FCC SAR EVALUATION REPORT

In accordance with the requirements of
FCC 47 CFR Part 2(2.1093), ANSI/IEEE C95.1-1992 and
IEEE Std 1528-2013

Product Name : Magic Drawing Pad

Trademark : XPPen

Model Name : MDP1221

Family Model : MDP1220,MDP1222,MDP1223, MDP1225

FCC ID : 2AKDT-MDP1221

Report No. : S24090504303001

Prepared for

XPPEN Technology CO.

15350 Fairfield Ranch Road, Chino Hills, CA, 91709, US

Prepared by

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TEST RESULT CERTIFICATION

Applicant's name .....: XPPEN Technology CO.

Address.....: 15350 Fairfield Ranch Road, Chino Hills, CA, 91709, US

Manufacturer's Name.....: Hanvon Ugee Technology Co., Ltd.

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Product description

Product name.....: Magic Drawing Pad

Trademark .....: XPPen

Model Name .....: MDP1221

Family Model.....: MDP1220, MDP1222, MDP1223, MDP1225

Standards .....: FCC 47 CFR Part 2(2.1093); ANSI/IEEE C95.1-1992 IEEE Std 1528-2013; Published RF exposure KDB procedures

This device described above has been tested by Shenzhen NTEK. In accordance with the measurement methods and procedures specified in IEEE Std 1528-2013 and KDB 865664 D01. Testing has shown that this device is capable of compliance with localized specific absorption rate (SAR) specified in FCC 47 CFR Part 2(2.1093) and ANSI/IEEE C95.1-1992. The test results in this report apply only to the tested sample of the stated device/equipment. Other similar device/equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

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Test Sample Number S240905043004

Date of Test

Date (s) of performance of tests .....: Jan. 08, 2025 ~ Jan. 12, 2025

Date of Issue .....: Jan. 12, 2025

Test Result .....: **Pass**

Prepared By	Reviewed By	Approved By
Owen Xiao	Aaron Cheng	Alex Li
Owen Xiao (Project Engineer)	Aaron Cheng (Supervisor)	Alex Li (Manager)

※ ※ Revision History ※ ※

REV.	DESCRIPTION	ISSUED DATE	REMARK
Rev.1.0	Initial Test Report Release	Jan. 12, 2025	Owen Xiao

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1. General Information

1.1. RF exposure limits

(A).Limits for Occupational/Controlled Exposure (W/kg)

Whole-Body	Partial-Body	Hands, Wrists, Feet and Ankles
0.4	8.0	20.0

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

Whole-Body	Partial-Body	Hands, Wrists, Feet and Ankles
0.08	1.6	4.0

NOTE: ***Whole-Body SAR*** is averaged over the entire body, ***partial-body SAR*** is averaged over any 1 gram of tissue defined as a tissue volume in the shape of a cube. ***SAR for hands, wrists, feet and ankles*** is averaged over any 10 grams of tissue defined as a tissue volume in the shape of a cube.

Occupational/Controlled Environments:

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

General Population/Uncontrolled Environments:

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

NOTE
TRUNK LIMIT
1.6 W/kg
APPLIED TO THIS EUT

1.2. Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) found during testing for MDP1221 are as follows.

Band	Equipment Class -Highest Reported SAR (W/kg)
	1-g Body
WLAN 2.4G	1.245
WLAN 5.2G	1.107
WLAN 5.3G	1.319
WLAN 5.6G	1.151
WLAN 5.8G	1.212
Bluetooth	0.118

Note: The Max Simultaneous Tx is calculated based on the same configuration and test position.
This device is in compliance with Specific Absorption Rate (SAR) for general population/uncontrolled exposure limits (1.6 W/kg) specified in FCC 47 CFR Part 2(2.1093) and ANSI/IEEE C95.1-1992, and had been tested in accordance with the measurement methods and procedures specified in IEEE Std 1528-2013 & KDB 865664 D01.

1.3. EUT Description

Device Information			
Product Name	Magic Drawing Pad		
Trade Name	XPPen		
Model Name	MDP1221		
Family Model	MDP1220, MDP1222, MDP1223, MDP1225		
Model Difference	All models are the same circuit and RF module, except for model names.		
FCC ID	2AKDT-MDP1221		
Device Phase	Identical Prototype		
Exposure Category	General population / Uncontrolled environment		
Antenna	PIFA Antenna		
Battery	Typical Capacity: DC 3.85V, 8000mAh, 30.80Wh Rated Capacity: DC 3.85V, 7800mAh, 30.03Wh		
Hardware version	05		
Software version	v1L11-H		
Device Operating Configurations			
Supporting Mode(s)	WLAN 2.4G/5G, Bluetooth		
Test Modulation	WLAN(DSSS/OFDM), Bluetooth(GFSK, π/4-DQPSK, 8DPSK)		
Operating Frequency Range(s)	Band	Tx (MHz)	Rx (MHz)
	WLAN 2.4G	2412-2462	
	WLAN 5.2G	5180-5240	
	WLAN 5.3G	5260-5320	
	WLAN 5.6G	5500-5700	
	WLAN 5.8G	5745-5825	

	Bluetooth	2402-2480

1.4. Test specification(s)

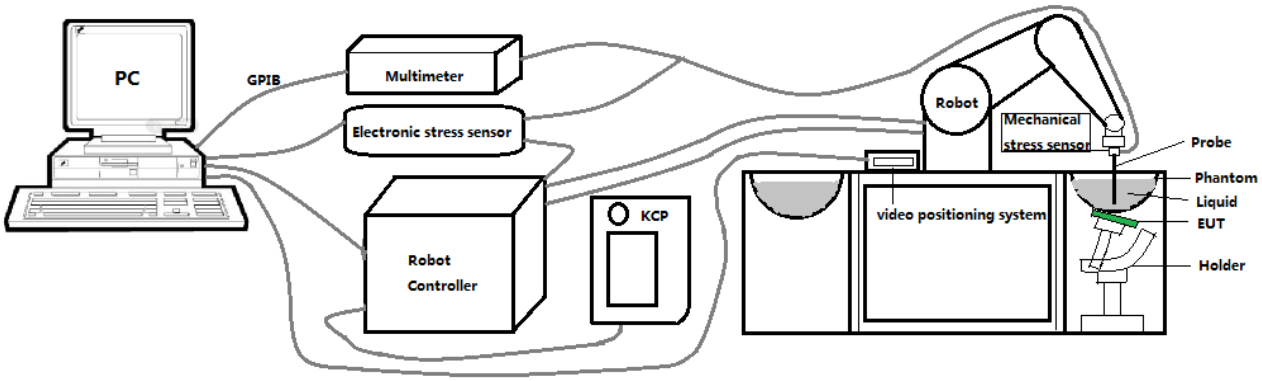
FCC 47 CFR Part 2(2.1093)
ANSI/IEEE C95.1-1992
IEEE Std 1528-2013
KDB 865664 D01 SAR measurement 100 MHz to 6 GHz
KDB 865664 D02 RF Exposure Reporting
KDB 447498 D01 General RF Exposure Guidance
KDB 248227 D01 802.11 Wi-Fi SAR
KDB 616217 D04 SAR for laptop and tablets

1.5. Ambient Condition

Ambient temperature	20°C – 24°C
Relative Humidity	30% – 70%

2. SAR Measurement System

2.1. SATIMO SAR Measurement Set-up Diagram



These measurements were performed with the automated near-field scanning system OPENSAR from SATIMO. The system is based on a high precision robot (working range: 901 mm), which positions the probes with a positional repeatability of better than ±0.03 mm. The SAR measurements were conducted with dosimetric probe (manufactured by SATIMO), designed in the classical triangular configuration and optimized for dosimetric evaluation.

The first step of the field measurement is the evaluation of the voltages induced on the probe by the device under test. Probe diode detectors are nonlinear. Below the diode compression point, the output voltage is proportional to the square of the applied E-field; above the diode compression point, it is linear to the applied E-field. The compression point depends on the diode, and a calibration procedure is necessary for each sensor of the probe.

The Keithley multimeter reads the voltage of each sensor and send these three values to the PC. The corresponding E field value is calculated using the probe calibration factors, which are stored in the working directory. This evaluation includes linearization of the diode characteristics. The field calculation is done separately for each sensor. Each component of the E field is displayed on the "Dipole Area Scan Interface" and the total E field is displayed on the "3D Interface"

2.2. Robot

The SATIMO SAR system uses the high precision robots from KUKA. For the 6-axis controller system, the robot controller version (KUKA) from KUKA is used. The KUKA robot series have many features that are important for our application:

- High precision (repeatability ±0.03 mm)
- High reliability (industrial design)
- Jerk-free straight movements
- Low ELF interference (the closed metallic construction shields against motor control fields)

2.3. E-Field Probe

This E-field detection probe is composed of three orthogonal dipoles linked to special Schottky diodes with low detection thresholds. The probe allows the measurement of electric fields in liquids such as the one defined in the IEEE and CENELEC standards.

For the measurements the Specific Dosimetric E-Field Probe SN 08/16 4024-EPGO-442 with following specifications is used

- Dynamic range: 0.01-100 W/kg
- Tip Diameter : 2.5 mm
- Distance between probe tip and sensor center: 1 mm
- Distance between sensor center and the inner phantom surface: 2 mm (repeatability better than ±1 mm).
- Probe linearity: ±0.08 dB
- Axial isotropy: ±0.01 dB
- Hemispherical Isotropy: ±0.01 dB
- Calibration range: 650MHz to 5900MHz for head & body simulating liquid.
- Lower detection limit: 8mW/kg

Angle between probe axis (evaluation axis) and surface normal line: less than 30°.

2.3.1. E-Field Probe Calibration

Each probe needs to be calibrated according to a dosimetric assessment procedure with accuracy better than ±10%. The spherical isotropy shall be evaluated and within ±0.25dB. The sensitivity parameters (Norm X, Norm Y, and Norm Z), the diode compression parameter (DCP) and the conversion factor (Conv F) of the probe are tested. The calibration data can be referred to appendix D of this report.

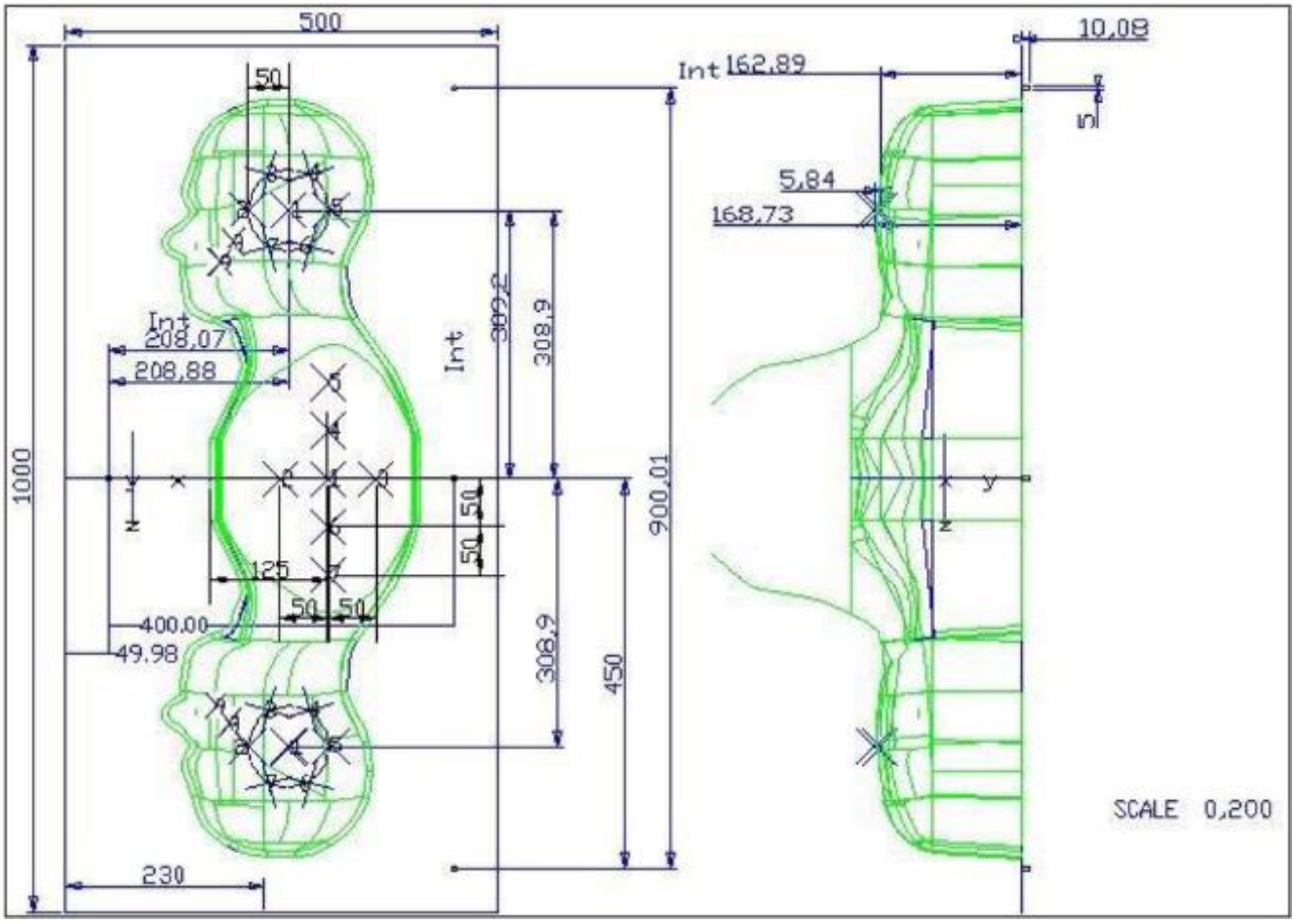
2.4. SAM phantoms

Photo of SAM phantom SN 16/15 SAM119

The SAM phantom is used to measure the SAR relative to people exposed to electro-magnetic field radiated by mobile phones.

2.4.1. Technical Data

Serial Number	Shell thickness	Filling volume	Dimensions	Positionner Material	Permittivity	Loss Tangent
SN 16/15 SAM119	2 mm ±0.2 mm	27 liters	Length:1000 mm Width:500 mm Height:200 mm	Gelcoat with fiberglass	3.4	0.02

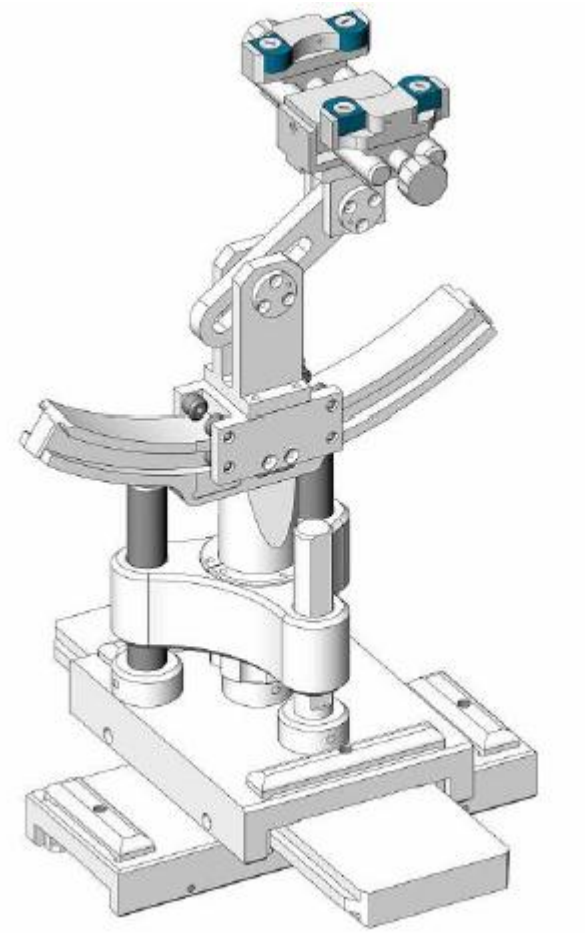


Serial Number	Left Head(mm)		Right Head(mm)		Flat Part(mm)	
SN 16/15 SAM119	2	2.02	2	2.08	1	2.09
	3	2.05	3	2.06	2	2.06
	4	2.07	4	2.07	3	2.08
	5	2.08	5	2.08	4	2.10
	6	2.05	6	2.07	5	2.10
	7	2.05	7	2.05	6	2.07
	8	2.07	8	2.06	7	2.07
	9	2.08	9	2.06	-	-

The test, based on ultrasonic system, allows measuring the thickness with an accuracy of 10 µm.

2.5. Device Holder

The positioning system allows obtaining cheek and tilting position with a very good accuracy. In compliance with CENELEC, the tilt angle uncertainty is lower than 1 degree.



Serial Number	Holder Material	Permittivity	Loss Tangent
SN 16/15 MSH100	Delrin	3.7	0.005

2.6. Test Equipment List

This table gives a complete overview of the SAR measurement equipment.

Devices used during the test described are marked ☒

	Manufacturer	Name of Equipment	Type/Model	Serial Number	Calibration	
					Last Cal.	Due Date
☒	MVG	E FIELD PROBE	SSE2	4024-EPGO-442	Oct.4.2024	Oct.3.2025
☐	MVG	750 MHz Dipole	SID750	SN 03/15 DIP 0G750-355	Feb. 21, 2024	Feb. 20, 2027
☐	MVG	835 MHz Dipole	SID835	SN 03/15 DIP 0G835-347	Feb. 21, 2024	Feb. 20, 2027
☐	MVG	900 MHz Dipole	SID900	SN 03/15 DIP 0G900-348	Feb. 21, 2024	Feb. 20, 2027
☐	MVG	1800 MHz Dipole	SID1800	SN 03/15 DIP 1G800-349	Feb. 21, 2024	Feb. 20, 2027
☐	MVG	1900 MHz Dipole	SID1900	SN 03/15 DIP 1G900-350	Feb. 21, 2024	Feb. 20, 2027
☐	MVG	2000 MHz Dipole	SID2000	SN 03/15 DIP 2G000-351	Feb. 21, 2024	Feb. 20, 2027
☒	MVG	2450 MHz Dipole	SID2450	SN 03/15 DIP 2G450-352	Feb. 21, 2024	Feb. 20, 2027
☐	MVG	2600 MHz Dipole	SID2600	SN 03/15 DIP 2G600-356	Feb. 21, 2024	Feb. 20, 2027
☒	MVG	5000 MHz Dipole	SWG5500	SN 13/14 WGA 33	Feb. 21, 2024	Feb. 20, 2027
☒	MVG	Liquid measurement Kit	SCLMP	SN 21/15 OCPG 72	NCR	NCR
☒	MVG	Power Amplifier	N.A	AMPLISAR_28/14_003	NCR	NCR
☒	KEITHLEY	Millivoltmeter	2000	4072790	Nov. 29, 2024	Nov. 28, 2025
☒	R&S	Universal radio communication tester	CMU200	105747	Apr. 26, 2024	Apr. 25, 2025
☒	R&S	Wideband radio communication tester	CMW500	103917	Apr. 26, 2024	Apr. 25, 2025
☒	HP	Network	E5071C	LPS-461	Oct. 15,	Oct. 14,

		Analyzer			2024	2025
☒	Agilent	MXG Vector Signal Generator	N5182A	MY47070317	Apr. 25, 2024	Apr. 24, 2025
☒	Agilent	Power meter	E4419B	MY45102538	Apr. 25, 2024	Apr. 24, 2025
☒	Agilent	Power sensor	E9301A	MY41495644	May. 30, 2024	May. 29, 2025
☒	Agilent	Power sensor	E9301A	US39212148	Apr. 25, 2024	Apr. 24, 2025
☒	MCLI/USA	Directional Coupler	CB11-20	0D2L51502	Apr. 26, 2024	Apr. 25, 2027
☒	N/A	Thermometer	N/A	LES-085	Mar. 27, 2023	Mar. 26, 2026
☒	MVG	SAM Phantom	SSM2	SN 16/15 SAM119	NCR	NCR
☒	MVG	Device Holder	SMPPD	SN 16/15 MSH100	NCR	NCR

Measurement Software

Manufacturer	Software Name	Software Version
SATIMO	OpenSAR	V4_02_31

3. SAR Measurement Procedures

The measurement procedures are as follows:

<Conducted power measurement>

(a) For WWAN power measurement, use base station simulator to configure EUT WWAN transmission in conducted connection with RF cable, at maximum power in each supported wireless interface and frequency band.

