FCC / IC

SAR EVALUATION REPORT

For

FCC ID：T2C-BT51AV2

IC：10741A-BT51AV2

Model：BT51A

Report Type：Original Report	**Product Name**：Bluetooth USB Dongle

Report Number: RXZ230928135SA01

Report Date: 2023-10-03

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Statement of Compliance

Applicant (Certification Holder)	YEALINK(XIAMEN) NETWORK TECHNOLOGY CO.,LTD.	
	No.666 Hu'an Rd. Huli District Xiamen City, Fujian, P.R. China	
Brand (Trade) Name	Yealink	
Product (Equipment) Name	Bluetooth USB Dongle	
Model Name	BT51A	
Serial Model Name	N/A	
Test Date	2023/10/02	

Measurement Procedures and Standards Used:

☒ IEC/IEEE62209-1528:2020
☒ IEEE 1528-2013
☒ RSS-102 ISSUE 5
☒ FCC 47 CFR part 2.1093
☒ KDB 447498 D04 Interim General RF Exposure Guidance v01
☒ KDB 447498 D02 SAR Procedures for Dongle Xmtr v02r01

The measurement results in this report were performed at Bay Area Compliance Laboratories Corp. (New Taipei Laboratory)

Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

The determination of the test results does not require consideration of the uncertainty of the measurement, unless the assessment is required by customer agreement, regulation or standard document specification.

Bay Area Compliance Laboratories Corp. (New Taipei Laboratory) is not responsible for the authenticity of the information provided by the applicant that affects the test results.

Report Issued Date: 2023-10-03

Project Engineer: Anson Lu Anson Lu

Reviewed By: Rory Cheng Rory Cheng

Revision History

Revision	No.	Report Number	Issue Date	Description	Author/ Revised by
0.0	RXZ230928135	RXZ230928135SA01	2023.10.03	Original Report	Anson Lu

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EUT RESULTS

Attestation of Test Results for Body SAR			
Frequency Band	Maxi. SAR Level(s) Reported(W/kg)		Limit(W/kg)
	Position	Maxi. SAR(W/kg)	
Bluetooth	BT1M Body SAR(1g)	0.395	1.6
	BT2M Body SAR(1g)	0.249	1.6
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 IEC/IEEE 62209-1528-2020 and RF exposure KDB procedures. **The results and statements contained in this report pertain only to the device(s) evaluated.**			

EUT DESCRIPTION

Technical Specification

Applicant	YEALINK(XIAMEN) NETWORK TECHNOLOGY CO.,LTD.
Exposure Category	Population / Uncontrolled
Modulation Type	BR Mode: GFSK EDR Mode: π/4-DQPSK
Frequency Band	BT 1M: 2402 ~ 2480 MHz BT 2M: 2402 ~ 2480 MHz
Conducted RF Power (Avg/Tune-Up)	BT 1M: 10.5 dBm BT 2M: 8.5 dBm
EIRP Power(Avg)	BT 1M: 10.19 dBm BT 2M: 8.15 dBm
Antenna Information	Antenna Type: Metal Antenna Antenna Gain: 0.01 dBi
Power Source	DC 5V from USB
Normal Operation	Body-worn mode

Note:

1) *All measurement and test data in this report was gathered from production sample serial number：RLK230922110-01 (Assigned by BACL, (New Taipei Laboratory)). The EUT supplied by the applicant was received on 2023/09/22.*

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 [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/IC Limit

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)	**1.60**	8.0
Spatial Peak (hands/wrists/feet/ankles averaged over 10 g)	**4.0**	20.0

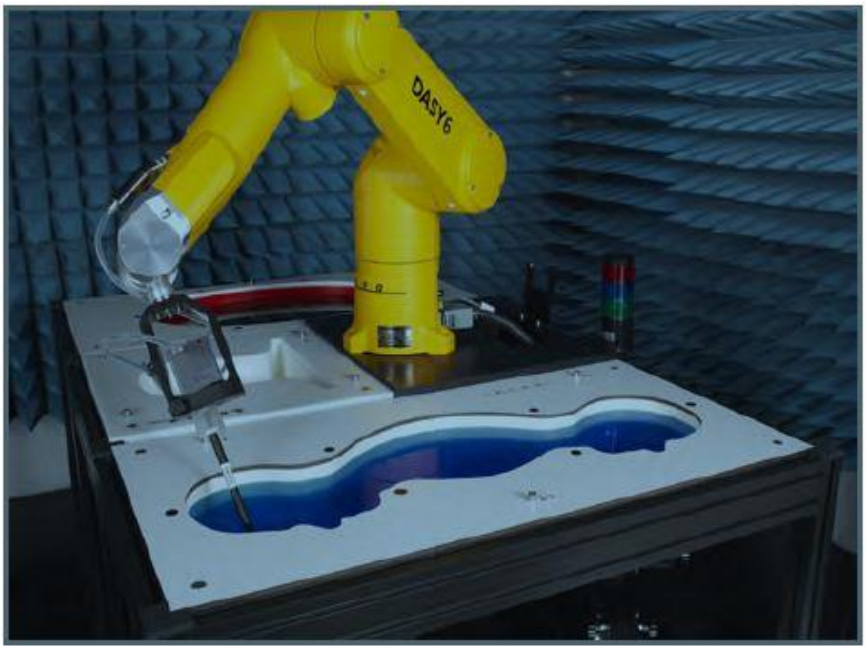
Population/Uncontrolled Environments are defined as locations where there is the exposure of individual who have no knowledge or control of their exposure.

