



Quarterly Financial Results Briefing 2nd Quarter of FY2022

QD Laser, Inc.
November 2022

Mission

**With the power of the semiconductor laser,
“I can’t” becomes “I can”.**

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What was once thought to be impossible is now a reality; we have become the only company in the world to successfully mass produce Quantum Dot LASERs.

Our laser technology will enable dramatic improvements in our ability to process information, support visually impaired people, prevent eye diseases, and enhance vision, continually pushing the boundaries of human possibility.

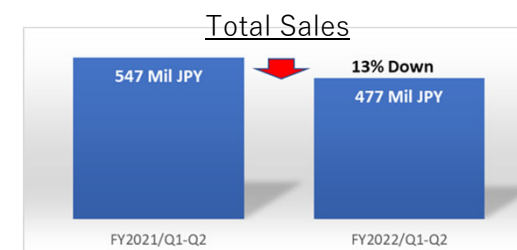
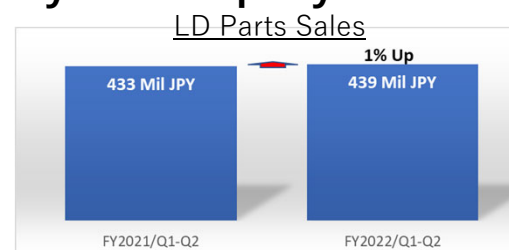
01

Financial Results for FY2022-Q2

Financial Results Highlights for FY2022-Q2 vs FY2021-Q2

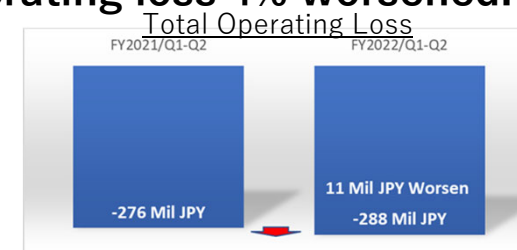
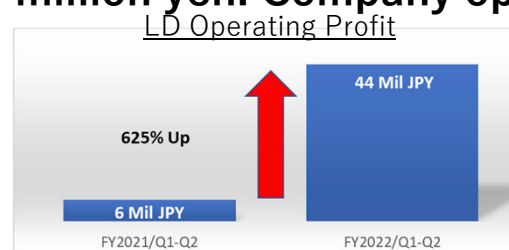
01 LD parts sales increased 1% YoY to 439 million yen. Company-wide sales 13% decreased .

In the laser device (LD) business, parts sales increased as other parts compensated for a decrease in high-power lasers due to the lockdown in China. However, total sales of the LD decreased due to the transfer of NRE sales to the laser eyewear (LEW) business. LEW business increased by 13%. The main reason for the YoY decline in company-wide sales was a decline of NRE.



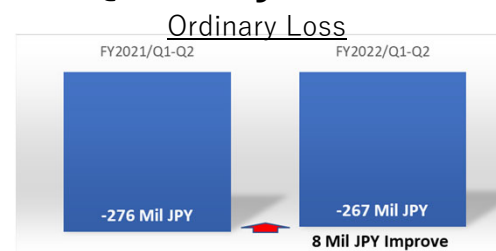
02 LD operating profit increased 625% YoY to 44 million yen. Company operating loss 4% worsened.

The LD business grew steadily with a profit of 44 million yen, up 625% year-on-year. Although selling, general and administrative expenses decreased by 4 million yen YoY, the company-wide operating loss worsened by 4% due to the decrease in gross profit due to the reduction in sales.



03 Ordinary loss improved by 8 million yen (3%) YoY. Quarterly net loss worsened by 9 million yen (3%).

Ordinary loss improved by JPY8mn YoY due to foreign exchange gains due to yen depreciation. In the same period of the previous year, there was an extraordinary profit of 21 million yen due to the reversal of asset retirement obligations, so the quarterly net loss worsened.



Financial Result Highlights for FY2022-Q2 vs FY2021-Q2

Sales decreased and loss worsen compared to the same period of the previous year.

Although sales of LD parts increased by 1% year-on-year, company-wide sales decreased by 13% due to NRE sales reduction. Operating income in the LD business grew by 625% year-on-year to 44 million yen. The company-wide operating loss worsened by 4% year-on-year due to increased development costs related to three new products in the LEW business.

Performance Summary

(Million JPY)	FY2022 Q1-Q2	FY2021 Q1-Q2	YOY
Sales	477	547	△13% (△70)
(LD)	439	513	△15%
(LEW)	38	33	+13%
Operating Profit or Loss (△)	△ 288	△276	△11
(LD)	44	6	+38
(LEW)	△ 184	△138	△46
Ordinary Loss (△)	△ 267	△276	+8
Quarterly Net Loss (△)	△ 269	△260	△9



Sales by Product Group

(Million JPY)	FY2022 Q1-Q2	FY2021 Q1-Q2	YOY
DFB Laser	171	161	+6%
Compact Visible Laser	118	71	+65%
High-Power Laser	101	146	△31%
Quantum Dot Laser	48	54	△11%
LD Parts Total	439	433	+1%
NRE	—	79	△100%
LD Total	439	513	△15%
LEW Total	38	33	+13%
Grand Total	477	547	△13%

Balance Sheet

Total assets decreased by 257 million yen due to a decrease in cash, deposits, and A/R, total liabilities decreased by 40 million yen due to the reduction in long-term borrowings scheduled to be repaid within one year, and the equity ratio was 89.2%^{*1} (88.9% at the end of the previous fiscal year).

Balance Sheet

Million JPY	End of September 2022	End of March 2022	Increase/Decrease
Current Assets	3,490	3,729	△239
Fixed Assets	270	288	△18
Total Assets	3,760	4,018	△257
Current Liabilities	347	383	△35
Fixed Liabilities	46	51	△4
Total Liabilities	394	434	△40
Total Net Assets	3,366	3,583	△217
Total Liabilities and Net Assets	3,760	4,018	△257

Cash Flow

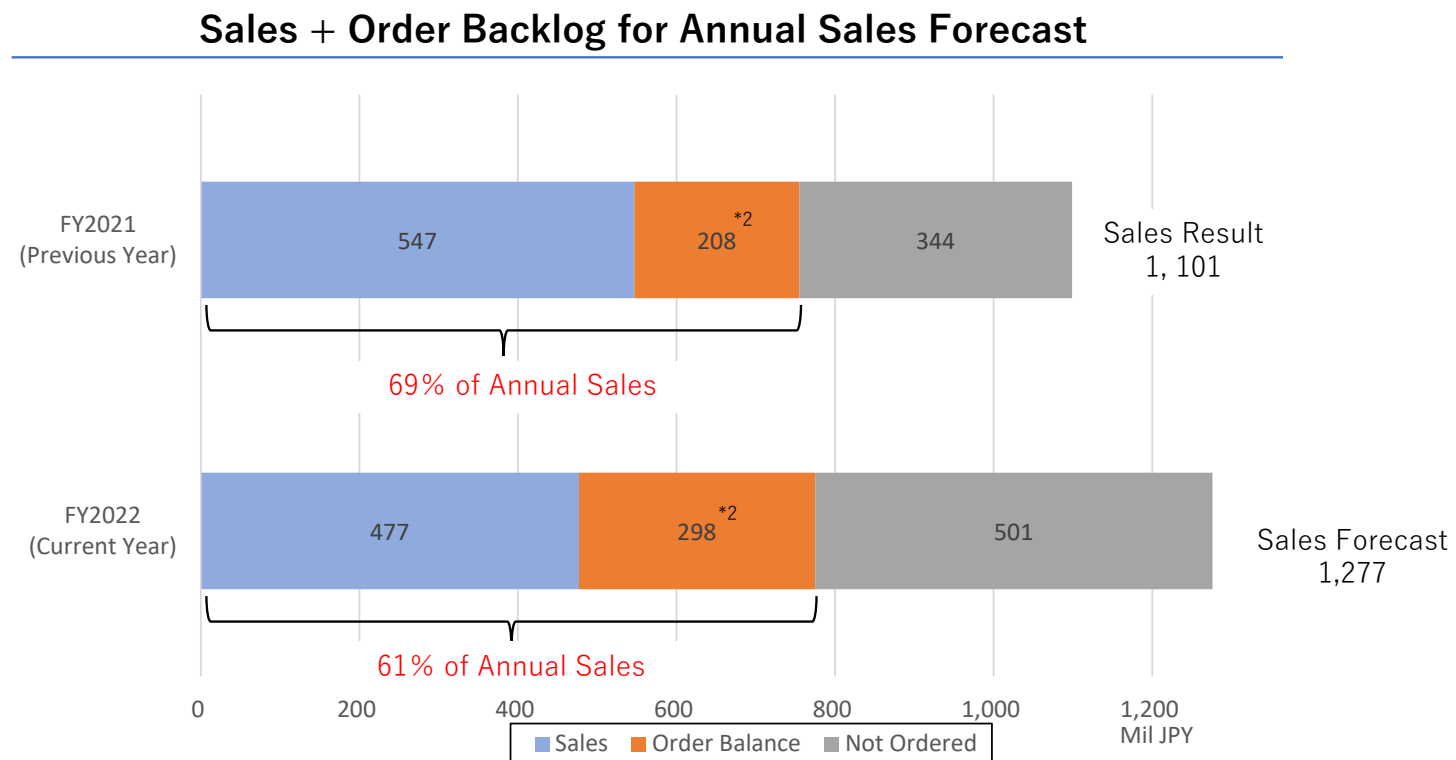
Cash and cash equivalents decreased by 114 million JPY year on year.

Cash Flow

(Million JPY)	FY2022 Q1-Q2	FY2021 Q1-Q2	YOY
CF from Operating Activities	$\Delta 116$	$\Delta 360$	+243
CF from Investing Activities	6	$\Delta 35$	+ 42
CF from Financing Activities	$\Delta 37$	$\Delta 41$	+ 4
Effect of Exchange Rate Change on Cash and Cash Equivalents	1	3	$\Delta 2$
Cash and Cash Equivalents Year-end Balance	2,675	2,790	$\Delta 114$

Order Status

As of the end of the second quarter, sales + order backlog^{*1} (planned sales for the current fiscal year) is 61% of annual forecast sales

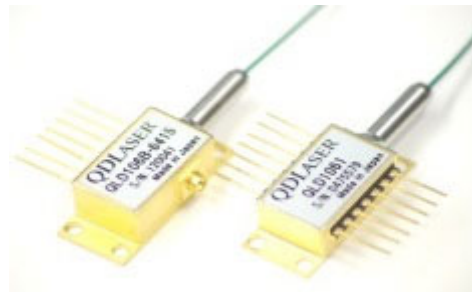


DFB Lasers for Precision Machining and Measurement : Sales in FY2022-Q2

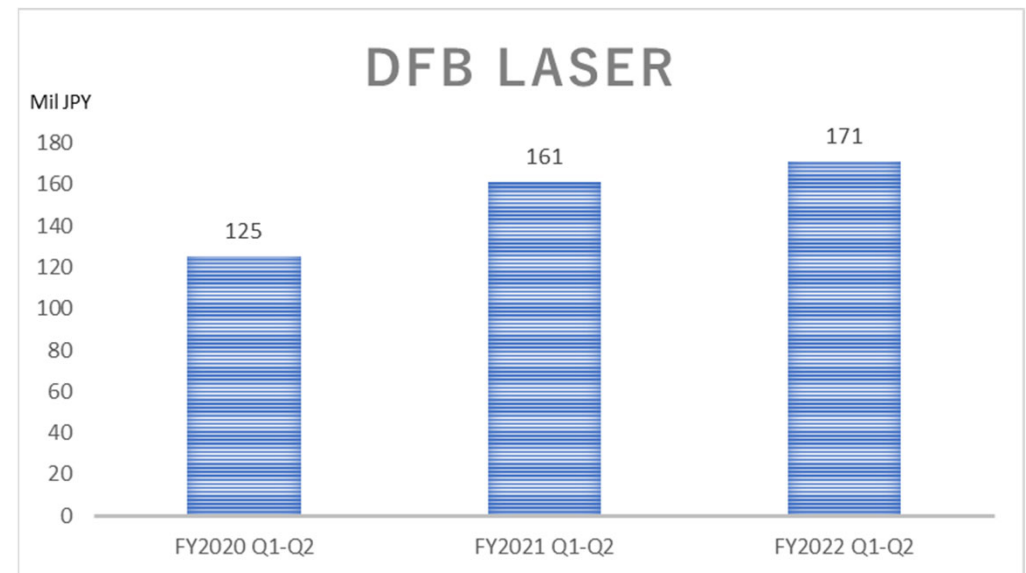
171 million JPY sales, increased by 6% YOY.

- North America: Sales increased by 1% YOY due to steady orders for lasers for processing equipment.
- Europe: Sales of light sources for inspection equipment in the semiconductor wafer process increased by 40% YOY.
- North America: Sales of light sources for sensors increased by 18.06 million YOY.
- Japan : Sales of light sources for ophthalmic diagnosis increased by 93% YOY
- JAPAN : Sales of light source prototypes for inspection equipment in the semiconductor wafer process increased by 4.29 million JPY YOY.

DFB lasers
Left : for 15 ps pulsed operation
Right : for 50 ps pulsed, ns pulsed, and CW operations



Cumulative Sales of Q1 and Q2 in
FY2020, 2021 and 2022



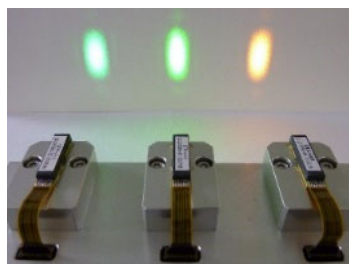
Compact Visible Lasers : Sales in FY2022-Q2

118 million JPY sales, increased by 65% YOY.

