

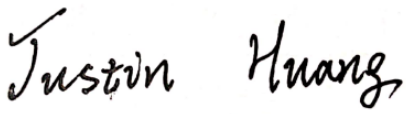


FCC SAR Test Report

FCC ID: RWO-RZ090510

Project No. : 2411C327
Equipment : Notebook PC
Brand Name :  or  or RAZER
Test Model : RZ09-0529
Series Model : N/A
Date of Receipt : Dec. 26, 2024
Date of Test : Jan. 16, 2025 ~ Jan. 24, 2025
Issued Date : Feb. 17, 2025
Report Version : R01
Test Sample : Engineering Sample No.: DG20241226112.
Standard(s) : Please refer to page 2.
Applicant : Razer Inc.
Address : 9 Pasteur, Suite 100, Irvine, CA92618, USA.
Manufacturer : Razer Inc.
Address : 9 Pasteur, Suite 100, Irvine, CA92618, USA.

The above equipment has been tested and found compliance with the requirement of the relative standards by BTL Inc.

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Standard(s) : **IEEE Std C95.1:2019** IEEE Standard for Safety Levels with Respect to Human Exposure to Electric, Magnetic, and Electromagnetic Fields, 0 kHz to 300 GHz.

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

IEC TR 63170-2018 Measurement procedure for the evaluation of power density related to human exposure to radio frequency fields from wireless communication devices operating between 6 GHz and 100 GHz.

IEC/IEEE 63195-1-2022 Assessment of power density of human exposure to radio frequency fields from wireless devices in close proximity to the head and body (frequency range of 6 GHz to 300 GHz) –Part 1: Measurement procedure.

KDB447498 D04 Interim General RF Exposure Guidance v01
KDB865664 D01 SAR measurement 100 MHz to 6 GHz v01r04
KDB865664 D02 SAR Reporting v01r02

The following reference test guidance is not within the scope of accreditation of A2LA:

KDB616217 D04 SAR for laptop and tablets v01r02
KDB248227 D01 802.11 Wi-Fi SAR v02r02
KDB690783 D01 SAR Listings on Grants v01r03

Declaration

BTL represents to the client that testing is done in accordance with standard procedures as applicable and that test instruments used has been calibrated with standards traceable to international standard(s) and/or national standard(s).

BTL's reports apply only to the specific samples tested under conditions. It is manufacture's responsibility to ensure that additional production units of this model are manufactured with the identical electrical and mechanical components. BTL assumes no responsibility for the data provided by the customer, any statements, inferences or generalizations drawn by the customer or others from the reports issued by BTL.

The report must not be used by the client to claim product certification, approval, or endorsement by A2LA or any agency of the U.S. Government.

This report is the confidential property of the client. As a mutual protection to the clients, the public and ourselves, the test report shall not be reproduced, except in full, without our written approval.

BTL's laboratory quality assurance procedures are in compliance with the ISO/IEC 17025: 2017 requirements, and accredited by the conformity assessment authorities listed in this test report.

BTL is not responsible for the sampling stage, so the results only apply to the sample as received.

The information, data and test plan are provided by manufacturer which may affect the validity of results, so it is manufacturer's responsibility to ensure that the apparatus meets the essential requirements of applied standards and in all the possible configurations as representative of its intended use.

Limitation

For the use of the authority's logo is limited unless the Test Standard(s)/Scope(s)/Item(s) mentioned in this test report is (are) included in the conformity assessment authorities acceptance respective.

Please note that the measurement uncertainty is provided for informational purpose only and are not use in determining the Pass/Fail results.

Table of Contents	Page
REPORT ISSUED HISTORY	6
1 . GENERAL INFORMATION	7
1.1 STATEMENT OF COMPLIANCE	7
1.2 LABORATORY ENVIRONMENT	7
1.3 GENERAL DESCRIPTION OF EUT	8
1.4 MAIN TEST INSTRUMENTS	10
2 . RF EMISSIONS MEASUREMENT	11
2.1 TEST FACILITY	11
2.2 MEASUREMENT UNCERTAINTY	11
3 . SAR MEASUREMENTS SYSTEM CONFIGURATION	12
3.1 SAR MEASUREMENT SET-UP	12
3.1.1 TEST SETUP LAYOUT	12
3.2 DASY5 E-FIELD PROBE SYSTEM	13
3.2.1 PROBE SPECIFICATION	13
3.2.2 E-FIELD PROBE CALIBRATION	14
3.2.3 OTHER TEST EQUIPMENT	15
3.2.4 SCANNING PROCEDURE	16
3.2.5 SPATIAL PEAK SAR EVALUATION	17
3.2.6 DATA STORAGE AND EVALUATION	18
3.2.7 DATA EVALUATION BY SEMCAD	19
4 . SYSTEM VERIFICATION PROCEDURE	21
4.1 TISSUE VERIFICATION	21
4.2 SYSTEM CHECK	22
4.2.1 POWER DENSITY SYSTEM CHECK	23
4.3 SYSTEM CHECK PROCEDURE	24
5 . SAR MEASUREMENT VARIABILITY AND UNCERTAINTY	25
5.1 SAR MEASUREMENT VARIABILITY	25
6 . OPERATIONAL CONDITIONS DURING TEST	26
6.1 SAR TEST CONFIGURATION	26
6.1.1 WIFI TEST CONFIGURATION	26
6.2 TEST POSITION	29
6.2.1 NOTEBOOK MODE	29
7 . TEST RESULT	31
7.1 CONDUCTED POWER RESULTS	31

Table of Contents	Page
7.2 SAR TEST RESULTS	63
7.2.1 SAR MEASUREMENT RESULT	64
7.3 MULTIPLE TRANSMITTER EVALUATION	66
7.3.1 SIMULTANEOUS TRANSMISSION CONDITIONS	66
7.3.2 SAR UMMATION SCENARIO	67
7.3.3 SIMULTANEOUS TRANSMISSION CONLCUSION	69
APPENDIX	75
1. TEST LAYOUT	75
Appendix A. SAR Plots of System Verification	
Appendix B. SAR Plots of SAR Measurement	
Appendix C. Calibration Certificate	
Appendix D. Photographs of the Test Set-Up	

REPORT ISSUED HISTORY

Report No.	Version	Description	Issued Date	Note
BTL-FCC SAR-1-2411C327	R00	Original Report.	Jan. 26, 2025	Invalid
BTL-FCC SAR-1-2411C327	R01	Modified the comments.	Feb. 17, 2025	Valid

1. GENERAL INFORMATION

1.1 STATEMENT OF COMPLIANCE

Mode	Highest Reported Body SAR-1g (W/kg)
WLAN 2.4G	0.607
WLAN 5.2G	1.350
WLAN 5.3G	1.217
WLAN 5.6G	1.319
WLAN 5.8G	1.316
WLAN 5.9G	1.301
WLAN 6.2G	0.531
WLAN 6.5G	0.419
WLAN 6.7G	0.648
WLAN 7.0G	0.623
Bluetooth	0.224

Frequency Band	Highest Averaged Power Density (mW/cm ²)
WLAN 6E	0.882

Note:

1) The device is in compliance with Specific Absorption Rate (SAR) for general population uncontrolled exposure limits according to the FCC rule §2.1093, the ANSI C95.1:1992/IEEE C95.1:1991, the NCRP Report Number 86 for uncontrolled environment, and had been tested in accordance with the measurement methods and procedures specified in IEEE Std 1528-2013.

2) According to 47 CFR part 2.1093, the MPE limits specified in part 1.1310 apply to portable devices that transmit at frequencies above 6 GHz. The localized power density limit for general population exposure is 1.0 mW/cm² (equal to 10 W/m²) for frequency up to 100 GHz.

1.2 LABORATORY ENVIRONMENT

Temperature	Min. = 20°C, Max. = 24°C
Relative humidity	Min. = 30%, Max. = 70%
Ground system resistance	< 0.5Ω
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.	

1.3 GENERAL DESCRIPTION OF EUT

Equipment	Notebook PC										
Brand Name	RAZER™ or  or RAZER										
Test Model	RZ09-0529										
Series Model	N/A										
Model Difference(s)	N/A										
Hardware Version	APF24003_MB										
Firmware Version	Windows 11 Home										
Module Card	BE200NGW M										
Modulation	WiFi(DSSS/OFDM/OFDMA), BT(GFSK/π/4-DQPSK/8-DPSK)										
Operation Frequency Range(s)	Band			TX (MHz)			RX (MHz)				
	Bluetooth			2400~2483.5							
	WiFi	2.4G		2400~2483.5							
		5G	UNII 1		5150~5250						
			UNII 2a		5250~5350						
			UNII 2c		5470~5725						
			UNII 3		5725~5850						
			UNII 4		5850~5895						
		6E	UNII 5		5925~6425						
			UNII 6		6425~6525						
			UNII 7		6525~6875						
			UNII 8		6875~7125						
Test Channels (low-mid-high)	0-39-78 (BT)										
	0-19-39 (BLE)										
	1-6-11 (2.4G WIFI 802.11b/g/n HT20/ax HE20/be EHT20)										
	3-6-9 (2.4G WIFI 802.11n HT40/ax HE40/be EHT40)										
	Band	5.2G	5.3G	5.6G	5.8G	5.9G	6.2G	6.5G	6.7G	7.0G	
	802.11a	36-40-44-48	52-56-60-64	100-104-	149-153-157-161-165	169-173-177	/	/	/	/	
	802.11n HT20			108-							
	802.11ax HE20			112-							
	802.11be EHT20			116-120-132-136-140			1-49-93	97-105-113	117-149-181	185-209-233	
	802.11n HT40	38-46	54-62	102-110-	151-159	167-175	/	/	/	/	
	802.11ax HE40			118-							
	802.11be EHT40			126-134			3-43-91	99-107	115-147-179	187-227	
	802.11ac VHT80	42	58	106-	155	171	/	/	/	/	
	802.11ax HE80			122-							
	802.11be EHT80			138			7-39-87	103-119	135-151-167	183-199-215	
	802.11ac VHT160	/	50	114	/	163	/	/	/	/	
	802.11ax HE160						15-47-79	111	143-175	207	
	802.11be EHT160										

Antenna Information	Ant.	Manufacturer	Ant. Part number	Type	Band	Gain (dBi)
	Main Ant	Amphenol Taiwan Corporation	BY5963-16-011-C	PIFA	2400-2483.5	2.55
					5150-5250	2.79
					5250-5350	2.69
					5470-5725	3.64
					5725-5850	3.39
					5850-5895	3.92
					5925-6425	3.52
					6425-6525	3.07
					6525-6875	3.58
					6875-7125	3.52
	Aux Ant	Amphenol Taiwan Corporation	BY5963-16-012-C	PIFA	2400-2483.5	2.37
					5150-5250	3.13
					5250-5350	3.32
					5470-5725	2.50
					5725-5850	3.45
					5850-5895	3.71
					5925-6425	3.35
					6425-6525	3.46
					6525-6875	3.38
6875-7125	2.01					
Other Information						
Battery Information	Model Name	RC30-0529				
	Power Rating	DC 15.56V, 6240mAh, 97.1Wh				
	Manufacturer	BYD				

Note: The antenna gain is provided by the manufacturer.

1.4 MAIN TEST INSTRUMENTS

Item	Equipment	Manufacturer	Model	Serial No.	Cal. Date	Cal. Interval
1	Data Acquisition Electronics	Speag	DAE4	420	Mar. 19, 2024	1 Year
2	Data Acquisition Electronics	Speag	DAE4	1717	Apr. 18, 2024	1 Year
3	E-field Probe	Speag	EX3DV4	7351	Mar. 20, 2024	1 Year
4	E-field Probe	Speag	EX3DV4	7693	Nov. 20, 2024	1 Year
5	E-field Probe	Speag	EUmmWV4	9503	Nov. 11, 2024	1 Year
6	System Validation Dipole	Speag	D2450V2	919	Apr. 22, 2024	3 Years
7	System Validation Dipole	Speag	D5GHzV2	1160	Apr. 25, 2024	3 Years
8	System Validation Dipole	Speag	D6.5GHzV2	1052	Nov. 13, 2024	3 Years
9	System Validation Source	Speag	5G Verification Source 10GHz	1041	May 22, 2024	1 Years
10	ELI Phantom	Speag	ELI Phantom V5.0	1222	N/A	N/A
11	ELI Phantom	Speag	ELI Phantom V5.0	1128	N/A	N/A
12	Twin Sam Phantom	Speag	SAM-Twim V8.0	2081	N/A	N/A
13	Power Amplifier	Mini-Circuits	ZVE-8G+	520701341	Jan. 12, 2025	1 Year
14	DC Source meter	Iteck	IT6154	006104126768201001	Jun. 29, 2024	1 Year
15	Vector Network Analyzer	Agilent	E5071C	MY46102965	Jan. 11, 2025	1 Year
16	Signal Generator	Keysight	N5173B	MY59101420	Jan. 11, 2025	1 Year
17	Smart Power Sensor	R&S	NRP18S	101333	Jun. 01, 2024	1 Year
18	Smart Power Sensor	R&S	NRP-Z21	102209	Jan. 12, 2025	1 Year
19	3.5mm Economy Calibration Kit	Agilent	85052D	MY43252246	Nov. 04, 2024	1 Year
20	Dielectric Assessment Kit	Speag	DAK-3.5	1226	Jan. 24, 2022	3 Years
21	Directional Coupler	Talent Microwave	TC-05180-20S	210628013	Jan. 11, 2025	1 Year
22	Liquid Thermometer	Nscing Es	YZ6021S	/	Nov. 24, 2024	1 Year

Note:

1. "N/A" denotes no model name, serial No. or calibration specified.

2.

1) Per KDB865664 D01 requirements for dipole calibration, the test laboratory has adopted three-year extended calibration interval. Each measured dipole is expected to evaluate with the following criteria at least on annual interval in Appendix C.

- There is no physical damage on the dipole;
- System check with specific dipole is within 10% of calibrated value;
- The most recent return-loss result, measured at least annually, deviates by no more than 20% from the previous measurement;
- The most recent measurement of the real or imaginary parts of the impedance, measured at least annually is within 5Ω from the previous measurement.

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

2. RF EMISSIONS MEASUREMENT

2.1 TEST FACILITY

The test facilities used to collect the test data in this report is SAR room at the location of Room 108-116, 309-310, Building 2, No.1, Yile Road, Songshan Lake Zone, Dongguan City, Guangdong, People's Republic of China.

BTL's Registration Number for FCC: 747969

BTL's Designation Number for FCC: CN1377

2.2 MEASUREMENT UNCERTAINTY

Note: 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.

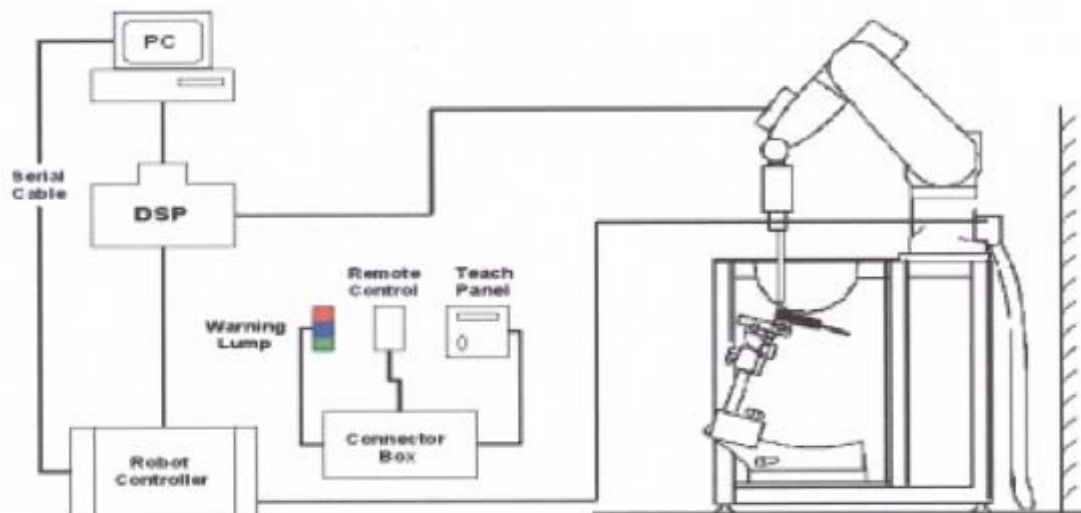
3. SAR MEASUREMENTS SYSTEM CONFIGURATION

3.1 SAR MEASUREMENT SET-UP

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

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

3.1.1 TEST SETUP LAYOUT



3.2 DASY5 E-FIELD PROBE SYSTEM

The SAR measurements were conducted with the dosimetric probe EX3DV4 (manufactured by SPEAG), designed in the classical triangular configuration and optimized for dosimetric evaluation.

