

TEST REPORT

Test Report No.: 1-2154-25-01-11_TR1-R04



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Akkreditierungsstelle
D-PL-12047-01-00

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The testing laboratory (area of testing) is accredited according to DIN EN ISO/IEC 17025 (2018-03) by the Deutsche Akkreditierungsstelle GmbH (DAkkS).

The accreditation is valid for the scope of testing procedures as stated in the accreditation certificate with the registration number: D-PL-12047-01-00.

ISED Testing Laboratory Recognized Listing Number: DE0001

FCC designation number: DE0002

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Test Standards

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)

RSS-102 Issue 6

Radio Frequency Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)

For further applied test standards please refer to section 3 of this test report.

Test Item

Kind of test item:

Laboratory Instrument

Device type:

desktop device

Model name:

IONIC Titrator

S/N serial number:

001000939367

FCC-ID:

2ACG6-CCIMX8

ISED Number:

12034A-CCIMX8

Product Marketing Name (PMN):

CC8X

Hardware Version Identification No. (HVIN):

CC8X

HMN:

IONIC Titrator

IMEI-Number:

358088754620063

Hardware status:

Metrohm: 3002000400 v05 Digi: ConnectCore 8X, Variant 0x02, SoM RevD, SoC RevC0

Software status:

IONICTitratorImage: 0.3.23-Release

Frequency:

see technical details

Antenna:

integrated antennas

Power supply:

230 V AC by mains

Test sample status:

Pre-production

Exposure category:

general population / uncontrolled environment

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1 Table of contents

1	Table of contents	2
2	General information	4
2.1	Notes and disclaimer	4
2.2	Application details	4
2.3	Statement of compliance	4
2.4	Technical details	5
2.5	Transmitter and Antenna Operating Configurations	6
3	Test standards/ procedures references	6
3.1	RF exposure limits	7
4	Reporting statements of conformity – decision rule	8
5	Summary of Measurement Results	8
6	Test Environment	8
7	Test Set-up	9
7.1	Measurement system	9
7.1.1	System Description	9
7.1.2	Test environment	10
7.1.3	Probe description	10
7.1.4	Phantom description	11
7.1.5	Laptop Extension Kit for Device holder	11
7.1.6	Scanning procedure	12
7.1.7	Spatial Peak SAR Evaluation	16
7.1.8	Data Storage and Evaluation	18
7.1.9	Tissue simulating liquids: dielectric properties	20
7.1.10	Tissue simulating liquids: parameters	20
7.1.11	Measurement uncertainty evaluation for SAR test	22
7.1.12	Measurement uncertainty evaluation for System Check	24
7.1.13	System check	25
7.1.14	System check procedure	26
7.1.15	System validation	26
8	Detailed Test Results	27
8.1	Conducted power measurements	27
8.1.1	Justification of SAR measurements in LTE mode	27
8.1.2	MPR information in LTE mode	27
8.1.3	Conducted power measurements WLAN 2.4 GHz	28
8.1.4	Conducted power measurements WLAN 5 GHz	30
8.1.5	Radiated output power measurements Bluetooth LE 2.4 GHz	37
8.2	SAR test results	38
8.2.1	General description of test procedures	38
8.2.2	Results overview	39
8.2.3	Multiple Transmitter Information	44
8.2.3.1	Multi-TX SAR Measurement Alternatives	46
8.2.4	SAR correction for deviations of complex permittivity from targets	47
9	Test equipment and ancillaries used for tests	48
10	Observations	48
Annex A:	System performance check	49
Annex B:	DASY measurement results	60
Annex B.1:	SAR results – LTE	60
Annex B.2:	SAR results – WLAN 2.4GHz	72
Annex B.3:	SAR results – WLAN 5GHz	74
Annex B.4:	SAR results – BLE 2.4GHz	76

Annex B.5: Liquid depth	77
Annex C: Photo documentation	77
Annex D: Calibration parameters	77
Annex E: RSS-102 Annex A	77
Annex F: Document History	78
Annex G: Further Information	78

2 General information

2.1 Notes and disclaimer

The test results of this test report relate exclusively to the test item specified in this test report. cetecom advanced GmbH does not assume responsibility for any conclusions and generalisations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item. The test report may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written approval of cetecom advanced GmbH.

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2.2 Application details

Date of receipt of order:	2026-04-20
Date of receipt of test item:	2026-06-29
Start of test:	2026-07-01
End of test:	2026-07-30

2.3 Statement of compliance

The SAR values found for the IONIC Titrator Laboratory Instrument are below the maximum recommended levels of 4 W/Kg as averaged over any 10 g tissue according to the FCC rule §2.1093, the Health Canada's Safety Code 6 and the Industry Canada Radio Standards Specification RSS-102 for General Population/Uncontrolled exposure.

2.4 Technical details

Band tested for this test report	Technology	Lowest transmit frequency/MHz	Highest transmit frequency/MHz	Lowest receive Frequency/MHz	Highest receive Frequency/MHz	Kind of modulation	Power Class	Tested power control level	Test channel low	Test channel middle	Test channel high	Maximum P _{avg} /dBm
☐	LTE FDD 1	1920	1980	2110	2170	QPSK	3	max	18100	18300	18500	23.76
☒	LTE FDD 2	1850	1910	1930	1990	QPSK	3	max	18700	18900	19100	22.78
☐	LTE FDD 3	1710	1785	1805	1880	QPSK	3	max	19300	19575	19850	24.12
☒	LTE FDD 4	1710	1755	2110	2155	QPSK	3	max	20050	20175	20300	23.56
☒	LTE FDD 5	824	849	869	894	QPSK	3	max	20450	20525	20600	22.25
☒	LTE FDD 7	2500	2570	2620	2690	QPSK	3	max	20850	21100	21350	22.89
☒	LTE FDD 8	880	915	925	960	QPSK	3	max	21500	21625	21750	22.62
☒	LTE FDD 12	704	711	734	741	QPSK	3	max	23060	23095	23130	23.12
☒	LTE FDD 13	777	787	746	756	QPSK	3	max	23205	23230	23255	22.72
☐	LTE FDD 18	815	830	860	875	QPSK	3	max	23900	23925	23950	23.50
☐	LTE FDD 19	830	845	875	890	QPSK	3	max	24050	24075	24100	22.15
☐	LTE FDD 20	832	862	791	821	QPSK	3	max	24250	24300	24350	22.67
☒	LTE FDD 26	814	849	859	894	QPSK	3	max	26765	26865	26965	23.66
☐	LTE FDD 28	703	748	758	803	QPSK	3	max	27310	27435	27560	22.66
☒	LTE TDD 38	2570	2620	2570	2620	QPSK	3	max	37850	38000	38150	23.43
☒	LTE TDD 41	2496	2690	2496	2690	QPSK	3	max	39750	40620	41490	22.79
☒	LTE FDD 66	1710	1780	2110	2200	QPSK	3	max	132072	132322	132572	22.72
☒	WLAN	2412	2462	2412	2462	CCK OFDM	--	max	1	6	9/11	11.0
☒	WLAN U-NII-1	5180	5240	5180	5240	OFDM	--	max	--	44	--	12.6
☒	WLAN U-NII-2	5260	5320	5260	5320	OFDM	--	max	--	60	--	12.6
☒	WLAN U-NII-2e	5500	5700	5500	5700	OFDM	--	max	108/112	124	132	11.7
☒	WLAN U-NII-3	5745	5825	5745	5825	OFDM	--	max	149	157/159	161/165	11.7
☒	BT LE	2402	2480	2402	2480	GFSK	3	max	0	19	39	6.6

2.5 Transmitter and Antenna Operating Configurations

Simultaneous transmission conditions		
	LTE	+ BLE
	LTE	+ WLAN 2.4GHz
	LTE	+ WLAN 5GHz

Table 1: Simultaneous transmission conditions

BLE¹ - Bluetooth low energy

3 Test standards/ procedures references

Test Standard	Version	Test Standard Description
RSS-102 Issue 6	2023-12	Radio Frequency Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)
Canada's Safety Code No. 6	2015-06	Limits of Human Exposure to Radiofrequency Electromagnetic Fields in the Frequency Range from 3 kHz to 300 GHz
IEEE Std. C95-3	2002	IEEE Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields – RF and Microwave
IEC/IEEE 62209-1528:2020	2020-10-19	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)

FCC KDBs:

KDB 865664D01v01	August 7, 2015	FCC OET SAR measurement requirements 100 MHz to 6 GHz
KDB 865664D02v01	October 23, 2015	RF Exposure Compliance Reporting and Documentation Considerations
KDB 447498D01v06	October 23, 2015	Mobile and Portable Devices RF Exposure Procedures and Equipment Authorization Policies
KDB 648474D04v01	October 23, 2015	SAR Evaluation Considerations for Wireless Handsets
KDB 941225D05v02	October 23, 2015	SAR for LTE Devices
KDB 248227D01v02	October 23, 2015	SAR Measurement Procedures for 802.11 a/b/g Transmitters

3.1 RF exposure limits

RF Exposure levels according CFR 47 – Part 1, §1.1310 / RSS 102 Issue 06 / safety Code 6:

Human Exposure	Uncontrolled Environment General Population	Controlled Environment Occupational
Spatial Peak SAR* (Brain and Trunk)	1.60 W/kg	8.00 W/kg
Spatial Average SAR** (Whole Body)	0.08 W/kg	0.40 W/kg
Spatial Peak SAR*** (Hands/Feet/Ankle/Wrist)	4.00 W/kg	20.00 W/kg

Table 2: RF exposure limits (100 kHz to 6 GHz)

The limit applied in this test report is shown in bold letters

Notes:

- * The Spatial Peak value of the SAR averaged over any 1 gram of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time
- ** The Spatial Average value of the SAR averaged over the whole body.
- *** The Spatial Peak value of the SAR averaged over any 10 grams of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.

Uncontrolled Environments are defined as locations where there is the exposure of individuals who have no knowledge or control of their exposure.

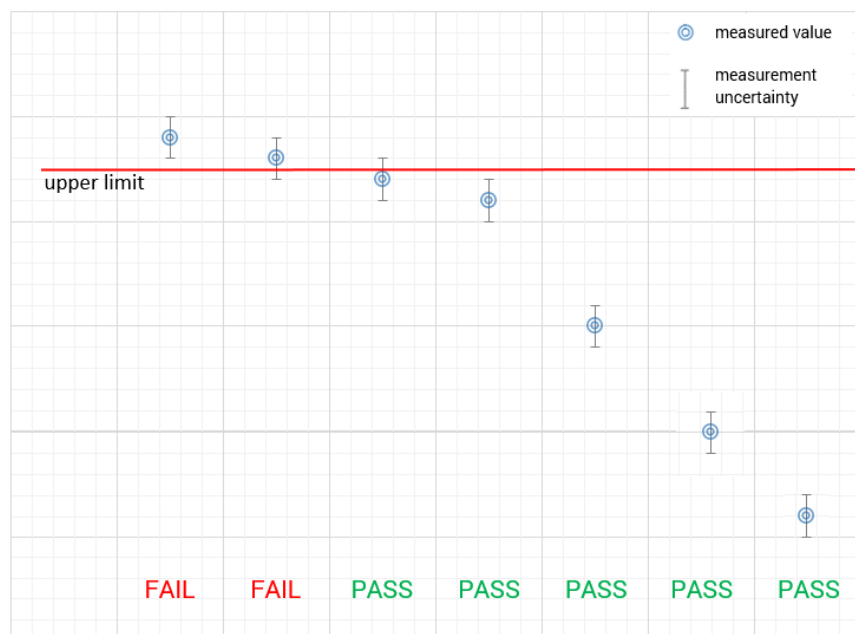
Controlled Environments are defined as locations where there is exposure that may be incurred by persons who are aware of the potential for exposure, (i.e. as a result of employment or occupation).

4 Reporting statements of conformity – decision rule

Only the measured values related to their corresponding limits will be used to decide whether the equipment under test meets the requirements of the test standards listed in chapter 3.

The measurement uncertainty is mentioned in this test report, see chapter 9, but is not taken into account - neither to the limits nor to the measurement results. Measurement results with a smaller margin to the corresponding limits than the measurement uncertainty have a potential risk of more than 20% that the decision might be wrong."

measured value, measurement uncertainty, verdict



5 Summary of Measurement Results

☒	No deviations from the technical specifications ascertained			
☐	Deviations from the technical specifications ascertained			
Maximum SAR _{10g} value reported (W/kg)				
		PCB	DTS	UNII
extremity 0 mm distance for 10g		1.054	0.358	0.202
collocated situations	ΣSAR _{10g} evaluation PCB & DTS	1.126		
	ΣSAR _{10g} evaluation PCB & UNII	1.208		

6 Test Environment

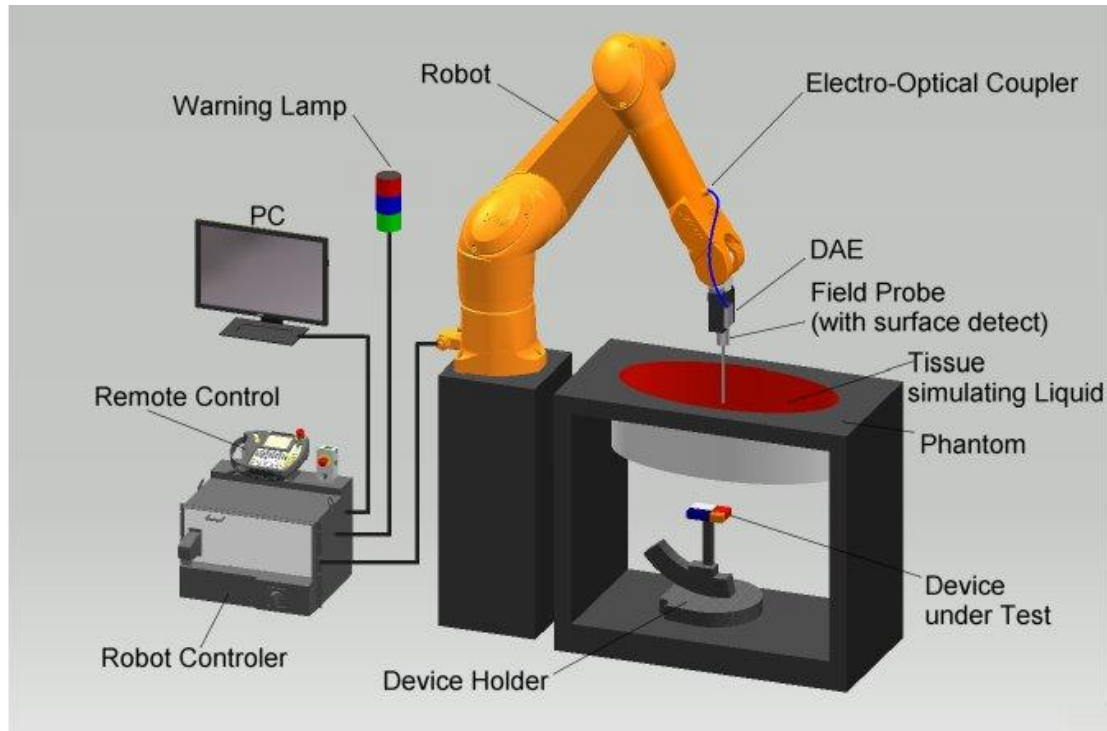
Ambient temperature:	20 – 24 °C
Tissue Simulating liquid:	20 – 24 °C
Relative humidity content:	40 – 50 %
Air pressure:	not relevant for this kind of testing
Power supply:	230 V / 50 Hz

NOTE: For the SAR measurements the exact temperature values for each test are shown in the SAR result tables and are also at the bottom of each measurement plot.

7 Test Set-up

7.1 Measurement system

7.1.1 System Description



- The DASY system for performing compliance tests consists of the following items:
- A standard high precision 6-axis robot (Stäubli RX family) with controller and software. An arm extension for accommodating the data acquisition electronics (DAE).
- A dosimetric probe, i.e. an isotropic E-field probe optimized and calibrated for usage in tissue simulating liquid. The probe is equipped with an optical surface detector system.
- A data acquisition electronic (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.
- A unit to operate the optical surface detector which is connected to the EOC.
- The Electro-Optical Coupler (EOC) performs the conversion from the optical into a digital electric signal of the DAE. The EOC is connected to the DASY measurement server.
- The DASY measurement server, which performs all real-time data evaluation for field measurements and surface detection, controls robot movements and handles safety operation. A computer operating Windows.
- DASY software and SEMCAD data evaluation software.
- Remote control with teach panel and additional circuitry for robot safety such as warning lamps, etc.
- The generic twin phantom enabling the testing of left-hand and right-hand usage.
- The device holder for handheld mobile phones.
- Tissue simulating liquid mixed according to the given recipes.
- System check dipoles allowing to validate the proper functioning of the system.

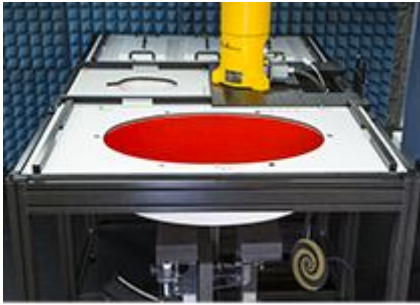
7.1.2 Test environment

The DASY measurement system is placed at the head end of a room with dimensions: 5 x 2.5 x 3 m³, the SAM phantom is placed in a distance of 75 cm from the side walls and 1.1m from the rear wall. Above the test system a 1.5 x 1.5 m² array of pyramid absorbers is installed to reduce reflections from the ceiling. Picture 1 of the photo documentation shows a complete view of the test environment. The system allows the measurement of SAR values larger than 0.005 W/kg.

7.1.3 Probe description

Isotropic E-Field Probe EX3DV4 for Dosimetric Measurements	
Technical data according to manufacturer information	
Construction	Symmetrical design with triangular core Interleaved sensors Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)
Calibration	ISO/IEC 17025 calibration service available.
Frequency	10 MHz to >6 GHz (dosimetry); Linearity: ± 0.2 dB (30 MHz to 6 GHz)
Directivity	± 0.3 dB in HSL (rotation around probe axis) ± 0.5 dB in tissue material (rotation normal to probe axis)
Dynamic range	10 μ W/g to > 100 W/kg; Linearity: ± 0.2 dB (noise: typically <1 μ W/g)
Dimensions	Overall length: 337 mm (Tip: 20mm) Tip length: 2.5 mm (Body: 12mm) Typical distance from probe tip to dipole centers: 1mm
Application	High precision dosimetric measurements in any exposure scenario (e.g., very strong gradient fields). Only probe which enables compliance testing for frequencies up to 6 GHz with precision of better 30%.

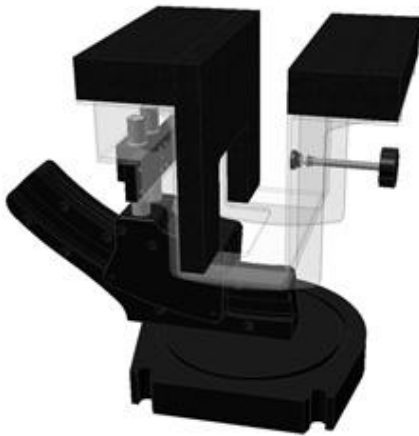
7.1.4 Phantom description



The used ELI Phantom is fully compatible with the IEC/IEEE 62209-1528 and all known tissue stimulating liquids. It meets the requirements specified in KDB865664 D01 for Specific Absorption Rate (SAR) measurements and is fully compatible with the standard IEC 62209-2. The phantom consists of a fibreglass shell integrated in a wooden table. The ELI phantom is intended for compliance testing of handheld and body-mounted wireless devices in the frequency range of 4MHz to 10 GHz.

7.1.5 Laptop Extension Kit for Device holder

SPEAG released a simple but effective extension for their Mounting Device that facilitates the testing of larger devices according to IEC 62209-2 (e.g., laptops, cameras, etc).



The extension is lightweight and made of POM, PET-G acrylic glass and foam. It fits easily on the upper part of the Mounting Device in place of the phone positioner.

Larger DUT's cannot be tested using this device holder. Instead a support of bigger polystyrene cubes and thin polystyrene plates is used to position the DUT in all relevant positions to find and measure spots with maximum SAR values.

7.1.6 Scanning procedure

- The DASY installation includes predefined files with recommended procedures for measurements and system check. They are read-only document files and destined as fully defined but unmeasured masks. All test positions (head or body-worn) are tested with the same configuration of test steps differing only in the grid definition for the different test positions.
- The „reference“ and „drift“ measurements are located at the beginning and end of the batch process. They measure the field drift at one single point in the liquid over the complete procedure. The indicated drift is mainly the variation of the DUT's output power and should vary max. +/- 5 %.
- The highest integrated SAR value is the main concern in compliance test applications. These values can mostly be found at the inner surface of the phantom and cannot be measured directly due to the sensor offset in the probe. To extrapolate the surface values, the measurement distances to the surface must be known accurately. A distance error of 0.5mm could produce SAR errors of 6% at 1800 MHz. Measurements can be performed in a fixed plane or by following an arbitrary surface.
- For an automatic and accurate detection of the phantom surface, the DASY system uses Mechanical Surface Detection:

Mechanical Surface Detection

Mechanical surface detection uses the probe collision detector built into the DAE. It is extremely accurate if the probe is normal to the surface (0.05 mm). For angled probes, the distance increases, because the detection is at the edge of the probe tip. It can be used in any liquid with any kind of probe. If the surface is strongly angled with respect to the probe, the probe slides along the surface and is deflected sideways. The second switch system in the DAE will detect this situation and the probe will move backward until the touch condition is cleared. However, there will be some remaining uncertainty in the final probe position. In the job description, the desired distance from the probe sensors to the phantom surface can be entered. The detection is always at touch, but the probe will move backward from the surface the indicated distance before starting the measurement.

Mother Scan in cDASY6/DASY8 Module SAR

The cDASY6/DASY8 Module SAR provides the possibility to do a Mother Scan in which a high resolution Area Scan is done in the phantom filled with liquid to a fixed level using a special teaching probe. This mother scan data is used to recreate the phantom inner surface in software, and all future area and/or zoom scans, and a surface detection check is no longer required.

- The „area scan“ measures the SAR above the DUT or verification dipole on a parallel plane to the surface. It is used to locate the approximate location of the peak SAR with 2D spline interpolation. The robot performs a stepped movement along one grid axis while the local electrical field strength is measured by the probe. The probe is touching the surface of the SAM during acquisition of measurement values. The scan uses different grid spacings for different frequency measurements. Standard grid spacing for head measurements in frequency ranges ≤ 2 GHz is 15 mm in x- and y- dimension. For higher frequencies a finer resolution is needed, thus for the grid spacing is reduced according the following table:

Area scan grid spacing for different frequency ranges	
Frequency range	Grid spacing
≤ 2 GHz	≤ 15 mm
2 – 4 GHz	≤ 12 mm
4 – 6 GHz	≤ 10 mm

Grid spacing and orientation have no influence on the SAR result. For special applications where the standard scan method does not find the peak SAR within the grid, e.g. mobile phones with flip cover, the grid can be adapted in orientation. Results of this coarse scan are shown in annex B.

- A „zoom scan“ measures the field in a volume around the 2D peak SAR value acquired in the previous „coarse“ scan. It uses a fine meshed grid where the robot moves the probe in steps along all the 3 axis (x, y and z-axis) starting at the bottom of the Phantom. The grid spacing for the cube measurement is varied according to the measured frequency range, the dimensions are given in the following table:

Zoom scan grid spacing and volume for different frequency ranges			
Frequency range	Grid spacing for x, y axis	Grid spacing for z axis	Minimum zoom scan volume
≤ 2 GHz	≤ 8 mm	≤ 5 mm	≥ 30 mm
2 – 3 GHz	≤ 5 mm*	≤ 5 mm	≥ 28 mm
3 – 4 GHz	≤ 5 mm*	≤ 4 mm	≥ 28 mm
4 – 5 GHz	≤ 4 mm*	≤ 3 mm	≥ 25 mm
5 – 6 GHz	≤ 4 mm*	≤ 2 mm	≥ 22 mm

* When zoom scan is required and the reported SAR from the area scan based 1-g SAR estimation procedures of KDB Publication 447498 is ≤ 1.4 W/kg, ≤ 8 mm, ≤ 7 mm and ≤ 5 mm zoom scan resolution may be applied, respectively, for 2 GHz to 3 GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz.

- DASY provides an auto-extending feature to expand the size of the measurement area of the zoom scan as long as the maximum is found too close to the edge of the measured range, which eliminates the need to re-measure cubes whose maximum is found on the boundary of the defined measurement cube.
- To meet the requirements of **IEC 62209-2 AMD1 from 2019** it is necessary to perform graded grid measurements to avoid measurement mistakes.

Below 3 GHz it defines:

Horizontal grid step ≤ 8 mm

Vertical grid step ≤ 5 mm for uniform spacing

For variable spacing in vertical direction the maximum distance between the two closest measured points to the phantom shell (M1 and M2) shall be ≤ 4 mm and the spacing between farther points shall increase by a factor ≤ 1.5 . Zoom Scan size ≤ 30 mm by 30 mm by 30 mm.

Above 3 GHz it defines:

Horizontal grid step $\leq (24/f \text{ [GHz]})$ mm

Vertical grid step $\leq (10/(f \text{ [GHz]} - 1))$ mm for uniform spacing

For variable spacing in vertical direction the maximum distance between the two closest measured points to the phantom shell (M1 and M2) shall be $\leq (12/f \text{ [GHz]})$ mm and the spacing between farther points shall increase by a factor ≤ 1.5 . Zoom Scan size ≤ 22 mm by 22 mm by 22 mm.

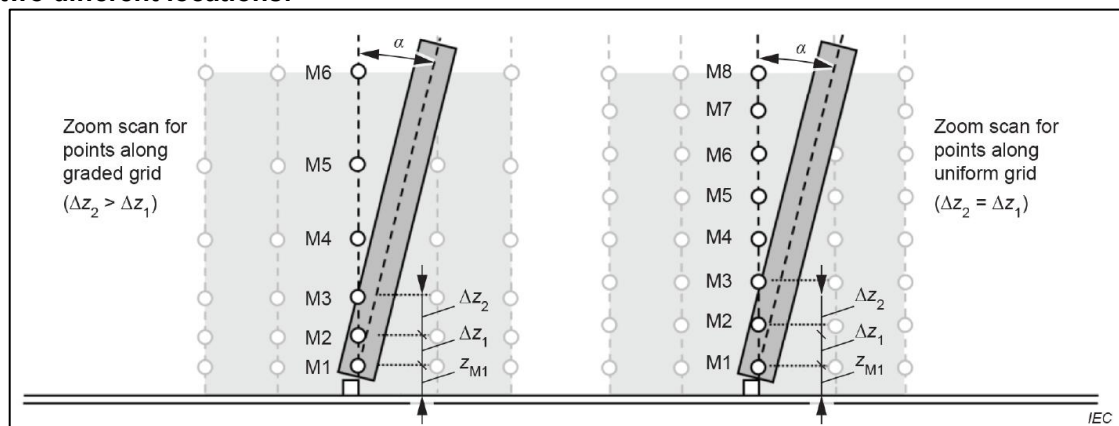
If the zoom scan measured as defined above complies with both of the following criteria, or if the peak spatial-average SAR is below 0.1 W/kg, no additional measurements are needed:

- the smallest horizontal distance from the local SAR peaks to all points 3 dB below the SAR peak shall be larger than the horizontal grid steps in both x and y directions (Δx , Δy). This shall be checked for the measured zoom scan plane conformal to the phantom at the distance z_{M1} . The minimum distance shall be recorded in the SAR test report;
- the ratio of the SAR at the second measured point (M2) to the SAR at the closest measured point (M1) at the x-y location of the measured maximum SAR value shall be at least 30 %. This ratio (in %) shall be recorded in the SAR test report.

If one or both of the above criteria are not met, the zoom scan measurement shall be repeated using a finer resolution while keeping the other zoom scan parameters compatible with the basic requirements for zoom scans.

New horizontal and vertical grid steps shall be determined from the measured SAR distribution so that the above criteria are met. Compliance with the above two criteria shall be demonstrated for the new measured zoom scan. The size of the higher resolution zoom scan and all other parameters shall apply. The closest point to the phantom shell shall be 2 mm or less for graded grids and the grading factor shall be 1.5 or less. Uncertainties due to field distortion between the media boundary and the dielectric enclosure of the probe should also be minimized, which is achieved if the distance between the phantom surface and physical tip of the probe is larger than the probe tip diameter. Other methods may utilize correction procedures to compensate for boundary effects that enable high precision measurements closer than half the probe tip diameter. For all measurement points, the angle of the probe normal to the flat phantom surface shall be less than 5° . If this cannot be achieved, an additional uncertainty evaluation is required.

Orientation of the probe with respect to the line normal to the phantom surface, shown at two different locations:



NOTE M1 to M8 are example measurement points used for extrapolation to the surface. The maximum of the angle α between the evaluation axis and the surface normal line is called the probe angle. The distance z_{M1} is from the phantom shell to the first measurement point M1, and its maximum value is 1.4mm fixed for the DASY system equipped with an EX-Probe. The distances Δz_i ($i = 1, 2, 3, \dots$) are the distances from measurement points M_i to M_{i-1} . For uniform grids, Δz_i are equal. For graded grids, $\Delta z_{i+1} > \Delta z_i$. $R_z = \Delta z_{i+1}/\Delta z_i$ is a ratio with a maximum value (defined in the table below). The z direction corresponds to the vertical direction, the x direction is horizontal and the y direction is horizontal into the page.

NOTE 1: The evaluation of the zoom scan is typically done by the post-processor by interpolation and extrapolation and without reconstruction of the field. More focused induced SAR distributions (e.g., for more localized sources such as capacitively coupled sources) require a more dense grid such that the same integration and extrapolation algorithms can be used for the same assessment uncertainty.

NOTE 2: The minimum ratio of 30 % is derived from the plane wave penetration depth at 6 GHz.

Detailed parameters can be seen in the following table:

Zoom scan parameters

Parameter	DUT transmit frequency being tested	
	$f \leq 3 \text{ GHz}$	$3 \text{ GHz} < f \leq 6 \text{ GHz}$ (f in GHz)
Maximum distance between the closest measured points and the phantom surface (z_{M1} in Figure 18 and Table 1, in mm)	5	$\delta \ln(2)/2^a$
Maximum angle between the probe axis and the phantom surface normal (α in Figure 20)	5° (flat phantom only) 30° (other phantoms)	5° (flat phantom only) 20° (other phantoms)
Maximum spacing between measured points in the x- and y-directions (Δx and Δy , in mm)	8	$24 / f^b$
For uniform grids: Maximum spacing between measured points in the direction normal to the phantom shell (Δz_1 in Figure 20, in mm)	5	$10 / (f - 1)$
For graded grids: Maximum spacing between the two closest measured points in the direction normal to the phantom shell (Δz_1 in Figure 20, in mm)	4	$12/f$
For graded grids: Maximum incremental increase in the spacing between measured points in the direction normal to the phantom shell ($R_z = \Delta z_2/\Delta z_1$ in Figure 20)	1.5	1.5
Minimum edge length of the zoom scan volume in the x- and y-directions (L_z in O.8.3.2, in mm)	30	22
Minimum edge length of the zoom scan volume in the direction normal to the phantom shell (L_h in O.8.3.2 in mm)	30	22
Tolerance in the probe angle	1°	1°

^a δ is the penetration depth for a plane-wave incident normally on a planar half-space.
^b This is the maximum spacing allowed, which might not work for all circumstances.

Minimum probe requirements as a function of frequency and parameters of the tissue equivalent liquid

1	2	3	4	5	6	7	8
Frequency MHz	Relative permittivity	Conductivity S/m	Wavelength in the medium (λ) mm	Plane wave Skin Depth (δ) mm	Maximum Diameter mm	50% Distance for M1 ($z_{50\%} = \delta \ln(2)/2$) mm	Min. distance for M1 (z_{M1}) mm
300	45.3	0.87	148.6	46.1	8.0	16.0	5.0
450	43.5	0.87	101.1	42.9	8.0	14.9	5.0
750	41.9	0.89	61.8	39.8	8.0	13.8	5.0
835	41.5	0.90	55.8	38.9	8.0	13.5	5.0
900	41.5	0.97	51.7	36.1	8.0	12.5	5.0
1450	40.5	1.20	32.5	28.6	8.0	9.9	5.0
1800	40.0	1.40	26.4	24.3	8.0	8.4	5.0
2000	40.0	1.40	23.7	24.2	8.0	8.4	5.0
2450	39.2	1.80	19.6	18.7	6.5	6.5	5.0
2600	39.0	1.96	18.5	17.2	6.2	5.9	5.0
3000	38.5	2.40	16.1	13.9	5.4	4.8	5.0
4000	37.4	3.43	12.3	9.6	4.1	3.3	3.3
5000	36.2	4.45	10.0	7.3	3.3	2.5	2.5
5200	36.0	4.66	9.6	7.0	3.2	2.4	2.4
5400	35.8	4.86	9.3	6.7	3.1	2.3	2.3
5600	35.5	5.07	9.0	6.4	3.0	2.2	2.2
5800	35.3	5.27	8.7	6.1	2.9	2.1	2.1
6000	35.1	5.48	8.4	5.9	2.8	2.0	2.0

Further probe parameters can be seen in Annex M of IEC 62209-2.

7.1.7 Spatial Peak SAR Evaluation

The cDASY6/DASY8 Module SAR software includes all numerical procedures necessary to evaluate the spatial peak SAR values. Based on the IEEE 1528 standard, a new algorithm has been implemented. The spatial-peak SAR can be computed over any required mass.

