

6. 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.

7. RF Exposure Positions

7.1. Generic device

The SAR evaluation shall be performed for surface of the DUT that are accessible during intended use, as indicated in Figure 7.1. Adjust the distance between the device surface and the flat phantom to 0mm.

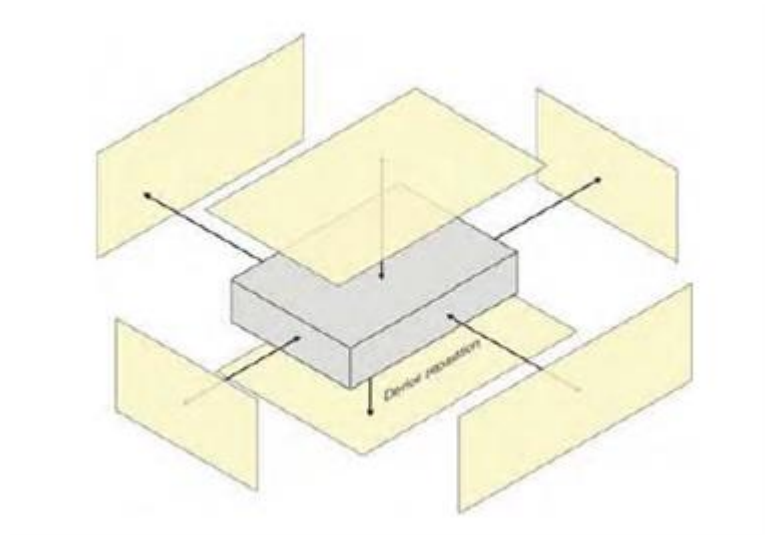


Figure 7.1 – Test positions for generic device

8. RF Output Power

8.1. Wi-Fi & BT Output Power

Mode	Channel	Frequency (MHz)	Output Power (dBm)	Tune-Up
802.11b	1	2412	14.42	15.00
	6	2437	14.74	15.00
	11	2462	14.77	15.00
802.11g	1	2412	16.75	17.00
	6	2437	16.87	17.00
	11	2462	16.92	17.00
802.11n (HT20)	1	2412	16.48	17.00
	6	2437	16.95	17.00
	11	2462	16.72	17.00
802.11n (H40)	3	2422	16.67	17.00
	6	2437	16.57	17.00
	9	2452	16.51	17.00

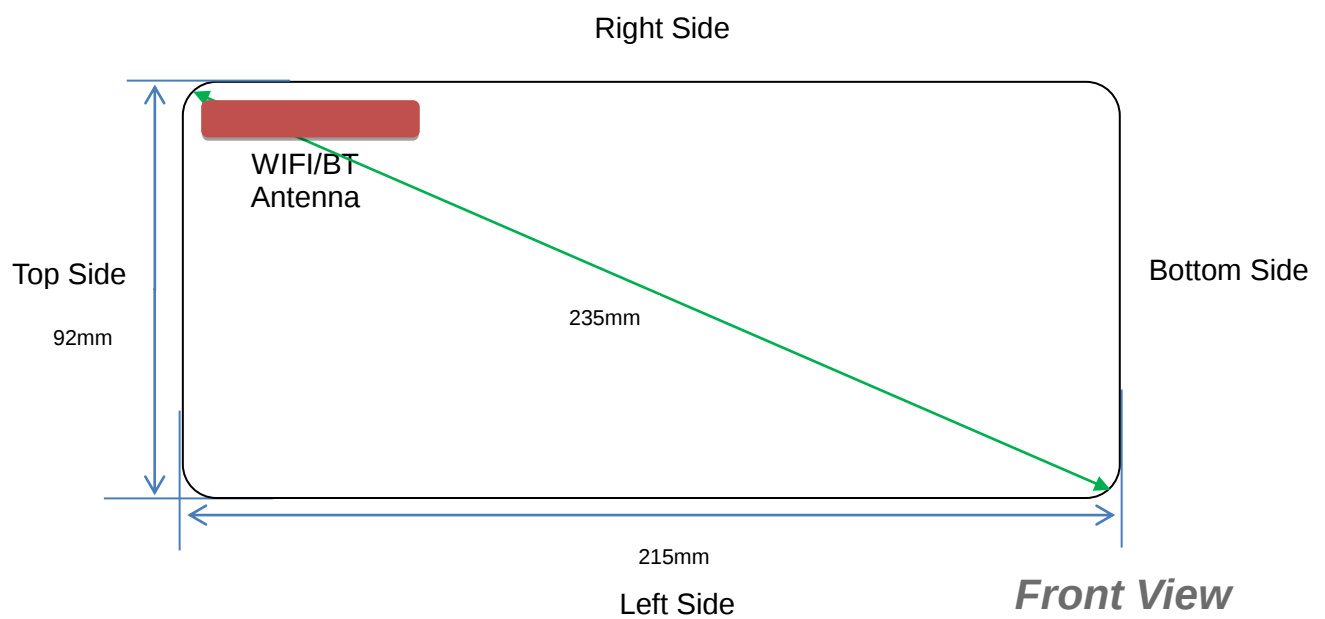
Mode	Frequency (MHz)	Output Power(dBm)	Tune-up
802.11A	5180	13.61	14.00
	5200	14.57	15.00
	5240	14.50	15.00
802.11N20SISO	5180	13.50	14.00
	5200	14.64	15.00
	5240	14.43	15.00
802.11N40SISO	5190	13.48	14.00
	5230	14.55	15.00
802.11AC20SISO	5180	13.46	14.00
	5200	14.61	15.00
	5240	14.30	15.00
802.11AC40SISO	5190	13.62	14.00
	5230	14.47	15.00
802.11AC80SISO	5210	14.59	15.00

Mode	Frequency (MHz)	Output Power (dBm)	Tune-up
802.11A	5745	12.18	13.00
	5785	14.63	15.00
	5825	14.47	15.00
802.11N20SISO	5745	11.69	12.00
	5785	14.48	15.00
	5825	14.33	15.00
802.11N40SISO	5755	11.65	12.00
	5795	14.52	15.00
802.11AC20SISO	5745	11.69	12.00
	5785	14.50	15.00
	5825	14.27	15.00
802.11AC40SISO	5755	11.59	12.00
	5795	14.54	15.00
802.11AC80SISO	5775	14.41	15.00

Mode	Channel	Output Power (dBm)	Tune-up
DH5	Hop	1.51	2.00
2DH5	Hop	1.76	2.00
3DH5	Hop	2.35	3.00
BLE1M	00	-3.58	-3.00

BLE2M	19	-2.07	-2.00
	39	-1.69	-1.00
	00	-3.54	-3.00
	19	-1.97	-1.00
	39	-1.59	-1.00

9. Antenna Location



Antenna information:

Distance of The Antenna to the EUT surface and edge (mm)						
Antennas	Front Side	Back Side	Left Side	Right Side	Top Side	Bottom Side
BT/WLAN	5mm	5mm	74mm	12mm	5mm	153mm

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

10. 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:

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

- $f(\text{GHz})$ 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	Pmax (dBm)	Pmax (mW)	Distance (mm)	f (GHz)	Calculation Result	SAR Exclusion threshold	SAR test exclusion
Bluetooth	3.00	2.00	5	2.480	0.6	3	Yes

NOTE: Standalone SAR test exclusion for Bluetooth.

When standalone SAR test exclusion applies to an antenna that transmits simultaneously with other antennas, the standalone SAR must be estimated according to following to determine simultaneous transmission SAR test exclusion:

$[(\text{max. power of channel, including tune-up tolerance, mW})/(\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})/x}] \leq 7.5$ W/kg for test separation distances ≤ 50 mm, where $x = 7.5$ for 1-g SAR and $x = 18.75$ for 10-g SAR.

