SAR TEST REPORT

For

RADIOSHACK WORLDWIDE CORP.

650Mbps USB WiFi Adapter

Test Model: 2505013

Prepared for	:	RADIOSHACK WORLDWIDE CORP.
Address	:	Building AFRA , Ave. Samuel Lewis and street 54, Panama City, Panama 5, Republic of Panama
Prepared by	:	Shenzhen LCS Compliance Testing Laboratory Ltd.
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Date of receipt of test sample	:	April 19, 2024
Number of tested samples	:	1
Sample number	:	A240410040-1
Serial number	:	Prototype
Date of Test	:	April 19, 2024 ~ May 10, 2024
Date of Report	:	May 29, 2024

SAR TEST REPORT	
Report Reference No.....................:	**LCSA04124140EB**
Date Of Issue..................................:	May 29, 2024
Testing Laboratory Name.............:	**Shenzhen LCS Compliance Testing Laboratory Ltd.**
Address...:	101, 201 Bldg A & 301 Bldg C, Juji Industrial Park Yabianxueziwei, Shajing Street, Baoan District, Shenzhen, 518000, China
Testing Location/ Procedure...........:	Full application of Harmonised standards ■ Partial application of Harmonised standards ☐ Other standard testing method ☐
Applicant's Name.........................:	**RADIOSHACK WORLDWIDE CORP.**
Address...:	Building AFRA , Ave. Samuel Lewis and street 54, Panama City, Panama 5, Republic of Panama
Test Specification:	
Standard..:	FCC 47CFR §2.1093, ANSI/IEEE C95.1-2019, IEEE 1528-2013
Test Report Form No....................:	LCSEMC-1.0
TRF Originator.................................:	Shenzhen LCS Compliance Testing Laboratory Ltd.
Master TRF.....................................:	Dated 2014-09

Test Item Description..................:	**650Mbps USB WiFi Adapter**
Trade Mark.......................................:	RADIOSHACK
Model/Type Reference..................:	2505013
Ratings...:	Input: DC 5V, 900mA
Result ....:	**Positive**

Compiled by:	Supervised by:	Approved by:
Jay Zhan/ File administrators	Cary Luo / Technique principal	Gavin Liang/ Manager

SAR -- TEST REPORT

Test Report No. :	**LCSA04124140EB**	May 29, 2024 Date of issue

EUT......................................	:	650Mbps USB WiFi Adapter
Type/Model	:	2505013
Applicant...............................	**:**	**RADIOSHACK WORLDWIDE CORP.**
Address..................................	:	Building AFRA , Ave. Samuel Lewis and street 54, Panama City, Panama 5, Republic of Panama
Telephone..............................	:	/
Fax..	:	/
Manufacturer.......................	**:**	**RADIOSHACK WORLDWIDE CORP.**
Address..................................	:	Building AFRA , Ave. Samuel Lewis and street 54, Panama City, Panama 5, Republic of Panama
Telephone..............................	:	/
Fax..	:	/
Factory............................	**:**	**RADIOSHACK WORLDWIDE CORP.**
Address.............................	:	Building AFRA , Ave. Samuel Lewis and street 54, Panama City, Panama 5, Republic of Panama
Telephone.........................	:	/
Fax....................................	:	/

Test Result	**Positive**

The test report merely corresponds to the test sample.
It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

Revison History

Revision	Issue Date	Revision Content	Revised By
000	May 29, 2024	Initial Issue	---

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1. TEST STANDARDS AND TEST DESCRIPTION

1.1. Statement of Compliance

The maximum of results of SAR found during testing for 2505013 are follows:

<Highest Reported standalone SAR Summary>

Classment Class	Frequency Band	Body (Report SAR1-g (W/kg)
		(Separation Distance 0mm)
DTS	WIFI2.4G	0.295
NII	WIFI5.2G	0.208
	WIFI5.8G	0.130

Note
1) This device is in compliance with Specific Absorption Rate (SAR) for general population/uncontrolled exposure limits (1.6 W/kg) specified in FCC 47CFR §2.1093 and ANSI/IEEE C95.1-2019, and had been tested in accordance with the measurement methods and procedures specified in IEEE 1528-2013.
2) The USB cable is smaller than 12 inches and does not affect the radiation characteristics and output power of the transmitter.

1.2. Test Location

Company:	Shenzhen LCS Compliance Testing Laboratory Ltd.
Address:	101, 201 Bldg A & 301 Bldg C, Juji Industrial Park Yabianxueziwei, Shajing Street, Baoan District, Shenzhen, 518000, China
Telephone:	(86)755-82591330
Fax:	(86)755-82591330
Web:	www.LCS-cert.com
E-mail:	webmaster@LCS-cert.com

1.3. Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

Site Description

SAR Lab. : NVLAP Accreditation Code is 600167-0.
FCC Designation Number is CN5024.
CAB identifier is CN0071.
CNAS Registration Number is L4595.
Test Firm Registration Number: 254912.

1.4. Test Laboratory Environment

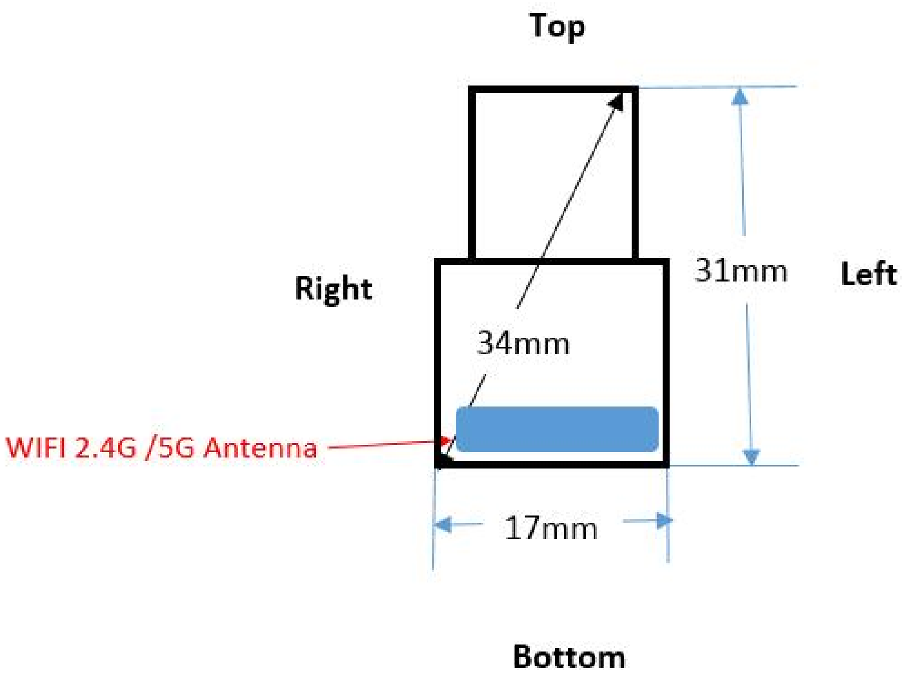
Temperature	Min. = 18°C, Max. = 25 °C
Relative humidity	Min. = 30%, Max. = 70%
Ground system resistance	< 0.5
Atmospheric pressure:	950-1050mbar
Ambient noise is checked and found very low and in compliance with requirement of standards. Reflection of surrounding objects is minimized and in compliance with requirement of standards.	

1.5. Product Description

The **RADIOSHACK WORLDWIDE CORP.** 's Model: 2505013 or the "EUT" as referred to in this report; more general information as follows, for more details, refer to the user's manual of the EUT.

EUT	:	650Mbps USB WiFi Adapter
Test Model	:	2505013
Power Supply	:	Input: DC 5V, 900mA
Hardware Version	:	/
Software Version	:	/
WIFI(2.4G Band)	:	
Frequency Range	:	2412MHz~2462MHz
Channel Spacing	:	5MHz
Channel Number	:	11 Channels for 20MHz bandwidth (2412~2462MHz) 7 Channels for 40MHz bandwidth (2422~2452MHz)
Modulation Type	:	IEEE 802.11b: DSSS (CCK, DQPSK, DBPSK) IEEE 802.11g: OFDM (64QAM, 16QAM, QPSK, BPSK) IEEE 802.11n: OFDM (64QAM, 16QAM, QPSK, BPSK)
Antenna Description	:	External Antenna, 2.82dBi(Max.)
WIFI(5.2G Band)	:	
Frequency Range	:	5180MHz~5240MHz
Channel Number	:	4 Channels for 20MHz bandwidth(5180MHz~5240MHz) 2 channels for 40MHz bandwidth(5190MHz~5230MHz) 1 channels for 80MHz bandwidth(5210MHz)
Modulation Type	:	IEEE 802.11a: OFDM (64QAM, 16QAM, QPSK, BPSK) IEEE 802.11n: OFDM (64QAM, 16QAM, QPSK, BPSK) IEEE 802.11ac: OFDM (256QAM, 64QAM, 16QAM, QPSK, BPSK)
Antenna Description	:	External Antenna, 2.86dBi(Max.)
WIFI(5.8G Band)	:	
Frequency Range	:	5745MHz~5825MHz
Channel Number	:	5 channels for 20MHz bandwidth(5745MHz~5825MHz) 2 channels for 40MHz bandwidth(5755MHz~5795MHz) 1 channels for 80MHz bandwidth(5775MHz)
Modulation Type	:	IEEE 802.11a: OFDM (64QAM, 16QAM, QPSK, BPSK) IEEE 802.11n: OFDM (64QAM, 16QAM, QPSK, BPSK) IEEE 802.11ac: OFDM (256QAM, 64QAM, 16QAM, QPSK, BPSK)
Antenna Description	:	External Antenna, 2.98dBi(Max.)
Exposure category	:	Uncontrolled Environment General Population

1.6. DUT Antenna Locations(Rear View)



Note:

1) The test device is a WIFI Dongle. The overall length and width of a device is＜" 9 cm x 5 cm"

According to the WIFI antennas we can draw the conclusion that:

EUT Sides for SAR Testing							
Mode	Exposure Condition	Front	Back	Left	Right	Top	Bottom
WIFI Antenna	Body 1g SAR	Yes	Yes	Yes	Yes	No	Yes

Table 1: EUT Sides for SAR Testing

1.7. Test Specification

Identity	Document Title
FCC 47CFR §2.1093	Radiofrequency Radiation Exposure Evaluation: Portable Devices
ANSI/IEEE C95.1-2019	IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz – 300 GHz.
IEEE 1528-2013	Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques
KDB 248227 D01	SAR Guidance for IEEE 802 11 Wi-Fi SAR v02r02
KDB 616217 D04	SAR for Tablet and Laptop
KDB 447498 D01	General RF Exposure Guidance v06
KDB 865664 D01	SAR Measurement 100 MHz to 6 GHz v01r04
KDB 865664 D02	RF Exposure Reporting v01r02
KDB 690783 D01	SAR Listings on Grants v01r03

1.8. RF exposure limits

Human Exposure	Uncontrolled Environment General Population	Controlled Environment Occupational
Spatial Peak SAR* (Brain*Trunk)	**1.60 mW/g**	8.00 mW/g
Spatial Average SAR** (Whole Body)	0.08 mW/g	0.40 mW/g
Spatial Peak SAR*** (Hands/Feet/Ankle/Wrist)	**4.00 mW/g**	20.00 mW/g

Notes:

* The Spatial Peak value of the SAR averaged over any 1 gram of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time

** The Spatial Average value of the SAR averaged over the whole body.

*** The Spatial Peak value of the SAR averaged over any 10 grams of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.