The base for the evaluation is a "cube" measurement in a volume of 30mm³ below 3GHz or 22mm³ above 3GHz. The measured volume must include the 1 g and 10 g cubes with the highest averaged SAR values. For that purpose, the center of the measured volume is aligned to the interpolated peak SAR value of a previously performed area scan. If the 10g cube or both cubes are not entirely inside the measured volumes, the system issues a warning regarding the evaluated spatial peak values within the post-processing engine. This means that if the measured volume is shifted, higher values might be possible. To get the correct values a finer measurement grid for the area scan is used. In complicated field distributions, a large grid spacing for the area scan might miss some details and give an incorrectly interpolated peak location. cDASY6/DASY8 Module SAR allows to automatically extend the grid to make sure that both cubes are inside the measured volume.

The entire evaluation of the spatial peak values is performed within the application in case of cDASY6/DASY8 Module SAR software. The system always gives the maximum values for the 1 g and 10 g cubes. The DASY6 software allow to automatically extend the grid to make sure that both cubes are inside the measured volume. The algorithm to find the cube with highest averaged SAR is divided into the following stages:

1. extraction of the measured data (grid and values) from the Zoom Scan
2. calculation of the SAR value at every measurement point based on all stored data (A/D values and measurement parameters)
3. generation of a high-resolution mesh within the measured volume
4. interpolation of all measured values from the measurement grid to the high-resolution grid
5. extrapolation of the entire 3-D field distribution to the phantom surface over the distance from sensor to surface
6. calculation of the averaged SAR within masses of 1 g and 10 g The significant parts are outlined in more detail within the following sections.

Interpolation, Extrapolation and Detection of Maxima

The probe is calibrated at the center of the dipole sensors which is located 1 to 2.7mm away from the probe tip. During measurements, the probe stops shortly above the phantom surface, depending on the probe and the surface detecting system. Both distances are included as parameters in the probe configuration file. The software always knows exactly how far away the measured point is from the surface. As the probe cannot directly measure at the surface, the values between the deepest measured point and the surface must be extrapolated.

The choice of the coordinate system defining the location of the measurement points has no influence on the uncertainty of the interpolation, Maxima Search and extrapolation routines. The interpolation, extrapolation and maximum search routines are all based on the modified Quadratic Shepard's method [Robert J. Renka, "Multivariate Interpolation Of Large Sets Of Scattered Data", University of North Texas ACM Transactions on Mathematical Software, vol. 14, no. 2, June 1988, pp. 139-148.].

Thereby, the interpolation scheme combines a least-square fitted function method and a weighted average method which are the two basic types of computational interpolation and approximation. The DASY6 routines construct a once-continuously differentiable function that interpolates the measurement values as follows:

- For each measurement point a trivariate (3-D) / bivariate (2-D) quadratic is computed. It interpolates the measurement values at the data point and forms a least-square fit to neighbouring measurement values.
- the spatial location of the quadratic with respect to the measurement values is attenuated by an inverse distance weighting. This is performed since the calculated quadratic will fit measurement values at nearby points more accurate than at points located further away.
- After the quadratics are calculated at all measurement points, the interpolating function is calculated as a weighted average of the quadratics.

There are two control parameters that govern the behavior of the interpolation method.

One specifies the number of measurement points to be used in computing the least-square fits for the local quadratics. These measurement points are the ones nearest the input point for which the quadratic is being computed.

The second parameter specifies the number of measurement points that will be used in calculating the weights for the quadratics to produce the final function. The input data points used there are the ones nearest the point at which the interpolation is desired. Appropriate defaults are chosen for each of the control parameters.

The trivariate quadratics that have been previously computed for the 3-D interpolation and whose input data are at the closest distance from the phantom surface, are used in order to extrapolate the fields to the surface of the phantom.

In order to determine all the field maxima in 2-D (Area Scan) and 3-D (Zoom Scan), the measurement grid is refined by a default factor of 10 (area) and 5 (zoom), respectively, and the interpolation function is used to evaluate all field values between corresponding measurement points. Subsequently, a linear search is applied to find all the candidate maxima. In a last step, non physical maxima are removed and only those maxima which are within 2 dB of the global maximum value are retained.

Important: To be processable by the interpolation/extrapolation scheme, the Area Scan requires at least 6 measurement points. The Zoom Scan requires at least 10 measurement points to allow the application of these algorithms.

In the Area Scan, the gradient of the interpolation function is evaluated to find all the extrema of the SAR distribution. The uncertainty on the locations of the extrema is less than 1/20 of the grid size. Only local maxima within 2 dB of the global maximum are searched and passed for the Zoom Scan measurement.

In the Zoom Scan, the interpolation function is used to extrapolate the Peak SAR from the lowest measurement points to the inner phantom surface (the extrapolation distance). The uncertainty increases with the extrapolation distance. To keep the uncertainty within 1% for the 1 g and 10 g cubes, the extrapolation distance should not be larger than 5 mm.

Averaging and Determination of spatial Peak SAR

Within cDASY6/DASY8 Module SAR software, the measured grid is interpolated to a high resolution grid, where the resolution is around 1mm and chosen such that the cube volume is a multiple of the resolution. Points which are outside of the measured grid are masked out and set to zero. Then, the antiderivative of the interpolated grid is computed by using a Gaussian quadrature consecutively for all spatial dimensions.

The antiderivative is used to compute all cube averages of the volume with the same resolution as the interpolated grid. The maximum of these SAR averages is reported. If the cube containing the maximum averaged SAR touches the surface of the measured volume, an appropriate warning is issued within the Post-processing engine.

7.1.8 Data Storage and Evaluation

Data Storage

The DASY software stores the acquired data from the data acquisition electronics as raw data (in microvolt readings from the probe sensors), together with all necessary software parameters for the data evaluation (probe calibration data, liquid parameters and device frequency and modulation data) in measurement files with the extension ".DA4", ".DA5x". The software evaluates the desired unit and format for output each time the data is visualized or exported. This allows verification of the complete software setup even after the measurement and allows correction of incorrect parameter settings. For example, if a measurement has been performed with a wrong crest factor parameter in the device setup, the parameter can be corrected afterwards and the data can be re-evaluated.

The measured data can be visualized or exported in different units or formats, depending on the selected probe type ([V/m], [A/m], [°C], [W/kg], [mW/cm²], [dBrel], etc.). Some of these units are not available in certain situations or show meaningless results, e.g., a SAR output in a lossless media will always be zero. Raw data can also be exported to perform the evaluation with other software packages.

Data Evaluation by SEMCAD

The SEMCAD software automatically executes the following procedures to calculate the field units from the microvolt readings at the probe connector. The parameters used in the evaluation are stored in the configuration modules of the software:

Probe parameters:	- Sensitivity	$\text{Norm}_i, a_{i0}, a_{i1}, a_{i2}$
	- Conversion factor	ConvF_i
	- Diode compression point	Dcpi
Device parameters:	- Frequency	f
	- Crest factor	cf
Media parameters:	- Conductivity	σ
	- Density	ρ

These parameters must be set correctly in the software. They can be found in the component documents or they can be imported into the software from the configuration files issued for the DASY components. In the direct measuring mode of the multimeter option, the parameters of the actual system setup are used. In the scan visualization and export modes, the parameters stored in the corresponding document files are used.

The first step of the evaluation is a linearization of the filtered input signal to account for the compression characteristics of the detector diode. The compensation depends on the input signal, the diode type and the DC-transmission factor from the diode to the evaluation electronics.

If the exciting field is pulsed, the crest factor of the signal must be known to correctly compensate for peak power. The formula for each channel can be given as:

$$V_i = U_i + U_i^2 \cdot cf/dcp_i$$

with V_i = compensated signal of channel i (i = x, y, z)
 U_i = input signal of channel i (i = x, y, z)
 cf = crest factor of exciting field (DASY parameter)
 dcp_i = diode compression point (DASY parameter)

From the compensated input signals the primary field data for each channel can be evaluated:

E-field probes: $E_i = (V_i / Norm_i \cdot ConvF)^{1/2}$

H-field probes: $H_i = (V_i)^{1/2} \cdot (a_{i0} + a_{i1}f + a_{i2}f^2)/f$

with V_i = compensated signal of channel i (i = x, y, z)
 $Norm_i$ = sensor sensitivity of channel i (i = x, y, z)
[mV/(V/m)²] for E-field Probes
 $ConvF$ = sensitivity enhancement in solution
 a_{ij} = sensor sensitivity factors for H-field probes
 f = carrier frequency [GHz]
 E_i = electric field strength of channel i in V/m
 H_i = magnetic field strength of channel i in A/m

The RSS value of the field components gives the total field strength (Hermitian magnitude):

$$E_{tot} = (E_x^2 + E_y^2 + E_z^2)^{1/2}$$

The primary field data are used to calculate the derived field units.

$$SAR = (E_{tot}^2 \cdot \sigma) / (\rho \cdot 1000)$$

with SAR = local specific absorption rate in W/kg
 E_{tot} = total field strength in V/m
 σ = conductivity in [mho/m] or [Siemens/m]
 ρ = equivalent tissue density in g/cm³

Note that the density is normally set to 1 (or 1.06), to account for actual brain density rather than the density of the simulation liquid. The power flow density is calculated assuming the excitation field to be a free space field.

$$P_{pwe} = E_{tot}^2 / 3770 \quad \text{or} \quad P_{pwe} = H_{tot}^2 \cdot 37.7$$

with P_{pwe} = equivalent power density of a plane wave in mW/cm²
 E_{tot} = total electric field strength in V/m
 H_{tot} = total magnetic field strength in A/m

Data Evaluation in cDASY6/DASY8

cDASY6/DASY8 features basic evaluation capabilities comparable to the above described SEMCAD evaluation.

7.1.9 Tissue simulating liquids: dielectric properties

The following materials are used for producing the tissue-equivalent materials.

HBBL600-10000MHz Simulating Head Liquid, Manufactured by SPEAG:

Ingredients	(% by weight)
Water	50-65%
Mineral oil	10-30%
Emulsifiers	8-25%
Sodium salt	0-1.5%

Table 3: Head tissue dielectric properties

7.1.10 Tissue simulating liquids: parameters

Freq. (MHz)	Target head tissue		Measurement head tissue					Measurement date
	Permittivity	Conductivity [S/m]	Permittivity	Dev. %	Conductivity		Dev. %	
					ε"	[S/m]		
704	42.15	0.89	43.3	2.8	22.81	0.89	0.7	2026-07-06
707	42.13	0.89	43.3	2.8	22.74	0.89	0.8	
711	42.11	0.89	43.3	2.8	22.64	0.90	0.9	
750	41.90	0.89	43.2	3.0	21.74	0.91	1.9	
779	41.76	0.89	43.1	3.2	21.15	0.92	2.6	
782	41.75	0.89	43.1	3.3	21.09	0.92	2.6	
784	41.74	0.89	43.1	3.3	21.05	0.92	2.7	
822	41.56	0.90	43.1	3.6	20.35	0.93	3.6	
824	41.55	0.90	43.1	3.6	20.32	0.93	3.6	
832	41.51	0.90	43.1	3.7	20.18	0.93	3.8	
835	41.50	0.90	43.0	3.7	20.13	0.94	3.9	
837	41.50	0.90	43.0	3.7	20.10	0.94	3.7	
847	41.50	0.91	43.0	3.7	19.93	0.94	2.9	
880	41.50	0.95	43.0	3.6	19.45	0.95	0.4	2026-07-06
897	41.50	0.97	43.0	3.6	19.20	0.96	-0.9	
900	41.50	0.97	43.0	3.6	19.16	0.96	-1.1	
915	41.47	0.98	43.0	3.6	18.98	0.97	-1.0	
1720	40.11	1.35	42.8	6.6	14.23	1.36	0.5	2026-07-01
1732	40.10	1.36	42.7	6.6	14.21	1.37	0.6	
1745	40.08	1.37	42.7	6.6	14.18	1.38	0.6	
1750	40.07	1.37	42.7	6.6	14.17	1.38	0.6	
1775	40.04	1.39	42.7	6.6	14.12	1.39	0.6	
1860	40.00	1.40	41.2	3.1	13.85	1.43	2.3	2026-07-08
1880	40.00	1.40	41.2	3.0	13.82	1.45	3.2	
1900	40.00	1.40	41.2	2.9	13.79	1.46	4.1	
2402	39.28	1.76	38.4	-2.3	13.44	1.80	2.2	2026-07-27
2412	39.27	1.77	38.4	-2.3	13.46	1.81	2.2	
2437	39.22	1.79	38.4	-2.2	13.49	1.83	2.3	
2442	39.21	1.79	38.3	-2.2	13.50	1.83	2.3	
2450	39.20	1.80	38.3	-2.2	13.51	1.84	2.3	
2462	39.18	1.81	38.3	-2.2	13.52	1.85	2.2	
2472	39.17	1.82	38.3	-2.2	13.53	1.86	2.1	
2480	39.16	1.83	38.3	-2.2	13.54	1.87	2.0	

Freq. (MHz)	Target head tissue		Measurement head tissue					Measurement date
	Permittivity	Conductivity [S/m]	Permittivity	Dev. %	Conductivity		Dev. %	
					ε"	[S/m]		
2510	39.12	1.86	41.8	6.9	13.80	1.93	3.3	2026-07-03
2535	39.09	1.89	41.8	6.9	13.83	1.95	3.2	
2560	39.05	1.92	41.7	6.9	13.87	1.97	3.0	
2600	39.00	1.96	41.7	6.9	13.92	2.01	2.7	
5180	36.02	4.64	34.9	-3.2	15.58	4.49	-3.2	2026-07-30
5200	36.00	4.66	34.8	-3.3	15.58	4.51	-3.3	
5220	35.98	4.68	34.8	-3.3	15.62	4.54	-3.1	
5240	35.96	4.70	34.8	-3.3	15.67	4.57	-2.8	
5260	35.94	4.72	34.7	-3.3	15.71	4.60	-2.6	
5280	35.92	4.74	34.7	-3.4	15.76	4.63	-2.4	
5300	35.90	4.76	34.7	-3.4	15.80	4.66	-2.1	
5320	35.88	4.78	34.6	-3.4	15.81	4.68	-2.1	
5500	35.65	4.97	34.6	-3.1	15.85	4.85	-2.3	
5520	35.62	4.99	34.5	-3.1	15.88	4.88	-2.2	
5540	35.59	5.01	34.5	-3.1	15.90	4.90	-2.2	
5560	35.56	5.03	34.5	-3.0	15.91	4.92	-2.1	
5580	35.53	5.05	34.5	-3.0	15.92	4.94	-2.1	
5600	35.50	5.07	34.5	-2.9	15.93	4.96	-2.1	
5620	35.48	5.09	34.4	-2.9	15.95	4.99	-2.0	
5640	35.46	5.11	34.4	-2.9	15.97	5.01	-1.9	
5660	35.44	5.13	34.4	-3.0	15.99	5.04	-1.8	
5680	35.42	5.15	34.4	-3.0	16.01	5.06	-1.8	
5700	35.40	5.17	34.3	-3.0	16.03	5.08	-1.7	
5745	35.36	5.22	34.3	-3.1	16.10	5.14	-1.4	
5765	35.34	5.24	34.2	-3.2	16.14	5.18	-1.1	
5785	35.32	5.26	34.1	-3.3	16.19	5.21	-0.9	
5800	35.30	5.27	34.1	-3.4	16.22	5.24	-0.7	
5805	35.30	5.28	34.1	-3.4	16.23	5.24	-0.6	
5825	35.28	5.30	34.1	-3.5	16.27	5.27	-0.5	

Table 4: Parameter of the head tissue simulating liquid (HSL)

Note: The dielectric properties have been measured using the contact probe method at 22°C.

*) as the liquid parameters deviation is $\geq \pm 5\%$ an extrapolation according IEC / IEEE 62209-1528 chapter 7.8.2 approach 3 is necessary. The DASY software is capable to perform the necessary corrections directly from the tissue and measurement data. The uncertainties in this document have been adjusted accordingly.

For detailed information see chapter 8.2.4 SAR correction for deviations of complex permittivity from target on page 47.

7.1.11 Measurement uncertainty evaluation for SAR test

DASY6/8 Uncertainty Budget										
According to IEC/IEEE 62209-1528 (Frequency band: 300 MHz - 3 GHz range)										
Symbol	Error Description	Uncertainty Value		Probability Distribution	Divisor	c _i	c _i	Standard Uncertainty		
						(1g)	(10g)	± %, (1g)	± %, (10g)	
Measurement System Errors										
CF	Probe Calibration Repeat.	± 12.0 %		Normal	2	1	1	± 6.0 %	± 6.0 %	
CFdrift	Probe Calibration Drift	± 1.7 %		Rectangular	√ 3	1	1	± 1.0 %	± 1.0 %	
LIN	Probe linearity	± 4.7 %		Rectangular	√ 3	1	1	± 2.7 %	± 2.7 %	
BBS	Broadband Signal	± 3.0 %		Rectangular	√ 3	1	1	± 1.7 %	± 1.7 %	
ISO	Probe Isotropy (axial)	± 7.6 %		Rectangular	√ 3	1	1	± 4.4 %	± 4.4 %	
DAE	Data Acquisition	± 0.3 %		Normal	1	1	1	± 0.3 %	± 0.3 %	
AMB	RF Ambient	± 1.8 %		Normal	1	1	1	± 1.8 %	± 1.8 %	
Δ _{sys}	Probe Positioning	± 0.006 mm		Normal	1	0.14	0.14	± 0.1 %	± 0.1 %	
DAT	Data Processing	± 1.2 %		Normal	1	1	1	± 1.2 %	± 1.2 %	
Phantom and Device Errors										
LIQ(σ)	Conductivity (meas.) ^{DAK}	± 2.5 %		Normal	1	0.78	0.71	± 2.0 %	± 1.8 %	
LIQ(Tσ)	Conductivity (temp.) ^{BB}	± 3.3 %		Rectangular	√ 3	0.78	0.71	± 1.5 %	± 1.4 %	
EPS	Phantom Permittivity	± 14.0 %		Rectangular	√ 3	0	0	± 0.0 %	± 0.0 %	
DIS	Distance DUT - TSL	± 2.0 %		Normal	1	2	2	± 4.0 %	± 4.0 %	
D _{xyz}	Device Positioning	± 1.0 %		Normal	1	1	1	± 1.0 %	± 1.0 %	
H	Device Holder	± 3.6 %		Normal	1	1	1	± 3.6 %	± 3.6 %	
MOD	DUT Modulation ^m	± 2.4 %		Rectangular	√ 3	1	1	± 1.4 %	± 1.4 %	
TAS	Time-average SAR	± 1.7 %		Rectangular	√ 3	1	1	± 1.0 %	± 1.0 %	
RF _{drift}	DUT drift	± 2.5 %		Normal	1	1	1	± 2.5 %	± 2.5 %	
VAL	Val Antenna Unc. ^{val}	± 0.0 %		Normal	1	1	1	± 0.0 %	± 0.0 %	
RF _{in}	Unc. Input Power ^{val}	± 0.0 %		Normal	1	1	1	± 0.0 %	± 0.0 %	
Correction to the SAR results										
C(ε, σ)	Deviation to Target	± 1.9 %		Normal	1	1	0.84	± 1.9 %	± 1.6 %	
C(R)	SAR scaling ^p	± 0.0 %		Rectangular	√ 3	1	1	± 0.0 %	± 0.0 %	
u(ΔSAR)	Combined Uncertainty							± 11.0 %	± 10.9 %	
U	Expanded Uncertainty							± 21.9 %	± 21.7 %	

Table 5: Measurement uncertainties

Worst-Case uncertainty budget for DASY6/8 assessed according to IEC/IEEE 62209-1528 [4]. The budget is valid for the frequency range 300MHz - 3 GHz and represents a worst-case analysis. For specific tests and configurations, the uncertainty could be considerable smaller. All listed error components have ν_{eff} equal to ∞ .

Footnote details:

^m SMC calibration is a new method for determining the total deviation from linearity. The uncertainty is ≤ 2.4% for psSAR ≤ 2 W/kg, ≤ 4.8% for psSAR1g/10g ≤ 4 W/kg and ≤ 9.6% for psSAR1g/10g ≤ 10 W/kg (see modulation calibration parameter uncertainty in the probe calibration certificate);

^{BB} if SPEAG's broad-band liquids (BBL) are used that have low temperature coefficients;

^{DAK} if SPEAG's high precision dielectric probe kit (DAK) is applied;

^p if power scaling is used, error item "SAR Scaling" must be adjusted accordingly;

^{val} only applies in case of validation measurements.

DASY8 Uncertainty Budget									
According to IEC/IEEE 62209-1528 (Frequency band: 3 GHz - 6 GHz range)									
Symbol	Error Description	Uncertainty Value	Probability Distribution	Divisor	c _i	c _i	Standard Uncertainty		
					(1g)	(10g)	± %, (1g)	± %, (10g)	
Measurement System Errors									
CF	Probe Calibration Repeat.	± 13.1 %	Normal	2	1	1	± 6.6 %	± 6.6 %	
CFdrift	Probe Calibration Drift	± 1.7 %	Rectangular	√ 3	1	1	± 1.0 %	± 1.0 %	
LIN	Probe linearity	± 4.7 %	Rectangular	√ 3	1	1	± 2.7 %	± 2.7 %	
BBS	Broadband Signal	± 2.6 %	Rectangular	√ 3	1	1	± 1.5 %	± 1.5 %	
ISO	Probe Isotropy (axial)	± 7.6 %	Rectangular	√ 3	1	1	± 4.4 %	± 4.4 %	
DAE	Data Acquisition	± 0.3 %	Normal	1	1	1	± 0.3 %	± 0.3 %	
AMB	RF Ambient	± 1.8 %	Normal	1	1	1	± 1.8 %	± 1.8 %	
Δ _{sys}	Probe Positioning	± 0.005 mm	Normal	1	0.29	0.29	± 0.2 %	± 0.2 %	
DAT	Data Processing	± 2.3 %	Normal	1	1	1	± 2.3 %	± 2.3 %	
Phantom and Device Errors									
LIQ(σ)	Conductivity (meas.) ^{DAK}	± 2.5 %	Normal	1	0.78	0.71	± 2.0 %	± 1.8 %	
LIQ(Tσ)	Conductivity (temp.) ^{BB}	± 3.4 %	Rectangular	√ 3	0.78	0.71	± 1.5 %	± 1.4 %	
EPS	Phantom Permittivity	± 14.0 %	Rectangular	√ 3	0.25	0.25	± 2.0 %	± 2.0 %	
DIS	Distance DUT - TSL	± 2.0 %	Normal	1	2	2	± 4.0 %	± 4.0 %	
D _{xyz}	Device Positioning	± 1.0 %	Normal	1	1	1	± 1.0 %	± 1.0 %	
H	Device Holder	± 3.6 %	Normal	1	1	1	± 3.6 %	± 3.6 %	
MOD	DUT Modulation ^m	± 2.4 %	Rectangular	√ 3	1	1	± 1.4 %	± 1.4 %	
TAS	Time-average SAR	± 1.7 %	Rectangular	√ 3	1	1	± 1.0 %	± 1.0 %	
RF _{drift}	DUT drift	± 2.5 %	Normal	1	1	1	± 2.5 %	± 2.5 %	
VAL	Val Antenna Unc. ^{val}	± 0.0 %	Normal	1	1	1	± 0.0 %	± 0.0 %	
RF _{in}	Unc. Input Power ^{val}	± 0.0 %	Normal	1	1	1	± 0.0 %	± 0.0 %	
Correction to the SAR results									
C(ε, σ)	Deviation to Target	± 1.9 %	Normal	1	1	0.84	± 1.9 %	± 1.6 %	
C(R)	SAR scaling ^p	± 0.0 %	Rectangular	√ 3	1	1	± 0.0 %	± 0.0 %	
u(ΔSAR)	Combined Uncertainty						± 11.6 %	± 11.5 %	
U	Expanded Uncertainty						± 23.2 %	± 23.0 %	

Table

6: Measurement uncertainties

Worst-Case uncertainty budget for DASY8 assessed according to IEC/IEEE 62209-1528 [4]. The budget is valid for the frequency range 3 GHz – 6 GHz and represents a worst-case analysis. For specific tests and configurations, the uncertainty could be considerable smaller. All listed error components have *veff* equal to ∞.

Footnote details:

^m SMC calibration is a new method for determining the total deviation from linearity. The uncertainty is ≤ 2.4% for psSAR ≤ 2 W/kg, ≤ 4.8% for psSAR1g/10g ≤ 4 W/kg and ≤ 9.6% for psSAR1g/10g ≤ 10 W/kg (see modulation calibration parameter uncertainty in the probe calibration certificate);

^{BB} if SPEAG's broad-band liquids (BBL) are used that have low temperature coefficients;

^{DAK} if SPEAG's high precision dielectric probe kit (DAK) is applied;

^p if power scaling is used, error item "SAR Scaling" must be adjusted accordingly;

^{val} only applies in case of validation measurements.

7.1.12 Measurement uncertainty evaluation for System Check

Repeatability Budget for System Check (Frequency band: 300MHz - 6GHz range) with DASY6/8 System									
Symbol	Error Description	Uncertainty Value		Probability Distribution	Divisor	c _i (1g)	c _i (10g)	Standard Uncertainty	
								± %, (1g)	± %, (10g)
Measurement System Errors									
CF	Probe Calibration Repeat.	± 3.6 %		Normal	2	2	1	± 5.1 %	± 2.5 %
CFdrift	Probe Calibration Drift	± 1.7 %		Rectangular	√ 3	1	1	± 1.0 %	± 1.0 %
LIN	Probe linearity	± 4.7 %		Rectangular	√ 3	0	0	± 0.0 %	± 0.0 %
BBS	Broadband Signal	± 0.0 %		Rectangular	√ 3	0	0	± 0.0 %	± 0.0 %
ISO	Probe Isotropy (axial)	± 4.7 %		Rectangular	√ 3	0	0	± 0.0 %	± 0.0 %
DAE	Data Acquisition	± 0.3 %		Normal	1	0	0	± 0.0 %	± 0.0 %
AMB	RF Ambient	± 0.6 %		Normal	1	0	0	± 0.0 %	± 0.0 %
Δ _{sys}	Probe Positioning	± 0.2 %		Normal	1	0.33	0.33	± 0.1 %	± 0.1 %
DAT	Data Processing	± 0.0 %		Normal	1	1	1	± 0.0 %	± 0.0 %
Phantom and Device Errors									
LIQ(σ)	Conductivity (meas.) ^{DAK}	± 2.5 %		Normal	1	0.78	0.71	± 2.0 %	± 1.8 %
LIQ(Tσ)	Conductivity (temp.) ^{BB}	± 3.4 %		Rectangular	√ 3	0.78	0.71	± 1.5 %	± 1.4 %
EPS	Phantom Permittivity	± 14.0 %		Rectangular	√ 3	0	0	± 0.0 %	± 0.0 %
DIS	Distance Phantom - DUT	± 1.0 %		Normal	1	2	2	± 2.0 %	± 2.0 %
MOD	DUT Modulation ^m	± 0.0 %		Rectangular	√ 3	1	1	± 0.0 %	± 0.0 %
TAS	Time-average SAR	± 0.0 %		Rectangular	√ 3	1	1	± 0.0 %	± 0.0 %
VAL	Validation antenna	± 0.0 %		Normal	1	1	1	± 0.0 %	± 0.0 %
P _{in}	Accepted power	± 1.2 %		Normal	1	1	1	± 1.2 %	± 1.2 %
Correction to the SAR results									
C(ε, σ)	Deviation to Target	± 1.9 %		Normal	1	1	0.84	± 1.9 %	± 1.6 %
u(ΔSAR)	Combined Uncertainty							± 6.5 %	± 4.5 %
U	Expanded Uncertainty							± 13.0 %	± 9.1 %

Table 7: Repeatability of the system check (300MHz - 6 GHz).

All listed error components have v_{eff} equal to ∞ .

Footnote details:

^{BB} if SPEAG's broad-band liquids (BBL) are used that have low temperature coefficients;

^{DAK} if SPEAG's high precision dielectric probe kit (DAK) is applied.

Note: Worst case probe calibration uncertainty has been applied for all probes used during the measurements.

7.1.13 System check

The system check is performed for verifying the accuracy of the complete measurement system and performance of the software. The following table shows system check results for all frequency bands and tissue liquids used during the tests (plot(s) see annex A).

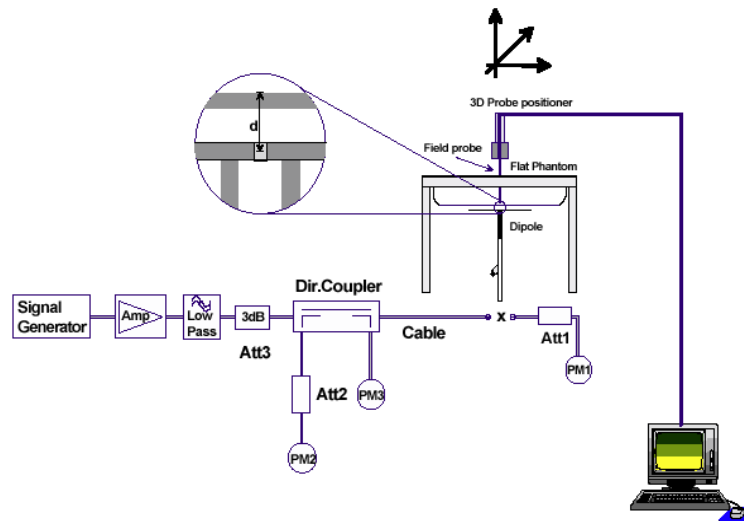
System performance check (1000 mW)									
System validation Kit	Probe	Frequency	Target SAR _{1g}	Target SAR _{10g}	Measured SAR _{1g}	SAR _{1g}	Measured SAR _{10g}	SAR _{10g}	Measured date
		MHz	W/kg (+/- 10%)		W/kg	dev.	W/kg	dev.	
D750V3 S/N: 1041	EX3DV4 S/N: 7852	750	8.48	5.57	8.28	-2.4%	5.44	-2.3%	2026-07-07
D835V2 S/N: 4d153	EX3DV4 S/N: 7852	835	9.63	6.29	9.28	-3.6%	6.10	-3.0%	2026-07-06
D835V2 S/N: 4d153	EX3DV4 S/N: 7852	835	9.63	6.29	9.10	-5.5%	5.96	-5.2%	2026-07-08
D1750V2 S/N: 1093	EX3DV4 S/N: 7852	1750	36.10	19.30	32.80	-9.1%	17.48	-9.4%	2026-07-01
D1750V2 S/N: 1093	EX3DV4 S/N: 7852	1750	36.10	19.30	33.40	-7.5%	17.84	-7.6%	2026-07-03
D1900V2 S/N: 5d009	EX3DV4 S/N: 7852	1900	40.60	21.50	37.20	-8.4%	19.66	-8.6%	2026-07-08
D2450V2 S/N: 710	EX3DV4 S/N: 3944	2450	52.60	24.50	49.80	-5.3%	23.40	-4.5%	2026-07-27
D2600V2 S/N: 1040	EX3DV4 S/N: 7852	2600	55.70	25.10	53.80	-3.4%	24.20	-3.6%	2026-07-03
D5GHzV2 S/N: 1055	EX3DV4 S/N: 3944	5200	78.30	22.30	79.40	1.4%	23.00	3.1%	2026-07-30
D5GHzV2 S/N: 1055	EX3DV4 S/N: 3944	5500	85.80	24.40	83.40	-2.8%	24.00	-1.6%	2026-07-30
D5GHzV2 S/N: 1055	EX3DV4 S/N: 3944	5800	80.90	22.90	79.20	-2.1%	22.80	-0.4%	2026-07-30

Table 8: Results system check

7.1.14 System check procedure

The system check is performed by using a validation dipole which is positioned parallel to the planar part of the SAM phantom at the reference point. The distance of the dipole to the SAM phantom is determined by a plexiglass spacer. The dipole is connected to the signal source consisting of signal generator and amplifier via a directional coupler, N-connector cable and adaption to SMA. It is fed with a power of 100 mW or 50 mW if used Powersource1. To adjust this power a power meter is used. The power sensor is connected to the cable before the system check to measure the power at this point and do adjustments at the signal generator. At the outputs of the directional coupler both return loss as well as forward power are controlled during the validation to make sure that emitted power at the dipole is kept constant. This can also be checked by the power drift measurement after the test (result on plot).

System check results have to be equal or near the values determined during dipole calibration (target SAR in table above) with the relevant liquids and test system.



7.1.15 System validation

The system validation is performed in a similar way as a system check. It needs to be performed once a SAR measurement system has been established and allows an evaluation of the system accuracy with all components used together with the specified system. It has to be repeated at least once a year or when new system components are used (DAE, probe, phantom, dipole, liquid type).

In addition to the procedure used during system check a system validation also includes checks of probe isotropy, probe modulation factor and RF signal.

8 Detailed Test Results

8.1 Conducted power measurements

LTE conducted output power measurements results are described in the additional document:
1-2154-25-01-11_TR1-A201-R02

8.1.1 Justification of SAR measurements in LTE mode

According to Chapter 5 'SAR test procedures for LTE devices of FCC KDB Publication 941225 D05 the following test configurations for standalone measurements of the largest channel bandwidth (chapter 5.2) had to be taken into consideration:

5.2.1. QPSK with 1 RB allocation

Start with the largest channel bandwidth and measure SAR for QPSK with 1 RB allocation, using the RB offset and *required test channel* combination with the highest maximum output power for RB offsets at the upper edge, middle and lower edge of each *required test channel*. When the *reported SAR* is ≤ 0.8 W/kg, testing of the remaining RB offset configurations and *required test channels* is not required for 1 RB allocation; otherwise, SAR is required for the remaining *required test channels* and only for the RB offset configuration with the highest output power for that channel. When the *reported SAR* of a *required test channel* is > 1.45 W/kg, SAR is required for all three RB offset configurations for that *required test channel*.

