TEST REPORT

No. 24T04N002892-001-SAR

For

VITURE Inc.

VITURE Pro Neckband

Model Name: V1231

With

Hardware Version: V1.03

Software Version: T29

FCC ID: 2BBOT-V1231

Issued Date: 2024-12-23

Designation Number: CN1210

Note:

The test results in this test report relate only to the devices specified in this report. This report shall not be reproduced except in full without the written approval of SAICT.

Test Laboratory:

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REPORT HISTORY

Report Number	Revision	Description	Issue Date
24T04N002892-001-SAR	Rev.0	1st edition	2024-12-23

CONTENTS

1. Summary of Test Report

1.1. Test Items

Description:	VITURE Pro Neckband
Model Name:	V1231
Applicant’s Name:	VITURE Inc.
Manufacturer's Name:	VITURE Inc.

1.2. Test Standards

ANSI C95.1:1992, IEEE Std 1528:2013

1.3. Test Result

Pass. Please refer to “12. Summary of Test Results”

1.4. Testing Location

Address: Building G, Shenzhen International Innovation Center, No.1006 Shennan Road, Futian District, Shenzhen, Guangdong, P. R. China

1.5. Project Data

Testing Start Date: 2024-12-12 Testing End Date: 2024-12-13

1.6. Signature

Li Yongfu	**Liu Jian**
(Prepared this test report)	**(Reviewed this test report)**

Cao Junfei

(Approved this test report)

2. Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) found during testing for VITURE Inc. VITURE Pro Neckband V1231 are as follows:

Table 2.1: Highest Reported SAR

Equipment Class	Frequency Bands	1g SAR (W/kg) Body (Separation 0mm)
DSS	Bluetooth	0.06
DTS	WLAN 2.4GHz	1.36
NII	WLAN 5GHz	**1.44**
Maximum Simultaneous Transmission SAR		1.50

This device is in compliance with Specific Absorption Rate (SAR) for general population/ uncontrolled exposure limits (1.6 W/kg for Head/Body 1g SAR, 4.0 W/kg for Extremity 10g SAR) specified in ANSI C95.1:1992.

The measurement together with the test system set-up is described in annex C of this test report.
A detailed description of the equipment under test can be found in chapter 4 of this test report.

The highest reported SAR value is obtained at the case of **(Table 2.1)**, Body value is **1.44 W/kg (1g)**.

3. Client Information

3.1. Applicant Information

Company Name:	VITURE Inc.
Address:	95 Third Street, 2nd Floor, San Francisco, 94103
Contact:	/
Email:	/
Telephone:	/

3.2. Manufacturer Information

Company Name:	VITURE Inc.
Address:	95 Third Street, 2nd Floor, San Francisco, 94103
Contact:	/
Email:	/
Telephone:	/

4. Equipment under Test (EUT) and Ancillary Equipment (AE)

4.1. About EUT

Description:	VITURE Pro Neckband
Model Name:	V1231
Condition of EUT as received:	No obvious damage in appearance
Frequency Bands:	Bluetooth, WLAN 2.4GHz/5GHz
Tested Tx Frequency:	2402 – 2480MHz (Bluetooth)
	2412 – 2462MHz (WLAN 2.4GHz)
	5150 – 5850MHz (WLAN 5GHz)
Test device Production information:	Production unit
Device type:	Portable device
Antenna type:	Integrated antenna

*Since the information of samples in this report is provided by the client, the laboratory is not responsible for the authenticity of sample information.

4.2. Internal Identification of EUT used during the test

EUT ID*	SN	HW Version	SW Version	Receipt Date
UT01aa	/	V1.03	T29	2024-12-10
UT02aa	df257498	V1.03	T29	2024-12-10

*EUT ID: is used to identify the test sample in the lab internally.

Note: It is performed to test SAR with the UT01aa, and conducted power with the UT02aa.

4.3. Internal Identification of AE used during the test

AE ID*	Description	Model	Manufacturer
AE1	Battery	F148001PA	Guangdong Fenghua New Energy Co..,Ltd

*AE ID: is used to identify the test sample in the lab internally.

5. Test Methodology

5.1. Applicable Limit Regulations

ANSI C95.1:1992 IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz.

It specifies the maximum exposure limit of **1.6 W/kg** as averaged over any 1 gram of tissue for portable devices being used within 20 cm of the user in the uncontrolled environment.

5.2. Applicable Measurement Standards

IEEE Std 1528:2013 Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Experimental Techniques.

KDB 447498 D01 General RF Exposure Guidance v06 RF Exposure Procedures and Equipment Authorization Policies for Mobile and Portable Devices

KDB 248227 D01 802.11 Wi-Fi SAR v02r02 SAR Guidance for IEEE 802.11 (Wi-Fi) Transmitters.

KDB 865664 D01SAR measurement 100 MHz to 6 GHz v01r04 SAR Measurement Requirements for 100 MHz to 6 GHz

KDB 865664 D02 RF Exposure Reporting v01r02 RF Exposure Compliance Reporting and Documentation Considerations

TCB workshop April 2019; RF Exposure Procedures (Tissue Simulating Liquids)

6. Specific Absorption Rate (SAR)

6.1. Introduction

SAR is related to the rate at which energy is absorbed per unit mass in an object exposed to a radio field. The SAR distribution in a biological body is complicated and is usually carried out by experimental techniques or numerical modeling. The standard recommends limits for two tiers of groups, occupational/controlled and general population/uncontrolled, based on a person's awareness and ability to exercise control over his or her exposure. In general, occupational/controlled exposure limits are higher than the limits for general population/uncontrolled.

6.2. SAR Definition

The SAR definition is the time derivative (rate) of the incremental energy (dW) absorbed by (dissipated in) an incremental mass (dm) contained in a volume element (dv) of a given density (ρ) . The equation description is as below:

$$SAR = \frac{d}{dt}(\frac{dW}{dm}) = \frac{d}{dt}(\frac{dW}{\rho dv})$$

SAR is expressed in units of Watts per kilogram (W/kg)

SAR measurement can be either related to the temperature elevation in tissue by

$$SAR = c(\frac{\delta T}{\delta t})$$

Where: C is the specific head capacity, δT is the temperature rise and δt is the exposure duration, or related to the electrical field in the tissue by

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

Where: σ is the conductivity of the tissue, ρ is the mass density of tissue and E is the RMS electrical field strength.

However for evaluating SAR of low power transmitter, electrical field measurement is typically applied.

7. Tissue Simulating Liquids

7.1. Targets for tissue simulating liquid

Table 7.1: Targets for tissue simulating liquid

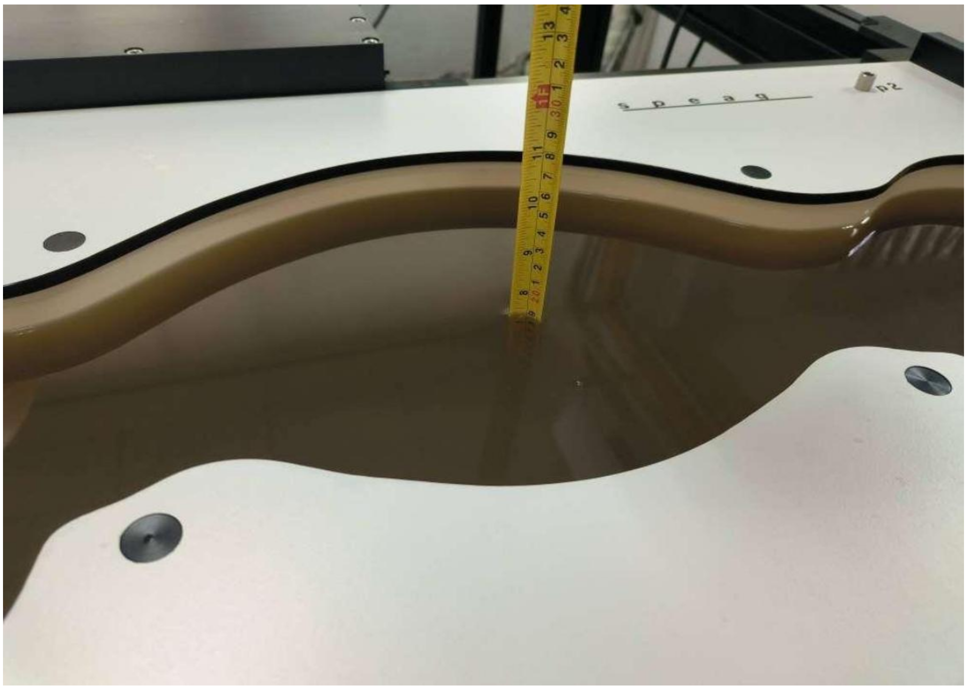
Frequency (MHz)	Liquid Type	Conductivity (σ)	± 5% Range	Permittivity (ε)	± 5% Range
2450	Head	1.80	1.71～1.89	39.2	37.2～41.2
5250	Head	4.71	4.47～4.95	35.9	34.1～37.7
5600	Head	5.07	4.82～5.32	35.5	33.8～37.3
5750	Head	5.22	4.96～5.48	35.4	33.6～37.1

7.2. Dielectric Performance

Table 7.2: Dielectric Performance of Tissue Simulating Liquid

Measurement Date (yyyy-mm-dd)	Frequency (MHz)	Conductivity σ (S/m)	Drift (%)	Permittivity ε	Drift (%)
2024-12-12	2450	1.833	1.83	38.47	-1.86
2024-12-13	5250	4.614	-2.04	36.72	2.28
2024-12-13	5600	4.971	-1.95	36.49	2.79
2024-12-13	5750	5.348	2.45	34.56	-2.37

Note: The liquid temperature is 22.0°C.

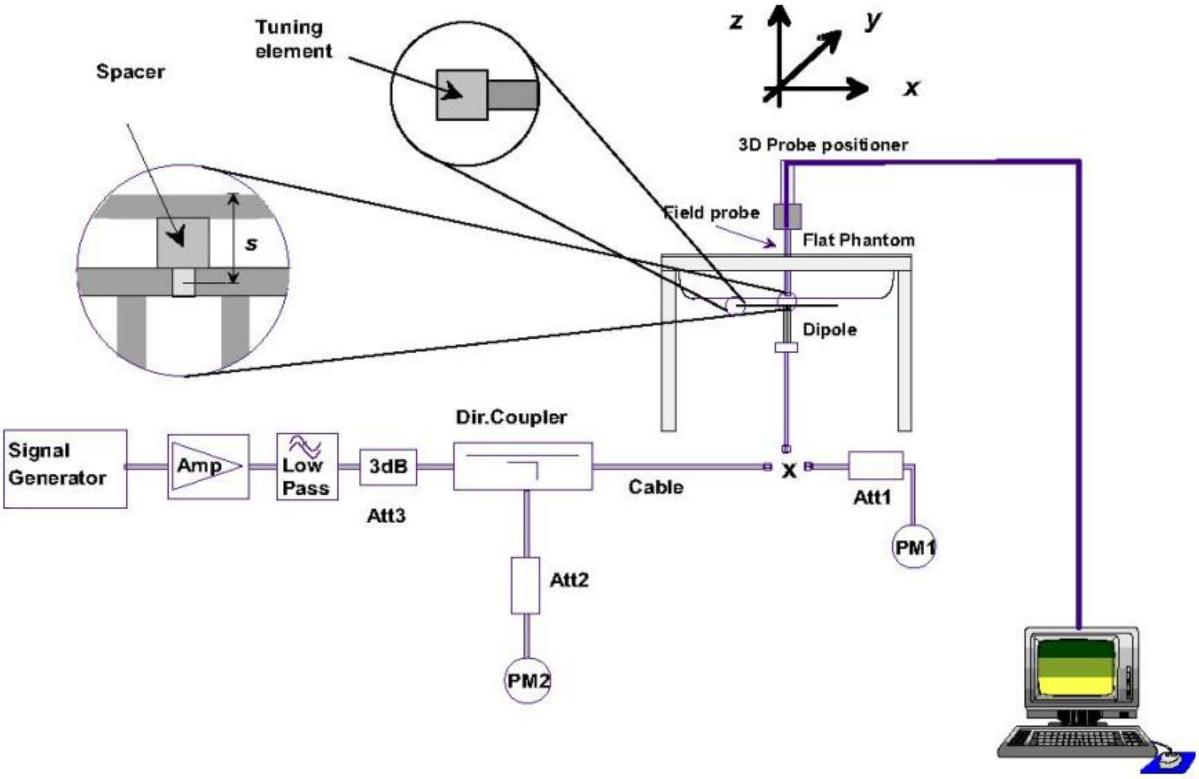


Picture 7.1 Liquid depth in the Flat Phantom (0.6GHz - 7.5GHz)

8. System verification

8.1. System Setup

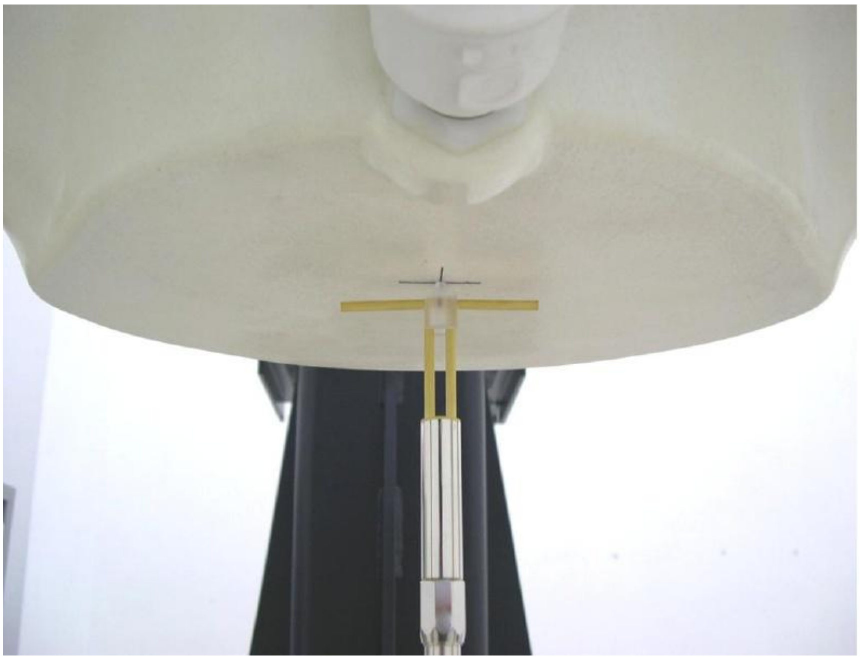
In the simplified setup for system evaluation, the DUT is replaced by a calibrated dipole and the power source is replaced by a continuous wave that comes from a signal generator. The calibrated dipole must be placed beneath the flat phantom section of the SAM twin phantom with the correct distance holder. The distance holder should touch the phantom surface with a light pressure at the reference marking and be oriented parallel to the long side of the phantom. The equipment setup is shown below:



Picture 8.1 System Setup for System Evaluation

For the dipole below 3GHz, the output power on dipole port must be calibrated to 24 dBm (250mW) before dipole is connected.

For the dipole above 3GHz, the output power on dipole port must be calibrated to 20 dBm (100mW) before dipole is connected.



Picture 8.2 Photo of Dipole Setup

8.2. System Verification

SAR system verification is required to confirm measurement accuracy, according to the tissue dielectric media, probe calibration points and other system operating parameters required for measuring the SAR of a test device. The system verification must be performed for each frequency band and within the valid range of each probe calibration point required for testing the device.

Table 8.1: System Verification of Head

Measurement Date	Frequency (MHz)	Target value (W/kg)		Measured value (W/kg)				Deviation (%)	
				/		Normalize to 1W			
		1 g	10 g	1 g	10 g	1 g	10 g	1 g	10 g
2024-12-12	2450	52.70	24.80	13.6	6.29	54.40	25.16	3.23	1.45
2024-12-13	5250	79.70	22.80	7.80	2.25	78.00	22.50	-2.13	-1.32
2024-12-13	5600	82.60	23.60	8.01	2.30	80.10	23.00	-3.03	-2.54
2024-12-13	5750	78.50	22.10	8.15	2.27	81.50	22.70	3.82	2.71

9. Measurement Procedures

9.1. Tests to be performed

In order to determine the highest value of the peak spatial-average SAR of a handset, all device positions, configurations and operational modes shall be tested for each frequency band according to steps 1 to 3 below. A flowchart of the test process is shown in picture 9.1.

Step 1: The tests described in 9.2 shall be performed at the channel that is closest to the center of the transmit frequency band (f_c) for:

a) all device positions (cheek and tilt, for both left and right sides of the SAM phantom, as described in annex D),

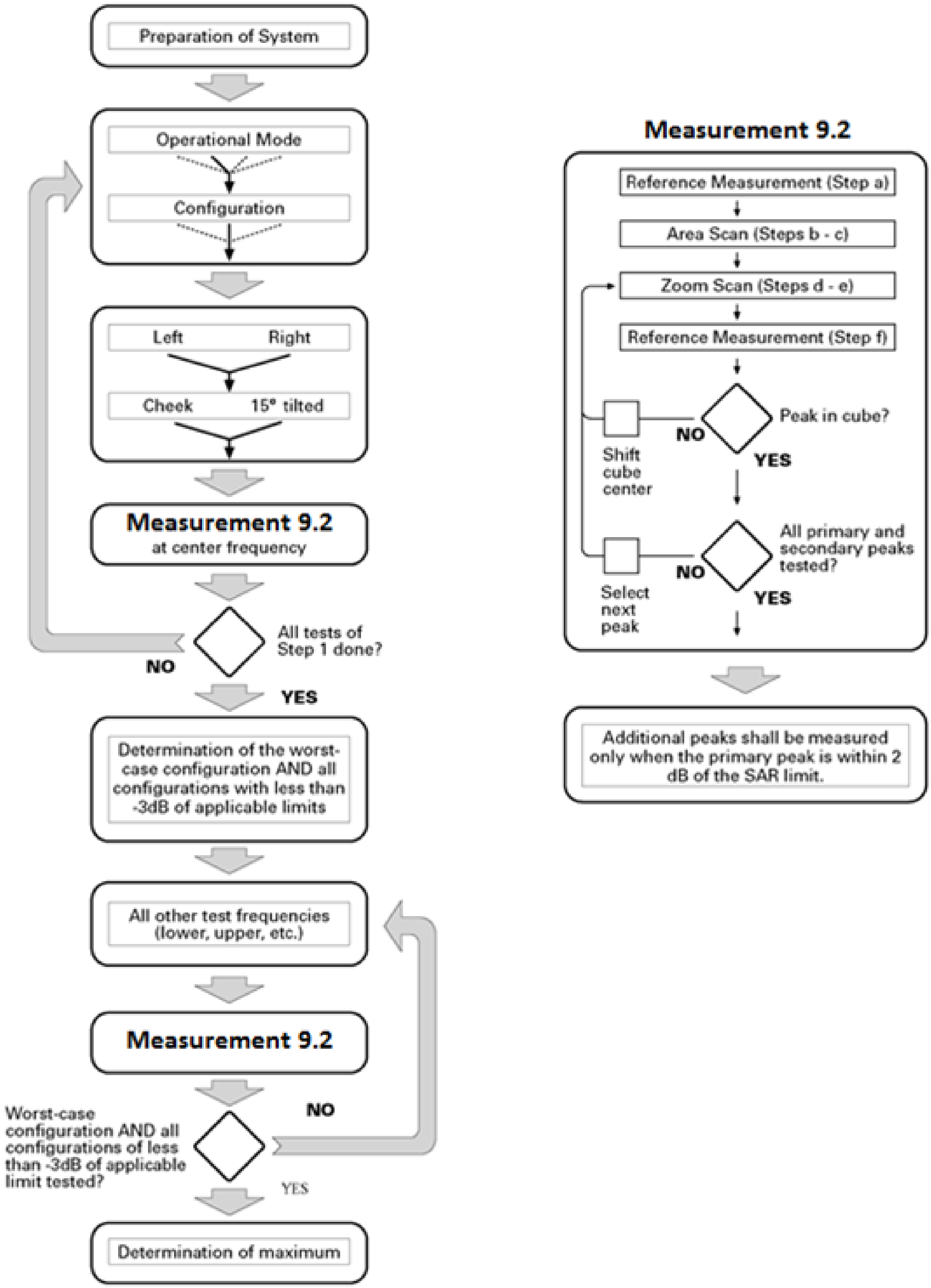
b) all configurations for each device position in a), e.g., antenna extended and retracted, and

c) all operational modes, e.g., analogue and digital, for each device position in a) and configuration in b) in each frequency band.

If more than three frequencies need to be tested according to 11.1 (i.e., $N_C > 3$), then all frequencies, configurations and modes shall be tested for all of the above test conditions.

Step 2: For the condition providing highest peak spatial-average SAR determined in Step 1, perform all tests described in 9.2 at all other test frequencies, i.e., lowest and highest frequencies. In addition, for all other conditions (device position, configuration and operational mode) where the peak spatial-average SAR value determined in Step 1 is within 3 dB of the applicable SAR limit, it is recommended that all other test frequencies shall be tested as well.

Step 3: Examine all data to determine the highest value of the peak spatial-average SAR found in Steps 1 to 2.



Picture 9.1 Block diagram of the tests to be performed

9.2. General Measurement Procedure

The area and zoom scan resolutions specified in the table below must be applied to the SAR measurements and fully documented in SAR reports to qualify for TCB approval. Probe boundary effect error compensation is required for measurements with the probe tip closer than half a probe tip diameter to the phantom surface. Both the probe tip diameter and sensor offset distance must satisfy measurement protocols; to ensure probe boundary effect errors are minimized and the higher fields closest to the phantom surface can be correctly measured and extrapolated to the phantom surface for computing 1-g SAR. Tolerances of the post-processing algorithms must be verified by the test laboratory for the scan resolutions used in the SAR measurements, according to the reference distribution functions specified in IEEE Std 1528-2013. The results should be documented as part of the system validation records and may be requested to support test results when all the measurement parameters in the following table are not satisfied.

<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">$\leq 1.5 \cdot \Delta z_{Zoom}(n-1)$</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>

9.3. Bluetooth & WLAN Measurement Procedures for SAR

Normal network operating configurations are not suitable for measuring the SAR of 802.11 transmitters in general. Unpredictable fluctuations in network traffic and antenna diversity conditions can introduce undesirable variations in SAR results. The SAR for these devices should be measured using chipset based test mode software to ensure that the results are consistent and reliable.
Chipset based test mode software is hardware dependent and generally varies among manufacturers. The device operating parameters established in a test mode for SAR measurements must be identical to those programmed in production units, including output power levels, amplifier gain settings and other RF performance tuning parameters. The test frequencies should correspond to actual channel frequencies defined for domestic use. SAR for devices with switched diversity should be measured with only one antenna transmitting at a time during each SAR measurement, according to a fixed modulation and data rate. The same data pattern should be used for all measurements.

9.4. Power Drift

To control the output power stability during the SAR test, DASY5 system calculates the power drift by measuring the E-field at the same location at the beginning and at the end of the measurement for each test position. These drift values can be found in Section 12 labeled as: (Power Drift [dB]). This ensures that the power drift during one measurement is within 5%.