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

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

1.9. Equipment list

Test Platform	SPEAG DASY5 Professional
Description	SAR Test System (Frequency range 300MHz-6GHz)
Software Reference	DASY52; SEMCAD X

Hardware Reference

	Equipment	Manufacturer	Model	Serial Number	Calibration Date	Due date of calibration
☒	PC	Lenovo	NA	NA	NA	NA
☒	Twin Phantom	SPEAG	SAM V5.0	1850	NCR	NCR
☒	ELI Phantom	SPEAG	ELI V6.0	2010	NCR	NCR
☒	DAE	SPEAG	DAE3	373	2024/1/3	2025/1/2
☒	E-Field Probe	SPEAG	EX3DV4	3805	2023/11/23	2024/11/22
☒	Validation Kits	SPEAG	D2450V2	808	2023/10/23	2026/10/22
☒	Validation Kits	SPEAG	D5GHzV2	1046	2023/10/23	2026/10/22
☒	Agilent Network Analyzer	Agilent	8753E	SU38432944	2023/6/9	2024/6/8
☒	Dielectric Probe Kit	SPEAG	DAK3.5	1425	NCR	NCR
☒	Universal Radio Communication Tester	R&S	CMW500	42115	2023/10/29	2024/10/28
☒	Directional Coupler	MCLI/USA	4426-20	03746	2023/6/9	2024/6/8
☒	Power meter	Agilent	E4419B	MY45104493	2023/10/29	2024/10/28
☒	Power meter	Agilent	E4419B	MY45100308	2023/10/29	2024/10/28
☒	Power sensor	Agilent	E9301H	MY41495616	2023/10/29	2024/10/28
☒	Power sensor	Agilent	E9301H	MY41495234	2023/10/29	2024/10/28
☒	Signal Generator	Agilent	E4438C	MY49072627	2023/6/9	2024/6/8
☒	Broadband Preamplifier	/	BP-01M18G	P190501	2023/6/15	2024/6/14
☒	DC POWER SUPPLY	I-SHENG	SP-504	NA	NCR	NCR
☒	Speed reading thermometer	HTC-1	NA	LCS-E-138	2023/6/13	2024/6/12

Note: All the equipments are within the valid period when the tests are performed.

2. SAR MEASUREMENTS SYSTEM CONFIGURATION

2.1. SAR Measurement System

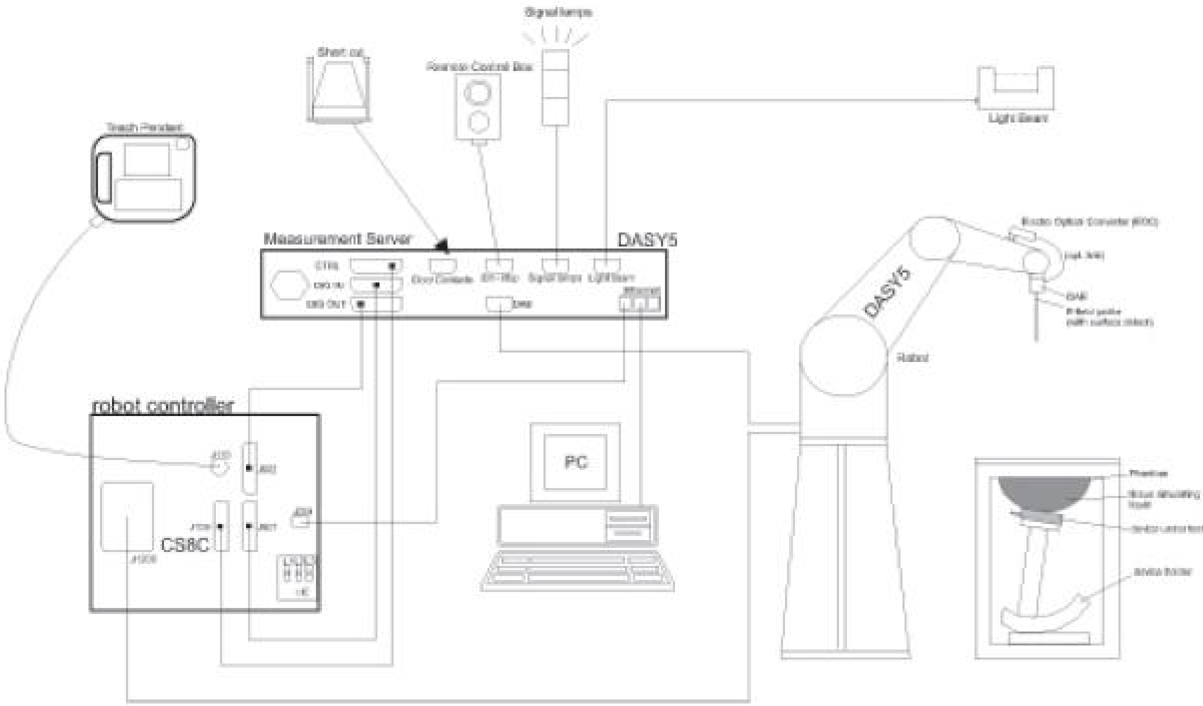
This SAR Measurement System uses a Computer-controlled 3-D stepper motor system (SPEAG DASY5 professional system). A E-field probe is used to determine the internal electric fields. The SAR can be obtained from the equation SAR= σ (|Ei|2)/ ρ where σ and ρ are the conductivity and mass density of the tissue-Simulate.

The DASY5 system for performing compliance tests consists of the following items:
A standard high precision 6-axis robot (Stabile RX family) with controller, teach pendant and software .An arm extension for accommodation the data acquisition electronics (DAE).

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.

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 between optical and electrical of the signals for the digital communication to DAE and for the analog signal from the optical surface detection. The EOC is connected to the measurement server.



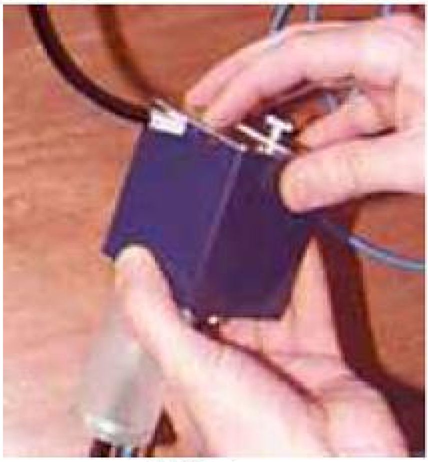
F-1. SAR Measurement System Configuration

- 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.
- A probe alignment unit which improves the (absolute) accuracy of the probe positioning.
- A computer operating Windows 7.
- DASY5 software.
- Remote control with teach pendant and additional circuitry for robot safety such as warning lamps, etc.
- The SAM twin phantom enabling testing left-hand, right-hand and Body Worn usage.
- The device holder for handheld mobile phones.
- Tissue simulating liquid mixed according to the given recipes.
- Validation dipole kits allowing to validating the proper functioning of the system.

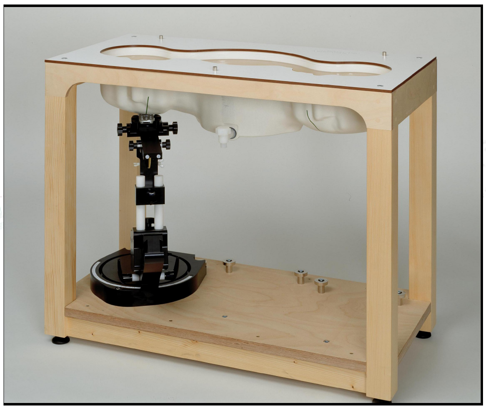
2.2. Isotropic E-field Probe EX3DV4

	Symmetrical design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)
Calibration	ISO/IEC 17025 calibration service available.
Frequency	10 MHz to > 6 GHz Linearity: ± 0.2 dB (30 MHz to 6 GHz)
Directivity	± 0.3 dB in TSL (rotation around probe axis) ± 0.5 dB in TSL (rotation normal to probe axis)
Dynamic Range	10 µW/g to > 100 mW/g Linearity: ± 0.2 dB (noise: typically < 1 µW/g)
Dimensions	Overall length: 337 mm (Tip: 20 mm) Tip diameter: 2.5 mm (Body: 12 mm) Typical distance from probe tip to dipole centers: 1 mm
Application	High precision dosimetric measurements in any exposure scenario (e.g., very strong gradient fields); the only probe that enables compliance testing for frequencies up to 6 GHz with precision of better 30%.
Compatibility	DASY3, DASY4, DASY52 SAR and higher, EASY4/MRI

2.3. Data Acquisition Electronics (DAE)

Model	DAE	
Construction	Signal amplifier, multiplexer, A/D converter and control logic. Serial optical link for communication with DASY4/5 embedded system (fully remote controlled). Two step probe touch detector for mechanical surface detection and emergency robot stop.	
Measurement Range	-100 to +300 mV (16 bit resolution and two range settings: 4mV,400mV)	
Input Offset Voltage	< 5μV (with auto zero)	
Input Bias Current	< 50 f A	
Dimensions	60 x 60 x 68 mm	

2.4. SAM Twin Phantom

Material	Vinylester, glass fiber reinforced (VE-GF)	
Liquid Compatibility	Compatible with all SPEAG tissue simulating liquids (incl. DGBE type)	
Shell Thickness	2 ± 0.2 mm (6 ± 0.2 mm at ear point)	
Dimensions (incl. Wooden Support)	Length: 1000 mm Width: 500 mm Height: adjustable feet	
Filling Volume	approx. 25 liters	
Wooden Support	SPEAG standard phantom table	

The shell corresponds to the specifications of the Specific Anthropomorphic Mannequin (SAM) phantom defined in IEEE 1528 and IEC 62209-1. It enables the dosimetric evaluation of left and right hand phone usage as well as body mounted usage at the flat phantom region. A cover prevents evaporation of the liquid. Reference markings on the phantom allow the complete setup of all predefined phantom positions and measurement grids by teaching three points with the robot.

Twin SAM V5.0 has the same shell geometry and is manufactured from the same material as Twin SAM V4.0, but has reinforced top structure.

2.5. ELI Phantom

Material	Vinylester, glass fiber reinforced (VE-GF)	
Liquid Compatibility	Compatible with all SPEAG tissue simulating liquids (incl. DGBE type)	
Shell Thickness	2.0 ± 0.2 mm (bottom plate)	
Dimensions	Major axis: 600 mm Minor axis: 400 mm	
Filling Volume	approx. 30 liters	
Wooden Support	SPEAG standard phantom table	

Phantom for compliance testing of handheld and body-mounted wireless devices in the frequency range of 30 MHz to 6 GHz. ELI is fully compatible with the IEC 62209-2 standard and all known tissue simulating liquids. ELI has been optimized regarding its performance and can be integrated into our standard phantom tables. A cover prevents evaporation of the liquid. Reference markings on the phantom allow installation of the complete setup, including all predefined phantom positions and measurement grids, by teaching three points. The phantom is compatible with all SPEAG dosimetric probes and dipoles.

ELI V5.0 has the same shell geometry and is manufactured from the same material as ELI4, but has reinforced top structure.

2.6. Device Holder for Transmitters

F-2. **Device Holder for Transmitters**

- The DASY device holder is designed to cope with different positions given in the standard. It has two scales for the device rotation (with respect to the body axis) and the device inclination (with respect to the line between the ear reference points). The rotation centres for both scales are the ear reference point (ERP). Thus the device needs no repositioning when changing the angles.
- The DASY device holder has been made out of low-loss POM material having the following dielectric parameters: relative permittivity 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.

2.7. Measurement procedure

2.7.1. Scanning procedure

Step 1: Power reference measurement

The “reference” and “drift” measurements are located at the beginning and end of the batch process. They measure the field drift at one single point in the liquid over the complete procedure.