(b) Read the WWAN RF power level from the base station simulator.

(c) For WLAN/Bluetooth power measurement, use engineering software to configure EUT WLAN/Bluetooth continuously transmission, at maximum RF power in each supported wireless interface and frequency band.

(d) Connect EUT RF port through RF cable to the power meter, and measure WLAN/Bluetooth output power.

<SAR measurement>

(a) Use base station simulator to configure EUT WWAN transmission in radiated connection, and engineering software to configure EUT WLAN/Bluetooth continuously transmission, at maximum RF power, in the highest power channel.

(b) Place the EUT in the positions as Appendix A demonstrates.

(c) Set scan area, grid size and other setting on the OPENSAR software.

(d) Measure SAR results for the highest power channel on each testing position.

(e) Find out the largest SAR result on these testing positions of each band.

(f) Measure SAR results for other channels in worst SAR testing position if the reported SAR of highest power channel is larger than 0.8 W/kg.

According to the test standard, the recommended procedure for assessing the peak spatial-average SAR value consists of the following steps:

(a) Power reference measurement

(b) Area scan

(c) Zoom scan

(d) Power drift measurement

3.1. Power Reference

The Power Reference Measurement and Power Drift Measurements are for monitoring the power drift of the device under test in the batch process. The minimum distance of probe sensors to surface determines the closest measurement point to phantom surface. This distance cannot be smaller than the distance of sensor calibration points to probe tip as defined in the probe properties.

3.2. Area scan & Zoom scan

The area scan is a 2D scan to find the hot spot location on the DUT. The zoom scan is a 3D scan above the hot spot to calculate the 1g and 10g SAR value.

Measurement of the SAR distribution with a grid of 8 to 16 mm * 8 to 16 mm and a constant distance to the inner surface of the phantom. Since the sensors cannot directly measure at the inner phantom surface, the values between the sensors and the inner phantom surface are extrapolated. With these values the area of the maximum SAR is calculated by an interpolation scheme. Around this point, a cube of 30 * 30 *30 mm or 32 * 32 * 32 mm is assessed by measuring 5 or 8 * 5 or 8 * 4 or 5 mm. With these data, the peak spatial-average SAR value can be calculated.

From the scanned SAR distribution, identify the position of the maximum SAR value, in addition identify the positions of any local maxima with SAR values within 2 dB of the maximum value that will not be within the zoom scan of other peaks; additional peaks shall be measured only when the primary peak is within 2 dB of the SAR compliance limit (e.g., 1 W/kg for 1,6 W/kg 1 g limit, or 1,26 W/kg for 2 W/kg, 10 g limit).

Area scan & Zoom scan scan parameters extracted from FCC KDB 865664 D01 SAR measurement 100 MHz to 6 GHz.

<table>
<tr><td colspan="3"></td><td>≤ 3 GHz</td><td>> 3 GHz</td></tr>
<tr><td colspan="3">Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface</td><td>5 ± 1 mm</td><td>½·δ·ln(2) ± 0.5 mm</td></tr>
<tr><td colspan="3">Maximum probe angle from probe axis to phantom surface normal at the measurement location</td><td>30° ± 1°</td><td>20° ± 1°</td></tr>
<tr><td colspan="3" rowspan="2">Maximum area scan spatial resolution: Δx_{Area}, Δy_{Area}</td><td>≤ 2 GHz: ≤ 15 mm
2 – 3 GHz: ≤ 12 mm</td><td>3 – 4 GHz: ≤ 12 mm
4 – 6 GHz: ≤ 10 mm</td></tr>
<tr><td colspan="2">When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be ≤ the corresponding x or y dimension of the test device with at least one measurement point on the test device.</td></tr>
<tr><td colspan="3">Maximum zoom scan spatial resolution: Δx_{Zoom}, Δy_{Zoom}</td><td>≤ 2 GHz: ≤ 8 mm
2 – 3 GHz: ≤ 5 mm*</td><td>3 – 4 GHz: ≤ 5 mm*
4 – 6 GHz: ≤ 4 mm*</td></tr>
<tr><td rowspan="3">Maximum zoom scan spatial resolution, normal to phantom surface</td><td colspan="2">uniform grid: $\Delta z_{Zoom}(n)$</td><td>≤ 5 mm</td><td>3 – 4 GHz: ≤ 4 mm
4 – 5 GHz: ≤ 3 mm
5 – 6 GHz: ≤ 2 mm</td></tr>
<tr><td rowspan="2">graded grid</td><td>$\Delta z_{Zoom}(1)$: between 1st two points closest to phantom surface</td><td>≤ 4 mm</td><td>3 – 4 GHz: ≤ 3 mm
4 – 5 GHz: ≤ 2.5 mm
5 – 6 GHz: ≤ 2 mm</td></tr>
<tr><td>$\Delta z_{Zoom}(n>1)$: between subsequent points</td><td colspan="2">≤ 1.5·$\Delta z_{Zoom}(n-1)$</td></tr>
<tr><td>Minimum zoom scan volume</td><td colspan="2">x, y, z</td><td>≥ 30 mm</td><td>3 – 4 GHz: ≥ 28 mm
4 – 5 GHz: ≥ 25 mm
5 – 6 GHz: ≥ 22 mm</td></tr>
<tr><td colspan="5">Note: δ is the penetration depth of a plane-wave at normal incidence to the tissue medium; see draft standard IEEE P1528-2011 for details.
* When zoom scan is required and the <u>reported</u> SAR from the area scan based 1-g SAR estimation procedures of KDB 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.</td></tr>
</table>

3.3. Description of interpolation/extrapolation scheme

The local SAR inside the phantom is measured using small dipole sensing elements inside a probe body. The probe tip must not be in contact with the phantom surface in order to minimise measurements errors, but the highest local SAR will occur at the surface of the phantom.
An extrapolation is using to determinate this highest local SAR values. The extrapolation is based on a fourth-order least-square polynomial fit of measured data. The local SAR value is then extrapolated from the liquid surface with a 1 mm step.
The measurements have to be performed over a limited time (due to the duration of the battery) so the step of measurement is high. It could vary between 5 and 8 mm. To obtain an accurate assessment of the maximum SAR averaged over 10 grams and 1 gram requires a very fine resolution in the three dimensional scanned data array.

3.4. Volumetric Scan

The volumetric scan consists to a full 3D scan over a specific area. This 3D scan is useful form multi Tx SAR measurement. Indeed, it is possible with OpenSAR to add, point by point, several volumetric scan to calculate the SAR value of the combined measurement as it is define in the standard IEEE1528 and IEC62209.

3.5. Power Drift

All SAR testing is under the EUT install full charged battery and transmit maximum output power. In OpenSAR measurement software, the power reference measurement and power drift measurement procedures are used for monitoring the power drift of EUT during SAR test. Both these procedures measure the field at a specified reference position before and after the SAR testing. The software will calculate the field difference in V/m. If the power drifts more than ±5%, the SAR will be retested.

4. System Verification Procedure

4.1. Tissue Verification

The following tissue formulations are provided for reference only as some of the parameters have not been thoroughly verified. The composition of ingredients may be modified accordingly to achieve the desired target tissue parameters required for routine SAR evaluation.

Ingredients (% of weight)	Head Tissue								
Frequency Band (MHz)	750	835	900	1800	1900	2000	2450	2600	5000
Water	34.40	34.40	34.40	55.36	55.36	71.88	71.88	71.88	65.53
NaCl	0.79	0.79	0.79	0.35	0.35	0.16	0.16	0.16	0.00
1,2-Propanediol	64.81	64.81	64.81	0.00	0.00	0.00	0.00	0.00	0.00
Triton X-100	0.00	0.00	0.00	30.45	30.45	19.97	19.97	19.97	17.24
DGBE	0.00	0.00	0.00	13.84	13.84	7.99	7.99	7.99	0.00

For SAR measurement of the field distribution inside the phantom, the phantom must be filled with homogeneous tissue simulating liquid to a depth of at least 15 cm. For head SAR testing, the liquid depth from the ear reference point (ERP) of the phantom to the liquid top surface is larger than 15 cm.

Photo of Liquid depth for Head Position	Photo of Liquid depth for Body Position
	

4.1.1. Tissue Dielectric Parameter Check Results

The simulating liquids should be checked at the beginning of a series of SAR measurements to determine of the dielectric parameter are within the tolerances of the specified target values. The measured conductivity and relative permittivity should be within ±5% of the target values.

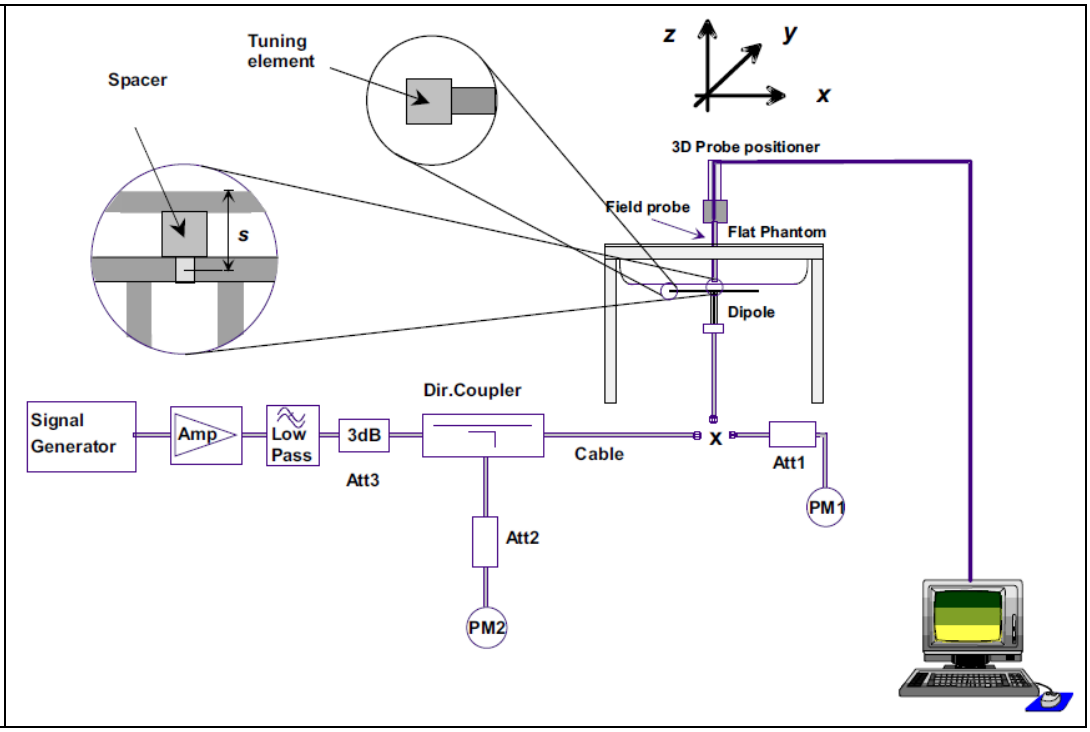
Tissue Type	Measured Frequency (MHz)	Target Tissue		Measured Tissue		Delta(%)		Liquid Temp.	Test Date
		εr	σ (S/m)	εr	σ (S/m)	εr	σ (S/m)		
Head 2450	2450	39.20	1.80	37.68	1.77	-3.88	-1.67	21.7 °C	Jan. 08, 2025
Head 5200	5200	36.00	4.66	34.85	4.55	-3.19	-2.36	21.3 °C	Jan. 10, 2025
Head 5200	5200	36.00	4.66	37.43	4.62	3.97	-0.86	21.6 °C	Jan. 11, 2025
Head 5400	5400	35.80	4.86	34.20	4.77	-4.47	-1.85	21.6 °C	Jan. 11, 2025
Head 5600	5600	35.50	5.07	34.27	4.90	-3.46	-3.35	21.4 °C	Jan. 12, 2025
Head 5800	5800	35.30	5.27	34.00	5.11	-3.68	-3.04	21.2 °C	Jan. 09, 2025

NOTE: The dielectric parameters of the tissue-equivalent liquid should be measured under similar ambient conditions and within 2 °C of the conditions expected during the SAR evaluation to satisfy protocol requirements.

4.2. System Verification Procedure

The system verification is performed for verifying the accuracy of the complete measurement system and performance of the software. 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. To adjust this power a power meter is used. The power sensor is connected to the cable before the system verification 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 system verification 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).

The system verification is shown as below picture:



4.2.1. System Verification Results

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

System Verification	Target SAR (1W)		Measured SAR			Measured SAR (Normalized to 1W)		Delta (%)		Liquid Temp.	Test Date
	1-g (W/Kg)	10-g (W/Kg)	Input Power (mW)	1-g (W/Kg)	10-g (W/Kg)	1-g (W/Kg)	10-g (W/Kg)	1-g (%)	10-g (%)		
2450MHz	50.05	23.80	100.00	5.174	2.214	51.74	22.14	3.38	-6.97	21.7 °C	Jan. 08, 2025
5200MHz	162.59	56.21	10.00	1.647	0.605	164.70	60.50	1.30	7.63	21.3 °C	Jan. 10, 2025
5200MHz	182.20	61.32	10.00	1.763	0.602	176.30	60.20	-3.24	-1.83	21.6 °C	Jan. 11, 2025
5400MHz	159.81	55.00	10.00	1.554	0.577	155.40	57.70	-2.76	4.91	21.6 °C	Jan. 11, 2025
5600MHz	179.15	61.01	10.00	1.690	0.636	169.00	63.60	-5.67	4.25	21.4 °C	Jan. 12, 2025
5800MHz	182.20	61.32	10.00	1.700	0.583	170.00	58.30	-6.70	-4.92	21.2 °C	Jan. 09, 2025

5. SAR Measurement variability and uncertainty

5.1. SAR measurement variability

Per KDB865664 D01 SAR measurement 100 MHz to 6 GHz, SAR measurement variability must be assessed for each frequency band, which is determined by the SAR probe calibration point and tissue-equivalent medium used for the device measurements. The additional measurements are repeated after the completion of all measurements requiring the same head or body tissue-equivalent medium in a frequency band. The test device should be returned to ambient conditions (normal room temperature) with the battery fully charged before it is re-mounted on the device holder for the repeated measurement(s) to minimize any unexpected variations in the repeated results.

1) Repeated measurement is not required when the original highest measured SAR is < 0.80 W/kg; steps 2) through 4) do not apply.

2) When the original highest measured SAR is ≥ 0.80 W/kg, repeat that measurement once.

3) Perform a second repeated measurement only if the ratio of largest to smallest SAR for the original and first repeated measurements is > 1.20 or when the original or repeated measurement is ≥ 1.45 W/kg (~ 10% from the 1-g SAR limit).

4) Perform a third repeated measurement only if the original, first or second repeated measurement is ≥1.5 W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20.

5.2. SAR measurement uncertainty

Per KDB865664 D01 SAR Measurement 100 MHz to 6 GHz, when the highest measured 1-g SAR within a frequency band is < 1.5 W/kg, the extensive SAR measurement uncertainty analysis described in IEEE Std 1528-2013 is not required in SAR reports submitted for equipment approval. The equivalent ratio (1.5/1.6) is applied to extremity and occupational exposure conditions.

6. RF Exposure Positions

6.1. Tablet host platform exposure conditions

Refer to KDB616217 D04, when the modular approach is used, transmitters and modules must be initially tested for standalone operations in generic host conditions according to the following minimum test separation distance and antenna installation requirements for incorporation in the tablet platform. The separation distance required for incorporation in qualified hosts is described in KDB 447498; item 5) of section 4.1 and item 1) of section 5.2.2 etc.

- ≤ 5 mm between the antenna and user for both back surface and edge exposure conditions
- the antennas used by the host must have been tested for equipment approval or qualify for SAR test exclusion
- the antenna polarization, physical orientation, rotation and installation configurations used by the host must have been tested for compliance or qualify for test exclusion
- when the *SAR Test Exclusion Threshold* in KDB 447498 applies, a *test separation distance* of 5 mm is required to determine test exclusion for the tablet platform

The antennas embedded in tablets are typically ≤ 5mm from the outer housing. The required antenna to user test separation distance is a “not to exceed test” distance required to apply the modular approach. Instead of the typical zero gap tablet edge test requirement between the edge of a tablet and the user, when an antenna has been tested at ≤ 5 mm according to the modular approach it can be incorporated into tablets with at least twice the tested distance from the outer housing of the tablet edge; otherwise, the tablet edge zero gap test requirement applies. When the dedicated host approach is applied, the back surface and edges of the tablet should be tested for SAR compliance with the tablet touching the phantom.

7. RF Output Power

7.1. WLAN & Bluetooth Output Power

7.1.1. Output Power Results Of WLAN

Mode	Channel	Frequency (MHz)	Tune-up	Output Power (dBm)
802.11b	1	2412	17.50	15.69
	6	2437	17.50	16.56
	11	2462	17.50	15.87
802.11g	1	2412	17.50	15.86
	6	2437	17.50	17.14
	11	2462	17.50	15.94
802.11n (HT20)	1	2412	15.00	12.83
	6	2437	15.00	14.56
	11	2462	15.00	12.94
802.11n (HT40)	3	2422	14.50	12.68
	6	2437	14.50	14.29
	9	2452	14.50	12.83

NOTE: Power measurement results of WLAN 2.4G.

Mode	Channel	Frequency (MHz)	Tune-up	Output Power (dBm)
802.11a	36	5180	18.50	16.86
	40	5200	18.50	18.34
	48	5240	18.50	18.46
802.11n HT20	36	5180	17.00	15.54
	40	5200	17.00	16.47
	48	5240	17.00	16.59
802.11n HT40	38	5190	14.50	12.48
	46	5230	14.50	14.04
802.11ac VHT20	36	5180	16.50	15.48
	40	5200	16.50	16.23
	48	5240	16.50	16.46
802.11ac VHT40	38	5190	14.50	12.86
	46	5230	14.50	14.28
802.11ac VHT80	42	5210	13.00	12.54

NOTE: Power measurement results of WLAN 5.2G.

Mode	Channel	Frequency (MHz)	Tune-up	Output Power (dBm)
802.11a	52	5260	18.50	18.45
	56	5280	18.50	18.23
	64	5320	18.50	16.89
802.11n (HT20)	52	5260	18.50	18.32
	56	5280	18.50	18.19
	64	5320	18.50	16.74
802.11n (HT40)	54	5270	15.00	14.65
	62	5310	15.00	12.71
802.11ac (VHT20)	52	5260	18.50	18.38
	56	5280	18.50	18.22
	64	5320	18.50	16.67
802.11ac (VHT40)	54	5270	15.00	14.75
	62	5310	15.00	12.69
802.11ac (VHT80)	58	5290	13.00	12.78

NOTE: Power measurement results of WLAN 5.3G.

