Explanatory Material on Potential for Growth

July 2024

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Mission

With the power of the semiconductor laser, Expanding the "Can Do" of Humanity.

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.

We make the impossible possible, and we also create new "can do" that doesn't yet exist.

This year, we will update our mission with a view to further expanding our business areas.

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.

Company Profile

Spin-off venture from Fujitsu. Feb. 2021 TSE Mothers (currently Growth) listing (Securities code: 6613)

Two businesses: semiconductor laser devices and visual information device (laser retinal projection)

Company Name	QD Laser, Inc.
Foundation	April 24, 2006
Fiscal year-ended	March 31
Representative	Osamu Nagao, President and CEO
Number of Persons *1	43
Location	Headquarter: 1-1 Minamiwatarida-cho, Kawasaki-ku, Kawasaki-shi, Kanagawa
Business	・Semiconductor Laser Device business ・Commercialization of state-of-the-art semiconductor lasers for communication, processing, and sensors. ・Development and commercialization of quantum dot lasers for silicon photonics ・Laser Retinal Projection business ・Commercialized the world's first "RETISSA" utilizing laser retinal projection technology ・Entrustment, joint development and commercialization of prototypes utilizing our technology and know-how
Licenses	• Class II Marketing License for Medical Devices • Registration of medical equipment manufacturer • ISO 9001 • EN ISO 13485

QD LASER

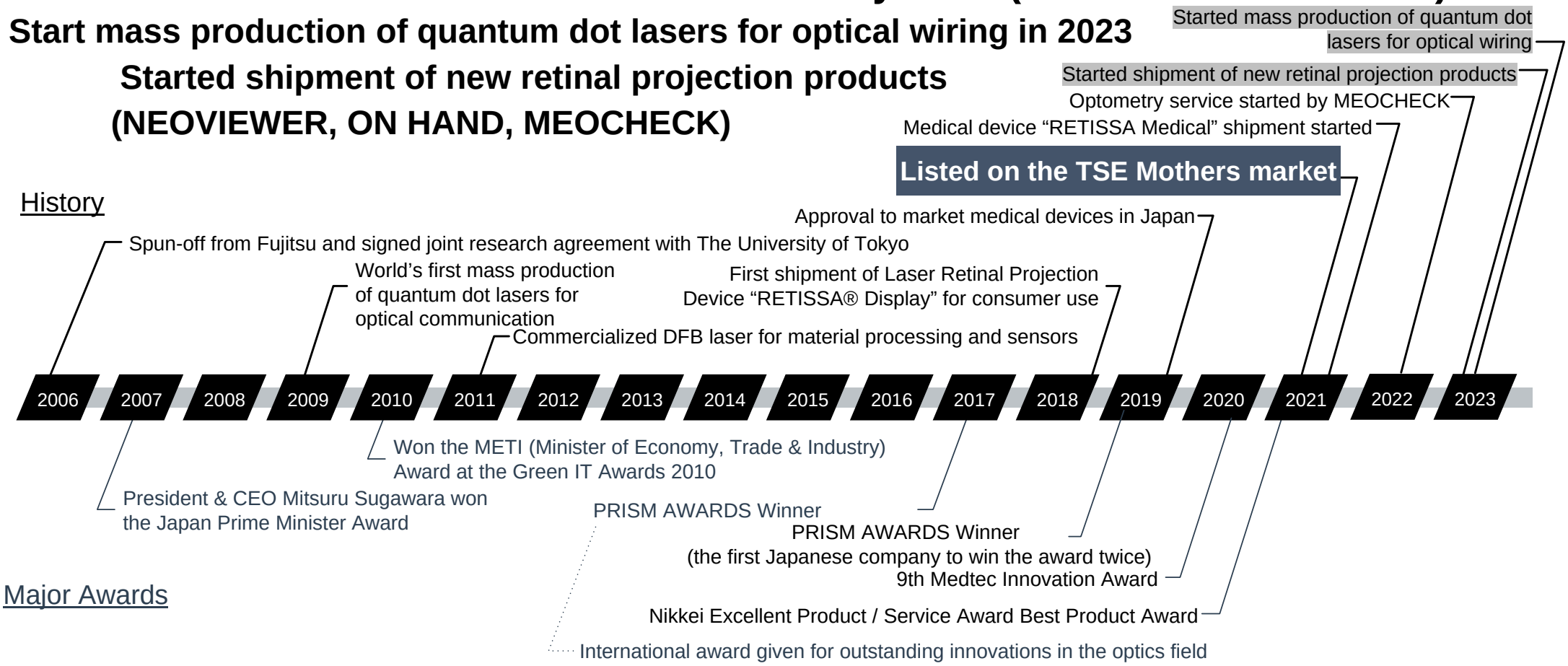
*1: As March 31, 2024. Excluding 14 dispatched employees.

Company History

Listed on the TSE Mothers market in February 2021 (Securities code: 6613)

Start mass production of quantum dot lasers for optical wiring in 2023

Started shipment of new retinal projection products (NEOVIEWER, ON HAND, MEOCHECK)



Company Highlights

1 Business Overview

2 FY2023 Results, FY2024 Forecast & Medium- to Long-Term Vision

3 Semiconductor Laser Devices' Vision & Strategy

4 Visual Information Devices' Vision & Strategy

5 ESG Initiatives

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01

QD LASER

Business Overview

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.

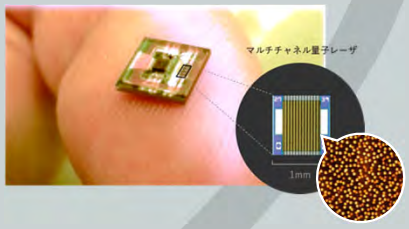
3rd phase
Accelerating the Integration of Humans and Information(2020s~)

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
- Visal field testing

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

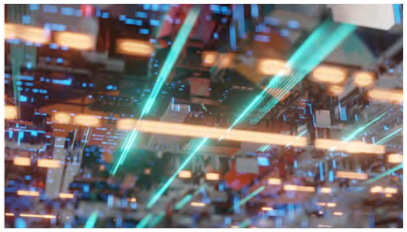


Quantum Dot Laser:
A semiconductor laser adopting a quantum dot structure which has a semiconductor nano-sized microcrystal in its active layer.
Compared with existing semiconductor lasers, these lasers are superior in temperature stability, temperature resistance, and low noise.

New Era for Semiconductor Lasers

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

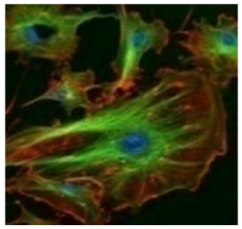
■ **Optical interconnect ⇒ enhancing the computing and data processing power**





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

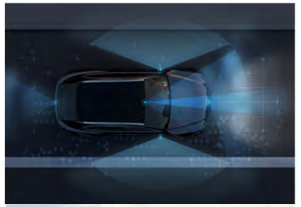
Biomedical

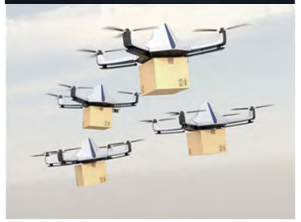


Face recognition



LiDAR（Automotive, Robotics, Drone）





Motion recognition



Fundus, Sight, Field of view



■ **Display ⇒AR/VR/XR**

Smart Glasses



Head-up display

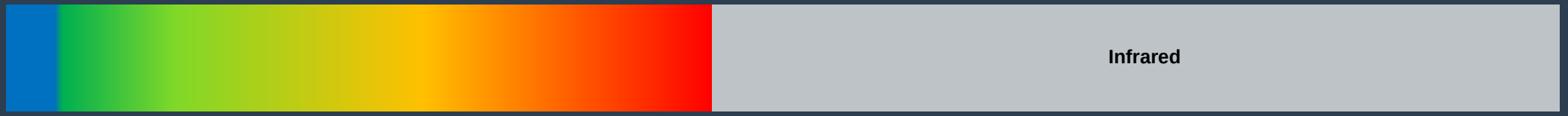


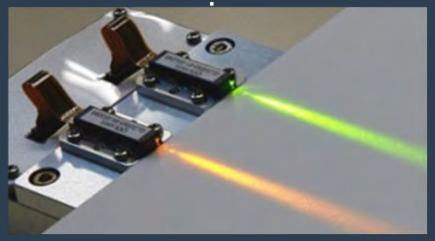
■ **Micromachining**
⇒Highly functional/high precision device manufacturing



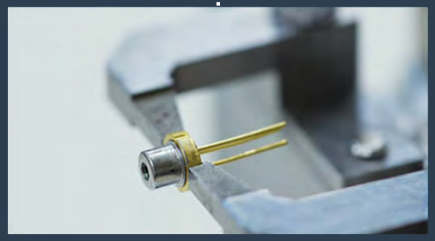
Variations on semiconductor lasers developed and sold by QD Laser

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





#2 Compact Visible Laser



#4 High Power Laser



#1 DFB Laser



#3 Quantum Dot Laser

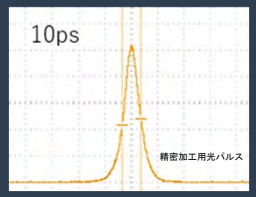
Our Core Technologies and Competitive Advantages

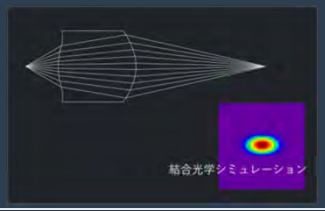
Material Creation, Design, and Control

Cutting Edge Semiconductor Laser Technology with Several Unique Features

Laser Design

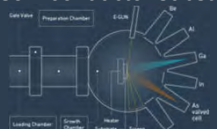
A technology to design lasers suitable for each use.
World's fastest (10ps)*3 semiconductor laser
for precision material processing
utilizing optical communication technology,





Semiconductor Crystal Growth

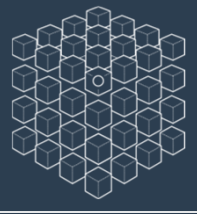
Technology to grow
each atomic layer of semiconductor crystals
on a semiconductor substrate

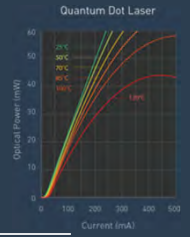


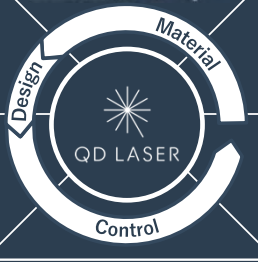
Quantum Dot

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









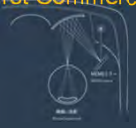
Small Module

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.



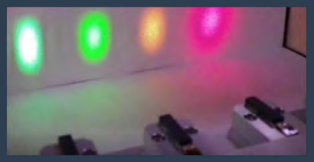
VISIRIUM Technology

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



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



*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

*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—

QD Laser's Strengths: Barriers to Entry for Other Companies

For other companies to catch up with QD Laser, they would need to secure highly specialized talent leading the laser industry, invest 4 billion yen[*1] in development, and spend over 15 years.



World-leading researchers and engineers with advanced expertise

+



15 years of research and development.
Total development investment of 4 billion yen

→



Numerous Only1 and No.1 technologies, including around 100 registered patents

Qualitative Barriers to Entry: Due to our technological superiority accumulated through years of know-how, it is difficult for late entrants to catch up.

Quantitative Barriers to Entry: For global leaders, the investment cost does not match the market size, making entry difficult.

*1 : Cumulative total of prototype material costs, commissioned research costs, and development-specific equipment investments.

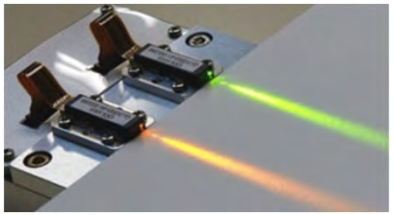
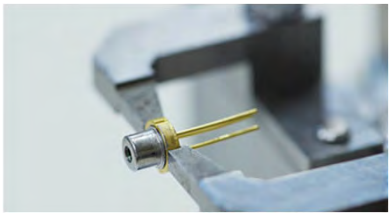
Two Businesses to Expand Human Capabilities

Increasing "abilities" with the power of semiconductor lasers, contributing to the improvement of overall human happiness.

*Note: The name has been changed from the Laser Eyewear (LEW) business due to the expansion of business

Business	**Laser Device (LD)**	**Visual Information Device (VID)※**
Area	Innovation in Communication, Measurement, and Processing	Innovation in Vision
What we can already "do" now	**High-speed and stable communication** **Precise measurement in biomedical and semiconductor manufacturing** **High-speed and high-precision processing**	**Using laser retinal projection technology to make the difficult-to-see visible (Low Vision Aid)**
What we can do from now on	**Dramatic improvement in computing power through optical interconnects** **Safer autonomous driving through light sensing** **Measurements that were not possible before**	**Early detection of eye diseases, prevention of blindness** **New visual experiences in the AR/VR field** **The "ultimate" smart glasses**

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

	Compact visible lasers	High power laser	DFB laser	Quantum dot laser
Produccts				
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	Measurement Processing	Measurement Communication Silicon photonics
			Bio.	

