

SAR

TEST REPORT

ISSUED BY
Shenzhen BALUN Technology Co., Ltd.



FOR
**AC650 High-Gain Dual Band Wireless USB
Adapter**

ISSUED TO
Ugreen Group Limited

URGEEN Building, Longcheng Industrial Park, Longguanxi Road,
Longhua, ShenZhen, China



Tested by: Zhang Jiwei

Zhang Jiwei

Date Feb. 22, 2022

Approved by: Wei Yanquan

Wei Yanquan
(Chief Engineer)

Date Feb. 22, 2022

Report No.: BL-SZ2210449-701

EUT Name: AC650 High-Gain Dual Band Wireless
USB Adapter

Model Name: CM496 (refer section 2.4)

Brand Name: **UGREEN**

FCC ID: 2AQ15-UG650A

Test Standard: 47 CFR Part 2.1093 (refer section 3.1)

Maximum SAR: Body (Antenna unfold) (1 g): 0.959 W/kg
Body (Antenna fold) (1 g): 0.355 W/kg

Test Conclusion: Pass

Test Date: Jan. 29, 2022 ~ Feb. 09, 2022

Date of Issue: Feb. 22, 2022

NOTE: This test report of test results only related to testing samples, which can be duplicated completely for the legal use with the approval of the applicant; it shall not be reproduced except in full, without the written approval of Shenzhen BALUN Technology Co., Ltd. Any objections should be raised within thirty days from the date of issue. To validate the report, please contact us.

Revision History

<u>Version</u>	<u>Issue Date</u>	<u>Revisions Content</u>
<u>Rev. 01</u>	<u>Feb. 22, 2022</u>	<u>Initial Issue</u>

TABLE OF CONTENTS

1	GENERAL INFORMATION	4
1.1	Identification of the Testing Laboratory	4
1.2	Identification of the Responsible Testing Location	4
1.3	Test Environment Condition	4
1.4	Announce	4
2	PRODUCT INFORMATION	5
2.1	Applicant Information	5
2.2	Manufacturer Information	5
2.3	Factory Information	5
2.4	General Description for Equipment under Test (EUT)	5
2.5	Ancillary Equipment	5
2.6	Technical Information	6
3	SUMMARY OF TEST RESULT	7
3.1	Test Standards	7
3.2	Device Category and SAR Limit	8
3.3	Test Result Summary	9
3.4	Test Uncertainty	10
4	MEASUREMENT SYSTEM	11
4.1	Specific Absorption Rate (SAR) Definition	11
4.2	DASY SAR System	12
5	SYSTEM VERIFICATION	19
5.1	Purpose of System Check	19
5.2	System Check Setup	19
6	TEST POSITION CONFIGURATIONS	20
6.1	Body-worn Position Conditions	20
7	MEASUREMENT PROCEDURE	21

7.1	Measurement Process Diagram.....	21
7.2	SAR Scan General Requirement	22
7.3	Measurement Procedure.....	23
7.4	Area & Zoom Scan Procedure	23
8	CONDUCTED RF OUPUT POWER.....	24
8.1	WIFI.....	24
9	TEST EXCLUSION CONSIDERATION.....	26
9.1	SAR Test Exclusion Consideration Table	27
10	TEST RESULT	29
10.1	WIFI 2.4GHz.....	29
10.2	WIFI 5GHz.....	30
11	SAR Measurement Variability.....	31
12	SIMULTANEOUS TRANSMISSION	32
13	TEST EQUIPMENTS LIST	33
ANNEX A	SIMULATING LIQUID VERIFICATION RESULT	34
ANNEX B	SYSTEM CHECK RESULT.....	35
ANNEX C	TEST DATA.....	39
ANNEX D	EUT EXTERNAL PHOTOS	45
ANNEX E	SAR TEST SETUP PHOTOS.....	45
ANNEX F	CALIBRATION REPORT	45

1 GENERAL INFORMATION

1.1 Identification of the Testing Laboratory

Company Name	Shenzhen BALUN Technology Co., Ltd.
Address	Block B, 1st FL, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China
Phone Number	+86 755 6685 0100
Fax Number	+86 755 6182 4271

1.2 Identification of the Responsible Testing Location

Test Location	Shenzhen BALUN Technology Co., Ltd.
Address	Block B, 1st FL, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China
Accreditation Certificate	The laboratory is a testing organization accredited by FCC as a accredited testing laboratory. The designation number is CN1196.
Description	All measurement facilities used to collect the measurement data are located at Block B, FL 1, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China 518055

1.3 Test Environment Condition

Ambient Temperature	21°C to 23°C
Ambient Relative Humidity	34% to 49%
Ambient Pressure	100 KPa to 102 KPa

1.4 Announce

- (1) The test report reference to the report template version v2.2.
- (2) The test report is invalid if not marked with the signatures of the persons responsible for preparing and approving the test report.
- (3) The test report is invalid if there is any evidence and/or falsification.
- (4) The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein.
- (5) This document may not be altered or revised in any way unless done so by BALUN and all revisions are duly noted in the revisions section.
- (6) Content of the test report, in part or in full, cannot be used for publicity and/or promotional purposes without prior written approval from the laboratory.
- (7) The laboratory is only responsible for the data released by the laboratory, except for the part provided by the applicant.

2 PRODUCT INFORMATION

2.1 Applicant Information

Applicant	Ugreen Group Limited
Address	Ugreen Building, Longcheng Industrial Park, Longguanxi Road, Longhua, ShenZhen, China

2.2 Manufacturer Information

Manufacturer	Ugreen Group Limited
Address	Ugreen Building, Longcheng Industrial Park, Longguanxi Road, Longhua, ShenZhen, China

2.3 Factory Information

Factory	SHENZHEN TENDA TECHNOLOGY CO., LTD.
Address	6/F-8/F, Block E3, TCL Hi-tech Park, #1001 Zhongshanyua Rd, Xili, Nanshan District. Shenzhen, China

2.4 General Description for Equipment under Test (EUT)

EUT Name	AC650 High-Gain Dual Band Wireless USB Adapter
Model Name Under Test	CM496
Series Model Name	90339, CM580, 90553
Description of Model name differentiation	All models are same with electrical parameters and internal circuit structure, but only differ in Case and Dimensions.
Hardware Version	V1.0
Software Version	FS_U10V1.0_RTL_V0.0.5.2_CLL01.bin
Dimensions (Approx.)	N/A
Weight (Approx.)	N/A

2.5 Ancillary Equipment

Note: Not applicable.

2.6 Technical Information

Network and Wireless connectivity	WIFI 802.11a, 802.11b, 802.11g, 802.11n and 802.11ac U-NII-1/3
-----------------------------------	---

The requirement for the following technical information of the EUT was tested in this report:

Operating Mode	WLAN	
Frequency Range	802.11b/g	2412 ~ 2462 MHz
	802.11n(HT20/HT40)	2412 ~ 2462 MHz
	802.11a	5150 ~ 5250 MHz
		5725 ~ 5850 MHz
	802.11n(HT20/HT40)	5150 ~ 5250 MHz
		5725 ~ 5850 MHz
	802.11ac(VHT20/VHT40/VHT80)	5150 ~ 5250 MHz
		5725 ~ 5850 MHz
Antenna Type	WLAN	External
DTM	N/A	
Hotspot Function	N/A	
Power Reduction	Support	
Exposure Category	General Population/Uncontrolled exposure	
EUT Stage	Portable Device	
Product	Type	
	☒ Production unit	☐ Identical prototype

3 SUMMARY OF TEST RESULT

3.1 Test Standards

No.	Identity	Document Title
1	47 CFR Part 2.1093	Radiofrequency radiation exposure evaluation: portable devices
2	ANSI C95.1-1992	IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz
3	IEEE Std. 1528-2013	Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques
4	FCC KDB 447498 D01 v06	Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies
5	FCC KDB 941225 D06 v02r01	SAR Evaluation Procedures for Portable Devices with Wireless Router Capabilities
6	FCC KDB 865664 D01 v01r04	SAR Measurement 100 MHz to 6 GHz
7	FCC KDB 865664 D02 v01r02	RF Exposure Reporting
8	KDB 248227 D01 v02r02	SAR Guidance for IEEE 802.11 (Wi-Fi) Transmitters

3.2 Device Category and SAR Limit

This device belongs to portable device category because its radiating structure is allowed to be used within 20 centimeters of the body of the user.

Limit for General Population/Uncontrolled exposure should be applied for this device, it is 1.6 W/kg as averaged over any 1 gram of tissue.

Table of Exposure Limits:

Body Position	SAR Value (W/Kg)	
	General Population/ Uncontrolled Exposure	Occupational/ Controlled Exposure
Whole-Body SAR (averaged over the entire body)	0.08	0.4
Partial-Body SAR (averaged over any 1 gram of tissue)	1.60	8.0
SAR for hands, wrists, feet and ankles (averaged over any 10 grams of tissue)	4.0	20.0

NOTE:

General Population/Uncontrolled Exposure: Locations where there is the exposure of individuals who have no knowledge or control of their exposure. General population/uncontrolled exposure limits are applicable to situations in which the general public may be exposed or in which persons who are exposed as a consequence of their employment may not be made fully aware of the potential for exposure or cannot exercise control over their exposure. Members of the general public would come under this category when exposure is not employment-related; for example, in the case of a wireless transmitter that exposes persons in its vicinity.

Occupational/Controlled Exposure: Locations where there is exposure that may be incurred by persons who are aware of the potential for exposure, In general, occupational/controlled exposure limits are applicable to situations in which persons are exposed as a consequence of their employment, who have been made fully aware of the potential for exposure and can exercise control over their exposure. This exposure category is also applicable when the exposure is of a transient nature due to incidental passage through a location where the exposure levels may be higher than the general population/uncontrolled limits, but the exposed person is fully aware of the potential for exposure and can exercise control over his or her exposure by leaving the area or by some other appropriate means.

3.3 Test Result Summary

3.3.1 Highest SAR (1 g Value)

Frequency Band		Maximum Report SAR (W/kg) 1 g
		Body SAR (Separation 5 mm)
WIFI	2.4 G (Antenna unfold)	0.025
	2.4 G (Antenna fold)	0.023
	5.2 G (Antenna unfold)	0.959
	5.2 G (Antenna fold)	0.343
	5.8 G (Antenna unfold)	0.526
	5.8 G (Antenna fold)	0.355
Limits (W/kg)		1.6
Test Verdict		Pass

3.4 Test Uncertainty

According to KDB 865664 D01, When the highest measured 1 g SAR within a frequency band is < 1.5 W/kg, the extensive SAR measurement uncertainty analysis is not required in SAR reports submitted for equipment approval.

