Test report No.: 2360732R-SAUSV01S-A

SAR Test Report
(Class II Permissive Change)

Product Name	Intel® Wi-Fi 6 AX200
Trademark	Intel
Model and /or type reference	AX200NGW
Applicant´s name / address	Intel Corporation 425 rue de Goa Le Cargo B6 Antibes, 06600 France
Manufacturer´s name	Intel Corporation
FCC ID	PD9AX200NG
Applicable Standard	IEEE 1528-2013 KDB 447498 D01 v06 KDB 865664 D01 v01r04
Test Result	Refer to Section 1.1
Verdict Summary	IN COMPLIANCE
Documented By (Supervisor / Jinn Chen)	Jinn Chen
Tested By (Senior Engineer / Luke Cheng)	Luke Cheng
Approved By (Assistant Manager / San Lin)	San Lin
Date of Receipt	2023/06/27
Date of Issue	2023/09/08
Report Version	V1.0

INDEX

Page

1. General Information 5
1.1 EUT Description 5
1.2 Antenna List 6
1.3 SAR Test Exclusion Calculation 7
1.4 Test Environment 9
1.5 Measurement procedures 10
2. SAR Measurement System 11
2.1 DASY System Description 11
2.2 Area Scans 12
2.3 DASY E-Field Probe 13
2.4 DATA Acquisition Electronics (DAE) and Measurement Server 14
2.5 Robot 14
2.6 Device Holder 15
2.7 Phantom 15
3. Tissue Simulating Liquid 16
3.1 The composition of the tissue simulating liquid 16
3.2 Tissue Calibration Result 16
3.3 Tissue Dielectric Parameters for Phantoms 17
4. Measurement Procedure 18
4.1 SAR System Check 18
4.2 SAR Measurement Procedure 19
5. RF Exposure Limits 20
6. Test Equipment List 21
7. Measurement Uncertainty 24
8. Conducted Power Measurement (Including tolerance allowed for production unit) 26
9. Test Results 29
9.1 Test Results Summary 29
9.2 Simultaneous Transmission 35
Appendix A. System Check Data
Appendix B. Highest measurement Data
Appendix C. Test Setup Photographs
Appendix D. Probe Calibration Data
Appendix E. Dipole & Source Calibration
Appendix F. Product Photos-Please refer to the file: 2360732R-Product Photos

Competences and Guarantees

DEKRA is a testing laboratory competent to carry out the tests described in this report.

In order to assure the traceability to other national and international laboratories, DEKRA has a calibration and maintenance program for its measurement equipment.

DEKRA guarantees the reliability of the data presented in this report, which is the result of the measurements and the tests performed to the item under test on the date and under the conditions stated in the report and it is based on the knowledge and technical facilities available at DEKRA at the time of performance of the test.

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1. The test results relate only to the samples tested.
2. The test results shown in the test report are traceable to the national/international standard through the calibration report of the equipment and evaluated measurement uncertainty herein.
3. This report must not be used to claim product endorsement by TAF or any agency of the government.
4. The test report shall not be reproduced without the written approval of DEKRA Testing and Certification Co., Ltd.
5. Measurement uncertainties evaluated for each testing system and associated connections are given here to provide the system information for reference. Compliance determinations do not take into account measurement uncertainties for each testing system, but are based on the results of the compliance measurement.

Revision History

Report No.	Version	Description	Issued Date
2360732R-SAUSV01S-A	V1.0	Initial issue of report.	2023/09/08

1. General Information

1.1 EUT Description

Product Name	Intel® Wi-Fi 6 AX200
Trademark	Intel
Model and /or type reference	AX200NGW
FCC ID	PD9AX200NG
Frequency Range	WLAN 2.4GHz: 2412-2472MHz WLAN 5GHz: 5180-5320MHz, 5500-5720MHz, 5745-5825MHz BT: 2402-2480MHz
Type of Modulation	802.11b: DSSS 802.11a/g/n/ac/ax: OFDM, OFDMA GFSK(1Mbps) / π /4DQPSK(2Mbps) / 8DPSK(3Mbps)
Antenna Type	PIFA
Device Category	Portable
RF Exposure Environment	Uncontrolled

Summary of test result – Reported 1g SAR (W/kg)			
Test configuration	DTS	NII	DSS(BT)
Body	0.164	0.266	0.003
Simultaneous	0.164	0.269	0.269
Summary of test result – Reported 10g SAR (W/kg)			
Test configuration	DTS	NII	DSS(BT)
Extremity	0.751	2.493	0.044
Simultaneous	1.159	4.489 (SPLSR=0.09)	4.489 (SPLSR=0.09)

Note:

Host information			
Brand	Product Name	Model No.	Difference
Bosch	Tablet PC	3571-0100-3x	no VCI
		3571-0100-5x	TMVCI
The representative test sample is 3571-0100-52.			

1.2 Antenna List

No.	Manufacturer	Part No.	Antenna Type	Peak Gain
1	Joymax	TFF-M7L1MPFX-H029 (Main)	PIFA	-2.39 dBi for 2400 MHz -1.40 dBi for 5150~5250 MHz -0.74 dBi for 5250~5350 MHz 1.71 dBi for 5470~5725 MHz 1.71 dBi for 5725~5850 MHz
		TFF-M7L1MPFX-H029 (Aux)		-2.39 dBi for 2400 MHz -1.40 dBi for 5150~5250 MHz -0.74 dBi for 5250~5350 MHz 1.71 dBi for 5470~5725 MHz 1.71 dBi for 5725~5850 MHz

Note: The above EUT information is provided by the host manufacturer.

1.3 SAR Test Exclusion Calculation

According to KDB Publication 447498 D01, section 4.3.1, SAR is required based on the calculations of item 1 (Power(mW)/separation (mm)*sqrt(f(GHz))) for 1-g Body SAR when the value is ≤ 3.0, and for 10-g extremity when it's ≤ 7.5.

The cable must be connected above it to be used, and the human body will not be near the top of it in a visible use situation, so the top is only evaluated for extremity SAR.

SAR exclusion calculations for WiFi-SISO and Bluetooth for antenna < 50mm from the user :

Antenna	Tx	Frequency (MHz)	Output Power		Separation distances (mm)					Calculated Threshold Value (≦3.0 for 1-g Body SAR and ≤ 7.5 for 10-g Extremity SAR is not required)				
			dBm	mW	Back	Right	Left	Top*	Bottom	Back	Right	Left	Top*	Bottom
Main	WiFi	2462	21.5	141	40	55.45	156.25	2.3	141.7	5.5	>50mm	>50mm	44.3	>50mm
Main	WiFi	5240	21.0	126	40	55.45	156.25	2.3	141.7	7.2	>50mm	>50mm	57.6	>50mm
Main	WiFi	5320	21.0	126	40	55.45	156.25	2.3	141.7	7.3	>50mm	>50mm	58.1	>50mm
Main	WiFi	5700	21.0	126	40	55.45	156.25	2.3	141.7	7.5	>50mm	>50mm	60.1	>50mm
Main	WiFi	5825	21.0	126	40	55.45	156.25	2.3	141.7	7.6	>50mm	>50mm	60.8	>50mm

Note: For Extremity SAR.

SAR exclusion calculations for WiFi-SISO and Bluetooth for antenna > 50mm from the user :

Antenna	Tx	Frequency (MHz)	Output Power		Separation distances (mm)					Calculated Threshold Value (SAR test exclusion power,mW)				
			dBm	mW	Back	Right	Left	Top	Bottom	Back	Right	Left	Top	Bottom
Main	WiFi	2462	21.5	141	40	55.45	156.25	2.3	141.7	<50mm	150.1	1158.1	<50mm	1012.6
Main	WiFi	5240	21.0	126	40	55.45	156.25	2.3	141.7	<50mm	120.0	1128.0	<50mm	982.5
Main	WiFi	5320	21.0	126	40	55.45	156.25	2.3	141.7	<50mm	119.5	1127.5	<50mm	982.0
Main	WiFi	5700	21.0	126	40	55.45	156.25	2.3	141.7	<50mm	117.3	1125.3	<50mm	979.8
Main	WiFi	5825	21.0	126	40	55.45	156.25	2.3	141.7	<50mm	116.7	1124.7	<50mm	979.2

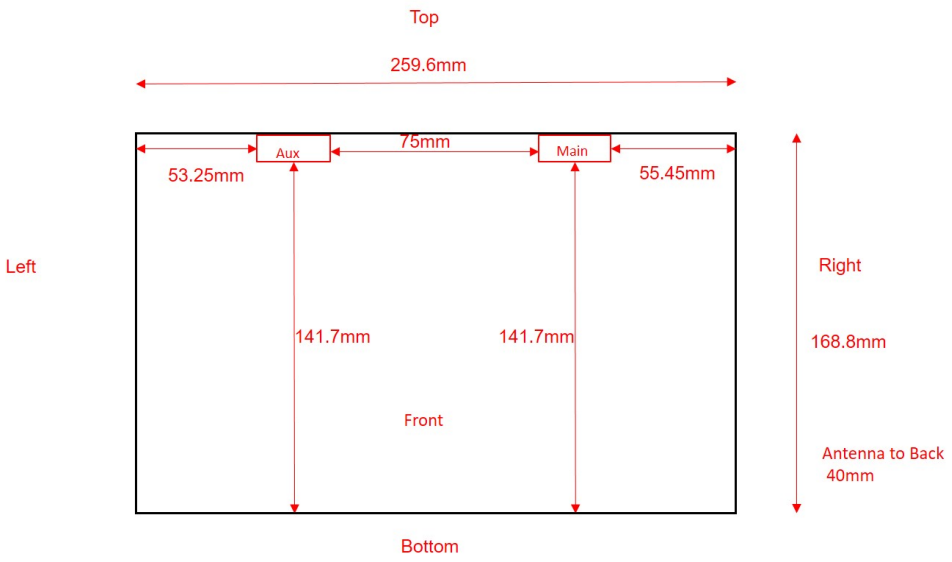
SAR exclusion calculations for WiFi-SISO and Bluetooth for antenna < 50mm from the user :

Antenna	Tx	Frequency (MHz)	Output Power		Separation distances (mm)					Calculated Threshold Value (≦3.0 for 1-g Body SAR and ≤ 7.5 for 10-g Extremity SAR is not required)				
			dBm	mW	Back	Right	Left	Top*	Bottom	Back	Right	Left	Top*	Bottom
Aux	WiFi	2462	21.5	141	40	158.45	53.25	2.3	141.7	5.5	>50mm	>50mm	44.3	>50mm
Aux	WiFi	5240	21.0	126	40	158.45	53.25	2.3	141.7	7.2	>50mm	>50mm	57.6	>50mm
Aux	WiFi	5320	21.0	126	40	158.45	53.25	2.3	141.7	7.3	>50mm	>50mm	58.1	>50mm
Aux	WiFi	5700	21.0	126	40	158.45	53.25	2.3	141.7	7.5	>50mm	>50mm	60.1	>50mm
Aux	WiFi	5825	21.0	126	40	158.45	53.25	2.3	141.7	7.6	>50mm	>50mm	60.8	>50mm
Aux	BT	2480	11.00	13	40	158.45	53.25	2.3	141.7	0.5	>50mm	>50mm	4.0	>50mm

Note: For Extremity SAR.

SAR exclusion calculations for WiFi-SISO and Bluetooth for antenna > 50mm from the user :

Antenna	Tx	Frequency (MHz)	Output Power		Separation distances (mm)					Calculated Threshold Value (SAR test exclusion power,mW)				
			dBm	mW	Back	Right	Left	Top	Bottom	Back	Right	Left	Top	Bottom
Aux	WiFi	2462	21.5	141	40	158.45	53.25	2.3	141.7	<50mm	1180.1	128.1	<50mm	1012.6
Aux	WiFi	5240	21.0	126	40	158.45	53.25	2.3	141.7	<50mm	1150.0	98.0	<50mm	982.5
Aux	WiFi	5320	21.0	126	40	158.45	53.25	2.3	141.7	<50mm	1149.5	97.5	<50mm	982.0
Aux	WiFi	5700	21.0	126	40	158.45	53.25	2.3	141.7	<50mm	1147.3	95.3	<50mm	979.8
Aux	WiFi	5825	21.0	126	40	158.45	53.25	2.3	141.7	<50mm	1146.7	94.7	<50mm	979.2
Aux	BT	2480	11.00	13	40	158.45	53.25	2.3	141.7	<50mm	1179.8	127.8	<50mm	1012.3



1.4 Test Environment

Ambient conditions in the laboratory:

Test Date: 2023/08/23 - 2023/08/24

Items	Required	Actual
Temperature (°C)	18-25	23 ± 2
Humidity (%RH)	30-70	50 ± 20

USA	FCC Registration Number: TW0033
Canada	CAB Identifier Number: TW3023 / Company Number: 26930

Site Description	Accredited by TAF
	Accredited Number: 3023

Test Laboratory	DEKRA Testing and Certification Co., Ltd.
	Linkou Laboratory
Address	No.5-22, Ruishukeng Linkou District, New Taipei City, 24451, Taiwan, R.O.C
Performed Location	No. 26, Huaya 1st Rd., Guishan Dist.,Taoyuan City 333411, Taiwan, R.O.C.
Phone Number	+886-3-275-7255
Fax Number	+886-3-327-8031

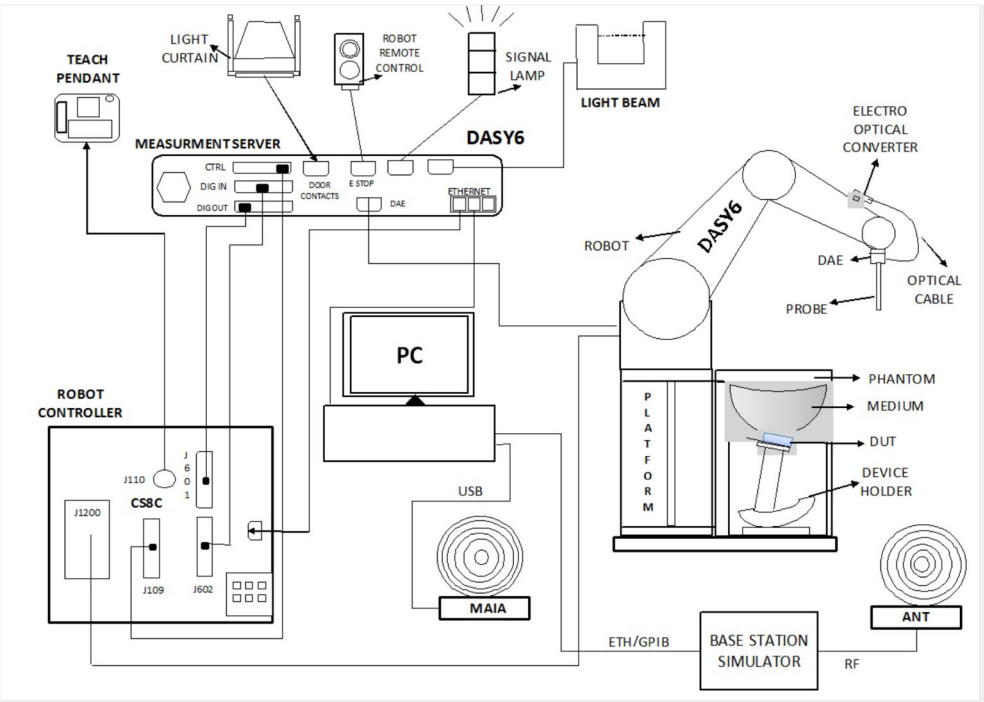
1.5 Measurement procedures

IEEE 1528-2013
47CFR § 2.1093
KDB 248227 D01 v02r02
KDB 447498 D01 v06
KDB 616217 D04 v01r02
KDB 865664 D01 v01r04

2. SAR Measurement System

2.1 DASY System Description

SAR Configurations is shown below:



The DASY system for performing compliance tests consists of the following items:

- A standard high precision 6-axis robot with controller, teach pendant and software. An arm extension for accommodating the data acquisition electronics (DAE).
- A data acquisition electronics (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.
- The Electro-optical converter (EOC) performs the conversion from optical to electrical signals for the digital communication to the DAE. To use optical surface detection, a special version of the EOC is required. The EOC signal is transmitted to the measurement server.
- The Light Beam used is for probe alignment. This improves the (absolute) accuracy of the probe positioning.
- A computer running Win7/8/10 and the DASY software.
- Remote control and teach pendant as well as additional circuitry for robot safety such as warning lamps, etc.
- The phantom, the device holder and other accessories according to the targeted measurement.

2.2 Area Scans

Area scans are defined prior to the measurement process being executed with a user defined variable spacing between each measurement point (integral) allowing low uncertainty measurements to be conducted. Scans defined for utilize a 10mm² step integral, with 1mm interpolation used to locate the peak SAR area used for zoom scan assessments.

When an Area Scan has measured all reachable points, it computes the field maxima found in the scanned area, within a range of the global maximum. The range (in dB) is specified in the standards for compliance testing.

2.2.1 Zoom Scan (Cube Scan Averaging)

Zoom Scans are used to assess the peak spatial SAR values within a cubic averaging volume containing 1 g and 10 g of simulated tissue. A density of 1000 kg/m³ is used to represent the head and body tissue density and not the phantom liquid density, in order to be consistent with the definition of the liquid dielectric properties, i.e. the side length of the 1 g cube is 10mm, with the side length of the 10 g cube 21,5mm.

The zoom scan integer steps can be user defined so as to reduce uncertainty, but normal practice for typical test applications utilize a physical step of 5x5x7 (8mmx8mmx5mm) providing a volume of 32mm in the X & Y axis, and 30mm in the Z axis.

