TEST REPORT

Applicant Name : Shenzhen Four Seas Global Link Network Technology Co., Ltd
Address : Room 607-610, Block B, TAOJINDI Electronic Business Incubation Base, Tenglong Road， Longhua District, Shenzhen China
Report Number : SZ4240129-13293E-20A
FCC ID: OYR-CF-AC1300

Test Standard (s)

FCC 47 CFR part 2.1093

Sample Description

Product Type: Wi-Fi Dongle
Model No.: CF-AC1300
Multiple Model(s) No.: CF-913AC V2
Trade Mark: COMFAST

Date Received: 2024/02/23
Date of Test: 2024/02/24~2024/02/29
Issue Date: 2024/04/03

Test Result:	Pass▲

▲In the configuration tested, the EUT complied with the standards above.

Prepared and Checked By:

Sid Luo
SAR Engineer

Approved By:

Luke Jiang
SAR Engineer

Note: The information marked#is provided by the applicant, the laboratory is not responsible for its authenticity and this information can affect the validity of the result in the test report. Customer model name, addresses, names, trademarks etc. are included.

This report may contain data that are not covered by the NVLAP accreditation and are marked with an asterisk "▼".

Attestation of Test Results			
EUT Information	**EUT Description**	Wi-Fi Dongle	
	Tested Model	CF-AC1300	
	Multiple Model(s) No.:	CF-913AC V2	
	Trade Mark	COMFAST	
	FCC ID:	OYR-CF-AC1300	
	Serial Number	2HVZ-1	
	Test Date	2024/02/24~2024/02/29	
MODE		**Max. SAR Level(s) Reported(W/kg)**	**Limit (W/kg)**
ANT1 2.4G Wi-Fi	1g Body SAR	0.19	1.6
ANT1 5.2G Wi-Fi	1g Body SAR	0.79	
ANT2 2.4G Wi-Fi	1g Body SAR	0.02	
ANT2 5.2G Wi-Fi	1g Body SAR	0.79	
Simultaneous	1g Body SAR	1.58	

Applicable Standards	**FCC 47 CFR part 2.1093** Radiofrequency radiation exposure evaluation: portable devices
	RF Exposure Procedures: TCB Workshop
	IEEE1528:2013 IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques
	KDB procedures 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 447498 D02 SAR Procedures for Dongle Xmtr v02r01.

Note: This wireless device has been shown to be capable of compliance for localized specific absorption rate (SAR) for General Population/Uncontrolled Exposure limits specified in **FCC 47 CFR part 2.1093** and has been tested in accordance with the measurement procedures specified in IEEE 1528-2013 and RF exposure KDB procedures.

The results and statements contained in this report pertain only to the device(s) evaluated.

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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	SZ4240129-13293E-20A	Original Report	2024/04/03

EUT DESCRIPTION

This report has been prepared on behalf of ***Shenzhen Four Seas Global Link Network Technology Co., Ltd*** and their product ***Wi-Fi Dongle***, Model: ***CF-AC1300***, FCC ID: ***OYR-CF-AC1300*** or the EUT (Equipment under Test) as referred to in the rest of this report.

Technical Specification

Device Type:	Portable
Exposure Category:	Population / Uncontrolled
Antenna Type(s):	Internal Antenna
Proximity sensor for SAR reduction:	None
Operation modes:	Wi-Fi
Frequency Band:	2.4G Wi-Fi: 2412 MHz-2462 MHz 5.2G Wi-Fi: 5150 MHz-5250 MHz
Voltage Range:	DC 5V

REFERENCE, STANDARDS, AND GUIDELINES

FCC:

The Report and Order requires routine SAR evaluation prior to equipment authorization of portable transmitter devices, including portable telephones. For consumer products, the applicable limit is 1.6 mW/g as recommended by the ANSI/IEEE standard C95.1-1992 [6] for an uncontrolled environment (Paragraph 65). According to the Supplement C of OET Bulletin 65 "Evaluating Compliance with FCC Guide-lines for Human Exposure to Radio frequency Electromagnetic Fields", released on Jun 29, 2001 by the FCC, the device should be evaluated at maximum output power (radiated from the antenna) under "worst-case" conditions for normal or intended use, incorporating normal antenna operating positions, device peak performance frequencies and positions for maximum RF energy coupling.

This report describes the methodology and results of experiments performed on wireless data terminal. The objective was to determine if there is RF radiation and if radiation is found, what is the extent of radiation with respect to safety limits. SAR (Specific Absorption Rate) is the measure of RF exposure determined by the amount of RF energy absorbed by human body (or its parts) – to determine how the RF energy couples to the body or head which is a primary health concern for body worn devices. The limit below which the exposure to RF is considered safe by regulatory bodies in North America is 1.6 mW/g average over 1 gram of tissue mass.

SAR Limits

FCC Limit(1g Tissue)

EXPOSURE LIMITS	SAR (W/kg)	
	(General Population / Uncontrolled Exposure Environment)	(Occupational / Controlled Exposure Environment)
Spatial Average (averaged over the whole body)	0.08	0.4
Spatial Peak (averaged over any 1 g of tissue)	**1.6**	8.0
Spatial Peak (hands/wrists/feet/ankles averaged over 10 g)	4.0	20.0

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

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

General Population/Uncontrolled environments Spatial Peak limit 1.6W/kg (FCC) applied to the EUT.

FACILITIES

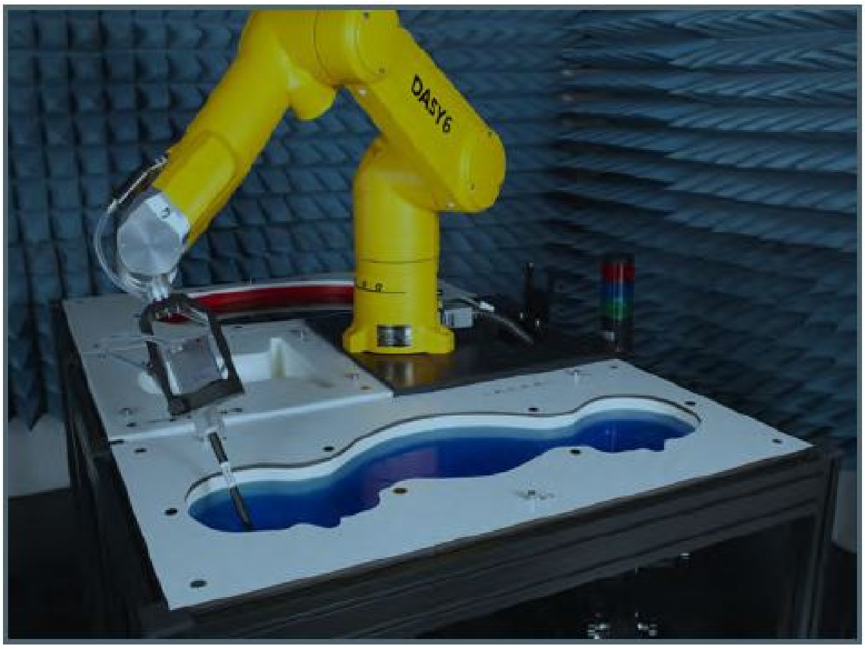
The test site used by Bay Area Compliance Laboratories Corp. (Shenzhen) to collect data is located at 5F(B-West) ,6F,7F,the 3rd Phase of Wan Li Industrial Building D,Shihua Rd, FuTian Free Trade Zone, Shenzhen, China

The lab has been recognized as the FCC accredited lab under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No.: 715558, the FCC Designation No.: CN5045.

Each test item follows test standards and with no deviation.

