

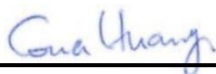
FCC SAR TEST REPORT

FCC ID : J9C-QCNCM825
Equipment : Qualcomm WiFi 7/BT Combo module
Brand Name : Qualcomm
Model Name : QCNCM825
Applicant : Qualcomm Technologies, Inc.
5775 Morehouse Drive, San Diego, CA 92121-1714
Standard : FCC 47 CFR Part 2 (2.1093)

The product was installed into Notebook Computer (Brand Name: Lenovo, Model Name: TP00161A) during test.

The product was received on Apr. 26, 2024 and testing was started from May 05, 2024 and completed on May 09, 2024. We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample provide by manufacturer and the test data has been evaluated in accordance with the test procedures given in 47 CFR Part 2.1093 and FCC KDB and has been pass the FCC requirement.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC. Laboratory, the test report shall not be reproduced except in full.



Approved by: Cona Huang / Deputy Manager



Sporton International Inc. EMC & Wireless Communications Laboratory



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1. Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) for Qualcomm Technologies, Inc., Qualcomm WiFi 7/BT Combo module, QCNCM825, are as follows.

Equipment Class	Frequency Band		Highest SAR Summary	
			Body (Separation 0mm)	Highest Simultaneous Transmission 1g SAR (W/kg)
			1g SAR (W/kg)	
DTS	WLAN	2.4GHz WLAN	0.74	1.36
NII		5GHz WLAN	1.09	1.46
6CD		6GHz WLAN	0.50	1.46
DSS	2.4GHz Band	Bluetooth	0.38	1.46
Equipment Class	Frequency Band		Reported APD (mW/cm ²)	Reported PD (mW/cm ²)
6CD	WLAN	6GHz WLAN	0.35	0.65
Date of Testing:			2024/05/05 ~ 2024/05/09	

Sporton Lab is accredited to ISO 17025 by Taiwan Accreditation Foundation and the FCC designation No. TW1190 under the FCC 2.948(e) by Mutual Recognition Agreement (MRA) in FCC test. This device is in compliance with Specific Absorption Rate (SAR) for general population/uncontrolled exposure limits (1.6 W/kg for Partial-Body 1g SAR) specified in FCC 47 CFR part 2 (2.1093) and ANSI/IEEE C95.1-1992, and had been tested in accordance with the measurement methods and procedures specified in IEEE 1528-2013 and FCC KDB publications.

Reviewed by: Jason Wang
Report Producer: Wan Liu

2. Guidance Applied

The Specific Absorption Rate (SAR) testing specification, method, and procedure for this device is in accordance with the following standards, the below KDB standard may not including in the TAF code without accreditation.

- FCC 47 CFR Part 2 (2.1093)
- ANSI/IEEE C95.1-1992
- IEEE 1528-2013
- FCC KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz v01r04
- FCC KDB 865664 D02 SAR Reporting v01r02
- FCC KDB 447498 D01 General RF Exposure Guidance v06
- FCC KDB 248227 D01 802.11 Wi-Fi SAR v02r02
- FCC KDB 616217 D04 SAR for laptop and tablets v01r02
- IEC/IEEE 62209-1528:2020
- SPEAG DASY6 System Handbook
- SPEAG DASY6 Application Note (Interim Procedure for Device Operation at 6GHz-10GHz)



3. Equipment Under Test (EUT) Information

3.1 General Information

Product Feature & Specification	
Equipment Name	Qualcomm WiFi 7/BT Combo module
Brand Name	Qualcomm
Model Name	QCNCM825
FCC ID	J9C-QCNCM825
Wireless Technology and Frequency Range	WLAN 2.4 GHz Band: 2400 MHz ~ 2483.5 MHz WLAN 5.2 GHz Band: 5150 MHz ~ 5250 MHz WLAN 5.3 GHz Band: 5250 MHz ~ 5350 MHz WLAN 5.6 GHz Band: 5470 MHz ~ 5725 MHz WLAN 5.8 GHz Band: 5725 MHz ~ 5850 MHz WLAN 5.9 GHz Band: 5850 MHz ~ 5895 MHz WLAN 6E: 5925 MHz ~ 6425 MHz, 6425 MHz ~ 6525 MHz, 6525 MHz ~ 6875 MHz, 6875 MHz ~ 7125 MHz Bluetooth: 2400 MHz ~ 2483.5 MHz
Mode	WLAN: 802.11a/b/g/n/ac/ax/be HT20/HT40/VHT20/VHT40/VHT80/HE20/HE40/HE80/HE160/EHT20/EHT40/EHT80/EHT160/EHT320 Bluetooth BR/EDR/LE
Remark:	
1. This device has two antenna vendors, RF exposure evaluation selects AWAN as the main test, Speed will spot check worst case found in AWAN.	
2. The device support DBS (Dual Band Simultaneous) function, when the device 2.4GHz and 5/6GHz transmit at the same time the module will limit different output power for simultaneous transmission compliance.	

Host Information	
Equipment Name	Notebook Computer
Brand Name	Lenovo
Model Name	TP00161A
EUT Stage	Production Unit

Antenna Information					
Antenna 1	Manufacturer	AWAN			
	Antenna Type	PIFA Antenna		PIFA Antenna	
	Part number	025.902D6.0001		025.902D6.0001	
	Peak gain (dBi)	Main Antenna :		Aux Antenna :	
		WLAN(2.4G):	2.39 dBi	BT/WLAN(2.4G):	2.48 dBi
		WLAN(5G B1):	1.11 dBi	WLAN(5G B1):	2.52 dBi
		WLAN(5G B2):	0.36 dBi	WLAN(5G B2):	1.78 dBi
		WLAN(5G B3):	3.21 dBi	WLAN(5G B3):	3.01 dBi
		WLAN(5G B4):	3.21 dBi	WLAN(5G B4):	3.21 dBi
		UNII-4:	3.01 dBi	UNII-4:	3.21 dBi
		UNII-5:	2.20 dBi	UNII-5:	3.20 dBi
UNII-6:		3.08 dBi	UNII-6:	2.64 dBi	
UNII-7:	3.08 dBi	UNII-7:	0.77 dBi		
UNII-8:	1.87 dBi	UNII-8:	0.92 dBi		
Antenna 2	Manufacturer	Speed			
	Antenna Type	PIFA Antenna		PIFA Antenna	
	Part number	025.902D7.0001		025.902D7.0001	
	Peak gain (dBi)	Main Antenna :		Aux Antenna :	
		WLAN(2.4G):	2.22 dBi	WLAN(2.4G):	2.37 dBi
		WLAN(5G B1):	1.92 dBi	WLAN(5G B1):	2.48 dBi
		WLAN(5G B2):	1.71 dBi	WLAN(5G B2):	1.91 dBi
		WLAN(5G B3):	3.89 dBi	WLAN(5G B3):	3.53 dBi
		WLAN(5G B4):	3.29 dBi	WLAN(5G B4):	3.70 dBi
		UNII-4:	3.01 dBi	UNII-4:	3.00 dBi
		UNII-5:	4.48 dBi	UNII-5:	3.80 dBi
UNII-6:		3.64 dBi	UNII-6:	2.85 dBi	
UNII-7:	4.16 dBi	UNII-7:	4.06 dBi		
UNII-8:	3.24 dBi	UNII-8:	3.70 dBi		



