

Laser Segment Business Briefing

Tokyo Stock Exchange : 6965
March, 2026

Agenda

01 | Laser Segment Overview

02 | Growth Strategy Semiconductor Quantum Security

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Business Overview

HAMAMATSU
PHOTON IS OUR BUSINESS

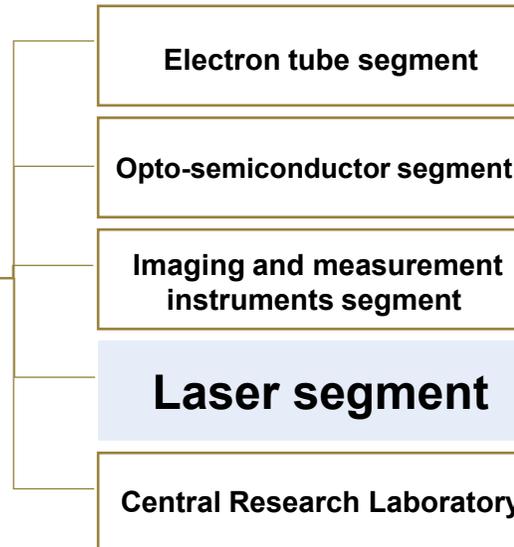
Hamamatsu Photonics K.K.

Established

September 29, 1953

Number of Employees

6,601*



Number of Employees

Total: 592

Manufacturing : 183

Development : 215

Indirect : 194

Key Products

- Laser diode bar module
- LCOS-SLM (Spatial Light Modulator)
- Solid-state and Fiber lasers
- Stealth dicing™ engine
- Laser application products
- Photonic Crystal Fiber (PCF)

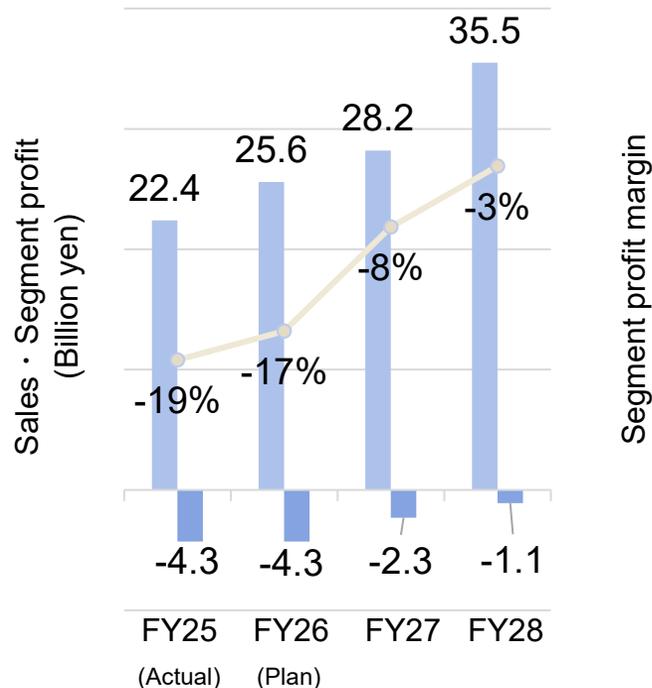
*Number of employees as of the end of September 2025

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



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)

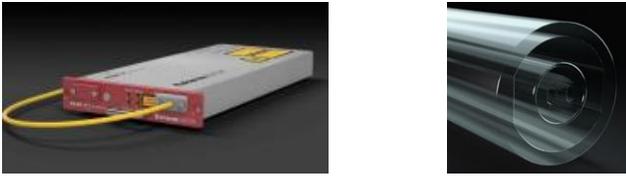
Profitability improvement

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

Key Applications and Products of Laser segment

Vertically integrated development enabling diverse laser light sources for various applications

Security



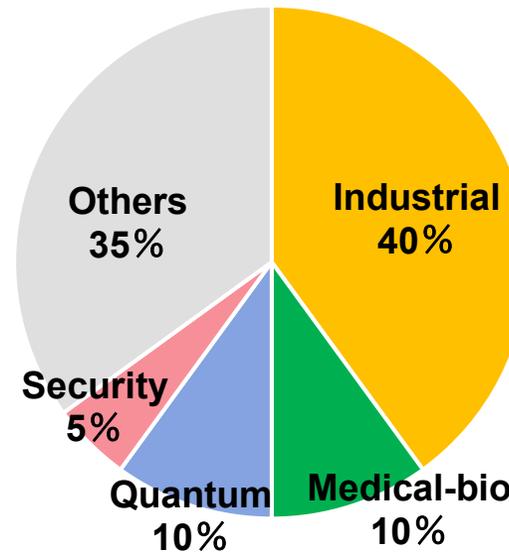
- Narrow-linewidth laser
- kW fiber laser
- LD bar module (for excitation)
- Photonic Crystal Fiber (PCF)