2.2.2 SAR measurement drifts

Before an area scan and after the zoom scan, single point SAR measurements are performed at defined locations to estimate the SAR measurement drift due to device output power variations. If a device is known to drift randomly, additional single point drift reference measurements should be performed at regular intervals throughout the area and zoom scan test durations. The SAR drift shall be kept within ± 5%, whether there are substantial drifts or not. The field difference will be calculated in dB units in the DASY software.

2.2.3 Uncertainty of Inter-/Extrapolation and Averaging

In order to evaluate the uncertainty of the interpolation, extrapolation and averaged SAR calculation algorithms of the Postprocessor, DASY allows the generation of measurement grids which are artificially predefined by analytically based test functions. Therefore, the grids of area scans and zoom scans can be filled with uncertainty test data, according to the SAR benchmark functions.

2.3 DASY E-Field Probe

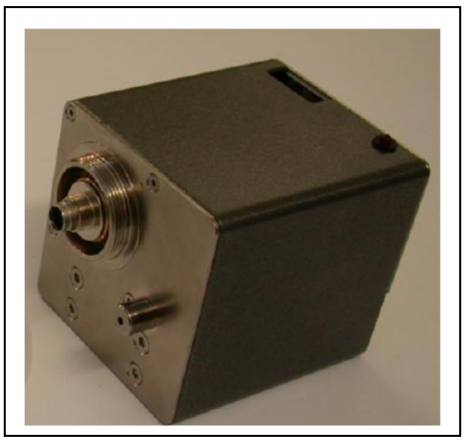
The SAR measurement is conducted with the dosimetric probe manufactured by SPEAG. The probe is specially designed and calibrated for use in liquid with high permittivity. The dosimetric probe has special calibration in liquid at different frequency.

SPEAG conducts the probe calibration in compliance with international and national standards under ISO 17025. The calibration data are in Appendix D**.**

Isotropic E-Field Probe Specification

Model	Ex3DV4	
Construction	Symmetrical design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)	
Frequency	4 MHz – 10 GHz Linearity: ± 0.2 dB (30 MHz to 10 GHz)	
Directivity	± 0.1 dB in TSL (rotation around probe axis) ± 0.3 dB in TSL (rotation normal to probe axis)	
Dynamic Range	10 µW/g to 100 mW/g Linearity: ± 0.2 dB (noise: typically < 1 µW/g)	
Dimensions	Overall length: 337 mm (Tip: 20 mm) Tip diameter: 2.5 mm (Body: 12 mm) Typical distance from probe tip to dipole centers: 1 mm	
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%.	

2.4 DATA Acquisition Electronics (DAE) and Measurement Server



The data acquisition electronics (DAE) consists of a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16-bit AD-converter and a command decoder and control logic unit.

Transmission to the measurement server is accomplished through an optical downlink for data and status information as well as an optical uplink for commands and the clock.

The input impedance of the DAE4 is 200M Ohm; the inputs are symmetrical and floating. Common mode rejection is above 80dB.

2.5 Robot

The DASY system uses the high precision robots TX90 XL type out of the newer series from Stäubli SA (France). For the 6-axis controller DASY system, the CS8C robot controller version from Stäubli is used.

The XL robot series have many features that are important for our application:

- High precision (repeatability 0.02 mm)
- High reliability (industrial design)
- Jerk-free straight movements
- Low ELF interference (the closed metallic construction shields against motor control fields)
- 6-axis controller

2.6 Device Holder

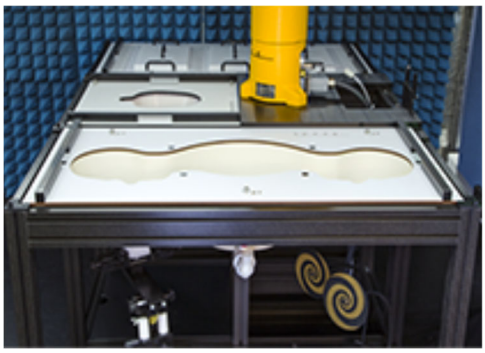
The DASY device holder is designed to cope with different positions given in the standard. It has two scales for the device rotation (with respect to the body axis) and the device inclination (with respect to the line between the ear reference points). The rotation center for both scales is the ear reference point (EPR).

Thus the device needs no repositioning when changing the angles.

The DASY device holder has been made out of low-loss POM material having the following dielectric parameters: relative permittivity εr = 3 and loss tangent δ = 0.02. The amount of dielectric material has been reduced in the closest vicinity of the device, since measurements have suggested that the influence of the clamp on the test results could thus be lowered.

2.7 Phantom

2.7.1 SAM Twin Phantom



The SAM twin phantom is a fiberglass shell phantom with 2mm shell thickness (except the ear region where shell thickness increases to 6mm). It has three measurement areas:

- Left head
- Right head
- Flat phantom

The device holder positions are adjusted to the standard measurement positions in the three sections. A cover is provided to tap the phantom during off-periods to prevent water evaporation and changes in the liquid parameters. On the phantom top, three reference markers are provided to identify the phantom position with respect to the robot.

3. Tissue Simulating Liquid

3.1 The composition of the tissue simulating liquid

Description: Aqueous solution with surfactants and inhibitors
Declarable, or hazardous components:

CAS: 107-21-1 EINECS: 203-473-3 Reg.nr.: 01-2119456816-28-0000	**Ethanediol** STOT RE 2, H373; Acute Tox. 4, H302	< 5.2%
CAS: 68608-26-4 EINECS: 271-781-5 Reg.nr.: 01-2119527859-22-0000	**Sodium petroleum sulfonate** Eye Irrit. 2, H319	< 2.9%
CAS: 107-41-5 EINECS: 203-489-0 Reg.nr.: 01-2119539582-35-0000	**Hexylene Glycol / 2-Methyl-pentane-2,4-diol** Skin Irrit. 2, H315; Eye Irrit. 2, H319	< 2.9%
CAS: 68920-66-1 NLP: 500-236-9 Reg.nr.: 01-2119489407-26-0000	**Alkoxylated alcohol, > C_{16}** Aquatic Chronic 2, H411; Skin Irrit. 2, H315; Eye Irrit. 2, H319	< 2.0%

3.2 Tissue Calibration Result

The dielectric parameters of the liquids were verified prior to the SAR evaluation using Dielectric Probe Kit and Vector Network Analyzer.

Date	Tissue Type	Frequency (MHz)	Relative Permittivity (εr)			Conductivity (σ)			Tissue Temp. (°C)
			Measured	Target	Delta (%)	Measured	Target	Delta (%)	
2023/8/23	Head	2450	40.41	39.20	3.09	1.79	1.80	-0.56	22.1
		2412	40.55	39.28	3.23	1.75	1.77	-1.13	
		2437	40.46	39.23	3.14	1.78	1.79	-0.56	
		2441	40.44	39.22	3.11	1.78	1.79	-0.56	
		2462	40.36	39.18	3.01	1.81	1.81	0.00	
2023/8/24	Head	5250	36.03	35.95	0.22	4.59	4.71	-2.55	21.9
		5260	36.01	35.94	0.19	4.61	4.72	-2.33	
		5280	35.94	35.92	0.06	4.63	4.74	-2.32	
		5300	35.89	35.90	-0.03	4.66	4.76	-2.10	
		5320	35.83	35.88	-0.14	4.68	4.78	-2.09	
		5600	35.06	35.50	-1.24	5.06	5.07	-0.20	
		5530	35.25	35.61	-1.01	4.97	5.00	-0.60	
		5610	35.03	35.49	-1.30	5.08	5.08	0.00	
		5690	34.82	35.41	-1.67	5.18	5.16	0.39	
		5800	34.51	35.30	-2.24	5.32	5.27	0.95	
		5755	34.64	35.35	-2.01	5.26	5.23	0.57	
		5795	34.53	35.31	-2.21	5.32	5.27	0.95	

3.3 Tissue Dielectric Parameters for Phantoms

The head tissue dielectric parameters recommended by the IEC/IEEE 62209-1528 have been incorporated in the following table. These head parameters are derived from planar layer models simulating the highest expected SAR for the dielectric properties and tissue thickness variations in a human head. Other head tissue parameters that have not been specified are interpolated according to the head parameters specified in IEC/IEEE 62209-1528.

Target Frequency	Head	
(MHz)	ε_r	σ (S/m)
450	43.5	0.87
750	41.9	0.89
835	41.5	0.90
900	41.5	0.97
1450	40.5	1.20
1640	40.2	1.31
1750	40.1	1.37
1800 – 2000	40.0	1.40
2450	39.2	1.80
3000	38.5	2.40
5000	36.2	4.45
5200	36.0	4.66
5400	35.8	4.86
5600	35.3	5.27
5800	35.3	5.27
6000	35.1	5.48
6500	34.5	6.07
7000	33.9	6.65
7500	33.3	7.24

4. Measurement Procedure

4.1 SAR System Check

4.1.1 Dipoles

The SAR dipoles are optimized symmetrical dipole with λ/4 balun matched to a Flat phantom section filled with tissue simulating liquids. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC signals. They are available for the variety of frequencies between 300MHz and 10 GHz. The provided tripod is used to hold the dipole below the phantom. As the distance between the dipole center and the TSL is critical, a spacer is placed between the dipole and the phantom. The spacing distance is frequency dependent.

4.1.2 SAR System Check Result

1. Comparing to the original SAR value provided by SPEAG, the verification data should be within its specification of 10 %.
2. Below table shows the target SAR and measured SAR after normalized to 1W input power. The table below indicates the system performance check can meet the variation criterion and the plots can be referred to Appendix A of this report.

Date	Frequency (MHz)	Input Power (mW)	Measured 1g SAR (W/kg)	Targeted 1g SAR (W/kg)	Normalized 1g SAR (W/kg)	Delta 1g (%)	Measured 10g SAR (W/kg)	Targeted 10g SAR (W/kg)	Normalized 10g SAR (W/kg)	Delta 10g (%)	Tissue Temp. (°C)
2023/8/23	2450	250	13.60	52.40	54.4	3.82	6.15	24.60	24.6	0.00	22.1
2023/8/24	5250	100	8.32	80.80	83.2	2.97	2.35	23.20	23.5	1.29	21.9
	5600	100	8.34	84.20	83.4	-0.95	2.41	23.80	24.1	1.26	
	5800	100	8.34	81.80	83.4	1.96	2.34	23.00	23.4	1.74	

4.2 SAR Measurement Procedure

The Dasy calculates SAR using the following equation,

$$\mathbf{SAR} = \frac{\sigma|E|^2}{\rho}$$

Where：

σ: represents the simulated tissue conductivity

ρ: represents the tissue density

E :RMS electric field strength (V/m)

The SAR / APD measurements for the EUT should be performed on the channel that produces the highest rated output power of each transmitting antenna.

Pre-scans are made on the device to establish the location for the transmitting antenna, using a large area scan in either air or tissue simulation fluid.

The EUT is placed against the Universal Phantom where the maximum area scan dimensions are larger than the physical size of the resonating antenna. When the scan size is not large enough to cover the peak SAR / APD distribution, it is modified by either extending the area scan size in both the X and Y directions, or the device is shifted within the predefined area.

The area scan is then run to establish the peak SAR / APD location (interpolated resolution set at $1mm^2$)which is then used to orient the center of the zoom scan. The zoom scan is then executed and the 1g and 10g averages are derived from the zoom scan volume (interpolated resolution set at $1mm^3$).

5. RF Exposure Limits

SAR assessments have been made in line with the requirements of IEEE-1528, RSS-102 Issue 5, and comply with ANSI/IEEE C95.1-1992 “Uncontrolled Environments” limits. These limits apply to a location which is deemed as “Uncontrolled Environment” which can be described as a situation where the general public may be exposed to an RF source with no prior knowledge or control over their exposure.

Limits for General Population/Uncontrolled Exposure (W/kg)

Type Exposure	Uncontrolled Environment Limit
Spatial Peak SAR (1g cube tissue for brain or body)	**1.60 W/kg**
Spatial Average SAR (whole body)	**0.08 W/kg**
Spatial Peak SAR (10g for hands, feet, ankles and wrist)	**4.00 W/kg**

6. Test Equipment List

Instrument	Manufacturer	Model No.	Serial No.	Last Calibration	Next Calibration
Reference Dipole 2450MHz	Speag	D2450V2	930	2022/11/21	2025/11/20
Reference Dipole 5GHz	Speag	D5GHzV2	1321	2021/02/05	2024/02/04
Device Holder	Speag	N/A	N/A	N/A	N/A
Data Acquisition Electronic	Speag	DAE4	1425	2022/11/23	2023/11/22
E-Field Probe	Speag	EX3DV4	3979	2022/11/23	2023/11/22
SAR Software	Speag	DASY52	V52.10.4.1535	N/A	N/A
Power Amplifier	Mini-Circuit	ZHL-42	D051404-20	N/A	N/A
Power Amplifier	Mini-Circuit	ZVE-8G+	447202211	N/A	N/A
Directional Coupler	Agilent	87300C	MY44300353	N/A	N/A[1]
Attenuator	Woken	WATT-218FS-10	N/A	N/A	N/A[1]
Attenuator	Mini-Circuit	BW-S20W2+	N/A	N/A	N/A[1]
Vector Network Analyzer	Agilent	E5071C	MY46108013	2023/03/09	2024/03/07
Signal Generator	R&S	SMB100A	110724	2022/12/19	2023/12/18
Power Meter	Anritsu	ML2487A	6K00001447	2022/10/31	2023/10/30
Power Sensor	Anritsu	MA2411B	1339194	2022/10/31	2023/10/30

Note: 1. System Check, the path loss measured by the network analyzer, includes the signal generator, amplifier, cable, attenuator and directional coupler.

Note:

Per KDB 865664 D01 requirements for dipole calibration, the following are recommended FCC procedures for SAR dipole calibration.

1. After a dipole is damaged and properly repaired to meet required specifications.

2. When the measured SAR deviates from the calibrated SAR value by more than 10% due to changes in physical, mechanical, electrical or other relevant dipole conditions.

3. When the most recent return-loss, measured at least annually, deviates by more than 20% from the previous measurement (i.e. 0.2 of the dB value) or not meeting the required -20 dB return-loss specification.

	Frequency	Tissue	Return loss	Limit	Date
Calibration	5250 MHz	Head	-39.2	Within 20%	2021/2/5
Measurement	5250 MHz	Head	-39.38		2022/2/7
Measurement	5250 MHz	Head	-39.31		2023/2/2

	Frequency	Tissue	Return loss	Limit	Date
Calibration	5600 MHz	Head	-27.4	Within 20%	2021/2/5
Measurement	5600 MHz	Head	-26.91		2022/2/7
Measurement	5600 MHz	Head	-26.6		2023/2/2

	Frequency	Tissue	Return loss	Limit	Date
Calibration	5800 MHz	Head	-23.6	Within 20%	2021/2/5
Measurement	5800 MHz	Head	-26.92		2022/2/7
Measurement	5800 MHz	Head	-23.6		2023/2/2

4. When the most recent measurement of the real or imaginary parts of the impedance, measured at least annually, deviates by more than 5 Ω from the previous measurement.