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

Mode	Position	Pmax (dBm)	Pmax (mW)	Distance (mm)	f (GHz)	x	Estimated SAR (W/kg)
Bluetooth	Body	3.00	2.00	5	2.48	7.5	0.084

NOTE: Estimated SAR calculation for Bluetooth

11. SAR Measurement Results

< WLAN 2.4G >

Test Position of Body with 0mm	Test channel /Freq.	Mode	SAR Value (W/kg)		Power Drift (±5%)	Conducted power (dBm)	Tune-up power (dBm)	Scaled SAR 1g (W/Kg)	Date	Plot
			1g	10g						
Front Side	6/2437	802.11b	0.120	0.084	-2.90	14.77	15.00	0.127	2025/7/8	
Back Side	6/2437	802.11b	0.162	0.115	-0.26	14.77	15.00	0.171	2025/7/8	3#
Back Side	6/2437	802.11n (HT20)	0.158	0.110	1.25	16.95	17.00	0.160	2025/7/8	
Left Side	6/2437	802.11b	0.060	0.032	1.02	14.77	15.00	0.063	2025/7/8	
Right Side	6/2437	802.11b	0.082	0.056	3.61	14.77	15.00	0.086	2025/7/8	
Top Side	6/2437	802.11b	0.109	0.070	2.20	14.77	15.00	0.115	2025/7/8	
Bottom Side	6/2437	802.11b	0.030	0.015	0.37	14.77	15.00	0.032	2025/7/8	

< WLAN 5.2G >

Test Position of Body with 0mm	Test channel /Freq.	Mode	SAR Value (W/kg)		Power Drift (±5%)	Conducted power (dBm)	Tune-up power (dBm)	Scaled SAR 1g (W/Kg)	Date	Plot
			1g	10g						
Front Side	40/5200	802.11N20	0.384	0.193	-1.52	14.64	15.00	0.417	2025/7/9	
Back Side	40/5200	802.11N20	0.591	0.310	-2.95	14.64	15.00	0.642	2025/7/9	1#
Left Side	40/5200	802.11N20	0.282	0.117	2.36	14.64	15.00	0.306	2025/7/9	
Right Side	40/5200	802.11N20	0.320	0.154	1.02	14.64	15.00	0.348	2025/7/9	
Top Side	40/5200	802.11N20	0.355	0.178	-1.01	14.64	15.00	0.386	2025/7/9	
Bottom Side	40/5200	802.11N20	0.188	0.077	-2.65	14.64	15.00	0.204	2025/7/9	

< WLAN 5.8G >

Test Position of Body with 0mm	Test channel /Freq.	Mode	SAR Value (W/kg)		Power Drift (±5%)	Conducted power (dBm)	Tune-up power (dBm)	Scaled SAR 1g (W/Kg)	Date	Plot
			1g	10g						
Front Side	157/5785	802.11a	0.391	0.203	1.81	14.63	15.00	0.426	2025/7/10	
Back Side	157/5785	802.11a	0.626	0.314	-0.54	14.63	15.00	0.682	2025/7/10	2#
Left Side	157/5785	802.11a	0.294	0.123	2.65	14.63	15.00	0.320	2025/7/10	
Right Side	157/5785	802.11a	0.331	0.162	3.32	14.63	15.00	0.360	2025/7/10	
Top Side	157/5785	802.11a	0.366	0.182	1.63	14.63	15.00	0.399	2025/7/10	
Bottom Side	157/5785	802.11a	0.194	0.088	-0.47	14.63	15.00	0.211	2025/7/10	

12. Simultaneous Transmission Analysis

N/A

Appendix A. Photo documentation

Refer to appendix Test Setup photo-SAR

Appendix B. System Check Plots

Table of contents
MEASUREMENT 1 System Performance Check - 2450MHz
MEASUREMENT 2 System Performance Check - 5200MHz
MEASUREMENT 3 System Performance Check - 5800MHz

MEASUREMENT 1

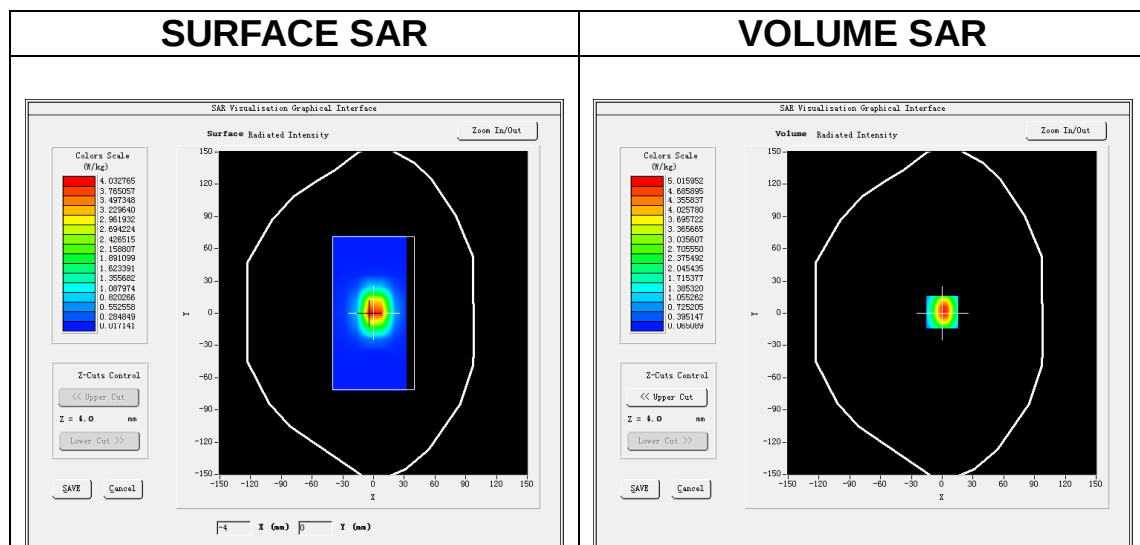
Date of measurement: 8/7/2025

A. Experimental conditions.

Area Scan	<u>dx=12mm dy=12mm, h= 5.00 mm</u>
ZoomScan	<u>7x7x7,dx=5mm dy=5mm dz=5mm</u>
Phantom	<u>Validation plane</u>
Device Position	<u>Dipole</u>
Band	<u>CW2450</u>
Channels	<u>Middle</u>
Signal	<u>CW (Crest factor: 1.0)</u>
ConvF	<u>2.38</u>