5.2.2. QPSK with 50% RB allocation

The procedures required for 1 RB allocation in 5.2.1 are applied to measure the SAR for QPSK with 50% RB allocation.

5.2.3. QPSK with 100% RB allocation

For QPSK with 100% RB allocation, SAR is not required when the highest maximum output power for 100 % RB allocation is less than the highest maximum output power in 50% and 1 RB allocations and the highest *reported SAR* for 1 RB and 50% RB allocation in 5.2.1 and 5.2.2 are ≤ 0.8 W/kg. Otherwise, SAR is measured for the highest output power channel and if the *reported SAR* is > 1.45 W/kg, the remaining *required test channels* must also be tested.

5.2.4. Higher order modulations

For each modulation besides QPSK; e.g., 16-QAM, 64-QAM, apply the QPSK procedures in sections 5.2.1, 5.2.2 and 5.2.3 to determine the QAM configurations that may need SAR measurement. For each configuration identified as required for testing, SAR is required only when the highest maximum output power for the configuration in the higher order modulation is $> \frac{1}{2}$ dB higher than the same configuration in QPSK or when the *reported SAR* for the QPSK configuration is > 1.45 W/kg.

Testing of other channel bandwidths was not necessary because the output power of equivalent channel configurations was less than $\frac{1}{2}$ dB larger compared to the largest channel bandwidth and reported SAR was < 1.45 W/kg.

Conducted and radiated measurements were performed with the maximum number of bundled TTIs supported by the DUT (see section 2.4 for details).

8.1.2 MPR information in LTE mode

There is a permanently applied MPR implemented by the manufacturer.
MPR is enabled for this device according to 3GPP TS36.101.

Modulation	Channel bandwidth / resource block configuration						Target MPR	3 GPP MPR
	1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz		
QPSK	> 5	> 4	> 8	> 12	> 16	> 18	1	≤ 1
16QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	1	≤ 1
16QAM	> 5	> 4	> 8	> 12	> 16	> 18	2	≤ 2

Therefore there is no power reduction at 1.4 MHz bandwidth with 50% RB allocation (3 RBs).

Additional differences in conducted power are not caused by implemented MPR but depend on measurement uncertainty and allowable tolerances per 3GPP or tune-up.

A-MPR was disabled for all SAR tests.

8.1.3 Conducted power measurements WLAN 2.4 GHz

802.11b ANT 1		maximum avg. conducted output power [dBm]							
Freq. [MHz]	Ch	1Mbps	2Mbps	5.5Mbps	11Mbps				
2412	1	9.7	9.9	9.8	9.6				
2437	6	10.1	10.3	10.2	10.0				
2462	11	9.7	9.9	9.8	9.5				
802.11b ANT 2		maximum avg. conducted output power [dBm]							
Freq. [MHz]	Ch	1Mbps	2Mbps	5.5Mbps	11Mbps				
2412	1	9.2	9.4	9.2	8.9				
2437	6	9.8	10.0	9.8	9.5				
2462	11	9.5	9.7	9.6	9.3				
802.11b MIMO		maximum avg. conducted output power [dBm]							
Freq. [MHz]	Ch	1Mbps		2Mbps		5.5Mbps		11Mbps	
		Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2
2412	1	9.7	9.4	9.9	9.6	9.8	9.5	9.6	9.3
2437	6	10.1	10.1	10.3	10.3	10.2	10.1	10.0	9.8
2462	11	9.7	9.7	9.8	9.6	9.8	9.4	9.6	9.2

Table 9: Test results conducted power measurement 802.11b

802.11g ANT 1		maximum average conducted output power [dBm]															
Freq. [MHz]	Ch	6Mbps	9Mbps	12Mbps	18Mbps	24Mbps	36Mbps	48Mbps	54Mbps								
2412	1	11.0	10.9	10.7	10.5	10.7	10.4	10.0	9.9								
2437	6	10.7	10.6	10.4	10.2	10.4	10.1	9.7	9.6								
2462	11	10.2	10.1	9.8	9.6	9.7	9.4	9.0	8.9								
802.11g ANT 2		maximum average conducted output power [dBm]															
Freq. [MHz]	Ch	6Mbps	9Mbps	12Mbps	18Mbps	24Mbps	36Mbps	48Mbps	54Mbps								
2412	1	10.8	10.7	10.6	10.4	10.7	10.3	10.0	9.8								
2437	6	10.4	10.3	10.2	10.0	10.3	10.0	9.7	9.5								
2462	11	9.9	9.8	9.7	9.5	9.8	9.5	9.2	9.0								
802.11g		maximum average conducted output power [dBm]															
Freq. [MHz]	Ch	6Mbps		9Mbps		12Mbps		18Mbps		24Mbps		36Mbps		48Mbps		54Mbps	
		Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2
2412	1	10.9	10.9	10.8	10.8	10.6	10.6	10.4	10.9	10.6	10.6	10.3	10.3	9.9	10.0	9.8	9.8
2437	6	10.6	10.6	10.5	10.5	10.3	10.3	10.1	10.6	10.4	10.3	10.1	10.0	9.7	9.7	9.6	9.5
2462	11	10.3	10.2	10.2	10.1	10.0	9.9	9.8	10.2	10.2	9.9	9.9	9.6	9.5	9.3	9.4	9.1

Table 10: Test results conducted power measurement 802.11g

802.11n HT-20 ANT 1		maximum average conducted output power [dBm]															
Freq. [MHz]	Ch	MCS-0	MCS-1	MCS-2	MCS-3	MCS-4	MCS-5	MCS-6	MCS-7								
		6.5Mbps	13Mbps	19.5Mbps	26Mbps	39Mbps	52Mbps	58.5Mbps	65Mbps								
2412	1	10.8	10.6	10.3	10.7	10.3	10.0	9.8	9.7								
2437	6	10.5	10.3	10.0	10.4	10.0	9.7	9.5	9.4								
2462	11	10.0	9.8	9.5	9.9	9.5	9.2	9.0	8.9								
802.11n HT-20 ANT 2		maximum average conducted output power [dBm]															
Freq. [MHz]	Ch	MCS-0	MCS-1	MCS-2	MCS-3	MCS-4	MCS-5	MCS-6	MCS-7								
		6.5Mbps	13Mbps	19.5Mbps	26Mbps	39Mbps	52Mbps	58.5Mbps	65Mbps								
2412	1	10.7	10.4	10.2	10.5	10.2	9.9	9.7	9.6								
2437	6	10.3	10.0	9.8	10.1	9.8	9.5	9.3	9.2								
2462	11	9.9	9.6	9.4	9.7	9.4	9.1	8.9	8.8								
802.11n HT-20 MIMO		maximum average conducted output power [dBm]															
Freq. [MHz]	Ch	MCS-0		MCS-1		MCS-2		MCS-3		MCS-4		MCS-5		MCS-6		MCS-7	
		6.5Mbps		13Mbps		19.5Mbps		26Mbps		39Mbps		52Mbps		58.5Mbps		65Mbps	
		Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2
2412	1	10.7	10.8	10.5	10.5	10.2	10.3	10.6	10.6	10.2	10.3	9.9	10.0	9.7	9.8	9.6	9.7
2437	6	10.4	10.4	10.2	10.1	9.9	9.9	10.2	10.2	9.9	9.9	9.6	9.6	9.4	9.4	9.3	9.3
2462	11	10.1	10.1	9.9	9.7	9.6	9.5	9.9	9.8	9.6	9.5	9.3	9.2	9.1	9.0	9.0	8.9

Table 11: Test results conducted power measurement 802.11n HT-20

802.11n HT-40 ANT 1		maximum average conducted output power [dBm]															
Freq. [MHz]	Ch	MCS-0	MCS-1	MCS-2	MCS-3	MCS-4	MCS-5	MCS-6	MCS-7								
		13.5Mbps	27Mbps	40.5Mbps	54Mbps	81Mbps	108Mbps	121.5Mbps	135Mbps								
2422	3	11.0	10.5	10.1	10.0	9.5	9.0	8.8	8.7								
2437	6	10.9	10.4	10.0	9.9	9.4	8.9	8.7	8.6								
2452	9	10.6	10.1	9.7	9.6	9.1	8.6	8.4	8.3								
802.11n HT-40 ANT 2		maximum average conducted output power [dBm]															
Freq. [MHz]	Ch	MCS-0	MCS-1	MCS-2	MCS-3	MCS-4	MCS-5	MCS-6	MCS-7								
		13.5Mbps	27Mbps	40.5Mbps	54Mbps	81Mbps	108Mbps	121.5Mbps	135Mbps								
2422	3	10.9	10.3	10.0	9.9	9.3	8.9	8.7	8.6								
2437	6	10.6	10.0	9.7	9.6	9.1	8.7	8.4	8.3								
2452	9	10.4	9.8	9.5	9.4	8.9	8.5	8.2	8.1								
802.11n HT-40 MIMO		maximum average conducted output power [dBm]															
Freq. [MHz]	Ch	MCS-0		MCS-1		MCS-2		MCS-3		MCS-4		MCS-5		MCS-6		MCS-7	
		13.5Mbps		27Mbps		40.5Mbps		54Mbps		81Mbps		108Mbps		121.5Mbps		135Mbps	
			Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2	Ant 1
2422	3	10.9	11.0	10.4	10.3	10.0	10.0	9.9	9.9	9.5	9.3	9.0	8.9	8.8	8.7	8.7	8.6
2437	6	10.8	10.7	10.3	10.2	9.9	9.9	9.8	9.8	9.4	9.2	8.9	8.8	8.7	8.6	8.6	8.5
2452	9	10.5	10.5	10.0	9.9	9.6	9.6	9.5	9.5	9.1	8.9	8.7	8.5	8.5	8.3	8.4	8.2

Table 12: Test results conducted power measurement 802.11n HT-40

8.1.4 Conducted power measurements WLAN 5 GHz

802.11a		maximum average conducted output power [dBm]							
Freq. [MHz]	Ch	6Mbps	9Mbps	12Mbps	18Mbps	24Mbps	36Mbps	48Mbps	54Mbps
5180	36	11.3	11.2	11.1	10.9	11.0	10.6	10.3	10.2
5200	40	11.5	11.4	11.3	11.1	11.2	10.8	10.5	10.4
5220	44	11.6	11.5	11.4	11.2	11.3	11.0	10.6	10.5
5240	48	11.5	11.4	11.3	11.1	11.2	10.8	10.5	10.4
5260	52	11.3	11.2	11.1	10.9	11.0	10.6	10.3	10.2
5280	56	11.4	11.3	11.2	11.0	11.1	10.8	10.4	10.3
5300	60	11.7	11.6	11.5	11.3	11.4	11.0	10.7	10.6
5320	64	11.6	11.5	11.4	11.2	11.3	10.9	10.6	10.5
5500	100	11.0	10.9	10.8	10.6	10.7	10.3	10.0	9.9
5520	104	10.8	10.7	10.6	10.4	10.5	10.1	9.8	9.7
5540	108	11.1	11.0	10.9	10.7	10.8	10.5	10.1	10.0
5560	112	11.2	11.1	11.0	10.8	10.9	10.6	10.2	10.1
5580	116	10.9	10.8	10.7	10.5	10.6	10.2	9.9	9.8
5600	120	10.8	10.6	10.6	10.4	10.5	10.1	9.8	9.6
5620	124	11.2	11.1	11.0	10.8	10.9	10.5	10.2	10.1
5640	128	11.2	11.0	11.0	10.8	10.9	10.5	10.2	10.0
5660	132	11.0	10.9	10.8	10.6	10.7	10.4	10.0	9.9
5680	136	10.8	10.7	10.6	10.4	10.5	10.1	9.8	9.7
5700	140	10.9	10.8	10.7	10.5	10.6	10.3	9.9	9.8
5745	149	10.8	10.7	10.6	10.4	10.5	10.1	9.8	9.7
5765	153	10.7	10.6	10.5	10.3	10.4	10.0	9.7	9.6
5785	157	10.9	10.8	10.7	10.5	10.6	10.2	9.9	9.8
5805	161	10.9	10.8	10.7	10.5	10.6	10.2	9.9	9.8
5825	165	10.8	10.7	10.6	10.4	10.5	10.2	9.8	9.7

Table 13: Test results conducted power measurement 802.11a ANT 1

802.11a		maximum average conducted output power [dBm]							
Freq. [MHz]	Ch	6Mbps	9Mbps	12Mbps	18Mbps	24Mbps	36Mbps	48Mbps	54Mbps
5180	36	12.2	12.1	11.9	11.8	11.9	11.5	11.2	11.0
5200	40	12.4	12.3	12.1	12.0	12.1	11.7	11.4	11.2
5220	44	12.4	12.3	12.1	12.0	12.1	11.7	11.4	11.2
5240	48	12.0	11.9	11.8	11.6	11.7	11.3	11.0	10.9
5260	52	12.1	12.0	11.9	11.7	11.8	11.5	11.1	11.0
5280	56	12.0	11.9	11.8	11.6	11.7	11.3	11.0	10.9
5300	60	12.3	12.2	12.1	11.9	12.0	11.7	11.4	11.2
5320	64	12.0	11.9	11.8	11.6	11.7	11.3	11.0	10.9
5500	100	11.1	10.9	10.8	10.7	10.7	10.4	10.1	9.9
5520	104	11.5	11.4	11.3	11.1	11.2	10.9	10.5	10.4
5540	108	11.6	11.4	11.3	11.2	11.2	10.9	10.6	10.4
5560	112	11.3	11.2	11.1	10.9	11.0	10.7	10.3	10.2
5580	116	11.2	11.1	11.0	10.8	10.9	10.6	10.2	10.1
5600	120	11.3	11.2	11.1	10.9	11.0	10.6	10.3	10.2
5620	124	11.3	11.2	11.1	10.9	11.0	10.7	10.4	10.2
5640	128	11.4	11.2	11.1	11.0	11.0	10.7	10.4	10.2
5660	132	11.2	11.0	10.9	10.7	10.8	10.5	10.2	10.0
5680	136	11.2	11.1	11.0	10.8	10.9	10.6	10.3	10.1
5700	140	11.4	11.3	11.2	11.0	11.1	10.8	10.4	10.3
5745	149	11.2	11.1	11.0	10.8	10.9	10.6	10.2	10.1
5765	153	11.3	11.2	11.0	10.9	11.0	10.6	10.3	10.1
5785	157	11.6	11.5	11.4	11.2	11.3	11.0	10.6	10.5
5805	161	11.7	11.5	11.4	11.3	11.3	11.0	10.7	10.5
5825	165	11.5	11.3	11.2	11.0	11.1	10.8	10.5	10.3

Table 14: Test results conducted power measurement 802.11a ANT 2

802.11a		maximum average conducted output power [dBm]															
Freq. [MHz]	Ch	6Mbps		9Mbps		12Mbps		18Mbps		24Mbps		36Mbps		48Mbps		54Mbps	
		Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2
5180	36	9.3	10.2	9.2	10.1	9.1	9.9	8.9	9.8	9.0	9.9	8.6	9.5	8.3	9.2	8.2	9.0
5200	40	9.5	10.4	9.4	10.3	9.3	10.1	9.1	10.0	9.2	10.1	8.8	9.7	8.5	9.4	8.4	9.2
5220	44	9.6	10.4	9.5	10.3	9.4	10.1	9.2	10.0	9.3	10.1	8.9	9.7	8.6	9.4	8.5	9.2
5240	48	9.5	10.0	9.4	9.9	9.3	9.7	9.1	9.6	9.2	9.7	8.8	9.3	8.5	9.0	8.4	8.8
5260	52	9.3	10.1	9.2	10.0	9.1	9.8	8.9	9.7	9.0	9.8	8.6	9.4	8.3	9.1	8.2	8.9
5280	56	9.4	10.0	9.3	9.9	9.2	9.7	9.0	9.6	9.1	9.7	8.7	9.3	8.4	9.0	8.3	8.8
5300	60	9.7	10.3	9.6	10.2	9.5	10.0	9.3	9.9	9.4	10.0	9.0	9.6	8.7	9.3	8.6	9.1
5320	64	9.6	10.0	9.5	9.9	9.4	9.7	9.2	9.6	9.3	9.7	8.9	9.3	8.6	9.0	8.5	8.8
5500	100	9.0	9.1	8.9	9.0	8.8	8.8	8.6	8.7	8.7	8.8	8.3	8.4	8.0	8.1	7.9	7.9
5520	104	8.8	9.5	8.7	9.4	8.6	9.2	8.4	9.1	8.5	9.2	8.1	8.8	7.8	8.5	7.7	8.3
5540	108	9.1	9.6	9.0	9.5	8.9	9.3	8.7	9.2	8.8	9.3	8.4	8.9	8.1	8.6	8.0	8.4
5560	112	9.2	9.3	9.1	9.2	9.0	9.0	8.8	8.9	8.9	9.0	8.5	8.6	8.2	8.3	8.1	8.1
5580	116	8.9	9.2	8.8	9.1	8.7	8.9	8.5	8.8	8.6	8.9	8.2	8.5	7.9	8.2	7.8	8.0
5600	120	8.8	9.3	8.7	9.2	8.6	9.0	8.4	8.9	8.5	9.0	8.1	8.6	7.8	8.3	7.7	8.1
5620	124	9.2	9.3	9.1	9.2	9.0	9.0	8.8	8.9	8.9	9.0	8.5	8.6	8.2	8.3	8.1	8.1
5640	128	9.2	9.4	9.1	9.3	9.0	9.1	8.8	9.0	8.9	9.1	8.5	8.7	8.2	8.4	8.1	8.2
5660	132	9.0	9.2	8.9	9.1	8.8	8.9	8.6	8.8	8.7	8.9	8.3	8.5	8.0	8.2	7.9	8.0
5680	136	8.8	9.2	8.7	9.1	8.6	8.9	8.4	8.8	8.5	8.9	8.1	8.5	7.8	8.2	7.7	8.0
5700	140	8.9	9.4	8.8	9.3	8.7	9.1	8.5	9.0	8.6	9.1	8.2	8.7	7.9	8.4	7.8	8.2
5745	149	8.8	9.2	8.7	9.1	8.6	8.9	8.4	8.8	8.5	8.9	8.1	8.5	7.8	8.2	7.7	8.0
5765	153	8.7	9.3	8.6	9.2	8.5	9.0	8.3	8.9	8.4	9.0	8.0	8.6	7.7	8.3	7.6	8.1
5785	157	8.9	9.6	8.8	9.5	8.7	9.3	8.5	9.2	8.6	9.3	8.2	8.9	7.9	8.6	7.8	8.4
5805	161	8.9	9.7	8.8	9.6	8.7	9.4	8.5	9.3	8.6	9.4	8.2	9.0	7.9	8.7	7.8	8.5
5825	165	8.8	9.5	8.7	9.4	8.6	9.2	8.4	9.1	8.5	9.2	8.1	8.8	7.8	8.5	7.7	8.3

Table 15: Test results conducted power measurement 802.11a ANT MIMO

802.11n HT-20 / 802.11ac VHT-20 maximum average conducted output power [dBm]										
Freq. [MHz]	Ch	MCS-0	MCS-1	MCS-2	MCS-3	MCS-4	MCS-5	MCS-6	MCS-7	MCS-8
		6.5Mbps	13Mbps	19.5Mbps	26Mbps	39Mbps	52Mbps	58.5Mbps	65Mbps	78Mbps
5180	36	11.0	10.8	10.6	10.8	10.5	10.2	10.1	9.9	10.8
5200	40	11.2	10.9	10.7	11.0	10.7	10.4	10.2	10.1	10.9
5220	44	11.4	11.2	11.0	11.2	10.9	10.6	10.5	10.3	11.2
5240	48	11.2	11.0	10.8	11.1	10.7	10.4	10.3	10.1	11.0
5260	52	11.0	10.8	10.6	10.8	10.5	10.2	10.1	9.9	10.8
5280	56	11.1	10.9	10.7	11.0	10.6	10.3	10.2	10.1	10.9
5300	60	11.4	11.2	11.0	11.2	10.9	10.6	10.5	10.3	11.2
5320	64	11.3	11.1	10.9	11.1	10.8	10.5	10.4	10.2	11.1
5500	100	10.7	10.5	10.3	10.6	10.2	9.9	9.8	9.7	10.5
5520	104	10.8	10.6	10.4	10.7	10.3	10.0	9.9	9.8	10.6
5540	108	11.0	10.7	10.5	10.8	10.5	10.2	10.0	9.9	10.7
5560	112	10.9	10.7	10.5	10.8	10.4	10.1	10.0	9.9	10.7
5580	116	10.6	10.4	10.2	10.4	10.1	9.8	9.7	9.5	10.4
5600	120	10.6	10.3	10.1	10.4	10.1	9.8	9.6	9.5	10.3
5620	124	10.8	10.6	10.4	10.7	10.3	10.0	9.9	9.7	10.6
5640	128	11.0	10.8	10.6	10.9	10.5	10.2	10.1	9.9	10.8
5660	132	10.7	10.4	10.2	10.5	10.2	9.9	9.7	9.6	10.4
5680	136	10.4	10.2	9.9	10.2	9.9	9.6	9.4	9.3	10.1
5700	140	10.7	10.5	10.2	10.5	10.2	9.9	9.7	9.6	10.4
5745	149	10.7	10.5	10.3	10.5	10.2	9.9	9.8	9.6	10.5
5765	153	10.5	10.3	10.0	10.3	10.0	9.7	9.5	9.4	10.2
5785	157	10.8	10.6	10.4	10.7	10.3	10.0	9.9	9.7	10.6
5805	161	10.6	10.4	10.2	10.5	10.1	9.8	9.7	9.6	10.4
5825	165	10.5	10.3	10.1	10.4	10.0	9.7	9.6	9.5	10.3

Table 16: Test results conducted power measurement 802.11n HT-20 / 802.11ac VHT-20 ANT 1

802.11n HT-20 / 802.11ac VHT-20 maximum average conducted output power [dBm]										
Freq. [MHz]	Ch	MCS-0	MCS-1	MCS-2	MCS-3	MCS-4	MCS-5	MCS-6	MCS-7	MCS-8
		6.5Mbps	13Mbps	19.5Mbps	26Mbps	39Mbps	52Mbps	58.5Mbps	65Mbps	78Mbps
5180	36	12.0	11.8	11.6	11.8	11.4	11.2	11.0	10.9	11.7
5200	40	12.2	11.9	11.7	12.0	11.6	11.4	11.2	11.1	11.9
5220	44	12.2	12.0	11.8	12.0	11.6	11.4	11.2	11.1	11.9
5240	48	11.8	11.6	11.4	11.6	11.2	11.0	10.9	10.8	11.6
5260	52	11.9	11.7	11.5	11.7	11.3	11.1	11.0	10.9	11.7
5280	56	12.1	11.9	11.7	12.0	11.6	11.3	11.2	11.1	11.9
5300	60	12.1	11.9	11.7	12.0	11.6	11.3	11.2	11.1	11.9
5320	64	11.8	11.6	11.4	11.6	11.2	11.0	10.9	10.7	11.5
5500	100	10.8	10.6	10.4	10.7	10.3	10.0	9.9	9.8	10.6
5520	104	11.3	11.1	10.9	11.2	10.8	10.5	10.4	10.3	11.1
5540	108	11.4	11.1	10.9	11.2	10.8	10.5	10.4	10.3	11.1
5560	112	11.1	10.9	10.7	10.9	10.5	10.3	10.2	10.1	10.9
5580	116	11.0	10.8	10.6	10.9	10.5	10.2	10.1	10.0	10.8
5600	120	11.1	10.9	10.7	10.9	10.5	10.3	10.1	10.0	10.8
5620	124	11.1	10.9	10.7	10.9	10.5	10.3	10.2	10.1	10.9
5640	128	11.2	10.9	10.7	11.0	10.6	10.3	10.2	10.1	10.9
5660	132	11.0	10.7	10.5	10.8	10.4	10.1	10.0	9.9	10.7
5680	136	11.0	10.8	10.6	10.9	10.5	10.2	10.1	10.0	10.8
5700	140	11.2	11.0	10.8	11.1	10.7	10.4	10.3	10.2	11.0
5745	149	11.0	10.8	10.6	10.8	10.4	10.2	10.1	10.0	10.8
5765	153	11.1	10.9	10.7	10.9	10.5	10.3	10.1	10.0	10.8
5785	157	11.4	11.2	11.0	11.2	10.8	10.6	10.5	10.4	11.2
5805	161	11.5	11.2	11.0	11.3	10.9	10.7	10.5	10.4	11.2
5825	165	11.3	11.0	10.8	11.1	10.7	10.4	10.3	10.2	11.0

Table 17: Test results conducted power measurement 802.11n HT-20 / 802.11ac VHT-20 ANT 2

802.11n HT-20 / 802.11ac VHT-20 maximum average conducted output power [dBm]																			
Freq. [MHz]	Ch	MCS-0		MCS-1		MCS-2		MCS-3		MCS-4		MCS-5		MCS-6		MCS-7		MCS-8	
		6.5Mbps		13Mbps		19.5Mbps		26Mbps		39Mbps		52Mbps		58.5Mbps		65Mbps		78Mbps	
		Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2
5180	36	9.0	10.0	8.8	9.8	8.6	9.6	8.8	9.8	8.5	9.4	8.2	9.2	8.1	9.0	7.9	8.9	8.8	9.7
5200	40	9.2	10.2	9.0	10.0	8.8	9.8	9.0	10.0	8.7	9.6	8.4	9.4	8.3	9.2	8.1	9.1	9.0	9.9
5220	44	9.4	10.2	9.2	10.0	9.0	9.8	9.2	10.0	8.9	9.6	8.6	9.4	8.5	9.2	8.3	9.1	9.2	9.9
5240	48	9.2	9.8	9.0	9.6	8.8	9.4	9.0	9.6	8.7	9.2	8.4	9.0	8.3	8.8	8.1	8.7	9.0	9.5
5260	52	9.0	9.9	8.8	9.7	8.6	9.5	8.8	9.7	8.5	9.3	8.2	9.1	8.1	8.9	7.9	8.8	8.8	9.6
5280	56	9.1	10.1	8.9	9.9	8.7	9.7	8.9	9.9	8.6	9.5	8.3	9.3	8.2	9.1	8.0	9.0	8.9	9.8
5300	60	9.4	10.1	9.2	9.9	9.0	9.7	9.2	9.9	8.9	9.5	8.6	9.3	8.5	9.1	8.3	9.0	9.2	9.8
5320	64	9.3	9.8	9.1	9.6	8.9	9.4	9.1	9.6	8.8	9.2	8.5	9.0	8.4	8.8	8.2	8.7	9.1	9.5
5500	100	8.7	8.8	8.5	8.6	8.3	8.4	8.5	8.6	8.2	8.2	7.9	8.0	7.8	7.8	7.6	7.7	8.5	8.5
5520	104	8.8	9.3	8.6	9.1	8.4	8.9	8.6	9.1	8.3	8.7	8.0	8.5	7.9	8.3	7.7	8.2	8.6	9.0
5540	108	9.0	9.4	8.8	9.2	8.6	9.0	8.8	9.2	8.5	8.8	8.2	8.6	8.1	8.4	7.9	8.3	8.8	9.1
5560	112	8.9	9.1	8.7	8.9	8.5	8.7	8.7	8.9	8.4	8.5	8.1	8.3	8.0	8.1	7.8	8.0	8.7	8.8
5580	116	8.6	9.0	8.4	8.8	8.2	8.6	8.4	8.8	8.1	8.4	7.8	8.2	7.7	8.0	7.5	7.9	8.4	8.7
5600	120	8.6	9.1	8.4	8.9	8.2	8.7	8.4	8.9	8.1	8.5	7.8	8.3	7.7	8.1	7.5	8.0	8.4	8.8
5620	124	8.8	9.1	8.6	8.9	8.4	8.7	8.6	8.9	8.3	8.5	8.0	8.3	7.9	8.1	7.7	8.0	8.6	8.8
5640	128	9.0	9.2	8.8	9.0	8.6	8.8	8.8	9.0	8.5	8.6	8.2	8.4	8.1	8.2	7.9	8.1	8.8	8.9
5660	132	8.7	9.0	8.5	8.8	8.3	8.6	8.5	8.8	8.2	8.4	7.9	8.2	7.8	8.0	7.6	7.9	8.5	8.7
5680	136	8.4	9.0	8.2	8.8	8.0	8.6	8.2	8.8	7.9	8.4	7.6	8.2	7.5	8.0	7.3	7.9	8.2	8.7
5700	140	8.7	9.2	8.5	9.0	8.3	8.8	8.5	9.0	8.2	8.6	7.9	8.4	7.8	8.2	7.6	8.1	8.5	8.9
5745	149	8.7	9.0	8.5	8.8	8.3	8.6	8.5	8.8	8.2	8.4	7.9	8.2	7.8	8.0	7.6	7.9	8.5	8.7
5765	153	8.5	9.1	8.3	8.9	8.1	8.7	8.3	8.9	8.0	8.5	7.7	8.3	7.6	8.1	7.4	8.0	8.3	8.8
5785	157	8.8	9.4	8.6	9.2	8.4	9.0	8.6	9.2	8.3	8.8	8.0	8.6	7.9	8.4	7.7	8.3	8.6	9.1
5805	161	8.6	9.5	8.4	9.3	8.2	9.1	8.4	9.3	8.1	8.9	7.8	8.7	7.7	8.5	7.5	8.4	8.4	9.2
5825	165	8.5	9.3	8.3	9.1	8.1	8.9	8.3	9.1	8.0	8.7	7.7	8.5	7.6	8.3	7.4	8.2	8.3	9.0

Table 18: Test results conducted power measurement 802.11n HT-20 / 802.11ac VHT-20 ANT MIMO

802.11n HT-40 / 802.11ac VHT-40 maximum average conducted output power [dBm]											
Freq. [MHz]	Ch	MCS-0	MCS-1	MCS-2	MCS-3	MCS-4	MCS-5	MCS-6	MCS-7	MCS-8	MCS-9
		13.5Mbps	27Mbps	40.5Mbps	54Mbps	81Mbps	108Mbps	121.5Mbps	135Mbps	162Mbps	180Mbps
5190	38	11.3	10.9	10.5	10.3	9.8	9.3	9.1	9.0	10.8	10.2
5230	46	11.6	11.2	10.8	10.6	10.1	9.6	9.5	9.4	11.1	10.5
5270	54	11.3	10.8	10.5	10.2	9.7	9.3	9.1	9.0	10.8	10.2
5310	62	11.7	11.2	10.9	10.7	10.2	9.7	9.5	9.4	11.2	10.6
5510	102	11.1	10.6	10.3	10.0	9.5	9.1	8.9	8.8	10.6	10.0
5550	110	11.3	10.9	10.5	10.3	9.8	9.3	9.1	9.0	10.8	10.2
5590	118	11.1	10.7	10.3	10.1	9.6	9.2	9.0	8.9	10.7	10.0
5630	126	11.1	10.7	10.3	10.1	9.6	9.2	9.0	8.9	10.7	10.1
5670	134	10.9	10.5	10.1	9.9	9.4	8.9	8.8	8.7	10.4	9.8
5755	151	10.7	10.3	9.9	9.7	9.2	8.8	8.6	8.5	10.3	9.7
5795	159	10.8	10.4	10.0	9.8	9.3	8.9	8.7	8.6	10.4	9.7

Table 19: Test results conducted power measurement 802.11n HT-40 / 802.11ac VHT-40 ANT 1

802.11n HT-40 / 802.11ac VHT-40 maximum average conducted output power [dBm]											
Freq. [MHz]	Ch	MCS-0	MCS-1	MCS-2	MCS-3	MCS-4	MCS-5	MCS-6	MCS-7	MCS-8	MCS-9
		13.5Mbps	27Mbps	40.5Mbps	54Mbps	81Mbps	108Mbps	121.5Mbps	135Mbps	162Mbps	180Mbps
5190	38	12.3	11.9	11.6	11.3	10.8	10.4	10.2	10.1	11.9	11.2
5230	46	12.5	12.1	11.7	11.5	11.0	10.5	10.4	10.3	12.1	11.4
5270	54	12.3	11.8	11.5	11.2	10.7	10.3	10.1	10.0	11.8	11.2
5310	62	12.5	12.1	11.7	11.5	11.0	10.6	10.4	10.3	12.1	11.4
5510	102	11.3	10.8	10.5	10.2	9.7	9.3	9.1	9.0	10.8	10.2
5550	110	11.7	11.3	11.0	10.7	10.2	9.8	9.6	9.5	11.3	10.7
5590	118	11.4	11.0	10.6	10.3	9.8	9.4	9.2	9.1	11.0	10.3
5630	126	11.5	11.1	10.7	10.5	10.0	9.5	9.4	9.3	11.1	10.4
5670	134	11.4	10.9	10.6	10.3	9.8	9.4	9.2	9.1	10.9	10.3
5755	151	11.5	11.1	10.7	10.5	10.0	9.5	9.4	9.3	11.1	10.4
5795	159	11.7	11.3	11.0	10.7	10.2	9.8	9.6	9.5	11.3	10.7

Table 20: Test results conducted power measurement 802.11n HT-40 / 802.11ac VHT-40 ANT 2

