

Laser Segment Business Briefing

Tokyo Stock Exchange : 6965
March, 2026

HAMAMATSU PHOTONICS K.K.

Laser Segment Business Briefing

March 13, 2026

Presentation

Kodama: Thank you very much for taking time out of your busy schedule to attend HAMAMATSU PHOTONICS K.K.'s business briefing today.

Let me introduce our attendees. We have Mr. Naoki Uchiyama, Executive Officer and Laser Division Manager, and I Kodama, of the Corporate Communication Department, who will be in charge of facilitating this briefing.

Today, we will explain our laser business. After the presentation, we will move on to the Q&A session. The relevant materials have been posted on our corporate website, so please take a look at them.

On that note, we will now begin. Executive Director Uchiyama, you may have the floor.

Uchiyama: My name is Naoki Uchiyama from the laser division. I oversee our laser segment, which includes NKT Photonics.

Thus far, we have developed technologies, such as dicing technology, that cut semiconductor wafers with lasers. One of the strengths of our laser business is having a business model in which we not only supply lasers as components, but also understand market issues, transform them into solution technologies, and supply them as module and engine products to system integrators on an OEM basis, as evidenced by the over 600 patents we have already acquired.

Today, I would like to provide an overview of our laser business strategy and some of the new challenges we are facing. Thank you.

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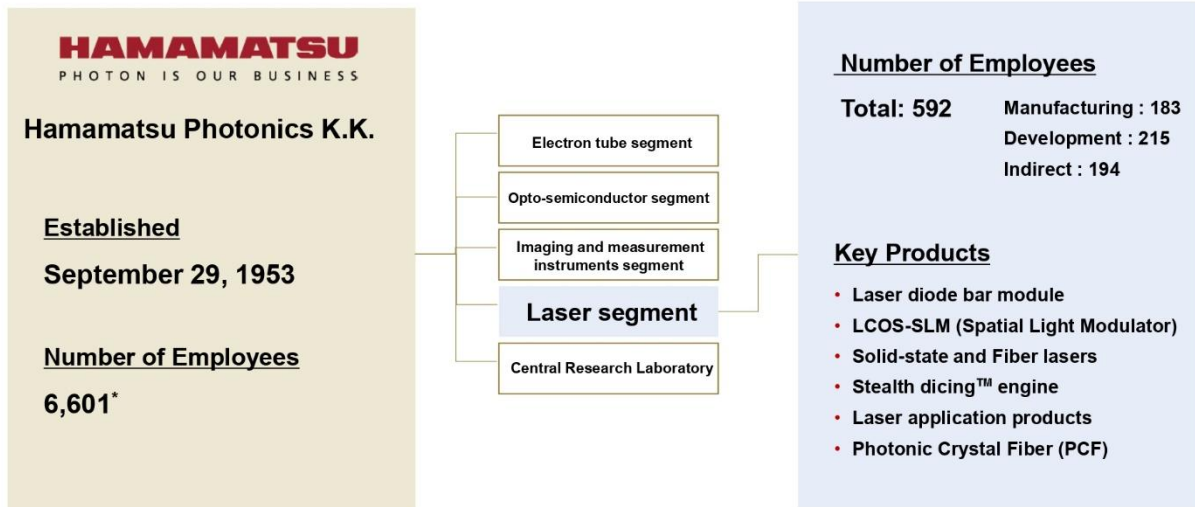
Agenda

01 | Laser Segment Overview

02 | Growth Strategy Semiconductor Quantum Security

Here are two items on today's agenda.

Business Overview



*Number of employees as of the end of September 2025

First, let me give you an overview of our laser business. Our company has grown through three businesses, namely electron tube, opto-semiconductor, and imaging and measurement instrument.

The laser division was established in 2025 to serve as our fourth pillar. It was launched as the laser business segment, incorporating NKT Photonics that we have acquired. This segment has approximately 600 employees.

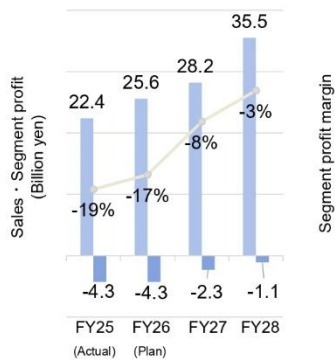
Our major products include laser diode modules, which are the basis of lasers, and laser oscillators, photonic crystal fibers (PCFs), which are the key to amplifying laser beams and transmittance, LCOS-SLM, which is an optical device that can freely control the wavefront of laser beams, and stealth dicing engines that can cut silicon wafers with lasers and these key devices integrated into them,.

Laser Segment

Point

- Drivers of sales growth with a **CAGR of 16.7% (FY2025–2028)**
- Profit (margin) improvement through maintaining fixed cost ratio and increasing sales
- NKT Photonics : Targeting profitability in FY2028, including goodwill amortization, and significant contribution to our profit growth thereafter

Laser segment Mid-Term Plan



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Growth

- Technology integration between NKT Photonics and Laser Division
- Developing application technologies to solve market challenges
- Expanding production capacity and product development to meet growing sales (Maintaining fixed cost ratio despite workforce expansion)

Profitability improvement

- Review low-margin products (increase selling price, reduce cost)
- Consider outsourcing and manufacturing automation
- NKT Photonics: Optimize prioritization of R&D

