P62704-1a

Submitter Email: christ@itis.ethz.ch
Type of Project: Amendment to IEEE Standard 62704-1-2017
PAR Request Date: 16-Oct-2018
PAR Approval Date: 05-Dec-2018
PAR Expiration Date: 31-Dec-2022
Status: PAR for an Amendment to an existing IEEE Standard
Root Project: 62704-1-2017

1.1 Project Number: P62704-1a
1.2 Type of Document: Standard
1.3 Life Cycle: Full Use

2.1 Title: IEC/IEEE International Standard for Determining the Peak Spatial Average Specific Absorption Rate (SAR) in the Human Body from Wireless Communications Devices, 30 MHz - 6 GHz. Part 1: General Requirements for using the Finite Difference Time Domain (FDTD) Method for SAR Calculations
Amendment 1 Extension of the SAR Spatial Averaging Algorithm for Equivalence to the Procedure Defined in the IEEE 1528 and IEC 62209-1 Standards

3.1 Working Group: SAR evaluation - numerical techniques (SASB/SCC39/TC34_SC2)
Contact Information for Working Group Chair
Name: jafar keshvari
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Contact Information for Working Group Vice-Chair
None

3.2 Sponsoring Society and Committee: IEEE-SASB Coordinating Committees/SCC39 - International Committee on Electromagnetic Safety (SASB/SCC39)
Contact Information for Sponsor Chair
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None

4.1 Type of Ballot: Individual
4.2 Expected Date of submission of draft to the IEEE-SA for Initial Sponsor Ballot: 12/2019
4.3 Projected Completion Date for Submittal to RevCom
Note: Usual minimum time between initial sponsor ballot and submission to Revcom is 6 months.: 05/2021

5.1 Approximate number of people expected to be actively involved in the development of this project: 10
5.2.a. Scope of the complete standard: The scope of this standard is to define the methodology for the application of the finite difference time domain (FDTD) technique when used for determining the peak spatial-average specific absorption rate (SAR) in the human body exposed to wireless communication devices with known uncertainty. It defines methods to validate the numerical model of the device under test (DUT) and to assess its uncertainty when used in SAR simulations. Moreover, it defines procedures to determine the peak spatial average SAR in a cubical volume and to validate the correct implementation of the FDTD simulation software. This document will not recommend specific SAR limits since these are found elsewhere, e.g., in the guidelines published by the International Commission on Non-Ionizing Radiation Protection (ICNIRP) or in IEEE C95.1.

5.2.b. Scope of the project: The IEC/IEEE 62704-1 standard algorithm for the calculation of the peak spatial-average Specific Absorption Rate (psSAR) in a cubical volume of a certain mass is largely based on the method proposed in IEEE C95.3 and traditionally used in the FDTD community. This algorithm is equally applicable to SAR averaging in the arbitrarily shaped objects with both homogeneous and heterogeneous material composition (e.g., homogeneous phantoms or anatomical human body models). Such generalization of the algorithm required distinguishing among many different cases of integrating the material density in order to arrive at the target mass of the averaging volume and numerical interpolation of the local field

strength and tissue properties. In addition, in the current algorithm the psSAR averaging cubical volumes are tied to the Cartesian FDTD grid of the computational domain both in terms of orientation and spatial sampling resolution. Because of this, when applied to the phantoms defined in the experimental SAR assessment standards (IEEE 1528, IEC 62209-1) there is a level of inconsistency between the numerical and measurements SAR averaging procedures as well as potential for unnecessary oversampling of the averaging volume. This may significantly reduce efficiency of the current averaging algorithm to the point where psSAR processing time easily exceeds the time of the original electromagnetic field simulations. On the other hand the experimental SAR averaging algorithm defined in IEEE 1528 and IEC 62209-1 always aligns the averaging volume cube with the phantom surface. This discrepancy may lead to ambiguities between experimentally and numerically assessed psSAR. The objective of this amendment is to reduce the computational effort of the SAR averaging algorithm and establish full equivalency with the experimental algorithm defined in IEEE 1528 and IEC 62209-1.

5.3 Is the completion of this standard dependent upon the completion of another standard: No
5.4 Purpose: This document will not include a purpose clause.
5.5 Need for the Project: IEC/IEEE 62704-1 defines a numerical algorithm for the calculation of the peak spatial average specific absorption rate (psSAR) based on results from FDTD simulations of anatomical models of the human body or dosimetric phantoms. The algorithm is computationally expensive and not identical to the algorithms defined in the respective experimental standards. The latter may lead to ambiguities when comparing numerical and experimental results. The proposed amendment has the objective to develop improved methods with significantly increased computational efficiency that are compatible to those of the experimental standards when applied on dosimetric phantoms. Further details can be found in Section 8.1 of this PAR.

5.6 Stakeholders for the Standard: Telecommunication industry, manufacturers, regulatory agencies, and software developers.

Intellectual Property
6.1.a. Is the Sponsor aware of any copyright permissions needed for this project?: No
6.1.b. Is the Sponsor aware of possible registration activity related to this project?: No

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7.1 Are there other standards or projects with a similar scope?: No
7.2 Joint Development
Is it the intent to develop this document jointly with another organization?: No

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8.1 Additional Explanatory Notes: #5.2.A: The amendment does not change the scope of the standard. Hence, the scope of the complete standard is identical to the original one.

IEEE C95.1 - IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz

IEEE 1528 - IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques

IEC 62209-1 - 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 1: Devices used next to the ear (Frequency range of 300 MHz to 6 GHz)