	Frequency	Tissue	Impedance	Limit	Date
Calibration	5250 MHz	Head	50.8	Within 5Ω	2021/2/5
Measurement	5250 MHz	Head	50.86		2022/2/7
Measurement	5250 MHz	Head	49.95		2023/2/2

	Frequency	Tissue	Impedance	Limit	Date
Calibration	5600 MHz	Head	52.9	Within 5Ω	2021/2/5
Measurement	5600 MHz	Head	50.99		2022/2/7
Measurement	5600 MHz	Head	50.11		2023/2/2

	Frequency	Tissue	Impedance	Limit	Date
Calibration	5800 MHz	Head	53.0	Within 5Ω	2021/2/5
Measurement	5800 MHz	Head	51.12		2022/2/7
Measurement	5800 MHz	Head	51.06		2023/2/2

7. Measurement Uncertainty

Measurement uncertainty for 300 MHz to 3 GHz							
Error Description	Uncert. value	Prob. Dist.	Div.	(ci) 1g	(ci) 10g	Std. Unc. (1g)	Std. Unc. (10g)
Measurement System Errors							
Probe Calibration	±12.0%	N	2	1	1	±6.0%	±6.0%
Probe Calibration Drift	±1.7%	R	1.732	1	1	±1.0%	±1.0%
Probe Linearity	±4.7%	R	1.732	1	1	±2.7%	±2.7%
Broadband Signal	±2.8%	R	1.732	1	1	±1.6%	±1.6%
Probe Isotropy	±7.6%	R	1.732	1	1	±4.4%	±4.4%
Other Probe+Electronic	±0.8%	N	1	1	1	±0.8%	±0.8%
RF Ambient	±1.8%	N	1	1	1	±1.8%	±1.8%
Probe Positioning	±0.006 mm	N	1	0.14	0.14	±0.1%	±0.1%
Data Processing	±1.2%	N	1	1	1	±1.2%	±1.2%
Phantom and Device Errors							
Conductivity (meas.)	±2.5%	N	1	0.78	0.71	±2.0%	±1.8%
Conductivity (temp.)	±3.3%	R	1.732	0.78	0.71	±1.5%	±1.4%
Phantom Permittivity	±14.0%	R	1.732	0	0	±0.0%	±0.0%
Distance DUT - TSL	±2.0%	N	1	2	2	±4.0%	±4.0%
Device Positioning	±1.0%	N	1	1	1	±1.0%	±1.0%
Device Holder	±3.6%	N	1	1	1	±3.6%	±3.6%
DUT Modulation	±2.4%	R	1.732	1	1	±1.4%	±1.4%
Time-average SAR	±1.7%	R	1.732	1	1	±1.0%	±1.0%
DUT drift	±2.5%	N	1	1	1	±2.5%	±2.5%
Val Antenna Unc.	±0.0%	N	1	1	1	±0.0%	±0.0%
Unc. Input Power	±0.0%	N	1	1	1	±0.0%	±0.0%
Correction to the SAR results							
Deviation to Target	±1.9%	N	1	1	0.84	±1.9%	±1.6%
SAR scaling	±0.0%	R	1.732	1	1	±0.0%	±0.0%
Combined Uncertainty						±11.0%	±10.9%
Expanded Uncertainty						±21.9%	±21.7%

Measurement uncertainty for 3 GHz to 6 GHz							
Error Description	Uncert. value	Prob. Dist.	Div.	(ci) 1g	(ci) 10g	Std. Unc. (1g)	Std. Unc. (10g)
Measurement System Errors							
Probe Calibration	±14.0%	N	2	1	1	±7.0%	±7.0%
Probe Calibration Drift	±1.7%	R	1.732	1	1	±1.0%	±1.0%
Probe Linearity	±4.7%	R	1.732	1	1	±2.7%	±2.7%
Broadband Signal	±2.6%	R	1.732	1	1	±1.5%	±1.5%
Probe Isotropy	±7.6%	R	1.732	1	1	±4.4%	±4.4%
Other Probe+Electronic	±1.2%	N	1	1	1	±1.2%	±1.2%
RF Ambient	±1.8%	N	1	1	1	±1.8%	±1.8%
Probe Positioning	±0.005 mm	N	1	0.29	0.29	±0.2%	±0.2%
Data Processing	±2.3%	N	1	1	1	±2.3%	±2.3%
Phantom and Device Errors							
Conductivity (meas.)	±2.5%	N	1	0.78	0.71	±2.0%	±1.8%
Conductivity (temp.)	±3.4%	R	1.732	0.78	0.71	±1.5%	±1.4%
Phantom Permittivity	±14.0%	R	1.732	0.25	0.25	±2.0%	±2.0%
Distance DUT - TSL	±2.0%	N	1	2	2	±4.0%	±4.0%
Device Positioning	±1.0%	N	1	1	1	±1.0%	±1.0%
Device Holder	±3.6%	N	1	1	1	±3.6%	±3.6%
DUT Modulation	±2.4%	R	1.732	1	1	±1.4%	±1.4%
Time-average SAR	±1.7%	R	1.732	1	1	±1.0%	±1.0%
DUT drift	±2.5%	N	1	1	1	±2.5%	±2.5%
Val Antenna Unc.	±0.0%	N	1	1	1	±0.0%	±0.0%
Unc. Input Power	±0.0%	N	1	1	1	±0.0%	±0.0%
Correction to the SAR results							
Deviation to Target	±1.9%	N	1	1	0.84	±1.9%	±1.6%
SAR scaling	±0.0%	R	1.732	1	1	±0.0%	±0.0%
Combined Uncertainty						±11.9%	±11.8%
Expanded Uncertainty						±23.8%	±23.6%

8. Conducted Power Measurement (Including tolerance allowed for production unit)

WLAN 2.4G 2TX SISO									
DSSS/OFDM mode specified maximum output power at an antenna port	Frequency	Mode	BW	SISO-Main(TX1)			SISO-Aux(TX2)		
				CH	AV Power	AV Target	CH	AV Power	AV Target
	WLAN 2.4GHz	b	20	1	19.41	19.5	1	19.75	20
				6	21.31	21.5	6	21.23	21.5
				11	19.39	19.5	11	18.84	19
		g	20	1	16.92	17	1	16.84	17
				6	19.37	21	6	19.33	20.5
				11	14.89	15	11	15.34	15.5
		n (HT)	20	1	17.37	17.5	1	16.71	17
				6	19.36	20.5	6	20.19	20.5
				11	16.93	17	11	16.68	17
			40	3	17.43	17.5	3	16.43	16.5
				6	16.84	17	6	16.68	17
				9	15.44	15.5	9	15.71	16
		ax (HE)	20	1	16.92	17	1	16.74	17
				6	19.41	19.5	6	19.11	19.5
				11	16.45	16.5	11	16.37	16.5
			40	3	17.36	17.5	3	16.76	17
				6	16.94	17	6	16.26	16.5
				9	14.94	15	9	15.31	15.5

WLAN 5G 2TX SISO

OFDM mode specified maximum output power at an antenna port

Frequency	Mode	BW	SISO-Main(TX1)			SISO-Aux(TX2)		
			CH	AV Power	AV Target	CH	AV Power	AV Target
U-NII-1 (5150~5250MHz)	a	20	36	18.76	19	36	18.81	19
			40	20.65	21	40	20.67	21
			44	20.64	21	44	20.74	21
			48	20.71	21	48	20.71	21
	n (HT)	20	36	18.67	19	36	18.52	19
			40	20.69	21	40	20.62	21
			44	20.63	21	44	20.56	21
			48	20.68	21	48	20.68	21
		40	38	18.39	18.5	38	18.41	18.5
			46	20.44	20.5	46	20.47	20.5
	ac(VHT)	80	42	18.79	19	42	18.72	19
	ax (HE)	20	36	18.65	19	36	18.66	19
			40	20.64	21	40	20.59	21
			44	20.66	21	44	20.61	21
			48	20.57	21	48	20.58	21
		40	38	18.36	18.5	38	18.38	18.5
			46	20.47	20.5	46	20.41	20.5
		80	42	18.81	19	42	18.81	19
U-NII-2A (5250~5350MHz)	a	20	52	20.94	21	52	20.82	21
			56	20.95	21	56	20.88	21
			60	20.88	21	60	20.81	21
			64	18.42	19.5	64	18.41	18.5
	n (HT)	20	52	20.57	21	52	20.62	21
			56	20.67	21	56	20.66	21
			60	20.62	21	60	20.61	21
			64	17.83	18	64	17.66	18
		40	54	20.47	20.5	54	20.42	20.5
			62	16.94	17	62	17.39	17.5
	ac (VHT)	80	58	18.23	18.5	58	18.26	18.5
		160	50	14.45	14.5	50	14.43	14.5
	ax (HE)	20	52	20.59	21	52	20.53	21
			56	20.67	21	56	20.62	21
			60	20.68	21	60	20.57	21
			64	17.42	17.5	64	17.56	18
		40	54	20.41	20.5	54	20.41	20.5
			62	16.93	17	62	17.45	17.5
		80	58	17.87	18	58	18.32	18.5
		160	50	14.87	15	50	14.37	14.5

Frequency	Mode	BW	SISO-Main(TX1)			SISO-Aux(TX2)		
			CH	AV Power	AV Target	CH	AV Power	AV Target
U-NII-2C (5470~5725MHz)	a	20	100	18.61	19	100	18.66	19
			112	20.74	21	112	20.62	21
			116	20.77	21	116	20.61	21
			128	20.72	21	128	20.68	21
			132	20.68	21	132	20.64	21
	n (HT)	20	100	18.55	19	100	18.51	19
			112	20.53	21	112	20.61	21
			116	20.64	21	116	20.59	21
			128	20.69	21	128	20.51	21
			132	20.71	21	132	20.52	21
		40	102	18.46	18.5	102	18.37	18.5
			110	20.84	21	110	20.72	21
			118	20.77	21	118	20.75	21
			126	20.82	21	126	20.73	21
			134	19.43	19.5	134	18.86	19
	ac (VHT)	20	144	20.79	21	144	20.74	21
		40	142	20.81	21	142	20.72	21
		80	138	20.94	21	138	20.81	21
			106	18.81	19	106	18.38	18.5
			122	19.77	20	122	19.31	19.5
		160	114	15.41	15.5	114	14.95	15
	ax (HE)	20	100	18.66	19	100	18.72	19
			112	20.53	21	112	20.54	21
			116	20.59	21	116	20.57	21
			128	20.69	21	128	20.63	21
			132	20.67	21	132	20.52	21
			144	20.39	20.5	144	20.72	21
		40	102	18.42	18.5	102	18.35	18.5
			110	20.81	21	110	20.37	21
			118	20.78	21	118	20.34	21
			126	20.82	21	126	20.35	21
			134	18.84	19	134	18.32	18.5
			142	20.81	21	142	20.71	21
		80	106	18.71	19	106	18.35	18.5
			122	19.47	19.5	122	18.84	19
		160	114	15.43	15.5	114	14.81	15
U-NII-3 (5725~5850MHz)	a	20	149	20.62	21	149	20.65	21
			157	20.64	21	157	20.62	21
			165	20.71	21	165	20.67	21
	n (HT)	20	149	20.65	21	149	20.66	21
			157	20.52	21	157	20.71	21
			165	20.67	21	165	20.68	21
		40	151	20.93	21	151	20.83	21
			159	20.81	21	159	20.72	21
	ac(VHT)	80	155	18.85	19	155	18.77	19
	ax (HE)	20	149	20.53	21	149	20.58	21
			157	20.51	21	157	20.66	21
			165	20.67	21	165	20.67	21
		40	151	20.59	21	151	20.47	20.5
			159	20.52	21	159	20.87	21
		80	138	20.82	21	138	20.75	21
			155	18.57	19	155	18.11	18.5

BT						
Bluetooth mode maximum output power	Frequency	Mode	Modulation	SISO-Aux(TX2) Chain A		
				CH	AV Power	AV Target
	BT 2.4GHz	BR	GFSK	0	9.15	11.0
				39	9.44	11.0
				78	9.35	11.0
		EDR	8DPSK	0	7.71	10.5
				39	8.54	10.5
				78	8.14	10.5
		BLE	GFSK	0	5.73	6.0
				19	5.83	6.0
				39	5.86	6.0

9. Test Results

9.1 Test Results Summary

Body SAR

SAR MEASUREMENT								
Ambient Temperature (°C): 22.8±2				Relative Humidity (%):52 %				
Liquid Temperature (°C): 22.1 ±2				Depth of Liquid (cm): >15				
Test Position	Dist. (mm)	Frequency		Conducted Power (dBm)		SAR (W/kg)		Plot No.
		Ch.	MHz	Meas.	Tune-Up Limit	Meas-1g	Scaled-1g	
Test Mode: WLAN 2.4GHz_802.11b-1M_Ant Main								
Back	0	6	2437	21.31	21.5	0.00262	0.003	
Right-side	0	6	2437	21.31	21.5	0.068	0.072	
Test Mode: WLAN2.4GHz_802.11b-1M_Ant Main_No VCI								
Right-side	0	6	2437	21.31	21.5	0.060	0.064	
Test Mode: WLAN 2.4GHz_802.11b-1M_Ant Aux								
Back	0	6	2437	21.23	21.5	0.00798	0.009	
Left-side	0	1	2437	19.75	20	0.114	0.123	
Left-side	0	6	2437	21.23	21.5	0.151	**0.164**	10
Left-side	0	11	2437	18.84	19	0.075	0.079	
Test Mode: WLAN 2.4GHz_802.11b-1M_Ant Aux_No VCI								
Left-side	0	6	2437	21.23	21.5	0.118	0.128	
Test Mode: Bluetooth_BT-1M_Ant Aux								
Back	0	39	2441	9.44	11	0.00126	0.002	
Left-side	0	39	2441	9.44	11	0.00183	0.003	11

Note:

1. When the highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg, SAR is not required.

2. When the reported SAR of the highest measured maximum output power channel for the exposure configuration is ≤ 0.8 W/kg, no further SAR testing is required for 802.11b DSSS in that exposure configuration.

Extremity SAR

SAR MEASUREMENT								
Ambient Temperature (°C): 22.8±2				Relative Humidity (%):52 %				
Liquid Temperature (°C): 22.1 ±2				Depth of Liquid (cm): >15				
Test Position	Dist. (mm)	Frequency		Conducted Power (dBm)		SAR (W/kg)		Plot No.
		Ch.	MHz	Meas.	Tune-Up Limit	Meas-10g	Scaled-10g	
Test Mode: WLAN 2.4GHz_802.11b-1M_Ant Main								
Top	0	6	2437	21.31	21.5	0.383	0.408	
Test Mode: WLAN 2.4GHz_802.11b-1M_Ant Main_No VCI								
Top	0	6	2437	21.31	21.5	0.320	0.341	
Test Mode: WLAN 2.4GHz_802.11b-1M_Ant Aux								
Top	0	1	2437	19.75	20	0.437	0.472	
Top	0	6	2437	21.23	21.5	0.692	**0.751**	4
Top	0	11	2437	18.84	19	0.359	0.380	
Test Mode: WLAN 2.4GHz_802.11b-1M_Ant Aux_No VCI								
Top	0	6	2437	21.23	21.5	0.463	0.503	
Test Mode: Bluetooth_BT-1M_Ant Aux								
Top	0	39	2441	9.44	11	0.024	0.044	1

Note:

1. When the highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and the adjusted SAR is ≤ 3.0 W/kg, SAR is not required.

2.When the reported SAR of the highest measured maximum output power channel for the exposure configuration is ≤ 2.0 W/kg, no further SAR testing is required for 802.11b DSSS in that exposure configuration.

Body SAR

SAR MEASUREMENT								
Ambient Temperature (°C): 22.8 ±2				Relative Humidity (%):52 %				
Liquid Temperature (°C): 21.9 ±2				Depth of Liquid (cm): >15				
Test Position	Dist. (mm)	Frequency		Conducted Power (dBm)		SAR (W/kg)		Plot No.
		Ch.	MHz	Meas.	Tune-Up Limit	Meas-1g	Scaled-1g	
Test Mode: WLAN 5GHz_802.11a-6M_Ant Main								
Back	0	56	5280	20.95	21	0.069	0.070	
Right-side	0	56	5280	20.95	21	0.013	0.013	
Test Mode: WLAN 5GHz_802.11a-6M_Ant Main_No VCI								
Back	0	56	5280	20.95	21	0.042	0.043	
Test Mode: WLAN 5GHz_802.11ac80-VHT0_Ant Main								
Back	0	138	5690	20.94	21	0.095	0.097	
Right-side	0	138	5690	20.94	21	0.00878	0.009	
Test Mode: WLAN 5GHz_802.11ac80-VHT0_Ant Main_No VCI								
Back	0	138	5690	20.94	21	0.040	0.041	
Test Mode: WLAN 5GHz_802.11n40-HT0_Ant Main								
Back	0	151	5755	20.93	21	0.097	0.100	
Right-side	0	151	5755	20.93	21	0.011	0.011	
Test Mode: WLAN 5GHz_802.11n40-HT0_Ant Main_No VCI								
Back	0	151	5755	20.93	21	0.037	0.038	

Test Position	Dist. (mm)	Frequency		Conducted Power (dBm)		SAR (W/kg)		Plot No.
		Ch.	MHz	Meas.	Tune-Up Limit	Meas-1g	Scaled-1g	
Test Mode: WLAN 5GHz_802.11a-6M_Ant Aux								
Back	0	56	5280	20.88	21	0.030	0.031	
Left-side	0	52	5260	20.82	21	0.245	0.258	
Left-side	0	56	5280	20.88	21	0.175	0.182	
Left-side	0	60	5300	20.81	21	0.252	**0.266**	54
Left-side	0	64	5320	18.41	18.5	0.151	0.156	
Test Mode: WLAN 5GHz_802.11a-6M_Ant Aux_No VCI								
Left-side	0	60	5300	20.81	21	0.221	0.233	
Test Mode: WLAN 5GHz_802.11ac80-VHT0_Ant Aux								
Back	0	138	5690	20.81	21	0.022	0.023	
Left-side	0	106	5530	18.38	18.5	0.072	0.074	
Left-side	0	122	5610	19.31	19.5	0.079	0.083	
Left-side	0	138	5690	20.81	21	0.117	0.123	45
Test Mode: WLAN 5GHz_802.11ac80-VHT0_Ant Aux_No VCI								
Left-side	0	138	5690	20.81	21	0.111	0.117	
Test Mode: WLAN 5GHz_802.11n40-HT0_Ant Aux								
Back	0	151	5755	20.83	21	0.021	0.022	
Left-side	0	151	5755	20.83	21	0.102	0.107	46
Left-side	0	159	5795	20.72	21	0.100	0.108	
Test Mode: WLAN 5GHz_802.11n40-HT0_Ant Aux_No VCI								
Left-side	0	151	5755	20.83	21	0.100	0.105	

Note:

1. When multiple transmission modes have the same specified maximum output power, largest channel bandwidth, lowest order modulation and lowest data rate, the lowest order 802.11 mode is selected

2. When the reported SAR of the highest measured maximum output power channel for the exposure configuration is ≤ 0.8 W/kg, no further SAR testing is required in that exposure configuration.

3. When the reported SAR of the highest measured maximum U-NII-2A for the exposure configuration is ≤ 1.2 W/kg, SAR is not required for U-NII-1 band.