802.11n HT-40 / 802.11ac VHT-40 maximum average conducted output power [dBm]																					
Freq. [MHz]	Ch	MCS-0		MCS-1		MCS-2		MCS-3		MCS-4		MCS-5		MCS-6		MCS-7		MCS-8		MCS-9	
		13.5Mbps		27Mbps		40.5Mbps		54Mbps		81Mbps		108Mbps		121.5Mbps		135Mbps		162Mbps		180Mbps	
		Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2
5190	38	11.3	12.4	10.9	11.9	10.6	11.5	10.4	11.3	9.9	10.9	9.5	10.5	9.3	10.3	9.2	10.1	8.9	9.9	8.7	9.7
5230	46	11.6	12.6	11.2	12.1	10.9	11.7	10.7	11.5	10.2	11.1	9.8	10.7	9.6	10.5	9.5	10.3	9.2	10.1	9.0	9.9
5270	54	11.3	12.3	10.9	11.8	10.6	11.4	10.4	11.2	9.9	10.8	9.5	10.4	9.3	10.2	9.2	10.0	8.9	9.8	8.7	9.6
5310	62	11.6	12.6	11.2	12.1	10.9	11.7	10.7	11.5	10.2	11.1	9.8	10.7	9.6	10.5	9.5	10.3	9.2	10.1	9.0	9.9
5510	102	11.0	11.3	10.6	10.8	10.3	10.4	10.1	10.2	9.6	9.8	9.2	9.4	9.0	9.2	8.9	9.0	8.6	8.8	8.4	8.6
5550	110	11.3	11.7	10.9	11.2	10.6	10.8	10.4	10.6	9.9	10.2	9.5	9.8	9.3	9.6	9.2	9.4	8.9	9.2	8.7	9.0
5590	118	10.9	11.4	10.5	10.9	10.2	10.5	10.0	10.3	9.5	9.9	9.1	9.5	8.9	9.3	8.8	9.1	8.5	8.9	8.3	8.7
5630	126	11.1	11.5	10.7	11.0	10.4	10.6	10.2	10.4	9.7	10.0	9.3	9.6	9.1	9.4	9.0	9.2	8.7	9.0	8.5	8.8
5670	134	10.9	11.3	10.5	10.8	10.2	10.4	10.0	10.2	9.5	9.8	9.1	9.4	8.9	9.2	8.8	9.0	8.5	8.8	8.3	8.6
5755	151	10.7	11.3	10.3	10.8	10.0	10.4	9.8	10.2	9.3	9.8	8.9	9.4	8.7	9.2	8.6	9.0	8.3	8.8	8.1	8.6
5795	159	10.8	11.4	10.4	10.9	10.1	10.5	9.9	10.3	9.4	9.9	9.0	9.5	8.8	9.3	8.7	9.1	8.4	8.9	8.2	8.7

Table 21: Test results conducted power measurement 802.11n HT-40 / 802.11ac VHT-40 MIMO

802.11ac VHT-80 maximum average conducted output power [dBm]											
Freq. [MHz]	Ch	MCS-0	MCS-1	MCS-2	MCS-3	MCS-4	MCS-5	MCS-6	MCS-7	MCS-8	MCS-9
		29.3Mbps	58.5Mbps	87.8Mbps	117Mbps	175.5Mbps	234Mbps	263.3Mbps	292.5Mbps	351Mbps	390Mbps
5210	42	10.0	9.3	8.8	8.6	8.1	7.7	7.5	7.4	7.2	7.0
5290	58	9.9	9.2	8.7	8.5	8.0	7.5	7.4	7.3	7.1	6.9
5530	106	9.5	8.8	8.3	8.1	7.6	7.1	7.0	6.9	6.7	6.5
5610	122	9.2	8.5	8.0	7.9	7.3	6.9	6.8	6.7	6.4	6.2
5775	155	9.0	8.3	7.8	7.6	7.1	6.7	6.5	6.4	6.2	6.0

Table 22: Test results conducted power measurement 802.11ac VHT-80 ANT 1

802.11ac VHT-80 maximum average conducted output power [dBm]											
Freq. [MHz]	Ch	MCS-0	MCS-1	MCS-2	MCS-3	MCS-4	MCS-5	MCS-6	MCS-7	MCS-8	MCS-9
		29.3Mbps	58.5Mbps	87.8Mbps	117Mbps	175.5Mbps	234Mbps	263.3Mbps	292.5Mbps	351Mbps	390Mbps
5210	42	10.8	10.1	9.6	9.5	8.9	8.5	8.3	8.2	8.0	7.9
5290	58	10.9	10.2	9.7	9.6	9.0	8.6	8.4	8.3	8.1	7.9
5530	106	9.9	9.2	8.7	8.6	8.0	7.6	7.4	7.3	7.1	7.0
5610	122	9.7	9.0	8.5	8.4	7.8	7.4	7.2	7.1	6.9	6.7
5775	155	9.7	9.0	8.5	8.4	7.8	7.4	7.2	7.1	6.9	6.7

Table 23: Test results conducted power measurement 802.11ac VHT-80 ANT 2

802.11ac VHT-80 maximum average conducted output power [dBm]																					
Freq. [MHz]	Ch	MCS-0		MCS-1		MCS-2		MCS-3		MCS-4		MCS-5		MCS-6		MCS-7		MCS-8		MCS-9	
		29.3Mbps		58.5Mbps		87.8Mbps		117Mbps		175.5Mbps		234Mbps		263.3Mbps		292.5Mbps		351Mbps		390Mbps	
		Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2
5210	42	10.0	10.9	9.3	10.2	8.8	9.7	8.6	9.5	8.1	9.0	7.7	8.6	7.5	8.4	7.4	8.3	7.2	8.1	7.0	7.4
5290	58	9.8	11.0	9.1	10.3	8.6	9.8	8.4	9.6	7.9	9.1	7.5	8.7	7.3	8.5	7.2	8.4	7.0	8.2	6.8	8.0
5530	106	9.4	10.0	8.7	9.3	8.2	8.8	8.0	8.6	7.5	8.1	7.1	7.7	6.9	7.5	6.8	7.4	6.6	7.2	6.4	6.5
5610	122	9.2	9.7	8.5	9.0	8.0	8.5	7.8	8.3	7.3	7.8	6.9	7.4	6.7	7.2	6.6	7.1	6.4	6.9	6.2	6.2
5775	155	8.9	9.7	8.2	9.0	7.7	8.5	7.5	8.3	7.0	7.8	6.6	7.4	6.4	7.2	6.3	7.1	6.1	6.9	5.9	6.2

Table 24: Test results conducted power measurement 802.11ac VHT-80 MIMO

8.1.5 Radiated output power measurements Bluetooth LE 2.4 GHz

Modulation Maximum output power radiated [dBm]			
Frequency	2402 MHz	2440 MHz	2480 MHz
1 Msps	6.2	6.6	3.2

Table 25: Test results radiated output power measurement Bluetooth LE 2.4 GHz

8.2 SAR test results

8.2.1 General description of test procedures

- WLAN and BLE are tested using a test software to control test channels and maximum output power of the DUT.
- The LTE is tested using a CMW 500 communications tester as controller unit to set test channels and maximum output power to the DUT, as well as for measuring the conducted peak power.
- Test positions as described in the tables below are in accordance with the specified test standard.
- Required WLAN test channels were selected according to KDB 248227
- According to IEC/IEEE 62209-1528 the SAR test shall be performed at the channel producing the highest rated output power.

- When the width of the transmit frequency band ($\Delta f = f_{\text{high}} - f_{\text{low}}$) exceeds 1 % of its centre frequency f_c , the channels at the lowest and highest frequencies of the transmit band shall also be tested.
- When the width of the transmit frequency band exceeds 10 % of its centre frequency. The following formula shall be used to determine the number of channels, N_c , to be tested:

$$N_c = 2 \times \text{roundup} \left[\frac{10 * (f_{\text{high}} - f_{\text{low}})}{f_c} \right] + 1$$

where

f_c is the centre frequency channel of the transmission band in Hz;

f_{high} is the highest frequency channel of the transmission band in Hz;

f_{low} is the lowest frequency channel of the transmission band in Hz;

N_c is the number of channels

- According to KDB 447498 D01 testing of other required channels within the operating mode of a frequency band is not required when the reported 1-g or 10-g SAR for the mid-band or highest output power channel is:
 - ≤ 0.8 W/kg or 2.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≤ 100 MHz
 - ≤ 0.6 W/kg or 1.5 W/kg, for 1-g or 10-g respectively, when the transmission band is between 100 MHz and 200 MHz
 - ≤ 0.4 W/kg or 1.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≥ 200 MHz

8.2.2 Results overview

measured / extrapolated SAR numbers - Limb - LTE FDD 2 1900 MHz - 0 mm distance												
Ch.	Freq. (MHz)	RB offset	BW (MHz)	Position	cond. P _{max} (dBm)		SAR _{1g} (W/kg)		SAR _{10g} (W/kg)		P _{drift} (dB)	liquid (°C)
					declared*	measured	meas.	extrap.	meas.	extrap.		
1RB/QPSK												
18700	1860	mid	20	front	23.5	22.5	0.021	0.027	0.012	0.015	0.02	22.2
18700	1860	mid	20	left	23.5	22.5	0.517	0.655	0.272	0.345	0.07	22.2
18700	1860	mid	20	right	23.5	22.5	0.024	0.030	0.014	0.018	0.14	22.2
18700	1860	mid	20	top	23.5	22.5	0.179	0.227	0.106	0.134	0.01	22.2
18900	1880	mid	20	left	23.5	22.2	0.461	0.616	0.255	0.341	-0.10	22.2
19100	1900	mid	20	left	23.5	22.3	0.338	0.446	0.190	0.250	-0.05	22.2
50%RB/QPSK												
18700	1860	low	20	left	22.0	21.0	0.376	0.478	0.207	0.263	-0.03	22.2
measured / extrapolated SAR numbers - Limb - LTE FDD 4 1700 MHz - 0 mm distance												
Ch.	Freq. (MHz)	RB offset	BW (MHz)	Position	cond. P _{max} (dBm)		SAR _{1g} (W/kg)		SAR _{10g} (W/kg)		P _{drift} (dB)	liquid (°C)
					declared*	measured	meas.	extrap.	meas.	extrap.		
1RB/QPSK												
20050	1720.0	mid	20	front	23.5	23.0	0.025	0.028	0.016	0.018	-0.10	22.0
20050	1720.0	mid	20	left	23.5	23.0	0.587	0.660	0.328	0.369	0.12	22.0
20050	1720.0	mid	20	right	23.5	23.0	0.030	0.034	0.019	0.021	0.07	22.0
20050	1720.0	mid	20	top	23.5	23.0	0.175	0.197	0.108	0.121	0.04	22.0
20175	1732.5	mid	20	left	23.5	22.8	0.856	1.003	0.463	0.543	-0.06	22.0
20300	1745.0	high	20	left	23.5	22.2	0.910	1.242	0.492	0.671	0.05	22.0
50%RB/QPSK												
20175	1732.5	mid	20	left	22.0	21.2	0.737	0.878	0.400	0.476	-0.01	22.0
measured / extrapolated SAR numbers - Limb - LTE FDD 5 850 MHz - 0 mm distance												
Ch.	Freq. (MHz)	RB offset	BW (MHz)	Position	cond. P _{max} (dBm)		SAR _{1g} (W/kg)		SAR _{10g} (W/kg)		P _{drift} (dB)	liquid (°C)
					declared*	measured	meas.	extrap.	meas.	extrap.		
1RB/QPSK												
20525	836.5	mid	10	front	24.0	22.2	0.009	0.014	0.006	0.009	0.08	21.2
20525	836.5	mid	10	left	24.0	22.2	0.060	0.090	0.041	0.062	-0.11	21.2
20525	836.5	mid	10	right	24.0	22.2	0.011	0.017	0.007	0.011	0.04	21.2
20525	836.5	mid	10	top	24.0	22.2	0.057	0.086	0.039	0.059	0.17	21.2
20407	824.7	high	1.4	left	24.0	22.3	0.061	0.091	0.041	0.061	-0.09	21.2
20625	846.5	mid	5	left	24.0	22.0	0.075	0.118	0.050	0.079	0.12	21.2
50%RB/QPSK												
20407	824.7	low	1.4	left	23.0	21.9	0.061	0.079	0.041	0.053	0.17	21.2
measured / extrapolated SAR numbers - LTE FDD 7 / 1RB/QPSK/0 mm distance												
Ch.	Freq. (MHz)	RB offset	BW (MHz)	Position	cond. P _{max} (dBm)		SAR _{1g} (W/kg)		SAR _{10g} (W/kg)		P _{drift} (dB)	liquid (°C)
					declared*	measured	meas.	extrap.	meas.	extrap.		
1RB/QPSK												
21100	2535.0	mid	20	front	24.0	22.2	0.049	0.075	0.027	0.041	-0.07	22.2
21100	2535.0	mid	20	left	24.0	22.2	1.290	1.971	0.690	1.054	-0.04	22.2
21100	2535.0	mid	20	right	24.0	22.2	0.027	0.041	0.013	0.020	-0.04	22.2
21100	2535.0	mid	20	top	24.0	22.2	0.266	0.406	0.152	0.232	0.01	22.2
20800	2505.0	mid	10	left	24.0	22.9	1.040	1.343	0.553	0.714	0.09	22.2
21400	2565.0	mid	10	left	24.0	22.4	1.160	1.684	0.625	0.908	0.05	22.2
50%RB/QPSK												
20800	2505.0	low	10	left	22.5	21.5	0.982	1.236	0.539	0.679	-0.02	22.2

Table 26: SAR test results LTE FDD 2/4/5/7 (see max. SAR plot in Annex B.1: SAR results – LTE page 60)

* - maximum possible output power declared by manufacturer

measured / extrapolated SAR numbers - LTE FDD 8 / 1RB/QPSK/0 mm distance												
Ch.	Freq. (MHz)	RB offset	BW (MHz)	Position	cond. P _{max} (dBm)		SAR _{1g} (W/kg)		SAR _{10g} (W/kg)		P _{drift} (dB)	liquid (°C)
					declared*	measured	meas.	extrap.	meas.	extrap.		
21625	897.5	high	10	front	24.0	22.2	0.006	0.009	0.004	0.006	-0.18	20.4
21625	897.5	high	10	left	24.0	22.2	0.123	0.188	0.080	0.122	-0.12	20.4
21625	897.5	high	10	right	24.0	22.2	0.013	0.020	0.009	0.014	0.05	20.4
21625	897.5	high	10	top	24.0	22.2	0.082	0.126	0.056	0.086	-0.12	20.4
21500	885.0	mid	10	left	24.0	22.6	0.089	0.123	0.059	0.082	0.07	20.4
21750	910.0	mid	10	left	24.0	22.4	0.136	0.195	0.086	0.123	-0.03	20.4
21625	897.5	mid	3	left	24.0	22.3	0.112	0.166	0.075	0.111	-0.05	20.4
measured / extrapolated SAR numbers - Limb - LTE FDD 12 700 MHz - 0 mm distance												
Ch.	Freq. (MHz)	RB offset	BW (MHz)	Position	cond. P _{max} (dBm)		SAR _{1g} (W/kg)		SAR _{10g} (W/kg)		P _{drift} (dB)	liquid (°C)
					declared*	measured	meas.	extrap.	meas.	extrap.		
1RB/QPSK												
23130	711.0	mid	10	front	24.0	23.1	0.002	0.002	0.002	0.002	0.10	20.7
23130	711.0	mid	10	left	24.0	23.1	0.027	0.033	0.018	0.022	-0.06	20.7
23130	711.0	mid	10	right	24.0	23.1	0.003	0.004	0.002	0.002	0.05	20.7
23130	711.0	mid	10	top	24.0	23.1	0.024	0.029	0.017	0.021	-0.03	20.7
23060	704.0	mid	10	left	24.0	22.7	0.033	0.044	0.021	0.028	-0.08	20.7
23095	707.5	mid	10	left	24.0	22.5	0.030	0.042	0.019	0.027	0.00	20.7
50%RB/QPSK												
23095	707.5	mid	1.4	left	23.0	22.4	0.023	0.026	0.015	0.017	0.02	20.7
measured / extrapolated SAR numbers - Limb - LTE FDD 13 750 MHz - 0 mm distance												
Ch.	Freq. (MHz)	RB offset	BW (MHz)	Position	cond. P _{max} (dBm)		SAR _{1g} (W/kg)		SAR _{10g} (W/kg)		P _{drift} (dB)	liquid (°C)
					declared*	measured	meas.	extrap.	meas.	extrap.		
1RB/QPSK												
23230	782.0	mid	10	front	24.0	22.7	0.008	0.011	0.004	0.005	-0.02	20.7
23230	782.0	mid	10	left	24.0	22.7	0.035	0.048	0.023	0.031	-0.05	20.7
23230	782.0	mid	10	right	24.0	22.7	0.018	0.024	0.012	0.016	0.01	20.7
23230	782.0	mid	10	top	24.0	22.7	0.036	0.049	0.031	0.042	0.02	20.7
23205	779.5	mid	5	top	24.0	22.7	0.033	0.045	0.024	0.033	0.10	20.7
23255	784.5	mid	5	top	24.0	22.7	0.035	0.047	0.025	0.034	-0.07	20.7
50%RB/QPSK												
23230	782.0	low	10	top	23.0	21.6	0.032	0.044	0.022	0.030	0.06	20.7
measured / extrapolated SAR numbers - Limb - LTE FDD 26 850 MHz - 0 mm distance												
Ch.	Freq. (MHz)	RB offset	BW (MHz)	Position	cond. P _{max} (dBm)		SAR _{1g} (W/kg)		SAR _{10g} (W/kg)		P _{drift} (dB)	liquid (°C)
					declared*	measured	meas.	extrap.	meas.	extrap.		
1RB/QPSK												
27015	846.5	mid	5	front	24.0	23.7	0.007	0.008	0.004	0.004	0.11	21.2
27015	846.5	mid	5	left	24.0	23.7	0.078	0.084	0.053	0.057	-0.18	21.2
27015	846.5	mid	5	right	24.0	23.7	0.010	0.011	0.007	0.008	0.07	21.2
27015	846.5	mid	5	top	24.0	23.7	0.053	0.057	0.037	0.040	-0.08	21.2
26765	821.5	low	15	left	24.0	21.9	0.047	0.076	0.031	0.050	0.14	21.2
26865	831.5	mid	10	left	24.0	22.4	0.064	0.093	0.042	0.061	-0.04	21.2
50%RB/QPSK												
27015	846.5	high	5	left	23.0	22.5	0.056	0.063	0.038	0.042	-0.13	21.2

Table 27: SAR test results LTE FDD 8/12/13/26 (see max. SAR plot in Annex B.1: SAR results – LTE)

* - maximum possible output power declared by manufacturer.

measured / extrapolated SAR numbers - LTE TDD 38 / 1RB/QPSK/0 mm distance												
Ch.	Freq. (MHz)	RB offset	BW	Position	cond. P _{max} (dBm)		SAR _{1g} (W/kg)		SAR _{10g} (W/kg)		P _{drift} (dB)	liquid (°C)
					declared*	measured	meas.	extrap.	meas.	extrap.		
38000	2595.0	mid	20	front	24.0	22.7	0.048	0.064	0.027	0.036	0.12	22.2
38000	2595.0	mid	20	left	24.0	22.7	0.396	0.532	0.216	0.290	-0.05	22.2
38000	2595.0	mid	20	right	24.0	22.7	0.011	0.015	0.005	0.007	0.07	22.2
38000	2595.0	mid	20	top	24.0	22.7	0.194	0.260	0.106	0.142	-0.10	22.2
37850	2580.0	low	20	left	24.0	23.0	0.453	0.568	0.245	0.307	0.04	22.2
38150	2610.0	low	20	left	24.0	22.9	0.413	0.535	0.224	0.290	0.03	22.2
50%RB/QPSK												
37775	2572.5	mid	5	left	23.0	22.4	0.471	0.538	0.261	0.298	-0.01	22.2
measured / extrapolated SAR numbers - LTE TDD 41 / 1RB/QPSK/0 mm distance												
Ch.	Freq. (MHz)	RB offset	BW	Position	cond. P _{max} (dBm)		SAR _{1g} (W/kg)		SAR _{10g} (W/kg)		P _{drift} (dB)	liquid (°C)
					declared*	measured	meas.	extrap.	meas.	extrap.		
40620	2593	mid	20	front	24.0	22.7	0.039	0.053	0.022	0.030	-0.15	22.2
40620	2593	mid	20	left	24.0	22.7	0.406	0.551	0.222	0.302	0.06	22.2
40620	2593	mid	20	right	24.0	22.7	0.012	0.016	0.007	0.010	0.04	22.2
40620	2593	low	20	top	24.0	22.7	0.249	0.338	0.141	0.192	-0.07	22.2
39750	2506	low	20	left	24.0	22.7	0.278	0.374	0.154	0.207	0.11	22.2
41490	2680	mid	20	left	24.0	22.6	0.399	0.547	0.215	0.295	-0.02	22.2
50%RB/QPSK												
40620	2593	mid	20	left	23.0	21.7	0.438	0.589	0.244	0.328	-0.04	21.6
measured / extrapolated SAR numbers - Limb - LTE FDD 66 1700 MHz - 0 mm distance												
Ch.	Freq. (MHz)	RB offset	BW (MHz)	Position	cond. P _{max} (dBm)		SAR _{1g} (W/kg)		SAR _{10g} (W/kg)		P _{drift} (dB)	liquid (°C)
					declared*	measured	meas.	extrap.	meas.	extrap.		
1RB/QPSK												
132572	1770.0	mid	20	front	23.0	22.1	0.035	0.043	0.021	0.026	0.07	22.2
132572	1770.0	mid	20	left	23.0	22.1	0.931	1.140	0.507	0.621	0.06	22.2
132572	1770.0	mid	20	right	23.0	22.1	0.031	0.038	0.019	0.023	-0.02	22.2
132572	1770.0	mid	20	top	23.0	22.1	0.190	0.233	0.119	0.146	-0.12	22.2
132072	1720.0	high	20	left	23.0	22.1	0.820	1.021	0.452	0.563	0.10	22.2
132322	1745.0	low	20	left	23.0	21.8	0.843	1.101	0.457	0.597	-0.19	22.2
50%RB/QPSK												
132072	1720.0	high	20	left	22.0	21.1	0.603	0.738	0.346	0.424	0.01	22.2

Table 28: SAR test results LTE TDD 38/41/FDD 66 (see max. SAR plot in Annex B.1: SAR results – LTE)

* - maximum possible output power declared by manufacturer.

measured / extrapolated SAR numbers - WLAN 2.4 GHz - 0 mm distance														
Ch.	Freq. (MHz)	Ant.	test cond.	Position	cond. P _{max} (dBm)		SAR _{1g} (W/kg)			SAR _{10g} (W/kg)			P _{drift} (dB)	liquid (°C)
					declared*	meas.	meas.	extrap.	100% DF	meas.	extrap.	100% DF		
3	2422	1	MCS-0	front	11.5	11.0	0.012	0.013	0.014	0.007	0.008	0.008	0.07	21.5
3	2422	1	MCS-0	left	11.5	11.0	0.013	0.015	0.015	0.007	0.008	0.008	-0.12	21.5
3	2422	1	MCS-0	right	11.5	11.0	0.088	0.099	0.100	0.044	0.049	0.050	0.02	21.5
3	2422	1	MCS-0	top	11.5	11.0	0.300	0.337	0.340	0.263	0.295	0.298	-0.02	21.5
6	2437	1	MCS-0	top	11.5	10.9	0.289	0.332	0.335	0.169	0.194	0.196	-0.01	21.5
9	2452	1	MCS-0	top	11.5	10.6	0.288	0.354	0.358	0.169	0.208	0.210	0.02	21.5
6	2437	1	1Mbit/s	top	11.5	10.1	0.285	0.393	0.397	0.257	0.355	0.358	0.03	21.5
3	2422	2	MCS-0	front	11.5	10.9	0.061	0.070	0.071	0.028	0.032	0.032	-0.10	21.5
3	2422	2	MCS-0	left	11.5	10.9	0.129	0.148	0.150	0.062	0.071	0.072	-0.18	21.5
3	2422	2	MCS-0	right	11.5	10.9	0.017	0.020	0.020	0.008	0.009	0.009	0.11	21.5
3	2422	2	MCS-0	top	11.5	10.9	0.232	0.266	0.269	0.140	0.161	0.162	0.18	21.5
6	2437	2	MCS-0	top	11.5	10.6	0.228	0.281	0.283	0.137	0.169	0.170	-0.14	21.5
9	2452	2	MCS-0	top	11.5	10.4	0.223	0.287	0.290	0.133	0.171	0.173	-0.02	21.5
6	2437	2	1Mbit/s	top	11.5	9.8	0.208	0.308	0.311	0.126	0.186	0.188	-0.06	21.5
6	2437	MIMO	1Mbit/s	top	11.5	10.1	0.228	0.315	0.318	0.213	0.294	0.297	0.02	21.5
13	2472	MIMO	1Mbit/s	top	11.5	9.5	0.232	0.368	0.371	0.215	0.341	0.344	0.00	21.5

Table 29: SAR test results WLAN 2.4 GHz (see max. SAR plot Annex B.2: SAR results – WLAN 2.4GHz page 72)

measured / extrapolated SAR numbers - WLAN 5 GHz - 0 mm distance														
Ch.	Freq. (MHz)	Ant.	test cond.	Position	cond. P _{max} (dBm)		SAR _{1g} (W/kg)			SAR _{10g} (W/kg)			P _{drift} (dB)	liquid (°C)
					declared*	meas.	meas.	extrap.	100% DF	meas.	extrap.	100% DF		
124	5620	1	6Mbit/s	front	12.5	11.2	0.019	0.026	0.026	0.008	0.011	0.011	0.17	21.5
124	5620	1	6Mbit/s	left	12.5	11.2	0.023	0.031	0.031	0.009	0.012	0.012	-0.08	21.5
124	5620	1	6Mbit/s	right	12.5	11.2	0.338	0.456	0.461	0.136	0.183	0.185	0.00	21.5
44	5220	1	6Mbit/s	top	12.5	11.6	0.133	0.164	0.165	0.059	0.073	0.073	-0.12	21.5
60	5300	1	6Mbit/s	top	12.5	11.7	0.151	0.182	0.183	0.062	0.075	0.075	-0.09	21.5
124	5620	1	6Mbit/s	top	12.5	11.2	0.176	0.237	0.240	0.121	0.163	0.165	-0.06	21.5
157	5785	1	6Mbit/s	top	12.5	10.9	0.158	0.228	0.231	0.070	0.101	0.102	0.14	21.5
112	5560	1	6Mbit/s	top	12.5	11.2	0.172	0.232	0.234	0.072	0.097	0.098	0.11	21.5
132	5660	1	6Mbit/s	top	12.5	11.0	0.153	0.216	0.218	0.066	0.093	0.094	-0.05	21.5
161	5805	2	6Mbit/s	front	12.5	11.7	0.019	0.023	0.023	0.007	0.008	0.009	0.18	21.5
161	5805	2	6Mbit/s	left	12.5	11.7	0.310	0.373	0.376	0.127	0.153	0.154	-0.06	21.5
161	5805	2	6Mbit/s	right	12.5	11.7	0.009	0.011	0.011	0.003	0.004	0.004	0.13	21.5
44	5220	2	6Mbit/s	top	12.5	12.4	0.201	0.206	0.208	0.085	0.087	0.088	-0.08	21.5
60	5300	2	6Mbit/s	top	12.5	12.3	0.248	0.260	0.262	0.102	0.107	0.108	0.09	21.5
108	5540	2	6Mbit/s	top	12.5	11.6	0.305	0.375	0.379	0.123	0.151	0.153	0.02	21.5
161	5805	2	6Mbit/s	top	12.5	11.7	0.318	0.382	0.386	0.166	0.200	0.202	-0.03	21.5
153	5765	2	6Mbit/s	top	12.5	11.3	0.319	0.421	0.425	0.127	0.167	0.169	-0.02	21.5
165	5825	2	6Mbit/s	top	12.5	11.5	0.311	0.392	0.395	0.122	0.154	0.155	0.05	21.5
161	5805	MIMO	6Mbit/s	top	12.5	9.7	0.225	0.429	0.433	0.090	0.171	0.173	-0.05	21.5
159	5795	MIMO	13.5Mbit/s	top	12.5	11.4	0.255	0.329	0.332	0.102	0.131	0.133	0.06	21.5

Table 30: SAR test results WLAN 5 GHz (see max. SAR plot Annex B.3: SAR results – WLAN 5GHz page 74)

* - maximum possible output power declared by manufacturer

measured / extrapolated SAR numbers Bluetooth LE 2.4 GHz - 0 mm distance											
Ch.	Freq. (MHz)	test cond.	Position	radiated. $P_{\max}$ (dBm)		SAR _{1g} (W/kg)		SAR _{10g} (W/kg)		P_{drift} (dB)	liquid (°C)
				declared*	meas.	meas.	extrap.	meas.	extrap.		
19	2440	1 Msps	front	8.0	6.6	0.000	0.000	0.000	0.000	-0.05	21.8
19	2440	1 Msps	left	8.0	6.6	0.000	0.000	0.000	0.000	0.02	21.8
19	2440	1 Msps	right	8.0	6.6	0.000	0.000	0.000	0.000	0.00	21.8
19	2440	1 Msps	top	8.0	6.6	0.000	0.000	0.000	0.000	0.08	21.8
0	2402	1 Msps	top	8.0	6.6	0.000	0.000	0.000	0.000	0.11	21.8
39	2480	1 Msps	top	8.0	6.6	0.000	0.000	0.000	0.000	0.15	21.8

Table 31: SAR test results BLE 2.4 GHz (see max. SAR plot Annex B.4: SAR results – BLE 2.4GHz page 76)

* - maximum possible output power declared by manufacturer

8.2.3 Multiple Transmitter Information

The following tables list information which is relevant for the decision if a simultaneous transmit evaluation is necessary according to FCC KDB 447498D01 General RF Exposure Guidance v05.

reported SAR WWAN and WLAN 2.4GHz, Σ SAR _{10g} evaluation.				
Frequency band	Position	SAR _{max} /W/kg		Σ SAR _{10g} <4W/kg
		WWAN	WLAN 2.4GHz	
LTE FDD 2	front	0.015	0.032	0.047
	left	0.345	0.072	0.417
	right	0.018	0.050	0.068
	top	0.134	0.358	0.492
LTE FDD 4	front	0.018	0.032	0.050
	left	0.671	0.072	0.743
	right	0.021	0.050	0.071
	top	0.121	0.358	0.479
LTE FDD 5	front	0.009	0.032	0.041
	left	0.079	0.072	0.151
	right	0.011	0.050	0.061
	top	0.059	0.358	0.417
LTE FDD 7	front	0.041	0.032	0.073
	left	1.054	0.072	1.126
	right	0.020	0.050	0.070
	top	0.232	0.358	0.590
LTE FDD 8	front	0.006	0.032	0.038
	left	0.123	0.072	0.195
	right	0.014	0.050	0.064
	top	0.086	0.358	0.444
LTE FDD 12	front	0.002	0.032	0.034
	left	0.028	0.072	0.100
	right	0.002	0.050	0.052
	top	0.021	0.358	0.379
LTE FDD 13	front	0.005	0.032	0.037
	left	0.031	0.072	0.103
	right	0.016	0.050	0.066
	top	0.042	0.358	0.400
LTE FDD 26	front	0.004	0.032	0.036
	left	0.061	0.072	0.133
	right	0.008	0.050	0.058
	top	0.040	0.358	0.398
LTE TDD 38	front	0.036	0.032	0.068
	left	0.307	0.072	0.379
	right	0.007	0.050	0.057
	top	0.142	0.358	0.500
LTE TDD 41	front	0.030	0.032	0.062
	left	0.302	0.072	0.374
	right	0.010	0.050	0.060
	top	0.192	0.358	0.550
LTE FDD 66	front	0.026	0.032	0.058
	left	0.621	0.072	0.693
	right	0.023	0.050	0.073
	top	0.146	0.358	0.504

Table 32: SAR_{max} WWAN and **WLAN 2.4GHz**, Σ SAR evaluation.

reported SAR WWAN and WLAN 5GHz, Σ SAR _{10g} evaluation.				
Frequency band	Position	SAR _{max} /W/kg		Σ SAR _{10g} <4W/kg
		WWAN	WLAN 2.4GHz	
LTE FDD 2	front	0.015	0.011	0.026
	left	0.345	0.154	0.499
	right	0.018	0.185	0.203
	top	0.134	0.202	0.336
LTE FDD 4	front	0.018	0.011	0.029
	left	0.671	0.154	0.825
	right	0.021	0.185	0.206
	top	0.121	0.202	0.323
LTE FDD 5	front	0.009	0.011	0.020
	left	0.079	0.154	0.233
	right	0.011	0.185	0.196
	top	0.059	0.202	0.261
LTE FDD 7	front	0.041	0.011	0.052
	left	1.054	0.154	1.208
	right	0.020	0.185	0.205
	top	0.232	0.202	0.434
LTE FDD 8	front	0.006	0.011	0.017
	left	0.123	0.154	0.277
	right	0.014	0.185	0.199
	top	0.086	0.202	0.288
LTE FDD 12	front	0.002	0.011	0.013
	left	0.028	0.154	0.182
	right	0.002	0.185	0.187
	top	0.021	0.202	0.223
LTE FDD 13	front	0.005	0.011	0.016
	left	0.031	0.154	0.185
	right	0.016	0.185	0.201
	top	0.042	0.202	0.244
LTE FDD 26	front	0.004	0.011	0.015
	left	0.061	0.154	0.215
	right	0.008	0.185	0.193
	top	0.040	0.202	0.242
LTE TDD 38	front	0.036	0.011	0.047
	left	0.307	0.154	0.461
	right	0.007	0.185	0.192
	top	0.142	0.202	0.344
LTE TDD 41	front	0.030	0.011	0.041
	left	0.302	0.154	0.456
	right	0.010	0.185	0.195
	top	0.192	0.202	0.394
LTE FDD 66	front	0.026	0.011	0.037
	left	0.621	0.154	0.775
	right	0.023	0.185	0.208
	top	0.146	0.202	0.348

Table 33: SAR_{max} WWAN and **WLAN 5GHz**, Σ SAR evaluation.**Conclusion:**

Σ SAR < 4 W/kg, therefore simultaneous transmissions SAR measurement with the enlarged zoom scan measurement and volume scan post-processing procedures is **not** required.

