

Furukawa Electric Presents an 8-Channel CWDM TOSA for CPO ELS Employing a Blind Mate Optical Connector at OFC 2023

Record low power consumption realized of 4.0 W operated with a fiber-coupled power of 100 mW/ch at a case temperature of 55 degrees Celsius

OFC 2023, Booth 3229, San Diego, California, March 1, 2023 - Furukawa Electric Co., Ltd. (FEC) announces the development of an 8-channel Transmitter Optical Sub-Assembly (TOSA) for Co-Packaged Optics (CPO) External Laser Source (ELS) employing a blind mate optical connector.

■ Background

Data traffic has been increasing to support many kinds of IT services such as cloud services and 5G mobile networks. Hyperscale data centers that process big data and edge data centers that realize the low latency for beyond 5G are faced with the challenge of expanding bandwidth and reducing the power consumption of a network switch server. CPO is a new server architecture that performs photoelectric conversion in close proximity to an electronic device. CPO has a unique packaging structure where high-density silicon photonics transceivers are mounted together with a switch ASIC (application specific integrated circuit) on the same substrate. A wide bandwidth switch ASIC generates a large amount of heat. Hence, it derives the temperature increase of SiPh transceivers. Silicon ICs (integrated circuits) can be operated at a high temperature of 100 ° C, but it is difficult for compound semiconductor lasers to realize the required characteristics and guarantee the reliability in such a high temperature. Therefore, an ELS is located and operated at a front panel which has an environmental condition of lower ambient temperature. The laser beams are supplied to the optical transceivers via multi-lane PMF cables (Fig. 1). The usage of a blind mate optical connector (Fig. 2) has been proposed to meet the eye safety requirements since launched laser beams from an ELS reach the total optical output power of 800 mW. A blind mate optical connector is located at the same facet of an electrical connector to enable optical and electrical connections at the same time. The laser beams are never outputted from an ELS to outside, since the blind mate connector is located inside a rack. A blind mate ELS integrates a blind mate optical connector, a control circuitry embedded on a PCB assembly, a TOSA, and an MT connector into a housing.

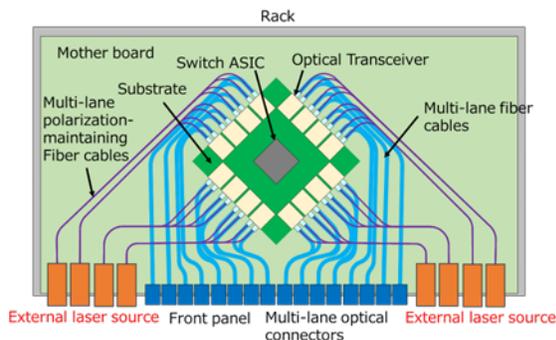


Fig. 1 Schematic top view of network switch server employing CPO

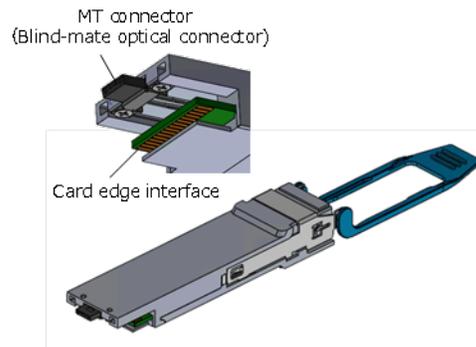


Fig. 2 Illustration for ELS employing a blind mate optical connector

■ Details

Furukawa Electric presents an 8-channel CWDM TOSA (Fig. 3) attached with a short pigtailed MT connector for an ELS employing a blind mate optical connector at an OFC2023 oral session. To obtain high optical output power, we adopted a newly developed high-power DFB (Distributed Feedback) LD (Laser Diode) and integrated it into the TOSA. The heat dissipation structure of the TOSA was optimized to reduce the LD temperature and the optical coupling system was optimized to maximize the optical coupling efficiency. This TOSA achieves a low LD bias current as low as 350 mA at a case temperature of 55 °C to realize the fiber-coupled power of 100 mW/ch with an uncooled operating condition. The low LD bias current contributes to realize a record low power consumption of 4.0 W, to the best of Furukawa knowledge.

The mechanical size of the TOSA is as small as 22.5 × 13.0 × 4.0 mm, which allows to be built in any SFF (small form factor) potentially applied for an ELS. To be adopted to a blind mate ELS, the PMF cables attached to the TOSA should be draw back to the card edge and the length of PMF cables should be shorten for routing inside the housing. We developed an MT connector attachment technology to PMF (polarization maintain fiber) cables with the minimum length of 50 mm where the slow axis of the PMF cable can be aligned and fixed to an MT or SN[®]-MT connector with a rotational angular error of less than 2 degree. This TOSA can be built in a QSFP-DD housing together with a control circuitry mounted on a PCB assembly and an MT connector (Fig. 4), and also meet the requirements of fiber bending loss and PER (polarization extinction ratio). Sample delivery of the TOSA and the commercialization has been scheduled in 2024.

Furukawa Electric will give a talk at a technical session and exhibit the TOSA at OFC 2023, March 7-9, 2023, in San Diego at OFS booth 3229.

Furukawa Electric Group's efforts toward the SDGs

Based on the “Sustainable Development Goals (SDGs)” adopted by the United Nations, Furukawa Electric Group has formulated the “Furukawa Electric Group Vision 2030” which sets forth the year 2030 as its target and is advancing efforts with the aim to “Build a sustainable world and make people’s life safe, peaceful and rewarding, Furukawa Electric Group will create solutions for the new generation of global infrastructure combining information, energy, and mobility.” Toward achieving our Vision 2030, we will take open, agile, and innovative approaches to promote ESG management that aims to increase corporate value over the medium to long term and will contribute to achieving the SDGs.

Furukawa Electric Group's efforts towards the SDGs

<https://furukawaelectric.disclosure.site/ja/themes/182>

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PR Contact:

Murakoshi, Public Relations Department

Furukawa Electric Co., Ltd.

fec.pub@furukawaelectric.com