Step 2: Area scan

The SAR distribution at the exposed side of the head was measured at a distance of 4mm from the inner surface of the shell. The area covered the entire dimension of the head and the horizontal grid spacing was 15mm*15mm or 12mm*12mm or 10mm*10mm.Based on the area scan data, the area of the maximum absorption was determined by spline interpolation.

Step 3: Zoom scan

Around this point, a volume of 32mm*32mm*30mm (f≤2GHz), 30mm*30mm*30mm (f for 2-3GHz) and 24mm*24mm*22mm (f for 5-6GHz) was assessed by measuring 5x5x7 points (f≤2GHz), 7x7x7 points (f for 2-3GHz) and 7x7x12 points (f for 5-6GHz). On this basis of this data set, the spatial peak SAR value was evaluated with the following procedure:

The data at the surface was extrapolated, since the centre of the dipoles is 2.0mm away from the tip of the probe and the distance between the surface and the lowest measuring point is 1.2mm. (This can be variable. Refer to the probe specification).The extrapolation was based on a least square algorithm. A polynomial of the fourth order was calculated through the points in z-axes. This polynomial was then used to evaluate the points between the surface and the probe tip. The maximum interpolated value was searched with a straight-forward algorithm. Around this maximum the SAR values averaged over the spatial volumes (1g or 10g) were computed using the 3D-Spline interpolation algorithm. The volume was integrated with the trapezoidal algorithm. One thousand points were interpolated to calculate the average. All neighbouring volumes were evaluated until no neighboring volume with a higher average value was found.

The area and zoom scan resolutions specified in the table below must be applied to the SAR measurements 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.

			$\leq$ 3 GHz	> 3 GHz
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}			$\leq$ 2 GHz: $\leq$ 15 mm 2 – 3 GHz: $\leq$ 12 mm	3 – 4 GHz: $\leq$ 12 mm 4 – 6 GHz: $\leq$ 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 $\leq$ 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}			$\leq$ 2 GHz: $\leq$ 8 mm 2 – 3 GHz: $\leq$ 5 mm*	3 – 4 GHz: $\leq$ 5 mm* 4 – 6 GHz: $\leq$ 4 mm*
Maximum zoom scan spatial resolution, normal to phantom surface	uniform grid: $\Delta z_{Zoom}(n)$		$\leq$ 5 mm	3 – 4 GHz: $\leq$ 4 mm 4 – 5 GHz: $\leq$ 3 mm 5 – 6 GHz: $\leq$ 2 mm
	graded grid	$\Delta z_{Zoom}(1)$: between 1st two points closest to phantom surface	$\leq$ 4 mm	3 – 4 GHz: $\leq$ 3 mm 4 – 5 GHz: $\leq$ 2.5 mm 5 – 6 GHz: $\leq$ 2 mm
		$\Delta z_{Zoom}(n>1)$: between subsequent points	$\leq 1.5\cdot\Delta z_{Zoom}(n-1)$	
Minimum zoom scan volume	x, y, z		$\geq$ 30 mm	3 – 4 GHz: $\geq$ 28 mm 4 – 5 GHz: $\geq$ 25 mm 5 – 6 GHz: $\geq$ 22 mm

Step 4: Power reference measurement (drift)

The Power Drift Measurement job measures the field at the same location as the most recent power reference measurement job within the same procedure, and with the same settings. The indicated drift is mainly the variation of the DUT's output power and should vary max. ± 5 %

2.7.2. Data Storage

The DASY software stores the acquired data from the data acquisition electronics as raw data (in microvolt readings from the probe sensors), together with all necessary software parameters for the data evaluation (probe calibration data, liquid parameters and device frequency and modulation data) in measurement files with the extension ".DAE4". The software evaluates the desired unit and format for output each time the data is visualized or exported. This allows verification of the complete software setup even after the measurement and allows correction of incorrect parameter settings. For example, if a measurement has been performed with a wrong crest factor parameter in the device setup, the parameter can be corrected afterwards and the data can be re-evaluated. The measured data can be visualized or exported in different units or formats, depending on the selected probe type ([V/m], [A/m], [°C], [m W/g], [m W/cm²], [dBrel], etc.). Some of these units are not available in certain situations or show meaningless results, e.g., a SAR output in a lossless media will always be zero. Raw data can also be exported to perform the evaluation with other software packages.

2.7.3. Data Evaluation by SEMCAD

The SEMCAD software automatically executes the following procedures to calculate the field units from the microvolt readings at the probe connector. The parameters used in the evaluation are stored in the configuration modules of the software:

Probe parameters: - Sensitivity Normi, ai0, ai1, ai2
- Conversion factor ConvFi
- Diode compression point Dcpi
Device parameters: - Frequency f
- Crest factor cf
Media parameters: - Conductivity ε
- Density ρ

These parameters must be set correctly in the software. They can be found in the component documents or they can be imported into the software from the configuration files issued for the DASY components. In the direct measuring mode of the multimeter option, the parameters of the actual system setup are used. In the scan visualization and export modes, the parameters stored in the corresponding document files are used.

The first step of the evaluation is a linearization of the filtered input signal to account for the compression characteristics of the detector diode. The compensation depends on the input signal, the diode type and the DC-transmission factor from the diode to the evaluation electronics.

If the exciting field is pulsed, the crest factor of the signal must be known to correctly compensate for peak power. The formula for each channel can be given as:

$$V_i = U_i + U_i^2 \cdot cf / dcp_i$$

With Vi = compensated signal of channel i (i = x, y, z)
Ui = input signal of channel i (i = x, y, z)
cf = crest factor of exciting field (DASY parameter)
dcp i = diode compression point (DASY parameter)

From the compensated input signals the primary field data for each channel can be evaluated:

E-field probes:

$$E_i = (V_i / Norm_i \cdot ConvF)^{1/2}$$

H-field probes:

$$H_i = (V_i)^{1/2} \cdot (a_{i0} + a_{i1} f + a_{i2} f^2) / f$$

With Vi = compensated signal of channel i (i = x, y, z)
Normi = sensor sensitivity of channel I (i = x, y, z)
[mV/(V/m)2] for E-field Probes
ConvF = sensitivity enhancement in solution
aij = sensor sensitivity factors for H-field probes
f = carrier frequency [GHz]
Ei = electric field strength of channel i in V/m
Hi = magnetic field strength of channel i in A/m

The RSS value of the field components gives the total field strength (Hermitian magnitude):

$$E_{tot} = (E_x^2 + E_Y^2 + E_z^2)^{1/2}$$

The primary field data are used to calculate the derived field units.

$$SAR = (Etot^2 \cdot \sigma) / (\varepsilon \cdot 1000)$$

with SAR = local specific absorption rate in mW/g
Etot = total field strength in V/m
σ= conductivity in [mho/m] or [Siemens/m]
ε= equivalent tissue density in g/cm3

Note that the density is normally set to 1 (or 1.06), to account for actual brain density rather than the density of the simulation liquid. The power flow density is calculated assuming the excitation field to be a free space field.

$$P_{pwe} = E_{tot}{}^2 2 / 3770 \quad \text{or} \quad P_{pwe} = H_{tot}{}^2 \cdot 37.7$$

with Ppwe = equivalent power density of a plane wave in mW/cm2
Etot = total electric field strength in V/m
Htot = total magnetic field strength in A/m

3. SAR measurement variability and uncertainty

3.1. SAR measurement variability

Per KDB865664 D01 SAR measurement 100 MHz to 6 GHz v01r04, SAR measurement variability must be assessed for each frequency band, which is determined by the SAR probe calibration point and tissue-equivalent medium used for the device measurements. The additional measurements are repeated after the completion of all measurements requiring the same head or body tissue-equivalent medium in a frequency band. The test device should be returned to ambient conditions (normal room temperature) with the battery fully charged before it is re-mounted on the device holder for the repeated measurement(s) to minimize any unexpected variations in the repeated results.

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

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

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

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

The same procedures should be adapted for measurements according to extremity and occupational exposure limits by applying a factor of 2.5 for extremity exposure and a factor of 5 for occupational exposure to the corresponding SAR thresholds.

3.2. SAR measurement uncertainty

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

4. Description of Test Position

4.1. Test Positions Configuration

Test all USB orientations [see figure below: (A) Horizontal-Up, (B) Horizontal-Down, (C) Vertical-Front, and (D) Vertical-Back] with a device-to-phantom separation distance of 5 mm or less, according to KDB Publication 447498 D01 requirements. These test orientations are intended for the exposure conditions found in typical laptop/notebook/netbook or tablet computers with either horizontal or vertical USB connector configurations at various locations in the keyboard section of the computer. Current generation portable host computers should be used to establish the required SAR measurement separation distance. The same test separation distance must be used to test all frequency bands and modes in each USB orientation. The typical Horizontal-Up USB connection (A), found in the majority of host computers, must be tested using an appropriate host computer. A host computer with either Vertical-Front (C) or Vertical-Back (D) USB connection should be used to test one of the vertical USB orientations. If a suitable host computer is not available for testing the Horizontal-Down (B) or the remaining Vertical USB orientation, a high quality USB cable, 12 inches or less, may be used for testing these other orientations. It must be documented that the USB cable does not influence the radiating characteristics and output power of the transmitter.

(A) Horizontal-Up | (B) Horizontal-Down | (C) Vertical-Front | (D) Vertical-Back

5. SAR System Verification Procedure

5.1. Tissue Simulate Liquid

5.1.1. Recipes for Tissue Simulate Liquid

The bellowing tables give the recipes for tissue simulating liquids to be used in different frequency bands：

Ingredients (% by weight)	Frequency (MHz)				
	450	700-900	1750-2000	2300-2500	2500-2700
Water	38.56	40.30	55.24	55.00	54.92
Salt (NaCl)	3.95	1.38	0.31	0.2	0.23
Sucrose	56.32	57.90	0	0	0
HEC	0.98	0.24	0	0	0
Bactericide	0.19	0.18	0	0	0
Tween	0	0	44.45	44.80	44.85

Salt: 99^{+}% Pure Sodium Chloride
Sucrose: 98^{+}% Pure Sucrose
Water: De-ionized, 16 MΩ^{+} resistivity
HEC: Hydroxyethyl Cellulose
Tween: Polyoxyethylene (20) sorbitan monolaurate

HSL5GHz is composed of the following ingredients：
Water：50-65%
Mineral oil：10-30%
Emulsifiers：8-25%
Sodium salt：0-1.5%

Table 2： Recipe of Tissue Simulate Liquid

5.1.2. Measurement for Tissue Simulate Liquid

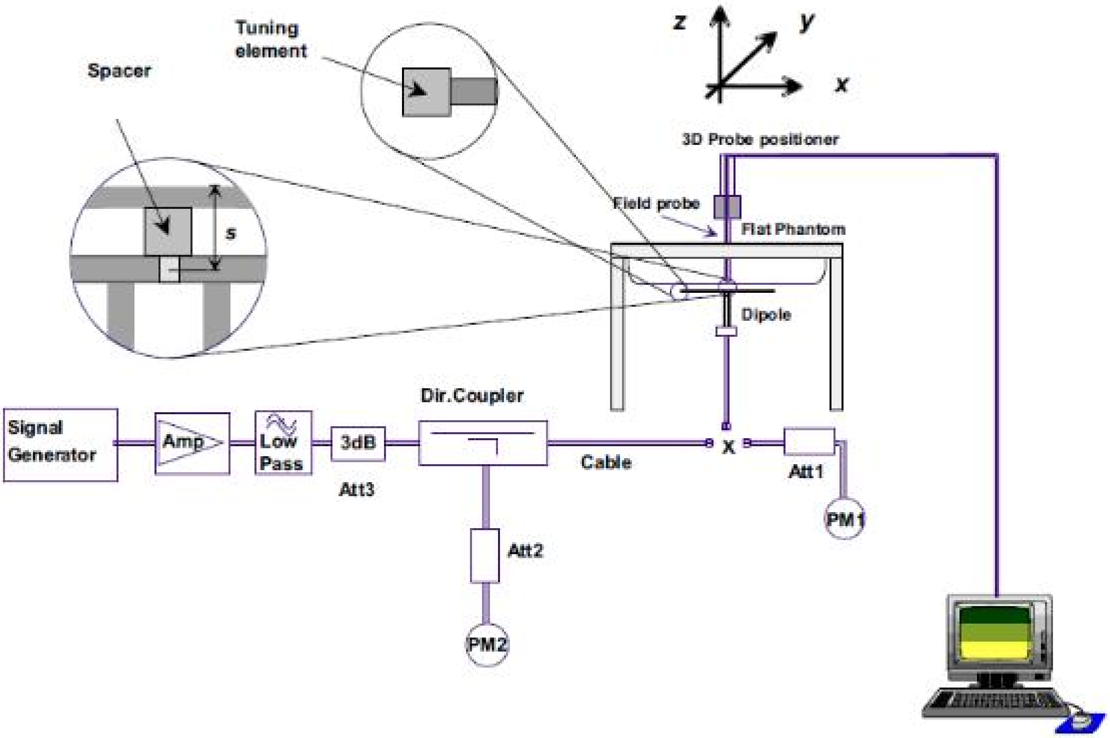
The dielectric properties for this Tissue Simulate Liquids were measured by using the DAKS. The Conductivity (σ) and Permittivity (ρ) are listed in bellow table. For the SAR measurement given in this report. The temperature variation of the Tissue Simulate Liquids was 22±2°C.