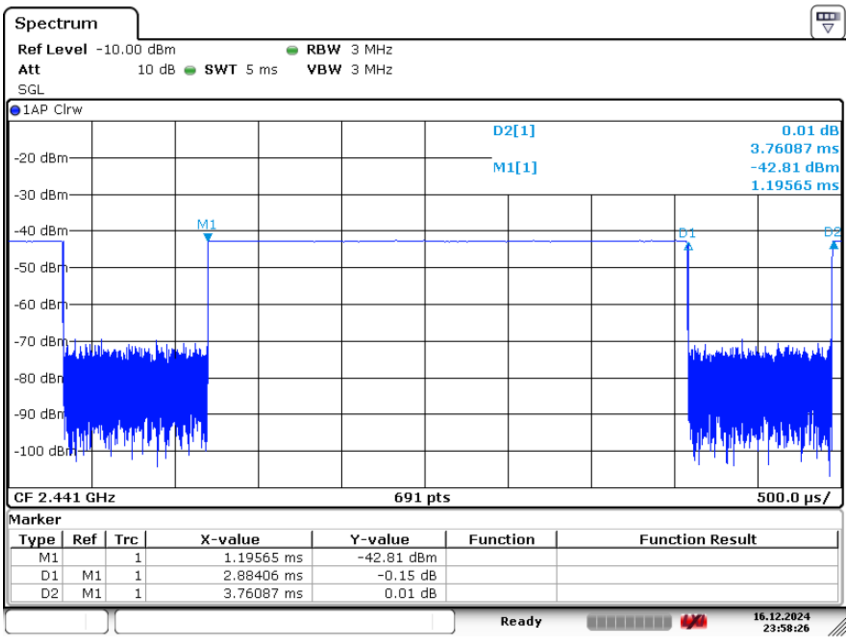
10. Conducted Output Power

Table 10.1: The conducted Power measurement results for Bluetooth

Bluetooth

Mode	Channel	Frequency [MHz]	Ant.1	
			Averaged Power [dBm]	Tune up [dBm]
GFSK	0	2402.0	3.76	**4.5**
	39	2441.0	**4.05**	**4.5**
	78	2480.0	2.99	**4.5**
EDR2M-4_DQPSK	0	2402.0	2.42	**3.5**
	39	2441.0	2.71	**3.5**
	78	2480.0	1.89	**3.5**
EDR3M-8DPSK	0	2402.0	2.54	**3.5**
	39	2441.0	3.17	**3.5**
	78	2480.0	2.24	**3.5**
BLE 1M	0	2402.0	2.36	**3.5**
	19	2440.0	2.75	**3.5**
	39	2480.0	1.73	**3.5**
BLE 2M	0	2402.0	2.35	**3.5**
	19	2440.0	2.80	**3.5**
	39	2480.0	1.79	**3.5**

Duty factor plot



Date: 16.DEC.2024 23:58:26

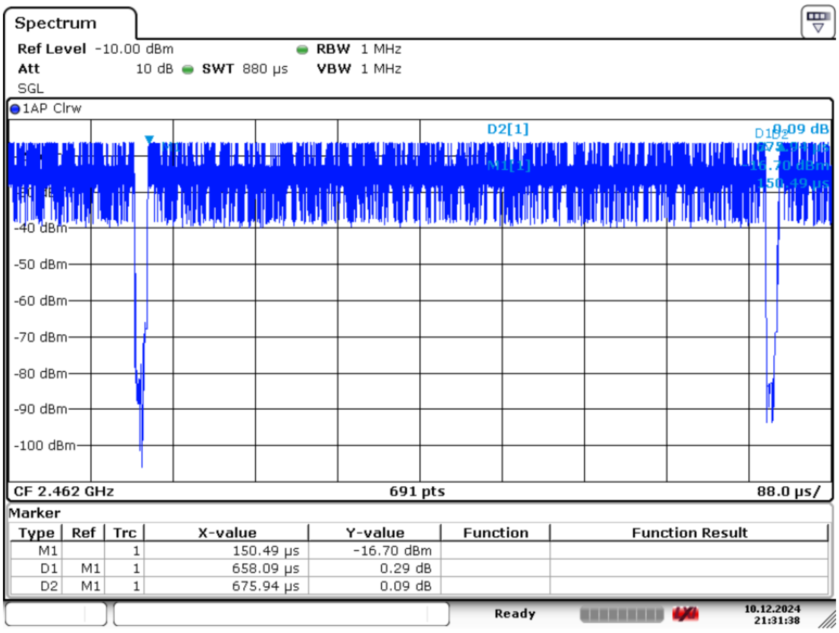
Duty cycle = on time / total time = (2.88406 / 3.76087) * 100% = 76.69%

Table 10.2: The conducted Power measurement results for WLAN 2.4GHz

WLAN 2.4GHz

Mode	Channel	Frequency [MHz]	Ant.1		Ant.2		Ant.1 + Ant.2	
			Averaged Power [dBm]	Tune up [dBm]	Averaged Power [dBm]	Tune up [dBm]	Averaged Power [dBm]	Tune up [dBm]
802.11b	1	2412.0	13.14	14.0	**12.62**	13.0	15.90	16.5
	6	2437.0	13.29	14.0	12.30	13.0	15.83	16.5
	11	2462.0	**13.41**	14.0	12.44	13.0	**15.96**	16.5
802.11g	1	2412.0	12.92	14.0	12.30	13.0	15.63	16.5
	6	2437.0	13.21	14.0	12.07	13.0	15.69	16.5
	11	2462.0	13.27	14.0	12.42	13.0	15.88	16.5
802.11n-20MHz	1	2412.0	11.85	13.0	11.86	12.5	14.87	16.0
	6	2437.0	12.10	13.0	11.75	12.5	14.94	16.0
	11	2462.0	12.14	13.0	11.83	12.5	15.00	16.0
802.11n-40MHz	3	2422.0	12.98	14.0	12.75	13.5	15.88	17.0
	6	2437.0	13.69	14.0	**13.21**	13.5	16.47	17.0
	9	2452.0	13.05	14.0	12.72	13.5	15.90	17.0
802.11ax-20MHz	1	2412.0	12.47	13.0	12.32	12.5	15.41	16.0
	6	2437.0	12.67	13.0	12.13	12.5	15.42	16.0
	11	2462.0	12.51	13.0	12.32	12.5	15.43	16.0
802.11ax-40MHz	3	2422.0	12.36	14.0	12.13	13.0	15.26	16.5
	6	2437.0	13.21	14.0	12.62	13.0	15.94	16.5
	9	2452.0	12.51	14.0	12.14	13.0	15.34	16.5

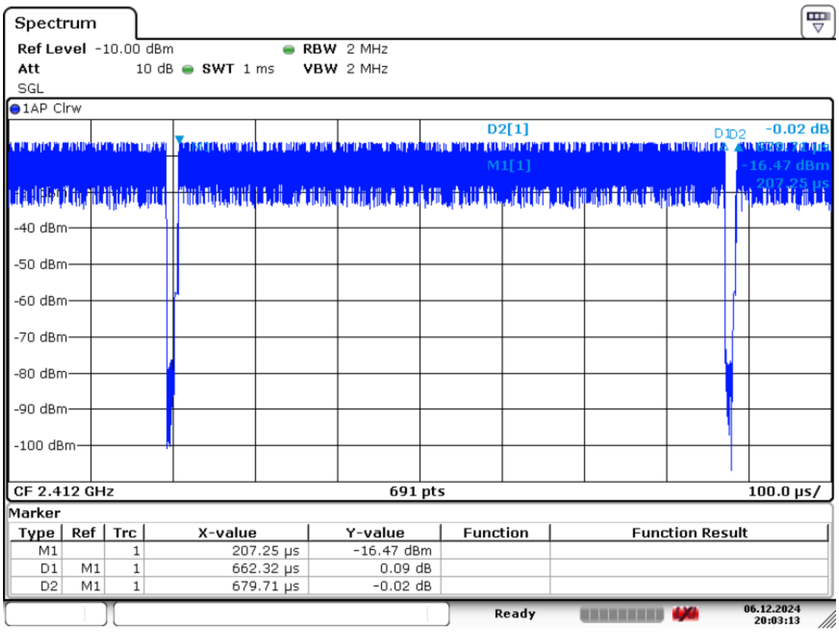
Ant.1 - Duty factor plot



Date: 10.DEC.2024 21:31:38

Duty cycle = on time / total time = (658.09 / 675.94) * 100% = 97.36%

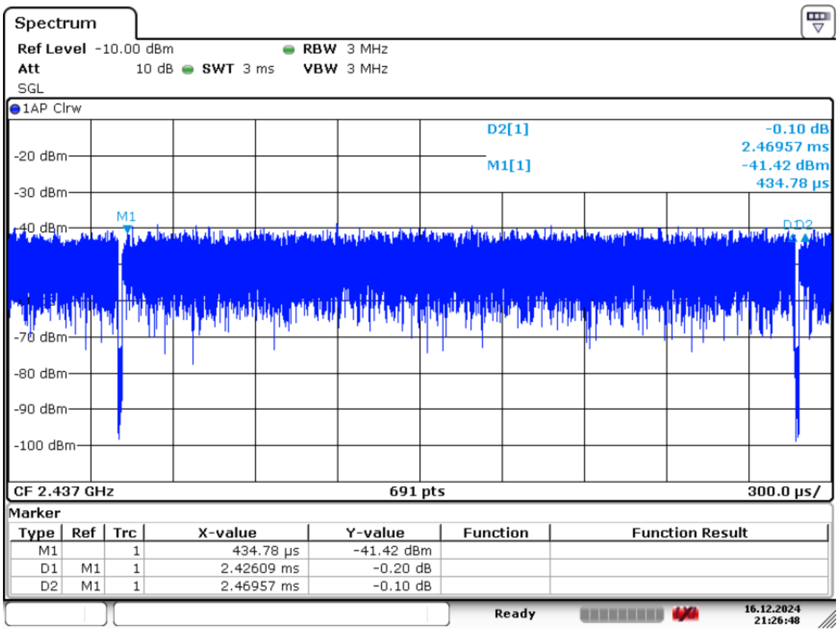
Ant.2 - Duty factor plot (802.11b)



Date: 6.DEC.2024 20:03:14

Duty cycle = on time / total time = (662.32 / 679.71) * 100% = 97.44%

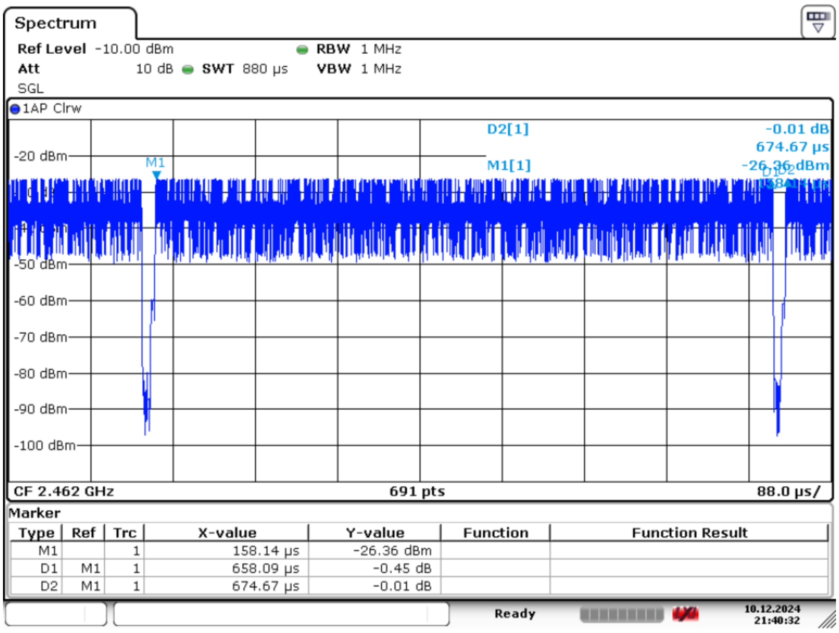
Ant.2 - Duty factor plot (802.11n-40M)



Date: 16.DEC.2024 21:26:49

Duty cycle = on time / total time = (2.42609 / 2.46957) * 100% = 98.24%

MIMO - Duty factor plot



Date: 10.DEC.2024 21:40:32

Duty cycle = on time / total time = (658.09 / 674.67) * 100% = 97.54%

Table 10.3: The conducted Power measurement results for WLAN 5GHz

WLAN 5GHz

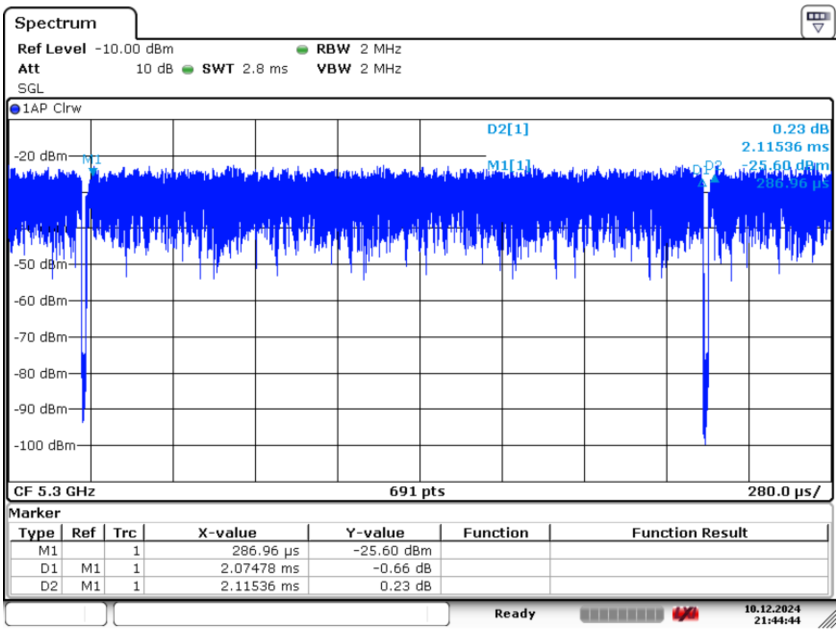
Mode	U-NII	Channel	Frequency [MHz]	Ant.1		Ant.2		Ant.1 + Ant.2	
				Averaged Power [dBm]	Tune up [dBm]	Averaged Power [dBm]	Tune up [dBm]	Averaged Power [dBm]	Tune up [dBm]
802.11a	U-NII-1	36	5180.0	10.81	12.1	10.55	11.6	13.69	14.8
		40	5200.0	10.63	12.1	10.47	11.6	13.56	14.8
		44	5220.0	**11.40**	12.1	10.75	11.6	14.10	14.8
		48	5240.0	10.73	12.1	10.94	11.6	13.85	14.8
802.11n-20MHz	U-NII-1	36	5180.0	11.12	12.0	10.00	11.5	13.61	14.7
		40	5200.0	11.06	12.0	9.67	11.5	13.43	14.7
		44	5220.0	10.86	12.0	10.11	11.5	13.51	14.7
		48	5240.0	10.76	12.0	10.63	11.5	13.71	14.7
802.11n-40MHz	U-NII-1	38	5190.0	11.22	12.0	10.46	11.5	13.87	14.7
		46	5230.0	11.22	12.0	11.01	11.5	14.13	14.7
802.11ac-20MHz	U-NII-1	36	5180.0	11.25	12.0	10.39	11.5	13.85	14.7
		40	5200.0	10.88	12.0	10.29	11.5	13.61	14.7
		44	5220.0	10.98	12.0	10.27	11.5	13.65	14.7
		48	5240.0	10.86	12.0	10.68	11.5	13.78	14.7
802.11ac-40MHz	U-NII-1	38	5190.0	11.38	12.0	10.65	11.5	14.04	14.7
		46	5230.0	11.33	12.0	11.15	11.5	14.25	14.7
802.11ac-80MHz	U-NII-1	42	5210.0	11.66	12.0	10.76	11.5	14.24	14.7
802.11ax-20MHz	U-NII-1	36	5180.0	11.42	12.0	10.28	11.5	13.90	14.7
		40	5200.0	11.18	12.0	10.21	11.5	13.73	14.7
		44	5220.0	11.27	12.0	10.56	11.5	13.94	14.7
		48	5240.0	11.23	12.0	10.61	11.5	13.94	14.7
802.11ax-40MHz	U-NII-1	38	5190.0	11.31	12.0	10.70	11.5	14.03	14.7
		46	5230.0	11.26	12.0	11.17	11.5	14.23	14.7
802.11ax-80MHz	U-NII-1	42	5210.0	11.71	12.0	10.90	11.5	14.33	14.7

Mode	U-NII	Channel	Frequency [MHz]	Ant.1		Ant.2		Ant.1 + Ant.2	
				Averaged Power [dBm]	Tune up [dBm]	Averaged Power [dBm]	Tune up [dBm]	Averaged Power [dBm]	Tune up [dBm]
802.11a	U-NII-2A	52	5260.0	10.71	11.1	**11.35**	12.1	14.05	15.3
		56	5280.0	10.80	11.1	11.19	12.1	14.01	15.3
		60	5300.0	**12.33**	12.6	11.32	12.1	**14.86**	15.3
		64	5320.0	10.82	11.1	11.26	12.1	14.06	15.3
802.11n-20MHz	U-NII-2A	52	5260.0	9.98	11.0	9.45	11.0	12.73	14.0
		56	5280.0	10.12	11.0	9.30	11.0	12.74	14.0
		60	5300.0	10.74	11.0	9.57	11.0	13.20	14.0
		64	5320.0	10.25	11.0	9.18	11.0	12.76	14.0
802.11n-40MHz	U-NII-2A	54	5270.0	10.76	11.0	10.06	11.0	13.43	14.0
		62	5310.0	11.34	12.5	10.00	11.0	13.73	14.0
802.11ac-20MHz	U-NII-2A	52	5260.0	10.07	11.0	9.67	11.0	12.88	14.0
		56	5280.0	10.13	11.0	9.47	11.0	12.82	14.0
		60	5300.0	10.87	11.0	9.63	11.0	13.30	14.0
		64	5320.0	10.34	11.0	9.30	11.0	12.86	14.0
802.11ac-40MHz	U-NII-2A	54	5270.0	10.82	11.0	10.18	11.0	13.52	14.0
		62	5310.0	11.55	12.5	10.05	11.0	13.87	14.0
802.11ac-80MHz	U-NII-2A	58	5290.0	11.37	12.5	10.33	11.0	13.89	14.0
802.11ax-20MHz	U-NII-2A	52	5260.0	10.12	11.0	9.82	11.0	12.98	14.0
		56	5280.0	10.38	11.0	9.72	11.0	13.07	14.0
		60	5300.0	11.16	12.5	9.88	11.0	13.58	14.0
		64	5320.0	10.73	11.0	9.67	11.0	13.24	14.0
802.11ax-40MHz	U-NII-2A	54	5270.0	10.43	11.0	9.89	11.0	13.18	14.0
		62	5310.0	11.17	12.5	9.76	11.0	13.53	14.0
802.11ax-80MHz	U-NII-2A	58	5290.0	11.40	12.5	10.38	11.0	13.93	14.0
802.11ax-160MHz	U-NII-2A	50	5250.0	8.33	9.5	7.78	9.0	11.07	12.0

Mode	U-NII	Channel	Frequency [MHz]	Ant.1		Ant.2		Ant.1 + Ant.2	
				Averaged Power [dBm]	Tune up [dBm]	Averaged Power [dBm]	Tune up [dBm]	Averaged Power [dBm]	Tune up [dBm]
802.11a	U-NII-2C	100	5500.0	8.89	10.6	8.86	10.1	11.89	13.1
		116	5580.0	9.54	10.6	8.17	10.1	11.92	13.1
		124	5620.0	10.16	10.6	8.36	10.1	12.36	13.1
		132	5660.0	9.76	10.6	8.42	10.1	12.15	13.1
		140	5700.0	8.69	10.6	8.24	10.1	11.48	13.1
		144	5720.0	8.62	10.6	7.12	9.1	10.94	12.1
802.11n-20MHz	U-NII-2C	100	5500.0	8.01	9.0	7.15	7.5	10.61	11.0
		116	5580.0	8.50	9.0	6.42	7.5	10.59	11.0
		124	5620.0	8.31	9.0	6.78	7.5	10.62	11.0
		132	5660.0	8.03	9.0	6.92	7.5	10.52	11.0
		140	5700.0	7.68	9.0	6.26	7.5	10.04	11.0
		144	5720.0	6.96	8.0	5.38	6.5	9.25	10.0
802.11n-40MHz	U-NII-2C	102	5510.0	9.00	10.0	7.98	8.5	11.53	12.0
		110	5550.0	9.07	10.0	7.64	8.5	11.42	12.0
		126	5630.0	9.42	10.0	7.32	8.5	11.51	12.0
		134	5670.0	8.27	10.0	6.33	8.0	10.42	12.0
		142	5710.0	8.32	10.0	6.29	8.0	10.43	12.0
802.11ac-20MHz	U-NII-2C	100	5500.0	8.04	9.0	7.31	7.5	10.70	11.0
		116	5580.0	8.71	9.0	6.62	7.5	10.80	11.0
		124	5620.0	8.57	9.0	6.88	7.5	10.82	11.0
		132	5660.0	8.16	9.0	6.98	7.5	10.62	11.0
		140	5700.0	7.83	9.0	6.36	7.5	10.17	11.0
		144	5720.0	7.07	9.0	5.42	7.5	9.33	11.0
802.11ac-40MHz	U-NII-2C	102	5510.0	9.06	10.0	8.01	8.5	11.58	12.0
		110	5550.0	9.18	10.0	7.77	8.5	11.54	12.0
		126	5630.0	9.58	10.0	7.59	8.5	11.71	12.0
		134	5670.0	8.56	10.0	6.80	8.5	10.78	12.0
		142	5710.0	8.47	10.0	6.71	8.5	10.69	12.0
802.11ac-80MHz	U-NII-2C	106	5530.0	9.10	10.0	7.61	8.5	11.43	12.0
		122	5610.0	9.47	10.0	7.50	8.5	11.61	12.0
		138	5690.0	8.37	10.0	6.90	8.5	10.71	12.0
802.11ax-20MHz	U-NII-2C	100	5500.0	8.41	9.5	7.70	8.5	11.08	12.0
		116	5580.0	9.12	9.5	7.09	8.5	11.23	12.0
		124	5620.0	9.03	9.5	7.34	8.5	11.28	12.0
		132	5660.0	8.62	9.5	7.38	8.5	11.05	12.0
		140	5700.0	8.20	9.5	6.78	8.5	10.56	12.0
		144	5720.0	7.20	8.5	5.65	6.5	9.50	11.0
802.11ax-40MHz	U-NII-2C	102	5510.0	8.62	10.0	7.66	8.0	11.18	12.0
		110	5550.0	8.80	10.0	7.41	8.0	11.17	12.0
		126	5630.0	9.24	10.0	7.23	8.0	11.36	12.0
		134	5670.0	8.23	10.0	6.48	8.0	10.45	12.0
		142	5710.0	8.08	10.0	6.37	8.0	10.32	12.0
802.11ax-80MHz	U-NII-2C	106	5530.0	9.38	10.0	8.08	8.5	11.79	12.0
		122	5610.0	9.64	10.0	7.94	8.5	11.88	12.0
		138	5690.0	8.34	10.0	7.35	8.5	10.88	12.0
802.11ax-160MHz	U-NII-2C	114	5570.0	9.37	10.0	7.25	8.5	11.45	12.0