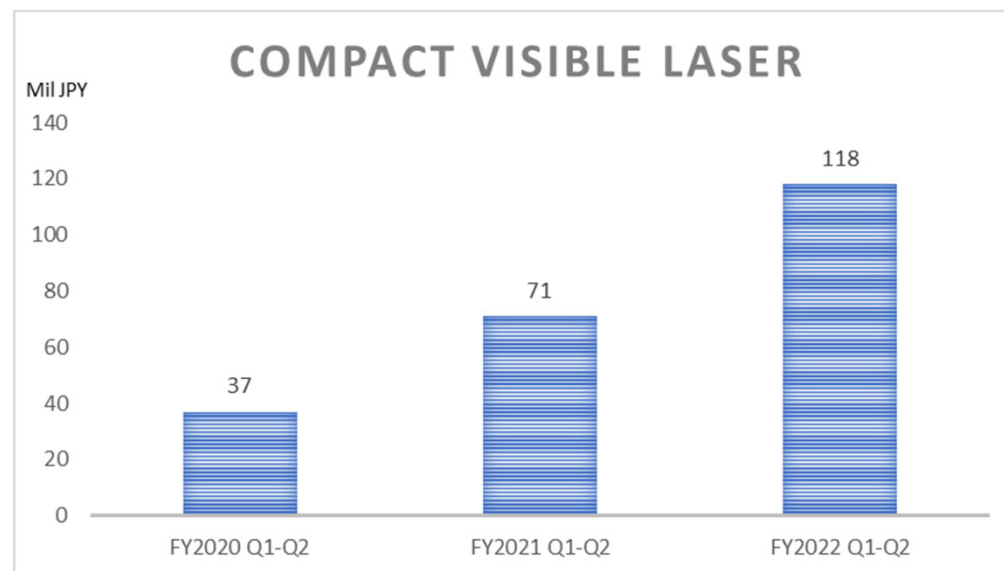
- China: Sales increased by 49% YOY with the expanding mass production, including a new application (cell sorter*1) in the biomedical equipment manufacturer.
- Europe: Orders from a biomedical STED*2 microscope manufacturer resumed last fiscal year, with a forecast of 100pcs in 2022-2023. The sales of this term were 3.24 million JPY.
- Europe: Newly certified by one customer for microscope applications last fiscal year, with this term sales increased by 192% YOY.
- North America: Sales increased by 289% YOY with starting of mass production for biomedical applications
- Japan : Order started for the biomedical equipment manufacturer with sales of 3.00 million JPY.

Compact visible lasers

Left: green,
Middle: yellow-green, and
Right: orange.



Cumulative Sales of Q1 and Q2 in
FY2020, 2021 and 2022



High-Power Lasers : Sales in FY2022-Q2

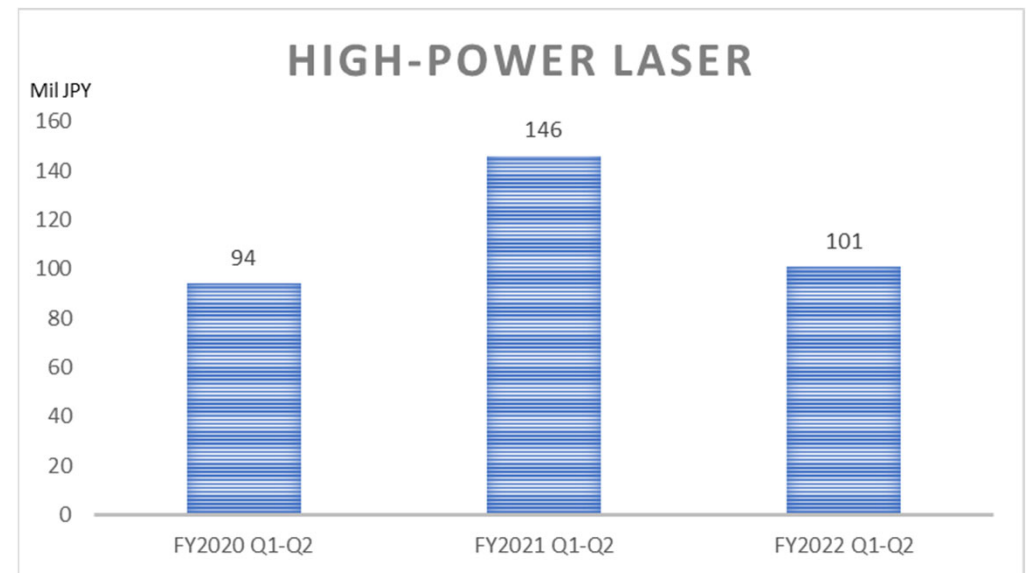
101 million JPY sales, decreased by 31% YOY.

- China: Orders of light sources for sensors and levelers decreased by 62% YOY due to the suspension of factory operations under COVID-19.
- Europe: Increased sales of light sources for sensors by 4.92 million JPY YOY.
- North America: Increased sales of light sources for particle counters in semiconductor factories with 2.91 million JPY.
- Japan : Sales of light sources for sensors of wafer transfer machines to be used in semiconductor factories increased by 194% YOY.
- Japan : Sales of light sources for particle counters in semiconductor factories increased by 168% YOY.



High-power lasers
TO package

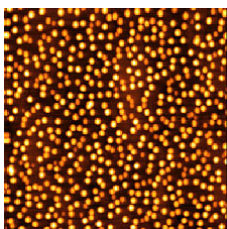
Cumulative Sales of Q1 and Q2 in
FY2020, 2021 and 2022



Quantum Dot Lasers^{*1} : Sales in FY2022-Q2

48 million JPY sales, decreased by 11% YOY.

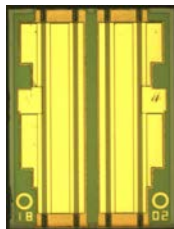
- QD Laser is working on quantum-dot lasers for silicon photonics with nine customers in Japan, the US, and Europe.
- Japan: Completed the development of highly efficient chips for the optical connector and chip-to-chip communication customer. Shipped chips to prepare for mass production. Continuing activities to reduce costs. Mass production is scheduled to start in 2023.
- North America: Shipped to customers working on LiDAR and the optical connector and chip-to-chip communication.
- North America: Under discussion about the following order from the customer of optical connector/ chip-to-chip communication shipped in the previous fiscal year.
- One university in Europe and two research centers in Asia : Received orders and shipped quantum dot wafers for research.



Quantum dot

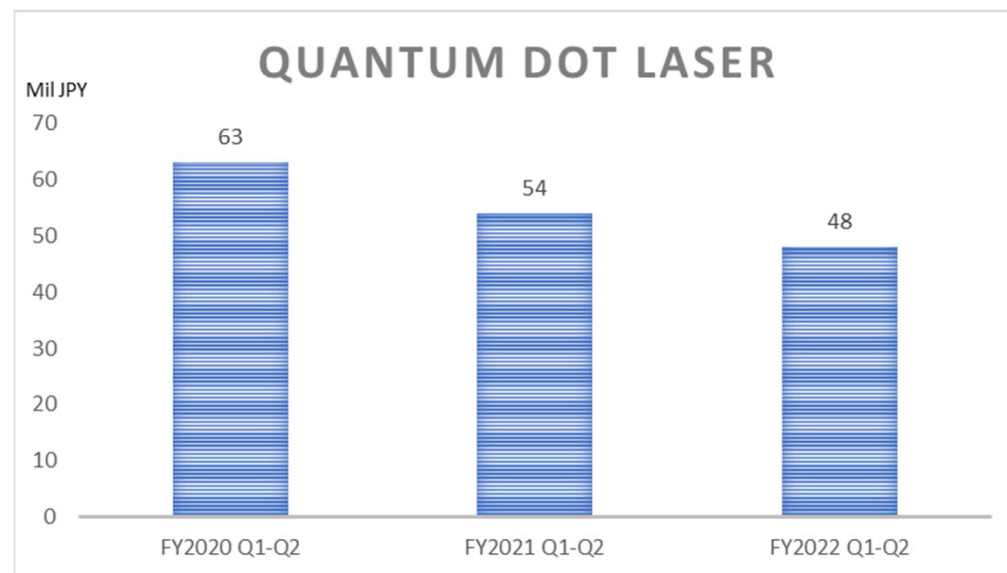


Quantum dot wafer



Quantum dot laser chip

Cumulative Sales of Q1 and Q2 in
FY2020, 2021 and 2022



Laser Eyewear (LEW) : Sales in FY2022 -2Q

38 million JPY sales, increased by 13% YOY.

■ RETISSA Medical

- Introducing RETISSA Medical, together with Display II and ON HAND to about thirty medical institutions interested in retinal imaging under collaboration with SEED.

■ RETISSA Display II /CAM (Consumer Product)

- Started support for an NPO institution named “Albino Donut Society” under collaboration with MIRAIRO :
<https://www.youtube.com/watch?v=RSSeiCLq7v8>
https://www.youtube.com/watch?v=MOtONIOt_fE
<https://camp-fire.jp/projects/625837> (Crowd Funding)
- Local Municipality Subsidy with 90% benefit registered in 11 areas in Tokyo. Plan to expand to many cities nationwide.
- Rental at WAKASA-SEIKATSU antenna shop. Customer's interview entitled "Practicing to see with both eyes" on <https://www.retissa.biz/>.
- Resumed sales in China with a Chinese agency, and is currently applying for a bid for a school for the blind in Xi'an

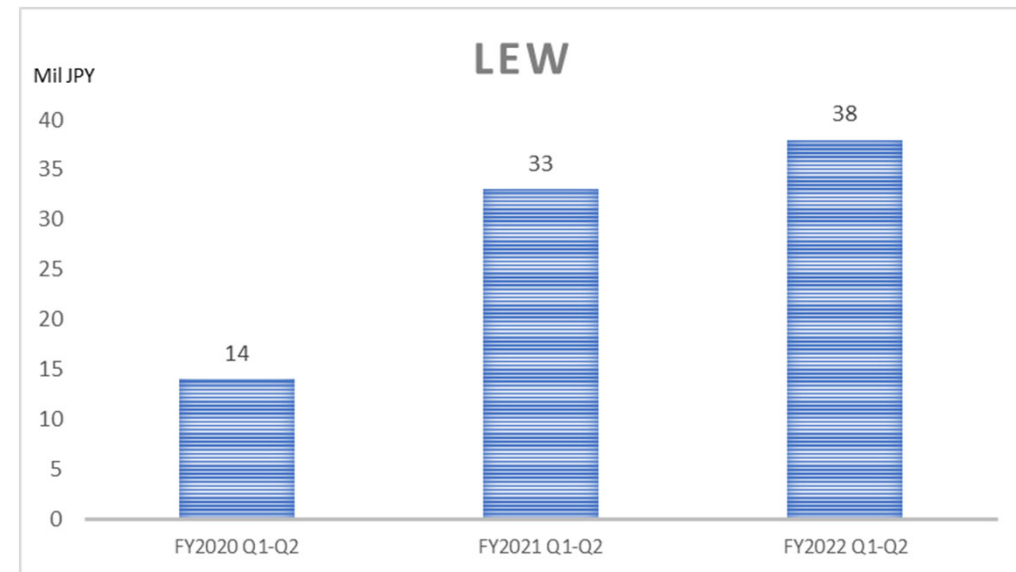
■ NRE We jointly developed a laser-integrated light source for smart glasses with TDK and NTT and exhibited it at the TDK booth at CEATEC 2022 (October 18), along with our developed flat mirror with a wide viewing angle (FOV of about 40 degrees).

■ New three products

- ONHNAD: Contracted an order of 240 units with a contracted distributor.
- RNV(Super Capture): Coordinating business cooperation with a digital camera manufacturer.
- MEOCHECK: Concluded a general sales agent contract (750 units sold for one year until the next term. 150 units for this fiscal year).

✧ QD LASER

Cumulative Sales of Q1 and Q2 in
FY2020, 2021 and 2022



RETISSA Display II



RD2CAM



RETISSA Medical

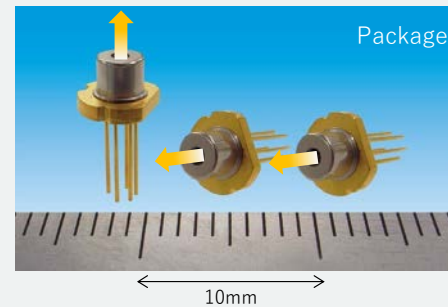
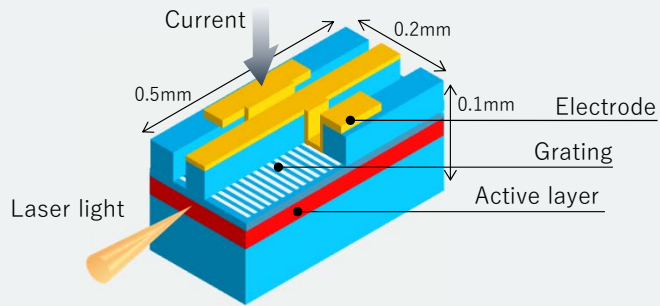
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Semiconductor Laser Devices

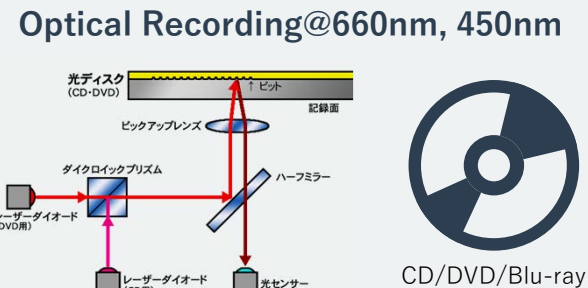
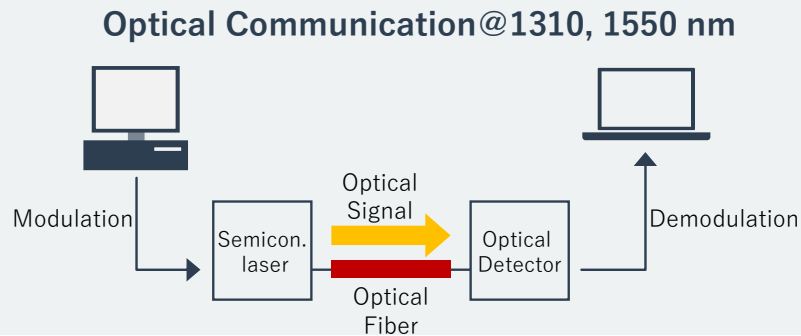
Solid Earnings Base and High Growth Potential
under Global Laser Market Expansion

What is a Semiconductor Laser?

A tiny device to provide laser light by injecting an electric current through a semiconductor.



First Large-Scale Applications of Semiconductor Lasers: Optical communication and optical recording have significantly contributed to the global information and communication infrastructure.



Expected Role of QD Laser, Inc.

Semiconductor Laser History and Our Position in the 3rd Phase

1st phase

Proposals of Scientific Principles and Invention of Laser (1960s)

Laser

A technology used in recording, communication, processing and sensing.

Applied in various industries such as medicine, home appliances, automobiles, manufacturing and entertainment.

2nd phase

Invention of Semiconductor Lasers, Building out Optical Communication and the Internet (1995~)

Semiconductor lasers and packaging



Semiconductor laser:

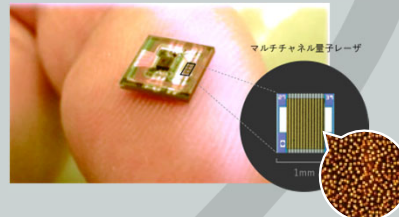
A small element with a length of about 1 mm that causes a laser to oscillate by passing a current through a semiconductor. Compared with other lasers, possesses excellent properties such as ultra-small size, high-speed modulation characteristics reaching several 10s of GHz, high power-to-light conversion efficiency (in several 10s of %), and wavelength controllability, etc.