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

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

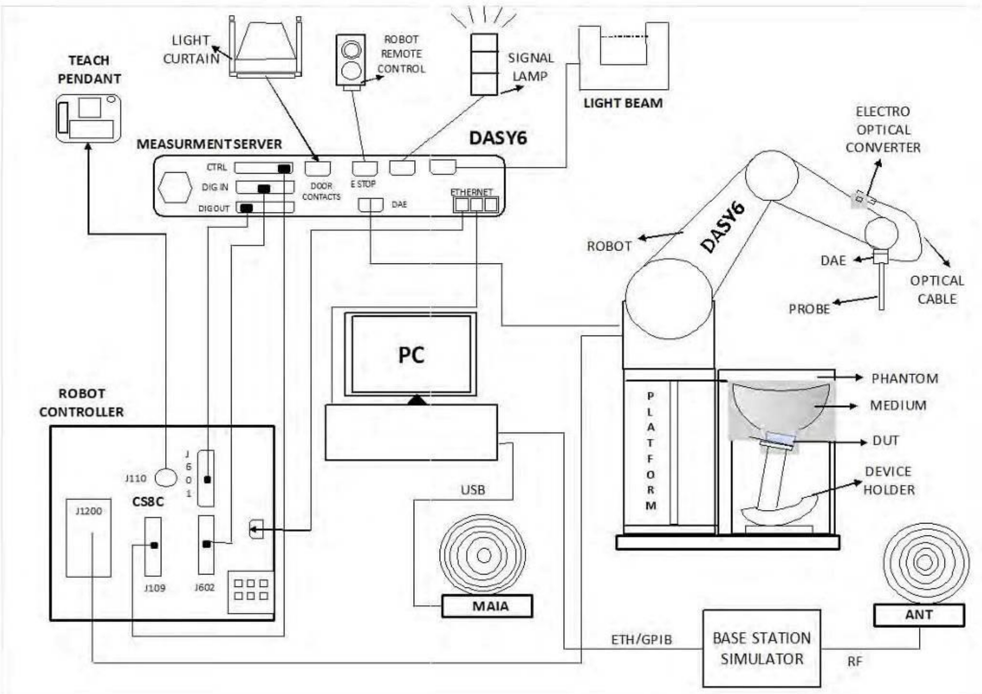
DESCRIPTION OF TEST SYSTEM

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 and software. An arm extension for accommodating the data acquisition electronics (DAE).
- An isotropic field probe optimized and calibrated for the targeted measurement.
- A data acquisition electronics (DAE) which performs the signal 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 as well as additional circuitry for robot safety such as warning lamps, etc.
- The phantom, the device holder and other accessories according to the targeted measurement.

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

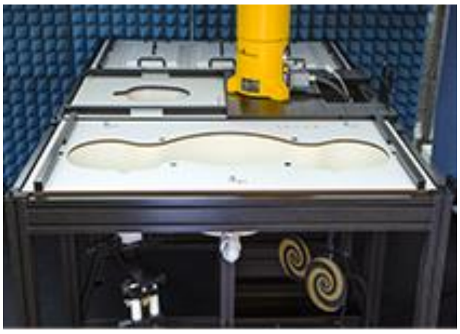
The data acquisition electronics (DAE4) consist of a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16 bit AD-converter and a command decoder with a control logic unit. Transmission to the measurement server is accomplished through 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	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 diameter: 2.5 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



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 V5.2 software. When the DASY6 platform is used to mount the