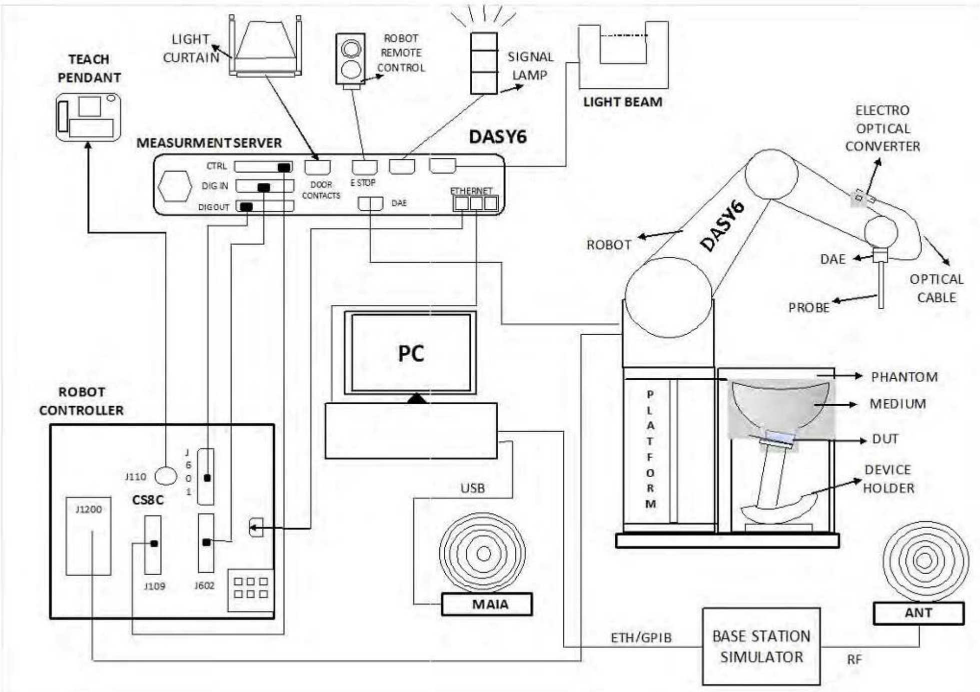
DESCRIPTION OF TEST SYSTEM

These measurements were performed with the automated near-field scanning system DASY6 from Schmid & Partner Engineering AG (SPEAG) which is the Fifth generation of the system shown in the figure hereinafter:



DASY6 System Description

The DASY6 system for performing compliance tests consists of the following items:



- A standard high precision 6-axis robot (Staubli TX=RX family) with controller, teach pendANT 1nd software. An arm extension for accommodating the data acquisition electronics (DAE).
- An isotropic field probe optimized and calibrated for the targeted measurement.
- A data acquisition electronics (DAE) which performs the signal application, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.
- The Electro-optical converter (EOC) performs the conversion from optical to electrical signals for the digital communication to the DAE. To use optical surface detection, a special version of the EOC is required. The EOC signal is transmitted to the measurement server.
- The function of the measurement server is to perform the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
- The Light Beam used is for probe alignment. This improves the (absolute) accuracy of the probe positioning.
- A computer running Win7 professional operating system and the DASY52 software.
- Remote control and teach pendANT 1s well as additional circuitry for robot safety such as warning lamps, etc.
- The phantom, the device holder and other accessories according to the targeted measurement.

DASY6 Measurement Server

The DASY6 measurement server is based on a PC/104 CPU board with a 400 MHz Intel ULV Celeron, 128 MB chip-disk and 128 MB RAM. The necessary circuits for communication with the DAE4 (or DAE3) electronics box, as well as the 16-bit AD converter system for optical detection and digital I/O interface are contained on the DASY6 I/O board, which is directly connected to the PC/104 bus of the CPU board.

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

Data Acquisition Electronics

The data acquisition electronics (DAE4) consist of a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16 bit AD-converter and a command decoder with a control logic unit. Transmission to the measurement server is accomplished through an optical downlink for data and status information, as well as an optical uplink for commands and the clock.

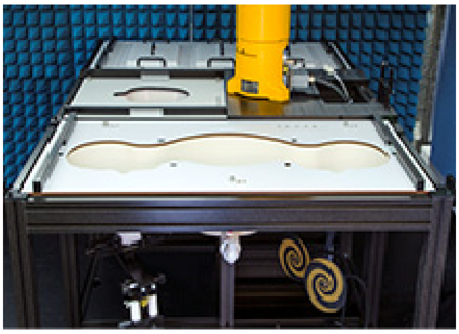
The mechanical probe mounting device includes two different sensor systems for frontal and sideways probe contacts. They are used for mechanical surface detection and probe collision detection.

The input impedance of both the DAE4 as well as of the DAE3 box is 200MOhm; the inputs are symmetrical and floating. Common mode rejection is above 80 dB.

EX3DV4 E-Field Probes

Frequency	4 MHz to >10 GHz Linearity: ± 0.2 dB (30 MHz to 10 GHz)
Directivity	± 0.1 dB in TSL (rotation around probe axis) ± 0.3 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, EASY6, EASY4/MRI

SAM Twin Phantom



The SAM Twin Phantom (shown in front of DASY6) is a fiberglass shell phantom with shell thickness 2 mm, except in the ear region where the thickness is increased to 6 mm. The phantom has three measurement areas: 1) Left Head, 2) Right Head, and 3) Flat Section. For larger devices, the use of the ELI-Phantom (shown behind DASY6) is required. For devices such as glasses with a wireless link, the Face Down Phantom is the most suitable (between the SAM Twin and ELI phantoms).

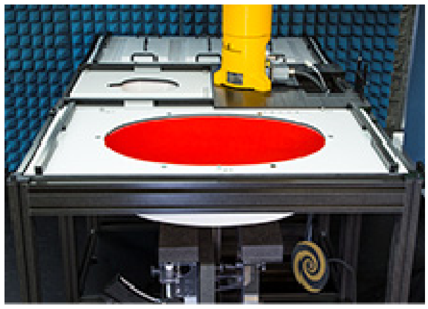
When the phantom is mounted inside allocated slot of the DASY6 platform, phantom reference points can be taught directly in the DASY5 V5.2software. When the DASY6 platform is used to mount the

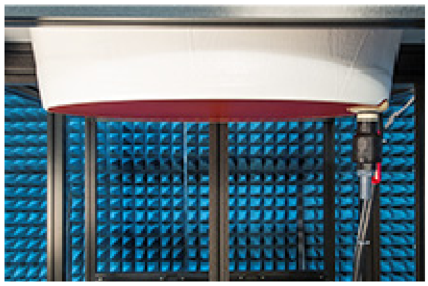
Phantom, some of the phantom teaching points cannot be reached by the robot in DASY5 V5.2. A special tool called P1a-P2aX-Former is provided to transform two of the three points, P1 and P2, to reachable locations. To use these new teaching points, a revised phantom configuration file is required.
In addition to our standard broadband liquids, the phantom can be used with the following tissue simulating liquids:

Sugar-water-based liquids can be left permanently in the phantom. Always cover the liquid when the system is not in use to prevent changes in liquid parameters due to water evaporation.
DGBE-based liquids should be used with care. As DGBE is a softener for most plastics, the liquid should be taken out of the phantom, and the phantom should be dried when the system is not in use (desirable at least once a week).

Do not use other organic solvents without previously testing the solvent resistivity of the phantom.
Approximately 25 liters of liquid is required to fill the SAM Twin phantom.

ELI Phantom





The ELI phantom is intended for compliance testing of handheld and body-mounted wireless devices in the frequency range of 30MHz to 6 GHz. ELI is fully compatible with the latest draft of the standard IEC 62209-2 and the use of all known tissue simulating liquids. ELI has been optimized for performance and can be integrated into a SPEAG standard phantom table. A cover is provided to prevent evaporation of water and changes in liquid parameters. 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 can be used with the following tissue simulating liquids:

- Sugar-water-based liquids can be left permanently in the phantom. Always cover the liquid when the system is not in use to prevent changes in liquid parameters due to water evaporation.

- DGBE-based liquids should be used with care. As DGBE is a softener for most plastics, the liquid should be taken out of the phantom, and the phantom should be dried when the system is not in use (desirable at least once a week).

- Do not use other organic solvents without previously testing the solvent resistivity of the phantom.

Approximately 25 liters of liquid is required to _fill the ELI phantom.