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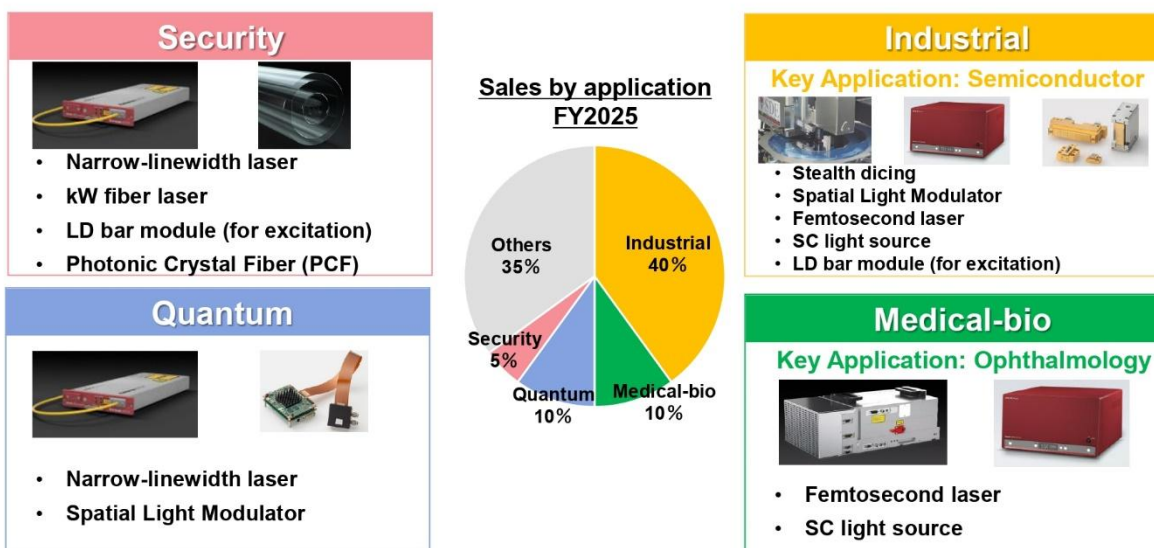
This is an overview of our medium-term plan. The laser business is one of our company's growth drivers with an expected CAGR of over 16%. So far, we have been making advanced investments in research and development that is essential for our future growth, so we are currently in the red. Going forward though, we will continue to improve profits by increasing sales, while maintaining fixed costs as much as possible.

In FY2028, we aim to return to profitability on a basis that includes goodwill amortization related to NKT Photonics and thereafter expect to contribute to the overall profit growth of the company.

In terms of growth factors, we will work on the creation of technological synergies with NKT Photonics, as well as the improvement of production efficiency and expansion of production capacity to accommodate increased orders. To improve profitability, we are reviewing low-margin products and reassessing our R&D priorities. At the same time, we have embarked on accelerating product commercialization and improving efficiency.

Key Applications and Products of Laser segment

Vertically integrated development enabling diverse laser light sources for various applications



The primary applications of our laser business are in the semiconductor manufacturing equipment market. Our core products include stealth dicing engines used for laser cutting of silicon wafers, as well as high-brightness laser light sources utilized in semiconductor inspection equipment.

In the medical and bio market, our portfolio includes ultrashort-pulse lasers used in ophthalmic surgery.

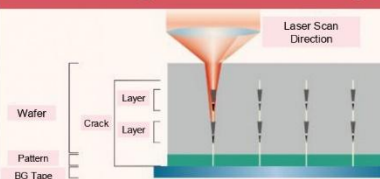
In the field of quantum computing research, key revenue drivers include lasers for cooling atoms and LCOS-SLMs used in optical tweezers, which enable precise manipulation and repositioning of trapped atoms.

The security market is currently still small in terms of revenue, but we view it as the next pillar of growth. This includes lasers used for applications such as drone tracking and neutralization.

Competitive advantage enabled by vertically integrated development - Stealth Dicing -

 <p style="text-align: center; font-weight: bold; color: white;">Market Background</p>	<p style="text-align: center; color: #0056b3;"><u>Evolution of semiconductors</u></p> <p>Rapid adoption of thin semiconductor devices using ultra-thin silicon wafers</p>	<p style="text-align: center; color: #0056b3;"><u>Limitations of existing methods</u></p> <p>Yield degradation in conventional dicing processes</p>
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Technological Breakthrough



- Crack formation and controlled cleaving within wafer
- New principle enabled on transmission lasers
- Enabling high precision and high repeatability

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Strength: Vertically Integrated Development



- Laser technology: Development of high-transmission lasers
- Phase modulation: High-efficiency focusing pattern
- Optical design: High reliability and robust system architecture
- IP strategy: Construction of comprehensive patent portfolio

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Semiconductor devices, which are required for high-speed and large-capacity computing and communications, are becoming lighter, thinner, and denser, requiring various breakthroughs in semiconductor manufacturing technology. Even in the dicing process, in which silicon wafers are cut into chips, we also faced challenges in terms of technology for cutting thin silicon wafers.

