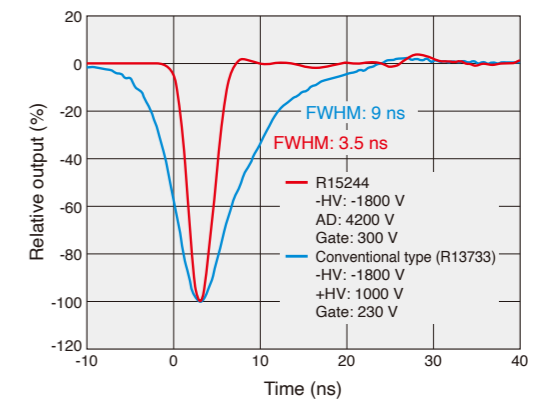
A new type of ion detector that delivers a wide dynamic range and long service life

The EMADION is a new type of ion detector utilizing a combination of electron multiplier and semiconductor AD (avalanche diode). Compared to our currently available product (R13733), the EMADION offers better time response characteristics, longer service life and a wider dynamic range.

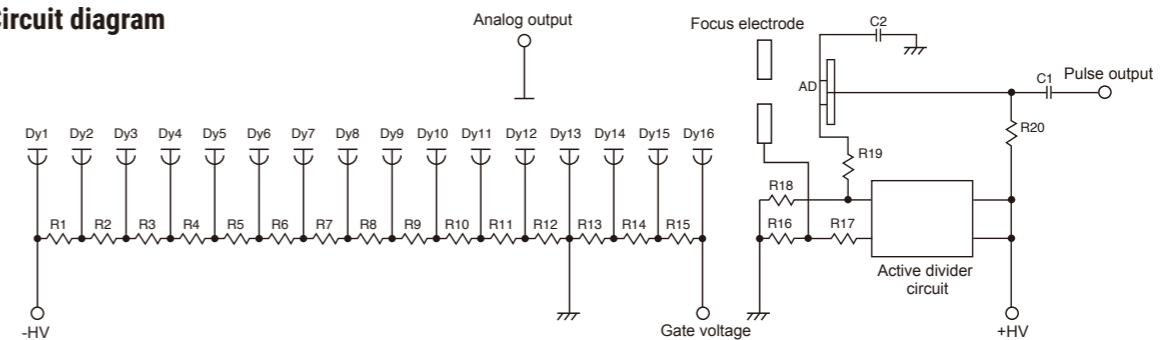
Dynamic range (Typ.)



Output waveform (Typ.)



Circuit diagram





Mass Spectrometry (MS)

Ion Detector with Lead-Free MCP

Dev.

Dual Mode Electron Multiplier EMADION™
R15244

Dev.

Ceramic Channel Electron Multiplier CERARION®
R14747-80

NEW

Ionization-Assisting Substrates DIUTHAME®

Dev.

Q-MS (Quadrupole MS)

Ceramic Channel Electron Multiplier CERARION® R14747-80

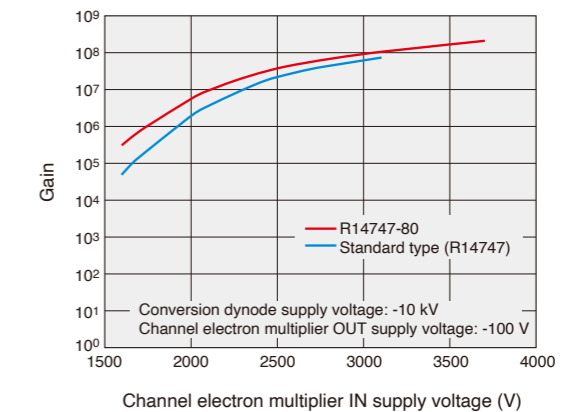
NEW



Lead-free ion detector customizable to meet user equipment specifications

CERARION is a lead-free channel electron multiplier that employs a ceramic structure with high design flexibility and robustness. The shape and the number of channels can be customized to meet user equipment specifications. When mounted with a conversion dynode, CERARION can measure ions of both polarities by changing the polarity of the voltage applied to the conversion dynode.

Gain (Typ.)



Mass Spectrometry (MS)

Ion Detector with Lead-Free MCP Dev.

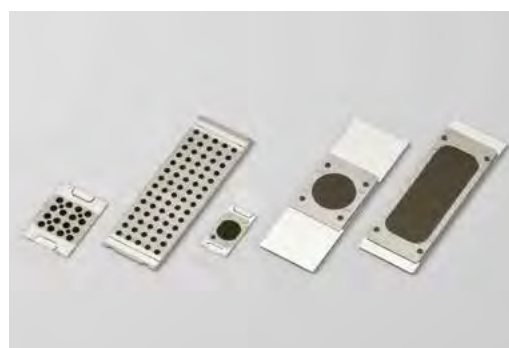
Dual Mode Electron Multiplier EMADION™ R15244 Dev.

Ceramic Channel Electron Multiplier CERARION® R14747-80 NEW

Ionization-Assisting Substrates DIUTHAME® Dev.

MALDI-MS (Matrix Assisted Laser Desorption/Ionization MS)

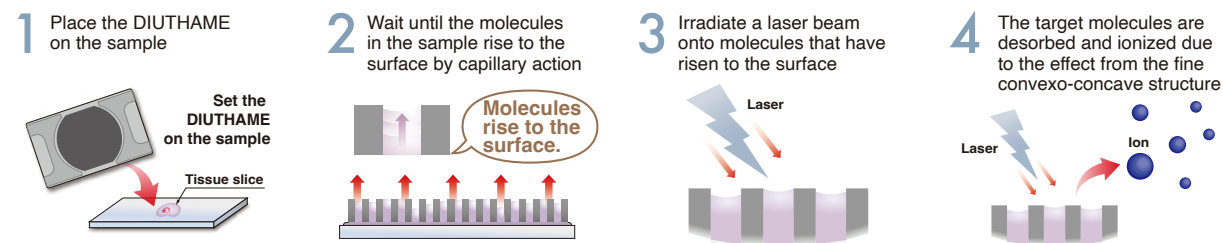
Ionization-Assisting Substrates DIUTHAME® Dev.



Ionization measurement support tool broadens the range of possible applications with an expanded lineup

DIUTHAME is an ionization-assisting tool that eliminates the matrix required by the MALDI technique. Just placing a DIUTHAME substrate on a sample swiftly promotes ionization. There is no background noise originating from the matrix, and no pretreatment of samples is required. DIUTHAME brings high reproducibility and ease-of-handling to mass spectrometry by serving as a completely new ionization tool that can be readily used by all MALDI mass spectrometer users.

Principle



Application examples

- [MS imaging of frozen fried chicken using blotting method](#)
- [MS imaging of chocolate](#)
- [MS imaging of fresh strawberry using blotting method](#)
- [MS imaging of mouse brain](#)
- [MS imaging of flower petal using blotting method](#)
- [MS imaging of industrial material using blotting method](#)
- [MS imaging of polymer material by mist extraction method using a humidifier](#)
- [MS imaging of black rice](#)
- [MS imaging for mouse brain using vapor extraction method](#)
- [Skin analysis by MS imaging using blotting method](#)
- [MS imaging for chemorepellent of slime mold using blotting method](#)
- [High spatial resolution\(5 μm\) MS imaging with simple pretreatment](#)

➔ [Click here](#) for more information on this product.

Product lineup

Type	Type No.	Product photo	Number of channels	Channel diameter (mm)
For mass spectrum Multiple channels enable efficient measurement	16 channel	A14111-3-2	16	φ3
	70 channel	A14111-3-3	70	
For mass imaging Products can be selected according to the size of the measurement sample	Standard	A13331-10-1	1	φ10
	Blotting*1	A13331-10-1B		
	Standard	A13331-18-3 Dev.	1	φ18
	Blotting*1	A13331-18-3B Dev.		
	Standard	A13331-5019-2 Dev.		
	Blotting*1	A13331-5019-2B Dev.	49 × 18	

*1: Blotting is a measurement technique for transferring the components of the sample surface from the back side of DIUTHAME.

Printing and Bonding



In printing and bonding applications where demands for higher speed, higher quality, and higher added value never cease, Hamamatsu Photonics helps vastly improve the throughput and yield by supplying products backed by advanced photonics technology. To do our part in assisting with environmental regulations and SDGs (Sustainable Development Goals) that are becoming much stricter in recent years, we are also focusing on providing solutions that are friendly to both people and the environment.