Laser Device (LD) Division: Cases of QD laser product adoption

QD Laser products are integrated into devices that support various industries, contributing to economic activity and the development of various manufacturing industries and businesses that society focuses on.

Biomedical



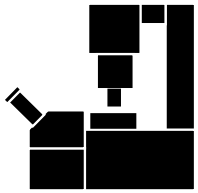
As a light source for inspection and analysis equipment, Contributing to drug discovery and other medical research



Flow cytometer

An analytical device for counting cells. Adopted as its light source.

Light source size 1/3



STED Microscope

A microscope capable of observing much smaller objects than conventional microscopes. Adopted as its light source.

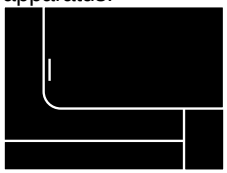
Spatial resolution 50nm

Light source size 1/3

Micromachining



Used in the processing of bodies, electronic board, and substrates of precision electronic devices, contributing to miniaturization and higher functionality of the micromachining apparatus.



Ultrashort-pulse laser processing machine

Capable of fine processing with minimal thermal effects. Adopted as its light source

Maintenance frequency 1/3

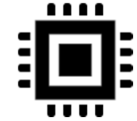
Surface roughness 1/4

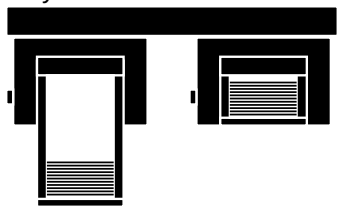
Throughput X 2*1

By adopting QD laser products, it becomes possible to create small, high-precision, and high-performance devices

Semiconductor Processing

Incorporated into various manufacturing process equipment, contributing to the entire semiconductor industry





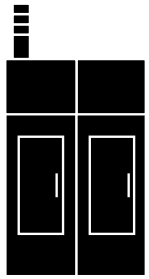
Semiconductor wafer transfer machine

A device for transporting plate-shaped semiconductors. Adopted as a collision prevention sensor

Semiconductor inspection equipment

Inspection equipment to ensure semiconductor quality. Adopted as a sensor to detect abnormalities

Time resolution 10ps



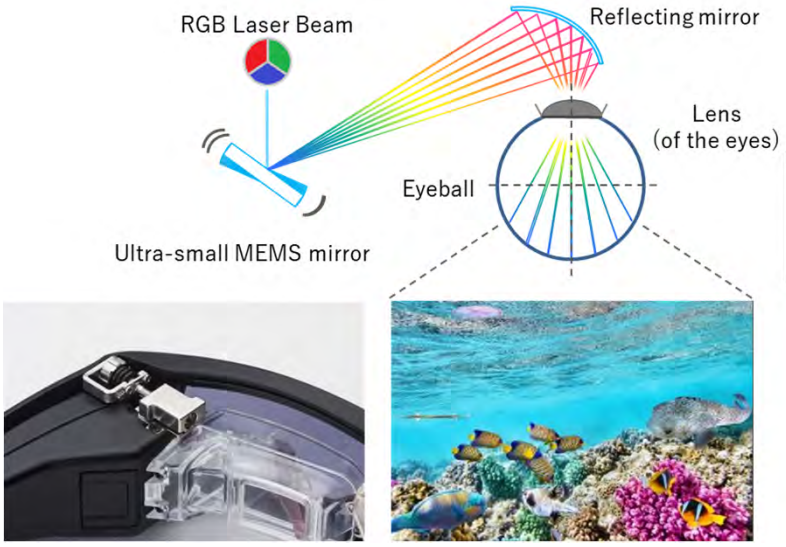
1: Comparison with the same pulse energy. Versus 1064nm nanosecond laser. Our calculation based on Gregory Eberle and Konrad Wegener, Physics Procedia 56 (2014) 951-962.

Visual Information Device (VID) Division: Business Overview

Technology and products that project images directly onto the retina using lasers, bringing innovation to human vision.

World-leading laser retinal projection technology

VISIRIUM TECHNOLOGY®



Three business areas expanding possibilities:

3. Expanding the visible world
Augmented Vision

Creating the ultimate 'smart glasses' that are indispensable

2. Extending healthy vision lifespan
Vision Health Care

Ability to provide peace of mind to eye disease patients through eye health check services



1. Making the hard-to-see visible
Low Vision Aid

Enabling those with low vision to accomplish tasks





02

QD LASER

FY2023 Results, FY2024 Forecast & Medium- to Long-Term Vision

Business plan achievement status

Sales increased compared to the revised plan[*1] and the previous year, but losses worsened.

Although sales were 0.3% higher than the revised plan, the operating loss worsened by 45 million yen due to inventory valuation losses.
Compared to the previous fiscal year, sales increased by 8% and operating loss worsened by 47 million yen.
In addition, due to a decline in demand for bio-testing equipment due to the end of China's COVID-19 countermeasures and a review of RETISSA ON HAND's target market, business plan was revised on February 14, 2024 from the initial plan[*2] (announced on May 12, 2023).[*3]

(Mil JPY)	FY2023 Result	FY2023 Plan(1) [*1]	Result vs Plan(1)	FY2022 Result	YOY	FY2023 Plan(2) [*2]	Result vs Plan(2)
Sales	**1,247**	1,244	+0.3% (+3)	1,159	+8% (+88)	1,446	△13.7% (△198)
(LD)	**934**	930	+1%	891	+5%	1,014	△8%
(LEW)	**312**	314	△0%	268	+17%	432	△28%
Operating Profit or Loss(△)	**△604**	△559	△45	△556	△47	△559	△45
(LD)	**41**	67	△25	64	△23	+67	△25
(LEW)	**△375**	△305	△70	△338	△37	△296	△79

*1 : Published on February 14, 2024
*2 : Published on May 12, 2023
*3 : Refer to "Notice Concerning Revision of Full-year Earnings Forecast for the Fiscal Year Ending March 2024 and Recording of Non-Operating Income and Non-Operating Expenses" published on February 14, 2024 (Only in Japanese).

Forecast for FY2024

While the LD business is steadily growing, the VID business[*1] is undergoing business restructuring aimed at 2026, and company-wide sales will be flat.

Full-year earnings forecast

(Million JPY)	FY2024	FY2023	YOY
Sales	**1,245**	1,247	△0% (△1)
(LD)	**1,000**	934	+7%
(VID)	**244**	312	△22%
Operating Profit or Loss (△)	**△589**	△604	+14
(LD)	**8**	41	△33
(VID)	**△290**	△375	+85
Ordinary Loss (△)	**△592**	△600	+7
Net Loss (△)	**△596**	△642	+45

【LD business】
・Sales increase 7% YOY to 1,000 million yen due to growth in DFB lasers and small visible lasers.
・SG&A increase 38% YOY to 375 million yen due to securing highly skilled human resources, increasing depreciation costs due to shortening the depreciation period of the current base due to base relocation, and an increase in development items centered on DFB lasers and small visible lasers.
・Operating income will be 8 million yen, down 80% from FY2023.

【VID business】
・FY2024 is positioned as a period of business restructuring targeting 2026, and sales are 244 million yen, down 22% from FY2023.
・SG&A are expected to be 349 million yen, down 8% YOY due to a decrease in development items and a review of advertising.
・Operating loss will be 290 million yen, an improvement of 85 million yen from FY2023.

【Company-wide】
・Operating loss will be 589 million yen, an improvement of 14 million yen from FY2023.
・Ordinary loss improve by 7 million yen compared to FY2023, and net loss improved by 45 million yen compared to the previous year due to fixed asset impairment losses in FY2023.

*1 : Name changed from laser eyewear (LEW) business due to expansion of business area.

Business Highlights for FY2023

Company-wide sales of 1.24 billion yen (8% increase compared to the previous period), steady expansion of each business segment

Laser Device Division

Operating profit

consecutive **9** years

Operating profit of 41 million yen
Sales of 930 million yen (+5% YoY)

Certified customers

68 ⇒ **77** institutions

Expansion of compact visible lasers: from 8 to 13 companies
Expansion of DFB laser applications: 7 applications[*1]
Development of 7 laser device products is progressing well[*2]

QD lasers for silicon optical wiring. Mass production shipment of

42,000[*3] units

Mass production started in May 2023.
Building a full-scale mass production system with a capacity of 1 million units per year.

Visual Information Device Division

YoY sales

17%UP

Sales : 314 million yen
Sales of retinal projection products: 950 units
Contracted development of smart glasses

New retinal Imaging Display device

Overseas expansion

NEOVIEWER sales by Sony Corporation in the USA
ON HAND sales in the USA and Asia
Preparation for mass production

Vision Health Check Service

Full-scale implementation

Full-scale adoption by major taxi operators (over 6,000 people). Introduction to the truck industry has begun (400 people)"

*1: Wafer inspection, precision machining, flow cytometry, microscopy, LiDAR, mask inspection, axial length measurement
*2: High-speed DFB lasers for processing and measurement, new wavelengths and modules for small visible lasers, quantum dot DFB lasers
*3: Shipment quantity for the fiscal year ending March 2024 out of an order of 60,000 units. The remaining 18,000 units are scheduled for shipment in the fiscal year ending March 2025.

Major Business Target for FY2024

Updating business for early company-wide operating profit and subsequent explosive growth

Laser Device Division

Operating profit

consecutive **10** years

Operating profit: 8 million yen
Sales: 1.0 billion yen (7% increase compared to the previous term)
Increased costs for new product development and amortization[*1]

Expansion of certified mass production

98⇒108products

Compact visible lasers: from 13 to 18 companies
DFB laser applications: 9 applications[*2]
New product development and commercialization

Solution product launch[*3]

The world's smallest
Compact Visible Laser Unit

Product name: Lantana Planned sales volume for the first year (field test): 16 units

Visual Information Device Division[*4]

YoY sales

78%

Sales: 244 million yen
Smart glasses, fundus camera, etc.
Progress in contracted development
Preparation for profitability and stable revenue

Development of new technologies for retinal projection devices, product development, manufacturing, and sales

Corporate collaboration and overseas expansion

Building an ecosystem for smart glasses
Launch of overseas sales and production of ONHAND
Start of overseas sales of MEOCHECK

Vision Health Check Service

Business expansion

Horizontal expansion in the transportation industry (taxis, trucks, buses)
Subscription-based service implementation to start

*1: Due to the shortening of the useful life associated with the decision to relocate the business unit
*2: Wafer inspection, precision machining, flow cytometry, microscopy, LiDAR, mask inspection, axial length measurement, inter-satellite communication, brain examination
*3: Contributing to the enhancement of product competitiveness for customers through miniaturization and improved design flexibility of biomedical equipment
*4: Name changed from Laser Eyewear (LEW) business due to the expansion of the business area

Mid-term business target (about 3 years)

Achieve company-wide turn around and establish the foundation for explosive growth thereafter

Laser Device Division

Operating profit

consecutive **12~13** years

Operating profit: Over 250 million yen (gross profit margin > 40%)
Expansion of sales for global niche products
Transition from joint development to mass production for silicon photonics

Global niche new products

Sales over **400 million** yen

Compact visible laser units
DFB laser for semiconductor wafer/mask inspection
DFB laser for high-speed precision processing

Mass production order of QD lasers for silicon optical wiring.