B. SAR Measurement Results

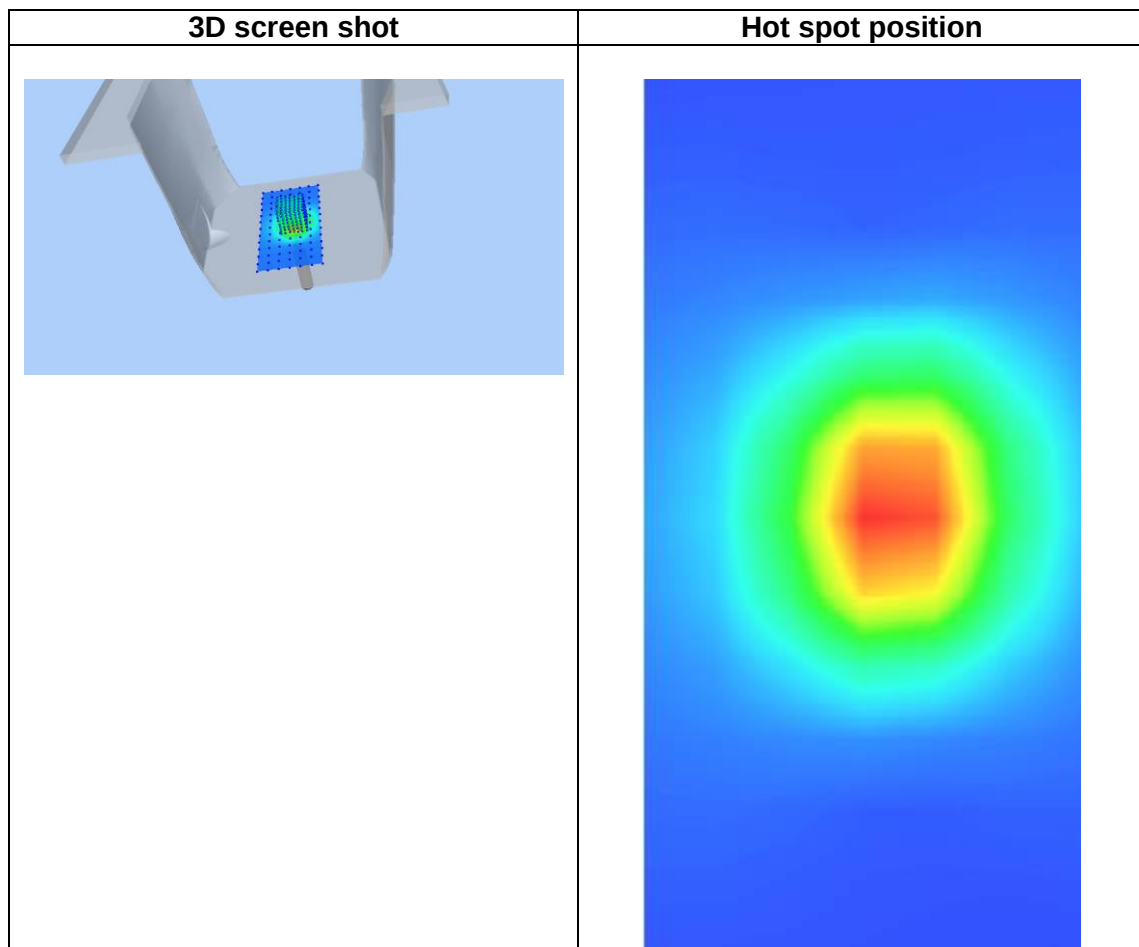
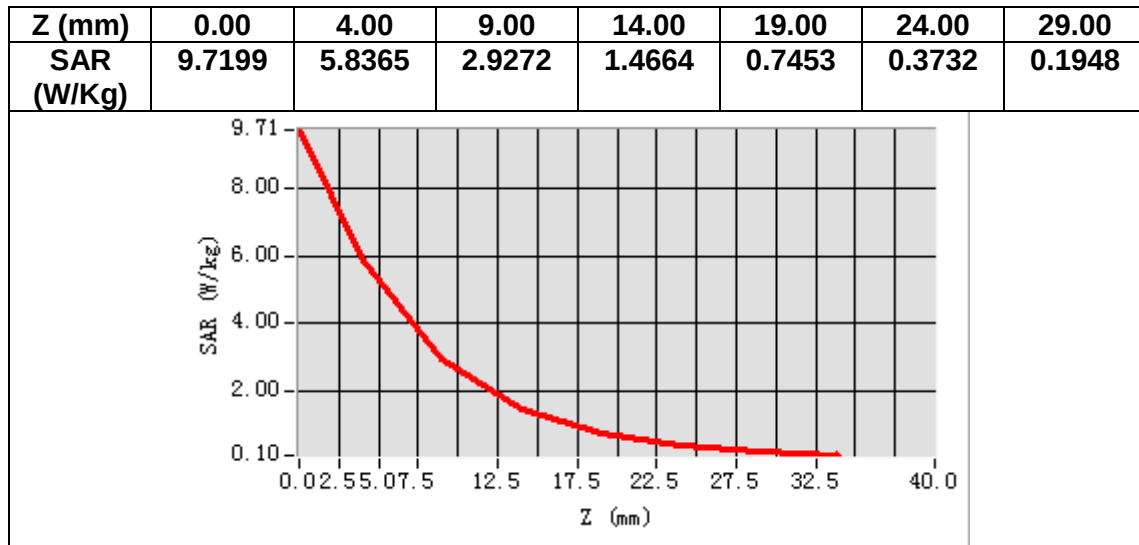
Frequency (MHz)	2450.000000
Relative permittivity (real part)	40.408511
Relative permittivity (imaginary part)	13.399264
Conductivity (S/m)	1.823789
Variation (%)	-1.250000



Maximum location: X=0.00, Y=1.00

SAR Peak: 8.14 W/kg

SAR 10g (W/Kg)	2.359425
SAR 1g (W/Kg)	5.183642



MEASUREMENT 2

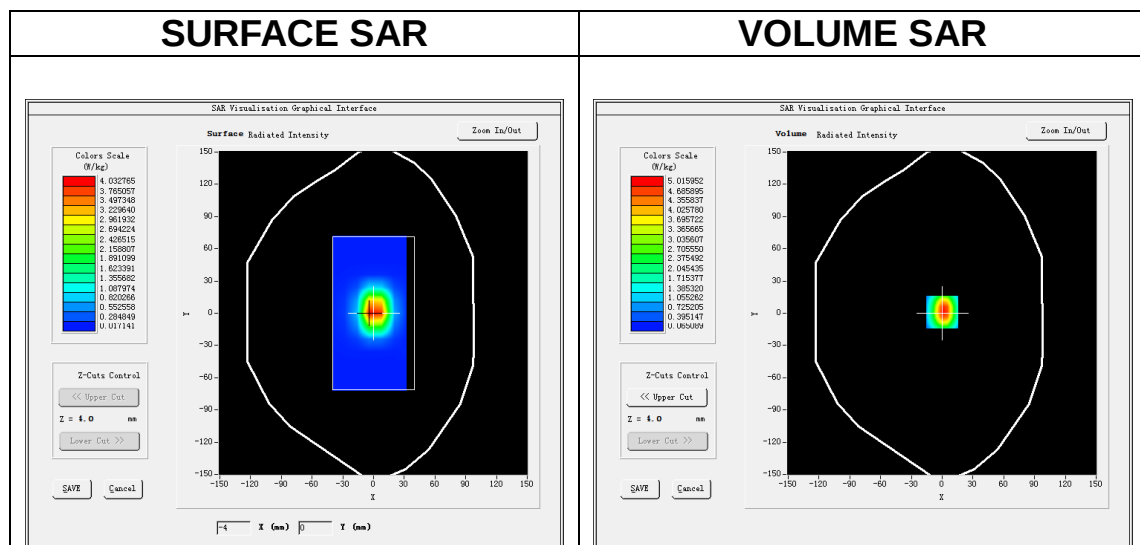
Date of measurement: 9/7/2025

A. Experimental conditions.

Area Scan	<u>dx=10mm dy=10mm, h= 2.00 mm</u>
ZoomScan	<u>7x7x12,dx=4mm dy=4mm dz=2mm</u>
Phantom	<u>Validation plane</u>
Device Position	<u>Dipole</u>
Band	<u>CW5200</u>
Channels	<u>Middle</u>
Signal	<u>CW (Crest factor: 1.0)</u>
ConvF	<u>2.30</u>