Tissue Type	Measured Frequency （MHz）	Target Tissue (±5%)		Measured Tissue		Liquid Temp. (℃)	Measured Date
		ε_r	σ(S/m)	ε_r	σ(S/m)		
2450 Head	2450	39.2 (37.24~41.16)	1.8 (1.71~1.89)	38.764	1.796	22.0	April 19, 2024
5250 Head	5250	36.0 (34.20~37.80)	4.66 (4.43~4.89)	36.214	4.709	23.2	May 10, 2024
5750 Head	5750	35.3 (33.54~37.07)	5.27 (5.01~5.53)	35.754	5.335	23.2	May 10, 2024

Table 3： Measurement result of Tissue electric parameters

5.2. SAR System Check

The microwave circuit arrangement for system Check is sketched in F-1. The daily system accuracy verification occurs within the flat section of the SAM phantom. A SAR measurement was performed to see if the measured SAR was within +/- 10% from the target SAR values. The tests were conducted on the same days as the measurement of the EUT. The obtained results from the system accuracy verification are displayed in the following table (A power level of 250mW (below 3GHz) or 100mW (3-6GHz) was input to the dipole antenna). During the tests, the ambient temperature of the laboratory was in the range 22±2°C, the relative humidity was in the range 60% and the liquid depth above the ear reference points was above 15±0.5 cm in all the cases. It is seen that the system is operating within its specification, as the results are within acceptable tolerance of the reference values.



F-1. the microwave circuit arrangement used for SAR system check

5.2.1. Justification for Extended SAR Dipole Calibrations

1) Referring to KDB865664 D01 requirements for dipole calibration, instead of the typical annual calibration recommended by measurement standards, longer calibration intervals of up to three years may be considered when it is demonstrated that the SAR target, impedance and return loss of a dipole have remain stable according to the following requirements. Each measured dipole is expected to evaluate with the following criteria at least on annual interval in Appendix C.

a) There is no physical damage on the dipole;
b) System check with specific dipole is within 10% of calibrated value;
c) Return-loss is within 20% of calibrated measurement;
d) Impedance is within 5Ω from the previous measurement.

2) Network analyzer probe calibration against air, distilled water and a shorting block performed before measuring liquid parameters.

5.2.2. Summary System Check Result(s)

Validation Kit		Measured SAR 250mW	Measured SAR 250mW	Measured SAR (normalized to 1W)	Measured SAR (normalized to 1W)	Target SAR (normalized to 1W) (±10%)	Target SAR (normalized to 1W (±10%)	Liquid Temp. (℃)	Measured Date
		1g (W/kg)	10g (W/kg)	1g (W/kg)	10g (W/kg)	1-g(W/kg)	10-g(W/kg)		
D2450V2	Head	12.61	5.87	50.44	23.48	53.5 (48.15~58.85)	24.8 (22.32~27.28)	22.2	April 19, 2024
Validation Kit		**Measured SAR 100mW**	**Measured SAR 100mW**	**Measured SAR (normalized to 1W)**	**Measured SAR (normalized to 1W)**	**Target SAR (normalized to 1W) (±10%)**	**Target SAR (normalized to 1W) (±10%)**	**Liquid Temp. (℃)**	**Measured Date**
		1g (W/kg)	**10g (W/kg)**	**1g (W/kg)**	**10g (W/kg)**	**1-g(W/kg)**	**10-g(W/kg)**		
D5GHzV2	Head (5.25GHz)	7.68	2.22	76.80	22.20	78.1 (70.29~85.91)	22.2 (19.98~24.42)	23.2	May 10, 2024
	Head (5.75GHz)	8.15	2.18	81.50	21.80	77.4 (69.66~85.14)	21.6 (19.44~23.76)	23.2	May 10, 2024

Table 4： Please see the Appendx A

6. SAR measurement procedure

The measurement procedures are as follows:

6.1. Conducted power measurement

a. For WLAN/BT power measurement, use engineering software to configure EUT WLAN/BT continuously Transmission, at maximum RF power in each supported wireless interface and frequency band.
b. Connect EUT RF port through RF cable to the power meter, and measure WLAN/BT output power.

6.2. WIFI Test Configuration

For WiFi SAR testing, a communication link is set up with the testing software for WiFi mode test. During the test,at the each test frequency channel, the EUT is operated at the RF continuous emission mode. Per KDB 248227D01, a minimum transmission duty factor of 85% is required to avoid certain hardware and device implementation issues related to wide range SAR scaling. The repotted SAR must be scaled to 100% transmission duty factor to determine compliance at the maximum tune-up tolerance limit.

6.2.1. Initial Test Position Procedure

For exposure condition with multiple test position, such as handsets operating next to the ear, devices with hotspot mode or IJMPC mini-tablet , procedures for initial test position can be applied. Using the transmission mode determined by the DSSS procedure or initial test configuration, area scans are measured for all position in an exposure condition. The test position with the highest extrapolated(peak) SAR is used as the initial test position. When reported SAR for the initial test position is ≤ 0.4W/kg, no additional testing for the remaining test position is required. Otherwise, SAR is evaluated at the subsequent highest peak SAR position until the reported SAR result is ≤ 0.8W/kg or all test position are measured. For all positions/configurations tested using the initial test position and subsequent test positions, when the repotted SAR is > 0.8 W/kg, SAR is measured for these test positions/configurations on the subsequent next highest measured output power channel(s) until the reported SAR is ≤ 1.2 W/kg or all required channels are tested.

6.2.2. Initial Test Configuration Procedure

An initial test configuration is determined for OFDM transmission modes according to the channel bandwidth, modulation and data rate combination(s) with the highest maximum output power specified for production units in each standalone and aggregated frequency band. SAR is measured using the highest measured maximum output power channel. For configurations with the same specified or measured maximum output power, additional transmission mode and test channel selection procedures are required (see section 5.3.2 of KDB 248227D01). SAR test reduction of subsequent highest output test channels is based on the reported SAR of the initial test configuration.
For next to the ear, hotspot mode and CIMC mini-tablet exposure configurations where multiple test positions are required, the initial test position procedure is applied to minimize the number of test positions required for SAR measurement using the initial test configuration transmission mode. For fixed exposure conditions that do not have multiple SAR test positions, SAR is measured in the transmission mode determined by the initial test configuration. When the reported SAR of the initial test configuration is > 0.8 W/kg, SAR measurement is required for the subsequent next highest measured output power channel(s) in the initial test configuration until the repotted SAR is ≤ 1.2 W/kg or all required channels are tested.

6.2.3. Sub Test Configuration Procedure

SAR measurement requirements for the remaining 802 11 transmission mode configurations that have not been tested in the initial test configuration are determined separately for each standalone and aggregated frequency band, in each exposure condition, according to the maximum output power specified for production units.
When the highest reported SAR for the initial test configuration, according to the initial test position or fixed exposure position requirements, is adjusted by the ratio of the subsequent test configuration to initial test configuration specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg, SAR is not required for that subsequent test configuration.

6.2.4. WiFi 2.4G SAR Test Procedures

Separate SAR procedures are applied to DSSS and OFDM configurations in the 2.4 GHz band to simplify DSSS test requirements. For 802.11b DSSS SAR measurements, DSSS SAR procedure applies to fixed exposure test position and initial test position procedure applies to multiple exposure test positions.

a) 802.11b DSSS SAR Test Requirements

SAR is measured for 2.4 GHz 802.11b DSSS using either a fixed test position or, when applicable, the initial test position procedure. SAR test reduction is determined according to the following:

1) When the reported SAR of the highest measured maximum output power channel (section 3.1 of of KD8 248227D01) for the exposure configuration is ≤ 0.8 W/kg, no further SAR testing is required for 802.11b DSSS in that exposure configuration.

2) When the reported SAR is > 0 8 W/kg, SAR is required for that exposure configuration using the next highest measured output power channel. When any reported SAR is > 1.2 W/kg, SAR is required for the third channel; i.e., all channels require testing.

b) 2.4GHz 802.11g/n OFDM SAR Test Exclusion Requirements

When SAR measurement is required for 2.4 GHz 802.11g/n OFDM configurations, the measurement and test reduction procedures for OFDM are applied (section 5.3 of of KD8 248227D01 SAR is not required for the following 2.4 GHz OFDM conditions.

1) When KDB Publication 447498 SAR test exclusion applies to the OFDM configuration.

2) 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.

c) SAR Test Requirements for OFDM configurations

When SAR measurement is required for 802.11 a/g/n/ac OFDM configurations, each standalone and frequency aggregated band is considered separately for SAR test reduction. When the same transmitter and antenna(s) are used for U-NII-I and U-NII-2A bands, additional SAR test reduction applies. When band gap channels between U-NII-2C band and 5.8 GHz U-NII-3 or §15.247 band are supported, the highest maximum output power transmission mode configuration and maximum output power channel across the bands must be used to determine SAR test reduction, according to the initial test configuration and subsequent test configuration requirements. In applying the initial test configuration and subsequent test configuration procedures, the 802.11 transmission configuration with the highest specified maximum output power and the channel within a test configuration with the highest measured maximum output power should be clearly distinguished to apply the procedures.

6.3. Power Reduction

The product without any power reduction.

6.4. Power Drift

To control the output power stability during the SAR test, SAR 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. This ensures that the power drift during one measurement is within ±0.2dB.