Robots

The DASY6 system uses the high-precision industrial robots TX60L, TX90XL, and RX160L from Staubli SA (France). The TX robot family - the successor of the well-known RX robot family - continues to offer the features important for DASY6 applications:

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

The robots are controlled by the Staubli CS8c robot controllers. All information regarding the use and maintenance of the robot arm and the robot controller is provided

Calibration Frequency Points for EX3DV4 E-Field Probes SN: 7382 Calibrated: 2023/09/27

Calibration Frequency Point(MHz)	Frequency Range(MHz)		Conversion Factor		
	From	To	X	Y	Z
750 Head	650	850	10.65	10.65	10.65
900 Head	850	1000	10.19	10.19	10.19
1750 Head	1650	1850	8.60	8.60	8.60
1900 Head	1850	2000	8.30	8.30	8.30
2300 Head	2200	2400	8.16	8.16	8.16
2450 Head	2400	2550	7.89	7.89	7.89
2600 Head	2550	2700	7.65	7.65	7.65
3300 Head	3200	3400	7.39	7.39	7.39
3500 Head	3400	3600	7.24	7.24	7.24
3700 Head	3600	3800	7.10	7.10	7.10
3900 Head	3800	4000	6.98	6.98	6.98
5250 Head	5140	5360	5.62	5.62	5.62
5500 Head	5390	5610	5.10	5.10	5.10
5750 Head	5640	5860	5.08	5.08	5.08

SAR Scan Procedures

Step 1: Power Reference Measurement

The Power Reference Measurement and Power Drift Measurements are for monitoring the power drift of the device under test in the batch process. The minimum distance of probe sensors to surface determines the closest measurement point to phantom surface. The minimum distance of probe sensors to surface is 1.4 mm. This distance cannot be smaller than the distance of sensor calibration points to probe tip as defined in the probe properties.

Step 2: Area Scans

Area scans are defined prior to the measurement process being executed with a user defined variable spacing between each measurement point (integral) allowing low uncertainty measurements to be conducted. Scans defined for FCC applications utilize a 15mm2 step integral, with 1.5mm interpolation used to locate the peak SAR area used for zoom scan assessments.

Where the system identifies multiple SAR peaks (which are within 25% of peak value) the system will provide the user with the option of assessing each peak location individually for zoom scan averaging.

Area Scan Parameters extracted from KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz

	≤ 3 GHz	> 3 GHz
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface	5 mm ± 1 mm	$\frac{1}{2}\cdot\delta\cdot\ln(2)$ mm ± 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.	

Step 3: Zoom Scan (Cube Scan Averaging)

The averaging zoom scan volume utilized in the DASY5 software is in the shape of a cube and the side dimension of a 1 g or 10 g mass is dependent on the density of the liquid representing the simulated tissue. A density of 1000 kg/m^3 is used to represent the head and body tissue density and not the phantom liquid density, in order to be consistent with the definition of the liquid dielectric properties, i.e. the side length of the 1g cube is 5mm,with the side length of the 10g cube is 21.5mm.

Zoom Scan Parameters extracted from KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz

<table>
<tr><td colspan="3">Maximum zoom scan spatial resolution: Δx_{Zoom}, Δy_{Zoom}</td><td>≤ 2 GHz: ≤ 8 mm
2 – 3 GHz: ≤ 5 mm*</td><td>3 – 4 GHz: ≤ 5 mm*
4 – 6 GHz: ≤ 4 mm*</td></tr>
<tr><td rowspan="3">Maximum zoom scan spatial resolution, normal to phantom surface</td><td colspan="2">uniform grid: $\Delta z_{Zoom}(n)$</td><td>≤ 5 mm</td><td>3 – 4 GHz: ≤ 4 mm
4 – 5 GHz: ≤ 3 mm
5 – 6 GHz: ≤ 2 mm</td></tr>
<tr><td rowspan="2">graded grid</td><td>$\Delta z_{Zoom}(1)$: between 1st two points closest to phantom surface</td><td>≤ 4 mm</td><td>3 – 4 GHz: ≤ 3 mm
4 – 5 GHz: ≤ 2.5 mm
5 – 6 GHz: ≤ 2 mm</td></tr>
<tr><td>$\Delta z_{Zoom}(n>1)$: between subsequent points</td><td colspan="2">$\leq 1.5 \cdot \Delta z_{Zoom}(n-1)$ mm</td></tr>
<tr><td>Minimum zoom scan volume</td><td colspan="2">x, y, z</td><td>≥ 30 mm</td><td>3 – 4 GHz: ≥ 28 mm
4 – 5 GHz: ≥ 25 mm
5 – 6 GHz: ≥ 22 mm</td></tr>
<tr><td colspan="5">Note: δ is the penetration depth of a plane-wave at normal incidence to the tissue medium; see IEEE Std 1528-2013 for details.
* When zoom scan is required and the <u>*reported*</u> SAR from the *area scan based 1-g SAR estimation* procedures of KDB Publication 447498 is ≤ 1.4 W/kg, ≤ 8 mm, ≤ 7 mm and ≤ 5 mm zoom scan resolution may be applied, respectively, for 2 GHz to 3 GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz.</td></tr>
</table>

Step 4: Power Drift Measurement

The Power Drift Measurement measures the field at the same location as the most recent power reference measurement within the same procedure, and with the same settings. The Power Drift Measurement gives the field difference in dB from the reading conducted within the last Power Reference Measurement. This allows a user to monitor the power drift of the device under test within a batch process. The measurement procedure is the same as Step 1.

When the cube intersects with the surface of the phantom, it is oriented so that 3 vertices touch the surface of the shell or the center of a face is tangent to the surface. The face of the cube closest to the surface is modified in order to conform to the tangent surface.

The zoom scan integer steps can be user defined so as to reduce uncertainty, but normal practice for typical test applications (including FCC) utilize a physical step of 7 x7 x 7 (5mmx5mmx5mm) providing a volume of 30 mm in the X & Y & Z axis.

Tissue Dielectric Parameters for Head

The head tissue dielectric parameters recommended by the KDB 865664 D01

Recommended Tissue Dielectric Parameters for Head liquid

Frequency MHz	**Relative permittivity** ε_r	**Conductivity (σ)** S/m
300	45,3	0,87
450	43,5	0,87
750	*41,9*	*0,89*
835	41,5	0,90
900	41,5	0,97
1 450	40,5	1,20
1 500	*40,4*	*1,23*
1 640	*40,2*	*1,31*
1 750	*40,1*	*1,37*
1 800	40,0	1,40
1 900	40,0	1,40
2 000	40,0	1,40
2 100	*39,8*	*1,49*
2 300	*39,5*	*1,67*
2 450	39,2	1,80
2 600	*39,0*	*1,96*
3 000	38,5	2,40
3 500	*37,9*	*2,91*
4 000	*37,4*	*3,43*
4 500	*36,8*	*3,94*
5 000	*36,2*	*4,45*
5 200	*36,0*	*4,66*
5 400	*35,8*	*4,86*
5 600	*35,5*	*5,07*
5 800	*35,3*	*5,27*
6 000	*35,1*	*5,48*

EQUIPMENT LIST AND CALIBRATION

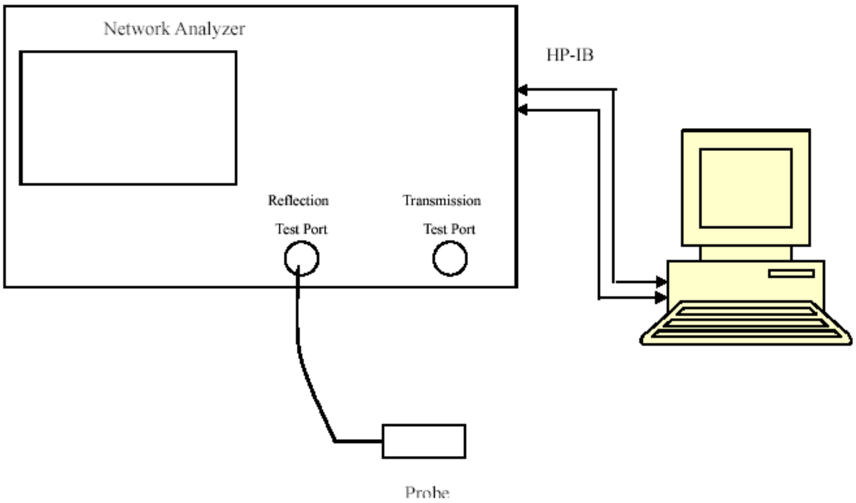
Equipment's List & Calibration Information

