HAMAMATSU

PHOTON IS OUR BUSINESS

Light is

possibility itself.

Light is
possibility itself.

Opening up the infinite possibilities of light to contribute further to humankind and society.

Light is all around us and brings numerous benefits. Since its founding, Hamamatsu Photonics has been pursuing the possibilities of light and taking on the challenges of opening up the unknown and unexplored realms. Our unique products and state-of-the-art technologies that have emerged from these challenges serve as key enabling technologies that are beginning to shed light on the various issues facing human society.

We are now at a major turning point of the times. In addition to the three existing advanced technologies of electron tubes, opto-semiconductors, and image & measurement instruments, we have set out to further boost our laser application technology. In this way, we will respond to increasingly diverse needs at the industrial, societal, and global levels.

Inheriting the “Photonics-ism” that makes us a unique R&D company and leads the way to the yet unexplored. Using the needs of the world as guideposts, we hope to contribute to the health and well-being of mankind and create a sustainable society.

Knowledge and Light

Kamiokande has brought us

a number of new discoveries.

Yet these great discoveries are

only the start for a stream of new

evolution.

In 1987, Kamiokande made a stunning achievement, namely history's first observation of neutrinos that were released from a supernova explosion.

This one-in-a-million chance, brought from a point in space 160,000 light-years away, was captured by the world's largest

20-inch diameter photomultiplier tubes.

This technology has continually evolved, and been taken over by Super-Kamiokande that is currently working for even higher performance and

will eventually be succeeded by the Hyper-Kamiokande project.

Academic Research

- **IceCube Neutrino Observatory**
- **CERN/High-energy particle collision experiment (Higgs boson detection)**
- **Subaru Telescope**

Photo: Interior of Super-Kamiokande (This site holds 11,129 photomultiplier tubes each 20 inches in diameter)

Academic Research

Large diameter spherical photomultiplier tube used for IceCube experiment

Experiment for observing high-energy neutrinos travelling through the universe

Neutrinos are mysterious and elusive elementary particles that have extremely high permeability and almost never react with other substances. These features make them nearly impossible to detect. The IceCube Neutrino Observatory is located in Antarctica. In this observatory, high-sensitivity detectors using our large diameter spherical photomultiplier tubes are installed deep within a 1 cubic kilometer ice block in Antarctica that blocks out almost all light and radiation. In very rare cases, when a neutrino interacts with a molecule of ice, weak light called Cherenkov radiation is emitted and is captured by these high-sensitivity detectors.

©IceCube Collaboration

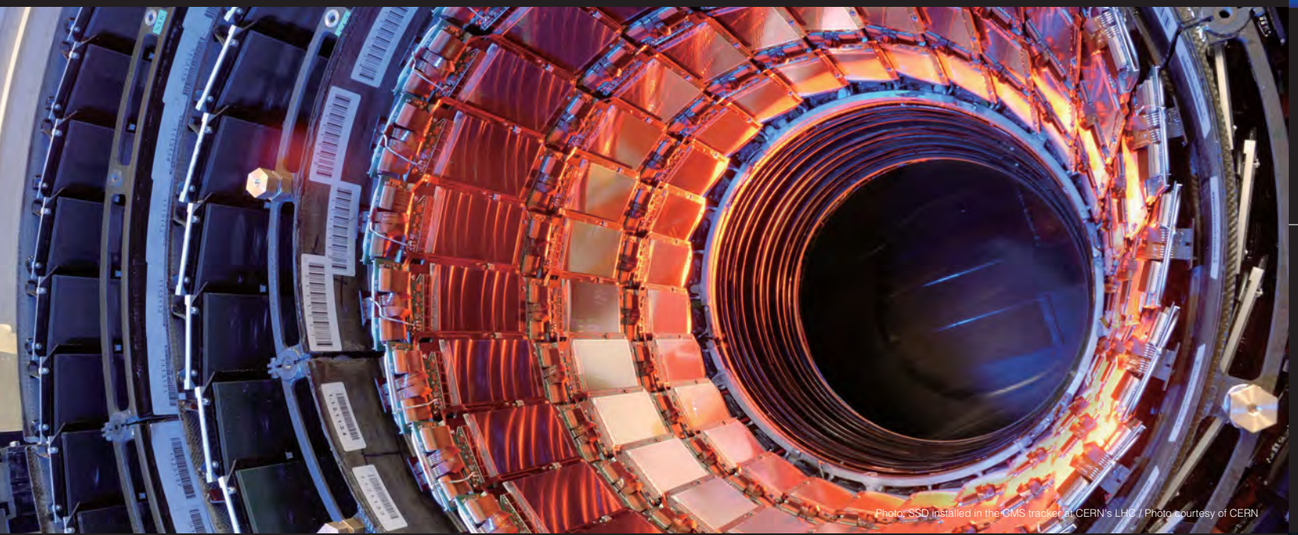
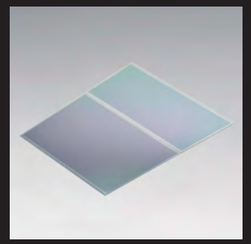


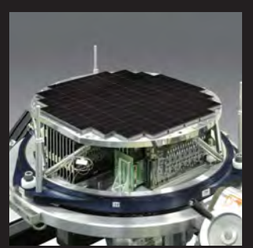
Photo: SSD installed in the CMS tracker at CERN's LHC / Photo courtesy of CERN

Contributing to detection of “Higgs boson” often called the God particle that gives mass to matter particles

The Higgs boson often called the God particle has not been discovered up until recently. Its existence has finally been confirmed by the experiments using the ”Large Hadron Collider (LHC)” - the world’s largest accelerator measuring 27 kilometers in circumference. Hamamatsu Photonics SSD (Silicon Strip Detectors) contributed to this great discovery. These SSD detected the tracks along which the particles pass to a resolution within a few dozen micrometers.



SSD used for “Higgs boson” detection



CCD area image sensors arranged in a tile format

Image sensors with the world’s highest sensitivity mounted in the Subaru Telescope

The Subaru Telescope is a large-scale optical infrared telescope located at an elevation of 4205 meters atop Mauna Kea on the Island of Hawaii. This new generation telescope offers epoch-making high observation performance. Its ultra-wide-field prime focus camera contains CCD area image sensors made by Hamamatsu Photonics that boast the highest sensitivity in the world. The Subaru Telescope observed a galaxy that is 12.91 billion light-years away from Earth (about 750 million years after the Big Bang).