4. RF Exposure Limits

4.1 Uncontrolled Environment

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

4.2 Controlled Environment

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

Limits for Occupational/Controlled Exposure (W/kg)

Whole-Body	Partial-Body	Hands, Wrists, Feet and Ankles
0.4	8.0	20.0

Limits for General Population/Uncontrolled Exposure (W/kg)

Whole-Body	Partial-Body	Hands, Wrists, Feet and Ankles
0.08	1.6	4.0

1. Whole-Body SAR is averaged over the entire body, partial-body SAR is averaged over any 1gram of tissue defined as a tissue volume in the shape of a cube. SAR for hands, wrists, feet and ankles is averaged over any 10 grams of tissue defined as a tissue volume in the shape of a cube.



4.3 RF Exposure limit for above 6GHz

According to ANSI/IEEE C95.1-1992, the criteria listed in Table 1 shall be used to evaluate the environmental impact of human exposure to radio frequency (RF) radiation as specified in §1.1310.

Peak Spatially Averaged Power Density was evaluated over a circular area of 4cm² per interim FCC Guidance for near-field power density evaluations per October 2018 TCB Workshop notes

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3-3.0	614	1.63	*(100)	6
3.0-30	1842/f	4.89/f	*(900/f ²)	6
30-300	61.4	0.163	1.0	6
300-1500			f/300	6
1500-100,000			5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*(180/f ²)	30
30-300	27.5	0.073	0.2	30
300-1500			f/1500	30
1500-100,000			1.0	30

5. Specific Absorption Rate (SAR)

5.1 Introduction

SAR is related to the rate at which energy is absorbed per unit mass in an object exposed to a radio field. The SAR distribution in a biological body is complicated and is usually carried out by experimental techniques or numerical modeling. The standard recommends limits for two tiers of groups, occupational/controlled and general population/uncontrolled, based on a person's awareness and ability to exercise control over his or her exposure. In general, occupational/controlled exposure limits are higher than the limits for general population/uncontrolled.

5.2 SAR Definition

The SAR definition is the time derivative (rate) of the incremental energy (dW) absorbed by (dissipated in) an incremental mass (dm) contained in a volume element (dv) of a given density (ρ). The equation description is as below:

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

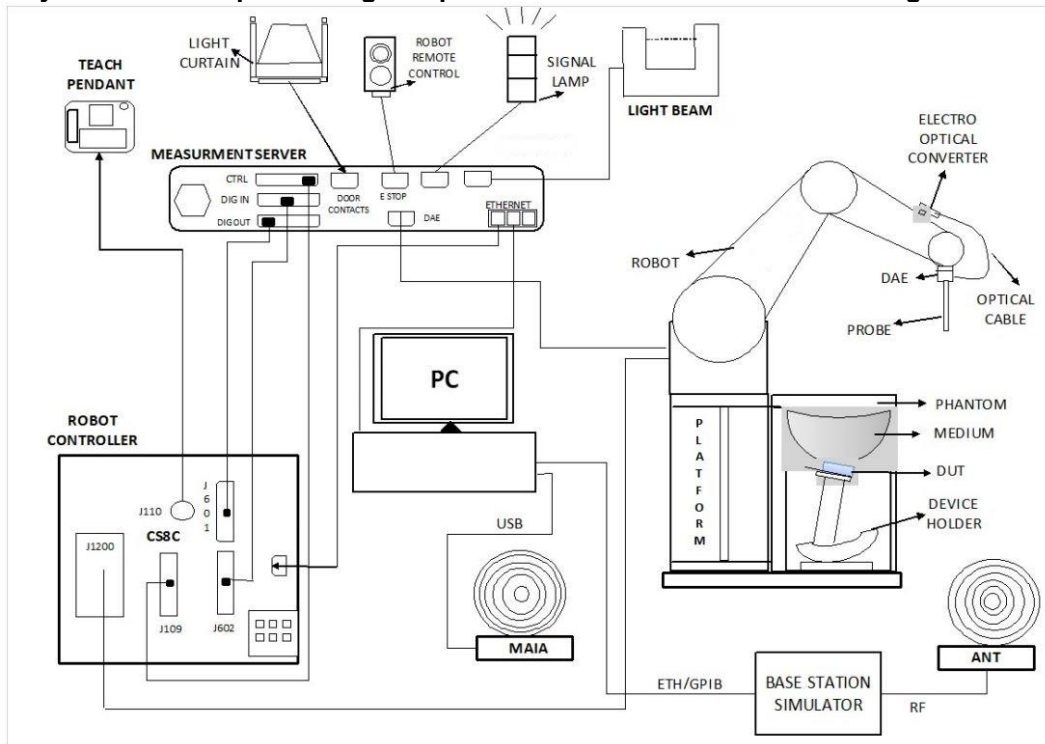
SAR is expressed in units of Watts per kilogram (W/kg)

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

Where: σ is the conductivity of the tissue, ρ is the mass density of the tissue and E is the RMS electrical field strength.

6. System Description and Setup

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



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

6.1 Test Site Location


The SAR measurement facilities used to collect data are within both Sporton Lab list below test site location are accredited to ISO 17025 by Taiwan Accreditation Foundation (TAF code: 1190 and 3786) and the FCC designation No. TW1190 and TW3786 under the FCC 2.948(e) by Mutual Recognition Agreement (MRA) in FCC test. In system validation list test site number, if the test site number is include in the Wensan Laboratory, that's mean the test data are subcontracted to Sporton International Inc. Wensan Laboratory.

Laboratory	EMC & Wireless Communications Laboratory		Wensan Laboratory				
Test Site Location	TW1190 No.52, Huaya 1st Rd., Guishan Dist., Taoyuan City 333, Taiwan		TW3786 No.58, Aly. 75, Ln. 564, Wenhua 3rd, Rd., Guishan Dist., Taoyuan City 333010, Taiwan				
Test Site No.	SAR01-HY	SAR03-HY	SAR08-HY	SAR09-HY	SAR15-HY	SAR18-HY	SAR21-HY
	SAR04-HY	SAR05-HY	SAR11-HY	SAR12-HY	SAR16-HY	SAR19-HY	SAR22-HY
	SAR06-HY	SAR10-HY	SAR13-HY	SAR14-HY	SAR17-HY	SAR20-HY	


6.2 E-Field Probe

The SAR measurement is conducted with the dosimetric probe (manufactured by SPEAG). The probe is specially designed and calibrated for use in liquid with high permittivity. The dosimetric probe has special calibration in liquid at different frequency. This probe has a built in optical surface detection system to prevent from collision with phantom.