60,000units[*1] → **100,000**units[*2]

Mass production by several joint development partners
Expansion of demand in the silicon photonics market

Visual Information Device Division[*4]

Sales of

310mil.[*3] → **1bil.yen**

Steady continuation in the visual support field
Stable revenue from the vision health check service
Commercialization of intellectual property

Retinal imaging products[*5]

Corporate collaboration and overseas expansion

Production and launch of next-generation devices for visual support
Overseas expansion in the vision healthcare field
Field testing and market introduction of smart glasses

Vision Health Check Service

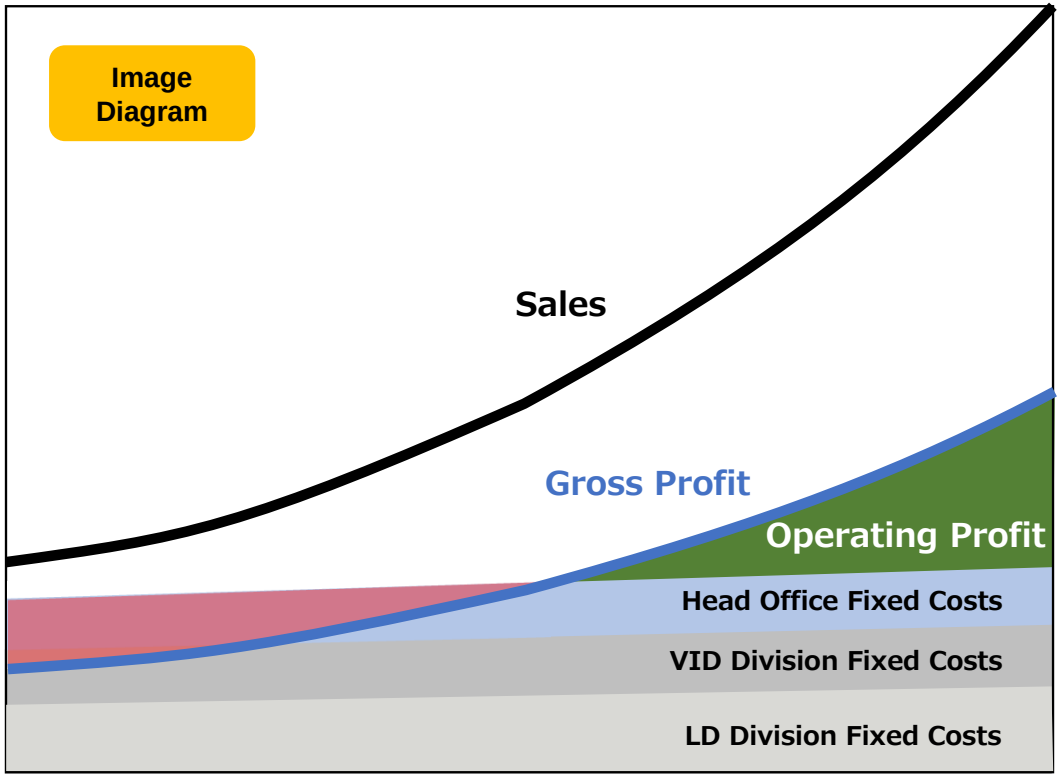
6,000[*1] → **70,000**people

Expansion to transportation industry health checkups, healthy companies, and health checkup service providers
Nationwide expansion of permanent installations in contact lens retail stores, etc.
Operation of data services through administrator/personal viewers

*1: Actual results for the fiscal year ending March 2024
*2: Milestone for the introduction of the third MBE machine aimed at significantly expanding mass production thereafter. The start of mass production by customers has been delayed, resulting in a reduction from the previous target of 200,000 to 400,000 units.
*3: Actual results for the fiscal year ending March 2024
*4: Name changed from Laser Eyewear (LEW) business due to the expansion of the business area
*5: Based on the sales activities in the fiscal year ending March 2024, the target market is being re-evaluated and re-developed. Therefore, the specific unit target has been withdrawn.

Features of Our Company's Revenue Model

Variable cost conversion of fixed costs through Semi-Fabless Model.
Stable growth and break-even point surpassing through product diversification, large-scale mass production, and gross profit expansion



Target Gross Profit Margin of 50%

Profit Expansion Once Break-Even Point is Surpassed

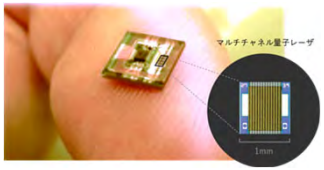
Fixed Costs Slightly Increase at a Constant Rate Due to Semi-Fabless Model

Fiscal Year Ending March 2024

Expected growth potential in mid to long term

03 In the mid to long term, in addition to the laser eyewear business, plan to expand sales of vision health check service and silicon photonics.

- QD lasers for optical wiring (silicon photonics) Mass production start*3



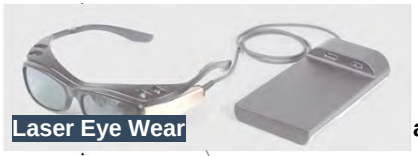
- Vision health check service Full service start*4



- Smart glass as RETISSA Display3 Progress in R&D*5



02 Establish mass production and sales channels of consumer/medical eyewear
Three new RETISSA as the growth driver in the short to mid term

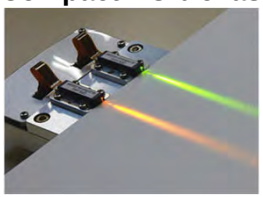


Visual support and vision healthcare Social implementation and overseas expansion*5

DFB laser



Compact visible laser



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





Plan to national and international sales growth

World's smallest laser light source unit "Lantana series". Shipping starts in FY2024.



Mass production of 3 new RETISSA (FY2022)

IPO

Now

Future

*1 : The graph is shown as an image.
*2 : We are reconsidering the target market based on sales activities for FY2023 and are re-developing it, so we have withdrawn the description of specific sales targets.
*3 : Mass production and shipment starts in FY2023.
*4 : Service business starts in 2023.
*5 : Scheduled to be launched in FY2026-FY2027.

03

QD LASER

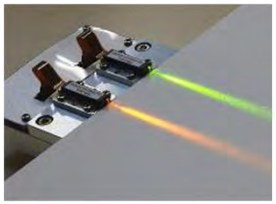
Vision and Strategy for the Laser Device Division

Mid- to Long-term Vision: Laser Device Division

Up until now → Present → From now

01 Investment in R&D



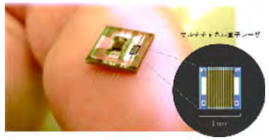


"Strengthening the management foundation for future significant growth through research and development of various laser technologies and securing stable revenue

02 Expanding Applications

Wafer inspection	Brain test	Precision work
Intersatellite communication	Flow cytometer	Microscope
Lidar	Mask inspection	Axial length measurement

Steadily expanding sales by promoting the installation of QD laser products into various application devices



03-B New Pillar Sales Expansion in Silicon Photonics

03-A New Applications ＋ Solution Products

3 次元造形

遠隔操作・医療



Compact visible laser BOX with built-in electronic circuits

Sales of 2 billion yen

Sales of 1 billion yen

Break even

IPO

9 companies in mass production (Over 20 million yen each)

20 companies in mass production (Over 20 million yen each)

2024

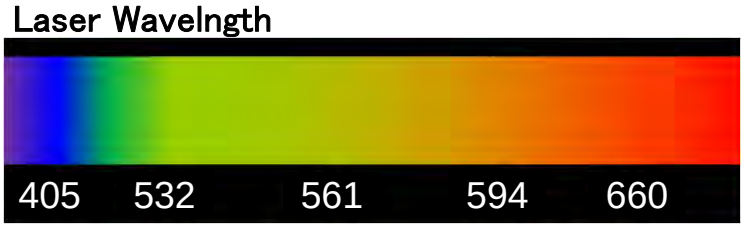
2026

2030

*1：The graph is shown as an image.

03-A Launch of new applications and solution products

Expansion of the wavelength lineup



FY2023：532, 561, 594 nm
Fy2024：488, 552, 588 nm
FY2025 and beyond：405 – 660 nm
Gradual expansion across the entire visible light spectrum

Launch of solution products

Compact visible laser





Achieving plug-and-play functionality
Compact visible laser unit with built-in drive circuit: "Lantana Series"
Compact visible laser with built-in TEC: "Lantana mini Series"

- Expansion of customers and applications: By expanding the wavelength lineup, the target market size will increase 6.4 times[*1] by 2027, reaching 25,000 units.
- Expansion of the customer base: By improving the usability of compact visible lasers, we will promote introduction to emerging countries and research institutions.
- Increasing added value: Achieving cost reduction and miniaturization of devices in customers' product development, thereby sharing added value with customers.

*1: Comparison with the case where the wavelength lineup is not expanded. Based on https://www.marketsandmarkets.com/Market-Reports/flow-cytometry-market-65374584.html and our customer information, the number of lasers used for typical wavelengths 405nm, 488nm, 561nm, and 638nm in flow cytometers is estimated.

Growth Strategy of Compact Visible Laser

- **Current product sales volume and market share**

Wavelenth (nm)	Color	FY2022 Sales in units	FY2023 Planned Sales in units	FY2023 Actual Sales in units	Number of customers FY2022 →FY2023	Market share
532	green	24	24	36	2 → 3	※
561	Yellow green	1,438	1,697	945	6 → 12	36%
594	Orange	10	10	3	1 → 1	※
Total		1,472	1,731	984	8 → 13	18%

※less than1%

- **Aiming for annual growth of 30% from FY2023 ⇒ 3 measures ⇒ Market share 44% @ FY2027**[*1]

1. Promotion

・Increase in client companies: 8 ⇒ 13 companies@FY2027 13 companies@2024/6

・Increase of introduced equipment: 9 ⇒ 26 models@FY2027 19 models@2024/6

2. New laser development

・New wavelengths (488nm, 552nm): Market of 11,500 units → Development in progress

・High output power (30 ⇒ 50mW): Market of 3,800 units → Development completed

3. Solution

・Box module： Market of 10,600 units → To be launched in fall 2024

Photonics West 2024 exhibited [*2]



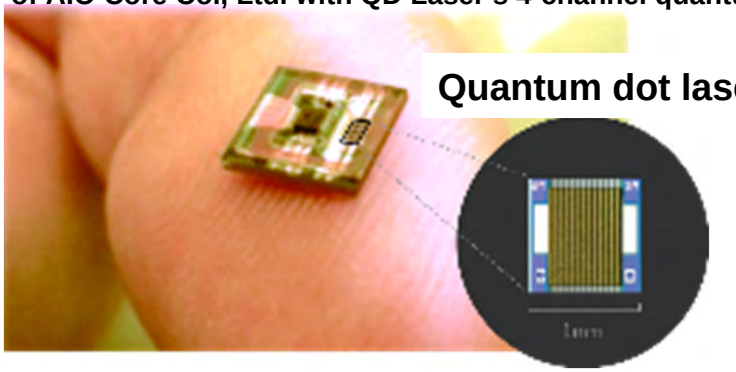
・Multicolor light sources ： Market of 12,500 units

*1: Optical output 50mW or less
*2: https://www.qdlaser.com/news/1363/

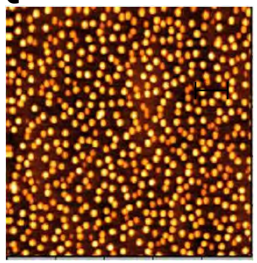
IOCore ™ with Quantum-Dot Laser Launched for Mass Production

- **Installed in IOCore's silicon photonics chip for optical wiring "IOCore™" (commonly known as NPO *1)**
- **Implementation of optical wiring technology contributes to dramatic improvements in computer information processing capabilities essential for AI and the Metaverse**

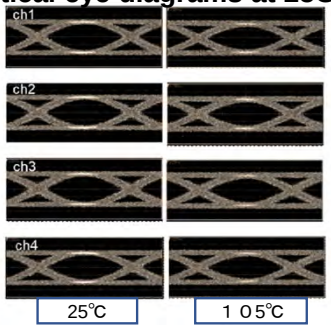
100Gb/s Silicon photonics chip named IOCore™
of AIO Core Co., Ltd. with QD Laser's 4-channel quantum dot lasers

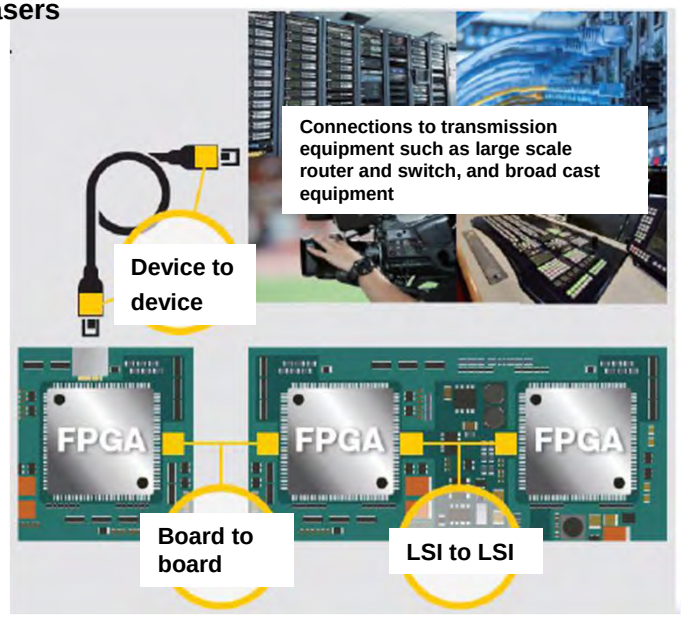


Quantum dots



Optical eye diagrams at 25Gbps





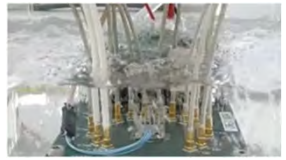
Courtesy of AIO Core Co., Ltd.