3.2.1 PROBE SPECIFICATION

EX3DV4

Construction	Symmetrical design with triangular core Interleaved sensors 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 HSL (rotation around probe axis) ± 0.5 dB in tissue material (rotation normal to probe axis)
Dynamic Range	10 μ W/g to > 100 mW/g Linearity: ± 0.2 dB
Dimensions	Overall length: 330 mm (Tip: 20 mm) Tip diameter: 2.5 mm (Body: 12 mm) Distance from probe tip to dipole centers: 1.0 mm



E-field Probe

3.2.2 E-FIELD PROBE CALIBRATION

Each probe is calibrated according to a dosimetric assessment procedure with accuracy better than $\pm 10\%$. The spherical isotropy was evaluated and found to be better than $\pm 0.25\text{dB}$. The sensitivity parameters (NormX, NormY, NormZ), the diode compression parameter (DCP) and the conversion factor (ConvF) of the probe are tested.

The free space E-field from amplified probe outputs is determined in a test chamber. This is performed in a TEM cell for frequencies below 1 GHz, and in a wave guide above 1 GHz for free space. For the free space calibration, the probe is placed in the volumetric center of the cavity and at the proper orientation with the field. The probe is then rotated 360 degrees.

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

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

Where: Δt =Exposure time (30 seconds),

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

ΔT =Temperature increase due to RF exposure.

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

Where: σ = Simulated Tissue Conductivity,

ρ =Tissue density (kg/m³).

3.2.3 OTHER TEST EQUIPMENT

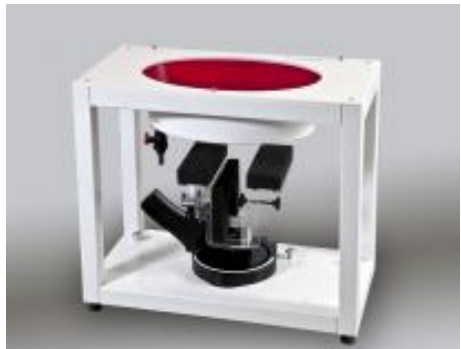
3.2.3.1. Device Holder for Transmitters

Construction: Simple but effective and easy-to-use extension for Mounting Device that facilitates the testing of larger devices (e.g., laptops, cameras, etc.) It is light weight and fits easily on the upper part of the Mounting Device in place of the phone positioner. The extension is fully compatible with the Twin SAM, ELI and SAM v6.0 Phantoms.

Material: POM, Acrylic glass, Foam

3.2.3.2 Phantom

Model	Twin SAM	
Construction	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.	
Shell Thickness	2 ± 0.2 mm	
Filling Volume	Approx. 25 liters	
Dimensions	Length: 1000mm; Width: 500mm Height: adjustable feet	
Available	Special	

Model	ELI Phantom	
Construction	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.	
Shell Thickness	2±0.1 mm	
Filling Volume	Approx. 30 liters	
Dimensions	Length: 600 mm; Width: 190mm Height: adjustable feet	
Available	Special	

3.2.4 SCANNING PROCEDURE

The DASY5 installation includes predefined files with recommended procedures for measurements and validation. They are read-only document files and destined as fully defined but unmeasured masks. All test positions (head or body-worn) are tested with the same configuration of test steps differing only in the grid definition for the different test positions.

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. The indicated drift is mainly the variation of the DUT’s output power and should vary max. $\pm 5\%$.

The “surface check” measurement tests the optical surface detection system of the DASY5 system by repeatedly detecting the surface with the optical and mechanical surface detector and comparing the results. The output gives the detecting heights of both systems, the difference between the two systems and the standard deviation of the detection repeatability. Air bubbles or refraction in the liquid due to separation of the sugar-water mixture gives poor repeatability (above $\pm 0.1\text{mm}$). To prevent wrong results tests are only executed when the liquid is free of air bubbles. The difference between the optical surface detection and the actual surface depends on the probe and is specified with each probe. (It does not depend on the surface reflectivity or the probe angle to the surface within $\pm 30^\circ$.)

● Area Scan

The “area scan” measures the SAR above the DUT or verification dipole on a parallel plane to the surface. It is used to locate the approximate location of the peak SAR with 2D spline interpolation. The robot performs a stepped movement along one grid axis while the local electrical field strength is measured by the probe. The probe is touching the surface of the SAM during acquisition of measurement values. The standard scan uses large grid spacing for faster measurement. Standard grid spacing for head measurements is 15 mm in x- and y- dimension ($\leq 2\text{GHz}$), 12 mm in x- and y- dimension (2-4 GHz) and 10mm in x- and y- dimension (4-6GHz). If a finer resolution is needed, the grid spacing can be reduced. Grid spacing and orientation have no influence on the SAR result. For special applications where the standard scan method does not find the peak SAR within the grid, e.g. mobile phones with flip cover, the grid can be adapted in orientation.

● Zoom Scan

A “zoom scan” measures the field in a volume around the 2D peak SAR value acquired in the previous “coarse” scan. This is a fine grid with maximum scan spatial resolution: $\Delta x_{\text{zoom}}, \Delta y_{\text{zoom}} \leq 2\text{GHz} \rightarrow 8\text{mm}$, 2-4GHz $\rightarrow 5\text{mm}$ and 4-6 GHz $\rightarrow 4\text{mm}$; $\Delta z_{\text{zoom}} \leq 3\text{GHz} \rightarrow 5\text{mm}$, 3-4 GHz $\rightarrow 4\text{mm}$ and 4-6GHz $\rightarrow 2\text{mm}$ where the robot additionally moves the probe along the z-axis away from the bottom of the Phantom. DASY is also able to perform repeated zoom scans if more than 1 peak is found during area scan. In this document, the evaluated peak 1g and 10g averaged SAR values are shown in the 2D-graphics in Appendix B. Test results relevant for the specified standard (see chapter 1.4.) are shown in table form in chapter 7.2.

A Z-axis scan measures the total SAR value at the x-and y-position of the maximum SAR value found during the cube scan. The probe is moved away in z-direction from the bottom of the SAM phantom in 2 mm steps. This measurement shows the continuity of the liquid and can - depending in the field strength – also show the liquid depth.

The following table summarizes the area scan and zoom scan resolutions per FCC KDB 865664D01:

Frequency	Maximun Area Scan resolution ($\Delta x_{\text{area}}, \Delta y_{\text{area}}$)	Maximun Zoom Scan spatial resolution ($\Delta x_{\text{Zoom}}, \Delta y_{\text{Zoom}}$)	Maximun Zoom Scan spatial resolution			Minimum zoom scan volume (x,y,z)
			Uniform Grid	Graded Grad		
			$\Delta z_{\text{Zoom}}(n)$	$\Delta z_{\text{Zoom}}(1)^*$	$\Delta z_{\text{Zoom}}(n>1)^*$	
$\leq 2\text{GHz}$	$\leq 15\text{mm}$	$\leq 8\text{mm}$	$\leq 5\text{mm}$	$\leq 4\text{mm}$	$\leq 1.5^* \Delta z_{\text{Zoom}}(n-1)$	$\geq 30\text{mm}$
2-3GHz	$\leq 12\text{mm}$	$\leq 5\text{mm}$	$\leq 5\text{mm}$	$\leq 4\text{mm}$	$\leq 1.5^* \Delta z_{\text{Zoom}}(n-1)$	$\geq 30\text{mm}$
3-4GHz	$\leq 12\text{mm}$	$\leq 5\text{mm}$	$\leq 4\text{mm}$	$\leq 3\text{mm}$	$\leq 1.5^* \Delta z_{\text{Zoom}}(n-1)$	$\geq 28\text{mm}$
4-5GHz	$\leq 10\text{mm}$	$\leq 4\text{mm}$	$\leq 3\text{mm}$	$\leq 2.5\text{mm}$	$\leq 1.5^* \Delta z_{\text{Zoom}}(n-1)$	$\geq 25\text{mm}$
5-6GHz	$\leq 10\text{mm}$	$\leq 4\text{mm}$	$\leq 2\text{mm}$	$\leq 2\text{mm}$	$\leq 1.5^* \Delta z_{\text{Zoom}}(n-1)$	$\geq 22\text{mm}$

3.2.5 SPATIAL PEAK SAR EVALUATION

The spatial peak SAR - value for 1 and 10 g is evaluated after the Cube measurements have been done. The basis of the evaluation are the SAR values measured at the points of the fine cube grid consisting of 5 x 5 x 7 points (with 8mm horizontal resolution) or 7 x 7 x 7 points (with 5mm horizontal resolution) or 8 x 8 x 7 points (with 4mm horizontal resolution). The algorithm that finds the maximal averaged volume is separated into three different stages.

- The data between the dipole center of the probe and the surface of the phantom are extrapolated. This data cannot be measured since the center of the dipole is 2.7 mm away from the tip of the probe and the distance between the surface and the lowest measuring point is about 1 mm (see probe calibration sheet). The extrapolated data from a cube measurement can be visualized by selecting "Graph Evaluated".
- The maximum interpolated value is searched with a straight-forward algorithm. Around this maximum the SAR - values averaged over the spatial volumes (1g or 10 g) are computed using the 3d-spline interpolation algorithm. If the volume cannot be evaluated (i.e., if a part of the grid was cut off by the boundary of the measurement area) the evaluation will be started on the corners of the bottom plane of the cube.
- All neighboring volumes are evaluated until no neighboring volume with a higher average value is found.

Extrapolation

The extrapolation is based on a least square algorithm [W. Gander, Computer mathematic, p.168-180]. Through the points in the first 3 cm along the z-axis, polynomials of order four are calculated. These polynomials are then used to evaluate the points between the surface and the probe tip. The points, calculated from the surface, have a distance of 1 mm from each other.

Interpolation

The interpolation of the points is done with a 3d-Spline. The 3d-Spline is composed of three one-dimensional splines with the "Not a knot"-condition [W. Gander, Computer mathematic, p.141-150] (x, y and z -direction) [Numerical Recipes in C, Second Edition, p.123ff].

Volume Averaging

At First the size of the cube is calculated. Then the volume is integrated with the trapezoidal algorithm. 8000 points (20x20x20) are interpolated to calculate the average.

Advanced Extrapolation

DASY5 uses the advanced extrapolation option which is able to compensate boundary effects on E-field probes.

3.2.6 DATA STORAGE AND EVALUATION

3.2.6.1 Data Storage

The DASY5 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 “DAE”. 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], [mW/g], [mW/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.

3.2.7 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	Dcpj
Device parameters:	Frequency	f
	Crest factor	cf
Media parameters:	Conductivity	
	Density	

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 DASY5 components. In the direct measuring mode of the multi meter 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	V_i = compensated signal of channel i	(i = x, y, z)
	U_i = input signal of channel i	(i = x, y, z)
	cf = crest factor of exciting field	(DASY parameter)
	dcpj = diode compression point	(DASY parameter)

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

$$\text{E-field probes: } E_i = (V_i / \text{Norm}_i \cdot \text{ConvF})^{1/2}$$

$$\text{H-field probes: } H_i = (V_i)^{1/2} \cdot (a_{i0} + a_{i1} f + a_{i2} f^2) / f$$

With V_i = compensated signal of channel i ($i = x, y, z$)

Norm_i = sensor sensitivity of channel i ($i = x, y, z$)
[mV/(V/m)²] for E-field Probes

ConvF = sensitivity enhancement in solution

a_{ij} = sensor sensitivity factors for H-field probes

f = carrier frequency [GHz]

E_i = electric field strength of channel i in V/m

H_i = magnetic field strength of channel i in A/m

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

$$E_{\text{tot}} = (E_x^2 + E_y^2 + E_z^2)^{1/2}$$

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

$$\text{SAR} = (E_{\text{tot}})^2 \cdot \sigma / (\rho \cdot 1000)$$

With SAR = local specific absorption rate in mW/g

E_{tot} = total field strength in V/m
= conductivity in [mho/m] or [Siemens/m]
= 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.

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

With P_{pwe} = equivalent power density of a plane wave in mW/cm²

E_{tot} = total field strength in V/m

H_{tot} = total magnetic field strength in A/m

4. SYSTEM VERIFICATION PROCEDURE

4.1 TISSUE VERIFICATION

The simulating liquids should be checked at the beginning of a series of SAR measurements to determine if the dielectric parameters are within the tolerances of the specified target values. The measured conductivity and relative permittivity should be within $\pm 5\%$ of the target values.

The following materials are used for producing the tissue-equivalent materials.

Tissue Type	Bactericide	DGBE	HEC	NaCl	Sucrose	Triton X-100	Water	Diethylene Glycol Mono-hexylether
Head 2450	-	45.0	-	0.1	-	-	54.9	-
Head 5G	-	-	-	-	-	17.2	65.5	17.3

Salt: 99+% Pure Sodium Chloride; Sugar: 98+% Pure Sucrose; Water: De-ionized, 16M + resistivity
HEC: Hydroxyethyl Cellulose; DGBE: 99+% Di(ethylene glycol) butyl ether, [2-(2-butoxyethoxy)ethanol]
Triton X-100 (ultra pure): Polyethylene glycol mono [4-(1,1,3,3-tetramethylbutyl)phenyl]ether

Tissue Verification									
Tissue Type	Frequency (MHz)	Liquid Temp. (°C)	Conductivity (σ)	Permittivity (ϵ_r)	Targeted Conductivity (σ)	Targeted Permittivity (ϵ_r)	Deviation Conductivity (σ) (%)	Deviation Permittivity (ϵ_r) (%)	Date
Head	2450	22.4	1.820	39.639	1.80	39.2	1.11	1.12	Jan. 20, 2025
Head	5250	22.5	4.780	35.811	4.71	36.0	1.49	-0.39	Jan. 19, 2025
Head	5600	22.5	5.254	34.995	5.07	35.5	3.63	-1.42	Jan. 19, 2025
Head	5750	22.5	5.377	34.592	5.22	35.4	3.01	-2.14	Jan. 19, 2025
Head	5800	22.3	5.353	34.269	5.22	35.4	2.55	-3.06	Jan. 21, 2025
Head	6500	22.2	5.87	33.60	6.07	34.5	-3.29	-2.61	Jan. 22, 2025

Note:

- 1) The dielectric parameters of the tissue-equivalent liquid should be measured under similar ambient conditions and within 2 °C of the conditions expected during the SAR evaluation to satisfy protocol requirements.
- 2) KDB 865664 was ensured to be applied for probe calibration frequencies greater than or equal to 50MHz of the EUT frequencies.
- 3) The above measured tissue parameters were used in the DASY software to perform interpolation via the DASY software to determine actual dielectric parameters at the test frequencies. The SAR test plots may slightly differ from the table above since the DASY rounds to three significant digits.

4.2 SYSTEM CHECK

The system check is performed for verifying the accuracy of the complete measurement system and performance of the software. The system check is performed with tissue equivalent material according to IEEE P1528 (described above). The following table shows system check results for all frequency bands and tissue liquids used during the tests.

System Check	Date	Frequency (MHz)	Targeted SAR 1g (W/kg)	Measured SAR 1g (W/kg)	normalized SAR 1g (W/kg)	Deviation (%)	Dipole S/N
Head	Jan. 20, 2025	2450	52.10	12.80	51.20	-1.73	919
Head	Jan. 19, 2025	5250	78.00	7.76	77.60	-0.51	1160
Head	Jan. 19, 2025	5600	80.60	8.08	80.80	0.25	1160
Head	Jan. 19, 2025	5750	76.50	7.52	75.20	-1.70	1160
Head	Jan. 21, 2025	5800	76.50	7.89	78.90	3.14	1160
Head	Jan. 22, 2025	6500	290.00	27.90	279.00	-3.79	1052

4.2.1 POWER DENSITY SYSTEM CHECK

System check provides a fast and reliable method to routinely verify that the measurement system is operational with no system component failures, including probe defects, drifts or deviation from target performance requirements. A system check also verifies the repeatability of the measurement system before compliance testing.

The measurement of a verification source is started from 5G probe installed and the phantom taught. The verification source is placed on the 5G phantom. Due to the internal distance from the horn to the outer surface of the verification source, the measurement distance set in the software should be offset by -4.45 mm; e.g, for measurement of the verification source at 10 mm, the measurement distance set in the software should be 5.55mm (10mm -4.45 mm).

The system check is a complete measurement using simple well-defined reference sources. According to the description of "Relative system check" in Section A.3 of Annex A to the IEC IEEE 63195-1 test standard, the uncertainty tolerance range of the system performance check can be converted to a percentage by referring to the uncertainty K=1 of the source calibration certificate. Here are some examples of A.5 and A.6 formulas! The uncertainty tolerance range of this calibration certificate is $\pm 15.88\%$. According to the measured $psPD_{4cm^2}$ result, within the tolerance of the calibration certificate standard uncertainty, the system verification is successful. The instruments and procedures used for system inspection shall ensure that the system is ready to perform compliance tests.