Linear Irradiation Type UV-LED Unit
LIGHTNINGCURE® LC-L5G GH-103A

NEW

Linear Irradiation Type UV-LED Unit
LIGHTNINGCURE® LC-L5G GC-113A

NEW

Linear Irradiation Type UV-LED Unit
LIGHTNINGCURE® LC-L5G GA-107

NEW

UV-LED Spot Light Source
LIGHTNINGCURE® LC-L1V5

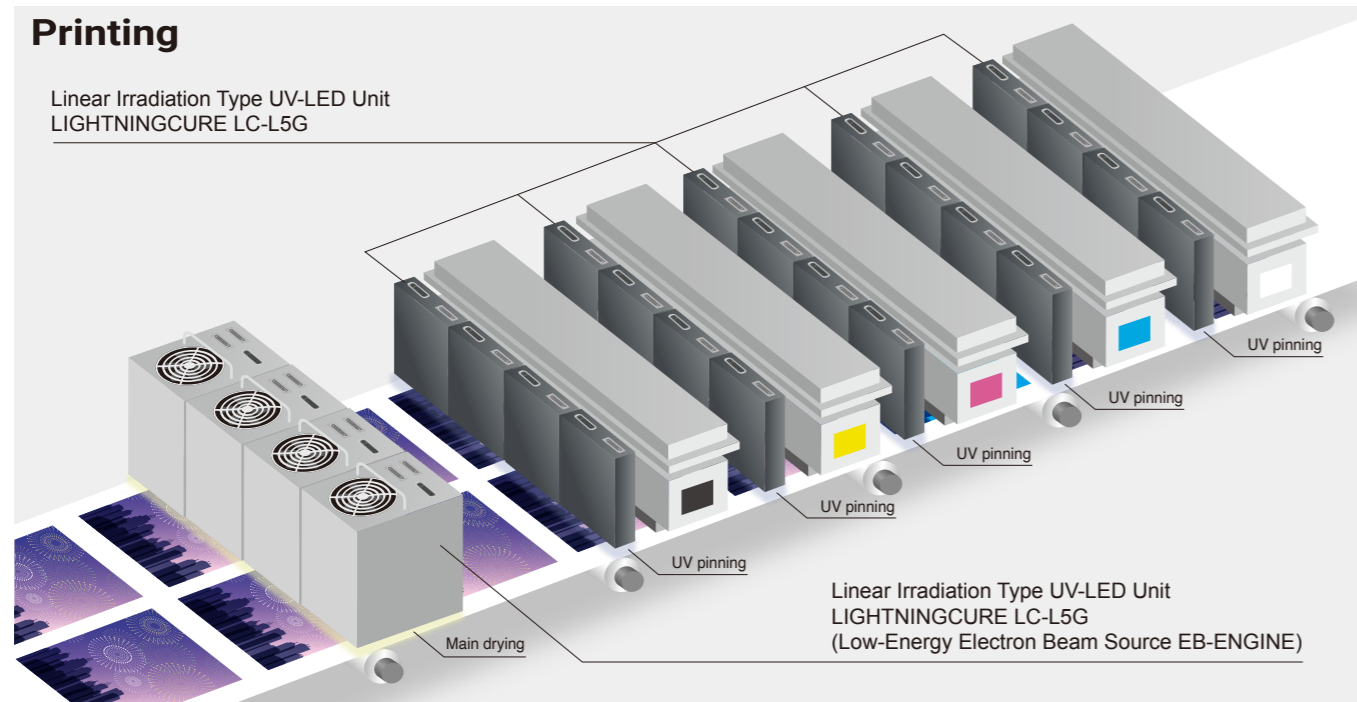
NEW

Low-Energy Electron Beam Source
EB-ENGINE™ (Wide Type) L16379

Dev.

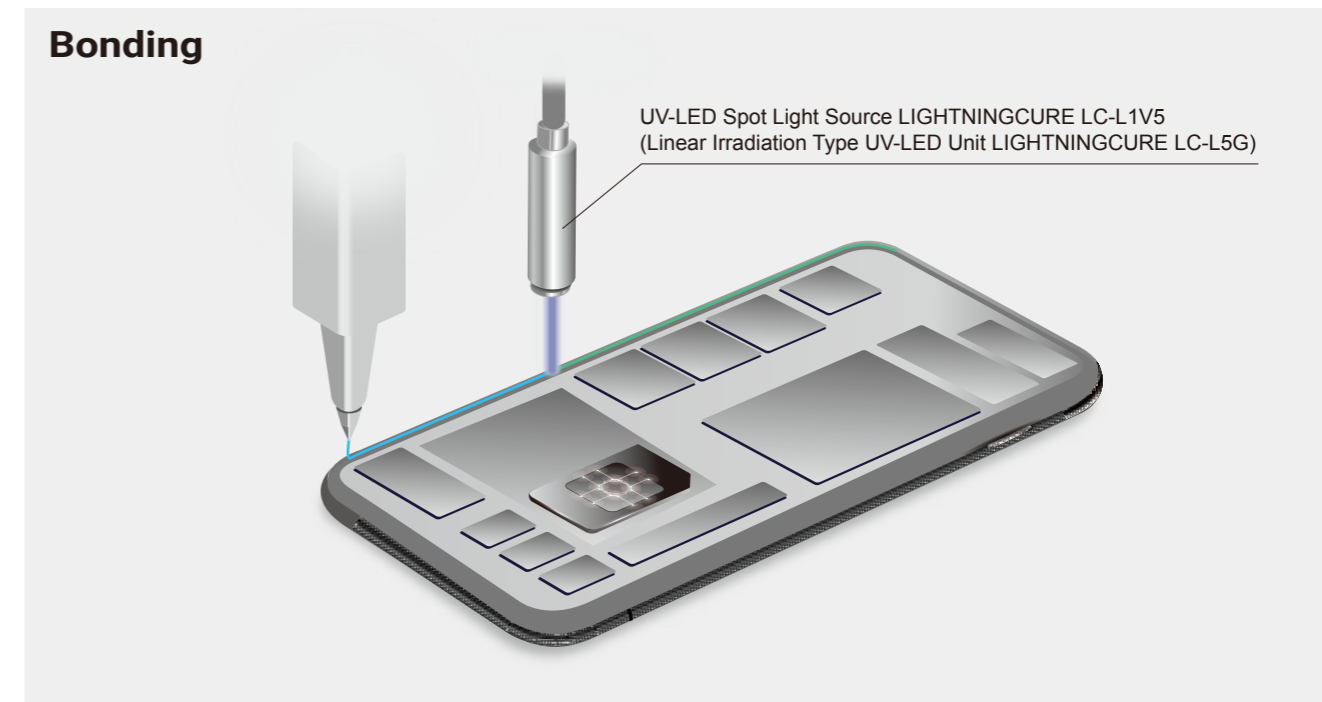
Printing

Linear Irradiation Type UV-LED Unit
LIGHTNINGCURE LC-L5G



Bonding

UV-LED Spot Light Source LIGHTNINGCURE LC-L1V5
(Linear Irradiation Type UV-LED Unit LIGHTNINGCURE LC-L5G)





Printing and Bonding

Linear Irradiation Type UV-LED Unit
LIGHTNINGCURE® LC-L5G GH-103A **NEW**

UV-LED Spot Light Source
LIGHTNINGCURE® LC-L1V5 **NEW**

Linear Irradiation Type UV-LED Unit
LIGHTNINGCURE® LC-L5G GC-113A **NEW**

Low-Energy Electron Beam Source
EB-ENGINE™ (Wide Type) L16379 **Dev.**

Linear Irradiation Type UV-LED Unit
LIGHTNINGCURE® LC-L5G GA-107 **NEW**

Linear Irradiation Type UV-LED Unit LIGHTNINGCURE® LC-L5G

Air-cooled UV-LED light sources that deliver industry's highest output power in their class

Hamamatsu Photonics now offers a new lineup of linear irradiation type UV-LED light sources. These include models using our proprietary air-cooling method and nitrogen purge system as well as a product warranty extension option.

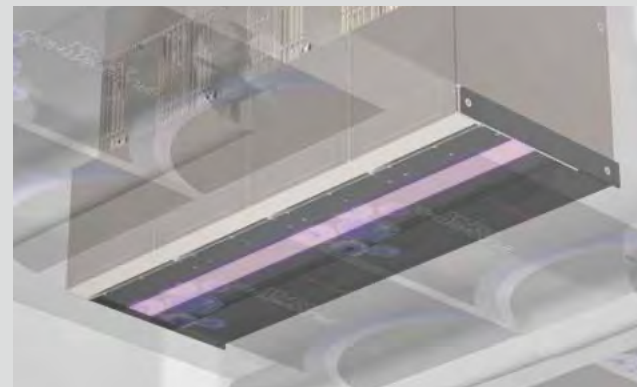
Proprietary air-cooling method

Using our proprietary air-cooling method perfected by thermal analysis technology specialized for air cooling and proprietary cooling structure and materials developed totally in-house, we have designed a cooling mechanism with still higher performance that achieves high output power yet is compact and lightweight.