Mode	Channel	Frequency (MHz)	Tune-up	Output Power (dBm)
802.11a	100	5500	16.00	14.49
	120	5600	16.00	15.55
	140	5700	16.00	14.36
802.11n (HT20)	100	5500	15.50	14.45
	120	5600	15.50	15.41
	140	5700	15.50	14.24
802.11n (HT40)	102	5510	15.50	13.19
	118	5590	15.50	14.53
	134	5670	15.50	15.34
802.11ac (VHT20)	100	5500	15.50	14.48
	120	5600	15.50	15.47
	140	5700	15.50	14.28
802.11ac (VHT40)	102	5510	15.50	13.39
	118	5590	15.50	14.57
	134	5670	15.50	15.23
802.11ac (VHT80)	106	5530	13.50	12.12
	122	5610	13.50	13.24

NOTE: Power measurement results of WLAN 5.6G.

Mode	Channel	Frequency (MHz)	Tune-up (dBm)	Output Power (dBm)
802.11a	149	5745	17.50	17.14
	157	5785	18.00	17.84
	165	5825	17.50	17.40
802.11n HT20	149	5745	18.00	17.05
	157	5785	18.00	17.72
	165	5825	18.00	17.59
802.11n HT40	151	5755	18.00	17.67
	159	5795	18.00	17.40
802.11ac VHT20	149	5745	17.50	17.08
	157	5785	17.50	17.22
	165	5825	17.50	17.26
802.11ac VHT40	151	5755	17.50	17.08
	159	5795	17.50	17.34
802.11ac VHT80	155	5775	17.50	17.26

NOTE: Power measurement results of WLAN 5.8G.

P-Sensor Power

Mode	Channel	Frequency (MHz)	Tune-up	Output Power (dBm)
802.11b	1	2412	9.00	8.45
	6	2437	9.00	8.71
	11	2462	9.00	8.63
802.11g	1	2412	9.00	8.84
	6	2437	9.00	8.25
	11	2462	9.00	7.54
802.11n (HT20)	1	2412	8.00	7.58
	6	2437	8.00	7.47
	11	2462	8.00	7.42
802.11n (HT40)	3	2422	7.00	6.35
	6	2437	7.00	6.72
	9	2452	7.00	6.57

NOTE: Power measurement results of WLAN 2.4G.

Mode	Channel	Frequency (MHz)	Tune-up	Output Power (dBm)
802.11a	36	5180	6.00	5.21

	40	5200	6.00	5.64
	48	5240	6.00	5.51
802.11n HT20	36	5180	5.50	5.08
	40	5200	5.50	5.14
	48	5240	5.50	5.29
802.11n HT40	38	5190	5.50	5.28
	46	5230	5.50	5.17
802.11ac VHT20	36	5180	5.50	5.42
	40	5200	5.50	5.23
	48	5240	5.50	5.32
802.11ac VHT40	38	5190	4.00	3.74
	46	5230	4.00	3.82
802.11ac VHT80	42	5210	4.00	3.61

NOTE: Power measurement results of WLAN 5.2G.

Mode	Channel	Frequency (MHz)	Tune-up	Output Power (dBm)
802.11a	52	5260	6.00	5.57
	56	5280	6.00	5.53
	64	5320	6.00	5.68
802.11n (HT20)	52	5260	5.50	5.42
	56	5280	5.50	5.38
	64	5320	5.50	5.12
802.11n (HT40)	54	5270	5.00	4.75
	62	5310	5.00	4.37
802.11ac (VHT20)	52	5260	6.00	5.66
	56	5280	6.00	5.53
	64	5320	6.00	5.51
802.11ac (VHT40)	54	5270	5.50	5.17
	62	5310	5.50	5.25
802.11ac (VHT80)	58	5290	4.50	4.06

NOTE: Power measurement results of WLAN 5.3G.

Mode	Channel	Frequency (MHz)	Tune-up	Output Power (dBm)
802.11a	100	5500	5.00	4.51
	120	5600	5.00	4.58
	140	5700	5.00	4.43

802.11n (HT20)	100	5500	5.00	4.52
	120	5600	5.00	4.63
	140	5700	5.00	4.52
802.11n (HT40)	102	5510	5.00	4.42
	118	5590	5.00	4.57
	134	5670	5.00	4.57
802.11ac (VHT20)	100	5500	5.00	4.52
	120	5600	5.00	4.35
	140	5700	5.00	4.57
802.11ac (VHT40)	102	5510	5.00	4.56
	118	5590	5.00	4.35
	134	5670	5.00	4.63
802.11ac (VHT80)	106	5530	4.00	3.18
	122	5610	4.00	3.54

NOTE: Power measurement results of WLAN 5.6G.

Mode	Channel	Frequency (MHz)	Tune-up	Output Power (dBm)
802.11a	149	5745	4.00	3.86
	157	5785	4.00	3.81
	165	5825	4.00	3.72
802.11n HT20	149	5745	4.00	3.78
	157	5785	4.00	3.82
	165	5825	4.00	3.71
802.11n HT40	151	5755	4.00	3.72
	159	5795	4.00	3.68
802.11ac VHT20	149	5745	3.50	3.31
	157	5785	3.50	3.28
	165	5825	3.50	3.49
802.11ac VHT40	151	5755	3.50	3.32
	159	5795	3.50	3.38
802.11ac VHT80	155	5775	3.50	3.31

NOTE: Power measurement results of WLAN 5.8G.

7.1.2. Output Power Results Of Bluetooth

BR+EDR	Output Power (dBm)		
	Data	Tune-up	Channel

	Rates	(dBm)	0CH	39CH	78CH
	1M	5.00	4.74	3.90	2.89
	2M	4.00	3.95	3.10	2.18
	3M	4.00	3.97	3.13	2.19

BLE	Output Power (dBm)				
	Data Rates	Tune-up (dBm)	Channe		
			0CH	19CH	39CH
	1M	5.00	3.80	4.48	3.22
	2M	5.00	4.22	4.82	4.02

7.2. Proximity Sensor Considerations

7.2.1. Proximity sensor triggering distances

WLAN 2.4G 802.11b CH6 Back Side						WLAN 2.4G 802.11b CH6 Right Side						WLAN 2.4G 802.11b CH6 Top Side					
Moved toward the phantom			Away from the phantom			Moved toward the phantom			Away from the phantom			Moved toward the phantom			Away from the phantom		
Gap (mm)	P sensor	Index	Gap (mm)	P sensor	Index	Gap (mm)	P sensor	Index	Gap (mm)	P sensor	Index	Gap (mm)	P sensor	Index	Gap (mm)	P sensor	Index
38	Inactive	0	0	Active	1	37	Inactive	0	0	Active	1	37	Inactive	0	0	Active	1
33	Inactive	0	3	Active	1	32	Inactive	0	3	Active	1	32	Inactive	0	1	Active	1
28	Inactive	0	6	Active	1	27	Inactive	0	6	Active	1	27	Inactive	0	4	Active	1
23	Inactive	0	9	Active	1	22	Inactive	0	9	Active	1	22	Inactive	0	7	Active	1
18	Inactive	0	10	Active	1	17	Inactive	0	10	Active	1	17	Inactive	0	10	Active	1
17	Inactive	0	11	Active	1	16	Inactive	0	11	Active	1	16	Inactive	0	11	Active	1
16	Inactive	0	12	Active	1	15	Inactive	0	12	Active	1	15	Inactive	0	12	Active	1
15	Inactive	0	13	Active	1	14	Inactive	0	13	Active	1	14	Inactive	0	13	Active	1
14	Inactive	0	14	Active	1	13	Inactive	0	14	Active	1	13	Inactive	0	14	Active	1
13	Active	1	15	Inactive	0	12	Active	1	15	Inactive	0	12	Active	1	15	Active	1
12	Active	1	16	Inactive	0	11	Active	1	16	Inactive	0	11	Active	1	16	Inactive	0
11	Active	1	17	Inactive	0	10	Active	1	17	Inactive	0	10	Active	1	17	Inactive	0
10	Active	1	18	Inactive	0	9	Active	1	18	Inactive	0	9	Active	1	18	Inactive	0
9	Active	1	19	Inactive	0	8	Active	1	19	Inactive	0	8	Active	1	19	Inactive	0
8	Active	1	24	Inactive	0	7	Active	1	24	Inactive	0	7	Active	1	20	Inactive	0
5	Active	1	29	Inactive	0	4	Active	1	29	Inactive	0	4	Active	1	25	Inactive	0
2	Active	1	34	Inactive	0	1	Active	1	34	Inactive	0	1	Active	1	30	Inactive	0
0	Active	1	39	Inactive	0	0	Active	1	39	Inactive	0	0	Active	1	35	Inactive	0
/	/	/	44	Inactive	0	/	/	/	44	Inactive	0	/	/	/	40	Inactive	0
/	/	/	49	Inactive	0	/	/	/	49	Inactive	0	/	/	/	45	Inactive	0
/	/	/	54	Inactive	0	/	/	/	54	Inactive	0	/	/	/	50	Inactive	0

/	/	/	59	Inactive	0	/	/	/	59	Inactive	0	/	/	/	55	Inactive	0
/	/	/	64	Inactive	0	/	/	/	64	Inactive	0	/	/	/	60	Inactive	0
/	/	/	69	Inactive	0	/	/	/	69	Inactive	0	/	/	/	65	Inactive	0
/	/	/	74	Inactive	0	/	/	/	74	Inactive	0	/	/	/	70	Inactive	0

WLAN 5.2G 802.11a CH40 Back Side						WLAN 5.2G 802.11a CH40 Right Side						WLAN 5.2G 802.11a CH40 Top Side					
Moved toward the phantom			Away from the phantom			Moved toward the phantom			Away from the phantom			Moved toward the phantom			Away from the phantom		
Gap (mm)	P sensor	Index	Gap (mm)	P sensor	Index	Gap (mm)	P sensor	Index	Gap (mm)	P sensor	Index	Gap (mm)	P sensor	Index	Gap (mm)	P sensor	Index
38	Inactive	0	0	Active	1	37	Inactive	0	0	Active	1	37	Inactive	0	0	Active	1
33	Inactive	0	3	Active	1	32	Inactive	0	1	Active	1	32	Inactive	0	3	Active	1
28	Inactive	0	6	Active	1	27	Inactive	0	4	Active	1	27	Inactive	0	6	Active	1
23	Inactive	0	9	Active	1	22	Inactive	0	7	Active	1	22	Inactive	0	9	Active	1
18	Inactive	0	10	Active	1	17	Inactive	0	10	Active	1	17	Inactive	0	10	Active	1
17	Inactive	0	11	Active	1	16	Inactive	0	11	Active	1	16	Inactive	0	11	Active	1
16	Inactive	0	12	Active	1	15	Inactive	0	12	Active	1	15	Inactive	0	12	Active	1
15	Inactive	0	13	Active	1	14	Inactive	0	13	Active	1	14	Inactive	0	13	Active	1
14	Inactive	0	14	Active	1	13	Inactive	0	14	Active	1	13	Inactive	0	14	Active	1
13	Active	1	15	Inactive	0	12	Active	1	15	Active	1	12	Active	1	15	Inactive	0
12	Active	1	16	Inactive	0	11	Active	1	16	Inactive	0	11	Active	1	16	Inactive	0
11	Active	1	17	Inactive	0	10	Active	1	17	Inactive	0	10	Active	1	17	Inactive	0
10	Active	1	18	Inactive	0	9	Active	1	18	Inactive	0	9	Active	1	18	Inactive	0
9	Active	1	19	Inactive	0	8	Active	1	19	Inactive	0	8	Active	1	19	Inactive	0
8	Active	1	24	Inactive	0	7	Active	1	20	Inactive	0	7	Active	1	24	Inactive	0
5	Active	1	29	Inactive	0	4	Active	1	25	Inactive	0	4	Active	1	29	Inactive	0
2	Active	1	34	Inactive	0	1	Active	1	30	Inactive	0	1	Active	1	34	Inactive	0
0	Active	1	39	Inactive	0	0	Active	1	35	Inactive	0	0	Active	1	39	Inactive	0
/	/	/	44	Inactive	0	/	/	/	40	Inactive	0	/	/	/	44	Inactive	0
/	/	/	49	Inactive	0	/	/	/	45	Inactive	0	/	/	/	49	Inactive	0
/	/	/	54	Inactive	0	/	/	/	50	Inactive	0	/	/	/	54	Inactive	0
/	/	/	59	Inactive	0	/	/	/	55	Inactive	0	/	/	/	59	Inactive	0
/	/	/	64	Inactive	0	/	/	/	60	Inactive	0	/	/	/	64	Inactive	0
/	/	/	69	Inactive	0	/	/	/	65	Inactive	0	/	/	/	69	Inactive	0
/	/	/	74	Inactive	0	/	/	/	70	Inactive	0	/	/	/	74	Inactive	0

WLAN 5.3G 802.11aCH56 Back Side		WLAN 5.3G 802.11a CH56 Right Side		WLAN 5.3G 802.11a CH56 Top Side	
Moved toward the phantom	Away from the phantom	Moved toward the phantom	Away from the phantom	Moved toward the phantom	Away from the phantom

Gap (mm)	P sensor	Index	Gap (mm)	P sensor	Index	Gap (mm)	P sensor	Index	Gap (mm)	P sensor	Index	Gap (mm)	P sensor	Index	Gap (mm)	P sensor	Index
38	Inactive	0	0	Active	1	37	Inactive	0	0	Active	1	37	Inactive	0	0	Active	1
33	Inactive	0	3	Active	1	32	Inactive	0	3	Active	1	32	Inactive	0	1	Active	1
28	Inactive	0	6	Active	1	27	Inactive	0	6	Active	1	27	Inactive	0	4	Active	1
23	Inactive	0	9	Active	1	22	Inactive	0	9	Active	1	22	Inactive	0	7	Active	1
18	Inactive	0	10	Active	1	17	Inactive	0	10	Active	1	17	Inactive	0	10	Active	1
17	Inactive	0	11	Active	1	16	Inactive	0	11	Active	1	16	Inactive	0	11	Active	1
16	Inactive	0	12	Active	1	15	Inactive	0	12	Active	1	15	Inactive	0	12	Active	1
15	Inactive	0	13	Active	1	14	Inactive	0	13	Active	1	14	Inactive	0	13	Active	1
14	Inactive	0	14	Active	1	13	Inactive	0	14	Active	1	13	Inactive	0	14	Active	1
13	Active	1	15	Inactive	0	12	Active	1	15	Inactive	0	12	Active	1	15	Active	1
12	Active	1	16	Inactive	0	11	Active	1	16	Inactive	0	11	Active	1	16	Inactive	0
11	Active	1	17	Inactive	0	10	Active	1	17	Inactive	0	10	Active	1	17	Inactive	0
10	Active	1	18	Inactive	0	9	Active	1	18	Inactive	0	9	Active	1	18	Inactive	0
9	Active	1	19	Inactive	0	8	Active	1	19	Inactive	0	8	Active	1	19	Inactive	0
8	Active	1	24	Inactive	0	7	Active	1	24	Inactive	0	7	Active	1	20	Inactive	0
5	Active	1	29	Inactive	0	4	Active	1	29	Inactive	0	4	Active	1	25	Inactive	0
2	Active	1	34	Inactive	0	1	Active	1	34	Inactive	0	1	Active	1	30	Inactive	0
0	Active	1	39	Inactive	0	0	Active	1	39	Inactive	0	0	Active	1	35	Inactive	0
/	/	/	44	Inactive	0	/	/	/	44	Inactive	0	/	/	/	40	Inactive	0
/	/	/	49	Inactive	0	/	/	/	49	Inactive	0	/	/	/	45	Inactive	0
/	/	/	54	Inactive	0	/	/	/	54	Inactive	0	/	/	/	50	Inactive	0
/	/	/	59	Inactive	0	/	/	/	59	Inactive	0	/	/	/	55	Inactive	0
/	/	/	64	Inactive	0	/	/	/	64	Inactive	0	/	/	/	60	Inactive	0
/	/	/	69	Inactive	0	/	/	/	69	Inactive	0	/	/	/	65	Inactive	0
/	/	/	74	Inactive	0	/	/	/	74	Inactive	0	/	/	/	70	Inactive	0

WLAN 5.6G 802.11a CH132 Back Side						WLAN 5.6G 802.11a CH132 Right Side						WLAN 5.6G 802.11a CH132 Top Side					
Moved toward the phantom			Away from the phantom			Moved toward the phantom			Away from the phantom			Moved toward the phantom			Away from the phantom		
Gap (mm)	P sensor	Index	Gap (mm)	P sensor	Index	Gap (mm)	P sensor	Index	Gap (mm)	P sensor	Index	Gap (mm)	P sensor	Index	Gap (mm)	P sensor	Index
38	Inactive	0	0	Active	1	37	Inactive	0	0	Active	1	37	Inactive	0	0	Active	1
33	Inactive	0	3	Active	1	32	Inactive	0	1	Active	1	32	Inactive	0	3	Active	1
28	Inactive	0	6	Active	1	27	Inactive	0	4	Active	1	27	Inactive	0	6	Active	1
23	Inactive	0	9	Active	1	22	Inactive	0	7	Active	1	22	Inactive	0	9	Active	1
18	Inactive	0	10	Active	1	17	Inactive	0	10	Active	1	17	Inactive	0	10	Active	1
17	Inactive	0	11	Active	1	16	Inactive	0	11	Active	1	16	Inactive	0	11	Active	1

16	Inactive	0	12	Active	1	15	Inactive	0	12	Active	1	15	Inactive	0	12	Active	1
15	Inactive	0	13	Active	1	14	Inactive	0	13	Active	1	14	Inactive	0	13	Active	1
14	Inactive	0	14	Active	1	13	Inactive	0	14	Active	1	13	Inactive	0	14	Active	1
13	Active	1	15	Inactive	0	12	Active	1	15	Active	1	12	Active	1	15	Inactive	0
12	Active	1	16	Inactive	0	11	Active	1	16	Inactive	0	11	Active	1	16	Inactive	0
11	Active	1	17	Inactive	0	10	Active	1	17	Inactive	0	10	Active	1	17	Inactive	0
10	Active	1	18	Inactive	0	9	Active	1	18	Inactive	0	9	Active	1	18	Inactive	0
9	Active	1	19	Inactive	0	8	Active	1	19	Inactive	0	8	Active	1	19	Inactive	0
8	Active	1	24	Inactive	0	7	Active	1	20	Inactive	0	7	Active	1	24	Inactive	0
5	Active	1	29	Inactive	0	4	Active	1	25	Inactive	0	4	Active	1	29	Inactive	0
2	Active	1	34	Inactive	0	1	Active	1	30	Inactive	0	1	Active	1	34	Inactive	0
0	Active	1	39	Inactive	0	0	Active	1	35	Inactive	0	0	Active	1	39	Inactive	0
/	/	/	44	Inactive	0	/	/	/	40	Inactive	0	/	/	/	44	Inactive	0
/	/	/	49	Inactive	0	/	/	/	45	Inactive	0	/	/	/	49	Inactive	0
/	/	/	54	Inactive	0	/	/	/	50	Inactive	0	/	/	/	54	Inactive	0
/	/	/	59	Inactive	0	/	/	/	55	Inactive	0	/	/	/	59	Inactive	0
/	/	/	64	Inactive	0	/	/	/	60	Inactive	0	/	/	/	64	Inactive	0
/	/	/	69	Inactive	0	/	/	/	65	Inactive	0	/	/	/	69	Inactive	0
/	/	/	74	Inactive	0	/	/	/	70	Inactive	0	/	/	/	74	Inactive	0

