HAMAMATSU PHOTON IS OUR BUSINESS

The New Hamamatsu Optical Transceiver: Transforming Free-Space Data Transmission in Rotary Joints

As Industry 4.0 evolves, the demand for fast, efficient, and reliable data transmission is more important than ever. With the growing number of sensors and actuators in robotics, ensuring smooth data exchange is a necessity.

Industries rely on real-time data exchange, yet transmitting information through rotating joints presents considerable challenges for engineers. Traditionally, slip rings have been employed to address this issue. They are subject to limitations, though, such as frequent maintenance requirements, susceptibility to electromagnetic interference, and accelerated wear, especially when rotary speeds exceed 1000 rpm. At these high speeds, slip rings often fail, making optical data communication the only viable alternative. The Fiber Optic Rotary Joint (FORJ) represents an advancement in this field, enabling the transmission of data through light via plastic optical fibers (POFs).

Hamamatsu has taken a significant leap forward from this, eliminating the need for optical fibers altogether, and introducing an innovative solution that promises to redefine rotary data transmission. The new P16548-01AT optical transceiver from Hamamatsu Photonics is ideal for Free-Space Optical Data Transmission.



Fiber Optic Rotary Joint (FORJ) scheme.

The Evolution to Free-Space Optical Data Transmission

Building on the foundation of FORJ technology, free-space optical data transmission represents a significant evolution. Unlike FORJ, which relies on optical fibers, free-space optical transmission eliminates the need for these fragile components. This advancement allows for even greater reliability and durability, as there are no fibers to break or degrade over time.



Hamamatsu's P16548-01AT optical transceiver.

Key Features of Hamamatsu's Optical Transceiver

The new P16548-01AT optical transceiver features a built-in transmitter and receiver, incorporating an 850 nm VCSEL transmitter with a driver IC for temperature compensation to ensure stable communication. The receiver is equipped with a PIN photodiode and a signal processing IC, enabling high-speed operation. Additionally, the transceiver boasts an extremely compact device package with dimensions of 6.7 x 7.6 x 5.9 mm, making it ideal for space-constrained applications.

360deg Tx-IC Photodiode Rx-IC

P16548 01AT product overview.

Coupling two of these transceivers, attached to mutually rotating joints allows for:

Bidirectional Full Duplex Communication

Ensures efficient and simultaneous two-way data transmission in free space.

Communication Distance

Ranging from 25mm to 100mm.

High-speed Data Transmission From 100Mbps to 1.25Gbps.

Stable Communication

Even during continuous 360° rotation.

Operating Temperature

Range of -40°C to +85°C.

Potential Applications for the P16548-01AT

Designed to enable short distance board to board data transmission, the P16548-01AT guarantees high speed signal transmission and EMI insulation for compact setups. Being fiber-less and without connectors, it saves valuable space in several applications such:



Rotating Cameras

Ensuring uninterrupted, high-quality video transmission in surveillance and broadcasting.



Medical Equipment

Providing reliable data transfer for precise, realtime control in surgical robots or medical diagnostic devices such as CT and MRI scanners.



Automotive LiDAR Modules

Enabling accurate and rapid data transmission for advanced driver-assistance systems (ADAS) and autonomous vehicles.

Meeting the Demands of Industry 4.0

Industry 4.0 continues to drive the automation and networking of machines and equipment, and the volume of data being processed is growing exponentially. Hamamatsu's optical transceiver is designed to meet these demands, offering maximum efficiency and uptime. Its robust design ensures reliable real-time control, even in the most challenging environments, such as bottling plants, fairground rides, and industrial robots.

Why Choose Hamamatsu Photonics?

Hamamatsu Photonics is a trusted name in photonics technology, known for its quality control, reliability, and commitment to continuous improvement. Their latest optical transceiver follows that tradition, standing out for its exceptional performance and reliability. By applying the latest technology, it provides a wear-free, contactless solution that excels in environments where traditional slip rings fall short. With the possibility of customization for more tailored solutions, whether optimizing data transmission in wind turbines or ensuring seamless operation in radar systems with rotating antennas, the P16548-01AT optical transceiver is the ideal choice for modern industrial applications.

Embrace the next step in data transmission with Hamamatsu's new optical transceiver and experience high performance, reliability, and flexibility in your rotary optical data transmission needs.

Discover more by visiting <u>www.hamamatsu.com</u> or contact us at <u>info@hamamatsu.eu</u> to discuss your project requirements.