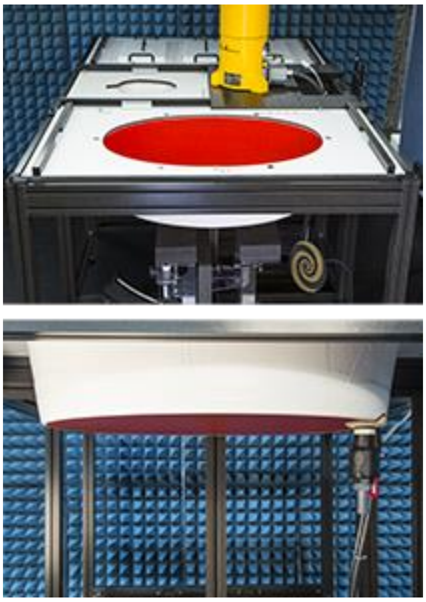
Phantom, some of the phantom teaching points cannot be reached by the robot in DASY5 V5.2. A special tool called P1a-P2aX-Former is provided to transform two of the three points, P1 and P2, to reachable locations. To use these new teaching points, a revised phantom configuration file is required.
In 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 StaubliSA (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

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 15mm^2 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.

Zoom Scan (Cube Scan Averaging)

The averaging zoom scan volume utilized in the DASY6 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 10mm, with the side length of the 10g cube is 21.5mm.

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.

Recommended Tissue Dielectric Parameters for Head and Body

Tissue Dielectric Parameters for Head and Body Phantoms

The head tissue dielectric parameters recommended by the IEC/IEEE 62209-1528

Recommended Tissue Dielectric Parameters for Head liquid

Table 2 – Dielectric properties of the tissue-equivalent medium

Frequency(MHz)	permittivity,(ε'r)	Conductivity, σ(S/m)
4	*55,0*	*0,75*
13	*55,0*	*0,75*
30	55,0	0,75
150	52,3	0,76
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
1450	40,5	1,20
1800	40,0	1,40
1900	40,0	1,40
1950	40,0	1,40
2000	40,0	1,40
2100	*39,8*	*1,49*
2450	39,2	1,80
2600	*39,0*	*1,96*
3000	38,5	2,40
3500	*37,9*	*2,91*
4000	*37,4*	*3,43*
4500	*36,8*	*3,94*
5000	*36,2*	*4,45*
5200	*36,0*	*4,66*
5400	*35,8*	*4,86*
5600	*35,5*	*5,07*
5800	35,3	5,27
6000	*35,1*	*5,48*
6500	*34,5*	*6,07*
7000	*33,9*	*6,65*

7500	*33,3*	*7,24*
8000	*32,7*	*7,84*
8500	*32,1*	*8,46*
9000	*31,6*	*9,08*
9500	*31,0*	*9,71*
10000	*30,4*	*10,40*

NOTE For convenience, permittivity and conductivity values are linearly interpolated for frequencies that are not a part of the original data from Drossos et al. [2]. They are shown in italics in Table 2. The italicized values are linearly interpolated (below 5800 MHz) or extrapolated (above 5800 MHz) from the non-italicized values that are immediately above and below these values.

