IEC PAS 63446

Edition 1.0 2022-10

PUBLICLY AVAILABLE SPECIFICATION

Conversion method of specific absorption rate to absorbed power density for the assessment of human exposure to radio frequency electromagnetic fields from wireless devices in close proximity to the head and body – Frequency range of 6 GHz to 10 GHz

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 17.220.20

ISBN 978-2-8322-5854-5

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CONVERSION METHOD OF SPECIFIC ABSORPTION RATE TO ABSORBED POWER DENSITY FOR THE ASSESSMENT OF HUMAN EXPOSURE TO RADIO FREQUENCY ELECTROMAGNETIC FIELDS FROM WIRELESS DEVICES IN CLOSE PROXIMITY TO THE HEAD AND BODY – FREQUENCY RANGE OF 6 GHZ TO 10 GHZ

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IEC PAS 63446 has been processed by IEC technical committee 106: Methods for the assessment of electric, magnetic and electromagnetic fields associated with human exposure.

The text of this PAS is based on the following document:	This PAS was approved for publication by the P-members of the committee concerned as indicated in the following document
Draft PAS	**Report on voting**
106/572/DPAS	106/580/RVDPAS

Following publication of this PAS, which is a pre-standard publication, the technical committee or subcommittee concerned may transform it into an International Standard.

This PAS shall remain valid for an initial maximum period of 2 years starting from the publication date. The validity may be extended for a single period up to a maximum of 2 years, at the end of which it shall be published as another type of normative document, or shall be withdrawn.

This document contains supplemental files that are detailed in Annex D. These files can be downloaded from https://www.iec.ch/tc106/supportingdocuments.

INTRODUCTION

This document provides the method to conservatively evaluate the area averaged electromagnetic (EM) power density entering the human body, i.e. the absorbed power density (APD), for communication devices 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. The applicable frequency range is from 6 GHz to 10 GHz.

This document specifies:

- conversion of the psSAR to the psAPD (Clause 6);
- uncertainty estimation (Clause 7);
- reporting requirements (Clause 8);
- methods of validation and system check (Annex C)

The measurement and computational standards IEC/IEEE 63195-1:2022 [1][1] and IEC/IEEE 63195-2:2022 [2] for incident power density (IPD) cover the frequency range from 6 GHz to 300 GHz. Hence there is a frequency overlap from 6 GHz to 10 GHz between this document on APD and the IEC/IEEE standards addressing IPD. The committee was aware of this fact and opted for enhanced flexibility by providing methods for basic restriction metric APD in addition to reference level metric IPD.

[1] Numbers in square brackets refer to the Bibliography.

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1 Scope

This document specifies a conversion method for the assessment of the peak spatial-average absorbed power density ($psAPD$) in the human head and body due to exposure to radio frequency (RF) electromagnetic fields (EMF) from wireless communication devices, with a specified conversion uncertainty. This conversion method is based on specific absorption rate (SAR) values and is specified with the objective to yield conservative and reproducible absorbed power density values of the exposure for a significant majority of the population during the use of hand-held, body-worn or any other RF transmitting communication devices that can operate in close proximity to a human head or body. This conversion method applies for devices that can feature single or multiple transmitters and/or antennas and can be operated with their radiating structure(s) at distances up to 200 mm from a human head or body.

The conversion method of this document can be employed to determine conformity with applicable absorbed power density or epithelial power density limits, such as those defined in ICNIRP guidelines 2020 [3] and IEEE Std C95.1™-2019 [4], of different types of RF transmitting communication devices being used in close proximity to the head and body. The assessment of $psAPD$ is based on the conversion of the peak spatial-average specific absorption rate (psSAR) values assessed according to applicable international standards. The applicable frequency range of the conversion method of this document is 6 GHz to 10 GHz.

NOTE Applicable international standards for the assessment of the psSAR are those accepted by the local regulatory body or specified in the CENELEC product standards. Such international standards include, e.g. IEC/IEEE 62209-1528 and IEC 62209-3 [5] for measurement methods, and IEC/IEEE 62704-1 [6] and IEC/IEEE 62704-4 [7] for computational methods. The frequency range of [5], [6] and [7] is limited up to 6 GHz. While the applicability of the methods of [5] for the frequency range of this document may need further verification, the numerical standards [6] and [7].may be applied for frequencies up to 10 GHz.

The categories of RF transmitting communication devices covered in this document include but are not limited to mobile telephones, radio transmitters in personal computers, and desktop and laptop devices or devices embedded in garments, using single or multiple transmitters and/or antennas, when operating within the frequency range indicated above.

The conversion method of this document does not apply for EMF evaluation of exposure from the devices or objects intended to be implanted in the body, such as active or passive implanted medical devices.

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/IEEE 62209-1528:2020, *Measurement procedure for the assessment of specific absorption rate of human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices – Part 1528: Human models, instrumentation and procedures (Frequency range of 4 MHz to 10 GHz)*