8.2.3.1 Multi-TX SAR Measurement Alternatives

Standards such as FCC KDB 447498, RF Exposure procedures and equipment authorization policies for mobile and portable devices and IEC/IEEE 62209-1528:2020 offer several alternative methods for assessment of Multi-TX SAR measurements. The alternatives are summarized as follows:

- **Alternative 1:** Algebraic summation of psSAR1g/8g/10g values – This is the most conservative method, and does not consider separation between the peaks. The sum of psSAR1g/8g/10g values are available in the combined area / zoom scan properties.
- **Alternative 2:** Selection of the highest assessed peak spatial-average SAR value – This method is applicable when the two or more SAR distributions have negligible overlap between the peaks. An important measure of the degree of overlap as described in FCC KDB 447498 is the SAR to peak location separation ratio (SPLSR). DASY8 software calculates the SPLSR ratio for each combination of transmitters in a Multi-TX combined area / zoom scan and these values are available in the combined scan properties.
- **Alternative 3:** Calculation of combined volumetric SAR from existing area and/or zoom – In this alternative, the existing area / zoom scans, which have been previously measured are combined to obtain the Multi-TX combined SAR. The DASY8 combiner evaluated the combined SAR in the overlapping region of the individual scans and evaluates the psSAR1g/8g/10g. If the overlapping regions are not sufficient for the evaluations, appropriate warnings are raised.
- **Alternative 4: Volumetric scanning** – In case the existing zoom scans don't have a sufficient degree of overlap, large zoom scans covering the region of the individual zoom scans are performed and then combined in the normal way. To define the grid, existing zoom scans are displayed in the 3D window and the measurement grid extents / offsets (user defined settings for zoom scan, with the anchor as the device reference point) for the enlarged zoom scan are adjusted to cover the total volume.

All the above evaluation alternatives are available and can be conveniently performed with DASY8.

Alternative 4: Volumetric scanning was used for this report.

Measurement Report for Multi-TX Evaluator can be find in

8.2.4 SAR correction for deviations of complex permittivity from targets

The max reported SAR values are once more corrected wherever the deviation of the liquid parameters is larger than $\pm 5\%$.

According IEC / IEEE 62209-1528 chapter 7.8.2 SAR correction formula

there is a linear relationship between the percentage change in SAR (denoted ΔSAR) and the percentage change in the permittivity and conductivity from the target values (denoted $\Delta\epsilon$ and $\Delta\sigma$, respectively).

The relationship is given by:

$$\Delta\text{SAR} = c_{\epsilon}\Delta\epsilon + c_{\sigma}\Delta\sigma$$

where

$c_{\epsilon} = \partial (\Delta\text{SAR}) / \partial (\Delta\epsilon)$ is the coefficient representing the sensitivity of SAR to permittivity where SAR is normalized to output power;

$c_{\sigma} = \partial (\Delta\text{SAR}) / \partial (\Delta\sigma)$ is the coefficient representing the sensitivity of SAR to conductivity, where SAR is normalized to output power.

The values of c_{ϵ} and c_{σ} have a simple relationship with frequency that can be described using polynomial equations. For dipole antennas at frequencies from 4 MHz to 6 GHz, the **1 g averaged SAR** c_{ϵ} and c_{σ} are given by

$$c_{\epsilon} = -7.854 \times 10^{-4} \times f^3 + 9.402 \times 10^{-3} \times f^2 - 2.742 \times 10^{-2} \times f - 0.2026$$

$$c_{\sigma} = 9.804 \times 10^{-3} \times f^3 - 8.661 \times 10^{-2} \times f^2 + 2.981 \times 10^{-2} \times f + 0.7829$$

where f is the frequency in GHz. Above 6 GHz, the sensitivity is non-varying with frequency due to the small penetration depth; the values of $c_{\epsilon} = -0,198$ and $c_{\sigma} = 0$ shall be used.

For frequencies from 4 MHz to 6 GHz, the **10 g averaged SAR** c_{ϵ} and c_{σ} are given by:

$$c_{\epsilon} = 3.456 \times 10^{-3} \times f^3 - 3.531 \times 10^{-2} \times f^2 + 7.675 \times 10^{-2} \times f - 0.1860$$

$$c_{\sigma} = 4.479 \times 10^{-3} \times f^3 - 1.586 \times 10^{-2} \times f^2 - 0.1972 \times f + 0.7717$$

where f is the frequency in GHz. Above 6 GHz, the sensitivity is non-varying with frequency due to the small penetration depth; the values of $c_{\epsilon} = -0,250$ and $c_{\sigma} = 0$ shall be used.

NOTE:

The Tables in the uncertainties of this report are updated accordingly with the values from table 6 – Root-mean-squared error SAR correction formula as a function of the maximum change in permittivity or conductivity:

Max. change in ϵ or σ	RMS uncertainty for SAR _{1g} %	RMS uncertainty for SAR _{10g} %
$\pm 5\%$	1.2	0.97
$\pm 10\%$	1.9	1.6

NOTE:

The DASY software is capable of directly correcting the measured values according to the above-described procedure, fully compliant to IEC / IEEE 62209-1528, so that no further evaluation is necessary.

9 Test equipment and ancillaries used for tests

To simplify the identification of the test equipment and/or ancillaries which were used, the reporting of the relevant test cases only refer to the test item number as specified in the table below.

Equipment	Type	Manufacturer	Serial No.	Last Calibration	Frequency (months)
Dosimetric E-Field Probe	EX3DV4	Schmid & Partner Engineering AG	3944	May 5, 2026	12
Dosimetric E-Field Probe	EX3DV4	Schmid & Partner Engineering AG	7852	March 12, 2026	12
750 MHz System Validation Dipole	D750V3	Schmid & Partner Engineering AG	1041	May 6, 2026	36
835 MHz System Validation Dipole	D835V2	Schmid & Partner Engineering AG	4d153	April 30, 2026	36
1750 MHz System Validation Dipole	D1750V2	Schmid & Partner Engineering AG	1093	August 15, 2024	36
1900 MHz System Validation Dipole	D1900V2	Schmid & Partner Engineering AG	5d009	May 7, 2026	36
2450 MHz System Validation Dipole	D2450V2	Schmid & Partner Engineering AG	710	May 07, 2025	36
2600 MHz System Validation Dipole	D2600V2	Schmid & Partner Engineering AG	1040	May 5, 2026	36
5 GHz System Validation Dipole	D5GHzV2	Schmid & Partner Engineering AG	1055	May 16, 2024	36
Data acquisition electronics	DAE4	Schmid & Partner Engineering AG	477	May 11, 2026	12
Data acquisition electronics	DAE4ip	Schmid & Partner Engineering AG	1842	November 12, 2025	12
Software	V18.0.0.7250	Schmid & Partner Engineering AG	---	N/A	--
Phantom ELI 8.0	QD OVA 004 AA	Schmid & Partner Engineering AG	2214	N/A	--
Universal Radio Communication Tester	CMW500	Rohde & Schwarz	170616	December 05, 2025	24
Network Analyser 300 kHz to 6 GHz	8753ES	Agilent Technologies)*	US39174 436	December 10, 2025	24
Dielectric Assessment Kit (DAK)	DAK 200MHz – 20GHz Package	Schmid & Partner Engineering AG	1127	N/A	--
Powersource1	SE UMS 160 CC	Schmid & Partner Engineering AG	4342	May 07, 2026	24
Signal Generator	8671B	Hewlett Packard	2823A006 56	December 10, 2024	24
Signal Generator	SML03	Rohde & Schwarz	102519	December 02, 2025	24
RF Power Amplifier	BLMA 0760-6 (6 Watt)	BONN Elektronik	1510273	N/A	--
Power Meter	NRP	Rohde & Schwarz	101367	December 02, 2025	12
Power Meter Sensor	NRP Z22	Rohde & Schwarz	100227	December 02, 2025	12
Power Meter Sensor	NRP Z22	Rohde & Schwarz	100234	December 02, 2025	12
Directional Coupler	778D	Hewlett Packard	19171	December 02, 2025	12

)* : Network analyzer probe calibration against air, distilled water and a shorting block performed before measuring liquid parameters.

10 Observations

No observations exceeding those reported with the single test cases have been made.

Annex A: System performance check

Date/Time: 2026-07-07, 09:17 2026-07-07, 09:22

SystemPerformanceCheck-D750

DUT: Dipole; Type: D750V3; Serial: SN1041

Communication System: CW; Communication System Frequency: 750.0 MHz

Medium parameters used: $f = 750.0$ MHz, $\sigma = 0.907$ S/m; $\epsilon_r = 43.2$; $\rho = 1000$ kg/m³

Phantom Section: Flat

Measurement Standard: DASY 8

DASY Configuration:

- Probe: EX3DV4 - SN7852; ConvF(8.75, 8.96, 9.74); Calibrated: 2026-03-12
- Sensor-Surface: 1.4 mm
- DAE: DAE4ip Sn1842; Calibrated: 2025-11-12
- Phantom: ELI V8.0 (20deg probe tilt); Serial: 2214;
- Software: DASY8 Module SAR V18.0.0.7250

HBBL-600-10000/750.0MHz/Area Scan (10.0 x 15.0 x 1.0) :

Grid Extents [mm]: 40.0 x 90.0

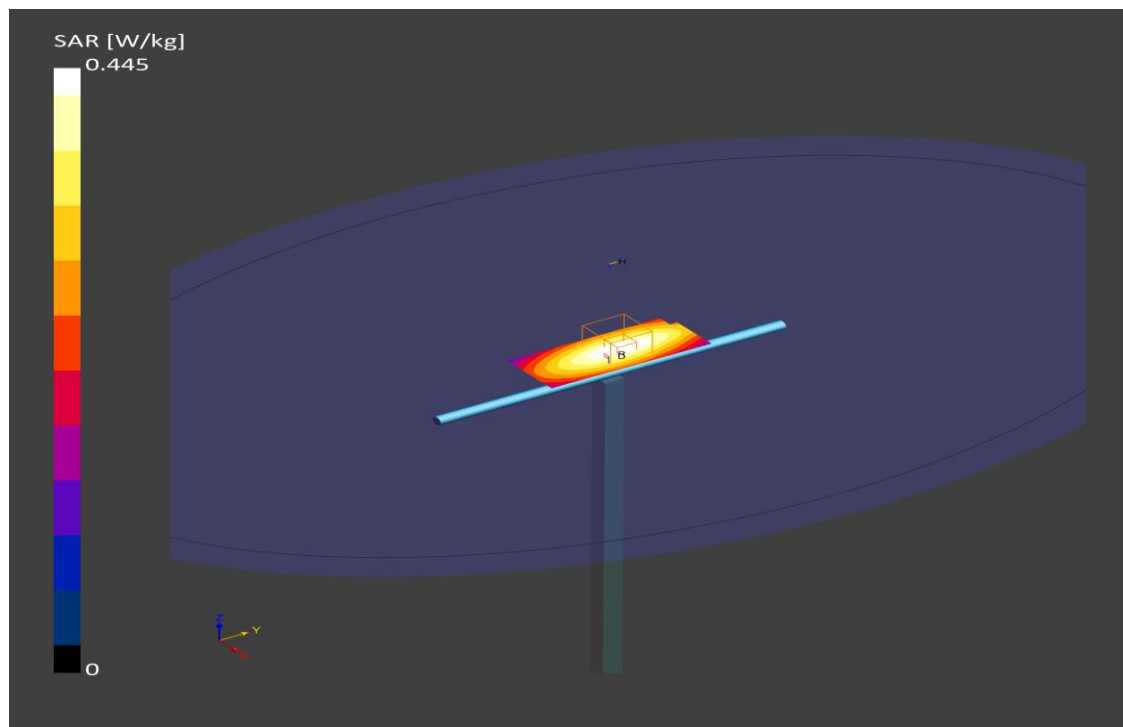
Maximum value of SAR (interpolated) - SAR(1 g) = 0.412 W/kg; SAR(10 g) = 0.274 W/kg

HBBL-600-10000/750.0MHz/Zoom Scan (6.0 x 6.0 x 1.5) :

Grid Extents [mm]: 30.0 x 30.0 x 30.0

SPC Power = 17.0 dBm

Power Drift = -0.01 dB

SAR(1 g) = 0.414 W/kg; SAR(10 g) = 0.272 W/kg

Additional information:

ambient temperature: 21.4°C; liquid temperature: 20.7°C;

SystemPerformanceCheck-D835**DUT: Dipole; Type: D835V2; Serial: SN4d153**

Communication System: CW; Communication System Frequency: 835.0 MHz

Medium parameters used: $f = 835.0$ MHz, $\sigma = 0.935$ S/m; $\epsilon_r = 43.0$; $\rho = 1000$ kg/m³

Phantom Section: Flat

Measurement Standard: DASY 8

DASY Configuration:

- Probe: EX3DV4 - SN7852; ConvF(8.5, 8.7, 9.47); Calibrated: 2026-03-12
- Sensor-Surface: 1.4 mm
- DAE: DAE4ip Sn1842; Calibrated: 2025-11-12
- Phantom: ELI V8.0 (20deg probe tilt); Serial: 2214;
- Software: DASY8 Module SAR V18.0.0.7250

HBBL-600-10000/835.0MHz/Area Scan (10.0 x 15.0 x 1.0) :

Grid Extents [mm]: 40.0 x 90.0

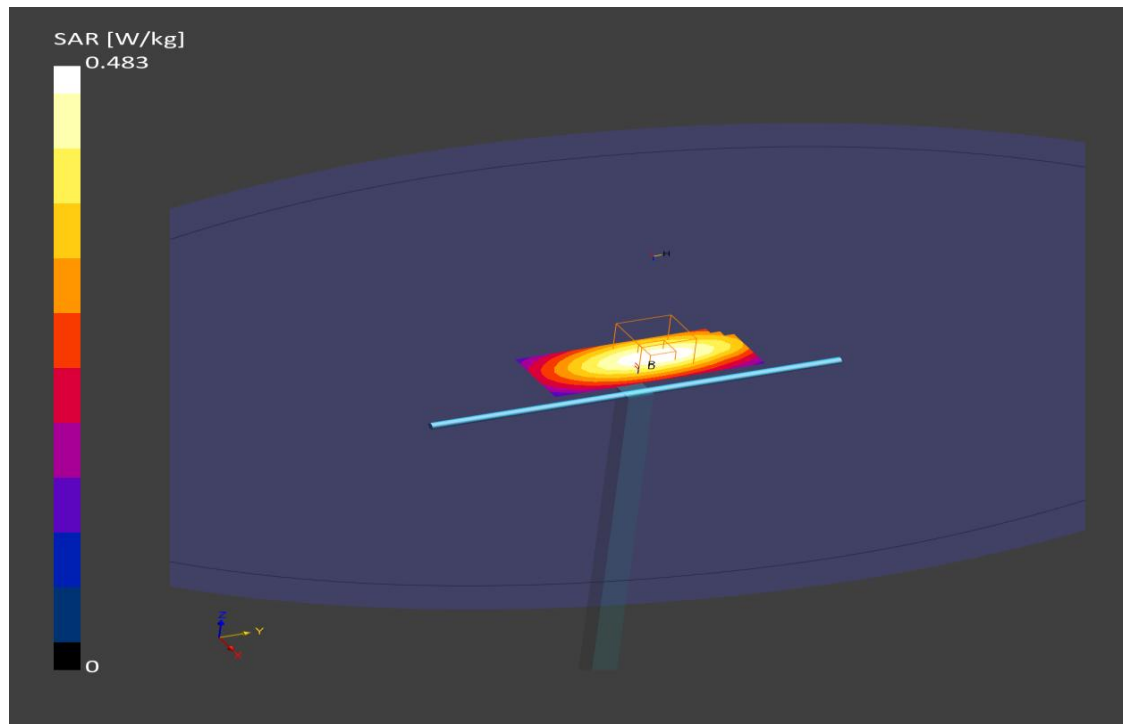
Maximum value of SAR (interpolated) - SAR(1 g) = 0.462 W/kg; SAR(10 g) = 0.302 W/kg

HBBL-600-10000/835.0MHz/Zoom Scan (6.0 x 6.0 x 1.5) :

Grid Extents [mm]: 30.0 x 30.0 x 30.0

SPC Power = 17.0 dBm

Power Drift = 0.07 dB

SAR(1 g) = 0.464 W/kg; SAR(10 g) = 0.305 W/kg**Additional information:**

ambient temperature: 22.4°C; liquid temperature: 20.2°C;

Date/Time: 2026-07-08, 10:24 2026-07-08, 10:29

SystemPerformanceCheck-D835

DUT: Dipole; Type: D835V2; Serial: SN4d153

Communication System: CW; Communication System Frequency: 835.0 MHz

Medium parameters used: $f = 835.0$ MHz, $\sigma = 0.935$ S/m; $\epsilon_r = 43.0$; $\rho = 1000$ kg/m³

Phantom Section: Flat

Measurement Standard: DASY 8

DASY Configuration:

- Probe: EX3DV4 - SN7852; ConvF(8.5, 8.7, 9.47); Calibrated: 2026-03-12
- Sensor-Surface: 1.4 mm
- DAE: DAE4ip Sn1842; Calibrated: 2025-11-12
- Phantom: ELI V8.0 (20deg probe tilt); Serial: 2214;
- Software: DASY8 Module SAR V18.0.0.7250

HBBL-600-10000/835.0MHz/Area Scan (10.0 x 15.0 x 1.0) :

Grid Extents [mm]: 40.0 x 90.0

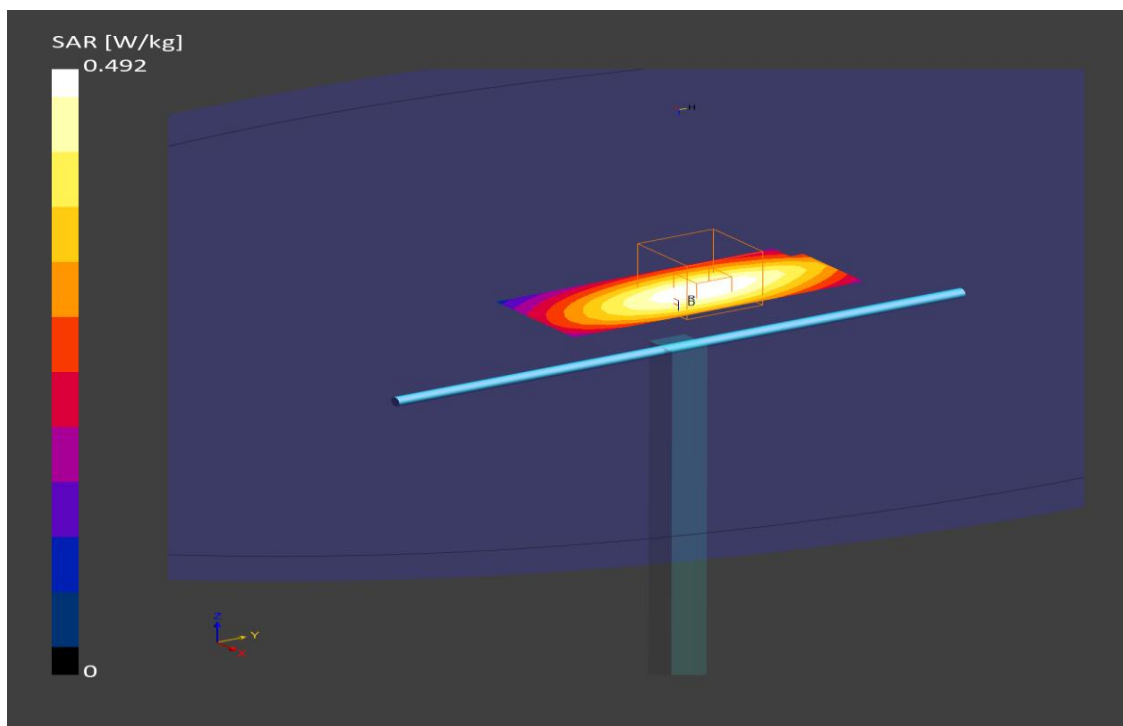
Maximum value of SAR (interpolated) - SAR(1 g) = 0.455 W/kg; SAR(10 g) = 0.302 W/kg

HBBL-600-10000/835.0MHz/Zoom Scan (6.0 x 6.0 x 1.5) :

Grid Extents [mm]: 30.0 x 30.0 x 30.0

SPC Power = 17.0 dBm

Power Drift = -0.11 dB

SAR(1 g) = 0.455 W/kg; SAR(10 g) = 0.298 W/kg**Additional information:**

ambient temperature: 22.4°C; liquid temperature: 21.2°C;

SystemPerformanceCheck-D1750

DUT: Dipole; Type: D1750V2; Serial: SN1093

Communication System: CW; Communication System Frequency: 1750.0 MHz

Medium parameters used: $f = 1750.0$ MHz, $\sigma = 1.38$ S/m; $\epsilon_r = 42.7$; $\rho = 1000$ kg/m³

Phantom Section: Flat

Measurement Standard: DASY 8

DASY Configuration:

- Probe: EX3DV4 - SN7852; ConvF(7.26, 7.43, 8.09); Calibrated: 2026-03-12
- Sensor-Surface: 1.4 mm
- DAE: DAE4ip Sn1842; Calibrated: 2025-11-12
- Phantom: ELI V8.0 (20deg probe tilt); Serial: 2214;
- Software: DASY8 Module SAR V18.0.0.7250

HBBL-600-10000/1750.0MHz/Area Scan (10.0 x 15.0 x 1.0) :

Grid Extents [mm]: 40.0 x 90.0

Maximum value of SAR (interpolated) - SAR(1 g) = 1.64 W/kg; SAR(10 g) = 0.878 W/kg

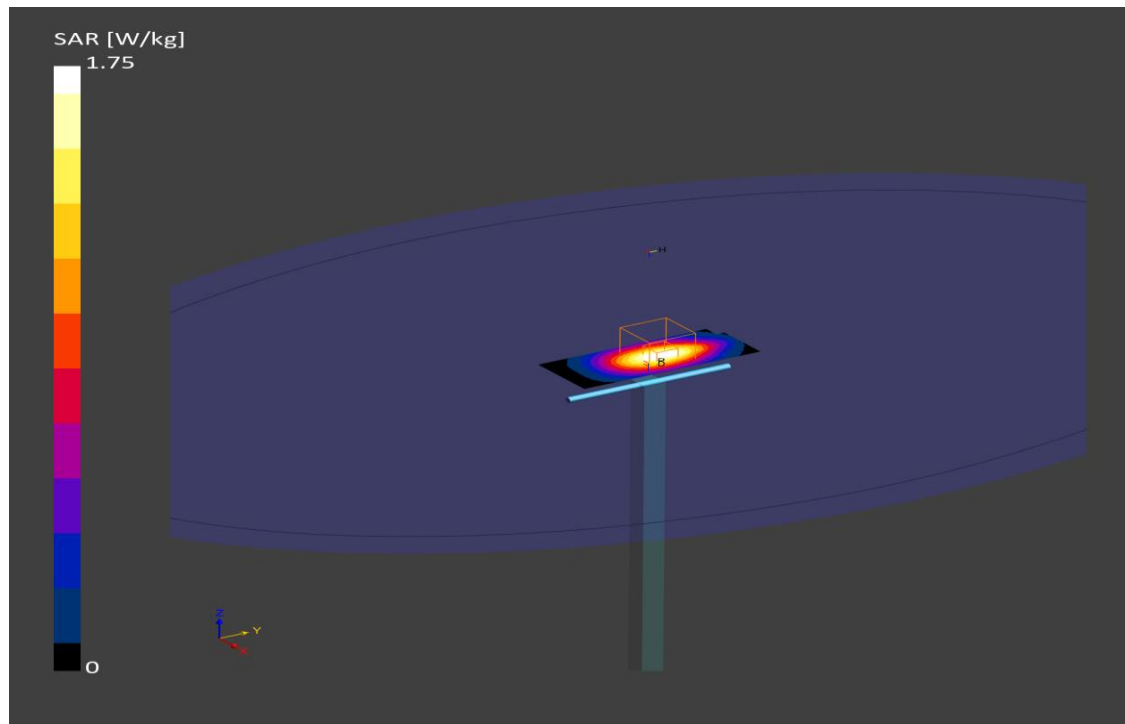
HBBL-600-10000/1750.0MHz/Zoom Scan (6.0 x 6.0 x 1.5) :

Grid Extents [mm]: 30.0 x 30.0 x 30.0

SPC Power = 17.0 dBm

Power Drift = -0.07 dB

SAR(1 g) = 1.64 W/kg; SAR(10 g) = 0.874 W/kg



Additional information:

ambient temperature: 23.7°C; liquid temperature: 22.0°C;

SystemPerformanceCheck-D1750

DUT: Dipole; Type: D1750V2; Serial: SN1093

Communication System: CW; Communication System Frequency: 1750.0 MHz

Medium parameters used: $f = 1750.0$ MHz, $\sigma = 1.38$ S/m; $\epsilon_r = 42.7$; $\rho = 1000$ kg/m³

Phantom Section: Flat

Measurement Standard: DASY 8

DASY Configuration:

- Probe: EX3DV4 - SN7852; ConvF(7.26, 7.43, 8.09); Calibrated: 2026-03-12
- Sensor-Surface: 1.4 mm
- DAE: DAE4ip Sn1842; Calibrated: 2025-11-12
- Phantom: ELI V8.0 (20deg probe tilt); Serial: 2214;
- Software: DASY8 Module SAR V18.0.0.7250

HBBL-600-10000/1750.0MHz/Area Scan (10.0 x 15.0 x 1.0) :

Grid Extents [mm]: 40.0 x 90.0

Maximum value of SAR (interpolated) - SAR(1 g) = 1.68 W/kg; SAR(10 g) = 0.897 W/kg

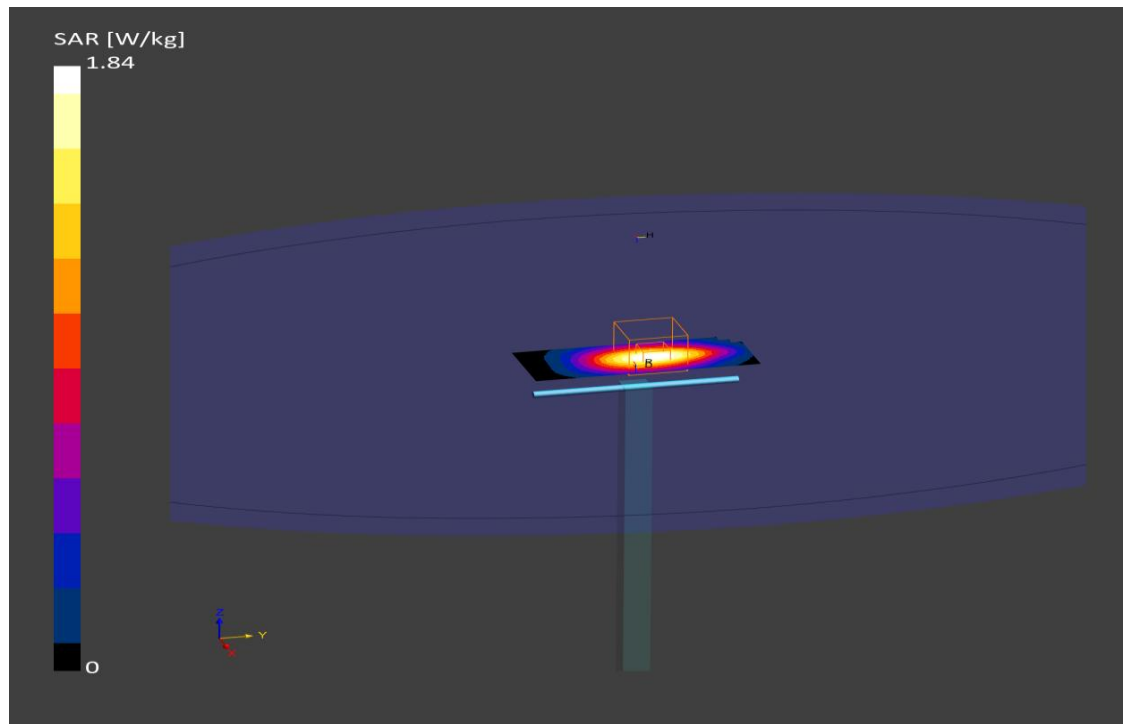
HBBL-600-10000/1750.0MHz/Zoom Scan (6.0 x 6.0 x 1.5) :

Grid Extents [mm]: 30.0 x 30.0 x 30.0

SPC Power = 17.0 dBm

Power Drift = 0.01 dB

SAR(1 g) = 1.67 W/kg; SAR(10 g) = 0.892 W/kg



Additional information:

ambient temperature: 23.5°C; liquid temperature: 22.2°C;

SystemPerformanceCheck-D1900

DUT: Dipole; Type: D1900V2; Serial: SN5d009

Communication System: CW; Communication System Frequency: 1900.0 MHz

Medium parameters used: $f = 1900.0$ MHz, $\sigma = 1.46$ S/m; $\epsilon_r = 41.2$; $\rho = 1000$ kg/m³

Phantom Section: Flat

Measurement Standard: DASY 8

DASY Configuration:

- Probe: EX3DV4 - SN7852; ConvF(6.85, 7.01, 7.63); Calibrated: 2026-03-12
- Sensor-Surface: 1.4 mm
- DAE: DAE4ip Sn1842; Calibrated: 2025-11-12
- Phantom: ELI V8.0 (20deg probe tilt); Serial: 2214;
- Software: DASY8 Module SAR V18.0.0.7250

HBBL-600-10000/1900.0MHz/Area Scan (10.0 x 15.0 x 1.0) :

Grid Extents [mm]: 40.0 x 90.0

Maximum value of SAR (interpolated) - SAR(1 g) = 2.01 W/kg; SAR(10 g) = 1.05 W/kg

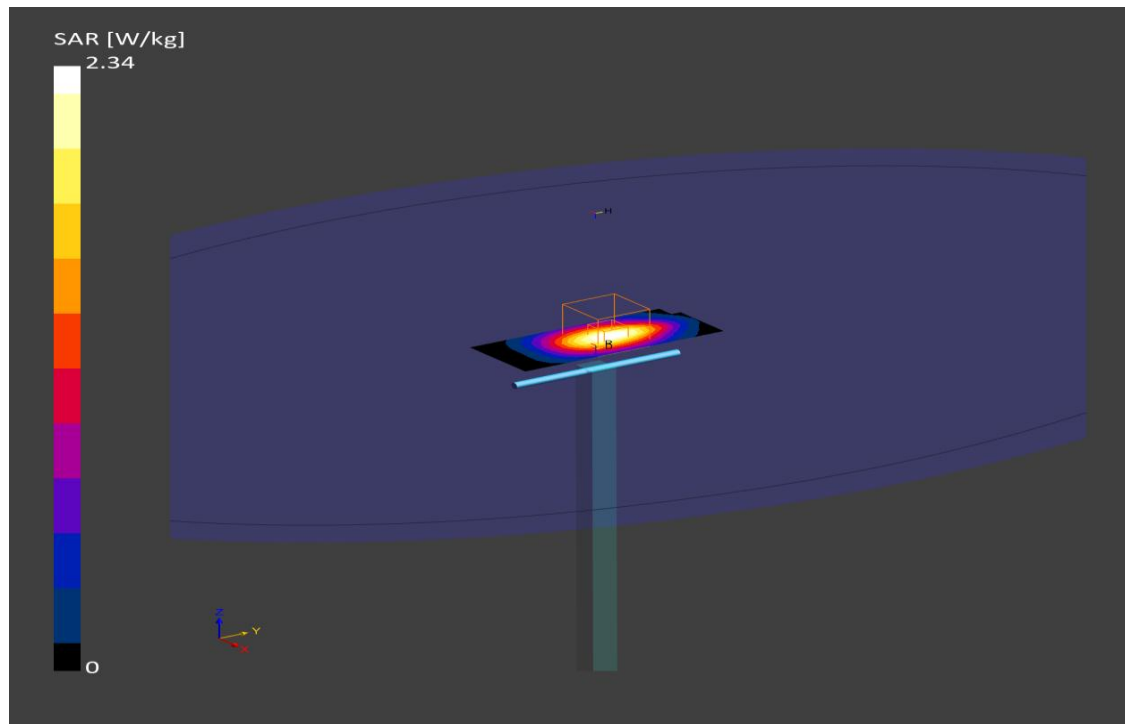
HBBL-600-10000/1900.0MHz/Zoom Scan (6.0 x 6.0 x 1.5) :

Grid Extents [mm]: 30.0 x 30.0 x 30.0

SPC Power = 17.0 dBm

Power Drift = -0.04 dB

SAR(1 g) = 1.86 W/kg; SAR(10 g) = 0.983 W/kg



Additional information:

ambient temperature: 22.4°C; liquid temperature: 21.2°C;

SystemPerformanceCheck-D2450

DUT: Dipole; Type: D2450V2; Serial: SN710

Communication System: CW; Communication System Frequency: 2450.0 MHz

Medium parameters used: $f = 2450.0$ MHz, $\sigma = 1.84$ S/m; $\epsilon_r = 38.3$; $\rho = 1000$ kg/m³

Phantom Section: Flat

Measurement Standard: DASy 8

DASy Configuration:

- Probe: EX3DV4 - SN3944; ConvF(7.45, 7.98, 7.73); Calibrated: 2026-05-05
- Sensor-Surface: 1.4 mm
- DAE: DAE4ip Sn1842; Calibrated: 2025-11-12
- Phantom: ELI V8.0 (20deg probe tilt); Serial: 2214;
- Software: DASy8 Module SAR V18.0.0.7250

HBBL-600-10000/2450.0MHz/Area Scan (10.0 x 10.0 x 1.0) :

Grid Extents [mm]: 40.0 x 80.0

Maximum value of SAR (interpolated) - SAR(1 g) = 2.54 W/kg; SAR(10 g) = 1.18 W/kg