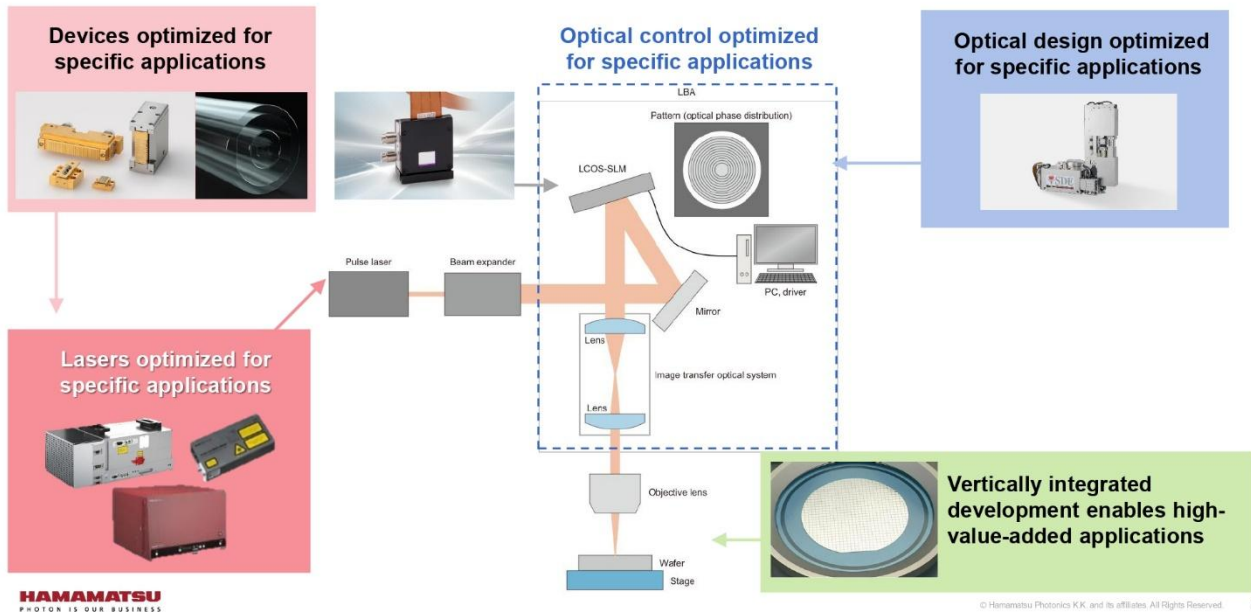
As shown in the figure on the bottom left, we have developed a completely new laser dicing technology that uses a laser to form a crack inside the silicon and divide it into chips, and it is now becoming virtually the de facto standard in the memory market.

Our strength in this business is our ability to develop and manufacture everything in-house, from laser oscillators, to laser dicing applications.

In addition, since we develop and manufacture key devices, which hold the key to the growth of such technologies, from the material stage, we are able to immediately relay new issues that arise at the side of customers to our elemental technology and key device departments and then link them to the development of our next generation of new products.

In addition, we release new products only after establishing a sufficiently comprehensive patent portfolio.

Competitive advantage enabled by vertically integrated development - Stealth Dicing -



Shown here is an overview of the configuration of the stealth dicing engine, which is said to be the heart of stealth dicing technology.

Stealth dicing forms cracks of a certain length inside the silicon using a laser with a wavelength that can penetrate silicon, thereby ensuring the stable dicing and singulation of silicon wafers into small pieces.

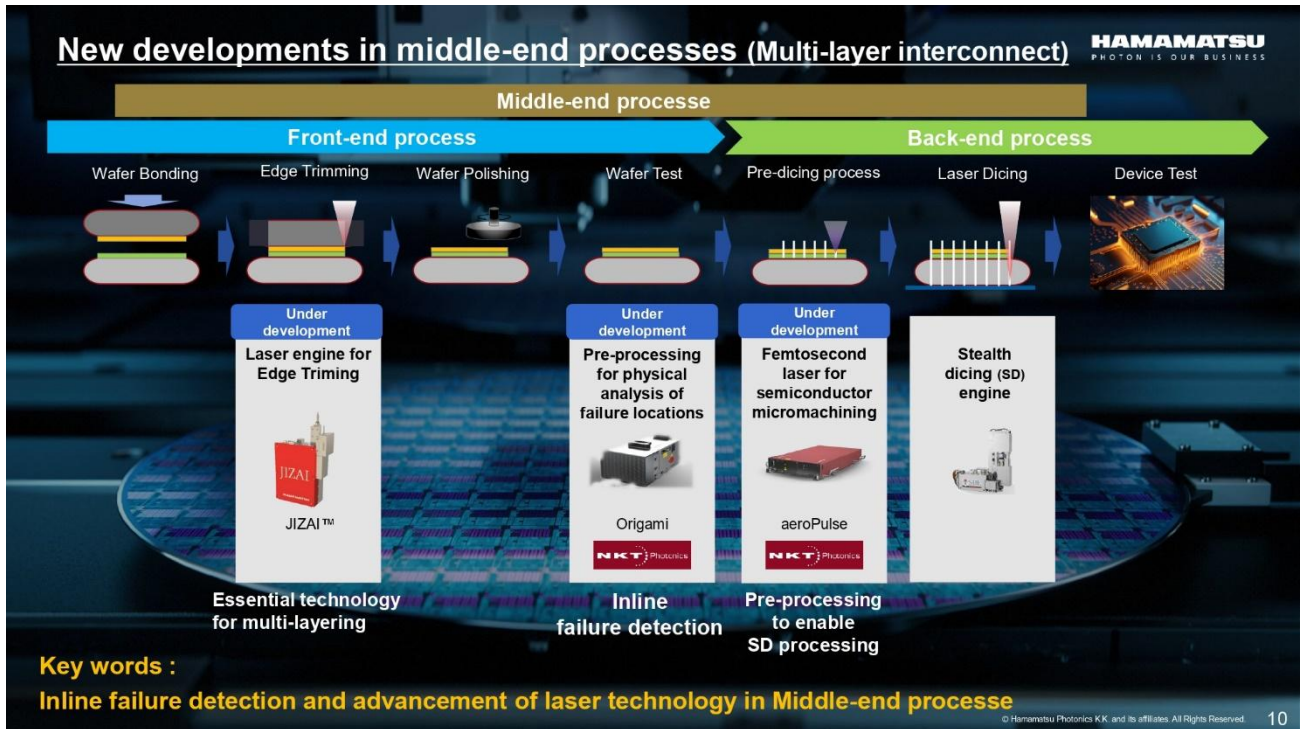
We have developed this application by building this series of evaluation systems in-house and checking the final dicing quality ourselves. By creating such a development process, we have found that a dedicated laser is needed to optimize the formation of crack lengths inside silicon.