Before starting DUT PD testing in any configuration, the acceptance criteria shall be met. The relative system check is successful if a) or b) is met:

- a) All absolute differences between the measured values, $psPD_{meas}$ and target values $psPD_{tgt}$, with $psPD$ values averaged over 1 cm^2 and/or 4 cm^2 , shall be within the combined uncertainty u_c of the measurement system and the source antenna, according to Formula (A.4) if the uncertainty is expressed in decibel, or according to Formula (A.5) if the uncertainty is expressed in percent, along with Formula (A.6).

$$\Delta psPD_{tgt} = \left| 10 \times \lg \left(\frac{psPD_{meas}}{psPD_{tgt}} \right) \right| < \min(2 \times |u_c|, 2 \text{ dB}) \quad (\text{A.4})$$

or

$$\Delta psPD_{tgt} = \left| \frac{psPD_{meas} - psPD_{tgt}}{psPD_{tgt}} \right| < \min(2 \times |u_c|, 58\%) \quad (\text{A.5})$$

$$u_c = \sqrt{u_{\text{antenna_cal}}^2 + u_{\text{power}}^2 + u_{\text{meas}}^2} \quad (\text{A.6})$$

where

- $psPD_{tgt}$ is the target value, derived from repeated measurement of source antenna, normalized to 0 dBm TRP;
- $u_{\text{antenna_cal}}$ is the standard uncertainty ($k = 1$) of the $psPD$ of the antenna model;
- u_{power} is the standard uncertainty ($k = 1$) of the measured TRP (see Clause A.2);
- u_{meas} is the standard uncertainty ($k = 1$) of the $psPD$ measurement (probe calibration, electronics, and positioning).

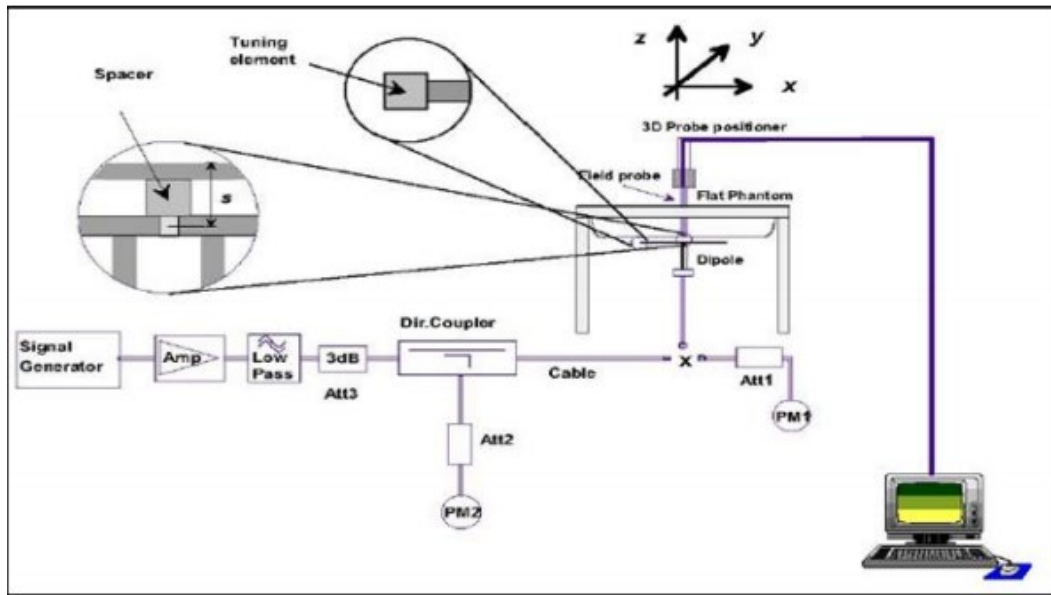
System Check	Date	Frequency (GHz)	Distance (mm)	Targeted 4cm^2 (W/m^2)	Measured 4cm^2 (W/m^2)	Deviation For 4cm^2 (%)	Dipole S/N
Power Density	Jan. 24, 2025	10	10	51.4	50	-2.72	1041

4.3 SYSTEM CHECK PROCEDURE

The system check is performed by using a system check dipole which is positioned parallel to the planar part of the SAM phantom at the reference point. The distance of the dipole to the SAM phantom is determined by a plexiglass spacer. The dipole is connected to the signal source consisting of signal generator and amplifier via a directional coupler, N-connector cable and adaption to SMA. It is fed with a power of 250mW (below 3GHz) or 100mW (3-6GHz). To adjust this power a power meter is used.

The power sensor is connected to the cable before the system check to measure the power at this point and do adjustments at the signal generator. At the outputs of the directional coupler both return loss as well as forward power are controlled during the system check to make sure that emitted power at the dipole is kept constant. This can also be checked by the power drift measurement after the test.

System check results have to be equal or near the values determined during dipole calibration (target SAR in table above) with the relevant liquids and test system ($\pm 10\%$).



5. SAR MEASUREMENT VARIABILITY AND UNCERTAINTY

5.1 SAR MEASUREMENT VARIABILITY

Per KDB865664 D01 SAR measurement 100 MHz to 6 GHz, 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 ($\sim 10\%$ 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.

The detailed repeated measurement results are shown in Section 7.2.

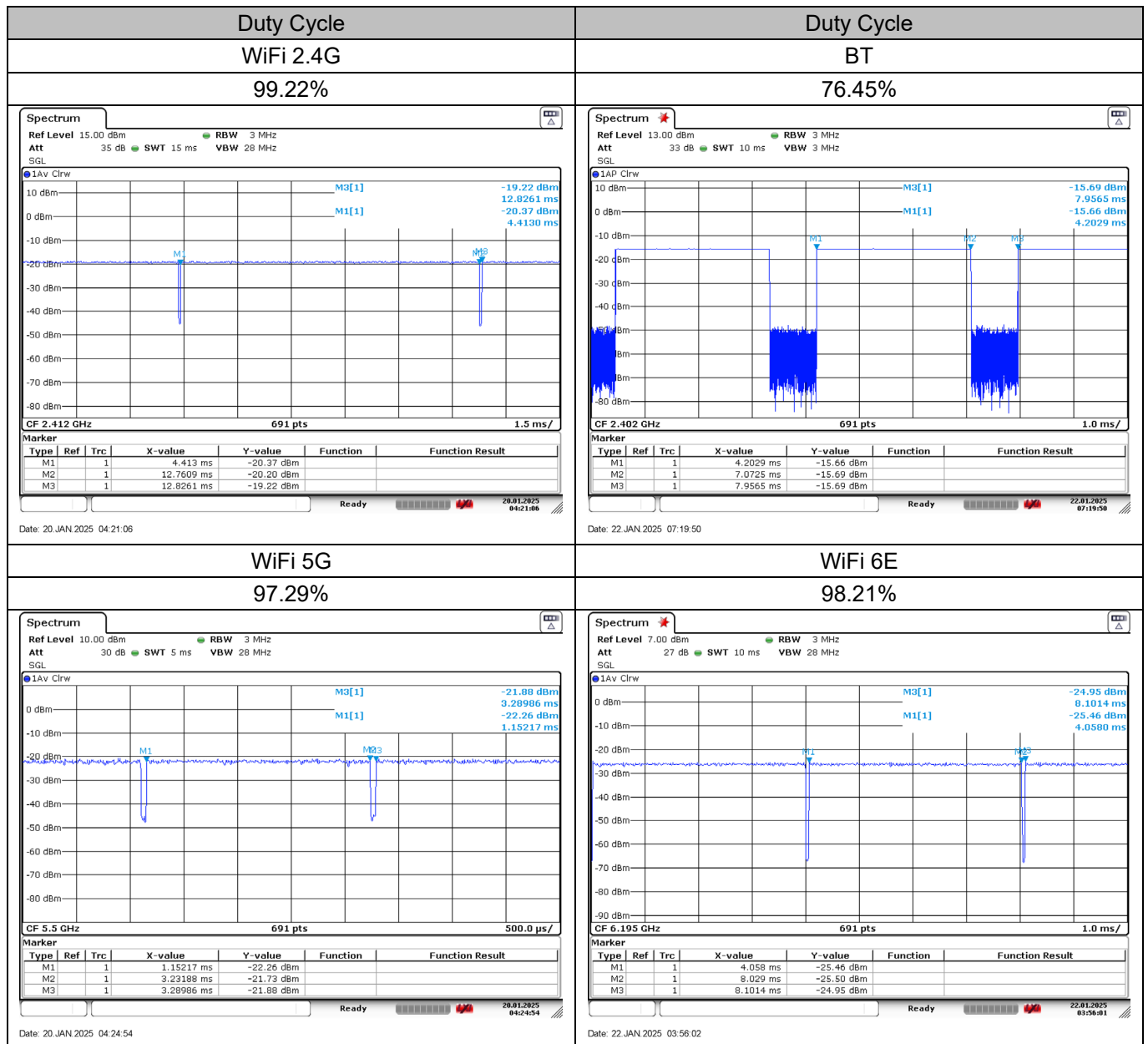
6. OPERATIONAL CONDITIONS DURING TEST

6.1 SAR TEST CONFIGURATION

6.1.1 WIFI TEST CONFIGURATION

For WLAN / BT SAR testing, WLAN / BT engineering testing software installed on the DUT can provide continuous transmitting RF signal.

For WiFi SAR testing, a communication link is set up with the test mode software for WiFi mode test. During the test, at the each test frequency channel, the EUT is operated at the RF continuous emission mode. The test procedures in KDB 248227 D01 are applied.



6.1.1.1 2.4G SAR Test Requirements

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 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.

2.4 GHz 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. 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.

SAR Test Requirements for OFDM configurations

When SAR measurement is required for 2.4 GHz 802.11g/n OFDM configurations, each stand alone. And frequency aggregated band is considered separately for SAR test reduction. 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.

6.1.1.2 5G SAR Test Requirements

✧ U-NII-1 and U-NII-2A Band

For devices that operate in both U-NII-1 and U-NII-2A bands, when the same maximum output power is specified for both bands, begin SAR measurement in U-NII-2A band by applying the OFDM SAR requirements. If the highest reported SAR for a test configuration is ≤ 1.2 W/kg, SAR is not required for U-NII-1 band for that configuration (802.11 mode and exposure condition); otherwise, both bands are tested independently for SAR. When different maximum output power is specified for the bands, begin SAR measurement in the band with higher specified maximum output power. The highest reported SAR for the tested configuration is adjusted by the ratio of lower to higher specified maximum output power for the two bands. When the adjusted SAR is ≤ 1.2 W/kg, SAR is not required for the band with lower maximum output power in that test configuration; otherwise, both bands are tested independently for SAR.

✧ U-NII-2C, U-NII-3 Bands

The frequency range covered by these bands is 380 MHz (5.47 – 5.85 GHz), which requires a minimum of at least two SAR probe calibration frequency points to support SAR measurements. When Terminal Doppler Weather Radar (TDWR) restriction applies, the channels at 5.60 – 5.65 GHz in U-NII-2C band must be disabled with acceptable mechanisms and documented in the equipment certification.

Unless band gap channels are permanently disabled, they must be considered for SAR testing. To maintain SAR measurement accuracy and to facilitate test reduction, the channels in U-NII-2C band above 5.65 GHz may be grouped with the 5.8 GHz channels in U-NII-3 or §15.247 band to enable two SAR probe calibration frequency points to cover the bands, including the band gap channels.¹¹ When band gap channels are supported and the bands are not aggregated for SAR testing, band gap channels must be considered independently in each band according to the normally required OFDM SAR measurement and probe calibration frequency points requirements.

6.1.1.3 OFDM transmission mode and SAR test channel selection

For the 2.4GHz and 5GHz bands, when the same maximum output power was specified for multiple OFDM transmission mode configurations in a frequency band or aggregated band, SAR is measured using the configuration with the largest channel bandwidth, lowest order modulation and lowest data rate. When the maximum output power of a channel is the same for equivalent OFDM configurations (for example 802.11a, 802.11n and 802.11ac, or 802.11g and 802.11n, with the same channel bandwidth, modulation, and data rate, etc.), the lower order 802.11 mode (i.e. 802.11a then 802.11n and 802.11ac, or 802.11g then 802.11n) is used for SAR measurement. When the maximum output power are the same for multiple test channels, either according to the default or additional power measurement requirements, SAR is measured using the channel closest to the middle of the frequency band or aggregated band. When there are multiple channels with the same maximum output power, SAR is measured using the higher number channel.

6.1.1.4 Initial test configuration procedure

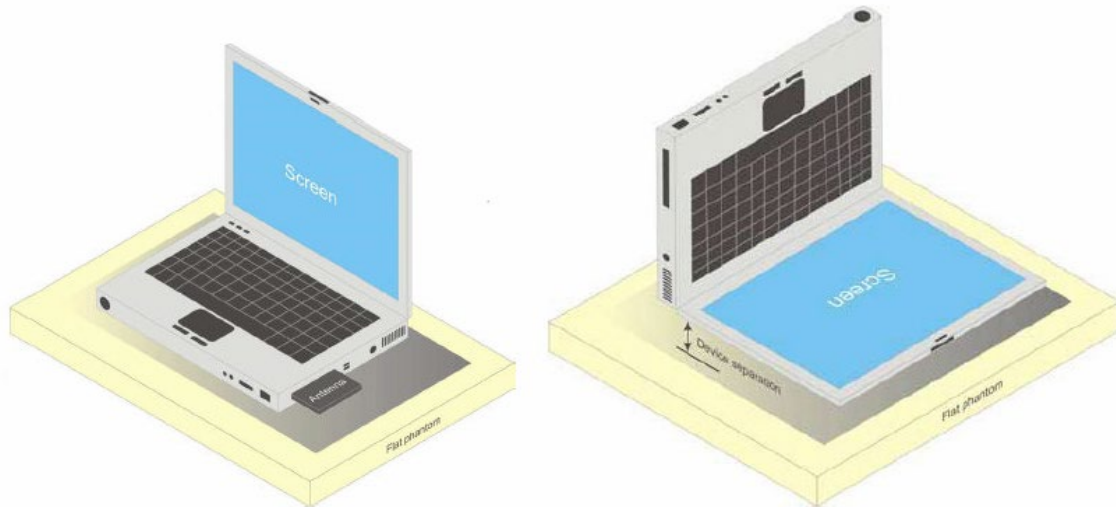
For OFDM, in both 2.4G and 5GHz bands, an initial test configuration is determined for each frequency band and aggregated band, according to the transmission mode with the highest maximum output power specified for SAR measurements. When the same maximum output power is specified for multiple OFDM transmission mode configurations in a frequency band or aggregated band, SAR is measured using the configuration(s) with the largest channel bandwidth, lowest order modulation, and lowest data rate. If the average RF output powers of the highest identical transmission modes are within 0.25 dB of each other, mid channel of the transmission mode with highest average RF output powers is the initial test channel. Otherwise, the channel of the transmission mode with the highest average RF output power will be the initial test configuration.

When the reported SAR is ≤ 0.8 W/kg, no additional measurements on other test channels are required. Otherwise, SAR is evaluated using the subsequent highest average RF output channel until the reported SAR result is ≤ 1.2 W/kg or all channels are measured. When there are multiple untested channels having the same subsequent highest average RF output power, the channel with higher frequency from the lowest 802.11 mode is considered for SAR measurement.

6.2 TEST POSITION

6.2.1 NOTEBOOK MODE

This DUT was tested in 2 different positions. They are back of keyboard and back of screen as illustrated below:



a) Portable computer with back of keyboard and back of screen.

When antennas are incorporated in the keyboard section of a laptop computer, SAR is required for the bottom surface of the keyboard. Provided tablet use conditions are not supported by the laptop computer, SAR tests for bystander exposure from the edges of the keyboard and display screen of laptop computers are generally not required. However, when edge testing is necessary, the similar concerns for simultaneous transmission on adjacent or multiple edges described for tablets near the end of 4.3 also apply.

When the modular approach is applied, transmitters and modules must be tested initially without using a representative host for incorporation in the display and/or keyboard of qualified laptop computers for standalone use according to the following minimum test separation distance and antenna installation requirements. The separation distance required for incorporation in qualified hosts is described in KDB Publication 447498 D04; item e) of 4.1 and item a) of 5.2.2 etc.

a) ≤ 25 mm between the antenna and user for incorporation in laptop display screens¹⁵

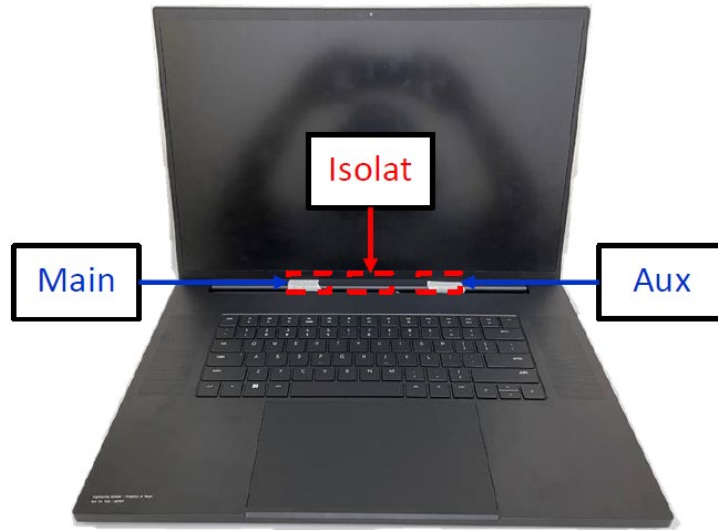
b) ≤ 5 mm between the antenna and user; only when incorporation in the keyboard compartment is required by the hosts, for bottom surface and edge exposure conditions

c) the antennas used by the host must have been tested for equipment approval or qualify for SAR test exclusion

d) the antenna polarization, physical orientation, rotation and installation configurations used by the host must have been tested for compliance for the required display and/or keyboard installation conditions and test separation distance(s) or qualify for SAR test exclusion

e) when the SAR Test Exclusion Threshold in KDB Publication 447498 D04 applies, a minimum test separation distance of 25 mm is required to determine test exclusion for the display, and 5 mm for the keyboard compartment.