Extremity SAR

SAR MEASUREMENT								
Ambient Temperature (°C): 22.8 ±2				Relative Humidity (%):52 %				
Liquid Temperature (°C): 21.9 ±2				Depth of Liquid (cm): >15				
Test Position	Dist. (mm)	Frequency		Conducted Power (dBm)		SAR (W/kg)		Plot No.
		Ch.	MHz	Meas.	Tune-Up Limit	Meas-10g	Scaled-10g	
Test Mode: WLAN 5GHz_802.11a-6M_Ant Main								
Top	0	52	5260	20.94	21	2.17	2.222	
Top	0	56	5280	20.95	21	2.44	**2.493**	3
Top	0	60	5300	20.88	21	2.08	2.160	
Top	0	64	5320	18.42	18.5	1.18	1.214	
Test Mode: WLAN 5GHz_802.11a-6M_Ant Main_No VCI								
Top	0	56	5280	20.95	21	2.18	2.227	
Test Mode: WLAN 5GHz_802.11ac80-VHT0_Ant Main								
Top	0	106	5530	18.81	19	1.09	1.150	
Top	0	122	5610	19.77	20	1.22	1.299	
Top	0	138	5690	20.94	21	1.70	1.741	21
Test Mode: WLAN 5GHz_802.11ac80-VHT0_Ant Main_No VCI								
Top	0	138	5690	20.94	21	1.62	1.659	
Test Mode: WLAN 5GHz_802.11n40-HT0_Ant Main								
Top	0	151	5755	20.93	21	1.81	1.858	34
Top	0	159	5795	20.81	21	1.52	1.604	
Test Mode: WLAN 5GHz_802.11n40-HT0_Ant Main_No VCI								
Top	0	151	5755	20.93	21	1.63	1.673	

Test Position	Dist. (mm)	Frequency		Conducted Power (dBm)		SAR (W/kg)		Plot No.
		Ch.	MHz	Meas.	Tune-Up Limit	Meas-10g	Scaled-10g	
Test Mode: WLAN 5GHz_802.11a-6M_Ant Aux								
Top	0	56	5280	20.88	21	1.88	1.952	
Test Mode: WLAN 5GHz_802.11a-6M_Ant Aux_No VCI								
Top	0	56	5280	20.88	21	1.84	1.910	
Test Mode: WLAN 5GHz_802.11ac80-VHT0_Ant Aux								
Top	0	138	5690	20.81	21	1.55	1.636	
Test Mode: WLAN 5GHz_802.11ac80-VHT0_Ant Aux_No VCI								
Top	0	138	5690	20.81	21	1.52	1.604	
Test Mode: WLAN 5GHz_802.11n40-HT0_Ant Aux								
Top	0	151	5755	20.83	21	1.26	1.323	
Test Mode: WLAN 5GHz_802.11n40-HT0_Ant Aux_No VCI								
Top	0	151	5755	20.83	21	1.21	1.271	

Note:

1. When multiple transmission modes have the same specified maximum output power, largest channel bandwidth, lowest order modulation and lowest data rate, the lowest order 802.11 mode is selected

2. When the reported SAR of the highest measured maximum output power channel for the exposure configuration is ≤ 2.0 W/kg, no further SAR testing is required in that exposure configuration.

3. When the reported SAR of the highest measured maximum U-NII-2A for the exposure configuration is ≤ 3.0 W/kg, SAR is not required for U-NII-1 band.

9.2 Simultaneous Transmission

Simultaneous Transmission Configurations	
1	WLAN 2.4 GHz ANT Main + WLAN 2.4 GHz ANT Aux
2	WLAN 2.4 GHz ANT Main + Bluetooth Aux
3	WLAN 5 GHz ANT Main + WLAN 5 GHz ANT Aux
4	WLAN 5 GHz ANT Main + Bluetooth Aux
5	WLAN 5 GHz ANT Main + WLAN 5 GHz ANT Aux + Bluetooth Aux

9.2.1 Simultaneous transmission test exclusion considerations

Body Exposure Conditions

Simultaneous Transmission Summation Scenario

Test Position	1	2	3	4	5	1 + 2	1 + 5	3 + 4	3 + 5	3 + 4 + 5
	WLAN2.4GHz ANT Main (W/kg)	WLAN2.4GHz ANT Aux (W/kg)	WLAN5GHz ANT Main (W/kg)	WLAN5GHz ANT Aux (W/kg)	Bluetooth ANT Aux (W/kg)	Σ 1-g SAR	Σ 1-g SAR	Σ 1-g SAR	Σ 1-g SAR	Σ 1-g SAR
Back at 0 mm	0.003	0.009	0.100	0.031	0.002	0.012	0.005	0.131	0.102	0.133
Left-side at 0 mm	--	0.164	--	0.266	0.003	0.164	0.003	0.266	0.003	0.269
Right-side at 0 mm	0.072	--	0.013	--	--	0.072	0.072	0.013	0.013	0.013

When the sum of SAR is larger than the limit, The ratio is determined by ***(SAR1 + SAR2)^1.5/Ri,*** rounded to two decimal digits, and must be ≤ 0.04 for all antenna pairs in the configuration to qualify for 1-g SAR test exclusion.

Extremity Exposure Conditions

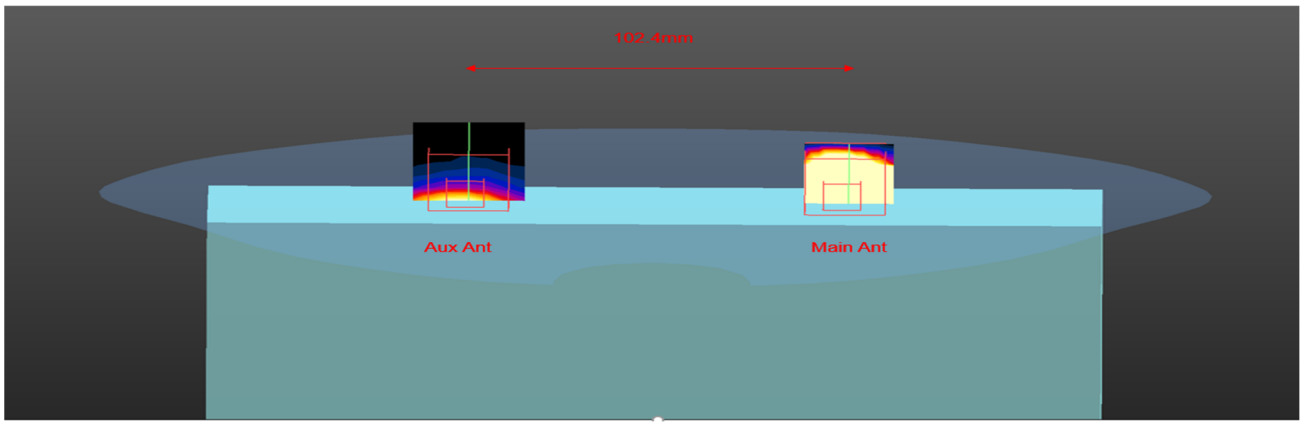
Simultaneous Transmission Summation Scenario

Test Position	1	2	3	4	5	1 + 2	1 + 5	3 + 4	3 + 5	3 + 4 + 5
	WLAN2.4GHz ANT Main (W/kg)	WLAN2.4GHz ANT Aux (W/kg)	WLAN5GHz ANT Main (W/kg)	WLAN5GHz ANT Aux (W/kg)	Bluetooth ANT Aux (W/kg)	Σ 10-g SAR	Σ 10-g SAR	Σ 10-g SAR	Σ 10-g SAR	Σ 10-g SAR
Back at 0 mm	0.001	0.004	0.044	0.013	0.000	0.005	0.001	0.057	0.044	0.057
Left-side at 0 mm	--	0.090	--	0.108	0.001	0.090	0.001	0.108	0.001	0.109
Right-side at 0 mm	0.040	--	0.005	--	--	0.040	0.040	0.005	0.005	0.005
Top at 0 mm	0.408	0.751	2.493	1.952	0.044	1.159	0.452	4.445	2.537	4.489

When the sum of SAR is larger than the limit, The ratio is determined by ***(SAR1 + SAR2)^1.5/Ri,*** rounded to two decimal digits, and must be ≤ 0.1 for all antenna pairs in the configuration to qualify for 10-g SAR test exclusion. The estimation result as below:

WLAN 5 GHz ANT Main + WLAN 5 GHz ANT Aux + Bluetooth Aux

Test Position	WLAN5GHz ANT Main SAR (W/kg)	WLAN5GHz ANT Aux SAR (W/kg)	Bluetooth ANT Aux SAR (W/kg)	Simultaneous Transmission (W/kg)	Antenna pair in mm	Peak location separation ratio
Top	2.493	1.952	0.044	4.489	102.4	0.09



The ratio of value is less than 0.1, thus simultaneous SAR testing is not needed.

Appendix

Appendix A. System Check Data

Appendix B. Highest measurement Data

Appendix C. Test Setup Photographs

Appendix D. Probe Calibration Data

Appendix E. Dipole Calibration Data

Appendix F. Product Photos-Please refer to the file: 2360732R-Product Photos

Appendix A. System Check Data

Test Laboratory: DEKRA Date: 2023/08/23

System Performance Check_2450MHz-Head

DUT: Dipole 2450 MHz; Type: D2450V2

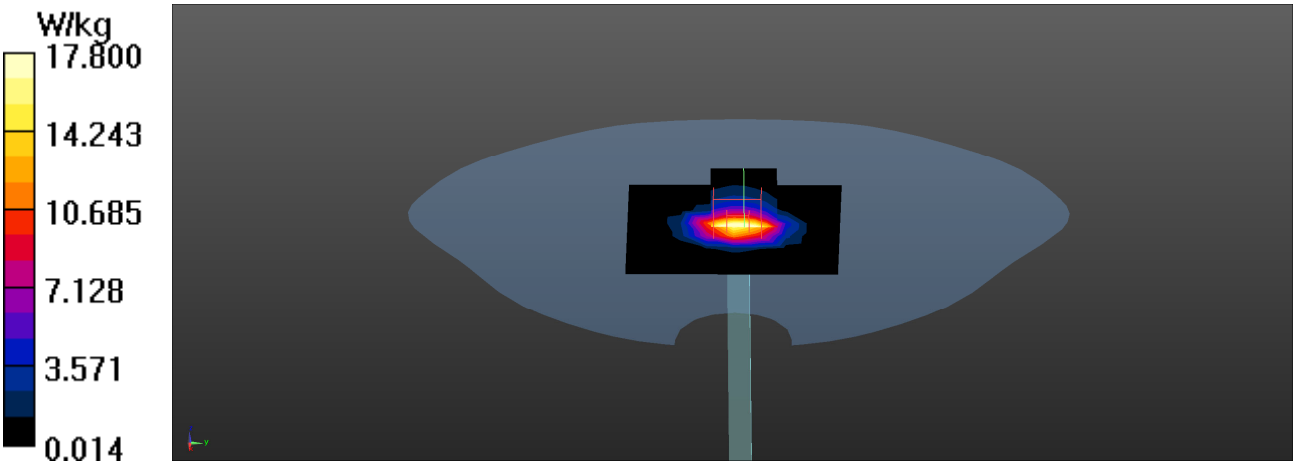
Communication System: UID 0, CW; Frequency: 2450 MHz
Communication System PAR: 0dB
Medium parameters used: f = 2450 MHz; σ = 1.79 S/m; ε_r = 40.41; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY5 Configuration:

- Probe: EX3DV4 - SN3979; ConvF(7.58, 7.58, 7.58) @ 2450 MHz; Calibrated: 2022/11/23
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1425; Calibrated: 2022/11/23
- Phantom: SAM with left table; Type: SAM;
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7501)

Configuration/2450MHz-Head/Area Scan (8x9x1): Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (measured) = 17.8 W/kg

Configuration/2450MHz-Head/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 112.3 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 25.9 W/kg
SAR(1 g) = 13.6 W/kg; SAR(10 g) = 6.15 W/kg
Smallest distance from peaks to all points 3 dB below = 9 mm
Ratio of SAR at M2 to SAR at M1 = 48.9%
Maximum value of SAR (measured) = 20.7 W/kg



Test Laboratory: DEKRA Date: 2023/08/24

System Performance Check_5250MHz-Head

DUT: Dipole 5GHz; Type: D5GHzV2

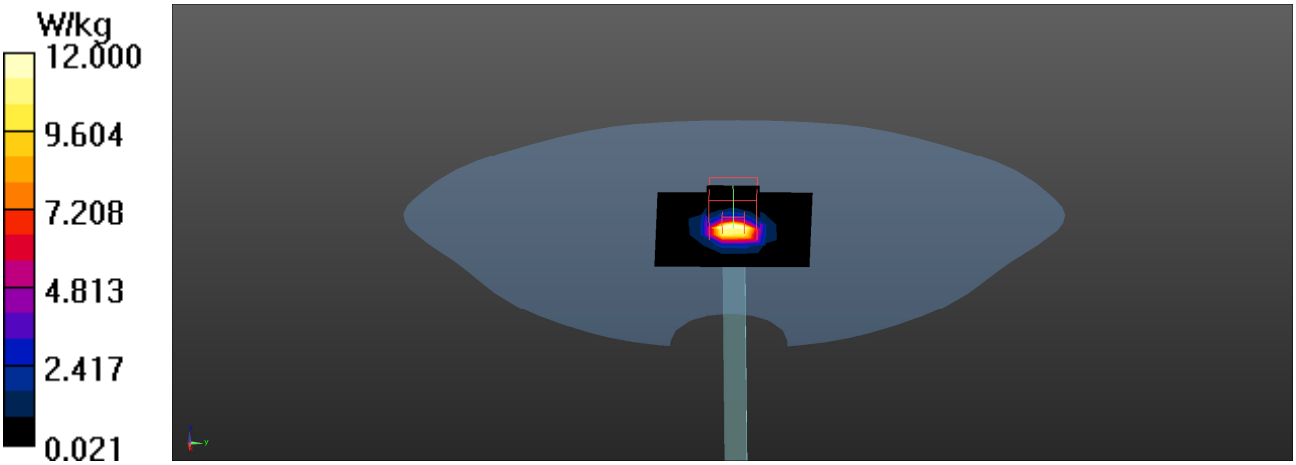
Communication System: UID 0, CW; Frequency: 5250 MHz
Communication System PAR: 0dB
Medium parameters used: f = 5250 MHz; σ = 4.59 S/m; ε_r = 36.03; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY5 Configuration:

- Probe: EX3DV4 - SN3979; ConvF(4.8, 4.8, 4.8) @ 5250 MHz; Calibrated: 2022/11/23
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1425; Calibrated: 2022/11/23
- Phantom: SAM with left table; Type: SAM;
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7501)

Configuration/5250MHz-Head/Area Scan (8x8x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 12.0 W/kg

Configuration/5250MHz-Head/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 75.35 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 29.1 W/kg
SAR(1 g) = 8.32 W/kg; SAR(10 g) = 2.35 W/kg
Smallest distance from peaks to all points 3 dB below = 7.2 mm
Ratio of SAR at M2 to SAR at M1 = 64.6%
Maximum value of SAR (measured) = 21.3 W/kg



Test Laboratory: DEKRA Date: 2023/08/24

System Performance Check_5600MHz-Head

DUT: Dipole 5GHz; Type: D5GHzV2

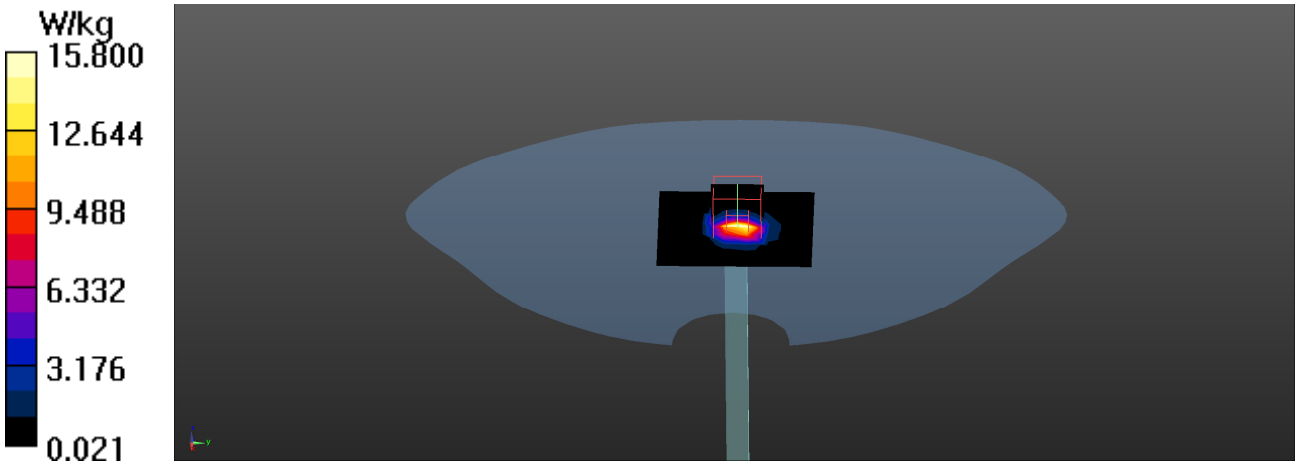
Communication System: UID 0, CW; Frequency: 5600 MHz
Communication System PAR: 0dB
Medium parameters used: f = 5600 MHz; σ = 5.06 S/m; ε_r = 35.06; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY5 Configuration:

- Probe: EX3DV4 - SN3979; ConvF(4.42, 4.42, 4.42) @ 5600 MHz; Calibrated: 2022/11/23
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1425; Calibrated: 2022/11/23
- Phantom: SAM with Left; Type: SAM;
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7501)

Configuration/5600MHz-Head/Area Scan (8x8x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 15.8 W/kg

Configuration/5600MHz-Head/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 69.90 V/m; Power Drift = 0.07 dB
Peak SAR (extrapolated) = 32.6 W/kg
SAR(1 g) = 8.34 W/kg; SAR(10 g) = 2.41 W/kg
Smallest distance from peaks to all points 3 dB below = 7.2 mm
Ratio of SAR at M2 to SAR at M1 = 61.9%
Maximum value of SAR (measured) = 21.6 W/kg