WLAN 5.8G 802.11n(HT20)CH157 Back Side						WLAN 5.8G 802.11n(HT20) CH157 Right Side						WLAN 5.8G 802.11n(HT20) CH157 Top Side					
Moved toward the phantom			Away from the phantom			Moved toward the phantom			Away from the phantom			Moved toward the phantom			Away from the phantom		
Gap (mm)	P sensor	Index	Gap (mm)	P sensor	Index	Gap (mm)	P sensor	Index	Gap (mm)	P sensor	Index	Gap (mm)	P sensor	Index	Gap (mm)	P sensor	Index
38	Inactive	0	0	Active	1	37	Inactive	0	0	Active	1	37	Inactive	0	0	Active	1
33	Inactive	0	3	Active	1	32	Inactive	0	3	Active	1	32	Inactive	0	1	Active	1
28	Inactive	0	6	Active	1	27	Inactive	0	6	Active	1	27	Inactive	0	4	Active	1
23	Inactive	0	9	Active	1	22	Inactive	0	9	Active	1	22	Inactive	0	7	Active	1
18	Inactive	0	10	Active	1	17	Inactive	0	10	Active	1	17	Inactive	0	10	Active	1
17	Inactive	0	11	Active	1	16	Inactive	0	11	Active	1	16	Inactive	0	11	Active	1
16	Inactive	0	12	Active	1	15	Inactive	0	12	Active	1	15	Inactive	0	12	Active	1
15	Inactive	0	13	Active	1	14	Inactive	0	13	Active	1	14	Inactive	0	13	Active	1
14	Inactive	0	14	Active	1	13	Inactive	0	14	Active	1	13	Inactive	0	14	Active	1
13	Active	1	15	Inactive	0	12	Active	1	15	Inactive	0	12	Active	1	15	Active	1
12	Active	1	16	Inactive	0	11	Active	1	16	Inactive	0	11	Active	1	16	Inactive	0
11	Active	1	17	Inactive	0	10	Active	1	17	Inactive	0	10	Active	1	17	Inactive	0
10	Active	1	18	Inactive	0	9	Active	1	18	Inactive	0	9	Active	1	18	Inactive	0
9	Active	1	19	Inactive	0	8	Active	1	19	Inactive	0	8	Active	1	19	Inactive	0

8	Active	1	24	Inactive	0	7	Active	1	24	Inactive	0	7	Active	1	20	Inactive	0
5	Active	1	29	Inactive	0	4	Active	1	29	Inactive	0	4	Active	1	25	Inactive	0
2	Active	1	34	Inactive	0	1	Active	1	34	Inactive	0	1	Active	1	30	Inactive	0
0	Active	1	39	Inactive	0	0	Active	1	39	Inactive	0	0	Active	1	35	Inactive	0
/	/	/	44	Inactive	0	/	/	/	44	Inactive	0	/	/	/	40	Inactive	0
/	/	/	49	Inactive	0	/	/	/	49	Inactive	0	/	/	/	45	Inactive	0
/	/	/	54	Inactive	0	/	/	/	54	Inactive	0	/	/	/	50	Inactive	0
/	/	/	59	Inactive	0	/	/	/	59	Inactive	0	/	/	/	55	Inactive	0
/	/	/	64	Inactive	0	/	/	/	64	Inactive	0	/	/	/	60	Inactive	0
/	/	/	69	Inactive	0	/	/	/	69	Inactive	0	/	/	/	65	Inactive	0
/	/	/	74	Inactive	0	/	/	/	74	Inactive	0	/	/	/	70	Inactive	0

7.2.2. Proximity sensor coverage range

This procedure is not required because antenna and sensor are collocated and the peak SAR location is overlapping with the sensor.

7.2.3. EUT tilt angle influences to proximity sensor triggering

WLAN 2.4G 802.11b CH6											
Right side of the DUT is positioned perpendicularly to the phantom with Gap(11mm)						Top side of the DUT is positioned perpendicularly to the phantom with Gap(11mm)					
Tilt angle (°)	P sensor	Index	Tilt angle (°)	P sensor	Index	Tilt angle (°)	P sensor	Index	Tilt angle (°)	P sensor	Index
0	Active	1	0	Active	1	0	Active	1	0	Active	1
10	Active	1	-10	Active	1	10	Active	1	-10	Active	1
20	Active	1	-20	Active	1	20	Active	1	-20	Active	1
30	Active	1	-30	Active	1	30	Active	1	-30	Active	1
40	Active	1	-40	Active	1	40	Active	1	-40	Active	1
45	Active	1	-45	Active	1	45	Active	1	-45	Active	1

WLAN 5.2G 802.11a CH40											
Right side of the DUT is positioned perpendicularly to the phantom with Gap(11mm)						Top side of the DUT is positioned perpendicularly to the phantom with Gap(11mm)					
Tilt angle (°)	P sensor	Index	Tilt angle (°)	P sensor	Index	Tilt angle (°)	P sensor	Index	Tilt angle (°)	P sensor	Index
0	Active	1	0	Active	1	0	Active	1	0	Active	1
10	Active	1	-10	Active	1	10	Active	1	-10	Active	1
20	Active	1	-20	Active	1	20	Active	1	-20	Active	1
30	Active	1	-30	Active	1	30	Active	1	-30	Active	1

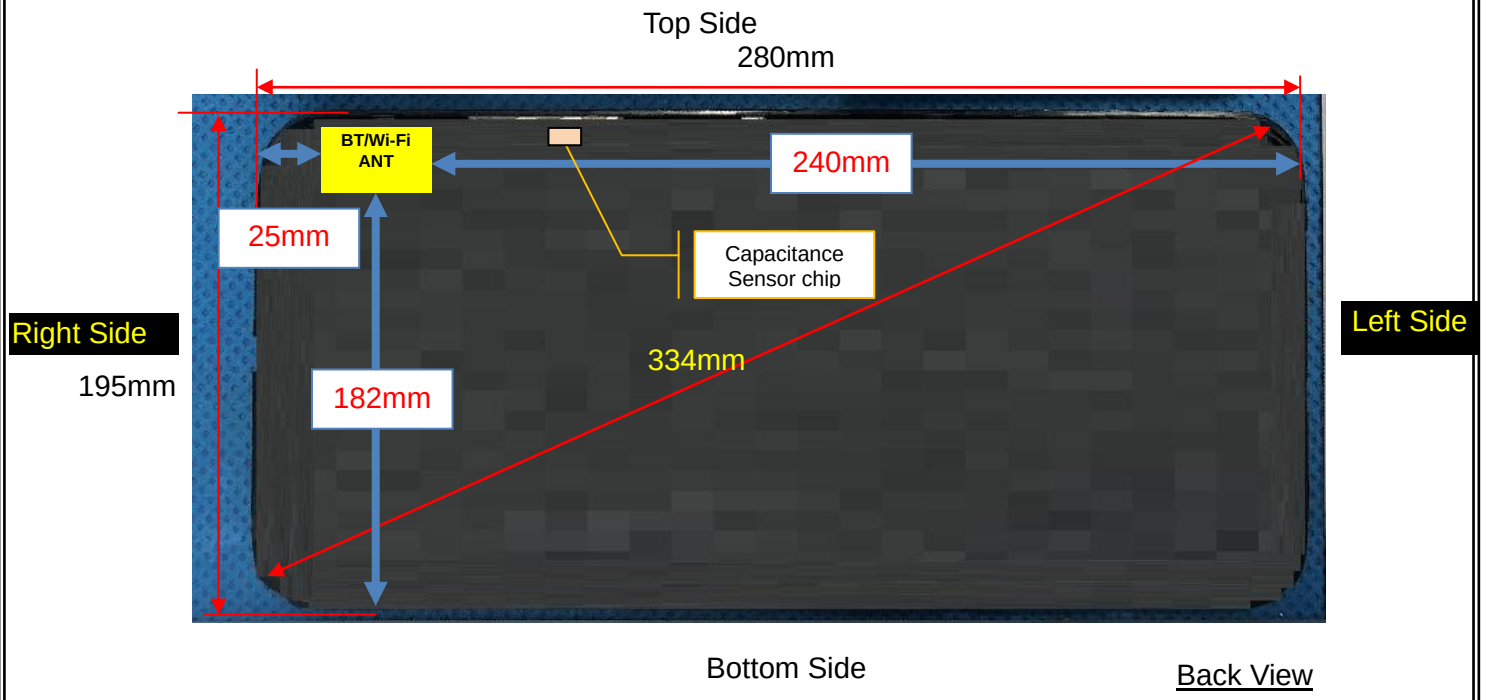
40	Active	1	-40	Active	1	40	Active	1	-40	Active	1
45	Active	1	-45	Active	1	45	Active	1	-45	Active	1

WLAN 5.3G 802.11a CH56											
Right side of the DUT is positioned perpendicularly to the phantom with Gap(11mm)						Top side of the DUT is positioned perpendicularly to the phantom with Gap(11mm)					
Tilt angle (°)	P sensor	Index	Tilt angle (°)	P sensor	Index	Tilt angle (°)	P sensor	Index	Tilt angle (°)	P sensor	Index
0	Active	1	0	Active	1	0	Active	1	0	Active	1
10	Active	1	-10	Active	1	10	Active	1	-10	Active	1
20	Active	1	-20	Active	1	20	Active	1	-20	Active	1
30	Active	1	-30	Active	1	30	Active	1	-30	Active	1
40	Active	1	-40	Active	1	40	Active	1	-40	Active	1
45	Active	1	-45	Active	1	45	Active	1	-45	Active	1

WLAN 5.6G 802.11a CH132											
Right side of the DUT is positioned perpendicularly to the phantom with Gap(11mm)						Top side of the DUT is positioned perpendicularly to the phantom with Gap(11mm)					
Tilt angle (°)	P sensor	Index	Tilt angle (°)	P sensor	Index	Tilt angle (°)	P sensor	Index	Tilt angle (°)	P sensor	Index
0	Active	1	0	Active	1	0	Active	1	0	Active	1
10	Active	1	-10	Active	1	10	Active	1	-10	Active	1
20	Active	1	-20	Active	1	20	Active	1	-20	Active	1
30	Active	1	-30	Active	1	30	Active	1	-30	Active	1
40	Active	1	-40	Active	1	40	Active	1	-40	Active	1
45	Active	1	-45	Active	1	45	Active	1	-45	Active	1

WLAN 5.8G 802.11n(HT20) CH157											
Right side of the DUT is positioned perpendicularly to the phantom with Gap(11mm)						Top side of the DUT is positioned perpendicularly to the phantom with Gap(11mm)					
Tilt angle (°)	P sensor	Index	Tilt angle (°)	P sensor	Index	Tilt angle (°)	P sensor	Index	Tilt angle (°)	P sensor	Index
0	Active	1	0	Active	1	0	Active	1	0	Active	1
10	Active	1	-10	Active	1	10	Active	1	-10	Active	1
20	Active	1	-20	Active	1	20	Active	1	-20	Active	1
30	Active	1	-30	Active	1	30	Active	1	-30	Active	1
40	Active	1	-40	Active	1	40	Active	1	-40	Active	1
45	Active	1	-45	Active	1	45	Active	1	-45	Active	1

8. Antenna Location



Note: Since the confidentiality request of EUT，the antenna location example diagram see as above.

Distance of the Antenna to the EUT surface/edge					
Antennas	Back Side	Left Side	Right Side	Top Side	Bottom Side
WLAN & Bluetooth	5	240	25	5	182

Note: When the minimum separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion.

Positions for SAR tests		
Test separation distances ≤ 50 mm		
Exposure Positions	Tune-up Maximum power of WLAN 2.4G	
	17.00 dBm	50.12 mW
Back Side	Antenna to user(mm)	5
	SAR exclusion threshold	15.79
	SAR testing required?	YES
Right Side	Antenna to user(mm)	23
	SAR exclusion threshold	3.43
	SAR testing required?	YES
Top Side	Antenna to user(mm)	5
	SAR exclusion threshold	15.79
	SAR testing required?	YES
Exposure Positions	Tune-up Maximum power of WLAN 5.2G	
	18.50 dBm	70.80 mW
Back Side	Antenna to user(mm)	5

	SAR exclusion threshold	32.41
	SAR testing required?	YES
Right Side	Antenna to user(mm)	23
	SAR exclusion threshold	7.05
	SAR testing required?	YES
Top Side	Antenna to user(mm)	5
	SAR exclusion threshold	32.41
	SAR testing required?	YES
Exposure Positions	Tune-up Maximum power of WLAN 5.3G	
	18.50 dBm	70.80 mW
Back Side	Antenna to user(mm)	5
	SAR exclusion threshold	32.66
	SAR testing required?	YES
Right Side	Antenna to user(mm)	23
	SAR exclusion threshold	7.10
	SAR testing required?	YES
Top Side	Antenna to user(mm)	5
	SAR exclusion threshold	32.66
	SAR testing required?	YES
Exposure Positions	Tune-up Maximum power of WLAN 5.6G	
	16.00 dBm	39.81 mW
Back Side	Antenna to user(mm)	5
	SAR exclusion threshold	19.00
	SAR testing required?	YES
Right Side	Antenna to user(mm)	23
	SAR exclusion threshold	4.13
	SAR testing required?	YES
Top Side	Antenna to user(mm)	5
	SAR exclusion threshold	19.00
	SAR testing required?	YES
Exposure Positions	Tune-up Maximum power of WLAN 5.8G	
	18.00 dBm	63.10 mW
Back Side	Antenna to user(mm)	5
	SAR exclusion threshold	30.46
	SAR testing required?	YES
Right Side	Antenna to user(mm)	23
	SAR exclusion threshold	6.62
	SAR testing required?	YES
Top Side	Antenna to user(mm)	5
	SAR exclusion threshold	30.46
	SAR testing required?	YES

NOTE: Refer to section 4.3.1 of KDB 447498 D01.

Positions for SAR tests		
Test separation distances > 50 mm		
Exposure Positions	Tune-up Maximum power of WLAN 2.4G	
	17.00 dBm	50.12 mW
Left Side	Antenna to user(mm)	238
	SAR exclusion threshold(mW)	1976
	SAR testing required?	NO
Bottom Side	Antenna to user(mm)	184
	SAR exclusion threshold(mW)	1436
	SAR testing required?	NO
Exposure Positions	Tune-up Maximum power of WLAN 5.2G	
	18.50 dBm	70.80 mW
Left Side	Antenna to user(mm)	238
	SAR exclusion threshold(mW)	1946
	SAR testing required?	NO
Bottom Side	Antenna to user(mm)	184
	SAR exclusion threshold(mW)	1406
	SAR testing required?	NO
Exposure Positions	Tune-up Maximum power of WLAN 5.3G	
	18.50 dBm	70.80 mW
Left Side	Antenna to user(mm)	238
	SAR exclusion threshold(mW)	1946
	SAR testing required?	NO
Bottom Side	Antenna to user(mm)	184
	SAR exclusion threshold(mW)	1406
	SAR testing required?	NO
Exposure Positions	Tune-up Maximum power of WLAN 5.6G	
	16.00 dBm	39.81 mW
Left Side	Antenna to user(mm)	238
	SAR exclusion threshold(mW)	1945
	SAR testing required?	NO
Bottom Side	Antenna to user(mm)	184
	SAR exclusion threshold(mW)	1405
	SAR testing required?	NO
Exposure Positions	Tune-up Maximum power of WLAN 5.8G	
	18.00 dBm	63.10 mW
Left Side	Antenna to user(mm)	238
	SAR exclusion threshold(mW)	1942
	SAR testing required?	NO

Bottom Side	Antenna to user(mm)	184
	SAR exclusion threshold(mW)	1402
	SAR testing required?	NO

NOTE: Refer to section 4.3.1 of KDB 447498 D01.

9. Stand-alone SAR test exclusion

Refer to FCC KDB 447498D01, the 1-g SAR and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:

[(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)]·[$\sqrt{f_{(GHZ)}}$] ≤ 3.0 for 1-g SAR and ≤ 7.5 for 10-g extremity SAR, where:

- $f_{(GHZ)}$ is the RF channel transmit frequency in GHz
- Power and distance are rounded to the nearest mW and mm before calculation
- The result is rounded to one decimal place for comparison

When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion.

Mode	P_{max} (dBm)	P_{max} (mW)	Distance (mm)	f (GHz)	Calculation Result	SAR Exclusion threshold	SAR test exclusion
Bluetooth	5.00	3.162	5	2.480	0.996	3	Yes

NOTE: Standalone SAR test exclusion for Bluetooth.

10. SAR Results

1. Per KDB 248227 D01v02r02, for 2.4GHz 802.11g/n SAR testing is not required 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.
2. Per KDB 248227 D01v02r02,U-NII-1 SAR testing is not required when the U-Nll-2A band highest reported SAR for a test configuration is ≤ 1.2 W/kg, SAR is not required for U-Nll-1 band.
3. For all positions/configurations, when the reported SAR is > 0.8 W/kg, SAR is measured for these positions/configurations on the subsequent next highest measured output power channel(s) until the reported SAR is ≤ 1.2 W/kg or all required test channels are considered.
4. When the reported SAR of the test position is > 0.4 W/kg, SAR is repeated for the 802.11 transmission mode configuration tested in the initial test position to measure the subsequent next closet/smallest test separation distance and maximum coupling test position on the highest maximum output power channel, until the report SAR is ≤ 0.8 W/kg or all required test position are tested
5. SAR measurement is not required for the PSKand BLE. When the secondary mode is ≤ ¼ dB higher than the primary mode.