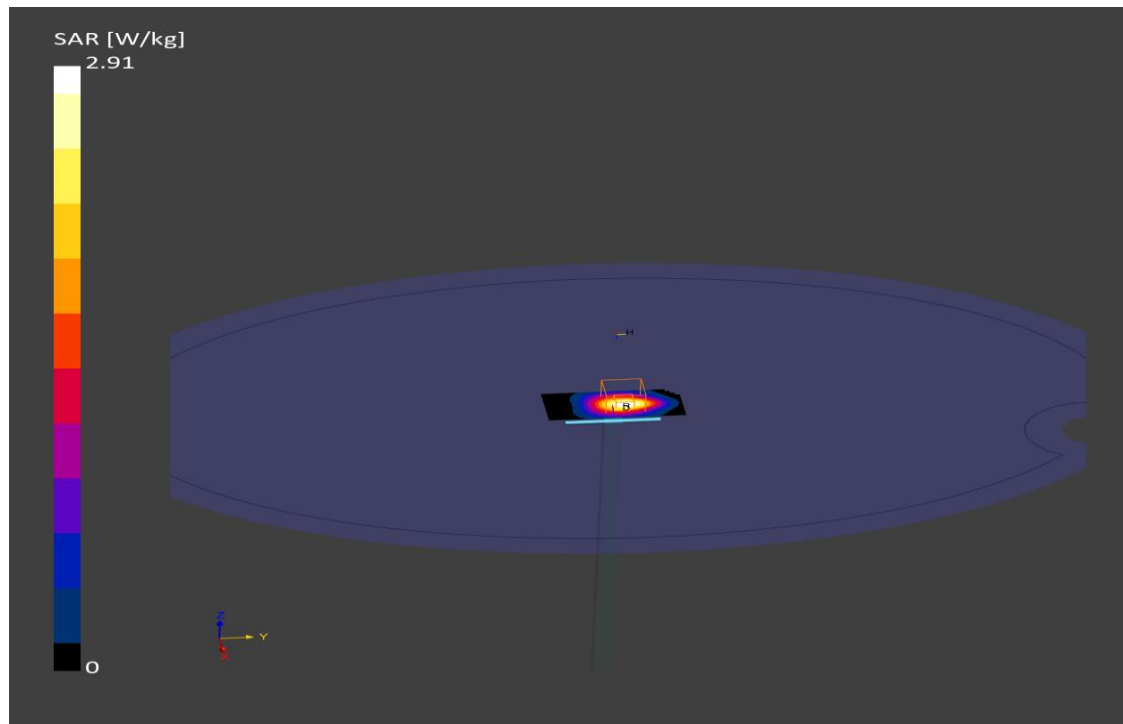
HBBL-600-10000/2450.0MHz/Zoom Scan (5.0 x 5.0 x 1.5) :

Grid Extents [mm]: 30.0 x 30.0 x 30.0

SPC Power = 17.0 dBm

Power Drift = -0.08 dB

SAR(1 g) = 2.49 W/kg; SAR(10 g) = 1.17 W/kg



Additional information:

ambient temperature: 22.6°C; liquid temperature: 21.5°C;

SystemPerformanceCheck-D2600

DUT: Dipole; Type: D2600V2; Serial: SN1040

Communication System: CW; Communication System Frequency: 2600.0 MHz

Medium parameters used: $f = 2600.0$ MHz, $\sigma = 2.01$ S/m; $\epsilon_r = 41.7$; $\rho = 1000$ kg/m³

Phantom Section: Flat

Measurement Standard: DASY 8

DASY Configuration:

- Probe: EX3DV4 - SN7852; ConvF(6.32, 6.48, 7.04); Calibrated: 2026-03-12
- Sensor-Surface: 1.4 mm
- DAE: DAE4ip Sn1842; Calibrated: 2025-11-12
- Phantom: ELI V8.0 (20deg probe tilt); Serial: 2214;
- Software: DASY8 Module SAR V18.0.0.7250

HBBL-600-10000/2600.0MHz/Area Scan (10.0 x 10.0 x 1.0) :

Grid Extents [mm]: 40.0 x 80.0

Maximum value of SAR (interpolated) - SAR(1 g) = 2.71 W/kg; SAR(10 g) = 1.22 W/kg

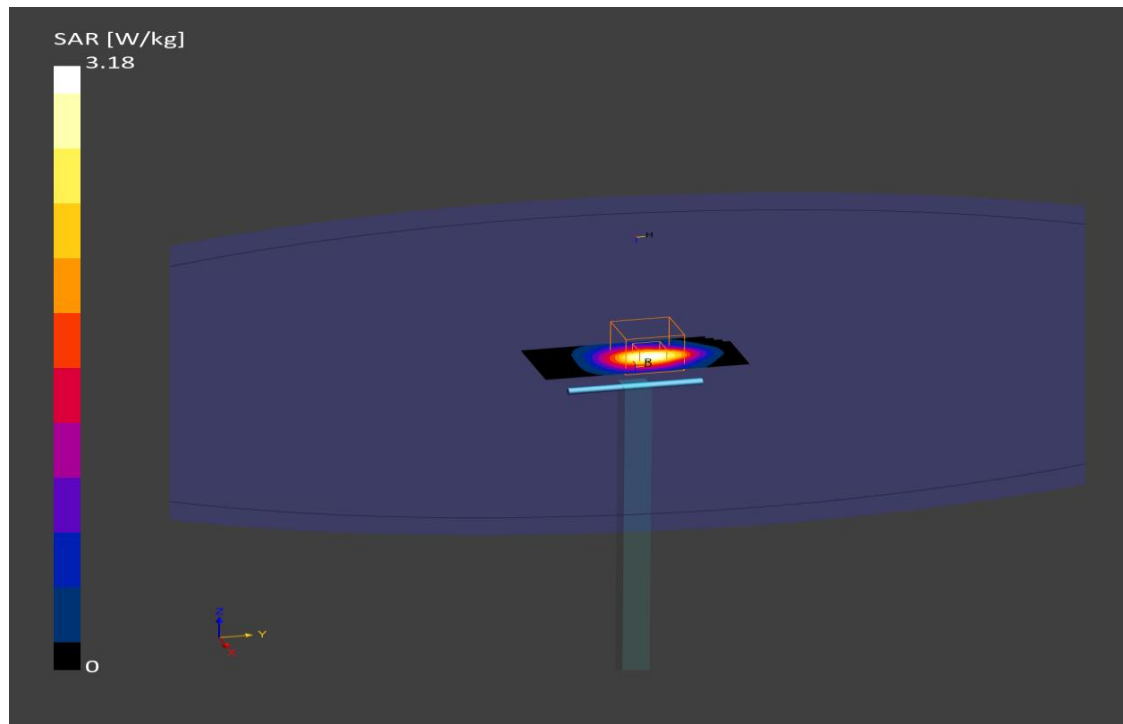
HBBL-600-10000/2600.0MHz/Zoom Scan (5.0 x 5.0 x 1.5) :

Grid Extents [mm]: 30.0 x 30.0 x 30.0

SPC Power = 17.0 dBm

Power Drift = 0.06 dB

SAR(1 g) = 2.69 W/kg; SAR(10 g) = 1.21 W/kg



Additional information:

ambient temperature: 23.5°C; liquid temperature: 22.2°C;

SystemPerformanceCheck-D5GHz

DUT: Dipole; Type: D5GHzV2; Serial: SN1055

Communication System: CW; Communication System Frequency: 5200.0 MHz

Medium parameters used: $f = 5200.0$ MHz, $\sigma = 4.51$ S/m; $\epsilon_r = 34.8$; $\rho = 1000$ kg/m³

Phantom Section: Flat

Measurement Standard: DASY 8

DASY Configuration:

- Probe: EX3DV4 - SN3944; ConvF(5.31, 5.68, 5.5); Calibrated: 2026-05-05
- Sensor-Surface: 1.4 mm
- DAE: DAE4 Sn477; Calibrated: 2026-05-11
- Phantom: ELI V8.0 (20deg probe tilt); Serial: 2214;
- Software: DASY8 Module SAR V18.0.0.7250

HBBL-600-10000/5200.0MHz/Area Scan (10.0 x 10.0 x 1.0) :

Grid Extents [mm]: 40.0 x 80.0

Maximum value of SAR (interpolated) - SAR(1 g) = 3.55 W/kg; SAR(10 g) = 1.09 W/kg

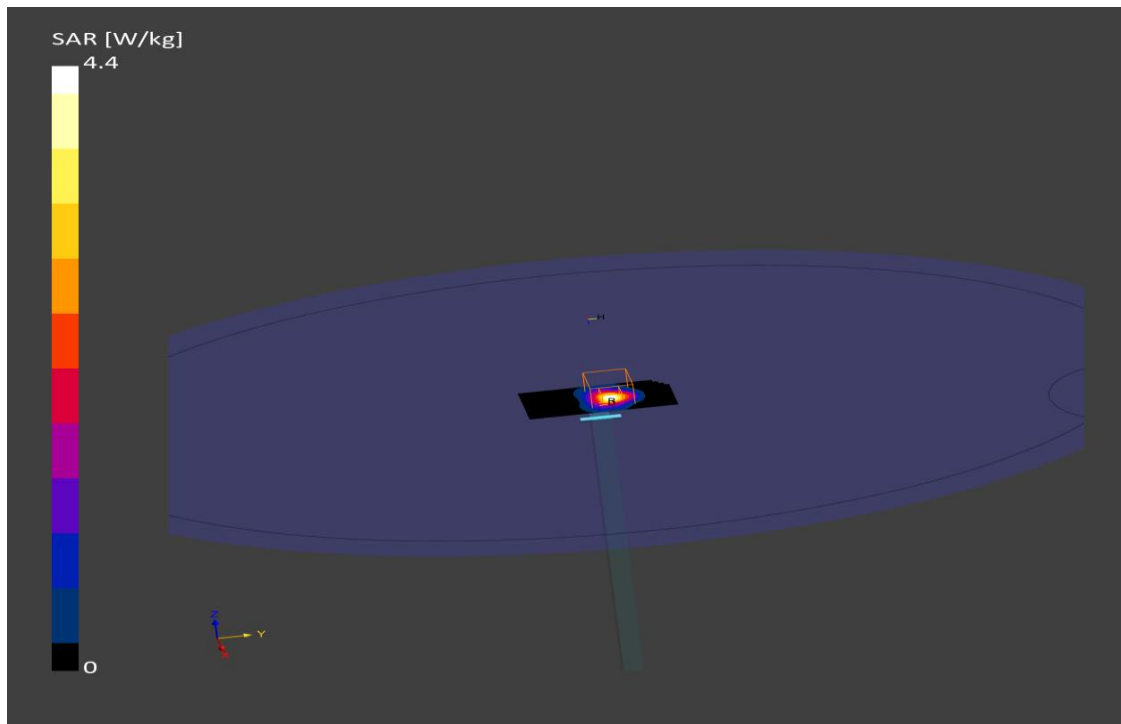
HBBL-600-10000/5200.0MHz/Zoom Scan (4.0 x 4.0 x 1.4) :

Grid Extents [mm]: 22.0 x 22.0 x 22.0

SPC Power = 17.0 dBm

Power Drift = -0.04 dB

SAR(1 g) = 3.97 W/kg; SAR(10 g) = 1.15 W/kg



Additional information:

ambient temperature: 22.1°C; liquid temperature: 21.7°C;

SystemPerformanceCheck-D5GHz

DUT: Dipole; Type: D5GHzV2; Serial: SN1055

Communication System: CW; Communication System Frequency: 5500.0 MHz

Medium parameters used: $f = 5500.0$ MHz, $\sigma = 4.85$ S/m; $\epsilon_r = 34.6$; $\rho = 1000$ kg/m³

Phantom Section: Flat

Measurement Standard: DASY 8

DASY Configuration:

- Probe: EX3DV4 - SN3944; ConvF(4.9, 5.25, 5.08); Calibrated: 2026-05-05
- Sensor-Surface: 1.4 mm
- DAE: DAE4 Sn477; Calibrated: 2026-05-11
- Phantom: ELI V8.0 (20deg probe tilt); Serial: 2214;
- Software: DASY8 Module SAR V18.0.0.7250

HBBL-600-10000/5500.0MHz/Area Scan (10.0 x 10.0 x 1.0) :

Grid Extents [mm]: 40.0 x 80.0

Maximum value of SAR (interpolated) - SAR(1 g) = 3.84 W/kg; SAR(10 g) = 1.16 W/kg

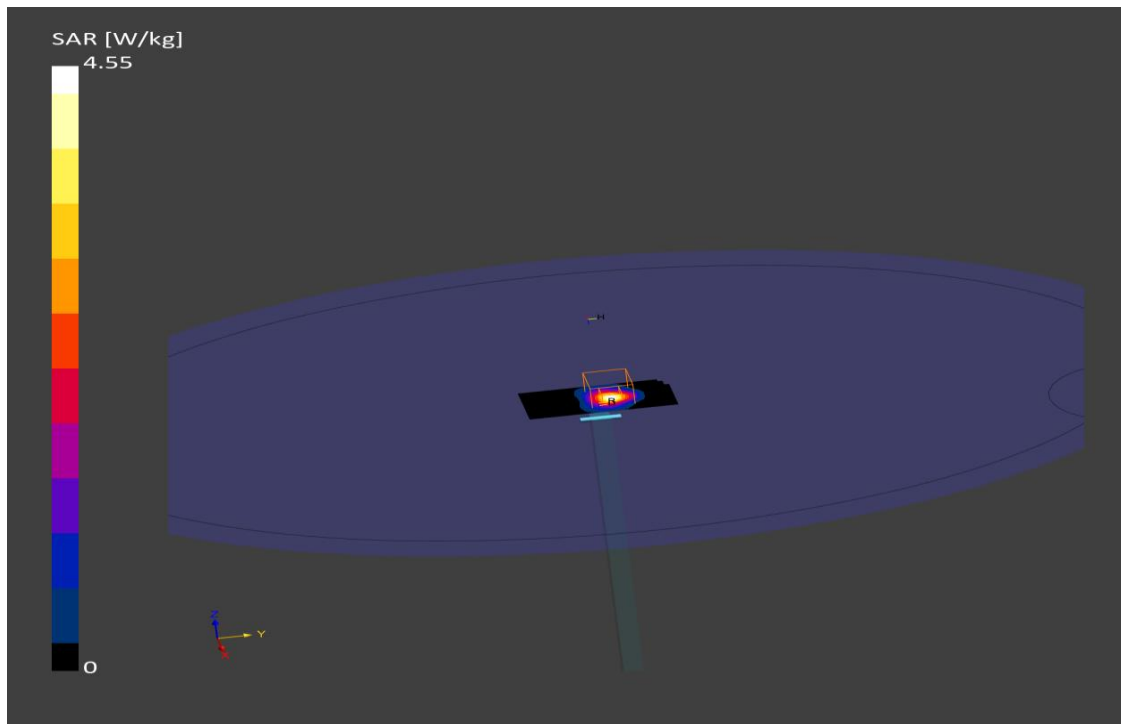
HBBL-600-10000/5500.0MHz/Zoom Scan (4.0 x 4.0 x 1.4) :

Grid Extents [mm]: 22.0 x 22.0 x 22.0

SPC Power = 17.0 dBm

Power Drift = -0.04 dB

SAR(1 g) = 4.17 W/kg; SAR(10 g) = 1.20 W/kg



Additional information:

ambient temperature: 22.1°C; liquid temperature: 21.7°C;

SystemPerformanceCheck-D5GHz

DUT: Dipole; Type: D5GHzV2; Serial: SN1055

Communication System: CW; Communication System Frequency: 5800.0 MHz

Medium parameters used: $f = 5800.0$ MHz, $\sigma = 5.24$ S/m; $\epsilon_r = 34.1$; $\rho = 1000$ kg/m³

Phantom Section: Flat

Measurement Standard: DASY 8

DASY Configuration:

- Probe: EX3DV4 - SN3944; ConvF(4.96, 5.31, 5.15); Calibrated: 2026-05-05
- Sensor-Surface: 1.4 mm
- DAE: DAE4 Sn477; Calibrated: 2026-05-11
- Phantom: ELI V8.0 (20deg probe tilt); Serial: 2214;
- Software: DASY8 Module SAR V18.0.0.7250

HBBL-600-10000/5800.0MHz/Area Scan (10.0 x 10.0 x 1.0) :

Grid Extents [mm]: 40.0 x 80.0

Maximum value of SAR (interpolated) - SAR(1 g) = 3.54 W/kg; SAR(10 g) = 1.07 W/kg

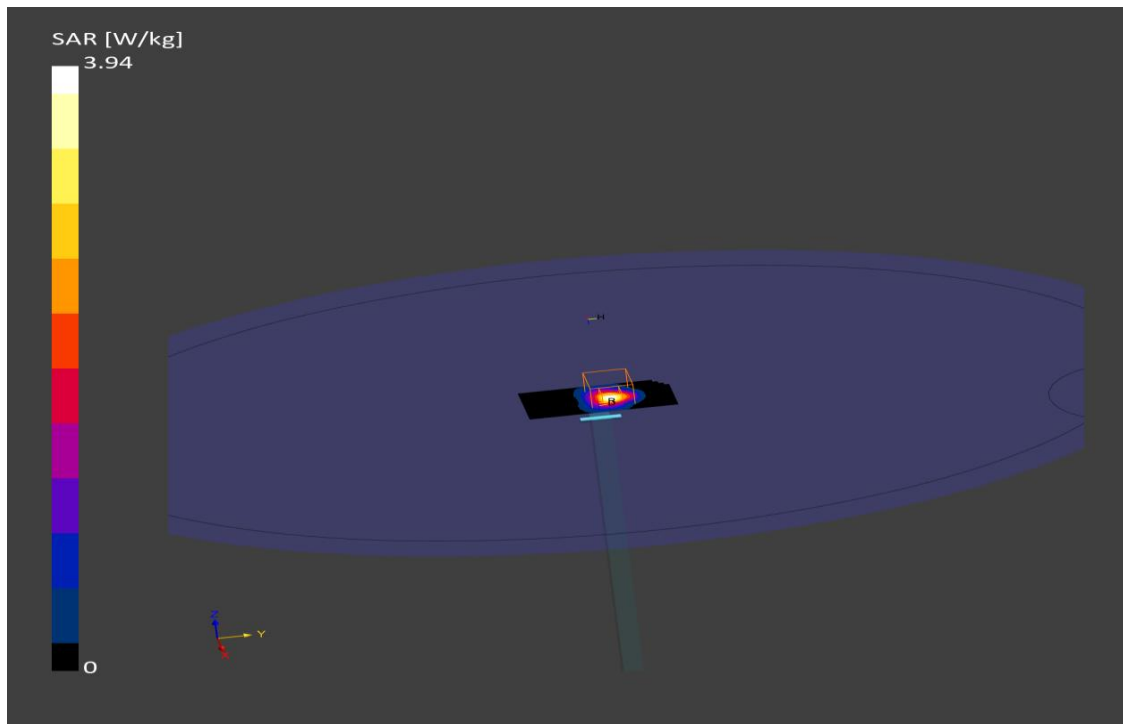
HBBL-600-10000/5800.0MHz/Zoom Scan (4.0 x 4.0 x 1.4) :

Grid Extents [mm]: 22.0 x 22.0 x 22.0

SPC Power = 17.0 dBm

Power Drift = -0.06 dB

SAR(1 g) = 3.96 W/kg; SAR(10 g) = 1.14 W/kg



Additional information:

ambient temperature: 22.1°C; liquid temperature: 21.7°C;

Annex B: DASY measurement results

SAR plots for the **highest measured SAR** in each exposure configuration, wireless mode and frequency band combination according to FCC KDB 865664 D02

Annex B.1: SAR results – LTE

Date/Time: 2026-07-08, 14:24 2026-07-08, 14:30

IEC_IEEE62209-1528 LTE FDD 2 limb

DUT: Laboratory instrument; Type: IONIC Titrator; Serial: 001000939367

Communication System: LTE-FDD: 20.0 MHz, QPSK, 1 RB (Mid); Communication System Band: Band 2;

Communication System Frequency: 1860.0 MHz

Medium parameters used: $f = 1860.0$ MHz, $\sigma = 1.43$ S/m; $\epsilon_r = 41.2$; $\rho = 1000$ kg/m³

Phantom Section: Flat

Measurement Standard: DASY 8

DASY Configuration:

- Probe: EX3DV4 - SN7852; ConvF(6.85, 7.01, 7.63); Calibrated: 2026-03-12
- Sensor-Surface: 1.4mm
- DAE: DAE4ip Sn1842; Calibrated: 2025-11-12
- Phantom: ELI V8.0 (20deg probe tilt); Serial: 2214;
- Software: DASY8 Module SAR V18.0.0.7250

HBBL-600-10000/EDGE LEFT, 0 mm - Channel 18700/Area Scan (15.0 x 15.0 x 1.0) :

Grid Extents [mm]: 60.0 x 60.0

Maximum value of SAR (interpolated) - SAR(1 g) = 0.499 W/kg; SAR(10 g) = 0.254 W/kg

HBBL-600-10000/EDGE LEFT, 0 mm - Channel 18700/Zoom Scan (6.0 x 6.0 x 1.5) :

Grid Extents [mm]: 30.0 x 30.0 x 30.0

Graded Grid: Ratio 1.5 - Distance Sensor to Surface 1.4 mm

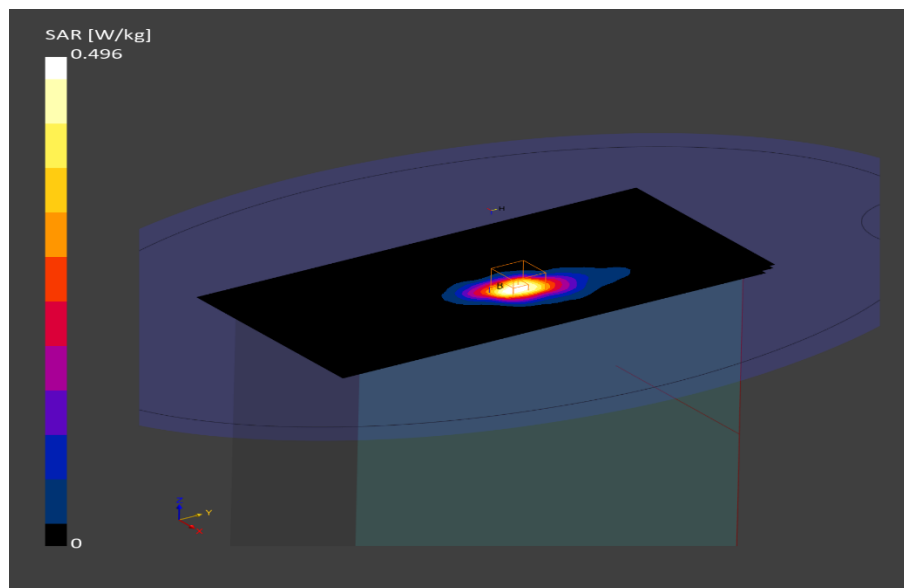
Power Drift = 0.07 dB

SAR(1 g) = 0.517 W/kg; SAR(10 g) = 0.272 W/kg

Additional Info for IEC 62209-2 AMD1:

TDist 3dB Peak [mm]: 10.3

M2/M1 [%]: 85.4



Additional information:

position or distance of DUT to SAM: 0 mm

ambient temperature: 23.0°C; liquid temperature: 22.2°C;

IEC_IEEE62209-1528 LTE FDD 4 limb**DUT: Laboratory instrument; Type: IONIC Titrator; Serial: 001000939367**

Communication System: LTE-FDD: 20.0 MHz, QPSK, 1 RB (High); Communication System Band: Band 4;

Communication System Frequency: 1745.0 MHz

Medium parameters used: $f = 1745.0$ MHz, $\sigma = 1.38$ S/m; $\epsilon_r = 42.7$; $\rho = 1000$ kg/m³

Phantom Section: Flat

Measurement Standard: DASY 8

DASY Configuration:

- Probe: EX3DV4 - SN7852; ConvF(7.26, 7.43, 8.09); Calibrated: 2026-03-12
- Sensor-Surface: 1.4mm
- DAE: DAE4ip Sn1842; Calibrated: 2025-11-12
- Phantom: ELI V8.0 (20deg probe tilt); Serial: 2214;
- Software: DASY8 Module SAR V18.0.0.7250

HBBL-600-10000/EDGE LEFT, 0 mm - Channel 20300/Area Scan (15.0 x 15.0 x 1.0) :

Grid Extents [mm]: 60.0 x 60.0

Maximum value of SAR (interpolated) - SAR(1 g) = 0.875 W/kg; SAR(10 g) = 0.456 W/kg

HBBL-600-10000/EDGE LEFT, 0 mm - Channel 20300/Zoom Scan (5.0 x 5.0 x 1.5) :

Grid Extents [mm]: 30.0 x 30.0 x 30.0

Graded Grid: Ratio 1.5 - Distance Sensor to Surface 1.4 mm

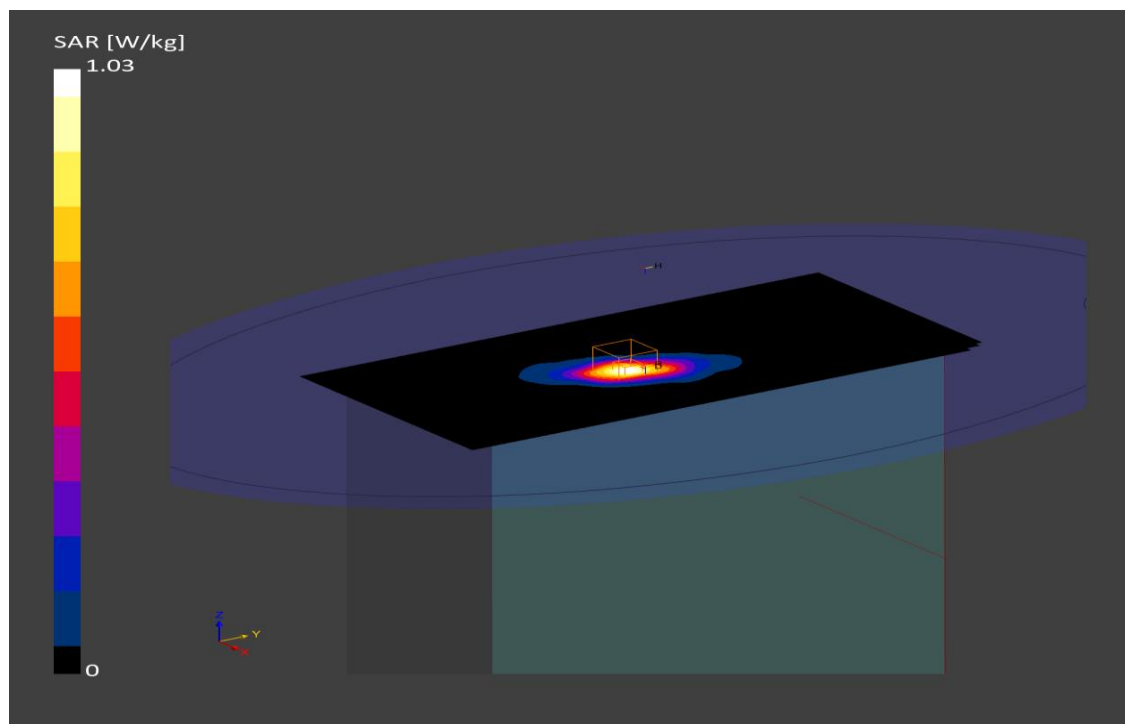
Power Drift = 0.05 dB

SAR(1 g) = 0.910 W/kg; SAR(10 g) = 0.492 W/kg

Additional Info for IEC 62209-2 AMD1:

TDist 3dB Peak [mm]: 10.8

M2/M1 [%]: 84.4

**Additional information:**

position or distance of DUT to SAM: 0 mm

ambient temperature: 23.0°C; liquid temperature: 22.0°C;

IEC_IEEE62209-1528 LTE FDD 5 limb**DUT: Laboratory instrument; Type: IONIC Titrator; Serial: 001000939367**

Communication System: LTE-FDD: 5.0 MHz, QPSK, 1 RB (Mid); Communication System Band: Band 5;

Communication System Frequency: 846.5 MHz

Medium parameters used: $f = 846.5$ MHz, $\sigma = 0.939$ S/m; $\epsilon_r = 43.0$; $\rho = 1000$ kg/m³

Phantom Section: Flat

Measurement Standard: DASY 8

DASY Configuration:

- Probe: EX3DV4 - SN7852; ConvF(8.5, 8.7, 9.47); Calibrated: 2026-03-12
- Sensor-Surface: 1.4mm
- DAE: DAE4ip Sn1842; Calibrated: 2025-11-12
- Phantom: ELI V8.0 (20deg probe tilt); Serial: 2214;
- Software: DASY8 Module SAR V18.0.0.7250

HBBL-600-10000/EDGE LEFT, 0 mm - Channel 20625/Area Scan (15.0 x 15.0 x 1.0) :

Grid Extents [mm]: 60.0 x 60.0

Maximum value of SAR (interpolated) - SAR(1 g) = 0.075 W/kg; SAR(10 g) = 0.050 W/kg

HBBL-600-10000/EDGE LEFT, 0 mm - Channel 20625/Zoom Scan (6.0 x 6.0 x 1.5) :

Grid Extents [mm]: 30.0 x 30.0 x 30.0

Graded Grid: Ratio 1.5 - Distance Sensor to Surface 1.4 mm

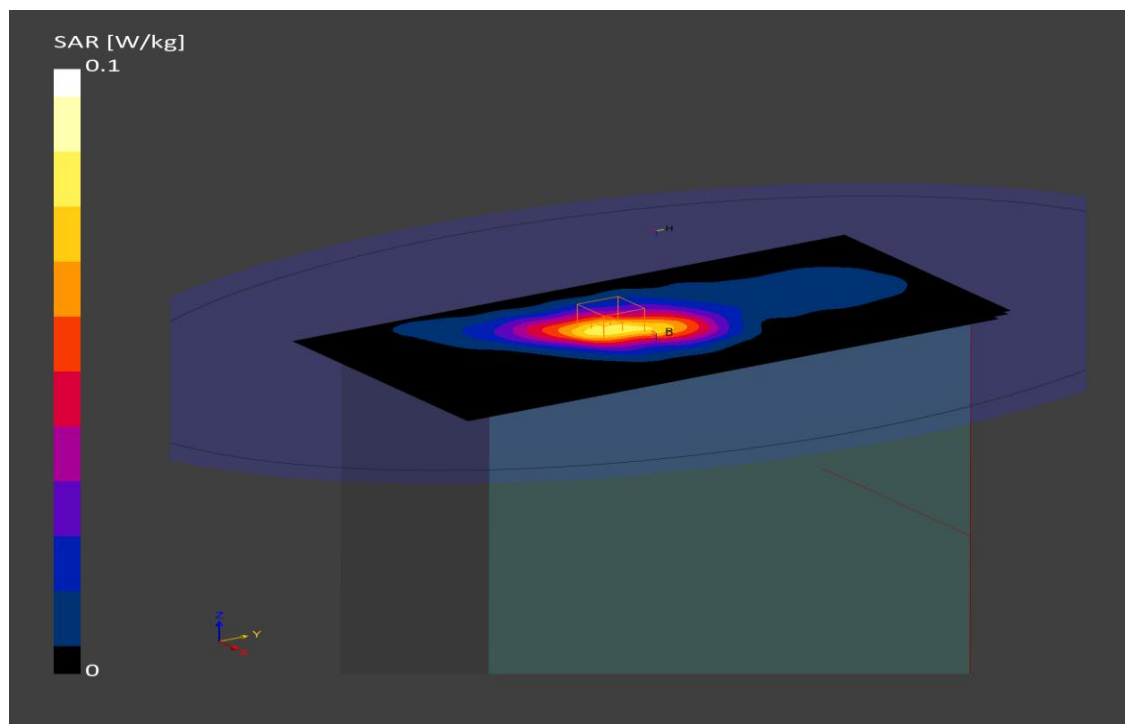
Power Drift = 0.12 dB

SAR(1 g) = 0.075 W/kg; SAR(10 g) = 0.050 W/kg

Additional Info for IEC 62209-2 AMD1:

TDist 3dB Peak [mm]: > 15.0

M2/M1 [%]: 85.7

**Additional information:**

position or distance of DUT to SAM: 0 mm

ambient temperature: 22.4°C; liquid temperature: 21.2°C;

IEC_IEEE62209-1528 LTE FDD 7 limb**DUT: Laboratory instrument; Type: IONIC Titrator; Serial: 001000939367**

Communication System: LTE-FDD: 20.0 MHz, QPSK, 1 RB (Mid); Communication System Band: Band 7;

Communication System Frequency: 2535.0 MHz

Medium parameters used: $f = 2535.0$ MHz, $\sigma = 1.95$ S/m; $\epsilon_r = 41.8$; $\rho = 1000$ kg/m³

Phantom Section: Flat

Measurement Standard: DASY 8

DASY Configuration:

- Probe: EX3DV4 - SN7852; ConvF(6.32, 6.48, 7.04); Calibrated: 2026-03-12
- Sensor-Surface: 1.4mm
- DAE: DAE4ip Sn1842; Calibrated: 2025-11-12
- Phantom: ELI V8.0 (20deg probe tilt); Serial: 2214;
- Software: DASY8 Module SAR V18.0.0.7250

HBBL-600-10000/EDGE LEFT, 0 mm - Channel 21100/Area Scan (10.0 x 10.0 x 1.0) :

Grid Extents [mm]: 60.0 x 60.0

Maximum value of SAR (interpolated) - SAR(1 g) = 1.37 W/kg; SAR(10 g) = 0.730 W/kg