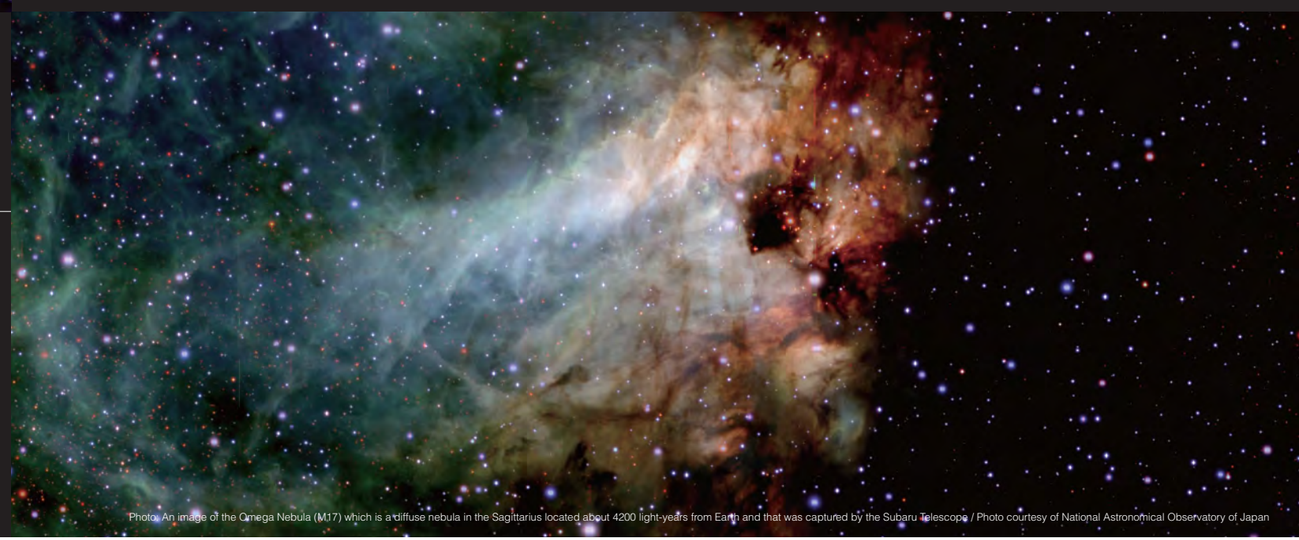


Photo: An image of the Omega Nebula (M17) which is a diffuse nebula in the Sagittarius located about 4200 light-years from Earth and that was captured by the Subaru Telescope / Photo courtesy of National Astronomical Observatory of Japan

Body, life, and mind
all spring from effects of
the same substances.
Light reveals how these substances work
and is the key to help treat all kinds
of illnesses.

Human beings and Light

For figuring out causes of diseases, observation for tissues and cells is important. Creating digital data with giga pixels by scanning glass slides containing cells and tissues at high speed enables observation beyond time and space. Hamamatsu Photonics will contribute to a wide range of medical care, from prevention to diagnosis, by imaging the human body from various angles using cutting edge of optical technologies.

Medical (Imaging)
Medical (Laboratory testing)
Life Science

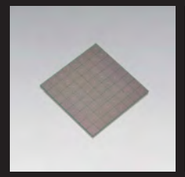
- **PET/CT**
- **Blood test**
- **Whole slide imaging**

Photo: Cells image scanned with NanoZoomer®

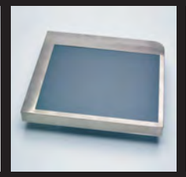
Medical (Imaging)

Detecting disease at an even earlier stage

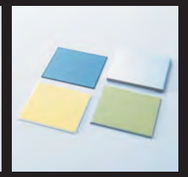
No matter how healthy you are, you cannot reduce the future risk of disease to zero. Early detection of disease by regular health checkups is very important. Hamamatsu Photonics manufactures high-performance devices optimized for medical use such as PET (positron emission tomography), mammography and X-ray CT. Our devices currently play an important role in medical examinations throughout the world by detecting diseases including cancer at their early stages.



MPPC array for PET scanner



X-ray flat panel sensor



X-ray scintillator plate for X-ray inspection

Photo: PET/CT scanner

Photo for illustrative purpose

Life Science

Capturing complex and diverse life phenomena ranging from molecules to tissue

The human body consists of 60 trillion cells and each cell functions according to its genetic information. If we could understand the molecular level mechanism by which cells proliferate and die then we could develop new therapeutic agents and drugs. Molecular mechanisms that create higher functions in organisms are currently being revealed one after another. Hamamatsu Photonics continues to provide advanced detection technology for research fields underlying the study of life phenomena.

Kinetic plate imager (FDSS®-GX)

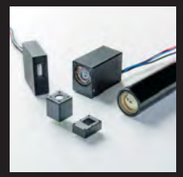
Digital slide scanner system (NanoZoomer® S360)

Camera for microscope imaging (ORCA®-Fusion BT)

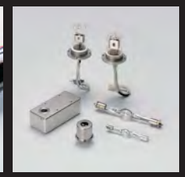
Medical (Sample testing)

To maintain daily health in mind and body every day

If we could carry out highly accurate daily health tests at home, then daily health management and health awareness would be vastly improved. If we could obtain detailed test results from just a small amount of blood, then this would take a large burden off the person being tested. To make them a reality Hamamatsu Photonics provides cutting-edge photonics technology for medical use in the form of compact, high-performance devices for new medical fields that include blood tests, biochemical tests, immunological tests, and bacteria tests.



Compact photomultiplier tube products for laboratory testers



Compact lamp light sources for laboratory testers

Image sensors for blood tests

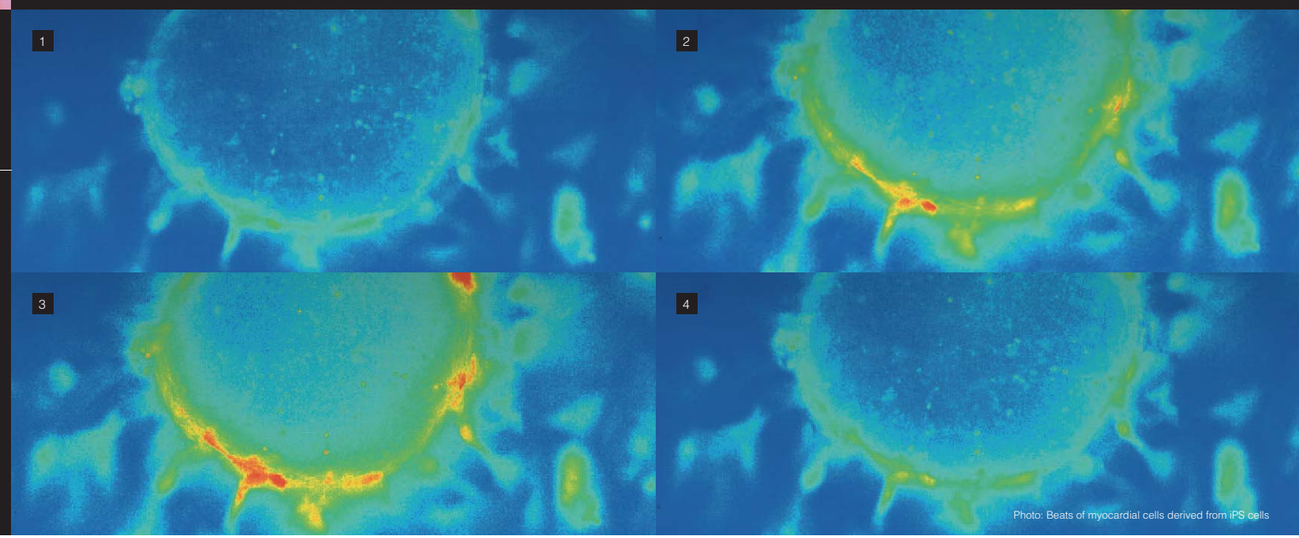


Photo: Beats of myocardial cells derived from iPS cells

Creating energy that brings the
blessing of the sun within reach…
Light can possibly solve the two major
problems of energy shortages and
environmental destruction at the same time.

Future and Light

A spherical vacuum vessel is installed in a laboratory surrounded by concrete walls1.2 meters thick.
A nuclear fusion target is placed in the center of this vacuum vessel and irradiated by a high-power laser beam guided through a red pipe to trigger a nuclear fusion reaction with deuterium.
Light or namely photons have properties of both a wave and a particle and so possess the potential to open up entirely new applications in various industrial fields.