3rd phase

Accelerating the Integration of Humans and Information(2020s~)

Nanotechnology of QD laser to generate and control laser light

Image of quantum dots taken by an atomic force microscope and a quantum dot laser equipped on fingertip-sized silicon chip as 100Gbps optical transceiver



Quantum Dot Laser:

A semiconductor laser adopting a quantum dot structure which has a semiconductor nano-sized microcrystal in its active layer. Compared with existing semiconductor lasers, these lasers are superior in temperature stability, temperature resistance, and low noise.

Fields where our lasers are applied (being Developed or Commercialized)

- 5G base station
- Supercomputer
- Visual Aid
- Smart Glass
- Optical Interconnect
- Facial recognition
- Fundus photography
- Micromachining
- In-Vehicle communication
- LiDAR for autonomous cars
- Biophotonics
- Visual field testing

New Era for Semiconductor Lasers

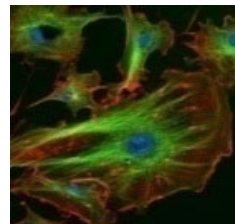
We are developing products for all applications shown below and have launched a part of them.

- Optical interconnect ⇒ enhancing the computing and data processing power



- Sensor ⇒ Precise detection of human and material (shape, position, velocity)

Biomedical



Face recognition



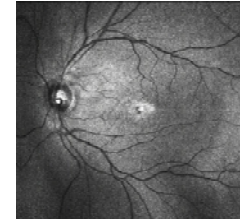
LiDAR (Automotive, Robotics, Drone)



Motion recognition



Fundus, Sight, Field of view



- Micromachining ⇒ Highly functional/high precision device manufacturing



- Display ⇒ AR/VR/XR

Smart Glasses



Head-up display



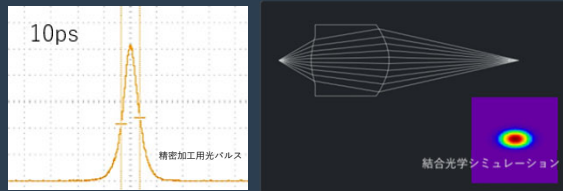
Our Core Technologies and Competitive Advantages

Material Creation, Design, and Control

Cutting Edge Semiconductor Laser Technology with Several Unique Features

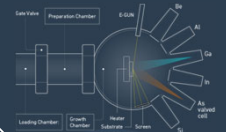
Laser Design

A technology to design lasers suitable for each use.
World's fastest (10ps)^{*3} semiconductor laser
 for precision material processing
 utilizing optical communication technology,



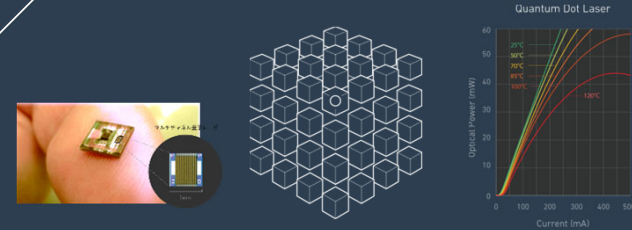
Semiconductor Crystal Growth

Technology to grow
 each atomic layer of semiconductor crystals
 on a semiconductor substrate



Quantum Dot

Succeeded in the mass production of
 quantum dot lasers with **world's highest operating temperature**^{*1}
 and developed **world's smallest silicon-based optical transceiver**^{*2}



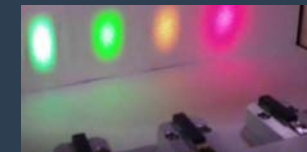
Small Module

A technology to make DFB lasers ultra compact.
 Our yellow/orange laser modules led us
 to become one of the finalists at the Prism Awards 2014.



Diffraction Grating

Technology to form periodic refractive index change inside the laser
 enabling arbitrary wavelength control.
World's first^{*5} commercialization of yellow/orange semiconductor laser



VISIRIUM Technology

A technology to project
 images directly on the retina
 through ultra small laser projectors.
World's First Commercialization^{*4}



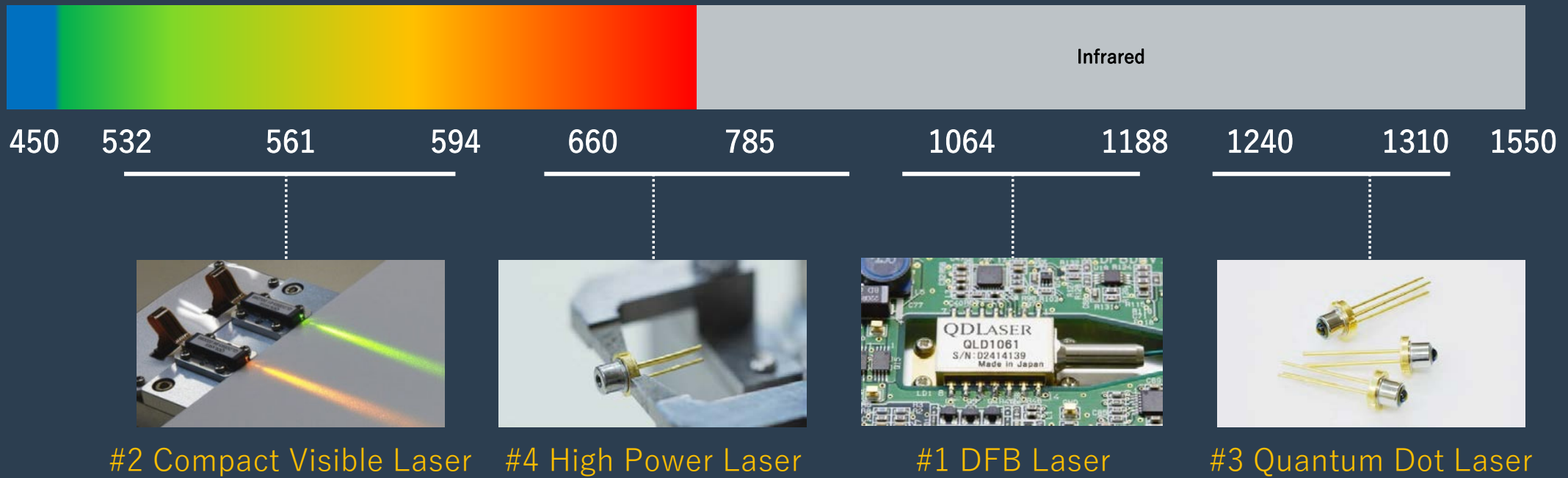
*1: "Extremely high temperature (220° C) continuous-wave operation of 1300-nm-range quantum-dot lasers",
 Published in 2011 Conference on Lasers and Electro-Optics Europe and 12th European

*2: Developed the world's smallest 5mm square ultra-high-speed, low-power-consumption optical transceiver – Achieved the world's best, 25Gbps / ch transmission speed –

*3: 2017 PRISM Award in Industrial Lasers - QD Laser (2nd Feb 2017)
 *4: Prism Awards honour photonic innovations at Photonics West 2019
 *5: Japan/U.S. PATENT JP5362301/US8896911

Variations on semiconductor lasers developed and sold by QD Laser

QD Laser provides a wide range of semiconductor lasers with wavelengths suitable for each application



#1



DFB Laser

- Applications: Laser processing, measurement, and LiDAR.

Amplifies only the wavelength selected by the diffraction grating. **High output power, high stability, and low noise.** Provides the optimum wavelength for a wide range of applications and required performance.

- **Wavelength lineup of** 1030, 1053, 1064, 1080, 1120, 1180nm
- **Provided in 1nm unit**
- Non-heated processing is possible by **short-pulse operation in picoseconds.**
- **Highly stable and low noise** enables high-precision machining and measurement.
- Only a few companies worldwide can manufacture DFB lasers in this wavelength band.

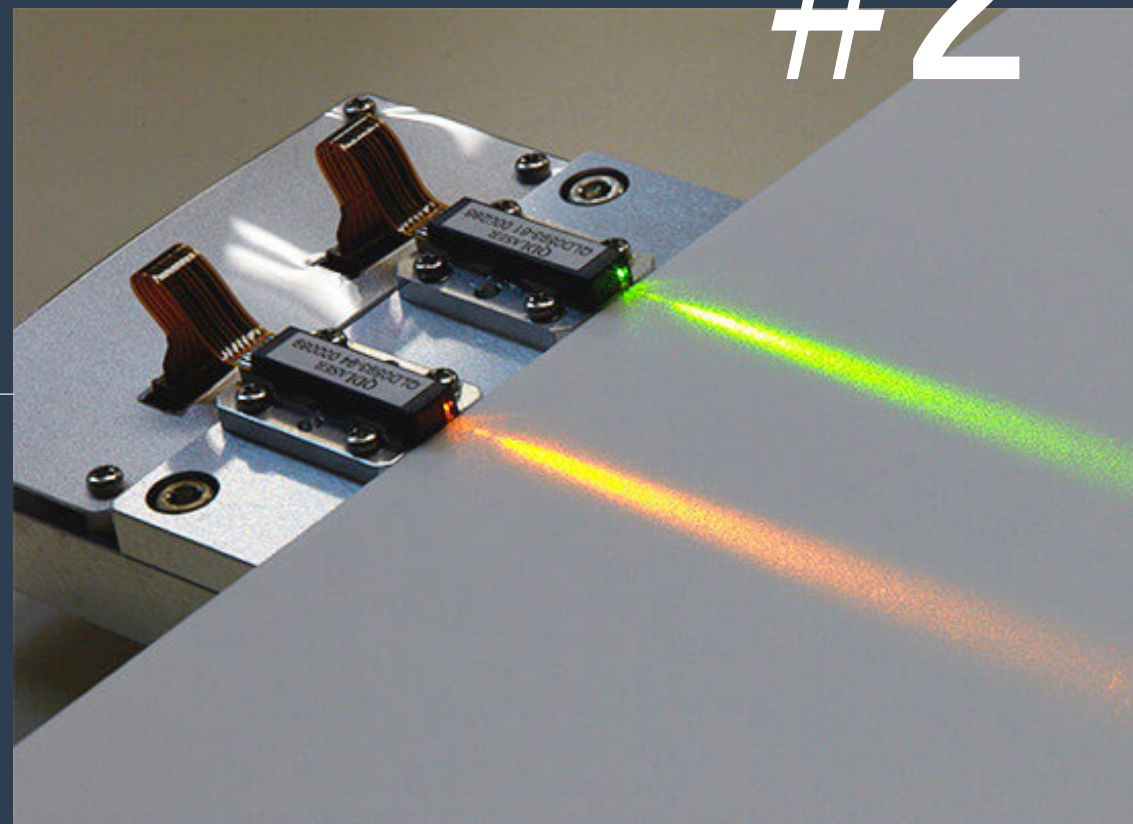
Compact Visible Laser Small Multi-Color Laser Light Source

- Application : Biomedical

Green, Yellow-Green, and Orange visible laser

The **patented technology** * 1 realizes a **small device that other companies cannot manufacture**.

- Wavelength lineup of **532, 561, and 594nm**.
- Used for **"flow cytometer", "cell sorter", "laser microscope", "fundus diagnostics"** etc.
- Wavelength range where there is no direct emitting semiconductor lasers.
- Wavelength doubling with a nonlinear optical crystal.
- Unique semiconductor laser chip and wavelength conversion crystal package achieves miniaturization.
- **Low noise and excellent pulse stability**.



*1 : Japan/U.S. PATENT JP5362301/US8896911

Growth Strategy of Compact Visible Laser

● Current product sales volume and market share

Wavelength (nm)	Color	FY2021 Sales in units	FY2022 Planned Sales in units	Number of customers	Market share
532	green	17	17	2	※
561	Yellow green	1,055	1,308	6	33%
594	Orange	13	13	1	※
Total		1,085	1,338	8	17%

※less than 1%

● Aiming for annual growth of 30% from FY2011 ⇒ 3 measures ⇒ Market share 44% @ FY2027*

1. Promotion

- Increase in client companies: 8 ⇒ 13 companies
- Increase of introduced equipment: 9 ⇒ 26 models

2. New laser development

- New wavelengths (488nm, 552nm): Market of 11,500 units
- High output power(30 ⇒ 50mW): Market of 3,800 units

3. Solution

- Box module : Market of 10,600 units



- Multicolor light sources(next page) : Market of 12,500 units

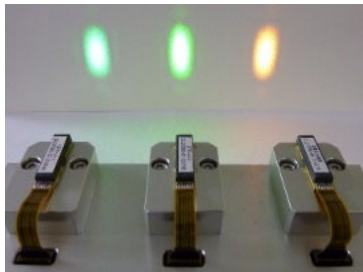
*1For all the devices with the power of less than 50mW

Launch of Palm-Sized Multi-color Compact Laser Light Source for Biomedical Equipment

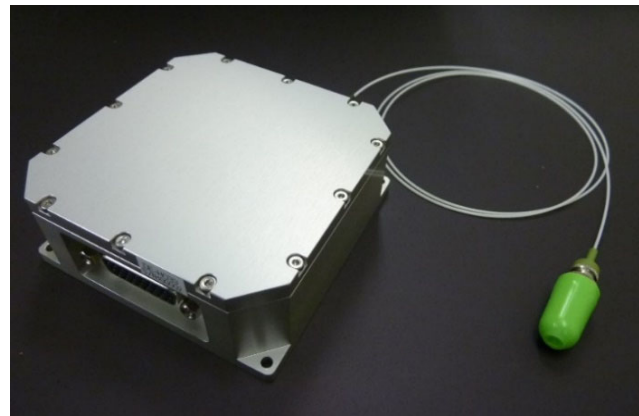
High value-added solution for biomedical equipment *1

- This light source provides manufacturers with all laser wavelengths required for any biomedical equipment in one palm-sized compact module *2 with stable output power and plug-and-play operation.
- This product enables manufacturers to miniaturize their equipment and shorten the development and production period as a new solution.
- Under testing by equipment manufactures.
- QD Laser aims for an industry share of *3 20% in light sources for biomedical equipment in five years.