Mode	U-NII	Channel	Frequency [MHz]	Ant.1		Ant.2		Ant.1 + Ant.2	
				Averaged Power [dBm]	Tune up [dBm]	Averaged Power [dBm]	Tune up [dBm]	Averaged Power [dBm]	Tune up [dBm]
802.11a	U-NII-3	149	5745.0	11.56	13.5	10.97	12.6	14.29	16.1
		157	5785.0	12.32	13.5	11.00	12.6	14.72	16.1
		165	5825.0	12.21	13.5	11.66	12.6	14.95	16.1
802.11n-20MHz	U-NII-3	149	5745.0	11.17	13.0	10.64	12.0	13.92	15.5
		157	5785.0	11.82	13.0	10.39	12.0	14.17	15.5
		165	5825.0	11.76	13.0	11.06	12.0	14.43	15.5
802.11n-40MHz	U-NII-3	151	5755.0	12.02	13.0	11.14	12.0	14.61	15.5
		159	5795.0	12.67	13.0	11.24	12.0	15.02	15.5
802.11ac-20MHz	U-NII-3	149	5745.0	11.29	13.0	10.65	12.0	13.99	15.5
		157	5785.0	11.95	13.0	10.55	12.0	14.32	15.5
		165	5825.0	11.85	13.0	11.19	12.0	14.54	15.5
802.11ac-40MHz	U-NII-3	151	5755.0	12.23	13.0	11.30	12.0	14.80	15.5
		159	5795.0	12.72	13.0	11.39	12.0	15.12	15.5
802.11ac-80MHz	U-NII-3	155	5775.0	13.10	13.3	11.30	12.0	15.30	15.5
802.11ax-20MHz	U-NII-3	149	5745.0	11.91	13.0	11.32	12.0	14.64	15.5
		157	5785.0	12.53	13.0	11.20	12.0	14.93	15.5
		165	5825.0	12.37	13.0	11.81	12.0	15.11	15.5
802.11ax-40MHz	U-NII-3	151	5755.0	12.02	13.0	11.14	12.0	14.61	15.5
		159	5795.0	12.54	13.0	11.25	12.0	14.95	15.5
802.11ax-80MHz	U-NII-3	155	5775.0	13.12	13.3	11.31	12.0	15.32	15.5

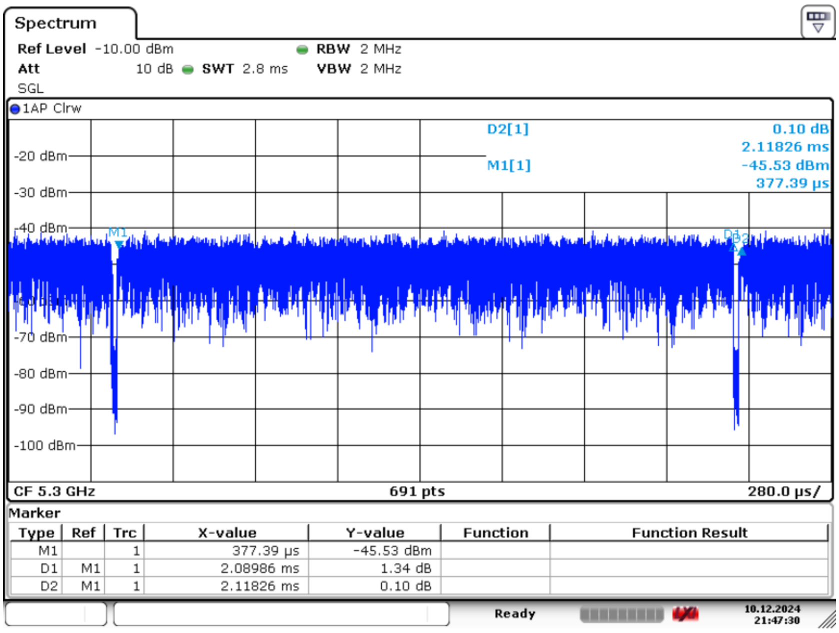
Ant.1 - Duty factor plot



Date: 10.DEC.2024 21:44:45

Duty cycle = on time / total time = (2.07478 / 2.11536) * 100% = 98.08%

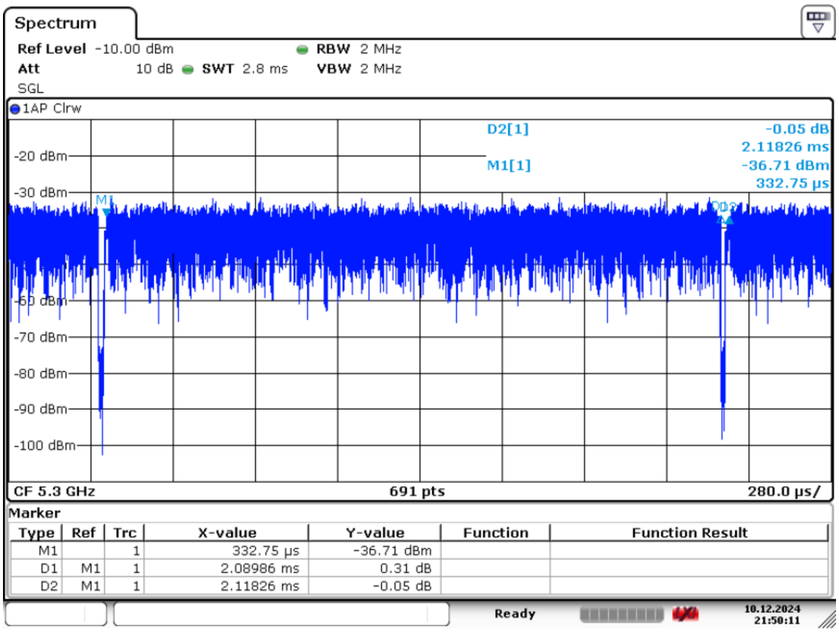
Ant.2 - Duty factor plot



Date: 10.DEC.2024 21:47:30

Duty cycle = on time / total time = (2.08986 / 2.11826) * 100% = 98.66%

MIMO - Duty factor plot

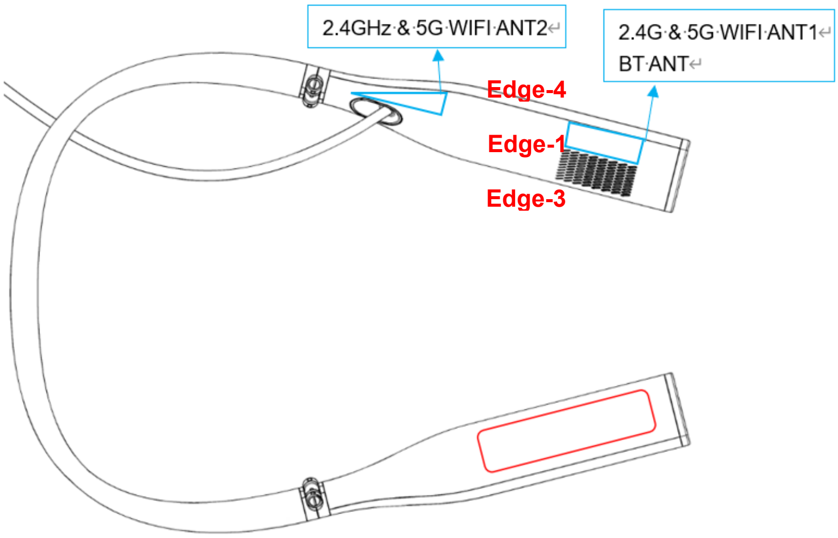


Date: 10.DEC.2024 21:50:11

Duty cycle = on time / total time = (2.08986 / 2.11826) * 100% = 98.66%

11. Simultaneous TX SAR Considerations

11.1. Transmit Antenna Separation Distances



Picture 11.1 Antenna Locations (Edge-1 View)

11.2. Evaluation of Simultaneous

No.	Simultaneous Transmission Configuration
1	WLAN 2.4GHz (Ant.1) + Bluetooth (Ant.1)
2	WLAN 2.4GHz (Ant.2) + Bluetooth (Ant.1)
3	WLAN 2.4GHz MIMO + Bluetooth (Ant.1)
4	WLAN 5GHz (Ant.1) + Bluetooth (Ant.1)
5	WLAN 5GHz (Ant.2) + Bluetooth (Ant.1)
6	WLAN 5GHz MIMO + Bluetooth (Ant.1)

Table 11.1: Maximum Simultaneous Transmission SAR

/	Position	Sum (W/kg)
Highest reported SAR value for Body	Edge-1 WLAN 5GHz (Ant.1) + Bluetooth (Ant.1)	**1.50**

Note: The test positions of above tables are for the worse case that has been evaluated.

Conclusion:

According to the above tables, the sum of reported SAR values is less than limit. So the simultaneous transmission SAR with volume scans is not required.

12. Summary of Test Results

According to the client's decision rule in the test registration form, which is "based on the measurement results as the basis of the conformity statement", the test conclusion of this report meets the limit requirements.

The calculated SAR is obtained by the following formula:

$$\text{Calculated SAR} = \text{Measured SAR} \times 10^{(P_{\text{Target}} - P_{\text{Measured}})/10}$$

Where P_{Target} is the power of manufacturing upper limit;

$P_{Measured}$ is the measured power in chapter 10.

12.1. Testing Environment

Temperature:	18°C~25°C
Relative humidity:	30%~70%
Ambient noise & Reflection:	< 0.012 W/kg

12.2. Test Results

Table 12.1: Bluetooth SAR Values

ANT	RF Exposure Conditions	Frequency Band	Channel Number	Frequency (MHz)	Mode/RB	Test Position	Distance	Note	Figure No.	EUT Measured Power (dBm)	Tune up (dBm)	Duty Cycle %	Duty Cycle Scaling Factor	Measured SAR 1g (W/kg)	Calculated SAR 1g (W/kg)	Measured SAR 10g (W/kg)	Calculated SAR 10g (W/kg)	Power Drift
1	Body	Bluetooth	39	2441.0	GFSK	Edge-1	0mm	\	\	4.05	4.50	76.69	1.30	0.044	**0.06**	0.019	**0.03**	0.14
1	Body	Bluetooth	39	2441.0	GFSK	Edge-2	0mm	\	\	4.05	4.50	76.69	1.30	0.007	**0.01**	0.003	**0.00**	0.11
1	Body	Bluetooth	39	2441.0	GFSK	Edge-3	0mm	\	**1**	4.05	4.50	76.69	1.30	**0.045**	0.06	0.016	**0.02**	0.09
1	Body	Bluetooth	39	2441.0	GFSK	Edge-4	0mm	\	\	4.05	4.50	76.69	1.30	<0.01	**<0.01**	<0.01	**<0.01**	\

Table 12.2: WLAN 2.4GHz SAR Values

ANT	RF Exposure Conditions	Frequency Band	Channel Number	Frequency (MHz)	Mode/RB	Test Position	Distance	Note	Figure No.	EUT Measured Power (dBm)	Tune up (dBm)	Duty Cycle %	Duty Cycle Scaling Factor	Measured SAR 1g (W/kg)	Calculated SAR 1g (W/kg)	Measured SAR 10g (W/kg)	Calculated SAR 10g (W/kg)	Power Drift
1	Body	WLAN 2.4GHz	11	2462.0	802.11b	Edge-1	0mm	\	\	13.41	14.00	97.36	1.03	0.320	**0.38**	0.172	**0.20**	0.01
1	Body	WLAN 2.4GHz	11	2462.0	802.11b	Edge-2	0mm	\	\	13.41	14.00	97.36	1.03	0.064	**0.08**	0.037	**0.04**	0.09
1	Body	WLAN 2.4GHz	11	2462.0	802.11b	Edge-3	0mm	\	\	13.41	14.00	97.36	1.03	**0.403**	0.48	0.175	**0.21**	-0.03
1	Body	WLAN 2.4GHz	11	2462.0	802.11b	Edge-4	0mm	\	\	13.41	14.00	97.36	1.03	0.034	**0.04**	0.020	**0.02**	-0.14
2	Body	WLAN 2.4GHz	1	2412.0	802.11b	Edge-1	0mm	\	**2**	12.62	13.00	97.44	1.03	**1.210**	1.36	0.515	**0.58**	0.05
2	Body	WLAN 2.4GHz	1	2412.0	802.11b	Edge-2	0mm	\	\	12.62	13.00	97.44	1.03	0.108	**0.12**	0.053	**0.06**	0.17
2	Body	WLAN 2.4GHz	1	2412.0	802.11b	Edge-3	0mm	\	\	12.62	13.00	97.44	1.03	0.396	**0.45**	0.175	**0.20**	0.03
2	Body	WLAN 2.4GHz	1	2412.0	802.11b	Edge-4	0mm	\	\	12.62	13.00	97.44	1.03	0.063	**0.07**	0.029	**0.03**	0.17
2	Body	WLAN 2.4GHz	6	2437.0	802.11b	Edge-1	0mm	\	\	12.30	13.00	97.44	1.03	1.080	**1.31**	0.456	**0.55**	0.03
2	Body	WLAN 2.4GHz	11	2462.0	802.11b	Edge-1	0mm	\	\	12.44	13.00	97.44	1.03	0.964	**1.13**	0.397	**0.47**	-0.11
2	Body	WLAN 2.4GHz	6	2437.0	802.11n40M	Edge-1	0mm	\	\	13.21	13.50	98.24	1.02	0.736	**0.80**	0.290	**0.32**	0.16
2	Body	WLAN 2.4GHz	6	2437.0	802.11n40M	Edge-2	0mm	\	\	13.21	13.50	98.24	1.02	0.104	**0.11**	0.048	**0.05**	-0.15
2	Body	WLAN 2.4GHz	6	2437.0	802.11n40M	Edge-3	0mm	\	\	13.21	13.50	98.24	1.02	0.292	**0.32**	0.120	**0.13**	0.03
2	Body	WLAN 2.4GHz	6	2437.0	802.11n40M	Edge-4	0mm	\	\	13.21	13.50	98.24	1.02	0.041	**0.04**	0.019	**0.02**	0.05
2	Body	WLAN 2.4GHz	3	2422.0	802.11n40M	Edge-1	0mm	\	\	12.75	13.50	98.24	1.02	**0.867**	1.05	0.354	**0.43**	-0.17
1+2	Body	WLAN 2.4GHz	11	2462.0	802.11b	Edge-1	0mm	\	\	15.96	16.50	97.54	1.03	**0.925**	1.07	0.379	**0.44**	0.12
1+2	Body	WLAN 2.4GHz	11	2462.0	802.11b	Edge-2	0mm	\	\	15.96	16.50	97.54	1.03	0.091	**0.11**	0.072	**0.08**	-0.07
1+2	Body	WLAN 2.4GHz	11	2462.0	802.11b	Edge-3	0mm	\	\	15.96	16.50	97.54	1.03	0.507	**0.58**	0.334	**0.39**	-0.05
1+2	Body	WLAN 2.4GHz	11	2462.0	802.11b	Edge-4	0mm	\	\	15.96	16.50	97.54	1.03	0.085	**0.10**	0.063	**0.07**	0.15
1+2	Body	WLAN 2.4GHz	1	2412.0	802.11b	Edge-1	0mm	\	\	15.90	16.50	97.54	1.03	0.885	**1.05**	0.602	**0.72**	0.03

Note:

1. According to the KDB 248227 D01, SAR is measured for 2.4GHz 802.11b DSSS using the initial test position procedure.

2. For all positions/configurations tested using the initial test position and subsequent test positions, when the reported SAR is > 0.8 W/kg, SAR is measured for these test positions/configurations on the subsequent next highest measured output power channel until the reported SAR is ≤ 1.2 W/kg or all required channels are tested.

3. According to the KDB 248227 D01, the reported SAR must be scaled to 100% transmission duty factor to determine compliance at the maximum tune-up tolerance limit.

4. SAR is not required for OFDM(Ant.1 & Ant.1+2) because the 802.11b adjusted SAR ≤ 1.2 W/kg.

Table 12.3: WLAN 5GHz SAR Values

ANT	RF Exposure Conditions	Frequency Band	Channel Number	Frequency (MHz)	Mode/RB	Test Position	Distance	Note	Figure No.	EUT Measured Power (dBm)	Tune up (dBm)	Duty Cycle %	Duty Cycle Scaling Factor	Measured SAR 1g (W/kg)	Calculated SAR 1g (W/kg)	Measured SAR 10g (W/kg)	Calculated SAR 10g (W/kg)	Power Drift
1	Body	U-NII-2A	60	5300.0	802.11a	Edge-1	0mm	\	\	12.33	12.60	98.08	1.02	1.230	1.34	0.302	0.33	0.01
1	Body	U-NII-2A	60	5300.0	802.11a	Edge-2	0mm	\	\	12.33	12.60	98.08	1.02	0.215	0.23	0.068	0.07	-0.07
1	Body	U-NII-2A	60	5300.0	802.11a	Edge-3	0mm	\	\	12.33	12.60	98.08	1.02	0.924	1.00	0.240	0.26	-0.02
1	Body	U-NII-2A	60	5300.0	802.11a	Edge-4	0mm	\	\	12.33	12.60	98.08	1.02	0.022	0.02	0.007	0.01	0.08
1	Body	U-NII-2A	64	5320.0	802.11a	Edge-1	0mm	\	3	10.82	11.10	98.08	1.02	1.320	1.44	0.346	0.38	0.02
1	Body	U-NII-2A	56	5280.0	802.11a	Edge-1	0mm	\	\	10.80	11.10	98.08	1.02	0.941	1.03	0.220	0.24	0.14
1	Body	U-NII-2A	52	5260.0	802.11a	Edge-1	0mm	\	\	10.71	11.10	98.08	1.02	0.534	0.60	0.161	0.18	0.03
1	Body	U-NII-2A	64	5320.0	802.11a	Edge-3	0mm	\	\	10.82	11.10	98.08	1.02	0.834	0.91	0.254	0.28	0.11
1	Body	U-NII-1	44	5220.0	802.11a	Edge-1	0mm	\	\	11.40	12.10	98.08	1.02	0.673	0.81	0.183	0.22	-0.07
1	Body	U-NII-1	44	5220.0	802.11a	Edge-2	0mm	\	\	11.40	12.10	98.08	1.02	0.185	0.22	0.069	0.08	0.18
1	Body	U-NII-1	44	5220.0	802.11a	Edge-3	0mm	\	\	11.40	12.10	98.08	1.02	0.588	0.70	0.218	0.26	-0.09
1	Body	U-NII-1	44	5220.0	802.11a	Edge-4	0mm	\	\	11.40	12.10	98.08	1.02	0.065	0.08	0.025	0.03	0.04
1	Body	U-NII-1	36	5180.0	802.11a	Edge-1	0mm	\	\	10.81	12.10	98.08	1.02	0.647	0.89	0.157	0.22	-0.09
2	Body	U-NII-2A	52	5260.0	802.11a	Edge-1	0mm	\	\	11.35	12.10	98.66	1.01	0.045	0.05	0.010	0.01	-0.13
2	Body	U-NII-2A	52	5260.0	802.11a	Edge-2	0mm	\	\	11.35	12.10	98.66	1.01	0.011	0.01	0.003	0.00	-0.09
2	Body	U-NII-2A	52	5260.0	802.11a	Edge-3	0mm	\	\	11.35	12.10	98.66	1.01	0.034	0.04	0.007	0.01	0.18
2	Body	U-NII-2A	52	5260.0	802.11a	Edge-4	0mm	\	\	11.35	12.10	98.66	1.01	0.010	0.01	0.003	0.00	0.03
1+2	Body	U-NII-2A	60	5300.0	802.11a	Edge-1	0mm	\	\	14.86	15.30	98.66	1.01	0.913	1.02	0.263	0.29	0.10
1+2	Body	U-NII-2A	60	5300.0	802.11a	Edge-2	0mm	\	\	14.86	15.30	98.66	1.01	0.119	0.13	0.052	0.06	0.17
1+2	Body	U-NII-2A	60	5300.0	802.11a	Edge-3	0mm	\	\	14.86	15.30	98.66	1.01	0.467	0.52	0.191	0.21	0.12
1+2	Body	U-NII-2A	60	5300.0	802.11a	Edge-4	0mm	\	\	14.86	15.30	98.66	1.01	0.022	0.02	0.011	0.01	-0.01
1+2	Body	U-NII-2A	64	5320.0	802.11a	Edge-1	0mm	\	\	14.06	15.30	98.66	1.01	0.778	1.05	0.212	0.28	-0.13
1	Body	U-NII-2C	124	5620.0	802.11a	Edge-1	0mm	\	4	10.16	10.60	98.08	1.02	1.240	1.40	0.224	0.25	0.09
1	Body	U-NII-2C	124	5620.0	802.11a	Edge-2	0mm	\	\	10.16	10.60	98.08	1.02	0.114	0.13	0.039	0.04	0.13
1	Body	U-NII-2C	124	5620.0	802.11a	Edge-3	0mm	\	\	10.16	10.60	98.08	1.02	0.703	0.79	0.188	0.21	0.04
1	Body	U-NII-2C	124	5620.0	802.11a	Edge-4	0mm	\	\	10.16	10.60	98.08	1.02	0.032	0.04	0.011	0.01	-0.15
1	Body	U-NII-2C	132	5660.0	802.11a	Edge-1	0mm	\	\	9.76	10.60	98.08	1.02	0.915	1.13	0.193	0.24	0.09
2	Body	U-NII-2C	100	5500.0	802.11a	Edge-1	0mm	\	\	8.86	10.10	98.66	1.01	0.026	0.04	0.001	0.00	-0.11
2	Body	U-NII-2C	100	5500.0	802.11a	Edge-2	0mm	\	\	8.86	10.10	98.66	1.01	0.008	0.01	0.000	0.00	-0.14
2	Body	U-NII-2C	100	5500.0	802.11a	Edge-3	0mm	\	\	8.86	10.10	98.66	1.01	0.018	0.02	0.000	0.00	0.00
2	Body	U-NII-2C	100	5500.0	802.11a	Edge-4	0mm	\	\	8.86	10.10	98.66	1.01	0.004	0.01	0.000	0.00	-0.17
1+2	Body	U-NII-2C	124	5620.0	802.11a	Edge-1	0mm	\	\	12.36	13.10	98.66	1.01	1.070	1.28	0.216	0.26	-0.19
1+2	Body	U-NII-2C	124	5620.0	802.11a	Edge-2	0mm	\	\	12.36	13.10	98.66	1.01	0.165	0.20	0.005	0.01	0.18
1+2	Body	U-NII-2C	124	5620.0	802.11a	Edge-3	0mm	\	\	12.36	13.10	98.66	1.01	0.808	0.97	0.019	0.02	-0.05
1+2	Body	U-NII-2C	124	5620.0	802.11a	Edge-4	0mm	\	\	12.36	13.10	98.66	1.01	0.031	0.04	0.001	0.00	0.08
1+2	Body	U-NII-2C	132	5660.0	802.11a	Edge-1	0mm	\	\	12.15	13.10	98.65	1.01	0.744	0.94	0.156	0.20	0.05
1+2	Body	U-NII-2C	132	5660.0	802.11a	Edge-3	0mm	\	\	12.15	13.10	98.66	1.01	0.629	0.79	0.012	0.02	0.07
1	Body	U-NII-3	157	5785.0	802.11a	Edge-1	0mm	\	5	12.32	13.50	98.08	1.02	1.050	1.41	0.270	0.36	0.16
1	Body	U-NII-3	157	5785.0	802.11a	Edge-2	0mm	\	\	12.32	13.50	98.08	1.02	0.083	0.11	0.038	0.05	0.11
1	Body	U-NII-3	157	5785.0	802.11a	Edge-3	0mm	\	\	12.32	13.50	98.08	1.02	0.466	0.62	0.172	0.23	0.05
1	Body	U-NII-3	157	5785.0	802.11a	Edge-4	0mm	\	\	12.32	13.50	98.08	1.02	0.029	0.04	0.014	0.02	0.11
1	Body	U-NII-3	165	5825.0	802.11a	Edge-1	0mm	\	\	12.21	13.50	98.08	1.02	0.806	1.11	0.225	0.31	-0.12
2	Body	U-NII-3	165	5825.0	802.11a	Edge-1	0mm	\	\	11.66	12.60	98.66	1.01	0.266	0.33	0.053	0.07	-0.18
2	Body	U-NII-3	165	5825.0	802.11a	Edge-2	0mm	\	\	11.66	12.60	98.66	1.01	0.095	0.12	0.023	0.03	0.07
2	Body	U-NII-3	165	5825.0	802.11a	Edge-3	0mm	\	\	11.66	12.60	98.66	1.01	0.211	0.26	0.043	0.05	-0.05
2	Body	U-NII-3	165	5825.0	802.11a	Edge-4	0mm	\	\	11.66	12.60	98.66	1.01	0.018	0.02	0.003	0.00	-0.03
1+2	Body	U-NII-3	165	5825.0	802.11a	Edge-1	0mm	\	\	14.95	16.10	98.66	1.01	0.882	1.16	0.136	0.18	0.02
1+2	Body	U-NII-3	165	5825.0	802.11a	Edge-2	0mm	\	\	14.95	16.10	98.66	1.01	0.193	0.25	0.046	0.06	-0.09
1+2	Body	U-NII-3	165	5825.0	802.11a	Edge-3	0mm	\	\	14.95	16.10	98.66	1.01	0.438	0.58	0.104	0.14	0.12
1+2	Body	U-NII-3	165	5825.0	802.11a	Edge-4	0mm	\	\	14.95	16.10	98.66	1.01	0.024	0.03	0.007	0.01	0.09
1+2	Body	U-NII-3	157	5785.0	802.11a	Edge-1	0mm	\	\	14.72	16.10	98.66	1.01	0.863	1.20	0.154	0.21	0.15
1+2	Body	U-NII-3	149	5745.0	802.11a	Edge-1	0mm	\	\	14.29	16.10	98.66	1.01	0.568	0.87	0.126	0.19	-0.14

Note:

1. The maximum output and tolerance of U-NII-2A band is greater than that of U-NII-1 band, SAR is measured for U-NII-2A band first. Adjusted SAR of U-NII-2A band is ≤ 1.2 W/kg, SAR(Ant.1 & Ant.1+2) is not required for U-NII-1 band.