Equipment	Model	S/N	Calibration Date	Calibration Due Date
DASY5 Test Software	DASY52 52.10.2	N/A	NCR	NCR
DASY6 Measurement Server	DASY6 6.0.31	N/A	NCR	NCR
Data Acquisition Electronics	DAE4	1325	2023/9/27	2024/9/26
E-Field Probe	EX3DV4	7382	2023/9/27	2024/9/26
Mounting Device	MD4HHTV5	SD 000 H01 KA	NCR	NCR
SAM Twin Phantom	SAM-Twin V8.0	1962	NCR	NCR
Dipole, 2450 MHz	D2450V2	1103	2023/3/27	2026/3/26
Dipole,5GHz	D5GHzV2	1374	2023/3/27	2026/3/26
Simulated Tissue Liquid Head	HBBL600-10000V6	180622-2	Each Time	/
Network Analyzer	E5071C	SER MY46519680	2023/06/08	2024/06/07
Dielectric Assessment Kit	DAK-3.5	1248	NCR	NCR
MXG Analog Signal Generator	N5181A	MY48180408	2023/06/08	2024/06/07
USB wideband power sensor	U2021XA	MY52350001	2023/06/08	2024/06/07
Directional Coupler	855673	3307	NCR	NCR
20dB Attenuator	2	BH9879	NCR	NCR
RF Power Amplifier	5205FE	1014	NCR	NCR
Temperature & Humidity Meter	DTM3000	N/A	2024/01/16	2025/01/15
Spectrum Analyzer	FSV40	101943	2023/3/31	2024/3/30

NCR: No Calibration Required.

SAR MEASUREMENT SYSTEM VERIFICATION

Liquid Verification



Liquid Verification Setup Block Diagram

Liquid Verification Results

Frequency (MHz)	Liquid Type	Liquid Parameter		Target Value		Delta (%)		Tolerance (%)
		ε_r	Ơ (S/m)	ε_r	Ơ (S/m)	$\Delta\varepsilon_r$	ΔƠ	
2412	Simulated Tissue Liquid Head	38.816	1.815	39.27	1.77	-1.16	2.54	±5
2437	Simulated Tissue Liquid Head	38.765	1.844	39.21	1.79	-1.13	3.02	±5
2450	Simulated Tissue Liquid Head	38.564	1.844	39.20	1.80	-1.62	2.44	±5
2462	Simulated Tissue Liquid Head	38.255	1.87	39.16	1.82	-2.31	2.75	±5

**Liquid Verification above was performed on 2024/02/24.*

Frequency (MHz)	Liquid Type	Liquid Parameter		Target Value		Delta (%)		Tolerance (%)
		ε_r	Ơ (S/m)	ε_r	Ơ (S/m)	$\Delta\varepsilon_r$	ΔƠ	
5180	Simulated Tissue Liquid Head	37.112	4.831	36.0	4.63	3.09	4.34	±5
5200	Simulated Tissue Liquid Head	37.048	4.851	36.0	4.66	2.91	4.1	±5
5240	Simulated Tissue Liquid Head	37.066	4.896	35.9	4.70	3.25	4.17	±5
5250	Simulated Tissue Liquid Head	36.603	4.804	35.9	4.71	1.96	2	±5

**Liquid Verification above was performed on 2024/02/29*

System Accuracy Verification

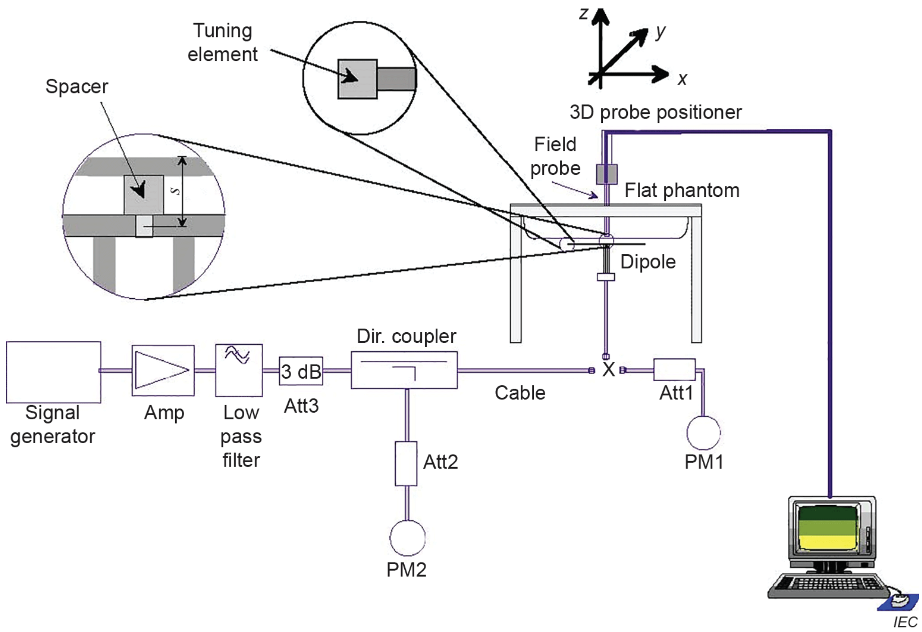
Prior to the assessment, the system validation kit was used to test whether the system was operating within its specifications of ±10%. The validation results are tabulated below. And also the corresponding SAR plot is attached as well in the SAR plots files.

The spacing distances in the **System Verification Setup Block Diagram** is given by the following:

a) s = 15 mm ± 0,2 mm for 300 MHz ≤ f ≤ 1 000 MHz;

b) s = 10 mm ± 0,2 mm for 1 000 MHz < f ≤ 6 000 MHz;

System Verification Setup Block Diagram



System Accuracy Check Results

Date	Frequency Band	Liquid Type	Input Power (mW)	Measured SAR (W/kg)		Normalized to 1W (W/kg)	Target Value (W/kg)	Delta (%)	Tolerance (%)
2024/02/24	2450 MHz	Head	100	1g	5.09	50.9	51.7	-1.547	±10
2024/02/29	5250 MHz	Head	100	1g	7.82	78.2	80.1	-2.372	±10

*The SAR values above are normalized to 1 Watt forward power.