Test Laboratory: DEKRA Date: 2023/08/24

System Performance Check_5800MHz-Head

DUT: Dipole 5GHz; Type: D5GHzV2

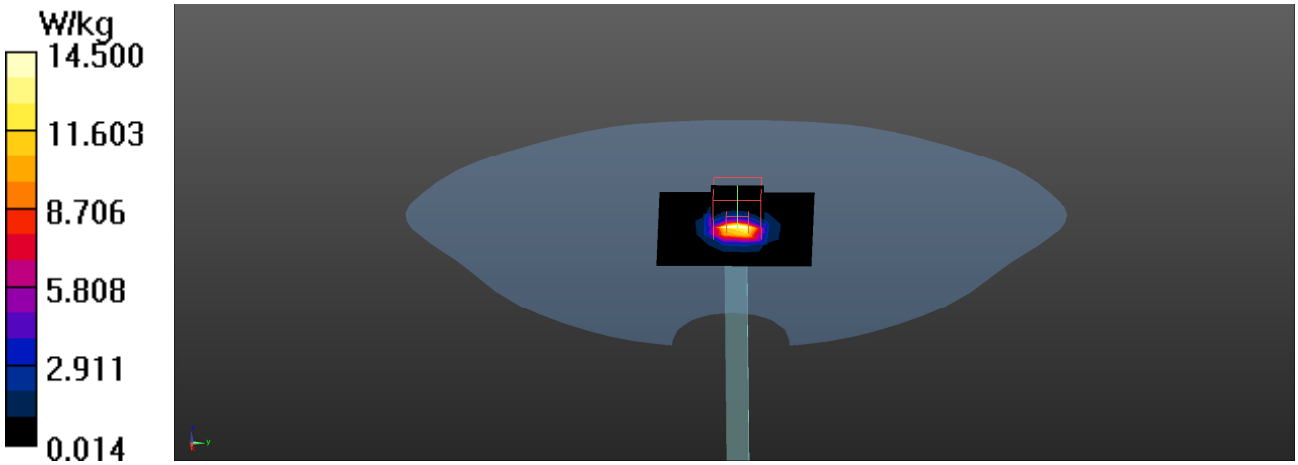
Communication System: UID 0, CW; Frequency: 5800 MHz
Communication System PAR: 0dB
Medium parameters used: f = 5800 MHz; σ = 5.32 S/m; ε_r = 34.51; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY5 Configuration:

- Probe: EX3DV4 - SN3979; ConvF(4.4, 4.4, 4.4) @ 5800 MHz; Calibrated: 2022/11/23
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1425; Calibrated: 2022/11/23
- Phantom: SAM with right table; Type: SAM;
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7501)

Configuration/5800MHz-Head/Area Scan (8x8x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 14.5 W/kg

Configuration/5800MHz-Head/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 70.83 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 34.7 W/kg
SAR(1 g) = 8.34 W/kg; SAR(10 g) = 2.34 W/kg
Smallest distance from peaks to all points 3 dB below = 7.4 mm
Ratio of SAR at M2 to SAR at M1 = 59.8%
Maximum value of SAR (measured) = 22.3 W/kg



Appendix B. Highest Measurement Data

Test Laboratory: DEKRA Date: 2023/08/23

10_WLAN2.4GHz_802.11b-1M_CH6_Left-side_0mm_ANT Aux

DUT: Tablet PC; Type: 3571-0100

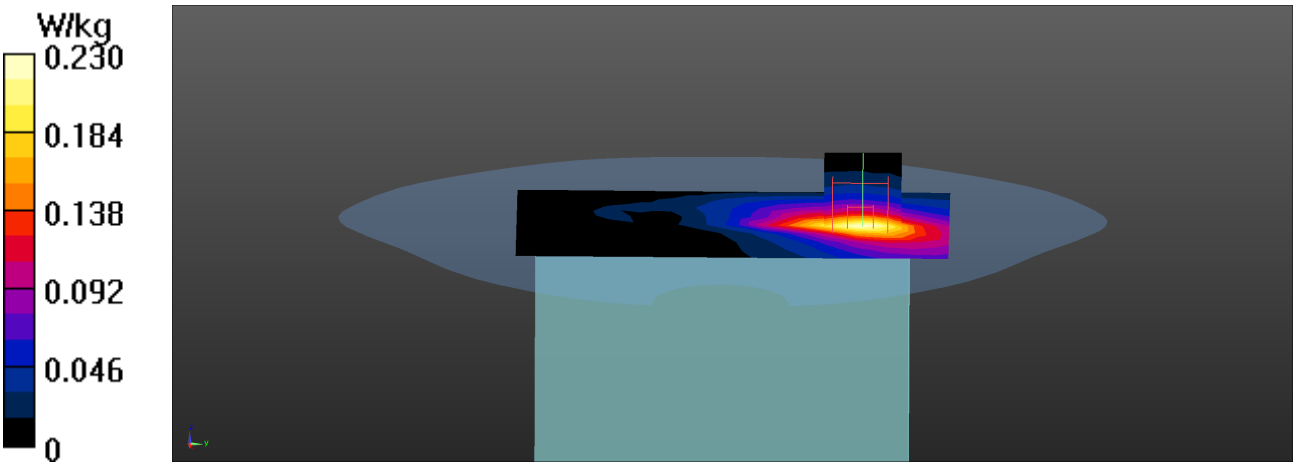
Communication System: UID 0, WLAN 2.4G; Frequency: 2437 MHz
Communication System PAR: 0dB
Medium parameters used: f = 2437 MHz; σ = 1.78 S/m; ε_r = 40.46; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY5 Configuration:

- Probe: EX3DV4 - SN3979; ConvF(7.58, 7.58, 7.58) @ 2437 MHz; Calibrated: 2022/11/23
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1425; Calibrated: 2022/11/23
- Phantom: SAM with left table; Type: SAM;
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7501)

Configuration/Flat/Area Scan (9x15x1): Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (measured) = 0.230 W/kg

Configuration/Flat/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 11.54 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 0.287 W/kg
SAR(1 g) = 0.151 W/kg; SAR(10 g) = 0.083 W/kg
Smallest distance from peaks to all points 3 dB below = 16.1 mm
Ratio of SAR at M2 to SAR at M1 = 52.2%
Maximum value of SAR (measured) = 0.233 W/kg



Test Laboratory: DEKRA Date: 2023/08/23

11_Bluetooth_BT-1M_CH39_Left-side_0mm_ANT Aux

DUT: Tablet PC; Type: 3571-0100

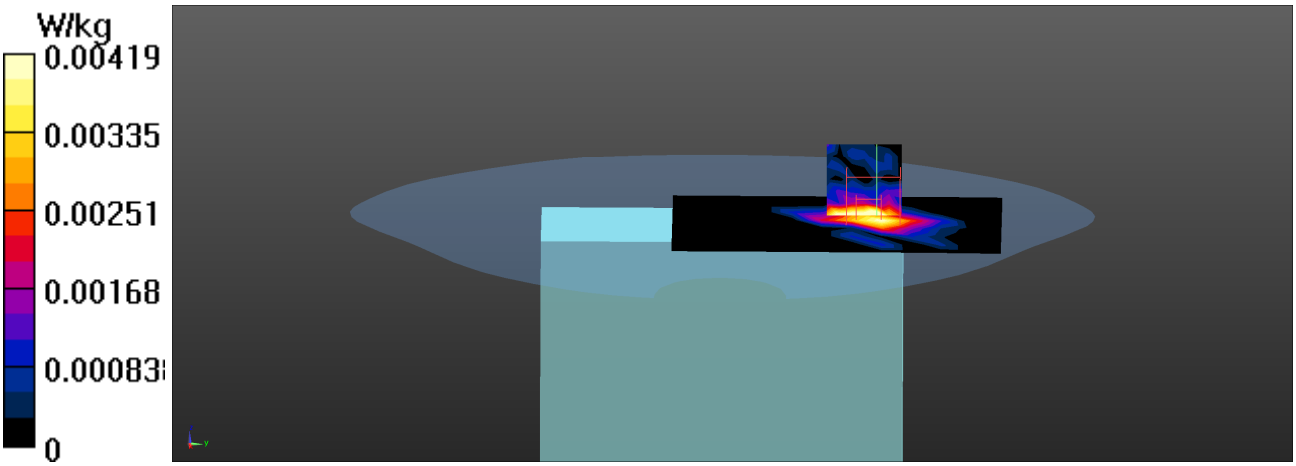
Communication System: UID 0, WLAN 2.4G; Frequency: 2437 MHz
Communication System PAR: 0dB
Medium parameters used: f = 2437 MHz; σ = 1.78 S/m; ε_r = 40.46; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY5 Configuration:

- Probe: EX3DV4 - SN3979; ConvF(7.58, 7.58, 7.58) @ 2437 MHz; Calibrated: 2022/11/23
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1425; Calibrated: 2022/11/23
- Phantom: SAM with left table; Type: SAM;
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7501)

Configuration/Flat/Area Scan (8x12x1): Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (measured) = 0.00419 W/kg

Configuration/Flat/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 1.800 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 0.0110 W/kg
SAR(1 g) = 0.00183 W/kg; SAR(10 g) = 0.000615 W/kg
Smallest distance from peaks to all points 3 dB below: Larger than measurement grid (> 15 mm)
Ratio of SAR at M2 to SAR at M1 = 42.5%
Maximum value of SAR (measured) = 0.00559 W/kg



Test Laboratory: DEKRA Date: 2023/08/23

4_WLAN2.4GHz_802.11b-1M_CH6_Top_0mm_ANT Aux

DUT: Tablet PC; Type: 3571-0100

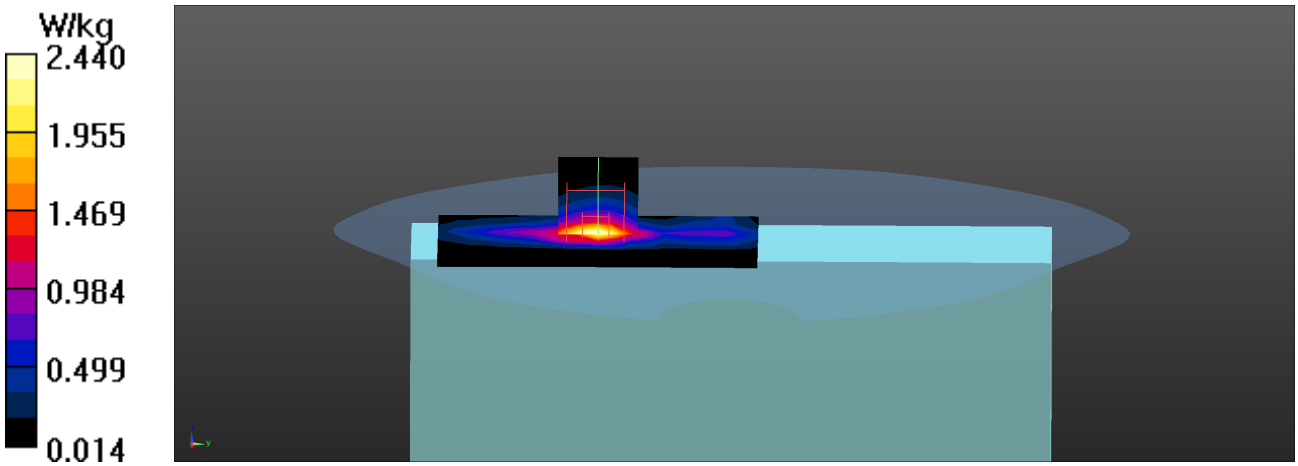
Communication System: UID 0, WLAN 2.4G; Frequency: 2437 MHz
Communication System PAR: 0dB
Medium parameters used: f = 2437 MHz; σ = 1.78 S/m; ε_r = 40.46; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY5 Configuration:

- Probe: EX3DV4 - SN3979; ConvF(7.58, 7.58, 7.58) @ 2437 MHz; Calibrated: 2022/11/23
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1425; Calibrated: 2022/11/23
- Phantom: SAM with left table; Type: SAM;
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7501)

Configuration/Flat/Area Scan (7x11x1): Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (measured) = 2.44 W/kg

Configuration/Flat/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 40.46 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 3.52 W/kg
SAR(1 g) = 1.55 W/kg; SAR(10 g) = 0.692 W/kg
Smallest distance from peaks to all points 3 dB below = 7.6 mm
Ratio of SAR at M2 to SAR at M1 = 46%
Maximum value of SAR (measured) = 2.68 W/kg



Test Laboratory: DEKRA Date: 2023/08/23

1_Bluetooth_BT-1M_CH39_Top_0mm_ANT Aux

DUT: Tablet PC; Type: 3571-0100

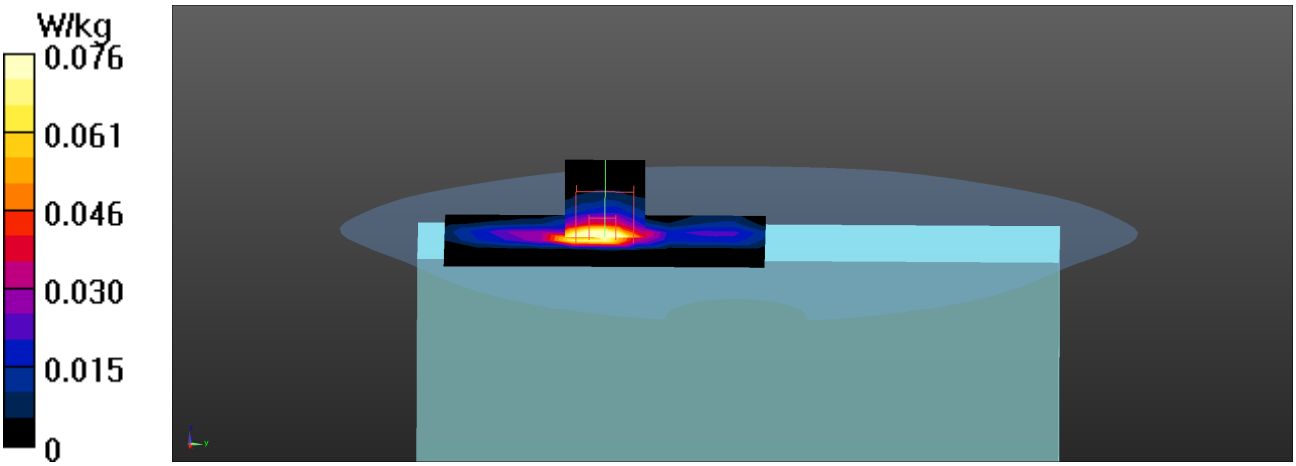
Communication System: UID 0, BT 1M&3M&BLE; Frequency: 2441 MHz
Communication System PAR: 0dB
Medium parameters used: f = 2441 MHz; σ = 1.78 S/m; ε_r = 40.44; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY5 Configuration:

- Probe: EX3DV4 - SN3979; ConvF(7.58, 7.58, 7.58) @ 2441 MHz; Calibrated: 2022/11/23
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1425; Calibrated: 2022/11/23
- Phantom: SAM with left table; Type: SAM;
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7501)

Configuration/Flat/Area Scan (7x11x1): Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (measured) = 0.0761 W/kg

Configuration/Flat/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 7.931 V/m; Power Drift = -0.08 dB
Peak SAR (extrapolated) = 0.140 W/kg
SAR(1 g) = 0.056 W/kg; SAR(10 g) = 0.024 W/kg
Smallest distance from peaks to all points 3 dB below = 7.6 mm
Ratio of SAR at M2 to SAR at M1 = 40.7%
Maximum value of SAR (measured) = 0.103 W/kg



Test Laboratory: DEKRA Date: 2023/08/24

54_WLAN5GHz_802.11a-6M_CH60_Left-side_0mm_ANT Aux

DUT: Tablet PC; Type: 3571-0100

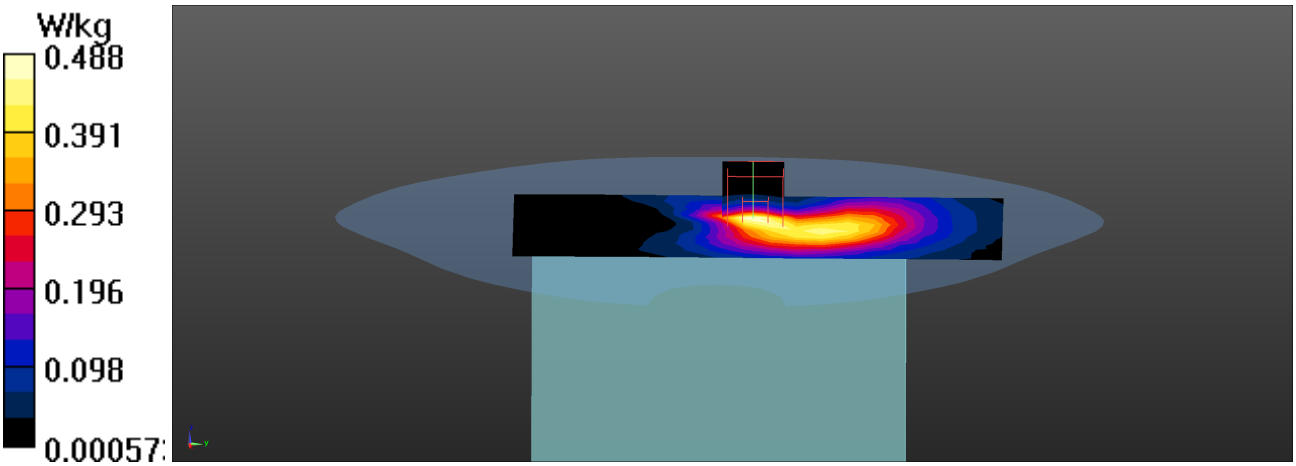
Communication System: UID 0, WLAN 5G; Frequency: 5300 MHz
Communication System PAR: 0dB
Medium parameters used: f = 5300 MHz; σ = 4.66 S/m; ε_r = 35.89; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY5 Configuration:

- Probe: EX3DV4 - SN3979; ConvF(4.8, 4.8, 4.8) @ 5300 MHz; Calibrated: 2022/11/23
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1425; Calibrated: 2022/11/23
- Phantom: SAM with right table; Type: SAM;
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7501)

Configuration/Flat/Area Scan (10x20x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 0.488 W/kg

Configuration/Flat/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 11.99 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 0.862 W/kg
SAR(1 g) = 0.252 W/kg; SAR(10 g) = 0.099 W/kg
Smallest distance from peaks to all points 3 dB below = 11.4 mm
Ratio of SAR at M2 to SAR at M1 = 66.6%
Maximum value of SAR (measured) = 0.548 W/kg



Test Laboratory: DEKRA Date: 2023/08/24

45_WLAN5GHz_802.11ac80-VHT0_CH138_Left-side_0mm_ANT Aux

DUT: Tablet PC; Type: 3571-0100

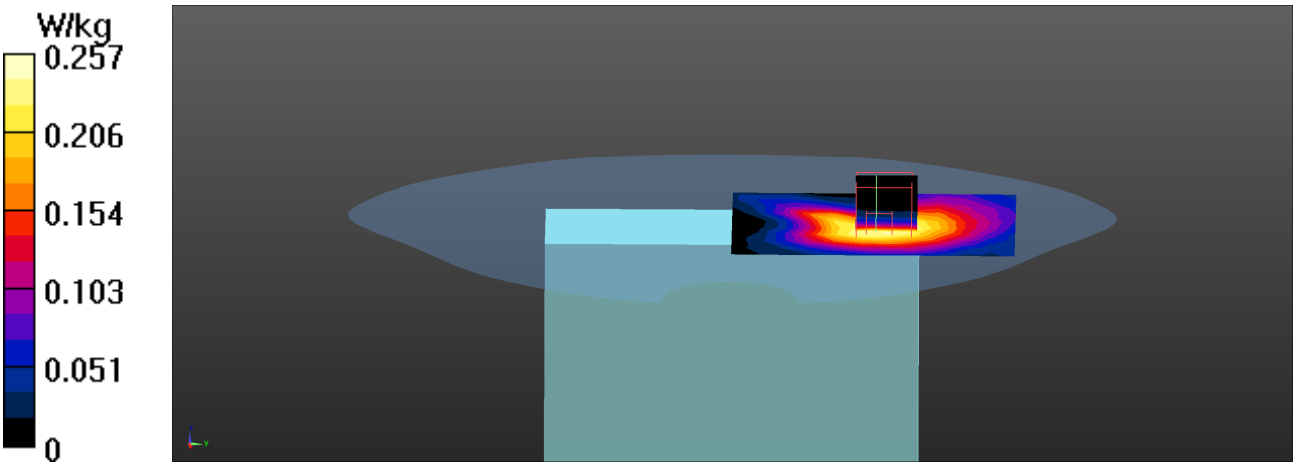
Communication System: UID 0, WLAN 5G; Frequency: 5690 MHz
Communication System PAR: 0dB
Medium parameters used: f = 5690 MHz; σ = 5.18 S/m; ε_r = 34.82; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY5 Configuration:

- Probe: EX3DV4 - SN3979; ConvF(4.42, 4.42, 4.42) @ 5690 MHz; Calibrated: 2022/11/23
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1425; Calibrated: 2022/11/23
- Phantom: SAM with right table; Type: SAM;
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7501)

Configuration/Flat/Area Scan (10x12x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 0.257 W/kg

Configuration/Flat/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 6.528 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 0.433 W/kg
SAR(1 g) = 0.117 W/kg; SAR(10 g) = 0.052 W/kg
Smallest distance from peaks to all points 3 dB below: Larger than measurement grid (> 12 mm)
Ratio of SAR at M2 to SAR at M1 = 62.2%
Maximum value of SAR (measured) = 0.257 W/kg



Test Laboratory: DEKRA Date: 2023/08/24

46_WLAN5GHz_802.11n40-HT0_CH151_Left-side_0mm_ANT Aux

DUT: Tablet PC; Type: 3571-0100

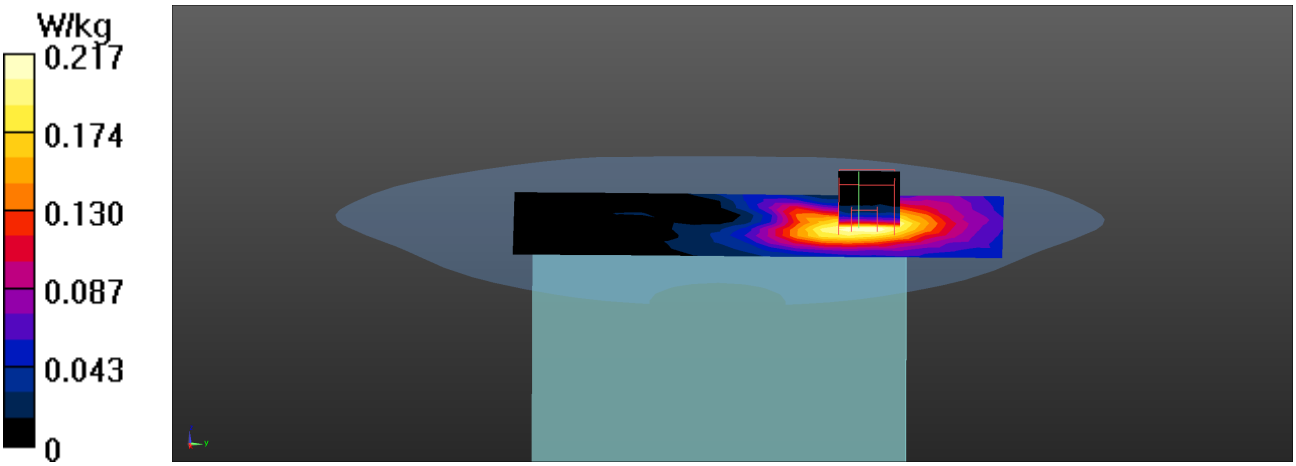
Communication System: UID 0, WLAN 5G; Frequency: 5755 MHz
Communication System PAR: 0dB
Medium parameters used: f = 5755 MHz; σ = 5.26 S/m; ε_r = 34.64; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY5 Configuration:

- Probe: EX3DV4 - SN3979; ConvF(4.4, 4.4, 4.4) @ 5755 MHz; Calibrated: 2022/11/23
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1425; Calibrated: 2022/11/23
- Phantom: SAM with right table; Type: SAM;
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7501)

Configuration/Flat/Area Scan (10x20x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 0.217 W/kg

Configuration/Flat/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 7.254 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 0.365 W/kg
SAR(1 g) = 0.102 W/kg; SAR(10 g) = 0.046 W/kg
Smallest distance from peaks to all points 3 dB below: Larger than measurement grid (> 12 mm)
Ratio of SAR at M2 to SAR at M1 = 63.2%
Maximum value of SAR (measured) = 0.220 W/kg



Test Laboratory: DEKRA Date: 2023/08/24

3_WLAN5GHz_802.11a-6M_CH56_Top_0mm_ANT Main

DUT: Tablet PC; Type: 3571-0100

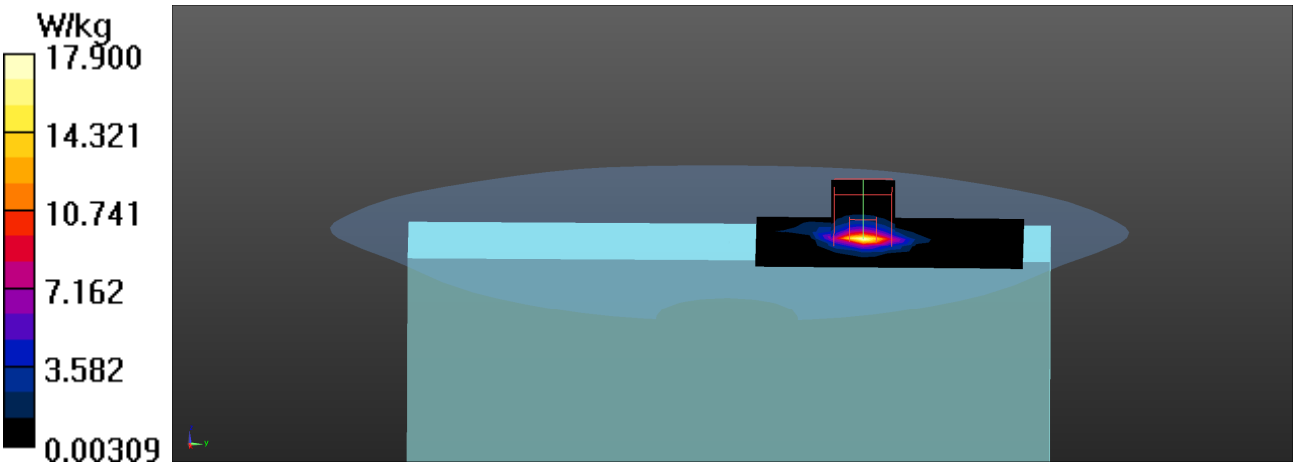
Communication System: UID 0, WLAN 5G; Frequency: 5280 MHz
Communication System PAR: 0dB
Medium parameters used: f = 5280 MHz; σ = 4.63 S/m; ε_r = 35.94; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY5 Configuration:

- Probe: EX3DV4 - SN3979; ConvF(4.8, 4.8, 4.8) @ 5280 MHz; Calibrated: 2022/11/23
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1425; Calibrated: 2022/11/23
- Phantom: SAM with right table; Type: SAM;
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7501)

Configuration/Flat/Area Scan (8x11x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 17.9 W/kg

Configuration/Flat/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 66.78 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 28.5 W/kg
SAR(1 g) = 7.67 W/kg; SAR(10 g) = 2.44 W/kg
Smallest distance from peaks to all points 3 dB below = 8.2 mm
Ratio of SAR at M2 to SAR at M1 = 65.8%
Maximum value of SAR (measured) = 17.9 W/kg



Test Laboratory: DEKRA Date: 2023/08/24

21_WLAN5GHz_802.11ac80-VHT0_CH138_Top_0mm_ANT Main

DUT: Tablet PC; Type: 3571-0100

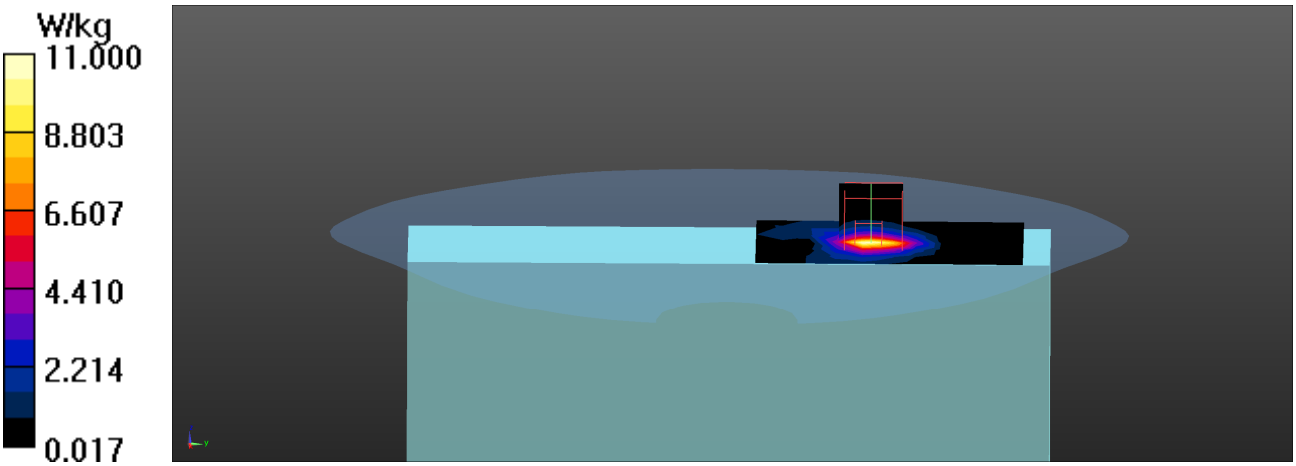
Communication System: UID 0, WLAN 5G; Frequency: 5690 MHz
Communication System PAR: 0dB
Medium parameters used: f = 5690 MHz; σ = 5.18 S/m; ε_r = 34.82; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY5 Configuration:

- Probe: EX3DV4 - SN3979; ConvF(4.42, 4.42, 4.42) @ 5690 MHz; Calibrated: 2022/11/23
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1425; Calibrated: 2022/11/23
- Phantom: SAM with right table; Type: SAM;
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7501)

Configuration/Flat/Area Scan (7x11x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 11.0 W/kg

Configuration/Flat/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 50.50 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 19.3 W/kg
SAR(1 g) = 4.77 W/kg; SAR(10 g) = 1.7 W/kg
Smallest distance from peaks to all points 3 dB below = 9.7 mm
Ratio of SAR at M2 to SAR at M1 = 61.8%
Maximum value of SAR (measured) = 11.3 W/kg



Test Laboratory: DEKRA Date: 2023/08/24

34_WLAN5GHz_802.11n40-HT0_CH151_Top_0mm_ANT Main

DUT: Tablet PC; Type: 3571-0100

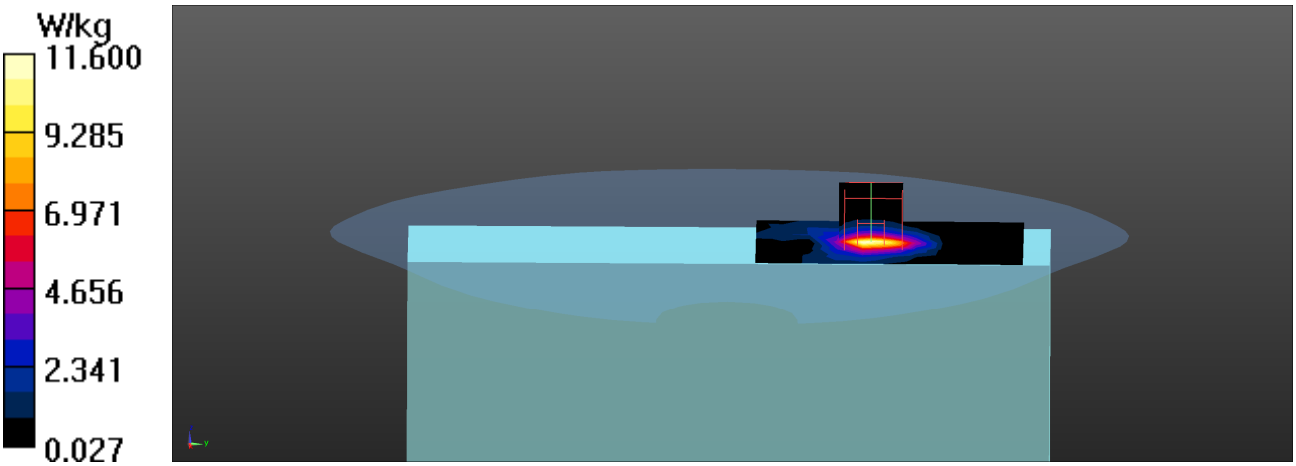
Communication System: UID 0, WLAN 5G; Frequency: 5755 MHz
Communication System PAR: 0dB
Medium parameters used: f = 5755 MHz; σ = 5.26 S/m; ε_r = 34.64; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY5 Configuration:

- Probe: EX3DV4 - SN3979; ConvF(4.4, 4.4, 4.4) @ 5755 MHz; Calibrated: 2022/11/23
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1425; Calibrated: 2022/11/23
- Phantom: SAM with right table; Type: SAM;
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7501)

Configuration/Flat/Area Scan (7x11x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 11.6 W/kg

Configuration/Flat/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 52.49 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 20.9 W/kg
SAR(1 g) = 5.07 W/kg; SAR(10 g) = 1.81 W/kg
Smallest distance from peaks to all points 3 dB below = 9.6 mm
Ratio of SAR at M2 to SAR at M1 = 61%
Maximum value of SAR (measured) = 12.0 W/kg



Appendix D. Probe Calibration

Calibration Laboratory of
Schmid & Partner
Engineering AG
Zeughausstrasse 43, 8004 Zurich, Switzerland

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
Servizio svizzero di taratura
S Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)
The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 0108

Client DEKRA (Auden)

Certificate No EX-3979_Nov22

CALIBRATION CERTIFICATE

Object	EX3DV4 - SN:3979
Calibration procedure(s)	QA CAL-01.v9, QA CAL-12.v9, QA CAL-14.v6, QA CAL-23.v5, QA CAL-25.v7 Calibration procedure for dosimetric E-field probes
Calibration date	November 23, 2022

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI). The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3) °C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	04-Apr-22 (No. 217-03525/03524)	Apr-23
Power sensor NRP-Z91	SN: 103244	04-Apr-22 (No. 217-03524)	Apr-23
OCP DAK-3.5 (weighted)	SN: 1249	20-Oct-22 (OCP-DAK3.5-1249_Oct22)	Oct-23
OCP DAK-12	SN: 1016	20-Oct-22 (OCP-DAK12-1016_Oct22)	Oct-23
Reference 20 dB Attenuator	SN: CC2552 (20x)	04-Apr-22 (No. 217-03527)	Apr-23
DAE4	SN: 660	10-Oct-22 (No. DAE4-660_Oct22)	Oct-23
Reference Probe ES3DV2	SN: 3013	27-Dec-21 (No. ES3-3013_Dec21)	Dec-22

Secondary Standards	ID	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB41293874	06-Apr-16 (in house check Jun-22)	In house check: Jun-24
Power sensor E4412A	SN: MY41498087	06-Apr-16 (in house check Jun-22)	In house check: Jun-24
Power sensor E4412A	SN: 000110210	06-Apr-16 (in house check Jun-22)	In house check: Jun-24
RF generator HP 8648C	SN: US3642U01700	04-Aug-99 (in house check Jun-22)	In house check: Jun-24
Network Analyzer E8358A	SN: US41080477	31-Mar-14 (in house check Oct-22)	In house check: Oct-24

	Name	Function	Signature
Calibrated by	Jeffrey Katzman	Laboratory Technician	
Approved by	Sven Kühn	Technical Manager	

Issued: November 23, 2022

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.