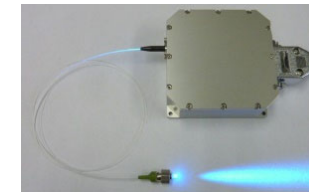
Compact Visible Lasers



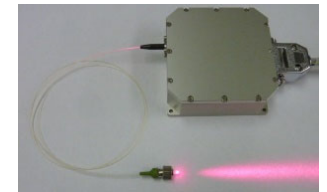
Integrated
into



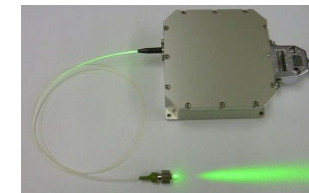
**Palm-Sized Multi-color
Compact Laser Light Source
(80 x 80 x t30mm)**



488nm



660nm



561nm



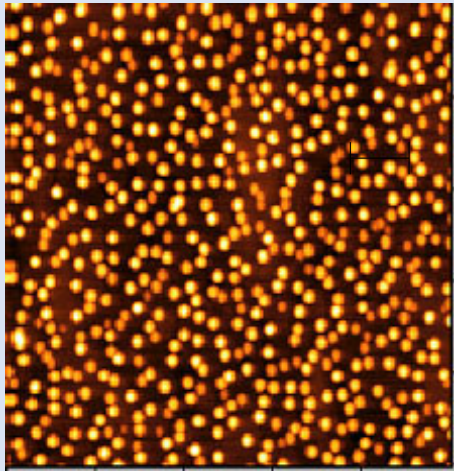
785nm

*1: Biomedical equipment is flow cytometers, ophthalmic examination equipment, fluorescence microscopes, and the like.

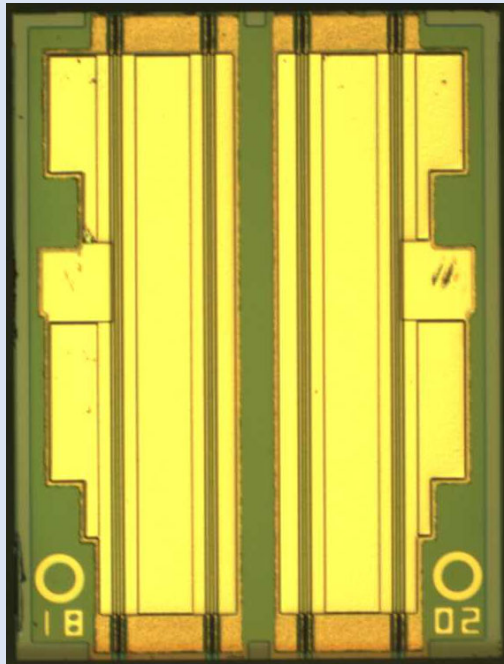
*2: The total volume of the driver integrated light sources is less than 50% of other company's products.

*3: Estimated annual accessible market size is 12,500 units. (8,000 out of 16,000 units for flow cytometer based on the "Global Flow Cytometer Market 2020-2024", and 4,500 units for an ophthalmic medical device)

#3



100 nm



Quantum-dot laser

- Application : Optical communication, LiDAR, and Silicon photonics.

Mass-produced by our world's only technology.

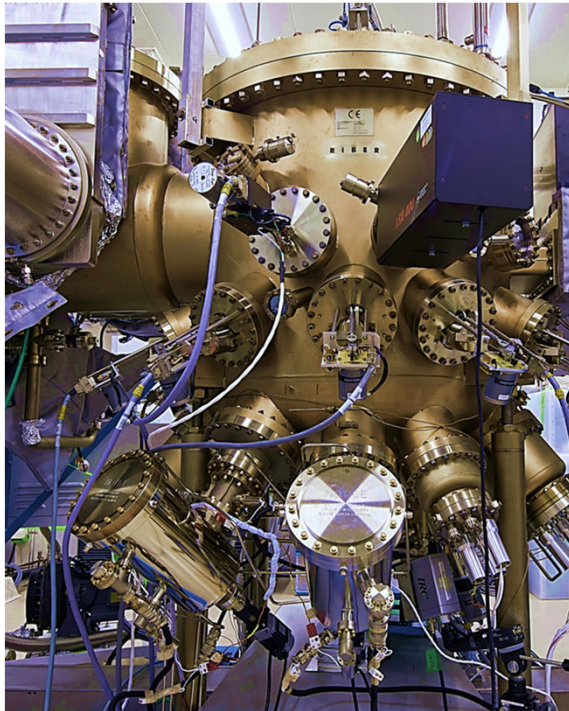
Achieved the **world's highest operating temperature** with excellent temperature stability at 1300nm.

- The wavelength lineup is **1200-1330nm**.
- **Silicon photonics** (optical connector-chip communication, LiDAR) is evolved by quantum dot laser.
- Can operate even in a high temperature environment **of 150-200 ° C** . The operating limit temperature of a normal semiconductor laser is 80-100 ° C.
- Can be used in **high-temperature environments such as servers, wireless base stations, and automobiles**.
- **Excellent reflected return light resistance**, leading to miniaturization by eliminating isolators.

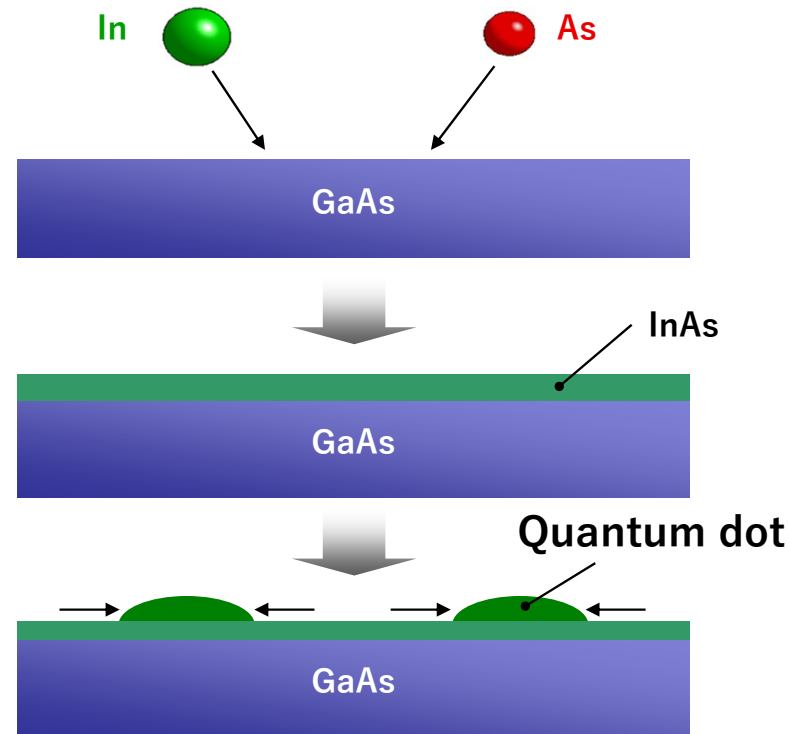
QDLaser's World Only-One Mass-Production Technology of Quantum Dot Lasers

- Introduction of mass-production MBE (Molecular Beam Epitaxy) system
- Control of temperature, indium source supply, and arsenic pressure at each second.
- Material recipe and know-hows for optimum growth conditions with several-tens-of-years experience (secret internal techniques which are intentionally not patented)

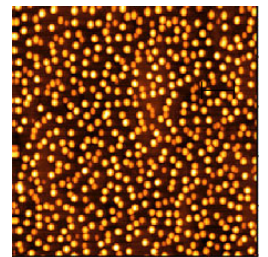
Mass production MBE system



Growth sequence of quantum dots (illustration of side view)



Atomic force microscope (top view) of quantum dots



100 nm

Tangible Silicon Photonics Market as Electronic / Optical Integrated Circuit Technology Platform

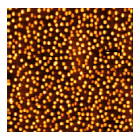
Customizing quantum dot lasers for Japan/US/EU silicon photonics vendors.

Starting mass production in FY2021-2023.

Development and production

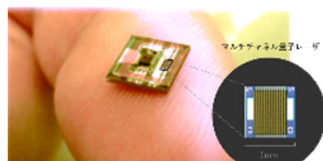
- 2010**
World's first mass production of quantum dot laser for optical communication
- 2012**
Started development of quantum dot laser for silicon photonics
- 2017**
Established mass production system of quantum dot lasers for silicon photonics (supplied to AIO core)
- 2019**
Our products installed in the "Ultra-thin connector integrated active optical module (I-PEX EOM)" developed by I-PEX
- 2022**
Working on joint development with silicon photonics vendors around the world. Starting mass production for chip-to-chip optical interconnect and Lidar during FY2022 to FY2023.

Quantum Dots

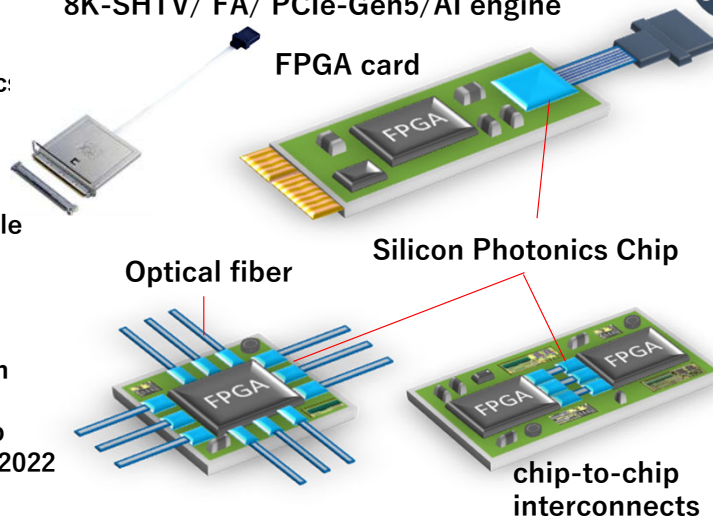


100 nm

100Gbps optical transceiver with quantum dot lasers as light sources

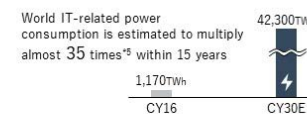
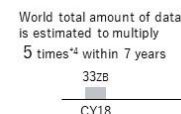


Optical Connector(EOM^{*1},CPO^{*2}) : 8K-SHTV/ FA/ PCIe-Gen5/AI engine



Increased data and power consumption to be solved by Silicon Photonics

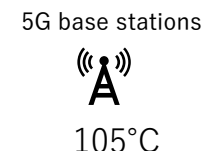
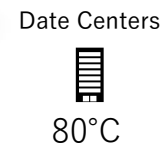
Problem Increasing demand for global data in turn creates a global issue of increasing power consumption



Solution Silicon photonics with quantum dot lasers mounted on silicon chips enable dramatic improvement in semiconductor performance⁶

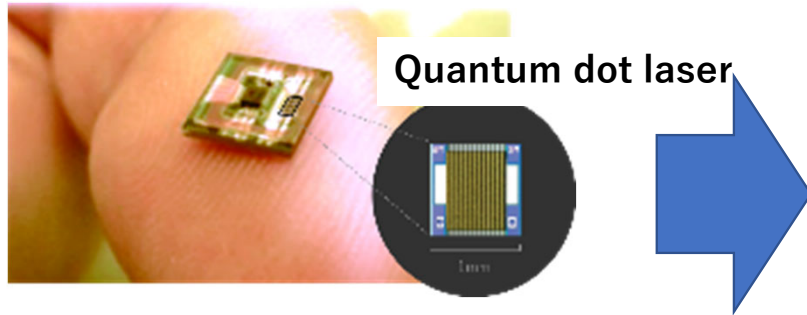


Huge information processing application that requires high-temperature operation

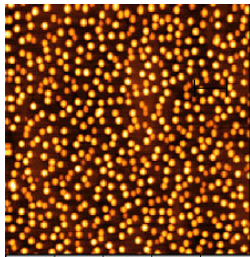


I/O core with Quantum-Dot Lasers Ready for Commercialization

100Gb/s Silicon photonics chip
named **I/O core of AIO Core** with
QDLaser's 4-channel quantum dot lasers

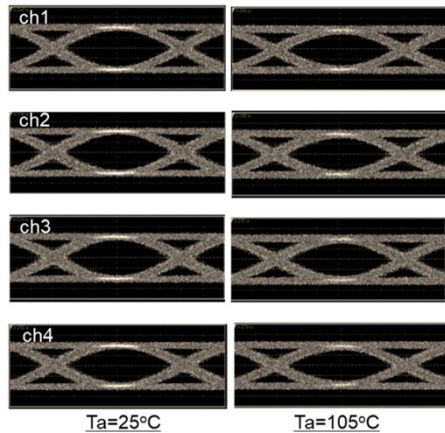


Quantum dots



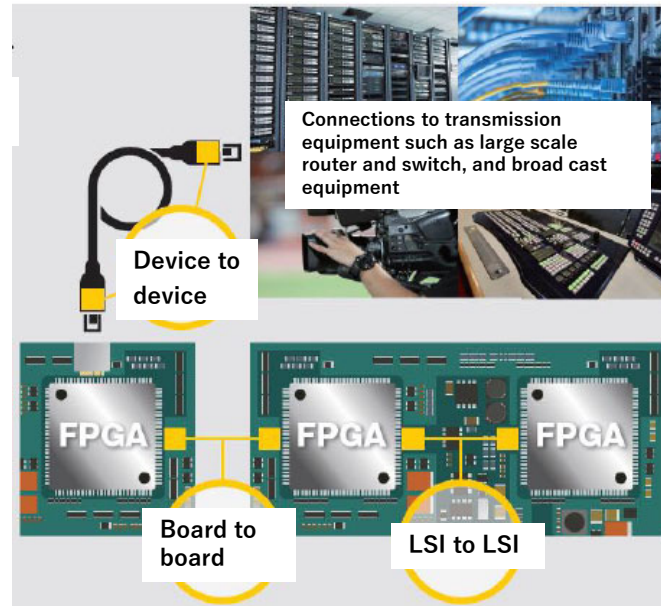
100 nm

Optical eye diagrams at 25Gbps



Ta=25°C

Ta=105°C



Connections to transmission
equipment such as large scale
router and switch, and broad cast
equipment

Device to
device

Board to
board

LSI to LSI

Courtesy of AIO Core Co., Ltd.