SAR SYSTEM VALIDATION DATA

System Performance 2450MHz

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: 1103

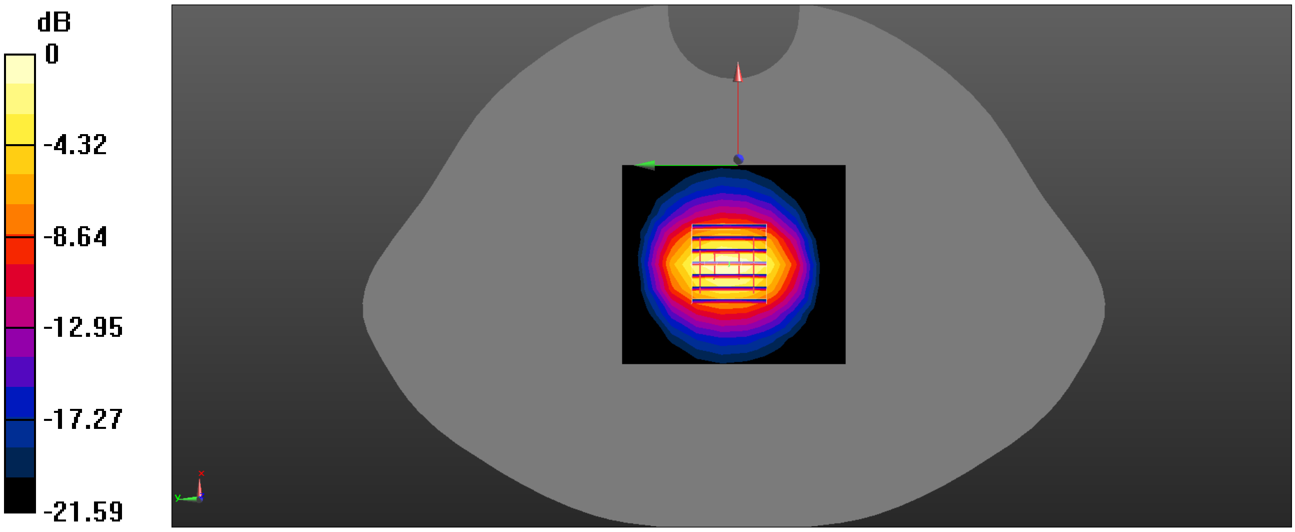
Communication System: UID 0, CW (0); Frequency: 2450 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2450 MHz; σ = 1.844 S/m; ε_r = 38.564; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7382; ConvF(7.89, 7.89, 7.89) @ 2450 MHz;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1325; Calibrated: 2023/09/27
- Phantom: SAM-Twin V8.0 P1aP2a; Type: QD 000 P41 AA ; Serial: 1962
- Measurement SW: DASY52, Version 52.10 (2);

Configuration/Head 2450MHz Pin=100mW/Area Scan (9x10x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 9.43 W/kg

Configuration/Head 2450MHz Pin=100mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 61.86 V/m; Power Drift = -0.08 dB
Peak SAR (extrapolated) = 11.63 W/kg
SAR(1 g) = 5.09 W/kg; SAR(10 g) = 2.23 W/kg
Maximum value of SAR (measured) = 8.98 W/kg



0 dB = 8.98 W/kg = 9.53 dBW/kg

System Performance 5250 MHz

DUT: Dipole D5GHz; Type: D5GHzV2; Serial: 1374

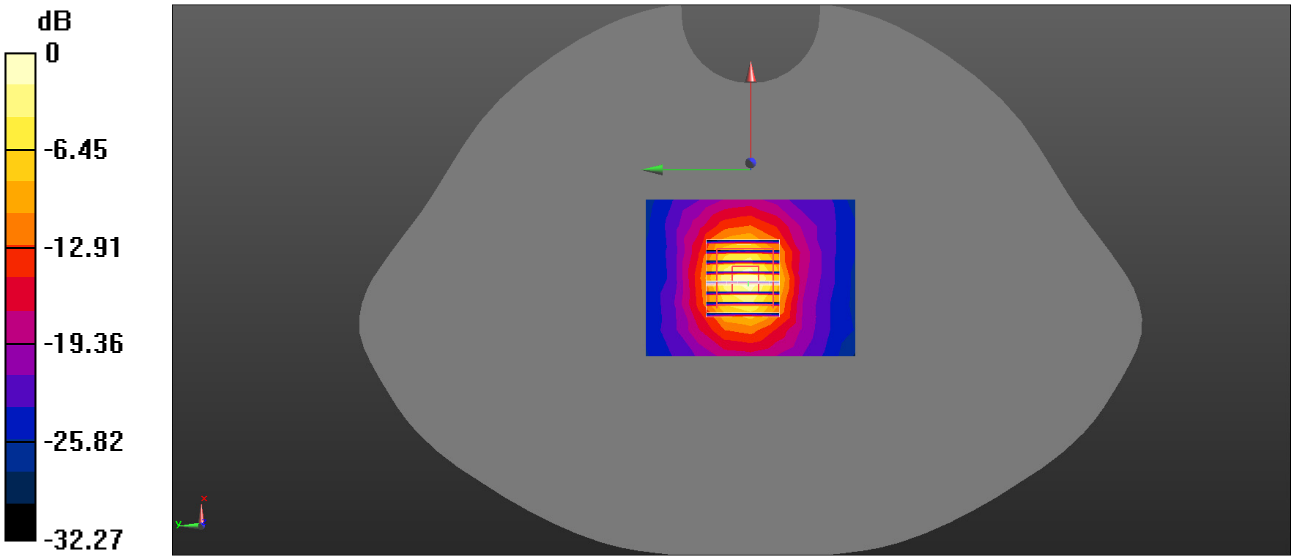
Communication System: UID 0, CW (0); Frequency: 5250 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5250 MHz; σ = 4.804 S/m; ε_r = 36.603; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7382; ConvF(5.62, 5.62, 5.62) @ 5250 MHz;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1325; Calibrated: 2023/09/27
- Phantom: SAM-Twin V8.0 P1aP2a; Type: QD 000 P41 AA ; Serial: 1962
- Measurement SW: DASY52, Version 52.10 (2);

Configuration/Head 5250MHz Pin=100mW/Area Scan (7x9x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 15.14 W/kg

Configuration/Head 5250MHz Pin=100mW/Zoom Scan (8x8x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 40.59 V/m; Power Drift = -0.15 dB
Peak SAR (extrapolated) = 28.47 W/kg
SAR(1 g) = 7.82 W/kg; SAR(10 g) = 3.46 W/kg
Maximum value of SAR (measured) = 15.2 W/kg



0 dB = 15.2 W/kg = 11.82 dBW/kg

EUT TEST STRATEGY AND METHODOLOGY

SIMPLE DONGLE PROCEDURES

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 D02 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 typinal 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.

When the antenna is located near the tip of a dongle, it may operate at closer proximity to users in certain connector orientations where dongle tip testing may be required.

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

Test Distance for SAR Evaluation

For this case the EUT(Equipment Under Test) is set 5mm away from the phantom, the test distance is 5mm.

SAR Evaluation Procedure

The evaluation was performed with the following procedure:

Step 1: Measurement of the SAR value at a fixed location above the ear point or central position was used as a reference value for assessing the power drop. The SAR at this point is measured at the start of the test and then again at the end of the testing.

Step 2: The SAR distribution at the exposed side of the head was measured at a distance of 4 mm from the inner surface of the shell. The area covered the entire dimension of the head or radiating structures of the EUT, the horizontal grid spacing was 15 mm x 15 mm, and the SAR distribution was determined by integrated grid of 1.5mm x 1.5mm. Based on these data, the area of the maximum absorption was determined by spline interpolation. The first Area Scan covers the entire dimension of the EUT to ensure that the hotspot was correctly identified.

Step 3: Around this point, a volume of 30 mm x 30 mm x 30 mm was assessed by measuring 7x 7 x 7 points. On the basis of this data set, the spatial peak SAR value was evaluated under the following procedure:

1) The data at the surface were extrapolated, since the center of the dipoles is 1.2 mm away from the tip of the probe and the distance between the surface and the lowest measuring point is 1.3 mm. 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.

2) The maximum interpolated value was searched with a straightforward algorithm. Around this maximum the SAR values averaged over the spatial volumes (1 g or 10 g) were computed by the 3D-Spline interpolation algorithm. The 3D-Spline is composed of three one dimensional splines with the “Not a knot"-condition (in x, y and z-directions). The volume was integrated with the trapezoidal-algorithm. One thousand points (10 x 10 x 10) were interpolated to calculate the averages.

All neighboring volumes were evaluated until no neighboring volume with a higher average value was found.

Step 4: Re-measurement of the SAR value at the same location as in Step 1. If the value changed by more than 5%, the evaluation was repeated.