In addition, we knew that the future demand for higher laser output power to improve dicing performance would require NKT Photonics' fiber technology for the amplification technology.

At present, we have already started developing the next generation of lasers incorporating that fiber technology. The LCOS-SLM, which can change the shape of the laser beam and correct optical distortions in real time simply through computer-based control, is another key device that determines the performance and quality of this engine. We also design the liquid crystal, which is the key element of this device, on our own and we have a development and manufacturing system in place for it.

Our business in this field is in the form of an OEM business, in which we provide the engine integrating these key devices as our company's product to system integrators.

The example shown here is stealth dicing, but in the future, we intend to use the same method to expand our module and engine sales business with this kind of OEM-type business model in mind for various applications.



From this page onward, I would like to introduce some of the growth strategies for the laser business segment.

First, semiconductors.

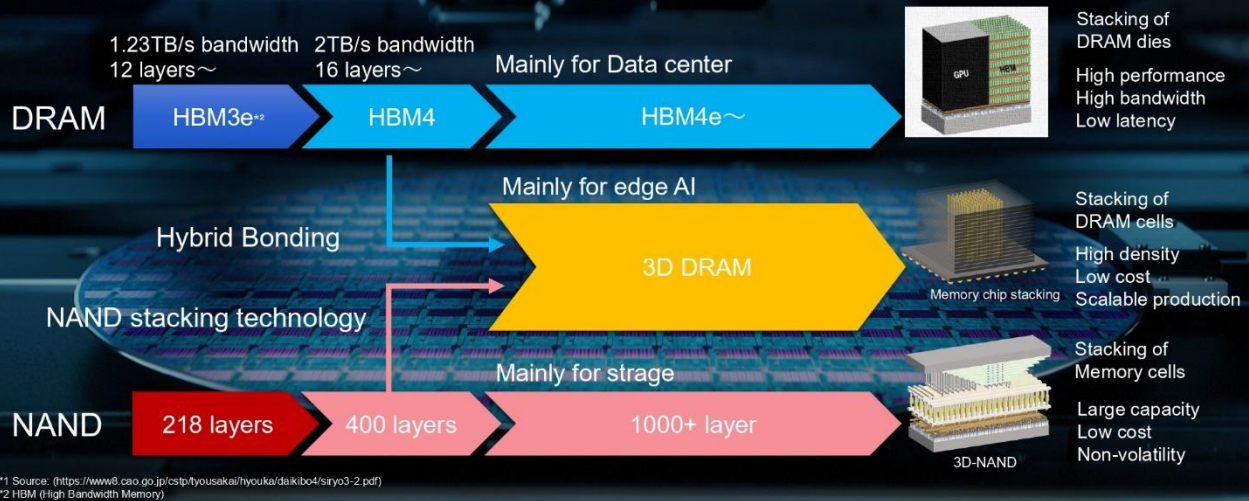
In recent years, the rise of AI has increased the need for semiconductors with multiple layers of semiconductor circuits, requiring new technologies and equipment to increase circuit density vertically, while repeatedly bonding and peeling silicon wafers.

We have only sold stealth dicing engines for back-end dicing processes so far. Our company is currently developing three essential new technologies for this emerging market, known as the middle-end processes. All three are still under development, but some have already begun to be evaluated by end users.

Advanced Semiconductors Demand opportunities driven by device evolution

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By 2030, AI semiconductors are expected to account for 70% of advanced semiconductor market*1
 → As power constraints limit expansion of data centers, companies are increasingly focusing on development of low-power edge AI designs



*1 Source: (<https://www8.cao.go.jp/cstp/tyousakai/hyouka/daikibo4/siryos3-2.pdf>)
 *2 HBM (High Bandwidth Memory)

I will now present an overview of these three technologies. It is believed that by 2030, AI semiconductors will account for 70% of the advanced semiconductor market. The projection is that the development of edge AI will become a trend in order to solve the power demand crunch in data centers.

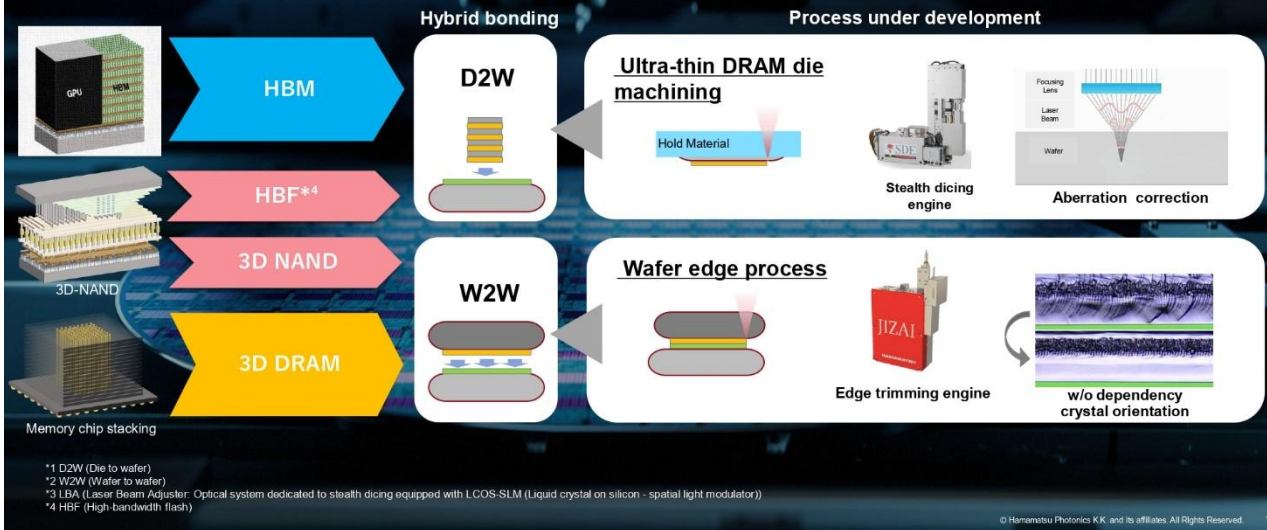
Stealth dicing has been used in the mass production of HBM3e in the DRAM segment, which is growing primarily for data centers, and preparations have begun for the mass production of the next HBM4.