Note: Yellow squares show 100Gb/s transceiver
Silicon chip

Applied modules
(Sample shipment)

IPEX: LIGHTPASS™



AIO Core



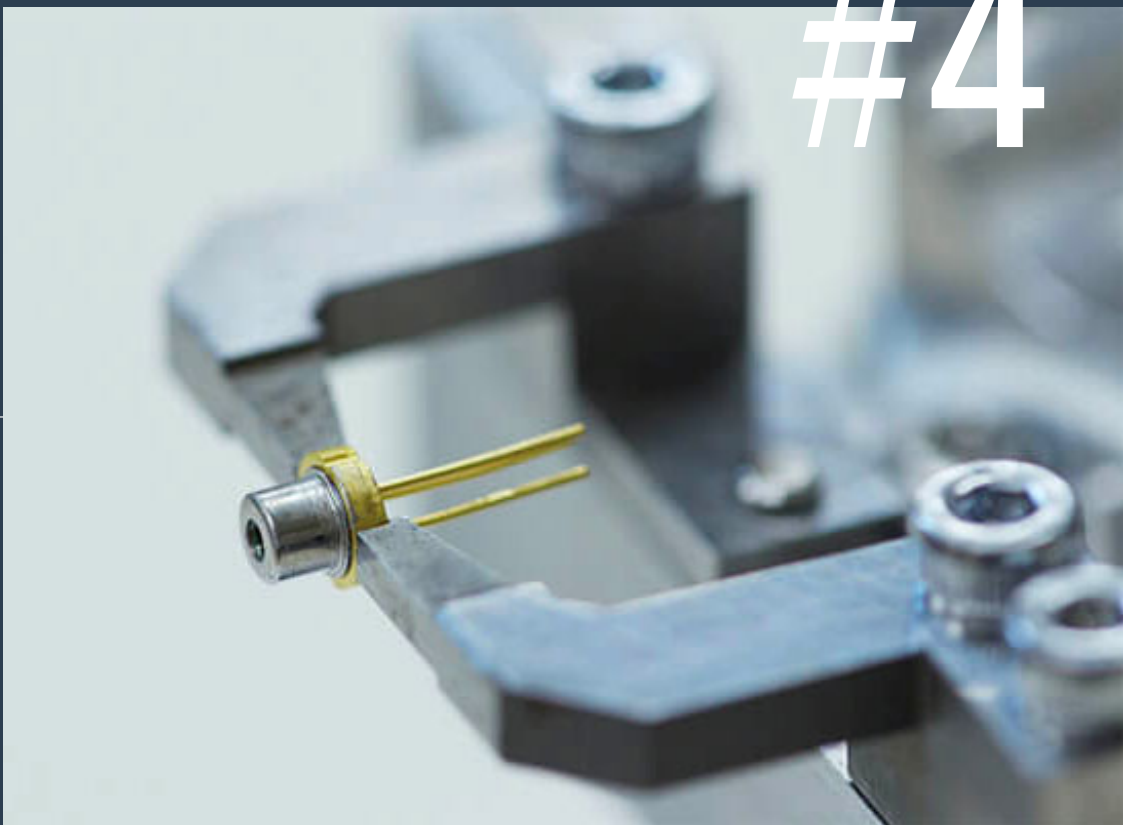
High Power FP Laser

- Applications : Particle Counter, Leveler, Machine Vision and Factory LiDAR.

Highly reliable and high-quality CW / nanosecond pulse high power laser.

Providing services that meet customer requirements, such as usage conditions and small-quantity support.

- The wavelength lineup is 640-940nm.
- CW and high-power nanosecond pulse drive for a wide range of sensor applications.
- Hearing customer needs on pulse, optical output, reliability, wavelength, and control method to propose optimal products and solution.
- Small quantity production possible.



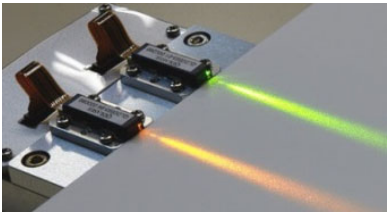
Our Major Laser Device Products, Wavelengths, Features, and Uses

Compact visible lasers

High power laser

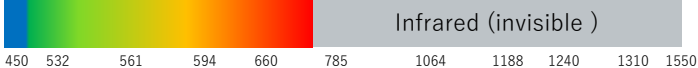
DFB laser

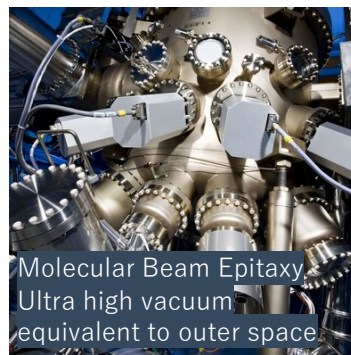
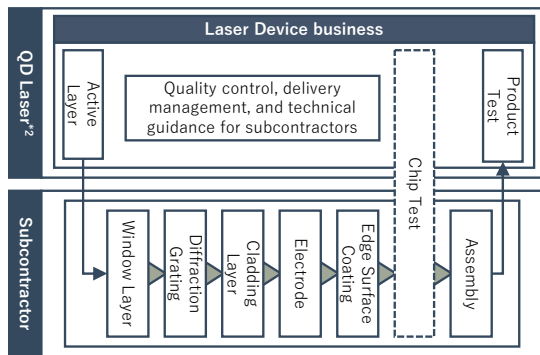
Quantum dot laser

Products				
Wavelength	532, 561,594 nm	640-940nm	1030, 1053, 1064, 1080, 1120, 1180nm 1020-1120nm provided 1nm by 1nm	1200-1330nm
Features	- Miniature size, low power consumption, stability, short pulse generation, and high-speed modulation, etc. - World's first current injection yellow-green and orange lasers	- High power Fabry Perot laser - Providing products and solutions according to applications. - Supports various wavelengths, small quantities, and custom production.	- Precise control of wavelength with stable operation under continuous, nanosecond, and picosecond modes. - High beam quality, small size, lightweight, high electricity-light conversion efficiency, and long life compared to existing solid-state lasers. - Extensive product lineup that meets the various needs of customers.	- Quantum dots are used for the active layer (light-emitting part) of semiconductor lasers. - Excellent temperature stability, high-temperature resistance, and low noise performance compared to existing semiconductor lasers.
Use	Measurement Bio. Processing Communication Silicon photonics			

Semiconductor Laser Devices : Our Competitive Advantages / Barriers to Entry

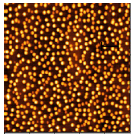
Business Model

- **The only fabless company in the semiconductor laser industry**
 - Flexible manufacturing scale of several units to tens of millions units
 - High marginal profit ratio of over 45% on average*¹ (made fixed costs into variable costs)
 - Mass production and diverse product offering lead to beyond breakeven point
- **Any wavelengths of lasers**
Wavelengths of lasers we offer (nm)
 
- **High level of freedom in creating new business, fields and products**



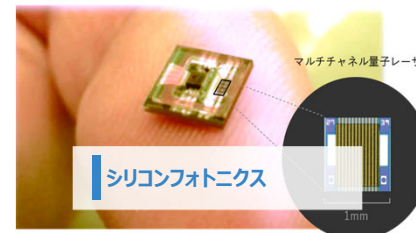
Core Competence : Quantum Dot Lasers

- **Atomic-level precision epitaxy technology (proprietary)**
 - Growth control by 0.1 second
 - Extracted the best recipes from over 100,000 recipes
 - The only one to succeed in mass production of quantum dot lasers, thanks to over 20 years of accumulated technology
- **Capable of operating in harsh environments of over 100°C and under high density packaging**
 - Optoelectronic integrated circuit
 - In-vehicle devices
- **New potential market created by quantum dot lasers**
 - Chip-to-chip optical interconnect
 - LiDAR
 - Quantum cryptography



100 nm

image of quantum dot by
atomic force microscope



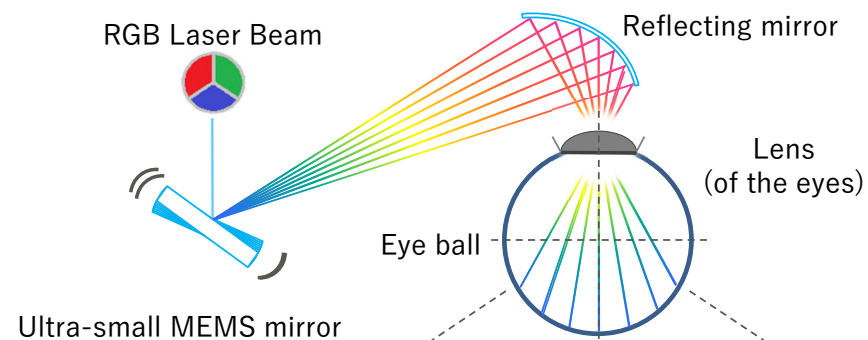
03

Laser Retinal Projection

World's First Commercialization of Laser Retinal Projection Eyewear

VISIRIUM TECHNOLOGY®

Unique Laser Technology bringing Innovation to Vision

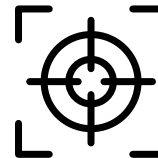


Direct Image Projection onto Retina



Visual experience independent of the condition of your cornea or lens

You can recognize an image clearly even with myopia, hyperopia, astigmatism, or ametropia.



Free focus

The focus of both the landscape you see with the naked eye and the image projected by our glasses can be superimposed on the retina. This is a unique feature not found in other AR glasses.



Enables vision even in the periphery of the retina*1

Since the image is in focus even over a wide area of the retina, we expect that it can also be effective for patients with retinopathy.

Three Areas based on Retinal Projection Technology

Transforms
“hard to see”
to “visible”

Low Vision Aid

Sales started

Extend the healthy
lifespan of your vision

Vision Health Care

Business Development

The power of
“vision” broadens
your world

augmented vision

Strengthening Alliance

World's First Laser Retinal Projection Eyewear

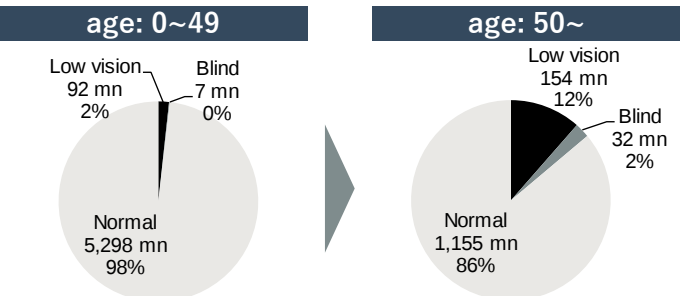
In the Low Vision Aid Space where Innovation has been Minimal, Laser Technology makes a Breakthrough

250mn people

with Low Vision Globally*1

Currently they use magnifying glasses, video magnifiers, and telescopes daily. These tools are limited in use, have operational, issues and are not suitable for all users.

Here, we will make a breakthrough with our laser retinal projection technology.



GLOBAL DATA ON VISUAL IMPAIRMENTS 2010, WHO



"Papa, you have grown old, I can see the wrinkles on your forehead."*2



Medical Regulatory Affairs: Completed Clinical Study in Japan and EU

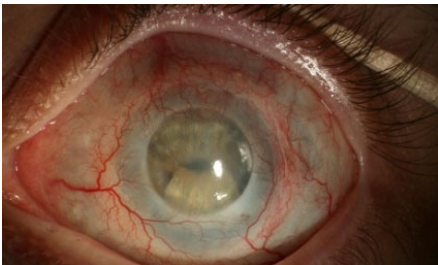
JAPAN



Irregular astigmatism

- Improved visual acuity and reading speed of **15 subjects** verified.
- Domestic medical device manufacturing and marketing approval @ January 28, 2020

Europe



Corneal clouding

- Improved visual acuity on and reading speed of **20 subjects** verified.
- Long-term safety confirmed after one year of home use.
- Clinical trial completed in June 2021.

RETISSA® series product development status

Sales in both consumer and medical models



Corrected vision: 0.8

- Refractive power: 0.8 corrected vision without eyeglasses in the power range of -11D^{*1} (high myopia) to +6D (medium high hyperopia) ^{*2}

Sales strategy of this term

- New frame to improve wearing alignment and stability
- Accessory camera connected to the frame for enhanced functionality
- Proposals of use cases for companies
- Overseas sales, including US, China, and South Korea.



Controlled medical device (Controlled medical devices requiring special maintenance)^{*3}

- Used to correct vision in patients whose vision is impaired by unjustified astigmatism (patients who are unable to achieve adequate vision using existing eyeglasses or contact lenses)
- Expected to (1) correct visual acuity, (2) improve reading speed, and (3) improve reading acuity

Sales strategy of this term

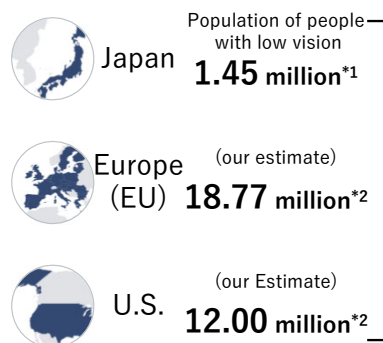
- Sales collaboration with Santen Pharmaceutical and Seed. • Efforts to reduce the burden on purchasers: Healthcare subsidy, medical insurance, tax deduction, etc.

Low Vision Aids : Total Addressable Market (※Anterior eye disease patients only : Ametropia and corneal opacity)

JPY 900 bn (USD 8.6 bn) Market in Japan, U.S. and Europe

Plan to Expand into Other Countries like China further behind in Ophthalmic Technologies

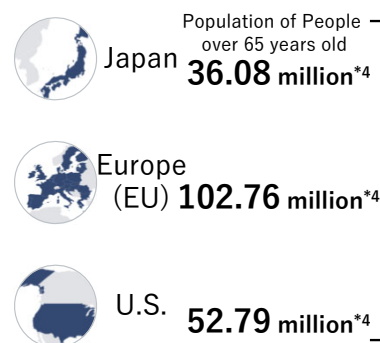
Low Vision Market



Estimated percentage of applicability (our estimate)*3 $\times$ **11%** $\times$ Product Price per Unit (our assumption)*6 **JPY 200k (USD 1.9k)**

Total market size of advanced countries (Our estimate)
JPY 708.7 bn (USD 6.7 bn)

Senior Citizens Market



Estimated percentage of applicability (our estimate)*5 $\times$ **1%** $\times$ Product Price per Unit (our assumption)*6 **JPY 100k (USD 950)**

Total market size of advanced countries (our estimate)
JPY 191.7 bn (USD 1.8 bn)

JPY 900 bn (USD 8.6 bn)

*1: Japan Ophthalmologists Association "Social costs of visual impairment in Japan"

*2: Calculated by multiplying the ratio of persons with low vision sourced from WHO "Visual Impairment and Blindness 2010" by the current population in each region (Europe: Eurostat "Population on 1 January", U.S.: United States Census Bureau "Annual Estimates of the Resident Population for the United States")

*3: According to the survey by Santen Pharmaceuticals, the number of keratoconus patients in Japan is estimated to be 60,000 to 120,000; also, as the data on p.39 shows that the prevalence per 100,000 people of keratoconus is almost the same as that of corneal opacity, it is assumed that the number of corneal opacity patients in Japan is similar to that of keratoconus patients. Assuming the number of patients suffering from each of these diseases to be an intermediate value of 80,000, the total is calculated to be 160,000; then, we apply the estimated percentage of applicability of 11%, calculated by dividing 160,000 by the population of persons with low vision (1,450,000), to each country's population of low vision persons. This percentage only takes into account anterior eye diseases; therefore, if our product is also effective for patients with retinal disease, the estimated percentage of applicability is expected to increase.