Industry
Environment
Daily life

- **X-ray non-destruction inspections**
- **Environmental analysis (water, air, soil, radiation, etc.)**
- **Vehicle on-board electronics**

Camber for laser fusion

Industry

Light is essential in modern industry that allows no compromise with quality and safety.

While recent years have seen increasingly tougher demands for food product safety and industrial product quality, there also seems to be no letup in the pace of tech advances to streamline and speed up production processes. Hamamatsu Photonics is helping to refine and streamline manufacturing and inspection processes to deal with diverse problems in the industrial field. Hamamatsu Photonics does this by offering a wide-ranging product lineup including X-ray sources and detectors capable of non-contact and non-destructive inspection of defects in tiny internal structures.

X-ray source for X-ray non-destruction inspections
Microfocus X-ray source

X-ray flat panel sensor

Camera for X-ray non-destruction inspections
X-ray TDI camera / X-ray line sensor camera

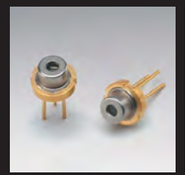
Photo: X-ray non-destructive inspection

Photo for illustrative purpose

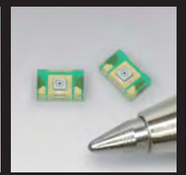
Daily Life

Photonics technology that supports a future life of greater convenience

Highly sophisticated devices are making their way into close-at-hand items in our daily lives such as constantly evolving wearable communication terminals, household robots in the form of automatic vacuum cleaners, and other gadgets. Hamamatsu Photonics photodetector and light emitter devices are expanding into ever widening areas encompassing our daily lives. Our optical devices are also being applied to the automotive field through photonics technology as distance measurement devices for automatic brake control and light level sensors that automatically control air conditioners and headlights, and so on.



Pulsed laser diode for distance measurement



Si APD for distance measurement

Photo IC diode for light dimmer

Environment

What can photonics technology do to achieve a sustainable society?

Human actions have caused multiple environmental problems such as pollution of air and water quality, global warming and radiation issues. To protect our world from these problems and achieve a sustainable society, it is essential that we create highly accurate optical measurement techniques. Hamamatsu Photonics designs and fabricates environmental measurement devices that capture accurate information on air, water quality and soil. We also contribute to alleviating global environmental problems by offering various types of optical measurement products such as mini-spectrometers and module products specifically designed for detecting radiation.

Photodetectors and light sources for gas analysis

Side-on photomultiplier tube for environmental measurement

Mini-spectrometer for environmental measurement

Photo for illustrative purpose

Central Research Laboratory

Basic Research and Applied Research

Shedding light on every problem mankind faces




Life Photonics

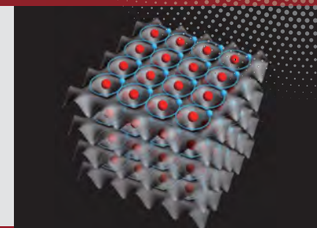
A future world with an optimal balance among Earth, people, and all life --- we aim to achieve this wonderful dream through the research into “light” which is the source of all substances.

What will our future world be like after 20 or 30 years? How about a future where all people can enjoy comfortable and exciting lives without anxiety and where an optimal balance maintained among the Earth, people and all life ensures total harmony? To make this dream a reality we have to overcome many obstacles and meet many challenges. Our Central Research Laboratory does R&D that conforms to “sustainability” values. We call this research “Life Photonics” which is based on the theme of “life” encompassing broad-ranging areas such as life, living things, human life, vitality sources, and ways of living. We will work on research into “Life Photonics” to make full use of various optical technologies.

RESEARCH

Optical information processing and measurement

We have created technologies for generating and applying so-called “new light” using key concepts such as optical computing, complex systems, and interactions between light and matter. Through intensive research on advanced optical control and measurement of the spatial, temporal and wavelength axes of light, we aim to create a whole new sphere of information processing.



Courtesy of Ohmori Group, Department of Photo-Molecular Science, Institute for Molecular Science (IMS), National Institutes of Natural Sciences

Advanced light-control technology — To unlock the mysteries of quantum mechanics, we are working to make a quantum simulator a reality by creating and harnessing photonics technology for controlling individual atoms. ▶

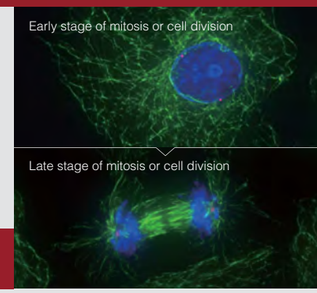
Health care and medicine

We continue to take a broad approach toward achieving “true health” and making people’s lives healthy and fulfilling. We will further expand the possibilities of light through research including the design and development of high-resolution PET systems, PET application research, and bio-measurements by applying near-infrared light, and bio-related research.

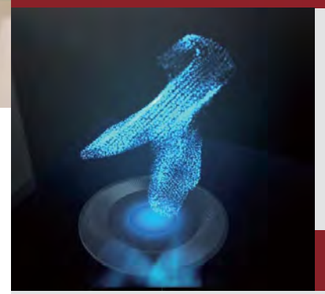
◀ **PET** — PET is capable of non-invasive and quantitative imaging of information on biological functions. Statistical analysis of PET images taken from many patients allows creating an image of body sections with low metabolic activity.

Biophotonics

Our research also aims to understand the interactions between light and vital phenomena and create materials and tools for the well-being of mankind based on learning gained from biomolecules and biological functions. By developing elemental technologies that support the environment, material production and health and medical care, we will continue to take on the challenges that only “light” can achieve.



Fluorescence observation method — Fluorescence observation is used to study the cell cycle. We are developing a new method for cell observation and will apply it to discovery of new drugs and regenerative medicine. ▶



Photonic materials

When the structure of a substance is smaller than wavelength of interest, the interaction between light and matter exhibits completely different behavior from that on the macro scale. Considering wavelength of electron, this phenomenon is same in case of the interaction between electron and matter. Therefore, we use the word "nano-photonics" to refer to the mutual interaction between light/electron and matter in the nano-region. We are constantly researching new materials which utilize this interaction between light/electron and light.

◀ **New semiconductor lasers iPMSEL®** — New semiconductor laser capable of emitting laser beams in any desired pattern. This device will open up various new applications such as natural 3D displays.