10.1. SAR measurement results

10.1.1. SAR measurement Result of WLAN 2.4G

Test Position of body	Test channel /Freq.	Mode	Test separation distance (mm)	P-sensor	SAR Value (W/kg)		Power Drift(%)	Conducted Power (dBm)	Tune-up Power (dBm)	Scaled SAR 1-g (W/Kg)	Date	Plot
					1-g	10-g						
Back Side	6/2437	802.11b	11	Inactive	0.579	0.290	0.46	16.56	17.50	0.719	2025/1/08	
Right Side	6/2437	802.11b	11	Inactive	0.062	0.030	-2.34	16.56	17.50	0.077	2025/1/08	
Top Side	6/2437	802.11b	11	Inactive	0.823	0.395	1.02	16.56	17.50	1.022	2025/1/08	
Top Side	1/2412	802.11b	11	Inactive	0.821	0.412	-1.64	15.69	17.50	1.245	2025/1/08	
Top Side	11/2462	802.11b	11	Inactive	0.818	0.375	-0.52	15.87	17.50	1.191	2025/1/08	
Back Side	6/2437	802.11b	0	Active	0.800	0.295	0.62	8.71	9.00	0.855	2025/1/08	
Right Side	6/2437	802.11b	0	Active	0.085	0.030	-2.38	8.71	9.00	0.091	2025/1/08	
Top Side	6/2437	802.11b	0	Active	1.093	0.354	4.38	8.71	9.00	1.168	2025/1/08	1#
Top Side Repeated	6/2437	802.11b	0	Active	1.087	0.348	-2.94	8.71	9.00	1.162	2025/1/08	
Back Side	1/2412	802.11b	0	Active	0.725	0.236	0.62	8.45	9.00	0.823	2025/1/08	
Back Side	11/2462	802.11b	0	Active	0.763	0.270	-1.54	8.63	9.00	0.831	2025/1/08	
Top Side	1/2412	802.11b	0	Active	0.964	0.325	-3.62	8.45	9.00	1.094	2025/1/08	
Top Side	11/2462	802.11b	0	Active	1.012	0.314	-2.74	8.63	9.00	1.102	2025/1/08	
Back Side	6/2437	802.11g	11	Inactive	0.510	0.248	-3.13	17.14	17.50	0.554	2025/1/08	
Right Side	6/2437	802.11g	11	Inactive	0.070	0.032	3.22	17.14	17.50	0.076	2025/1/08	
Top Side	6/2437	802.11g	11	Inactive	0.726	0.364	-1.73	17.14	17.50	0.789	2025/1/08	
Back Side	1/2412	802.11g	0	Active	0.671	0.235	1.80	8.84	9.00	0.696	2025/1/08	
Right Side	1/2412	802.11g	0	Active	0.105	0.036	-3.11	8.84	9.00	0.109	2025/1/08	
Top Side	1/2412	802.11g	0	Active	0.923	0.293	0.51	8.84	9.00	0.958	2025/1/08	
Top Side	6/2437	802.11g	0	Active	0.810	0.265	-3.59	8.25	9.00	0.963	2025/1/08	
Top Side	11/2462	802.11g	0	Active	0.851	0.251	2.01	7.54	9.00	1.191	2025/1/08	

NOTE: Body SAR test results of WLAN 2.4G

10.1.2. SAR measurement Result of WLAN 5.2G

Test Position of body	Test channel /Freq.	Mode	Test separation distance (mm)	P-sensor	SAR Value (W/kg)		Power Drift(%)	Conducted Power (dBm)	Tune-up Power (dBm)	Scaled SAR 1-g (W/Kg)	Date	Plot
					1-g	10-g						
Back Side	40/5200	802.11a	11	Inactive	0.804	0.345	-4.65	18.34	18.50	0.834	2025/1/10	
Right Side	40/5200	802.11a	11	Inactive	0.273	0.113	-3.30	18.34	18.50	0.283	2025/1/10	
Top Side	40/5200	802.11a	11	Inactive	0.656	0.281	-1.35	18.34	18.50	0.681	2025/1/10	
Back Side	36/5180	802.11a	11	Inactive	0.714	0.215	-3.62	16.86	18.50	1.042	2025/1/10	
Back Side	48/5240	802.11a	11	Inactive	0.794	0.357	2.54	18.46	18.50	0.801	2025/1/10	

Back Side	40/5200	802.11a	0	Active	1.019	0.300	4.29	5.64	6.00	1.107	2025/1/10	2#
BackSide Repeated	40/5200	802.11a	0	Active	1.005	0.294	-3.85	5.64	6.00	1.092	2025/1/10	
Right Side	40/5200	802.11a	0	Active	0.082	0.019	-3.67	5.64	6.00	0.089	2025/1/10	
Top Side	40/5200	802.11a	0	Active	0.343	0.097	0.58	5.64	6.00	0.373	2025/1/10	
Back Side	36/5180	802.11a	0	Active	0.915	0.285	-1.52	5.21	6.00	1.098	2025/1/10	
Back Side	48/5240	802.11a	0	Active	0.986	0.294	-2.87	5.51	6.00	1.104	2025/1/10	

NOTE: Body SAR test results of WLAN 5.2G

10.1.3. SAR measurement Result of WLAN 5.3G

Test Position of body	Test channel /Freq.	Mode	Test separation distance (mm)	P-sensor	SAR Value (W/kg)		Power Drift(%)	Conducted Power (dBm)	Tune-up Power (dBm)	Scaled SAR 1-g (W/Kg)	Date	Plot
					1-g	10-g						
Back Side	56/5280	802.11a	11	Inactive	1.099	0.454	3.78	18.23	18.50	1.169	2025/1/11	
Right Side	56/5280	802.11a	11	Inactive	0.330	0.135	1.71	18.23	18.50	0.351	2025/1/11	
Top Side	56/5280	802.11a	11	Inactive	0.912	0.369	1.13	18.23	18.50	0.970	2025/1/11	
Back Side	52/5260	802.11a	11	Inactive	1.058	0.437	-2.54	18.45	18.50	1.070	2025/1/11	
Back Side	64/5320	802.11a	11	Inactive	0.835	0.236	-1.58	16.89	18.50	1.210	2025/1/11	
Top Side	52/5260	802.11a	11	Inactive	0.896	0.254	-2.84	18.45	18.50	0.906	2025/1/11	
Top Side	64/5320	802.11a	11	Inactive	0.785	0.234	-1.89	16.89	18.50	1.137	2025/1/11	
Back Side	56/5280	802.11a	0	Active	1.184	0.262	3.97	5.53	6.00	1.319	2025/1/11	3#
BackSide Repeated	56/5280	802.11a	0	Active	1.069	0.247	-3.41	5.53	6.00	1.191	2025/1/11	
Right Side	56/5280	802.11a	0	Active	0.286	0.072	2.31	5.53	6.00	0.319	2025/1/11	
Top Side	56/5280	802.11a	0	Active	0.462	0.120	0.77	5.53	6.00	0.515	2025/1/11	
Back Side	52/5260	802.11a	0	Active	1.052	0.241	-1.52	5.57	6.00	1.161	2025/1/11	
Back Side	64/5320	802.11a	0	Active	1.046	0.237	-2.74	5.68	6.00	1.126	2025/1/11	

11. NOTE: BodySAR test results of WLAN 5.3G

11.1.1. SAR measurement Result of WLAN 5.6G

Test Position of body	Test channel /Freq.	Mode	Test separation distance (mm)	P-sensor	SAR Value (W/kg)		Power Drift(%)	Conducted Power (dBm)	Tune-up Power (dBm)	Scaled SAR 1-g (W/Kg)	Date	Plot
					1-g	10-g						
Back Side	120/5600	802.11a	11	Inactive	0.636	0.307	-1.04	15.55	16.00	0.705	2025/1/12	
Right Side	120/5600	802.11a	11	Inactive	0.195	0.091	3.26	15.55	16.00	0.216	2025/1/12	
Top Side	120/5600	802.11a	11	Inactive	0.512	0.247	-2.48	15.55	16.00	0.568	2025/1/12	
Back Side	120/5600	802.11a	0	Active	1.045	0.265	3.28	4.58	5.00	1.151	2025/1/12	4#
Back Side Repeated	120/5600	802.11a	0	Active	1.031	0.252	2.63	4.58	5.00	1.136	2025/1/12	
Right Side	120/5600	802.11a	0	Active	0.218	0.054	0.84	4.58	5.00	0.240	2025/1/12	
Top Side	120/5600	802.11a	0	Active	0.347	0.084	-0.26	4.58	5.00	0.382	2025/1/12	
Back Side	100/5500	802.11a	0	Active	1.015	0.245	-1.25	4.58	5.00	1.118	2025/1/12	
Back Side	140/5700	802.11a	0	Active	0.957	0.221	0.36	4.58	5.00	1.054	2025/1/12	

NOTE: Body SAR test results of WLAN 5.6G

11.1.2. SAR measurement Result of WLAN 5.8G

Test Position of body	Test channel /Freq.	Mode	Test separation distance (mm)	P-sensor	SAR Value (W/kg)		Power Drift(%)	Conducted Power (dBm)	Tune-up Power (dBm)	Scaled SAR 1-g (W/Kg)	Date	Plot
					1-g	10-g						
Back Side	157/5785	802.11n(HT20)	11	Inactive	0.893	0.374	-4.93	17.72	18.00	0.952	2025/1/9	
Right Side	157/5785	802.11n(HT20)	11	Inactive	0.270	0.107	-2.90	17.72	18.00	0.288	2025/1/9	
Top Side	157/5785	802.11n(HT20)	11	Inactive	0.714	0.249	3.12	17.72	18.00	0.762	2025/1/9	
Back Side	149/5745	802.11n(HT20)	11	Inactive	0.791	0.294	0.32	17.05	18.00	0.984	2025/1/9	
Back Side	165/5825	802.11n(HT20)	11	Inactive	0.832	0.321	-3.54	17.59	18.00	0.914	2025/1/9	
Back Side	157/5785	802.11n(HT20)	0	Active	1.136	0.334	-3.56	3.82	4.00	1.184	2025/1/9	5#
BackSide Repeated	157/5785	802.11n(HT20)	0	Active	1.125	0.328	-3.14	3.82	4.00	1.173	2025/1/9	
Right Side	157/5785	802.11n(HT20)	0	Active	0.252	0.066	1.60	3.82	4.00	0.263	2025/1/9	
Top Side	157/5785	802.11n(HT20)	0	Active	0.416	0.109	-3.78	3.82	4.00	0.434	2025/1/9	
Back Side	149/5745	802.11n(HT20)	0	Active	1.003	0.289	0.22	3.78	4.00	1.055	2025/1/9	
Back Side	165/5825	802.11n(HT20)	0	Active	1.134	0.324	2.67	3.71	4.00	1.212	2025/1/9	

11.2. Simultaneous Transmission Analysis

NO simultaneous transmissions are possible for this device of Bluetooth, 2.4G Wi-Fi and 5G Wi-Fi.

12. Appendix A. Photo documentation

Refer to appendix Test Setup photo---SAR

13. Appendix B. System Check Plots

Table of contents
1# System check at 2450 MHz
2# System check at 5200 MHz
3# System check at 5200 MHz
4# System check at 5400 MHz
5# System check at 5600 MHz
6# System check at 5800 MHz

1# System check at 2450 MHz
Date of measurement: 8/1/2025

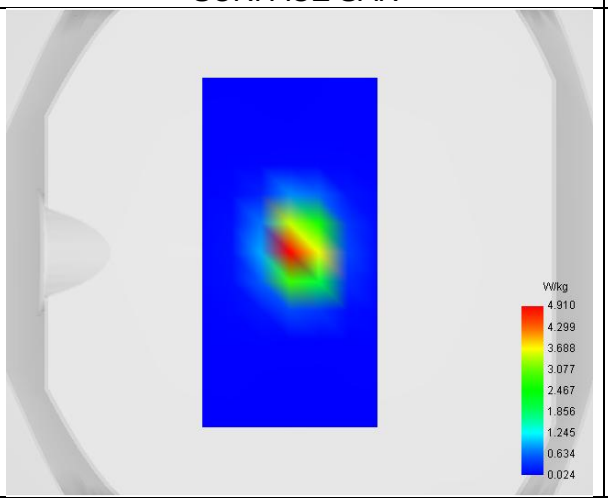
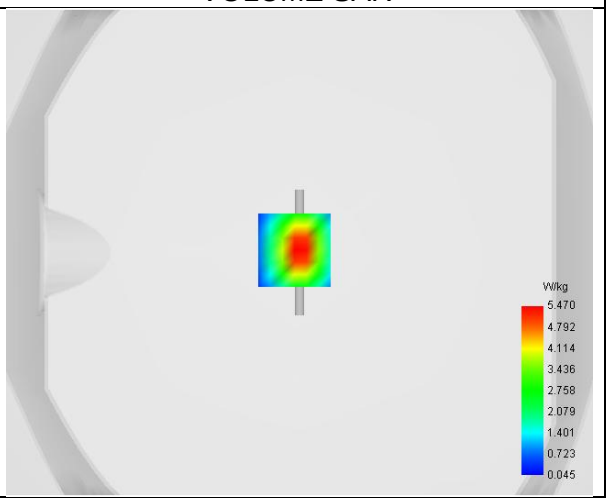
A. Experimental conditions.

Probe	4024-EPGO-442
ConvF	2.74
Area Scan	dx=12mm dy=12mm, Complete
Zoom Scan	7x7x7,dx=5mm dy=5mm dz=5.0mm,Complete
Phantom	Validation plane
Device Position	Dipole
Band	CW2450
Channels/Frequency	Middle
Signal	CW

B. Permitivity

Middle TX Frequency (MHz)	2450.000
Relative permitivity (real part)	37.68
Relative permitivity (imaginary part)	12.97
Conductivity (S/m)	1.77

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

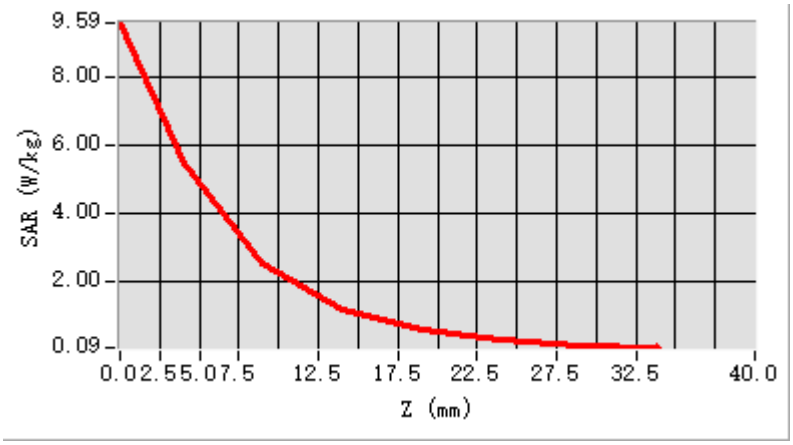
Maximum location: X=-2.00, Y=1.00 ; SAR Peak: 9.86 W/kg

D. SAR 1g & 10g

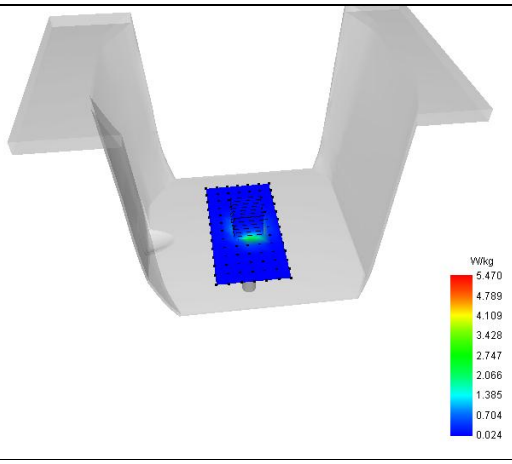
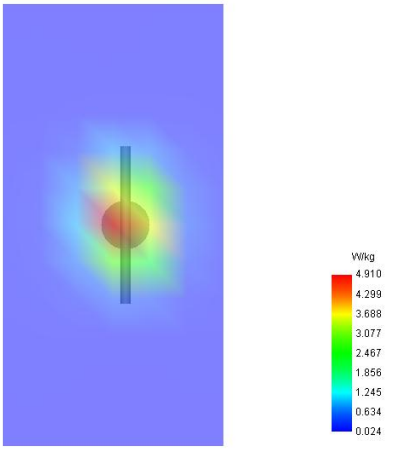
SAR 10g (W/Kg)	2.214
SAR 1g (W/Kg)	5.174
Variation (%)	0.57
Horizontal validation criteria: minimum distance (mm)	10.00
Vertical validation criteria: SAR ratio M2/M1 (%)	46.17

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	9.587	5.470	2.526	1.213	0.598	0.304	0.165



F. 3D Image

3D screen shot	Hot spot position
	

2# System check at 5200 MHz
Date of measurement: 10/1/2025

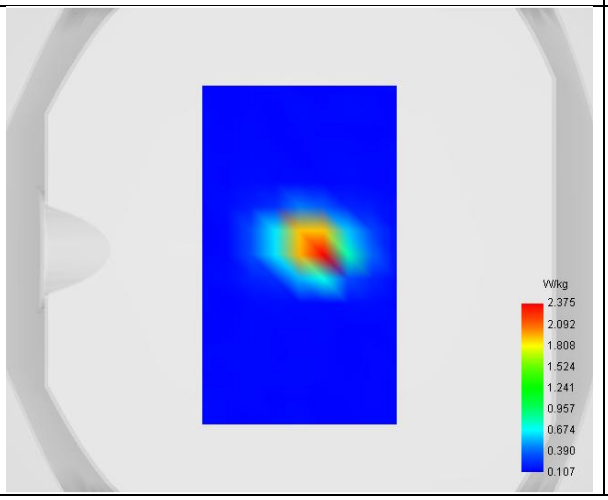
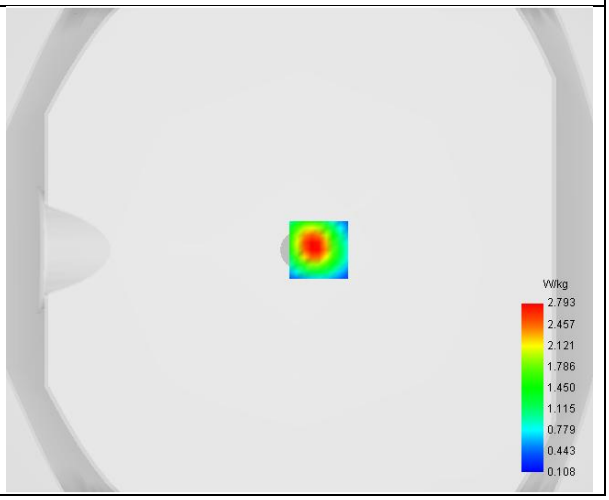
A. Experimental conditions.

Probe	4024-EPGO-442
ConvF	1.89
Area Scan	dx=10mm dy=10mm, Complete
Zoom Scan	9x9x16,dx=3mm dy=3mm dz=1.5mm,Complete
Phantom	Validation plane
Device Position	Body
Band	CW5200
Channels/Frequency	Middle
Signal	CW

B. Permitivity

Middle TX Frequency (MHz)	5200.000
Relative permitivity (real part)	34.85
Relative permitivity (imaginary part)	15.74
Conductivity (S/m)	4.55

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

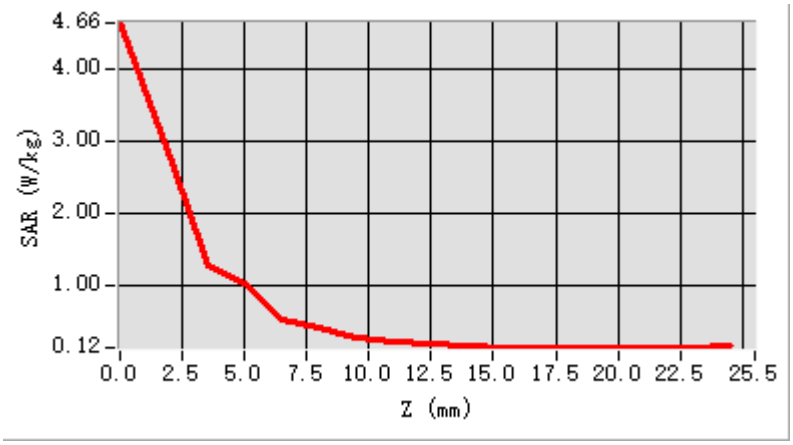
Maximum location: X=8.00, Y=0.00 ; SAR Peak: 5.11 W/kg

D. SAR 1g & 10g

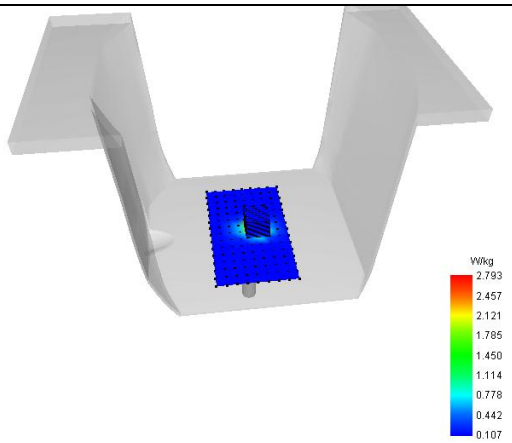
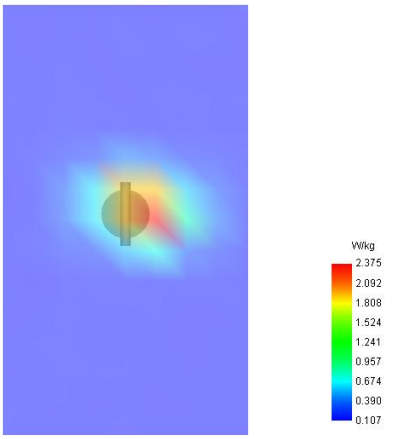
SAR 10g (W/Kg)	0.605
SAR 1g (W/Kg)	1.647
Variation (%)	-0.59
Horizontal validation criteria: minimum distance (mm)	9.49
Vertical validation criteria: SAR ratio M2/M1 (%)	58.25

E. Z Axis Scan

Z (mm)	0.00	2.00	3.50	5.00	6.50	8.00	9.50	11.00	12.50	14.00	15.50	17.00	18.50	20.00	21.50	23.00
SAR (W/Kg)	4.656	2.793	1.257	1.004	0.504	0.405	0.251	0.220	0.166	0.150	0.136	0.131	0.122	0.123	0.130	0.132



F. 3D Image

3D screen shot	Hot spot position
	

3# System check at 5200 MHz
Date of measurement: 11/1/2025

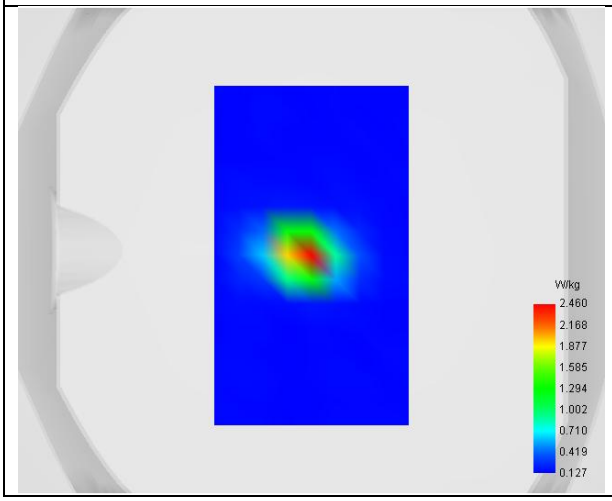
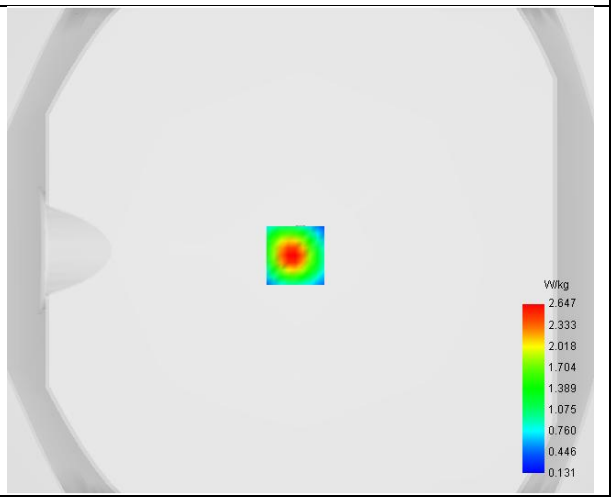
A. Experimental conditions.