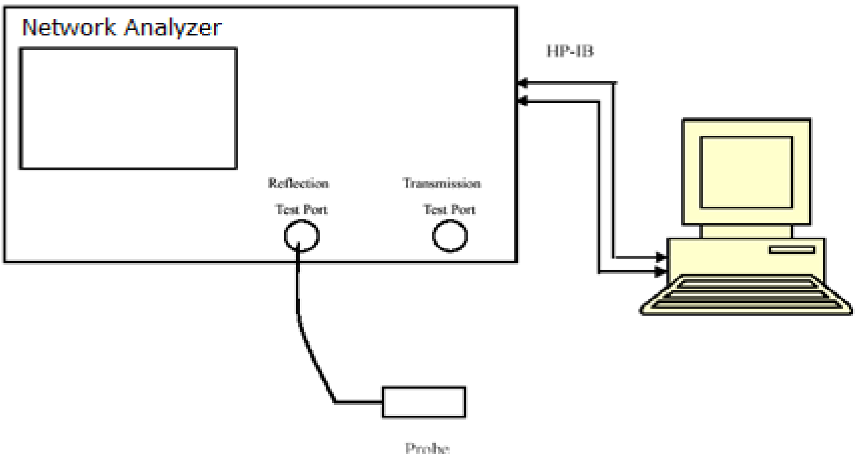
EQUIPMENT LIST AND CALIBRATION

Equipment's List & Calibration Information

Equipment	Model	S/N	Calibration Date	Calibration Due Date
Robot	TX90	5N26A1	N.C.R	N.C.R
DASY5 Test Software	DASY5.2	N/A	N.C.R	N.C.R
DASY6 Measurement Server	DASY 6.0	1588	N/A	N/A
Data Acquisition Electronics	DAE	1561	2022/12/15	2023/12/14
E-Field Probe	EX3DV4	7520	2022/12/12	2023/12/11
Dipole, 2450 MHz	D2450V2	1068	2021/10/11	2024/10/10
Twin SAM	Twin SAM V5.0	1368	N/A	N/A
Twin ELI	Twin ELI V8.0	2088	N/A	N/A
Simulated Tissue 0.6G~6GHz Head	TS-6GHz-H	N/A	Each Time/	
Mounting Device	N/A	SD 000 H01 KA	N/A	N/A
Network Analyzer	E5063A	MY54402093	2022/12/20	2023/12/19
Dielectric probe kit	85070B	50207	N/A	N/A
MXG Signal Generator	N5183A	MY50140407	2022/12/29	2023/12/28
Spectrum Analyzer	FSV40	101606	2023/09/07	2024/09/06
EPM Series Power Meter	E4419B	GB43312279	2023/1/4	2024/1/3
Avg Power Sensor	E9304A H18	MZ54110016	2023/1/4	2024/1/3
Power Amplifier	ZVE-8G+	365701647	2023/1/11	2024/1/10
Power Amplifier	ZHL-42W+	329401642	2023/1/11	2024/1/10
Temperature and Humidity Recoder	HTC-1	005	2022/10/25	2023/10/24
Directional Coupler	488Z	810	N.C.R	N.C.R
Attenuator	20dB, 100W	1453	N.C.R	N.C.R

SAR MEASUREMENT SYSTEM VERIFICATION

Liquid Verification



Liquid Verification Setup Block Diagram

Liquid Verification Results

Test Date	Frequency (MHz)	Liquid Type	Liquid parameter		Target Value		Delta (%)		Tolerance (%)
			Ơ (S/m)	εr	Ơ (S/m)	εr	Ơ (S/m)	εr	
2023/10/02	2450	HSL	1.813	40.705	1.80	39.20	0.72	3.84	±5
	2402	HSL	1.768	40.786	1.79	39.22	-1.23	3.99	±5
	2441	HSL	1.807	40.708	1.76	39.28	2.67	3.64	±5
	2480	HSL	1.834	40.639	1.83	39.16	0.22	3.78	±5

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.

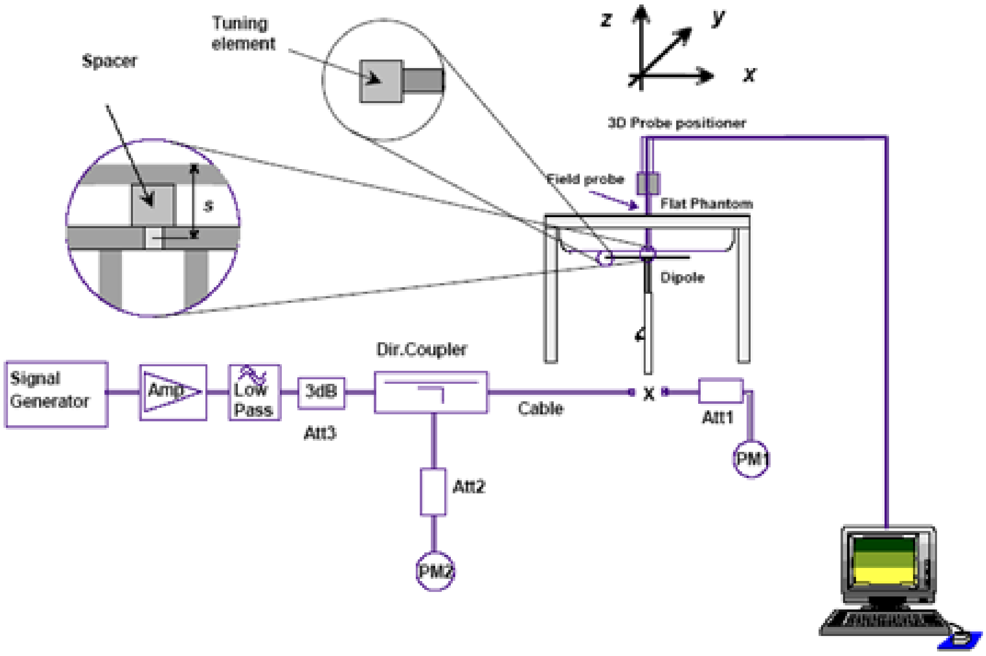
The spacing distance*s* in the **System Verification Setup Block Diagram** is given by the following:

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 ≤ 3 000 MHz;

c) s = 10 mm ± 0,2 mm for 3 000 MHz < f ≤ 6 000 MHz.