Energy

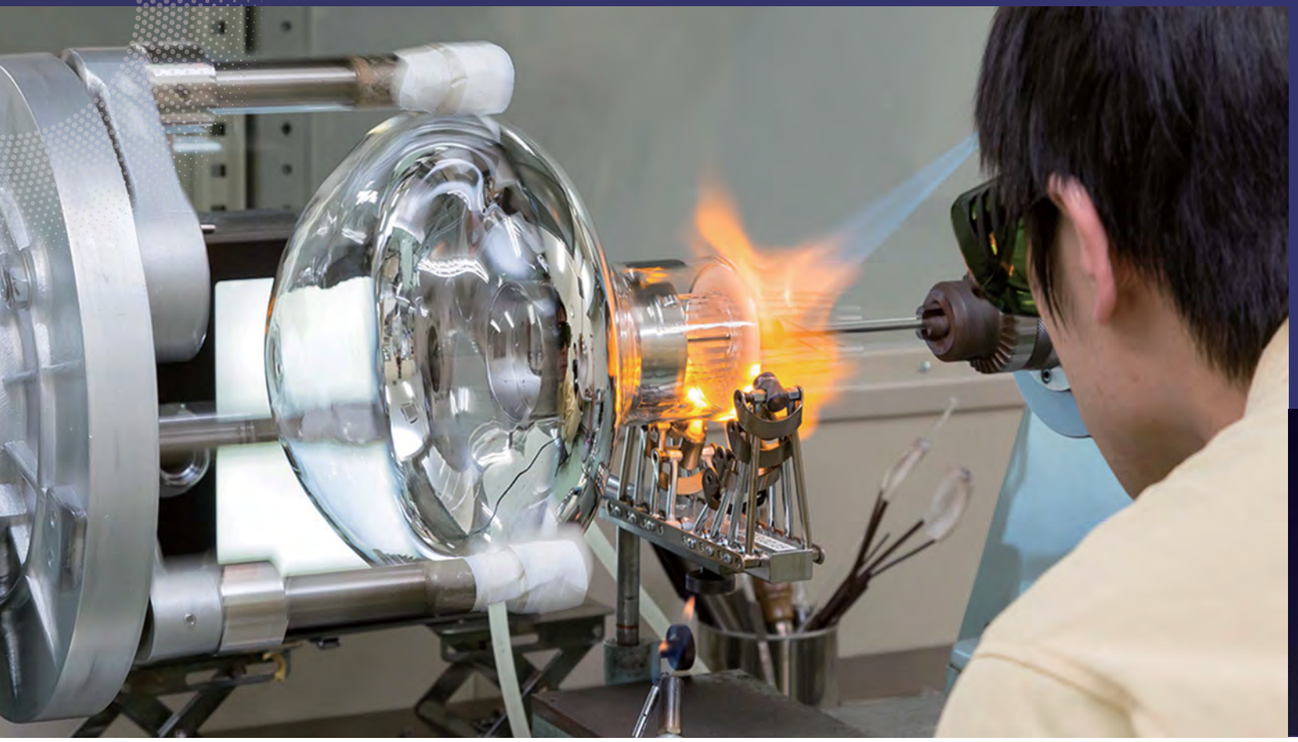
New industries give people new ways of living from which new values are born. Then, these new values help acquire new and more accurate knowledge, which in turn will create new science. To foster and develop new industries, we now aim to create them for example by utilizing light for generating electrical power, medical treatment and for new substances based primarily on research into laser fusion capable of extracting energy from hydrogen isotopes available in the nearly inexhaustible supply of seawater.

Laser fusion — Creating a sun on Earth is an attempt to trigger nuclear fusion in high-temperature, high-density plasma by irradiating high power laser onto a deuterium fuel pellet. ▶

Electron Tube Division

Electron tube photodetectors and light sources

Applications of light extend to areas surpassing our imagination.



Pursuing performance to its farthest boundaries

Pursuing the ultimate in performance guided by past experience in fabricating devices for academic research has led to applications in high-precision optical measurement such as in medical, environmental and measurement fields, and its use has even spread to monozukuri or namely the creating of things that support life.

Electron tube devices are key devices for measuring and capturing phenomena that were impossible to find up to now. We achieve this by applying our long-fostered basic and element technologies. Our new manufacturing technology creates innovative devices that are more compact and optimized for particular usage environments, expanding the application fields of the equipment in which those devices are mounted. Electron tube devices that have actively been used in a wide range of fields such as medical diagnosis, spectroscopic analysis, semiconductors, biology, and academic research are now being pushed to their ultimate performance limits and applied to meet customer needs in a virtuous circle to expand the market.

PRODUCTS

Photomultiplier tubes (light sensors)

Light sensors with outstanding characteristics such as high sensitivity and high-speed response. Our photomultiplier products have been adapted in various applications and expanding the fields for more than five decades.

Ion detectors (electron multiplier/MCP)

Detectors for mass spectrometry. Our product line-up includes electron multipliers with wide dynamic range and MCPs (Microchannel Plate) having subnanoseconds level time resolution.

X-ray scintillator plates

X-ray detection devices used for medical X-ray diagnosis. Their unique structure ensures high quality images with high resolution. Main applications include chest examinations, mammographies, and dental examinations.

Light sources (scientific lamps)

Scientific lamps with high illuminance, high stability and long life.
Our lamps have been contributing to equipment performance, maintenance performance and reducing running cost.

Microfocus X-ray sources

X-ray sources for industrial non-destructive inspection.
Our microfocus X-ray sources are indispensable for quality inspection of electronics devices that support our daily life.

Stealth dicing (laser dicing technology)

High quality dicing technology using laser for silicon wafers, glass substrates, etc.
Stealth Dicing is a special achievement integrated with various optical technologies.

Photocathode technology

We continue to provide solutions to various requirement by mastering the techniques for photocathode fabrication.

Glass processing technology

Automated mass production of glass is making technical strides. However, sophisticated glass works are still handcrafted by our experienced professionals.

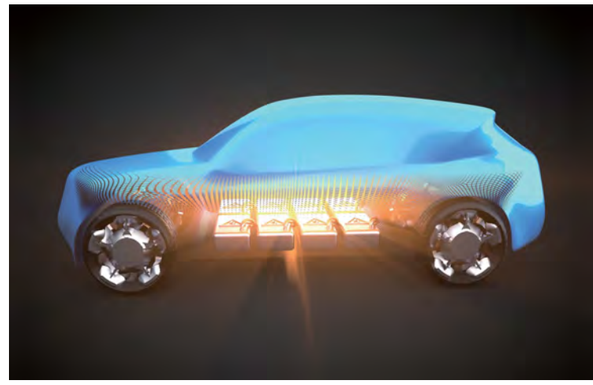
Discharge technology

We continue to develop various light sources to push the limit of the lowest fluctuation by exploring discharge plasma phenomena.