The maximum 1 g SAR for the EUT in this report is 0.959 W/kg, which is lower than 1.5 W/kg, so the extensive SAR measurement uncertainty analysis is not required in this report.

4 MEASUREMENT SYSTEM

4.1 Specific Absorption Rate (SAR) Definition

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.

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:

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

SAR is expressed in units of Watts per kilogram (W/kg) SAR measurement can be related to the electrical field in the tissue by

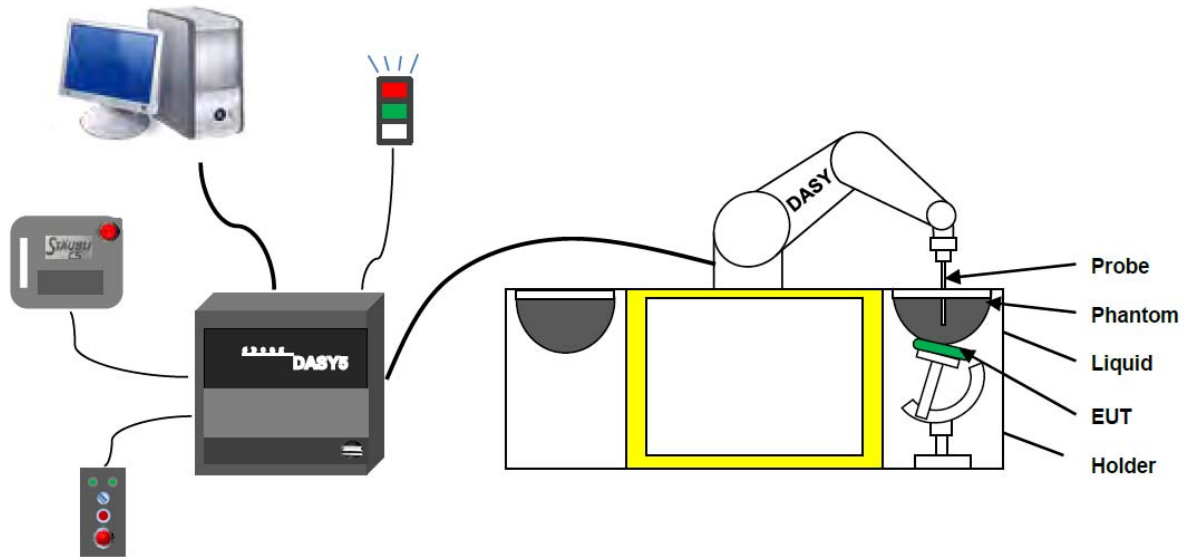
$$\text{SAR} = \frac{\sigma E^2}{\rho}$$

Where: σ is the conductivity of the tissue,

ρ is the mass density of the tissue and E is the RMS electrical field strength.

4.2 DASY SAR System

4.2.1 DASY SAR System Diagram



The DASY5 system for performing compliance tests consists of the following items:

1. A standard high precision 6-axis robot (Stäubli RX family) with controller and software. An arm extension for accommodating the data acquisition electronics (DAE).
2. A dosimetric probe, i.e. an isotropic E-field probe optimized and calibrated for usage in tissue simulating liquid. The probe is equipped with an optical surface detector system.
3. A data acquisition electronic (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.
4. A unit to operate the optical surface detector which is connected to the EOC.
5. The Electro-Optical Coupler (EOC) performs the conversion from the optical into a digital electric signal of the DAE. The EOC is connected to the DASY5 measurement server.
6. The DASY5 measurement server, which performs all real-time data evaluation for field measurements and surface detection, controls robot movements and handles safety operation.
7. DASY5 software and SEMCAD data evaluation software.
8. Remote control with teach panel and additional circuitry for robot safety such as warning lamps, etc.
9. The generic twin phantom enabling the testing of left-hand and right-hand usage.
10. The device holder for handheld mobile phones.
11. Tissue simulating liquid mixed according to the given recipes.
12. System validation dipoles allowing to validate the proper functioning of the system.

4.2.2 Robot

The Dasy SAR system uses the high precision robots. Symmetrical design with triangular core Built-in optical fiber for surface detection system For the 6-axis controller system, Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents). The robot series have many features that are important for our application:



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

4.2.3 E-Field Probe

The probe is specially designed and calibrated for use in liquids with high permittivities for the measurements the Specific Dosimetric E-Field Probe EX3DV4-SN:3717 with following specifications is used.

Construction	Symmetrical design with triangular core Built-in optical fiber for surface detection system Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., glycolether)
Calibration	ISO/IEC 17025 calibration service available
Frequency	10 MHz to 6 GHz; Linearity: ± 0.2 dB (30 MHz to 6 GHz)
Directivity	± 0.2 dB in HSL (rotation around probe axis) ; ± 0.4 dB in HSL (rotation normal to probe axis)
Dynamic range	5 μ W/g to > 100 mW/g; Linearity: ± 0.2 dB
Dimensions	Overall length: 337 mm (Tip: 9 mm) Tip diameter: 2.5 mm (Body: 10 mm) Distance from probe tip to dipole centers: 1.0 mm
Application	General dosimetry up to 3 GHz Compliance tests of mobile phones Fast automatic scanning in arbitrary phantoms (EX3DV4)



E-Field Probe Calibration Process

Probe calibration is realized, in compliance with CENELEC EN 62209-1/-2 and IEEE 1528 std, with CALISAR, Antennessa proprietary calibration system. The calibration is performed with the EN 62209-1/2 annexe technique using reference guide at the five frequencies.

4.2.4 Data Acquisition Electronics

The data acquisition electronics (DAE) consist of a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16 bit AD-converte 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.



- Input Impedance: 200M Ω m
- The Inputs: Symmetrical and Floating
- Commom Mode Rejection: Above 80dB

4.2.5 Phantoms

For the measurements the Specific Anthropomorphic Mannequin (SAM) defined by the IEEE SCC-34/SC2 group is used. The phantom is a polyurethane shell integrated in a wooden table. The thickness of the phantom amounts to 2mm +/- 0.2mm. It enables the dosimetric evaluation of left and right phone usage and includes an additional flat phantom part for the simplified performance check. The phantom set-up includes a cover, which prevents the evaporation of the liquid.



- Left hand
- Right hand
- Flat phantom

Photo of Phantom SN1857



Serial Number	Material	Length	Height
SN 1857 SAM	Vinylester, glass fiber reinforced	1000	500

4.2.6 Device Holder

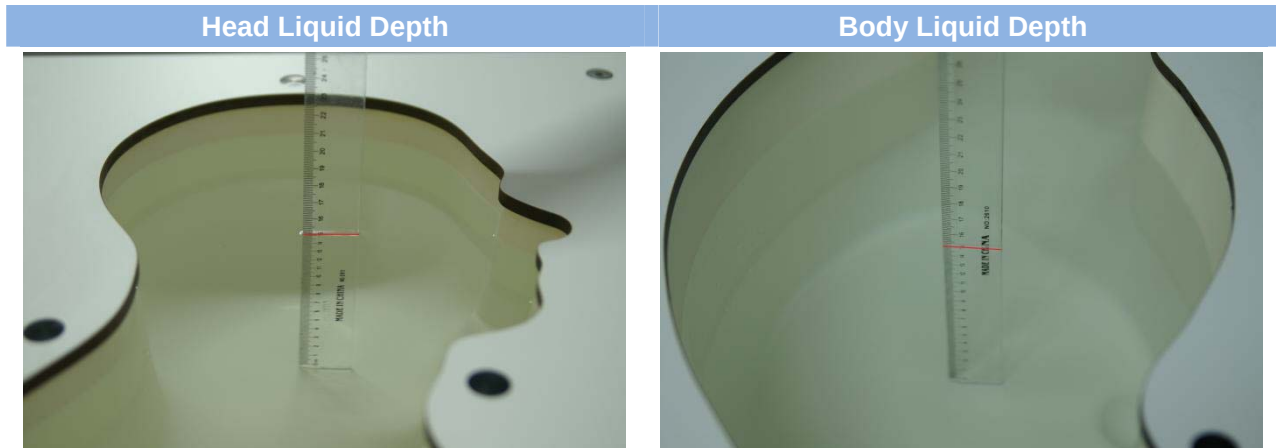
The DASY5 device holder has two scales for device rotation (with respect to the body axis) and the device inclination (with respect to the line between the ear openings). The plane between the ear openings and the mouth tip has a rotation angle of 65° . The bottom plate contains three pair of bolts for locking the device holder. The device holder positions are adjusted to the standard measurement positions in the three sections. This device holder is used for standard mobile phones or PDA"s only. If necessary an additional support of polystyrene material is used. Larger DUT"s (e.g. notebooks) cannot be tested using this device holder. Instead a support of bigger polystyrene cubes and thin polystyrene plates is used to position the DUT in all relevant positions to find and measure spots with maximum SAR values. Therefore those devices are normally only tested at the flat part of the SAM.



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

4.2.7 Simulating Liquid

For SAR measurement of the field distribution inside the phantom, the phantom must be filled with homogeneous tissue simulating liquid to a depth of at least 15 cm. For head SAR testing, the liquid height from the ear reference point (ERP) of the phantom to the liquid top surface is larger than 15 cm. For body SAR testing, the liquid height from the center of the flat phantom to the liquid top surface is larger than 15 cm. The nominal dielectric values of the tissue simulating liquids in the phantom and the tolerance of 5%.



The following table gives the recipes for tissue simulating liquid and the theoretical Conductivity/Permittivity.