2. For all positions/configurations tested using the initial test position and subsequent test positions, when the reported SAR is > 0.8 W/kg, SAR is measured for these test positions/configurations on the subsequent next highest measured output power channel until the reported SAR is ≤ 1.2 W/kg or all required channels are tested.

3. According to the KDB 248227 D01, the reported SAR must be scaled to 100% transmission duty factor to determine compliance at the maximum tune-up tolerance limit.

13. SAR Measurement Variability

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. When both head and body tissue-equivalent media are required for SAR measurements in a frequency band, the variability measurement procedures should be applied to the tissue medium with the highest measured SAR, using the highest measured SAR configuration for that tissue-equivalent medium.

The following procedures are applied to determine if repeated measurements are required.

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.

Table 13.1: SAR Measurement Variability

Antenna	RF Exposure Conditions	Frequency Band	Frequency		Mode/RB	Test Position	Distance	Original	1st Repeated	Ratio	2nd Repeated
			Ch.	MHz				SAR (W/kg)	SAR (W/kg)		SAR (W/kg)
2	Body	WLAN 2.4GHz	1	2412.0	802.11b	Edge-1	0mm	1.21	1.180	1.03	/
2	Body	WLAN 2.4GHz	3	2422.0	802.11n40M	Edge-1	0mm	0.867	0.854	1.02	/
1+2	Body	WLAN 2.4GHz	11	2462.0	802.11b	Edge-1	0mm	0.925	0.909	1.02	/
1	Body	U-NII-2A	64	5320.0	802.11a	Edge-1	0mm	1.320	1.250	1.06	/
1+2	Body	U-NII-2A	60	5300.0	802.11a	Edge-1	0mm	0.913	0.888	1.03	/
1	Body	U-NII-2C	124	5620.0	802.11a	Edge-1	0mm	1.240	1.160	1.07	/
1+2	Body	U-NII-2C	124	5620.0	802.11a	Edge-1	0mm	1.070	1.060	1.01	/
1	Body	U-NII-3	157	5785.0	802.11a	Edge-1	0mm	1.050	1.010	1.04	/
1+2	Body	U-NII-3	165	5825.0	802.11a	Edge-1	0mm	0.882	0.869	1.01	/

14. Measurement Uncertainty

14.1. Measurement Uncertainty for Normal SAR Tests (300MHz~3GHz)

No.	Error Description	Type	Uncertainty value	Probably Distribution	Div.	(Ci) 1g	(Ci) 10g	Std. Unc. (1g)	Std. Unc. (10g)	Degree of freedom
Measurement system										
1	Probe calibration	B	11.0	N	2	1	1	5.5	5.5	∞
2	Axial isotropy	B	4.7	R	$\sqrt{3}$	$\sqrt{0.5}$	$\sqrt{0.5}$	4.3	4.3	∞
3	Hemispherical isotropy	B	9.6	R	$\sqrt{3}$	1	1	4.8	4.8	∞
4	Boundary effect	B	1.1	R	$\sqrt{3}$	1	1	0.6	0.6	∞
5	Linearity	B	4.7	R	$\sqrt{3}$	1	1	2.7	2.7	∞
6	Detection limit	B	1.0	R	$\sqrt{3}$	1	1	0.6	0.6	∞
7	Modulation response	B	4.0	R	$\sqrt{3}$	1	1	2.3	2.3	∞
8	Readout electronics	B	1.0	N	1	1	1	1.0	1.0	∞
9	Response time	B	0.8	R	$\sqrt{3}$	1	1	0.5	0.5	∞
10	Integration time	B	1.7	R	$\sqrt{3}$	1	1	1.0	1.0	∞
11	RF ambient conditions-noise	B	3.0	R	$\sqrt{3}$	1	1	1.7	1.7	∞
12	RF ambient conditions-reflection	B	3.0	R	$\sqrt{3}$	1	1	1.7	1.7	∞
13	Probe positioned mech. restrictions	B	0.35	R	$\sqrt{3}$	1	1	0.2	0.2	∞
14	Probe positioning with respect to phantom shell	B	2.9	R	$\sqrt{3}$	1	1	1.7	1.7	∞
15	Post-processing	B	1.0	R	$\sqrt{3}$	1	1	0.6	0.6	∞
Test sample related										
16	Test sample positioning	A	3.3	N	1	1	1	3.3	3.3	5
17	Device holder uncertainty	A	3.4	N	1	1	1	3.4	3.4	5
18	Power scaling	B	0	R	$\sqrt{3}$	1	1	0	0	∞
19	Drift of output power	B	5.0	R	$\sqrt{3}$	1	1	2.9	2.9	∞
Phantom and set-up										
20	Phantom uncertainty	B	1.0	R	$\sqrt{3}$	1	1	0.6	0.6	∞
21	Algorithm for correcting SAR for deviations in permittivity and conductivity	B	1.9	N	1	1	0.84	1.9	1.6	∞
22	Liquid conductivity (target)	B	5.0	R	$\sqrt{3}$	0.64	0.43	1.8	1.2	∞
23	Liquid conductivity (meas.)	A	1.3	N	1	0.64	0.43	0.83	0.56	9
24	Liquid permittivity (target)	B	5.0	R	$\sqrt{3}$	0.6	0.49	1.7	1.4	∞
25	Liquid permittivity (meas.)	A	1.6	N	1	0.6	0.49	0.96	0.78	9
Combined standard uncertainty, $u_c' = \sqrt{\sum_{i=1}^{25} c_i^2 u_i^2}$								11.2	11.0	95.5
Expanded uncertainty (Confidence interval of 95 %), $u_e = 2u_c$								22.4	22.0	

14.2. Measurement Uncertainty for Normal SAR Tests (3GHz~6GHz)

No.	Error Description	Type	Uncertainty value	Probably Distribution	Div.	(Ci) 1g	(Ci) 10g	Std. Unc. (1g)	Std. Unc. (10g)	Degree of freedom
Measurement system										
1	Probe calibration	B	13.1	N	2	1	1	6.55	6.55	∞
2	Axial isotropy	B	4.7	R	$\sqrt{3}$	$\sqrt{0.5}$	$\sqrt{0.5}$	4.3	4.3	∞
3	Hemispherical isotropy	B	9.6	R	$\sqrt{3}$	1	1	4.8	4.8	∞
4	Boundary effect	B	1.1	R	$\sqrt{3}$	1	1	0.6	0.6	∞
5	Linearity	B	4.7	R	$\sqrt{3}$	1	1	2.7	2.7	∞
6	Detection limit	B	1.0	R	$\sqrt{3}$	1	1	0.6	0.6	∞
7	modulation response	B	4.0	R	$\sqrt{3}$	1	1	2.3	2.3	∞
8	Readout electronics	B	1.0	N	1	1	1	1.0	1.0	∞
9	Response time	B	0.0	R	$\sqrt{3}$	1	1	0.0	0.0	∞
10	Integration time	B	1.7	R	$\sqrt{3}$	1	1	1.0	1.0	∞
11	RF ambient conditions-noise	B	3.0	R	$\sqrt{3}$	1	1	1.7	1.7	∞
12	RF ambient conditions-reflection	B	3.0	R	$\sqrt{3}$	1	1	1.7	1.7	∞
13	Probe positioned mech. Restrictions	B	0.35	R	$\sqrt{3}$	1	1	0.2	0.2	∞
14	Probe positioning with respect to phantom shell	B	2.9	R	$\sqrt{3}$	1	1	1.7	1.7	∞
15	Post-processing	B	1.0	R	$\sqrt{3}$	1	1	0.6	0.6	∞
Test sample related										
16	Test sample positioning	A	3.3	N	1	1	1	3.3	3.3	5
17	Device holder uncertainty	A	3.4	N	1	1	1	3.4	3.4	5
18	Power scaling	B	0	R	$\sqrt{3}$	1	1	0	0	∞
19	Drift of output power	B	5.0	R	$\sqrt{3}$	1	1	2.9	2.9	∞
Phantom and set-up										
20	Phantom uncertainty	B	1.0	R	$\sqrt{3}$	1	1	0.6	0.6	∞
21	Algorithm for correcting SAR for deviations in permittivity and conductivity	B	1.9	N	1	1	0.84	1.9	1.6	∞
22	Liquid conductivity (target)	B	5.0	R	$\sqrt{3}$	0.64	0.43	1.8	1.2	∞
23	Liquid conductivity (meas.)	A	1.3	N	1	0.64	0.43	0.83	0.56	9
24	Liquid permittivity (target)	B	5.0	R	$\sqrt{3}$	0.6	0.49	1.7	1.4	∞
25	Liquid permittivity (meas.)	A	1.6	N	1	0.6	0.49	0.96	0.78	9
Combined standard uncertainty, $u_c' = \sqrt{\sum_{i=1}^{25} c_i^2 u_i^2}$								11.7	11.6	95.5
Expanded uncertainty (Confidence interval of 95 %), $u_e = 2u_c$								23.4	23.2	

15. Main Test Instruments

Table 15.1: List of Main Instruments

No.	Name	Type	Serial Number	Calibration Date	Valid Period
01	Network analyzer	E5071C	MY46103759	2024-11-12	One year
02	Dielectric probe	85070E	MY44300317	/	/
03	Power meter	E4418B	MY50000366	2024-12-09	One year
04	Power sensor	E9304A	MY50000188	2024-12-09	One year
05	Power meter	NRP	102603	2023-12-28	One year
06	Power sensor	NRP-Z51	102211	2023-12-28	One year
07	Signal Generator	E8257D	MY47461211	2024-01-12	One year
08	Amplifier	VTL5400	0404	/	/
09	DAE	DAE4	1790	2024-06-06	One year
10	E-field Probe	EX3DV4	7683	2024-07-03	One year
11	Dipole Validation Kit	D2450V2	873	2024-09-26	Three years
12	Dipole Validation Kit	D5GHzV2	1238	2022-08-17	Three years
13	Thermometer	51II	99250045	2024-11-21	One year
14	Software	DASY5	/	/	/

ANNEX A: Graph Results

Bluetooth Body

Date: 2024-12-12

Electronics: DAE4 Sn1790

Medium: Head 2450MHz

Medium parameters used (interpolated): f = 2441 MHz; σ = 1.822 S/m; εr = 38.504; ρ = 1000 kg/m^3

Communication System: UID 0, BT (0) Frequency: 2441 MHz Duty Cycle: 1:1

Probe: EX3DV4 - SN7683 ConvF (7.87, 7.49, 7.34)

Edge-3 Ch.39/Area Scan (61x111x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 0.0985 W/kg

Edge-3 Ch.39/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 1.367 V/m; Power Drift = 0.09 dB

Peak SAR (extrapolated) = 0.128 W/kg

SAR(1 g) = 0.045 W/kg; SAR(10 g) = 0.016 W/kg

Maximum value of SAR (measured) = 0.0837 W/kg

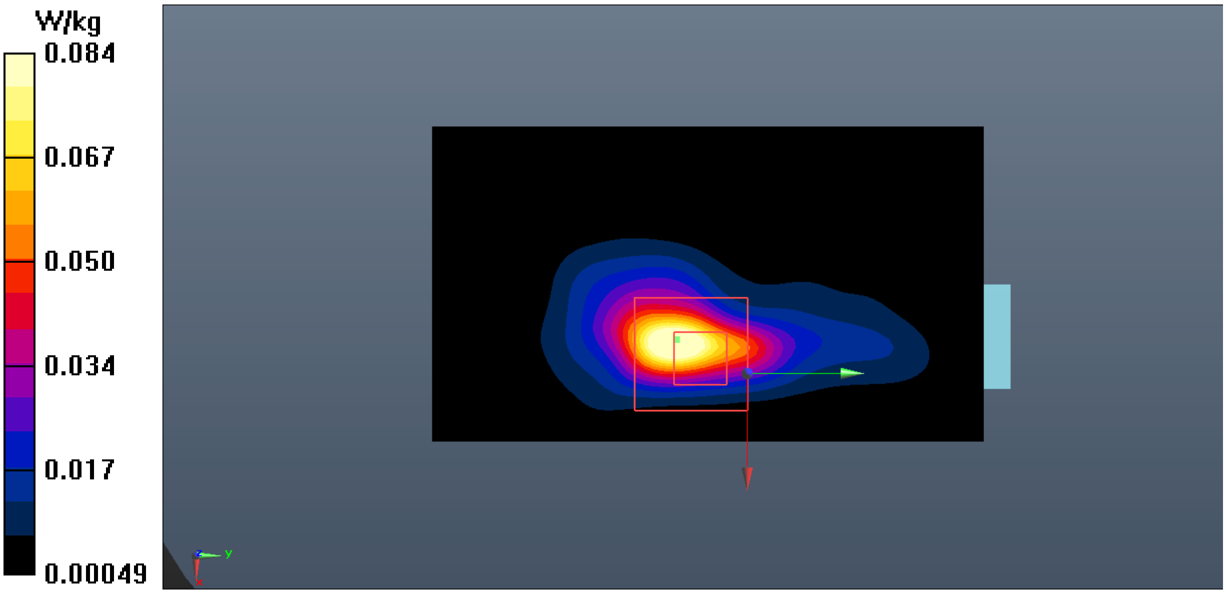


Fig.1 Bluetooth Body

WLAN 2.4GHz Body

Date: 2024-12-12

Electronics: DAE4 Sn1790

Medium: Head 2450MHz

Medium parameters used: f = 2412 MHz; σ = 1.788 S/m; ε_r = 38.599; ρ = 1000 kg/m^3

Communication System: UID 0, WLAN (0) Frequency: 2412 MHz Duty Cycle: 1:1

Probe: EX3DV4 - SN7683 ConvF (7.87, 7.49, 7.34)

Edge-1 Ch.1/Area Scan (141x91x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 1.79 W/kg

Edge -1 Ch.1/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 0.1370 V/m; Power Drift = 0.05 dB

Peak SAR (extrapolated) = 2.70 W/kg

SAR(1 g) = 1.21 W/kg; SAR(10 g) = 0.515 W/kg

Maximum value of SAR (measured) = 2.01 W/kg

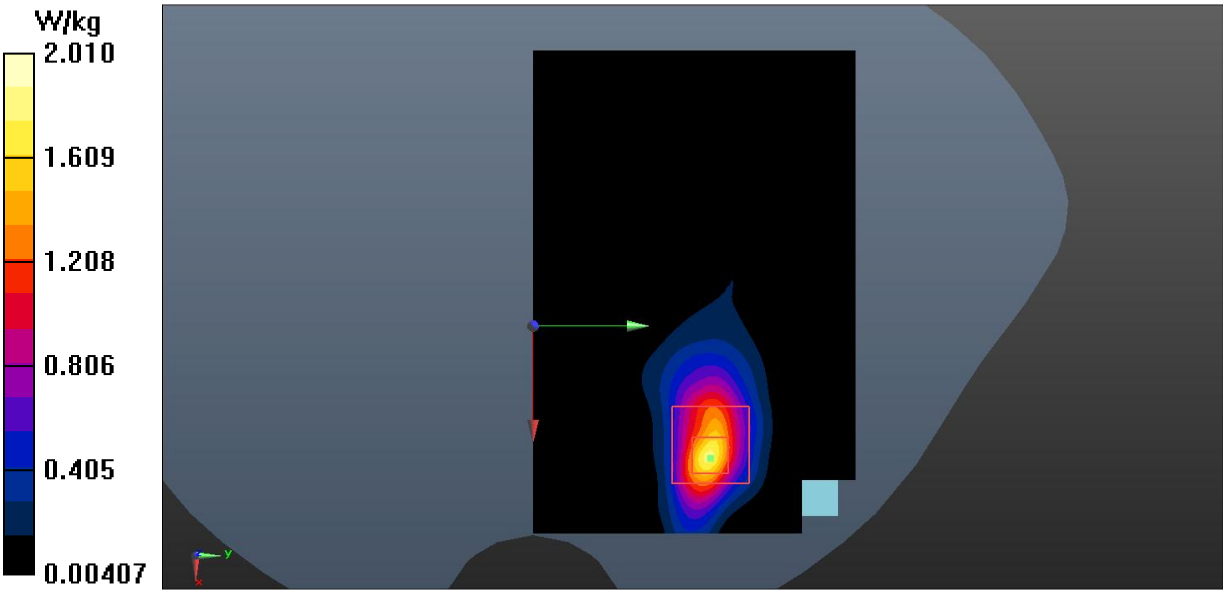


Fig.2 WLAN 2.4GHz Body

WLAN 5GHz Body (U-NII-2A)
Date: 2024-12-13
Electronics: DAE4 Sn1790
Medium: Head 5250MHz
Medium parameters used: f = 5320 MHz; σ = 4.709 S/m; ε_r = 36.534; ρ = 1000 kg/m^3
Communication System: UID 0, WLAN 5G (0) Frequency: 5320 MHz Duty Cycle: 1:1
Probe: EX3DV4 - SN7683 ConvF (6.03, 5.73, 5.62)

Edge-1 Ch.64/Area Scan (91x91x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 3.32 W/kg

Edge-1 Ch.64/Zoom Scan (8x8x21)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 0.4360 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 6.37 W/kg
SAR(1 g) = 1.32 W/kg; SAR(10 g) = 0.346 W/kg
Maximum value of SAR (measured) = 3.56 W/kg

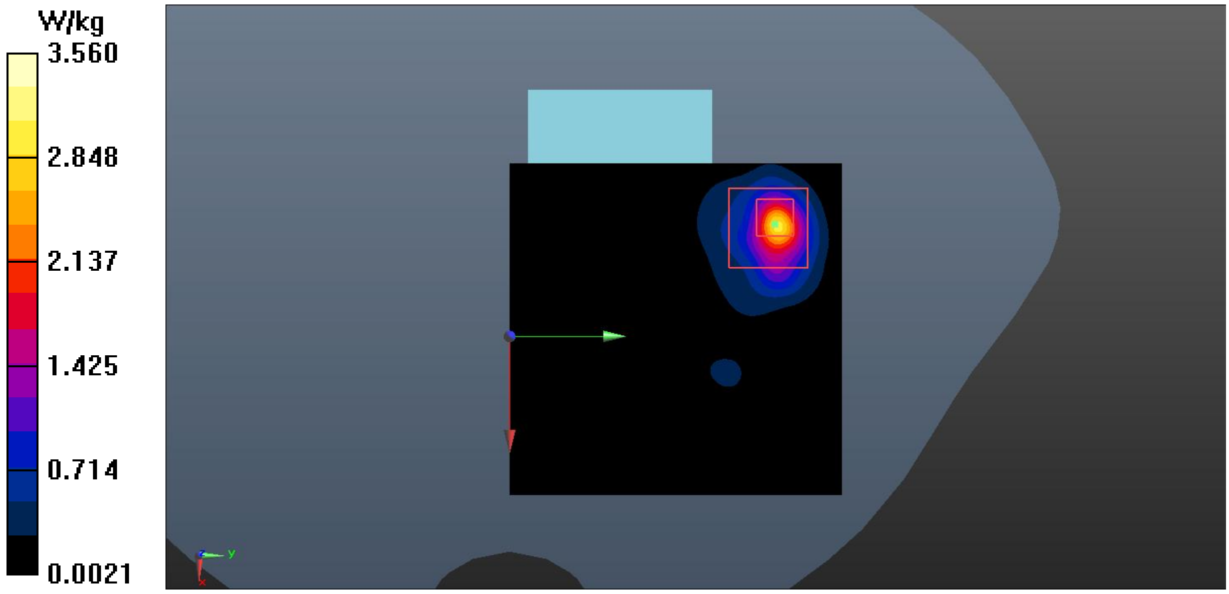


Fig.3 WLAN 5GHz Body

WLAN 5GHz Body (U-NII-2C)
Date: 2024-12-13
Electronics: DAE4 Sn1790
Medium: Head 5600MHz
Medium parameters used: f = 5620 MHz; σ = 4.998 S/m; ε_r = 36.435; ρ = 1000 kg/m^3
Communication System: UID 0, WLAN 5G (0) Frequency: 5620 MHz Duty Cycle: 1:1
Probe: EX3DV4 - SN7683 ConvF (5.46, 5.19, 5.09)

Edge-1 Ch.124/Area Scan (71x91x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 1.80 W/kg

Edge-1 Ch.124/Zoom Scan (8x8x21)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 0.1170 V/m; Power Drift = 0.09 dB
Peak SAR (extrapolated) = 8.02 W/kg
SAR(1 g) = 1.24 W/kg; SAR(10 g) = 0.224 W/kg
Maximum value of SAR (measured) = 3.47 W/kg

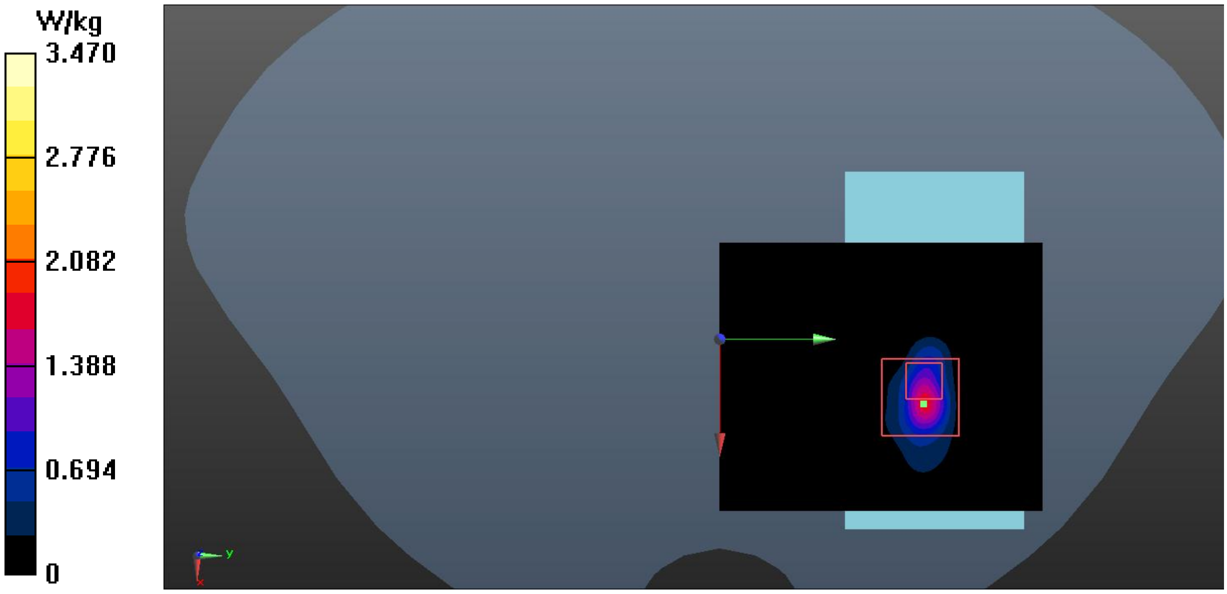


Fig.4 WLAN 5GHz Body

WLAN 5GHz Body (U-NII-3)
Date: 2024-12-13
Electronics: DAE4 Sn1790
Medium: Head 5750MHz
Medium parameters used (interpolated): f = 5785 MHz; σ = 5.395 S/m; ε_r = 34.461; ρ = 1000 kg/m^3
Communication System: UID 0, WLAN 5G (0) Frequency: 5785 MHz Duty Cycle: 1:1
Probe: EX3DV4 - SN7683 ConvF (5.53, 5.26, 5.15)

