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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 2: Computational procedure

Táto norma obsahuje anglickú verziu európskej normy.  
This standard includes the English version of the European Standard.

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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 2:  
Computational procedure  
(IEC/IEEE 63195-2:2022)

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  
2: Procédure de calcul  
(IEC/IEEE 63195-2:2022)

Bewertung der Leistungsdichte der Exposition des  
Menschen gegenüber hochfrequenten Feldern von  
drahtlosen Geräten in unmittelbarer Nähe des Kopfes und  
des Körpers (Frequenzbereich von 6 GHz bis 300 GHz) -  
Teil 2: Berechnungsverfahren  
(IEC/IEEE 63195-2:2022)

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<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC/IEEE 62704-1	2017	Determining the peak spatial-average specific absorption rate (SAR) in the human body from wireless communications devices, 30 MHz to 6 GHz - Part 1: General requirements for using the finite difference time-domain (FDTD) method for SAR calculations	-	-
IEC/IEEE 62704-4	2020	Determining the peak spatial-average specific absorption rate (SAR) in the human body from wireless communication devices, 30 MHz to 6 GHz - Part 4: General requirements for using the finite element method for SAR calculations	-	-
IEC/IEEE 63195-1	2022	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	EN IEC/IEEE 63195-1	2023
IEEE 145	-	Definitions of terms for antennas	-	-



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# 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 2: Computational 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 2: Procédure de calcul**



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# 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 2: Computational 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 2: Procédure de calcul**

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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

**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 2: Computational procedure**

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This document is published as an IEC/IEEE Dual Logo standard.

This publication contains supplemental files that are required for the code verification according to Annex A. Download links and checksums for these files can be found in Annex I.

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

Draft	Report on voting
106/564/FDIS	106/569/RVD

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

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## INTRODUCTION

This document provides a method to evaluate the human exposure from wireless devices using computational methods. This document was developed to provide procedures for the numerical modelling and evaluation of such wireless devices operating close to the head, held in the hand or in front of the face, mounted on the body or embedded in garments. It applies to individual transmitters as well as to transmitters operating simultaneously with other transmitters within a product. The choice of technique, i.e. FDTD or FEM, is optional but can be influenced by the application. The advantages of computational procedures include the capability to provide repeatable, non-intrusive methods for determining exposure in or near an object and without the need for expensive hardware equipment. Device categories covered include but are not limited to mobile telephones, radio transmitters in personal computers, desktop and laptop devices, and multi-band and multi-antenna devices. This document specifies:

- requirements on the numerical software (Clause 5);
- model development and validation (Clause 7);
- power density computation and averaging (Clause 8);
- uncertainty evaluation (Clause 9);
- reporting requirements (Clause 10).

To develop this document, IEC Technical Committee 106 (TC 106) and IEEE International Committee on Electromagnetic Safety (ICES), Technical Committee 34 (TC 34) Subcommittee 1 (SC 1) formed Joint Working Group 11 (JWG 11) on computational methods to assess the power density of human exposure to radio frequency fields from wireless devices in close proximity to the head and body.

# 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 2: Computational procedure

### 1 Scope

This document specifies computational procedures for conservative and reproducible computations of power density (PD) incident to a human head or body due to radio-frequency (RF) electromagnetic field (EMF) transmitting devices. The computational procedures described are finite-difference time-domain (FDTD) and finite element methods (FEM), which are computational techniques that can be used to determine electromagnetic quantities by solving Maxwell's equations within a specified computational uncertainty. The procedures specified here apply to exposure evaluations for a significant majority of the population during the use of hand-held and body-worn RF transmitting devices. The methods apply to devices that can feature single or multiple transmitters or antennas, and that can be operated with their radiating part or parts at distances up to 200 mm from a human head or body.

This document can be employed to determine conformity with any applicable maximum PD requirements of different types of RF transmitting devices used in close proximity to the head and body, including those 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 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.

The procedures of this document do not apply to PD evaluation of electromagnetic fields emitted or altered by devices or objects intended to be implanted in the body.

NOTE For the evaluation of the combined exposure from simultaneous transmitters operating on frequencies below 6 GHz, the relevant standards for SAR computation are IEC/IEEE 62704-1:2017 and IEC/IEEE 62704-4:2020.

### 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 62704-1:2017, *Determining the peak spatial-average specific absorption rate (SAR) in the human body from wireless communications devices, 30 MHz to 6 GHz – Part 1: General requirements for using the finite difference time-domain (FDTD) method for SAR calculations*

IEC/IEEE 62704-4:2020, *Determining the peak spatial-average specific absorption rate (SAR) in the human body from wireless communications devices, 30 MHz to 6 GHz – Part 4: General requirements for using the finite element method for SAR calculations*



IEC/IEEE 63195-1:2021<sup>1</sup>, *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*

IEEE Std 145, *IEEE Standard for Definitions of Terms for Antennas*

**koniec náhľadu – text ďalej pokračuje v platenej verzii STN**