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AMENDMENT 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 1528: Human models, instrumentation, and procedures (Frequency range of 4 MHz to 10 GHz)

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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)

AMENDMENT 1

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Amendment 1 to IEC/IEEE 62209-1528:2020 has been prepared by IEC technical committee 106: Methods for the assessment of electric, magnetic and electromagnetic fields associated with human exposure, in cooperation with the International Committee on Electromagnetic Safety of the IEEE Standards Association, under the IEC/IEEE Dual Logo Agreement between IEC and IEEE.

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

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

Draft	Report on voting
106/738/FDIS	106/747/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 Amendment is English.

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– reconfirmed,
– withdrawn, or
– revised.

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3 Terms and definitions

Add the following new term:

3.57
dynamic power control and exposure time averaging
DPC-ETA
algorithms used in RF modem chipset of wireless devices to ensure SAR compliance for continuous exposure based on time-averaged power over a specified time window duration

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4 Symbols and abbreviated terms

4.3 Abbreviated terms

Add the following new abbreviated terms:

BER	Bit error rate
DPC-ETA	Dynamic power control and exposure time averaging
PER	Packet error rate

7 Protocol for SAR assessment

7.2 Measurement preparation

7.2.4 Positioning of the DUT relative to the phantom

7.2.4.1.2 DUT-to-phantom separation distance

Replace the existing text with the following new text:

When measuring against the flat phantom, the DUT-to-phantom separation distance is set according to the following hierarchy:

a) If national regulatory requirements specify the DUT separation distance to the phantom, the DUT shall be positioned accordingly.
b) "Intended use distance" specified by device manufacturer: If there are no regulatory requirements, the intended use condition or distance specified by the manufacturer shall be used. This information shall be aligned with the user documentation of the DUT.
c) Default separation distance: If there are neither regulatory requirements nor a manufacturer specification of an intended use distance, the DUT shall be measured with each accessible face in direct contact with the surface of the phantom.

The applicable separation distance is determined with the optional carrying accessory attached to the DUT, when such condition is tested; see 7.2.4.1.5.

NOTE Calibrated gauge blocks or similar can be used to ensure repeatable and precise positioning at the applicable separation distance.

7.6 Time-period averaged SAR consideration

Replace the existing text with the following new text:

7.6.1 General

Subclause 7.6 specifies the test procedures for assessing the time-period averaged SAR (TPAS) when the DUT uses time-period averaged power control algorithms, i.e. dynamic power control and exposure time averaging (DPC-ETA) algorithms (see 7.6.3, also [143]). The applicable time-averaging period is specified in various international guidelines. Requirements and a procedure for assessing the TPAS are provided in 7.6.2 to 7.6.4 (see NOTE 1). The procedure shall be applied if the following requirements are met:

a) The power control algorithms in the DUT shall not be alterable or accessible by the user.

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b) Sufficient documentation about the power control algorithms and their implementation shall be provided. The time-averaged output power P_{limit} of each test condition, set by the algorithm, shall be validated to result in conservative exposure, i.e. that the device is capable of dynamically managing the time-averaged output power in use conditions like call drop, dynamic power changes, and handovers and change in telecommunication technology, change in modulation, change in DUT antenna, starting or restarting the DUT, and influence of accessories, so that the P_{limit} is not exceeded. The DUT used for these validation tests shall be electrically identical to and support the same software implementation with respect to the time-averaging algorithm or algorithms and RF parameters as the final production device. Validation of DPC-ETA algorithms can be done by conducted power measurements, radiated power measurements, or SAR measurements.

c) In case of software or hardware failure, the output power of the algorithm shall default to P_{limit} (see Figure 29).

If the preceding requirements are not met, the SAR shall be assessed at the maximum output power level, in accordance with 7.4.

NOTE 1 The procedures described in 7.6.2 to 7.6.4 are used for testing devices with dynamic power control. In other words, their output power is dynamically controlled based on changes in the network and transmission conditions and use conditions: instantaneous and time-averaged output power, frequency band, presently active transmission antenna, device position (head or body), etc.

NOTE 2 In addition, IEC TR 63424-1:2024 [143] provides detailed guidance on the validation of DPC-ETA algorithms.

NOTE 3 It is possible that the applicable regulations include detailed guidance and requirements to validate DPC-ETA algorithms.

NOTE 4 Time-period averaged SAR procedures are no longer based on the evaluation of a TX factor, as done in IEC/IEEE 62209-1528:2020. The approach of this document is more versatile than applying a (TX) scaling factor, for example when evaluating simultaneous transmission or multiple inputs from proximity or motion sensors.

NOTE 5 While not used in IEC TR 63424-1:2024 [143], the term, definition, and abbreviation TPAS are retained in this document for consistency with IEC/IEEE 62209-1528:2020, but is subject to change in the next revision.