Glossary

TSL	tissue simulating liquid
NORMx,y,z	sensitivity in free space
ConvF	sensitivity in TSL / NORMx,y,z
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C, D	modulation dependent linearization parameters
Polarization φ	φ rotation around probe axis
Polarization ϑ	ϑ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., $\vartheta = 0$ is normal to probe axis
Connector Angle	information used in DASY system to align probe sensor X to the robot coordinate system

Calibration is Performed According to the Following Standards:

a) IEC/IEEE 62209-1528, "Measurement Procedure For The Assessment Of Specific Absorption Rate Of Human Exposure To Radio Frequency Fields From Hand-Held And Body-Worn Wireless Communication Devices – Part 1528: Human Models, Instrumentation And Procedures (Frequency Range of 4 MHz to 10 GHz)", October 2020.
b) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Methods Applied and Interpretation of Parameters:

- *NORMx,y,z*: Assessed for E-field polarization $\vartheta = 0$ ($f \leq 900$ MHz in TEM-cell; $f > 1800$ MHz: R22 waveguide). NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx,y,z does not affect the E^2-field uncertainty inside TSL (see below *ConvF*).
- *NORM(f)x,y,z = NORMx,y,z * frequency_response* (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of ConvF.
- *DCPx,y,z*: DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal. DCP does not depend on frequency nor media.
- *PAR*: PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics
- *Ax,y,z; Bx,y,z; Cx,y,z; Dx,y,z; VRx,y,z: A, B, C, D* are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. VR is the maximum calibration range expressed in RMS voltage across the diode.
- *ConvF and Boundary Effect Parameters*: Assessed in flat phantom using E-field (or Temperature Transfer Standard for $f \leq 800$ MHz) and inside waveguide using analytical field distributions based on power measurements for $f > 800$ MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to *NORMx,y,z * ConvF* whereby the uncertainty corresponds to that given for *ConvF*. A frequency dependent *ConvF* is used in DASY version 4.4 and higher which allows extending the validity from ±50 MHz to ±100 MHz.
- *Spherical isotropy (3D deviation from isotropy)*: in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- *Sensor Offset*: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.
- *Connector Angle*: The angle is assessed using the information gained by determining the *NORMx* (no uncertainty required).

Parameters of Probe: EX3DV4 - SN:3979

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc ($k = 2$)
Norm (μV/(V/m)^2) [A]	0.46	0.49	0.47	±10.1%
DCP (mV) [B]	103.0	101.0	103.4	±4.7%

Calibration Results for Modulation Response

UID	Communication System Name		A dB	B dB$\sqrt{\mu V}$	C	D dB	VR mV	Max dev.	Max Unc[E] $k = 2$
0	CW	X	0.00	0.00	1.00	0.00	163.8	±1.7%	±4.7%
		Y	0.00	0.00	1.00		165.4		
		Z	0.00	0.00	1.00		158.1		

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

[A] The uncertainties of Norm X,Y,Z do not affect the E^2-field uncertainty inside TSL (see Page 5).
[B] Linearization parameter uncertainty for maximum specified field strength.
[E] Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

Parameters of Probe: EX3DV4 - SN:3979

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle	136.0°
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	9 mm
Tip Diameter	2.5 mm
Probe Tip to Sensor X Calibration Point	1 mm
Probe Tip to Sensor Y Calibration Point	1 mm
Probe Tip to Sensor Z Calibration Point	1 mm
Recommended Measurement Distance from Surface	1.4 mm

Note: Measurement distance from surface can be increased to 3–4 mm for an *Area Scan* job.

Parameters of Probe: EX3DV4 - SN:3979

Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz)[C]	Relative Permittivity[F]	Conductivity[F] (S/m)	ConvF X	ConvF Y	ConvF Z	Alpha[G]	Depth[G] (mm)	Unc ($k = 2$)
450	43.5	0.87	10.79	10.79	10.79	0.16	1.30	±13.3%
750	41.9	0.89	10.47	10.47	10.47	0.54	0.80	±12.0%
835	41.5	0.90	10.05	10.05	10.05	0.53	0.80	±12.0%
900	41.5	0.97	9.73	9.73	9.73	0.49	0.80	±12.0%
1450	40.5	1.20	8.47	8.47	8.47	0.54	0.80	±12.0%
1640	40.2	1.31	8.48	8.48	8.48	0.38	0.86	±12.0%
1750	40.1	1.37	8.34	8.34	8.34	0.35	0.86	±12.0%
1950	40.0	1.40	8.12	8.12	8.12	0.39	0.86	±12.0%
2300	39.5	1.67	7.87	7.87	7.87	0.31	0.90	±12.0%
2450	39.2	1.80	7.58	7.58	7.58	0.34	0.90	±12.0%
2600	39.0	1.96	7.38	7.38	7.38	0.41	0.90	±12.0%
3300	38.2	2.71	6.92	6.92	6.92	0.40	1.30	±13.1%
3500	37.9	2.91	6.85	6.85	6.85	0.40	1.30	±13.1%
3700	37.7	3.12	6.82	6.82	6.82	0.35	1.30	±13.1%
5250	35.9	4.71	4.80	4.80	4.80	0.40	1.80	±13.1%
5600	35.5	5.07	4.42	4.42	4.42	0.40	1.80	±13.1%
5800	35.3	5.27	4.40	4.40	4.40	0.40	1.80	±13.1%

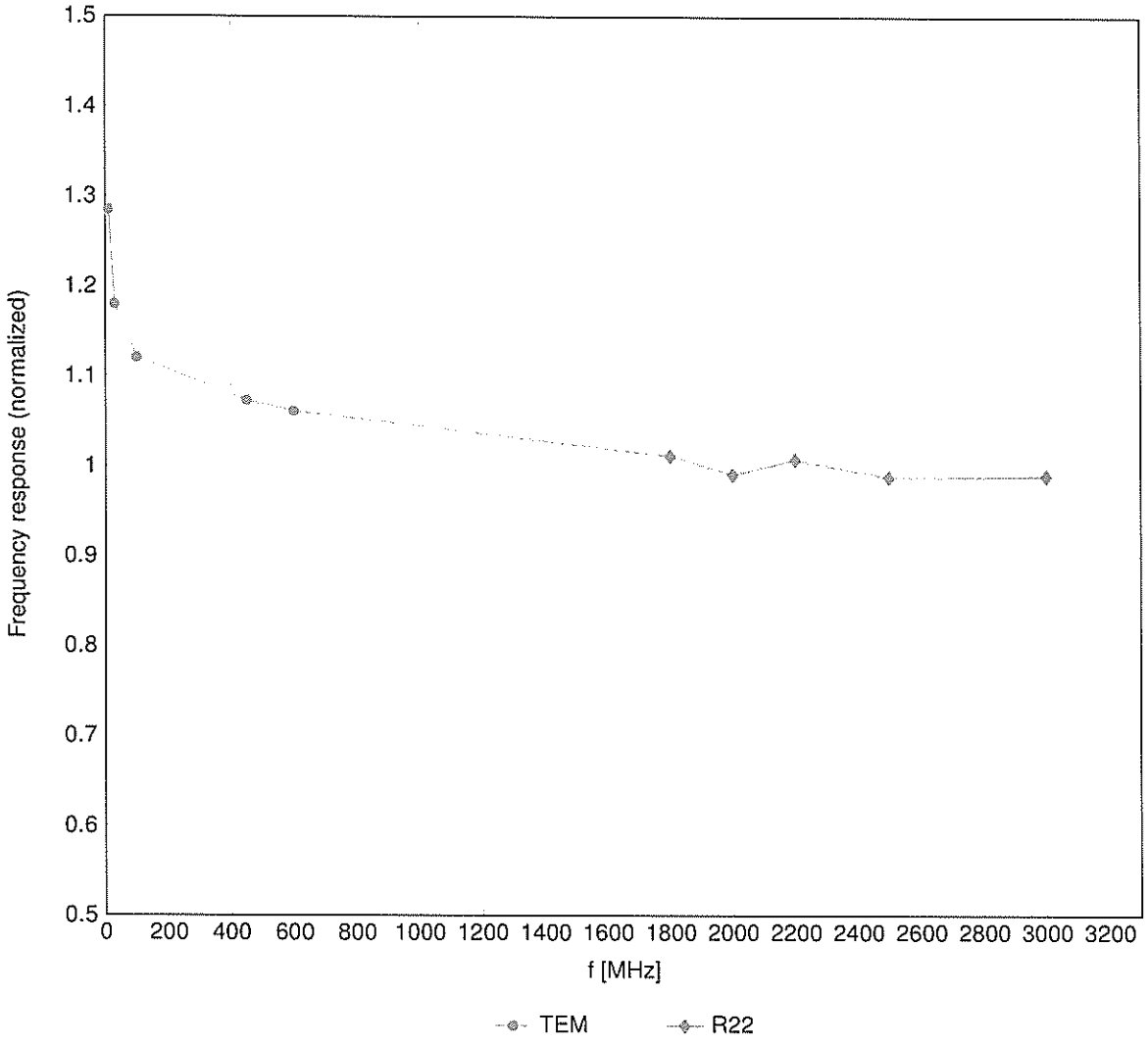
[C] Frequency validity above 300 MHz of ±100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ±50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ±10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Validity of ConvF assessed at 6 MHz is 4–9 MHz, and ConvF assessed at 13 MHz is 9–19 MHz. Above 5 GHz frequency validity can be extended to ±110 MHz.

[F] At frequencies below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ±10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ±5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

[G] Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ±1% for frequencies below 3 GHz and below ±2% for frequencies between 3–6 GHz at any distance larger than half the probe tip diameter from the boundary.

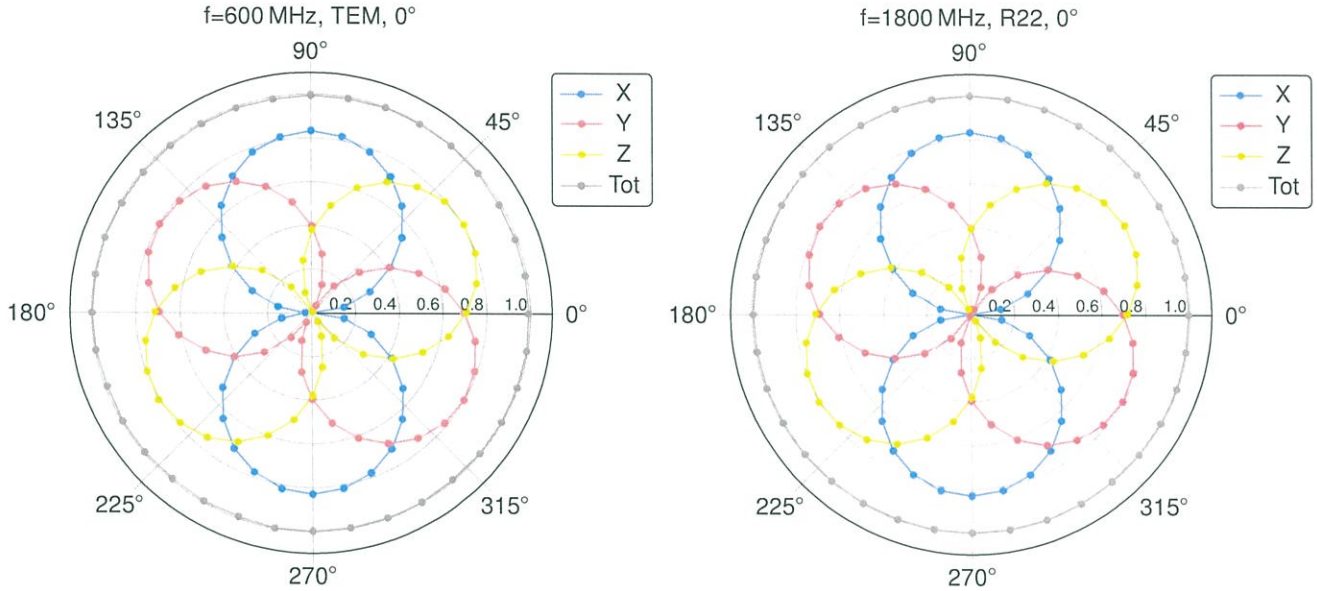
Frequency Response of E-Field

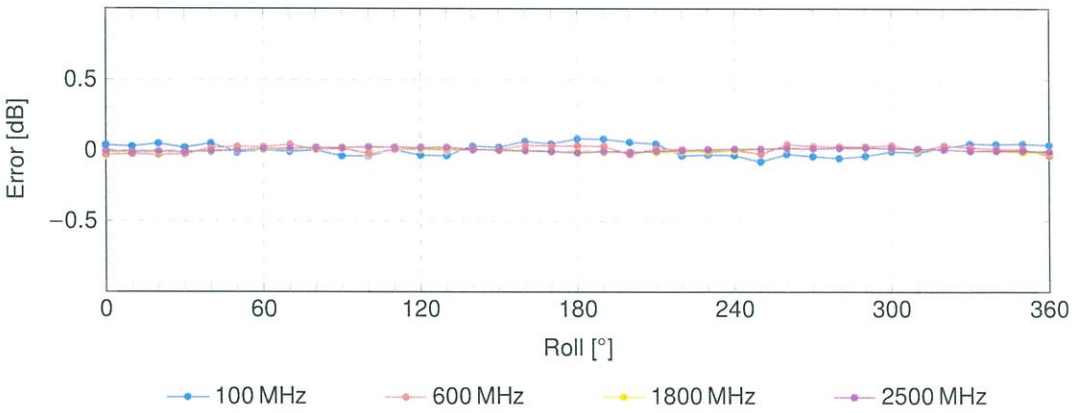
(TEM-Cell:ifi110 EXX, Waveguide:R22)



Uncertainty of Frequency Response of E-field: ±6.3% (k=2)

Receiving Pattern (ϕ), $\vartheta = 0°$

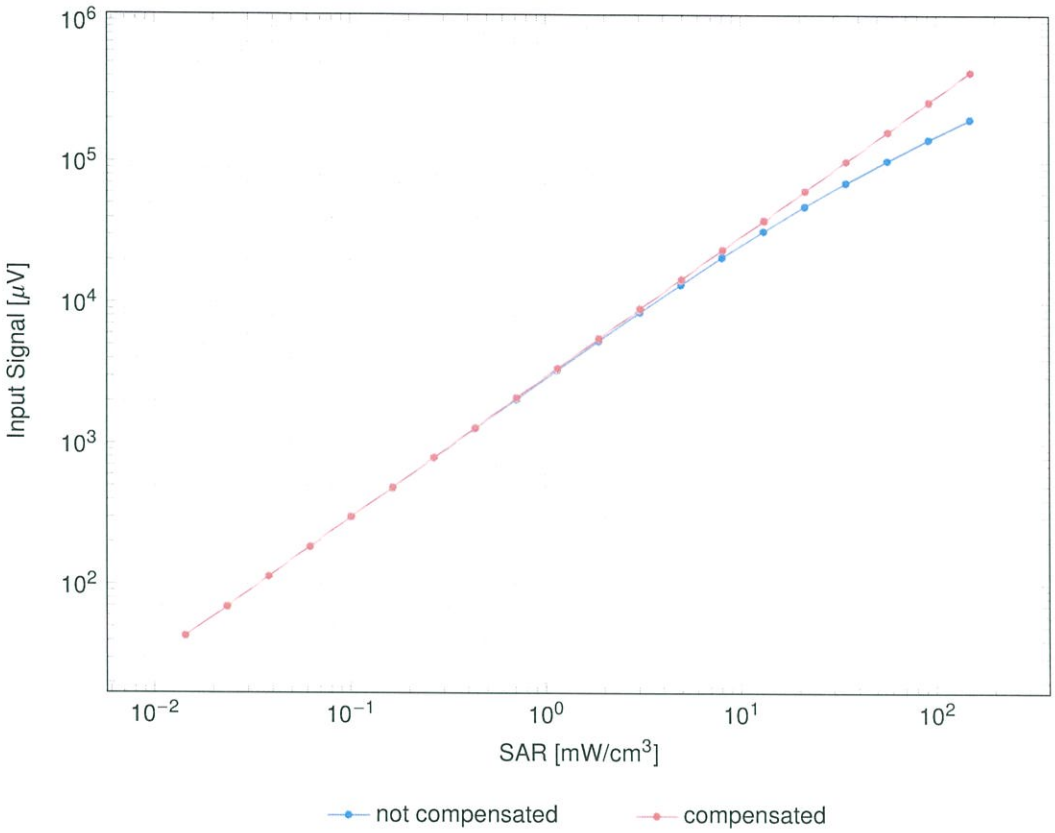


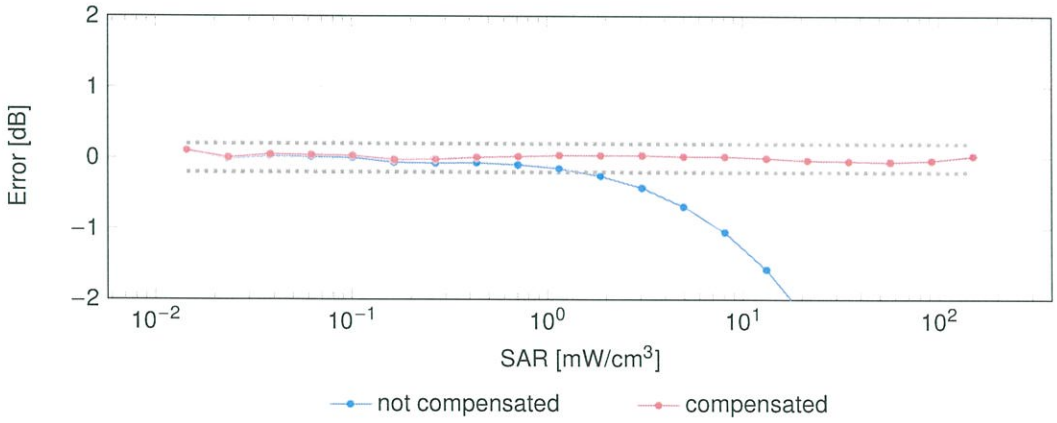


Uncertainty of Axial Isotropy Assessment: ±0.5% (k=2)