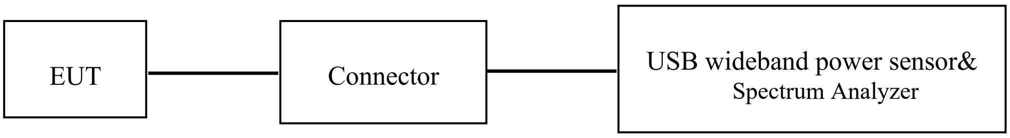
CONDUCTED OUTPUT POWER MEASUREMENT

Maximum Target Output Power

Max Target Power(dBm)			
Mode/Band	Channel		
	Low	Middle	High
ANT1 WLAN 2.4G	16	16	16
ANT1 WLAN 5.2G	12	12	12
ANT2 WLAN 2.4G	16	16	16
ANT2 WLAN 5.2G	12.5	12.5	12.5

Test Procedure

The RF output of the transmitter was connected to the input of the Wireless Communication through Connector.



WLAN

Test Results:

ANT1 Wi-Fi 2.4G:

Mode	Channel frequency (MHz)	Data Rate	Conducted Average Output(dBm)
802.11b	2412	1Mbps	15.82
	2437		15.97
	2462		15.85
802.11g	2412	6Mbps	12.90
	2437		13.13
	2462		12.86
802.11n HT20	2412	MCS0	10.29
	2437		10.46
	2462		10.35
802.11n HT40	2422	MCS0	10.86
	2437		11.27
	2452		10.96

ANT1 Wi-Fi 5.2G:

Mode	Channel frequency (MHz)	Data Rate	Conducted Average Output(dBm)
802.11a	5180	6Mbps	11.91
	5200		11.92
	5240		11.95
802.11AC20	5180	MCS0	9.66
	5200		9.73
	5240		9.80
802.11AC40	5190	MCS0	9.90
	5230		10.03
802.11AC80	5210	MCS0	9.81

ANT2 Wi-Fi 2.4G:

Mode	Channel frequency (MHz)	Data Rate	Conducted Average Output(dBm)
802.11b	2412	1Mbps	15.09
	2437		15.98
	2462		15.67
802.11g	2412	6Mbps	12.39
	2437		12.75
	2462		12.32
802.11n HT20	2412	MCS0	10.03
	2437		10.10
	2462		10.04
802.11n HT40	2422	MCS0	10.64
	2437		10.86
	2452		10.22

ANT2 Wi-Fi 5.2G:

Mode	Channel frequency (MHz)	Data Rate	Conducted Average Output(dBm)
802.11a	5180	6Mbps	12.03
	5200		12.08
	5240		12.05
802.11AC20	5180	MCS0	9.94
	5200		9.63
	5240		9.78
802.11AC40	5190	MCS0	9.86
	5230		10.03
802.11AC80	5210	MCS0	9.78

Duty Cycle:

ANT1

Test Mode	Duty Cycle [%]
802.11b	100
802.11g	100
802.11n-HT20	100
802.11n-HT40	100
802.11A	96.45
802.11AC-VHT20	95.49
802.11AC-VHT40	91.30
802.11AC-VHT80	83.78

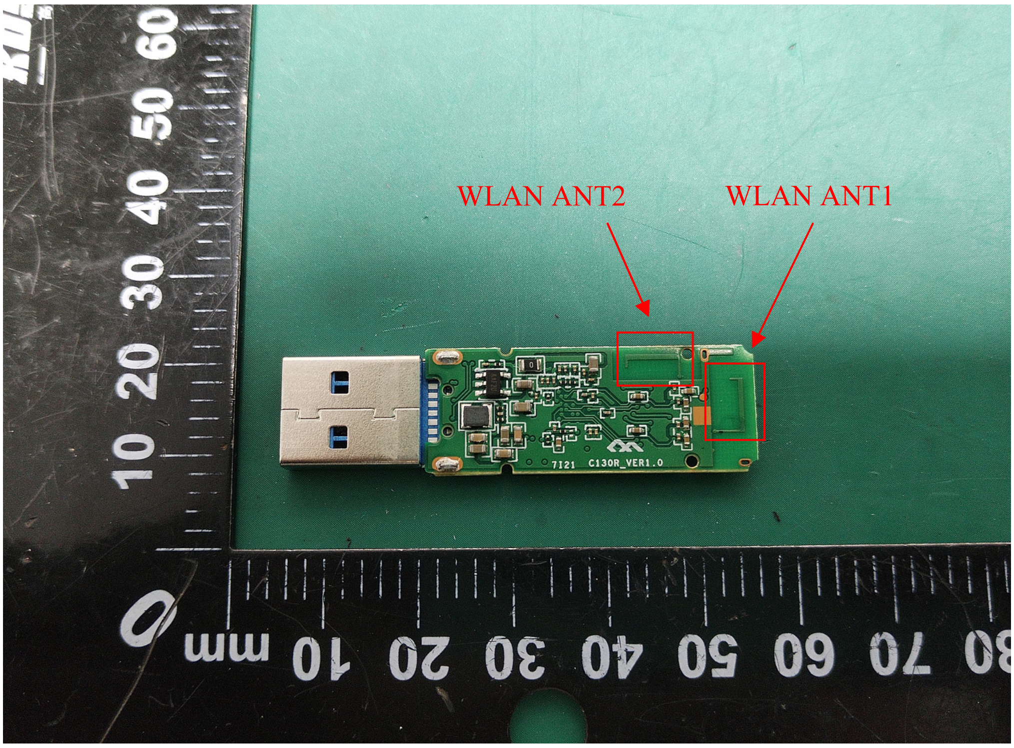
ANT2

Test Mode	Duty Cycle [%]
802.11b	100
802.11g	100
802.11n-HT20	100
802.11n-HT40	100
802.11A	95.74
802.11AC-VHT20	95.45
802.11AC-VHT40	91.30
802.11AC-VHT80	83.78

Note: Duty cycle data from RF reports.

Standalone SAR test exclusion considerations

Antennas Location:



Standalone SAR test exclusion considerations:

Mode	Frequency (MHz)	Output Power (dBm)	Output Power (mW)	Distance (mm)	Calculated value	Threshold (1-g)	SAR Test Exclusion
ANT1 WLAN 2.4G	2462	16.0	39.81	0	12.5	3	No
ANT1 WLAN 5.2G	5250	12.0	15.85	0	7.3	3	No
ANT2 WLAN 2.4G	2462	16.0	39.81	0	12.5	3	No
ANT2 WLAN 5.2G	5250	12.5	17.78	0	8.1	3	No

NOTE:

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:

[(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)] · [√f(GHz)] ≤ 3.0 for 1-g SAR and ≤7.5 for 10-g extremity SAR, where

1. f(GHz) is the RF channel transmit frequency in GHz.
2. Power and distance are rounded to the nearest mW and mm before calculation.
3. The result is rounded to one decimal place for comparison.
4. When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test Exclusion.

SAR MEASUREMENT RESULTS

This page summarizes the results of the performed dosimetric evaluation.

SAR Test Data

Environmental Conditions

Temperature:	22.2-23.3 ℃	22.1-23.1 ℃
Relative Humidity:	51-57%	50-55%
ATM Pressure:	101.1 kPa	101.3 kPa
Test Date:	2024/02/24	2024/02/29

** Testing was performed by Sid Luo.*

ANT1 WLAN 2.4G:

Test Mode	EUT Position	Frequency (MHz)	Max. Meas. Power (dBm)	Max. Rated Power (dBm)	1g SAR (W/Kg), Limited=1.6 W/kg				
					Scaled Factor	Duty Cycle (%)	Meas.	Scaled SAR	Plot
802.11b	Horizontal-UP (5mm)	2412	/	/	/	/	/	/	/
		2437	15.97	16.0	1.007	100	0.104	0.10	1
		2462	/	/	/	/	/	/	/
	Horizontal-Down (5mm)	2412	15.82	16.0	1.042	100	0.179	0.19	**2**
		2437	15.97	16.0	1.007	100	0.116	0.12	3
		2462	15.85	16.0	1.035	100	0.109	0.11	4
	Vertical-Front (5mm)	2412	/	/	/	/	/	/	/
		2437	15.97	16.0	1.007	100	0.096	0.10	5
		2462	/	/	/	/	/	/	/
	Vertical-Back (5mm)	2412	/	/	/	/	/	/	/
		2437	15.97	16.0	1.007	100	0.051	0.05	6
		2462	/	/	/	/	/	/	/
	Tip (5mm)	2412	/	/	/	/	/	/	/
		2437	15.97	16.0	1.007	100	0.015	0.02	7
		2462	/	/	/		/	/	/