Head (Reference IEEE1528)								
Frequency (MHz)	Water (%)	Sugar (%)	Cellulose (%)	Salt (%)	Preventol (%)	DGBE (%)	Conductivity σ (S/m)	Permittivity ε
750	41.1	57.0	0.2	1.4	0.2	0	0.89	41.9
835	40.3	57.9	0.2	1.4	0.2	0	0.90	41.5
900	40.3	57.9	0.2	1.4	0.2	0	0.97	41.5
1800, 1900, 2000	55.2	0	0	0.3	0	44.5	1.4	40.0
2450	55.0	0	0	0.1	0	44.9	1.80	39.2
2600	54.9	0	0	0.1	0	45.0	1.96	39.0
Frequency (MHz)	Water (%)	Hexyl Carbitol (%)			Triton X-100 (%)		Conductivity σ (S/m)	Permittivity ε
5200	62.52	17.24			17.24		4.66	36.0
5800	62.52	17.24			17.24		5.27	35.3
Body (From instrument manufacturer)								
Frequency (MHz)	Water (%)	Sugar (%)	Cellulose (%)	Salt (%)	Preventol (%)	DGBE (%)	Conductivity σ (S/m)	Permittivity ε
750	51.7	47.2	0	0.9	0.1	0	0.96	55.5
835	50.8	48.2	0	0.9	0.1	0	0.97	55.2
900	50.8	48.2	0	0.9	0.1	0	1.05	55.0
1800, 1900, 2000	70.2	0	0	0.4	0	29.4	1.52	53.3
2450	68.6	0	0	0.1	0	31.3	1.95	52.7
2600	68.2	0	0	0.1	0	31.7	2.16	52.5
Frequency(MHz)	Water	DGBE (%)			Salt (%)		Conductivity σ (S/m)	Permittivity ε
5200	78.60	21.40			/		5.54	47.86
5800	78.50	21.40			0.1		6.0	48.20

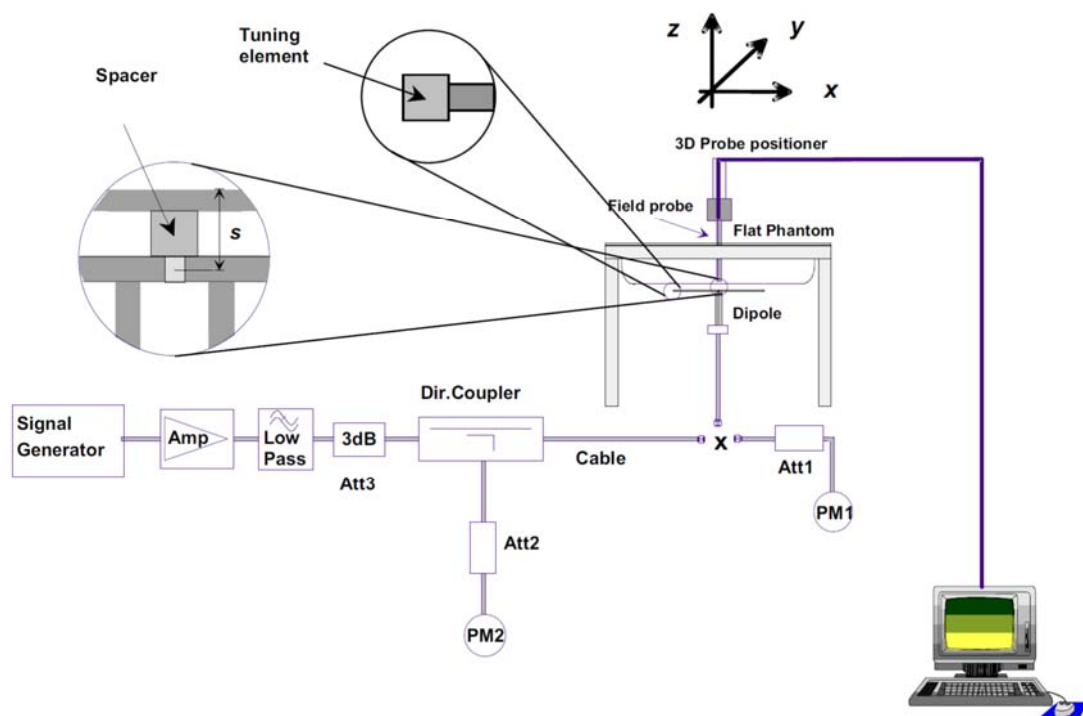
5 SYSTEM VERIFICATION

5.1 Purpose of System Check

The system performance check verifies that the system operates within its specifications. System and operator errors can be detected and corrected. It is recommended that the system performance check be performed prior to any usage of the system in order to guarantee reproducible results. The system performance check uses normal SAR measurements in a simplified setup with a well characterized source. This setup was selected to give a high sensitivity to all parameters that might fail or vary over time. The system check does not intend to replace the calibration of the components, but indicates situations where the system uncertainty is exceeded due to drift or failure.

5.2 System Check Setup

In the simplified setup for system evaluation, the EUT 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:



6 TEST POSITION CONFIGURATIONS

According to KDB 648474 D04 Handset, handsets are tested for SAR compliance in head, body-worn accessory and other use configurations described in the following subsections.

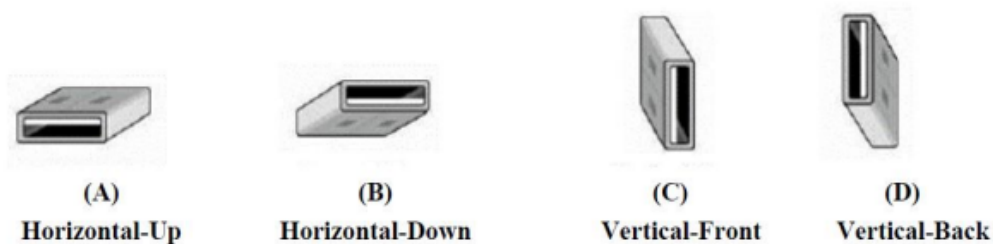
6.1 Body-worn Position Conditions

Body-worn accessory exposure is typically related to voice mode operations when handsets are carried in body-worn accessories. The body-worn accessory procedures in KDB 447498 are used to test for body-worn accessory SAR compliance, without a headset connected to it. This enables the test results for such configuration to be compatible with that required for hotspot mode when the body-worn accessory test separation distance is greater than or equal to that required for hotspot mode. When the reported SAR for a body-worn accessory.

Body-worn accessories that do not contain metallic or conductive components may be tested according to worst-case exposure configurations, typically according to the smallest test separation distance required for the group of body-worn accessories with similar operating and exposure characteristics. All body-worn accessories containing metallic components are tested in conjunction with the host device.

Body-worn accessory SAR compliance is based on a single minimum test separation distance for all wireless and operating modes applicable to each body-worn accessory used by the host, and according to the relevant voice and/or data mode transmissions and operations. If a body-worn accessory supports voice only operations in its normal and expected use conditions, testing of data mode for body-worn compliance is not required. A conservative minimum test separation distance for supporting off-the-shelf body-worn accessories that may be acquired by users of consumer handsets is used to test for body-worn accessory SAR compliance. This distance is determined by the handset manufacturer, according to the requirements of Supplement C 01-01. Devices that are designed to operate on the body of users using lanyards and straps, or without requiring additional body-worn accessories, will be tested using a conservative minimum test separation distance ≤ 5 mm to support compliance.

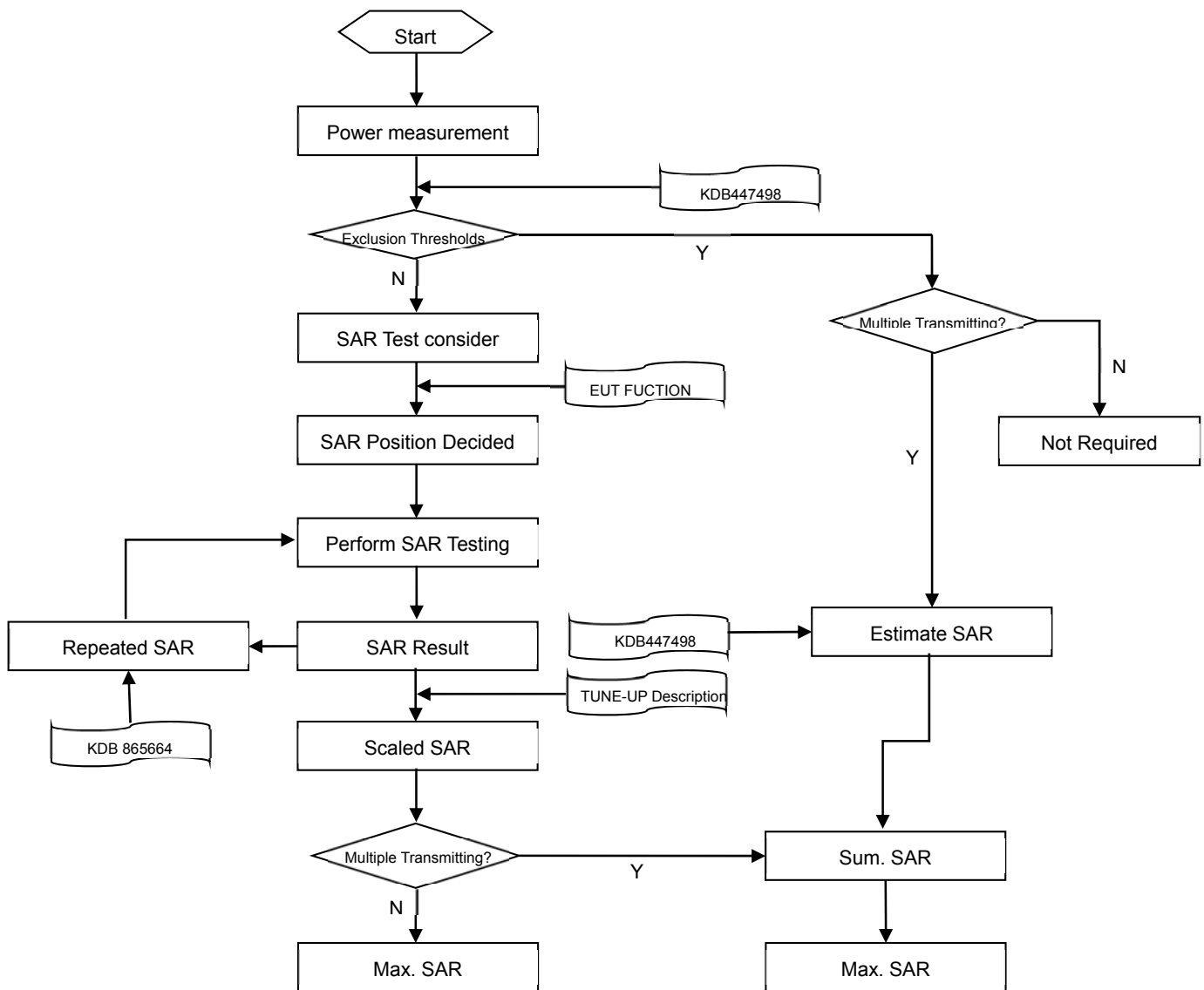
USB dongle transmitter must show compliance at a test separation distance of 5mm.



Note: These are USB connector orientations on laptop computers; USB dongles have the reverse configuration for plugging into the corresponding laptop computers.

7 MEASUREMENT PROCEDURE

7.1 Measurement Process Diagram



7.2 SAR Scan General Requirement

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.