System Verification Setup Block Diagram



System Accuracy Check Results

System Check for 1g SAR

Test Date	Frequency Band (MHz)	Liquid Type	Input Power (mW)	Measured SAR (W/kg)	Target Value (W/kg)	Normalized to 1W (W/kg)	Delta (%)	Tolerance (%)
2023/10/02	2450	HSL	250	12.6	54.2	50.4	-7.01	±10

Note:

1) *Below 5GHz, The power inputted to dipole is 0.25Watt; the SAR values are normalized to 1 Watt forward power by multiplying 4 times.*

SAR SYSTEM VALIDATION DATA

Test Laboratory:BACL.SAR TestingLab

System Check_2450MHz_D2450V2

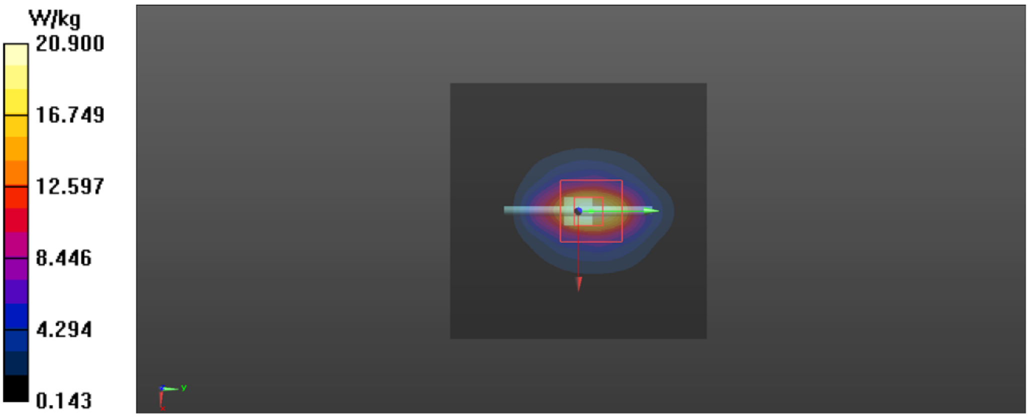
DUT: D2450V2-1068

Communication System: UID 0, CW (0); Frequency: 2450 MHz;Duty Cycle: 1:1
Medium: HSL 2450 Medium parameters used: f = 2450 MHz; σ = 1.813 S/m; ε_r = 40.705; ρ = 1000 kg/m^3

DASY5 Configuration:
- Probe: EX3DV4 - SN7520; ConvF(7.49, 7.49, 7.49) @ 2450 MHz; Calibrated: 12/12/2022
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1561; Calibrated: 12/15/2022
- Phantom: ELI-Righr-ELI V8.0 (20deg probe tilt); Type: QD OVA 004 Ax; Serial: 2088
- Measurement SW: DASY52, Version 52.10 (4);SEMCAD X Version 14.6.14 (7483)

Pin=250mW/Area Scan (61x61x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 21.3 W/kg

Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 110.7 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 25.6 W/kg
SAR(1 g) = 12.6 W/kg; SAR(10 g) = 5.88 W/kg
Smallest distance from peaks to all points 3 dB below = 9 mm
Ratio of SAR at M2 to SAR at M1 = 49.4%
Maximum value of SAR (measured) = 20.9 W/kg



EUT TEST STRATEGY AND METHODOLOGY

SAR Testing for USB Dongle

Test all USB orientations with a device to phantom separation distance of 5mm, according to KDB 447498 D02 requirements. These test orientations are intended for the exposure conditions found in typical notebook/laptop/notebook 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.

During SAR testing use a 0.3M high quality USB cable for testing these other orientations, and that the USB cable does not influence the radiating characteristics and output power of the transmitter

SAR testing configuration please refer to page 25.

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.

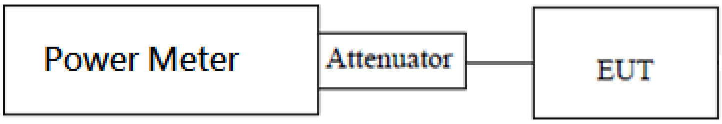
CONDUCTED OUTPUT POWER MEASUREMENT

Provision Applicable

The measured peak output power should be greater and within 5% than EMI measurement.