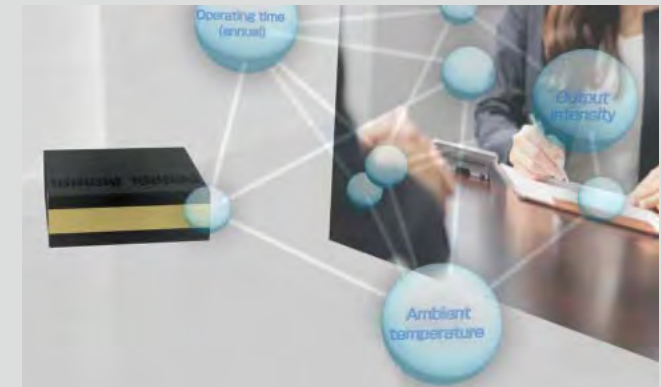
Proprietary nitrogen purge system

Nitrogen purge reduces the stickiness of UV ink caused by oxygen inhibition. Our proprietary nitrogen purge system delivers effective nitrogen purging using a minimal amount of nitrogen, allowing high-speed transport of 150 m/min at a nitrogen quantity of only 27 L/min.



Product warranty extension option

This is an optional service to extend the product warranty by calculating the actual life of the UV-LED light source based on the user's operating conditions and usage environment.



Printing and Bonding

Linear Irradiation Type UV-LED Unit
LIGHTNINGCURE® LC-L5G GH-103A

NEW

Linear Irradiation Type UV-LED Unit
LIGHTNINGCURE® LC-L5G GC-113A

NEW

Linear Irradiation Type UV-LED Unit
LIGHTNINGCURE® LC-L5G GA-107

NEW

UV-LED Spot Light Source
LIGHTNINGCURE® LC-L1V5

NEW

Low-Energy Electron Beam Source
EB-ENGINE™ (Wide Type) L16379

Dev.

Linear Irradiation Type UV-LED Unit LIGHTNINGCURE® LC-L5G



GH-103A

NEW

High-end model with industry's highest output power
(air-cooling, 24 W/cm²) in its class

The GH-103A is an air-cooled UV-LED unit that achieves the industry's highest output power in its class by utilizing our proprietary air-cooling method. The GH-103A also employs our proprietary nitrogen purge system that performs effective nitrogen purging with a minimum amount of nitrogen. This also allows high-speed transport which has been difficult to do up to now with previously available UV-LED light sources.

Specifications

- Light emission window size: 103 mm x 24 mm
- Wavelength: 395 nm
- UV irradiance*1: 24 W/cm²

Applications

- UV printing (main drying)
- UV bonding



▲Equipped with proprietary nitrogen purging method



GC-113A

NEW

High-power pinning model capable of segment lighting

This UV-LED light source delivers high output power, enough to allow high-speed transport and effective pinning of white ink. Using the RS-485 communication also improves the versatility and ease of use.

Specifications

- Light emission window size: 113 mm x 18 mm
- Wavelength: 365 nm, 385 nm, 395 nm
- UV irradiance*1: 7.5 W/cm² (at 365 nm), 10 W/cm² (at 385 nm and 395 nm)

Applications

- UV printing (UV pinning)
- UV bonding

*1: Maximum UV irradiance within the irradiation area at distance of 0 mm.



Printing and Bonding

Linear Irradiation Type UV-LED Unit
LIGHTNINGCURE® LC-L5G GH-103A NEW

UV-LED Spot Light Source
LIGHTNINGCURE® LC-L1V5 NEW

Linear Irradiation Type UV-LED Unit
LIGHTNINGCURE® LC-L5G GC-113A NEW

Low-Energy Electron Beam Source
EB-ENGINE™ (Wide Type) L16379 Dev.

Linear Irradiation Type UV-LED Unit
LIGHTNINGCURE® LC-L5G GA-107 NEW

Linear Irradiation Type UV-LED Unit LIGHTNINGCURE® LC-L5G



GA-107

NEW

Large-area irradiation model capable of irradiating large samples all at once

The GA-107 UV-LED unit can irradiate large samples all at once which has been difficult to do up until now. Using the GA-107 in a UV curing furnace will also help cut running costs.

Specifications

- Light emission window size: 107 mm x 108 mm
- Wavelength: 365 nm
- UV irradiance*1: 1.5 W/cm²

Applications

- UV bonding (UV curing)

*1: UV irradiance within the irradiation area at distance of 10 mm.

UV-LED Spot Light Source LIGHTNINGCURE® LC-L1V5

NEW



UV-LED spot light source for small-area point curing

The LC-L1V5 is a UV-LED spot light source ideal for small-area point curing for 3D printers and UV adhesives. Its compact LED heads deliver a wide range of irradiation patterns just by installing an optical system such as a condenser lens. A new model has also been added to the product lineup that emits deep UV light (wavelength at 280 nm) making it a promising tool for applications such as removal of UV adhesive tacks during UV bonding.

Applications

- 3D printing (UV curing)
- UV bonding (UV curing, UV adhesive tack removal)

Printing and Bonding

Linear Irradiation Type UV-LED Unit
LIGHTNINGCURE® LC-L5G GH-103A

NEW

Linear Irradiation Type UV-LED Unit
LIGHTNINGCURE® LC-L5G GC-113A

NEW

Linear Irradiation Type UV-LED Unit
LIGHTNINGCURE® LC-L5G GA-107

NEW

UV-LED Spot Light Source
LIGHTNINGCURE® LC-L1V5

NEW

Low-Energy Electron Beam Source
EB-ENGINE™ (Wide Type) L16379

Dev.

Low-Energy Electron Beam Source EB-ENGINE™ (Wide Type) L16379

Dev.



Low-energy electron beam source good for high-speed transport

The L16379 is a low-energy electron beam source capable of emitting a high-density, low-energy electron beam generated at an accelerating voltage of 50 to 100 kV. The L16379 has a wide effective processing span of 450 mm making it ideal for EB ink curing in industrial printers and large part printing. EB printing has advantages such as front surface printing and suppressed migration because it requires no initiators and also reduces residual monomers. The L16379 also solves problems often encountered with VOC (volatile organic compounds) and odor and so is drawing a lot of interest as eco-friendly printing. Our electron beam source ensures high-speed transport, supports a wide range of materials, and simplifies the shielding.

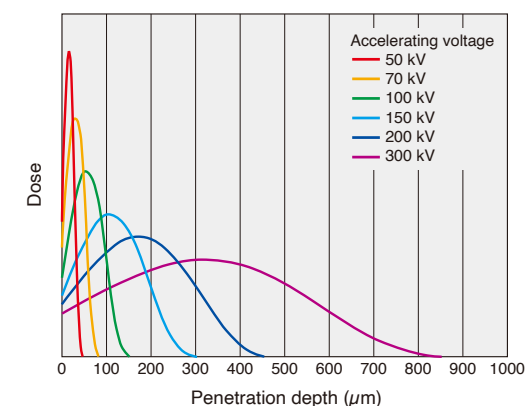
Features

- High ink processing efficiency (low accelerating voltage: 50 to 100 kV)
- High processing capability: 30 kGy at 100 m/min
- Compatible with a wide range of materials (including plastics such as PET and PI as well as paper)
- Makes it easy to build up a printing line due to its compact, lightweight and simple X-ray shielding
- Easy maintenance by using consumable parts in modular units

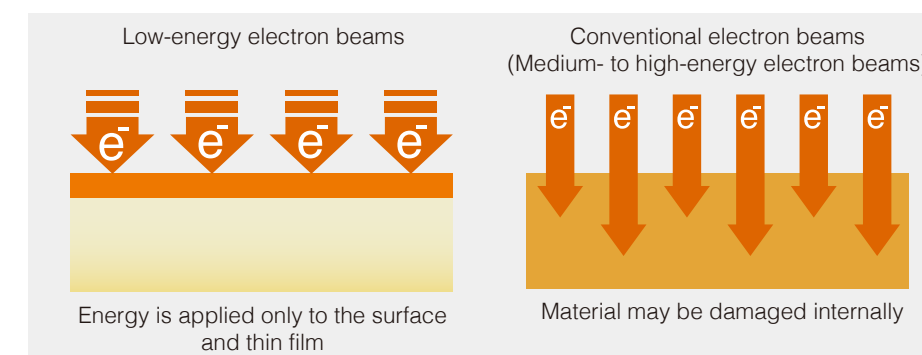
Applications

- EB printing (main drying)
 - Soft flexible packaging printing for foods and pharmaceuticals
- EB cross-linking
- EB sterilization