In terms of storage applications, it is used for the mass production of 218 layers following the increase in the number of NAND flash layers, and preparations are underway for the mass production of NAND with more than 400 layers in the future.

The 3D DRAM for edge AI, shown in the center, is being advanced as the development of DRAM with a circuit structure that is vertically thickened and densely stacked by bonding, and peeling a number of silicon wafers with semiconductor circuit layers formed on them.

Advanced Semiconductors Challenges in D2W¹ and W2W² processes

Advanced semiconductor devices face challenges in next-generation packaging technologies
 → By adopting engine equipped with LBA^{*3}, we are currently developing process capable of supporting hybrid bonding approaches for D2W and W2W integration



The dicing process for this 3D DRAM has its challenges, thereby necessitating new technologies. One of the methods for manufacturing HBM, a type of advanced semiconductor, is the die-to-wafer method. As shown in the diagram in the middle, it is a manufacturing process in which DRAM chips that have been diced in advance are stacked on top of a wafer with a circuit.

The stacked DRAM chips require the dicing of thin silicon wafers that are less than 20 microns thick, and we have developed a stealth dicing engine suitable for this purpose.

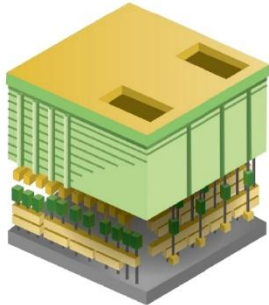
In the case of 3D DRAM and 3D NAND, they are manufactured using the wafer-to-wafer method shown at the bottom. After directly bonding the circuit surfaces of silicon wafers on which circuitry has been formed, the silicon wafer itself has fulfilled its role and is therefore thinned and removed by grinding.

During the grinding process, the edge of the silicon wafer becomes thin and sharp, so the tip of the wafer chips off as fragments, resulting in defects in the cutting process.

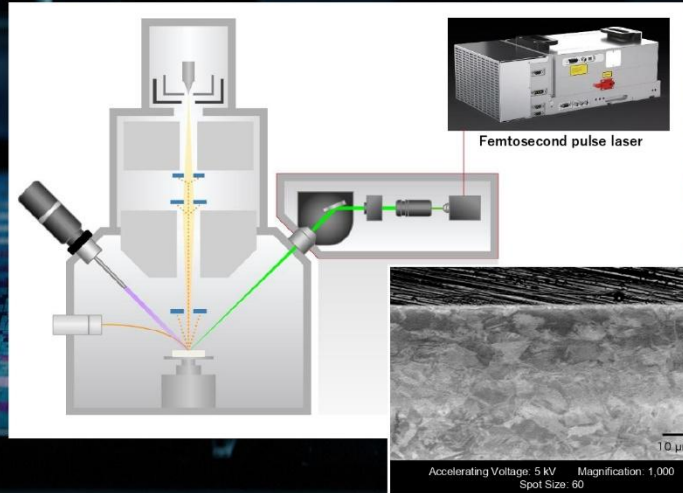
To avoid this, the outermost circumference of the silicon wafer must be cut off in a circular manner in advance. Such cutting process is called trimming, and we have developed a laser engine (JIZAI), suitable for trimming.

As semiconductor devices continue to scale down, yield degradation has become critical challenge in advanced semiconductor manufacturing
→ To improve yields, physical failure analysis of defect locations is increasingly required

Observing cross-sections of thick semiconductor devices to verify quality



High-speed and large-area processing is required



Processing example
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In terms of devices, such as 3D NAND and 3D DRAM, which are stacked high by repeated bonding, their structure is becoming more complex, leading to the growing need for the physical analysis of circuit failure locations in order to improve device yields.

We expect the demand for high-resolution microscopes, such as electron microscopes, to expand in line with the growing demand for the physical analysis of failure locations.

We are developing a technology that enables high-speed, large-area laser microfabrication by combining NKT Photonics' lasers and our LCOS-SLM.

What we hope to do is observe circuit sections suspected to be faulty with an electron microscope. In many cases though, the locations that we want to actually observe are somewhat deep or lies within a wide area.

In this case, pre-processing is required to shave it down to the target area. We believe that our laser processing technology can be applied to this pre-processing technology.

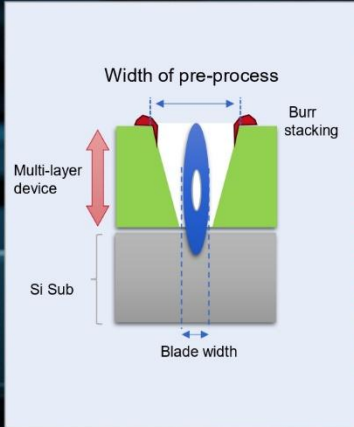
The FIB method used to be the mainstream technology that enabled high-definition processing, but it has a problem, and that is the long processing time. As a solution to this issue, we are developing a new laser technology that will perform high-definition processing of a large circuit area at high speed.

The image on the bottom right shows the circuit surface that was cut through our laser processing technology. I think you can see that the grain boundaries of the crystals are clearly visible.