Probe	4024-EPGO-442
ConvF	1.89
Area Scan	dx=10mm dy=10mm, Complete
Zoom Scan	9x9x16,dx=3mm dy=3mm dz=1.5mm,Complete
Phantom	Validation plane
Device Position	Body
Band	CW5200
Channels/Frequency	Middle
Signal	CW

B. Permitivity

Middle TX Frequency (MHz)	5200.000
Relative permitivity (real part)	37.43
Relative permitivity (imaginary part)	16.00
Conductivity (S/m)	4.62

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

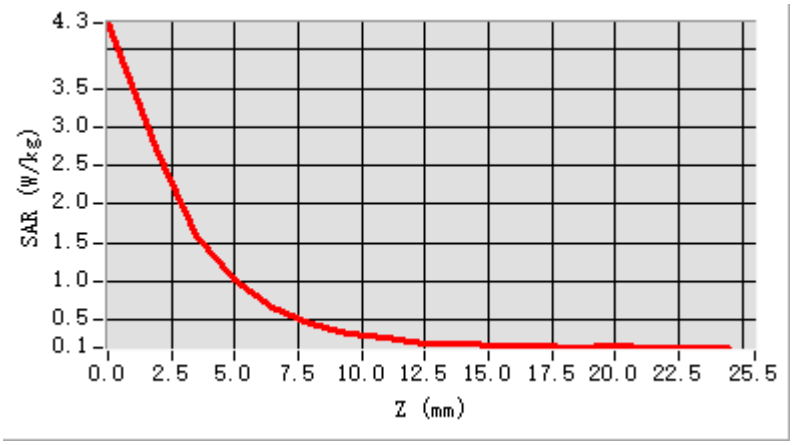
Maximum location: X=-2.00, Y=-2.00 ; SAR Peak: 4.66 W/kg

D. SAR 1g & 10g

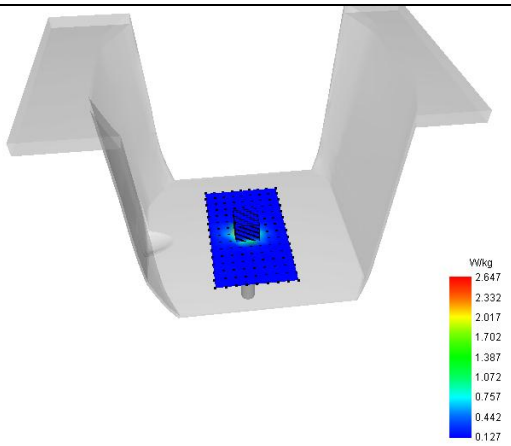
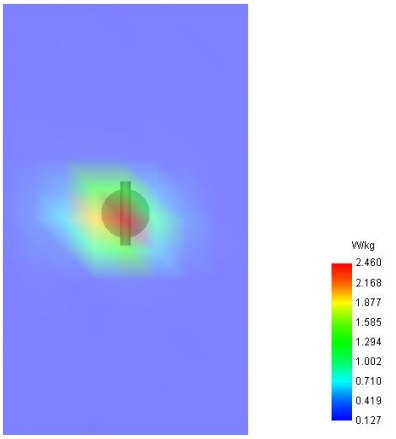
SAR 10g (W/Kg)	0.602
SAR 1g (W/Kg)	1.763
Variation (%)	1.22
Horizontal validation criteria: minimum distance (mm)	9.00
Vertical validation criteria: SAR ratio M2/M1 (%)	60.51

E. Z Axis Scan

Z (mm)	0.00	2.00	3.50	5.00	6.50	8.00	9.50	11.00	12.50	14.00	15.50	17.00	18.50	20.00	21.50	23.00
SAR (W/Kg)	4.349	2.647	1.602	1.023	0.666	0.451	0.324	0.256	0.202	0.184	0.174	0.172	0.138	0.159	0.147	0.150



F. 3D Image

3D screen shot	Hot spot position
	

4# System check at 5400 MHz
Date of measurement: 11/1/2025

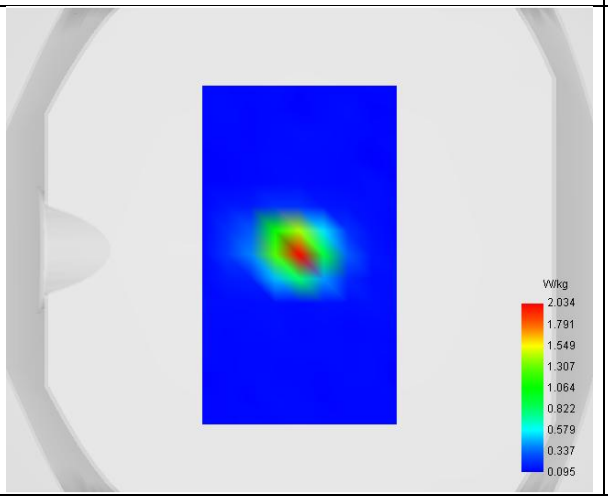
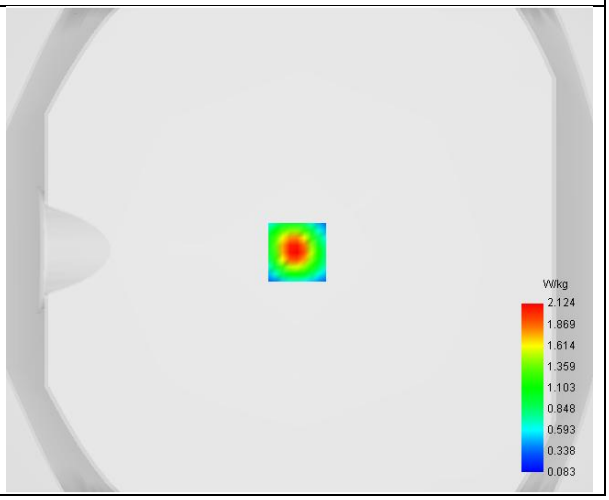
A. Experimental conditions.

Probe	4024-EPGO-442
ConvF	1.97
Area Scan	dx=10mm dy=10mm, Complete
Zoom Scan	9x9x16,dx=3mm dy=3mm dz=1.5mm,Complete
Phantom	Validation plane
Device Position	Body
Band	CW5400
Channels/Frequency	Middle
Signal	CW

B. Permitivity

Middle TX Frequency (MHz)	5400.000
Relative permitivity (real part)	34.20
Relative permitivity (imaginary part)	15.89
Conductivity (S/m)	4.77

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

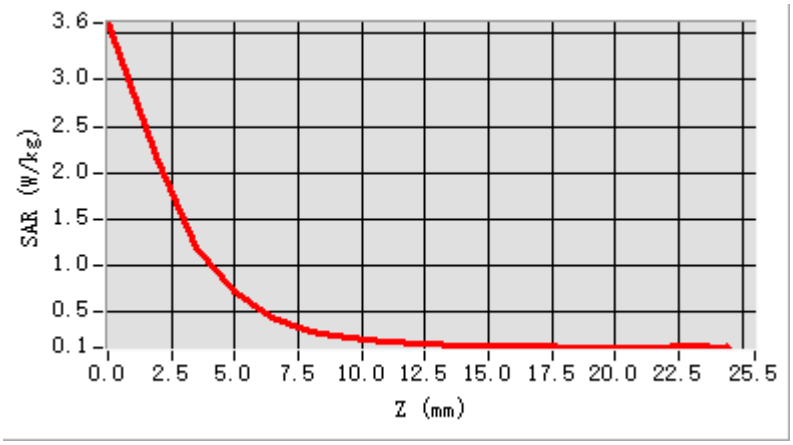
Maximum location: X=-1.00, Y=-1.00 ; SAR Peak: 3.94 W/kg

D. SAR 1g & 10g

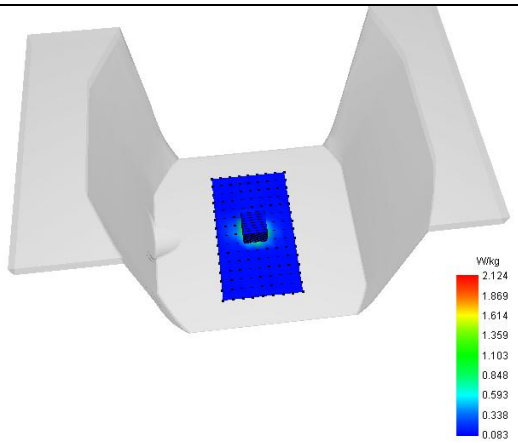
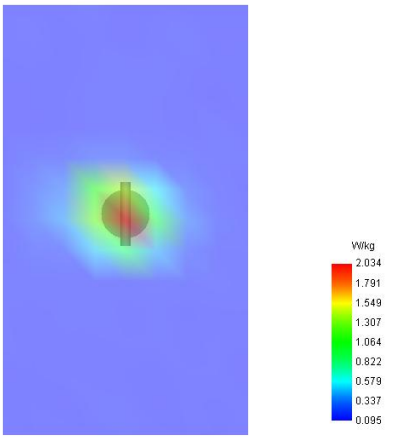
SAR 10g (W/Kg)	0.577
SAR 1g (W/Kg)	1.554
Variation (%)	-0.78
Horizontal validation criteria: minimum distance (mm)	9.49
Vertical validation criteria: SAR ratio M2/M1 (%)	56.50

E. Z Axis Scan

Z (mm)	0.00	2.00	3.50	5.00	6.50	8.00	9.50	11.00	12.50	14.00	15.50	17.00	18.50	20.00	21.50	23.00
SAR (W/Kg)	3.617	2.124	1.200	0.719	0.440	0.290	0.212	0.174	0.155	0.132	0.122	0.128	0.109	0.107	0.116	0.122



F. 3D Image

3D screen shot	Hot spot position
	

5# System check at 5600 MHz
Date of measurement: 12/1/2025

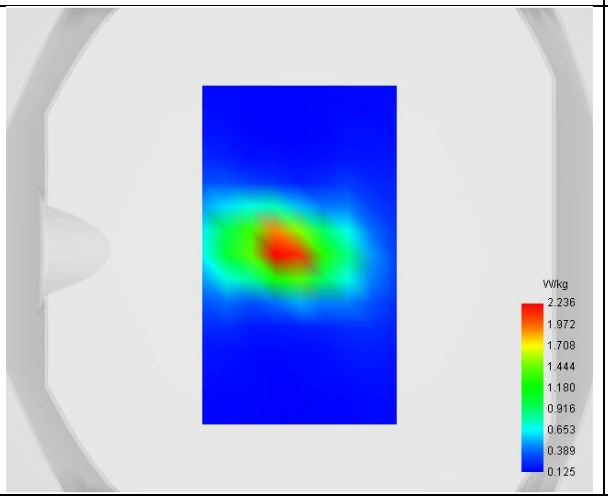
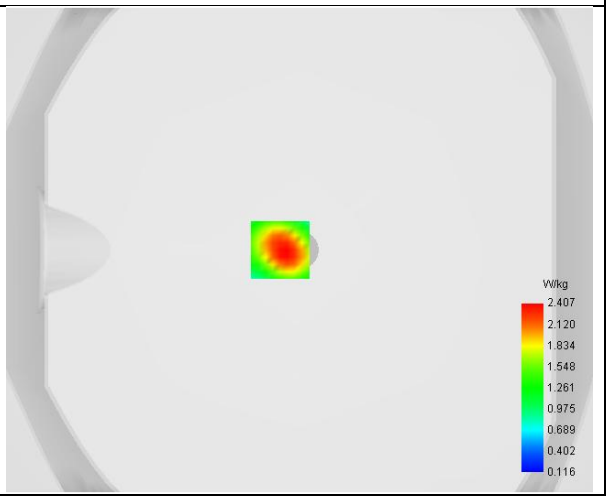
A. Experimental conditions.

Probe	4024-EPGO-442
ConvF	1.88
Area Scan	dx=10mm dy=10mm, Complete
Zoom Scan	9x9x16,dx=3mm dy=3mm dz=1.5mm,Complete
Phantom	Validation plane
Device Position	Body
Band	CW5600
Channels/Frequency	Middle
Signal	CW

B. Permitivity

Middle TX Frequency (MHz)	5600.000
Relative permitivity (real part)	34.27
Relative permitivity (imaginary part)	15.74
Conductivity (S/m)	4.90

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

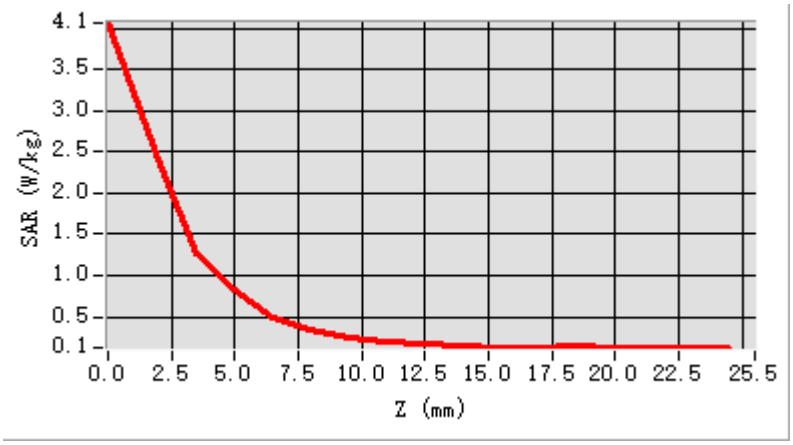
Maximum location: X=-8.00, Y=0.00 ; SAR Peak: 4.48 W/kg

D. SAR 1g & 10g

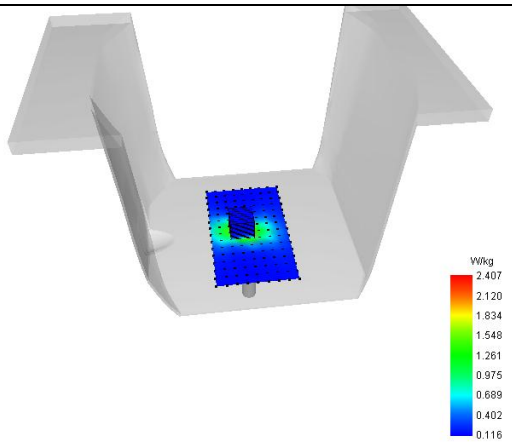
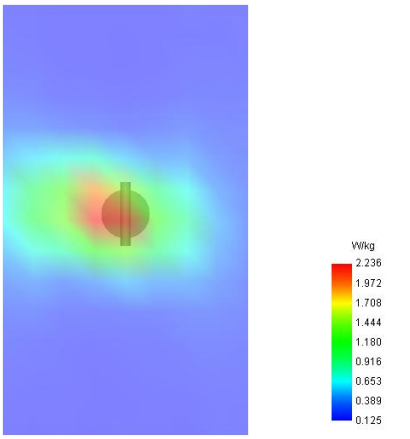
SAR 10g (W/Kg)	0.636
SAR 1g (W/Kg)	1.690
Variation (%)	-0.10
Horizontal validation criteria: minimum distance (mm)	12.37
Vertical validation criteria: SAR ratio M2/M1 (%)	56.57

E. Z Axis Scan

Z (mm)	0.00	2.00	3.50	5.00	6.50	8.00	9.50	11.00	12.50	14.00	15.50	17.00	18.50	20.00	21.50	23.00
SAR (W/Kg)	4.065	2.407	1.260	0.821	0.488	0.342	0.236	0.193	0.176	0.149	0.136	0.137	0.139	0.134	0.126	0.135



F. 3D Image

3D screen shot	Hot spot position
	

6# System check at 5800 MHz
Date of measurement: 9/1/2025

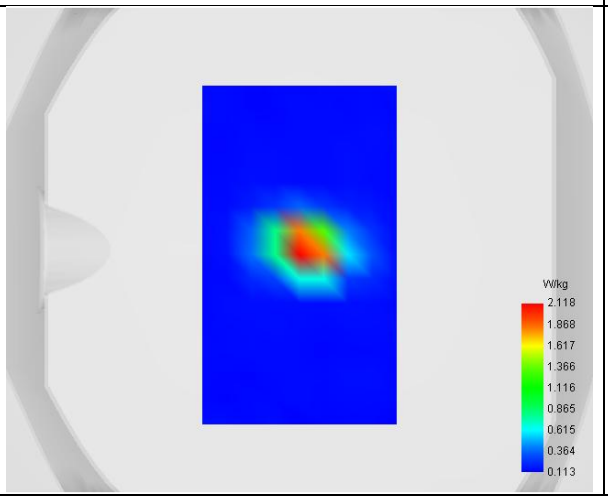
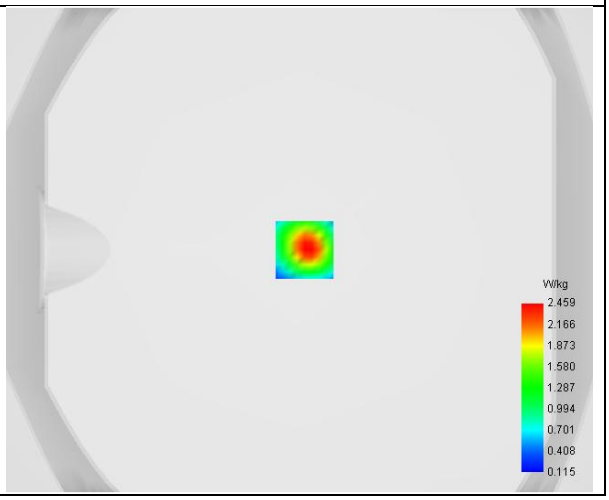
A. Experimental conditions.