Quantum



- Narrow-linewidth laser
- Spatial Light Modulator

Sales by application
FY2025



Industrial

Key Application: Semiconductor



- Stealth dicing
- Spatial Light Modulator
- Femtosecond laser
- SC light source
- LD bar module (for excitation)

Medical-bio

Key Application: Ophthalmology



- Femtosecond laser
- SC light source

Competitive advantage enabled by vertically integrated development - Stealth Dicing -



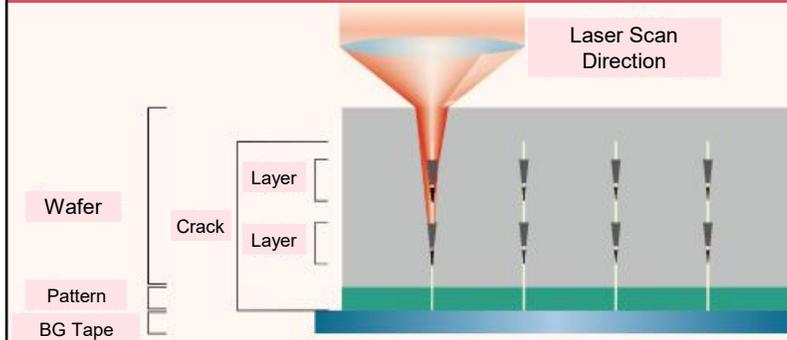
Evolution of semiconductors

Rapid adoption of thin semiconductor devices using ultra-thin silicon wafers

Limitations of existing methods

Yield degradation in conventional dicing processes

Technological Breakthrough



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

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

Competitive advantage enabled by vertically integrated development - Stealth Dicing -

Devices optimized for specific applications



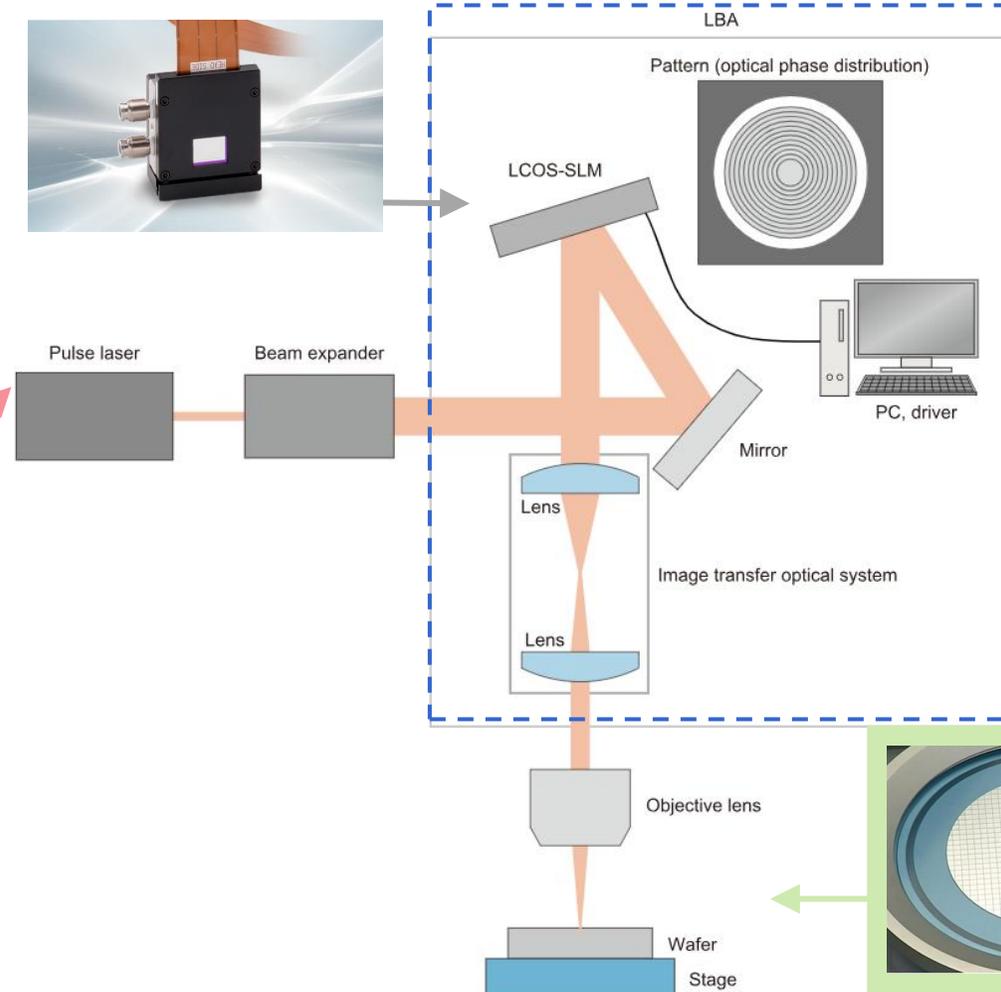
Optical control optimized for specific applications