B. SAR Measurement Results

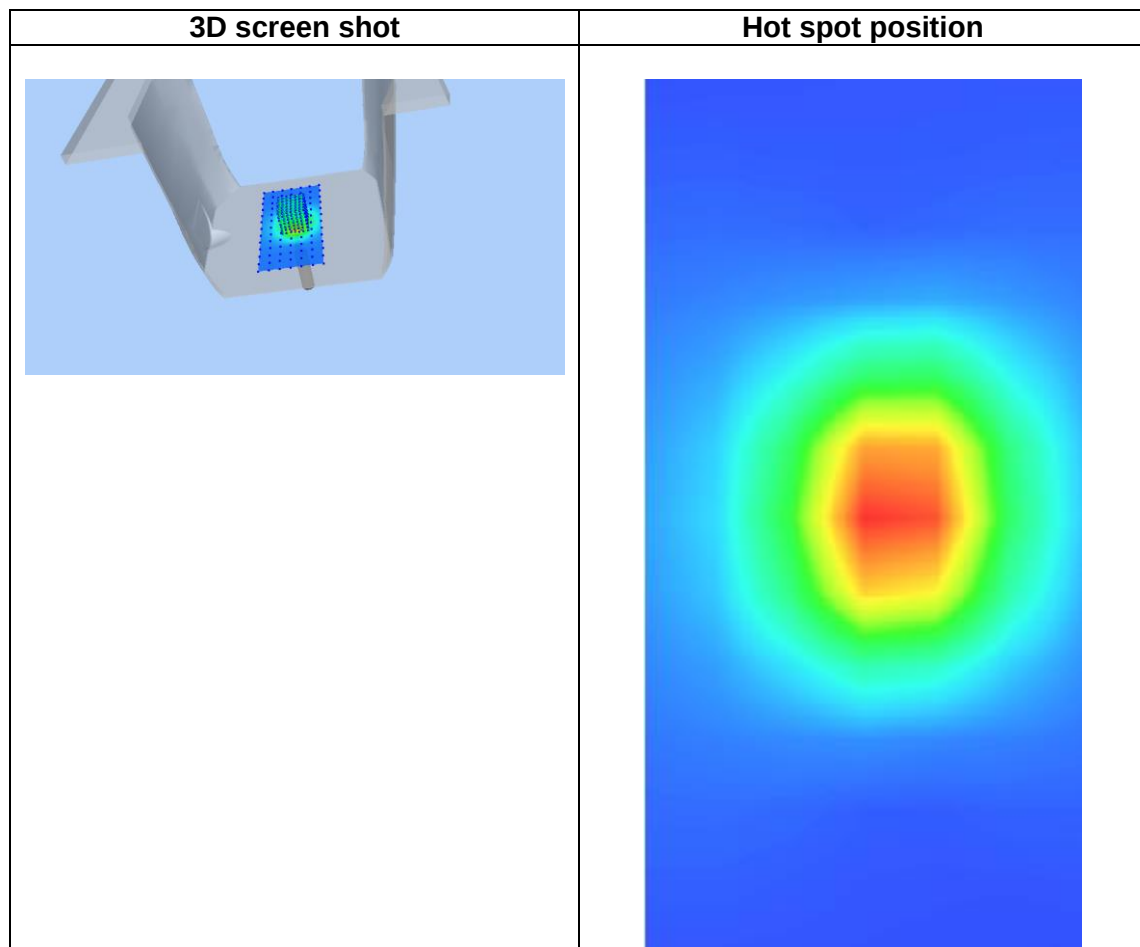
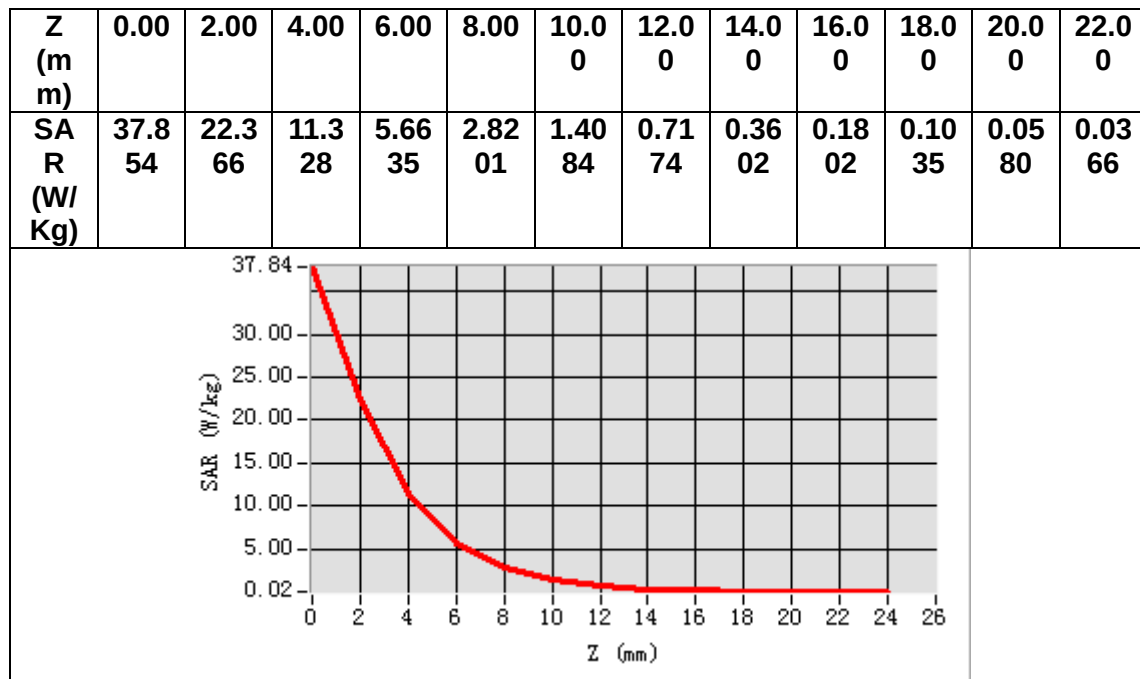
Frequency (MHz)	5200.000000
Relative permittivity (real part)	37.400000
Relative permittivity (imaginary part)	16.129999
Conductivity (S/m)	4.510778
Variation (%)	-4.570000



Maximum location: X=0.00, Y=1.00

SAR Peak: 15.14 W/kg

SAR 10g (W/Kg)	5.212361
SAR 1g (W/Kg)	14.712032



MEASUREMENT 3

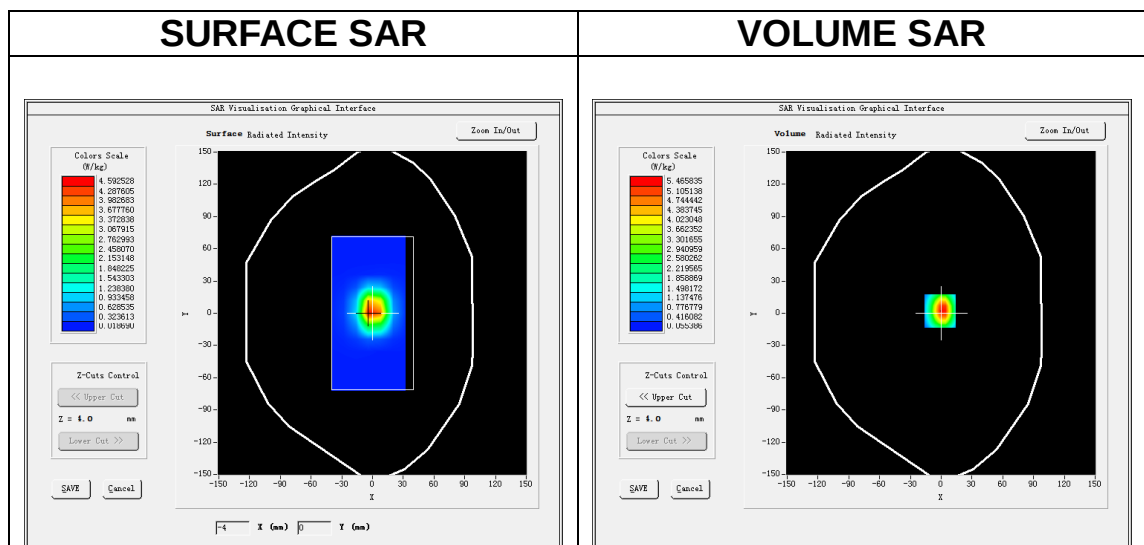
Date of measurement: 10/7/2025

A. Experimental conditions.

Area Scan	<u>dx=10mm dy=10mm, h= 2.00 mm</u>
ZoomScan	<u>7x7x12,dx=4mm dy=4mm dz=2mm</u>
Phantom	<u>Validation plane</u>
Device Position	<u>Dipole</u>
Band	<u>CW5800</u>
Channels	<u>Middle</u>
Signal	<u>CW (Crest factor: 1.0)</u>
ConvF	<u>2.27</u>