Edge-1 Ch.157/Area Scan (71x91x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.717 W/kg

Edge-1 Ch.157/Zoom Scan (8x8x21)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 0.8100 V/m; Power Drift = 0.16 dB
Peak SAR (extrapolated) = 7.54 W/kg
SAR(1 g) = 1.05 W/kg; SAR(10 g) = 0.270 W/kg
Maximum value of SAR (measured) = 2.63 W/kg

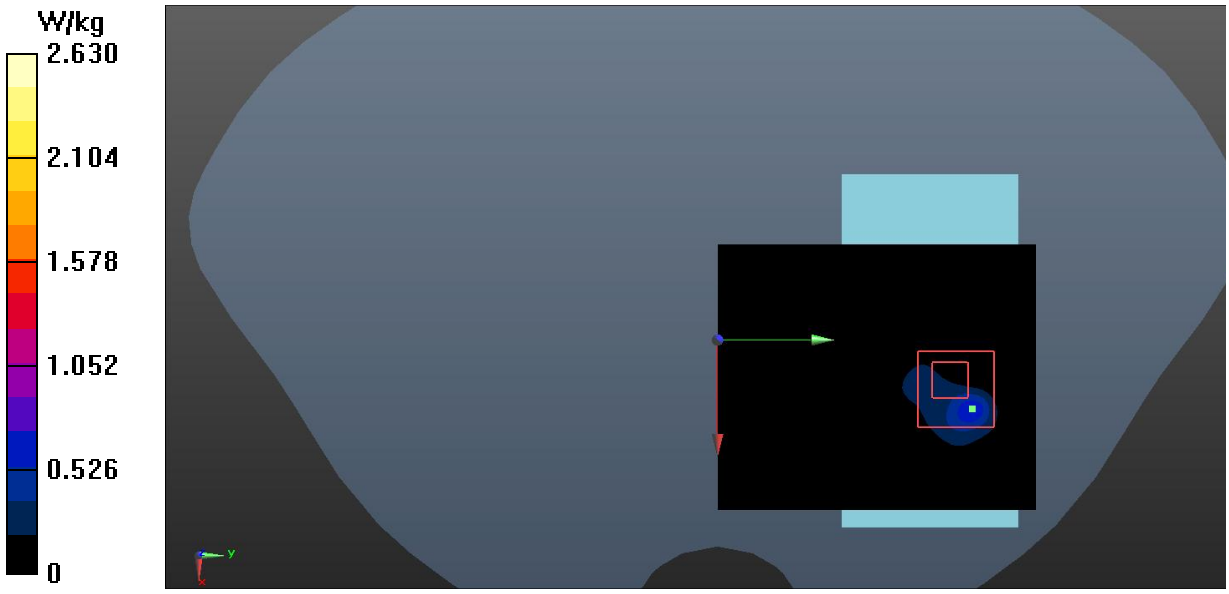


Fig.5 WLAN 5GHz Body

ANNEX B: SystemVerification Results

2450MHz

Date: 2024-12-12

Electronics: DAE4 Sn1790

Medium: Head 2450MHz

Medium parameters used: f = 2450 MHz; σ = 1.833 S/m; ε_r = 38.474; ρ = 1000 kg/m^3

Communication System: CW Frequency: 2450 MHz Duty Cycle: 1:1

Probe: EX3DV4 - SN7683 ConvF (7.87, 7.49, 7.34)

System Validation/Area Scan (81x121x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Reference Value = 90.855 V/m; Power Drift = 0.08 dB

SAR(1 g) = 13.4 W/kg; SAR(10 g) = 6.22 W/kg

Maximum value of SAR (interpolated) = 20.9 W/kg

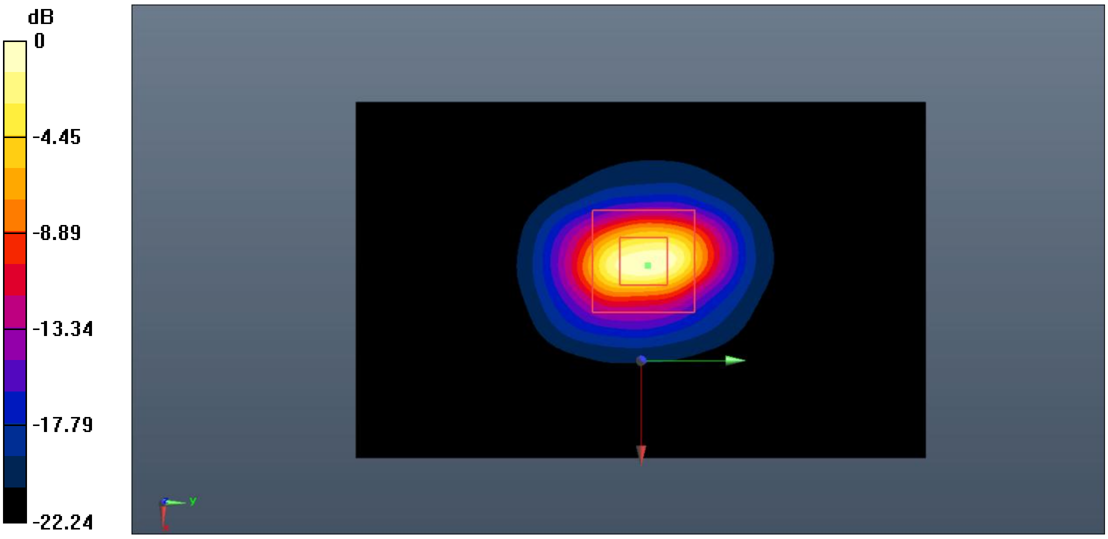
System Validation/Zoom Scan (7x7x7)/Cube0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 90.855 V/m; Power Drift = 0.08 dB

Peak SAR (extrapolated) = 30.4 W/kg

SAR(1 g) = 13.6 W/kg; SAR(10 g) = 6.29 W/kg

Maximum value of SAR (measured) = 21.4 W/kg



0 dB = 21.4 W/kg = 13.30 dB W/kg

Fig.B.1. Validation 2450MHz 250mW

5250MHz

Date: 2024-12-13

Electronics: DAE4 Sn1790

Medium: Head 5250MHz

Medium parameters used: f = 5250 MHz; σ = 4.614 S/m; ε_r = 36.723; ρ = 1000 kg/m^3

Communication System: CW Frequency: 5250 MHz Duty Cycle: 1:1

Probe: EX3DV4 - SN7683 ConvF (6.03, 5.73, 5.62)

System Validation/Area Scan (61x91x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Reference Value = 66.984 V/m; Power Drift = -0.15 dB

SAR(1 g) = 7.97 W/kg; SAR(10 g) = 2.29 W/kg

Maximum value of SAR (interpolated) = 19.3 W/kg

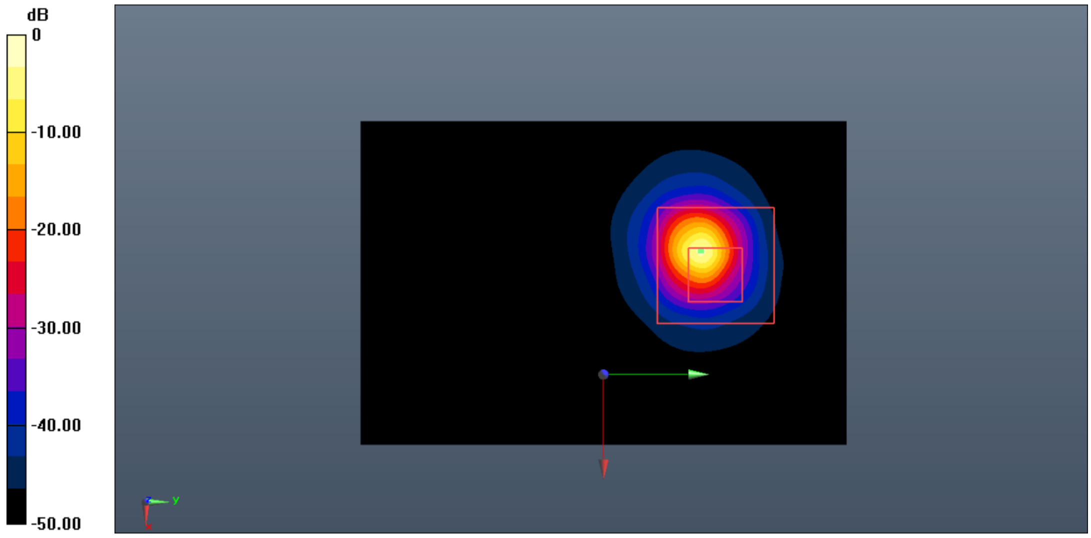
System Validation/Zoom Scan (8x8x21)/Cube0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 66.984 V/m; Power Drift = -0.15 dB

Peak SAR (extrapolated) = 31.9 W/kg

SAR(1 g) = 7.80 W/kg; SAR(10 g) = 2.25 W/kg

Maximum value of SAR (measured) = 19.0 W/kg



0 dB = 19.0 W/kg = 12.79 dB W/kg

Fig.B.2. Validation 5250MHz 100mW

5600MHz

Date: 2024-12-13

Electronics: DAE4 Sn1790

Medium: Head 5600MHz

Medium parameters used: f = 5600 MHz; σ = 4.971 S/m; ε_r = 36.488; ρ = 1000 kg/m^3

Communication System: CW Frequency: 5600 MHz Duty Cycle: 1:1

Probe: EX3DV4 - SN7683 ConvF (5.46, 5.19, 5.09)

System Validation/Area Scan (61x91x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Reference Value = 67.591 V/m; Power Drift = -0.13 dB

SAR(1 g) = 8.17 W/kg; SAR(10 g) = 2.35 W/kg

Maximum value of SAR (interpolated) = 19.7 W/kg

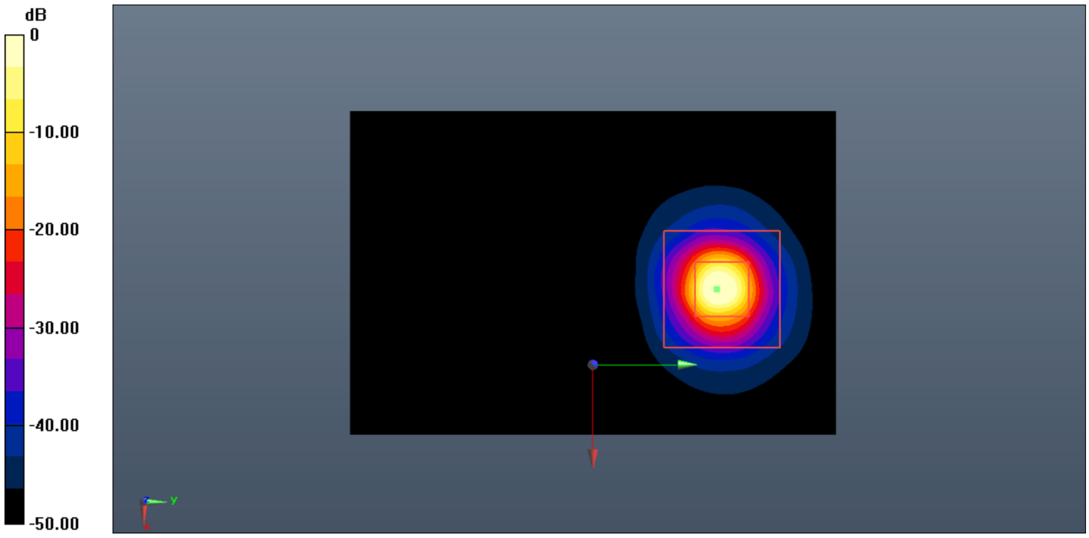
System Validation/Zoom Scan (8x8x21)/Cube0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 67.591 V/m; Power Drift = -0.13 dB

Peak SAR (extrapolated) = 33.2 W/kg

SAR(1 g) = 8.01 W/kg; SAR(10 g) = 2.30 W/kg

Maximum value of SAR (measured) = 19.5 W/kg



0 dB = 19.5 W/kg = 12.90 dB W/kg

Fig.B.3. Validation 5600MHz 100mW

5750MHz

Date: 2024-12-13

Electronics: DAE4 Sn1790

Medium: Head 5750MHz

Medium parameters used: f = 5750 MHz; σ = 5.348 S/m; ε_r = 34.556; ρ = 1000 kg/m^3

Communication System: CW Frequency: 5750 MHz Duty Cycle: 1:1

Probe: EX3DV4 - SN7683 ConvF (5.53, 5.26, 5.15)

System Validation/Area Scan (61x91x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Reference Value = 69.158 V/m; Power Drift = 0.07 dB

SAR(1 g) = 8.05 W/kg; SAR(10 g) = 2.21 W/kg

Maximum value of SAR (interpolated) = 19.5 W/kg

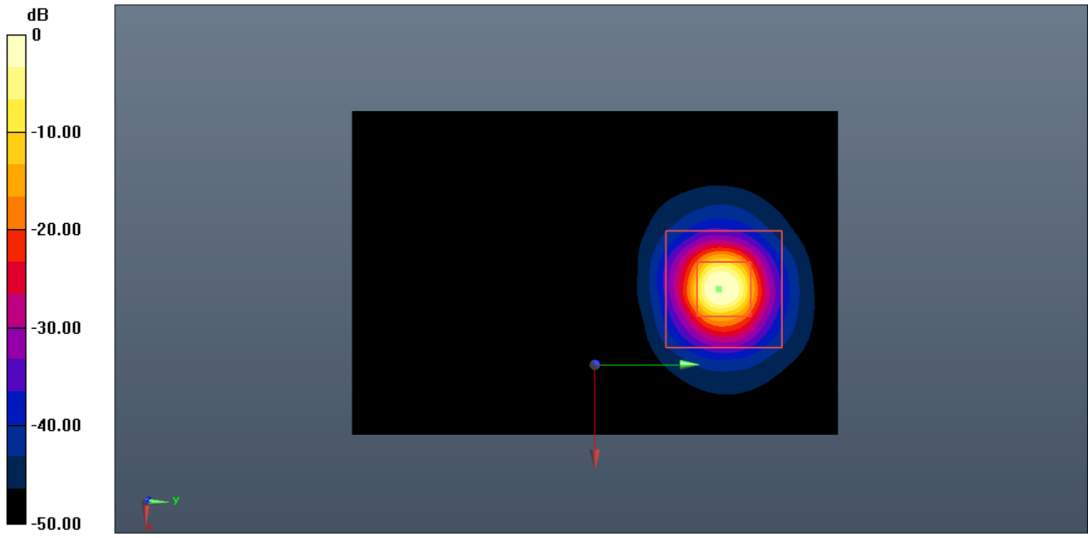
System Validation/Zoom Scan (8x8x21)/Cube0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 69.158 V/m; Power Drift = 0.07 dB

Peak SAR (extrapolated) = 35.4 W/kg

SAR(1 g) = 8.15 W/kg; SAR(10 g) = 2.27 W/kg

Maximum value of SAR (measured) = 19.8 W/kg



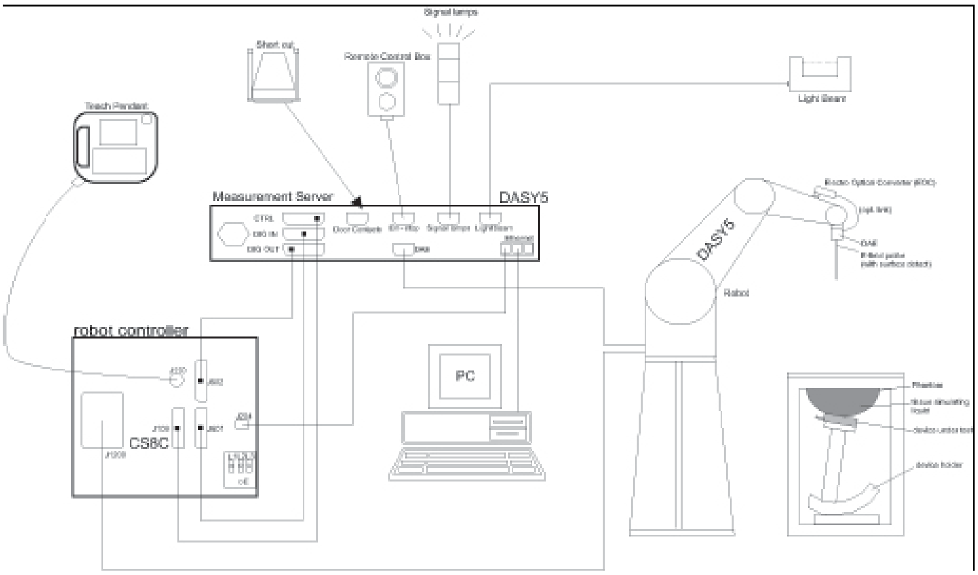
0 dB = 19.8 W/kg = 12.97 dB W/kg

Fig.B.4. Validation 5750MHz 100mW

ANNEX C: SAR Measurement Setup

C.1. Measurement Set-up

DASY5 system for performing compliance tests is illustrated above graphically. This system consists of the following items:



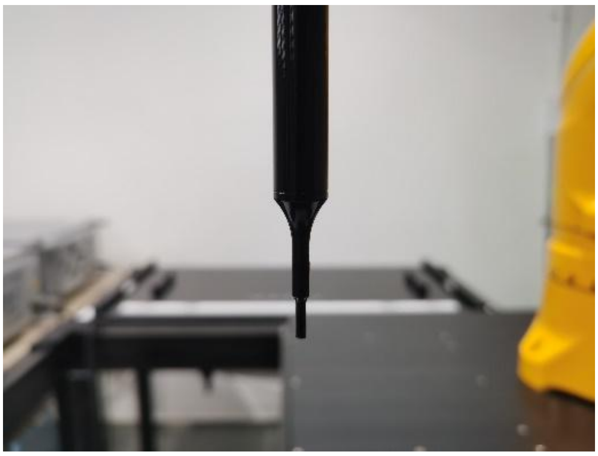
Picture C.1 SAR Lab Test Measurement Set-up

- A standard high precision 6-axis robot (Stäubli TX=RX family) with controller, teach pendant and software. An arm extension for accommodating the data acquisition electronics (DAE).
- An isotropic field probe optimized and calibrated for the targeted measurement.
- A data acquisition electronics (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.
- The Electro-optical converter (EOC) performs the conversion from optical to electrical signals for the digital communication to the DAE. To use optical surface detection, a special version of the EOC is required. The EOC signal is transmitted to the measurement server.
- The function of the measurement server is to perform the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
- The Light Beam used is for probe alignment. This improves the (absolute) accuracy of the probe positioning.
- A computer running WinXP and the DASY5 software.
- Remote control and teach pendant as well as additional circuitry for robot safety such as
- warning lamps, etc.
- The phantom, the device holder and other accessories according to the targeted measurement.

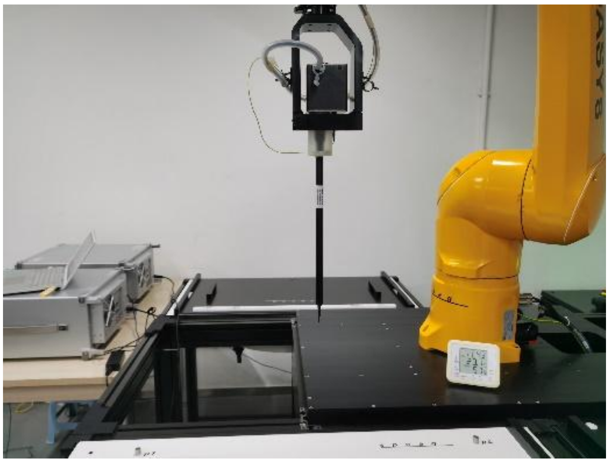
C.2. DASY E-field Probe System

The SAR measurements were conducted with the dosimetric probe designed in the classical triangular configuration and optimized for dosimetric evaluation. The probe is constructed using the thick film technique; with printed resistive lines on ceramic substrates. The probe is equipped with an optical multifiber line ending at the front of the probe tip. It is connected to the EOC box on the robot arm and provides an automatic detection of the phantom surface. Half of the fibers are connected to a pulsed infrared transmitter, the other half to a synchronized receiver. As the probe approaches the surface, the reflection from the surface produces a coupling from the transmitting to the receiving fibers. This reflection increases first during the approach, reaches maximum and then decreases. If the probe is flatly touching the surface, the coupling is zero. The distance of the coupling maximum to the surface is independent of the surface reflectivity and largely independent of the surface to probe angle. The DASY5 OR DASY8 software reads the reflection durning a software approach and looks for the maximum using 2ndord curve fitting. The approach is stopped at reaching the maximum.

Probe Specifications:	
Model:	EX3DV4
Frequency Range:	10 MHz - 6.0 GHz
Calibration:	In head simulating tissue at Frequencies from 750 up to 5750 MHz
Linearity:	± 0.2 dB (30 MHz to 6 GHz)
Dynamic Range:	10 mW/kg - 100 W/kg
Probe Length:	337 mm
Probe Tip Length:	20 mm
Body Diameter:	12 mm
Tip Diameter:	2.5 mm
Tip-Center:	1 mm
Application:	SAR Dosimetry Testing / Compliance tests of mobile phones / Dosimetry in strong gradient fields



Picture C.2: Near-field Probe



Picture C.3: E-field Probe

C.3. E-field Probe Calibration

Each E-Probe/Probe Amplifier combination has unique calibration parameters. A TEM cell calibration procedure is conducted to determine the proper amplifier settings to enter in the probe parameters. The amplifier settings are determined for a given frequency by subjecting the probe to a known E-field density (1 mW/cm^2) using an RF Signal generator, TEM cell, and RF Power Meter.

The free space E-field from amplified probe outputs is determined in a test chamber. This calibration can be performed in a TEM cell if the frequency is below 1 GHz and inn a waveguide or other methodologies above 1 GHz for free space. For the free space calibration, the probe is placed in the volumetric center of the cavity and at the proper orientation with the field. The probe is then rotated 360 degrees until the three channels show the maximum reading. The power density readings equates to 1 mW/ cm^2.

E-field temperature correlation calibration is performed in a flat phantom filled with the appropriate simulated brain tissue. The E-field in the medium correlates with the temperature rise in the dielectric medium. For temperature correlation calibration a RF transparent thermistor-based temperature probe is used in conjunction with the E-field probe.

$$SAR = C\frac{\Delta T}{\Delta t}$$

Where:

Δt = Exposure time (30 seconds),

C = Heat capacity of tissue (brain or muscle),

ΔT = Temperature increase due to RF exposure.

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

Where:

σ = Simulated tissue conductivity,

ρ = Tissue density (kg/m^3).

C.4. Other Test Equipment

C.4.1. Data Acquisition Electronics (DAE)

The data acquisition electronics consist of a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16 bit AD-converter and a command decoder with a control logic unit. Transmission to the measurement server is accomplished through an optical downlink for data and status information, as well as an optical uplink for commands and the clock.