7. TEST CONDITIONS AND RESULTS

7.1. Conducted Power Results

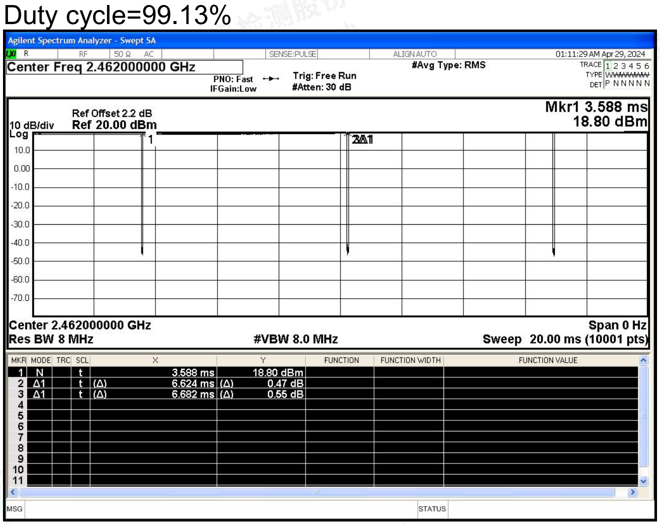
According KDB 447498 D01 General RF Exposure Guidance v06 Section 4.1 2) states that “Unless it is specified differently in the published RF exposure KDB procedures, these requirements also apply to test reduction and test exclusion considerations. Time-averaged maximum conducted output power applies to SAR and, as required by § 2.1091(c), time-averaged ERP applies to MPE. When an antenna port is not available on the device to support conducted power measurement, such as FRS and certain Part 15 transmitters with built-in integral antennas, the maximum output power allowed for production units should be used to determine RF exposure test exclusion and compliance.”

7.1.1. Conducted Power Measurement Results(WIFI 2.4G)

Condition	Mode	Frequency (MHz)	Antenna	Conducted Power (dBm)	Tune Up (dBm)
NVNT	b	2412	Ant1	15.08	16.00
NVNT	b	2437	Ant1	15.45	16.00
NVNT	b	2462	Ant1	**15.88**	**16.00**
NVNT	g	2412	Ant1	14.48	15.00
NVNT	g	2437	Ant1	14.89	15.00
NVNT	g	2462	Ant1	14.68	15.00
NVNT	n20	2412	Ant1	13.85	14.00
NVNT	n20	2437	Ant1	13.1	14.00
NVNT	n20	2462	Ant1	13.03	14.00
NVNT	n40	2422	Ant1	12.44	13.00
NVNT	n40	2437	Ant1	12.2	13.00
NVNT	n40	2452	Ant1	12.14	13.00

Note:
a) Power must be measured at each transmit antenna port according to the DSSS and OFDM transmission configurations in each standalone and aggregated frequency band.
b) Power measurement is required for the transmission mode configuration with the highest maximum output power specified for production units.
1) When the same highest maximum output power specification applies to multiple transmission modes, the largest channel bandwidth configuration with the lowest order modulation and lowest data rate is measured.
2) When the same highest maximum output power is specified for multiple largest channel bandwidth configurations with the same lowest order modulation or lowest order modulation and lowest data rate, power measurement is required for all equivalent 802.11 configurations with the same maximum output power.
c) For each transmission mode configuration, power must be measured for the highest and lowest channels; and at the mid-band channel(s) when there are at least 3 channels. For configurations with multiple mid-band channels, due to an even number of channels, both channels should be measured.

WIFI 2.4G (802.11b):
Duty cycle=99.13%

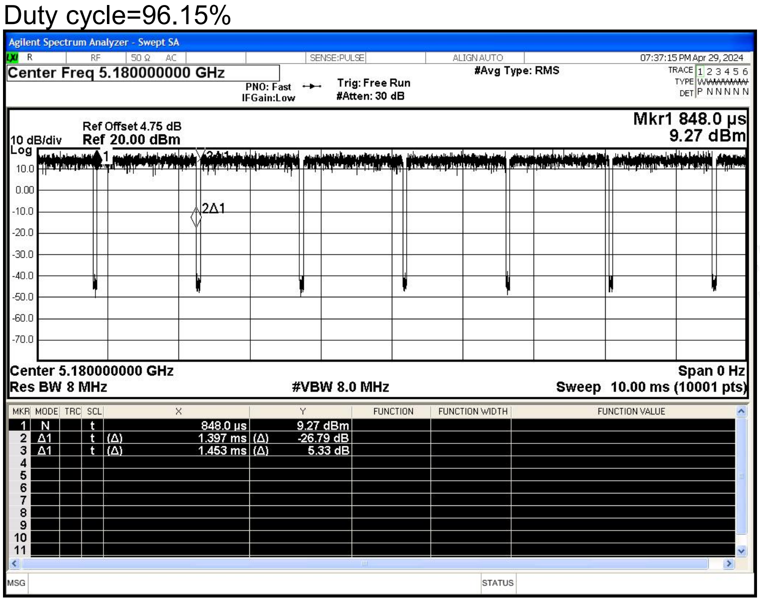


7.1.2. Conducted Power Measurement Results(WIFI 5.2G)

Condition	Mode	Frequency (MHz)	Antenna	Conducted Power (dBm)	Duty Factor (dB)	Total Power (dBm)	Tune Up (dBm)
NVNT	a	5180	Ant1	12.74	0.17	**12.91**	**13.00**
NVNT	a	5200	Ant1	12.47	0.17	12.64	13.00
NVNT	a	5240	Ant1	12.04	0.17	12.21	13.00
NVNT	n20	5180	Ant1	11.24	0.19	11.43	12.00
NVNT	n20	5200	Ant1	11.55	0.18	11.73	12.00
NVNT	n20	5240	Ant1	11.53	0.19	11.72	12.00
NVNT	n40	5190	Ant1	10.44	0.1	10.54	11.00
NVNT	n40	5230	Ant1	10.53	0.1	10.63	11.00
NVNT	ac20	5180	Ant1	11.9	0.27	12.17	12.50
NVNT	ac20	5200	Ant1	11.24	0.27	11.51	12.00
NVNT	ac20	5240	Ant1	10.83	0.27	11.1	12.00
NVNT	ac40	5190	Ant1	10.47	0.28	10.75	11.00
NVNT	ac40	5230	Ant1	10.11	0.28	10.39	11.00
NVNT	ac80	5210	Ant1	9.37	0.39	9.76	10.00

Note:
a) Power must be measured at each transmit antenna port according to the DSSS and OFDM transmission configurations in each standalone and aggregated frequency band.
b) Power measurement is required for the transmission mode configuration with the highest maximum output power specified for production units.
1) When the same highest maximum output power specification applies to multiple transmission modes, the largest channel bandwidth configuration with the lowest order modulation and lowest data rate is measured.
2) When the same highest maximum output power is specified for multiple largest channel bandwidth configurations with the same lowest order modulation or lowest order modulation and lowest data rate, power measurement is required for all equivalent 802.11 configurations with the same maximum output power.
c) For each transmission mode configuration, power must be measured for the highest and lowest channels; and at the mid-band channel(s) when there are at least 3 channels. For configurations with multiple mid-band channels, due to an even number of channels, both channels should be measured.

WIFI 5.2G (802.11a):
Duty cycle=96.15%

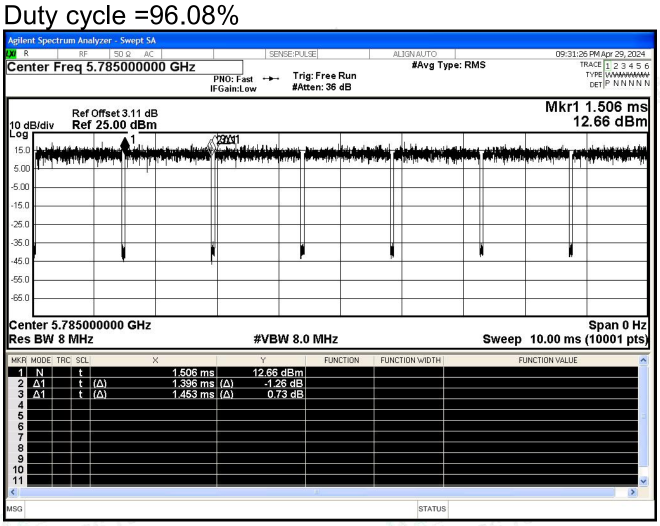


7.1.3. Conducted Power Measurement Results(WIFI 5.8G)

Condition	Mode	Frequency (MHz)	Antenna	Conducted Power (dBm)	Duty Factor (dB)	Total Power (dBm)	Tune Up (dBm)
NVNT	a	5745	Ant1	12.55	0.17	12.72	13.00
NVNT	a	5785	Ant1	12.8	0.17	**12.97**	**13.00**
NVNT	a	5825	Ant1	12.52	0.17	12.69	13.00
NVNT	n20	5745	Ant1	11.62	0.1	11.72	12.00
NVNT	n20	5785	Ant1	11.89	0.1	11.99	12.00
NVNT	n20	5825	Ant1	11.53	0.1	11.63	12.00
NVNT	n40	5755	Ant1	10.89	0.2	11.09	12.00
NVNT	n40	5795	Ant1	10.78	0.2	10.98	11.00
NVNT	ac20	5745	Ant1	11.22	0.27	11.49	12.00
NVNT	ac20	5785	Ant1	11.54	0.27	11.81	12.00
NVNT	ac20	5825	Ant1	11.68	0.27	11.95	12.00
NVNT	ac40	5755	Ant1	10.61	0.28	10.89	11.00
NVNT	ac40	5795	Ant1	10.44	0.28	10.72	11.00
NVNT	ac80	5775	Ant1	9.18	0.39	9.57	10.00

Note:
a) Power must be measured at each transmit antenna port according to the DSSS and OFDM transmission configurations in each standalone and aggregated frequency band.
b) Power measurement is required for the transmission mode configuration with the highest maximum output power specified for production units.
1) When the same highest maximum output power specification applies to multiple transmission modes, the largest channel bandwidth configuration with the lowest order modulation and lowest data rate is measured.
2) When the same highest maximum output power is specified for multiple largest channel bandwidth configurations with the same lowest order modulation or lowest order modulation and lowest data rate, power measurement is required for all equivalent 802.11 configurations with the same maximum output power.
c) For each transmission mode configuration, power must be measured for the highest and lowest channels; and at the mid-band channel(s) when there are at least 3 channels. For configurations with multiple mid-band channels, due to an even number of channels, both channels should be measured.

WIFI 5.8G (802.11a):
Duty cycle =96.08%



7.2. SAR Measurement Results

The calculated SAR is obtained by the following formula:

Reported SAR=Measured SAR*$10^{(Ptarget-Pmeasured))/10}$

Scaling factor=$10^{(Ptarget-Pmeasured))/10}$

Reported SAR= Measured SAR* Scaling factor

Where

P_{target} is the power of manufacturing upper limit;

$P_{measured}$ is the measured power;

Measured SAR is measured SAR at measured power which including power drift)

Reported SAR which including Power Drift and Scaling factor

7.2.1. SAR Results [WIFI 2.4G]

SAR Values [WIFI 2.4G]									
Ch/ Freq. (MHz)	Channel Type	Test Position	Duty Cycle Factor	Conducted Power (dBm)	Maximum Allowed Power (dBm)	PowerDrift (dB)	Scaling Factor	SAR_{1-g} *results(W/kg)*	
								Measured	Reported
measured / reported SAR numbers - Body (distance 0mm)									
11/2462	802.11b	Front side	1.009	15.88	16.00	0.08	1.028	0.245	0.254
11/2462	802.11b	Rear side	1.009	15.88	16.00	-0.18	1.028	**0.284**	**0.295**
11/2462	802.11b	Left side	1.009	15.88	16.00	0.19	1.028	0.121	0.125
11/2462	802.11b	Right side	1.009	15.88	16.00	0.1	1.028	0.116	0.120
11/2462	802.11b	Bottom side	1.009	15.88	16.00	-0.03	1.028	0.154	0.160

Note:

1) The maximum Scaled SAR value is marked in bold. Graph results refer to Appendix B.

2) When the highest reported SAR for the initial test configuration is adjusted by the ratio of the subsequent test configuration to initial test configuration specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg, SAR test for the other 802.11 modes are not required.