Depth-dose distribution in water of an incident electron



Difference between low-energy electron beams and conventional electron beams



Underwater Optical Communication



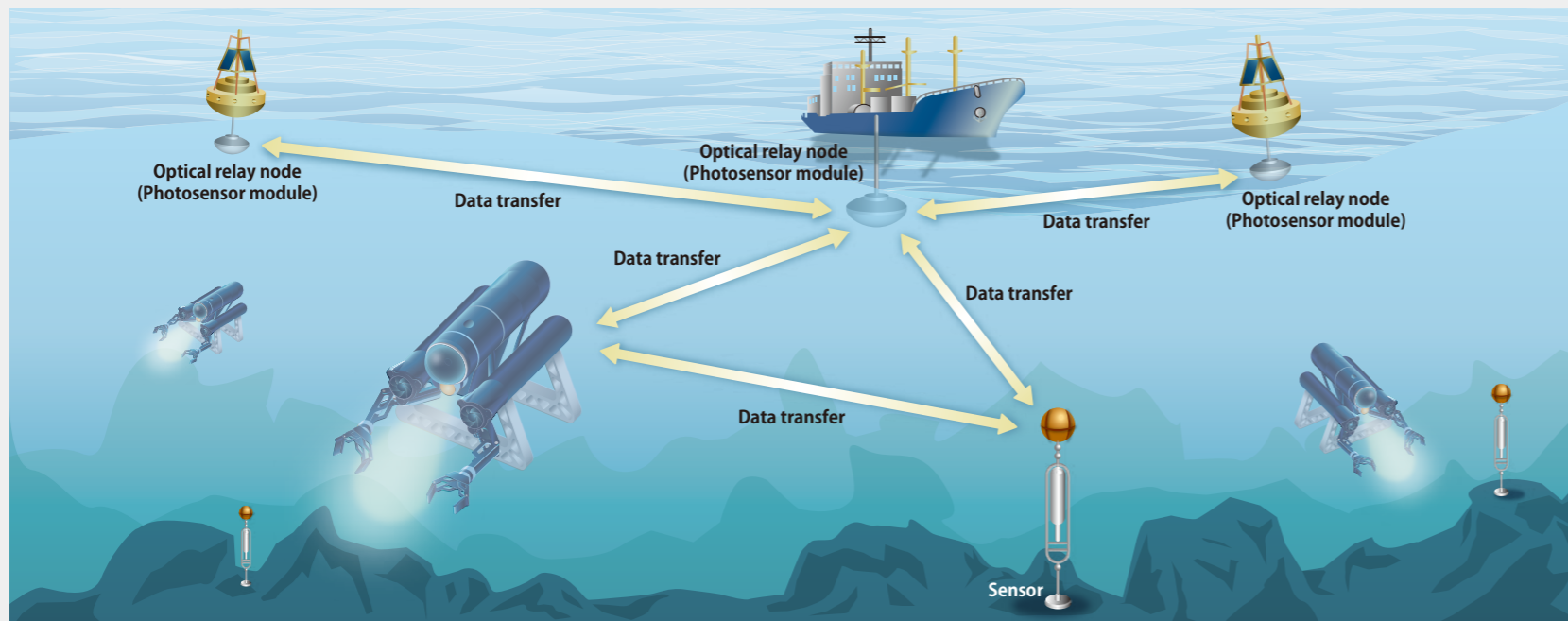
In underwater environments (mostly in the ocean), wireless communication by sound waves (acoustic waves) has been widely used. However, the speed and amount of data transmittable through acoustic communication are limited. This is why optical communication using light is now the focus of attention for solving issues with current underwater wireless communication.

Photonsensor Modules
H14447, H14990-100-02, H14600-100

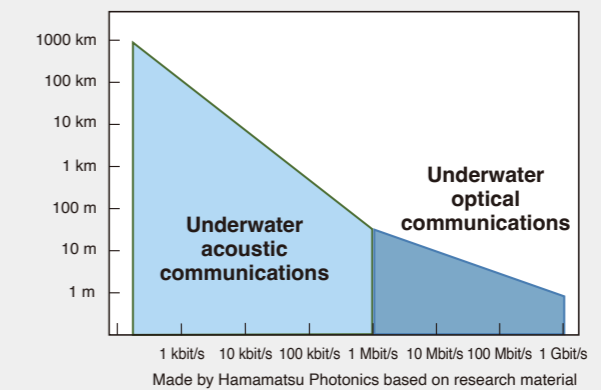
Photonsensor Module
H16704

Dev.

Underwater Optical Communication Concept



Underwater Communication Distance and Transmission Rate



Underwater optical communications

1-Gbps communication is possible that allows video streaming and high-resolution image/movie transfer.

Underwater acoustic communications

Communication speed is limited by narrower bandwidth in acoustic range.

Underwater Optical Communication

Photosensor Modules
H14447, H14990-100-02, H14600-100

Photosensor Module
H16704

Dev.

Photosensor Modules H14447, H14990-100-02, H14600-100



Photomultiplier tube modules capable of 1 Gbps communication

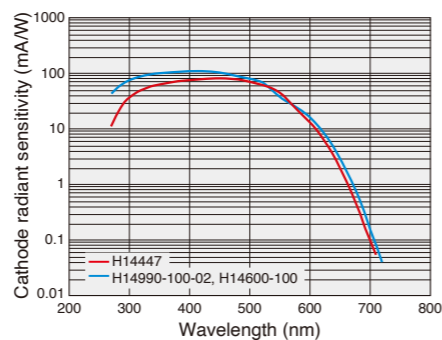
These photosensor modules have a fast response of 1 GHz (H14447), 0.8 GHz (H14990-100-02), and 0.2 GHz (H14600-100). These modules have specifications that ensure a wide opening in the eye pattern making them ideal for underwater optical communication. These also allow real-time analysis of large volumes of data and will likely be used for streamlining inspections of infrastructure equipment and for undersea resource exploration.

Features

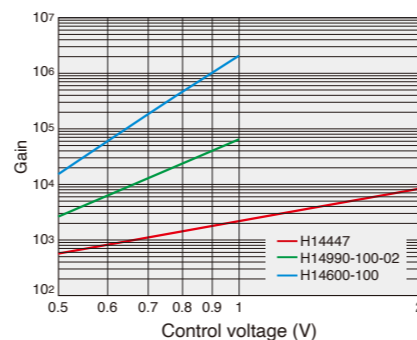
- Fast response capable of high-speed communication
- Wide effective area for easy optical axis alignment of receiver and transmitter
- High gain for extending communication range

Click here for more information on this product.

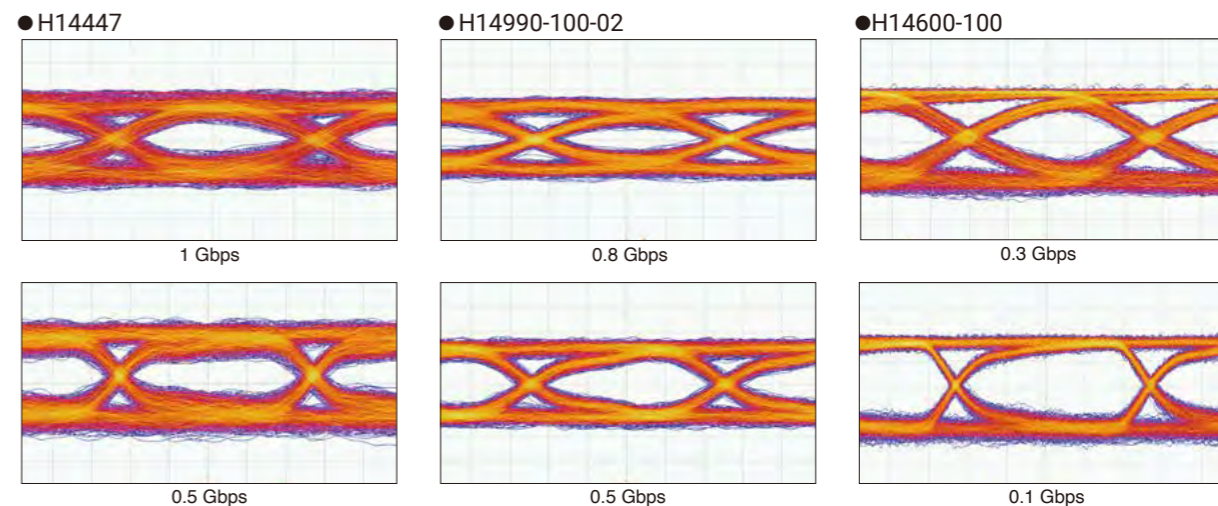
Spectral response (Typ.)