*4: Assuming that all the elderly aged 65 and over use near-sighted, presbyopic or bifocal glasses, we can estimate that each country's population aged 65 and over can be the potential population of persons with gap vision (Japan: Statistics Bureau of Japan "Population Estimates May 2020", EU: Eurostat "Population on 1 January by broad age group and sex", U.S.: United States Census Bureau "Population by Age and Sex: 2019").

*5: Due to the products' similarity in characteristics to hearing aids (used by the elderly on a daily basis, wearable equipment, sold at glasses stores, etc.), the hearing aid market is used as a reference to estimate the percentage of applicability. Given that the number of hearing aids shipped in Japan in 2017 numbered 562,747 (Japan Hearing Instruments Manufacturers Association "2018 Shipment Volume of Hearing Aids"), this number divided by the number of elderly people in Japan will give us an estimate that 1.7% of the elderly purchased a hearing aid, which we then adjust conservatively to assume an estimated percentage of applicability of 1.0% which can then be applied to each country's population of gap vision persons.

*6: Expected price per unit after the mass production is realized.

Sales and Manufacturing Strategies

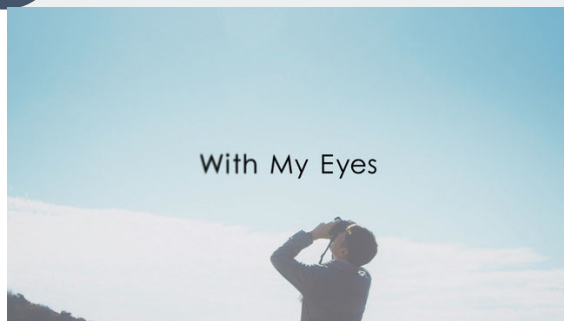
01

Through partnership with major manufacturers such as MinebeaMitsumi and Audio Technica, achieved fabless manufacturing for high-performance and low-cost products.

02

Through media exposure / participating in large-scale exhibitions / donations to schools for blind children / trial sessions and interviews, raise awareness

Cumulative
sales record as
of Sep. 2022
>900 units



03

Develop close cooperation with major players in each field



SONY

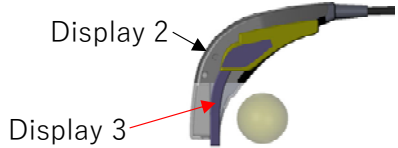


04

Improving usability and developing new products

Retinal Imaging Product "RETISSA" Roadmap: Laser Eyewear

- Medical Equipment "Medical": Being promoted by Santen Pharmaceutical and Seed to 479 hospitals on corneal diseases. Eleven domestic medical institutions are now introducing the device to patients.
- Consumer Product "Display / Display2": Cumulative sales of 800 units via EC, domestic and overseas distributors. Local Municipality Subsidy with 90% benefit starting to be registered.
- Display 3: Under development to realize a compact, lightweight, and low-price eyewear with improved operability.

	Medical	Display/Display 2	Display 3
		 RD2CAM	
FY2018-2021	• Domestic manufacturing and marketing approval. • Introduction to low vision and corneal outpatient. • Treated in 11 medical institutions.	• Free focus / high resolution (equivalent to 0.8 visual acuity) / full color • Launch of accessory camera RD2CAM • Cumulative sales of 800 units	• Jointly developed with a domestic electronics manufacturer.
FY2022	• Continue sales activities • Expansion of application range through clinical research (Clouding, retinopathy) • Strategy in Europe	• Subsidy, administrative budget acquisition activity (already certified by 6 municipalities) • Overseas expansion - US in-house EC - Korean subsidy acquisition activity - Resume Chinese agency activities	• Development and Marketing - Flat mirror (thinner and wider FOV) - Built-in camera - Low-cost design - Compact controller BOX - Eye Track
FY2023-2024	Consolidation of sales channels and know-how to comply with various regulations (Pharmaceutical Equipment Law, Consumer Product Safety Law, Welfare Equipment Law, etc.)		Commercialization 100,000 yen selling price 100,000 units sales target after launch

Retinal Imaging Product "RETISSA" Roadmap : Three New Products

- Commercialization of three new laser retinal imaging devices for various usage scenarios

<https://www.qdlaser.com/uploads/2021/12/20211214-1.pdf>

ONHAND

Hand-held devices used by visitors in public spaces (libraries, museums, theaters, etc.)



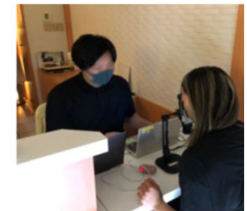
Super Capture

Digital cameras viewfinders that extend the vision and behavior of low vision users



MEOCHECK

Self-measuring simple checkers to help people recognize eye diseases



FY2021

Prototype

- Questioned and deliberated as a device to comply with the Reading Barrier-Free Act*1 at four congresses in the Tokyo metropolitan area.

Prototype

- Exhibited with Sony Corporation at CSUN, an accessibility exhibition in the U.S.
- Successful crowdfunding

Prototype

- Conducted eye examinations on 500 drivers at cab companies in Japan under collaborative research with medical universities.
- Obtained evidence of highly sensitive detection of glaucoma, cataract, etc. (to be published)

FY2022

Product launch

- Introduction to administrative services like libraries, art galleries, museums, theaters, etc.
- Sales collaboration with three distributors.

Product launch

- Promotion and sales collaboration with digital camera manufacturers
- Operation of EC sites in Japan and the U.S. (already established)

Product launch

- Sales collaboration with medical equipment distributors nationwide
- Eye check service pilot operation with Tohoku University and DX companies at transportation companies, drug chains, extensive private facilities, nursing care facilities, etc.

FY2023

Sales are expected to reach several thousand units/year.

- Assumed sales of 1,000 units/year

- Assumed sales of 1,000 units/year
- Full-scale operation of eye check service

RETISSA Sales Strategy and Progress: Laser Eyewear

- Posting information and expanding awareness with Mirairo Co., Ltd., low-vision groups, and public and educational institutions.
- Resuming operations in China. Bidding for a school for the blind in Xi'an.
- Developing high-performance, low-cost Display3 in cooperation with several domestic electronics manufacturers.

[Mirairo House TV] Retinal projection laser eyewear "Retissa Display 2". Visible and Impressive!
<https://www.youtube.com/watch?v=RSSeiCLq7v8>



Development of Display3

Release: 2022.10.13 Smart glasses will be unveiled at TDK's booth at CEATEC2022.



RETISSA Sales Strategy and Progress: ON HAND

- Concluded a sales contract with the Library Distribution Center (consignment operator of 562 public libraries and 19 facilities such as museums). A book fair joint exhibition tour and an experience session for library purchasing staff are underway. Working for the local government budget acquisition for fiscal 2023.
- Gradually replacing the magnifying reader for the visually impaired.
- In collaboration with the albino people's association, providing experience events in aquariums, Youtube information transmission, and crowdfunding #1.



RETISSA ON HAND

レティッサ オン ハンド

レーザー顕微鏡撮影装置

顕微鏡に接続映像を投影し、目で見るのではなく、見たいものが目に“映る”

ロービジョンの方、目障りな光を感知している方、細かい字が見にくい方の読書を助けます

TRC図書館流通センター

特徴 1 視力にかかわらず、クリアな像を網膜に焼き出します

顕微鏡「ビジュアル デュアル」
RGB三原色の半導体レーザーと高速で振動するMEMSミラーを組み合わせ、微弱な光を網膜にコントロールして、網膜に直接、ピントの合った像を焼き出します。
他のピント調節機能を要わずに見ることが出来ます。

フルカラーモード
グレースケール撮影モード
白黒撮影モード

詳しくはこちらから

特徴 2 広い視野でページ全体を見ることが出来ます

ルーペや拡大読書機は、文字を大きくすることで読めるようにするため、本の見開き全体を捉えることが出来ませんでした。
レティッサ オン ハンドの視野内は、約60度、広い視野で網膜に焼き出します。

ルーペ使用時
レティッサ オン ハンド 使用時

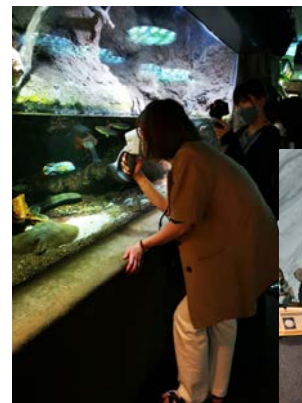
特徴 3 充電式・軽量のため、図書館のさまざまなシーンで利用できます

図書館にレティッサ オン ハンドがあることで、ロービジョンの方の展示物の閲覧や講演・講演会・講演会などイベントへの参加も可能です。
レティッサ オン ハンドにパソコンなどをつないで、電子書籍も見ることも出来ます。

重量:約500g サイズ:約100mm(幅)×120mm(高さ)×150mm(奥行き)
バッテリー:充電時間:約1時間 使用時間:約4時間
充電ポート:USB-Cポート(充電) 充電ケーブル:付属
充電ポート:USB-Cポート(充電) 充電ケーブル:付属

※レティッサ オン ハンドは、本館蔵書に限り、貸出・貸与の目的での使用は出来ません。
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株式会社図書館流通センター お問い合わせ フリーダイヤル 0120-118491



Events



← leaflet for libraries



Albino people's association

RETISSA Sales Strategy and Progress : NEOVIEWER(Super Capture)

- Expanding sales of the NEOVIEWER, laser retinal projection viewfinder, as an accessory for digital cameras.
- Launch of sales in Japan and overseas. Established a US subsidiary. Renewal of HP/brand site with contents including experienced users and customer leads for Internet sales.
- Equipment introductions and demonstrations are ongoing at exhibitions in Japan, the United States, and Europe in collaboration with digital camera manufacturers.

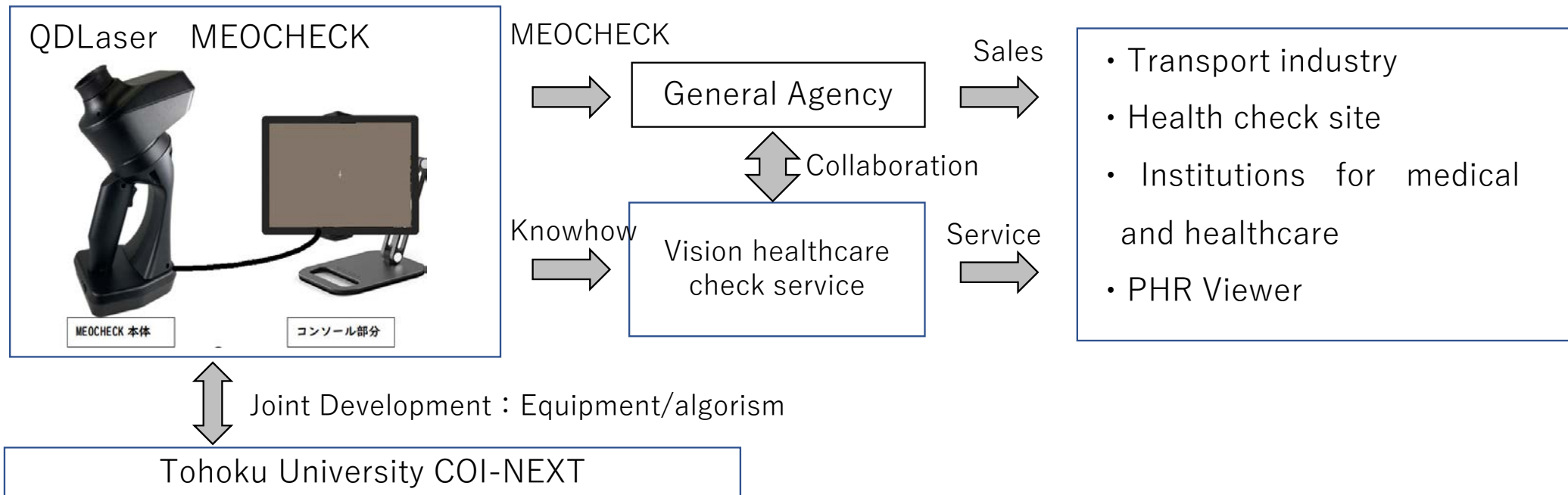


JAPAN : Sight World 2022 (suspended)
USA : 37th CSUN Assistive Technology Conference on May 14 to 18 in 2022
EU : TECHSHARE PRO, Nov, 15 to 17, 2022



RETISSA Sales Strategy and Progress: Laser Eyewear : MEOCHECK

- We plan to expand earnings by selling MEOCHECK, a small self-check optometry device, and providing the vision healthcare check service.
- Participation in Tohoku University COI-NEXT (JST "Co-creation field formation support program") for joint development of equipment and disease determination algorithm.
- Completed ophthalmology general agency contract (750 units of hardware sold).
- Test operation by taxi companies nationwide has been completed, and preparations are underway to start providing the service.



IEC (International Electrotechnical Commission) officially published an international standard that defines how to evaluate the overall image quality of scanning retinal projection devices

QD Laser Co., Ltd. is the only company to have commercialized the laser scanning retinal projection product globally. On June 20th, the IEC [Note 1] officially issued the international standard on scanning retinal projection devices. This document covers a general image quality evaluation method, including the free focus characteristics. As a result, the performance of our products to provide "clear images that do not depend on eyesight" has come to be evaluated objectively and quantitatively. With this standardization, QDLaser expects the guarantee of product quality and the elimination of inferior products in the market, accelerating the worldwide spread of our products and forming a healthy industry and market.

International Standard

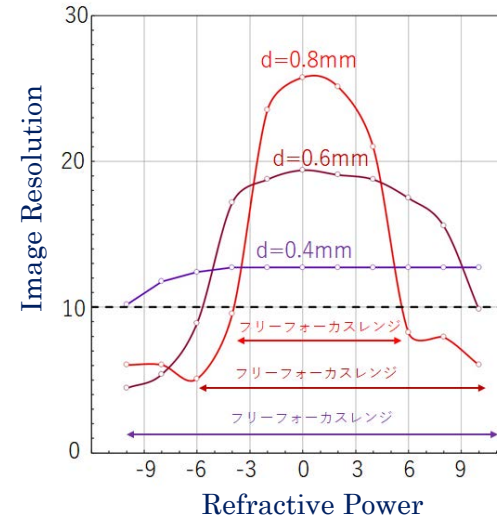
IEC 62906-5-5:2022

- Laser displays – Part 5-5
- Optical measuring methods of raster-scanning retina direct projection laser displays
- <https://webstore.iec.ch/publication/60142>

Note 1: IEC is an abbreviation for International Electrotechnical Commission.