B. SAR Measurement Results

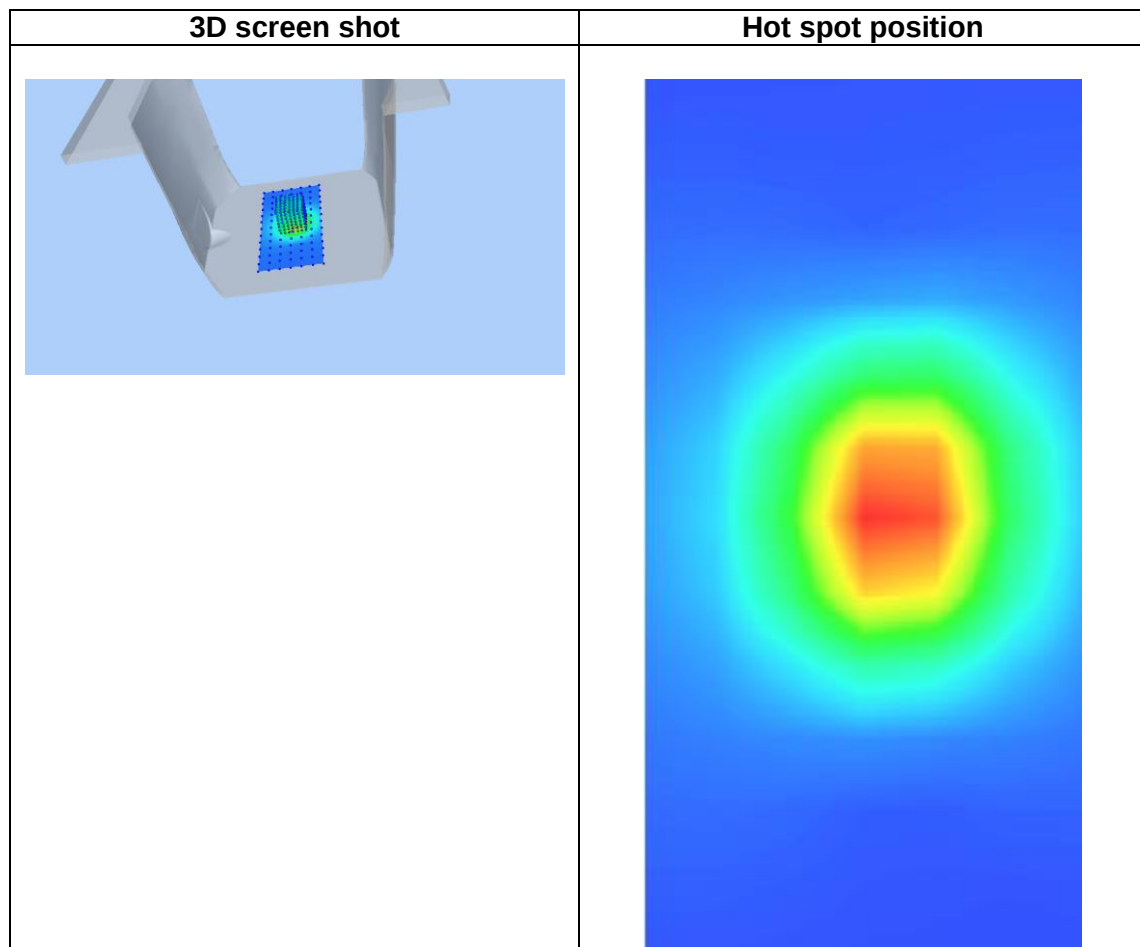
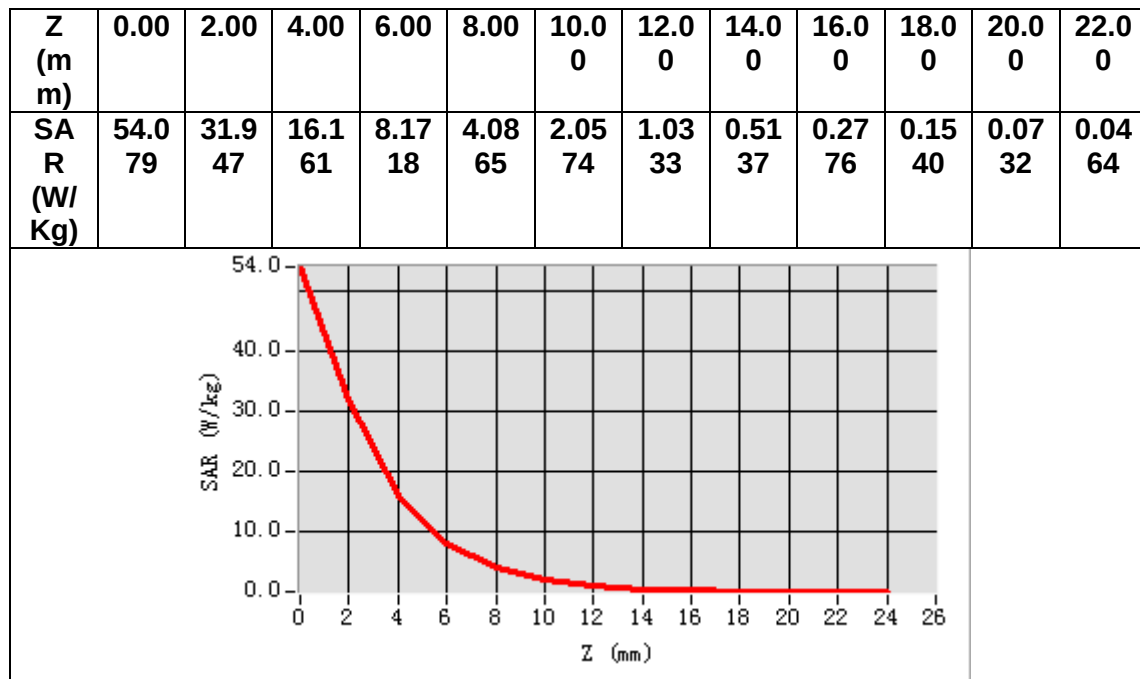
Frequency (MHz)	5800.000000
Relative permittivity (real part)	35.299999
Relative permittivity (imaginary part)	16.360001
Conductivity (S/m)	5.271556
Variation (%)	-2.480000



Maximum location: X=-1.00, Y=2.00

SAR Peak: 17.07 W/kg

SAR 10g (W/Kg)	5.623106
SAR 1g (W/Kg)	16.421035



Appendix C. SAR Test Plots

Table of contents
MEASUREMENT 1 WLAN 5.2G Body
MEASUREMENT 2 WLAN 5.8G Body
MEASUREMENT 3 WLAN 2.4G Body

MEASUREMENT 1

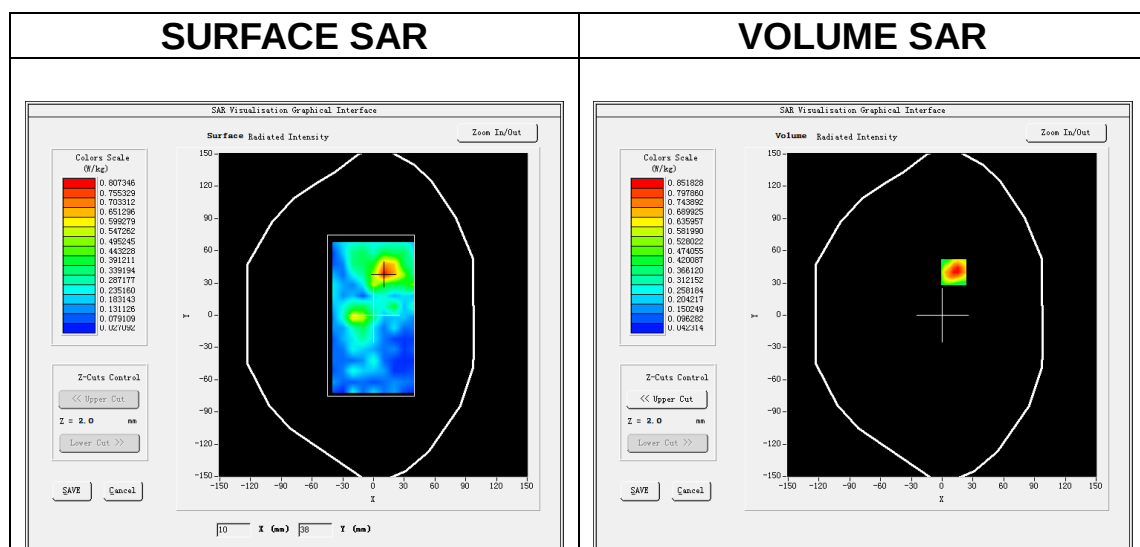
Date of measurement: 9/7/2025

A. Experimental conditions.

<u>Area Scan</u>	<u>dx=10mm dy=10mm, h= 2.00 mm</u>
<u>ZoomScan</u>	<u>7x7x12,dx=4mm dy=4mm dz=2mm</u>
<u>Phantom</u>	<u>Validation plane</u>
<u>Device Position</u>	<u>Body</u>
<u>Band</u>	<u>IEEE 802.11n U-NII</u>
<u>Channels</u>	<u>Middle</u>
<u>Signal</u>	<u>IEEE802.n (Crest factor: 1.0)</u>
<u>ConvF</u>	<u>2.30</u>