Optical design optimized for specific applications



Lasers optimized for specific applications



Vertically integrated development enables high-value-added applications



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01 | Laser Segment Overview

02 | **Growth Strategy**
Semiconductor
Quantum
Security

New developments in middle-end processes (Multi-layer interconnect)

Middle-end processes

Front-end process

Back-end process

Wafer Bonding

Edge Trimming

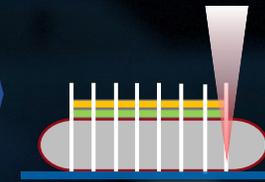
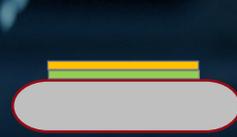
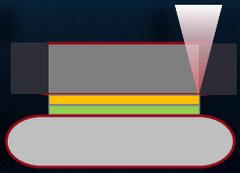
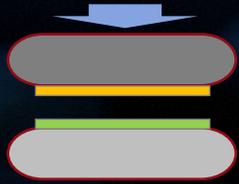
Wafer Polishing

Wafer Test

Pre-dicing process

Laser Dicing

Device Test



Under development
Laser engine for Edge Trimming



JIZAI™

Essential technology for multi-layering

Under development
Pre-processing for physical analysis of failure locations



Origami



Inline failure detection

Under development
Femtosecond laser for semiconductor micromachining



aeroPulse



Pre-processing to enable SD processing

Stealth dicing (SD) engine

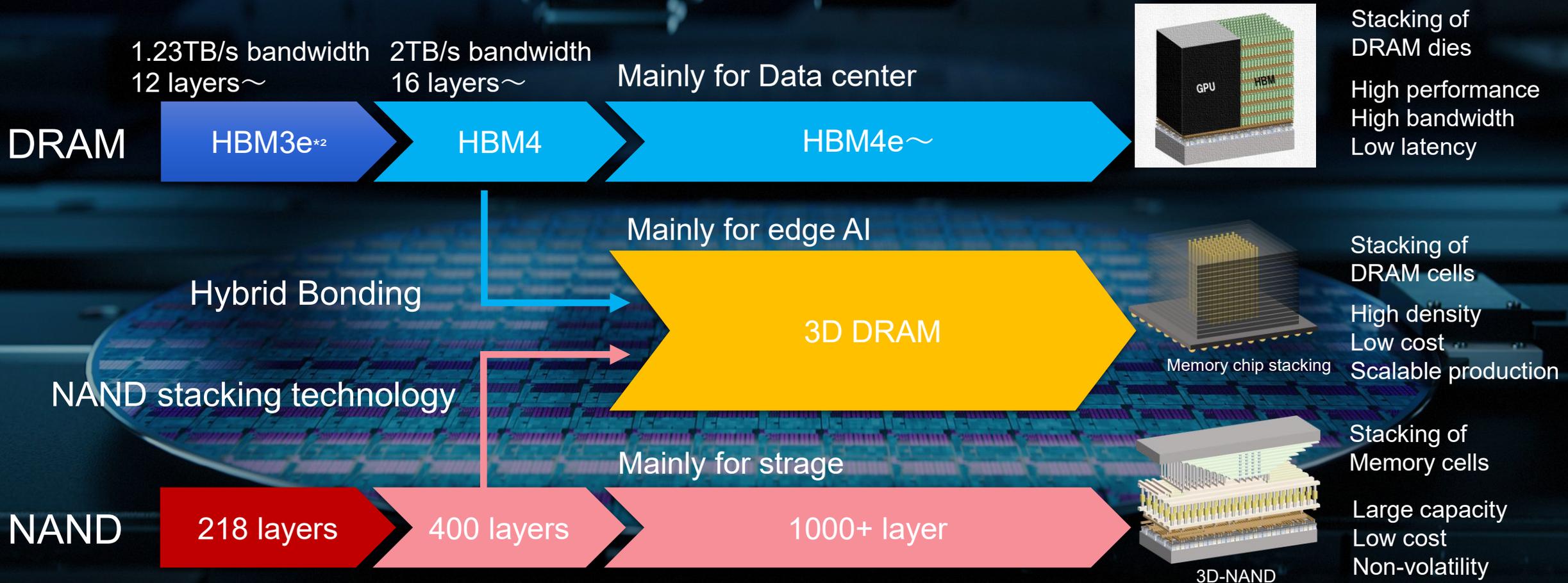


Key words :

Inline failure detection and advancement of laser technology in Middle-end processes