<ES3DV3 Probe>

Construction	Symmetric design with triangular core Interleaved sensors Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)	
Frequency	4 MHz – 4 GHz; Linearity: ± 0.2 dB (30 MHz – 4 GHz)	
Directivity	± 0.2 dB in TSL (rotation around probe axis) ± 0.3 dB in TSL (rotation normal to probe axis)	
Dynamic Range	5 μ W/g – >100 mW/g; Linearity: ± 0.2 dB	
Dimensions	Overall length: 337 mm (tip: 20 mm) Tip diameter: 3.9 mm (body: 12 mm) Distance from probe tip to dipole centers: 3.0 mm	

<EX3DV4 Probe>

Construction	Symmetric design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)	
Frequency	4 MHz – >6 GHz Linearity: ± 0.2 dB (30 MHz – 6 GHz)	
Directivity	± 0.3 dB in TSL (rotation around probe axis) ± 0.5 dB in TSL (rotation normal to probe axis)	
Dynamic Range	10 μ W/g – >100 mW/g Linearity: ± 0.2 dB (noise: typically <1 μ W/g)	
Dimensions	Overall length: 337 mm (tip: 20 mm) Tip diameter: 2.5 mm (body: 12 mm) Typical distance from probe tip to dipole centers: 1 mm	

6.3 Data Acquisition Electronics (DAE)

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

The input impedance of the DAE is 200 MOhm; the inputs are symmetrical and floating. Common mode rejection is above 80 dB.

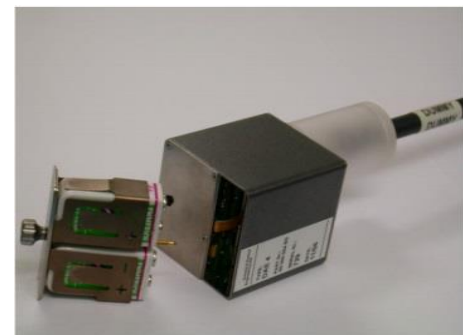



Fig 5.1 Photo of DAE

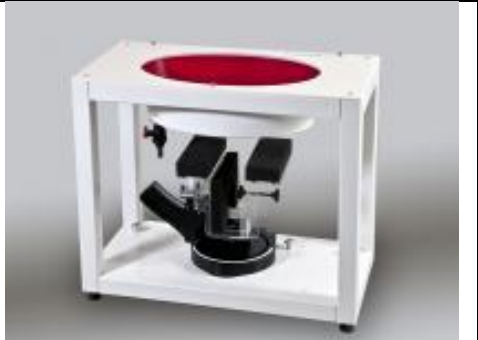
6.4 Phantom

<SAM Twin Phantom>

Shell Thickness	2 ± 0.2 mm; Center ear point: 6 ± 0.2 mm	
Filling Volume	Approx. 25 liters	
Dimensions	Length: 1000 mm; Width: 500 mm; Height: adjustable feet	
Measurement Areas	Left Hand, Right Hand, Flat Phantom	

The bottom plate contains three pair of bolts for locking the device holder. The device holder positions are adjusted to the standard measurement positions in the three sections. A white cover is provided to tap the phantom during off-periods to prevent water evaporation and changes in the liquid parameters. On the phantom top, three reference markers are provided to identify the phantom position with respect to the robot.

<ELI Phantom>

Shell Thickness	2 ± 0.2 mm (sagging: <1%)	
Filling Volume	Approx. 30 liters	
Dimensions	Major ellipse axis: 600 mm Minor axis: 400 mm	

The ELI phantom is intended for compliance testing of handheld and body-mounted wireless devices in the frequency range of 30 MHz to 6 GHz. ELI4 is fully compatible with standard and all known tissue simulating liquids.

6.5 Device Holder

<Mounting Device for Hand-Held Transmitter>

In combination with the Twin SAM V5.0/V5.0c or ELI phantoms, the Mounting Device for Hand-Held Transmitters enables rotation of the mounted transmitter device to specified spherical coordinates. At the heads, the rotation axis is at the ear opening. Transmitter devices can be easily and accurately positioned according to IEC 62209-1, IEEE 1528, FCC, or other specifications. The device holder can be locked for positioning at different phantom sections (left head, right head, flat). And upgrade kit to Mounting Device to enable easy mounting of wider devices like big smart-phones, e-books, small tablets, etc. It holds devices with width up to 140 mm.



Mounting Device for Hand-Held Transmitters



Mounting Device Adaptor for Wide-Phones

<Mounting Device for Laptops and other Body-Worn Transmitters>

The extension is lightweight and made of POM, acrylic glass and foam. It fits easily on the upper part of the mounting device in place of the phone positioned. The extension is fully compatible with the SAM Twin and ELI phantoms.



Mounting Device for Laptops

7. Measurement Procedures

The measurement procedures are as follows:

- (a) Use base station simulator to configure EUT WWAN transmission in radiated connection, and engineering software to configure EUT WLAN/BT continuously transmission, at maximum RF power, in the highest power channel.
- (b) Place the EUT in the positions as Appendix D demonstrates.
- (c) Set scan area, grid size and other setting on the DASY software.
- (d) Measure SAR results for the highest power channel on each testing position.
- (e) Find out the largest SAR result on these testing positions of each band
- (f) Measure SAR results for other channels in worst SAR testing position if the reported SAR of highest power channel is larger than 0.8 W/kg

According to the test standard, the recommended procedure for assessing the peak spatial-average SAR value consists of the following steps:

- (a) Power reference measurement
- (b) Area scan
- (c) Zoom scan
- (d) Power drift measurement

7.1 Spatial Peak SAR Evaluation

The procedure for spatial peak SAR evaluation has been implemented according to the test standard. It can be conducted for 1g and 10g, as well as for user-specific masses. The DASY software includes all numerical procedures necessary to evaluate the spatial peak SAR value.

The base for the evaluation is a "cube" measurement. The measured volume must include the 1g and 10g cubes with the highest averaged SAR values. For that purpose, the center of the measured volume is aligned to the interpolated peak SAR value of a previously performed area scan.

