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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 3: Measurement method of non-linear response of optical-to-electric converter

INTERNATIONAL ELECTROTECHNICAL COMMISSION

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#### INTERNATIONAL ELECTROTECHNICAL COMMISSION

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

## Part 3: Measurement method of nonlinear response of optical-to-electric converter

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#### INTRODUCTION

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

Microwave/millimetre-wave/terahertz-wave radio-over-fibre (RoF) systems are comprised of two parts: an electric-to-optical converter (E/O), and an optical-to-electric 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, millimeter-wave, and terahertz-wave signals at subcarrier frequencies are used for high-frequency RoF systems. In advanced radio wireless communication systems, orthogonal frequency domain multiplexing and multi-level modulation techniques have been implemented for the enhancement of spectral efficiency. Even in high-frequency wireless systems in the millimetre-wave and terahertz-wave bands, high spectral efficiency modulation and demodulation formats are indispensable. These advanced modulation formats require a high linearity in devices and transmission lines, and therefore, the high-frequency RoF system should also have high linearity to transfer these radio signals. Particularly in optical-to-electric converters, nonlinear distortions directly affect the quality of regenerated radio signals, to be compliant with radio regulations. Therefore, the nonlinear response of the optical-to-electric converter is a key characteristic to specify result signal quality. This document defines the measurement method of a nonlinear response, which has a significant impact on the performance of RoF systems.

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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 3: Measurement method of nonlinear response of optical-to-electric converter

#### 1 Scope

This part of IEC 62803 specifies the measurement method of the nonlinear response of optical-to-electric converters in both optical signal transport systems and RoF systems. The method applies for the following:

- frequency range: up to 170 GHz;

wavelength band: 0,8 μm to 2,0 μm.

#### 2 Normative references

There are no normative references in this document.