Advanced Semiconductors Demand opportunities driven by device evolution

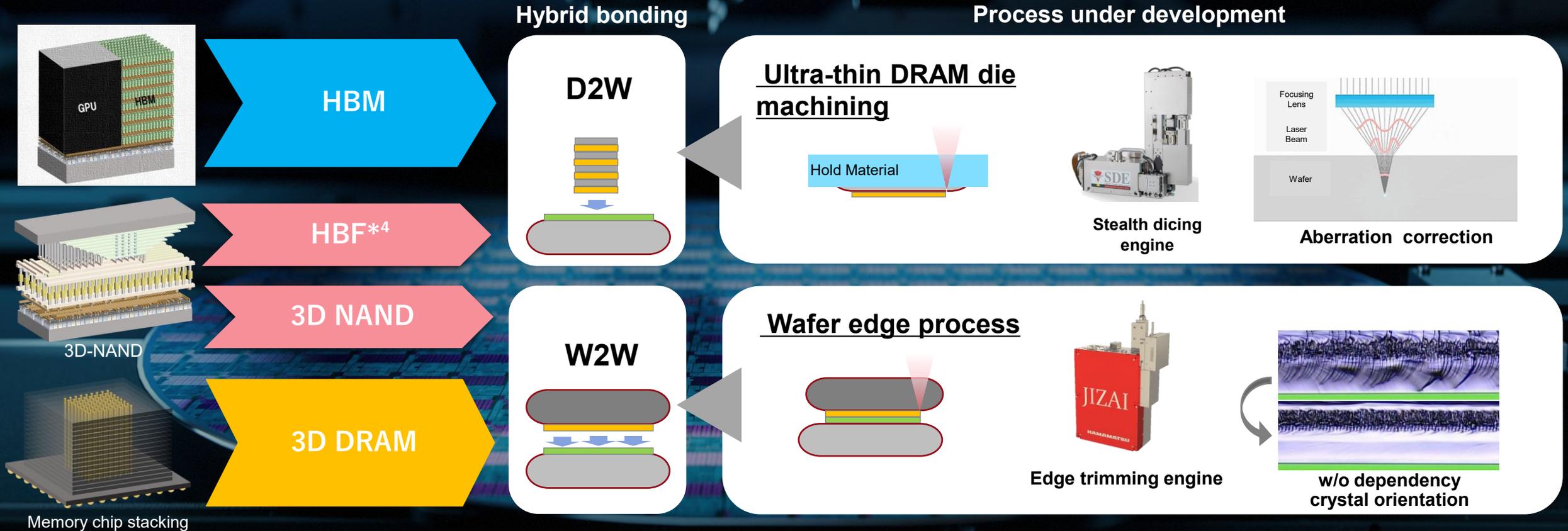
By 2030, AI semiconductors are expected to account for 70% of advanced semiconductor market*1
 → As power constraints limit expansion of data centers, companies are increasingly focusing on development of low-power edge AI designs



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

*2 HBM (High Bandwidth Memory)

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

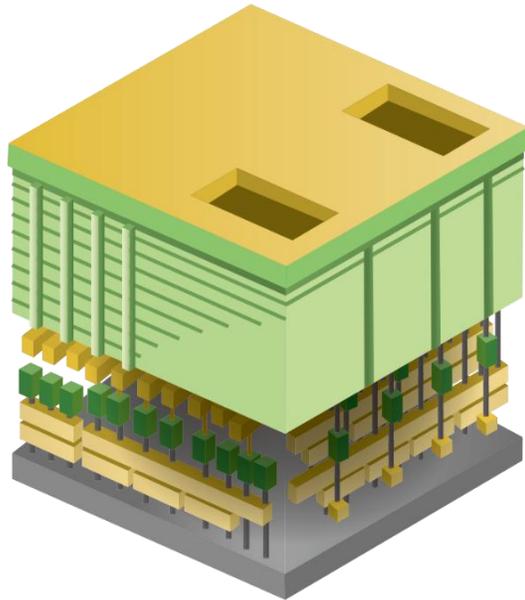


*1 D2W (Die to wafer)
 *2 W2W (Wafer to wafer)
 *3 LBA (Laser Beam Adjuster: Optical system dedicated to stealth dicing equipped with LCOS-SLM (Liquid crystal on silicon - spatial light modulator))
 *4 HBF (High-bandwidth flash)