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

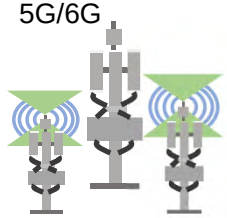
Data center, Server, Super Computer



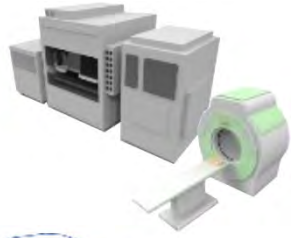
Demonstration of immersion cooling by AIO Core Co., Ltd.



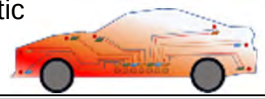
5G/6G



FA、Medical



Automatic Driving



*1: Near Packaged Optics. It is a photoelectric conversion element for optical wiring that is placed and mounted near packages such as FPGA and ASIC and has entered the practical stage.

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

Received orders of 60,000-unit quantum dot lasers for mass production.
Customizing quantum dot lasers for Japan/US/EU silicon photonics vendors.

Development and production

2010
World's first mass production of quantum dot laser for optical communication

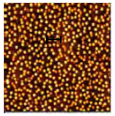
2012
Started development of quantum dot laser for silicon photonics

2017
Established mass production system of quantum dot lasers for silicon photonics (supplied to AIO Core Co., Ltd.)

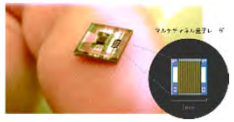
2019
Our products installed in the "Ultra-thin connector integrated active optical module (I-PEX EOM)" developed by I-PEX

2023
Received orders of 60,000pcs quantum dot lasers for mass production. Start shipment in May 2023.
Working on joint development with silicon photonics vendors around the world.

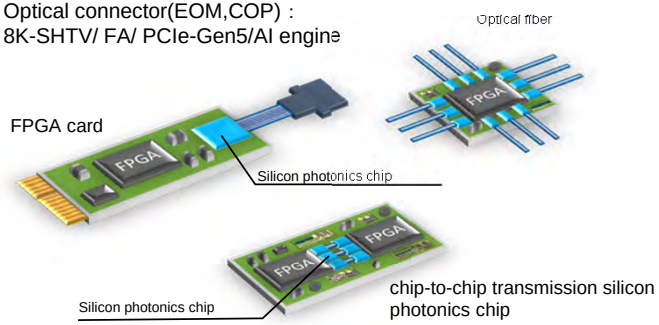
- quantum dot crystal



- 100Gb/s transceiver silicon chip with quantum dot laser



- Optical connector(EOM,COP) : 8K-SHTV/ FA/ PCIe-Gen5/AI engine



Roadmap of mass production

Phase 1: Lower production cost (2023-2024)

2023
Started mass production of quantum dot lasers for AIO Core Co., Ltd.
Lower cost of back-end process

2024
Increase wafer diameter of quantum dot lasers

Phase 2: Increase production capacity (2024-) *1

2024
LD division starts construction of new base

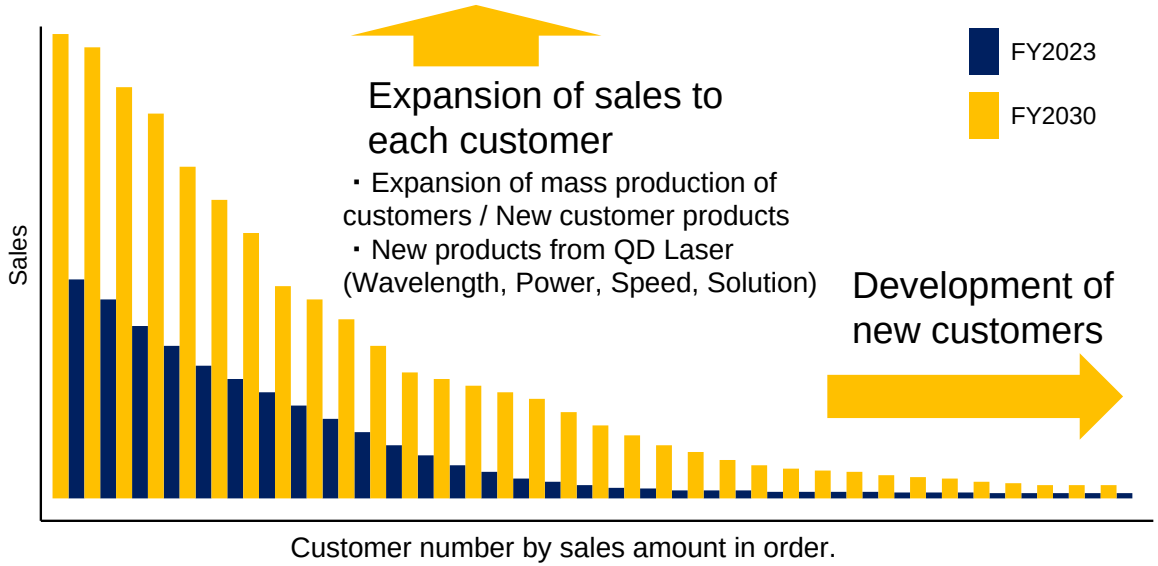
2026
LD division relocated
Strengthen manufacturing facilities and build a system to ship 1 million units per year

2028 onwards
MBE#3 starts operation
Quantum dot wafer production system to two units

*1 The previous forecast has been changed due to the decision to relocate the base and the postponement of the start of mass production by a customer.

LD Business: Sales Strategy Initiatives

We have already established a base of more than 100 existing customers. Shortly, new major customers will emerge from the long tail, expanding sales. Additionally, the number of new customers and new applications will increase.



Sales Strategy:

- **Thorough management of customer project stages to drive customer mass production and to achieve stable supply in response to increasing demand.**
- **While aiming at the growth of major customers from the existing customer base, efficiently find and develop new customers through agents, exhibitions, etc., on a necessary and sufficient scale.**
- **Web marketing, i.e., opening product sites and SEO[*1] measures, to discover and capture potential customers and needs.**

Anticipating future innovations in various fields and the subsequent surge in demand for semiconductor lasers, QD Laser has already established a customer base of over 100 companies. We are now seeing major customers emerging even from the long-tail customer group with small sales. In response, we are focused on ensuring stable supply and promoting gross profit increase, with the goal of achieving significant sales expansion over the next 10 years.

*1： Search Engine Optimization。

Laser Device Business Strategy

Based on the technology and products that have established our position in the industry, we will 1) expand across customers and develop new applications, 2) expand globally, and 3) develop module & solutions to realize significant growth.

			Estimated market size of the final product*1	Estimated market size of QDL products
DFB ・World's fastest speed of 15ps ・High-speed electronic circuit	Measurement	Wafer test / Mask test / Topographic survey / Brain monitor / Axial length	1,480 billion-yen@2032 CAGR 10%*2	14.8 billion-yen
	Micro machining	Electronic circuits / Composite materials / Emerging countries for nano and pico-second machining	652 billion-yen@2027 CAGR 7.3%*3	6.5 billion-yen
Compact Visible ・World's smallest size ・World's minimum power consumption ・World's fastest 50ps	Bio-analysis	Flow Cytometer / Cell sorter	1,129 billion-yen@2030 CAGR 7.2%*4	11.3 billion-yen
	Microscope	Confocal microscope / STED microscope	990 billion-yen@2030 CAGR 9.0%*5	9.9 billion-yen
		Total solution with 1)All wavelength（405nm~635nm) 2)World's smallest modules		
High Power ・World's highest nanosecond peak power ・High reliability	Leveler	Construction site / Manufacturing plant / DIY / Measurement	555 billion-yen@2032 CAGR 4.3%*6	5.6 billion-yen
	Sensors	Wafer transport / Spatial communication / Machine vision / Particle counter	233 billion-yen@2030 CAGR 10.1%*7	2.3 billion-yen
Quantum dots ・High temperature stable operation ・High reliability ・Low noise	Optical wiring	Super computor / Medical・FA / 5G/6G / Self-driving	1,219 billion-yen @2030 CAGR 25.8%*8	12.2 billion-yen
	LiDAR	Drone / Self-driving / Robotics		
			Todal 6 trillion-yen	**Total 62.6 billion-yen**

*1 : Please note that it is indicative of the overall size of our potential target market and is not a predictor of our performance. Calculated at the exchange rate of JPY/USD=150 yen/dollar.
*2 : Future Market Insights「Wafer Inspection Market by Technology, Defect Type & Region - Forecast 2022 - 2032」
*3 : Grand View Research「Micromachining Market Size & Share Report, 2020-2027」
*4 : Grand View Research「Global Flow Cytometry Market Size Analysis Report, 2030」
*5 : Grand View Research「Super-resolution Microscopes Market Size Report, 2022-2030」
*6 : Global Market Insights「Construction Laser Market」
*7 : Marketysers Global Consulting「Laser Sensor Market」
*8 : Grand View Research「Silicon Photonics Market Size, Share & Trends Analysis Report」

04

QD LASER

Vision and Strategy for the Visual Information Device Division

Three Pillars Aiming for the Ultimate Smart Glasses:
Low Vision Aid, Vision Healthcare, Augmented Vision

Mid- to Long-term Vision: Visual Information Device Division

Cultivating three pillars towards the commercialization of ultimate smart glasses



Augmented Vision

Expanding the world of "seeing"
Target: Approximately 50-80% of the population*3



Vision Healthcare

Extending the healthy life of "seeing“
Target: Approximately 30-40% of the population*2



Low Vision Aid

Transforming "difficulty seeing" into "seeing"
Target: Approximately 1-2% of the population*1

04 Realizing "Ultimate Smart Glasses“
Integration with Low Vision Care and Vision Healthcare

Aiming for significant growth by merging the three fields

03 Establishing and expanding the smart glasses market
- Providing core modules
- Accelerating monetization of development assets

monetization of development assets

02 Expansion of “Vision Healthcare”
- Development of healthcare services
- Establishment and development of subscription-type services

Near-term Growth

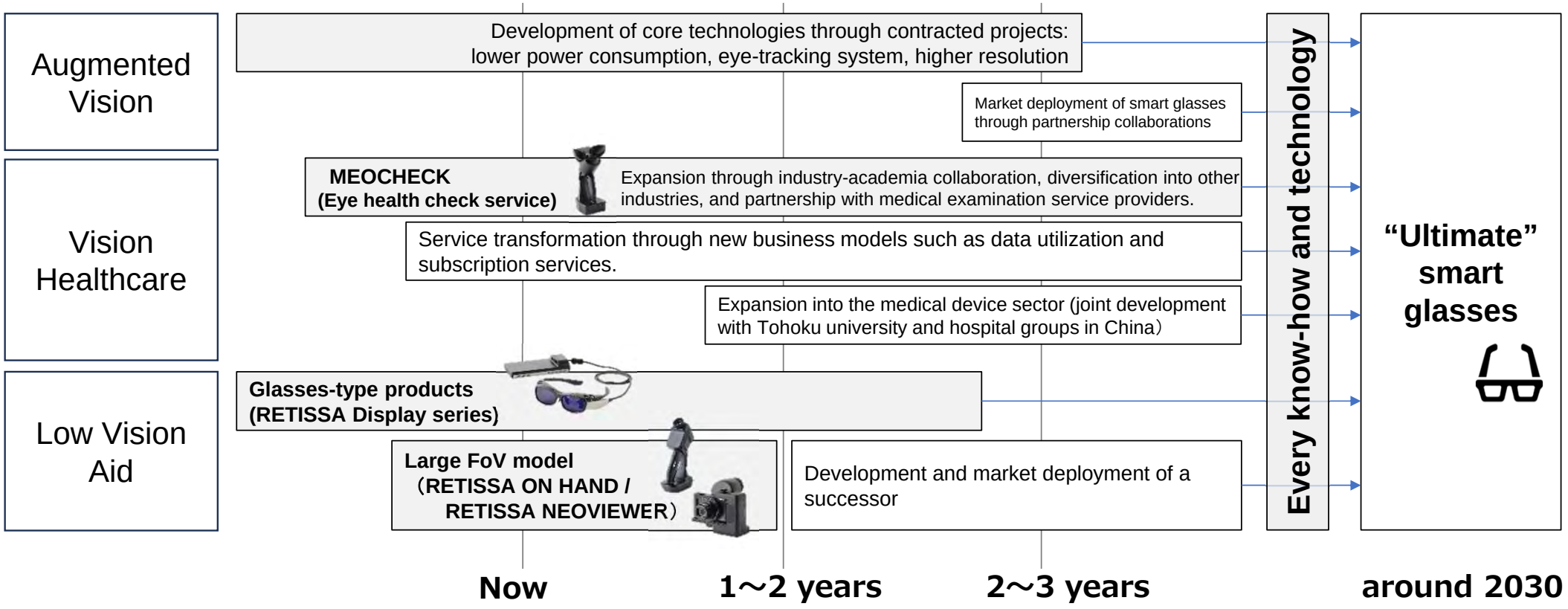
01 Steady and continuous progress
- Expanding recognition and implementation cases

Steady progress

*1 : Based on various references regarding the target population of low vision aids, estimates from the WHO and other sources.
*2 : Estimated from the population of people in their 40s to 60s, who are the primary target.
*3 : Estimated based on the proportions of Innovators, Early Adopters, Early Majority, and Late Majority.