The entire evaluation of the spatial peak values is performed within the post-processing engine (SEMCAD). The system always gives the maximum values for the 1g and 10g cubes. The algorithm to find the cube with highest averaged SAR is divided into the following stages:

- (a) Extraction of the measured data (grid and values) from the Zoom Scan
- (b) Calculation of the SAR value at every measurement point based on all stored data (A/D values and measurement parameters)
- (c) Generation of a high-resolution mesh within the measured volume
- (d) Interpolation of all measured values from the measurement grid to the high-resolution grid
- (e) Extrapolation of the entire 3-D field distribution to the phantom surface over the distance from sensor to surface
- (f) Calculation of the averaged SAR within masses of 1g and 10g

7.2 Power Reference Measurement

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

7.3 Area Scan

The area scan is used as a fast scan in two dimensions to find the area of high field values, before doing a fine measurement around the hot spot. The sophisticated interpolation routines implemented in DASY software can find the maximum found in the scanned area, within a range of the global maximum. The range (in dB) is specified in the standards for compliance testing. For example, a 2 dB range is required in IEEE standard 1528 and IEC 62209 standards, whereby 3 dB is a requirement when compliance is assessed in accordance with the ARIB standard (Japan), if only one zoom scan follows the area scan, then only the absolute maximum will be taken as reference. For cases where multiple maximums are detected, the number of zoom scans has to be increased accordingly.

Area scan parameters extracted from FCC KDB 865664 D01v01r04 SAR measurement 100 MHz to 6 GHz.

	≤ 3 GHz	> 3 GHz
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface	5 ± 1 mm	$\frac{1}{2} \cdot \delta \cdot \ln(2) \pm 0.5$ mm
Maximum probe angle from probe axis to phantom surface normal at the measurement location	30° ± 1°	20° ± 1°
Maximum area scan spatial resolution: $\Delta x_{Area}, \Delta y_{Area}$	≤ 2 GHz: ≤ 15 mm 2 – 3 GHz: ≤ 12 mm	3 – 4 GHz: ≤ 12 mm 4 – 6 GHz: ≤ 10 mm
	When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be ≤ the corresponding x or y dimension of the test device with at least one measurement point on the test device.	

7.4 Zoom Scan

Zoom scans are used to assess the peak spatial SAR values within a cubic averaging volume containing 1 gram and 10 gram of simulated tissue. The zoom scan measures points (refer to table below) within a cube whose base faces are centered on the maxima found in a preceding area scan job within the same procedure. When the measurement is done, the zoom scan evaluates the averaged SAR for 1 gram and 10 gram and displays these values next to the job's label.

Zoom scan parameters extracted from FCC KDB 865664 D01v01r04 SAR measurement 100 MHz to 6 GHz.

		≤ 3 GHz	> 3 GHz	
Maximum zoom scan spatial resolution: $\Delta x_{Zoom}, \Delta y_{Zoom}$		≤ 2 GHz: ≤ 8 mm 2 – 3 GHz: ≤ 5 mm*	3 – 4 GHz: ≤ 5 mm* 4 – 6 GHz: ≤ 4 mm*	
Maximum zoom scan spatial resolution, normal to phantom surface	uniform grid: $\Delta z_{Zoom}(n)$	≤ 5 mm	3 – 4 GHz: ≤ 4 mm 4 – 5 GHz: ≤ 3 mm 5 – 6 GHz: ≤ 2 mm	
	graded grid	$\Delta z_{Zoom}(1)$: between 1 st two points closest to phantom surface	≤ 4 mm	3 – 4 GHz: ≤ 3 mm 4 – 5 GHz: ≤ 2.5 mm 5 – 6 GHz: ≤ 2 mm
		$\Delta z_{Zoom}(n>1)$: between subsequent points	$\leq 1.5 \cdot \Delta z_{Zoom}(n-1)$	
Minimum zoom scan volume	x, y, z	≥ 30 mm	3 – 4 GHz: ≥ 28 mm 4 – 5 GHz: ≥ 25 mm 5 – 6 GHz: ≥ 22 mm	
<p>Note: δ is the penetration depth of a plane-wave at normal incidence to the tissue medium; see draft standard IEEE P1528-2011 for details.</p> <p>* When zoom scan is required and the <i>reported</i> SAR from the <i>area scan based 1-g SAR estimation</i> procedures of KDB 447498 is ≤ 1.4 W/kg, ≤ 8 mm, ≤ 7 mm and ≤ 5 mm zoom scan resolution may be applied, respectively, for 2 GHz to 3 GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz.</p>				

7.5 Volume Scan Procedures

The volume scan is used to assess overlapping SAR distributions for antennas transmitting in different frequency bands. It is equivalent to an oversized zoom scan used in standalone measurements. The measurement volume will be used to enclose all the simultaneous transmitting antennas. For antennas transmitting simultaneously in different frequency bands, the volume scan is measured separately in each frequency band. In order to sum correctly to compute the 1g aggregate SAR, the EUT remain in the same test position for all measurements and all volume scan use the same spatial resolution and grid spacing. When all volume scan were completed, the software, SEMCAD postprocessor can combine and subsequently superpose these measurement data to calculating the multiband SAR.

7.6 Power Drift Monitoring

All SAR testing is under the EUT install full charged battery and transmit maximum output power. In DASy measurement software, the power reference measurement and power drift measurement procedures are used for monitoring the power drift of EUT during SAR test. Both these procedures measure the field at a specified reference position before and after the SAR testing. The software will calculate the field difference in dB. If the power drifts more than 5%, the SAR will be retested.



8. Test Equipment List

Manufacturer	Name of Equipment	Type/Model	Serial Number	Calibration	
				Last Cal.	Due Date
SPEAG	2450MHz System Validation Kit ⁽²⁾	D2450V2	736	Aug. 17, 2021	Aug. 14, 2024
SPEAG	5GHz System Validation Kit ⁽²⁾	D5GHzV2	1006	May. 25, 2023	May. 23, 2025
SPEAG	5GHz System Validation Kit ⁽²⁾	D5GHzV2	1128	Feb. 22, 2023	Feb. 20, 2025
SPEAG	6500MHz System Validation Kit	D6.5GHzV2	1083	Oct. 20, 2023	Oct. 19, 2024
SPEAG	5G Verification Source	10GHz	1020	Jan. 18, 2024	Jan. 17, 2025
SPEAG	EUmmWV Probe Tip Protection	EUmmWV4	9441	Nov. 17, 2023	Nov. 16, 2024
SPEAG	Data Acquisition Electronics	DAE4	316	Jan. 18, 2024	Jan. 17, 2025
SPEAG	Data Acquisition Electronics	DAE4	656	Jan. 18, 2024	Jan. 17, 2025
SPEAG	Data Acquisition Electronics	DAE4	1424	Dec. 07, 2023	Dec. 06, 2024
SPEAG	Dosimetric E-Field Probe	EX3DV4	7700	Feb. 01, 2024	Jan. 31, 2025
SPEAG	Dosimetric E-Field Probe	EX3DV4	7814	May. 30, 2023	May. 29, 2024
Testo	Hygro meter	608-H1	45196600	Nov. 02, 2023	Nov. 01, 2024
R&S	BT Base Station	CBT	101136	Oct. 22, 2023	Oct. 21, 2024
SPEAG	Device Holder	N/A	N/A	N/A	N/A
Anritsu	Signal Generator	MG3710A	6201502524	Sep. 27, 2023	Sep. 26, 2024
Keysight	ENA Network Analyzer	E5071C	MY46104758	Oct. 30, 2023	Oct. 29, 2024
SPEAG	Dielectric Probe Kit	DAK-3.5	1126	Sep. 19, 2023	Sep. 18, 2024
LINE SEIKI	Digital Thermometer	DTM3000-spezial	3690	Aug. 09, 2023	Aug. 08, 2024
Anritsu	Power Meter	ML2495A	1419002	Aug. 17, 2023	Aug. 16, 2024
Anritsu	Power Sensor	MA2411B	1911176	Aug. 18, 2023	Aug. 17, 2024
Anritsu	Spectrum Analyzer	MS2830A	6201396378	Jul. 10, 2023	Jul. 09, 2024
Mini-Circuits	Power Amplifier	ZVE-8G+	6418	Oct. 16, 2023	Oct. 15, 2024
ATM	Dual Directional Coupler	C122H-10	P610410z-02	Note 1	
Warison	Directional Coupler	WCOU-10-50S-10	WR889BMC4B1	Note 1	
Woken	Attenuator 1	WK0602-XX	N/A	Note 1	
PE	Attenuator 2	PE7005-10	N/A	Note 1	
PE	Attenuator 3	PE7005- 3	N/A	Note 1	