TOPIC

X-ray inspection of battery electric vehicle (BEV) components

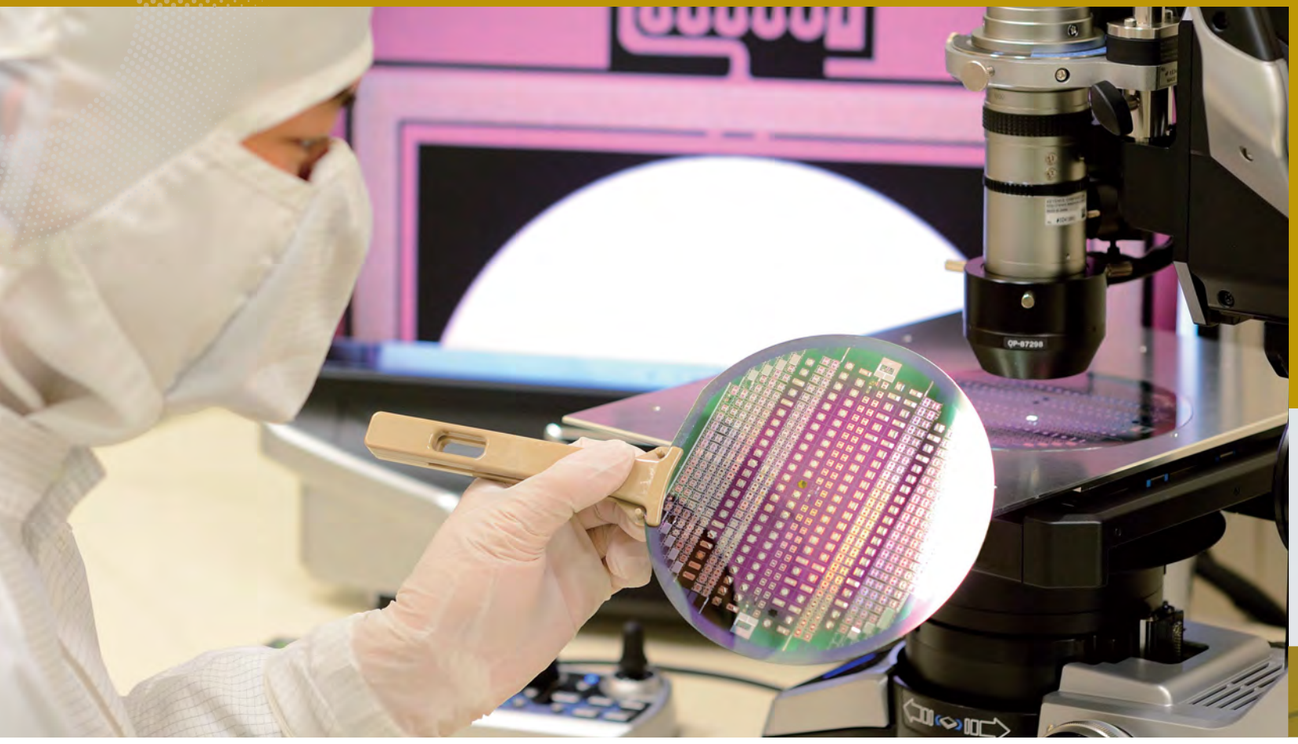
Global efforts to reduce CO_2 emissions are now accelerating the movement toward electrification of automobiles. Battery electric vehicles (BEVs) are equipped with high-capacity lithium-ion batteries whose manufacture requires X-ray non-destructive inspections. Our microfocus X-ray sources, X-ray cameras, and other related products are indispensable for X-ray non-destructive inspections not only for lithium-ion batteries but also for automotive electronic circuit boards, engine components and driver-assist systems.



Solid State Division

Opto-semiconductor products

This technology of light is the path to new global possibilities.

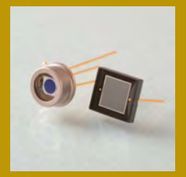


Toward the possibilities of the new technology of light

Getting a grasp on what lies one step ahead for our world. Pushing the limits of our unique opto-semiconductor technology to meet advanced user needs.

The Solid State Division has explored physical properties that determine opto-semiconductor performance since the early days in this field and succeeded in creating a variety of product lineups. Our opto-semiconductor products incorporate unique semiconductor process technology, mounting & packaging technology, and MEMS technology, and cover a wide wavelength range from infrared, visible, ultraviolet, all the way to X-rays and high energy rays. They are used in wide-ranging fields including medical care, scientific measurement, communications, consumer electronics, and vehicle on-board electronics. We will continue to pursue opto-semiconductor technology, always staying one step ahead, to meet the increasingly sophisticated needs of the future.

PRODUCTS



Si photodiode, Si APD, PSD, MPPC

Widely used light sensors that accurately detect changes in light intensity. A diverse range of silicon photodiodes are available in various packages and characteristics including those for low-light-level detection and position detection.

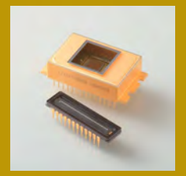


Image sensors

We offer a full lineup of image sensors that cover a broad spectral range from the near infrared through visible, ultraviolet, vacuum ultraviolet light to X-rays.

LED

We provide high power LED ideal for optical switches, encoders, distance measurement, environmental analysis.

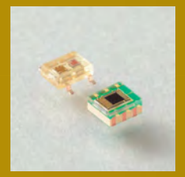
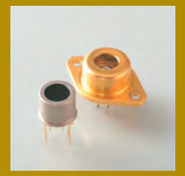


Photo IC

Photo ICs are photosensitive devices that have various functions by integrating a light sensor and a signal processing circuit into one package.

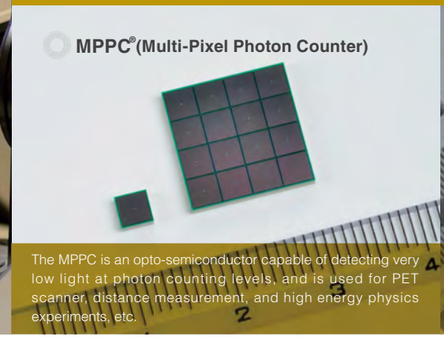


Infrared detectors

Our infrared detectors are used in a wide range of applications including academic research, information communication, and consumer electronics.

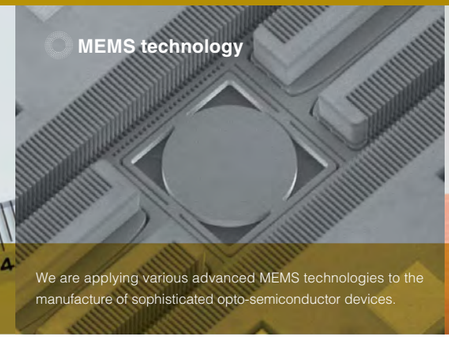
Opto-semiconductor modules

A wide variety of module products are available to extract the maximum performance from opto-semiconductors.



MPPC®(Multi-Pixel Photon Counter)

The MPPC is an opto-semiconductor capable of detecting very low light at photon counting levels, and is used for PET scanner, distance measurement, and high energy physics experiments, etc.



MEMS technology

We are applying various advanced MEMS technologies to the manufacture of sophisticated opto-semiconductor devices.

World's smallest spectrometer head (according to our research)

We have developed an ultra-compact grating type spectrometer by using advanced MOEMS (Micro-Opto-Electro-Mechanical Systems) technology to fabricate and combine a CMOS image sensor and grating, etc.

TOPIC

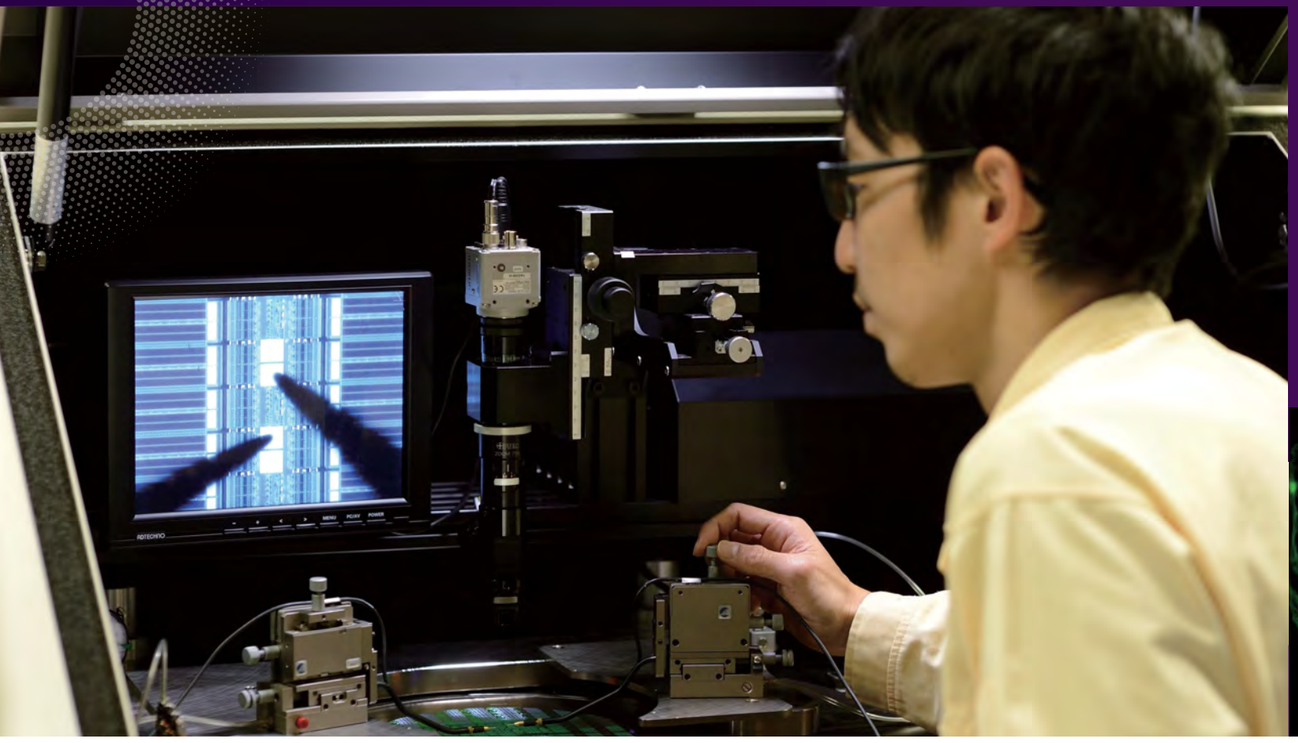
Opto-semiconductor devices for driving support systems