Advanced Semiconductors Challenges of higher layer stacking

In advanced semiconductors, increased layer stacking is creating new challenges in dicing processes
 → We are developing advanced dicing process capable of addressing high layer stacking, narrower streets, and particle suppression

Challenges of Advanced Device Stacking



Targeted Process Development Initiatives

Pre-dicing

Femtosecond laser for semiconductor microfabrication
PICT Photonics

Dicing

For Stealth dicing
JIZAI™-SD

Multi-point simultaneous processing technology

Width of pre-process

SD crack

This is our approach to the challenges we are facing in 3D DRAM. The projection is that the circuit layer will become increasingly thicker in the future.

Our company is developing a new laser dicing technology, shown on the right, which will perform stealth dicing after the removal of a small amount of that thick, stacked circuit layer using a laser.

Quantum Computer

Our products are used in Neutral-atom, Ion-trap, and Photonic platforms

Superconducting	Neutral-atom	Ion-trap	Photonic
<ul style="list-style-type: none"> Uses superconducting circuits operated at extremely low temperatures Primarily led by major IT companies and technology firms <p>< Related companies ></p> <p><small>FUJITSU</small> <small>IBM</small> <small>Google</small></p>	<ul style="list-style-type: none"> Atoms are arranged and controlled using lasers Highly compatible with large-scale qubit systems <p>< Related companies ></p> <p><small>Yaqumo</small> <small>IQ.Era</small> <small>Atom computing</small></p>	<ul style="list-style-type: none"> Ions are manipulated using electromagnetic fields High precision in Quantum computing <p>< Related companies ></p> <p><small>IONQ</small> <small>QUANTINUUM</small></p>	<ul style="list-style-type: none"> Photons are used as qubits Qubits operate at room temperature and are highly robust <p>< Related companies ></p> <p><small>PsiQuantum</small> <small>XANADU</small></p>

*1 Source: <https://quantumzeitgeist.com/queer-computing-and-pewsey-unite-to-boost-global-quantum-computing-and-supercomputing-innovation-with-up-to-256-qubit-machines/>
 *2 Source: <https://www.ionq.com/quantum-systems/forte>
 *3 Source: <https://thelogic.co/news/torontos-xanadu-makes-quantum-computing-breakthrough/>

Next, I will present our approach to the quantum market. In quantum computer research, worldwide research and development is moving forward through four major methods.

Quantum Computer

In quantum computers that use light, our high-performance, high-reliability **laser sources**, **modulators**, and **detectors** are widely adopted

Adopted across multiple quantum computing platforms, including “Ion-trap”, “Neutral-atom”, and “Photonic” platforms



Single-frequency fiber laser
Koheras Series



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



ORCA®-Quest 2
qCMOS® Camera

Among these, there are principles that use three optical technologies, comprising the neutral-atom, ion-trap, and photonic platforms, and our products are used in research and development.

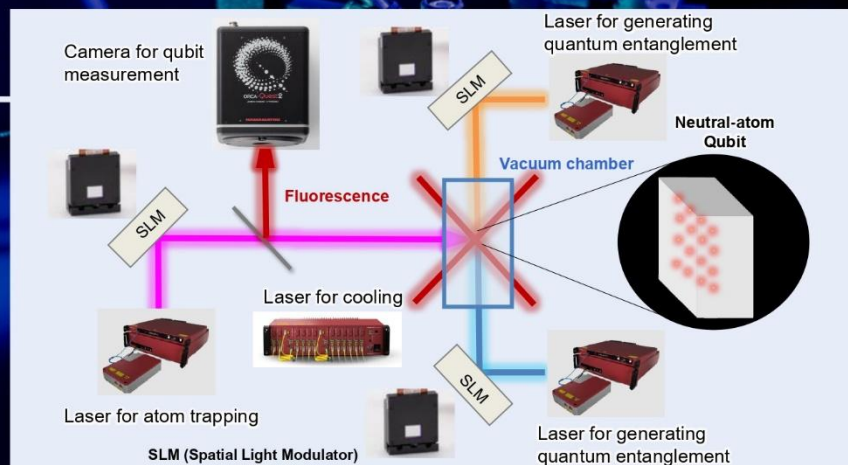
In these three quantum computer platforms that use light, lasers from and LCOS-SLMs and high-sensitivity cameras are widely used.

Quantum Computer

In quantum computers that use light, our high-performance, high-reliability **laser sources**, **modulators**, and **detectors** are widely adopted



Neutral-atom Quantum
computer



With respect to the neutral-atom quantum computer, four types of lasers, three types of LCOS-SLMs, and an ultra-sensitive camera are required as key devices, and we are the only company that can supply all of them. As a result, many research institutes and start-ups have adopted these key devices.

In the future, we are considering developing a product for the quantum market that is a comprehensive rack-type module of these key devices.

Quantum Computer

Basic research phase (NISQ)
One physical qubit is implemented using single atom
Physical Qubit = Atom
Error correction not applicable

Practical implementation phase (FTQC)
Stable logical qubit is formed through cooperative operation of multiple physical qubits
Logical qubit = Atom
Error correction rate significantly improved

Key Challenges

- 1. Error suppression technology**
To suppress error rates, high-power, low-noise, and highly robust fiber lasers are essential
- 2. Scalability (Large-Scale Qubit Systems)**
To increase number of laser branches, higher laser power and improved modulator power handling and resolution are required
- 3. Reduction of SWaP (Size, Weight, Power)**
To reduce installation space, fiber lasers and fiber-based output configurations are required

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The latest quantum computer research has begun to progress from the basic research phase shown on the left, to the practical implementation phase shown on the right.