Products and Service Strategy

Continuing technology development, product development, and business development aimed at creating the ultimate smart glasses that integrate three fields.



Low Vision Aid: Improving Recognition and Steady Adoption

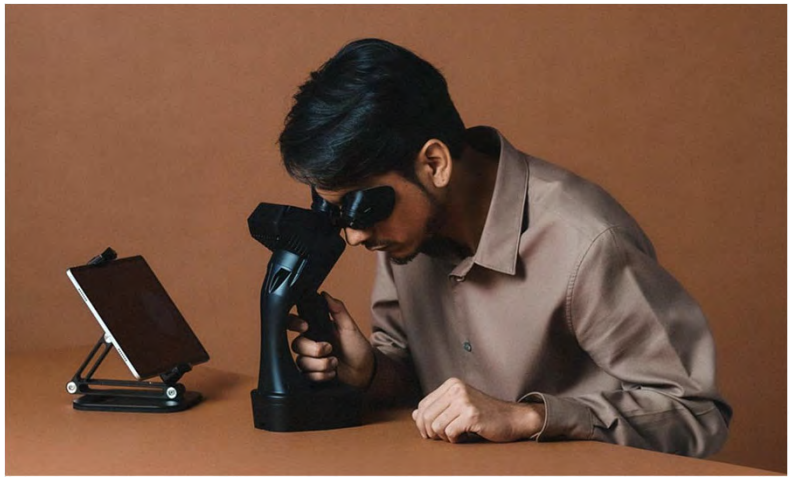
Creating value by "enjoying real content through events at cultural facilities," and increasing recognition through information dissemination. Promoting participation in "cultural and artistic activities" aimed at an inclusive society.

	FY2023 Clarification of value, initial introduction	FY2024/2025 Information dissemination, cultural project implementation, expanding introduction	FY2026~ Domestic and international adoption, contribution to GDW*1
RETISSA ON HAND 	- Experience events (15 times) - Trial introduction begins (19 units) Tokyo Metropolitan Art Museum, etc. - Tohoku University COI-NEXT collaboration Realizing an inclusive society from "seeing" in Miyagi Prefecture	- Financial support such as subsidies and donations - Overseas sales - Information dissemination enhancement through website *Organizing issues towards realizing an inclusive society* *Experiences, implementation processes, and case studies* - Creation of cultural projects - Formation of user communities	Introduction to art museums, museums, zoos, aquariums, racecourses, libraries, theaters, travel and tourist facilities Domestic: 5,738 facilities Worldwide: >10 million facilities Sales of subsequent models and global sales
RETISSA NEOVIEWER 	- Launch in Japan and US - Release of new "With My Eyes" episodes - Start of experience rental service - Donation to blind schools and facilities nationwide (about 200 units) - α-compatible model verification experiment	- Photo exhibition held in conjunction with GAAD*2 - Events in collaboration with donation recipients - Increased sales accompanying recognition expansion - Diversification of business models	- Active interest groups (photography, travel, art appreciation, astronomy, sports, gourmet, railways, fashion, pets…) Along with all creativity

*1 : Gross Domestic Well-being
*2 : Global Accessibility Awareness Day

Vision Healthcare: Eye Health Check Service MEOCHECK

Simple operation, short-time self-check including peripheral vision for "recognition", "judgment", and "operation.“ Provided mainly for transportation businesses as a "driver health management" service aimed at ensuring safe driving and extending driving life



- Quick and time-saving:
Both eyes measured in under 5 minutes, stress-free
- Self-check:
No need for specialist assistance, can be performed anytime
- Early detection:
Early treatment to prevent vision loss, extending driving life
- Compact:
Not cumbersome, easy to set up and transport







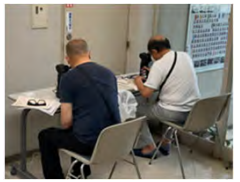
Main customers: Automobile transportation businesses

[Implementation Examples]

- Nihon Kotsu
Implemented in conjunction with regular health checkups



- Tsubame Kotsu
In addition to regular health checkups, installed at business locations



- Waki Logistics
Implemented in self-service format at bases nationwide

Vision Healthcare: Eye Health Check Service MEOCHECK

Advancing preparations for business expansion, aiming to expand through horizontal development of previous implementation examples.

Implementing concrete measures for business expansion:

- Introduced self-service method (completed)
Realized a self-service method that can be implemented on a flexible schedule.
Can be introduced even for customers with small numbers and multiple locations.
- Built digital platform (completed)
Developed web services that allow viewing results through the web.
Improved customer convenience and can expand future functions.
- Secured operational expansion capability (completed)
Enhanced on-site support through partnerships with other companies.
Can provide services on a nationwide scale.
- Establishing medical evidence (in progress)
Correlation with diseases like glaucoma and retinopathy, correlation with existing devices.
Big data analysis, epidemiological research.
- Contributing to safe driving (in progress)
Linking with accident data, drive recorders, etc.

Continuing, expanding, and horizontally developing previous cases:

Expanding to 1.3 million professional drivers nationwide (Responding to the manual issued by MLIT.)

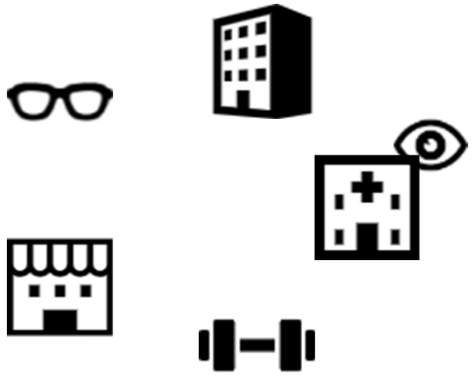
Also for drivers of company cars, vehicle operations, etc.



Further developing into permanent service:

Installing in commercial facilities, health facilities, etc.
Expanding from B2B to B2B2C.

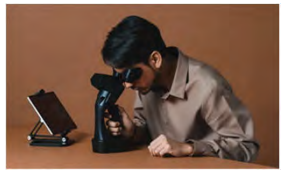
Aiming to increase customer visits and customer loyalty.



Vision Healthcare: Connecting MEOCHECK to Smart Glasses

Through data accumulation, establishing medical evidence, and integration with cutting-edge technology, we can provide added value beyond early disease detection, develop services for more people, and realize the ultimate smart glasses.

Data Accumulation with MEOCHECK



- Already accumulated data from approximately 10,000 individuals.
- Screening leads to disease detection and treatment in subsequent medical examinations.

Medical and Public Health Evidence/Supervision



Prof. Nakazawa



Prof. He Wei

- Tohoku University COI-NEXT "Vision to Connect" (Prof. Nakazawa)
  Relationship between check results and diseases
- China He Vision Group (Prof. He Wei)
  Visual function, cognitive function, disease diagnosis algorithms (using AI)

Integration with Advanced Medical Device Development Areas



- SLO and fundus cameras
- Eye tracking (measuring eye movement, pupil size, etc.)
- Wide-angle field of view, high-resolution imaging

Early detection of eye diseases

Retinopathy, glaucoma, macular degeneration, etc.

Understanding eye health conditions

Eye strain, dry eye, presbyopia, etc.

Assessing overall health through eyes

Cognitive function, stress, concentration, fatigue level, blood flow state, headaches, stiff shoulders, etc.

"Ultimate" Smart Glasses

Augmented Vision: The Potential of "Smart Glasses"

In a situation where the smartwatch market is catching up and rising to challenge the smartphone market, the next market to rise will be the smart glasses market.







Market Size	**Recent**	USD 450~500 billion[*1]	USD 25~30 billion[*2]	USD 15~20 billion[*3,4]
	Future,2030	~ USD 800 billion[*1]	~USD 80 billion[*2]	USD 35~50 billion[*3,4]
Market Growth Rate（CAGR）		7.3%[*1]	14.84%[*2]	15~30% or more[*3,4]
Market Evaluation		Mature large market	Rapidly growing market	Market expected to grow significantly from now on
Overview and Insights		Has become a "necessity" to the point of being called indispensable. On the other hand, social issues such as smartphone addiction and presbyopia are emerging.	Not just a second display for smartphones, but its role as a health care tracker is driving market expansion	A wearable device that represents the most natural form for the act of viewing a display. However, it is still in a transitional phase in terms of technology and applications.

*1：https://www.fortunebusinessinsights.com/jp/業界-レポート/スマートフォン市場-100308 $457.18 billion (2021), $484.81 billion (2022) ⇒ $792.51 billion (2029)
*2：https://www.fortunebusinessinsights.com/jp/スマートウォッチ市場-106625 $25.61 billion (2022), $29.31 billion (2023) ⇒ $77.22 billion (2030)
*3：https://www.gii.co.jp/report/tbrc1414015-ar-vr-smart-glasses-global-market-report.html $15.93 billion (2023), $18.58 billion (2024) ⇒ $34.62 billion (2028) CAGR: 16.8%
*4：https://www.sdki.jp/reports/ar-and-vr-smart-glasses-market/56031 $14.6 billion (2022) ⇒ $53.0 billion (2035) CAGR: approximately 32%

Augmented Vision: Smart Glasses as the Ultimate "Eyewear" Powered by QDL

Three "arrows" are necessary for the full-scale adoption of smart glasses, and by combining QD Laser's technologies, we can provide the ultimate form of smart glasses.

Augmented Vision + **Vision Healthcare** + **Low Vision Aid**

Digital and reality fusion

Access information anytime
Real world is expanded

This alone is not enough for full-scale adoption of smart glasses.

Understanding eye health conditions

Glaucoma, cataracts, macular degeneration,
eye fatigue, dry eye, etc.

Assessing overall health through eyes

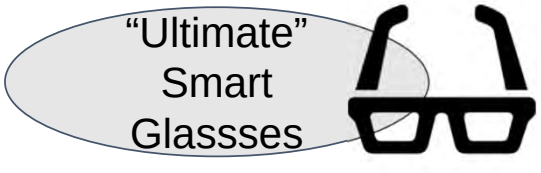
Cognitive function, stress level
blood flow status, fatigue level,
etc.

Like smartwatches, health care tracker functions will be key to smart glasses adoption.

No need to worry about eyesight

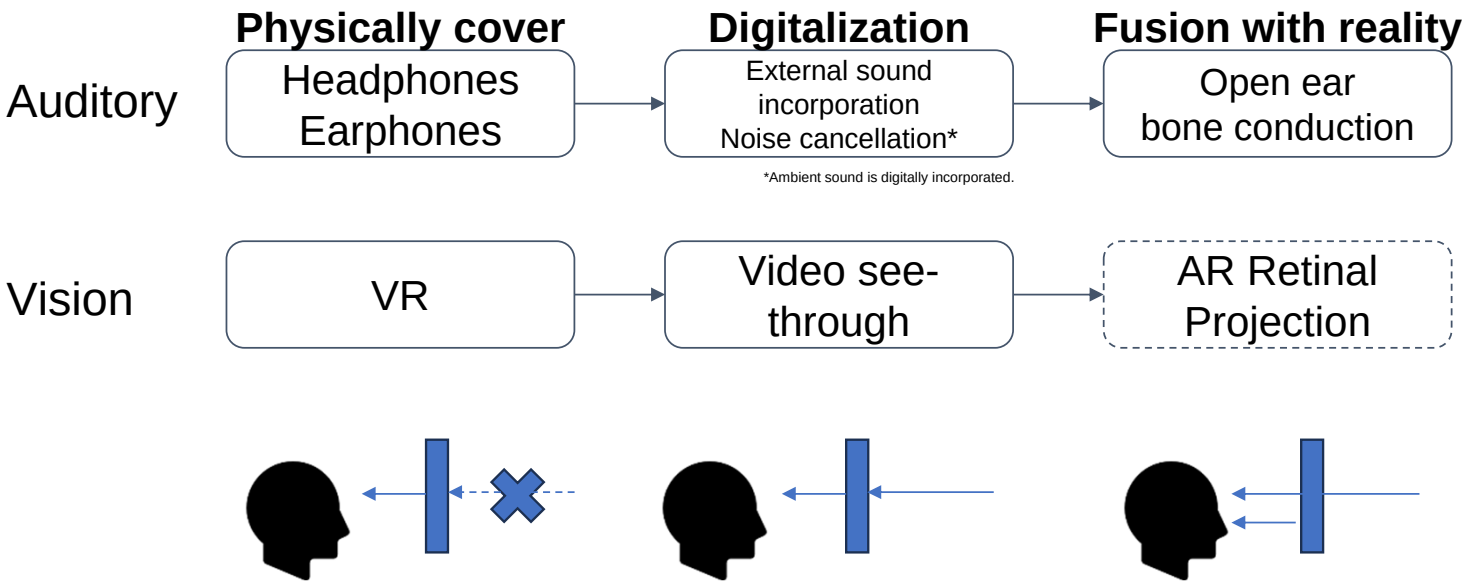
Near vision, far vision, astigmatism,
presbyopia, low vision...
Glasses that fit your eyes

Furthermore, QD Laser adds social value



Augmented Vision: (Reference) Fusion of Five Senses and Digital

For auditory devices like headphones and earphones, types that don't completely shut out environmental sounds have been gaining attention in recent years, after progressing from isolation from ambient noise to digital incorporation.
For visual devices, video see-through is becoming mainstream, evolving from fully immersive VR. The future will bring an era of AR and retinal projection that realize fusion with reality.