B. SAR Measurement Results

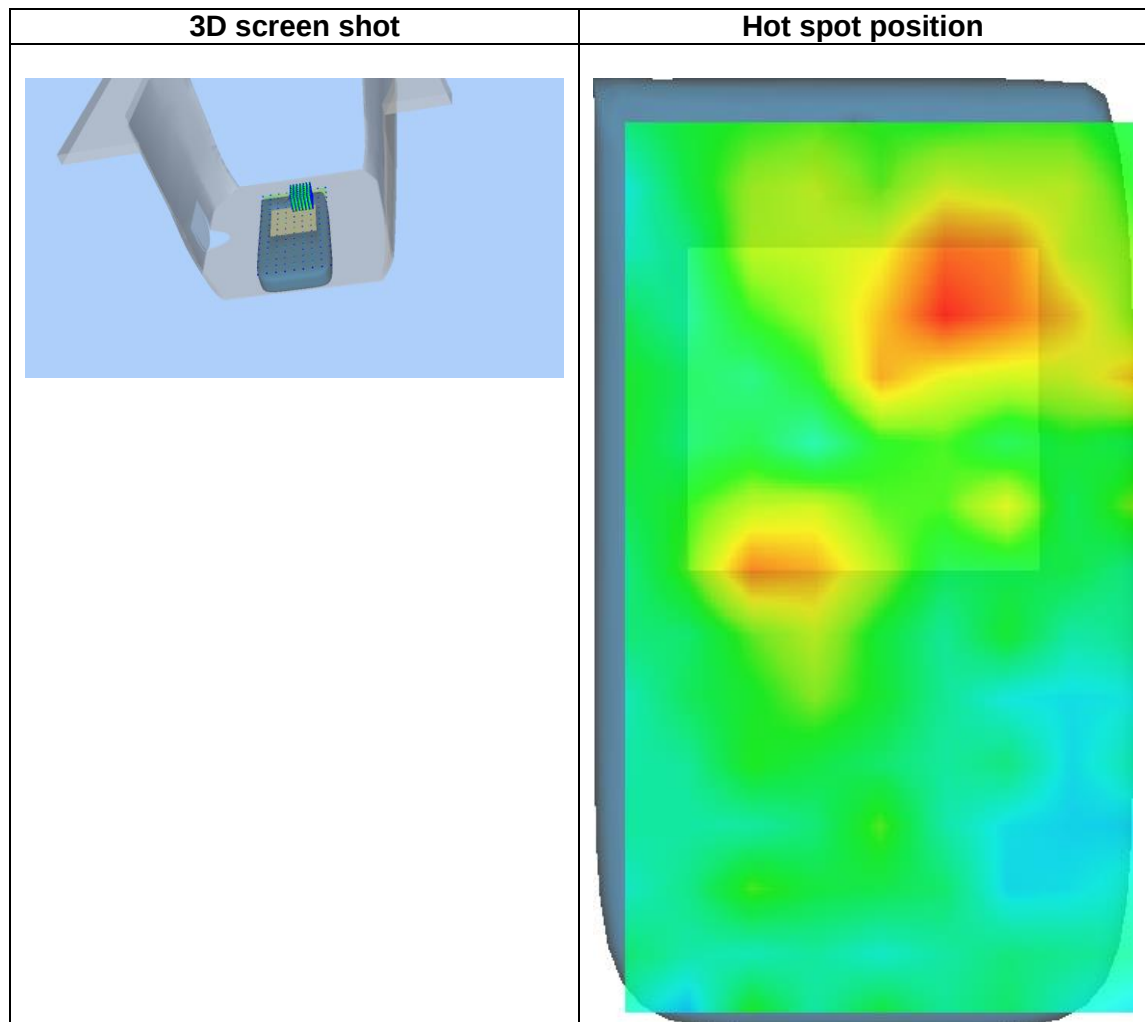
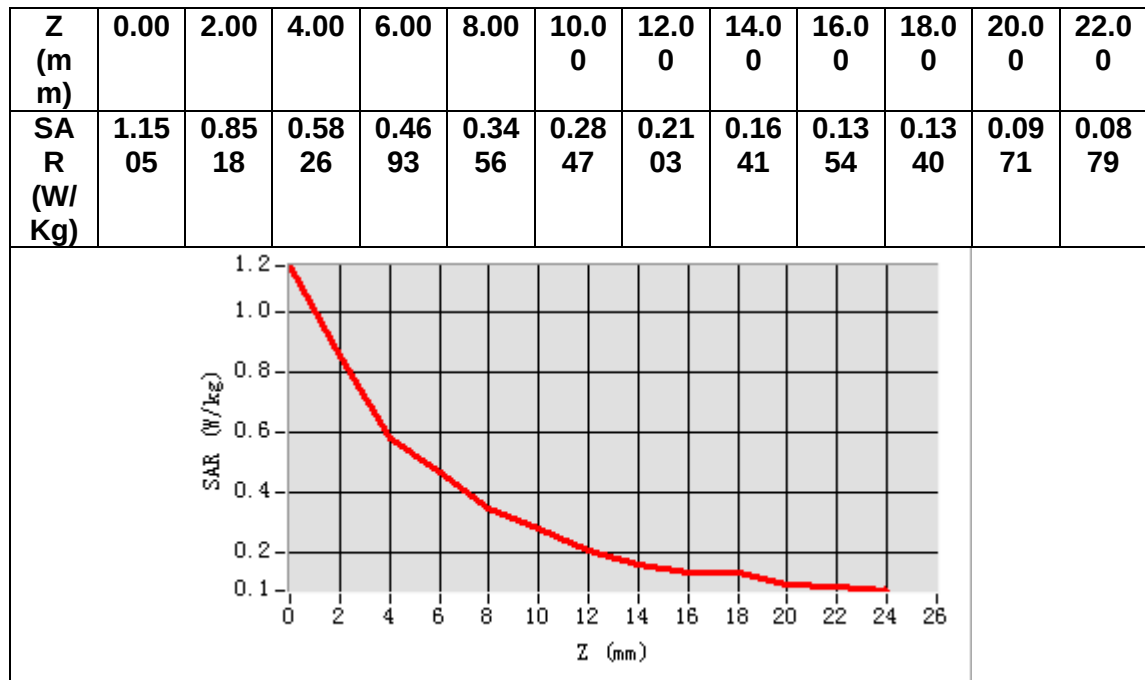
Frequency (MHz)	5200.000000
Relative permittivity (real part)	37.400000
Relative permittivity (imaginary part)	16.129999
Conductivity (S/m)	4.510778
Variation (%)	-2.950000



Maximum location: X=11.00, Y=40.00

SAR Peak: 1.18 W/kg

SAR 10g (W/Kg)	0.309895
SAR 1g (W/Kg)	0.591430



MEASUREMENT 2

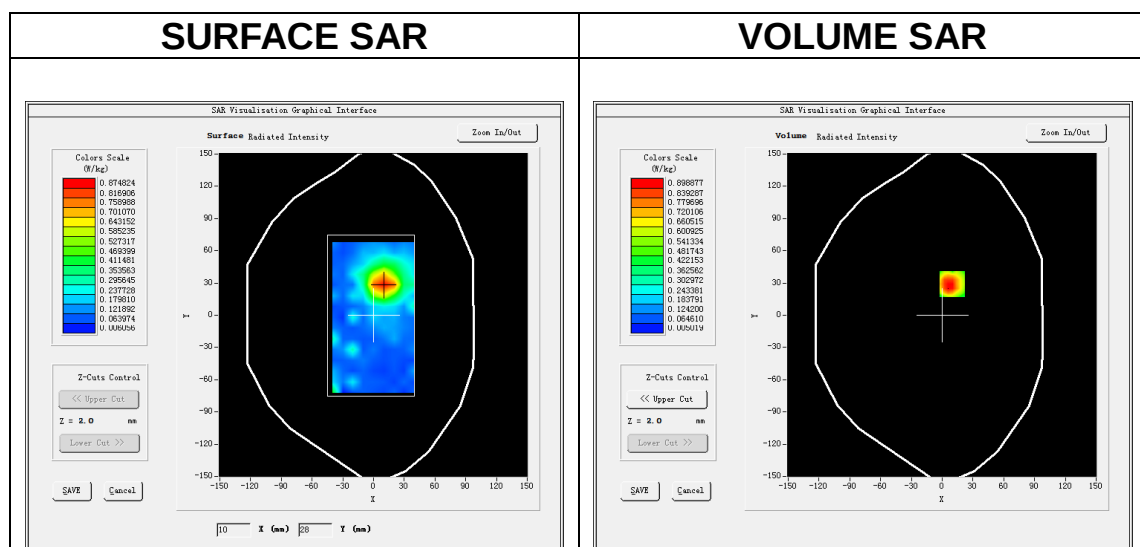
Date of measurement: 10/7/2025

A. Experimental conditions.

<u>Area Scan</u>	<u>dx=10mm dy=10mm, h= 2.00 mm</u>
<u>ZoomScan</u>	<u>7x7x12,dx=4mm dy=4mm dz=2mm</u>
<u>Phantom</u>	<u>Validation plane</u>
<u>Device Position</u>	<u>Body</u>
<u>Band</u>	<u>IEEE 802.11a U-NII</u>
<u>Channels</u>	<u>Middle</u>
<u>Signal</u>	<u>IEEE802.a (Crest factor: 1.0)</u>
<u>ConvF</u>	<u>2.27</u>