The location of the antenna for notebook mode is as below:



The SAR measurement positions of each band are as below:

Antenna	Back of Keyboard	Back of Screen
Main Ant	Yes	Yes
Aux Ant	Yes	Yes

Note: According to the antenna location shown as above, particular DUT edges were not required to be evaluated for SAR if the antenna-to-edge distance is greater than 50mm.

7. TEST RESULT

7.1 CONDUCTED POWER RESULTS

1. Conducted power measurements of BT

BT	Average Conducted Power(dBm)			
	Max.	CH0	CH39	CH78
	Tune up	2402MHz	2441MHz	2480MHz
DH5	13.00	12.42	12.26	12.31
2DH5	11.00	10.23	10.00	10.09
3DH5	11.00	10.10	9.86	9.98

BT	Average Conducted Power(dBm)			
	Max.	CH0	CH19	CH39
	Tune up	2402MHz	2440MHz	2480MHz
BLE(1M)	13.00	12.40	12.30	12.32
BLE(2M)	11.00	10.74	10.53	10.68

Note:

- 1) The Average conducted power of BT is measured with RMS detector.
- 2) The tested channel results are marks in bold.

2. Conducted power measurements of WiFi 2.4G

Band	Mode	Channel	Frequency (MHz)	Data Rate (Mbps)	Max. Tune up	Average Power(dBm)
2.4G WIFI _1TX _Main _Ant	802.11b	1	2412	1	18.50	18.01
		6	2437		18.50	18.03
		11	2462		18.50	17.87
	802.11g	1	2412	6	18.50	17.94
		6	2437		18.50	17.96
		11	2462		18.50	17.78
	802.11n HT20	1	2412	HT0	18.50	No Require
		6	2437		18.50	
		11	2462		18.50	
	802.11n HT40	3	2422	HT0	18.50	
		6	2437		18.50	
		9	2452		18.50	
	802.11ax HE20	1	2412	HE0	18.50	
		6	2437		18.50	
		11	2462		18.50	
	802.11be EHT20	1	2412	EHT0	18.50	
		6	2437		18.50	
		11	2462		18.50	
	802.11ax HE40	3	2422	HE0	18.50	
		6	2437		18.50	
		9	2452		18.50	
	802.11be EHT40	3	2422	EHT0	18.50	
		6	2437		18.50	
		9	2452		18.50	

Band	Mode	Channel	Frequency (MHz)	Data Rate (Mbps)	Max. Tune up	Average Power(dBm)
2.4G WIFI _1TX _Aux Ant	802.11b	1	2412	1	18.50	17.97
		6	2437		18.50	17.75
		11	2462		18.50	18.11
	802.11g	1	2412	6	18.50	17.91
		6	2437		18.50	17.99
		11	2462		18.50	17.79
	802.11n HT20	1	2412	HT0	18.50	No Require
		6	2437		18.50	
		11	2462		18.50	
	802.11n HT40	3	2422	HT0	18.50	
		6	2437		18.50	
		9	2452		18.50	
	802.11ax HE20	1	2412	HE0	18.50	
		6	2437		18.50	
		11	2462		18.50	
	802.11be EHT20	1	2412	EHT0	18.50	
		6	2437		18.50	
		11	2462		18.50	
	802.11ax HE40	3	2422	HE0	18.50	
		6	2437		18.50	
		9	2452		18.50	
	802.11be EHT40	3	2422	EHT0	18.50	
		6	2437		18.50	
		9	2452		18.50	

Band	Mode	Channel	Frequency (MHz)	Data Rate (Mbps)	ANT Main Average Power(dBm)	ANT Aux Average Power(dBm)	Max. Tune up	Total Average Power(dBm)
2.4G WIFI _2TX _Main Ant + Aux Ant	802.11b	1	2412	1	18.01	17.97	21.50	21.00
		6	2437		18.03	17.75	21.50	20.90
		11	2462		17.87	18.11	21.50	21.00
	802.11g	1	2412	6	17.94	17.91	21.50	20.94
		6	2437		17.96	17.99	21.50	20.99
		11	2462		17.78	17.79	21.50	20.80
	802.11n HT20	1	2412	HT8	-	-	21.50	No Require
		6	2437		-	-	21.50	
		11	2462		-	-	21.50	
	802.11n HT40	3	2422	HT8	-	-	21.50	
		6	2437		-	-	21.50	
		9	2452		-	-	21.50	
	802.11ax HE20	1	2412	HE8	-	-	21.50	
		6	2437		-	-	21.50	
		11	2462		-	-	21.50	
	802.11be EHT20	1	2412	EHT8	-	-	21.50	
		6	2437		-	-	21.50	
		11	2462		-	-	21.50	
	802.11ax HE40	3	2422	HE8	-	-	21.50	
		6	2437		-	-	21.50	
		9	2452		-	-	21.50	
	802.11be EHT40	3	2422	EHT8	-	-	21.50	
		6	2437		-	-	21.50	
		9	2452		-	-	21.50	

Note:

- 1) The Average conducted power of WiFi 2.4G is measured with RMS detector.
- 2) Per KDB248227 D01, for WiFi 2.4G, the highest measured maximum output power Channel for DSSS modes (802.11b) was selected for SAR measurement. SAR for OFDM modes (2.4GHz 802.11g/n/ax/be) was not required When the highest reported SAR for DSSS is adjusted by the ratio of OFDM modes (802.11g/n/ax/be) to DSSS modes (802.11b) specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg.
- 3) The tested channel results are marks in bold.

3. Conducted power measurements of WiFi 5.2G

Band	Mode	Channel	Frequency (MHz)	Data Rate (Mbps)	Max. Tune up	Average Power(dBm)
5.2G WIFI _1TX _Main _Ant	802.11a	36	5180	6	18.50	No Require
		40	5200		18.50	
		44	5220		18.50	
		48	5240		18.50	
	802.11n HT20	36	5180	HT0	18.50	
		40	5200		18.50	
		44	5220		18.50	
		48	5240		18.50	
	802.11n HT40	38	5190	HT0	18.50	
		46	5230		18.50	
	802.11ax HE20	36	5180	HE0	18.50	
		40	5200		18.50	
		44	5220		18.50	
		48	5240		18.50	
	802.11ax HE40	38	5190	HE0	18.50	
		46	5230		18.50	
	802.11ac VHT80	42	5210	VHT0	18.50	17.66
	802.11ax HE80	42	5210	HE0	18.50	17.59
	802.11be EHT20	36	5180	EHT0	18.50	No Require
		40	5200		18.50	
		44	5220		18.50	
		48	5240		18.50	
	802.11be EHT40	38	5190	EHT0	18.50	
		46	5230		18.50	
	802.11be EHT80	42	5210	EHT0	18.50	17.57

Band	Mode	Channel	Frequency (MHz)	Data Rate (Mbps)	Max. Tune up	Average Power(dBm)
5.2G WIFI _1TX _Aux _Ant	802.11a	36	5180	6	18.50	No Require
		40	5200		18.50	
		44	5220		18.50	
		48	5240		18.50	
	802.11n HT20	36	5180	HT0	18.50	
		40	5200		18.50	
		44	5220		18.50	
		48	5240		18.50	
	802.11n HT40	38	5190	HT0	18.50	
		46	5230		18.50	
	802.11ax HE20	36	5180	HE0	18.50	
		40	5200		18.50	
		44	5220		18.50	
		48	5240		18.50	
	802.11ax HE40	38	5190	HE0	18.50	
		46	5230		18.50	
	802.11ac VHT80	42	5210	VHT0	18.50	17.65
	802.11ax HE80	42	5210	HE0	18.50	17.56
	802.11be EHT20	36	5180	EHT0	18.50	No Require
		40	5200		18.50	
		44	5220		18.50	
		48	5240		18.50	
	802.11be EHT40	38	5190	EHT0	18.50	
		46	5230		18.50	
	802.11be EHT80	42	5210	EHT0	18.50	17.57

Band	Mode	Channel	Frequency (MHz)	Data Rate (Mbps)	ANT Main Average Power(dBm)	ANT Aux Average Power(dBm)	Max. Tune up	Total Average Power(dBm)
5.2G WIFI _2TX _Main Ant + Aux Ant	802.11a	36	5180	6	-	-	21.50	No Require
		40	5200		-	-	21.50	
		44	5220		-	-	21.50	
		48	5240		-	-	21.50	
	802.11n HT20	36	5180	HT8	-	-	21.50	
		40	5200		-	-	21.50	
		44	5220		-	-	21.50	
		48	5240		-	-	21.50	
	802.11n HT40	38	5190	HT8	-	-	21.50	
		46	5230		-	-	21.50	
	802.11ax HE20	36	5180	HE8	-	-	21.50	
		40	5200		-	-	21.50	
		44	5220		-	-	21.50	
		48	5240		-	-	21.50	
	802.11ax HE40	38	5190	HE8	-	-	21.50	
		46	5230		-	-	21.50	
	802.11ac VHT80	42	5210	VHT8	17.66	17.65	21.50	20.67
	802.11ax HE80	42	5210	HE8	17.59	17.56	21.50	20.59
	802.11be EHT20	36	5180	EHT8	-	-	21.50	No Require
		40	5200		-	-	21.50	
		44	5220		-	-	21.50	
		48	5240		-	-	21.50	
	802.11be EHT40	38	5190	EHT8	-	-	21.50	
		46	5230		-	-	21.50	
	802.11be EHT80	42	5210	EHT8	17.57	17.57	21.50	20.58

Note:

- 1) The Average conducted power of WiFi 5.2G is measured with RMS detector.
- 2) The tested channel results are marks in bold.

4. Conducted power measurements of WiFi 5.3G

Band	Mode	Channel	Frequency (MHz)	Data Rate (Mbps)	Max. Tune up	Average Power(dBm)
5.3G WIFI _1TX _Main _Ant	802.11a	52	5260	6	18.50	No Require
		56	5280		18.50	
		60	5300		18.50	
		64	5320		18.50	
	802.11n HT20	52	5260	HT0	18.50	
		56	5280		18.50	
		60	5300		18.50	
		64	5320		18.50	
	802.11n HT40	54	5270	HT0	18.50	
		62	5310		18.50	
	802.11ax HE20	52	5260	HE0	18.50	
		56	5280		18.50	
		60	5300		18.50	
		64	5320		18.50	
	802.11ax HE40	54	5270	HE0	18.50	
		62	5310		18.50	
	802.11ac VHT80	58	5290	VHT0	18.50	
	802.11ax HE80	58	5290	HE0	18.50	
	802.11ac VHT160	50	5250	VHT0	18.50	17.41
	802.11ax HE160	50	5250	HE0	18.50	17.38
	802.11be EHT20	52	5260	EHT0	18.50	No Require
		56	5280		18.50	
		60	5300		18.50	
		64	5320		18.50	
	802.11be EHT40	54	5270	EHT0	18.50	
		62	5310		18.50	
	802.11be EHT80	58	5290	EHT0	18.50	
	802.11be EHT160	50	5250	EHT0	18.50	17.34

Band	Mode	Channel	Frequency (MHz)	Data Rate (Mbps)	Max. Tune up	Average Power(dBm)
5.3G WIFI _1TX _Aux Ant	802.11a	52	5260	6	18.50	No Require
		56	5280		18.50	
		60	5300		18.50	
		64	5320		18.50	
	802.11n HT20	52	5260	HT0	18.50	
		56	5280		18.50	
		60	5300		18.50	
		64	5320		18.50	
	802.11n HT40	54	5270	HT0	18.50	
		62	5310		18.50	
	802.11ax HE20	52	5260	HE0	18.50	
		56	5280		18.50	
		60	5300		18.50	
		64	5320		18.50	
	802.11ax HE40	54	5270	HE0	18.50	
		62	5310		18.50	
	802.11ac VHT80	58	5290	VHT0	18.50	
	802.11ax HE80	58	5290	HE0	18.50	
	802.11ac VHT160	50	5250	VHT0	18.50	17.81
	802.11ax HE160	50	5250	HE0	18.50	17.76
	802.11be EHT20	52	5260	EHT0	18.50	No Require
		56	5280		18.50	
		60	5300		18.50	
		64	5320		18.50	
	802.11be EHT40	54	5270	EHT0	18.50	
		62	5310		18.50	
	802.11be EHT80	58	5290	EHT0	18.50	
	802.11be EHT160	50	5250	EHT0	18.50	17.75

Band	Mode	Channel	Frequency (MHz)	Data Rate (Mbps)	ANT Main Average Power(dBm)	ANT Aux Average Power(dBm)	Max. Tune up	Total Average Power(dBm)
5.3G WIFI _2TX _Main Ant + Aux Ant	802.11a	52	5260	6	-	-	21.50	No Require
		56	5280		-	-	21.50	
		60	5300		-	-	21.50	
		64	5320		-	-	21.50	
	802.11n HT20	52	5260	HT8	-	-	21.50	
		56	5280		-	-	21.50	
		60	5300		-	-	21.50	
		64	5320		-	-	21.50	
	802.11n HT40	54	5270	HT8	-	-	21.50	
		62	5310		-	-	21.50	
	802.11ax HE20	52	5260	HE8	-	-	21.50	
		56	5280		-	-	21.50	
		60	5300		-	-	21.50	
		64	5320		-	-	21.50	
	802.11ax HE40	54	5270	HE8	-	-	21.50	
		62	5310		-	-	21.50	
	802.11ac VHT80	58	5290	VHT8	-	-	21.50	
	802.11ax HE80	58	5290	HE8	-	-	21.50	
	802.11ac VHT160	50	5250	VHT8	17.41	17.81	21.50	20.62
	802.11ax HE160	50	5250	HE8	17.38	17.76	21.50	20.58
	802.11be EHT20	52	5260	EHT8	-	-	21.50	No Require
		56	5280		-	-	21.50	
		60	5300		-	-	21.50	
		64	5320		-	-	21.50	
	802.11be EHT40	54	5270	EHT8	-	-	21.50	
		62	5310		-	-	21.50	
	802.11be EHT80	58	5290	EHT8	-	-	21.50	
	802.11be EHT160	50	5250	EHT8	17.34	17.75	21.50	20.56

Note:

- 1) The Average conducted power of WiFi 5.3G is measured with RMS detector.
- 2) The tested channel results are marks in bold.

5. Conducted power measurements of WiFi 5.6G

Band	Mode	Channel	Frequency (MHz)	Data Rate (Mbps)	Max. Tune up	Average Power(dBm)
5.6G WIFI _1TX _Main Ant	802.11a	100	5500	6	18.50	No Require
		104	5520		18.50	
		108	5540		18.50	
		112	5560		18.50	
		116	5580		18.50	
		120	5600		18.50	
		132	5660		18.50	
		136	5680		18.50	
		140	5700		18.50	
	802.11n HT20	100	5500	HT0	18.50	
		104	5520		18.50	
		108	5540		18.50	
		112	5560		18.50	
		120	5600		18.50	
		116	5580		18.50	
		132	5660		18.50	
		136	5680		18.50	
		140	5700		18.50	
	802.11n HT40	102	5510	HT0	18.50	
		110	5550		18.50	
		118	5590		18.50	
		126	5630		18.50	
		134	5670		18.50	
	802.11ax HE20	100	5500	HE0	18.50	
		104	5520		18.50	
		108	5540		18.50	
		112	5560		18.50	
		120	5600		18.50	
		116	5580		18.50	
		132	5660		18.50	
		136	5680		18.50	
		140	5700		18.50	
	802.11ax HE40	102	5510	HE0	18.50	
		110	5550		18.50	
		118	5590		18.50	
		126	5630		18.50	
		134	5670		18.50	
	802.11ac VHT80	106	5530	VHT0	18.50	
		122	5610		18.50	
		138	5690		18.50	
	802.11ax HE80	106	5530	HE0	18.50	
		122	5610		18.50	
		138	5690		18.50	

Band	Mode	Channel	Frequency (MHz)	Data Rate (Mbps)	Max. Tune up	Average Power(dBm)
5.6G WIFI _1TX _Main _Ant	802.11ac VHT160	114	5570	VHT0	18.50	17.92
	802.11ax HE160	114	5570	HE0	18.50	17.91
	802.11be EHT20	100	5500	EHT0	18.50	No Require
		104	5520		18.50	
		108	5540		18.50	
		112	5560		18.50	
		116	5580		18.50	
		120	5600		18.50	
		132	5660		18.50	
		136	5680		18.50	
		140	5700		18.50	
	802.11be EHT40	102	5510	EHT0	18.50	
		110	5550		18.50	
		118	5590		18.50	
		126	5630		18.50	
		134	5670		18.50	
	802.11be EHT80	106	5530	EHT0	18.50	
		122	5610		18.50	
		138	5690		18.50	
	802.11be EHT160	114	5570	EHT0	18.50	17.89