Test Procedure

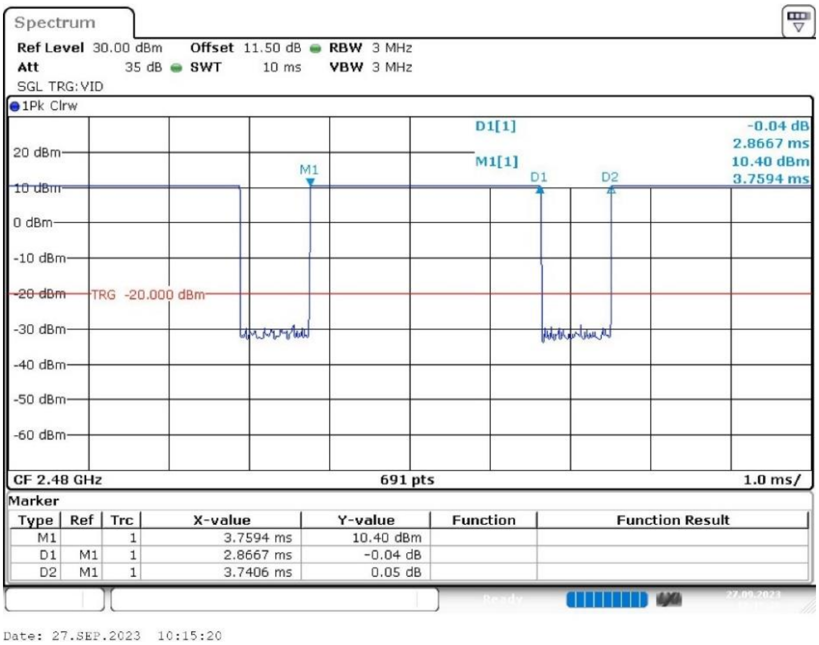
The RF output of the transmitter was connected to the input of the EMI Test Receiver through sufficient attenuation.



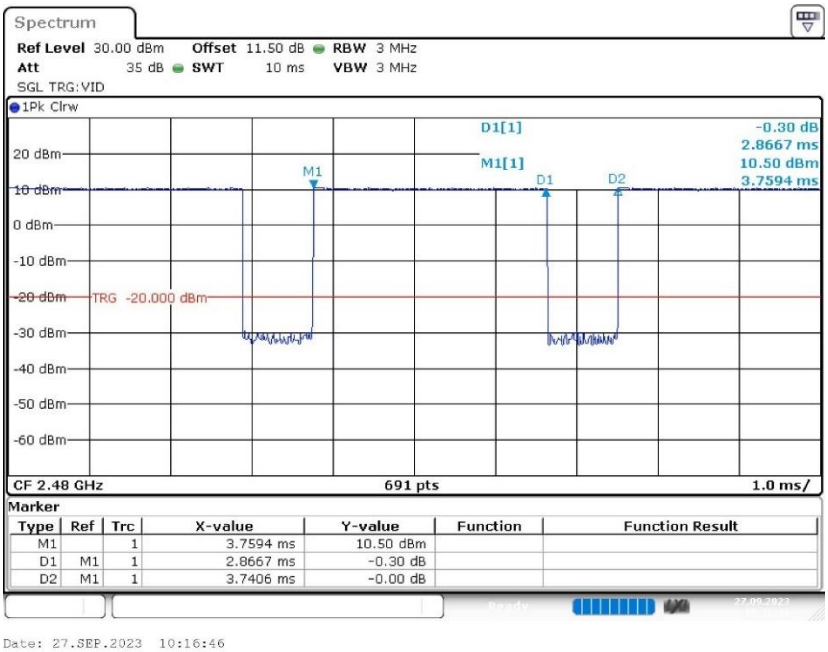
Bluetooth

Duty Cycle:

DH5



2DH5



Test Modes	Time-ON(ms)	Time-ON+OFF(ms)	Duty Cycle(%)
BT1M_DH5	2.87	3.74	76.74%
BT2M_2DH5	2.87	3.74	76.74%

Bluetooth Conducted Power Table:

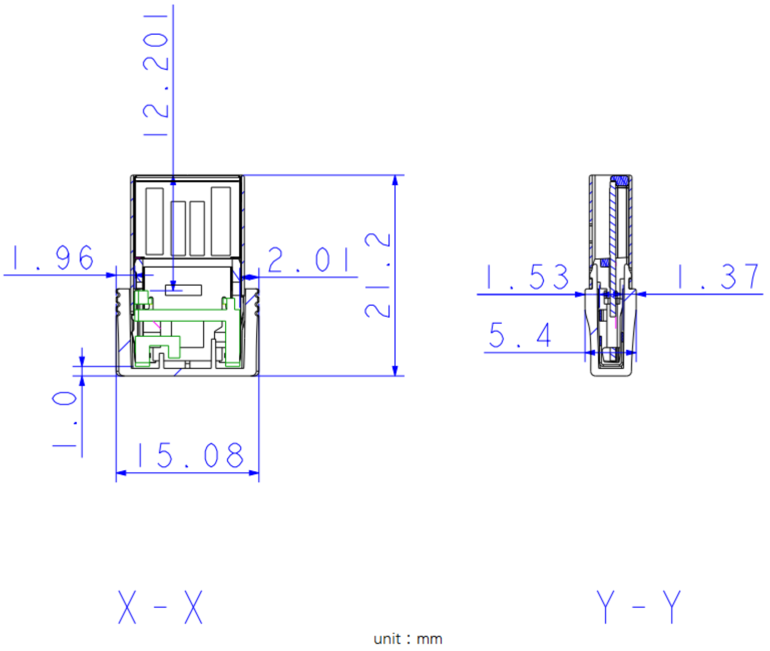
Mode	Channel	Frequency (MHz)	Conducted Power (Peak/dBm)	Conducted Power (Avg/dBm)	Antenna Gain (dBi)	EIRP Power (Avg/dBm)
GFSK	0	2402	10.21	10.12	0.01	10.13
	39	2441	10.26	10.18	0.01	10.19
	78	2480	10.15	10.06	0.01	10.07
π/4 DQPSK	0	2402	10.24	8.06	0.01	8.07
	39	2441	10.28	8.14	0.01	8.15
	78	2480	10.16	8.03	0.01	8.04