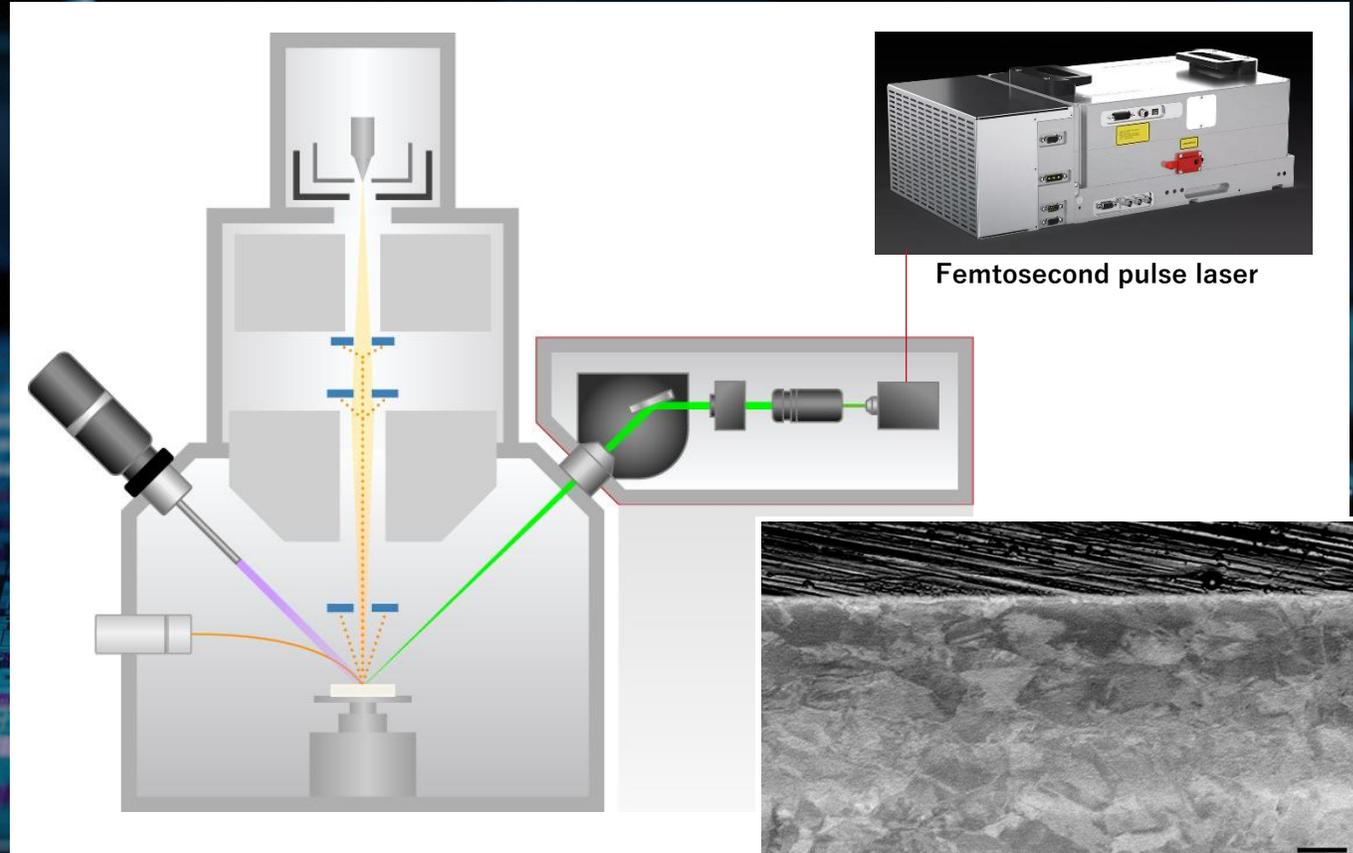
As semiconductor devices continue to scale down, yield degradation has become critical challenge in advanced semiconductor manufacturing

→ To improve yields, physical failure analysis of defect locations is increasingly required

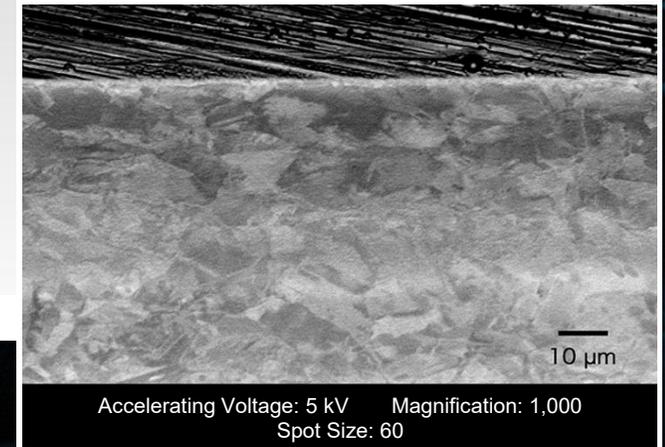
Observing cross-sections of thick semiconductor devices to verify quality