Note 2: Free focus means that the visibility of the image projected by the scanning retinal projection device does not depend on the refractive power of the eyeball or the focus position. The performance of free focus changes depending on the beam diameter and divergence angle of the laser incident on the eyeball.

Free Focus Range Evaluation



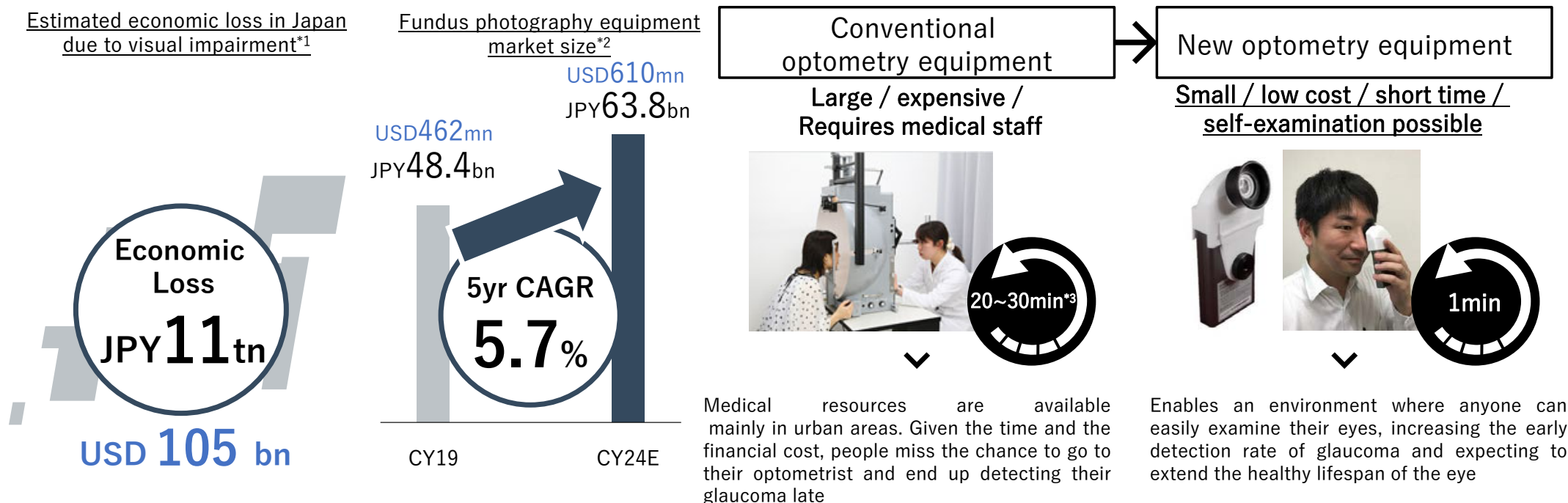
The refractive power of the eyeball determines the resolution of the retinal projection image with the diameter of the parallel laser beam as a parameter. This international standard states that the range of refractive power of the eyeball to provide free focus is determined according to the diameter. When commercializing a scanning retinal projection device, it is required to specify the range of refractive power to provide free focus.

04

Further Growth Upside Expected

Large Growth Potential in Optometry Market

Utilizing Laser Retinal Projection Technology,
Developed New Optometry Prototypes and Working with Partners to Launch
in FY2022-2023



*1: Japan Ophthalmologists Association (2009) "Economic Cost of Visual Impairment in Japan" and "Prevalence of Visual Impairment in the Adult Japanese Population by Cause and Severity and Future Projections"
Economic cost = Direct health costs + Other financial costs + monetary converted number of loss of well-being from visual impairment (measured in disability-adjusted life years (DALYs))

*2: TechNavio (2020) "Global Ophthalmic Diagnostic Devices MARKET 2020-2024" Converted at an exchange rate of JPY/USD = 110 yen

*3: The approximate measurement time of the Goldmann perimeter and Humphrey perimeter, which are typical perimeters in conventional perimeter measurement.

A new group of optometry devices that utilize laser retinal projection technology

■ Eye & Brain Diseases

- Cataract (47%)
- Glaucoma (3.6%)
- Retinopathy (55%)
- Brain tumor (10 to 15 patients per 100,000)

Note:% is the average appearance rate of the entire population. The older the person, the more it increases.

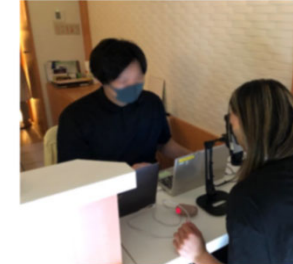
■ Cognitive Function Degradation

- Aging
- Dementia
- Fatigue, Stress
- Alcohol

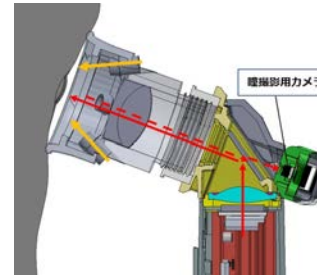
■ Cardiovascular Diseases

- Disease
- Diabetes
- Stroke
- Heart attack

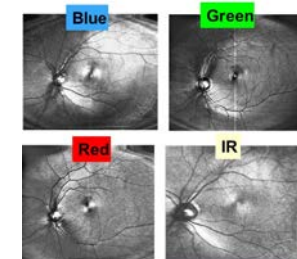
1st generation: Simple perimeter to be commercialized in FY2022, screening eye diseases in 1 minute.



2nd generation: Eye track perimeter with a camera to measure fixation stability and dynamic response to various visual stimuli. Software medical equipment.



3rd generation: Ultra-compact fundus photography device. Hardware medical equipment.



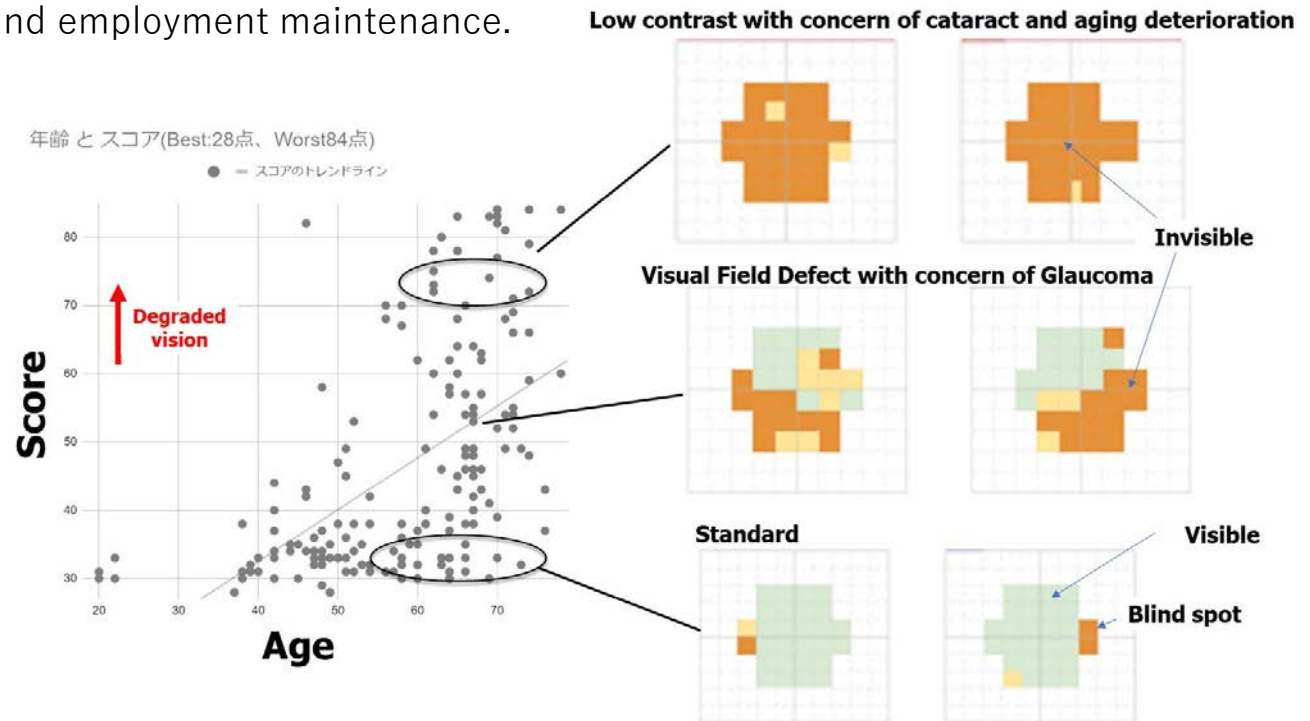
Results of the visual field test of 97 drivers of a taxi company

- We found a significant decrease in visual sensing ability with aging.
- A definitive diagnosis was made by an ophthalmologist as cataract for low contrast and glaucoma for visual field defect.
- The screening for eye diseases and the health check, including cognitive function, has become possible.
- We started studying with the taxi company about applying this device and system to health management of employees for accident prevention and employment maintenance.

Optometry diagnosis

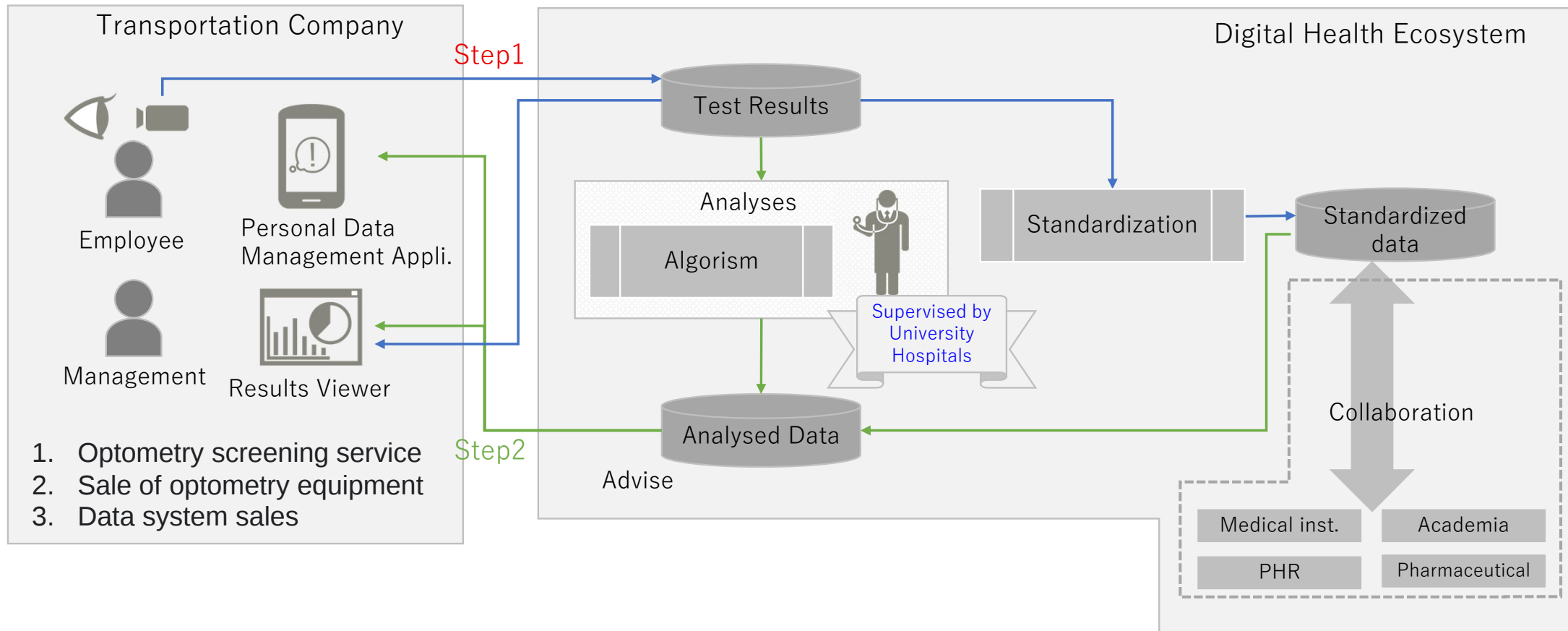


QDLaser is conducting medical research for people based on the Ministry of Health, Labor, and Welfare guidelines.



Service System Image

Starting introduction to companies with commercial drivers



Expected Growth Potential in Mid-Long Term

01 Through R&D of various laser technologies and stable profits from laser device business, strengthen business base for dramatic future growth.



02 Establish mass production and sales channels of consumer / medical eyewear
Make laser eyewear business the growth driver in the short to medium term



Target cumulative sales of 100,000 units and annual production of 50,000 units at FY2025.

Sales expansion in domestic and overseas markets

Starting low-cost mass production of RDIII later in FY 2023 to 2024

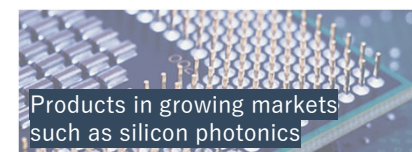
IPO

Present



03

In the mid to long term, in addition to the laser eyewear business, plan to expand sales of optometers and silicon photonics.



Quantum dot lasers for silicon photonics are being developed with nine companies in Japan, the United States, and Europe. Mass production is to start in FY 2023 in order.