			≤3GHz	>3GHz
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface			5±1 mm	$\frac{1}{2} \cdot \delta \cdot \ln(2) \pm 0.5$ mm
Maximum probe angle from probe axis to phantom surface normal at the measurement location			30°±1°	20°±1°
Maximum area scan spatial resolution: Δx Area , Δy Area			≤ 2 GHz: ≤ 15 mm 2 – 3 GHz: ≤ 12 mm	3–4 GHz: ≤ 12 mm 4 – 6 GHz: ≤ 10 mm
			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.	
Maximum zoom scan spatial resolution: Δx Zoom , Δy Zoom			≤ 2 GHz: ≤ 8 mm 2 – 3 GHz: ≤ 5 mm*	3–4 GHz: ≤ 5 mm* 4 – 6 GHz: ≤ 4 mm*
Maximum zoom scan spatial resolution, normal to phantom surface	uniform grid: Δz Zoom (n)		≤ 5 mm	3–4 GHz: ≤ 4 mm
				4–5 GHz: ≤ 3 mm
				5–6 GHz: ≤ 2 mm
	graded grid	Δz Zoom (1): between 1st two points closest to phantom surface	≤ 4 mm	3–4 GHz: ≤ 3 mm
				4–5 GHz: ≤ 2.5 mm
				5–6 GHz: ≤ 2 mm
		Δz Zoom (n>1): between subsequent points		≤ 1.5·Δz Zoom (n-1)
Minimum zoom scan volume	x, y, z		≥30 mm	3–4 GHz: ≥ 28 mm
				4–5 GHz: ≥ 25 mm
				5–6 GHz: ≥ 22 mm
Note:				
1. δ is the penetration depth of a plane-wave at normal incidence to the tissue medium; see draft standard IEEE P1528-2011 for details.				
2. * When zoom scan is required and the reported 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 3GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz.				

7.3 Measurement Procedure

The following steps are used for each test position

- a. Establish a call with the maximum output power with a base station simulator. The connection between the mobile and the base station simulator is established via air interface
- b. Measurement of the local E-field value at a fixed location. This value serves as a reference value for calculating a possible power drift.
- c. Measurement of the SAR distribution with a grid of 8 to 16mm * 8 to 16 mm and a constant distance to the inner surface of the phantom. Since the sensors cannot directly measure at the inner phantom surface, the values between the sensors and the inner phantom surface are extrapolated. With these values the area of the maximum SAR is calculated by an interpolation scheme.
- d. Around this point, a cube of 30 * 30 * 30 mm or 32 * 32 * 32 mm is assessed by measuring 5 or 8 * 5 or 8*4 or 5 mm. With these data, the peak spatial-average SAR value can be calculated.

7.4 Area & Zoom Scan Procedure

First Area Scan is used to locate the approximate location(s) of the local peak SAR value(s). The measurement grid within an Area Scan is defined by the grid extent, grid step size and grid offset. Next, in order to determine the EM field distribution in a three-dimensional spatial extension, Zoom Scan is required. The Zoom Scan is performed around the highest E-field value to determine the averaged SAR-distribution over 10 g. Area scan and zoom scan resolution setting follows KDB 865664 D01v01r04 quoted below.

When the 1 g SAR of the highest peak is within 2 dB of the SAR limit, additional zoom scans are required for other peaks within 2 dB of the highest peak that have not been included in any zoom scan to ensure there is no increase in SAR.

8 CONDUCTED RF OUPUT POWER

8.1 WIFI

8.1.1 2.4G WIFI

Band (GHz)	Mode	Channel	Freq. (MHz)	Conducted Power (dBm)	Tune-up Limit (dBm)	SAR Test Require.
2.4 (2.4~2.4835)	802.11b	1	2412	16.50	17.00	No
		6	2437	16.64	17.00	Yes
		11	2462	16.62	17.00	No
	802.11g	1	2412	18.64	19.00	No
		6	2437	18.75	19.00	No
		11	2462	18.55	19.00	No
	802.11n(HT20)	1	2412	18.59	19.00	No
		6	2437	18.59	19.00	No
		11	2462	18.43	19.00	No
	802.11n(HT40)	3	2422	18.52	19.00	No
		6	2437	18.76	19.00	No
		9	2452	18.59	19.00	No

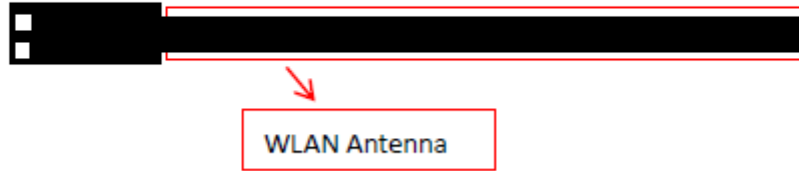
Note: According KDB 248227 D01 SAR is not required for the following 2.4 GHz OFDM conditions. When the highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg.

Adjusted SAR = Report SAR * (max power (OFDM)/ max power (DSSS)) = 0.025 * (79.43 mw)/(50.12 mw) =0.040 W/kg, so the 2.4GHz OFDM SAR test is not required.

8.1.2 5G WIFI

Band (GHz)	Mode	Channel	Freq. (MHz)	Conducted Power (dBm)	Tune-up Limit (dBm)	SAR Test Require.
5.2 (5.15~5.25)	802.11a	36	5180	17.21	17.50	No
		44	5220	17.16	17.50	No
		48	5240	17.12	17.50	No
	802.11n(HT20)	36	5180	17.14	17.50	No
		44	5220	17.03	17.50	No
		48	5240	17.16	17.50	No
	802.11n(HT40)	38	5190	17.21	17.50	Yes
		46	5230	17.01	17.50	Yes
	802.11ac(VHT20)	36	5180	17.12	17.50	No
		44	5220	17.10	17.50	No
		48	5240	17.04	17.50	No
	802.11ac(VHT40)	38	5190	17.13	17.50	No
		46	5230	17.13	17.50	No
	802.11ac(VHT80)	42	5210	15.45	17.00	No
5.8 (5.725~5.85)	802.11a	149	5745	17.02	17.50	No
		157	5785	17.03	17.50	No
		165	5825	17.18	17.50	No
	802.11n(HT20)	149	5745	16.91	17.50	No
		157	5785	17.31	17.50	No
		165	5825	17.15	17.50	No
	802.11n(HT40)	151	5755	17.29	17.50	Yes
		159	5795	17.23	17.50	No
	802.11ac(VHT20)	149	5745	17.35	17.50	No
		157	5785	17.11	17.50	No
		165	5825	17.23	17.50	No
	802.11ac(VHT40)	151	5755	17.16	17.50	No
		159	5795	17.27	17.50	No
	802.11ac(VHT80)	155	5775	16.54	17.00	No

9 TEST EXCLUSION CONSIDERATION



9.1 SAR Test Exclusion Consideration Table

According with FCC KDB 447498 D01, Appendix A, <SAR Test Exclusion Thresholds for 100 MHz – 6 GHz and ≤ 50 mm> Table, this Device SAR test configurations consider as following :

Band	Mode	Max. Peak Power		Test Position Configurations				
		dBm	mW	Horizontal-up	Horizontal-down	Vertical-Front	Vertical-Back	Tip
WLAN 2.4 G	Distance to User			<5mm	<5mm	<5mm	<5mm	<5mm
	802.11b	17.00	50.12	Yes	Yes	Yes	Yes	Yes
	802.11g	19.00	79.43	No	No	No	No	No
	802.11n(HT20)	19.00	79.43	No	No	No	No	No
	802.11n(HT40)	19.00	79.43	No	No	No	No	No
WLAN 5.2 G	Distance to User			<5mm	<5mm	<5mm	<5mm	<5mm
	802.11a	17.50	56.23	No	No	No	No	No
	802.11n(HT20)	17.50	56.23	No	No	No	No	No
	802.11n(HT40)	17.50	56.23	Yes	Yes	Yes	Yes	Yes
	802.11ac(VHT20)	17.50	56.23	No	No	No	No	No
	802.11ac(VHT40)	17.50	56.23	No	No	No	No	No
	802.11ac(VHT80)	17.00	50.12	No	No	No	No	No
WLAN 5.8 G	Distance to User			<5mm	<5mm	<5mm	<5mm	<5mm
	802.11a	17.50	56.23	No	No	No	No	No
	802.11n(HT20)	17.50	56.23	No	No	No	No	No
	802.11n(HT40)	17.50	56.23	Yes	Yes	Yes	Yes	Yes
	802.11ac(VHT20)	17.50	56.23	No	No	No	No	No
	802.11ac(VHT40)	17.50	56.23	No	No	No	No	No
	802.11ac(VHT80)	17.00	50.12	No	No	No	No	No

Note:

- Maximum power is the source-based time-average power and represents the maximum RF output power including tune-up tolerance among production units
- Per KDB 447498 D01, for larger devices, the test separation distance of adjacent edge configuration is determined by the closest separation between the antenna and the user.
- Per KDB 447498 D01, standalone SAR test exclusion threshold is applied; If the distance of the antenna to the user is < 5mm, 5mm is used to determine SAR exclusion threshold
- Per KDB 447498 D01, the 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:

$$[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})}] \leq 3.0 \text{ for 1-g SAR and } \leq 7.5 \text{ for 10-g extremity SAR}$$
 - f(GHz) is the RF channel transmit frequency in GHz
 - Power and distance are rounded to the nearest mW and mm before calculation
 - The result is rounded to one decimal place for comparison
 - For < 50 mm distance, we just calculate mW of the exclusion threshold value (3.0) to do compare.
This formula is $[3.0] / [\sqrt{f(\text{GHz})}] \cdot [\text{min. test separation distance, mm}] = \text{exclusion threshold of mW}$.
- Per KDB 447498 D01, at 100 MHz to 6 GHz and for test separation distances > 50 mm, the SAR test exclusion threshold is determined according to the following
 - [Threshold at 50 mm in step 1) + (test separation distance - 50 mm) · (f(MHz)/150)] mW, at 100 MHz to 1500

MHz

- b. $[\text{Threshold at 50 mm in step 1}) + (\text{test separation distance} - 50 \text{ mm}) \cdot 10]$ mW at $> 1500 \text{ MHz}$ and $\leq 6 \text{ GHz}$
- 6. Per KDB 248227 D01, choose the highest output power channel to test SAR and determine further SAR exclusion.8. For each frequency band, testing at higher data rates and higher order modulations is not required when the maximum average output power for each of these configurations is less than 1/4dB higher than those measured at the lowest data rate
- 7. Per KDB 248227 D01 SAR is not required for the following 2.4 GHz OFDM conditions.
 - a. When KDB Publication 447498 D01 SAR test exclusion applies to the OFDM configuration.
 - b. When the highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and the adjusted SAR is $\leq 1.2 \text{ W/kg}$.
- 8. Per KDB 248227 D01 SAR is not required for the following U-NII-1 and U-NII-2A bands conditions.
 - a. When the same maximum output power is specified for both bands, begin SAR measurement in U-NII-2A band by applying the OFDM SAR requirements. If the highest reported SAR for a test configuration is $\leq 1.2 \text{ W/kg}$, SAR is not required for U-NII-1 band for that configuration (802.11 mode and exposure condition); otherwise, each band is tested independently for SAR.
 - b. When different maximum output power is specified for the bands, begin SAR measurement in the band with higher specified maximum output power. The highest reported SAR for the tested configuration is adjusted by the ratio of lower to higher specified maximum output power for the two bands. When the adjusted SAR is $\leq 1.2 \text{ W/kg}$, SAR is not required for the band with lower maximum output power in that test configuration; otherwise, each band is tested independently for SAR.

