

PRESS RELEASE

PRESS RELEASEApril 20, 2026 || Page 1 | 4

Fraunhofer IPMS opens up new possibilities for industrial communication with LI-FI GRATHUS®

Li-Fi Grathus®: a high-speed, real-time optical data connection for industrial applications

Fraunhofer IPMS is introducing a new technology called Li-Fi Grathus®, which transmits data via light instead of cable or radio waves. The system delivers gigabit-speed performance and can send and receive data simultaneously. It operates reliably and with near-zero latency, even in environments where traditional wireless systems reach their limits. Thus, Li-Fi Grathus® enables flexible, reliable, and truly real-time industrial communication.

Modern industrial facilities require machines, sensors, and control systems to communicate with one another fast and reliably. Traditional wired connections are often inflexible, and wireless solutions are susceptible to interference.

Li-Fi Grathus®, developed by the Fraunhofer Institute for Photonic Microsystems IPMS, addresses this challenge. The new technology uses light for data transmission ("Li-Fi" stands for "Light Fidelity"), providing a wireless connection that does not rely on radio waves. With data rates of 1 Gbit/s or more and a range of up to 10 meters, the system is suitable for many industrial applications.

A key advantage is its extremely short and predictable delay, also called deterministic latency, of less than 100 nanoseconds. This allows for truly real-time data transmission, which is crucial for robotics and precise machine control.

High-Speed, Reliable, and Trouble-Free

Li-Fi Grathus® uses light signals instead of radio waves, giving it a key advantage: immunity to electromagnetic interference (EMI), which is common in industrial environments. The system also supports full-duplex communication, transmitting and receiving simultaneously, which ensures uninterrupted data flow and prevents any time loss. It can be seamlessly integrated into existing systems and networks without major modifications and supports common industrial standards, such as Profinet, EtherCAT, EtherCAT G, SERCOS III, and the new Time Sensitive Networking (TSN). In addition to Ethernet and Gigabit Ethernet, it supports USB 3.0/3.1 and customer-specific interfaces. An additional side channel with 1 Mbit/s supports management, diagnostics, and safety signals.

Editor

Franka Balvin | Fraunhofer Institute for Photonic Microsystems IPMS | Phone +49 351 8823-1144|
Maria-Reiche-Straße 2 | 01109 Dresden | www.ipms.fraunhofer.de | franka.balvin@ipms.fraunhofer.de

User-Friendly Design for Industrial Applications

PRESS RELEASE

April 20, 2026 || Page 2 | 4

In addition to performance, ease of use is crucial in practical industrial settings. Li-Fi Grathus® excels in this regard through:

- **Easy installation:** Unlike complex optical systems such as free-space setups, which require time-consuming alignment, or costly solutions like beam steering or adaptive optics, Li-Fi Grathus® can be installed and operated flexibly without any adjustments.
- **Innovative, patented multi-path lens:** Allows higher transmission power and simple manual alignment.
- **Eye-safe operation:** Laser Class 1 ensures safe use.
- **Robust design:** Thermally stable, compact, plug-and-play design with metal housing protects the technology in everyday industrial use.
- **High flexibility:** Supports versatile deployment across a wide range of applications.

Wide Range of Applications

With its reliable, real-time communication between control, sensor, and actuator systems, Li-Fi Grathus® is ideal for applications that require fast, wireless data transmission. Typical use cases include:

- Industrial automation
- Robotics
- Motion control (precise machine movement)
- Retrofitting of existing systems
- Backhaul and backbone connections for Wi-Fi and cellular access points
- Logistics systems, e.g., shelving and warehouse solutions
- Large rotating machinery
- High-bandwidth channels for uploading and downloading sensor data in automated guided vehicles (AGVs)

Wireless connectivity offers significant advantages, especially in flexible production environments, where machines are frequently reconfigured without compromising deterministic performance. It also ensures reliable operation in metallic environments, which are challenging for traditional radio technologies and can lead to failures.

"The Li-Fi Grathus® builds on more than 15 years of Li-Fi expertise at Fraunhofer IPMS. Our latest development provides fast, secure, real-time optical wireless communication for industrial applications and is compatible with numerous industrial Ethernet

FRAUNHOFER INSTITUTE FOR PHOTONIC MICROSYSTEMS IPMS

standards. Its robust design makes it ideal for demanding industrial environments," says Dr. René Kirrbach, Group Leader for Li-Fi at Fraunhofer IPMS.

PRESS RELEASEApril 20, 2026 || Page 3 | 4

Availability as an Evaluation Kit

The Li-Fi Grathus® is available as an evaluation kit. This "ready-to-use" set enables the easy replacement of a wired 1 Gbps Ethernet connection with an optical link via plug-and-play, while also allowing testing of the technology's basic functions in practice. The kit includes two Grathus® modules, two Ethernet cables, a power supply, and a user manual, and is available directly from Fraunhofer IPMS.

Technical Highlights of the Evaluation Kit

- Data rate: 1 Gbps and higher
- Range: Up to 5 m with high dynamic range
- Real-time capable: Deterministic latency <100 ns, about 10,000 times lower than 5G and Wi-Fi
- Bidirectional, full-duplex
- Industrial Ethernet compatibility: Profinet, EtherCAT, EtherCAT G, and SERCOS III
- Interfaces: Ethernet, Gigabit Ethernet, USB 3.0/3.1, and customer-specific interfaces
- Additional side channel: 1 Mbit/s for management, diagnostics, or safety signals
- Laser safety class 1: Eye-safe operation
- Robust and compact design: Interference-free, thermally stable, plug-and-play
- Easy alignment
- Dimensions (H x W x D): 79 mm x 119 mm x 62 mm

Grathus® is a registered trademark of Fraunhofer-Gesellschaft e.V.

Further details on Li-Fi Grathus® technology can be found at: [Li-Fi Grathus® - Fraunhofer IPMS](#).

About Fraunhofer IPMS

Fraunhofer IPMS is a leading international research and development service provider for electronic and photonic microsystems in the application fields of Smart Industrial Solutions, Bio and Health, Mobility as well as Green and Sustainable Microelectronics. Research focuses on customer-specific miniaturized sensors and actuators, MEMS

FRAUNHOFER INSTITUTE FOR PHOTONIC MICROSYSTEMS IPMS

systems, microdisplays and integrated circuits as well as wireless and wired data communication. The institute develops systems and components on 200 and 300 mm wafers in their state-of-the-art clean rooms. Services range from consulting and design to process development and pilot series production.

PRESS RELEASE

April 20, 2026 || Page 4 | 4

As an expert in secure data communication solutions, the Business Unit of Data Communication and Computing (DCC) develops innovative technologies in the future-oriented fields of IP cores, Li-Fi (light-based data transmission) and quantum technologies. These developments pave the way for new and secure communication solutions in key industries such as mobility, telecommunications, industrial automation and energy supply.

Images



Two Grathus® modules from the evaluation kit
©Fraunhofer IPMS / photographer: Sebastian Lassak



Li-Fi Grathus® from Fraunhofer IPMS
©Fraunhofer IPMS / photographer: Sebastian Lassak



Dr. René Kirrbach, Group Leader Li-Fi at Fraunhofer IPMS
©Fraunhofer IPMS / photographer: ProBild Fotografie Tobias Sauer