The mechanical probe mounting device includes two different sensor systems for frontal and sideways probe contacts. They are used for mechanical surface detection and probe collision detection.

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

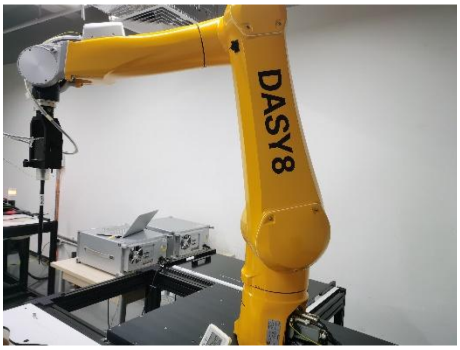
Picture C.4: DAE

C.4.2. Robot

The SPEAG DASY system uses the high precision robots (DASY5: RX90L) type from Stäubli SA (France). For the 6-axis controller system, the robot controller version from Stäubli is used. The Stäubli robot series have many features that are important for our application:

- High precision (repeatability 0.02mm)
- High reliability (industrial design)
- Low maintenance costs (virtually maintenance free due to direct drive gears; no belt drives)
- Jerk-free straight movements (brushless synchron motors; no stepper motors)
- Low ELF interference (motor control fields shielded via the closed metallic construction shields)

Picture C.5: DASY 5



Picture C.6: DASY 8

C.4.3. Measurement Server

The Measurement server is based on a PC/104 CPU broad with CPU (DASY5: 400 MHz, Intel Celeron), chipdisk (DASY5:128MB), RAM (DASY5:128MB). The necessary circuits for communication with the DAE electronic box, as well as the 16 bit AD converter system for optical detection and digital I/O interface are contained on the DASY I/O broad, which is directly connected to the PC/104 bus of the CPU broad.

The measurement server performs all real-time data evaluation of field measurements and surface detection, controls robot movements and handles safety operation. The PC operating system cannot interfere with these time critical processes. All connections are supervised by a watchdog, and disconnection of any of the cables to the measurement server will automatically disarm the robot and disable all program-controlled robot movements. Furthermore, the measurement server is equipped with an expansion port which is reserved for future applications. Please note that this expansion port does not have a standardized pinout, and therefore only devices provided by SPEAG can be connected. Devices from any other supplier could seriously damage the measurement server.

Picture C.7: Server for DASY 5

Picture C.8: Server for DASY 8

C.4.4. Device Holder for Phantom

The SAR in the phantom is approximately inversely proportional to the square of the distance between the source and the liquid surface. For a source at 5mm distance, a positioning uncertainty of ±0.5mm would produce a SAR uncertainty of ±20%. Accurate device positioning is therefore crucial for accurate and repeatable measurements. The positions in which the devices must be measured are defined by the standards.

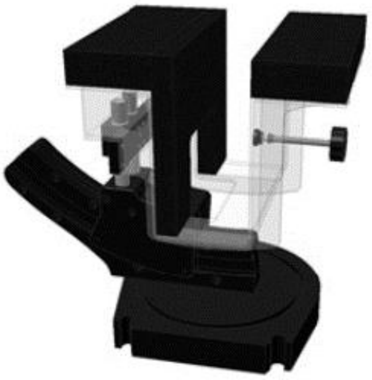
The DASY device holder is designed to cope with the different positions given in the standard. It has two scales for device rotation (with respect to the body axis) and device inclination (with respect to the line between the ear reference points). The rotation centers for both scales is the ear reference point (ERP). Thus the device needs no repositioning when changing the angles.

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

<Laptop Extension Kit>

The extension is lightweight and made of POM, acrylic glass and foam. It fits easily on the upper part of the Mounting Device in place of the phone positioner. The extension is fully compatible with the Twin-SAM and ELI phantoms.

Picture C.9: Device Holder



Picture C.10: Laptop Extension Kit

The SAM Twin Phantom V4.0 is constructed of a fiberglass shell integrated in a table. The shape of the shell is based on data from an anatomical study designed to
Represent the 90th percentile of the population. The phantom enables the dissymmetric evaluation of SAR for both left and right handed handset usage, as well as body-worn usage using the flat phantom region. Reference markings on the Phantom allow the complete setup of all predefined phantom positions and measurement grids by manually teaching three points in the robot. The shell phantom has a 2mm shell thickness (except the ear region where shell thickness increases to 6 mm).

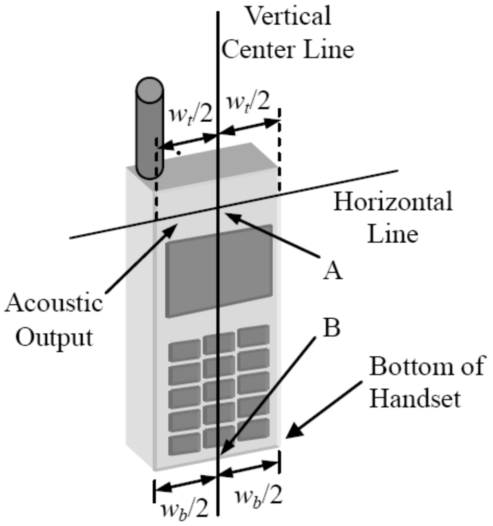
Shell Thickness: 2 ± 0. 2 mm
Filling Volume: Approx. 25 liters
Dimensions: 810 x l000 x 500 mm (H x L x W)
Available: Special

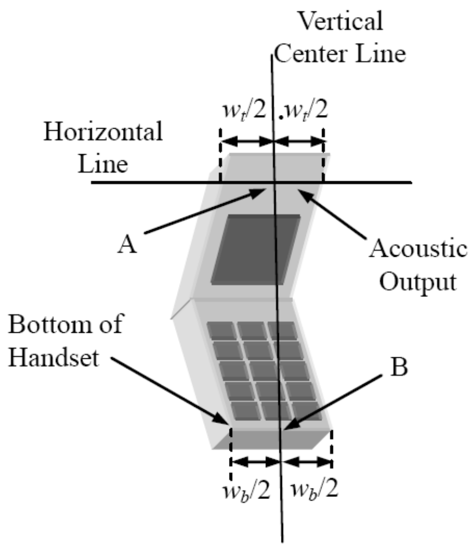
Picture C.11: SAM Twin Phantom

ANNEX D: Position of the wireless device in relation to the phantom

D.1. General considerations

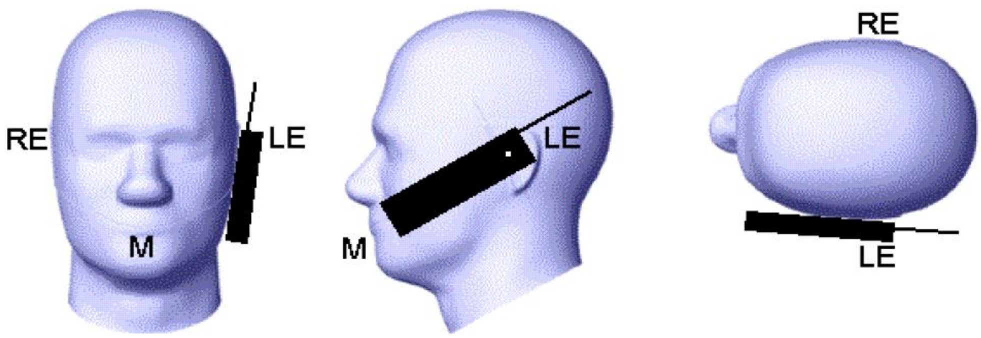
This standard specifies two handset test positions against the head phantom – the “cheek” position and the “tilt” position.



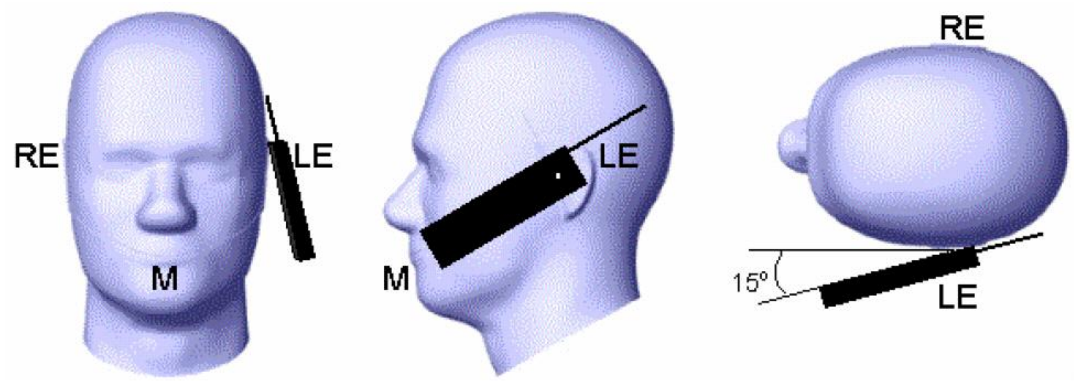


w_t	Width of the handset at the level of the acoustic
w_b	Width of the bottom of the handset
A	Midpoint of the width w_t of the handset at the level of the acoustic output
B	Midpoint of the width w_b of the bottom of the handset

Picture D.1-a Typical “fixed” case handset   Picture D.1-b Typical “clam-shell” case handset



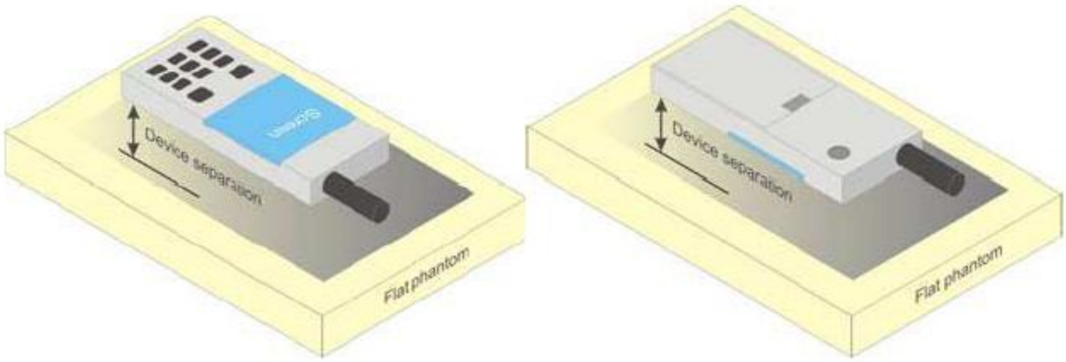
Picture D.2 Cheek position of the wireless device on the left side of SAM



Picture D.3 Tilt position of the wireless device on the left side of SAM

D.2. Body-worn device

A typical example of a body-worn device is a mobile phone, wireless enabled PDA or other battery operated wireless device with the ability to transmit while mounted on a person's body using a carry accessory approved by the wireless device manufacturer.

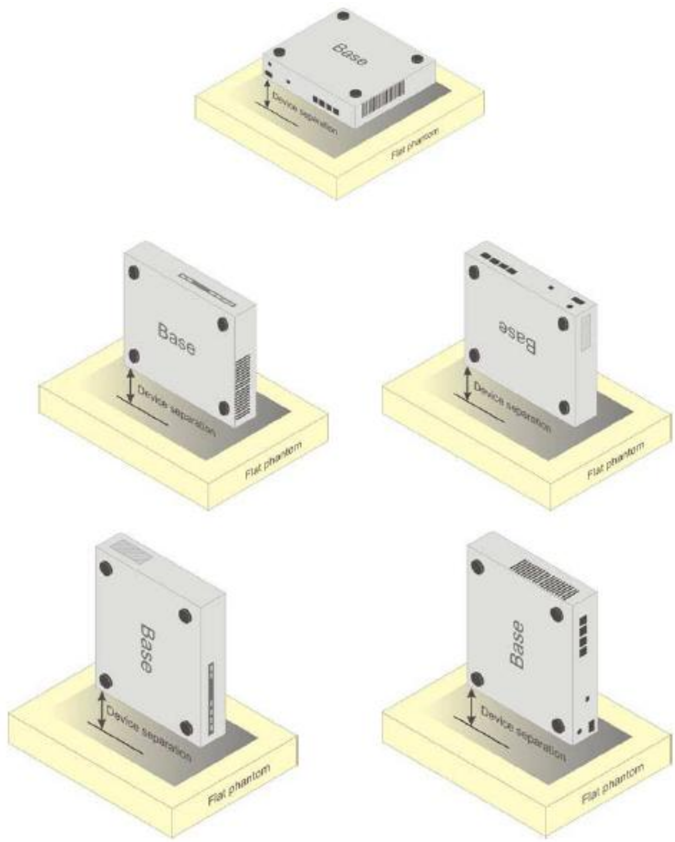


Picture D.4 Test positions for body-worn devices

D.3. Desktop device

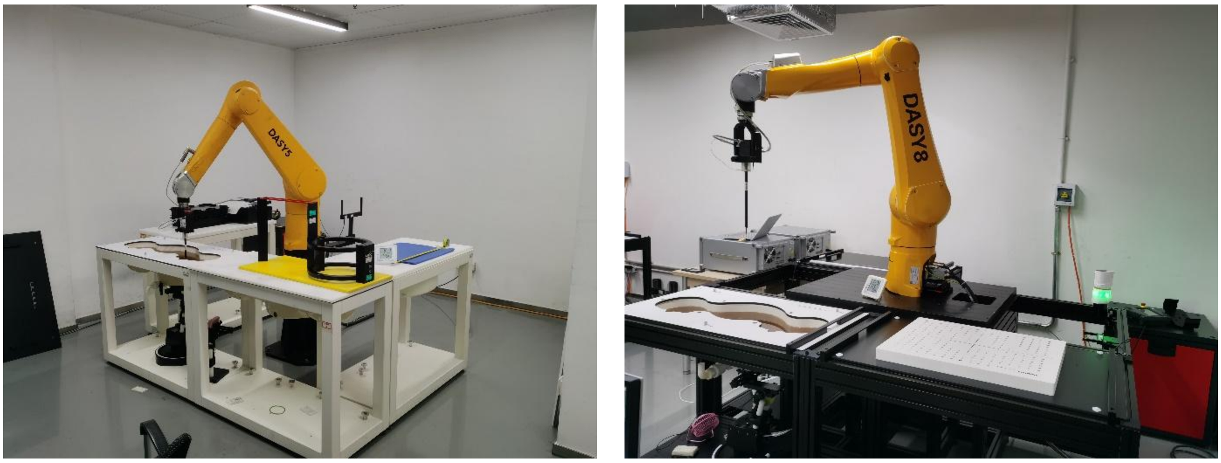
A typical example of a desktop device is a wireless enabled desktop computer placed on a table or desk when used.

The DUT shall be positioned at the distance and in the orientation to the phantom that corresponds to the intended use as specified by the manufacturer in the user instructions. For devices that employ an external antenna with variable positions, tests shall be performed for all antenna positions specified. Picture 8.5 show positions for desktop device SAR tests. If the intended use is not specified, the device shall be tested directly against the flat phantom.



Picture D.5 Test positions for desktop devices

D.4. DUT Setup Photos



Picture D.6 Specific Absorption Rate Test Layout

ANNEX E: Equivalent Media Recipes

The liquid used for the frequency range of 700-6000 MHz consisted of water, sugar, salt, preventol, glycol monobutyl and Cellulose. The liquid has been previously proven to be suited for worst-case. The Table E.1 shows the detail solution. It's satisfying the latest tissue dielectric parameters requirements proposed by the IEEE 1528 and IEC 62209.

Table E.1: Composition of the Tissue Equivalent Matter

Frequency (MHz)	835	1750	1900	2450	2600	5200	5800
Water	41.45	55.242	55.242	58.79	58.79	65.53	66.10
Sugar	56.0	/	/	/	/	/	/
Salt	1.45	0.306	0.306	0.06	0.06		
Preventol	0.1	/	/	/	/	17.24	16.95
Cellulose	1.0	/	/	/	/	17.24	16.95
Glycol Monobutyl	/	44.452	44.452	41.15	41.15	/	/
Diethylenglycol monohexylether	/	/	/	/	/	/	/
Triton X-100	/	/	/	/	/	/	/
Dielectric Parameters Target Value	ε=41.5 σ=0.90	ε=40.08 σ=1.37	ε=40.0 σ=1.40	ε=39.20 σ=1.80	ε=39.01 σ=1.96	ε=35.99 σ=4.66	ε=35.30 σ=5.27

Note: There is a little adjustment respectively for 750, 5300 and 5600, based on the recipe of closest frequency in table E.1

ANNEX F: System Validation

The SAR system must be validated against its performance specifications before it is deployed. When SAR probes, system components or software are changed, upgraded or recalibrated, these must be validated with the SAR system(s) that operates with such components.

Table F.1: System Validation

Probe SN.	Liquid name (MHz)	Validation date	Frequency point	CW Validation	Modulation Signal Validation		
					Modulation Type	Duty Factor	PAR
7683	Head 750	2024-08-08	750MHz	Pass	N/A	N/A	N/A
7683	Head 835	2024-08-08	835MHz	Pass	GMSK	Pass	N/A
7683	Head 1750	2024-08-08	1750MHz	Pass	N/A	N/A	N/A
7683	Head 1900	2024-08-08	1900MHz	Pass	GMSK	Pass	N/A
7683	Head 2450	2024-08-20	2450MHz	Pass	OFDM/TDD	Pass	Pass
7683	Head 2550	2024-08-20	2550MHz	Pass	TDD	Pass	N/A
7683	Head 3500	2024-08-19	3500MHz	Pass	TDD	Pass	N/A
7683	Head 3700	2024-08-19	3700MHz	Pass	TDD	Pass	N/A
7683	Head 3900	2024-08-19	3900MHz	Pass	TDD	Pass	N/A
7683	Head 5250	2024-08-21	5250MHz	Pass	OFDM	N/A	Pass
7683	Head 5600	2024-08-21	5600MHz	Pass	OFDM	N/A	Pass
7683	Head 5750	2024-08-21	5750MHz	Pass	OFDM	N/A	Pass

ANNEX G: DAE Calibration Certificate

DAE4 - SN:1790 (2024-06-06)

In Collaboration with speag CALIBRATION LABORATORY

Add: No.52 HuaYuanBei Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2117
E-mail: emf@caict.ac.cn http://www.caict.ac.cn

中国认可 国际互认 校准 CALIBRATION CNAS L0570

Client : **SAICT** **Certificate No: 24J02Z000295**

CALIBRATION CERTIFICATE

Object	DAE4 - SN: 1790
Calibration Procedure(s)	FF-Z11-002-01 Calibration Procedure for the Data Acquisition Electronics (DAEx)
Calibration date:	June 06, 2024

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Process Calibrator 753	1971018	12-Jun-23 (CTTL, No.J23X05436)	Jun-24

	Name	Function	Signature
Calibrated by:	Yu Zongying	SAR Test Engineer	
Reviewed by:	Lin Jun	SAR Test Engineer	
Approved by:	Qi Dianyuan	SAR Project Leader	

Issued: June 09, 2024

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

Certificate No: 24J02Z000295 Page 1 of 3

In Collaboration with
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CALIBRATION LABORATORY

Add: No.52 HuaYuanBei Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2117
E-mail: emf@caict.ac.cn http://www.caict.ac.cn

Glossary:

DAE	data acquisition electronics
Connector angle	information used in DASY system to align probe sensor X to the robot coordinate system.

Methods Applied and Interpretation of Parameters:

- *DC Voltage Measurement*: Calibration Factor assessed for use in DASY system by comparison with a calibrated instrument traceable to national standards. The figure given corresponds to the full scale range of the voltmeter in the respective range.

- *Connector angle*: The angle of the connector is assessed measuring the angle mechanically by a tool inserted. Uncertainty is not required.

- The report provide only calibration results for DAE, it does not contain other performance test results.

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CAICT

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DC Voltage Measurement

A/D - Converter Resolution nominal

High Range: 1LSB = 6.1μV , full range = -100...+300 mV
Low Range: 1LSB = 61nV , full range = -1.......+3mV

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

Calibration Factors	X	Y	Z
High Range	404.649 ± 0.15% (k=2)	404.367 ± 0.15% (k=2)	404.501 ± 0.15% (k=2)
Low Range	4.00172 ± 0.7% (k=2)	3.99527 ± 0.7% (k=2)	3.98609 ± 0.7% (k=2)

Connector Angle

Connector Angle to be used in DASY system	305.5° ± 1 °

ANNEX H: Probe Calibration Certificate

EX3DV4 - SN:7683 (2024-07-03)

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

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

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

Accreditation No.: **SCS 0108**

Client **SAICT**
Shenzhen

Certificate No. **EX-7683_Jul24**

CALIBRATION CERTIFICATE

Object	EX3DV4 - SN:7683
Calibration procedure(s)	QA CAL-01.v10, QA CAL-12.v10, QA CAL-14.v7, QA CAL-23.v6, QA CAL-25.v8 Calibration procedure for dosimetric E-field probes
Calibration date	July 03, 2024

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP2	SN: 104778	26-Mar-24 (No. 217-04036/04037)	Mar-25
Power sensor NRP-Z91	SN: 103244	26-Mar-24 (No. 217-04036)	Mar-25
OCP DAK-3.5 (weighted)	SN: 1249	05-Oct-23 (OCP-DAK3.5-1249_Oct23)	Oct-24
OCP DAK-12	SN: 1016	05-Oct-23 (OCP-DAK12-1016_Oct23)	Oct-24
Reference 20 dB Attenuator	SN: CC2552 (20x)	26-Mar-24 (No. 217-04046)	Mar-25
DAE4	SN: 660	23-Feb-24 (No. DAE4-660_Feb24)	Feb-25
Reference Probe EX3DV4	SN: 7349	03-Jun-24 (No. EX3-7349_Jun24)	Jun-25

Secondary Standards	ID	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB41293874	06-Apr-16 (in house check Jun-24)	In house check: Jun-26
Power sensor E4412A	SN: MY41498087	06-Apr-16 (in house check Jun-24)	In house check: Jun-26
Power sensor E4412A	SN: 000110210	06-Apr-16 (in house check Jun-24)	In house check: Jun-26
RF generator HP 8648C	SN: US3642U01700	04-Aug-99 (in house check Jun-24)	In house check: Jun-26
Network Analyzer E8358A	SN: US41080477	31-Mar-14 (in house check Oct-22)	In house check: Oct-24

	Name	Function	Signature
Calibrated by	Joanna Lleshaj	Laboratory Technician	
Approved by	Sven Kühn	Technical Manager	

Issued: July 03, 2024

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

Certificate No: EX-7683_Jul24 Page 1 of 22

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

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Accreditation No.: **SCS 0108**

Glossary

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

Calibration is Performed According to the Following Standards:

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

Methods Applied and Interpretation of Parameters:

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

Parameters of Probe: EX3DV4 - SN:7683

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc ($k = 2$)
Norm ($\mu V/(V/m)^2$) A	0.62	0.63	0.63	±10.1%
DCP (mV) B	103.2	103.9	103.2	±4.7%