10 TEST RESULT

10.1WIFI 2.4GHz

Mode	Position	Dist. (mm)	Ch.	Freq. (MHz)	Power Drift (dB)	1g Meas SAR (W/kg)	Duty cycle (%)	Duty cycle Factor	Meas. Power (dBm)	Max. tune- up power (dBm)	Scaling Factor	1g Scaled SAR (W/kg)	Meas. No.
Body (Antenna unfold)													
802.11 b	Horizontal-up	5	6	2437	-0.06	0.023	100.00	1.000	16.64	17.00	1.086	0.025	1#
	Horizontal-down	5	6	2437	0.02	0.016	100.00	1.000	16.64	17.00	1.086	0.017	/
	Vertical-Front	5	6	2437	-0.15	0.020	100.00	1.000	16.64	17.00	1.086	0.022	/
	Vertical-Back	5	6	2437	0.09	0.020	100.00	1.000	16.64	17.00	1.086	0.022	/
	Tip	5	6	2437	0.06	0.000	100.00	1.000	16.64	17.00	1.086	0.000	/
Body (Antenna fold)													
802.11 b	Horizontal-up	5	6	2437	-0.17	0.014	100.00	1.000	16.64	17.00	1.086	0.015	/
	Horizontal-down	5	6	2437	0.11	0.018	100.00	1.000	16.64	17.00	1.086	0.020	/
	Vertical-Front	5	6	2437	0.17	0.000	100.00	1.000	16.64	17.00	1.086	0.000	/
	Vertical-Back	5	6	2437	0.14	0.015	100.00	1.000	16.64	17.00	1.086	0.016	/
	Tip	5	6	2437	0.03	0.021	100.00	1.000	16.64	17.00	1.086	0.023	2#
Note: Refer to ANNEX C for the detailed test data for each test configuration.													

10.2WIFI 5GHz

Mode	Fre. Band	Position	Dist. (mm)	Ch.	Freq. (MHz)	Power Drift (dB)	1g Meas SAR (W/kg)	Duty cycle (%)	Duty cycle Factor	Meas. Power (dBm)	Max. tune-up power (dBm)	Scaling Factor	1g Scaled SAR (W/kg)	Meas. No.
Body (Antenna unfold)														
5.2G	802.11 n HT40	Horizontal-up	5	38	5190	-0.04	0.355	100.00	1.000	17.21	17.50	1.069	0.380	/
		Horizontal-down	5	38	5190	0.17	0.752	100.00	1.000	17.21	17.50	1.069	0.804	/
			5	46	5230	-0.16	0.857	100.00	1.000	17.01	17.50	1.119	0.959	3#
		Vertical-Front	5	38	5190	0.14	0.574	100.00	1.000	17.21	17.50	1.069	0.614	/
		Vertical-Back	5	38	5190	-0.02	0.395	100.00	1.000	17.21	17.50	1.069	0.422	/
		Tip	5	38	5190	0.05	0.000	100.00	1.000	17.21	17.50	1.069	0.000	/
5.8G	802.11 n HT40	Horizontal-up	5	151	5755	0.11	0.338	100.00	1.000	17.29	17.50	1.050	0.355	/
		Horizontal-down	5	151	5755	0.03	0.501	100.00	1.000	17.29	17.50	1.050	0.526	4#
		Vertical-Front	5	151	5755	0.17	0.402	100.00	1.000	17.29	17.50	1.050	0.422	/
		Vertical-Back	5	151	5755	-0.17	0.415	100.00	1.000	17.29	17.50	1.050	0.436	/
		Tip	5	151	5755	0.11	0.000	100.00	1.000	17.29	17.50	1.050	0.000	/
Body (Antenna fold)														
5.2G	802.11 n HT40	Horizontal-up	5	38	5190	-0.11	0.236	100.00	1.000	17.21	17.50	1.069	0.252	/
		Horizontal-down	5	38	5190	0.06	0.261	100.00	1.000	17.21	17.50	1.069	0.279	/
		Vertical-Front	5	38	5190	-0.13	0.000	100.00	1.000	17.21	17.50	1.069	0.000	/
		Vertical-Back	5	38	5190	-0.11	0.310	100.00	1.000	17.21	17.50	1.069	0.331	/
		Tip	5	38	5190	0.13	0.321	100.00	1.000	17.21	17.50	1.069	0.343	5#
5.8G	802.11 n HT40	Horizontal-up	5	151	5755	-0.02	0.338	100.00	1.000	17.29	17.50	1.050	0.355	6#
		Horizontal-down	5	151	5755	0.01	0.210	100.00	1.000	17.29	17.50	1.050	0.220	/
		Vertical-Front	5	151	5755	-0.19	0.000	100.00	1.000	17.29	17.50	1.050	0.000	/
		Vertical-Back	5	151	5755	0.18	0.325	100.00	1.000	17.29	17.50	1.050	0.341	/
		Tip	5	151	5755	-0.01	0.248	100.00	1.000	17.29	17.50	1.050	0.260	/
Note: Refer to ANNEX C for the detailed test data for each test configuration.														

11 SAR Measurement Variability

According to KDB 865664 D01, SAR measurement variability was 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. Alternatively, if the highest measured SAR for both head and body tissue-equivalent media are ≤ 1.45 W/kg and the ratio of these highest SAR values, i.e., largest divided by smallest value, is ≤ 1.10 , the highest SAR configuration for either head or body tissue-equivalent medium may be used to perform the repeated measurement. These additional measurements are repeated after the completion of all measurements requiring the same head or body tissue-equivalent medium in a frequency band. The test device should be returned to ambient conditions (normal room temperature) with the battery fully charged before it is re-mounted on the device holder for the repeated measurement(s) to minimize any unexpected variations in the repeated results.

SAR repeated measurement procedure:

1. When the highest measured SAR is < 0.80 W/kg, repeated measurement is not required.
2. When the highest measured SAR is ≥ 0.80 W/kg, repeat that measurement once.
3. 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, perform a second repeated measurement.
4. If the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20 , and the original, first or second repeated measurement is ≥ 1.5 W/kg, perform a third repeated measurement.

Frequency Band (MHz)	Wireless Band	RF Exposure Conditions	Test Position	Highest Measured SAR (W/kg)	Repeated SAR (Yes/No)	Repeated1th Measured SAR (W/kg)	Largest to Smallest SAR Ratio
5230	5.2G	Body (Antenna unfold)	Horizontal-down	0.857	Yes	0.834	1.03

Note: The ratio of largest to smallest SAR for the original and first repeated measurements is < 1.20 , the second repeated measurement. is not required.

12 SIMULTANEOUS TRANSMISSION

Note: The product has only one antenna for WLAN, so simultaneous transmission evaluation is not required in this report.

13 TEST EQUIPMENTS LIST

Description	Manufacturer	Model	Serial No./Version	Cal. Date	Cal. Due
PC	Dell	N/A	N/A	N/A	N/A
Test Software	Speag	DASY5	52.8.8.1222	N/A	N/A
2450MHz Validation Dipole	Speag	D2450V2	SN: 952	2021/05/19	2024/05/18
5GHz Validation Dipole	Speag	D5GHzV2	SN: 1200	2021/05/18	2024/05/17
E-Field Probe	Speag	EX3DV4	SN: 3717	2021/06/07	2022/06/06
Data Acquisition Electronics	Speag	DAE4	SN: 1226	2021/05/17	2022/05/16
Signal Generator	R&S	SMB100A	177746	2021/08/24	2022/08/23
Power Meter	R&S	NRVD-B2	7250BJ-0112/2011	2021/09/08	2022/09/07
Power Sensor	R&S	NRV-Z4	100381	2021/09/08	2022/09/07
Power Sensor	R&S	NRV-Z2	100211	2021/09/08	2022/09/07
Network Analyzer	Agilent	E5071B	MY42404001	2021/04/01	2022/03/31
Thermometer	Elitech	RC-4HC	EF720B004820	2021/12/01	2022/11/30
Power Amplifier	SATIMO	6552B	22374	N/A	N/A
Dielectric Probe Kit	SATIMO	SCLMP	SN 25/13 OCPG56	N/A	N/A
Phantom1	Speag	SAM	SN: 1859	N/A	N/A
Phantom2	Speag	SAM	SN: 1857	N/A	N/A
Attenuator	COM-MW	ZA-S1-31	1305003187	N/A	N/A
Directional coupler	AA-MCS	AAMCS-UDC	000272	N/A	N/A

Note: For dipole antennas, BALUN has adopted 3 years as calibration intervals, and on annual basis, every measurement dipole has been evaluated and is in compliance with the following criteria:

1. There is no physical damage on the dipole;
2. System validation with specific dipole is within 10% of calibrated value;
3. Return-loss in within 20% of calibrated measurement.
4. Impedance (real or imaginary parts) in within 5 Ohms of calibrated measurement.

ANNEX A SIMULATING LIQUID VERIFICATION RESULT

The dielectric parameters of the liquids were verified prior to the SAR evaluation using an SCLMP Dielectric Probe Kit.

Head Liquid

Date	Liquid Type	Fre. (MHz)	Temp. (°C)	Meas. Conductivity (σ) (S/m)	Meas. Permittivity (ϵ)	Target Conductivity (σ) (S/m)	Target Permittivity (ϵ)	Conductivity Tolerance (%)	Permittivity Tolerance (%)
2022.02.09	Head	2450	21.0	1.78	39.64	1.80	39.20	-1.11	1.12
2022.01.30	Head	5250	21.4	4.77	34.96	4.71	35.93	1.27	-2.70
2022.01.29	Head	5750	21.3	5.36	34.29	5.22	35.36	2.68	-3.03

Note: The tolerance limit of Conductivity and Permittivity is $\pm 5\%$.

ANNEX B SYSTEM CHECK RESULT

Comparing to the original SAR value provided by SPEAG, the validation data should be within its specification of 10 % (for 1 g).

Head liquid 1g

Date	Liquid Type	Freq. (MHz)	Power (mW)	Measured SAR (W/kg)	Normalized SAR (W/kg)	Dipole SAR (W/kg)	Tolerance (%)
2022.02.09	Head	2450	100	5.160	51.60	52.60	-1.90
2022.01.30	Head	5250	100	7.840	78.40	77.80	0.77
2022.01.29	Head	5750	100	8.110	81.10	77.20	5.05

Note: The tolerance limit of System validation $\pm 10\%$.