7.2.2. SAR Results [WIFI 5.2G]

SAR Values [WIFI 5.2G]									
Ch/ Freq. (MHz)	Channel Type	Test Position	Duty Cycle Factor	Conducted Power (dBm)	Maximum Allowed Power (dBm)	PowerDrift (dB)	Scaling Factor	SAR_{1-g} *results(W/kg)*	
								Measured	Reported
measured / reported SAR numbers - Body (distance 0mm)									
36/5180	802.11a	Front side	1.040	12.91	13.00	-0.17	1.021	0.144	0.153
36/5180	802.11a	Rear side	1.040	12.91	13.00	0.02	1.021	**0.196**	**0.208**
36/5180	802.11a	Left side	1.040	12.91	13.00	0.02	1.021	0.042	0.045
36/5180	802.11a	Right side	1.040	12.91	13.00	-0.15	1.021	0.037	0.039
36/5180	802.11a	Bottom side	1.040	12.91	13.00	0.17	1.021	0.078	0.083

Note:

1) The maximum Scaled SAR value is marked in bold. Graph results refer to Appendix B.

2) When the highest reported SAR for the initial test configuration is adjusted by the ratio of the subsequent test configuration to initial test configuration specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg, SAR test for the other 802.11 modes are not required.

7.2.3. SAR Results [WIFI 5.8G]

SAR Values [WIFI 5.8G]									
Ch/ Freq. (MHz)	Channel Type	Test Position	Duty Cycle Factor	Conducted Power (dBm)	Maximum Allowed Power (dBm)	PowerDrift (dB)	Scaling Factor	SAR_{1-g} *results(W/kg)*	
								Measured	Reported
measured / reported SAR numbers - Body (distance 0mm)									
157/5785	802.11a	Front side	1.041	12.97	13.00	-0.04	1.007	0.088	0.092
157/5785	802.11a	Rear side	1.041	12.97	13.00	-0.14	1.007	**0.124**	**0.130**
157/5785	802.11a	Left side	1.041	12.97	13.00	0.12	1.007	0.032	0.034
157/5785	802.11a	Right side	1.041	12.97	13.00	-0.03	1.007	0.028	0.029
157/5785	802.11a	Bottom side	1.041	12.97	13.00	-0.16	1.007	0.052	0.054

Note:

1) The maximum Scaled SAR value is marked in bold. Graph results refer to Appendix B.

2) When the highest reported SAR for the initial test configuration is adjusted by the ratio of the subsequent test configuration to initial test configuration specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg, SAR test for the other 802.11 modes are not required.

APPENDIX A: DETAILED SYSTEM CHECK RESULTS

1. System Performance Check
System Performance Check 2450 MHz Head
System Performance Check 5250 MHz Head
System Performance Check 5750 MHz Head

Date: 2024/4/19

Test Laboratory: LCS-SAR Lab

System Check_2450Mhz

DUT: D2450V2; Type: D2450V2; Serial: 808

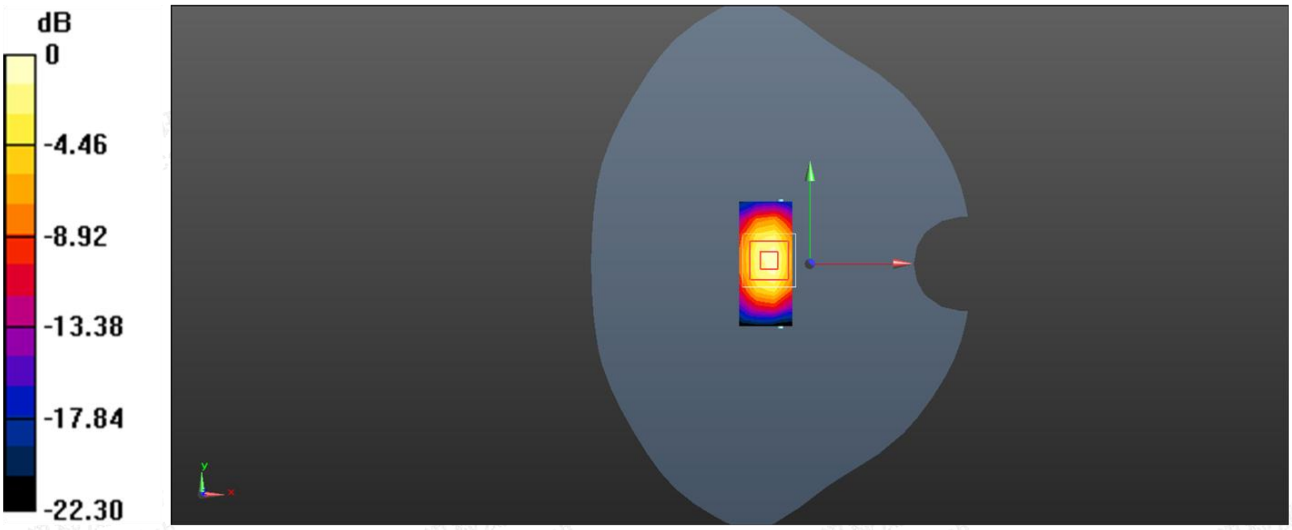
Communication System: UID 0, CW (0); Frequency: 2450 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2450 MHz; σ = 1.796 S/m; ε_r = 38.764; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY Configuration:

- Probe: EX3DV4 - SN3805; ConvF(7.42, 7.42, 7.42); Calibrated: 2023/11/23;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn373; Calibrated: 2024/1/3
- Phantom: SAM v5.0; Type: SAM; Serial: 1850
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Unnamed procedure/Area Scan (4x8x1): Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (measured) = 17.8 W/kg

Configuration/Unnamed procedure/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 88.38 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 26.5 W/kg
SAR(1 g) = 12.61 W/kg; SAR(10 g) = 5.87 W/kg
Maximum value of SAR (measured) = 18.8 W/kg



0 dB = 18.8 W/kg = 12.74 dBW/kg

Date: 2024/5/10

Test Laboratory: LCS-SAR Lab

System Check_5250Mhz

DUT: D5GHzV2; Type: D5GHzV2; Serial: 1046

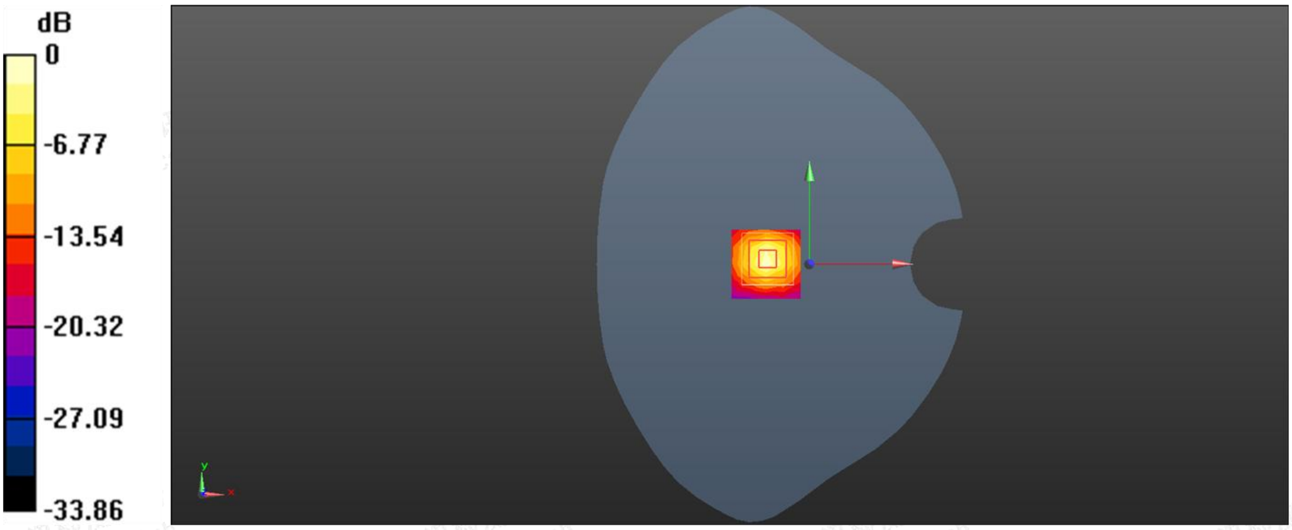
Communication System: UID 0, CW (0); Frequency: 5250 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5250 MHz; σ = 4.709 S/m; ε_r = 36.214; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY Configuration:

- Probe: EX3DV4 - SN3805; ConvF(5.38, 5.38, 5.38); Calibrated: 2023/11/23;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn373; Calibrated: 2024/1/3
- Phantom: SAM v5.0; Type: SAM; Serial: 1850
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Unnamed procedure/Area Scan (5x5x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 18.1 W/kg

Configuration/Unnamed procedure/Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 67.77 V/m; Power Drift = 0.14 dB
Peak SAR (extrapolated) = 30.5 W/kg
SAR(1 g) = 7.68 W/kg; SAR(10 g) = 2.22 W/kg
Maximum value of SAR (measured) = 22.6 W/kg



0 dB = 22.6 W/kg = 13.54 dBW/kg

Date: 2024/5/10

Test Laboratory: LCS-SAR Lab

System Check_5750Mhz

DUT: D5GHzV2; Type: D5GHzV2; Serial: 1046

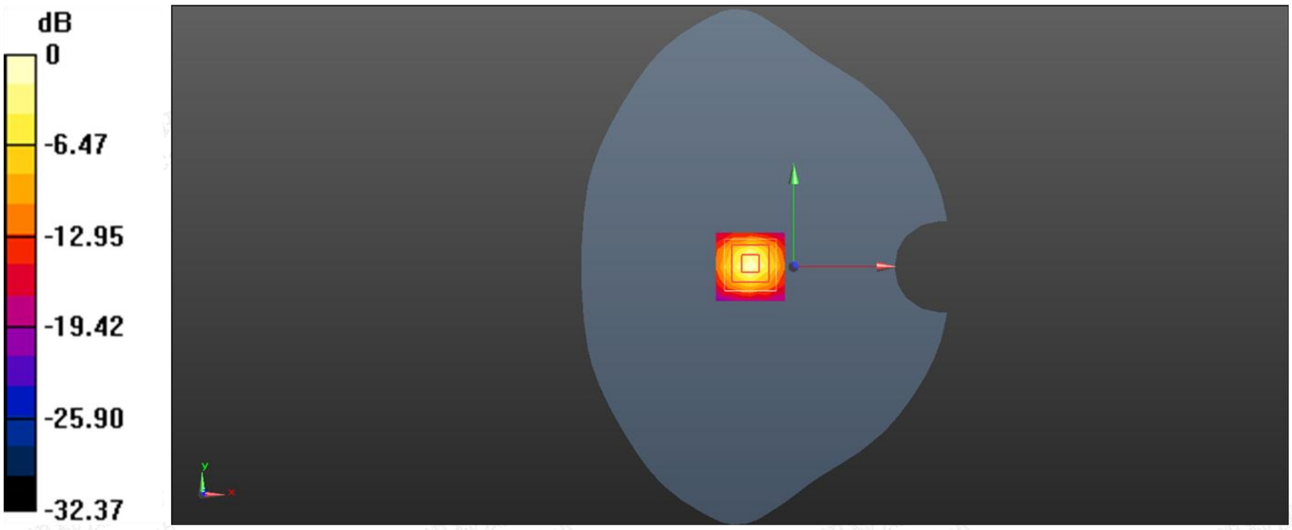
Communication System: UID 0, CW (0); Frequency: 5750 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5750 MHz; σ = 5.335 S/m; ε_r = 35.754; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY Configuration:

- Probe: EX3DV4 - SN3805; ConvF(4.88, 4.88, 4.88); Calibrated: 2023/11/23;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn373; Calibrated: 2024/1/3
- Phantom: SAM v5.0; Type: SAM; Serial: 1850
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Unnamed procedure/Area Scan (5x5x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 18.6 W/kg