General Note:

1. Prior to system verification and validation, the path loss from the signal generator to the system check source and the power meter, which includes the amplifier, cable, attenuator and directional coupler, was measured by the network analyzer. The reading of the power meter was offset by the path loss difference between the path to the power meter and the path to the system check source to monitor the actual power level fed to the system check source.
2. The dipole calibration interval can be extended to 3 years with justification according to KDB 865664 D01. The dipoles are also not physically damaged, or repaired during the interval. The justification data in appendix C can be found which the return loss is < -20dB, within 20% of prior calibration, the impedance is within 5 ohm of prior calibration for each dipole.



9. System Verification

9.1 Tissue Verification

The tissue dielectric parameters of tissue-equivalent media used for SAR measurements must be characterized within a temperature range of 18°C to 25°C, measured with calibrated instruments and apparatuses, such as network analyzers and temperature probes. The temperature of the tissue-equivalent medium during SAR measurement must also be within 18°C to 25°C and within ± 2°C of the temperature when the tissue parameters are characterized. The tissue dielectric measurement system must be calibrated before use. The dielectric parameters must be measured before the tissue-equivalent medium is used in a series of SAR measurements.

The liquid tissue depth was at least 15cm in the phantom for all SAR testing.

<Tissue Dielectric Parameter Check Results>

Frequency (MHz)	Liquid Temp. (°C)	Conductivity (σ)	Permittivity (ε _r)	Conductivity Target (σ)	Permittivity Target (ε _r)	Delta (σ) (%)	Delta (ε _r) (%)	Limit (%)	Date
2450	22.3	1.820	40.000	1.80	39.20	1.11	2.04	±5	2024/5/9
5250	22.5	4.810	36.600	4.71	35.95	2.12	1.81	±5	2024/5/5
5600	22.5	5.180	36.100	5.07	35.50	2.17	1.69	±5	2024/5/5
5750	22.5	5.350	35.900	5.22	35.35	2.49	1.56	±5	2024/5/5
5800	22.5	5.410	35.800	5.27	35.30	2.66	1.42	±5	2024/5/7
6500	22.4	6.110	34.600	6.07	34.50	0.66	0.29	±5	2024/5/6

9.2 System Performance Check Results

Comparing to the original SAR value provided by SPEAG, the verification data should be within its specification of 10 %. Below table shows the target SAR and measured SAR after normalized to 1W input power. The table below indicates the system performance check can meet the variation criterion and the plots can be referred to Appendix A of this report.

Date	Frequency (MHz)	Input Power (mW)	Dipole S/N	Probe S/N	DAE S/N	Measured 1g SAR (W/kg)	Targeted 1g SAR (W/kg)	Normalized 1g SAR (W/kg)	Deviation (%)	Test Site
2024/5/9	2450	50	D2450V2-736	EX3DV4 - SN7814	DAE4 Sn316	2.500	54.200	50	-7.75	SAR-14
2024/5/5	5250	100	D5GHzV2-1006-5250	EX3DV4 - SN7814	DAE4 Sn316	7.840	81.200	78.4	-3.45	SAR-14
2024/5/5	5600	100	D5GHzV2-1006-5600	EX3DV4 - SN7814	DAE4 Sn316	8.960	84.700	89.6	5.79	SAR-14
2024/5/5	5750	100	D5GHzV2-1006-5750	EX3DV4 - SN7814	DAE4 Sn316	7.890	80.900	78.9	-2.47	SAR-14
2024/5/7	5800	100	D5GHzV2-1128-5800	EX3DV4 - SN7700	DAE4 Sn656	8.250	78.700	82.5	4.83	SAR-15
2024/5/6	6500	100	D6.5GHzV2-1083	EX3DV4 - SN7814	DAE4 Sn316	29.700	292.000	297	1.71	SAR-14

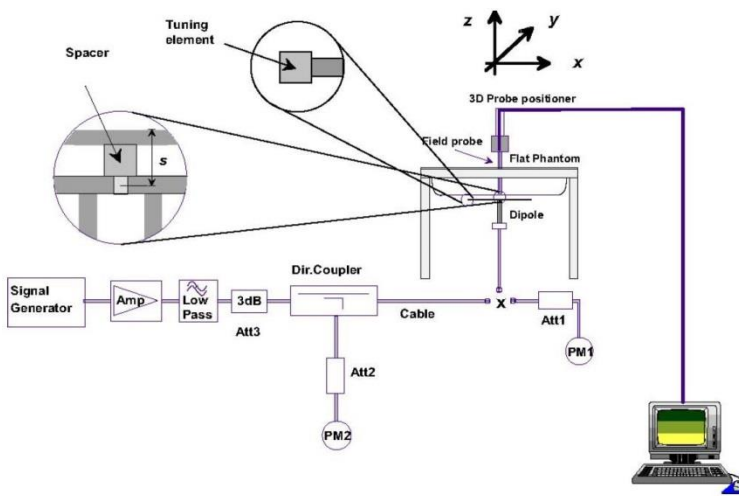


Fig 8.3.1 System Performance Check Setup

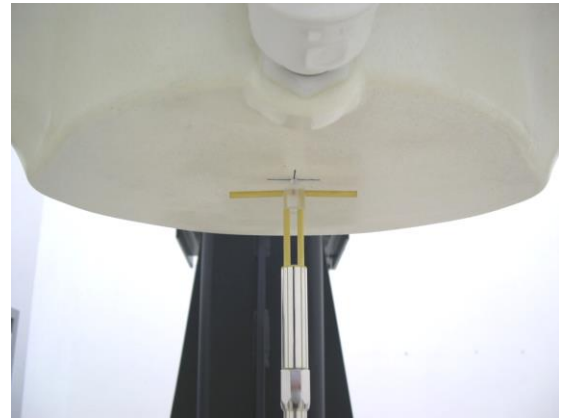


Fig 8.3.2 Setup Photo

9.3 PD System Performance Check Results

The system was verified to be within ± 0.66 dB of the power density targets on the calibration certificate according to the test system specification in the user’s manual and calibration facility recommendation. The 0.66 dB deviation threshold represents the expanded uncertainty for system performance checks using SPEAG’s mmWave verification sources. The same spatial resolution and measurement region used in the source calibration was applied during the system check. The measured power density distribution of verification source was also confirmed through visual inspection to have no noticeable differences, both spatially (shape) and numerically (level) from the distribution provided by the manufacturer, per November 2017 TCBC Workshop Notes.