High-speed and large-area processing is required



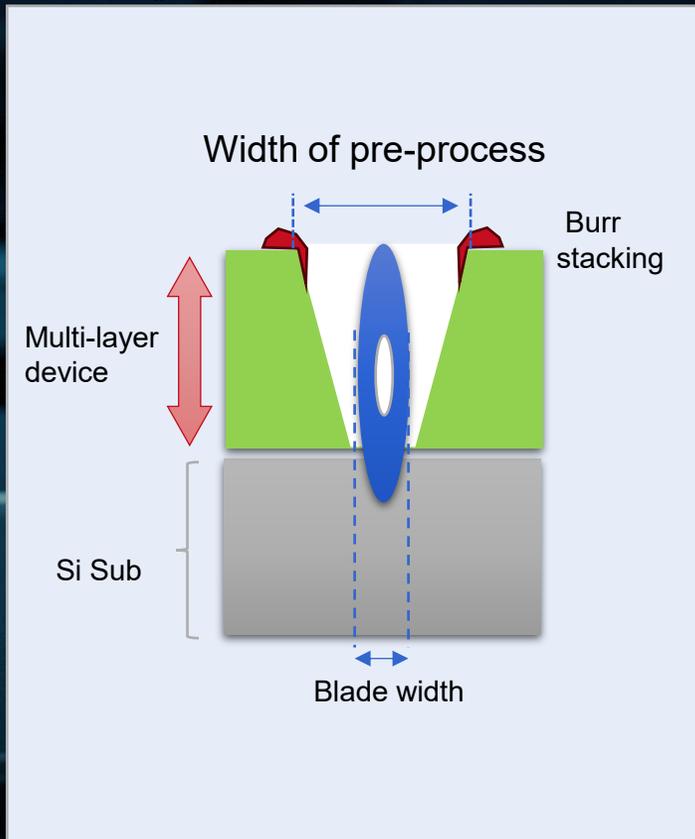
Femtosecond pulse laser



Processing example

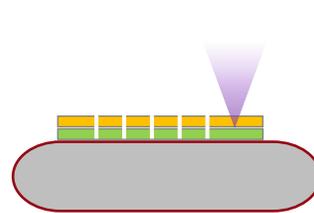
In advanced semiconductors, increased layer stacking is creating new challenges in dicing processes
→ We are developing advanced dicing process capable of addressing high layer stacking, narrower streets, and particle suppression

Challenges of Advanced Device Stacking



Targeted Process Development Initiatives

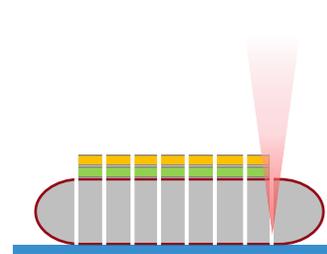
Pre-dicing



Femtosecond laser for semiconductor microfabrication

NKT Photonics

Dicing

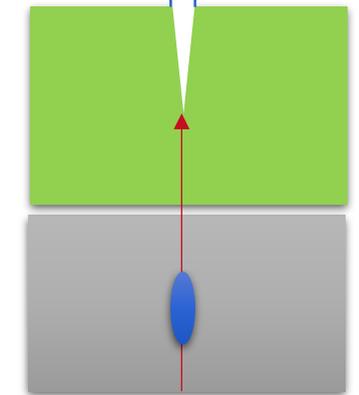


For Stealth dicing JIZAI™-SD



Multi-point simultaneous processing technology

Width of pre-process



SD crack

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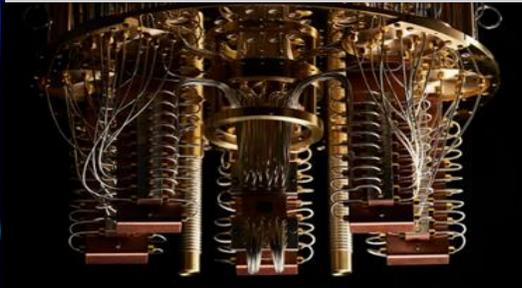
01 | Laser Segment Overview

02 | **Growth Strategy**
Semiconductor
Quantum
Security

Quantum Computer

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

Superconducting



- Uses superconducting circuits operated at extremely low temperatures
- Primarily led by major IT companies and technology firms

< Related companies >



Neutral-atom



- Atoms are arranged and controlled using lasers
- Highly compatible with large-scale qubit systems

< Related companies >



Ion-trap

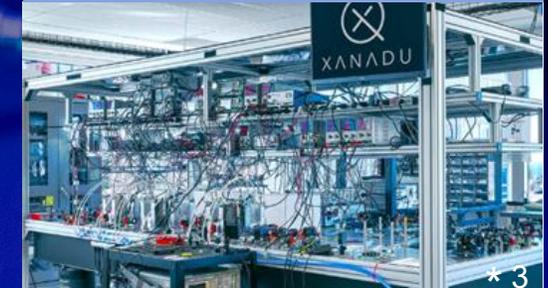


- Ions are manipulated using electromagnetic fields
- High precision in Quantum computing

< Related companies >



Photonic



- Photons are used as qubits
- Qubits operate at room temperature and are highly robust

< Related companies >



*1 Source: (<https://quantumzeitgeist.com/quera-computing-and-pawsey-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/>)

