

INTERNATIONAL STANDARD



**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**



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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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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**

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

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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.