Advanced driving support functions for cars are evolving at an ever more rapid pace. These include interfaces for reliably checking information essential for driving and systems for detecting possible hazards in advance. Our Solid State Division is actively working to commercialize opto-semiconductor devices (Si APD, MPPC, distance image sensor, etc.) for detecting vehicle periphery information which plays a vital role in making these on-board vehicle functions work effectively.

Systems Division

Image processing and measuring systems

Shedding light on new possibilities



The key to further progress

Creating the breakthrough specialized systems based on the optical sensor technology

Our Systems Division is developing and manufacturing systems that integrate light detection technology, imaging technology, and image processing technology by using optical sensors. By utilizing our expertise and high technology as a leading sensor manufacturer, we design and develop specialized systems that combine core products, such as cameras with peripheral technologies and equipments.

PRODUCTS

OEM cameras

By taking advantage of our long-fostered camera technology and expertise, we have produced OEM cameras designed specifically to meet user needs such as for the sensor, cooling method, and interface.

Quantaurus

The Quantaurus allows easy and rapid measurement of luminescence quantum yields and fluorescence/phosphorescence lifetimes for evaluation of various luminescent materials and fluorescent probes.

NanoZoomer®

The NanoZoomer is a digital slide scanner that convert glass slides into high-resolution digital data by high-speed scanning. It offers well-developed solution by using digital slides.

iPHEMOS™-MPX

The iPHEMOS detects weak light emissions caused by the defects in a semiconductor device to identify and analyze the failure locations.

Streak cameras

The streak camera is an ultrahigh-speed detector which captures light emission phenomena occurring in extremely short time on the order of picoseconds or nanoseconds.

pde-neo®

The pde-neo II is a medical device which uses infrared fluorescence to observe the distribution of blood vessels in a living body non-invasively.

This technology supports capturing and imaging various life phenomena by using microscope and high-sensitivity camera.

This technology supports fault localization of semiconductor devices at a design stage.

This technology contributes to improvement of product quality control, which uses NIR or X-ray for wafer or food internal inspection.

TOPIC

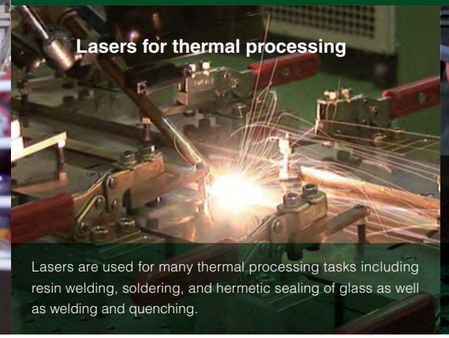
The ultimate performance in quantitative imaging

Hamamatsu Photonics has been developing high-sensitivity and low-noise cameras since the 1980s by leveraging its unique camera design technology. The ORCA-Quest equipped with the qCMOS image sensor is the world's first camera capable of PNR (photon-number-resolving) measurement that captures an image at very low light levels by accurately measuring the number of photoelectrons. Hamamatsu Photonics will be working to deliver the ultimate in quantitative imaging over a wide range of fields on the borders of human knowledge such as life science, astronomical research and quantum technology including quantum computers to further expand the boundaries of current science.

Laser Promotion Division

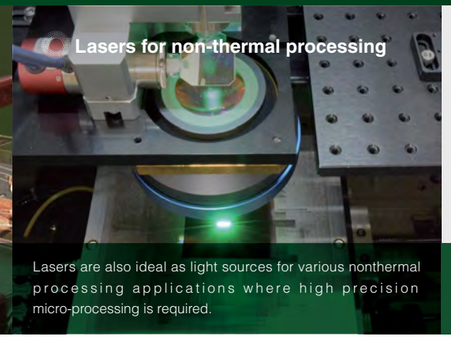
Lasers and related technology development

Creating energy to carve out a path to the future



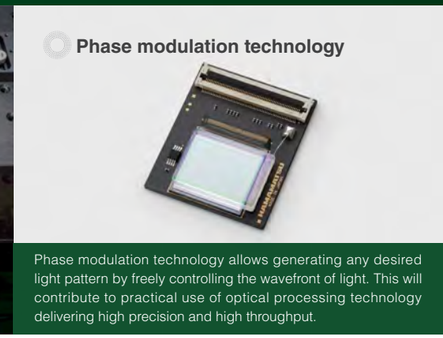
Lasers for thermal processing

Lasers are used for many thermal processing tasks including resin welding, soldering, and hermetic sealing of glass as well as welding and quenching.



Lasers for non-thermal processing

Lasers are also ideal as light sources for various nonthermal processing applications where high precision micro-processing is required.



Phase modulation technology

Phase modulation technology allows generating any desired light pattern by freely controlling the wavefront of light. This will contribute to practical use of optical processing technology delivering high precision and high throughput.

Technology to widen the path to future dreams

Fabricating high-reliability laser products with our advanced photonics technology

With laser fusion research as its core, we are working on multifaceted developments of laser technologies.
We are exploring still further possibilities for laser by merging integrated optics technology and our cultivated technology by laser fusion research, such as gas laser, semiconductor laser, and solid state laser.

PRODUCTS

Single chip laser diodes

Semiconductor lasers used for a broad range of applications including measurements, printing, medical treatment, and solid-state laser pumping.

Laser diode bar modules

These modules fully exhibit the high-level performance, high-power output and high reliability that are features of the laser diode bars, and are designed for easy handling.
Stacking the laser diode bars enables high-power output.

Laser heating systems

Laser heating systems optimized for thermal processing tasks are provided for specific applications such as soldering, plastic welding and quenching/hardening of materials.

Quantum cascade lasers (QCL)

Semiconductor lasers with a lasing wavelength in the mid-infrared range. The capabilities of high throughput and in-situ measurement enable to be suitable source for environmental monitoring and are also becoming used in industrial process automation.

Solid-state lasers

Solid-state laser products developed by merging our semiconductor laser technology, optical design technology, optical thin film technology, polishing and bonding technology, MEMS (Micro-Electro-Mechanical-Systems) technology and other cutting-edge technologies.