Configuration/Unnamed procedure/Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 71.23 V/m; Power Drift = 0.08 dB
Peak SAR (extrapolated) = 31.1 W/kg
SAR(1 g) = 8.15 W/kg; SAR(10 g) = 2.18 W/kg
Maximum value of SAR (measured) = 20.3 W/kg



0 dB = 20.3 W/kg = 13.07 dBW/kg

APPENDIX B: DETAILED TEST RESULTS

1. WIFI
WIFI-2.4G for Body
WIFI-5.2G for Body
WIFI-5.8G for Body

Date: 2024/4/19

Test Laboratory: LCS-SAR Lab

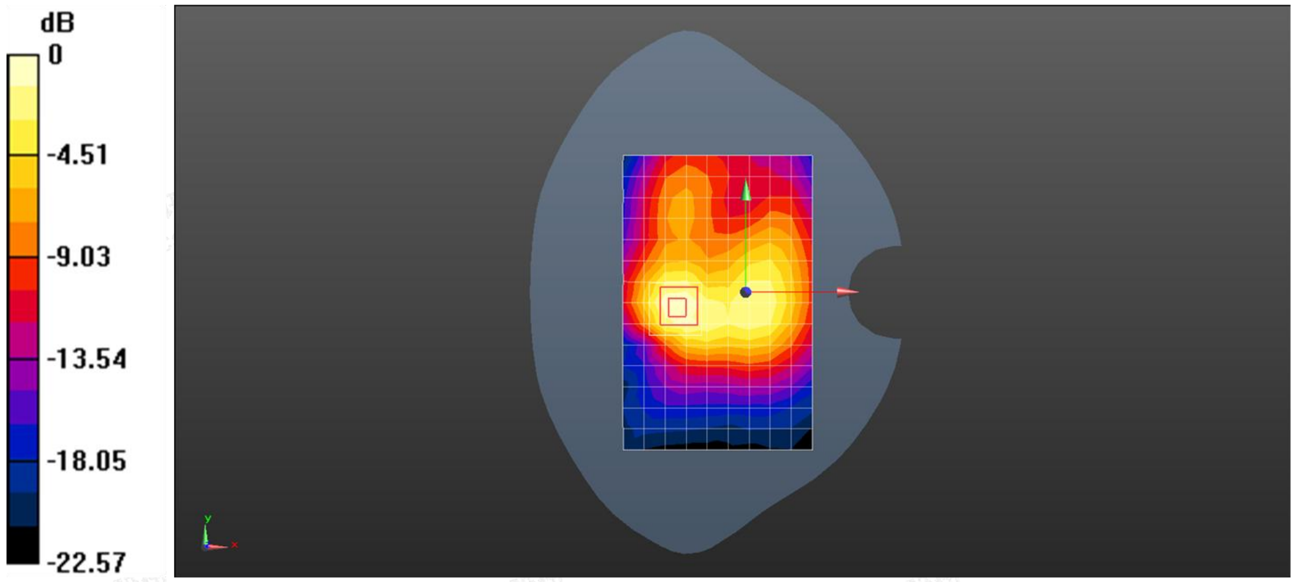
WIFI 2.4G 802.11b 11CH Rear side 0mm

DUT: 650Mbps USB WiFi Adapter; Type: 2505013; Serial: A240410040-1
Communication System: UID 0, WIFI 2.4GHz (0); Frequency: 2462 MHz;Duty Cycle: 1:1.009
Medium parameters used: f = 2462 MHz; σ = 1.786 S/m; ε_r = 39.442; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY Configuration:

- Probe: EX3DV4 - SN3805; ConvF(7.42, 7.42, 7.42); Calibrated: 2023/11/23;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn373; Calibrated: 2024/1/3
- Phantom: SAM v5.0; Type: SAM; Serial: 1850
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Unnamed procedure/Area Scan (10x15x1): Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (measured) = 0.532 W/kg
Configuration/Unnamed procedure/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 8.662 V/m; Power Drift = -0.18 dB
Peak SAR (extrapolated) = 1.11 W/kg
SAR(1 g) = 0.284 W/kg; SAR(10 g) = 0.112 W/kg
Maximum value of SAR (measured) = 0.548 W/kg



0 dB = 0.548 W/kg = -2.61 dBW/kg

Date: 2024/5/10

Test Laboratory: LCS-SAR Lab

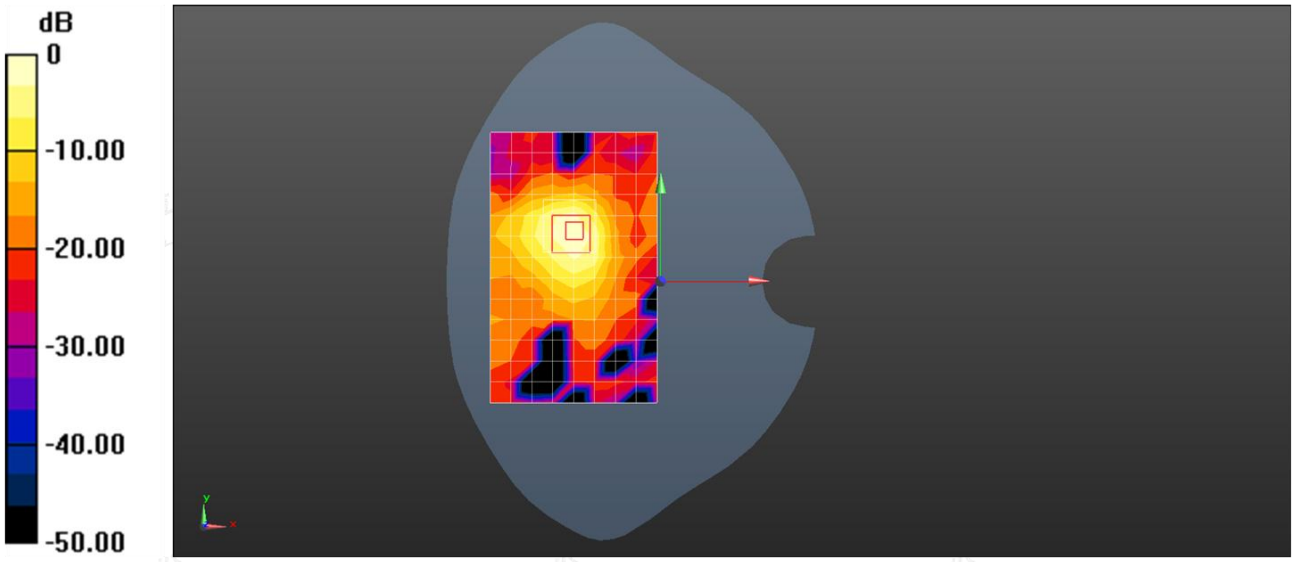
WIFI 5.2G 802.11a 36CH Rear side 0mm

DUT: 650Mbps USB WiFi Adapter; Type: 2505013; Serial: A240410040-1
Communication System: UID 0, WIFI 5GHz (0); Frequency: 5180 MHz;Duty Cycle: 1:1.040
Medium parameters used: f = 5180 MHz; σ =4.754 S/m; ε_r = 36.114; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY Configuration:

- Probe: EX3DV4 - SN3805; ConvF(5.38, 5.38, 5.38); Calibrated: 2023/11/23;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn373; Calibrated: 2024/1/3
- Phantom: SAM v5.0; Type: SAM; Serial: 1850
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Unnamed procedure/Area Scan (11x16x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 0.148 W/kg
Configuration/Unnamed procedure/Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 0.636 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 0.117 W/kg
SAR(1 g) = 0.196 W/kg; SAR(10 g) = 0.089 W/kg
Maximum value of SAR (measured) = 0.164 W/kg



0 dB = 0.164 W/kg = -7.85 dBW/kg

Date: 2024/5/10

Test Laboratory: LCS-SAR Lab

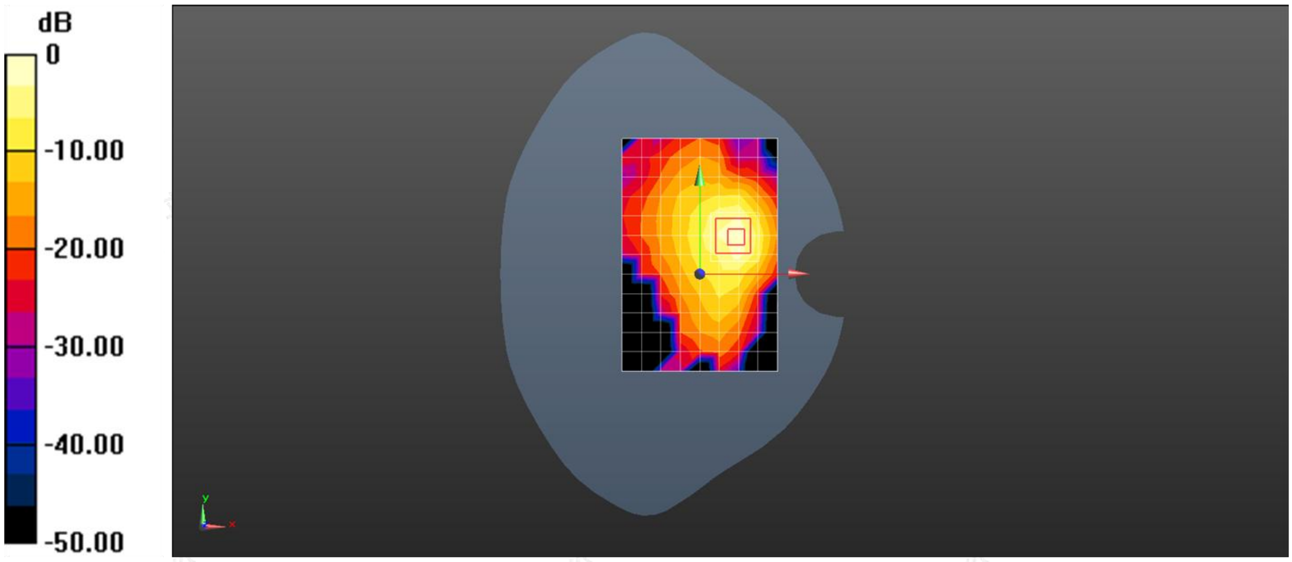
WIFI 5.8G 802.11a 157CH Rear side 0mm

DUT: 650Mbps USB WiFi Adapter; Type: 2505013; Serial: A240410040-1
Communication System: UID 0, WIFI 5GHz; Frequency: 5785 MHz;Duty Cycle: 1:1.041
Medium parameters used: f = 5785 MHz; σ =5.232 S/m; ε_r = 35.621; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY Configuration:

- Probe: EX3DV4 - SN3805; ConvF(4.88, 4.88, 4.88); Calibrated: 2023/11/23;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn373; Calibrated: 2024/1/3
- Phantom: SAM v5.0; Type: SAM; Serial: 1850
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Unnamed procedure/Area Scan (11x16x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 0.244 W/kg
Configuration/Unnamed procedure/Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 1.635 V/m; Power Drift = -0.14 dB
Peak SAR (extrapolated) = 0.321 W/kg
SAR(1 g) = 0.124 W/kg; SAR(10 g) = 0.048 W/kg
Maximum value of SAR (measured) = 0.269 W/kg



0 dB = 0.269 W/kg = -5.70 dBW/kg

APPENDIX C: CALIBRATION CERTIFICATE

1. Dipole
D2450V2-SN 808(2023-10-23)
D5GHzV2-SN 1046(2023-10-23)
2. DAE
DAE3-SN 373(2024-01-03)
3. Probe
EX3DV4-SN 3805(2023-11-23)

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E-mail: cttl@chinattl.com http://www.caict.ac.cn