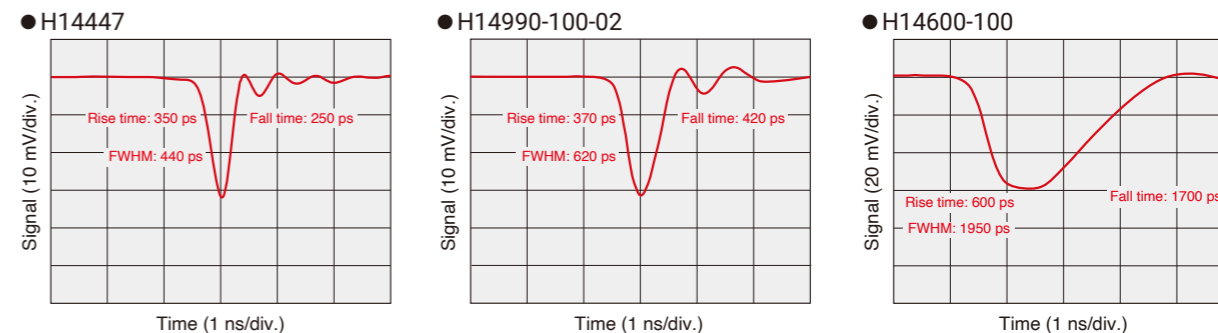
Gain (Typ.)



Eye pattern (Typ.)



Time response (Typ.)





Underwater Optical Communication

Photosensor Modules
H14447, H14990-100-02, H14600-100

Photosensor Module
H16704

Dev.

Photosensor Module H16704

Dev.



Photomultiplier tube module delivering even faster communication

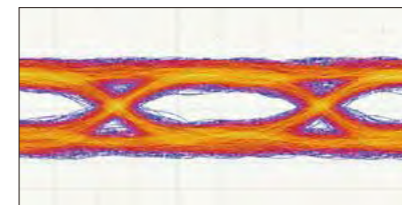
Hamamatsu Photonics is developing a photosensor module with a fast response of 1.5 GHz to streamline communication even further. Improved time response characteristics make it even easier to send and receive huge amounts of data.

Features

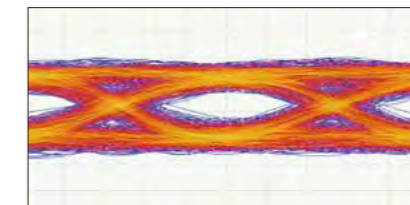
- Fast response capable of high-speed communication
- Wide effective area for easy optical axis alignment of receiver and transmitter
- High gain for extending communication range

Eye pattern (Typ.)

● H16704



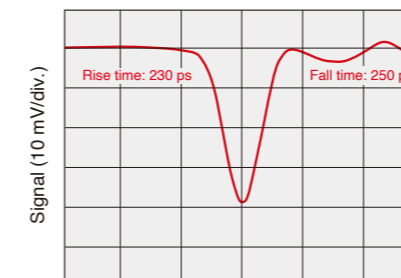
1 Gbps



1.5 Gbps

Time response (Typ.)

● H16704



Time (0.5 ns/div.)



Optical Sensor

Photomultiplier Tubes (1-1/8 inch Wide Photocathode)
R5983, R13096, R16022, R16571

NEW

Micro PMT Modules
H14066/-01

Photosensor Module
H16146-110

NEW

Photosensor Modules
H14600 / H14601 / H14603 / H14950 / H14951 / H14953 Series

Dev.

Photon Counting Head
H14870

High-Speed Gated Image Intensifier Units
C14245 Series

High-Speed Gated Image Intensifier Units
C16031 Series

NEW



Optical Sensor

Photomultiplier Tubes (1-1/8 inch Wide Photocathode)
R5983, R13096, R16022, R16571

NEW

Micro PMT Modules
H14066/-01

Photosensor Module
H16146-110

NEW

Photosensor Modules
H14600 / H14601 / H14603 / H14950 / H14951 / H14953 Series

Dev.

Photon Counting Head
H14870

High-Speed Gated Image Intensifier Units
C14245 Series

High-Speed Gated Image Intensifier Units
C16031 Series

NEW

Photomultiplier Tubes (1-1/8 inch Wide Photocathode) R5983, R13096, R16022, R16571

NEW



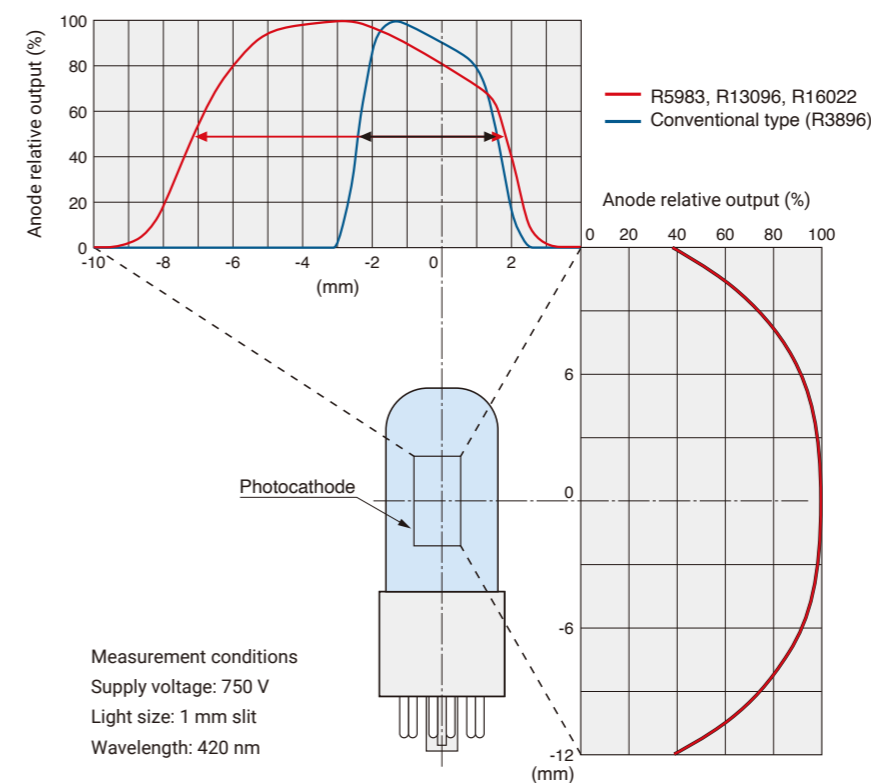
Photomultiplier tubes using a wide photocathode that doubles the photosensitive area with good uniformity compared to conventional products

Adopting a wide photocathode, these photomultiplier tubes offer a photosensitive area with good uniformity that is 2 times larger than conventional products while maintaining the same level of quantum efficiency and gain. This makes it easier to design the optical system when detecting diffused light and also allows detecting low level light with high sensitivity. The expanded product lineup covers a broad spectral range from the UV to infrared region.

Product lineup

Type No.	Photocathode	Spectral response (nm)
R5983	Low noise bialkali	185 to 710
R13096	Multialkali	185 to 900
R16022 NEW	Cs-Te	160 to 320
R16571 NEW	InGaAs	185 to 1010

Uniformity area (R5983, R13096, R16022) (Typ.)





Optical Sensor

Photomultiplier Tubes (1-1/8 inch Wide Photocathode)
R5983, R13096, R16022, R16571 **NEW**

Photon Counting Head
H14870

Micro PMT Modules
H14066/-01

High-Speed Gated Image Intensifier Units
C14245 Series

Photosensor Module
H16146-110 **NEW**

High-Speed Gated Image Intensifier Units
C16031 Series **NEW**

Photosensor Modules
H14600 / H14601 / H14603 / H14950 / H14951 / H14953 Series **Dev.**

Micro PMT Modules H14066/-01



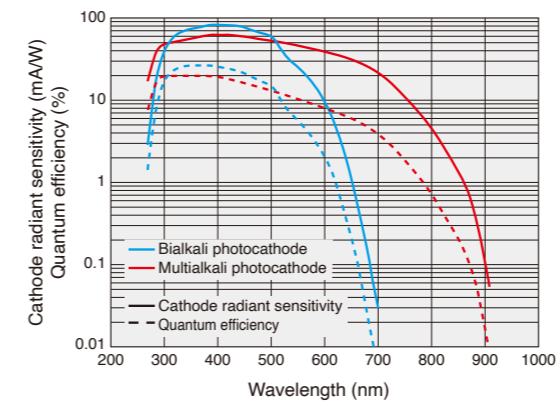
The world's smallest photomultiplier tube module that easily operates from a simple low voltage supply

The H14066 series is the world's smallest micro PMT module that integrates a micro PMT with a voltage-divider circuit and a high-voltage power supply circuit. The H14066 series incorporates a micro PMT. Compared with our currently available micro PMT module (H12402), the H14066 series is downsized about 50 % in volume, helping the design of more portable equipment. It also easily operates from a low voltage supply that makes it quick and easy to start using.