Probe	4024-EPGO-442
ConvF	1.90
Area Scan	dx=10mm dy=10mm, Complete
Zoom Scan	9x9x16,dx=3mm dy=3mm dz=1.5mm,Complete
Phantom	Validation plane
Device Position	Dipole
Band	CW5800
Channels/Frequency	Middle
Signal	CW

B. Permitivity

Middle TX Frequency (MHz)	5800.000
Relative permitivity (real part)	34.00
Relative permitivity (imaginary part)	15.86
Conductivity (S/m)	5.11

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

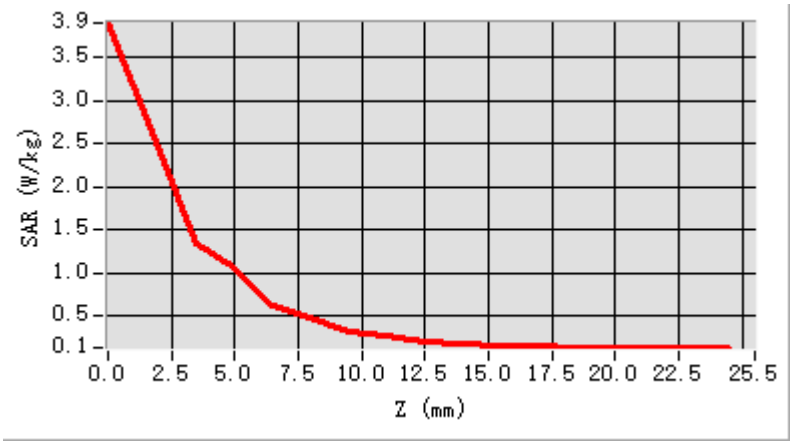
Maximum location: X=2.00, Y=0.00 ; SAR Peak: 4.23 W/kg

D. SAR 1g & 10g

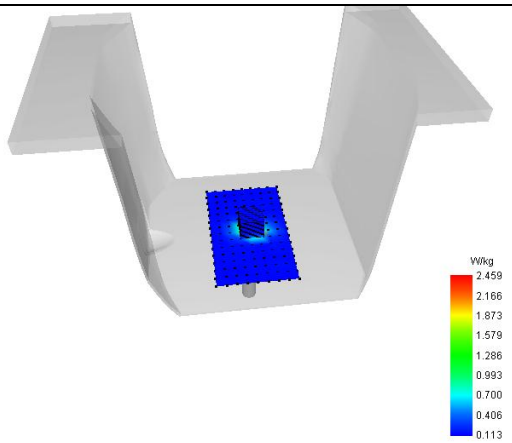
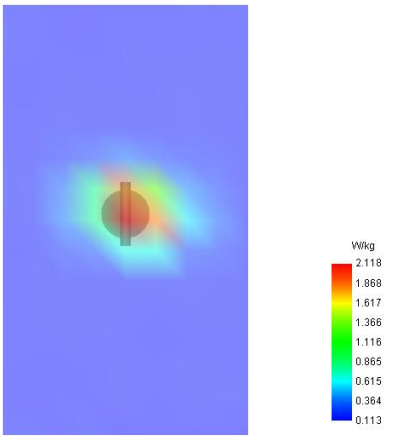
SAR 10g (W/Kg)	0.583
SAR 1g (W/Kg)	1.700
Variation (%)	1.22
Horizontal validation criteria: minimum distance (mm)	9.49
Vertical validation criteria: SAR ratio M2/M1 (%)	63.37

E. Z Axis Scan

Z (mm)	0.00	2.00	3.50	5.00	6.50	8.00	9.50	11.00	12.50	14.00	15.50	17.00	18.50	20.00	21.50	23.00
SAR (W/Kg)	3.906	2.459	1.337	1.063	0.625	0.495	0.328	0.284	0.215	0.193	0.171	0.152	0.144	0.146	0.147	0.138



F. 3D Image

3D screen shot	Hot spot position
	

14. Appendix C. Plots of High SAR Measurement

Table of contents
1# SAR Measurement at ISM (Body, Validation Plane)
2# SAR Measurement at U-NII-1 (Body, Validation Plane)
3# SAR Measurement at U-NII-2a (Body, Validation Plane)
4# SAR Measurement at U-NII-2c (Body, Validation Plane)
5# SAR Measurement at U-NII-3 (Body, Validation Plane)

1# SAR Measurement at ISM (Body, Validation Plane)
Date of measurement: 8/1/2025

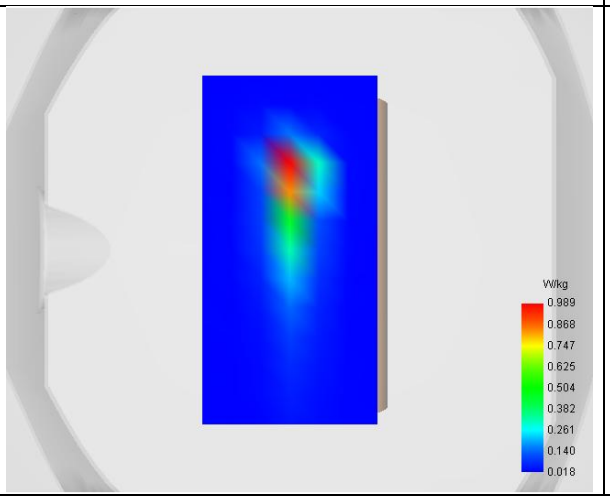
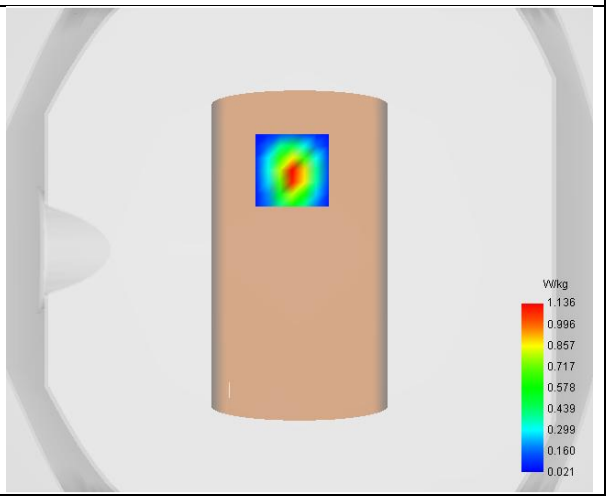
A. Experimental conditions.

Probe	4024-EPGO-442
ConvF	2.74
Area Scan	dx=12mm dy=12mm, Complete
Zoom Scan	7x7x7,dx=5mm dy=5mm dz=5.0mm,Complete
Phantom	Validation plane
Device Position	Body
Band	ISM
Channels/Frequency	Middle (1)/ frequency 2437.000 Mhz
Signal	IEEE802.11b

B. Permitivity

Middle TX Frequency (MHz)	2437.000
Relative permitivity (real part)	37.73
Relative permitivity (imaginary part)	12.88
Conductivity (S/m)	1.74

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

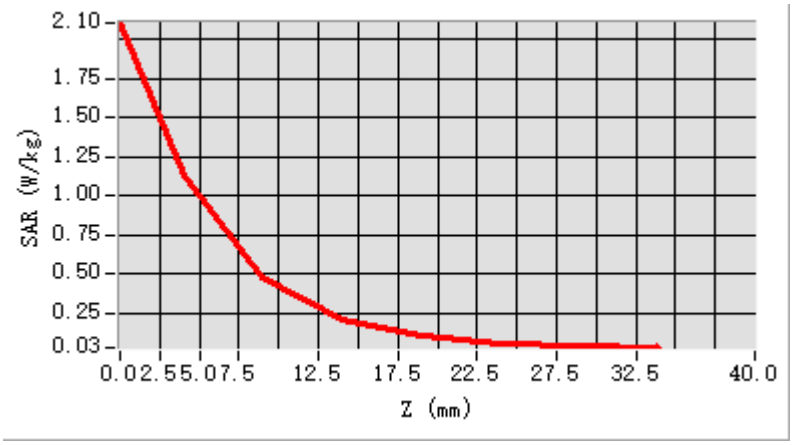
Maximum location: X=-3.00, Y=33.00 ; SAR Peak: 2.12 W/kg

D. SAR 1g & 10g

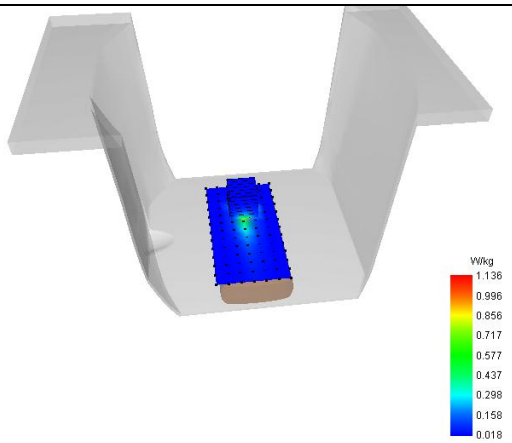
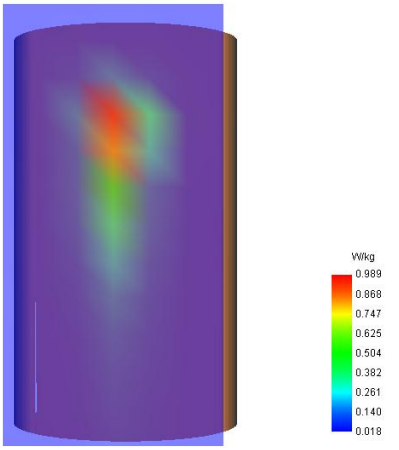
SAR 10g (W/Kg)	0.354
SAR 1g (W/Kg)	1.093
Variation (%)	4.38
Horizontal validation criteria: minimum distance (mm)	10.00
Vertical validation criteria: SAR ratio M2/M1 (%)	41.50

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	2.104	1.136	0.471	0.204	0.098	0.053	0.038



F. 3D Image

3D screen shot	Hot spot position
	

2# SAR Measurement at U-NII-1 (Body, Validation Plane)
Date of measurement: 10/1/2025

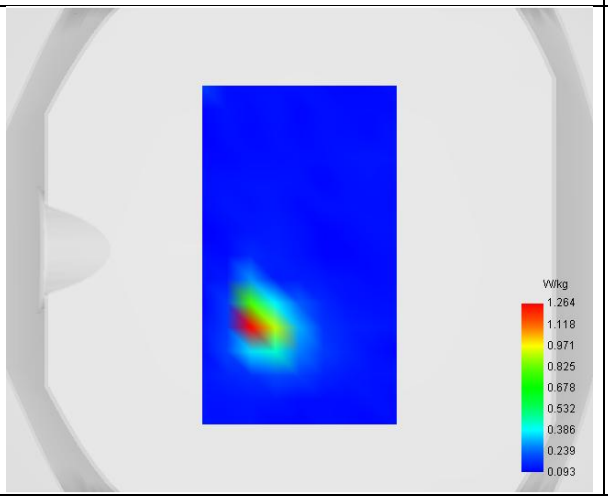
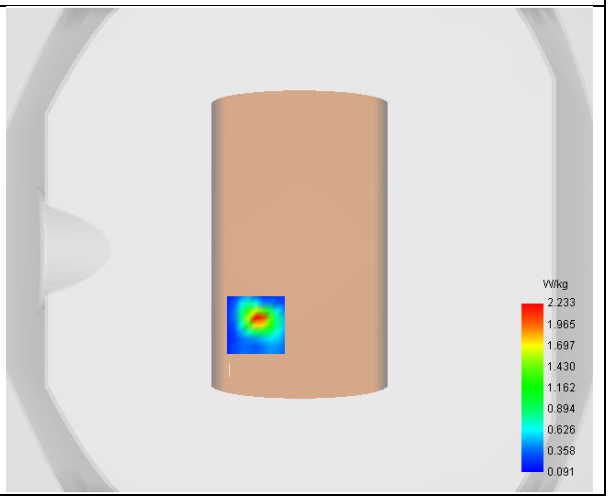
A. Experimental conditions.

Probe	4024-EPGO-442
ConvF	1.89
Area Scan	dx=10mm dy=10mm, Complete
Zoom Scan	9x9x16,dx=3mm dy=3mm dz=1.5mm,Complete
Phantom	Validation plane
Device Position	Body
Band	U-NII-1
Channels/Frequency	Middle (40)/ frequency 5200.000 Mhz
Signal	IEEE 802.11 a

B. Permitivity

Middle TX Frequency (MHz)	5200.000
Relative permitivity (real part)	34.85
Relative permitivity (imaginary part)	15.74
Conductivity (S/m)	4.55

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

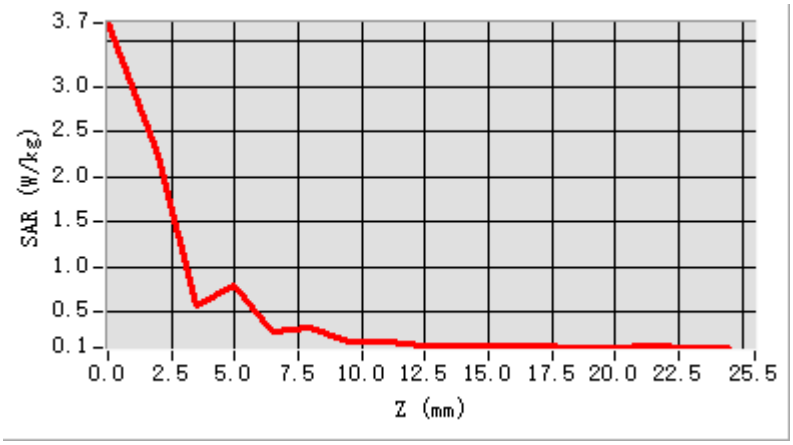
Maximum location: X=-18.00, Y=-31.00 ; SAR Peak: 4.14 W/kg

D. SAR 1g & 10g

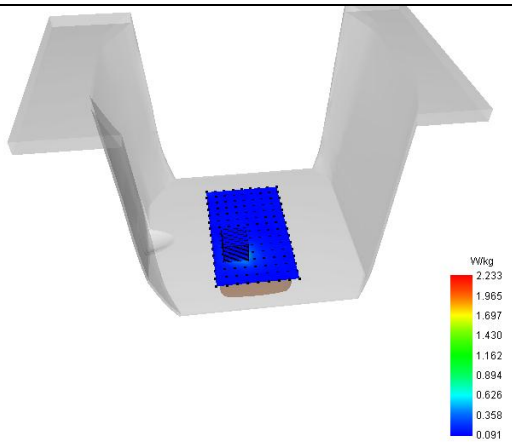
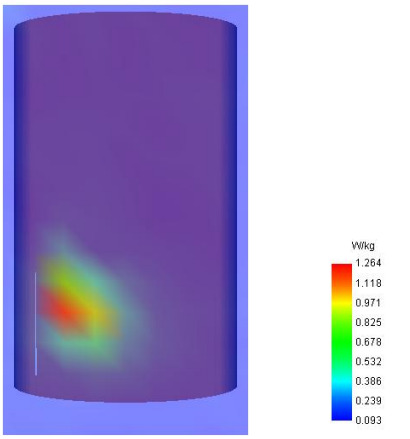
SAR 10g (W/Kg)	0.300
SAR 1g (W/Kg)	1.019
Variation (%)	4.29
Horizontal validation criteria: minimum distance (mm)	6.00
Vertical validation criteria: SAR ratio M2/M1 (%)	57.87

E. Z Axis Scan

Z (mm)	0.00	2.00	3.50	5.00	6.50	8.00	9.50	11.00	12.50	14.00	15.50	17.00	18.50	20.00	21.50	23.00
SAR (W/Kg)	3.710	2.233	0.579	0.785	0.275	0.324	0.165	0.181	0.136	0.136	0.117	0.133	0.107	0.110	0.114	0.106



F. 3D Image

3D screen shot	Hot spot position
	

3# SAR Measurement at U-NII-2a (Body, Validation Plane)
Date of measurement: 11/1/2025

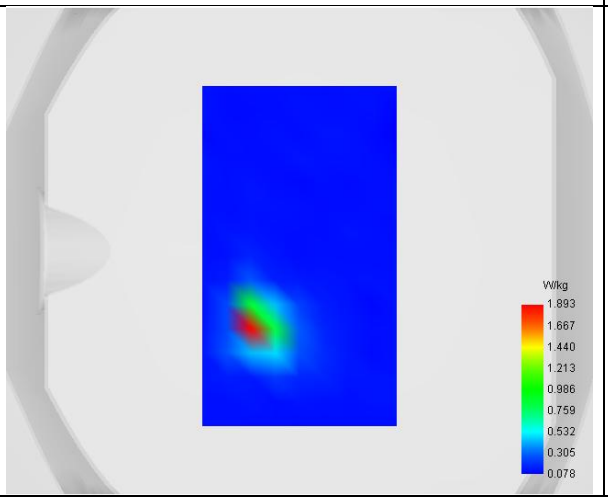
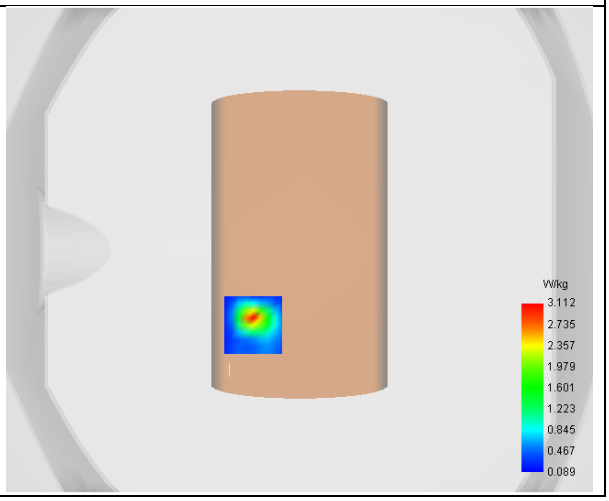
A. Experimental conditions.