HBBL-600-10000/EDGE LEFT, 0 mm - Channel 21100/Zoom Scan (6.0 x 6.0 x 1.5) :

Grid Extents [mm]: 30.0 x 30.0 x 30.0

Graded Grid: Ratio 1.5 - Distance Sensor to Surface 1.4 mm

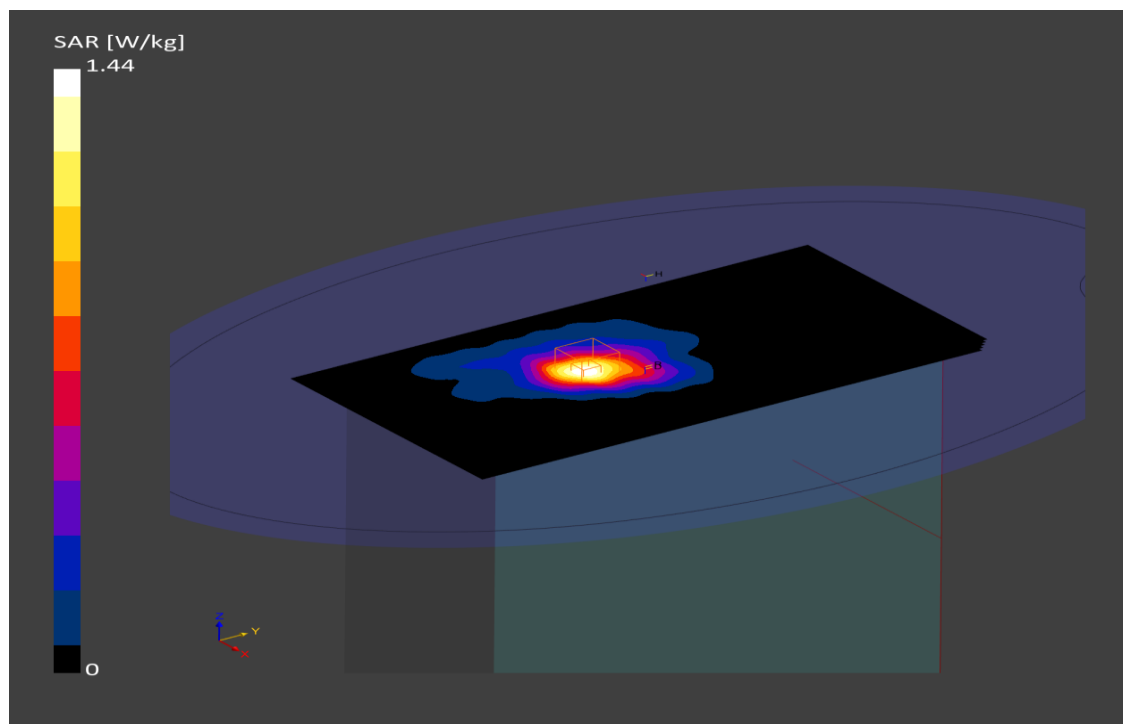
Power Drift = -0.04 dB

SAR(1 g) = 1.29 W/kg; SAR(10 g) = 0.690 W/kg

Additional Info for IEC 62209-2 AMD1:

TDist 3dB Peak [mm]: 16.7

M2/M1 [%]: 82.5

**Additional information:**

position or distance of DUT to SAM: 0 mm

ambient temperature: 23.5°C; liquid temperature: 22.2°C;

IEC_IEEE62209-1528 LTE FDD 8 limb**DUT: Laboratory instrument; Type: IONIC Titrator; Serial: 001000939367**

Communication System: LTE-FDD: 10.0 MHz, QPSK, 1 RB (Mid); Communication System Band: Band 8;

Communication System Frequency: 910.0 MHz

Medium parameters used: $f = 910.0$ MHz, $\sigma = 0.964$ S/m; $\epsilon_r = 43.0$; $\rho = 1000$ kg/m³

Phantom Section: Flat

Measurement Standard: DASY 8

DASY Configuration:

- Probe: EX3DV4 - SN7852; ConvF(8.42, 8.62, 9.38); Calibrated: 2026-03-12
- Sensor-Surface: 1.4mm
- DAE: DAE4ip Sn1842; Calibrated: 2025-11-12
- Phantom: ELI V8.0 (20deg probe tilt); Serial: 2214;
- Software: DASY8 Module SAR V18.0.0.7250

HBBL-600-10000/EDGE LEFT, 0 mm - Channel 21750/Area Scan (15.0 x 15.0 x 1.0) :

Grid Extents [mm]: 60.0 x 60.0

Maximum value of SAR (interpolated) - SAR(1 g) = 0.131 W/kg; SAR(10 g) = 0.084 W/kg

HBBL-600-10000/EDGE LEFT, 0 mm - Channel 21750/Zoom Scan (6.0 x 6.0 x 1.5) :

Grid Extents [mm]: 30.0 x 30.0 x 30.0

Graded Grid: Ratio 1.5 - Distance Sensor to Surface 1.4 mm

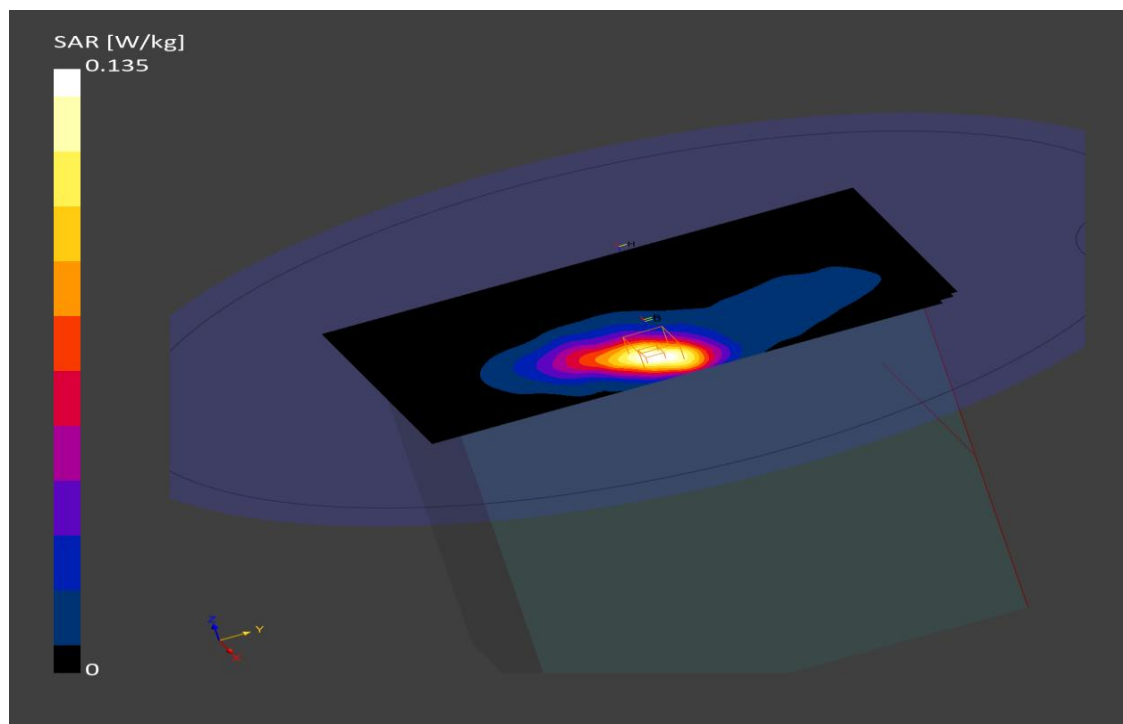
Power Drift = -0.03 dB

SAR(1 g) = 0.136 W/kg; SAR(10 g) = 0.086 W/kg

Additional Info for IEC 62209-2 AMD1:

TDist 3dB Peak [mm]: 13.7

M2/M1 [%]: 86.2

**Additional information:**

position or distance of DUT to SAM: 0 mm

ambient temperature: 23.0°C; liquid temperature: 20.4°C;

IEC_IEEE62209-1528 LTE FDD 12 limb**DUT: Laboratory instrument; Type: IONIC Titrator; Serial: 001000939367**

Communication System: LTE-FDD: 10.0 MHz, QPSK, 1 RB (Mid); Communication System Band: Band 12;

Communication System Frequency: 704.0 MHz

Medium parameters used: $f = 704.0$ MHz, $\sigma = 0.893$ S/m; $\epsilon_r = 43.3$; $\rho = 1000$ kg/m³

Phantom Section: Flat

Measurement Standard: DASY 8

DASY Configuration:

- Probe: EX3DV4 - SN7852; ConvF(8.75, 8.96, 9.74); Calibrated: 2026-03-12
- Sensor-Surface: 1.4mm
- DAE: DAE4ip Sn1842; Calibrated: 2025-11-12
- Phantom: ELI V8.0 (20deg probe tilt); Serial: 2214;
- Software: DASY8 Module SAR V18.0.0.7250

HBBL-600-10000/EDGE LEFT, 0 mm - Channel 23060/Area Scan (15.0 x 15.0 x 1.0) :

Grid Extents [mm]: 60.0 x 60.0

Maximum value of SAR (interpolated) - SAR(1 g) = 0.030 W/kg; SAR(10 g) = 0.020 W/kg

HBBL-600-10000/EDGE LEFT, 0 mm - Channel 23060/Zoom Scan (6.0 x 6.0 x 1.5) :

Grid Extents [mm]: 30.0 x 30.0 x 30.0

Graded Grid: Ratio 1.5 - Distance Sensor to Surface 1.4 mm

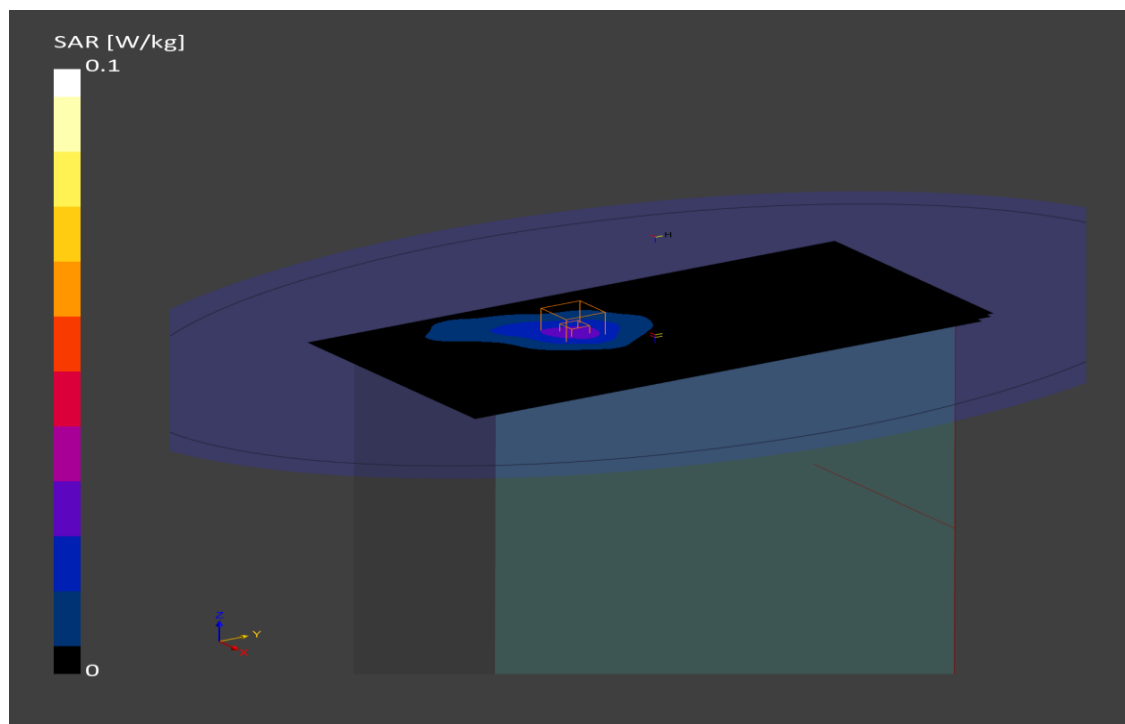
Power Drift = -0.08 dB

SAR(1 g) = 0.033 W/kg; SAR(10 g) = 0.021 W/kg

Additional Info for IEC 62209-2 AMD1:

TDist 3dB Peak [mm]: 20.0

M2/M1 [%]: 85.5

**Additional information:**

position or distance of DUT to SAM: 0 mm

ambient temperature: 21.4°C; liquid temperature: 20.7°C;

Date/Time: 2026-07-07, 17:44 2026-07-07, 17:49

IEC_IEEE62209-1528 LTE FDD 13 limb**DUT: Laboratory instrument; Type: IONIC Titrator; Serial: 001000939367**

Communication System: LTE-FDD: 10.0 MHz, QPSK, 1 RB (Mid); Communication System Band: Band 13;

Communication System Frequency: 782.0 MHz

Medium parameters used: $f = 782.0$ MHz, $\sigma = 0.917$ S/m; $\epsilon_r = 43.1$; $\rho = 1000$ kg/m³

Phantom Section: Flat

Measurement Standard: DASY 8

DASY Configuration:

- Probe: EX3DV4 - SN7852; ConvF(8.75, 8.96, 9.74); Calibrated: 2026-03-12
- Sensor-Surface: 1.4mm
- DAE: DAE4ip Sn1842; Calibrated: 2025-11-12
- Phantom: ELI V8.0 (20deg probe tilt); Serial: 2214;
- Software: DASY8 Module SAR V18.0.0.7250

HBBL-600-10000/EDGE TOP, 0 mm - Channel 23230/Area Scan (15.0 x 15.0 x 1.0) :

Grid Extents [mm]: 60.0 x 60.0

Maximum value of SAR (interpolated) - SAR(1 g) = 0.034 W/kg; SAR(10 g) = 0.023 W/kg

HBBL-600-10000/EDGE TOP, 0 mm - Channel 23230/Zoom Scan (6.0 x 6.0 x 1.5) :

Grid Extents [mm]: 30.0 x 30.0 x 30.0

Graded Grid: Ratio 1.5 - Distance Sensor to Surface 1.4 mm

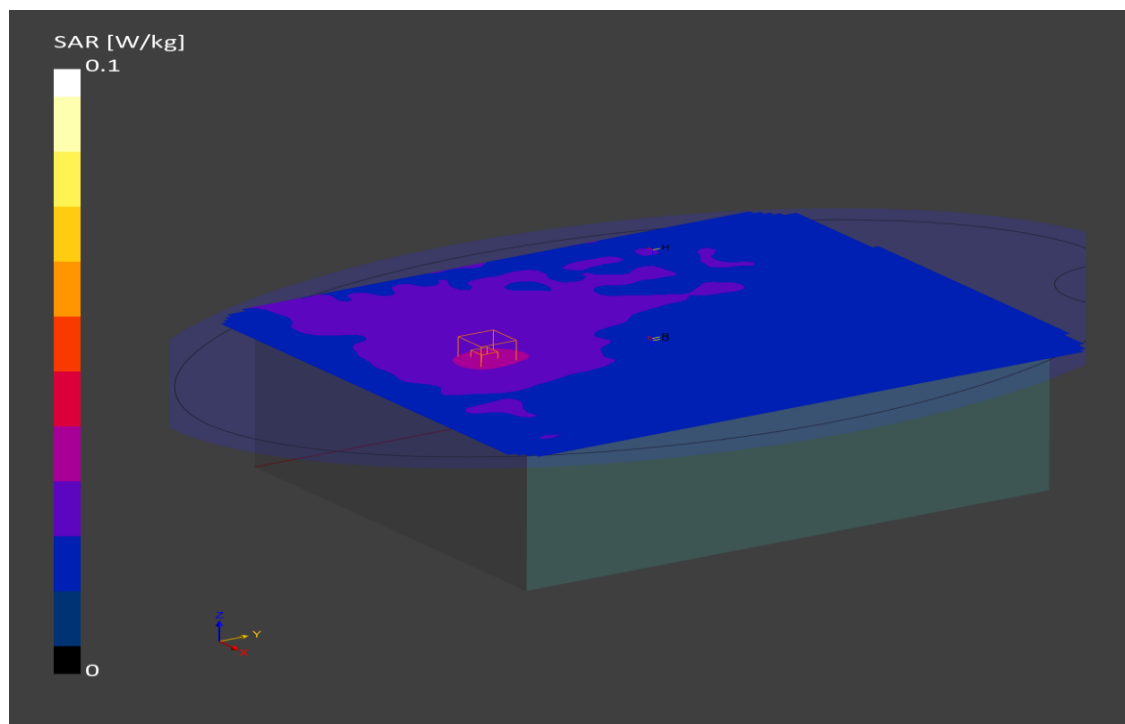
Power Drift = 0.02 dB

SAR(1 g) = 0.036 W/kg; SAR(10 g) = 0.031 W/kg

Additional Info for IEC 62209-2 AMD1:

TDist 3dB Peak [mm]: > 15.0

M2/M1 [%]: 99.7

**Additional information:**

position or distance of DUT to SAM: 0 mm

ambient temperature: 21.4°C; liquid temperature: 20.7°C;

IEC_IEEE62209-1528 LTE FDD 26 limb**DUT: Laboratory instrument; Type: IONIC Titrator; Serial: 001000939367**

Communication System: LTE-FDD: 5.0 MHz, QPSK, 1 RB (Mid); Communication System Band: Band 26;

Communication System Frequency: 846.5 MHz

Medium parameters used: $f = 846.5$ MHz, $\sigma = 0.939$ S/m; $\epsilon_r = 43.0$; $\rho = 1000$ kg/m³

Phantom Section: Flat

Measurement Standard: DASY 8

DASY Configuration:

- Probe: EX3DV4 - SN7852; ConvF(8.5, 8.7, 9.47); Calibrated: 2026-03-12
- Sensor-Surface: 1.4mm
- DAE: DAE4ip Sn1842; Calibrated: 2025-11-12
- Phantom: ELI V8.0 (20deg probe tilt); Serial: 2214;
- Software: DASY8 Module SAR V18.0.0.7250

HBBL-600-10000/EDGE LEFT, 0 mm - Channel 27015/Area Scan (15.0 x 15.0 x 1.0) :

Grid Extents [mm]: 60.0 x 60.0

Maximum value of SAR (interpolated) - SAR(1 g) = 0.076 W/kg; SAR(10 g) = 0.051 W/kg

HBBL-600-10000/EDGE LEFT, 0 mm - Channel 27015/Zoom Scan (6.0 x 6.0 x 1.5) :

Grid Extents [mm]: 30.0 x 30.0 x 30.0

Graded Grid: Ratio 1.5 - Distance Sensor to Surface 1.4 mm

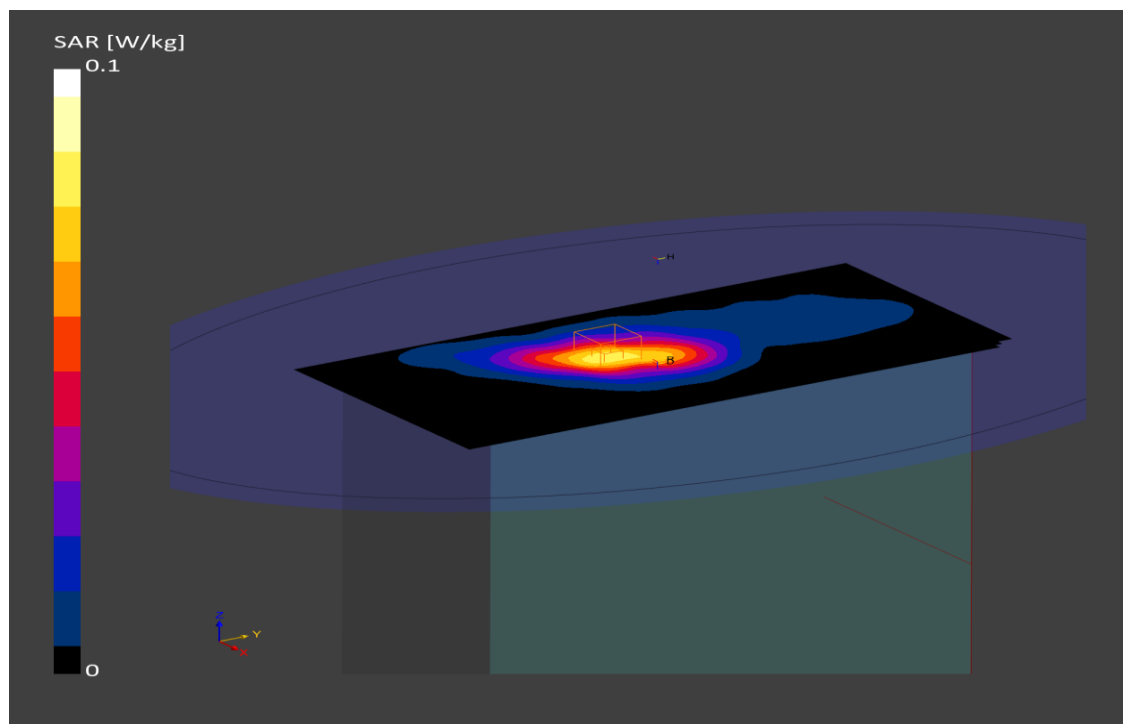
Power Drift = -0.18 dB

SAR(1 g) = 0.078 W/kg; SAR(10 g) = 0.053 W/kg

Additional Info for IEC 62209-2 AMD1:

TDist 3dB Peak [mm]: 23.0

M2/M1 [%]: 87.5

**Additional information:**

position or distance of DUT to SAM: 0 mm

ambient temperature: 23.0°C; liquid temperature: 21.2°C;

IEC_IEEE62209-1528 LTE FDD 26 limb**DUT: Laboratory instrument; Type: IONIC Titrator; Serial: 001000939367**

Communication System: LTE-FDD: 10.0 MHz, QPSK, 1 RB (Mid); Communication System Band: Band 26;

Communication System Frequency: 831.5 MHz

Medium parameters used: $f = 831.5$ MHz, $\sigma = 0.934$ S/m; $\epsilon_r = 43.1$; $\rho = 1000$ kg/m³

Phantom Section: Flat

Measurement Standard: DASY 8

DASY Configuration:

- Probe: EX3DV4 - SN7852; ConvF(8.5, 8.7, 9.47); Calibrated: 2026-03-12
- Sensor-Surface: 1.4mm
- DAE: DAE4ip Sn1842; Calibrated: 2025-11-12
- Phantom: ELI V8.0 (20deg probe tilt); Serial: 2214;
- Software: DASY8 Module SAR V18.0.0.7250

HBBL-600-10000/EDGE LEFT, 0 mm - Channel 26865/Area Scan (15.0 x 15.0 x 1.0) :

Grid Extents [mm]: 60.0 x 60.0

Maximum value of SAR (interpolated) - SAR(1 g) = 0.062 W/kg; SAR(10 g) = 0.042 W/kg

HBBL-600-10000/EDGE LEFT, 0 mm - Channel 26865/Zoom Scan (6.0 x 6.0 x 1.5) :

Grid Extents [mm]: 30.0 x 30.0 x 30.0

Graded Grid: Ratio 1.5 - Distance Sensor to Surface 1.4 mm

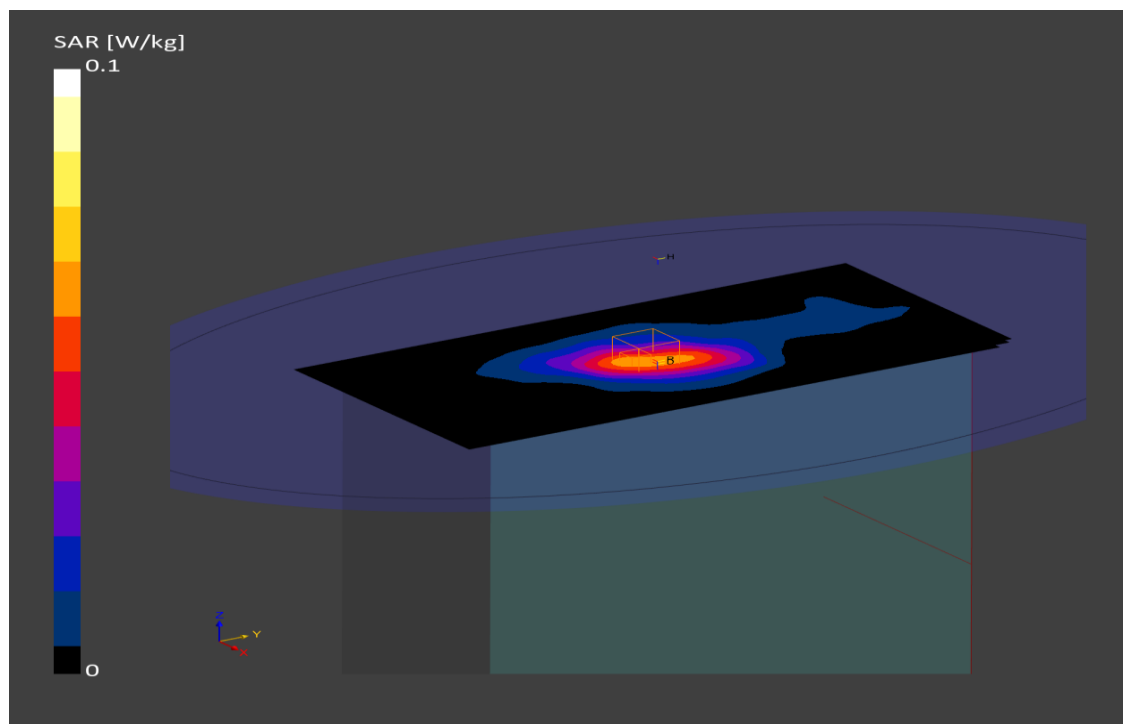
Power Drift = -0.04 dB

SAR(1 g) = 0.064 W/kg; SAR(10 g) = 0.042 W/kg

Additional Info for IEC 62209-2 AMD1:

TDist 3dB Peak [mm]: 17.8

M2/M1 [%]: 84.3

**Additional information:**

position or distance of DUT to SAM: 0 mm

ambient temperature: 23.0°C; liquid temperature: 21.2°C;

Date/Time: 2026-07-03, 20:59 2026-07-03, 21:06

IEC_IEEE62209-1528 LTE TDD 38 limb**DUT: Laboratory instrument; Type: IONIC Titrator; Serial: 001000939367**

Communication System: LTE-TDD: 20.0 MHz, QPSK, UL/DL CFG: 2, SSC: 7, 1 RB (Low); Communication System Band: Band 38; Communication System Frequency: 2580.0 MHz

Medium parameters used: $f = 2580.0$ MHz, $\sigma = 1.99$ S/m; $\epsilon_r = 41.7$; $\rho = 1000$ kg/m³

Phantom Section: Flat

Measurement Standard: DASY 8

DASY Configuration:

- Probe: EX3DV4 - SN7852; ConvF(6.32, 6.48, 7.04); Calibrated: 2026-03-12
- Sensor-Surface: 1.4mm
- DAE: DAE4ip Sn1842; Calibrated: 2025-11-12
- Phantom: ELI V8.0 (20deg probe tilt); Serial: 2214;
- Software: DASY8 Module SAR V18.0.0.7250

HBBL-600-10000/EDGE LEFT, 0 mm - Channel 37850/Area Scan (10.0 x 10.0 x 1.0) :

Grid Extents [mm]: 60.0 x 60.0

Maximum value of SAR (interpolated) - SAR(1 g) = 0.449 W/kg; SAR(10 g) = 0.241 W/kg

HBBL-600-10000/EDGE LEFT, 0 mm - Channel 37850/Zoom Scan (5.0 x 5.0 x 1.5) :

Grid Extents [mm]: 30.0 x 30.0 x 30.0

Graded Grid: Ratio 1.5 - Distance Sensor to Surface 1.4 mm

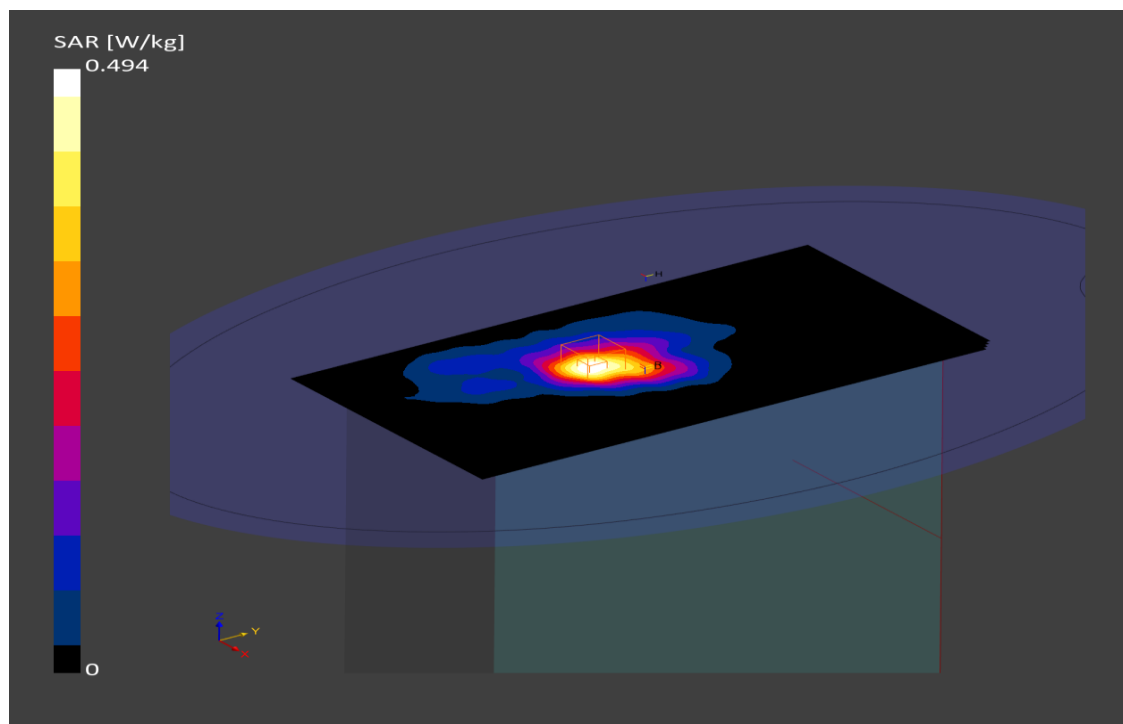
Power Drift = 0.04 dB

SAR(1 g) = 0.453 W/kg; SAR(10 g) = 0.245 W/kg

Additional Info for IEC 62209-2 AMD1:

TDist 3dB Peak [mm]: 17.0

M2/M1 [%]: 79.8

**Additional information:**

position or distance of DUT to SAM: 0 mm

ambient temperature: 23.5°C; liquid temperature: 22.2°C;

IEC_IEEE62209-1528 LTE TDD 41 limb**DUT: Laboratory instrument; Type: IONIC Titrator; Serial: 001000939367**

Communication System: LTE-TDD: 20.0 MHz, QPSK, UL/DL CFG: 2, SSC: 7, 1 RB (Mid); Communication System Band: Band 41; Communication System Frequency: 2593.0 MHz

Medium parameters used: $f = 2593.0$ MHz, $\sigma = 2.01$ S/m; $\epsilon_r = 41.7$; $\rho = 1000$ kg/m³

Phantom Section: Flat

Measurement Standard: DASY 8

DASY Configuration:

- Probe: EX3DV4 - SN7852; ConvF(6.32, 6.48, 7.04); Calibrated: 2026-03-12
- Sensor-Surface: 1.4mm
- DAE: DAE4ip Sn1842; Calibrated: 2025-11-12
- Phantom: ELI V8.0 (20deg probe tilt); Serial: 2214;
- Software: DASY8 Module SAR V18.0.0.7250

HBBL-600-10000/EDGE LEFT, 0 mm - Channel 40620/Area Scan (10.0 x 10.0 x 1.0) :

Grid Extents [mm]: 60.0 x 60.0

Maximum value of SAR (interpolated) - SAR(1 g) = 0.407 W/kg; SAR(10 g) = 0.219 W/kg

HBBL-600-10000/EDGE LEFT, 0 mm - Channel 40620/Zoom Scan (5.0 x 5.0 x 1.5) :

Grid Extents [mm]: 30.0 x 30.0 x 30.0

Graded Grid: Ratio 1.5 - Distance Sensor to Surface 1.4 mm

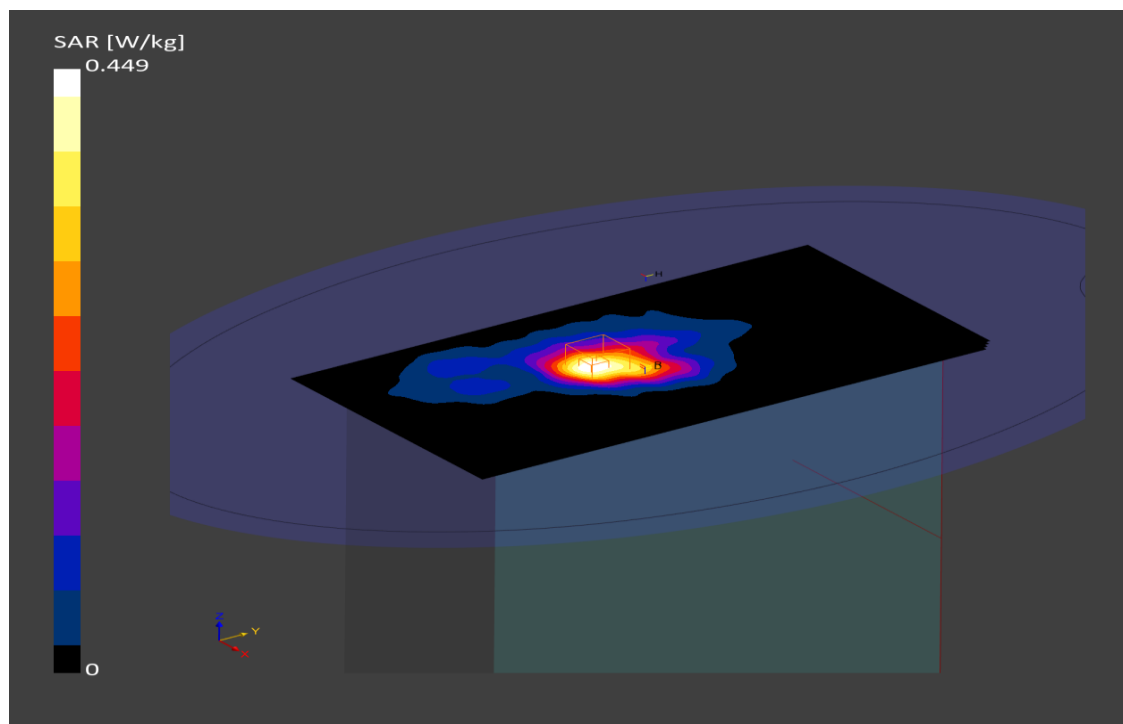
Power Drift = 0.06 dB

SAR(1 g) = 0.406 W/kg; SAR(10 g) = 0.222 W/kg

Additional Info for IEC 62209-2 AMD1:

