



# Laser Radiation Evaluations for Optical Transceivers

Optical transceivers, optical amplifiers and other similar optical subassemblies are building blocks of fiber optic networks. When installed in an end-to-end optical fiber communication system (OFCS), the laser radiation emitted by the optical transceivers is normally contained within the fiber cables and enclosure, thereby alleviating concerns about radiation exposure. The IEC 60825-1 and IEC 60825-2 series of standards can be used to evaluate the laser radiation safety of these closed-loop systems, including assessing what happens during a fiber cable break or disconnect.

However, optical transceiver manufacturers often need to evaluate the component optical transceivers themselves to the requirements of the laser product safety standards FDA/CDRH 21CFR 1040 or IEC 60825-1, and possibly to applicable requirements from IEC 60825-2. To do these assessments, a series of measurements are made on the optical transceiver's laser emissions, including wavelength verification, laser power or energy, and pulse characteristics (if pulsed). Then, the laser class is determined, required labels and user manual statements are verified and eventual compliance is documented in the appropriate CDRH product report or IEC 60825-1 IECCE test report format (TRF). When there is a need to consider applicable requirements from IEC 60825-2 (e.g., the hazard level the optical transceiver would contribute to an OFCS), the IEC 60825-2 IECCE TRF can also be used.

Special circumstances may require additional, more complex considerations, such as additive effects from multiple wavelengths multiplexed onto a fiber, as well as evaluating single pulse, average power and pulse train criteria for pulsed laser emissions.

The FDA/CDRH 21CFR 1040, IEC 60825-1 and IEC 60825-2 standards have been around for many years, but optical transceiver manufacturers should also be aware of the new EN 60825-1:2014/A11:2021 which makes the EN 60825-1 version different from the IEC 60825-1 version, including additional testing and laser emission limits for 1250 to 1400 nm wavelengths. For products also considered to be consumer laser products, the new standard EN 50689:2021 may apply as well. Manufacturers should consider June 21, 2023 as the target date to meet these new EN requirements. For more information on these two standards, consult [Understand the New Laser Product Safety Standards for Europe](#).

## How can UL Solutions support you?

Whether you are new to laser product safety compliance, have several existing reports that need updating to EN 60825-1:2014/A11:2021, or seek related information or assistance, UL Solutions can help. Our global Optical Radiation Laboratories are IECCE-qualified as CB Test Labs to perform IEC 60825-1 and IEC 60825-2 evaluations, and our laser experts are active members of the IEC Technical Committee (TC) 76 which is responsible for preparing international standards for laser-related equipment and making sure that they adequately address existing technologies. More information about our team and laser services can be found at [Optical Radiation Testing and Evaluation Services](#).

**For more information, visit [ul.com/services/optical-radiation-testing-and-evaluation-services](https://ul.com/services/optical-radiation-testing-and-evaluation-services).**



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