[Click here](#) for more information on this product.



Spectral response (Typ.)



Circuit Board E15964

The E15964 circuit board is designed to convert the lead pin output from the H14066 series into a cable output.



Optical Sensor

Photomultiplier Tubes (1-1/8 inch Wide Photocathode) R5983, R13096, R16022, R16571	NEW	Micro PMT Modules H14066/-01	Photosensor Module H16146-110	NEW	Photosensor Modules H14600 / H14601 / H14603 / H14950 / H14951 / H14953 Series	Dev.
Photon Counting Head H14870		High-Speed Gated Image Intensifier Units C14245 Series	High-Speed Gated Image Intensifier Units C16031 Series	NEW		

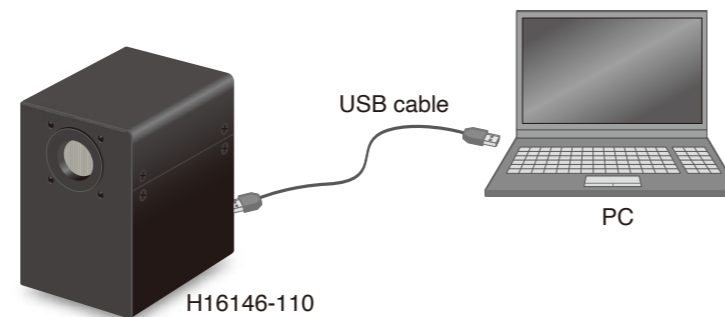
Photosensor Module H16146-110

NEW

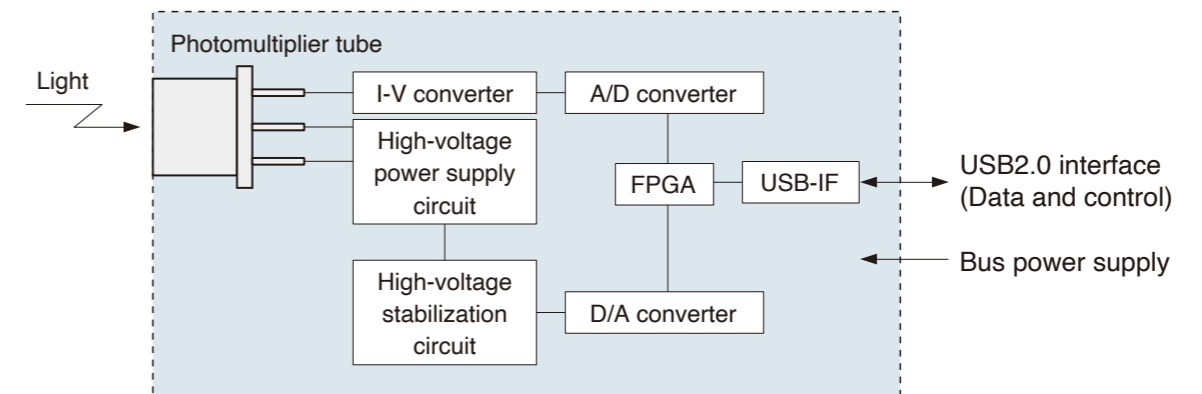


Easy-to-use photomultiplier tube with USB port

The H16146-110 is a photosensor module with USB port. It contains a TO-8 package photomultiplier tube, high-voltage power supply circuit, voltage divider circuit, current-to-voltage converter, and analog-to-digital converter. Just connecting it to a PC via a USB cable allows controlling the photomultiplier tube supply voltage and signal readout from the PC. This makes it easy and simple to make accurate measurements without having to redesign the operating system. To detect very low light levels, the H11890 photon counting head, which includes a photon counting circuit, is provided.



Block diagram

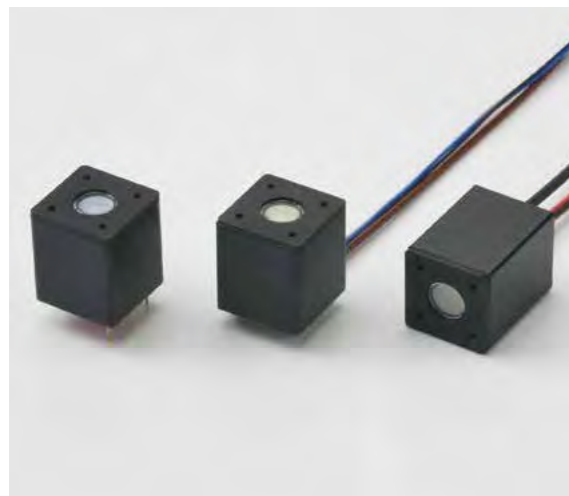




Optical Sensor

Photomultiplier Tubes (1-1/8 inch Wide Photocathode) R5983, R13096, R16022, R16571 NEW	Micro PMT Modules H14066/-01	Photosensor Module H16146-110 NEW	Photosensor Modules H14600 / H14601 / H14603 / H14950 / H14951 / H14953 Series Dev.
Photon Counting Head H14870	High-Speed Gated Image Intensifier Units C14245 Series	High-Speed Gated Image Intensifier Units C16031 Series NEW	

Photosensor Modules H14600 / H14601 / H14603 / H14950 / H14951 / H14953 Series Dev.



Miniaturized photomultiplier tube modules that help in the design of more portable equipment

These are miniaturized photosensor modules integrating a TO-8 package photomultiplier tube and a high-voltage power supply circuit. Compared to our currently available products, the cubic volume is reduced by about 50 % to help users design more portable equipment. The expanded lineup now allows us to respond to requests for mounting these modules in a wide range of equipment.

Product lineup

Type No.	Type	Input voltage (V)	Frequency bandwidth (kHz)
H14600 series	Current output	+5	—
H14950 series		+15	
H14601 series		+5	
H14951 series	Voltage output	+15	DC to 200
H14603 series		±5	
H14953 series Dev.		±15	

Suffix	Photocathode	Input window	Spectral response (nm)
-100	Super bialkali	Borosilicate glass	300 to 650
-103	Super bialkali	UV glass	185 to 650
-200	Ultra bialkali	Borosilicate glass	300 to 650
-01	Multialkali	Borosilicate glass	300 to 870
-04	Multialkali	UV glass	185 to 870
-20	Extended red multialkali	Borosilicate glass	300 to 920



Optical Sensor

Photomultiplier Tubes (1-1/8 inch Wide Photocathode)
R5983, R13096, R16022, R16571 **NEW**

Micro PMT Modules
H14066/-01

Photosensor Module
H16146-110 **NEW**

Photosensor Modules
H14600 / H14601 / H14603 / H14950 / H14951 / H14953 Series **Dev.**

**Photon Counting Head
H14870**

High-Speed Gated Image Intensifier Units
C14245 Series

High-Speed Gated Image Intensifier Units
C16031 Series **NEW**

Photon Counting Head H14870



Photomultiplier tube module for 16-channel simultaneous photon counting

The H14870 is a photomultiplier tube module for 4 × 4 channel MTP readers, designed so that the center-to-center spacing of each light-sensitive area is 9 mm to match the well-to-well spacing for 96-well microplates. The H14870 makes 16-channel simultaneous measurements with low crosstalk and in this way helps reduce the measurement time to achieve higher throughput.

► [Click here](#) for more information on this product.



Optical Sensor

Photomultiplier Tubes (1-1/8 inch Wide Photocathode) R5983, R13096, R16022, R16571	NEW
Photon Counting Head H14870	

Micro PMT Modules H14066/-01	
High-Speed Gated Image Intensifier Units C14245 Series	

Photosensor Module H16146-110	NEW
High-Speed Gated Image Intensifier Units C16031 Series	NEW

Photosensor Modules H14600 / H14601 / H14603 / H14950 / H14951 / H14953 Series	Dev.
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High-Speed Gated Image Intensifier Units



▲ C-mount type



▲ F-mount type



▲ C-mount type



▲ F-mount type

C14245 Series

Compact image intensifier units that capture momentary emissions of faint light

The C14245 series consists of an image intensifier (or I.I.), a high-voltage power supply circuit and a gate drive circuit enclosed in a cubic housing. The cubic housing easily connects to the body of most large-sized, high-performance cameras, which has been difficult for the conventional type (C9546 series) that has an L-shaped configuration. A wide photocathode lineup supports a wide range of imaging from the UV to near infrared region.