In the basic research phase on the left, one physical qubit consisting of a single atom was used as the smallest unit for this quantum operation. Hence, any errors that occurred could not be corrected, as this phase was limited to confirming the very basic behavior of computation in the quantum state.

At present, quantum research is accelerating, as start-up companies, in which major companies are also investing, gain financial strength one after another, and quantum computer research has finally moved into the verification phase, to the practical implementation phase shown on the right.

In the practical implementation phase, a logical qubit is composed of many atoms, so that even if an error occurs in 1 atom out of 100 atoms, for example, the error can be corrected through the cooperative operation of the remaining 99 atoms, thus dramatically improving the error correction rate.

However, to achieve this, a larger number of atoms must be cooled and manipulated in parallel. In the case of the optical method, this scale-up can be realized relatively easily by increasing the laser output power and branching it into multiple points. We believe such level of ease is one of the reasons why optical methods are preferred and chosen for the practical implementation research phase of quantum computers.

Our development theme is to maintain the excellent wavelength stability of current lasers even with higher output power. The design is already in progress, and at this point, the technical themes that need to be developed in the future have been clearly identified.

Furthermore, these lasers are slot-shaped and designed to be mounted on a rack, as shown in the bottom right photo, so even if the number of laser units increases with higher output power, they can still be installed in a small space. This represents one of their major advantages compared with magnetic field platforms.

Quantum Computer

Lasers are core technology in quantum computers

Lasers for cooling Preparation of atomic states	Lasers for atom trapping Arranging and fixing atoms in vacuum	Lasers for generating quantum entanglement Creating entanglement for quantum computing
Suppressing atomic motion and position fluctuations to achieve temperatures in microkelvin (μK) range	Using tightly focused optical tweezers to trap individual atoms and form large-scale qubit arrays with sub-100 nm positional accuracy	Exciting atoms to Rydberg states to realize strong interactions required for entanglement generation and quantum gate operations
Required laser performance <ul style="list-style-type: none">① Frequency stability and absolute accuracy② Narrow linewidth③ Polarization and intensity control④ Multi-wavelength and multi-beam synchronization	Required laser performance <ul style="list-style-type: none">① Output and intensity stability② Beam quality③ Wavelength selection	Required laser performance <ul style="list-style-type: none">① Ultra-narrow linewidth and low phase noise② Long-term frequency and phase stability③ High-speed, high-fidelity pulse control④ High output power and low noise
Our advantages Delivering highest level of stability required for quantum applications with compact, highly maintainable fiber lasers	Our advantages Demonstrated robust fiber laser technology that enables higher output power while maintaining low noise and high stability	Our advantages NKT Photonics' proprietary laser technology demonstrated improved two-qubit gate fidelity in real-system environment
Error rate reduction = Key to Reliability	Expanding Number of Quantum Bits = Key to Scaling	Improved computational capability = Key to Performance

As I have explained, we believe that lasers are one of the core technologies for the practical application of quantum computers in the future.

The performance requirements for each of the three types of lasers have become clear, and those would be lasers for cooling that are needed to generate atomic states, lasers for atom trapping, and lasers for generating a state for quantum computing. Our company began preparing for this several years ago.

Each of these three lasers has been designed with our company's unique advantages, which is why researchers who have used our lasers from the basic research phase continue to choose our lasers as they move into the practical implementation phase of their research.

One of the appeals of our company is that these lasers are developed by engineers who can discuss at the same level as leading researchers from organizations, such as IonQ, a start-up quantum computer manufacturer, and that we are a company that can provide customers with comprehensive consultation on the construction of entire systems, including LCOS-SLM and high-sensitivity cameras.

Security

Target markets for NKT Photonics products: Security

Development and manufacturing of kW-class fiber lasers for drone neutralization and illumination lasers for drone detection



News release from Rheinmetall Waffe Munition GmbH

September. 11. 2019 : Successfully tested 20 kW laser created by spectrally combining 12 fiber lasers from NKT Photonics



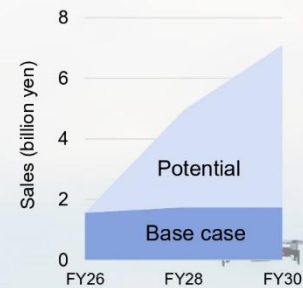
Rheinmetall

October. 28. 2025 : Laser system has completed a one-year sea trial and is expected to be operational from 2029



Rheinmetall

Sales target for lasers intended for security applications



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Finally, I will present our strategy for the security market. NKT Photonics has been developing and manufacturing two types of lasers for several years, comprising lasers for drone neutralization and lasers for drone tracking, and it has been supplying them to Rheinmetall.

The lasers required for these applications must not only have superior performance in terms of high wavelength stability but must also be extremely important technologies in terms of reliability and robustness. These can only be achieved through the accumulation of evaluation data aimed at practical application over many years.

It takes many years to assemble the data necessary for practical application, but we believe that these preparations have been largely completed.

In September 2019, we completed the integration of a 20-kilowatt high-power laser unit, as shown at the top of this Rheinmetall press release.

In October last year, it was announced through a news release that the product had successfully passed the severe sea trial required for practical application. It was even announced that such laser system is expected to be operational from 2029.

Our current long-term plan only incorporates the base plan. In the future, we will report again when we move into the specific application phase, and we will also review our sales plan.

To briefly explain why NKT Photonics' lasers are in demand, we believe that their greatest advantage is that in the basic research phase that spanned many years, which I just mentioned, the performance suitable for this purpose has been actually confirmed, demonstrated, and recognized.

That is not the only reason though, as the future needs in this market include the realization of multi-beam lasers and lighter, thinner, and smaller laser systems. We believe that this will allow more freedom in the location of laser beamlines and facilitate multi-beam applications.