B. SAR Measurement Results

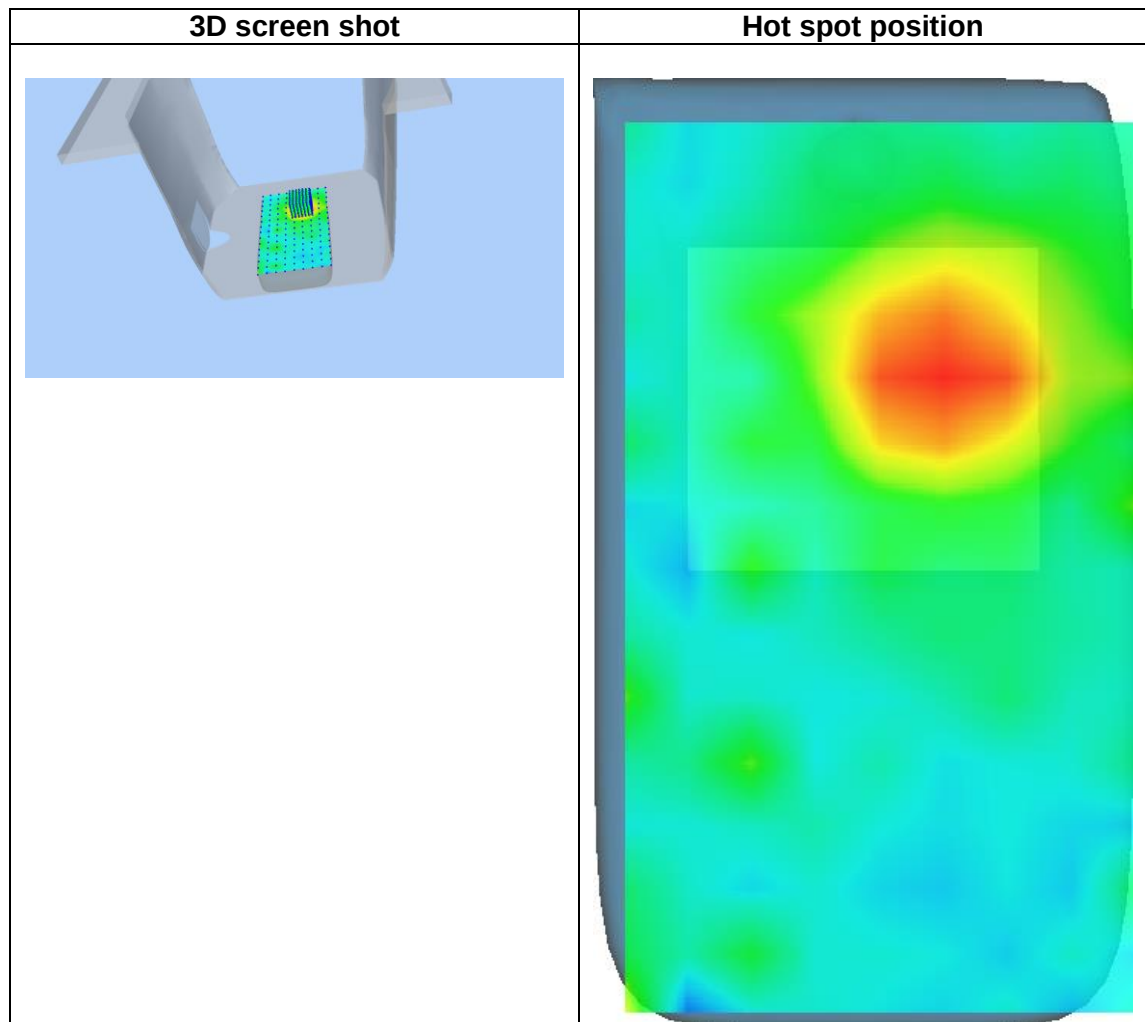
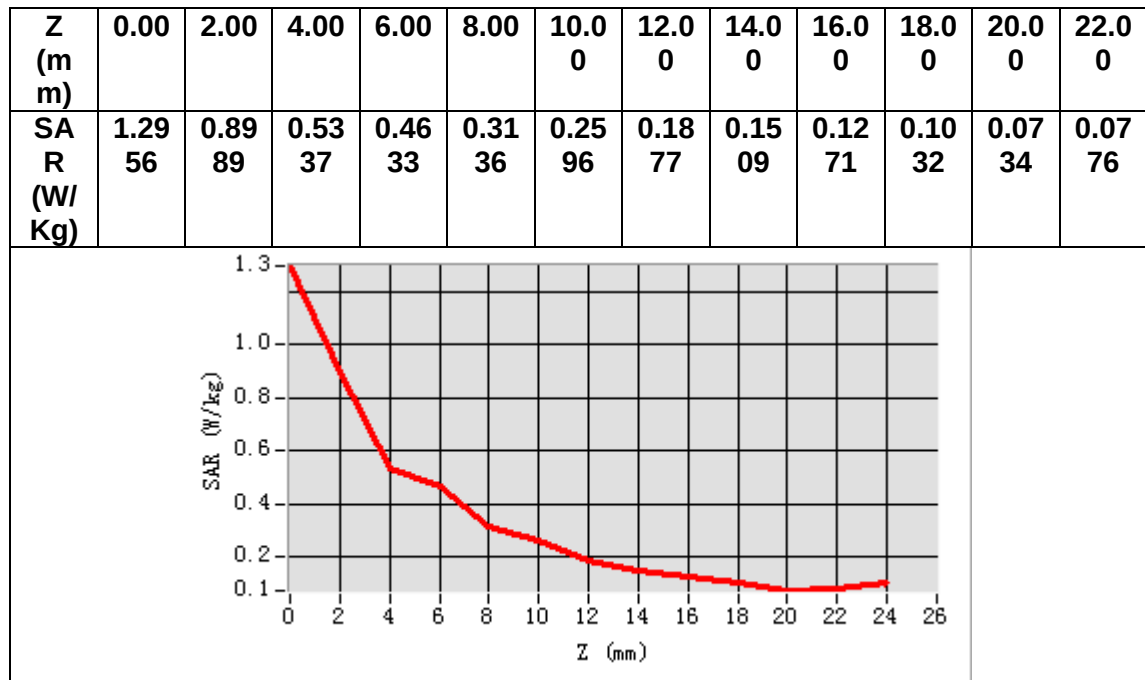
Frequency (MHz)	5785.000000
Relative permittivity (real part)	35.314999
Relative permittivity (imaginary part)	16.355499
Conductivity (S/m)	5.256476
Variation (%)	-0.540000



Maximum location: X=10.00, Y=29.00

SAR Peak: 1.28 W/kg

SAR 10g (W/Kg)	0.314147
SAR 1g (W/Kg)	0.626151



MEASUREMENT 3

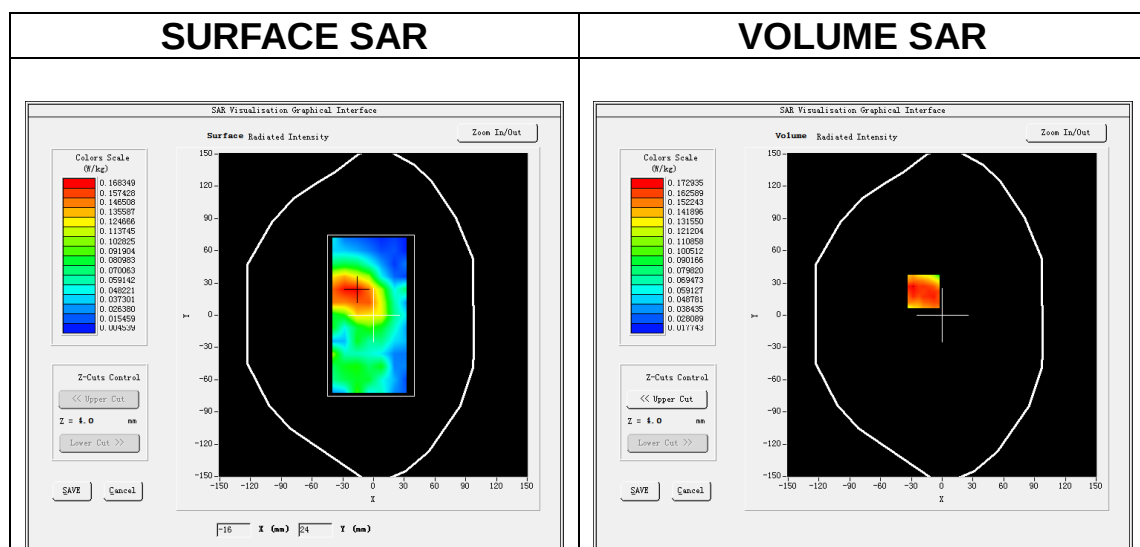
Date of measurement: 8/7/2025

A. Experimental conditions.

<u>Area Scan</u>	<u>dx=12mm dy=12mm, h= 5.00 mm</u>
<u>ZoomScan</u>	<u>7x7x7,dx=5mm dy=5mm dz=5mm</u>
<u>Phantom</u>	<u>Validation plane</u>
<u>Device Position</u>	<u>Body</u>
<u>Band</u>	<u>IEEE 802.11b ISM</u>
<u>Channels</u>	<u>Middle</u>
<u>Signal</u>	<u>IEEE802.b (Crest factor: 1.0)</u>
<u>ConvF</u>	<u>2.38</u>