LCOS-SLM (Liquid Crystal On Silicon – Spatial Light Modulator)

The LCOS-SLM is a spatial light modulator capable of modulating optical phases with high precision. It brings new functions to optical systems by wavefront control of light.

TOPIC

Next-generation social infrastructure devices

Sensing technology is currently used in all kinds of situations in our daily lives. Among these, non-contact optical sensing technology using light from compact lasers is very promising. Small and highly robust semiconductor lasers will play an indispensable role in every part of our daily lives, such as for various promising self-driving sensing functions including car collision prevention, human body sensing for auto door operation on subway and railroad station platform, and for detecting people at railway crossings.

History of Hamamatsu Photonics

Chronology of company

1953
- Hamamatsu TV Co., Ltd. (former company name) established.

Ebitsuka Factory around 1955

1961
- Tokyo Business Office (Tokyo Sales Office) opened.

1964
- Ichino Factory (present Main Factory) opened.

1966
- New York Business Office opened.

1969
- Hamamatsu Corporation established as a U.S.A. subsidiary.


Ichino Factory when it was built


Hamamatsu Corporation

1973
- Germany joint company, Hamamatsu Television Europe GmbH, established.
- Toyooka Factory opened.

1979
- Osaka Sales Office opened.


Hamamatsu Television Europe GmbH


First building of Toyooka Factory

1980
- Joko Factory opened.

1981
- Tenno Glass Works opened.

1983
- Company name changed to Hamamatsu Photonics K.K.

1984
- Registered on the over-the-counter market of the Japan Securities Dealers Association.

1985
- Headquarters Business Office opened and Tsukuba Research Laboratory established.
- Subsidiary established in France.

1988
- Subsidiaries established in the U.K. and Sweden.
- Joint company established in China.

Company name sign (Japanese)

1990
- Central Research Laboratory opened.

1991
- Subsidiary established in Italy.

1994
- Miyakoda Factory opened.

1996
- Company's stock registered on the second section of the Tokyo Stock Exchange.

1998
- Company's stock registered on the first section of the Tokyo Stock Exchange.


Company's stock registered on the first section of the Tokyo Stock Exchange

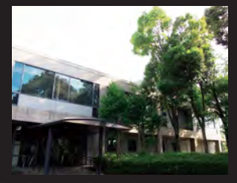
2000
- Mitsue Factory opened.

2002
- Masatoshi Koshiba, professor emeritus of the university of Tokyo, was awarded the Nobel Prize in Physics (for the research at Kamiokande where our photomultiplier tubes were installed).

2003
- A building of the general incorporated foundation : Hamamatsu Medical Photonics Foundation was completed to facilitate the early detection of cancer and dementia.

2005
- The Graduate School for the Creation of New Photonics Industries established for aiming at creating new industries using photonics technology.

2008
- Industrial Development Laboratory opened.


The Graduate School for the Creation of New Photonics Industries

2011
- Shingai Factory opened.
- Subsidiary established in China.

2013
- Professors emeritus François Englert and Peter W. Higgs were awarded the Nobel Prize in Physics (for Higgs boson discovery at CERN's LHC where our SSD, APD and PMT were used).

2014
- Our 20-inch photomultiplier tube was recognized as an IEEE milestone.
- Subsidiary established in Taiwan.

2015
- Professor Takaaki Kajita, the university of Tokyo, was awarded the Nobel Prize in Physics (for the research at SuperKamiokande where our photomultiplier tubes were installed).

2017
- Compound semiconductor Fabrication Center opened.
- Energetiq Technology, Inc. (U.S.A.) acquired as a subsidiary.


Surrounding Prof. Kajita

2020
- Subsidiary established in Korea.

2022
- Hamamatsu Ventures, Japan Co., Ltd. was established as a subsidiary.

1950's | 1960's | 1970's | 1980's | 1990's | 2000's | 2010's | 2020's

Chronology of main products

1953
- Production of phototubes started.

1956
- Image pickup tubes were put on the market.

1958
- CdS cells were put on the market.

1959
- Photomultiplier tubes were put on the market.

1961
- Production of PbS photoconductive detectors started.

1963
- Infrared video cameras were put on the market.

1970
- Deuterium lamps were put on the market

1972
- Silicon photodiodes were put on the market.

1977
- Streak camera systems were put on the market.

1982
- Infrared LEDs were put on the market.

1984
- Xenon lamps were put on the market.

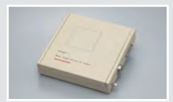
1985
- Linear image sensors were put on the market.
- High power pulsed laser diodes were put on the market.

1986
- Photo ICs were put on the market.

1987
- Excimer lasers were put on the market.

1994
- Microfocus X-ray sources were put on the market.

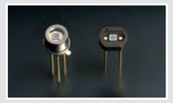
1998
- Flat panel sensors were put on the market.



2004
- Stealth Dicing Engine™ unit was put on the market.

2005
- Mini-spectrometers were put on the market.

2006
- MPPC (Multi-Pixel Photon Counter) was put on the market.



2007
- Quantum cascade lasers were put on the market.

2011
- ORCA®-Flash4.0 (scientific CMOS camera) was put on the market.

2012
- Micro PMT was put on the market.

2016
- MEMS-FPI spectrum sensor and MEMS mirror were put on the market.

2021
- ORCA-Quest was put on the market.

Corporate Profile

Corporate Outline (As of end of December 2022)

Company Name	HAMAMATSU PHOTONICS K.K.
Established	September 29, 1953
Capital	35,048 Million Yen
Number of Employees	3,884 (non-consolidated number, and not including 78 staff working overseas and others) (As of end of September 2022)

Global Network

Europe

●PHOTONICS MANAGEMENT EUROPE SRL
Chaussee de La Hulpe 120, 1000 Bruxelles, Belgium

●HAMAMATSU PHOTONICS EUROPE GMBH
Arzbergerstr. 10, 82211 Herrsching am Ammersee, Germany
Phone: (49)8152-375-0 Fax: (49)8152-265-8
E-mail: info@hamamatsu.de

●HAMAMATSU PHOTONICS DEUTSCHLAND GMBH

· **Main Office**
Arzbergerstr. 10, 82211 Herrsching am Ammersee, Germany
Phone: (49)8152-375-0 Fax: (49)8152-265-8
E-mail: info@hamamatsu.de

· **Netherlands Office**
Transistorstraat 7, 1322 CJ Almere, The Netherlands
Phone: (31)36-5405384 Fax: (31)36-5244948
E-mail: info@hamamatsu.nl

· **Poland Office**
10 Ciolka Street, 126-127 01-402 Warsaw, Poland
Phone: (48)22-646-0016 Fax: (48)22-646-0018
E-mail: poland@hamamatsu.de

· **Danish Office**
Lautruphoj 1-3, 2750 Ballerup, Denmark
Phone: (45)44-20-99-49 Fax: (45)44-20-99-10
E-mail: info@hamamatsu.dk

· **Israel Office (HAMAMATSU PHOTONICS ISRAEL LTD.)**
Ha-Menofim 10 st., third floor, 4672561 Herzliya, Israel
E-mail: info@hamamatsu.co.il

●HAMAMATSU PHOTONICS FRANCE S.A.R.L.