Maximum Target Output Power:

Mode	Channel	Frequency(MHz)	Target Output Power(Avg/dBm)
GFSK	0	2402	10.50
	39	2441	10.50
	78	2480	10.50
π/4 DQPSK	0	2402	8.50
	39	2441	8.50
	78	2480	8.50

STANDALONE SAR TEST EXCLUSION CONSIDERATIONS

Antennas Location for EUT:



	Horizontal Up	Horizontal Down	Vertical Front	Vertical Back	Tip
To edge distance	1.37	1.53	1.96	2.01	1.0

unit：mm

SAR test confoguration:

USB dongle SAR testing is according KDB 447498 D02 SAR Procedures for Dongle Xmtr and add Tip position. USB dongle transmitters must show compliance at a test separation distance of 5 mm. SAR setup photo please refer to the Attachment "APPENDIX B EUT TEST POSITION PHOTOS". SAR test position as:

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

SAR MEASUREMENT RESULTS

This page summarizes the results of the performed diametric evaluation.

During SAR testing use a 0.3M high quality USB cable for testing these other orientations, and that the USB cable does not influence the radiating characteristics and output power of the transmitter.

For SAR testing of WLAN/Bluetooth 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)”.

Scaling Factor = tune-up limit power(mW) / EUT RF power(mW), where tune-up limit is the maximum rated power among all production units.

For WLAN/Bluetooth, Reported SAR(W/kg) = Measured SAR(W/kg) * Duty Cycle scaling factor * Scaling factor.

SAR Test Data

Environmental Conditions

Test Date	2023/10/02
Freq. Band(MHz)	2450
Temperature	23.9℃
Relative Humidity	52%
Test Engineer	Anson Lu

Bluetooth 1M：

EUT Position	Freq. (MHz)	Test Mode	Maxi. Meas. Power (dBm)	Maxi. Rated Power (dBm)	SAR (W/Kg)					
					Duty Cycle Factor	Scaled Factor	Meas. SAR(1g)	Scaled SAR(1g)	Limit SAR(1g)	Plot
Horizontal Up (5mm)	2441	BT1M	10.18	10.50	1.303	1.076	0.282	0.395	1.6	1
Horizontal Up (5mm)	2402	BT1M	10.12	10.50	1.303	1.091	0.240	0.341	1.6	1-1
Horizontal Up (5mm)	2480	BT1M	10.06	10.50	1.303	1.107	0.264	0.381	1.6	1-2
Horizontal Down (5mm)	2441	BT1M	10.18	10.50	1.303	1.076	0.210	0.294	1.6	2
Vertical Front (5mm)	2441	BT1M	10.18	10.50	1.303	1.076	0.131	0.184	1.6	3
Vertical Back (5mm)	2441	BT1M	10.18	10.50	1.303	1.076	0.118	0.165	1.6	4
Tip (5mm)	2441	BT1M	10.18	10.50	1.303	1.076	0.066	0.093	1.6	5

Note: 1) Maxi. meas. Power is using time based Avg power.

Bluetooth 2M：

EUT Position	Freq. (MHz)	Test Mode	Maxi. Meas. Power (dBm)	Maxi. Rated Power (dBm)	SAR (W/Kg)					
					Duty Cycle Factor	Scaled Factor	Meas. SAR(1g)	Scaled SAR(1g)	Limit SAR(1g)	Plot
Horizontal Up (5mm)	2441	BT2M	8.14	8.50	1.303	1.086	0.176	0.249	1.6	21
Horizontal Up (5mm)	2402	BT2M	8.06	8.50	1.303	1.107	0.155	0.224	1.6	21-1
Horizontal Up (5mm)	2480	BT2M	8.03	8.50	1.303	1.114	0.169	0.245	1.6	21-2
Horizontal Down (5mm)	2441	BT2M	8.14	8.50	1.303	1.086	0.137	0.194	1.6	22
Vertical Front (5mm)	2441	BT2M	8.14	8.50	1.303	1.086	0.086	0.122	1.6	23
Vertical Back (5mm)	2441	BT2M	8.14	8.50	1.303	1.086	0.080	0.113	1.6	24
Tip (5mm)	2441	BT2M	8.14	8.50	1.303	1.086	0.049	0.069	1.6	25

Note: 1) Maxi. meas. Power is using time based Avg power.