Band	Mode	Channel	Frequency (MHz)	Data Rate (Mbps)	Max. Tune up	Average Power(dBm)
5.6G WIFI _1TX _Aux Ant	802.11a	100	5500	6	18.50	No Require
		104	5520		18.50	
		108	5540		18.50	
		112	5560		18.50	
		116	5580		18.50	
		120	5600		18.50	
		132	5660		18.50	
		136	5680		18.50	
		140	5700		18.50	
	802.11n HT20	100	5500	HT0	18.50	
		104	5520		18.50	
		108	5540		18.50	
		112	5560		18.50	
		120	5600		18.50	
		116	5580		18.50	
		132	5660		18.50	
		136	5680		18.50	
		140	5700		18.50	
	802.11n HT40	102	5510	HT0	18.50	
		110	5550		18.50	
		118	5590		18.50	
		126	5630		18.50	
		134	5670		18.50	
	802.11ax HE20	100	5500	HE0	18.50	
		104	5520		18.50	
		108	5540		18.50	
		112	5560		18.50	
		120	5600		18.50	
		116	5580		18.50	
		132	5660		18.50	
		136	5680		18.50	
		140	5700		18.50	
	802.11ax HE40	102	5510	HE0	18.50	
		110	5550		18.50	
		118	5590		18.50	
		126	5630		18.50	
		134	5670		18.50	
	802.11ac VHT80	106	5530	VHT0	18.50	
		122	5610		18.50	
		138	5690		18.50	
	802.11ax HE80	106	5530	HE0	18.50	
		122	5610		18.50	
		138	5690		18.50	

Band	Mode	Channel	Frequency (MHz)	Data Rate (Mbps)	Max. Tune up	Average Power(dBm)
5.6G WIFI _1TX _Aux Ant	802.11ac VHT160	114	5570	VHT0	18.50	17.83
	802.11ax HE160	114	5570	HE0	18.50	17.81
	802.11be EHT20	100	5500	EHT0	18.50	No Require
		104	5520		18.50	
		108	5540		18.50	
		112	5560		18.50	
		116	5580		18.50	
		120	5600		18.50	
		132	5660		18.50	
		136	5680		18.50	
		140	5700		18.50	
	802.11be EHT40	102	5510	EHT0	18.50	
		110	5550		18.50	
		118	5590		18.50	
		126	5630		18.50	
		134	5670		18.50	
	802.11be EHT80	106	5530	EHT0	18.50	
		122	5610		18.50	
		138	5690		18.50	
	802.11be EHT160	114	5570	EHT0	18.50	17.82

Band	Mode	Channel	Frequency (MHz)	Data Rate (Mbps)	ANT Main Average Power(dBm)	ANT Aux Average Power(dBm)	Max. Tune up	Total Average Power(dBm)
5.6G WIFI _2TX _Main Ant + Aux Ant	802.11a	100	5500	6	-	-	21.50	No Require
		104	5520		-	-	21.50	
		108	5540		-	-	21.50	
		112	5560		-	-	21.50	
		116	5580		-	-	21.50	
		120	5600		-	-	21.50	
		132	5660		-	-	21.50	
		136	5680		-	-	21.50	
		140	5700		-	-	21.50	
	802.11n HT20	100	5500	HT8	-	-	21.50	
		104	5520		-	-	21.50	
		108	5540		-	-	21.50	
		112	5560		-	-	21.50	
		120	5600		-	-	21.50	
		116	5580		-	-	21.50	
		132	5660		-	-	21.50	
		136	5680		-	-	21.50	
		140	5700		-	-	21.50	
	802.11n HT40	102	5510	HT8	-	-	21.50	
		110	5550		-	-	21.50	
		118	5590		-	-	21.50	
		126	5630		-	-	21.50	
		134	5670		-	-	21.50	
	802.11ax HE20	100	5500	HE8	-	-	21.50	
		104	5520		-	-	21.50	
		108	5540		-	-	21.50	
		112	5560		-	-	21.50	
		120	5600		-	-	21.50	
		116	5580		-	-	21.50	
		132	5660		-	-	21.50	
		136	5680		-	-	21.50	
		140	5700		-	-	21.50	
	802.11ax HE40	102	5510	HE8	-	-	21.50	
		110	5550		-	-	21.50	
		118	5590		-	-	21.50	
		126	5630		-	-	21.50	
		134	5670		-	-	21.50	
	802.11ac VHT80	106	5530	VHT8	-	-	21.50	
		122	5610		-	-	21.50	
		138	5690		-	-	21.50	
	802.11ax HE80	106	5530	HE8	-	-	21.50	
		122	5610		-	-	21.50	
		138	5690		-	-	21.50	

Band	Mode	Channel	Frequency (MHz)	Data Rate (Mbps)	ANT Main Average Power(dBm)	ANT Aux Average Power(dBm)	Max. Tune up	Total Average Power(dBm)
	802.11ac VHT160	114	5570	VHT8	17.92	17.83	21.50	20.89
	802.11ax HE160	114	5570	HE8	17.91	17.81	21.50	20.87
	802.11be EHT20	100	5500	EHT8	-	-	21.50	No Require
		104	5520		-	-	21.50	
		108	5540		-	-	21.50	
		112	5560		-	-	21.50	
		116	5580		-	-	21.50	
		120	5600		-	-	21.50	
		132	5660		-	-	21.50	
		136	5680		-	-	21.50	
		140	5700		-	-	21.50	
	802.11be EHT40	102	5510	EHT8	-	-	21.50	
		110	5550		-	-	21.50	
		118	5590		-	-	21.50	
		126	5630		-	-	21.50	
		134	5670		-	-	21.50	
	802.11be EHT80	106	5530	EHT8	-	-	21.50	
		122	5610		-	-	21.50	
		138	5690		-	-	21.50	
	802.11be EHT160	114	5570	EHT8	17.89	17.82	21.50	20.87

Note:

- 1) The Average conducted power of WiFi 5.6G is measured with RMS detector.
- 2) The tested channel results are marks in bold.

6. Conducted power measurements of WiFi 5.8G

Band	Mode	Channel	Frequency (MHz)	Data Rate (Mbps)	Max. Tune up	Average Power(dBm)
5.8G WIFI _1TX _Main Ant	802.11a	149	5745	6	18.50	No Require
		153	5765		18.50	
		157	5785		18.50	
		161	5805		18.50	
		165	5825		18.50	
	802.11n HT20	149	5745	HT0	18.50	
		153	5765		18.50	
		157	5785		18.50	
		161	5805		18.50	
		165	5825		18.50	
	802.11n HT40	151	5755	HT0	18.50	
		159	5795		18.50	
	802.11ax HE20	149	5745	HE0	18.50	
		153	5765		18.50	
		157	5785		18.50	
		161	5805		18.50	
		165	5825		18.50	
	802.11ax HE40	151	5755	HE0	18.50	
		159	5795		18.50	
	802.11ac VHT80	155	5775	VHT0	18.50	17.75
	802.11ax HE80	155	5775	HE0	18.50	17.62
	802.11be EHT20	149	5745	EHT0	18.50	No Require
		153	5765		18.50	
		157	5785		18.50	
		161	5805		18.50	
		165	5825		18.50	
	802.11be EHT40	151	5755	EHT0	18.50	
		159	5795		18.50	
	802.11be EHT80	155	5775	EHT0	18.50	17.65

Band	Mode	Channel	Frequency (MHz)	Data Rate (Mbps)	Max. Tune up	Average Power(dBm)
5.8G WIFI _1TX _Aux _Ant	802.11a	149	5745	6	18.50	No Require
		153	5765		18.50	
		157	5785		18.50	
		161	5805		18.50	
		165	5825		18.50	
	802.11n HT20	149	5745	HT0	18.50	
		153	5765		18.50	
		157	5785		18.50	
		161	5805		18.50	
		165	5825		18.50	
	802.11n HT40	151	5755	HT0	18.50	
		159	5795		18.50	
	802.11ax HE20	149	5745	HE0	18.50	
		153	5765		18.50	
		157	5785		18.50	
		161	5805		18.50	
		165	5825		18.50	
	802.11ax HE40	151	5755	HE0	18.50	
		159	5795		18.50	
	802.11ac VHT80	155	5775	VHT0	18.50	17.88
	802.11ax HE80	155	5775	HE0	18.50	17.81
	802.11be EHT20	149	5745	EHT0	18.50	No Require
		153	5765		18.50	
		157	5785		18.50	
		161	5805		18.50	
		165	5825		18.50	
	802.11be EHT40	151	5755	EHT0	18.50	
		159	5795		18.50	
	802.11be EHT80	155	5775	EHT0	18.50	17.78

Band	Mode	Channel	Frequency (MHz)	Data Rate (Mbps)	ANT Main Average Power(dBm)	ANT Aux Average Power(dBm)	Max. Tune up	Total Average Power(dBm)
5.8G	802.11a	149	5745	6	-	-	21.50	No Require
		153	5765		-	-	21.50	
		157	5785		-	-	21.50	
		161	5805		-	-	21.50	
		165	5825		-	-	21.50	
	802.11n HT20	149	5745	HT8	-	-	21.50	
		153	5765		-	-	21.50	
		157	5785		-	-	21.50	
		161	5805		-	-	21.50	
		165	5825		-	-	21.50	
	802.11n HT40	151	5755	HT8	-	-	21.50	
		159	5795		-	-	21.50	
	802.11ax HE20	149	5745	HE8	-	-	21.50	
		153	5765		-	-	21.50	
		157	5785		-	-	21.50	
		161	5805		-	-	21.50	
		165	5825		-	-	21.50	
	802.11ax HE40	151	5755	HE8	-	-	21.50	
		159	5795		-	-	21.50	
	802.11ac VHT80	155	5775	VHT8	17.75	17.88	21.50	20.83
	802.11ax HE80	155	5775	HE8	17.62	17.81	21.50	20.73
	802.11be EHT20	149	5745	EHT8	-	-	21.50	No Require
		153	5765		-	-	21.50	
		157	5785		-	-	21.50	
		161	5805		-	-	21.50	
		165	5825		-	-	21.50	
	802.11be EHT40	151	5755	EHT8	-	-	21.50	
		159	5795		-	-	21.50	
	802.11be EHT80	155	5775	EHT8	17.65	17.78	21.50	20.73

Note:

- 1) The Average conducted power of WiFi 5.8G is measured with RMS detector.
- 2) The tested channel results are marks in bold.

7. Conducted power measurements of WiFi 5.9G

Band	Mode	Channel	Frequency (MHz)	Data Rate (Mbps)	Max. Tune up	Average Power(dBm)
5.9G WIFI _1TX _Main _Ant	802.11a	169	5845	6	18.50	No Require
		173	5865		18.50	
		177	5885		18.50	
	802.11n HT20	169	5845	HT0	18.50	
		173	5865		18.50	
		177	5885		18.50	
	802.11n HT40	167	5835	HT0	18.50	
		175	5875		18.50	
	802.11ax HE20	169	5845	HE0	18.50	
		173	5865		18.50	
		177	5885		18.50	
	802.11ax HE40	167	5835	HE0	18.50	
		175	5875		18.50	
	802.11ac VHT80	171	5855	VHT0	18.50	
	802.11ax HE80	171	5855	HE0	18.50	
	802.11ac VHT160	163	5815	VHT0	18.50	17.69
	802.11ax HE160	163	5815	HE0	18.50	17.68
	802.11be EHT20	169	5845	EHT0	18.50	No Require
		173	5865		18.50	
		177	5885		18.50	
	802.11be EHT40	167	5835	EHT0	18.50	
		175	5875		18.50	
	802.11be EHT80	171	5855	EHT0	18.50	
	802.11be EHT160	163	5815	EHT0	18.50	17.66

Band	Mode	Channel	Frequency (MHz)	Data Rate (Mbps)	Max. Tune up	Average Power(dBm)
5.9G WIFI _1TX _Aux Ant	802.11a	169	5845	6	18.50	No Require
		173	5865		18.50	
		177	5885		18.50	
	802.11n HT20	169	5845	HT0	18.50	
		173	5865		18.50	
		177	5885		18.50	
	802.11n HT40	167	5835	HT0	18.50	
		175	5875		18.50	
	802.11ax HE20	169	5845	HE0	18.50	
		173	5865		18.50	
		177	5885		18.50	
	802.11ax HE40	167	5835	HE0	18.50	
		175	5875		18.50	
	802.11ac VHT80	171	5855	VHT0	18.50	
	802.11ax HE80	171	5855	HE0	18.50	
	802.11ac VHT160	163	5815	VHT0	18.50	17.52
	802.11ax HE160	163	5815	HE0	18.50	17.48
	802.11be EHT20	169	5845	EHT0	18.50	No Require
		173	5865		18.50	
		177	5885		18.50	
	802.11be EHT40	167	5835	EHT0	18.50	
		175	5875		18.50	
	802.11be EHT80	171	5855	EHT0	18.50	
	802.11be EHT160	163	5815	EHT0	18.50	17.41

Band	Mode	Channel	Frequency (MHz)	Data Rate (Mbps)	ANT Main Average Power(dBm)	ANT Aux Average Power(dBm)	Max. Tune up	Total Average Power(dBm)
5.9G WIFI _2TX _Main Ant + Aux Ant	802.11a	169	5845	6	-	-	21.50	No Require
		173	5865		-	-	21.50	
		177	5885		-	-	21.50	
	802.11n HT20	169	5845	HT8	-	-	21.50	
		173	5865		-	-	21.50	
		177	5885		-	-	21.50	
	802.11n HT40	167	5835	HT8	-	-	21.50	
		175	5875		-	-	21.50	
	802.11ax HE20	169	5845	HE8	-	-	21.50	
		173	5865		-	-	21.50	
		177	5885		-	-	21.50	
	802.11ax HE40	167	5835	HE8	-	-	21.50	
		175	5875		-	-	21.50	
	802.11ac VHT80	171	5855	VHT8	-	-	21.50	
	802.11ax HE80	171	5855	HE8	-	-	21.50	
	802.11ac VHT160	163	5815	VHT8	17.69	17.52	21.50	20.62
	802.11ax HE160	163	5815	HE8	17.68	17.48	21.50	20.59
	802.11be EHT20	169	5845	EHT8	-	-	21.50	No Require
		173	5865		-	-	21.50	
		177	5885		-	-	21.50	
	802.11be EHT40	167	5835	EHT8	-	-	21.50	
		175	5875		-	-	21.50	
	802.11be EHT80	171	5855	EHT8	-	-	21.50	
	802.11be EHT160	163	5815	EHT8	17.66	17.41	21.50	20.55

Note:

- 1) The Average conducted power of WiFi 5.9G is measured with RMS detector.
- 2) The tested channel results are marks in bold.

8. Conducted power measurements of WiFi 6.2G

Band	Mode	Channel	Frequency (MHz)	Data Rate (Mbps)	Max. Tune up	Average Power(dBm)
6.2G WIFI _1TX _Main Ant	802.11ax HE20	1	5955	HE0	14.50	No Require
		49	6195		14.50	
		93	6415		14.50	
	802.11ax HE40	3	5965	HE0	14.50	
		43	6165		14.50	
		91	6405		14.50	
	802.11ax HE80	7	5985	HE0	14.50	
		39	6145		14.50	
		87	6385		14.50	
	802.11ax HE160	15	6025	HE0	14.50	14.00
		47	6185		14.50	13.13
		79	6345		14.50	14.33
	802.11be EHT20	1	5955	EHT0	14.50	No Require
		49	6195		14.50	
		93	6415		14.50	
	802.11be EHT40	3	5965	EHT0	14.50	
		43	6165		14.50	
		91	6405		14.50	
	802.11be EHT80	7	5985	EHT0	14.50	
		39	6145		14.50	
		87	6385		14.50	
	802.11be EHT160	15	6025	EHT0	14.50	13.92
		47	6185		14.50	13.07
		79	6345		14.50	14.25

Band	Mode	Channel	Frequency (MHz)	Data Rate (Mbps)	Max. Tune up	Average Power(dBm)
6.2G WIFI _1TX _Aux Ant	802.11ax HE20	1	5955	HE0	14.50	No Require
		49	6195		14.50	
		93	6415		14.50	
	802.11ax HE40	3	5965	HE0	14.50	
		43	6165		14.50	
		91	6405		14.50	
	802.11ax HE80	7	5985	HE0	14.50	
		39	6145		14.50	
		87	6385		14.50	
	802.11ax HE160	15	6025	HE0	14.50	13.28
		47	6185		14.50	13.77
		79	6345		14.50	14.38
	802.11be EHT20	1	5955	EHT0	14.50	No Require
		49	6195		14.50	
		93	6415		14.50	
	802.11be EHT40	3	5965	EHT0	14.50	
		43	6165		14.50	
		91	6405		14.50	
	802.11be EHT80	7	5985	EHT0	14.50	
		39	6145		14.50	
		87	6385		14.50	
	802.11be EHT160	15	6025	EHT0	14.50	13.26
		47	6185		14.50	13.72
		79	6345		14.50	14.24

Band	Mode	Channel	Frequency (MHz)	Data Rate (Mbps)	ANT Main Average Power(dBm)	ANT Aux Average Power(dBm)	Max. Tune up	Total Average Power(dBm)
6.2G WIFI _2TX _Main Ant + Aux Ant	802.11ax HE20	1	5955	HE0	-	-	17.50	No Require
		49	6195		-	-	17.50	
		93	6415		-	-	17.50	
	802.11ax HE40	3	5965	HE0	-	-	17.50	
		43	6165		-	-	17.50	
		91	6405		-	-	17.50	
	802.11ax HE80	7	5985	HE0	-	-	17.50	
		39	6145		-	-	17.50	
		87	6385		-	-	17.50	
	802.11ax HE160	15	6025	HE0	14.00	13.28	17.50	16.67
		47	6185		13.13	13.77	17.50	16.47
		79	6345		14.33	14.38	17.50	17.37
	802.11be EHT20	1	5955	EHT0	-	-	17.50	No Require
		49	6195		-	-	17.50	
		93	6415		-	-	17.50	
	802.11be EHT40	3	5965	EHT0	-	-	17.50	
		43	6165		-	-	17.50	
		91	6405		-	-	17.50	
	802.11be EHT80	7	5985	EHT0	-	-	17.50	
		39	6145		-	-	17.50	
		87	6385		-	-	17.50	
	802.11be EHT160	15	6025	EHT0	13.92	13.26	17.50	16.61
		47	6185		13.07	13.72	17.50	16.42
		79	6345		14.25	14.24	17.50	17.26

Note:

- 1) The Average conducted power of WiFi 6.2G is measured with RMS detector.
- 2) The tested channel results are marks in bold.