Frequency (GHz)	5G Verification Source	Probe S/N	DAE S/N	Distance (mm)	Measured 4 cm ² (W/m ²)	Targeted 4 cm ² (W/m ²)	Deviation (dB)	Test Site	Date
10G	10GHz_1020	9441	1424	10mm	56.9	55.8	0.08	SAR13	2024/5/5

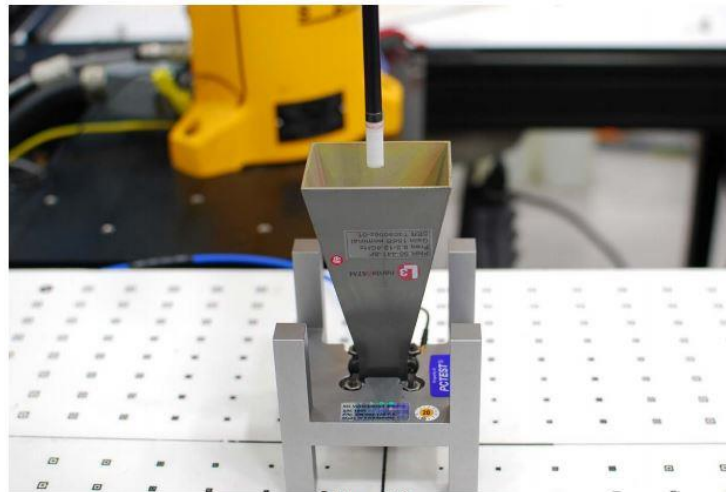


Figure 4-3
System Verification Setup Photo

System Performance Check Setup



10. WiFi/Bluetooth Output Power (Unit: dBm)

General Note:

1. For each antenna, transmit power in SISO operation is larger than (or equal to) the power in MIMO operation, RF exposure compliance of MIMO mode can be deduced from the compliance simultaneous transmission of antennas operating in SISO mode.
2. Per KDB 248227 D01v02r02, the simultaneous SAR provisions in KDB publication 447498 should be applied to determine simultaneous transmission SAR test exclusion for WiFi MIMO. If the sum of 1g single transmission chain SAR measurements is $< 1.6\text{W/kg}$ and SAR peak to location ratio ≤ 0.04 , no additional SAR measurements for MIMO.
3. The maximum output power specified for production units are determined for all applicable 802.11 transmission modes in each standalone and aggregated frequency band. Maximum output power is measured for the highest maximum output power configuration(s) in each frequency band according to the default power measurement procedures. For "Not required", SAR Test reduction was applied from KDB 248227 guidance, Sec. 2.1, b), 1) when the same maximum power is specified for multiple transmission modes in a frequency band, the largest channel bandwidth, lowest order modulation, lowest data rate and lowest order 802.11a/g/n/ac mode is used for SAR measurement, on the highest measured output power channel in the initial test configuration, additional output power measurements were not necessary.
4. Per KDB 248227 D01v02r02, SAR test reduction is determined according to 802.11 transmission mode configurations and certain exposure conditions with multiple test positions. In the 2.4 GHz band, separate SAR procedures are applied to DSSS and OFDM configurations to simplify DSSS test requirements. For OFDM, in both 2.4 and 5 GHz bands, an initial test configuration must be determined for each standalone and aggregated frequency band, according to the transmission mode configuration with the highest maximum output power specified for production units to perform SAR measurements. If the same highest maximum output power applies to different combinations of channel bandwidths, modulations and data rates, additional procedures are applied to determine which test configurations require SAR measurement. When applicable, an initial test position may be applied to reduce the number of SAR measurements required for next to the ear, UMPC mini-tablet or hotspot mode configurations with multiple test positions.
5. For 2.4 GHz 802.11b DSSS, either the initial test position procedure for multiple exposure test positions or the DSSS procedure for fixed exposure position is applied; these are mutually exclusive. For 2.4 GHz and 5 GHz OFDM configurations, the initial test configuration is applied to measure SAR using either the initial test position procedure for multiple exposure test position configurations or the initial test configuration procedures for fixed exposure test conditions. Based on the reported SAR of the measured configurations and maximum output power of the transmission mode configurations that are not included in the initial test configuration, the subsequent test configuration and initial test position procedures are applied to determine if SAR measurements are required for the remaining OFDM transmission configurations. In general, the number of test channels that require SAR measurement is minimized based on maximum output power measured for the test sample(s).
6. For OFDM transmission configurations in the 2.4 GHz and 5 GHz bands, When the same maximum power is specified for multiple transmission modes in a frequency band, the largest channel bandwidth, lowest order modulation, lowest data rate and lowest order 802.11a/g/n/ac mode is used for SAR measurement, on the highest measured output power channel for each frequency band.
7. DSSS and OFDM configurations are considered separately according to the required SAR procedures. SAR is measured in the initial test position using the 802.11 transmission mode configuration required by the DSSS procedure or initial test configuration and subsequent test configuration(s) according to the OFDM procedures. 18 The initial test position procedure is described in the following:
 - a. When the reported SAR of the initial test position is $\leq 0.4\text{ W/kg}$, further SAR measurement is not required for the other test positions in that exposure configuration and 802.11 transmission mode combinations within the frequency band or aggregated band.
 - b. When the reported SAR of the test position is $> 0.4\text{ W/kg}$, SAR is repeated for the 802.11 transmission mode configuration tested in the initial test position to measure the subsequent next closet/smallest test separation distance and maximum coupling test position on the highest maximum output power channel, until the report SAR is $\leq 0.8\text{ W/kg}$ or all required test position are tested.
 - c. For all positions/configurations, when the reported SAR is $> 0.8\text{ W/kg}$, SAR is measured for these test positions/configurations on the subsequent next highest measured output power channel(s) until the reported SAR is $\leq 1.2\text{ W/kg}$ or all required channels are tested.
8. Per 201904 TCBC workshops, General principles of FCC KDB Publication 248227 D01 can be applied to determine the SAR Initial Test Configurations and test reduction for 802.11ax SAR testing. For the table below the 802.11ax maximum power is SU (non-OFDMA), and the SU maximum power also higher than RU (OFDMA)
9. In applying the test guidance, the IEEE 802.11 mode with the maximum output power (out of all modes) should be considered for testing
10. For modes with the same maximum output power, the guidance from section 5.3.2 a) of FCC KDB Publication 248227 D01 should be applied, with 802.11ax being considered as the highest 802.11 mode for the appropriate frequency bands
11. When SAR testing for 802.11ax is required
 - a. If the maximum output power is highest for OFDMA scenarios, choose the tone size with the maximum number of tones and the highest maximum output power
 - b. Otherwise, consider the fully allocated channel for SAR testing
 - c. When SAR testing is required on RU sizes less than the fully allocated channel, use the RU number closest to the middle of the channel, choosing the higher RU number when two RUs are equidistant to the middle of the channel