Probe	4024-EPGO-442
ConvF	1.89
Area Scan	dx=10mm dy=10mm, Complete
Zoom Scan	9x9x16,dx=3mm dy=3mm dz=1.5mm,Complete
Phantom	Validation plane
Device Position	Body
Band	U-NII-2a
Channels/Frequency	Middle (56)/ frequency 5280.000 Mhz
Signal	IEEE 802.11 a

B. Permitivity

Middle TX Frequency (MHz)	5280.000
Relative permitivity (real part)	37.32
Relative permitivity (imaginary part)	16.09
Conductivity (S/m)	4.72

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

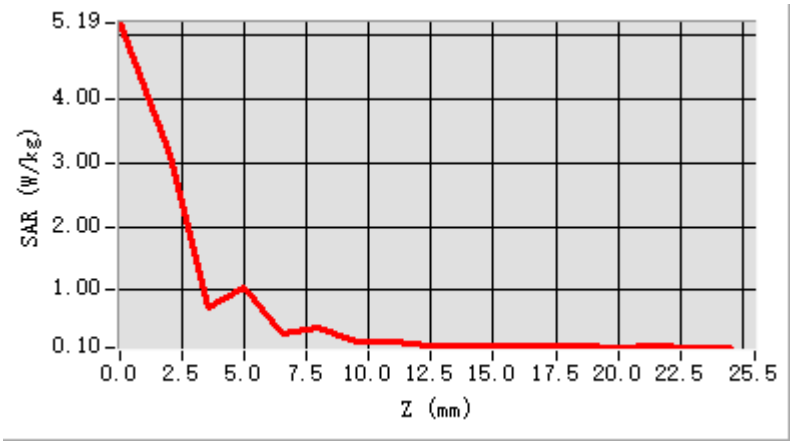
Maximum location: X=-19.00, Y=-31.00 ; SAR Peak: 5.83 W/kg

D. SAR 1g & 10g

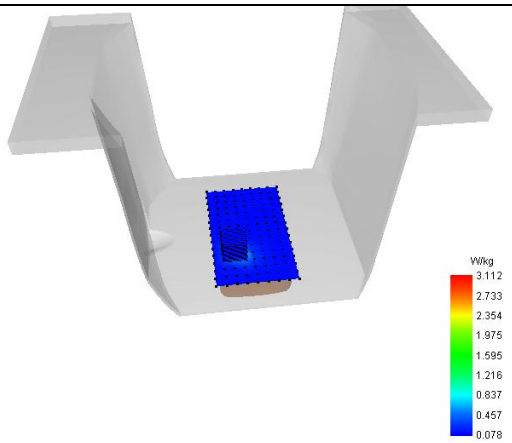
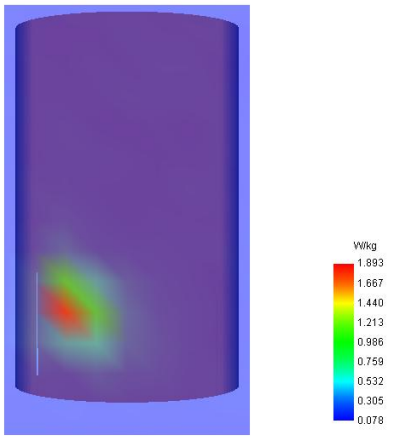
SAR 10g (W/Kg)	0.262
SAR 1g (W/Kg)	1.184
Variation (%)	3.97
Horizontal validation criteria: minimum distance (mm)	6.00
Vertical validation criteria: SAR ratio M2/M1 (%)	55.44

E. Z Axis Scan

Z (mm)	0.00	2.00	3.50	5.00	6.50	8.00	9.50	11.00	12.50	14.00	15.50	17.00	18.50	20.00	21.50	23.00
SAR (W/Kg)	5.190	3.112	0.715	1.044	0.328	0.416	0.186	0.206	0.136	0.138	0.121	0.121	0.120	0.108	0.117	0.107



F. 3D Image

3D screen shot	Hot spot position
	

4# SAR Measurement at U-NII-2c (Body, Validation Plane)
Date of measurement: 12/1/2025

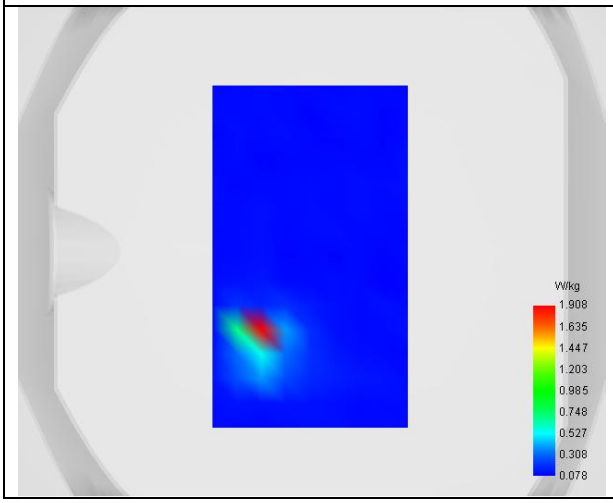
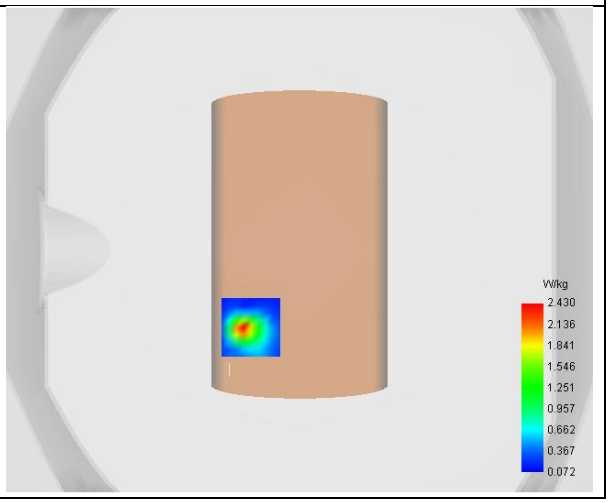
A. Experimental conditions.

Probe	4024-EPGO-442
ConvF	1.88
Area Scan	dx=10mm dy=10mm, Complete
Zoom Scan	9x9x16,dx=3mm dy=3mm dz=1.5mm,Complete
Phantom	Validation plane
Device Position	Body
Band	U-NII-2c
Channels/Frequency	Middle (132)/ frequency 5600.000 Mhz
Signal	IEEE 802.11 a

B. Permitivity

Middle TX Frequency (MHz)	5600.000
Relative permitivity (real part)	34.27
Relative permitivity (imaginary part)	15.74
Conductivity (S/m)	4.90

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

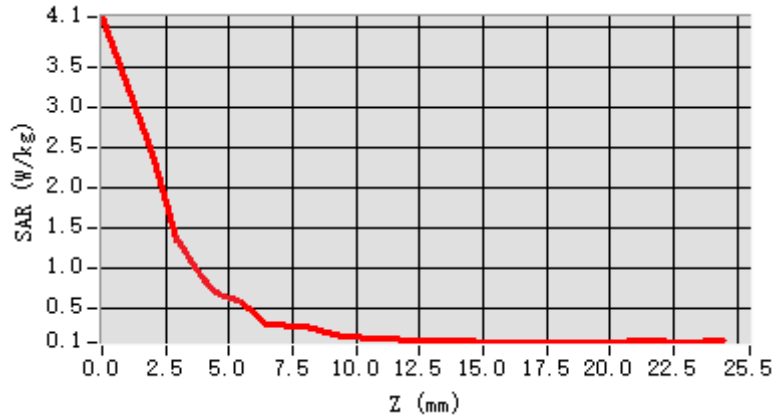
Maximum location: X=-20.00, Y=-32.00 ; SAR Peak: 4.68 W/kg

D. SAR 1g & 10g

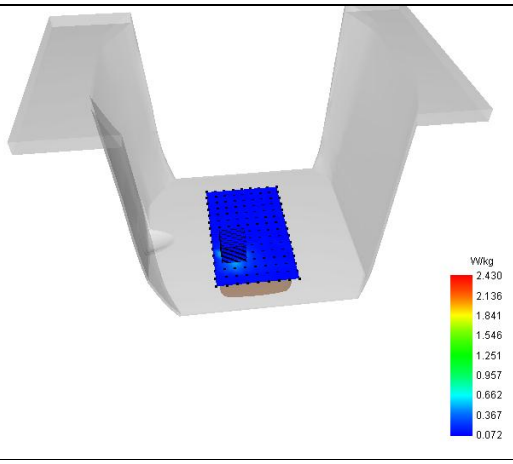
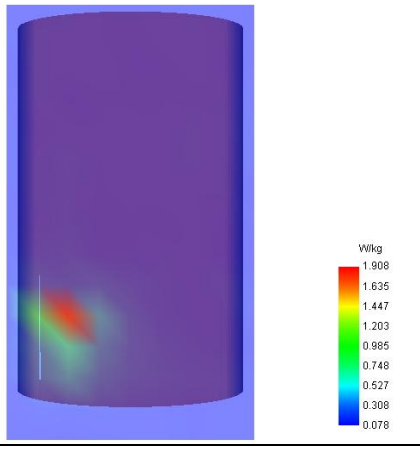
SAR 10g (W/Kg)	0.265
SAR 1g (W/Kg)	1.045
Variation (%)	3.28
Horizontal validation criteria: minimum distance (mm)	6.00
Vertical validation criteria: SAR ratio M2/M1 (%)	53.29

E. Z Axis Scan

Z (mm)	0.00	2.00	3.50	5.00	6.50	8.00	9.50	11.00	12.50	14.00	15.50	17.00	18.50	20.00	21.50	23.00
SAR (W/Kg)	4.115	2.423	0.742	0.739	0.315	0.276	0.161	0.143	0.116	0.106	0.098	0.091	0.085	0.093	0.101	0.090



F. 3D Image

3D screen shot	Hot spot position
	

5# SAR Measurement at U-NII-3 (Body, Validation Plane)
Date of measurement: 9/1/2025

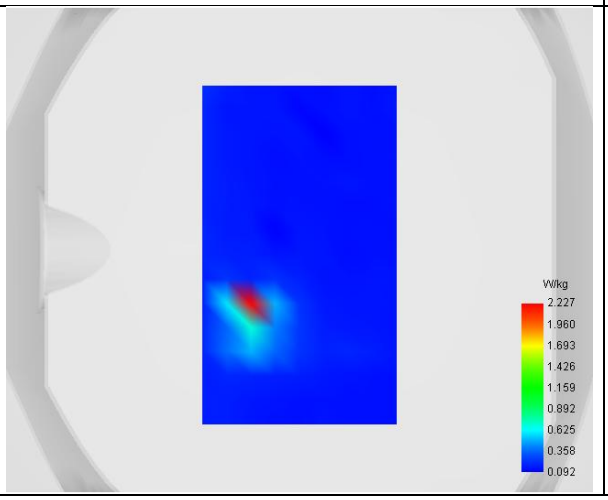
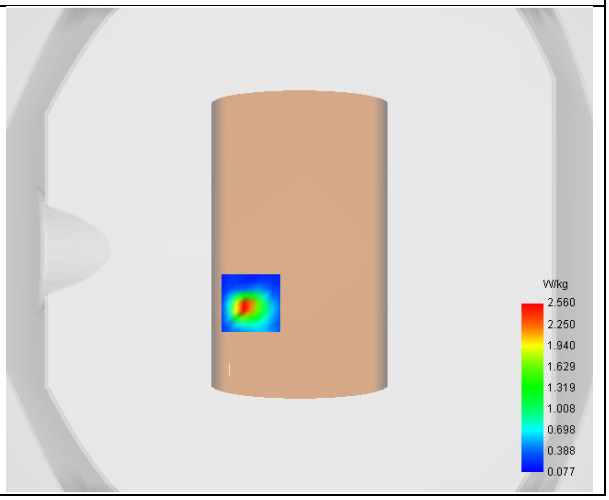
A. Experimental conditions.

Probe	4024-EPGO-442
ConvF	1.90
Area Scan	dx=10mm dy=10mm, Complete
Zoom Scan	9x9x16,dx=3mm dy=3mm dz=1.5mm,Complete
Phantom	Validation plane
Device Position	Body
Band	U-NII-3
Channels/Frequency	Middle (157)/ frequency 5785.000 Mhz
Signal	IEEE 802.11 n

B. Permitivity

Middle TX Frequency (MHz)	5785.000
Relative permitivity (real part)	34.08
Relative permitivity (imaginary part)	15.74
Conductivity (S/m)	5.06

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

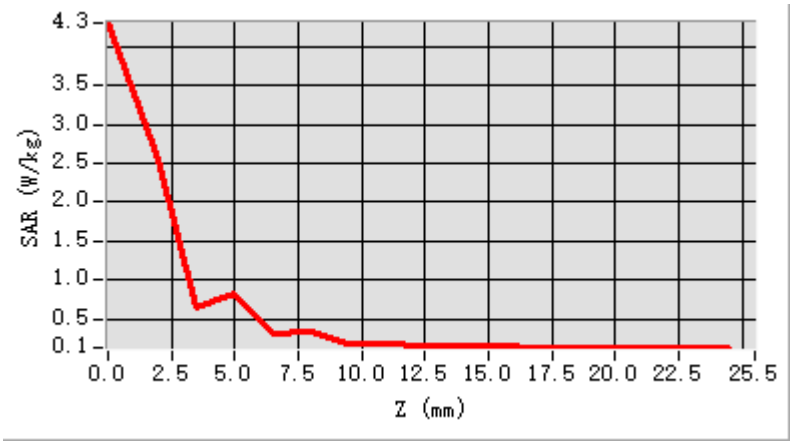
Maximum location: X=-20.00, Y=-22.00 ; SAR Peak: 5.16 W/kg

D. SAR 1g & 10g

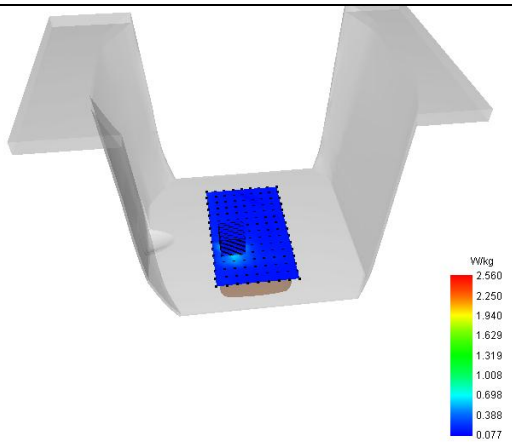
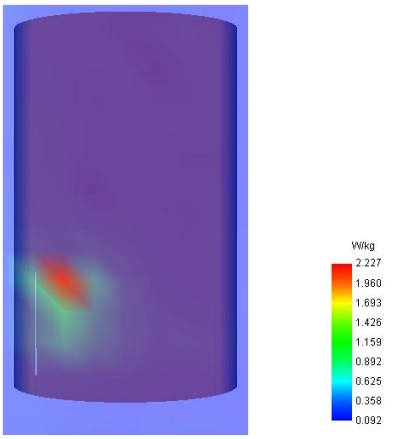
SAR 10g (W/Kg)	0.334
SAR 1g (W/Kg)	1.136
Variation (%)	-3.56
Horizontal validation criteria: minimum distance (mm)	4.24
Vertical validation criteria: SAR ratio M2/M1 (%)	54.05

E. Z Axis Scan

Z (mm)	0.00	2.00	3.50	5.00	6.50	8.00	9.50	11.00	12.50	14.00	15.50	17.00	18.50	20.00	21.50	23.00
SAR (W/Kg)	4.308	2.560	0.641	0.819	0.304	0.337	0.192	0.190	0.143	0.153	0.148	0.132	0.138	0.133	0.130	0.139



F. 3D Image

3D screen shot	Hot spot position
	

15. Appendix D. Calibration Certificate

Table of contents
E Field Probe - 4024-EPGO-442
2450 MHz Dipole - SN 03/15 DIP 2G450-352
5000-6000 MHz Dipole - SN 13/14 WGA 33

COMOSAR E-Field Probe Calibration Report

Ref : ACR.278.12.24.BES.A

SHENZHEN NTEK TESTING TECHNOLOGY CO., LTD.

BUILDING E, FENDA SCIENCE PARK, SANWEI COMMUNITY, XIXIANG STREET,

BAO'AN DISTRICT, SHENZHEN GUANGDONG, CHINA

MVG COMOSAR DOSIMETRIC E-FIELD PROBE

SERIAL NO.: 4024-EPGO-442

Calibrated at MVG

Z.I. de la pointe du diable

Technopôle Brest Iroise – 295 avenue Alexis de Rochon

29280 PLOUZANE - FRANCE

Calibration date: 10/04/2024

Accreditations #2-6789
Scope available on www.cofrac.fr

Summary:

This document presents the method and results from an accredited COMOSAR Dosimetric E-Field Probe calibration performed at MVG, using the CALIPROBE test bench, for use with a MVG COMOSAR system only. The test results covered by accreditation are traceable to the International System of Units (SI).

COMOSAR E-FIELD PROBE CALIBRATION REPORT

Ref: ACR.278.12.24.BES.A

	Name	*Function*	*Date*	*Signature*
Prepared by :	Cyrille ONNEE	Measurement Responsible	10/4/2024	
Checked & approved by:	Pedro Ruiz	Technical Manager	10/4/2024	
Authorized by:	Pedro Ruiz	Laboratory Director	10/4/2024 Assinado por: Pedro RUIZ 29093B31C46F428...	

	Customer Name
Distribution :	SHENZHEN NTEK TESTING TECHNOLOGY CO., LTD.

Issue	*Name*	*Date*	*Modifications*
A	Cyrille ONNEE	10/4/2024	Initial release

TABLE OF CONTENTS

1 DEVICE UNDER TEST

Device Under Test	
Device Type	COMOSAR DOSIMETRIC E FIELD PROBE
Manufacturer	MVG
Model	SSE2
Serial Number	4024-EPGO-442
Product Condition (new / used)	New
Frequency Range of Probe	0.15 GHz-7.5GHz
Resistance of Three Dipoles at Connector	Dipole 1: R1=0.206 MΩ Dipole 2: R2=0.223 MΩ Dipole 3: R3=0.235 MΩ

2 PRODUCT DESCRIPTION

2.1 GENERAL INFORMATION

MVG's COMOSAR E field Probes are built in accordance to the IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards.

Figure 1 – *MVG COMOSAR Dosimetric E field Probe*

Probe Length	330 mm
Length of Individual Dipoles	2 mm
Maximum external diameter	8 mm
Probe Tip External Diameter	2.5 mm
Distance between dipoles / probe extremity	1 mm

3 MEASUREMENT METHOD

The IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards provide recommended practices for the probe calibrations, including the performance characteristics of interest and methods by which to assess their effect. All calibrations / measurements performed meet the fore-mentioned standards.

3.1 SENSITIVITY

The sensitivity factors of the three dipoles were determined using a two step calibration method (air and tissue simulating liquid) using waveguides as outlined in the standards for frequency range 600-7500MHz and using the calorimeter cell method (transfer method) as outlined in the standards for frequency 150-450 MHz.

3.2 LINEARITY

The evaluation of the linearity was done in free space using the waveguide, performing a power sweep to cover the SAR range 0.01W/kg to 100W/kg.

3.3 ISOTROPY

The axial isotropy was evaluated by exposing the probe to a reference wave from a standard dipole with the dipole mounted under the flat phantom in the test configuration suggested for system validations and checks. The probe was rotated along its main axis from 0 to 360 degrees in 15-degree steps. The hemispherical isotropy is determined by inserting the probe in a thin plastic box filled with tissue-equivalent liquid, with the plastic box illuminated with the fields from a half wave dipole. The dipole is rotated about its axis (0°–180°) in 15° increments. At each step the probe is rotated about its axis (0°–360°).

3.4 BOUNDARY EFFECT

The boundary effect is defined as the deviation between the SAR measured data and the expected exponential decay in the liquid when the probe is oriented normal to the interface. To evaluate this effect, the liquid filled flat phantom is exposed to fields from either a reference dipole or waveguide. With the probe normal to the phantom surface, the peak spatial average SAR is measured and compared to the analytical value at the surface.

The boundary effect uncertainty can be estimated according to the following uncertainty approximation formula based on linear and exponential extrapolations between the surface and $d_{be} + d_{step}$ along lines that are approximately normal to the surface:

$$\mathrm{SAR}_{\mathrm{uncertainty}}[\%] = \delta\mathrm{SAR}_{be} \frac{(d_{be} + d_{step})^2}{2d_{step}} \frac{\left(e^{-d_{be}/(\delta/2)}\right)}{\delta/2} \quad \text{for } (d_{be} + d_{step}) < 10 \text{ mm}$$

where

$\mathrm{SAR}_{\mathrm{uncertainty}}$	is the uncertainty in percent of the probe boundary effect
d_{be}	is the distance between the surface and the closest *zoom-scan* measurement point, in millimetre
Δ_{step}	is the separation distance between the first and second measurement points that are closest to the phantom surface, in millimetre, assuming the boundary effect at the second location is negligible
δ	is the minimum penetration depth in millimetres of the head tissue-equivalent liquids defined in this standard, i.e., $\delta \approx 14$ mm at 3 GHz;
$\Delta\mathrm{SAR}_{be}$	in percent of SAR is the deviation between the measured SAR value, at the distance d_{be} from the boundary, and the analytical SAR value.

The measured worst case boundary effect SARuncertainty[%] for scanning distances larger than 4mm is 1.0% Limit ,2%).