9. Conducted power measurements of WiFi 6.5G

Band	Mode	Channel	Frequency (MHz)	Data Rate (Mbps)	Max. Tune up	Average Power(dBm)
6.5G WIFI _1TX _Main Ant	802.11ax HE20	97	6435	HE0	5.50	No Require
		105	6475		5.50	
		113	6515		5.50	
	802.11ax HE40	99	6445	HE0	8.50	
		107	6485		8.75	
	802.11ax HE80	103	6465	HE0	11.75	
		119	6545		12.00	
	802.11ax HE160	111	6505	HE0	14.50	13.81
	802.11be EHT20	97	6435	EHT0	5.50	No Require
		105	6475		5.50	
		113	6515		5.50	
	802.11be EHT40	99	6445	EHT0	8.50	
		107	6485		8.75	
	802.11be EHT80	103	6465	EHT0	11.75	
		119	6545		12.00	
	802.11be EHT160	111	6505	EHT0	14.50	13.78

Band	Mode	Channel	Frequency (MHz)	Data Rate (Mbps)	Max. Tune up	Average Power(dBm)
6.5G WIFI _1TX _Aux Ant	802.11ax HE20	97	6435	HE0	5.50	No Require
		105	6475		5.50	
		113	6515		5.50	
	802.11ax HE40	99	6445	HE0	8.50	
		107	6485		8.50	
	802.11ax HE80	103	6465	HE0	11.75	
		119	6545		11.75	
	802.11ax HE160	111	6505	HE0	14.75	13.85
	802.11be EHT20	97	6435	EHT0	5.50	No Require
		105	6475		5.50	
		113	6515		5.50	
	802.11be EHT40	99	6445	EHT0	8.50	
		107	6485		8.50	
	802.11be EHT80	103	6465	EHT0	11.75	
		119	6545		11.75	
	802.11be EHT160	111	6505	EHT0	14.75	13.81

Band	Mode	Channel	Frequency (MHz)	Data Rate (Mbps)	ANT Main Average Power(dBm)	ANT Aux Average Power(dBm)	Max. Tune up	Total Average Power(dBm)
6.5G WIFI _2TX _Main Ant + Aux Ant	802.11ax HE20	97	6435	HE0	-	-	8.50	No Require
		105	6475		-	-	8.50	
		113	6515		-	-	8.50	
	802.11ax HE40	99	6445	HE0	-	-	11.50	
		107	6485		-	-	11.75	
	802.11ax HE80	103	6465	HE0	-	-	14.75	
		119	6545		-	-	15.00	
	802.11ax HE160	111	6505	HE0	13.81	13.85	17.50	16.84
	802.11be EHT20	97	6435	EHT0	-	-	8.50	No Require
		105	6475		-	-	8.50	
		113	6515		-	-	8.50	
	802.11be EHT40	99	6445	EHT0	-	-	11.50	
		107	6485		-	-	11.75	
	802.11be EHT80	103	6465	EHT0	-	-	14.75	
		119	6545		-	-	15.00	
	802.11be EHT160	111	6505	EHT0	13.78	13.81	17.50	16.81

Note:

- 1) The Average conducted power of WiFi 6.5G is measured with RMS detector.
- 2) The tested channel results are marks in bold.

10. Conducted power measurements of WiFi 6.7G

Band	Mode	Channel	Frequency (MHz)	Data Rate (Mbps)	Max. Tune up	Average Power(dBm)
6.7G WIFI _1TX _Main Ant	802.11ax HE20	117	6535	HE0	14.50	No Require
		149	6695		14.50	
		181	6855		14.50	
	802.11ax HE40	115	6525	HE0	14.50	
		147	6685		14.50	
		179	6845		14.50	
	802.11ax HE80	135	6625	HE0	14.50	
		151	6705		14.50	
		167	6785		14.50	
	802.11ax HE160	143	6665	HE0	14.50	14.08
		175	6825		14.50	14.12
	802.11be EHT20	117	6535	EHT0	14.50	No Require
		149	6695		14.50	
		181	6855		14.50	
	802.11be EHT40	115	6525	EHT0	14.50	
		147	6685		14.50	
		179	6845		14.50	
	802.11be EHT80	135	6625	EHT0	14.50	
		151	6705		14.50	
		167	6785		14.50	
	802.11be EHT160	143	6665	EHT0	14.50	13.96
		175	6825		14.50	14.09

Band	Mode	Channel	Frequency (MHz)	Data Rate (Mbps)	Max. Tune up	Average Power(dBm)
6.7G WIFI _1TX _Aux Ant	802.11ax HE20	117	6535	HE0	14.50	No Require
		149	6695		14.50	
		181	6855		14.50	
	802.11ax HE40	115	6525	HE0	14.50	
		147	6685		14.50	
		179	6845		14.50	
	802.11ax HE80	135	6625	HE0	14.50	
		151	6705		14.50	
		167	6785		14.50	
	802.11ax HE160	143	6665	HE0	14.50	14.16
		175	6825		14.50	13.68
	802.11be EHT20	117	6535	EHT0	14.50	No Require
		149	6695		14.50	
		181	6855		14.50	
	802.11be EHT40	115	6525	EHT0	14.50	
		147	6685		14.50	
		179	6845		14.50	
	802.11be EHT80	135	6625	EHT0	14.50	
		151	6705		14.50	
		167	6785		14.50	
	802.11be EHT160	143	6665	EHT0	14.50	14.04
		175	6825		14.50	13.65

Band	Mode	Channel	Frequency (MHz)	Data Rate (Mbps)	ANT Main Average Power(dBm)	ANT Aux Average Power(dBm)	Max. Tune up	Total Average Power(dBm)
6.7G WIFI _2TX _Main Ant + Aux Ant	802.11ax HE20	117	6535	HE0	-	-	17.50	No Require
		149	6695		-	-	17.50	
		181	6855		-	-	17.50	
	802.11ax HE40	115	6525	HE0	-	-	17.50	
		147	6685		-	-	17.50	
		179	6845		-	-	17.50	
	802.11ax HE80	135	6625	HE0	-	-	17.50	
		151	6705		-	-	17.50	
		167	6785		-	-	17.50	
	802.11ax HE160	143	6665	HE0	14.08	14.16	17.50	17.13
		175	6825		14.12	13.68	17.50	16.92
	802.11be EHT20	117	6535	EHT0	-	-	17.50	No Require
		149	6695		-	-	17.50	
		181	6855		-	-	17.50	
	802.11be EHT40	115	6525	EHT0	-	-	17.50	
		147	6685		-	-	17.50	
		179	6845		-	-	17.50	
	802.11be EHT80	135	6625	EHT0	-	-	17.50	
		151	6705		-	-	17.50	
		167	6785		-	-	17.50	
	802.11be EHT160	143	6665	EHT0	13.96	14.04	17.50	17.01
		175	6825		14.09	13.65	17.50	16.89

Note:

- 1) The Average conducted power of WiFi 6.7G is measured with RMS detector.
- 2) The tested channel results are marks in bold.

11. Conducted power measurements of WiFi 7.0G

Band	Mode	Channel	Frequency (MHz)	Data Rate (Mbps)	Max. Tune up	Average Power(dBm)
7.0G WIFI _1TX _Main Ant	802.11ax HE20	185	6875	HE0	5.50	No Require
		209	6995		5.75	
		233	7115		1.25	
	802.11ax HE40	187	6885	HE0	8.75	
		227	7085		8.75	
	802.11ax HE80	183	6865	HE0	11.75	
		199	6945		11.75	
		215	7025		12.00	
	802.11ax HE160	207	6985	HE0	14.50	13.91
	802.11be EHT20	185	6875	EHT0	5.50	No Require
		209	6995		5.75	
		233	7115		1.25	
	802.11be EHT40	187	6885	EHT0	8.75	
		227	7085		8.75	
	802.11be EHT80	183	6865	EHT0	11.75	
		199	6945		11.75	
		215	7025		12.00	
	802.11be EHT160	207	6985	EHT0	14.50	13.85

Band	Mode	Channel	Frequency (MHz)	Data Rate (Mbps)	Max. Tune up	Average Power(dBm)
7.0G WIFI _1TX _Aux Ant	802.11ax HE20	185	6875	HE0	5.75	No Require
		209	6995		5.75	
		233	7115		1.00	
	802.11ax HE40	187	6885	HE0	8.75	
		227	7085		9.00	
	802.11ax HE80	183	6865	HE0	11.50	
		199	6945		12.00	
		215	7025		12.00	
	802.11ax HE160	207	6985	HE0	14.75	13.98
	802.11be EHT20	185	6875	EHT0	5.75	No Require
		209	6995		5.75	
		233	7115		1.00	
	802.11be EHT40	187	6885	EHT0	8.75	
		227	7085		9.00	
	802.11be EHT80	183	6865	EHT0	11.50	
		199	6945		12.00	
		215	7025		12.00	
	802.11be EHT160	207	6985	EHT0	14.75	13.96

Band	Mode	Channel	Frequency (MHz)	Data Rate (Mbps)	ANT Main Average Power(dBm)	ANT Aux Average Power(dBm)	Max. Tune up	Total Average Power(dBm)
7.0G WIFI _2TX _Main Ant + Aux Ant	802.11ax HE20	185	6875	HE0	-	-	8.50	No Require
		209	6995		-	-	8.75	
		233	7115		-	-	4.25	
	802.11ax HE40	187	6885	HE0	-	-	11.75	
		227	7085		-	-	11.75	
	802.11ax HE80	183	6865	HE0	-	-	14.75	
		199	6945		-	-	14.75	
		215	7025		-	-	15.00	
	802.11ax HE160	207	6985	HE0	13.91	13.98	17.50	16.96
	802.11be EHT20	185	6875	EHT0	-	-	8.50	No Require
		209	6995		-	-	8.75	
		233	7115		-	-	4.25	
	802.11be EHT40	187	6885	EHT0	-	-	11.75	
		227	7085		-	-	11.75	
	802.11be EHT80	183	6865	EHT0	-	-	14.75	
		199	6945		-	-	14.75	
		215	7025		-	-	15.00	
	802.11be EHT160	207	6985	EHT0	13.85	13.96	17.50	16.92

Note:

- 1) The Average conducted power of WiFi 7.0G is measured with RMS detector.
- 2) The tested channel results are marks in bold.

7.2 SAR TEST RESULTS

General Notes:

- 1) Per KDB447498 D04, all measurement SAR results are scaled to the maximum tune-up tolerance limit to demonstrate compliant.
- 2) Per KDB447498 D04, testing of other required channels within the operating mode of a frequency band is not required when the reported 1-g or 10-g SAR for the mid-band or highest output power channel is: ≤ 0.8 W/kg or 2.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≤ 100 MHz. When the maximum output power variation across the required test channels is $> \frac{1}{2}$ dB, instead of the middle channel, the highest output power channel must be used.
- 3) Per KDB865664 D01, for each frequency band, repeated SAR measurement is required only when the measured SAR is ≥ 0.8 W/kg; if the deviation among the repeated measurement is $\leq 20\%$, and the measured SAR < 1.45 W/kg, only one repeated measurement is required.
- 4) Per KDB941225 D06, the DUT Dimension is bigger than 9 cm x 5 cm, so 10mm is chosen as the test separation distance for Hotspot mode. When the antenna-to-edge distance is greater than 2.5cm, such position does not need to be tested.
- 5) Per KDB648474 D04, SAR is evaluated without a headset connected to the device. When the standalone reported body-worn SAR is ≤ 1.2 W/kg, no additional SAR evaluations using a headset are required.
- 6) Per KDB865664 D02, SAR plot is only required for the highest measured SAR in each exposure configuration, wireless mode and frequency band combination; Plots are also required when the measured SAR is > 1.5 W/kg, or > 7.0 W/kg for occupational exposure. The published RF exposure KDB procedures may require additional plots; for example, to support SAR to peak location separation ratio test exclusion and/or volume scan post-processing.

WLAN Notes:

1. For exposure conditions with multiple test positions, such as handset operating next to the ear, devices with hotspot mode, 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 positions in an exposure condition. The test position with the highest extrapolated (peak) SAR is used as the initial test position. When the reported SAR of the initial test position is ≤ 0.4 W/kg, further SAR measurement is not required for the other (remaining) test positions. Otherwise, SAR is evaluated at the subsequent highest peak SAR position until the reported SAR result is ≤ 0.8 W/kg or all test positions are measured.
2. Justification for test configurations for WLAN per KDB Publication 248227 for 2.4GHZ WIFI single transmission chain operations, the highest measured maximum output power Channel for DSSS was selected for SAR measurement. SAR for OFDM modes (2.4GHZ 802.11g/n) was not required due to the maximum allowed powers and the highest reported DSSS SAR. See Section 7.1 for more information.
3. Justification for test configurations for WLAN per KDB Publication 248227 for 5GHZ WIFI single transmission chain operations, the initial test configuration was selected according to the transmission mode with the highest maximum allowed power. Other transmission modes were not investigated since the highest reported SAR for initial test configuration adjusted by the ratio of maximum output powers is less than 1.2W/kg. See Section 7.1 for more information.

7.2.1 SAR MEASUREMENT RESULT

1. SAR test results of WiFi 2.4G

Test No.	Band	Channel	Test Position	Separation Distance (mm)	Ant	Data Rate	Duty Cycle (%)	Maximum Tune-up (dBm)	Conducted Power (dBm)	Power Drift (dB)	SAR 1g (W/kg)	SAR 10g (W/kg)	Reported 1g SAR (W/kg)
W01	802.11b	6	Back of Screen	25	Main	1	99.22	18.50	18.03	-0.09	0.061	0.027	0.068
W02	802.11b	6	Back of Keyboard	0	Main	1	99.22	18.50	18.03	0.07	0.460	0.209	0.517
W03	802.11b	1	Back of Keyboard	0	Main	1	99.22	18.50	18.01	0.1	0.507	0.231	0.572
W04	802.11b	11	Back of Keyboard	0	Main	1	99.22	18.50	17.87	-0.04	0.521	0.235	0.607
W05	802.11b	11	Back of Screen	25	Aux	1	99.22	18.50	18.11	0	0.042	0.020	0.046
W06	802.11b	11	Back of Keyboard	0	Aux	1	99.22	18.50	18.11	0.02	0.459	0.214	0.506
W07	802.11b	1	Back of Keyboard	0	Aux	1	99.22	18.50	17.97	-0.11	0.422	0.194	0.481
W08	802.11b	6	Back of Keyboard	0	Aux	1	99.22	18.50	17.75	0.19	0.411	0.189	0.492

Note: The value with boldface is the maximum SAR Value of each test band.

2. SAR test results of BT

Test No.	Band	Channel	Test Position	Separation Distance (mm)	Ant	Data Rate	Duty Cycle (%)	Maximum Tune-up (dBm)	Conducted Power (dBm)	Power Drift (dB)	SAR 1g (W/kg)	SAR 10g (W/kg)	Reported 1g SAR (W/kg)
W09	BT DH5	39	Back of Screen	25	Main	1	76.45	13.00	12.42	0	0.018	0.008	0.027
W10	BT DH5	39	Back of Keyboard	0	Main	1	76.45	13.00	12.42	0.13	0.126	0.064	0.188
W11	BT DH5	0	Back of Keyboard	0	Main	1	76.45	13.00	12.26	0.04	0.115	0.052	0.178
W12	BT DH5	78	Back of Keyboard	0	Main	1	76.45	13.00	12.31	-0.13	0.146	0.072	0.224

Note: The value with boldface is the maximum SAR Value of each test band.