C16031 Series

NEW

Image intensifier units with an image booster compatible with high-speed cameras

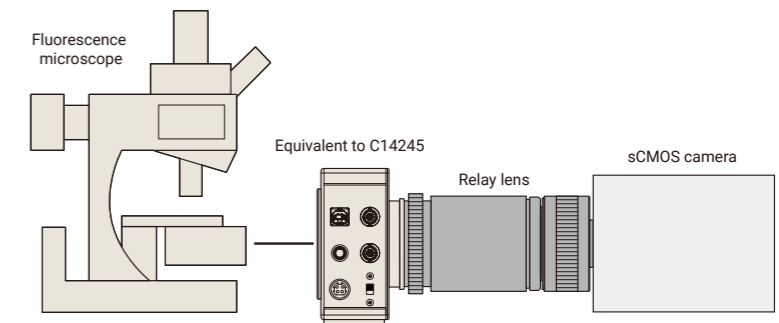
The C16031 series is a high-speed gated image intensifier unit designed for use with high-speed cameras. In addition to an image intensifier, high-voltage power supply circuit, and gate drive circuit, the C16031 series further contains an image booster in its cubic housing. When capturing and reading out images at a high frame rate, we recommend you use the C16031 series by connecting it to a high-speed camera.

Imaging example

- Observation of single cell membrane protein in molecule group
- This shows the movement of fluorescent molecules labeled to individual proteins (molecules) in a cell membrane.



*1: TALL: Temporary Arrest of Lateral diffusion



Fluorescence images provided by Mr. Akihiro Kusumi and Mr. Taka-aki Tsunoyama from Okinawa Institute of Science and Technology Graduate University Membrane Cooperativity Unit

▶ [Click here](#) for more information on this product.



Light Source

Excimer Lamp Light Source EX-PEN
L15444, C15445-01

NEW

Xenon Flash Lamps

IR Tunable Laser

Technology





Light Source

Excimer Lamp Light Source EX-PEN
L15444, C15445-01

NEW

Xenon Flash Lamps

IR Tunable Laser

Technology

Excimer Lamp Light Source EX-PEN L15444, C15445-01

NEW



World's smallest class mount-in type excimer lamp

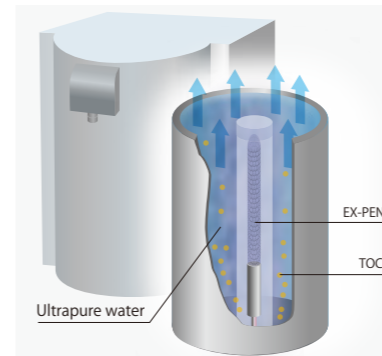
This is the world's smallest class excimer lamp designed for easy assembly into equipment. Its compact size and light weight allow a free and flexible design to achieve equipment downsizing and higher performance. This excimer lamp is an eco-friendly product since it uses absolutely no mercury which is designated as an environmentally harmful substance.

Features

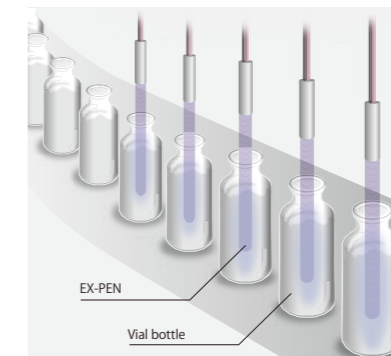
- Compact and lightweight
- Mount-in type
- Mercury-free lamp
- Instant ON/OFF

Applications

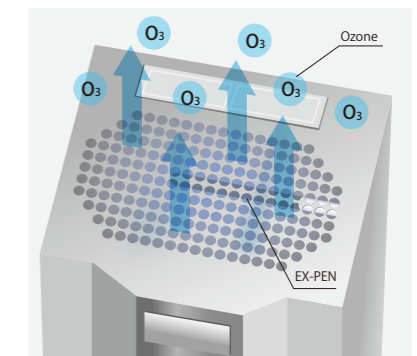
- TOC reduction (ultrapure water production, etc.)
- VOC decomposition (removal of harmful substances, etc.)



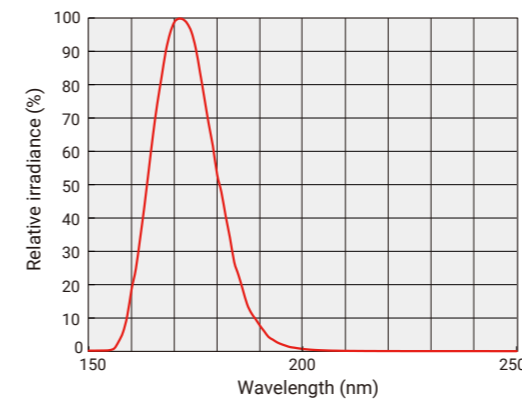
- Fine surface modification



- Ozone generation



Spectral distribution (Typ.)



Light Source

Excimer Lamp Light Source EX-PEN
L15444, C15445-01

NEW

Xenon Flash Lamps

IR Tunable Laser

Technology

Xenon Flash Lamps



Pulsed light source that emits a broad infrared spectrum

This xenon flash lamp is an infrared light source that emits a broad spectrum spanning from 160 nm to 7500 nm. Compared to other types of infrared light sources, this xenon flash lamp features low heat generation, stable operation and momentarily high optical output. It also delivers a long service life and ensures high reliability.

Features

- Broad spectrum: 160 nm to 7500 nm
- Momentarily high optical output: Approx. 1000 times (compared to halogen lamp)
- Low heat generation
- High stability
- Long life

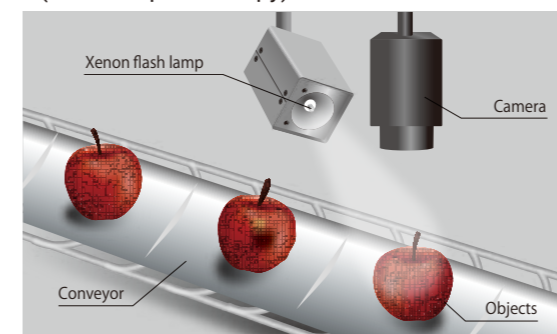
► [Click here](#) for more information on this product.

► Related products:
[Click here](#) for more information on xenon lamps, mercury-xenon lamps, and deuterium lamps.

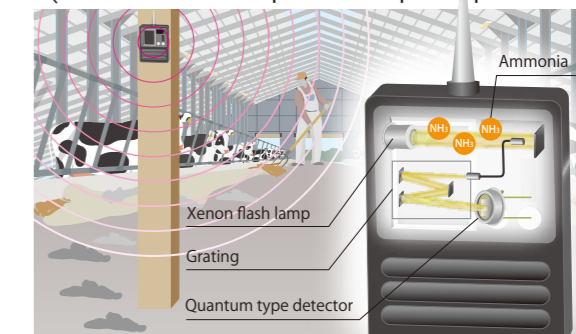
Applications

- Food analysis, foreign matter inspection, food sorting
- Gas measurement and analysis

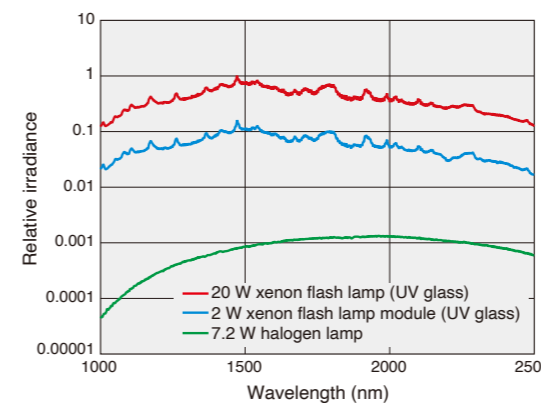
● Food inspection (Infrared spectroscopy)



● Ammonia gas detection (DOAS: Differential Optical Absorption Spectroscopy)

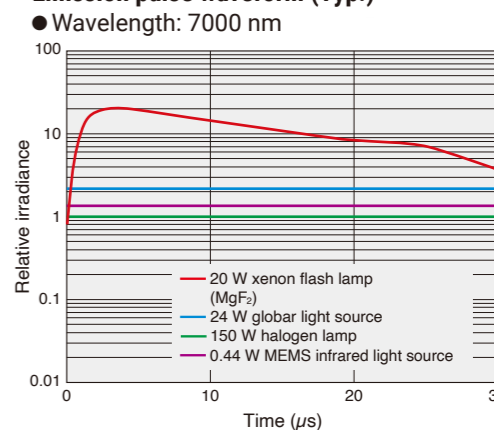


Spectral distribution (Typ.)