<Non-DBS>

<2.4GHz WLAN>												
2.4GHz WLAN	Mode	Channel	Frequency (MHz)	Main Ant			Aux Ant			Main+Aux Ant		
				Average power (dBm)	Tune-Up Limit	Duty Cycle %	Average power (dBm)	Tune-Up Limit	Duty Cycle %	Average power (dBm)	Tune-Up Limit	Duty Cycle %
802.11b 1Mbps	1	2412	18.42	18.50	98.52	17.60	18.50	98.52	Not Required	21.50	Not Required	
	6	2437	18.18	18.50		17.70	18.50			21.50		
	11	2462	18.10	18.50		17.80	18.50			21.50		
	12	2467	12.59	12.75		12.69	12.75			15.75		
	13	2472	12.48	12.75		12.62	12.75			15.75		
802.11g 6Mbps	1	2412	Not Required	18.50	Not Required	18.50	Not Required	Not Required	21.50	Not Required		
	6	2437		18.50		18.50			21.50			
	11	2462		18.50		18.50			21.50			
	12	2467		12.75		12.75			15.75			
	13	2472		10.75		10.75			13.75			
802.11n-HT20 MCS0	1	2412	Not Required	13.25	Not Required	13.25	Not Required	Not Required	16.25	Not Required		
	6	2437		18.50		18.50			21.50			
	11	2462		15.25		15.25			18.25			
	12	2467		12.50		12.50			15.50			
	13	2472		9.25		9.25			12.25			
802.11n-HT40 MCS0	3	2422	Not Required	13.50	Not Required	13.50	Not Required	Not Required	16.50	Not Required		
	6	2437		17.50		17.50			20.50			
	9	2452		14.00		14.00			17.00			
	10	2457		12.00		12.00			15.00			
	11	2462		6.25		6.25			9.25			
802.11ac-VHT20 MCS0	1	2412	Not Required	13.25	Not Required	13.25	Not Required	Not Required	16.25	Not Required		
	6	2437		18.50		18.50			21.50			
	11	2462		15.25		15.25			18.25			
	12	2467		12.50		12.50			15.50			
	13	2472		9.25		9.25			12.25			
802.11ac-VHT40 MCS0	3	2422	Not Required	13.50	Not Required	13.50	Not Required	Not Required	16.50	Not Required		
	6	2437		17.50		17.50			20.50			
	9	2452		14.00		14.00			17.00			
	10	2457		12.00		12.00			15.00			
	11	2462		6.25		6.25			9.25			
802.11ax-HE20 MCS0	1	2412	Not Required	13.25	Not Required	13.25	Not Required	Not Required	16.25	Not Required		
	6	2437		18.50		18.50			21.50			
	11	2462		15.25		15.25			18.25			
	12	2467		12.50		12.50			15.50			
	13	2472		9.25		9.25			12.25			
802.11ax-HE40 MCS0	3	2422	Not Required	13.50	Not Required	13.50	Not Required	Not Required	16.50	Not Required		
	6	2437		17.50		17.50			20.50			
	9	2452		14.00		14.00			17.00			
	10	2457		12.00		12.00			15.00			
	11	2462		6.25		6.25			9.25			
802.11be-EHT20 MCS0	1	2412	Not Required	13.25	Not Required	13.25	Not Required	Not Required	16.25	Not Required		
	6	2437		18.50		18.50			21.50			
	11	2462		15.25		15.25			18.25			
	12	2467		12.50		12.50			15.50			
	13	2472		9.25		9.25			12.25			
802.11be-EHT40 MCS0	3	2422	Not Required	13.50	Not Required	13.50	Not Required	Not Required	16.50	Not Required		
	6	2437		17.50		17.50			20.50			
	9	2452		14.00		14.00			17.00			
	10	2457		12.00		12.00			15.00			
	11	2462		6.25		6.25			9.25			



<5.2GHz WLAN>												
5.2GHz WLAN	Mode	Channel	Frequency (MHz)	Main Ant			Aux Ant			Main+Aux Ant		
				Average power (dBm)	Tune-Up Limit	Duty Cycle %	Average power (dBm)	Tune-Up Limit	Duty Cycle %	Average power (dBm)	Tune-Up Limit	Duty Cycle %
5.2GHz WLAN	802.11a 6Mbps	36	5180	Not Required	16.00	Not Required	Not Required	16.00	Not Required	Not Required	19.00	Not Required
		40	5200		16.00			19.00				
		44	5220		16.00			19.00				
		48	5240		16.00			19.00				
	802.11n-HT20 MCS0	36	5180		16.00			19.00				
		40	5200		16.00			19.00				
		44	5220		16.00			19.00				
		48	5240		16.00			19.00				
	802.11n-HT40 MCS0	38	5190		16.00			19.00				
		46	5230		16.00			19.00				
	802.11ac-VHT20 MCS0	36	5180		16.00			19.00				
		40	5200		16.00			19.00				
		44	5220		16.00			19.00				
		48	5240		16.00			19.00				
	802.11ac-VHT40 MCS0	38	5190		16.00			19.00				
		46	5230		16.00			19.00				
	802.11ac-VHT80 MCS0	42	5210		15.00			18.00				
		42	5210		15.00			18.00				
	802.11ax-HE20 MCS0	36	5180		16.00			19.00				
		40	5200		16.00			19.00				
		44	5220		16.00			19.00				
		48	5240		16.00			19.00				
	802.11ax-HE40 MCS0	38	5190		16.00			19.00				
		46	5230		16.00			19.00				
	802.11ax-HE80 MCS0	42	5210		15.00			18.00				
		42	5210		15.00			18.00				
	802.11be-EHT20 MCS0	36	5180		16.00			19.00				
		40	5200		16.00			19.00				
		44	5220		16.00			19.00				
		48	5240		16.00			19.00				
	802.11be-EHT40 MCS0	38	5190		16.00			19.00				
		46	5230		16.00			19.00				
	802.11be-EHT80 MCS0	42	5210		15.00			18.00				
		42	5210		15.00			18.00				