Augmented Vision: Element Technology Development for Smart Glasses

Laser Direct Retinal Projection (DRP) technology is a unique QD LASER technology that can only realize the ultimate AR/MR glasses.
Unique Features : 1) No need for visual acuity adjustment, 2) Ultra-miniaturization possible (projection device placed inside the glasses), 3) Suppression of myopia (axial length expansion)

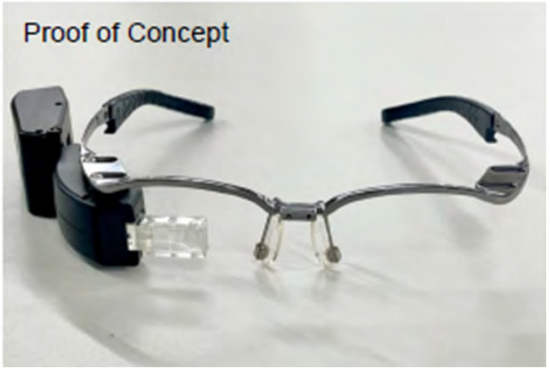
Small, low power consumption integrated light source standardization module*1

Unprecedented high image quality (1080P) for direct retinal projection (under development)

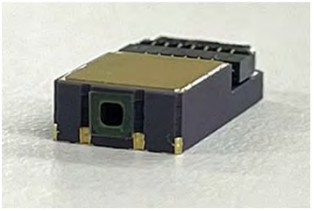
Eye-tracking drive system (patent registered)

Prototypes exhibited at CEATEC2023 and CES2024





[Reference] TDK's world's smallest class ultra-compact full-color laser module



*1: In the fiscal year ending March 2024, we continue activities aimed at standardized modules, such as developing prototypes with business partners, but we have withdrawn specific information on selling prices and sales volumes.

05

QD LASER

ESG Initiatives

Business Development Directly Linked to Sustainability

Using the power of semiconductor lasers to increase what's possible, contributing to the improvement of well-being for all humanity.

[Laser Device Division]
Advanced Sensing Using Laser Light Sources

- New inspection methods using laser light sources
- Contribution to innovation through data utilization
- Accident reduction in advanced autonomous driving





2024 ——— to ———→ 2030

[Visual Information Device Division]
Laser Retinal Projection Technology

- Early detection of eye diseases using MEOCHECK
- Expanding social implementation of low vision aid
- Resolving various inconveniences related to vision







2024 ——— to ———→ 2030

Contributing to medical examinations and research, extending healthy life expectancy through the development of preventive medicine, and realizing an inclusive society.

The expansion of QD LASER's technology and business directly leads to the realization of a happier society.

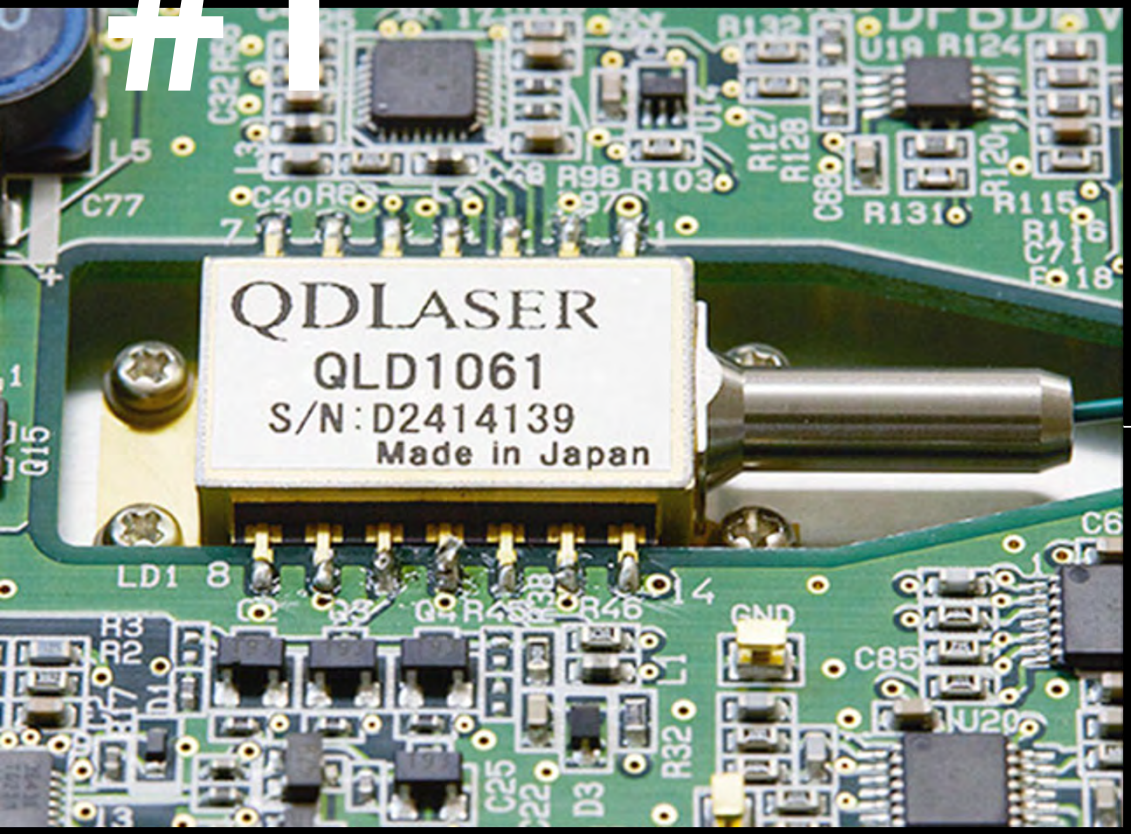
06

QD LASER

Appendix 1

Main product introduction

#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.

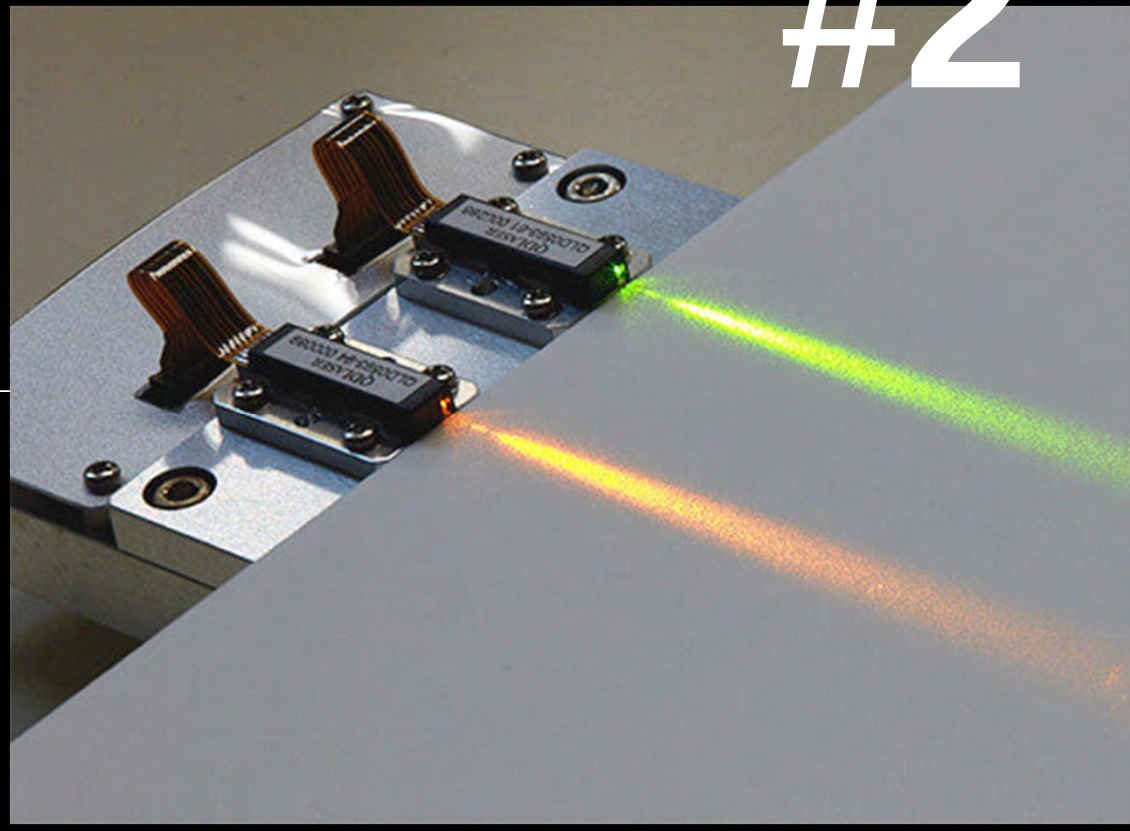
- **Wavelength lineup of**
  1030, 1053, 1064, 1080, 1120, 1180nm
- **Provided in 1nm unit**
- **Non-heated processing is possible by short-pulse operation in picoseconds.**
- **Highly stable and low noise enables high-precision machining and measurement.**
- **Only a few companies worldwide can manufacture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

#2

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

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

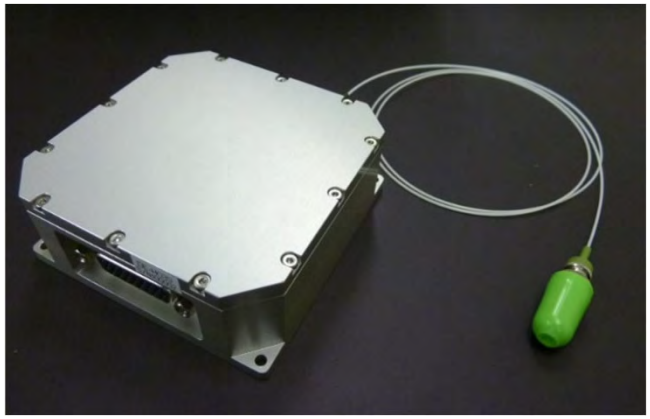
High value-added solution for biomedical equipment *1

- 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.