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)**



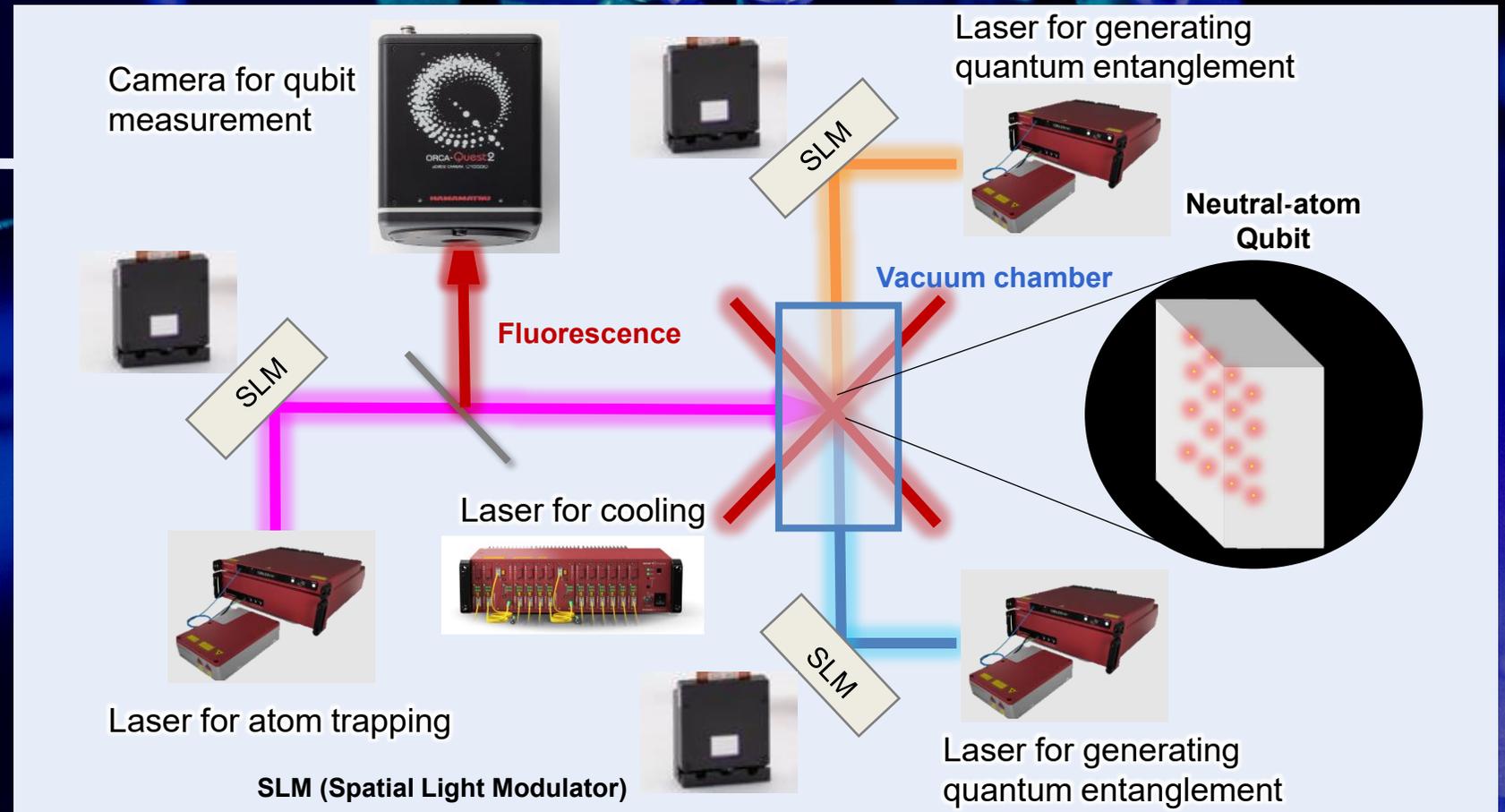
**ORCA®-Quest 2
qCMOS® Camera**

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



Quantum Computer

Basic research phase (NISQ)

One physical qubit is implemented
using single atom



Error correction not applicable

Practical implementation phase (FTQC)

Stable logical qubit is formed through cooperative
operation of multiple physical qubits



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



Lasers are core technology in quantum computers

Lasers for cooling

Preparation of atomic states

Suppressing atomic motion and position fluctuations to achieve temperatures in microkelvin (μK) range

Required laser performance

- ① Frequency stability and absolute accuracy
- ② Narrow linewidth
- ③ Polarization and intensity control
- ④ Multi-wavelength and multi-beam synchronization

Our advantages

Delivering highest level of stability required for quantum applications with compact, highly maintainable fiber lasers

Error rate reduction

= **Key to Reliability**

Lasers for atom trapping

Arranging and fixing atoms in vacuum

Using tightly focused optical tweezers to trap individual atoms and form large-scale qubit arrays with sub-100 nm positional accuracy

Required laser performance

- ① Output and intensity stability
- ② Beam quality
- ③ Wavelength selection

Our advantages

Demonstrated robust fiber laser technology that enables higher output power while maintaining low noise and high stability

Expanding Number of Quantum Bits

= **Key to Scaling**

Lasers for generating quantum entanglement

Creating entanglement for quantum computing

Exciting atoms to Rydberg states to realize strong interactions required for entanglement generation and quantum gate operations

Required laser performance

- ① Ultra-narrow linewidth and low phase noise
- ② Long-term frequency and phase stability
- ③ High-speed, high-fidelity pulse control
- ④ High output power and low noise

Our advantages

NKT Photonics' proprietary laser technology demonstrated improved two-qubit gate fidelity in real-system environment

Improved computational capability

= **Key to Performance**

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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