B. SAR Measurement Results

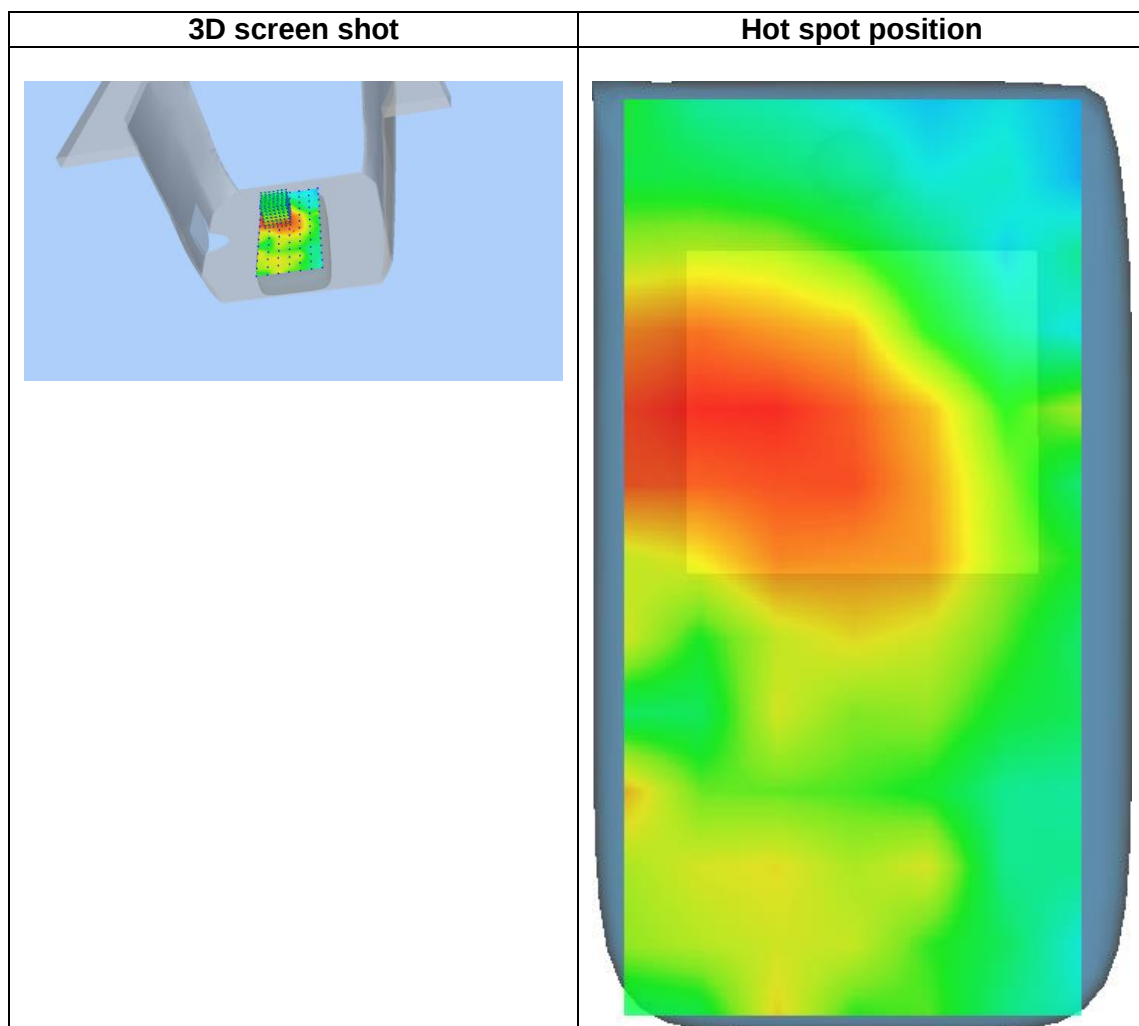
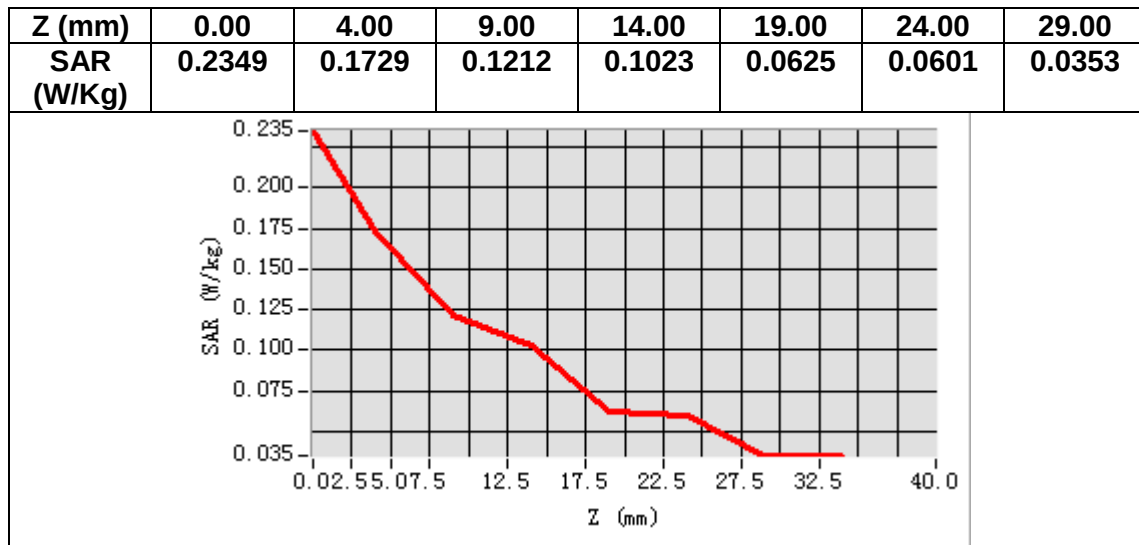
Frequency (MHz)	2437.000000
Relative permittivity (real part)	39.226002
Relative permittivity (imaginary part)	13.207000
Conductivity (S/m)	1.788081
Variation (%)	-0.260000



Maximum location: X=-18.00, Y=22.00

SAR Peak: 0.24 W/kg

SAR 10g (W/Kg)	0.114772
SAR 1g (W/Kg)	0.162420



Appendix D. Calibration Certificate

Table of contents
E Field Probe - EPGO0523-403
2450 MHz Dipole - SN 03/15 DIP 2G450-352
5000-6000 MHz Dipole - SN 03/14 WGA33



COMOSAR E-Field Probe Calibration Report

Ref : ACR.307.3.24.BES.A

**GUANGDONG ASIA HONGKE TEST
TECHNOLOGY CO., LTD**
NO.1/F,BUILDING B1, JUNFENG INDUSTRIAL PARK,
CHONGQING ROAD, HEPING COMMUNITY,
FUHAIHAI STREET, BAO'AN DISTRICT,SHENZHEN,
GUANGDONG 518055, P.R.CHINA
MVG COMOSAR DOSIMETRIC E-FIELD PROBE
SERIAL NO.: SN 39/21 EPGO0523-403

Calibrated at MVG

Z.I. de la pointe du diable

**Technopôle Brest Iroise – 295 avenue Alexis de Rochon
29280 PLOUZANE - FRANCE**

Calibration date: 09/11/2024



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

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Summary:

This document presents the method and results from an accredited COMOSAR 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.307.3.24.BES.A

	<i>Name</i>	<i>Function</i>	<i>Date</i>	<i>Signature</i>
<i>Prepared by :</i>	Jérôme Le Gall	Measurement Responsible	09/10/2024	
<i>Checked by :</i>	Jérôme Luc	Technical Manager	09/10/2024	
<i>Approved by :</i>	Yann Toutain	Laboratory Director	09/11/2024	

	<i>Customer Name</i>
<i>Distribution :</i>	Shenzhen Asia Hongke

<i>Issue</i>	<i>Name</i>	<i>Date</i>	<i>Modifications</i>
A	Jérôme Luc	9/11/2024	Initial release