Detector: Spectrometer NIRQuest512-2.5 made by Ocean Optics (slit width: 25 μ m, integration time: 1 ms)
Optical fiber: MF11L1 made by Thorlabs (core diameter: 100 μ m, InF₃ transmission wavelength range: 300 nm to 5500 nm)
NOTE: Light output depends on detector sensitivity. Use this data as a reference for comparison with other infrared light sources.
NOTE: Light output of halogen lamp is corrected to peak irradiance of xenon flash lamp (flash duration: approx. 6 μ s).

Emission pulse waveform (Typ.)





Light Source

Excimer Lamp Light Source EX-PEN
L15444, C15445-01

NEW

Xenon Flash Lamps

IR Tunable Laser

Technology

IR Tunable Laser

Technology



IR tunable laser for easily selecting a wavelength to emit infrared light

Using our unique lasing wavelength control, this IR tunable laser allows freely selecting a wavelength to emit infrared light in the lasing wavelength range from 1650 nm to 1900 nm. Laser operation can be easily controlled from a PC. Because the output light can be focused up to the diffraction limit while maintaining high beam quality, this laser is ideal for high-precision measurement, analysis and inspection using near-infrared light.

Features

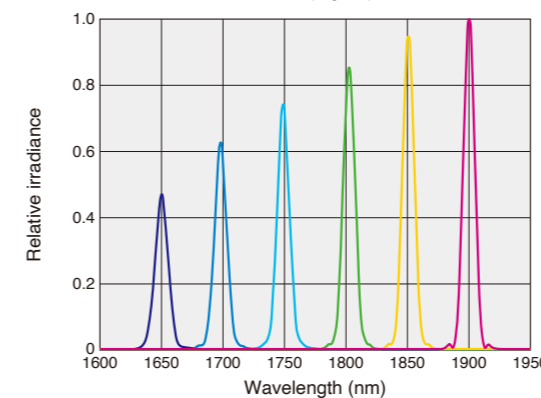
- Wavelengths instantaneously switchable
 - Wavelength tuning range: 1650 nm to 1900 nm
 - Wavelength switching speed: 10 ms (min.)
- No spectrometer required
- Trigger signal synchronized to switching
- Compact design
- Easy control by PC
- No misalignment of optical axis
- Beam focused up to diffraction limit
- Easy maintenance

Applications

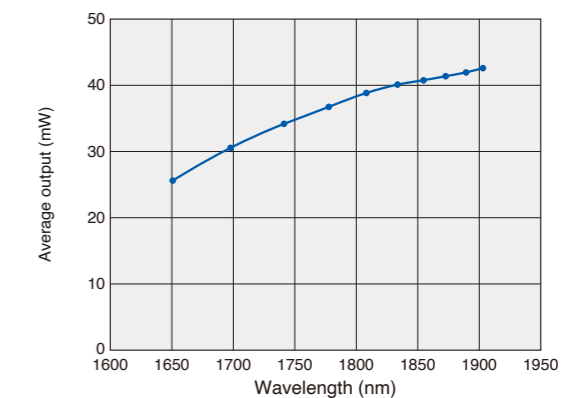
- Optical microscopes and confocal microscopes
- Multispectral imaging
- IR spectroscopic measurements and time-resolved spectroscopic measurements



Wavelength tuning range (Typ.)



Average output distribution (Typ.)



► Related products:
[Click here](#) for more information on supercontinuum light sources.



High-Voltage Power Supply

High-Voltage Power Supply Module
C14921-01

NEW



High-Voltage Power Supply

High-Voltage Power Supply Module
C14921-01

NEW

High-Voltage Power Supply Module C14921-01

NEW



Bipolar high-voltage power supply that provides ± 5 kV and 200 μ A output at a polarity switchable via control voltage

The C14921-01 is a regulated bipolar high-voltage power supply module with a maximum output of ± 5 kV / 200 μ A. Unlike using a switch to connect between two high-voltage power supplies with different polarities, the C14921-01 can be varied continuously and smoothly by using control voltage. Generally, monopolar type power supply operates only as "source" (refer to right figure), but the C14921-01 can also operate as "sink" in the second and fourth quadrants. The C14921-01 has achieved high speed responsivity capable of making the high voltage output change at maximum response time of 250 μ s according to the change of the control voltage and therefore is suitable for guiding electrons or ions.

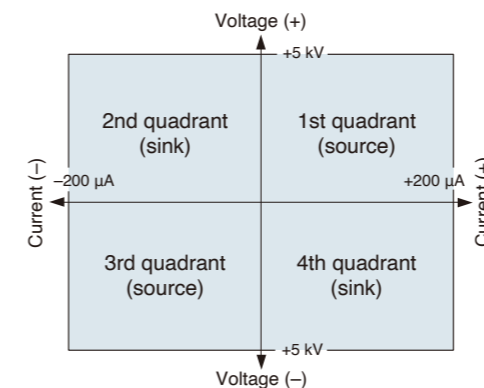
Features

- Bipolar output: Maximum ± 5 kV and 200 μ A
- Polarity switching by control voltage
- High-speed time response: 250 μ s
- Output monitor (voltage/current) included
- Output current limiter included
- Compact and lightweight

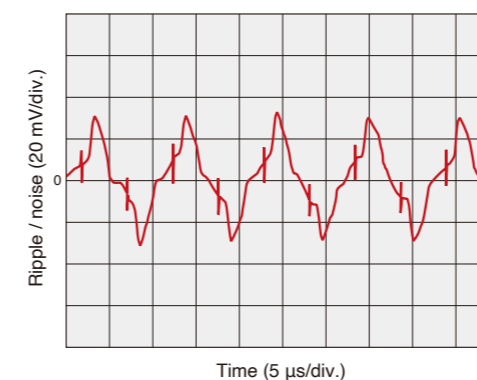
Applications

- Mass spectrometry
- Scanning electron microscope (SEM)
- Electrostatic chuck

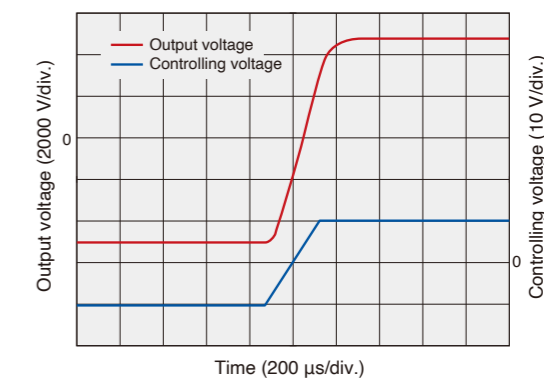
Output range (Typ.)



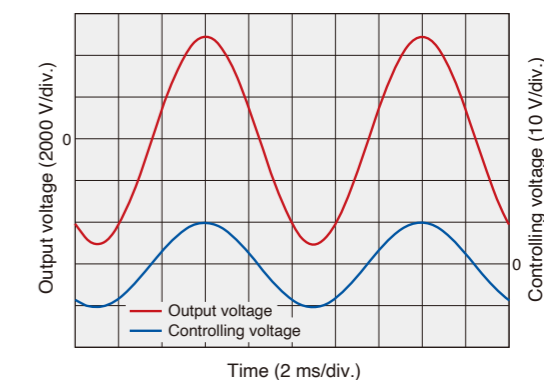
Ripple / noise (Typ.)



Rise time (-5 kV to +5 kV) (Typ.)



Frequency response (100 Hz sine wave) (Typ.)



Main Products

Opto-semiconductors

- Si photodiodes
- APD
- MPPC®
- Photo IC
- Image sensors
- PSD
- Infrared detectors
- LED
- Optical communication devices
- Automotive devices
- X-ray flat panel sensors
- MEMS devices
- Mini-spectrometers
- Opto-semiconductor modules

Electron Tubes

- Photomultiplier tubes
- Photomultiplier tube modules
- Microchannel plates
- Image intensifiers
- Xenon lamps / Mercury-xenon lamps
- Deuterium lamps
- Light source applied products
- Laser applied products
- Microfocus X-ray sources
- X-ray imaging devices

Imaging and Processing Systems

- Cameras / Image processing measuring systems
- X-ray products
- Life science systems
- Medical systems
- Semiconductor failure analysis systems
- FPD / LED characteristic evaluation systems
- Spectroscopic and optical measurement systems

Laser Products

- Single chip laser diodes
- Laser diode bar modules
- Quantum cascade lasers
- Applied products of semiconductor lasers
- Solid state lasers / Fiber lasers
- Laser related products

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