Calibration Results for Modulation Response

UID	Communication System Name		A dB	B dB$\sqrt{\mu V}$	C	D dB	VR mV	Max dev.	Max Unc[E] $k = 2$
0	CW	X	0.00	0.00	1.00	0.00	120.4	±1.4%	±4.7%
		Y	0.00	0.00	1.00		140.6		
		Z	0.00	0.00	1.00		119.4		
10352	Pulse Waveform (200Hz, 10%)	X	1.52	60.67	6.55	10.00	60.0	±2.6%	±9.6%
		Y	1.53	60.79	6.54		60.0		
		Z	2.00	62.00	7.00		60.0		
10353	Pulse Waveform (200Hz, 20%)	X	0.80	60.00	5.10	6.99	80.0	±2.3%	±9.6%
		Y	10.00	72.00	9.00		80.0		
		Z	0.80	60.00	4.99		80.0		
10354	Pulse Waveform (200Hz, 40%)	X	0.26	143.64	0.03	3.98	95.0	±2.6%	±9.6%
		Y	52.00	78.00	9.00		95.0		
		Z	0.19	137.24	0.48		95.0		
10355	Pulse Waveform (200Hz, 60%)	X	10.14	157.74	16.87	2.22	120.0	±1.6%	±9.6%
		Y	12.08	151.82	9.48		120.0		
		Z	10.53	156.21	19.40		120.0		
10387	QPSK Waveform, 1 MHz	X	0.62	63.82	12.61	1.00	150.0	±4.5%	±9.6%
		Y	0.70	63.58	11.65		150.0		
		Z	0.58	62.17	11.23		150.0		
10388	QPSK Waveform, 10 MHz	X	1.39	65.66	14.01	0.00	150.0	±1.4%	±9.6%
		Y	1.40	64.71	13.34		150.0		
		Z	1.31	64.28	13.14		150.0		
10396	64-QAM Waveform, 100 kHz	X	1.61	63.63	15.52	3.01	150.0	±1.1%	±9.6%
		Y	1.73	64.50	15.77		150.0		
		Z	1.59	63.24	15.16		150.0		
10399	64-QAM Waveform, 40 MHz	X	2.86	66.09	15.03	0.00	150.0	±1.9%	±9.6%
		Y	2.90	65.80	14.74		150.0		
		Z	2.80	65.50	14.61		150.0		
10414	WLAN CCDF, 64-QAM, 40 MHz	X	3.85	65.69	15.17	0.00	150.0	±3.5%	±9.6%
		Y	4.00	65.56	15.06		150.0		
		Z	4.03	66.09	15.30		150.0		

Note: For details on UID parameters see Appendix

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

A The uncertainties of Norm X,Y,Z do not affect the E^2-field uncertainty inside TSL (see Pages 5 and 6).
B Linearization parameter uncertainty for maximum specified field strength.
E Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

Parameters of Probe: EX3DV4 - SN:7683

Sensor Model Parameters

	C1 fF	C2 fF	α V^{-1}	T1 $ms V^{-2}$	T2 $ms V^{-1}$	T3 ms	T4 V^{-2}	T5 V^{-1}	T6
x	10.8	77.56	33.12	2.58	0.00	4.90	0.27	0.00	1.00
y	13.0	94.75	33.73	3.67	0.00	4.92	0.51	0.00	1.00
z	11.7	84.47	33.28	2.66	0.00	4.90	0.28	0.00	1.00

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle	70.6°
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	9 mm
Tip Diameter	2.5 mm
Probe Tip to Sensor X Calibration Point	1 mm
Probe Tip to Sensor Y Calibration Point	1 mm
Probe Tip to Sensor Z Calibration Point	1 mm
Recommended Measurement Distance from Surface	1.4 mm

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

Parameters of Probe: EX3DV4 - SN:7683

Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz)[C]	Relative Permittivity[F]	Conductivity[F] (S/m)	ConvF X	ConvF Y	ConvF Z	Alpha[G]	Depth[G] (mm)	Unc[H] ($k = 2$)
13	55.0	0.75	18.80	15.39	15.39	0.00	1.25	±13.3%
750	41.9	0.89	10.40	9.90	9.70	0.34	1.27	±11.0%
900	41.5	0.97	9.93	9.45	9.26	0.34	1.27	±11.0%
1640	40.2	1.31	8.55	8.13	7.97	0.35	1.27	±11.0%
1750	40.1	1.37	8.60	8.19	8.02	0.35	1.27	±11.0%
1900	40.0	1.40	8.37	7.96	7.80	0.35	1.27	±11.0%
2100	39.8	1.49	8.41	8.01	7.84	0.36	1.27	±11.0%
2300	39.5	1.67	8.14	7.75	7.59	0.36	1.27	±11.0%
2450	39.2	1.80	7.87	7.49	7.34	0.36	1.27	±11.0%
2600	39.0	1.96	7.93	7.55	7.39	0.36	1.27	±11.0%
3300	38.2	2.71	7.14	6.80	6.66	0.37	1.27	±13.1%
3500	37.9	2.91	7.20	6.85	6.71	0.37	1.27	±13.1%
3700	37.7	3.12	7.08	6.74	6.60	0.37	1.27	±13.1%
3900	37.5	3.32	6.96	6.62	6.49	0.38	1.27	±13.1%
4100	37.2	3.53	6.87	6.54	6.40	0.38	1.27	±13.1%
4400	36.9	3.84	6.68	6.35	6.22	0.38	1.27	±13.1%
4600	36.7	4.04	6.74	6.41	6.28	0.38	1.27	±13.1%
4800	36.4	4.25	6.61	6.29	6.16	0.39	1.27	±13.1%
4950	36.3	4.40	6.59	6.27	6.14	0.37	1.27	±13.1%
5250	35.9	4.71	6.03	5.73	5.62	0.34	1.27	±13.1%
5600	35.5	5.07	5.46	5.19	5.09	0.30	1.27	±13.1%
5800	35.3	5.27	5.53	5.26	5.15	0.28	1.27	±13.1%

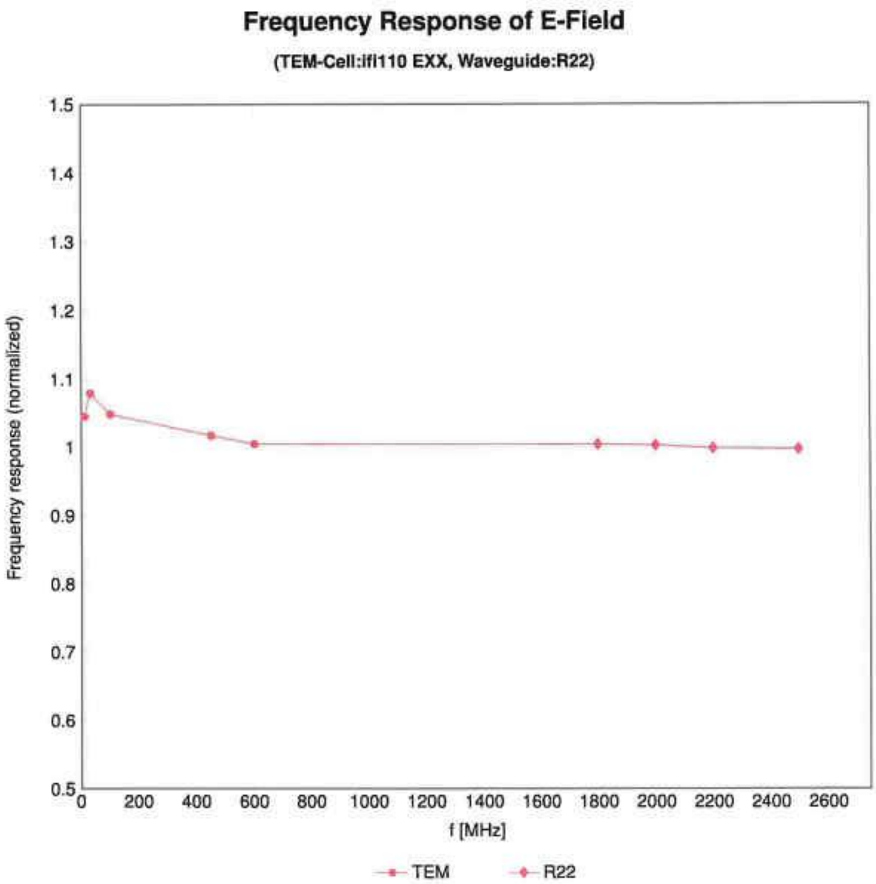
[C] Frequency validity above 300 MHz of ±100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ±50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ±10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Validity of ConvF assessed at 6 MHz is 4–9 MHz, and ConvF assessed at 13 MHz is 9–19 MHz. Above 5 GHz frequency validity can be extended to ±110 MHz.
[F] The probes are calibrated using tissue simulating liquids (TSL) that deviate for ε and σ by less than ±5% from the target values (typically better than ±3%) and are valid for TSL with deviations of up to ±10% if SAR correction is applied.
[G] Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ±1% for frequencies below 3 GHz and below ±2% for frequencies between 3–6 GHz at any distance larger than half the probe tip diameter from the boundary.
[H] The stated uncertainty is the total calibration uncertainty ($k = 2$) of Norm-ConvF. Therefore, the uncertainty stated is equivalent to the uncertainty component with the symbol CF in Table 9 of IEC/IEEE 62209-1528:2020.

Parameters of Probe: EX3DV4 - SN:7683

Calibration Parameter Determined in Head Tissue Simulating Media

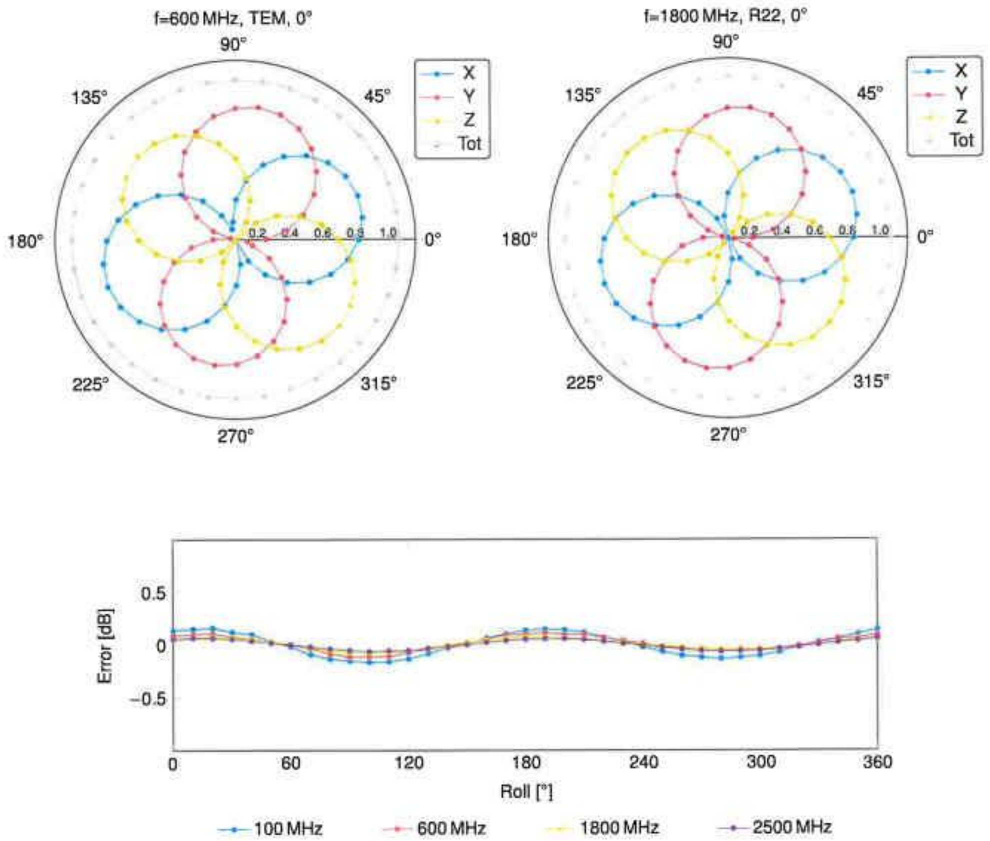
f (MHz)[C]	Relative Permittivity[F]	Conductivity[F] (S/m)	ConvF X	ConvF Y	ConvF Z	Alpha[G]	Depth[G] (mm)	Unc[H] ($k = 2$)
6500	34.5	6.07	5.99	5.70	5.58	0.20	1.27	±18.6%

[C] Frequency validity at 6.5 GHz is −600/+700 MHz, and ±700 MHz at or above 7 GHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.
[F] The probes are calibrated using tissue simulating liquids (TSL) that deviate for ε and σ by less than ±10% from the target values (typically better than ±6%) and are valid for TSL with deviations of up to ±10%.
[G] Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ±1% for frequencies below 3 GHz; below ±2% for frequencies between 3–6 GHz; and below ±4% for frequencies between 6–10 GHz at any distance larger than half the probe tip diameter from the boundary.
[H] The stated uncertainty is the total calibration uncertainty ($k = 2$) of Norm-ConvF. Therefore, the uncertainty stated is equivalent to the uncertainty component with the symbol CF in Table 9 of IEC/IEEE 62209-1528:2020.

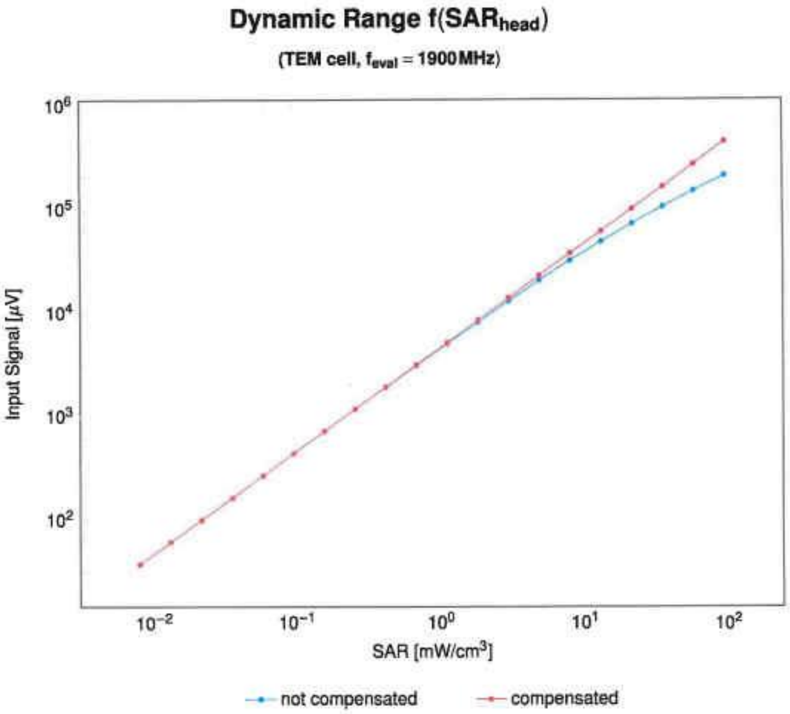


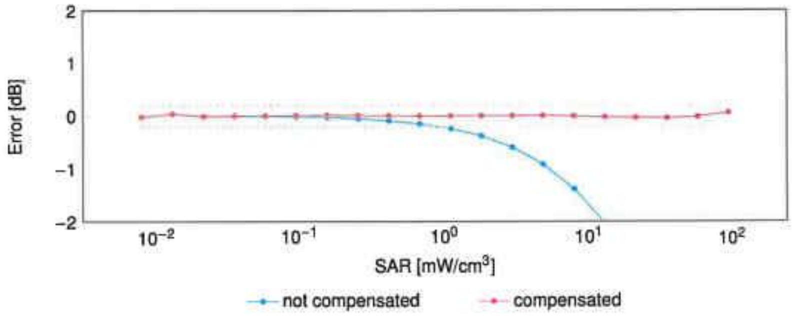
Uncertainty of Frequency Response of E-field: ±6.3% (k=2)

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



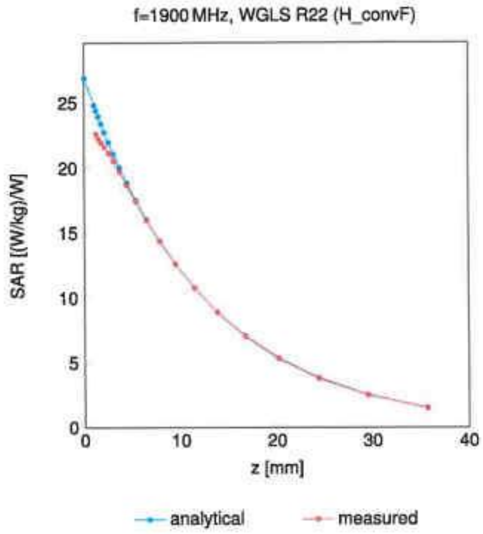
Uncertainty of Axial Isotropy Assessment: ±0.5% (k=2)





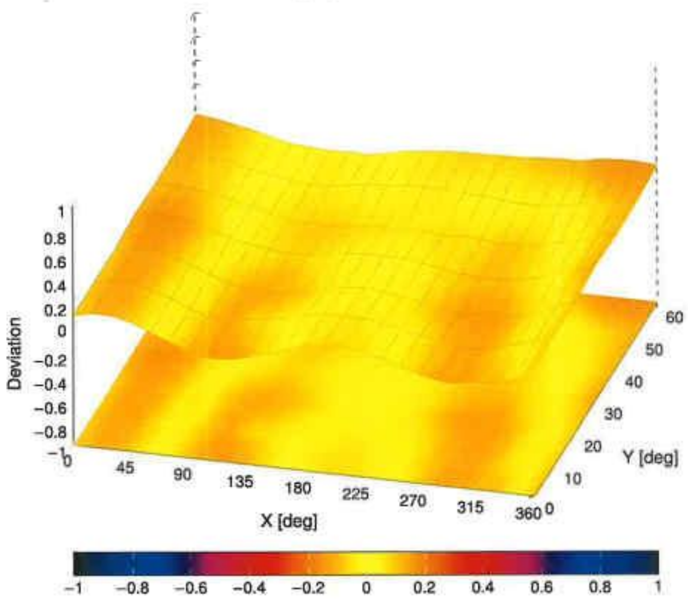
Uncertainty of Linearity Assessment: ±0.6% (k=2)

Conversion Factor Assessment



Deviation from Isotropy in Liquid

Error (ϕ, θ), f = 900 MHz



Uncertainty of Spherical Isotropy Assessment: ±2.6% (k=2)

Appendix: Modulation Calibration Parameters

UID	Rev	Communication System Name	Group	PAR (dB)	Unc^E $k = 2$
0		CW	CW	0.00	±4.7
10010	CAB	SAR Validation (Square, 100 ms, 10 ms)	Test	10.00	±9.6
10011	CAC	UMTS-FDD (WCDMA)	WCDMA	2.91	±9.6
10012	CAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps)	WLAN	1.87	±9.6
10013	CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps)	WLAN	9.46	±9.6
10021	DAC	GSM-FDD (TDMA, GMSK)	GSM	9.39	±9.6
10023	DAC	GPRS-FDD (TDMA, GMSK, TN 0)	GSM	9.57	±9.6
10024	DAC	GPRS-FDD (TDMA, GMSK, TN 0-1)	GSM	6.56	±9.6
10025	DAC	EDGE-FDD (TDMA, 8PSK, TN 0)	GSM	12.62	±9.6
10026	DAC	EDGE-FDD (TDMA, 8PSK, TN 0-1)	GSM	9.55	±9.6
10027	DAC	GPRS-FDD (TDMA, GMSK, TN 0-1-2)	GSM	4.80	±9.6
10028	DAC	GPRS-FDD (TDMA, GMSK, TN 0-1-2-3)	GSM	3.55	±9.6
10029	DAC	EDGE-FDD (TDMA, 8PSK, TN 0-1-2)	GSM	7.78	±9.6
10030	CAA	IEEE 802.15.1 Bluetooth (GFSK, DH1)	Bluetooth	5.30	±9.6
10031	CAA	IEEE 802.15.1 Bluetooth (GFSK, DH3)	Bluetooth	1.87	±9.6
10032	CAA	IEEE 802.15.1 Bluetooth (GFSK, DH5)	Bluetooth	1.16	±9.6
10033	CAA	IEEE 802.15.1 Bluetooth (PI/4-DQPSK, DH1)	Bluetooth	7.74	±9.6
10034	CAA	IEEE 802.15.1 Bluetooth (PI/4-DQPSK, DH3)	Bluetooth	4.53	±9.6
10035	CAA	IEEE 802.15.1 Bluetooth (PI/4-DQPSK, DH5)	Bluetooth	3.83	±9.6
10036	CAA	IEEE 802.15.1 Bluetooth (8-DPSK, DH1)	Bluetooth	8.01	±9.6
10037	CAA	IEEE 802.15.1 Bluetooth (8-DPSK, DH3)	Bluetooth	4.77	±9.6
10038	CAA	IEEE 802.15.1 Bluetooth (8-DPSK, DH5)	Bluetooth	4.10	±9.6
10039	CAB	CDMA2000 (1xRTT, RC1)	CDMA2000	4.57	±9.6
10042	CAB	IS-54 / IS-136 FDD (TDMA/FDM, PI/4-DQPSK, Halfrate)	AMPS	7.78	±9.6
10044	CAA	IS-91/EIA/TIA-553 FDD (FDMA, FM)	AMPS	0.00	±9.6
10048	CAA	DECT (TDD, TDMA/FDM, GFSK, Full Slot, 24)	DECT	13.80	±9.6
10049	CAA	DECT (TDD, TDMA/FDM, GFSK, Double Slot, 12)	DECT	10.79	±9.6
10056	CAA	UMTS-TDD (TD-SCDMA, 1.28 Mcps)	TD-SCDMA	11.01	±9.6
10058	DAC	EDGE-FDD (TDMA, 8PSK, TN 0-1-2-3)	GSM	6.52	±9.6
10059	CAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 2 Mbps)	WLAN	2.12	±9.6
10060	CAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 5.5 Mbps)	WLAN	2.83	±9.6
10061	CAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 11 Mbps)	WLAN	3.60	±9.6
10062	CAE	IEEE 802.11a/h WiFi 5 GHz (OFDM, 6 Mbps)	WLAN	8.68	±9.6
10063	CAE	IEEE 802.11a/h WiFi 5 GHz (OFDM, 9 Mbps)	WLAN	8.63	±9.6
10064	CAE	IEEE 802.11a/h WiFi 5 GHz (OFDM, 12 Mbps)	WLAN	9.09	±9.6
10065	CAE	IEEE 802.11a/h WiFi 5 GHz (OFDM, 18 Mbps)	WLAN	9.00	±9.6
10066	CAE	IEEE 802.11a/h WiFi 5 GHz (OFDM, 24 Mbps)	WLAN	9.38	±9.6
10067	CAE	IEEE 802.11a/h WiFi 5 GHz (OFDM, 36 Mbps)	WLAN	10.12	±9.6
10068	CAE	IEEE 802.11a/h WiFi 5 GHz (OFDM, 48 Mbps)	WLAN	10.24	±9.6
10069	CAE	IEEE 802.11a/h WiFi 5 GHz (OFDM, 54 Mbps)	WLAN	10.56	±9.6
10071	CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 9 Mbps)	WLAN	9.83	±9.6
10072	CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 12 Mbps)	WLAN	9.62	±9.6
10073	CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 18 Mbps)	WLAN	9.94	±9.6
10074	CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 24 Mbps)	WLAN	10.30	±9.6
10075	CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 36 Mbps)	WLAN	10.77	±9.6
10076	CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 48 Mbps)	WLAN	10.94	±9.6
10077	CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 54 Mbps)	WLAN	11.00	±9.6
10081	CAB	CDMA2000 (1xRTT, RC3)	CDMA2000	3.97	±9.6
10082	CAB	IS-54 / IS-136 FDD (TDMA/FDM, PI/4-DQPSK, Fullrate)	AMPS	4.77	±9.6
10090	DAC	GPRS-FDD (TDMA, GMSK, TN 0-4)	GSM	6.56	±9.6
10097	CAC	UMTS-FDD (HSDPA)	WCDMA	3.98	±9.6
10098	CAC	UMTS-FDD (HSUPA, Subtest 2)	WCDMA	3.98	±9.6
10099	DAC	EDGE-FDD (TDMA, 8PSK, TN 0-4)	GSM	9.55	±9.6
10100	CAF	LTE-FDD (SC-FDMA, 100% RB, 20 MHz, QPSK)	LTE-FDD	5.67	±9.6
10101	CAF	LTE-FDD (SC-FDMA, 100% RB, 20 MHz, 16-QAM)	LTE-FDD	6.42	±9.6
10102	CAF	LTE-FDD (SC-FDMA, 100% RB, 20 MHz, 64-QAM)	LTE-FDD	6.60	±9.6
10103	CAH	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, QPSK)	LTE-TDD	9.29	±9.6
10104	CAH	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, 16-QAM)	LTE-TDD	9.97	±9.6
10105	CAH	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, 64-QAM)	LTE-TDD	10.01	±9.6
10108	CAH	LTE-FDD (SC-FDMA, 100% RB, 10 MHz, QPSK)	LTE-FDD	5.80	±9.6
10109	CAH	LTE-FDD (SC-FDMA, 100% RB, 10 MHz, 16-QAM)	LTE-FDD	6.43	±9.6
10110	CAH	LTE-FDD (SC-FDMA, 100% RB, 5 MHz, QPSK)	LTE-FDD	5.75	±9.6
10111	CAH	LTE-FDD (SC-FDMA, 100% RB, 5 MHz, 16-QAM)	LTE-FDD	6.44	±9.6

