

# INTERNATIONAL STANDARD



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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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of optical-to-electric converter**

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

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Future documents in this series will carry the new general title as cited above. Titles of existing documents in this series will be updated at the time of the next edition.

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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 and 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, millimetre-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, non-linear distortions directly affect the quality of regenerated radio signals, to be compliant with radio regulations. Therefore, the non-linear response of the optical-to-electric converter is a key characteristic to specify result signal quality. This document defines the measurement method of a non-linear response, which has a significant impact on the performance of RoF systems.

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

## **1 Scope**

This part of IEC 62803 specifies the measurement method of the non-linear 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  $\mu\text{m}$  to 2,0  $\mu\text{m}$ .

## **2 Normative references**

There are no normative references in this document.