ANT1 WLAN 5.2G:

Test Mode	EUT Position	Frequency (MHz)	Max. Meas. Power (dBm)	Max. Rated Power (dBm)	1g SAR (W/Kg), Limited=1.6 W/kg				
					Scaled Factor	Duty Cycle (%)	Meas.	Scaled SAR	Plot
802.11a	Horizontal-UP (5mm)	5180	/	/	/	/	/	/	/
		5200	11.92	12.0	1.019	96.45	0.719	0.76	8
		5240	/	/	/	/	/	/	/
	Horizontal-Down (5mm)	5180	11.91	12.0	1.021	96.45	0.667	0.71	9
		5200	11.92	12.0	1.019	96.45	0.727	0.77	10
		5240	11.95	12.0	1.012	96.45	0.751	**0.79**	**11**
	Vertical-Front (5mm)	5180	/	/	/	/	/	/	/
		5200	11.92	12.0	1.019	96.45	0.678	0.72	12
		5240	/	/	/	/	/	/	/
	Vertical-Back (5mm)	5180	/	/	/	/	/	/	/
		5200	11.92	12.0	1.019	96.45	0.42	0.44	13
		5240	/	/	/	/	/	/	/
	Tip (5mm)	5180	/	/	/	/	/	/	/
		5200	11.92	12.0	1.019	96.45	0.705	0.74	14
		5240	/	/	/		/	/	/

ANT2 WLAN 2.4G:

Test Mode	EUT Position	Frequency (MHz)	Max. Meas. Power (dBm)	Max. Rated Power (dBm)	1g SAR (W/Kg), Limited=1.6 W/kg				
					Scaled Factor	Duty Cycle (%)	Meas.	Scaled SAR	Plot
802.11b	Horizontal-UP (5mm)	2412	/	/	/		/	/	/
		2437	14.84	15.0	1.038	100	0.00164	0.01	15
		2462	/	/	/	/	/	/	/
	Horizontal-Down (5mm)	2412	14.72	15.0	1.067	100	0.015	0.02	16
		2437	14.84	15.0	1.038	100	0.00822	0.01	17
		2462	14.76	15.0	1.057	100	0.016	0.02	**18**
	Vertical-Front (5mm)	2412	/	/	/	/	/	/	/
		2437	14.84	15.0	1.038	100	0.00569	0.01	19
		2462	/	/	/	/	/	/	/
	Vertical-Back (5mm)	2412	/	/	/	/	/	/	/
		2437	14.84	15.0	1.038	100	0.00347	0.01	20
		2462	/	/	/	/	/	/	/
	Tip (5mm)	2412	/	/	/	/	/	/	/
		2437	14.84	15.0	1.038	100	0.00279	0.01	21
		2462	/	/	/		/	/	/

ANT2 WLAN 5.2G:

Test Mode	EUT Position	Frequency (MHz)	Max. Meas. Power (dBm)	Max. Rated Power (dBm)	1g SAR (W/Kg), Limited=1.6 W/kg				
					Scaled Factor	Duty Cycle (%)	Meas.	Scaled SAR	Plot
802.11a	Horizontal-UP (5mm)	5180	/	/	/	/	/	/	/
		5200	12.08	12.5	1.102	95.74	0.661	0.76	22
		5240	/	/	/	/	/	/	/
	Horizontal-Down (5mm)	5180	/	/	/	/	/	/	/
		5200	12.08	12.5	1.102	95.74	0.677	0.78	23
		5240	/	/	/	/	/	/	/
	Vertical-Front (5mm)	5180	12.03	12.5	1.114	95.74	0.649	0.76	24
		5200	12.08	12.5	1.102	95.74	0.688	0.79	**25**
		5240	12.05	12.5	1.109	95.74	0.666	0.77	26
	Vertical-Back (5mm)	5180	/	/	/	/	/	/	/
		5200	12.08	12.5	1.102	95.74	0.27	0.31	27
		5240	/	/	/	/	/	/	/
	Tip (5mm)	5180	/	/	/	/	/	/	/
		5200	12.08	12.5	1.102	95.74	0.528	0.61	28
		5240	/	/	/		/	/	/

Note:

1. For 802.11b DSSS SAR measurements, DSSS SAR procedure applies to fixed exposure test position and initial test position procedure. When OFDM tune up power is greater than DSSS, 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, OFDM SAR is not required.
2. When the same maximum power is specified for multiple transmission modes in a frequency band, the largest channel bandwidth, lowest order modulation, lowest data rate and lowest order 80211b/g/n mode is use for SAR measurement, on the highest measured output power channel in the initial test configuration, for each frequency band.
3. According 2016 Oct. TCB, for SAR testing of 2.4G WIFI 802.11b signal with non-100% duty cycle, the measured SAR is scaled-up by the duty cycle scaling factor which is equal to “1/(duty cycle)”.
4. When the same maximum power is specified for multiple transmission modes in a frequency band, the largest channel bandwidth, lowest order modulation, lowest data rate and lowest order 802.11a/n20/n40/ac20/ac40/ac80 mode is use for SAR measurement, on the highest measured output power channel in the initial test configuration, for each frequency band, 802.11a is the initial position for the SAR test.
5. According 2016 Oct. TCB, for SAR testing of 5G WIFI 802.11a signal with non-100% duty cycle, the measured SAR is scaled-up by the duty cycle scaling factor which is equal to “1/(duty cycle)”.
6. When SAR or MPE is not measured at the maximum power level allowed for production units, the results must be scaled to the maximum tune-up tolerance limit according to the power applied to the individual channels tested to determine compliance.
7. The USB cable used for test does not affect the radiation characteristics and transmitting power of the transmitter.
8. The USB cable used for the test was less than 12 inches.

SAR Measurement Variability

In accordance with published RF Exposure KDB procedure 865664 D01 SAR measurement 100 MHz to 6 GHz v01. 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

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 Highest Measured SAR Configuration in Each Frequency Band

Body

SAR probe calibration point	Frequency Band	Freq.(MHz)	EUT Position	Meas. SAR (W/kg)		Largest to Smallest SAR Ratio
				Original	Repeated	
/	/	/	/	/	/	/

Note:

1. Second Repeated Measurement is not required since the ratio of the largest to smallest SAR for the original and first repeated measurement is not > 1.20.
2. The measured SAR results **do not** have to be scaled to the maximum tune-up tolerance to determine if repeated measurements are required.
3. 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..

SAR SIMULTANEOUS TRANSMISSION DESCRIPTION

Simultaneous Transmission:

Description of Simultaneous Transmit Capabilities		
Transmitter Combination	**Simultaneous?**	**Hotspot?**
2.4G WLAN ANT1 + 2.4G WLAN ANT2	√	×
5.2G WLAN ANT1+ 5.2G WLAN ANT2	√	×
2.4G WLAN + 5.2G WLAN	×	×

Note:
1. 802.11g, 802.11g and 802.11a can't support simultaneously transmission.
2. Since 2.4G WIFI 802.11b power is greater than 802.11g and 802.11n power, and 5.2G WIFI 802.11a power is greater than 802.11n and 802.11ac power, the measured values of 802.11b and 802.11a can represent simultaneous transmission.

Mode(SAR1+SAR2)	Position	Reported SAR(W/kg)		ΣSAR < 1.6W/kg
		SAR1	SAR2	
2.4G WLAN ANT1 + 2.4G WLAN ANT2	Body	0.19	0.02	0.21
5.2G WLAN ANT1+ 5.2G WLAN ANT2	Body	0.79	0.79	**1.58**

Conclusion:

Sum of SAR: **ΣSAR ≤ 1.6 W/kg** therefore simultaneous transmission SAR with SPLSR is **not required**.

SAR Plots

Please Refer to the Attachment.