Client **SHENZHEN LCS** **Certificate No: 23J02Z80105**

CALIBRATION CERTIFICATE

Object	D2450V2 - SN: 808
Calibration Procedure(s)	FF-Z11-003-01 Calibration Procedures for dipole validation kits
Calibration date:	October 23, 2023

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
Power Meter NRP2	106276	15-May-23 (CTTL, No.J23X04183)	May-24
Power sensor NRP6A	101369	15-May-23 (CTTL, No.J23X04183)	May-24
Reference Probe EX3DV4	SN 3617	31-Mar-23(CTTL-SPEAG,No.Z23-60161)	Mar-24
DAE4	SN 1556	11-Jan-23(CTTL-SPEAG,No.Z23-60034)	Jan-24
Secondary Standards	**ID #**	**Cal Date (Calibrated by, Certificate No.)**	**Scheduled Calibration**
Signal Generator E4438C	MY49071430	05-Jan-23 (CTTL, No. J23X00107)	Jan-24
NetworkAnalyzer E5071C	MY46110673	10-Jan-23 (CTTL, No. J23X00104)	Jan-24

	Name	Function	Signature
Calibrated by:	Zhao Jing	SAR Test Engineer	[signature]
Reviewed by:	Lin Hao	SAR Test Engineer	[signature]
Approved by:	Qi Dianyuan	SAR Project Leader	[signature]

Issued: October 31, 2023

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Glossary:

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

Calibration is Performed According to the Following Standards:

a) IEC/IEEE 62209-1528, "Measurement Procedure for The Assessment of Specific Absorption Rate of Human Exposure to Radio Frequency Fields from Hand-held and Body-mounted Wireless Communication Devices- Part 1528: Human Models, Instrumentation and Procedures (Frequency range of 4 MHz to 10 GHz)", October 2020

b) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

c) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

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Measurement Conditions

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

DASY Version	DASY52	52.10.4
Extrapolation	Advanced Extrapolation	
Phantom	Triple Flat Phantom 5.1C	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	2450 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	39.2	1.80 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	39.6 ± 6 %	1.81 mho/m ± 6 %
Head TSL temperature change during test	<1.0 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	13.4 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**53.5 W/kg ± 18.8 % (*k*=2)**
SAR averaged over 10 cm^3 (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	6.21 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**24.8 W/kg ± 18.7 % (*k*=2)**

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Appendix (Additional assessments outside the scope of CNAS L0570)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	51.4Ω+ 4.73jΩ
Return Loss	- 26.3dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.061 ns

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

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

Additional EUT Data

Manufactured by	SPEAG

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DASY5 Validation Report for Head TSL Date: 2023-10-23

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 808

Communication System: UID 0, CW; Frequency: 2450 MHz

Medium parameters used: f = 2450 MHz; σ = 1.813 S/m; ε_r = 39.57; ρ = 1000 kg/m^3

Phantom section: Right Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3617; ConvF(7.68, 7.68, 7.68) @ 2450 MHz; Calibrated: 2023-03-31
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1556; Calibrated: 2023-01-11
- Phantom: MFP_V5.1C (20deg probe tilt); Type: QD 000 P51 Cx; Serial: 1062
- DASY52 52.10.4(1535); SEMCAD X 14.6.14(7501)

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

Reference Value = 97.77 V/m; Power Drift = -0.01 dB

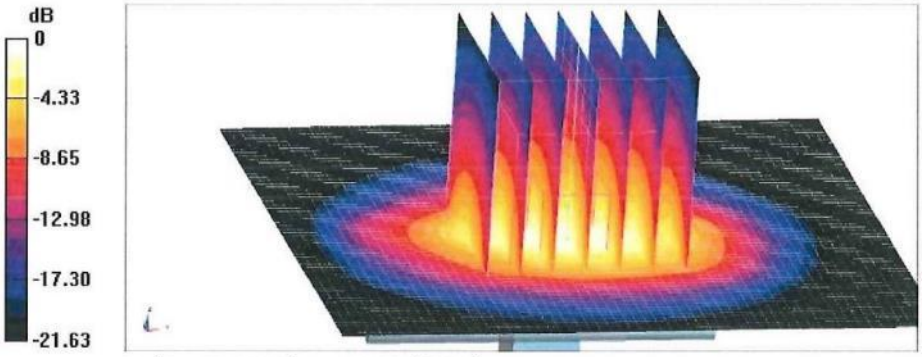
Peak SAR (extrapolated) = 27.8 W/kg

SAR(1 g) = 13.4 W/kg; SAR(10 g) = 6.21 W/kg

Smallest distance from peaks to all points 3 dB below = 8.9 mm

Ratio of SAR at M2 to SAR at M1 = 48.9%

Maximum value of SAR (measured) = 22.5 W/kg



0 dB = 22.5 W/kg = 13.52 dBW/kg

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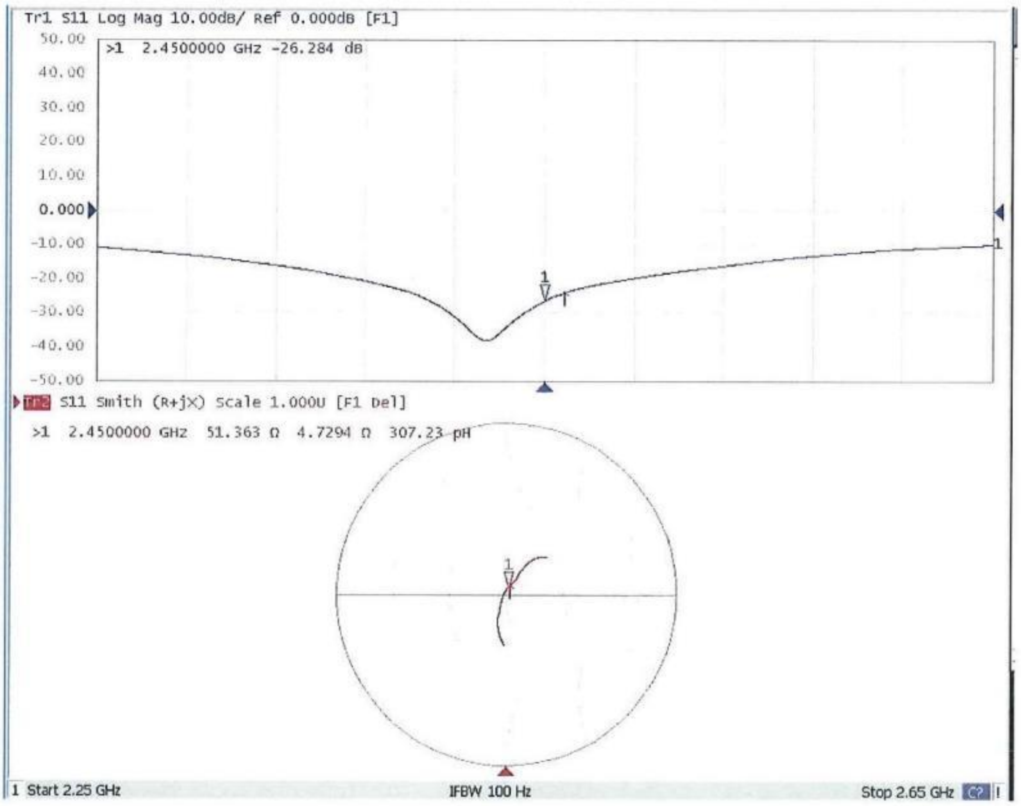
Impedance Measurement Plot for Head TSL



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Client SHENZHEN LCS Certificate No: 23J02Z80106

CALIBRATION CERTIFICATE

Object D5GHzV2 - SN: 1046

Calibration Procedure(s) FF-Z11-003-01
Calibration Procedures for dipole validation kits

Calibration date: October 23, 2023

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
Power Meter NRP2	106276	15-May-23 (CTTL, No.J23X04183)	May-24
Power sensor NRP6A	101369	15-May-23 (CTTL, No.J23X04183)	May-24
Reference Probe EX3DV4	SN 3617	31-Mar-23(CTTL-SPEAG,No.Z23-60161)	Mar-24
DAE4	SN 1556	11-Jan-23(CTTL-SPEAG,No.Z23-60034)	Jan-24
Secondary Standards	**ID #**	**Cal Date (Calibrated by, Certificate No.)**	**Scheduled Calibration**
Signal Generator E4438C	MY49071430	05-Jan-23 (CTTL, No. J23X00107)	Jan-24
NetworkAnalyzer E5071C	MY46110673	10-Jan-23 (CTTL, No. J23X00104)	Jan-24

	Name	Function	Signature
Calibrated by:	Zhao Jing	SAR Test Engineer	
Reviewed by:	Lin Hao	SAR Test Engineer	
Approved by:	Qi Dianyuan	SAR Project Leader	

Issued: October 31, 2023

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Glossary:

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

Calibration is Performed According to the Following Standards:

a) IEC/IEEE 62209-1528, "Measurement Procedure for The Assessment of Specific Absorption Rate of Human Exposure to Radio Frequency Fields from Hand-held and Body-mounted Wireless Communication Devices- Part 1528: Human Models, Instrumentation and Procedures (Frequency range of 4 MHz to 10 GHz)", October 2020

b) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

c) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

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Measurement Conditions

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

DASY Version	DASY52	52.10.4
Extrapolation	Advanced Extrapolation	
Phantom	Triple Flat Phantom 5.1C	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy = 4 mm, dz = 1.4 mm	Graded Ratio = 1.4 (Z direction)
Frequency	5250 MHz ± 1 MHz 5600 MHz ± 1 MHz 5750 MHz ± 1 MHz	

Head TSL parameters at 5250MHz

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	35.9	4.71 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	35.7 ± 6 %	4.75 mho/m ± 6 %
Head TSL temperature change during test	<1.0 °C	----	----

SAR result with Head TSL at 5250MHz

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	7.82 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**78.1 W/kg ± 24.4 % (*k*=2)**
SAR averaged over 10 cm^3 (10 g) of Head TSL	Condition	
SAR measured	100 mW input power	2.22 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**22.2 W/kg ± 24.2 % (*k*=2)**

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Head TSL parameters at 5600MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.5	5.07 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	35.1 ± 6 %	5.14 mho/m ± 6 %
Head TSL temperature change during test	<1.0 °C	----	----

SAR result with Head TSL at 5600MHz

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.20 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**81.9 W/kg ± 24.4 % (*k*=2)**
SAR averaged over 10 cm^3 (10 g) of Head TSL	Condition	
SAR measured	100 mW input power	2.31 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**23.1 W/kg ± 24.2 % (*k*=2)**

Head TSL parameters at 5750MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.4	5.22 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	34.9 ± 6 %	5.30 mho/m ± 6 %
Head TSL temperature change during test	<1.0 °C	----	----

SAR result with Head TSL at 5750MHz

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	7.76 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**77.4 W/kg ± 24.4 % (*k*=2)**
SAR averaged over 10 cm^3 (10 g) of Head TSL	Condition	
SAR measured	100 mW input power	2.17 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**21.6 W/kg ± 24.2 % (*k*=2)**

In Collaboration with
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Appendix (Additional assessments outside the scope of CNAS L0570)

Antenna Parameters with Head TSL at 5250MHz

Impedance, transformed to feed point	49.9Ω- 3.71jΩ
Return Loss	- 28.6dB

Antenna Parameters with Head TSL at 5600MHz

Impedance, transformed to feed point	55.3Ω+ 0.26jΩ
Return Loss	- 25.9dB

Antenna Parameters with Head TSL at 5750MHz

Impedance, transformed to feed point	54.6Ω+ 1.18jΩ
Return Loss	- 26.8dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.105 ns

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

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

Additional EUT Data

Manufactured by	SPEAG