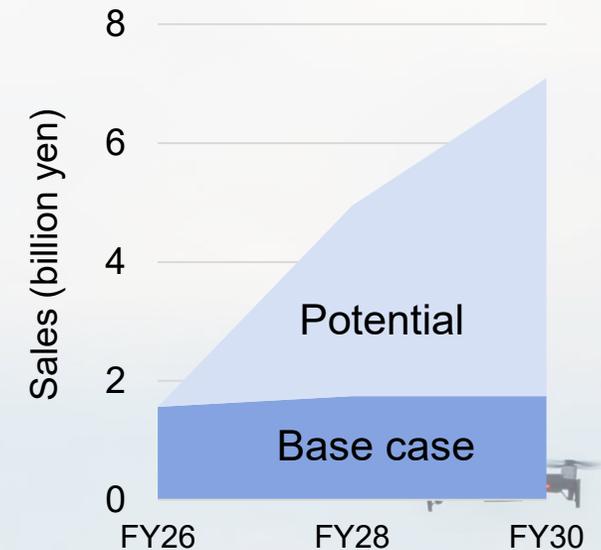
Rheinmetall

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



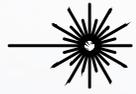
Rheinmetall

Sales target for lasers intended for security applications

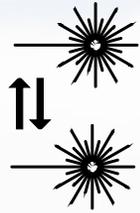
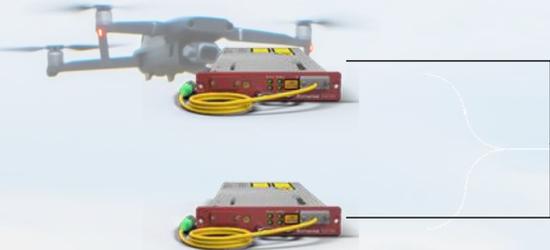


Security

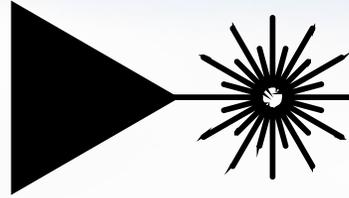
Building long-term customer relationships through flexible customization



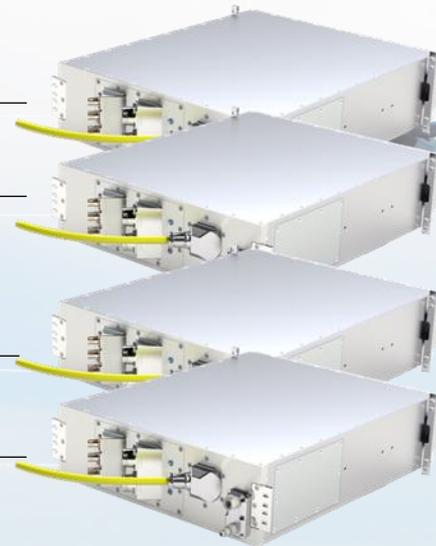
Seed laser
Narrow linewidth laser



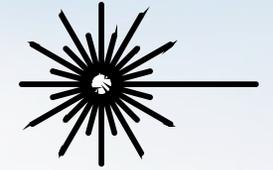
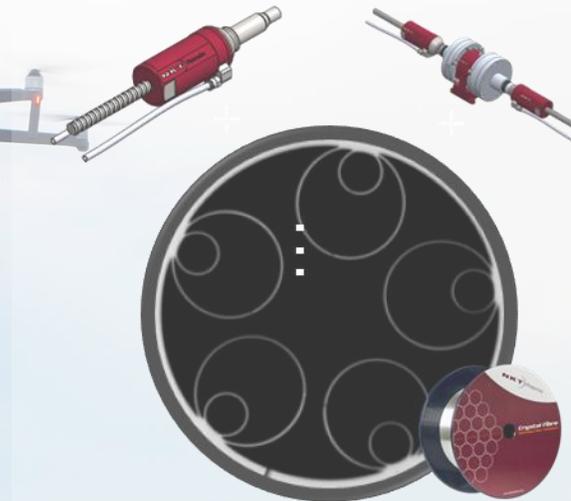
Seed laser
redundancy



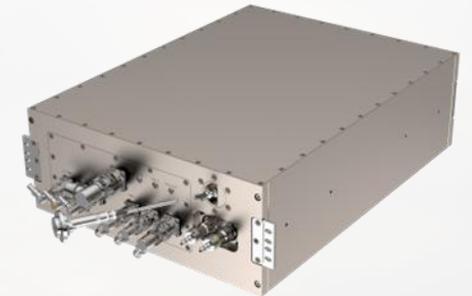
kW-class
amplification



kW-class PCF and
Hollow-core
fiber transmission



Eye-safe BILL/TILL
High pulse energy ~50 mJ



Notes

- This material is not intended to be a solicitation to buy or sell any securities of Hamamatsu Photonics K.K.
- The information contained in this material is based on data available as of making it. No guarantees or promises are made as to its accuracy or completeness.
- This material includes uncertain factors such as risks, economic trends and industry demands that affect actual business performance.
- Our prospects may differ from actual results.

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