TDist 3dB Peak [mm]: 17.1

M2/M1 [%]: 79.9

**Additional information:**

position or distance of DUT to SAM: 0 mm

ambient temperature: 23.5°C; liquid temperature: 22.2°C;

IEC_IEEE62209-1528 LTE FDD 66 limb**DUT: Laboratory instrument; Type: IONIC Titrator; Serial: 001000939367**

Communication System: LTE-FDD: 20.0 MHz, QPSK, 1 RB (Mid); Communication System Band: Band 66;

Communication System Frequency: 1770.0 MHz

Medium parameters used: $f = 1770.0$ MHz, $\sigma = 1.39$ S/m; $\epsilon_r = 42.7$; $\rho = 1000$ kg/m³

Phantom Section: Flat

Measurement Standard: DASY 8

DASY Configuration:

- Probe: EX3DV4 - SN7852; ConvF(7.26, 7.43, 8.09); Calibrated: 2026-03-12
- Sensor-Surface: 1.4mm
- DAE: DAE4ip Sn1842; Calibrated: 2025-11-12
- Phantom: ELI V8.0 (20deg probe tilt); Serial: 2214;
- Software: DASY8 Module SAR V18.0.0.7250

HBBL-600-10000/EDGE LEFT, 0 mm - Channel 132572/Area Scan (15.0 x 15.0 x 1.0) :

Grid Extents [mm]: 60.0 x 60.0

Maximum value of SAR (interpolated) - SAR(1 g) = 0.854 W/kg; SAR(10 g) = 0.445 W/kg

HBBL-600-10000/EDGE LEFT, 0 mm - Channel 132572/Zoom Scan (5.0 x 5.0 x 1.5) :

Grid Extents [mm]: 30.0 x 30.0 x 30.0

Graded Grid: Ratio 1.5 - Distance Sensor to Surface 1.4 mm

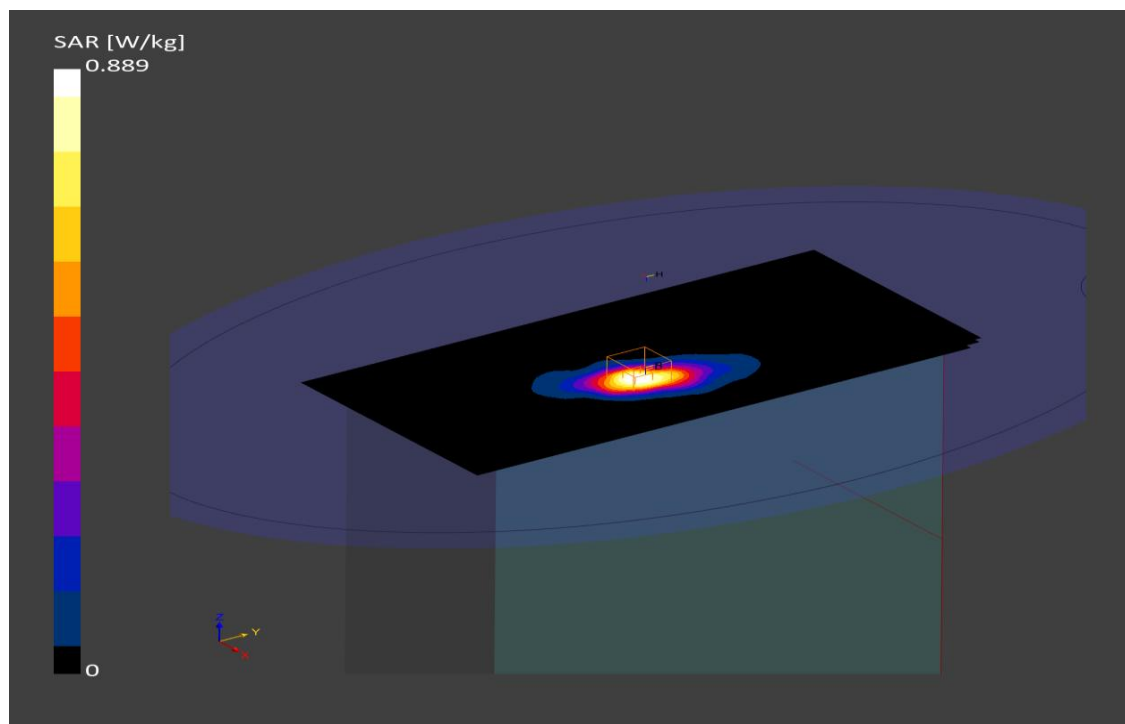
Power Drift = 0.06 dB

SAR(1 g) = 0.931 W/kg; SAR(10 g) = 0.507 W/kg

Additional Info for IEC 62209-2 AMD1:

TDist 3dB Peak [mm]: 10.1

M2/M1 [%]: 83.0

**Additional information:**

position or distance of DUT to SAM: 0 mm

ambient temperature: 23.5°C; liquid temperature: 22.2°C;

Annex B.2: SAR results – WLAN 2.4GHz

Date/Time: 2026-07-27, 14:42 2026-07-27, 14:49

IEC_IEEE62209-1528 WLAN 2.4 GHz limb**DUT: Laboratory instrument; Type: IONIC Titrator; Serial: 001000939367**

Communication System: WiFi (802.11n): HT40 Mixed, MCS0 (13.5 Mbps), 99.7% DC; Communication System Band: 2.4 GHz; Communication System Frequency: 2422.0 MHz

Medium parameters used: $f = 2422.0$ MHz, $\sigma = 1.82$ S/m; $\epsilon_r = 38.4$; $\rho = 1000$ kg/m³

Phantom Section: Flat

Measurement Standard: DASY 8

DASY Configuration:

- Probe: EX3DV4 - SN3944; ConvF(7.45, 7.98, 7.73); Calibrated: 2026-05-05
- Sensor-Surface: 1.4mm
- DAE: DAE4ip Sn1842; Calibrated: 2025-11-12
- Phantom: ELI V8.0 (20deg probe tilt); Serial: 2214;
- Software: DASY8 Module SAR V18.0.0.7250

HBBL-600-10000/EDGE TOP, 0 mm - Channel 3/Area Scan (10.0 x 10.0 x 1.0) :

Grid Extents [mm]: 60.0 x 60.0

Maximum value of SAR (interpolated) - SAR(1 g) = 0.259 W/kg; SAR(10 g) = 0.151 W/kg

HBBL-600-10000/EDGE TOP, 0 mm - Channel 3/Zoom Scan (5.0 x 5.0 x 1.5) :

Grid Extents [mm]: 30.0 x 30.0 x 30.0

Graded Grid: Ratio 1.5 - Distance Sensor to Surface 1.4 mm

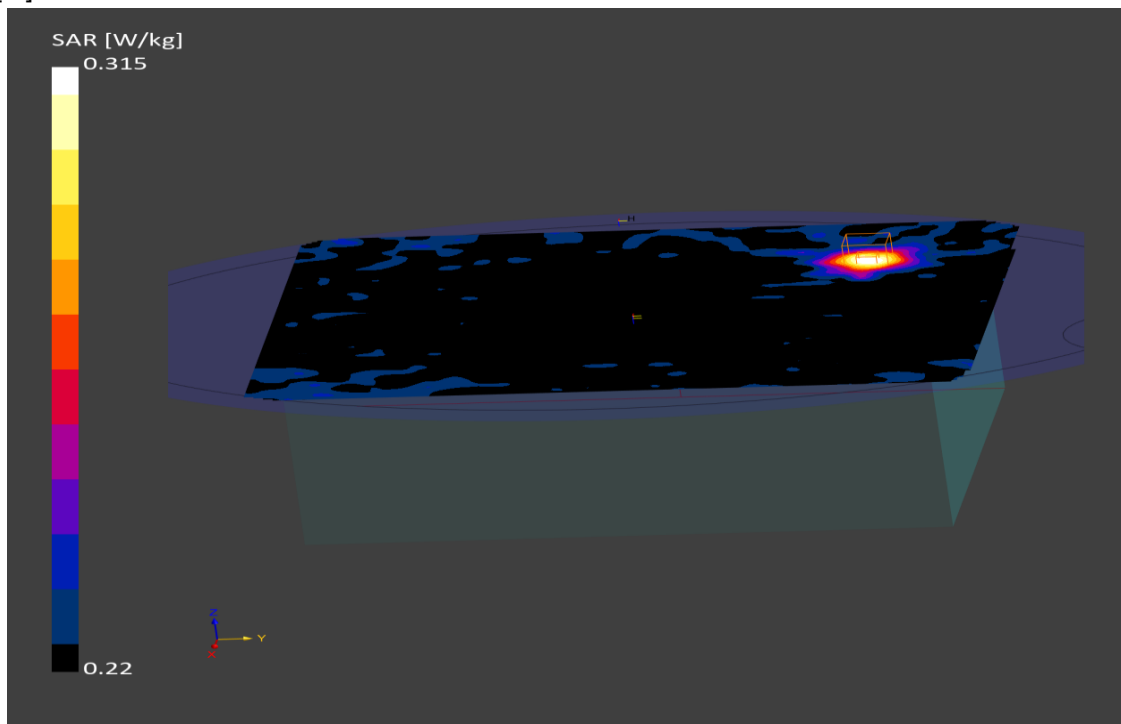
Power Drift = -0.02 dB

SAR(1 g) = 0.300 W/kg; SAR(10 g) = 0.263 W/kg

Additional Info for IEC 62209-2 AMD1:

TDist 3dB Peak [mm]: > 15.0

M2/M1 [%]: 95.8

**Additional information:**

position or distance of DUT to SAM: 0 mm

ambient temperature: 22.6°C; liquid temperature: 21.5°C;

Date/Time: 2026-07-27, 15:37 2026-07-27, 15:44

IEC_IEEE62209-1528 WLAN 2.4 GHz limb**DUT: Laboratory instrument; Type: IONIC Titrator; Serial: 001000939367**

Communication System: WiFi (802.11b): DSSS, DBPSK, 1.0 Mbps, 99.9% DC; Communication System Band: 2.4 GHz; Communication System Frequency: 2437.0 MHz

Medium parameters used: $f = 2437.0$ MHz, $\sigma = 1.83$ S/m; $\epsilon_r = 38.4$; $\rho = 1000$ kg/m³

Phantom Section: Flat

Measurement Standard: DASY 8

DASY Configuration:

- Probe: EX3DV4 - SN3944; ConvF(7.45, 7.98, 7.73); Calibrated: 2026-05-05
- Sensor-Surface: 1.4mm
- DAE: DAE4ip Sn1842; Calibrated: 2025-11-12
- Phantom: ELI V8.0 (20deg probe tilt); Serial: 2214;
- Software: DASY8 Module SAR V18.0.0.7250

HBBL-600-10000/EDGE TOP, 0 mm - Channel 6/Area Scan (10.0 x 10.0 x 1.0) :

Grid Extents [mm]: 60.0 x 60.0

Maximum value of SAR (interpolated) - SAR(1 g) = 0.243 W/kg; SAR(10 g) = 0.143 W/kg

HBBL-600-10000/EDGE TOP, 0 mm - Channel 6/Zoom Scan (5.0 x 5.0 x 1.5) :

Grid Extents [mm]: 30.0 x 30.0 x 30.0

Graded Grid: Ratio 1.5 - Distance Sensor to Surface 1.4 mm

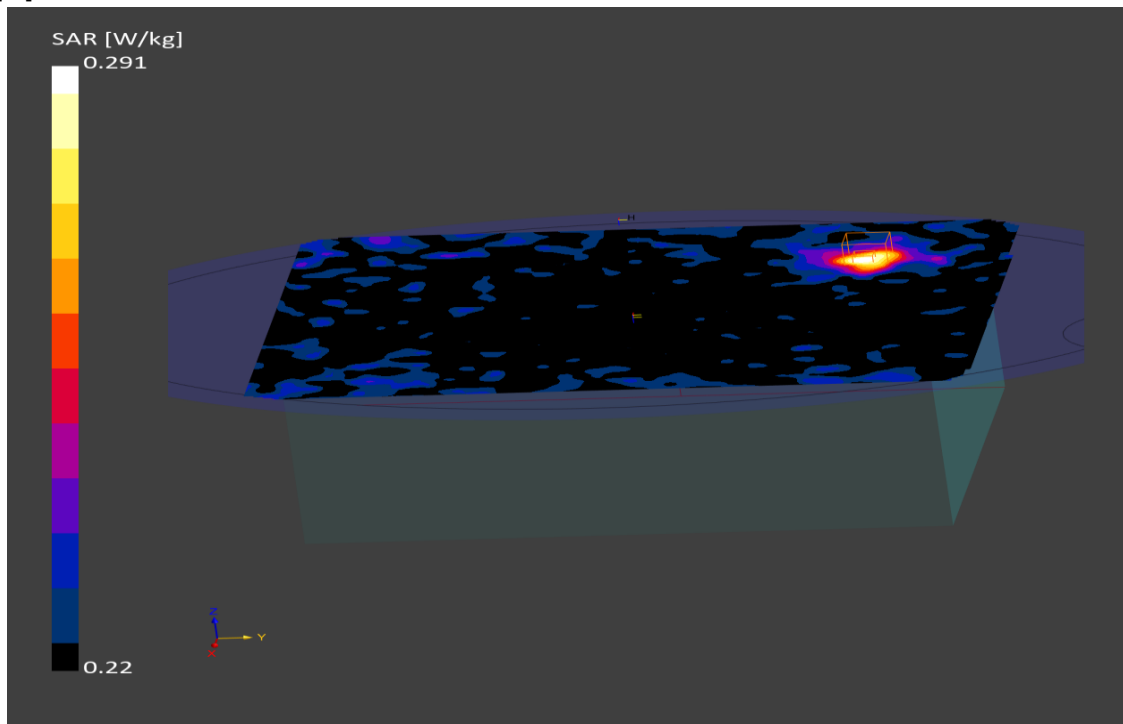
Power Drift = 0.03 dB

SAR(1 g) = 0.285 W/kg; SAR(10 g) = 0.257 W/kg

Additional Info for IEC 62209-2 AMD1:

TDist 3dB Peak [mm]: > 15.0

M2/M1 [%]: 97.6

**Additional information:**

position or distance of DUT to SAM: 0 mm

ambient temperature: 22.6°C; liquid temperature: 21.5°C;

Annex B.3: SAR results – WLAN 5GHz

Date/Time: 2026-07-30, 16:19 2026-07-30, 16:30

IEC_IEEE62209-1528 WLAN 5 GHz limb

DUT: Laboratory instrument; Type: IONIC Titrator; Serial: 001000939367

Communication System: WiFi (802.11a): OFDM, BPSK, 6.0 Mbps, 99.9% DC; Communication System Band: U-NII 2C; Communication System Frequency: 5620.0 MHz

Medium parameters used: $f = 5620.0$ MHz, $\sigma = 4.99$ S/m; $\epsilon_r = 34.4$; $\rho = 1000$ kg/m³

Phantom Section: Flat

Measurement Standard: DASYS 8

DASY Configuration:

- Probe: EX3DV4 - SN3944; ConvF(4.86, 5.21, 5.04); Calibrated: 2026-05-05
- Sensor-Surface: 1.4mm
- DAE: DAE4 Sn477; Calibrated: 2026-05-11
- Phantom: ELI V8.0 (20deg probe tilt); Serial: 2214;
- Software: DASY8 Module SAR V18.0.0.7250

HBBL-600-10000/EDGE TOP, 0 mm - Channel 124/Area Scan (10.0 x 10.0 x 1.0) :

Grid Extents [mm]: 60.0 x 60.0

Maximum value of SAR (interpolated) - SAR(1 g) = 0.149 W/kg; SAR(10 g) = 0.061 W/kg

HBBL-600-10000/EDGE TOP, 0 mm - Channel 124/Zoom Scan (4.0 x 4.0 x 1.4) :

Grid Extents [mm]: 22.0 x 22.0 x 22.0

Graded Grid: Ratio 1.4 - Distance Sensor to Surface 1.4 mm

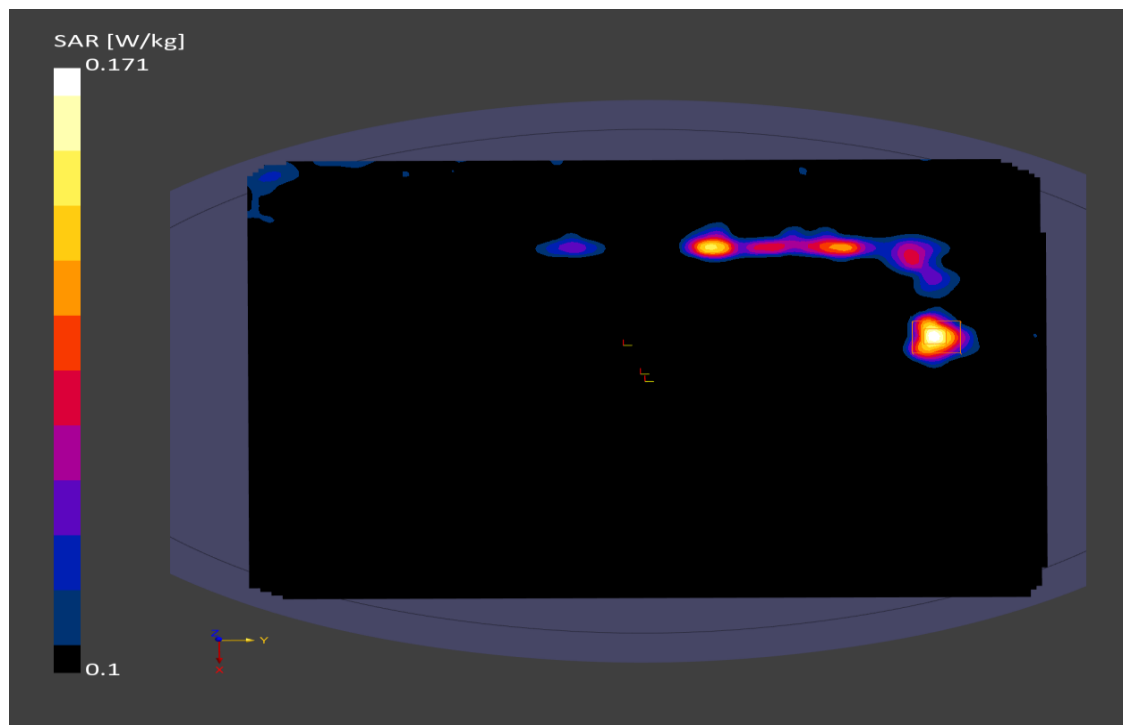
Power Drift = -0.06 dB

SAR(1 g) = 0.176 W/kg; SAR(10 g) = 0.121 W/kg

Additional Info for IEC 62209-2 AMD1:

TDist 3dB Peak [mm]: 8.4

M2/M1 [%]: 74.9



Additional information:

position or distance of DUT to SAM: 0 mm

ambient temperature: 22.6°C; liquid temperature: 21.5°C;

Date/Time: 2026-07-30, 18:04 2026-07-30, 18:11

IEC_IEEE62209-1528 WLAN 5 GHz limb**DUT: Laboratory instrument; Type: IONIC Titrator; Serial: 001000939367**

Communication System: WiFi (802.11a): OFDM, BPSK, 6.0 Mbps, 99.9% DC; Communication System Band: U-NII 3; Communication System Frequency: 5805.0 MHz

Medium parameters used: $f = 5805.0$ MHz, $\sigma = 5.24$ S/m; $\epsilon_r = 34.1$; $\rho = 1000$ kg/m³

Phantom Section: Flat

Measurement Standard: DASY 8

DASY Configuration:

- Probe: EX3DV4 - SN3944; ConvF(4.96, 5.31, 5.15); Calibrated: 2026-05-05
- Sensor-Surface: 1.4mm
- DAE: DAE4 Sn477; Calibrated: 2026-05-11
- Phantom: ELI V8.0 (20deg probe tilt); Serial: 2214;
- Software: DASY8 Module SAR V18.0.0.7250

HBBL-600-10000/EDGE TOP, 0 mm - Channel 161/Area Scan (10.0 x 10.0 x 1.0) :

Grid Extents [mm]: 60.0 x 60.0

Maximum value of SAR (interpolated) - SAR(1 g) = 0.297 W/kg; SAR(10 g) = 0.108 W/kg

HBBL-600-10000/EDGE TOP, 0 mm - Channel 161/Zoom Scan (4.0 x 4.0 x 1.4) :

Grid Extents [mm]: 22.0 x 22.0 x 22.0

Graded Grid: Ratio 1.4 - Distance Sensor to Surface 1.4 mm

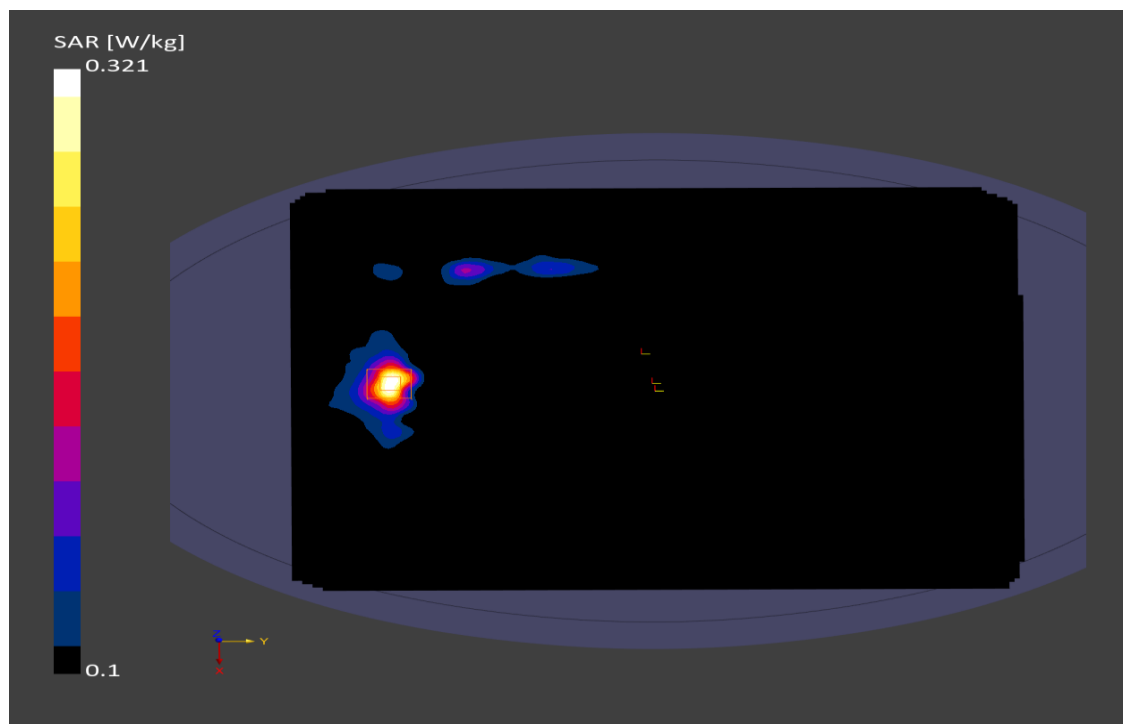
Power Drift = -0.03 dB

SAR(1 g) = 0.318 W/kg; SAR(10 g) = 0.166 W/kg

Additional Info for IEC 62209-2 AMD1:

TDist 3dB Peak [mm]: 6.9

M2/M1 [%]: 66.1

**Additional information:**

position or distance of DUT to SAM: 0 mm

ambient temperature: 22.6°C; liquid temperature: 21.5°C;

Annex B.4: SAR results – BLE 2.4GHz

Date/Time: 2026-07-27, 15:08 2026-07-27, 15:18

IEC_IEEE62209-1528 Bluetooth LE 2.4 GHz limb**DUT: Laboratory instrument; Type: IONIC Titrator; Serial: 001000939367**

Communication System: Bluetooth: BLE, GFSK; Communication System Band: ISM 2.4 GHz Band;

Communication System Frequency: 2440.0 MHz

Medium parameters used: $f = 2440.0$ MHz, $\sigma = 1.83$ S/m; $\epsilon_r = 38.3$; $\rho = 1000$ kg/m³

Phantom Section: Flat

Measurement Standard: DASYS 8

DASY Configuration:

- Probe: EX3DV4 - SN3944; ConvF(7.45, 7.98, 7.73); Calibrated: 2026-05-05
- Sensor-Surface: 1.4mm
- DAE: DAE4ip Sn1842; Calibrated: 2025-11-12
- Phantom: ELI V8.0 (20deg probe tilt); Serial: 2214;
- Software: DASY8 Module SAR V18.0.0.7250

HBBL-600-10000/EDGE TOP, 0 mm - Channel 19/Area Scan (10.0 x 10.0 x 1.0) :

Grid Extents [mm]: 300.0 x 360.0

Maximum value of SAR (interpolated) - SAR(1 g) = 0.003 W/kg; SAR(10 g) = 0.001 W/kg

HBBL-600-10000/EDGE TOP, 0 mm - Channel 19/Zoom Scan (5.0 x 5.0 x 1.5) :

Grid Extents [mm]: 30.0 x 30.0 x 30.0

Graded Grid: Ratio 1.5 - Distance Sensor to Surface 1.4 mm

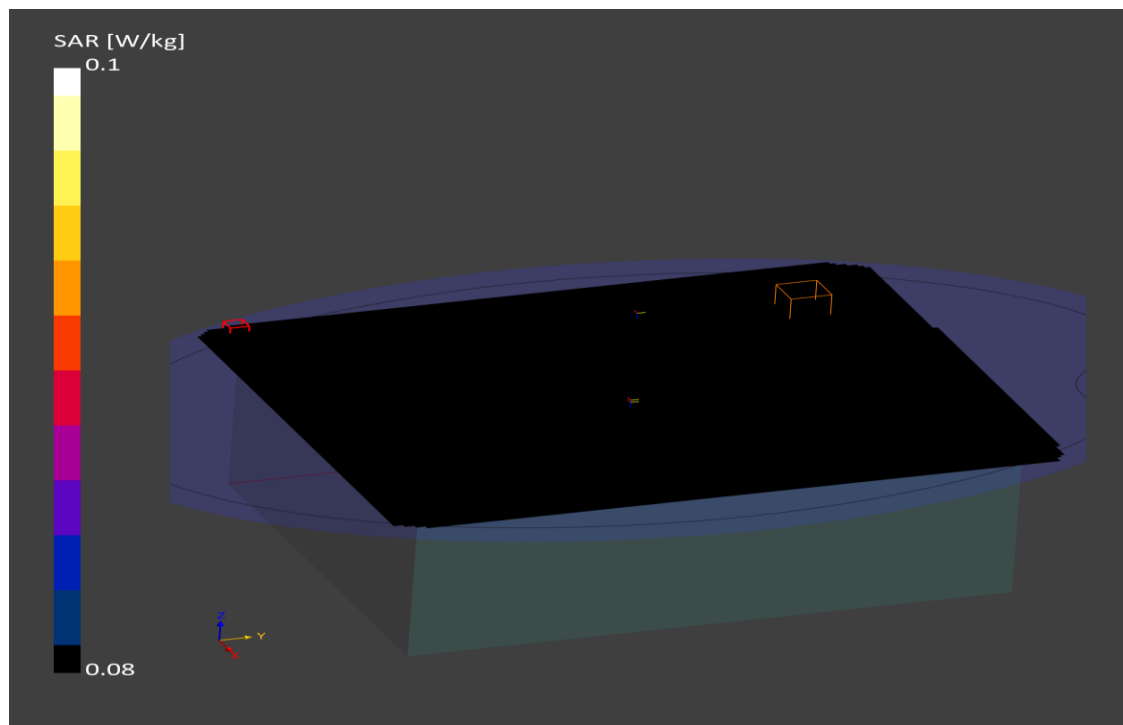
Power Drift = -0.02 dB

SAR(1 g) = 0.00 W/kg; SAR(10 g) = 0.00 W/kg

Additional Info for IEC 62209-2 AMD1:

TDist 3dB Peak [mm]: > 15.0

M2/M1 [%]: N/A

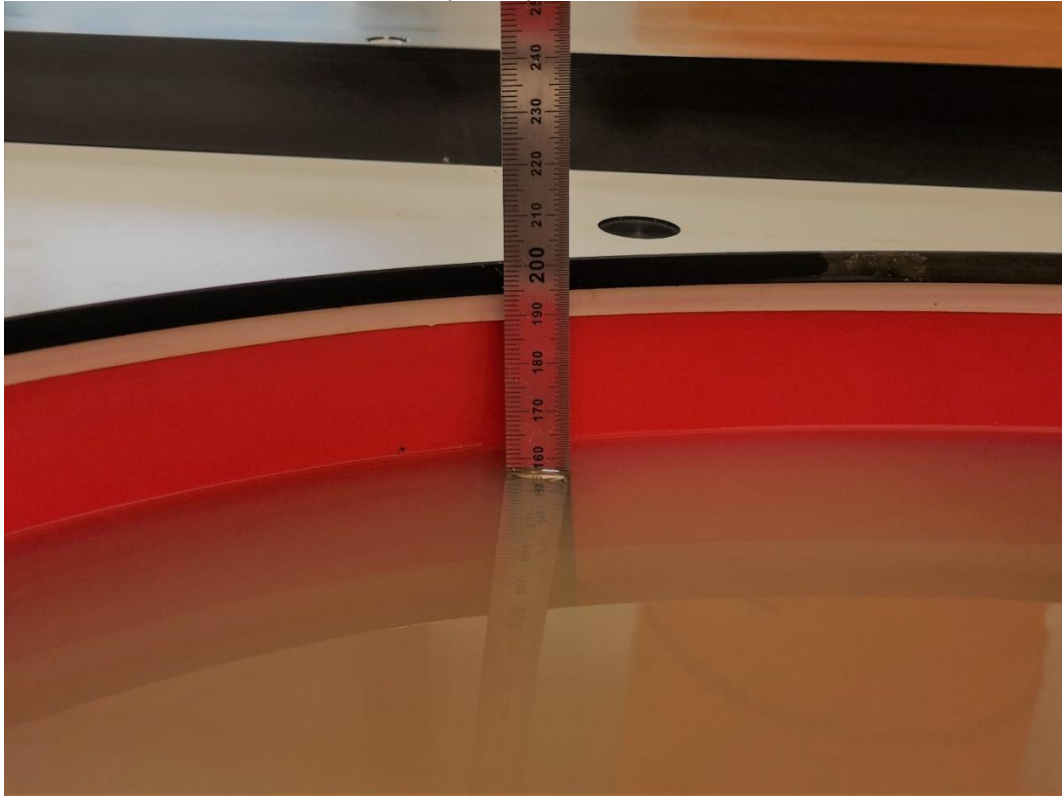
**Additional information:**

position or distance of DUT to SAM: 0 mm

ambient temperature: 22.6°C; liquid temperature: 21.5°C;

Annex B.5: Liquid depth

Photo 1: Liquid depth 600-10000 MHz



Annex C: Photo documentation

Photo documentation is described in the additional document:
1-2154-25-01-11_TR1-A101-R01

Annex D: Calibration parameters

Calibration parameters are described in the additional document:
1-2154-25-01-11_TR1-A301-R02_Caldata

Annex E: RSS-102 Annex A

ISED RF documents are described in the additional document:
1-2154-25-01-11_TR1-A401-R04_ISED - RSS-102 Annex A

Annex F: Document History

Version	Applied Changes	Date of Release
-R01	Initial Release	2026-07-31
-R02	HVIN was corrected on the page 1	2026-08-26
-R03	LTE 7/8/38/41 results were added	2026-09-14
-R04	FCC ID, IC ID, PMN, HVIN und HMN were changed	2026-09-28

Annex G: Further Information

Glossary

BW	-	Bandwidth
DTS	-	Distributed Transmission System
DUT	-	Device under Test
EUT	-	Equipment under Test
FCC	-	Federal Communication Commission
FCC ID	-	Combination of Grantee Code and Equipment Product Code
HW	-	Hardware
ISED	-	Innovation, Science and Economic Development Canada
LTE	-	Long Term Evolution
N/A	-	not applicable
PCB	-	PCS Licensed Transmitter
PCE	-	Personal Consumption Expenditure (PCS Licensed Transmitter held to ear)
PCS	-	Personal Consumption Services
OET	-	Office of Engineering and Technology
RB	-	resource block(s)
SAR	-	Specific Absorption Rate
S/N	-	Serial Number
SW	-	Software
UNII	-	Unlicensed National Information Infrastructure