



IEEE

IEC/IEEE 63195-1

Edition 1.0 2022-05

INTERNATIONAL STANDARD

NORME INTERNATIONALE



Assessment of power density of human exposure to radio frequency fields from wireless devices in close proximity to the head and body (frequency range of 6 GHz to 300 GHz) –

Part 1: Measurement procedure

Évaluation de la densité de puissance de l'exposition humaine aux champs radiofréquences provenant de dispositifs sans fil à proximité immédiate de la tête et du corps (plage de fréquences de 6 GHz à 300 GHz) –

Partie 1: Procédure de mesure



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3, rue de Varembe
CH-1211 Geneva 20
Switzerland
Tel.: +41 22 919 02 11
info@iec.ch
www.iec.ch

Institute of Electrical and Electronics Engineers, Inc.
3 Park Avenue
New York, NY 10016-5997
United States of America
stds.ipr@ieee.org
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INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

ICS 17.220.20

ISBN 978-2-8322-0123-7

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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FREQUENCY FIELDS FROM WIRELESS DEVICES IN CLOSE PROXIMITY
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106/565/FDIS	106/570/RVD

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INTRODUCTION

This document provides methods to evaluate incident power density exposures due to any electromagnetic field (EMF) transmitting device intended to be used at a position near the human head or body, or mounted on the body, combined with other transmitters within a product, or embedded in garments. The device categories covered include but are not limited to mobile telephones, radio transmitters in personal computers, and desktop and laptop devices. This document also addresses multi-band and multi-antenna devices. The overall applicable frequency range is from 6 GHz to 300 GHz. This document specifies:

- measurement system (Clause 6);
- power density measurement protocols (Clause 7);
- uncertainty evaluation (Clause 8);
- measurement report (Clause 9);
- system checks and system validation (Annex B).

To develop this document, IEC Technical Committee 106 (TC 106) and Technical Committee 34 (TC 34) Subcommittee 1 (SC 1) of IEEE International Committee on Electromagnetic Safety (ICES) formed Joint Working Group 12 (JWG 12) on measurement methods to assess the power density of electromagnetic fields from wireless devices in close proximity to the head and body.

This document is partly based on IEC TR 63170:2018.

NOTE System validation tests are specified in Annex B for 10 GHz, 30 GHz, 60 GHz, and 90 GHz to cover the frequency range from 6 GHz to 110 GHz. Additional validation antennas to cover the frequency range up to 300 GHz will be developed in a future revision of this document. Further discussion on rationales is given in Annex I.

ASSESSMENT OF POWER DENSITY OF HUMAN EXPOSURE TO RADIO FREQUENCY FIELDS FROM WIRELESS DEVICES IN CLOSE PROXIMITY TO THE HEAD AND BODY (FREQUENCY RANGE OF 6 GHz TO 300 GHz) –

Part 1: Measurement procedure

1 Scope

This document specifies protocols and test procedures for repeatable and reproducible measurements of power density (PD) that provide conservative estimates of exposure incident to a human head or body due to radio-frequency (RF) electromagnetic field (EMF) transmitting communication devices, with a specified measurement uncertainty. These protocols and procedures apply for exposure evaluations of a significant majority of the population during the use of hand-held and body-worn RF transmitting communication devices. The methods apply for devices that can feature single or multiple transmitters or antennas, and can be operated with their radiating structure(s) at distances up to 200 mm from a human head or body.

The methods of this document can be used to determine conformity with applicable maximum PD requirements of different types of RF transmitting communication devices being used in close proximity to the head and body, including if combined with other RF transmitting or non-transmitting devices or accessories (e.g. belt-clip), or embedded in garments. The overall applicable frequency range of these protocols and procedures is from 6 GHz to 300 GHz.

The RF transmitting communication device categories covered in this document include but are not limited to mobile telephones, radio transmitters in personal computers, desktop and laptop devices, and multi-band and multi-antenna devices.

NOTE 1 System validation tests are specified in Annex B for 10 GHz, 30 GHz, 60 GHz, and 90 GHz to cover the frequency range from 6 GHz to 110 GHz. Additional validation antennas to cover the frequency range up to 300 GHz will be developed in a future revision of this document. Further discussion on rationales is given in Annex I.

NOTE 2 The protocols and test procedures in this document can be adapted to evaluate exposure also due to non-communication types of devices operating in close proximity to the head and body, but these devices are not in the scope of this document.

NOTE 3 For the assessment of the combined exposure from simultaneous transmitters operating on frequencies below 6 GHz, the relevant standards for SAR measurements are IEC/IEEE 62209-1528:2020 and IEC/IEEE 62209-3:2019 [1].

NOTE 4 Between 6 GHz and 10 GHz, the scopes of this document and IEC/IEEE 62209-1528:2020 overlap. According to ICNIRP [2] guidelines and IEEE ICES C95.1 [3] standard, power density is the conformity metric in this frequency range. SAR can be used as conformity metric if local regulatory requirements allow it. (e.g. in case where a single transmit band includes test channels at both below and above 6 GHz).

The procedures of this document do not apply for EMF measurements of devices or objects intended to be implanted in the body.