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Transmitting and receiving equipment for radiocommunication – Frequency response of optical-to-electric conversion device in high-frequency radio-over-fibre systems –
Part 2: Measurement method of common-mode rejection ratio of optical coherent detection device for radio-over-fibre transmitter

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TITLE:

Transmitting and receiving equipment for radiocommunication - Frequency response of optical-to-electric conversion device in high-frequency radio-over-fibre systems - Part 2 Measurement method of common-mode rejection ratio of optical coherent detection device for radio over fibre transmitter

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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TRANSMITTING AND RECEIVING EQUIPMENT FOR RADIOCOMMUNICATION – FREQUENCY RESPONSE OF OPTICAL-TO-ELECTRIC CONVERSION DEVICE IN HIGH-FREQUENCY RADIO-OVER-FIBRE SYSTEMS –

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The text of this International Standard is based on the following documents:

Draft	Report on voting
103/XX/FDIS	103/XX/RVD

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

A list of all parts in the IEC 62803 series, published under the general title *Transmitting and receiving equipment for radiocommunication – Frequency response of optical-to-electric conversion device in high-frequency radio-over-fibre systems*, can be found on the IEC website.

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- withdrawn,
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INTRODUCTION

A variety of photonic devices operated in microwave and millimetre-wave bands are useful for an optical fibre transport system as well as wireless communication and broadcasting systems. An optical-to-electric conversion device including an optical receiver plays as an interface, which converts an optical signal into an electrical signal directly.

Microwave/millimetre-wave radio-over-fibre (RoF) systems are comprised mainly of two parts: an RF to photonic converter (E/O) and a photonic to RF converter (O/E). Radio waves are converted into an optical signal at the E/O, and the signal is transferred through the optical fibre, and then the radio waves are regenerated at the O/E.

A variety of photonic devices which carry microwave and millimeter-wave signals at subcarrier frequencies are used for high-frequency RoF systems. In high-frequency RoF systems such as millimetre-wave band radio signal transfer systems, the specifications of conversion efficiency and its frequency response have been important technical parameters, and therefore, the IEC 62803 series has been developed. Nowadays, the coherent optical fibre network system is used widely, namely in core and metro networks with a capacity greater than 100 Gbit/s/ch. Finally, cost and performance have improved. In this coherent optical fibre network system, an optical coherent detection device, which is comprised of an optical 90° hybrid coupler and balanced photodetectors, provides an IQ separation in an optical domain for easy digital signal processing. This detection device can be useful not only for the coherent optical signal transport but also for a millimeter-wave RoF system with high signal quality. To achieve a high signal quality, which means a good suppression of noises, a common-mode rejection ratio is a key parameter of the optical coherent detection. This document has been developed to provide to the industry a measurement method of a coherent optical detection device for evaluating the specifications to be used in high-frequency RoF systems as well as in an optical coherent transport system. This document defines the measurement method of a common-mode rejection ratio, which has a significant impact on the performance of RoF systems.

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Part 2: Measurement method of common-mode rejection ratio of optical coherent detection device for radio-over-fibre transmitter

1 Scope

This part of IEC 62803 provides the measurement method of the common-mode rejection ratio of optical coherent detection devices in high-speed RoF systems as well as in high-speed optical signal transmission systems. In addition, the method is also effective for the estimation of the detailed frequency response of the common-mode rejection ratios and O/E conversion efficiency. The method applies for the following:

– frequency range: 1 GHz to 110 GHz;

– wavelength band: 0,8 μm to 2,0 μm.

2 Terms, definitions and abbreviated terms

2.1 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- IEC Electropedia: available at https://www.electropedia.org/
- ISO Online browsing platform: available at https://www.iso.org/obp

2.1.1
common-mode rejection ratio
ratio between the signal powers of differential signals and common-mode signals

2.1.2
two-tone lightwave
lightwave that contains two dominant spectral components whose power difference is relatively small and frequency separation is stable

2.1.3
carrier-suppressed
situation when an MZM is biased at its minimum transmission point, the non-modulated carrier lightwave transmitted through and the two arms of the MZM are cancelled with each other at the output coupler

2.2 Abbreviated terms

CMRR common-mode rejection ratio
DUT device under test
E/O electrical-to-optical
IF intermediate frequency
LD laser diode
LO local oscillator
MZM Mach-Zehnder interferometer-type intensity modulator
SIG signal