· **Main Office**
19 Rue du Saule Trapu, Parc du Moulin de Massy,
91882 Massy Cedex, France
Phone: (33)1 69 53 71 00 Fax: (33)1 69 53 71 10
E-mail: infos@hamamatsu.fr

· **Swiss Office**
Dornacherplatz 7, 4500 Solothurn, Switzerland
Phone: (41)32 625 60 60 Fax: (41)32 625 60 61
E-mail: swiss@hamamatsu.ch

· **Belgian Office**
Axisparc Technology, Rue André Dumont 7,
1435 Mont-Saint-Guibert, Belgium
Phone: (32)10 45 63 34 Fax: (32)10 45 63 67
E-mail: info@hamamatsu.be

· **Spanish Office**
C. Argenters 4, edif 2, Parque Tecnológico del Vallés,
08290 Cerdanyola, (Barcelona), Spain
Phone: (34)93 582 44 30
E-mail: infospain@hamamatsu.es

●HAMAMATSU PHOTONICS UK LIMITED

· **Main Office**
2 Howard Court,10 Tewin Road, Welwyn Garden City,
Hertfordshire, AL7 1BW, UK
Phone: (44)1707-294888 Fax: (44)1707-325777
E-mail: info@hamamatsu.co.uk

· **South Africa Contact**
9 Beukes Avenue, Highway Gardens, Edenvale,
1609, South Africa
Phone/Fax: (27)11 609 0367

●HAMAMATSU PHOTONICS NORDEN AB

· **Main Office**
Torshamnsgatan 35, 16440 Kista, Sweden
Phone: (46)8-509-031-00 Fax: (46)8-509-031-01
E-mail: info@hamamatsu.se

●HAMAMATSU PHOTONICS ITALIA S.R.L.

· **Main Office**
Strada della Moia, 1 int. 6 20044 Arese (Milano), Italy
Phone: (39)02-93 58 17 33 Fax: (39)02-93 58 17 41
E-mail: info@hamamatsu.it

· **Rome Office**
Viale Cesare Pavese, 435, 00144 Roma, Italy
Phone: (39)06-50 51 34 54
E-mail: inforoma@hamamatsu.it

U.S.A.

●PHOTONICS MANAGEMENT CORP.
360 Foothill Road, Bridgewater, NJ 08807, U.S.A.
Phone: (1)908-231-0960 Fax: (1)908-231-0852

●HAMAMATSU CORPORATION

· **Main Office**
360 Foothill Road, Bridgewater, NJ 08807, U.S.A.
Phone: (1)908-231-0960 Fax: (1)908-231-1218

· **California Office**
2875 Moorpark Ave., San Jose, CA 95128, U.S.A.
Phone: (1)408-261-2022 Fax: (1)408-261-2522

●ENERGETIQ TECHNOLOGY, INC.
205 Lowell Street, Wilmington, MA 01887, U.S.A.
Phone: (1)781-939-0763 Fax: (1)781-939-0769
E-mail: info@energetiq.com

Asia

●HAMAMATSU PHOTONICS K.K.

· **Headquarters**
325-6, Sunayama-cho, Naka-ku, Hamamatsu City, Shizuoka
Pref., 430-8587, Japan
Phone: (81)-53-452-2141 Fax: (81)-53-456-7889
E-mail: kikaku2@hq.hpk.co.jp

●HAMAMATSU PHOTONICS (CHINA) CO., LTD.

· **Main Office**
1201, Tower B, Jiaming Center, 27 Dongsanhuan Beilu,
Chaoyang District, 100020 Beijing, P.R. China
Phone: (86)10-6586-6006 Fax: (86)10-6586-2866
E-mail: hpc@hamamatsu.com.cn

· **Shanghai Branch**
4905 Wheelock Square, 1717 Nanjing Road West, Jingan
District, 200040 Shanghai, P.R. China
Phone: (86)21-6089-7018 Fax: (86)21-6089-7017
E-mail: hpcsh@hamamatsu.com.cn

· **Shenzhen Branch**
14F China Merchants Tower 1#, No.1166 Wanghai Road,
Shekou, Nanshan District, Shenzhen, P.R. China
Phone: (86)755-2165-9058 Fax: (86)755-2165-9056
E-mail: hpcsz@hamamatsu.com.cn

· **Wuhan Branch**
Room 1005 Fanyue City T2 Building, No.19 Guanshan Avenue,
East Lake High-tech District, Wuhan 430075, Hubei, P.R. China
Phone: (86)27-5953-8219
E-mail: hpcwh@hamamatsu.com.cn

●BEIJING HAMAMATSU PHOTON TECHNIQUES, INC.
http://www.bhphoton.com

· **Main Office**
11-18 Building, No.188 Western Road, South 4th Ring Road,
Fengtai District, Beijing, 100070 P.R. China
Phone: (86)10-6370-6370 Fax: (86)10-6370-6371
E-mail: bhp@bhphoton.com

· **Langfang Factory**
No.1 Road, Langfang Economic & Technical Development
Zone, 062001 Hebei, P.R.China
Phone: (86)316-597-0188 Fax: (86)316-597-0189

●HAMAMATSU PHOTONICS TAIWAN CO., LTD.

· **Main Office**
8F-3, No.158, Section 2, Gongdao 5th Road, East District,
Hsinchu, 300, Taiwan R.O.C.
Phone: (886)3-659-0080 Fax: (886)3-659-0081
E-mail: info@hamamatsu.com.tw

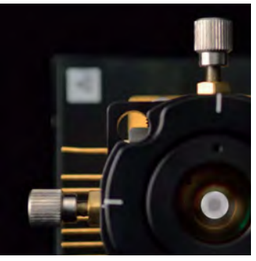
●HAMAMATSU PHOTONICS KOREA CO., LTD.

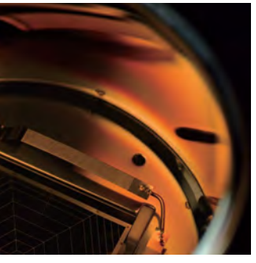
· **Main Office**
A-912, 167, Songpa-daero, Seoul, 05855, Korea
Phone: (82)2-2054-8202 Fax: (82)2-2054-8207

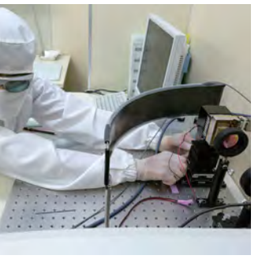
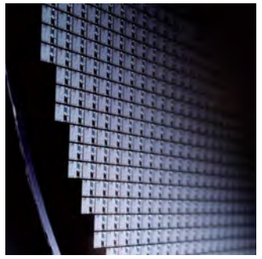
· **Hwaseong Plant**
63-5, Dongtancheomdansaneop 1-ro, Hwaseong-si,
Gyeonggi-do, Republic of Korea
Phone: (82)31-548-0050 Fax: (82)70-8290-0773

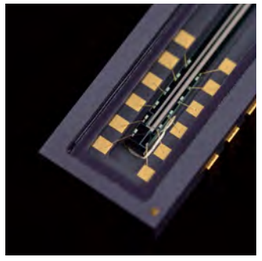
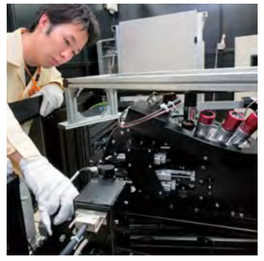
For detailed information concerning our Japanese corporation, please visit our website at
https://www.hamamatsu.com/all/en/our-company/index.html

Sales Office



Instead of being taught by someone,

See it with your own eyes,

Listen to it with your own ears,

Understand it with your own heart.

What we do not know and what we

cannot do is an infinite dimension

we must now explore.

Teruo Hiruma

HAMAMATSU

PHOTON IS OUR BUSINESS

HAMAMATSU PHOTONICS K.K.

www.hamamatsu.com

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