APPENDIX A MEASUREMENT UNCERTAINTY

The uncertainty budget has been determined for the measurement system and is given in the following Table.

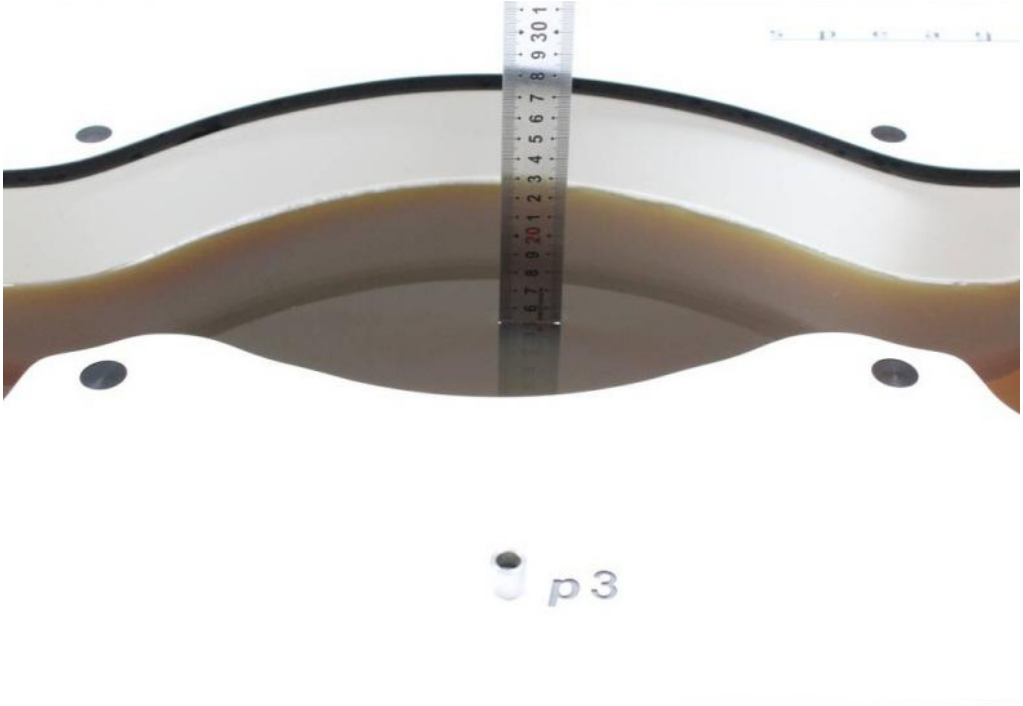
Measurement uncertainty evaluation for IEEE1528-2013 SAR test

Source of uncertainty	Tolerance/ uncertainty ± %	Probability distribution	Divisor	ci (1 g)	ci (10 g)	Standard uncertainty ± %, (1 g)	Standard uncertainty ± %, (10 g)
Measurement system							
Probe calibration	6.55	N	1	1	1	6.6	6.6
Axial Isotropy	4.7	R	√3	1	1	2.7	2.7
Hemispherical Isotropy	9.6	R	√3	0	0	0.0	0.0
Boundary effect	1.0	R	√3	1	1	0.6	0.6
Linearity	4.7	R	√3	1	1	2.7	2.7
Detection limits	1.0	R	√3	1	1	0.6	0.6
Readout electronics	0.3	N	1	1	1	0.3	0.3
Response time	0.0	R	√3	1	1	0.0	0.0
Integration time	0.0	R	√3	1	1	0.0	0.0
RF ambient conditions – noise	1.0	R	√3	1	1	0.6	0.6
RF ambient conditions–reflections	1.0	R	√3	1	1	0.6	0.6
Probe positioner mech. Restrictions	0.8	R	√3	1	1	0.5	0.5
Probe positioning with respect to phantom shell	6.7	R	√3	1	1	3.9	3.9
Post-processing	2.0	R	√3	1	1	1.2	1.2
Test sample related							
Test sample positioning	2.8	N	1	1	1	2.8	2.8
Device holder uncertainty	6.3	N	1	1	1	6.3	6.3
Drift of output power	5.0	R	√3	1	1	2.9	2.9
Phantom and set-up							
Phantom uncertainty (shape and thickness tolerances)	4.0	R	√3	1	1	2.3	2.3
Liquid conductivity target)	5.0	R	√3	0.64	0.43	1.8	1.2
Liquid conductivity meas.)	2.5	N	1	0.64	0.43	1.6	1.1
Liquid permittivity target)	5.0	R	√3	0.6	0.49	1.7	1.4
Liquid permittivity meas.)	2.5	N	1	0.6	0.49	1.5	1.2
Combined standard uncertainty		RSS				12.2	12.0
Expanded uncertainty 95 % confidence interval)						24.3	23.9

APPENDIX B EUT TEST POSITION PHOTOS

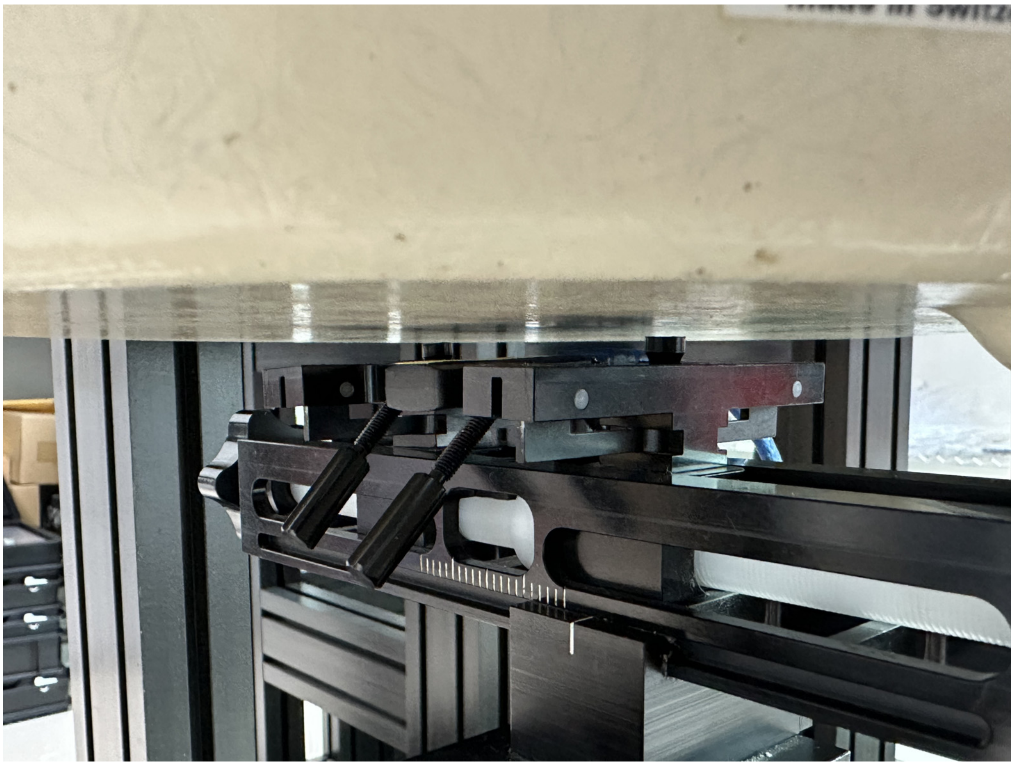
Liquid depth ≥ 15cm

Phantom: SAM-Twin V8.0 P1aP2a; Type: QD 000 P41 AA ; Serial: 1962



Horizontal-UP Setup Photo (5mm)

Horizontal-Down Setup Photo (5mm)



Vertical-Front Setup Photo (5mm)

Vertical-Back Setup Photo (5mm)

Tip Setup Photo (5mm)

APPENDIX C PROBE CALIBRATION CERTIFICATES

Please Refer to the Attachment.

APPENDIX D DIPOLE CALIBRATION CERTIFICATES

Please Refer to the Attachment.

******* END OF REPORT *******