System Performance Check Data(2450MHz)

Date: 2022.02.09

Communication System Band: D2450 (2450.0 MHz); Frequency: 2450 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 2450$ MHz; $\sigma = 1.784$ S/m; $\epsilon_r = 39.637$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Ambient Temperature:22.1 Liquid Temperature:21.0

DASY5 Configuration:

- Probe: EX3DV4 - SN3717; ConvF(7.15, 7.15, 7.15); Calibrated: 2021.06.07;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1226; Calibrated: 2021.05.17
- Phantom: SAM with CRP v5.0 Right 1857; Type: QD000P40CD; Serial: TP1857
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

CW 2450 100mw/Area Scan (101x101x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 6.11 W/kg

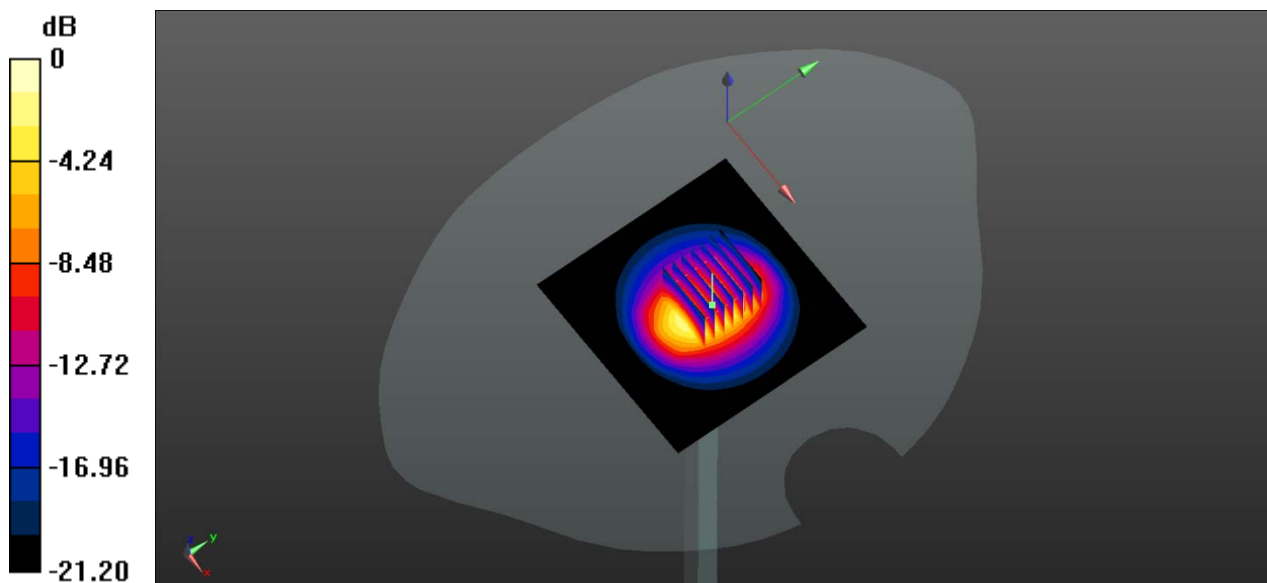
CW 2450 100mw/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 56.78 V/m; Power Drift = -0.06 dB

Peak SAR (extrapolated) = 11.3 W/kg

SAR(1 g) = 5.16 W/kg; SAR(10 g) = 2.31 W/kg

Maximum value of SAR (measured) = 6.08 W/kg



0 dB = 6.08 W/kg

System Performance Check Data(5250MHz)

Date: 2022.01.30

Communication System Band: D5GHz (5000.0 - 6000.0 MHz); Frequency: 5250 MHz;Duty Cycle: 1:1

Medium parameters used: $f = 5250$ MHz; $\sigma = 4.768$ S/m; $\epsilon_r = 34.96$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Ambient Temperature:22.5 Liquid Temperature:21.4

DASY5 Configuration:

- Probe: EX3DV4 - SN3717; ConvF(5.17, 5.17, 5.17); Calibrated: 2021.06.07;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1226; Calibrated: 2021.05.17
- Phantom: SAM with CRP v5.0 Right 1857; Type: QD000P40CC; Serial: TP:1857
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

CW 5250 100mW/Area Scan (101x101x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 8.23 W/kg

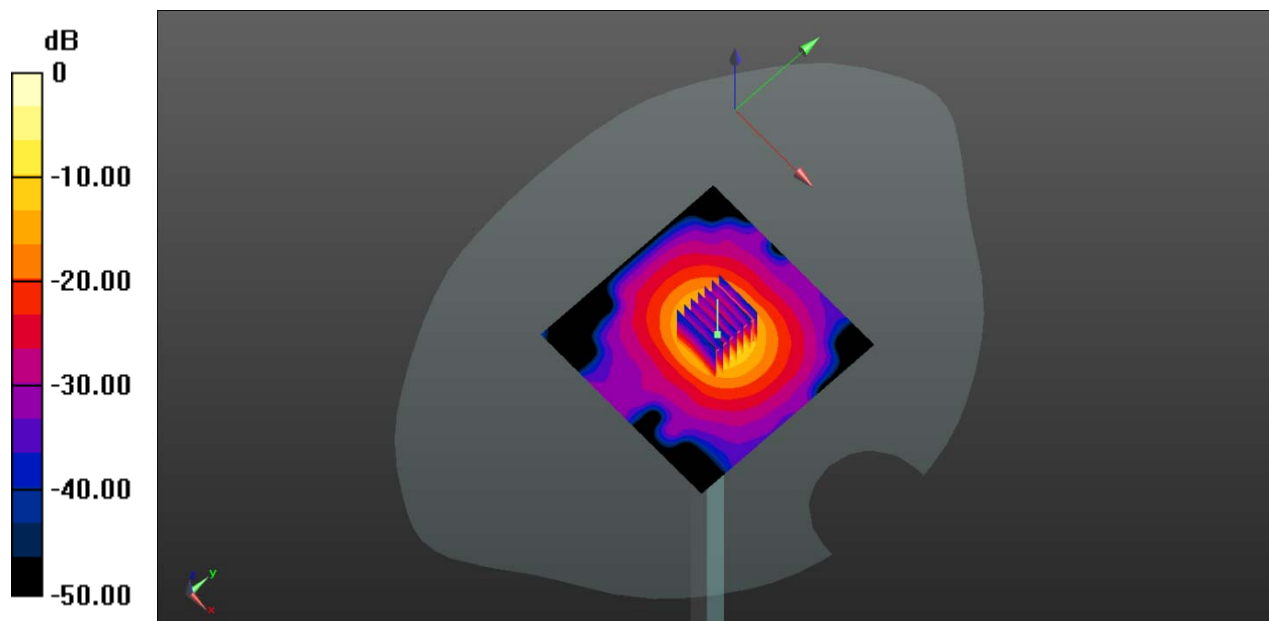
CW 5250 100mW/Zoom Scan (7x7x21)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm

Reference Value = 36.95 V/m; Power Drift = -0.11 dB

Peak SAR (extrapolated) = 31.9 W/kg

SAR(1 g) = 7.84 W/kg; SAR(10 g) = 2.26 W/kg

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



0 dB = 19.7 W/kg

System Performance Check Data(5750MHz)

Date: 2022.01.29

Communication System Band: D5GHz (5000.0 - 6000.0 MHz); Frequency: 5750 MHz;Duty Cycle: 1:1

Medium parameters used: $f = 5750$ MHz; $\sigma = 5.362$ S/m; $\epsilon_r = 34.286$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Ambient Temperature:22.7 Liquid Temperature:21.3

DASY5 Configuration:

- Probe: EX3DV4 - SN3717; ConvF(4.76, 4.76, 4.76); Calibrated: 2021.06.07;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1226; Calibrated: 2021.05.17
- Phantom: SAM with CRP v5.0 Right 1857; Type: QD000P40CC; Serial: TP:1857
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

CW 5750 100mW/Area Scan (81x81x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 9.01 W/kg

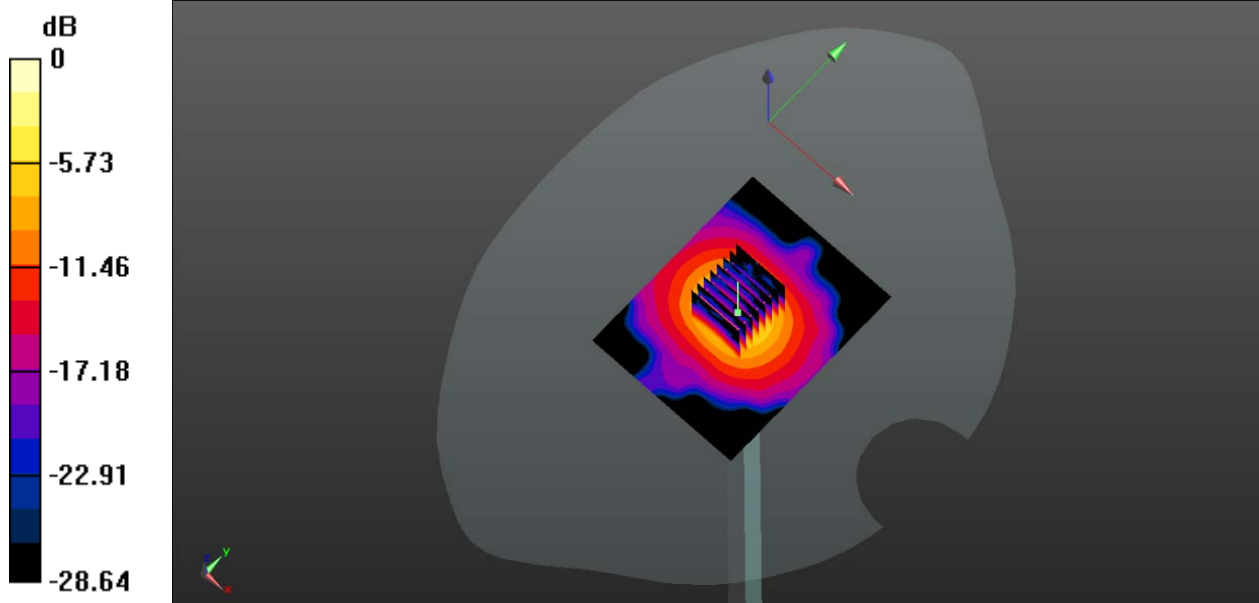
CW 5750 100mW/Zoom Scan (7x7x15)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm

Reference Value = 41.13 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 36.8 W/kg

SAR(1 g) = 8.11 W/kg; SAR(10 g) = 2.29 W/kg

Maximum value of SAR (measured) = 15.4 W/kg



0 dB = 15.4 W/kg

ANNEX C TEST DATA

1-Body Plane with Horizontal-up 5mm on 6 Channel in IEEE802.11b mode with Antenna unfold

Date: 2022.02.09

Communication System Band: 2.4G; Frequency: 2437 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 2437$ MHz; $\sigma = 1.76$ S/m; $\epsilon_r = 39.8$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Ambient Temperature: 22.1 Liquid Temperature: 21.0

DASY5 Configuration:

- Probe: EX3DV4 - SN3717; ConvF(7.15, 7.15, 7.15); Calibrated: 2021.06.07;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1226; Calibrated: 2021.05.17
- Phantom: SAM with CRP v5.0 Right 1857; Type: QD000P40CD; Serial: TP1857
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Ch6/Area Scan (51x81x1): Interpolated grid: $dx=1.200$ mm, $dy=1.200$ mm

Maximum value of SAR (interpolated) = 0.0952 W/kg

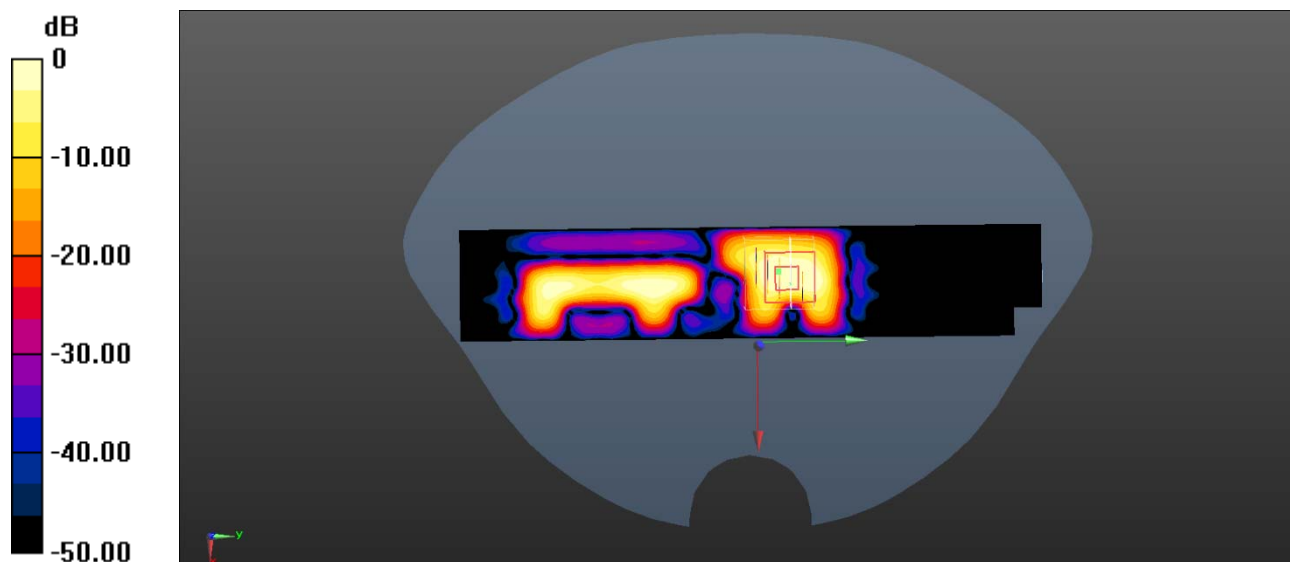
Ch6/Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5$ mm, $dy=5$ mm, $dz=5$ mm

Reference Value = 1.968 V/m; Power Drift = -0.06 dB

Peak SAR (extrapolated) = 0.123 W/kg

SAR(1 g) = 0.023 W/kg; SAR(10 g) = 0.00945 W/kg

Maximum value of SAR (measured) = 0.0315 W/kg



0 dB = 0.0315 W/kg

2-Body Plane with Tip 5mm on 6 Channel in IEEE802.11b mode with Antenna fold

Date: 2022.02.09

Communication System Band: 2.4G; Frequency: 2437 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 2437$ MHz; $\sigma = 1.76$ S/m; $\epsilon_r = 39.8$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Ambient Temperature: 22.1 Liquid Temperature: 21.0

DASY5 Configuration:

- Probe: EX3DV4 - SN3717; ConvF(7.15, 7.15, 7.15); Calibrated: 2021.06.07;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1226; Calibrated: 2021.05.17
- Phantom: SAM with CRP v5.0 Right 1857; Type: QD000P40CD; Serial: TP1857
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Ch6/Area Scan (51x81x1): Interpolated grid: $dx=1.200$ mm, $dy=1.200$ mm

Maximum value of SAR (interpolated) = 0.0473 W/kg

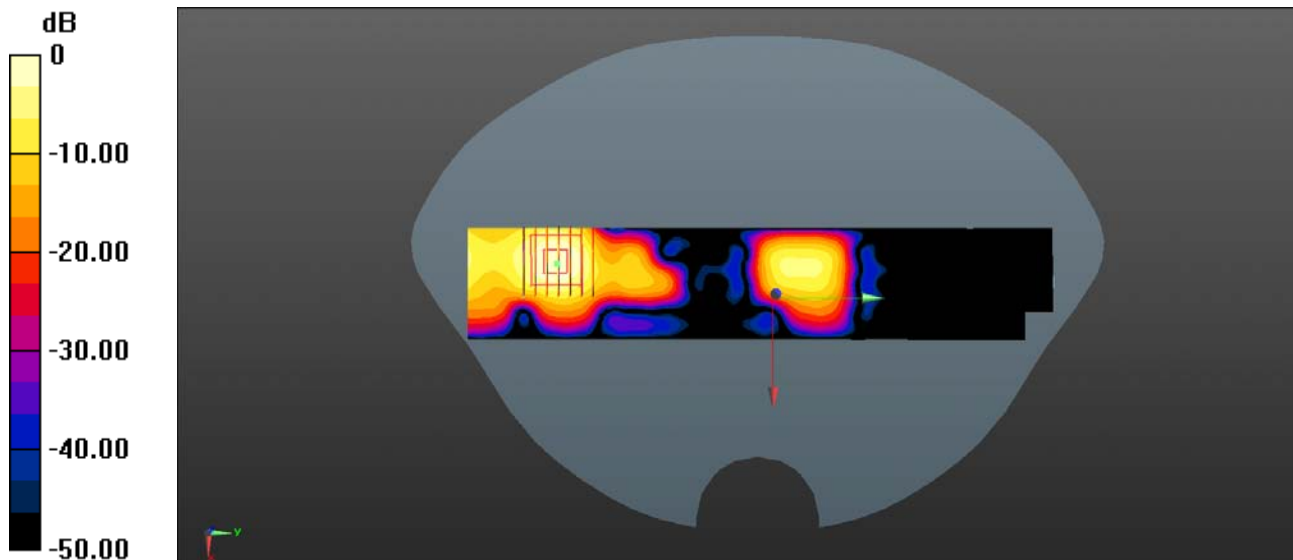
Ch6/Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5$ mm, $dy=5$ mm, $dz=5$ mm

Reference Value = 0.5400 V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 0.0486 W/kg

SAR(1 g) = 0.021 W/kg; SAR(10 g) = 0.00846 W/kg

Maximum value of SAR (measured) = 0.0328 W/kg



0 dB = 0.0328 W/kg

3-Body Plane with Horizontal-down 5mm on 46 Channel in IEEE802.11n HT40 mode with Antenna unfold

Date: 2022.01.30

Communication System Band: 5.2G; Frequency: 5230 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 5230$ MHz; $\sigma = 4.741$ S/m; $\epsilon_r = 35.01$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Ambient Temperature: 22.5 Liquid Temperature: 21.4

DASY5 Configuration:

- Probe: EX3DV4 - SN3717; ConvF(5.17, 5.17, 5.17); Calibrated: 2021.06.07;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1226; Calibrated: 2021.05.17
- Phantom: SAM with CRP v5.0 Right 1857; Type: QD000P40CC; Serial: TP:1857
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Ch46/Area Scan (61x101x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 2.15 W/kg

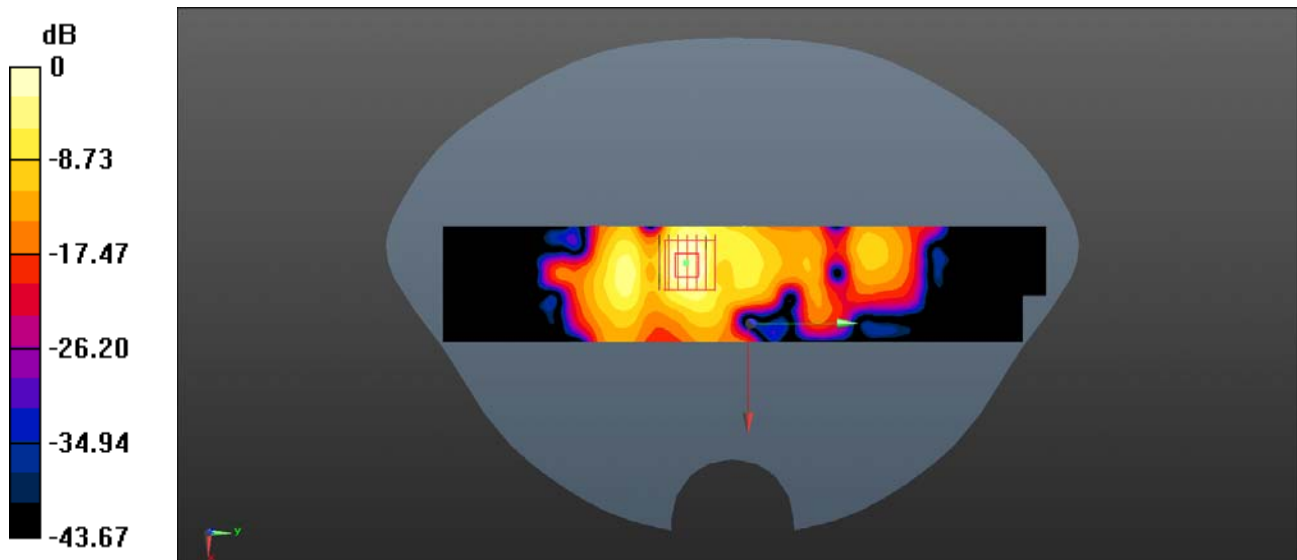
Ch46/Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm

Reference Value = 1.713 V/m; Power Drift = -0.16 dB

Peak SAR (extrapolated) = 3.53 W/kg

SAR(1 g) = 0.857 W/kg; SAR(10 g) = 0.227 W/kg

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



0 dB = 1.79 W/kg

4-Body Plane with Horizontal-down 5mm on 151 Channel in IEEE802.11n HT40 mode with Antenna unfold

Date: 2022.01.29

Communication System Band: 5.8G; Frequency: 5755 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 5755$ MHz; $\sigma = 5.371$ S/m; $\epsilon_r = 34.273$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Ambient Temperature: 22.7 Liquid Temperature: 21.3

DASY5 Configuration:

- Probe: EX3DV4 - SN3717; ConvF(4.76, 4.76, 4.76); Calibrated: 2021.06.07;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1226; Calibrated: 2021.05.17
- Phantom: SAM with CRP v5.0 Right 1857; Type: QD000P40CC; Serial: TP:1857
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Ch151/Area Scan (61x101x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 1.25 W/kg

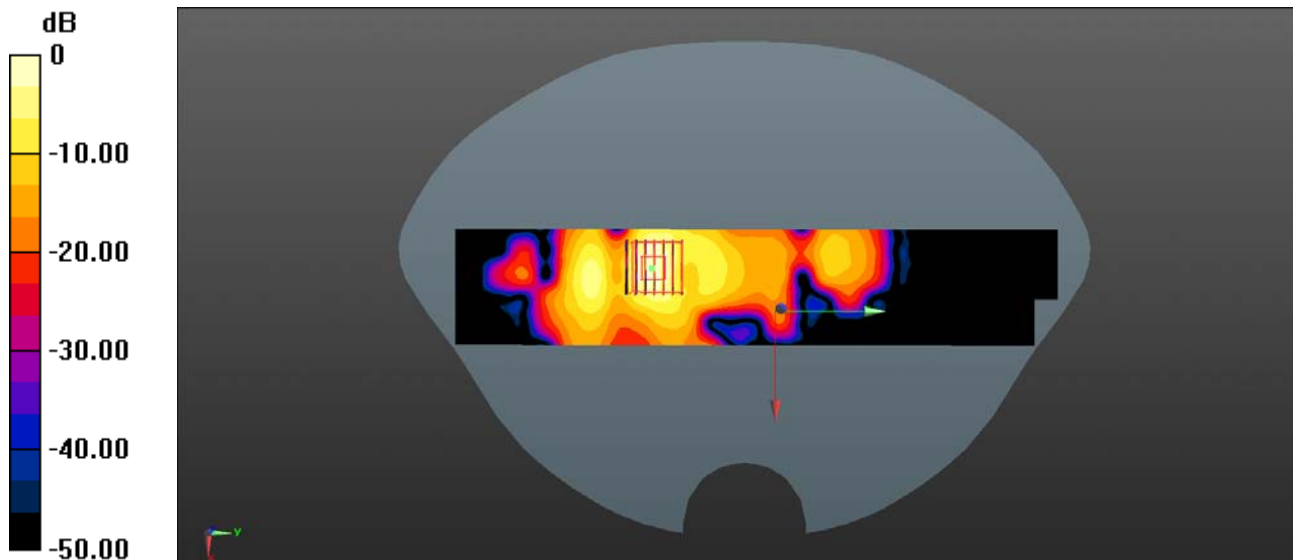
Ch151/Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm

Reference Value = 3.231 V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 1.94 W/kg

SAR(1 g) = 0.501 W/kg; SAR(10 g) = 0.147 W/kg

Maximum value of SAR (measured) = 1.00 W/kg



0 dB = 1.00 W/kg

5-Body Plane with Tip 5mm on 38 Channel in IEEE802.11n HT40 mode with Antenna fold

Date: 2022.01.30

Communication System Band: 5.2G; Frequency: 5190 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 5190$ MHz; $\sigma = 4.69$ S/m; $\epsilon_r = 35.081$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Ambient Temperature: 22.5 Liquid Temperature: 21.4

DASY5 Configuration:

- Probe: EX3DV4 - SN3717; ConvF(5.17, 5.17, 5.17); Calibrated: 2021.06.07;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1226; Calibrated: 2021.05.17
- Phantom: SAM with CRP v5.0 Right 1857; Type: QD000P40CC; Serial: TP:1857
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Ch38/Area Scan (61x101x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 0.786 W/kg

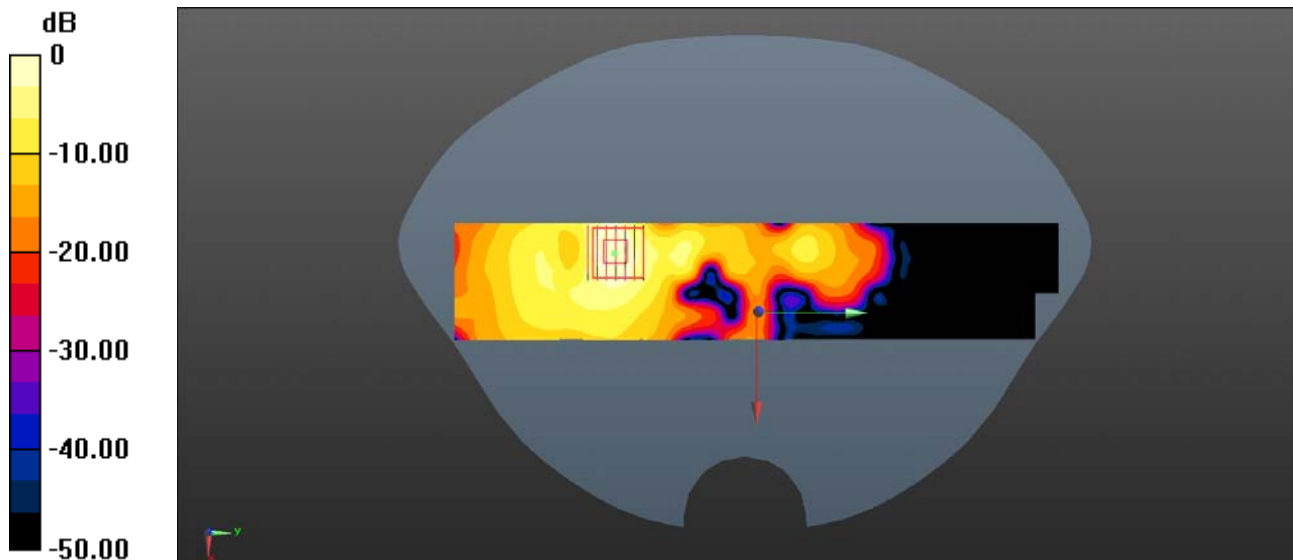
Ch38/Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm

Reference Value = 0.5800 V/m; Power Drift = 0.13 dB

Peak SAR (extrapolated) = 1.07 W/kg

SAR(1 g) = 0.321 W/kg; SAR(10 g) = 0.094 W/kg

Maximum value of SAR (measured) = 0.658 W/kg



0 dB = 0.658 W/kg

6-Body Plane with Horizontal-up 5mm on 151 Channel in IEEE802.11n HT40 mode with Antenna fold

Date: 2022.01.29

Communication System Band: 5.8G; Frequency: 5755 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 5755$ MHz; $\sigma = 5.396$ S/m; $\epsilon_r = 34.159$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Ambient Temperature: 22.7 Liquid Temperature: 21.3

DASY5 Configuration:

- Probe: EX3DV4 - SN3717; ConvF(4.76, 4.76, 4.76); Calibrated: 2021.06.07;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1226; Calibrated: 2021.05.17
- Phantom: SAM with CRP v5.0 Right 1857; Type: QD000P40CC; Serial: TP:1857
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Ch151/Area Scan (61x101x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 0.934 W/kg

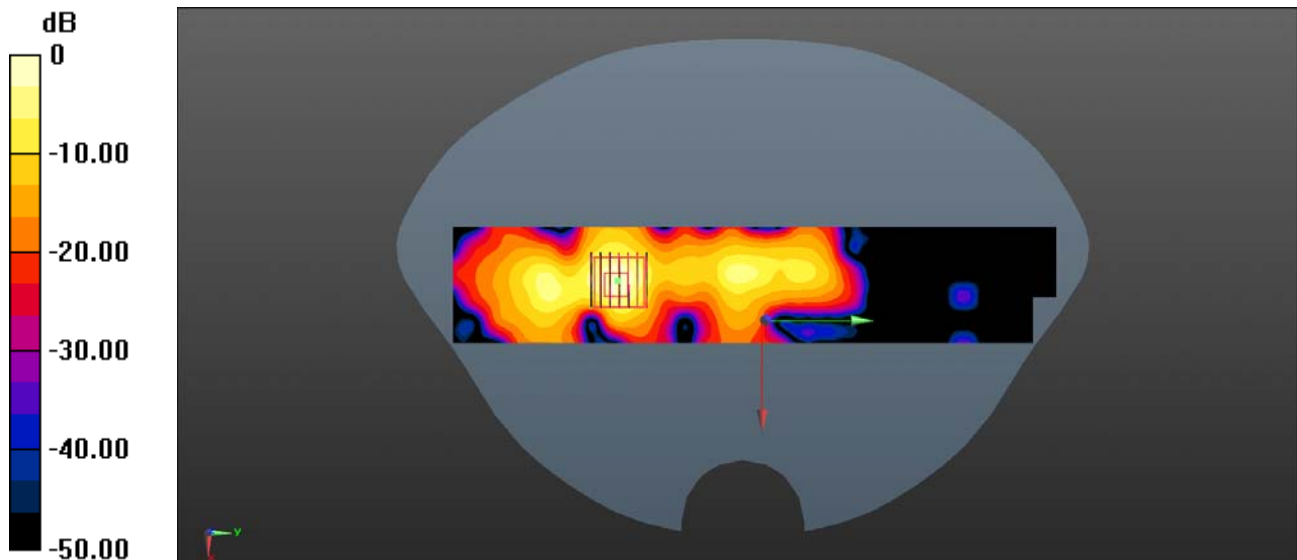
Ch151/Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm

Reference Value = 2.449 V/m; Power Drift = -0.02 dB

Peak SAR (extrapolated) = 1.35 W/kg

SAR(1 g) = 0.338 W/kg; SAR(10 g) = 0.101 W/kg

Maximum value of SAR (measured) = 0.696 W/kg



0 dB = 0.696 W/kg

ANNEX D EUT EXTERNAL PHOTOS

Please refer the document "BL-SZ2210449-AW.pdf".

ANNEX E SAR TEST SETUP PHOTOS

Please refer the document "BL-SZ2210449-AS.pdf".

ANNEX F CALIBRATION REPORT

Please refer the document "CALIBRATION REPORT.pdf".

 --END OF REPORT--