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7.6.2 Exposure conditions and test positions

The TPAS shall be assessed separately for each frequency band and operating mode. Two approaches are considered, depending on whether the device is capable of detecting and distinguishing its usage position, e.g. by detecting head and body-worn positions according to audio routing to the earpiece of a device during an audio (voice) call.

a) If the different usage positions are not detected and not distinguished by the device, the maximum time-averaged output power setting and corresponding TPAS among all applicable test/use positions and conditions, including all head, body-worn, and other positions, shall be used to determine compliance.

   NOTE This step a) is the most conservative and simple approach that applies to all use conditions.

b) Otherwise, the SAR test positions may be grouped as follows:

   1) Head test positions: The maximum time-averaged output power setting and corresponding TPAS among all head test positions (left cheek, left tilt, right cheek, and right tilt), corresponding to voice calls, are used to assess the head exposure.

   2) Body-worn and other test positions: The maximum time-averaged output power setting and corresponding TPAS among all other applicable test positions, when there is no voice call, are used to assess the body exposure.

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7.6.3 SAR measurements

SAR shall be measured for all required test positions and conditions as specified in 7.2.4, and for each test condition set by the DPC-ETA algorithm, resulting in different SAR levels. The output power shall be set to the time-averaged output power level P_{limit} of the DPC-ETA algorithm. The time-averaged output power levels used shall be reported for all test conditions. These TPAS results are the maximum assessed values. See Figure 29 for illustration of P_{limit}, other relevant DPC-ETA algorithm parameters, and the output power characteristics.

NOTE For all measurements in Figure 29, the power is the RMS power averaged over a duration long enough to include the signal modulation characteristics. For a TDD signal, this is the RMS power averaged over all time slots in a frame. The instantaneous power, P_{instant}, is instantaneous with respect to the DPC-ETA algorithm, i.e. it is the RMS power averaged over the modulation characteristics at any time instant. The average power, P_{average}, is the average of P_{instant} over the averaging window.

During SAR measurements, the DPC-ETA power control algorithms shall be disabled if supported by the DUT. Disabling the power control algorithms typically requires a specific radio configuration on the DUT, using specific test samples or specific test methods.

If the DUT does not support disabling the power control algorithm at the maximum output power level, the SAR shall be measured at a lower output power where the power control algorithm does not limit or change the power during measurement, and the measured psSAR shall be scaled to correspond to P_{limit}.

Another way of setting the output transmit power to the time-averaged output power level P_{limit} typically requires specific test samples where this power is set as maximum instantaneous power, to support repeatable power level-setting during SAR testing, especially when transmission is controlled by a base station simulator. Measurements shall be performed in an environment that prevents uncontrolled variations in the link budget over time.

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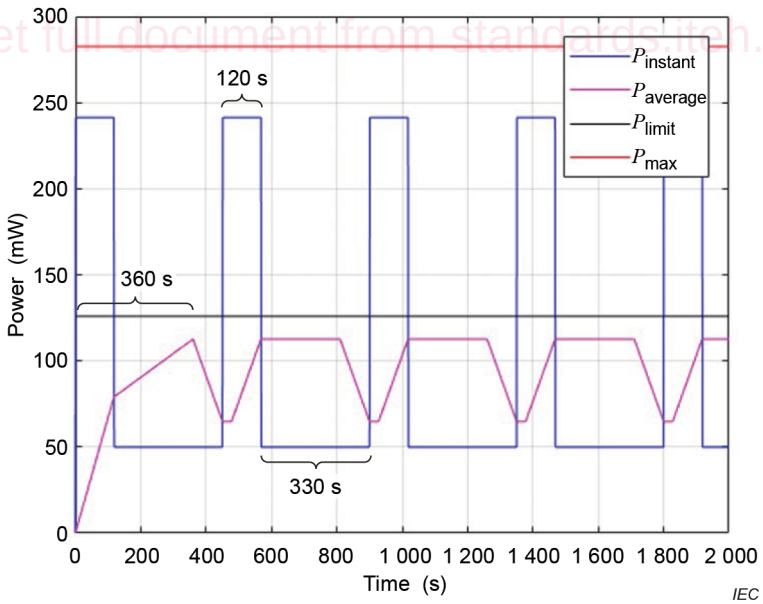

P_{instant} instantaneous output power recorded by the RF modem or measured during algorithm validation

P_{average} time-averaged output power calculated within a time-averaging window (set to 360 s in this example)

P_{limit} maximum time-averaged output power allowed for continuous exposure

P_{max} maximum instantaneous output power that a transmitter supports for the intended operations

Figure 29 – Example illustration of the output power characteristics of a simple TPAS implementation

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