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INTERNATIONAL STANDARD

NORME INTERNATIONALE

Transmitting and receiving equipment for radiocommunication – Radio-over fibre technologies and their performance standard – Part 3: Radio-over-fibre-based remote radar for foreign object debris (FOD) detection systems

Matériaux émetteurs et récepteurs pour les radiocommunications – Technologies radio sur fibre et leur norme de performance – Partie 3: Radar distant fondé sur la radio sur fibre pour système de détection des objets intrus (FOD)



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TRANSMITTING AND RECEIVING EQUIPMENT FOR RADIOCOMMUNICATION – RADIO-OVER-FIBRE TECHNOLOGIES AND THEIR PERFORMANCE STANDARD –

Part 3: Radio-over-fibre-based remote radar for foreign object debris (FOD) detection systems

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

Draft	Report on voting
103/245/FDIS	103/250/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 63098 series, published under the general title *Transmitting and receiving equipment for radiocommunication – Radio-over-fibre technologies and their performance standard*, can be found on the IEC website.

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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- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

INTRODUCTION

A remote radar system generally consists of a central station (CS) and remote radar heads (RRHs) connected by radio over fibre (RoF). Each RRH has a maximum detection range of several hundred metres because millimetre waves theoretically undergo a larger propagation loss compared with conventional aeronautical frequencies below 10 GHz. The RoF system is key to enhancing the radar coverage and connecting the CS with the RRHs located along a runway for its entire coverage.

To ensure the connection between the CS and RRHs, radio frequency (RF) and optical interfaces should be categorized according to their specifications, specifically, their link characteristics.

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Part 3: Radio-over-fibre-based remote radar for foreign object debris (FOD) detection systems

1 Scope

This part of IEC 63098 provides the specifications of the RoF interface connecting the central station (CS) with the remote radar heads (RRHs) in a remote radar system, along with the necessary information to ensure compatibility between vendors and, hence, choose appropriate systems to cover any type of RoF systems for delivering the signal.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 62149-10:2018, *Fibre optic active components and devices – Performance standards – Part 10: Radio-over-fibre (RoF) transceivers for mobile fronthaul*

IEC 60825-1, *Safety of laser products – Part 1: Equipment classification and requirements*

3 Terms, definitions and abbreviated terms

3.1 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 http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp

3.1.1
system input level
electrical or optical input level to the system

3.1.2
system output level
electrical or optical output level from the system

3.1.3
frequency multiplication factor
order of harmonic RF output that is derived from the optical or electrical system

3.1.4
input frequency range
RF frequency range accepted by the system

3.1.5
output frequency range
RF frequency range emitted by the system

3.1.6
frequency flatness
deviation of the RF output within the output frequency range

3.2 Abbreviated terms

CS	central station
DUT	device under test
FM-CW	frequency-modulated continuous wave
IF	intermediate frequency
LO	local oscillation
RF	radio frequency
RoF Rx	RoF receiver
RoF Tx	RoF transmitter
RRH	remote radar head
SMF	single-mode fibre

4 RoF system in remote radar system

4.1 General

Radars detect objects that transmit radio waves and measure the reflected waves.

A multi-radar system would require a larger coverage than a single-radar system. To satisfy this requirement, a remote radar system whose radar heads are connected by RoF is necessary.

To transfer the transmitting and receiving signals, at least one pair of RoF links can be installed. In order to ensure the connectivity between the CS and RRHs, this document specifies the performance of the RoF system using this purpose.

4.2 Structures

A remote radar system exchanges the signals between the CS and RRHs. Figure 1 illustrates the typical structure of a remote radar system where the CS and an RRH are connected through RoF links. Some types of remote radar systems can be equipped with multiple RRHs to widen their coverage. The basic structure of a remote radar system consists of the following components:

– central station,
– remote radar head,
– transmission RoF Tx,
– transmission RoF Rx,
– reference RoF Tx,
– reference RoF Rx,
– reception RoF Tx,
– reception RoF Rx.