3. SAR test results of WiFi 5G

Test No.	Band	Channel	Test Position	Separation Distance (mm)	Ant	Data Rate	Duty Cycle (%)	Maximum Tune-up (dBm)	Conducted Power (dBm)	Power Drift (dB)	SAR 1g (W/kg)	SAR 10g (W/kg)	Reported 1g SAR (W/kg)
W13	802.11ac VHT80	42	Back of Screen	25	Main	VHT0	97.29	18.50	17.66	0.07	0.107	0.044	0.133
W14	802.11ac VHT80	42	Back of Keyboard	0	Main	VHT0	97.29	18.50	17.66	0.02	0.970	0.332	1.210
W15	802.11ac VHT80	42	Back of Screen	25	Aux	VHT0	97.29	18.50	17.65	0.18	0.116	0.051	0.145
W16	802.11ac VHT80	42	Back of Keyboard	0	Aux	VHT0	97.29	18.50	17.65	-0.01	1.080	0.366	1.350
W17	802.11ac VHT160	50	Back of Screen	25	Main	VHT0	97.29	18.50	16.85	-0.03	0.105	0.047	0.158
W18	802.11ac VHT160	50	Back of Keyboard	0	Main	VHT0	97.29	18.50	16.85	-0.07	0.802	0.302	1.205
W19	802.11ac VHT160	50	Back of Screen	25	Aux	VHT0	97.29	18.50	17.81	-0.03	0.123	0.048	0.148
W20	802.11ac VHT160	50	Back of Keyboard	0	Aux	VHT0	97.29	18.50	17.81	0.09	1.010	0.340	1.217
W21	802.11ac VHT160	114	Back of Screen	25	Main	VHT0	97.29	18.50	17.92	0.17	0.155	0.062	0.182
W22	802.11ac VHT160	114	Back of Keyboard	0	Main	VHT0	97.29	18.50	17.92	0.01	0.874	0.279	1.027
W23	802.11ac VHT160	114	Back of Screen	25	Aux	VHT0	97.29	18.50	17.83	0.01	0.132	0.047	0.158
W24	802.11ac VHT160	114	Back of Keyboard	0	Aux	VHT0	97.29	18.50	17.83	0.19	1.100	0.358	1.319
W25	802.11ac VHT80	155	Back of Screen	25	Main	VHT0	97.29	18.50	17.75	0.01	0.118	0.052	0.144
W26	802.11ac VHT80	155	Back of Keyboard	0	Main	VHT0	97.29	18.50	17.75	0.06	0.776	0.280	0.948
W27	802.11ac VHT80	155	Back of Screen	25	Aux	VHT0	97.29	18.50	17.88	0.06	0.135	0.045	0.160
W28	802.11ac VHT80	155	Back of Keyboard	0	Aux	VHT0	97.29	18.50	17.88	-0.15	1.110	0.368	1.316
W29	802.11ac VHT160	163	Back of Screen	25	Main	VHT0	97.29	18.50	17.69	0.1	0.052	0.022	0.064
W30	802.11ac VHT160	163	Back of Keyboard	0	Main	VHT0	97.29	18.50	17.69	-0.01	0.470	0.161	0.582
W31	802.11ac VHT160	163	Back of Screen	25	Aux	VHT0	97.29	18.50	17.52	-0.06	0.083	0.030	0.107
W32	802.11ac VHT160	163	Back of Keyboard	0	Aux	VHT0	97.29	18.50	17.52	0.02	1.010	0.337	1.301

Note: The value with boldface is the maximum SAR Value of each test band.

4. SAR test results of WiFi 6E

Test No.	Band	Channel	Test Position	Separation Distance (mm)	Ant	Data Rate	Duty Cycle (%)	Maximum Tune-up (dBm)	Conducted Power (dBm)	Power Drift (dB)	SAR 1g (W/kg)	SAR 10g (W/kg)	Reported 1g SAR (W/kg)
W33	802.11ax HE160	79	Back of Screen	25	Main	HE0	98.21	14.50	14.33	0.01	0.029	0.005	0.030
W34	802.11ax HE160	79	Back of Keyboard	0	Main	HE0	98.21	14.50	14.33	-0.01	0.452	0.159	0.479
W35	802.11ax HE160	15	Back of Keyboard	0	Main	HE0	98.21	14.50	14.00	0.04	0.316	0.115	0.361
W36	802.11ax HE160	47	Back of Keyboard	0	Main	HE0	98.21	14.50	13.13	0.06	0.342	0.125	0.477
W37	802.11ax HE160	79	Back of Screen	25	Aux	HE0	98.21	14.50	14.38	0.00	0.026	0.005	0.027
W38	802.11ax HE160	79	Back of Keyboard	0	Aux	HE0	98.21	14.50	14.38	0.12	0.259	0.094	0.271
W39	802.11ax HE160	15	Back of Keyboard	0	Aux	HE0	98.21	14.50	13.28	-0.10	0.394	0.125	0.531
W40	802.11ax HE160	47	Back of Keyboard	0	Aux	HE0	98.21	14.50	13.77	0.05	0.374	0.124	0.451
W41	802.11ax HE160	111	Back of Screen	25	Main	HE0	98.21	14.50	13.81	-0.02	0.025	0.005	0.029
W42	802.11ax HE160	111	Back of Keyboard	0	Main	HE0	98.21	14.50	13.81	0.04	0.351	0.125	0.419
W43	802.11ax HE160	111	Back of Screen	25	Aux	HE0	98.21	14.75	13.85	0	0.023	0.004	0.029
W44	802.11ax HE160	111	Back of Keyboard	0	Aux	HE0	98.21	14.75	13.85	-0.07	0.325	0.111	0.407
W45	802.11ax HE160	175	Back of Screen	25	Main	HE0	98.21	14.50	14.12	0	0.031	0.008	0.034
W46	802.11ax HE160	175	Back of Keyboard	0	Main	HE0	98.21	14.50	14.12	-0.02	0.577	0.196	0.641
W47	802.11ax HE160	143	Back of Keyboard	0	Main	HE0	98.21	14.50	14.08	-0.04	0.578	0.198	0.648
W48	802.11ax HE160	143	Back of Screen	25	Aux	HE0	98.21	14.50	14.16	0.02	0.024	0.005	0.027
W49	802.11ax HE160	143	Back of Keyboard	0	Aux	HE0	98.21	14.50	14.16	0.06	0.343	0.104	0.378
W50	802.11ax HE160	175	Back of Keyboard	0	Aux	HE0	98.21	14.50	13.68	-0.08	0.354	0.107	0.435
W51	802.11ax HE160	207	Back of Screen	25	Main	HE0	98.21	14.50	13.91	0	0.029	0.006	0.033
W52	802.11ax HE160	207	Back of Keyboard	0	Main	HE0	98.21	14.50	13.91	0.03	0.534	0.179	0.623
W53	802.11ax HE160	207	Back of Screen	25	Aux	HE0	98.21	14.75	13.98	0	0.028	0.005	0.035
W54	802.11ax HE160	207	Back of Keyboard	0	Aux	HE0	98.21	14.75	13.98	0.08	0.391	0.124	0.475

Note: The value with boldface is the maximum SAR Value of each test band.

5. SAR test results of Power Density

System&Position					DUT& Accessory	SAR								Power Density							
Test No.	Band	Channel	Test Position	Separation Distance (cm)	Ant	Data Rate	Duty Cycle (%)	Maximum Tune up (dBm)	Conducted Power (dBm)	Power Drift (dB)	SAR 1g (W/kg)	SAR 10g (W/kg)	Reported 1g SAR	Grid Step (λ)	Scaling Factor for Measurement Uncertainty	Averaging Area (cm²)	Power Drift (dB)	Normal PsPD (W/m²)	Scaling Normal PsPD (W/m²)	Total PsPD (W/m²)	Scaling Total PsPD (W/m²)
W39	802.11ax HE160	15	Back of Keyboard	0	Aux	HE0	98.21	14.50	13.28	-0.10	0.394	0.125	0.531	0.0625	1.55	4	0.02	3.01	6.29	4.22	8.82
W47	802.11ax HE160	143	Back of Keyboard	0	Main	HE0	98.21	14.50	14.08	-0.01	0.578	0.198	0.648	0.0625	1.55	4	0.02	3.2	5.56	4.1	7.13

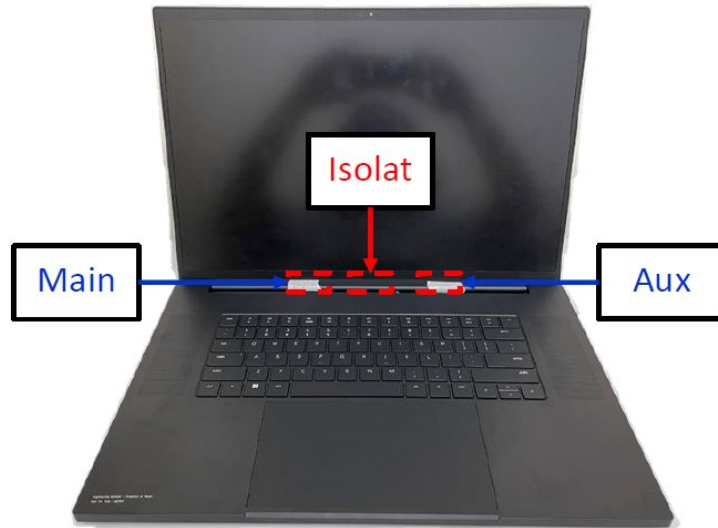
Note:

- 1) Chose the worst case of WiFi 6E to test power density.
- 2) This device is in compliance with power density for general population or uncontrolled exposure limits, and has been tested in accordance with the measurement methods and procedures specified in TCBC workshop notes and IEC TR 63170.

7.3 MULTIPLE TRANSMITTER EVALUATION

The following tables list information which is relevant for the decision if a simultaneous transmit evaluation is necessary according to FCC KDB447498 D04 Interim General RF Exposure Guidance v01.

The location of the antennas inside the EUT is shown as below picture:



7.3.1 SIMULTANEOUS TRANSMISSION CONDITIONS

Per FCC KDB447498 D04, SAR compliance for simultaneous transmission must be considered when the maximum duration of overlapping transmissions, including network hand-offs, is greater than 30 seconds. This device contains multiple transmitters that may operate simultaneously, and therefore requires a simultaneous transmission analysis.

The Simultaneous Transmission Possibilities of this device are as below:

No.	Configuration	Body
1	WLAN 2.4G Main Ant + WLAN 2.4G Aux Ant	Yes
2	WLAN 5G Main Ant + WLAN 5G Aux Ant	Yes
3	WLAN 6E Main Ant + WLAN 6E Aux Ant	Yes
4	BT Main Ant + WLAN 2.4G Aux Ant	Yes
5	BT Main Ant + WLAN 5G Aux Ant	Yes
6	BT Main Ant + WLAN 6E Aux Ant	Yes

Note: Only the Main Ant supports BT function.

7.3.2 SAR UMMATION SCENARIO

About WIFI and Bluetooth transmit simultaneously

Position		Back of Screen (2.5cm)	Back of Keyboard (0cm)
Band			
Main Ant	WiFi 2.4G	0.068	0.607
	WiFi 5.2G	0.133	1.210
	WiFi 5.3G	0.158	1.205
	WiFi 5.6G	0.182	1.027
	WiFi 5.8G	0.144	0.948
	WiFi 5.9G	0.064	0.582
	WiFi 6.2G	0.030	0.479
	WiFi 6.5G	0.029	0.419
	WiFi 6.7G	0.034	0.648
	WiFi 7.0G	0.033	0.623
	BT	0.027	0.224
Aux Ant	WiFi 2.4G	0.046	0.506
	WiFi 5.2G	0.145	1.350
	WiFi 5.3G	0.148	1.217
	WiFi 5.6G	0.158	1.319
	WiFi 5.8G	0.160	1.316
	WiFi 5.9G	0.107	1.301
	WiFi 6.2G	0.027	0.531
	WiFi 6.5G	0.029	0.407
	WiFi 6.7G	0.027	0.435
	WiFi 7.0G	0.035	0.475

Reported SAR _{1g}			MAIN											MAX ΣSAR _{1g}
Test Position			2.4G	5.2G	5.3G	5.6G	5.8G	5.9G	6.2G	6.5G	6.7G	7.0G	BT	
Back of Screen	AUX	2.4G	0.114	/	/	/	/	/	/	/	/	/	0.073	0.114
		5.2G	/	0.278	/	/	/	/	/	/	/	/	0.172	0.278
		5.3G	/	/	0.306	/	/	/	/	/	/	/	0.175	0.306
		5.6G	/	/	/	0.340	/	/	/	/	/	/	0.185	0.340
		5.8G	/	/	/	/	0.304	/	/	/	/	/	0.187	0.304
		5.9G	/	/	/	/	/	0.171	/	/	/	/	0.134	0.171
		6.2G	/	/	/	/	/	/	0.057	/	/	/	0.054	0.057
		6.5G	/	/	/	/	/	/	/	0.058	/	/	0.056	0.058
		6.7G	/	/	/	/	/	/	/	/	0.061	/	0.054	0.061
		7.0G	/	/	/	/	/	/	/	/	/	0.068	0.062	0.068

Test Position		Reported SAR ₁₀	MAIN											MAX Σ SAR _{1g}
			2.4G	5.2G	5.3G	5.6G	5.8G	5.9G	6.2G	6.5G	6.7G	7.0G	BT	
Back of Keyboard	AUX	2.4G	1.113	/	/	/	/	/	/	/	/	/	0.730	1.113
		5.2G	/	2.560	/	/	/	/	/	/	/	/	1.574	Refer to SPLSR results (1)
		5.3G	/	/	2.422	/	/	/	/	/	/	/	1.441	Refer to SPLSR results (2)
		5.6G	/	/	/	2.346	/	/	/	/	/	/	1.543	Refer to SPLSR results (3)
		5.8G	/	/	/	/	2.264	/	/	/	/	/	1.540	Refer to SPLSR results (4)
		5.9G	/	/	/	/	/	1.883	/	/	/	/	1.525	Refer to SPLSR results (5)
		6.2G	/	/	/	/	/	/	1.010	/	/	/	0.755	1.010
		6.5G	/	/	/	/	/	/	/	0.826	/	/	0.631	0.826
		6.7G	/	/	/	/	/	/	/	/	1.083	/	0.659	1.083
		7.0G	/	/	/	/	/	/	/	/	/	1.098	0.699	1.098

Note:

1) MAX. Σ SAR_{1g} < 1.6 W/Kg, the SAR to peak location separation ratio should not be considered, otherwise, see section 7.3.3 for more information.

2) The highest simultaneous SAR value = 1.574 W/Kg, per KDB690783 D01.

7.3.3 SIMULTANEOUS TRANSMISSION CONCLUSION

According to KDB447498 D04, When the sum of SAR is larger than limit, SAR test exclusion is determined by the SAR to peak location separation ratio (SPLSR). When the SAR to peak location ratio for each pair of antennas is 0.04 for all antenna pairs in the configuration to qualify for 1-g SAR test exclusion. When 10-g SAR applies, the ratio must be ≤ 0.10 .

When SAR is measured for both antennas in the pair the peak location separation distance is computed by the following formula:

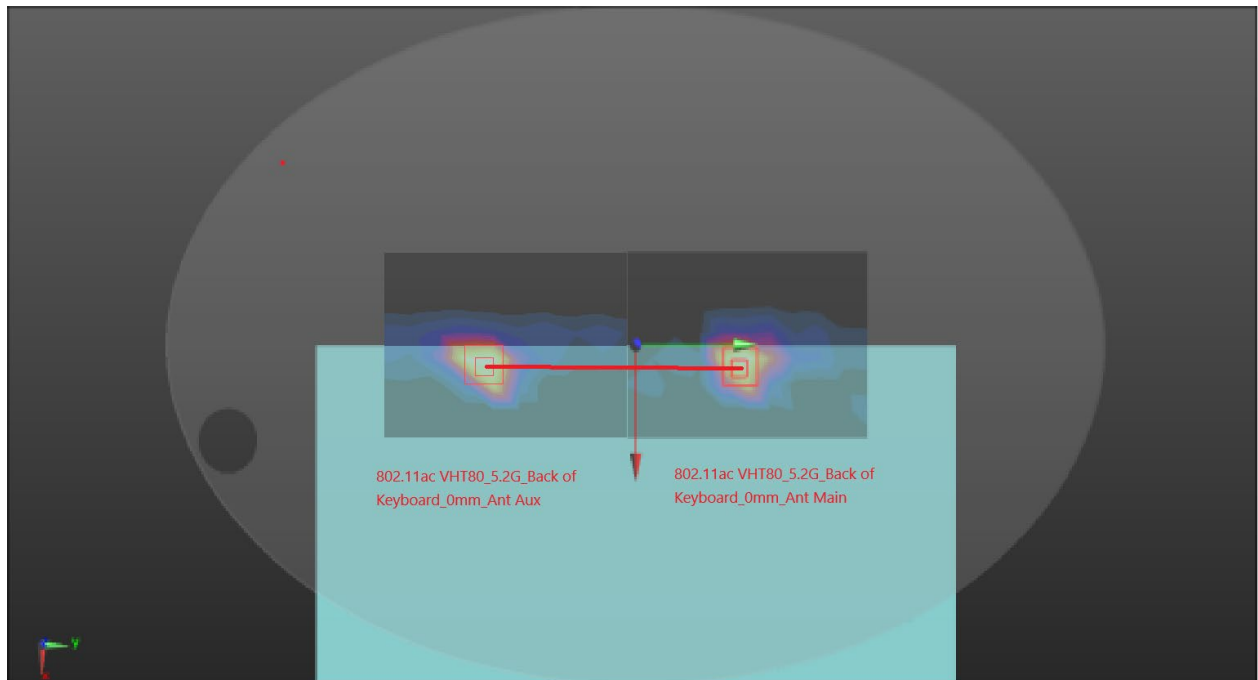
$$\text{Distance}_{\text{Tx1-Tx2}} = R_i = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2 + (z_1 - z_2)^2}$$

$$\text{SPLS Ratio} = (\text{SAR}_1 + \text{SAR}_2)^{1.5} / R_i$$

When standalone test exclusion applies, SAR is estimated; the peak location is assumed to be at the feed-point or geometric center of the antenna. Due to curvatures on the SAM phantom, when SAR is estimated for one of the antennas in an antenna pair, the measured peak SAR location should be translated onto the test device to determine the peak location separation for the antenna pair. The ERP location on the phantom is aligned with the ERP location on the handset, with 6mm separation in the z coordinate due to the ear spacer. A measured peak location can be translated onto the handset, with respect to the ERP location, by ignoring the 6 mm offset in the z coordinate. The assumed peak location of the antenna with estimated SAR can also be determined with respect to the ERP location on the handset. The peak location separation distance is estimated by the x and y coordinated of the peaks, referenced to the ERP location. While flat phantoms are not expected to have these issues, the same peak translation approach should be applied to determine peak location separation.