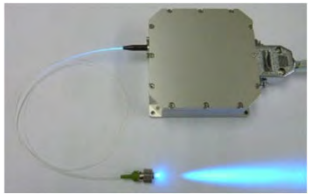
Compact Visible Lasers



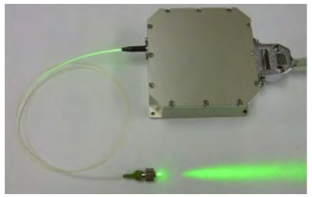
Integrated into



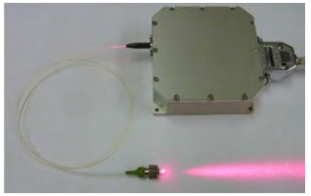
Palm-Sized Multi-color Compact Laser Light Source （80 x 80 x t30mm）



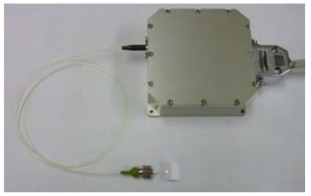
488nm



561nm



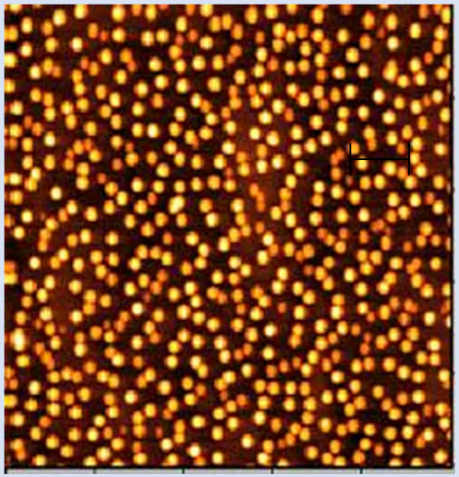
660nm



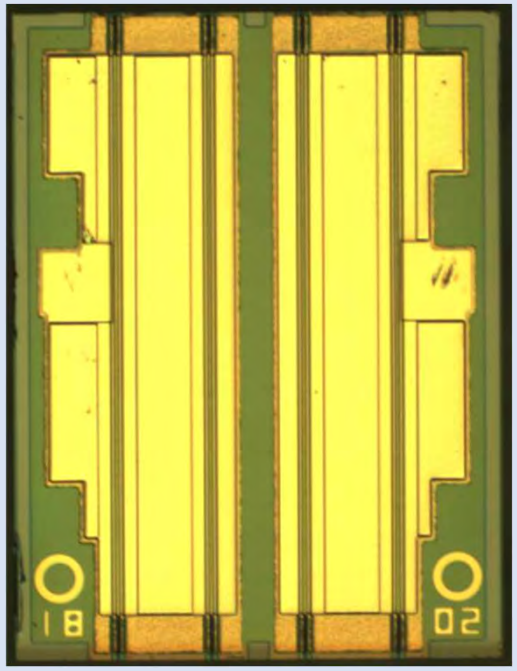
785nm

*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.**

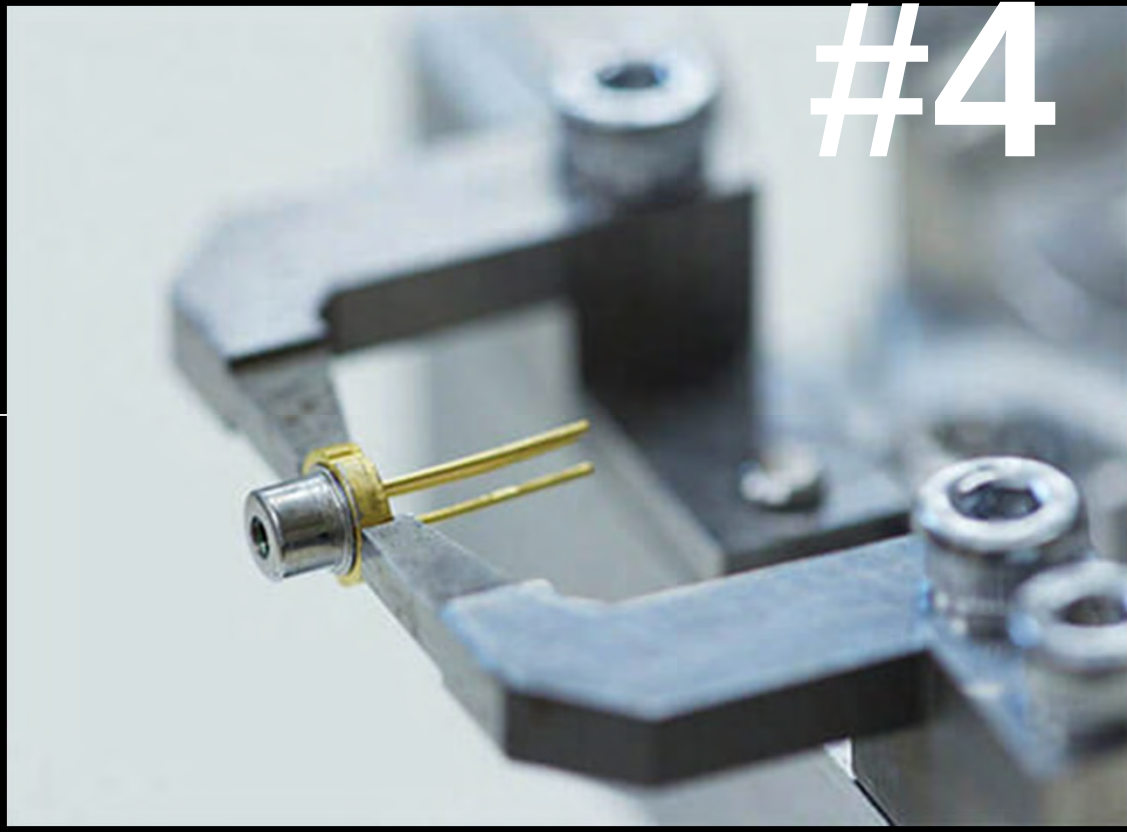
High Power FP Laser

- **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.**



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

JPY 900 bn (USD 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


Japan — Population of people with low vision: **1.45 million**[*1]


Europe (EU) — (our estimate): **18.77 million**[*2]


U.S. — (our Estimate): **12.00 million**[*2]

Estimated percentage of applicability (our estimate)*3: **11%**

× Product Price per Unit (our assumption)*6: **JPY 200k (USD 1.9k)**

Total market size of advanced countries (Our estimate)

JPY 708.7bn (USD 6.7bn)

＋

Senior Citizens Market


Japan — Population of People over 65 years old: **36.08 million**[*4]


Europe (EU): **102.76 million**[*4]


U.S.: **52.79 million**[*4]

Estimated percentage of applicability (our estimate)*5: **1%**

× Product Price per Unit (our assumption)*6: **JPY 100k (USD 950)**

Total market size of advanced countries (our estimate)

JPY 191.7bn (USD 1.8 bn)

JPY 900 bn (USD 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.

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 • Focused on obtaining the approvals to marketing medical devices by targeting diseases for which high efficacy can be expected. • Plan to expand the scope of application with RDII and RDIII on page 25 and the wide-angle viewfinder on page 27.
		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%	
		Aphakia	5,100					
		Phacocele	<50					
	Uvea	Uveitis	714	714	△	Effective on astigmatism developed as a complication	10%	
		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					
		Hypertensive retinopathy	9,100			Some efficacy is seen in cases where anterior eye disease is also present		
		Age-related maculopathy	3,900					
		Diabetic retinopathy	3,114			AE camera feature is exceptionally effective on photophobia, night blindness, etc.		
		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%	
		Color amblyopia, color blindness	2,500	2,500	○	-	20%	• Can improve by processing images taken by camera

*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%.

07

QD LASER

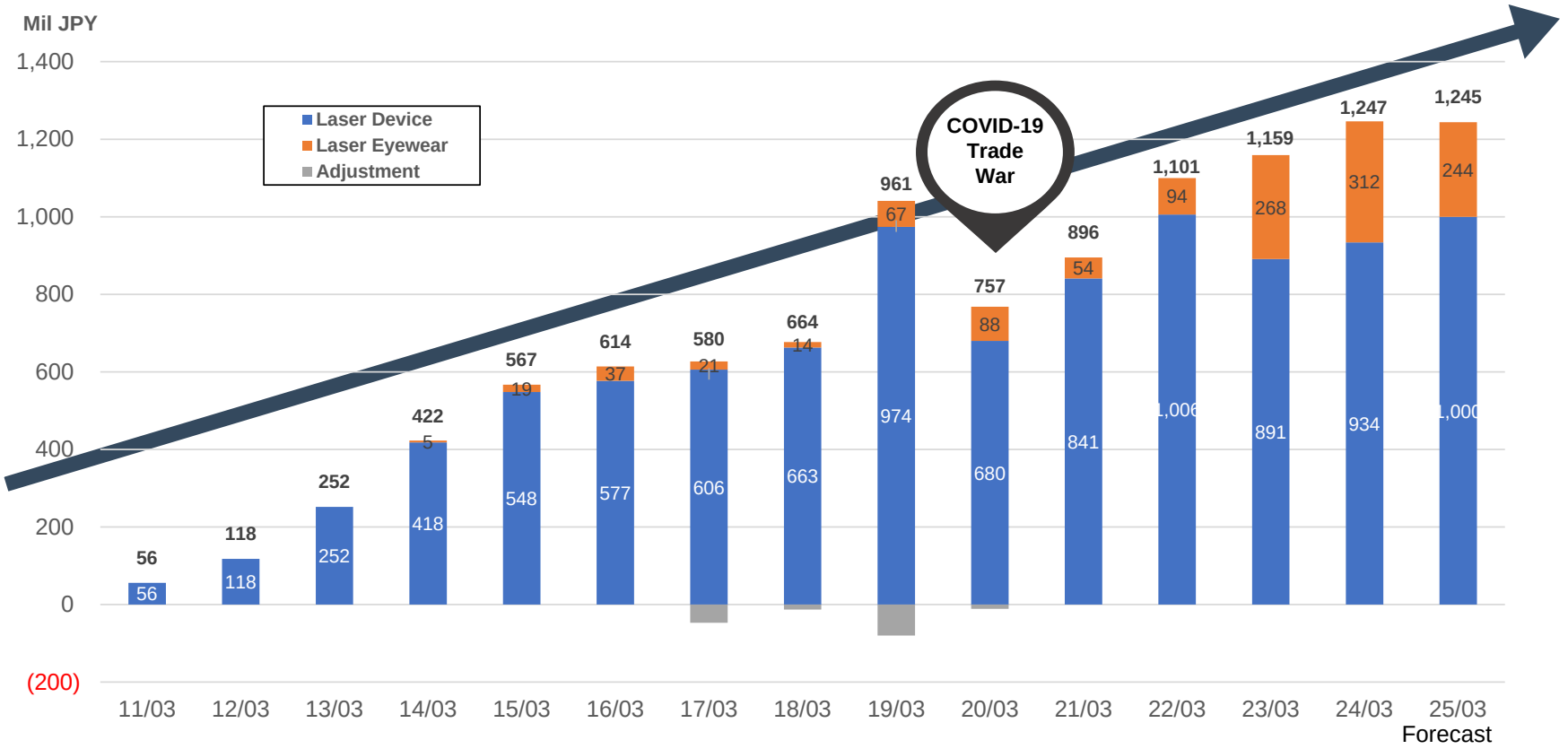
Appendix 2

Performance trends, glossary, etc.

Sales Trend

Continuous growth for over ten years.

Exceed one billion yen for the first time in FY2021、Record high sales in FY2023.



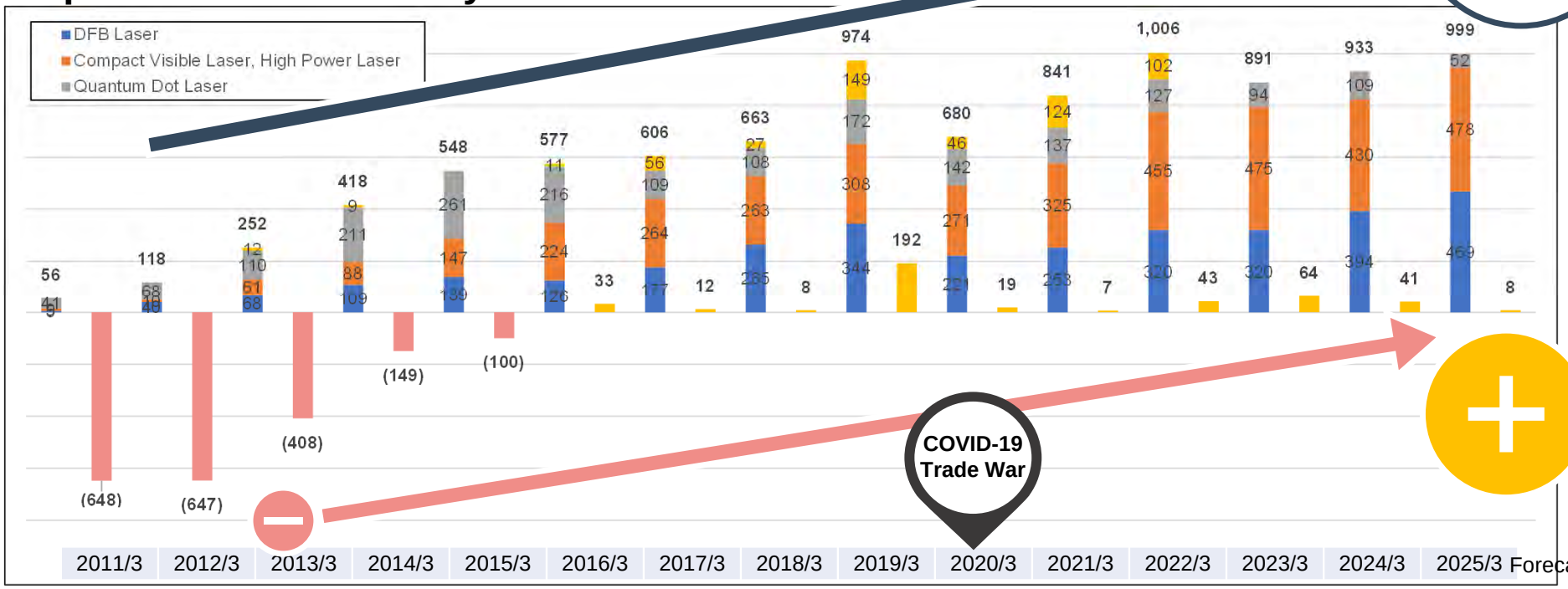
Laser Device Business Sales Trend

Growth of the semiconductor laser market and expansion of applications.
Sales are expected to be 1 billion yen in FY2024.