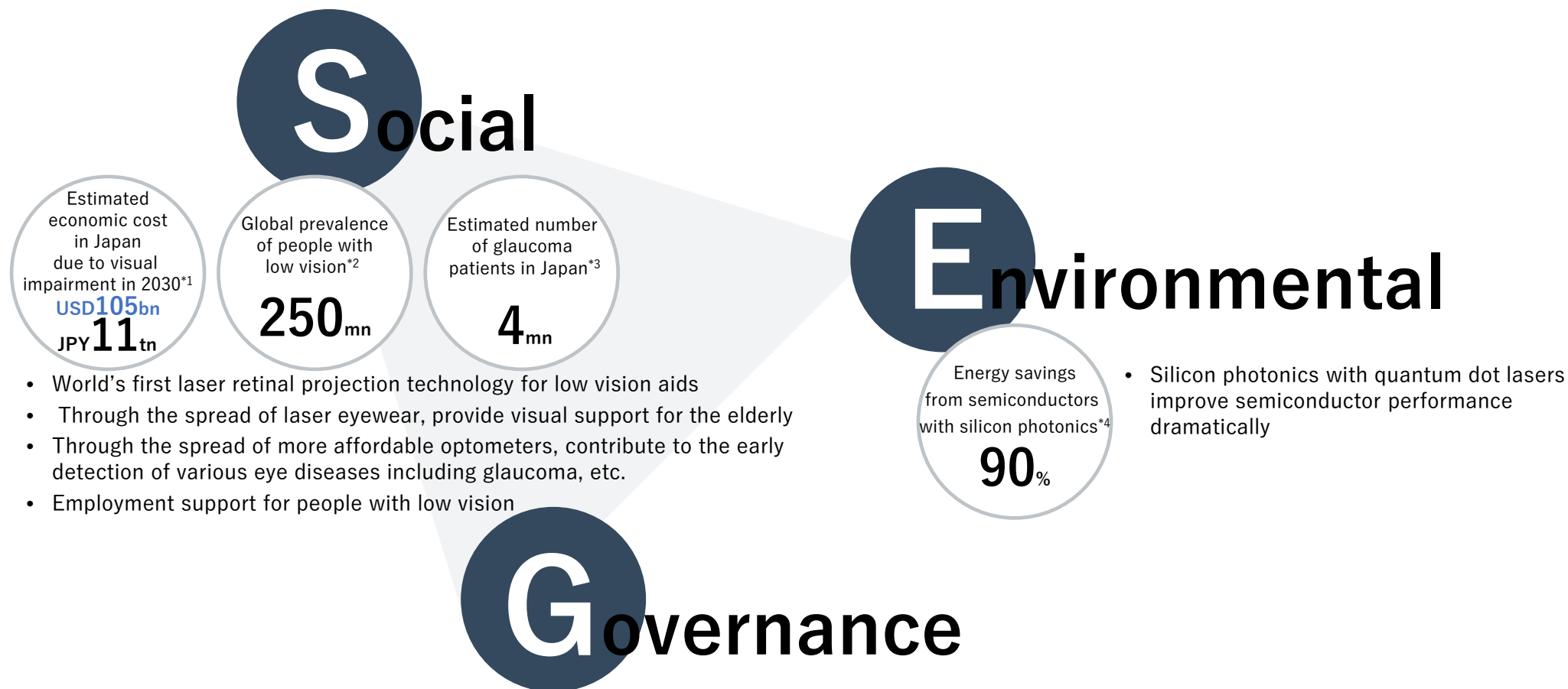
Trial operation of "optometry screening service" in FY2022 and full-scale delivery in FY2023. The compact optometry machine under is to be launched in FY2022.

Future

05

ESG Initiatives

Business Development from an ESG Perspective



*1: Japan Ophthalmologists Association "Economic Cost of Visual Impairment in Japan" and "Prevalence of Visual Impairment in the Adult Japanese Population by Cause and Severity and Future Projections"

Economic cost = Direct health costs + Other financial costs + monetary converted number of loss of well-being from visual impairment (measured in disability-adjusted life years (DALYs))

*2: WHO "GLOBAL DATA ON VISUAL IMPAIRMENTS 2010"

*3: Santen Pharmaceutical "Annual Report 2017"

*4: Target numbers in "Development of Technologies for Super Energy-Efficient Optical Electronics Implementation Systems" Promoted by METI, The Institute of Electronics, Information and Communication Engineers "Opt-Electronics Packaging Technology for Silicon Photonics"

With My Eyes project

#1 Photographs by low vision people.

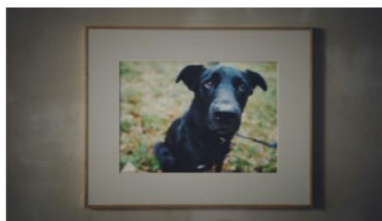
<https://www.youtube.com/watch?v=p5blfs94Oys>

#2 Let's go and see the invisible world.

https://www.youtube.com/watch?v=ZM52dax_5yc

#3 - Discovering a World of My Own -

<https://www.youtube.com/watch?v=lp6a5h6UfxA&t=37s>



RETISSA Super Capture

Digital cameras viewfinders that extend the vision and behavior of low vision users

QD Laser Announce Part 3 of “With My Eyes” Project supported by Sony

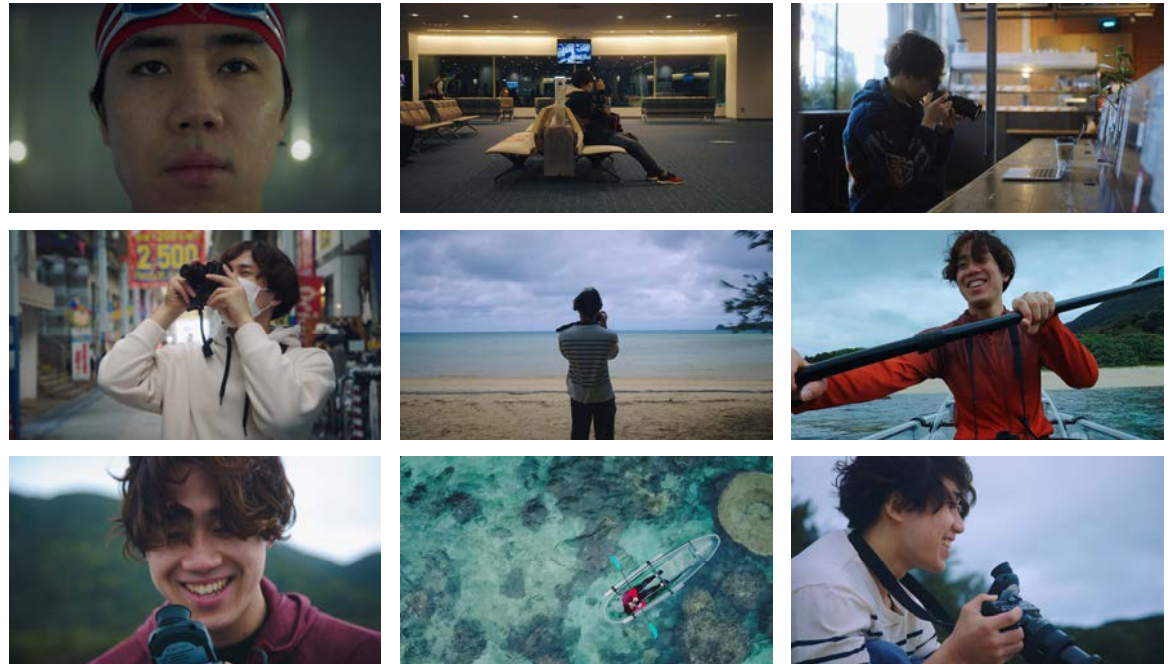
Latest documentary short in series depicts quest of Paralympic swimmer with low vision to use laser retinal imaging camera to see inside ocean

To be launched Mar. 14, 2022, on YouTube and presented at the QD Laser and Sony booths at the 37th Annual CSUN Assistive Technology Conference



QD Laser Co., Ltd. (Headquarters: Kawasaki City, Kanagawa Prefecture, hereinafter referred to as "QD Laser") is the state-of-the-art semiconductor laser technology company that plans, designs, develops, manufactures, and sells a variety of unique semiconductor lasers and related products. The company launched the project "With My Eyes," employing the original laser retinal imaging technology to change the "difficult to see" to "visible" of the 250 million low vision worldwide who have visual inconvenience even when wearing corrective glasses. This release shows off the third project carried out with the cooperation of Sony Corporation (hereinafter, Sony), featuring a newly produced documentary movie to be on air on March 14, 2022 (Monday). At the 37th Annual CSUN Assistive Technology Conference in Anaheim, USA, starting on the same day, each booth of the companies exhibits this documentary movie and the retinal imaging camera device "RETISSA SUPER CAPTURE."

■ Scenes from the Movie



Company Profile

Spin-off Venture from Fujitsu

Tier 1 Medical Companies such as Nikon/Santen joined as Shareholders

Company Name	QD Laser, Inc.
Foundation	April 24, 2006
Fiscal year-ended	March 31
Representative	Mitsuru Sugawara, President and CEO
Location	Headquarter: 1-1 Minamiwatarida-cho, Kawasaki-ku, Kawasaki-shi, Kanagawa
Number of Persons*1	42
Business	Planning, design, development, production and sales of semiconductor laser and its application products
Licenses	• Class II Marketing License for Medical Devices • Registration of medical equipment manufacturer • ISO 9001 • EN ISO 13485

**Science and Technology
Award from the Minister
of MEXT**

**Prime Minister's Honorary
Award for Achievement in
Industry-Academia-
Governmental Collaboration**



- Graduated from The University of Tokyo; Doctor of Engineering
- 1984: Graduated with a master's degree in Physical Engineering from the Department of Applied Physics, School of Engineering, University of Tokyo; joined Fujitsu Laboratory Ltd.
- 1995: Assumed the role of Senior Researcher at Optical Semiconductor Device Laboratory, Fujitsu Laboratory Ltd.; obtained degree in Eng. from The University of Tokyo
- 2004: Assumed the role of non-tenured professor at the Institute of Industrial Science, University of Tokyo
- 2005: Assumed the role of Deputy Head of Nanotechnology Research Center, Fujitsu Laboratory Ltd.
- 2006: Launched QD Laser Inc.; assumed the role of President and CEO

Laser Retinal Projection: Diseases and Applicable Rate

Parts of Eye	Major diseases	# of patients per 100k people*1	Total per eye part *1		Possible Efficacy*2	Estimated applicability %*3	Future Outlook	
Anterior eye	Cornea	Corneal angiogenesis	4,000	4,104	◎	Effective on astigmatism and moderate opacity	50%	• May not be applicable in cases of severe opacity
		Keratoconus	54					
		Corneal opacity	50					
	Crystalline lens	Cataract	47,800	52,900	◎	Effective on near/far-sightedness, astigmatism, opacity, etc. and as the technology does not depend on the function of the crystalline lens	40%	• Focused on obtaining the approvals to marketing medical devices by targeting diseases for which high efficacy can be expected.
		Aphakia	5,100					
		Phacocoele	<50					
	Uvea	Uveitis	714	714	△	Effective on astigmatism developed as a complication	10%	• Plan to expand the scope of application with RDII and RDIII on page 25 and the wide-angle viewfinder on page 27.
Choroidal neovascularization		<50						
Vitreum	Vitreous opacity	NA	-	○	Effective on low to moderate opacity	20%		
Retina	Epiretinal membrane	28,900	55,614	○	Enlargement and black and white inversion features are effective on macular diseases	30%	• Adaptable to central scotoma by changing the projection position and increasing magnification • Adaptable to tunnel vision through wide-angle imaging • May not be applicable in cases with severe symptoms	
	Lattice degeneration of retina	10,600			Some efficacy is seen in cases where anterior eye disease is also present			
	Hypertensive retinopathy	9,100			AE camera feature is exceptionally effective on photophobia, night blindness, etc.			
	Age-related maculopathy	3,900						
	Diabetic retinopathy	3,114						
	Retinitis pigmentosa	<50						
Optic nerve	Glaucoma	3,550	3,865	△	Image downsizing feature is effective on tunnel vision	10%	• May not be applicable in cases with severe symptoms	
	Optic nerve head drusen	200						
	Optic neuritis	115						
Other	High myopia	3,000	3,000	◎	Exceptionally effective	50%	• Can improve by processing images taken by camera	
	Color amblyopia, color blindness	2,500	2,500	○	-	20%		

*1: These numbers were calculated by research company Lampe & Company in a report we commissioned with reference to scholarly papers published by governments and research institutions from each country. Figures for "# of patients per 100k people" and "Total per eye part" reflect the general research conducted across several jurisdictions and are not necessarily indicative of the number of potential cases in the markets in which we currently operate.

*2: Based on our assumptions

*3: Evaluated the "expected efficacy" using a scale: ◎ = 40-50%, ○ = 20-30% and △ = 5-10%.

Terminology

Semiconductor laser	A compact device with an approximate length of 1mm that causes laser oscillation by passing an electric current to a semiconductor. In comparison with a solid-state laser or gas laser, more micro-miniature in size; higher speed modulation characteristics up to 10GHz; higher photoelectric conversion efficiency achieving several tens of percent and better controllability of wavelength, among other things. Became widely used in the 1980s as a light source for communication systems and optical recording media, such as CDs and DVDs, etc.
Quantum dot laser (QDL)	A semiconductor laser using a quantum-dot structure comprising nanocrystalline semiconductors in its active layer. QD Laser is the only firm in the world to mass-produce QDLs for optical communications and silicon photonics. In comparison to existing semiconductor lasers, it is superior in temperature stability, high-temperature endurance and low-noise properties.
DFB laser	Distributed Feedback Laser: QD Laser's DFB laser is equipped with a diffraction grating which enables laser oscillation at a single wavelength. It is suitable for applications where the light output needs to be concentrated into a narrow wavelength range, such as the seed light of a fiber laser.
Silicon photonics	A technology which integrates an optical circuit with a silicon electronic circuit that has signal processing and memory functions, thus enabling a breakthrough in the processing capacity limitation of the conventional electronic circuit system (achieving 100 times faster processing speed and lower power consumption) and high-capacity data transmission between LSI chips (10Tb/s).
VISIRIUM technology	A technology that projects images onto the retina using precise optical systems, creating different colors flexibly from the three primary laser light colors - red, green and blue.
Diffraction grating technology	A technology that freely and precisely controls the wavelength of semiconductor lasers to fit into various applications by forming periodic irregularities inside the laser.
Ultrashort pulse	A laser with a very short pulse width (duration). It is used for microfabrication and other processes as it can prevent shape distortion due to thermal effects.
Retinal projection	To project images onto the retina
Simple perimeter	A device to assess the visual field of human eyes
CE marking	A certification mark that indicates conformity with standards required to be met by products exported to the EU. The CE mark is granted when a product meets standards in all EU member states.
Flow cytometer	A device capable of measuring certain properties of cells. By irradiating a cell suspension in a tube with a laser beam, it can measure the number and size of a large volume of cells over a short period of time using fluorescence and scattered light parameters. It is used in various fields including molecular biology, pathology, immunology, plant biology and marine biology.
LiDAR	LiDAR (Light Detection and Ranging) is a technology which irradiates an object and uses a light sensor to detect the reflection to measure the distance. It is expected to be used in autonomous driving systems in the future.
Heads-up Display	A technology that projects information and images onto various surfaces, such as glass, within the field of view. It is expected one day to project necessary information for drivers onto the windshield and the like.

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- These statements are based on expectations, forecasts and risk assumptions as of this presentation's publishing, and contain uncertainties that could lead to results that are substantially different from these statements.
- These risks and uncertainties are present in any transaction, and are applicable to general industry and market conditions as well as general domestic and international economic conditions, including fluctuations in interest rates and currency exchange rates.
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