(1) The sum of aggregate 1g SAR was above 1.6 W/kg for Back of Keyboard configuration with WiFi 5.2G Main Ant and WiFi 5.2G Aux Ant.

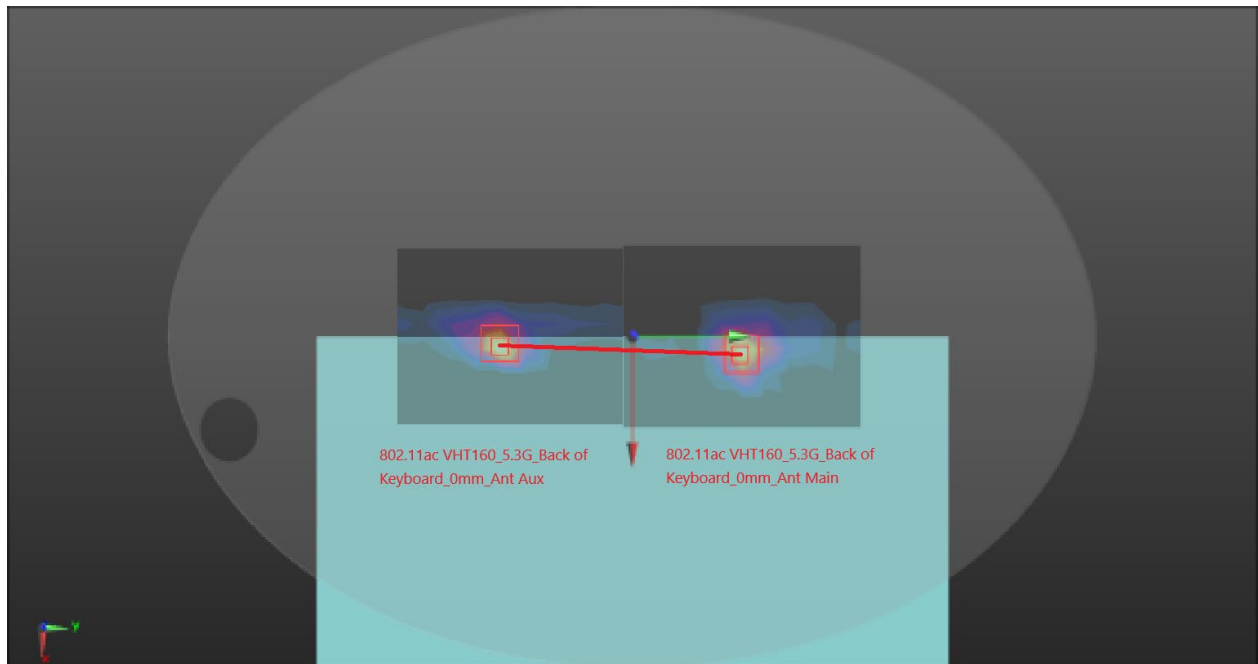
The Peak SAR location is as below:



Mode	Reported SAR _{1g}	Peak SAR _{1g}	X	Y	Z	D (mm)	SPLSR	Ratio Limit	Simultaneous SAR
	mW/g	mW/g	m	m	m				
Main Ant WiFi 5.2G	1.210	2.39	0.015	0.0635	-0.181	141.0	0.029	0.04	No
Aux Ant WiFi 5.2G	1.350	2.20	0.0165	-0.0775	-0.181				

(2) The sum of aggregate 1g SAR was above 1.6 W/kg for Back of Keyboard configuration with WiFi 5.3G Main Ant and WiFi 5.3G Aux Ant.

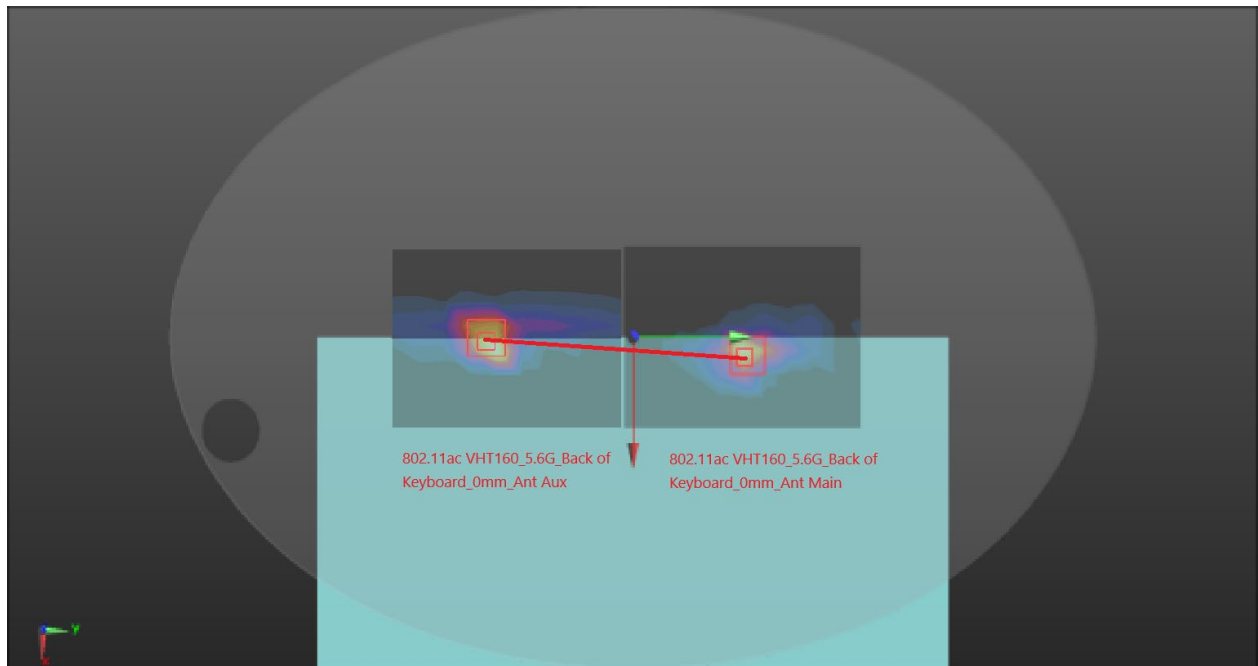
The Peak SAR location is as below:



Mode	Reported SAR _{1g}	Peak SAR _{1g}	X	Y	Z	D (mm)	SPLSR	Ratio Limit	Simultaneous SAR
	mW/g	mW/g	m	m	m				
Main Ant WiFi 5.3G	1.205	1.80	0.007	0.0665	-0.182	144.1	0.026	0.04	No
Aux Ant WiFi 5.3G	1.217	2.18	0.003	-0.0775	-0.182				

(3) The sum of aggregate 1g SAR was above 1.6 W/kg for Back of Keyboard configuration with WiFi 5.6G Main Ant and WiFi 5.6G Aux Ant.

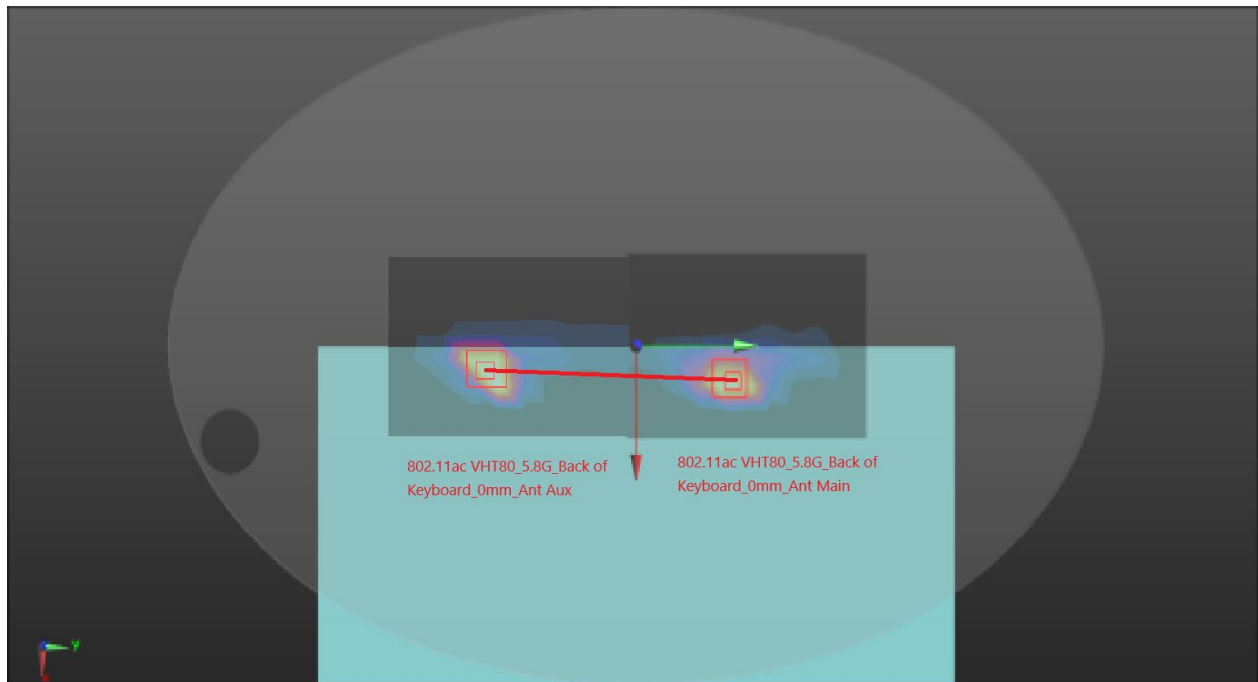
The Peak SAR location is as below:



Mode	Reported SAR _{1g}	Peak SAR _{1g}	X	Y	Z	D (mm)	SPLSR	Ratio Limit	Simultaneous SAR
	mW/g	mW/g	m	m	m				
Main Ant WiFi 5.6G	1.027	2.27	0.0135	0.068	-0.181	147.5	0.024	0.04	No
Aux Ant WiFi 5.6G	1.319	2.56	0.0015	-0.079	-0.182				

(4) The sum of aggregate 1g SAR was above 1.6 W/kg for Back of Keyboard configuration with WiFi 5.8G Main Ant and WiFi 5.8G Aux Ant.

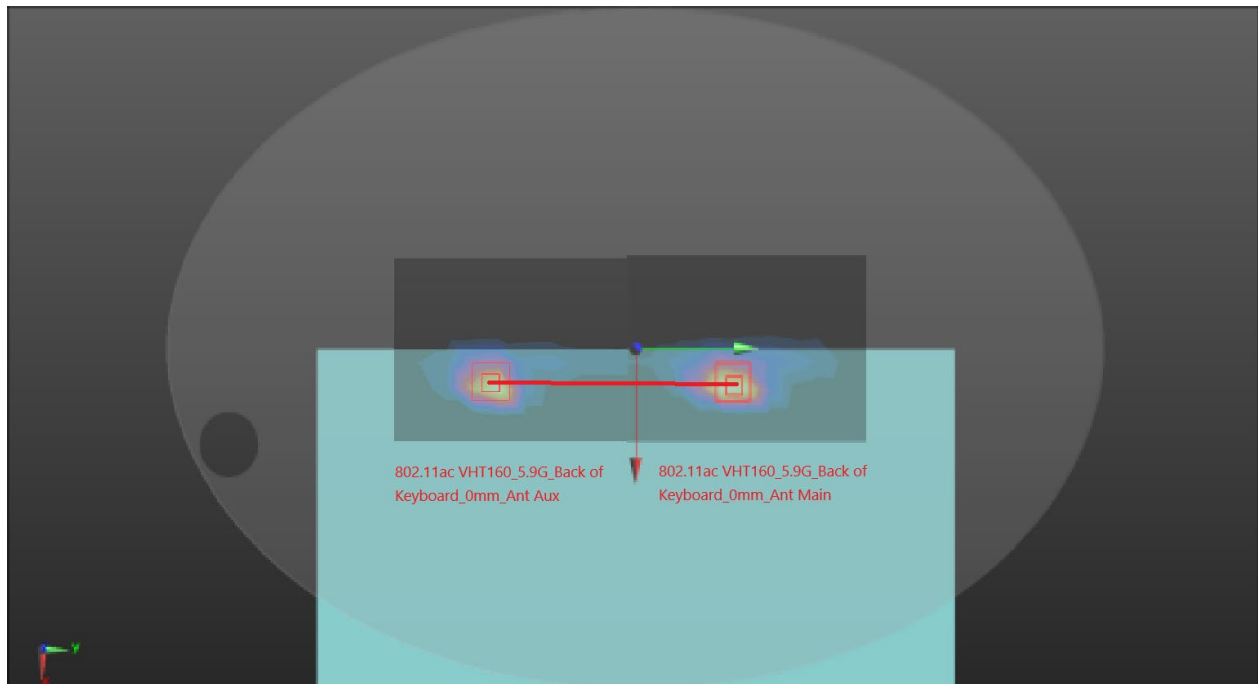
The Peak SAR location is as below:



Mode	Reported SAR _{1g}	Peak SAR _{1g}	X	Y	Z	D (mm)	SPLSR	Ratio Limit	Simultaneous SAR
	mW/g	mW/g	m	m	m				
Main Ant WiFi 5.8G	0.948	1.88	0.018	0.067	-0.182	152.5	0.022	0.04	No
Aux Ant WiFi 5.8G	1.316	2.37	0.0165	-0.0855	-0.181				

(5) The sum of aggregate 1g SAR was above 1.6 W/kg for Back of Keyboard configuration with WiFi 5.9G Main Ant and WiFi 5.9G Aux Ant.

The Peak SAR location is as below:



Mode	Reported SAR _{1g}	Peak SAR _{1g}	X	Y	Z	D (mm)	SPLSR	Ratio Limit	Simultaneous SAR
	mW/g	mW/g	m	m	m				
Main Ant WiFi 5.9G	0.582	1.11	0.018	0.067	-0.182	149.0	0.017	0.04	No
Aux Ant WiFi 5.9G	1.301	2.61	0.018	-0.082	-0.181				

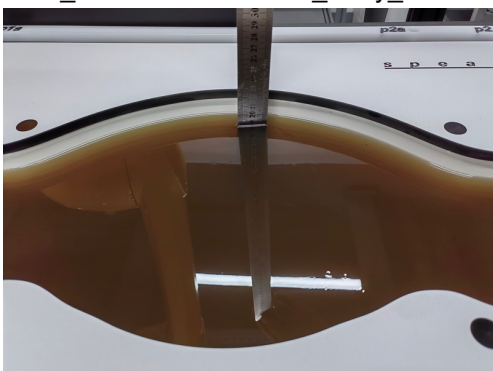
APPENDIX**1. TEST LAYOUT****Specific Absorption Rate Test Layout**

Liquid depth in the flat Phantom (≥ 15 cm depth)

HSL_2300MHz-2700MHz_Body_15.1cm HSL_4500MHz-6000MHz_Body_15.5cm



HSL_600MHz-10000MHz_Body_19.1cm



Appendix A. SAR Plots of System Verification

(Pls See BTL-FCC SAR-1-2411C327_Appendix A.)

Appendix B. SAR Plots of SAR Measurement

(Pls See BTL-FCC SAR-1-2411C327_Appendix B.)

Appendix C. Calibration Certificate

(Pls See BTL-FCC SAR-1-2411C327_Appendix C.)

Appendix D. Photographs of the Test Set-Up

(Pls See BTL-FCC SAR-1-2411C327_Appendix D.)

End of Test Report