14yrs CAGR*1
23%

Revenue

Operating Profit

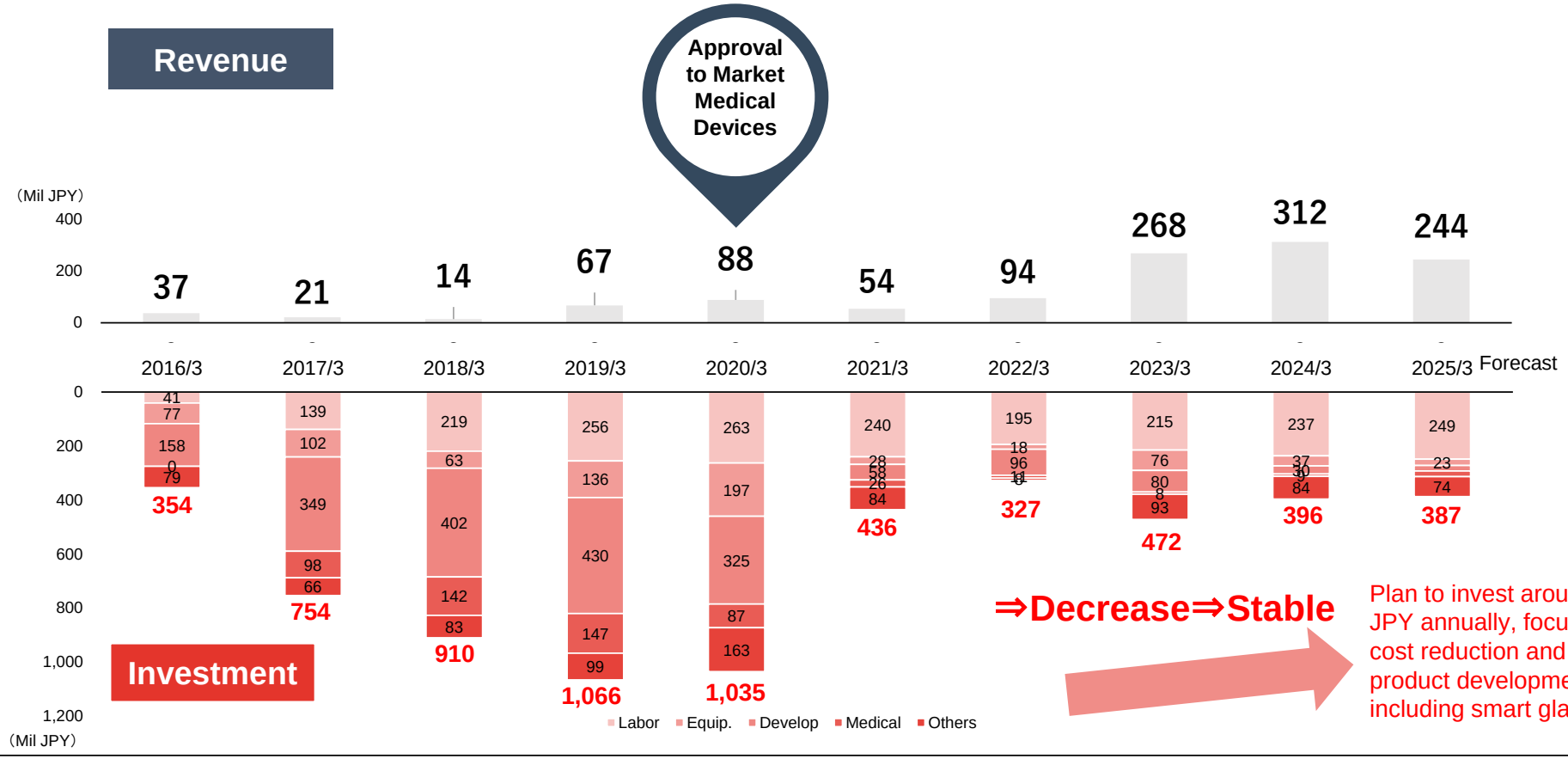


	2011/3	2012/3	2013/3	2014/3	2015/3	2016/3	2017/3	2018/3	2019/3	2020/3	2021/3	2022/3	2023/3	2024/3	2025/3 Forecast
Sales of Segment	56	118	252	418	548	577	606	663	974	680	841	1,006	891	934	1,000
Adjustment	0	0	0	0	0	0	(47)	(13)	(80)	(11)	0	0	0	0	0
Sales of Segment after adjustment	**56**	**118**	**252**	**418**	**548**	**577**	**559**	**650**	**894**	**669**	**841**	**1,006**	**891**	**934**	**1,000**

*1 : Compound annual growth rate in segment sales after internal adjustment.

Visual Information Device (Laser Eyewear) Business: Profit Structure

Preparing for increased sales of future smart glasses, eye health check services, etc. with a fixed amount of investment.



Fund allocation plan

Main purpose of raised fund by IPO and stock acquisition rights

(1) Manufacturing costs for retinal projection products and working capital for the VID business and head office labor costs, rent, IP costs, etc.[*1]
(2) Expenses for increasing production capacity and capital and business alliances in the LD business.

内容	Raised Amt[*2] (Spent Amt)[*3]	FY2021	FY2022	FY2023	FY2024	FY2025 onwards
Manufacturing cost for the mass production in the VID business	1,342	→	→	→	→	→
	(682)					
Development cost in the VID business	63				→	→
	(0)					
Labor costs, rent, IP costs, etc. in the VID business and Head office	1,528				→	→
	(0)					
Production capacity reinforcement in the LD business	2,927			→	→	→
	(198)					
Labor costs	175			→	→	→
	(0)					
Advertising expenses	100			→	→	→
	(5)					
M&A, capital and business alliance investment	300			→	→	→
	(0)					
Total	6,428					
	(885)					

*1 : Name changed from laser eyewear (LEW) business due to expansion of business area.
*2 : The Raised amount is the total amount of IPO raised amount of 2,926 million yen, 14th stock acquisition rights raised amount of 651 million yen, and 16th stock acquisition rights raised amount of 2,875 million yen.
*3 : The spent amount is the amount spent by the end of March 2024.

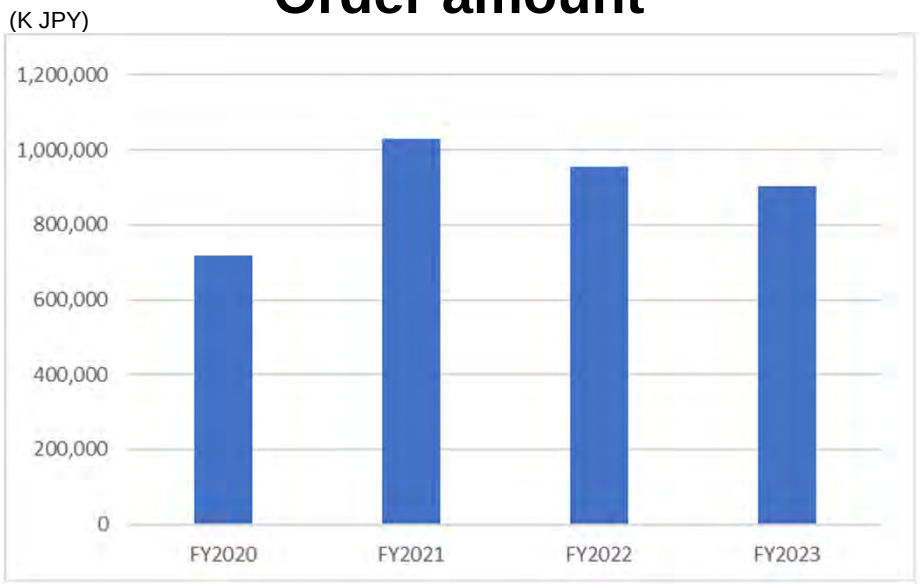
Trends in the amount of orders received of the LD business

Orders decreased by 6% YOY

Orders for small visible lasers decreased mainly due to a decline in demand for bio-testing equipment due to the end of COVID-19 countermeasures.

Order quantity decreased mainly due to a shift to high value-added products such as high-power lasers.

Order amount



Order Quantity



Management Profiles



President and CEO

Osamu Nagao

- 1982: Joined Mitsui & Co., Ltd.
- 2005: President & CEO, MVC Corporation
- 2006: Outside Director, QD Laser Inc. (to 2009)
- 2012: Senior Vice President of Mitsui & Co. (U.S.A.), Inc.
- 2018: President & CEO, Infomart Corporation
- 2022: Chairman and Director, Infomart Corporation
- 2024: Outside Director, Infomart Corporation (current role)
  President & CEO, QD Laser, Inc. (current role)



Outside Director

Tsutomu Yoshida

- 1980: Joined Mitsui & Co., Ltd.
- 2013: Assumed the role of Director of QD Laser (current role)
- 2024: Executive Advisor , Strategy, at Mitsubishi Chemical Holdings Corporation (current role)



Outside Director

Kaoru Hatano

- 2001: Joined Semiconductor Energy Laboratory Co., Ltd.
- 2022: Assumed the role of Director of QD Laser (current role)
- 2023: Assumed the role of R&D department, at Cardio Intelligence Inc.(current role)



Founder & Technology Superintendent

Mitsuru Sugawara

- 1984: Joined Fujitsu Ltd.
- 2006: Launched QD Laser Inc.; assumed the role of President and CEO
- Notable awards:
  - Science and Technology Award from the Minister of MEXT
  - Prime Minister's Honorary Award for Achievement in Industry-Academia- Governmental collaboration



Technical Advisor

Yasuhiko Arakawa

- Serves as Head of Institute for Nano Quantum Information Electronics, and Director of Center for Photonics Electronics Convergence, Institute of Industrial Science, University of Tokyo
- Notable awards:
  - Reona Esaki Award
  - Prime Minister's Honorary Award for Achievement in Industry-Academia- Governmental collaboration
  - Medal with Purple Ribbon

Possible Risks

The main business risks we are aware of and their countermeasures are as follows.

＜Business Risks*1＞	＜Possibility/ Time＞	＜counter-measure＞
Economic trends • The laser-related market in which we are entering is expected to continue its growth trend, mainly for industrial and medical equipment such as precision processing equipment and bio medical equipment. If market growth slow down due to economic trends and the accompanying decline in capital investment motivation, our business performance and financial position may be affected.	» Middle/ Medium to long term »	• Promote the construction of a business model that is resistant to economic fluctuations by entering a wide range of markets
Management deterioration of manufacturing contractors and quality accidents • We have a fabless manufacturing policy, so we outsource manufacturing to an external partner company. Considering the characteristics of each company, we decide the manufacturing items to each company according to the manufacturing capacity of our products. • For each company, we carry out quality inspections and confirmation of business conditions. If the management of the contractor deteriorates or a quality accident occurs, it is possible to easily change the contractor, but it will affect our business performance and financial position until the new production system is rebuilt.	» Low/ Medium to long term »	• Disperse risks by securing multiple outsourcers
Cash flow and financing • With the progress of our R&D activities, a large amount of R&D expenses have been recorded in advance. It is expected that the demand for working capital, R&D investment, capital investment, etc. will continue to increase as the business progresses. We will continue to strengthen our financial position in the future. But depending on the status of profits or raising funds, it may affect our business performance and financial position. • In addition, regarding the use of funds raised through the public offering, we plan to allocate it to the manufacturing cost of LEW business, R&D cost of LEW business and working capital such as personnel expenses, rent, IP expenses of LEW business and head office, etc. but due to sudden changes in the business environment, etc., it may be used for purposes other than the originally planned use of funds and the return on investment may not be as expected. In addition, regarding the use of funds raised through the stock acquisition rights with exercise price amendment clauses, we plan to mainly use them for increasing the production capacity of the LD business and for M&A, but due to sudden changes in the business environment, etc. it may be used for purposes other than those specified, and the investment effect may not be as expected.	» Middle/ Medium to long term »	• Secure financing means by promoting the establishment of bank credit lines such as commitment lines and overdrafts
Partnership with other companies in laser eyewear business • Each device in the laser eyewear business is sold to end users through sales agents such as optical stores, pharmaceutical and medical device manufacturers, and specialized trading companies, as well as EC sites operated by agents. In addition, we provide equipment, parts, and modules to business partners, who commercialize or package them for sale. • The sales plan for the laser eyewear business is created based on the sales targets of these partners and the agreements that have already been concluded. These sales targets were set based on marketing activities, etc., prior to market launch. However, retinal projection devices are almost unprecedented products in the market. Any changes, etc., may affect our business performance.	» Middle/ Medium to long term »	• Disperse risks by diversifying alliances

*1: For risks other than the above that we recognize, please refer to “Business Risks” in the securities report (Only in Japanese).

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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