Dynamic Range f(SAR_{head})

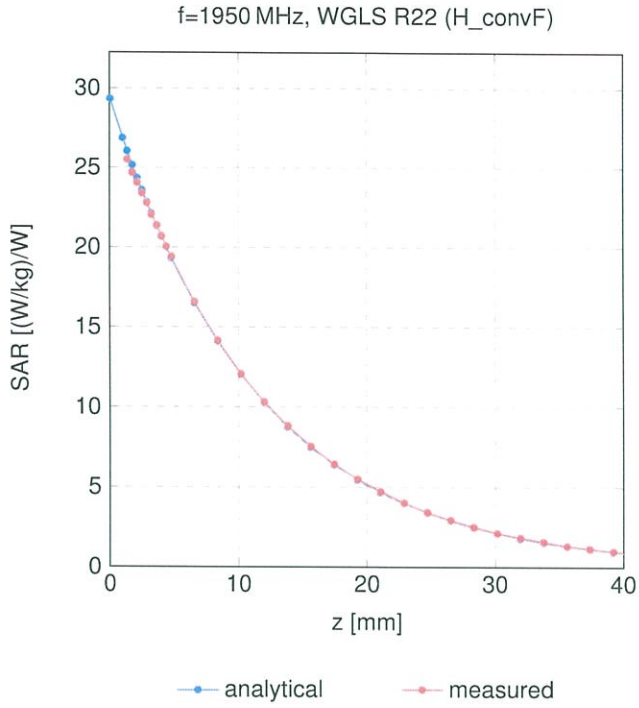
(TEM cell, f_{eval} = 1900 MHz)





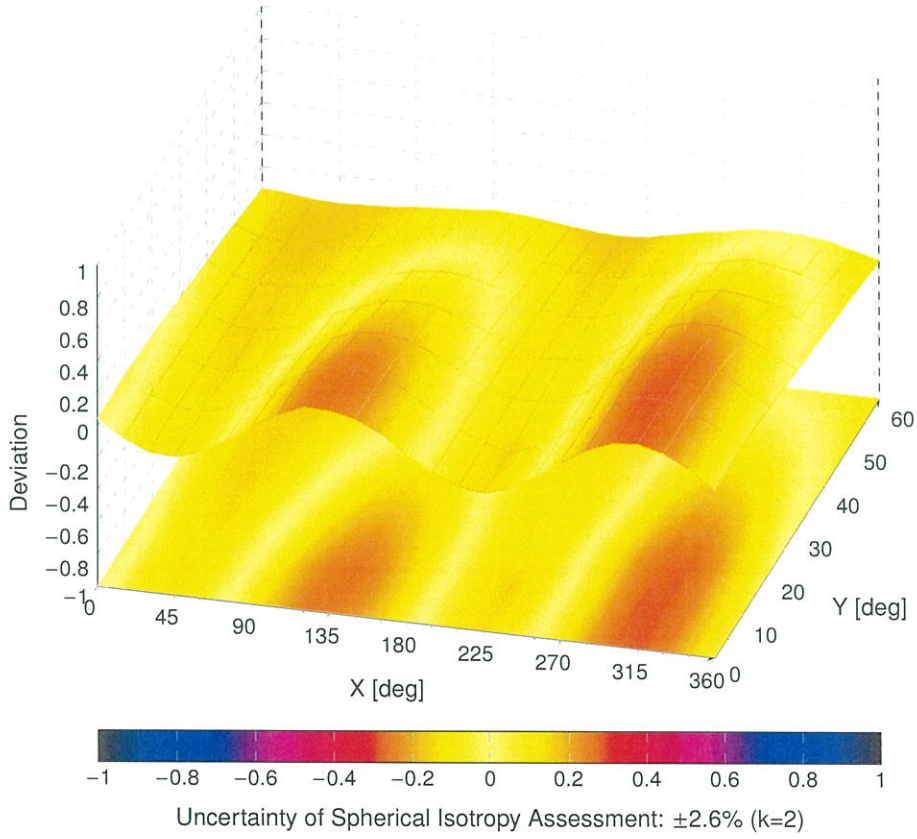
Uncertainty of Linearity Assessment: ±0.6% (k=2)

Conversion Factor Assessment



Deviation from Isotropy in Liquid

Error (ϕ,θ), f = 900 MHz



Appendix E. Dipole & Source Calibration

Calibration Laboratory of
Schmid & Partner
Engineering AG
Zeughausstrasse 43, 8004 Zurich, Switzerland

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
Servizio svizzero di taratura
S Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)
The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 0108

Client **DEKRA (Auden)**

Certificate No: D2450V2-930_Nov22

CALIBRATION CERTIFICATE

Object	D2450V2 - SN:930
Calibration procedure(s)	QA CAL-05.v11 Calibration Procedure for SAR Validation Sources between 0.7-3 GHz
Calibration date:	November 21, 2022

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	04-Apr-22 (No. 217-03525/03524)	Apr-23
Power sensor NRP-Z91	SN: 103244	04-Apr-22 (No. 217-03524)	Apr-23
Power sensor NRP-Z91	SN: 103245	04-Apr-22 (No. 217-03525)	Apr-23
Reference 20 dB Attenuator	SN: BH9394 (20k)	04-Apr-22 (No. 217-03527)	Apr-23
Type-N mismatch combination	SN: 310982 / 06327	04-Apr-22 (No. 217-03528)	Apr-23
Reference Probe EX3DV4	SN: 7349	31-Dec-21 (No. EX3-7349_Dec21)	Dec-22
DAE4	SN: 601	31-Aug-22 (No. DAE4-601_Aug22)	Aug-23

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB39512475	30-Oct-14 (in house check Oct-22)	In house check: Oct-24
Power sensor HP 8481A	SN: US37292783	07-Oct-15 (in house check Oct-22)	In house check: Oct-24
Power sensor HP 8481A	SN: MY41093315	07-Oct-15 (in house check Oct-22)	In house check: Oct-24
RF generator R&S SMT-06	SN: 100972	15-Jun-15 (in house check Oct-22)	In house check: Oct-24
Network Analyzer Agilent E8358A	SN: US41080477	31-Mar-14 (in house check Oct-22)	In house check: Oct-24

	Name	Function	Signature
Calibrated by:	Jeton Kastrati	Laboratory Technician	
Approved by:	Sven Kühn	Technical Manager	

Issued: November 22, 2022

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.

Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM x,y,z
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

a) IEC/IEEE 62209-1528, "Measurement Procedure For The Assessment Of Specific Absorption Rate Of Human Exposure To Radio Frequency Fields From Hand-Held And Body-Worn Wireless Communication Devices - Part 1528: Human Models, Instrumentation And Procedures (Frequency Range of 4 MHz to 10 GHz)", October 2020.
b) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

c) DASY System Handbook

Methods Applied and Interpretation of Parameters:

- *Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- *Antenna Parameters with TSL:* The source is mounted in a touch configuration below the center marking of the flat phantom.
- *Return Loss:* This parameter is measured with the source positioned under the liquid filled phantom (as described in the measurement condition clause). The Return Loss ensures low reflected power. No uncertainty required.
- *SAR measured:* SAR measured at the stated antenna input power.
- *SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
- *SAR for nominal TSL parameters:* The measured TSL parameters are used to calculate the nominal SAR result.

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY52	V52.10.4
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	2450 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	39.2	1.80 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	38.4 ± 6 %	1.87 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	13.4 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**52.4 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.24 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**24.6 W/kg ± 16.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	53.7 Ω + 2.9 jΩ
Return Loss	- 26.8 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.157 ns

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG

DASY5 Validation Report for Head TSL

Date: 21.11.2022

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:930

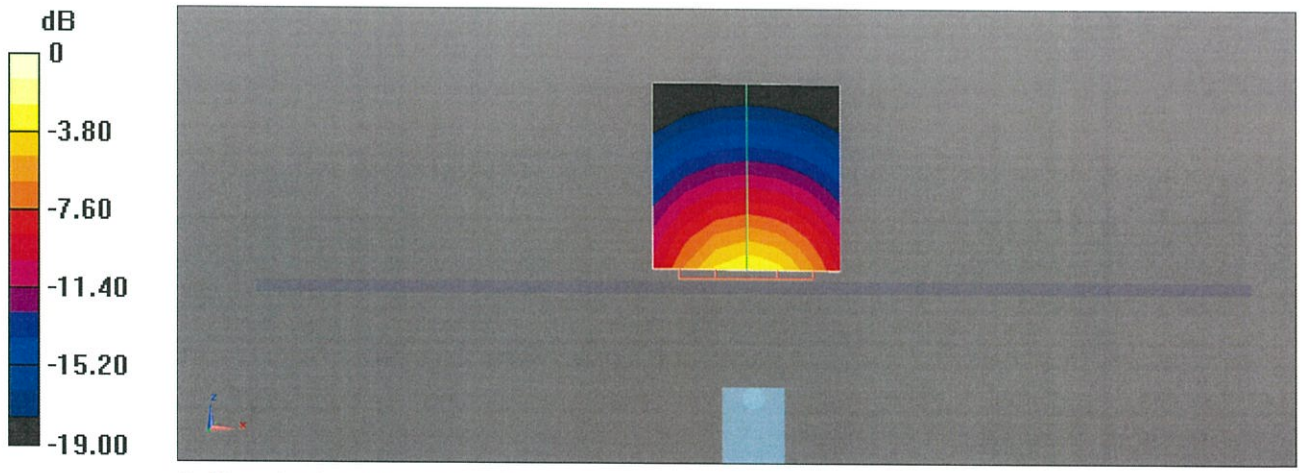
Communication System: UID 0 - CW; Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; σ = 1.87 S/m; ε_r = 38.4; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(7.96, 7.96, 7.96) @ 2450 MHz; Calibrated: 31.12.2021
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 31.08.2022
- Phantom: Flat Phantom 5.0 (front); Type: QD 000 P50 AA; Serial: 1001
- DASY52 52.10.4(1535); SEMCAD X 14.6.14(7501)

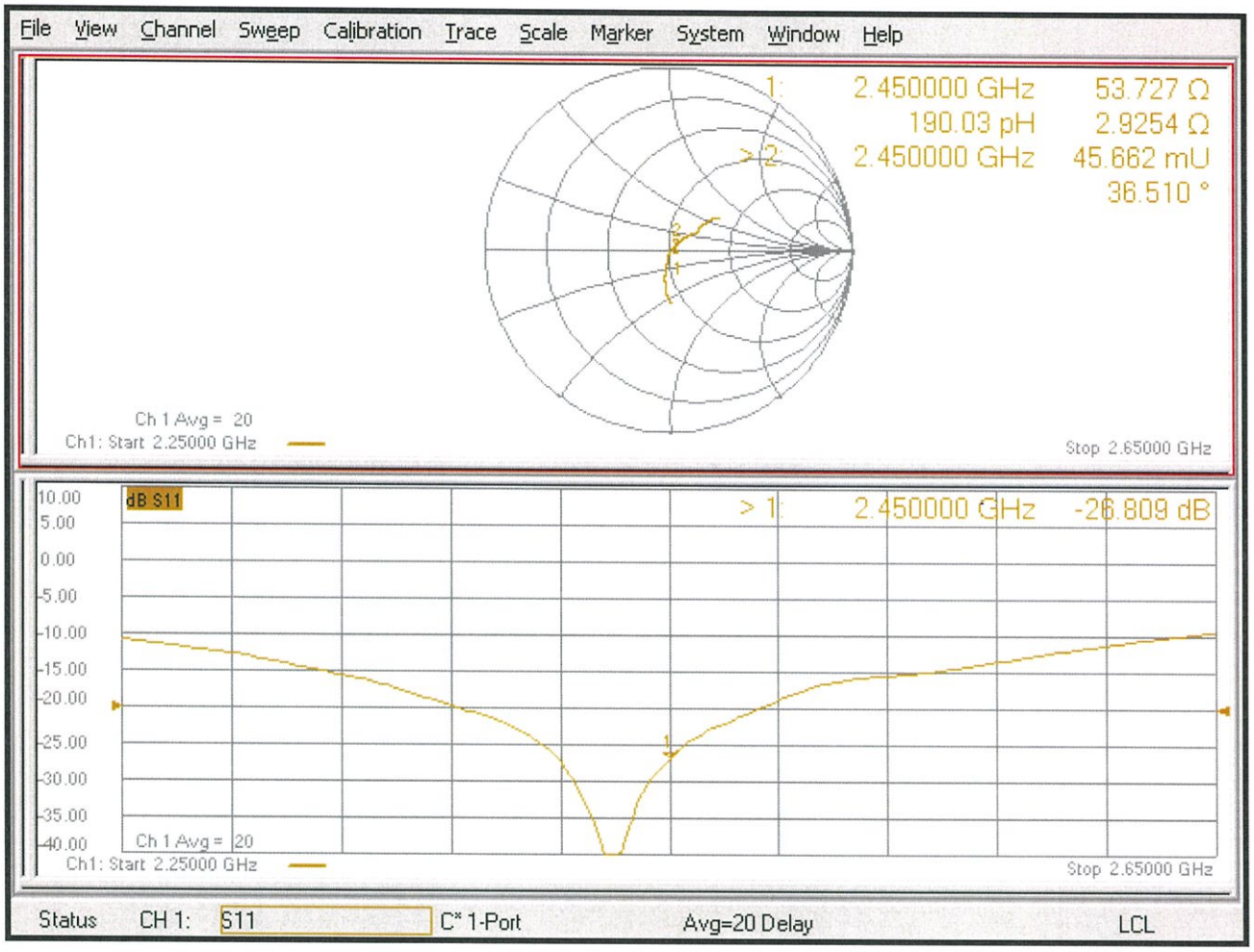
Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 115.6 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 25.9 W/kg
SAR(1 g) = 13.4 W/kg; SAR(10 g) = 6.24 W/kg
Smallest distance from peaks to all points 3 dB below = 9 mm
Ratio of SAR at M2 to SAR at M1 = 51.7%
Maximum value of SAR (measured) = 21.8 W/kg



0 dB = 21.8 W/kg = 13.38 dBW/kg

Impedance Measurement Plot for Head TSL



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Accredited by the Swiss Accreditation Service (SAS)
The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 0108

Client **Dekra-TW (Auden)**

Certificate No: D5GHzV2-1321_Feb21

CALIBRATION CERTIFICATE

Object	D5GHzV2 - SN:1321
Calibration procedure(s)	QA CAL-22.v6 Calibration Procedure for SAR Validation Sources between 3-10 GHz
Calibration date:	February 05, 2021

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	01-Apr-20 (No. 217-03100/03101)	Apr-21
Power sensor NRP-Z91	SN: 103244	01-Apr-20 (No. 217-03100)	Apr-21
Power sensor NRP-Z91	SN: 103245	01-Apr-20 (No. 217-03101)	Apr-21
Reference 20 dB Attenuator	SN: BH9394 (20k)	31-Mar-20 (No. 217-03106)	Apr-21
Type-N mismatch combination	SN: 310982 / 06327	31-Mar-20 (No. 217-03104)	Apr-21
Reference Probe EX3DV4	SN: 3503	30-Dec-20 (No. EX3-3503_Dec20)	Dec-21
DAE4	SN: 601	02-Nov-20 (No. DAE4-601_Nov20)	Nov-21

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB39512475	30-Oct-14 (in house check Oct-20)	In house check: Oct-22
Power sensor HP 8481A	SN: US37292783	07-Oct-15 (in house check Oct-20)	In house check: Oct-22
Power sensor HP 8481A	SN: MY41092317	07-Oct-15 (in house check Oct-20)	In house check: Oct-22
RF generator R&S SMT-06	SN: 100972	15-Jun-15 (in house check Oct-20)	In house check: Oct-22
Network Analyzer Agilent E8358A	SN: US41080477	31-Mar-14 (in house check Oct-20)	In house check: Oct-21

	Name	Function	Signature
Calibrated by:	Claudio Leubler	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: February 5, 2021

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.

Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM x,y,z
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
b) IEC 62209-1, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
c) IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
d) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

e) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- *Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- *Antenna Parameters with TSL:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- *Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- *Electrical Delay:* One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- *SAR measured:* SAR measured at the stated antenna input power.
- *SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
- *SAR for nominal TSL parameters:* The measured TSL parameters are used to calculate the nominal SAR result.

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.