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10112	CAH	LTE-FDD (SC-FDMA, 100% RB, 10 MHz, 64-QAM)	LTE-FDD	6.59	±9.6
10113	CAH	LTE-FDD (SC-FDMA, 100% RB, 5 MHz, 64-QAM)	LTE-FDD	6.62	±9.6
10114	CAE	IEEE 802.11n (HT Greenfield, 13.5 Mbps, BPSK)	WLAN	8.10	±9.6
10115	CAE	IEEE 802.11n (HT Greenfield, 81 Mbps, 16-QAM)	WLAN	8.46	±9.6
10116	CAE	IEEE 802.11n (HT Greenfield, 135 Mbps, 64-QAM)	WLAN	8.15	±9.6
10117	CAE	IEEE 802.11n (HT Mixed, 13.5 Mbps, BPSK)	WLAN	8.07	±9.6
10118	CAE	IEEE 802.11n (HT Mixed, 81 Mbps, 16-QAM)	WLAN	8.59	±9.6
10119	CAE	IEEE 802.11n (HT Mixed, 135 Mbps, 64-QAM)	WLAN	8.13	±9.6
10140	CAF	LTE-FDD (SC-FDMA, 100% RB, 15 MHz, 16-QAM)	LTE-FDD	6.49	±9.6
10141	CAF	LTE-FDD (SC-FDMA, 100% RB, 15 MHz, 64-QAM)	LTE-FDD	6.53	±9.6
10142	CAF	LTE-FDD (SC-FDMA, 100% RB, 3 MHz, QPSK)	LTE-FDD	5.73	±9.6
10143	CAF	LTE-FDD (SC-FDMA, 100% RB, 3 MHz, 16-QAM)	LTE-FDD	6.35	±9.6
10144	CAF	LTE-FDD (SC-FDMA, 100% RB, 3 MHz, 64-QAM)	LTE-FDD	6.65	±9.6
10145	CAG	LTE-FDD (SC-FDMA, 100% RB, 1.4 MHz, QPSK)	LTE-FDD	5.76	±9.6
10146	CAG	LTE-FDD (SC-FDMA, 100% RB, 1.4 MHz, 16-QAM)	LTE-FDD	6.41	±9.6
10147	CAG	LTE-FDD (SC-FDMA, 100% RB, 1.4 MHz, 64-QAM)	LTE-FDD	6.72	±9.6
10149	CAF	LTE-FDD (SC-FDMA, 50% RB, 20 MHz, 16-QAM)	LTE-FDD	6.42	±9.6
10150	CAF	LTE-FDD (SC-FDMA, 50% RB, 20 MHz, 64-QAM)	LTE-FDD	6.60	±9.6
10151	CAH	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, QPSK)	LTE-TDD	9.28	±9.6
10152	CAH	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, 16-QAM)	LTE-TDD	9.92	±9.6
10153	CAH	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, 64-QAM)	LTE-TDD	10.05	±9.6
10154	CAH	LTE-FDD (SC-FDMA, 50% RB, 10 MHz, QPSK)	LTE-FDD	5.75	±9.6
10155	CAH	LTE-FDD (SC-FDMA, 50% RB, 10 MHz, 16-QAM)	LTE-FDD	6.43	±9.6
10156	CAH	LTE-FDD (SC-FDMA, 50% RB, 5 MHz, QPSK)	LTE-FDD	5.79	±9.6
10157	CAH	LTE-FDD (SC-FDMA, 50% RB, 5 MHz, 16-QAM)	LTE-FDD	6.49	±9.6
10158	CAH	LTE-FDD (SC-FDMA, 50% RB, 10 MHz, 64-QAM)	LTE-FDD	6.62	±9.6
10159	CAH	LTE-FDD (SC-FDMA, 50% RB, 5 MHz, 64-QAM)	LTE-FDD	6.56	±9.6
10160	CAF	LTE-FDD (SC-FDMA, 50% RB, 15 MHz, QPSK)	LTE-FDD	5.82	±9.6
10161	CAF	LTE-FDD (SC-FDMA, 50% RB, 15 MHz, 16-QAM)	LTE-FDD	6.43	±9.6
10162	CAF	LTE-FDD (SC-FDMA, 50% RB, 15 MHz, 64-QAM)	LTE-FDD	6.58	±9.6
10166	CAG	LTE-FDD (SC-FDMA, 50% RB, 1.4 MHz, QPSK)	LTE-FDD	5.46	±9.6
10167	CAG	LTE-FDD (SC-FDMA, 50% RB, 1.4 MHz, 16-QAM)	LTE-FDD	6.21	±9.6
10168	CAG	LTE-FDD (SC-FDMA, 50% RB, 1.4 MHz, 64-QAM)	LTE-FDD	6.79	±9.6
10169	CAF	LTE-FDD (SC-FDMA, 1 RB, 20 MHz, QPSK)	LTE-FDD	5.73	±9.6
10170	CAF	LTE-FDD (SC-FDMA, 1 RB, 20 MHz, 16-QAM)	LTE-FDD	6.52	±9.6
10171	AAF	LTE-FDD (SC-FDMA, 1 RB, 20 MHz, 64-QAM)	LTE-FDD	6.49	±9.6
10172	CAH	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, QPSK)	LTE-TDD	9.21	±9.6
10173	CAH	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 16-QAM)	LTE-TDD	9.48	±9.6
10174	CAH	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 64-QAM)	LTE-TDD	10.25	±9.6
10175	CAH	LTE-FDD (SC-FDMA, 1 RB, 10 MHz, QPSK)	LTE-FDD	5.72	±9.6
10176	CAH	LTE-FDD (SC-FDMA, 1 RB, 10 MHz, 16-QAM)	LTE-FDD	6.52	±9.6
10177	CAJ	LTE-FDD (SC-FDMA, 1 RB, 5 MHz, QPSK)	LTE-FDD	5.73	±9.6
10178	CAH	LTE-FDD (SC-FDMA, 1 RB, 5 MHz, 16-QAM)	LTE-FDD	6.52	±9.6
10179	CAH	LTE-FDD (SC-FDMA, 1 RB, 10 MHz, 64-QAM)	LTE-FDD	6.50	±9.6
10180	CAH	LTE-FDD (SC-FDMA, 1 RB, 5 MHz, 64-QAM)	LTE-FDD	6.50	±9.6
10181	CAF	LTE-FDD (SC-FDMA, 1 RB, 15 MHz, QPSK)	LTE-FDD	5.72	±9.6
10182	CAF	LTE-FDD (SC-FDMA, 1 RB, 15 MHz, 16-QAM)	LTE-FDD	6.52	±9.6
10183	AAE	LTE-FDD (SC-FDMA, 1 RB, 15 MHz, 64-QAM)	LTE-FDD	6.50	±9.6
10184	CAF	LTE-FDD (SC-FDMA, 1 RB, 3 MHz, QPSK)	LTE-FDD	5.73	±9.6
10185	CAF	LTE-FDD (SC-FDMA, 1 RB, 3 MHz, 16-QAM)	LTE-FDD	6.51	±9.6
10186	AAF	LTE-FDD (SC-FDMA, 1 RB, 3 MHz, 64-QAM)	LTE-FDD	6.50	±9.6
10187	CAG	LTE-FDD (SC-FDMA, 1 RB, 1.4 MHz, QPSK)	LTE-FDD	5.73	±9.6
10188	CAG	LTE-FDD (SC-FDMA, 1 RB, 1.4 MHz, 16-QAM)	LTE-FDD	6.52	±9.6
10189	AAG	LTE-FDD (SC-FDMA, 1 RB, 1.4 MHz, 64-QAM)	LTE-FDD	6.50	±9.6
10193	CAE	IEEE 802.11n (HT Greenfield, 6.5 Mbps, BPSK)	WLAN	8.09	±9.6
10194	CAE	IEEE 802.11n (HT Greenfield, 39 Mbps, 16-QAM)	WLAN	8.12	±9.6
10195	CAE	IEEE 802.11n (HT Greenfield, 65 Mbps, 64-QAM)	WLAN	8.21	±9.6
10196	CAE	IEEE 802.11n (HT Mixed, 6.5 Mbps, BPSK)	WLAN	8.10	±9.6
10197	CAE	IEEE 802.11n (HT Mixed, 39 Mbps, 16-QAM)	WLAN	8.13	±9.6
10198	CAE	IEEE 802.11n (HT Mixed, 65 Mbps, 64-QAM)	WLAN	8.27	±9.6
10219	CAE	IEEE 802.11n (HT Mixed, 7.2 Mbps, BPSK)	WLAN	8.03	±9.6
10220	CAE	IEEE 802.11n (HT Mixed, 43.3 Mbps, 16-QAM)	WLAN	8.13	±9.6
10221	CAE	IEEE 802.11n (HT Mixed, 72.2 Mbps, 64-QAM)	WLAN	8.27	±9.6
10222	CAE	IEEE 802.11n (HT Mixed, 15 Mbps, BPSK)	WLAN	8.06	±9.6
10223	CAE	IEEE 802.11n (HT Mixed, 90 Mbps, 16-QAM)	WLAN	8.48	±9.6
10224	CAE	IEEE 802.11n (HT Mixed, 150 Mbps, 64-QAM)	WLAN	8.08	±9.6

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10225	CAC	UMTS-FDD (HSPA+)	WCDMA	5.97	±9.6
10226	CAC	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, 16-QAM)	LTE-TDD	9.49	±9.6
10227	CAC	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, 64-QAM)	LTE-TDD	10.26	±9.6
10228	CAC	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, QPSK)	LTE-TDD	9.22	±9.6
10229	CAE	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, 16-QAM)	LTE-TDD	9.48	±9.6
10230	CAE	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, 64-QAM)	LTE-TDD	10.25	±9.6
10231	CAE	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, QPSK)	LTE-TDD	9.19	±9.6
10232	CAH	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, 16-QAM)	LTE-TDD	9.48	±9.6
10233	CAH	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, 64-QAM)	LTE-TDD	10.25	±9.6
10234	CAH	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, QPSK)	LTE-TDD	9.21	±9.6
10235	CAH	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 16-QAM)	LTE-TDD	9.48	±9.6
10236	CAH	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 64-QAM)	LTE-TDD	10.25	±9.6
10237	CAH	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, QPSK)	LTE-TDD	9.21	±9.6
10238	CAG	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, 16-QAM)	LTE-TDD	9.48	±9.6
10239	CAG	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, 64-QAM)	LTE-TDD	10.25	±9.6
10240	CAG	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, QPSK)	LTE-TDD	9.21	±9.6
10241	CAC	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, 16-QAM)	LTE-TDD	9.82	±9.6
10242	CAC	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, 64-QAM)	LTE-TDD	9.86	±9.6
10243	CAC	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, QPSK)	LTE-TDD	9.46	±9.6
10244	CAE	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, 16-QAM)	LTE-TDD	10.06	±9.6
10245	CAE	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, 64-QAM)	LTE-TDD	10.06	±9.6
10246	CAE	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, QPSK)	LTE-TDD	9.30	±9.6
10247	CAH	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, 16-QAM)	LTE-TDD	9.91	±9.6
10248	CAH	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, 64-QAM)	LTE-TDD	10.09	±9.6
10249	CAH	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, QPSK)	LTE-TDD	9.29	±9.6
10250	CAH	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, 16-QAM)	LTE-TDD	9.81	±9.6
10251	CAH	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, 64-QAM)	LTE-TDD	10.17	±9.6
10252	CAH	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, QPSK)	LTE-TDD	9.24	±9.6
10253	CAG	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, 16-QAM)	LTE-TDD	9.90	±9.6
10254	CAG	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, 64-QAM)	LTE-TDD	10.14	±9.6
10255	CAG	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, QPSK)	LTE-TDD	9.20	±9.6
10256	CAC	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, 16-QAM)	LTE-TDD	9.96	±9.6
10257	CAC	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, 64-QAM)	LTE-TDD	10.08	±9.6
10258	CAC	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, QPSK)	LTE-TDD	9.34	±9.6
10259	CAE	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, 16-QAM)	LTE-TDD	9.98	±9.6
10260	CAE	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, 64-QAM)	LTE-TDD	9.97	±9.6
10261	CAE	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, QPSK)	LTE-TDD	9.24	±9.6
10262	CAH	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, 16-QAM)	LTE-TDD	9.83	±9.6
10263	CAH	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, 64-QAM)	LTE-TDD	10.16	±9.6
10264	CAH	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, QPSK)	LTE-TDD	9.23	±9.6
10265	CAH	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, 16-QAM)	LTE-TDD	9.92	±9.6
10266	CAH	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, 64-QAM)	LTE-TDD	10.07	±9.6
10267	CAH	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, QPSK)	LTE-TDD	9.30	±9.6
10268	CAG	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, 16-QAM)	LTE-TDD	10.06	±9.6
10269	CAG	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, 64-QAM)	LTE-TDD	10.13	±9.6
10270	CAG	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, QPSK)	LTE-TDD	9.58	±9.6
10274	CAC	UMTS-FDD (HSUPA, Subtest 5, 3GPP Rel8.10)	WCDMA	4.87	±9.6
10275	CAC	UMTS-FDD (HSUPA, Subtest 5, 3GPP Rel8.4)	WCDMA	3.96	±9.6
10277	CAA	PHS (QPSK)	PHS	11.81	±9.6
10278	CAA	PHS (QPSK, BW 884 MHz, Rolloff 0.5)	PHS	11.81	±9.6
10279	CAA	PHS (QPSK, BW 884 MHz, Rolloff 0.38)	PHS	12.18	±9.6
10290	AAB	CDMA2000, RC1, SO55, Full Rate	CDMA2000	3.91	±9.6
10291	AAB	CDMA2000, RC3, SO55, Full Rate	CDMA2000	3.46	±9.6
10292	AAB	CDMA2000, RC3, SO32, Full Rate	CDMA2000	3.39	±9.6
10293	AAB	CDMA2000, RC3, SO3, Full Rate	CDMA2000	3.50	±9.6
10295	AAB	CDMA2000, RC1, SO3, 1/8th Rate 25 fr.	CDMA2000	12.49	±9.6
10297	AAE	LTE-FDD (SC-FDMA, 50% RB, 20 MHz, QPSK)	LTE-FDD	5.81	±9.6
10298	AAE	LTE-FDD (SC-FDMA, 50% RB, 3 MHz, QPSK)	LTE-FDD	5.72	±9.6
10299	AAE	LTE-FDD (SC-FDMA, 50% RB, 3 MHz, 16-QAM)	LTE-FDD	6.39	±9.6
10300	AAE	LTE-FDD (SC-FDMA, 50% RB, 3 MHz, 64-QAM)	LTE-FDD	6.60	±9.6
10301	AAA	IEEE 802.16e WiMAX (29:18, 5 ms, 10 MHz, QPSK, PUSC)	WiMAX	12.03	±9.6
10302	AAA	IEEE 802.16e WiMAX (29:18, 5 ms, 10 MHz, QPSK, PUSC, 3 CTRL symbols)	WiMAX	12.57	±9.6
10303	AAA	IEEE 802.16e WiMAX (31:15, 5 ms, 10 MHz, 64QAM, PUSC)	WiMAX	12.52	±9.6
10304	AAA	IEEE 802.16e WiMAX (29:18, 5 ms, 10 MHz, 64QAM, PUSC)	WiMAX	11.86	±9.6
10305	AAA	IEEE 802.16e WiMAX (31:15, 10 ms, 10 MHz, 64QAM, PUSC, 15 symbols)	WiMAX	15.24	±9.6
10306	AAA	IEEE 802.16e WiMAX (29:18, 10 ms, 10 MHz, 64QAM, PUSC, 18 symbols)	WiMAX	14.67	±9.6

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10307	AAA	IEEE 802.16e WiMAX (29:18, 10 ms, 10 MHz, QPSK, PUSC, 18 symbols)	WiMAX	14.49	±9.6
10308	AAA	IEEE 802.16e WiMAX (29:18, 10 ms, 10 MHz, 16QAM, PUSC)	WiMAX	14.46	±9.6
10309	AAA	IEEE 802.16e WiMAX (29:18, 10 ms, 10 MHz, 16QAM, AMC 2x3, 18 symbols)	WiMAX	14.58	±9.6
10310	AAA	IEEE 802.16e WiMAX (29:18, 10 ms, 10 MHz, QPSK, AMC 2x3, 18 symbols)	WiMAX	14.57	±9.6
10311	AAE	LTE-FDD (SC-FDMA, 100% RB, 15 MHz, QPSK)	LTE-FDD	6.06	±9.6
10313	AAA	iDEN 1:3	iDEN	10.51	±9.6
10314	AAA	iDEN 1:6	iDEN	13.48	±9.6
10315	AAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps, 96pc duty cycle)	WLAN	1.71	±9.6
10316	AAB	IEEE 802.11g WiFi 2.4 GHz (ERP-OFDM, 6 Mbps, 96pc duty cycle)	WLAN	8.36	±9.6
10317	AAE	IEEE 802.11a WiFi 5 GHz (OFDM, 6 Mbps, 96pc duty cycle)	WLAN	8.36	±9.6
10352	AAA	Pulse Waveform (200Hz, 10%)	Generic	10.00	±9.6
10353	AAA	Pulse Waveform (200Hz, 20%)	Generic	6.99	±9.6
10354	AAA	Pulse Waveform (200Hz, 40%)	Generic	3.98	±9.6
10355	AAA	Pulse Waveform (200Hz, 60%)	Generic	2.22	±9.6
10356	AAA	Pulse Waveform (200Hz, 80%)	Generic	0.97	±9.6
10387	AAA	QPSK Waveform, 1 MHz	Generic	5.10	±9.6
10388	AAA	QPSK Waveform, 10 MHz	Generic	5.22	±9.6
10396	AAA	64-QAM Waveform, 100 kHz	Generic	6.27	±9.6
10399	AAA	64-QAM Waveform, 40 MHz	Generic	6.27	±9.6
10400	AAF	IEEE 802.11ac WiFi (20 MHz, 64-QAM, 99pc duty cycle)	WLAN	8.37	±9.6
10401	AAF	IEEE 802.11ac WiFi (40 MHz, 64-QAM, 99pc duty cycle)	WLAN	8.60	±9.6
10402	AAF	IEEE 802.11ac WiFi (80 MHz, 64-QAM, 99pc duty cycle)	WLAN	8.53	±9.6
10403	AAB	CDMA2000 (1xEV-DO, Rev. 0)	CDMA2000	3.76	±9.6
10404	AAB	CDMA2000 (1xEV-DO, Rev. A)	CDMA2000	3.77	±9.6
10406	AAB	CDMA2000, RC3, SO32, SCH0, Full Rate	CDMA2000	5.22	±9.6
10410	AAH	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, QPSK, UL Subframe=2,3,4,7,8,9, Subframe Conf=4)	LTE-TDD	7.82	±9.6
10414	AAA	WLAN CCDF, 64-QAM, 40 MHz	Generic	8.54	±9.6
10415	AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps, 99pc duty cycle)	WLAN	1.54	±9.6
10416	AAA	IEEE 802.11g WiFi 2.4 GHz (ERP-OFDM, 6 Mbps, 99pc duty cycle)	WLAN	8.23	±9.6
10417	AAD	IEEE 802.11a/h WiFi 5 GHz (OFDM, 6 Mbps, 99pc duty cycle)	WLAN	8.23	±9.6
10418	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps, 99pc duty cycle, Long preambule)	WLAN	8.14	±9.6
10419	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps, 99pc duty cycle, Short preambule)	WLAN	8.19	±9.6
10422	AAD	IEEE 802.11n (HT Greenfield, 7.2 Mbps, BPSK)	WLAN	8.32	±9.6
10423	AAD	IEEE 802.11n (HT Greenfield, 43.3 Mbps, 16-QAM)	WLAN	8.47	±9.6
10424	AAD	IEEE 802.11n (HT Greenfield, 72.2 Mbps, 64-QAM)	WLAN	8.40	±9.6
10425	AAD	IEEE 802.11n (HT Greenfield, 15 Mbps, BPSK)	WLAN	8.41	±9.6
10426	AAD	IEEE 802.11n (HT Greenfield, 90 Mbps, 16-QAM)	WLAN	8.45	±9.6
10427	AAD	IEEE 802.11n (HT Greenfield, 150 Mbps, 64-QAM)	WLAN	8.41	±9.6
10430	AAE	LTE-FDD (OFDMA, 5 MHz, E-TM 3.1)	LTE-FDD	8.28	±9.6
10431	AAE	LTE-FDD (OFDMA, 10 MHz, E-TM 3.1)	LTE-FDD	8.38	±9.6
10432	AAD	LTE-FDD (OFDMA, 15 MHz, E-TM 3.1)	LTE-FDD	8.34	±9.6
10433	AAD	LTE-FDD (OFDMA, 20 MHz, E-TM 3.1)	LTE-FDD	8.34	±9.6
10434	AAB	W-CDMA (BS Test Model 1, 64 DPCH)	WCDMA	8.60	±9.6
10435	AAG	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	LTE-TDD	7.82	±9.6
10447	AAE	LTE-FDD (OFDMA, 5 MHz, E-TM 3.1, Clipping 44%)	LTE-FDD	7.56	±9.6
10448	AAE	LTE-FDD (OFDMA, 10 MHz, E-TM 3.1, Clippin 44%)	LTE-FDD	7.53	±9.6
10449	AAD	LTE-FDD (OFDMA, 15 MHz, E-TM 3.1, Cliping 44%)	LTE-FDD	7.51	±9.6
10450	AAD	LTE-FDD (OFDMA, 20 MHz, E-TM 3.1, Clipping 44%)	LTE-FDD	7.48	±9.6
10451	AAB	W-CDMA (BS Test Model 1, 64 DPCH, Clipping 44%)	WCDMA	7.59	±9.6
10453	AAE	Validation (Square, 10 ms, 1 ms)	Test	10.00	±9.6
10456	AAD	IEEE 802.11ac WiFi (160 MHz, 64-QAM, 99pc duty cycle)	WLAN	8.63	±9.6
10457	AAB	UMTS-FDD (DC-HSDPA)	WCDMA	6.62	±9.6
10458	AAA	CDMA2000 (1xEV-DO, Rev. B, 2 carriers)	CDMA2000	6.55	±9.6
10459	AAA	CDMA2000 (1xEV-DO, Rev. B, 3 carriers)	CDMA2000	8.25	±9.6
10460	AAB	UMTS-FDD (WCDMA, AMR)	WCDMA	2.39	±9.6
10461	AAC	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	LTE-TDD	7.82	±9.6
10462	AAC	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.30	±9.6
10463	AAC	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.56	±9.6
10464	AAD	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	LTE-TDD	7.82	±9.6
10465	AAD	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.32	±9.6
10466	AAD	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.57	±9.6
10467	AAG	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	LTE-TDD	7.82	±9.6
10468	AAG	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.32	±9.6
10469	AAG	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.56	±9.6
10470	AAG	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	LTE-TDD	7.82	±9.6
10471	AAG	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.32	±9.6