This will bring about greater flexibility in the layout in which the laser equipment is installed. This feature should give NKT Photonics' laser technology an edge against the growing drone threat in public facilities and airports.

Security

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Building long-term customer relationships through flexible customization

The diagram illustrates the laser system architecture for drone threat mitigation. It shows a flow from a seed laser to a redundant seed laser, then to kW-class amplification, followed by kW-class PCF and hollow-core fiber transmission, and finally to an eye-safe BILL/TILL laser with high pulse energy (~50 mJ). The diagram includes icons for each stage and a central image of the physical hardware components.

- Seed laser
Narrow linewidth laser
- Seed laser
redundancy
- kW-class
amplification
- kW-class PCF and
Hollow-core
fiber transmission
- Eye-safe BILL/TILL
High pulse energy ~50 mJ

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Finally, I would like to conclude my presentation by touching upon our business strategy for the growth of our company and our laser business.

Before developing products, we first identify universal technical challenges in our target market, then we start verifying measures to develop the necessary solutions necessary for those challenges. Based on the evaluation results, we then study the design of laser engines, modules, and so on, utilizing our proprietary core technologies.

In parallel, we examine potential candidates for system integrators to whom we can supply our products on an OEM basis. During these processes, we ensure that a sufficient patent portfolio is established before starting the release of these products.

We listen to the needs of final end users, together with our customers, to whom we supply our products on an OEM basis and then feed them back to our core technology team, hoping that we will be able to continue to refine our core technologies, while carrying out the next stages of development and improvement, and that we can make proposals that exceed the expectations of our customers.

We believe that one of the strengths of the laser business is our ability to vertically integrate the necessary laser technologies within our company, from core technologies to solutions.

Thank you very much for your attention. This concludes my presentation.

Q&A

Q1. You are planning a significant increase in laser business revenue from FY2027 to FY2028. Could you explain the growth outlook and revenue breakdown by application?

A1. The revenue mix and key growth drivers of our laser business are summarized on page 6 of the presentation materials.

The main growth drivers are as follows:

- Industrial applications: Steady expansion of existing markets
- Medical applications: We expect strong growth driven by increasing demand
- Quantum-related applications: Growth is expected mainly in research and development use cases

In addition, we view the security segment as a field with meaningful growth potential over the medium to long term.

Q2. Could you elaborate on the outlook for profitability, including the performance of NKT Photonics, and the measures being taken to improve margins? Has the current plan changed from the mid-term management plan?

A2. The first quarter started slightly below our internal plan, mainly due to the timing of revenue recognition shifting toward the latter part of the fiscal year.

In the quantum-related segment in particular, inquiries and order opportunities have actually increased.

As a result, our full-year outlook for the laser business remains unchanged from the original plan set out in the mid-term management plan.

To improve profitability, we are implementing the following initiatives:

- Improving production efficiency
- Reviewing material costs for certain products
- For high-volume medical laser products, increasing production scale while simultaneously reducing material costs and enhancing productivity

Through these measures, we aim to steadily improve overall profit margins.

Q3. In the FY2025 revenue breakdown by application, “Other” accounts for 35%. What does this category include?

A3. The “Other” category primarily includes the following products and applications:

- Lasers for industrial and academic use
 - Characteristic laser light sources from NKT Photonics

- Widely adopted by universities and research institutions
- Component-level devices
 - Products such as LCOS-SLMs (Spatial Light Modulators)
 - Mainly sold to universities and research institutes for R&D purposes

Q4. Should we consider the “Other” segment to be stable but with relatively lower growth potential?

A4. Yes, that is our understanding.

Demand in the “Other” category is primarily stable and research driven.

We position industrial, medical, quantum, and security applications as the four main growth drivers going forward.

Q5. Could you clarify the time horizon for innovative technologies and when they are expected to contribute meaningfully to business growth? Are you expecting rapid short-term growth?

A5. We view the timeline by segment as follows:

- Semiconductor applications
 - Industry roadmaps for DRAM and NAND extend toward around FY2030
 - As 3D integration and further miniaturization progress, related businesses such as stealth dicing are expected to grow step by step
- Quantum applications
 - While the commercialization of full-scale quantum computers will take time, demand for research and development applications is expanding at a faster pace than initially expected.
 - Our products are essential enabling technologies in the R&D phase, and we view this earlier-than-expected demand positively
- Security applications
 - Given the characteristics of this market, it is difficult to provide specific numerical disclosures; however, taking into account the global geopolitical environment, we expect demand to expand over the medium to long term.

Q6. Is your wafer trimming technology currently being used in existing HBM die-to-wafer processes?

A6. This trimming technology is a newly developed solution that is currently being introduced.

In die-to-wafer processes:

- For silicon thicknesses below 20 micrometers, our newly developed laser engine is applicable

- For thicker wafers, the technology can be applied primarily for edge trimming purposes

Q7. Will femtosecond lasers also be commercialized for dicing applications?

A7. We are developing femtosecond lasers mainly for the following applications:

- Pre-processing for stealth dicing
- Precise removal of circuit layers
- Accelerating sample preparation prior to failure analysis (SEM observation)

At this stage, these products remain in the development phase, and they are not intended for exclusive supply to specific customers.

Q8. Regarding the three newly introduced semiconductor laser technologies, how much contribution do you expect around FY2028?

A8. Our current view on development progress and commercialization timing is as follows:

- Laser engines for failure analysis pre-processing:
Development is the most advanced, and we expect contribution at a relatively early stage
- Laser engines for trimming applications:
Expected to contribute in the subsequent phase
- Femtosecond lasers for fine-processing applications:
Commercial contribution is expected from 2028 onward