SAR SIMULTANEOUS TRANSMISSION DESCRIPTION

Simultaneous Transmission:

Conclusion:

This project is not evaluated.

APPENDIX A MEASUREMENT UNCERTAINTY

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

SAR Uncertainty Budget
According to IEC/IEEE 62209-1528
(Frequency band: 300MHz - 3GHz range)

Symbol	Input quantity *Xi* (source of uncertainty)	Unc. Value	Prob. Dist.	Div.	ci (1g)	ci (10g)	Std.Unc. (1g) (±%)	Std.Unc. (10g) (±%)	Ref.
Measurement system errors									
CF	Probe calibration(±%)	12.0	N	2	1	1	6.0	6.0	8.4.1.1
CF_{drift}	Probe calibration drift(±%)	1.7	R	√3	1	1	1.0	1.0	8.4.1.2
LIN	Probe linearity and detection limit(±%)	4.7	R	√3	1	1	2.7	2.7	8.4.1.3
BBS	Broadband signal(±%)	3.0	R	√3	1	1	1.7	1.7	8.4.1.4
ISO	Probe isotropy(±%)	7.6	R	√3	1	1	4.4	4.4	8.4.1.5
DAE	Other probe and data acquisition errors(±%)	0.3	N	1	1	1	0.3	0.3	8.4.1.6
AMB	RF ambient and noise(±%)	1.8	N	1	1	1	1.8	1.8	8.4.1.7
Δ_{xyz}	Probe positioning errors(±mm)	0.006	N	1	0.14	0.14	0.08	0.08	8.4.1.8
DAT	Data processing errors(±%)	1.2	N	1	1	1	1.2	1.2	8.4.1.9
Phantom and device (DUT or validation antenna) errors									
LIQ (σ)	Conductivity (meas.)(±%)	2.5	N	1	0.78	0.71	2.0	1.8	8.4.2.1
LIQ (T_c)	Conductivity (temp.)(±%)	3.2	R	√3	0.78	0.71	1.4	1.3	8.4.2.2
EPS	Phantom Permittivity(±%)	14	R	√3	0	0	0.0	0.0	8.4.2.3
DIS	Distance DUT - TSL(±%)	2	N	1	2	2	4.0	4.0	8.4.2.4
D_{xyz}	Device Positioning(±%)	2.5	N	1	1	1	2.5	2.5	8.4.2.5
H	Device Holder(±%)	2.7	N	1	1	1	2.7	2.7	8.4.2.6
MOD	DUT Modulationm(±%)	2.4	R	√3	1	1	1.4	1.4	8.4.2.7
TAS	Time-average SAR(±%)	1.7	R	√3	1	1	1.0	1.0	8.4.2.8
RF_{drift}	DUT drift(±%)	5	N	1	1	1	5.0	5.0	8.4.2.9
VAL	Val Antenna Unc.(±%)	0	N	1	1	1	0.0	0.0	8.4.2.10
P_{in}	Unc. Input Power(±%)	0	N	1	1	1	0.0	0.0	8.4.2.11
Corrections to the SAR result									
$C(\varepsilon',\sigma)$	Deviation to Target(±%)	1.9	N	1	1	0.84	1.9	1.6	8.4.3.1
$C(R)$	SAR scaling(±%)	0	R	√3	1	1	0.0	0.0	8.4.3.2
$u(\Delta SAR)$	Combined uncertainty						11.8	11.7	
U	Expanded uncertainty					*U* =	23.5	23.3	

a Other probability distributions and divisors may be used if they better represent available knowledge of the quantities concerned.

APPENDIX B EUT TEST POSITION PHOTOS

Please Refer to the Attachment APPENDIX B EUT TEST POSITION PHOTOS

APPENDIX C SAR PLOTS OF SAR MEASUREMENT

Please Refer to the Attachment APPENDIX C SAR PLOTS OF SAR MEASUREMEN

APPENDIX D PROBE & DAE CALIBRATION CERTIFICATES

Please refer to the file document APPENDIX D PROBE & DAE CALIBRATION CERTIFICATES

APPENDIX E DIPOLE CALIBRATION CERTIFICATES

Please refer to the file document APPENDIX E DIPOLE CALIBRATION CERTIFICATES

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