NEWS RELEASE

Hamamatsu Photonics develops a compact, low-cost optical transceiver for high-speed, cable-free data communication with rotating objects

September 25, 2024
Hamamatsu Photonics K. K.
Headquarters: 325-6, Sunayama-cho,
Chuo-ku, Hamamatsu City, Japan
President and CEO: Tadashi Maruno

Hamamatsu Photonics is proud to announce the development of the P16548-01AT, an optical transceiver for spatial light transmission, enabling cable-free optical data communication.

The P16548-01AT is a compact integrated optical transmitter and receiver that supports full-duplex bidirectional communication up to 1.25 gigabits per second (Gbps) over spatial distances up to 100 mm. It maintains consistent performance, even during communication between a stationary object and those rotating 360 degrees.

In addition to short-range board-to-board communication, this optical transceiver is ideal for data communication equipment with rotating mechanisms such as robotic manipulator arms, and omni-directional cameras. This new solution overcomes the limitations of traditional slip rings*, offering a reliable, maintenance-free alternative.

Sample products and evaluation kits will be available from Tuesday, October 1, for domestic and overseas manufacturers across industries such as transportation, industrial machinery, medical devices, cameras, connectors, and many more.

Optical transceiver P16548-01AT

*Slip ring: A connector that transmits electrical signals between a rotating and a stationary object. In systems with rotating mechanisms, they allow communication without cable tangling.

HAMAMATSU
PHOTON IS OUR BUSINESS

Product overview

The P16548-01AT optical transceiver integrates an optical transmitter that converts electrical signals into optical signals and an optical receiver that converts them back into electrical signals. These components are housed in a compact package opposite each other along the same optical axis. This configuration enables full-duplex bidirectional communication up to 1.25 Gbps, whether between circuit boards at short distances from each other or components within a rotating mechanism. This provides a compact and cost-effective solution that ensures stable data communication.

In traditional systems, slip rings are often used to transmit and receive electrical signals between rotating and stationary components to avoid cable tangling. However, in the case of contact slip rings, the rotating brush and fixed metal ring gradually wear out, degrading the signal quality and requiring periodic maintenance. The noise caused by vibration and friction also leads to gradual deterioration in signal quality. Our new optical transceiver overcomes these challenges by utilizing non-contact, spatial light transmission, ensuring consistent, high-quality communication.

The P16548-01AT features a vertical cavity surface emitting laser (VCSEL) for light emission, combined with a VCSEL driver capable of temperature compensation, thus allowing stable communication over a wide operating temperature range. Moreover, it also includes a high-speed photodiode for light reception and a signal processing IC that maximizes the photodiode performance characteristics, enabling high-speed operation.

With our extensive experience in developing devices and optical transceivers for fiber optic communication in automotive and industrial applications, we’ve applied our expertise to create this innovative solution. Our opto-semiconductor mounting and assembly technologies, combined with efficient manufacturing processes, allow us to offer this optical transceiver at a competitive price while maintaining excellent signal quality.

When installed in rotating systems like robotic arms and omni-directional cameras, the P16548-01AT ensures high signal quality by eliminating the limitations of traditional slip rings. This optical transceiver also supports lead-free reflow solder mounting where circuit boards are exposed to high temperatures up to 260°C.

We will expand this optical transceiver lineup to respond to ever-increasing market demand.

Main features

1. Full-duplex bidirectional communication via spatial light transmission

High-speed digital optical communication across spaces is now possible at up to 1.25 Gbps in full-duplex bidirectional mode between circuit boards that require electrical isolation without having to install complex optics.

2. Optimized for rotating mechanisms

A compact package integrating an optical transmitter and receiver provides spatial optical communication in narrow spaces where it is difficult to lay cables in rotating devices and mechanisms.

3. Stable data communications

Non-contact, spatial optical communication ensures stable data communication, eliminating the wear-and-tear issues associated with traditional slip rings.

Main specifications

Parameters	**P16548-01AT**	**Unit**
Transmission speed	0.1 to 1.25	Gbps
Communication distance	25 to 100	mm
Operating temperature	-40 to +85	˚C
Supply voltage	3.3	V
Peak emission wavelength	850	nm
Laser stability	Class 1 (JIS C 6802, IEC 60825-1)	-
Dimensions (W×D×H)	6.7 × 7.6 × 5.9	mm

* Specifications are subject to change without prior notice due to product improvements or other reasons.