<5.3GHz WLAN>												
5.3GHz WLAN	Mode	Channel	Frequency (MHz)	Main Ant			Aux Ant			Main+Aux Ant		
				Average power (dBm)	Tune-Up Limit	Duty Cycle %	Average power (dBm)	Tune-Up Limit	Duty Cycle %	Average power (dBm)	Tune-Up Limit	Duty Cycle %
5.3GHz WLAN	802.11a 6Mbps	52	5260	Not Required	16.00	Not Required	Not Required	16.00	Not Required	Not Required	19.00	Not Required
		56	5280		16.00			19.00				
		60	5300		16.00			19.00				
		64	5320		16.00			19.00				
	802.11n-HT20 MCS0	52	5260	Not Required	16.00	Not Required	Not Required	16.00	Not Required	Not Required	19.00	Not Required
		56	5280		16.00			19.00				
		60	5300		16.00			19.00				
		64	5320		16.00			19.00				
	802.11n-HT40 MCS0	54	5270	15.60	16.00	100.00	15.30	16.00	100.00	19.00	Not Required	
		62	5310	15.90	16.00		15.50	16.00		19.00		
	802.11ac-VHT20 MCS0	52	5260	Not Required	16.00	Not Required	Not Required	16.00	Not Required	Not Required	19.00	Not Required
		56	5280		16.00			19.00				
		60	5300		16.00			19.00				
		64	5320		16.00			19.00				
	802.11ac-VHT40 MCS0	54	5270	Not Required	16.00	Not Required	Not Required	16.00	Not Required	Not Required	19.00	Not Required
		62	5310		16.00			19.00				
	802.11ac-VHT80 MCS0	58	5290	Not Required	13.25	Not Required	Not Required	13.25	Not Required	Not Required	16.25	Not Required
	802.11ac-VHT160 MCS0	50	5250		13.75			16.75				
	802.11ax-HE20 MCS0	52	5260	Not Required	16.00	Not Required	Not Required	16.00	Not Required	Not Required	19.00	Not Required
		56	5280		16.00			19.00				
		60	5300		16.00			19.00				
		64	5320		16.00			19.00				
	802.11ax-HE40 MCS0	54	5270	Not Required	16.00	Not Required	Not Required	16.00	Not Required	Not Required	19.00	Not Required
		62	5310		16.00			19.00				
	802.11ax-HE80 MCS0	58	5290	Not Required	13.25	Not Required	Not Required	13.25	Not Required	Not Required	16.25	Not Required
	802.11ax-HE160 MCS0	50	5250		13.75			16.75				
	802.11be-EHT20 MCS0	52	5260	Not Required	16.00	Not Required	Not Required	16.00	Not Required	Not Required	19.00	Not Required
		56	5280		16.00			19.00				
60		5300	16.00		19.00							
64		5320	16.00		19.00							
802.11be-EHT40 MCS0	54	5270	Not Required	16.00	Not Required	Not Required	16.00	Not Required	Not Required	19.00	Not Required	
	62	5310		16.00			19.00					
802.11be-EHT80 MCS0	58	5290	Not Required	13.25	Not Required	Not Required	13.25	Not Required	Not Required	16.25	Not Required	
802.11be-EHT160 MCS0	50	5250		13.75			16.75					



<5.5GHz WLAN>																		
5.5GHz WLAN	Mode	Channel	Frequency (MHz)	Main Ant			Aux Ant			Main+Aux Ant								
				Average power (dBm)	Tune-Up Limit	Duty Cycle %	Average power (dBm)	Tune-Up Limit	Duty Cycle %	Average power (dBm)	Tune-Up Limit	Duty Cycle %						
5.5GHz WLAN	802.11a 6Mbps	100	5500	Not Required	16.00	Not Required	Not Required	16.00	Not Required	Not Required	19.00	Not Required						
		116	5580		16.00			19.00										
		124	5620		16.00			19.00										
		132	5660		16.00			19.00										
		144	5720		16.00			19.00										
	802.11n-HT20 MCS0	100	5500		16.00			19.00										
		116	5580		16.00			19.00										
		124	5620		16.00			19.00										
		132	5660		16.00			19.00										
	802.11n-HT40 MCS0	102	5510		16.00			19.00										
		110	5550		16.00			19.00										
		126	5630		16.00			19.00										
		134	5670		16.00			19.00										
	802.11ac-VHT20 MCS0	100	5500		16.00			19.00										
		116	5580		16.00			19.00										
		124	5620		16.00			19.00										
		132	5660		16.00			19.00										
	802.11ac-VHT40 MCS0	102	5510		16.00			19.00										
		110	5550		16.00			19.00										
		126	5630		16.00			19.00										
		134	5670		16.00			19.00										
	802.11ac-VHT80 MCS0	106	5530		15.70			16.00			99.26		15.80	16.00	100.00	Not Required	19.00	Not Required
		122	5610		15.80			16.00					15.80	16.00				
		138	5690		15.90			16.00					15.60	16.00				
		802.11ac-VHT160 MCS0	114		5570			13.75			16.00		13.75	16.00	16.75			
	802.11ax-HE20 MCS0	100	5500		16.00			19.00										
		116	5580		16.00			19.00										
		124	5620		16.00			19.00										
		132	5660		16.00			19.00										
		144	5720		16.00			19.00										
	802.11ax-HE40 MCS0	102	5510		16.00			19.00										
		110	5550		16.00			19.00										
		126	5630		16.00			19.00										
		134	5670		16.00			19.00										
	802.11ax-HE80 MCS0	106	5530		16.00			19.00			Not Required		Not Required	Not Required	Not Required	19.00		
		122	5610		16.00			19.00										
		138	5690		16.00			19.00										
	802.11ax-HE160 MCS0	114	5570		13.75			16.00			13.75		16.00	16.75				
	802.11be-EHT20 MCS0	100	5500		16.00			19.00										
		116	5580		16.00			19.00										
		124	5620		16.00			19.00										
		132	5660		16.00			19.00										
	802.11be-EHT40 MCS0	102	5510		16.00			19.00										
		110	5550		16.00			19.00										
126		5630	16.00	19.00														
134		5670	16.00	19.00														



Mode	Channel	Frequency (MHz)	Main Ant			Aux Ant			Main+Aux Ant			
			Average power (dBm)	Tune-Up Limit	Duty Cycle %	Average power (dBm)	Tune-Up Limit	Duty Cycle %	Average power (dBm)	Tune-Up Limit	Duty Cycle %	
802.11be-EHT80 MCS0	134	5670	Not Required	16.00	Not Required	Not Required	16.00	Not Required	Not Required	19.00	Not Required	
	142	5710		16.00			19.00					
	106	5530		16.00			19.00					
	122	5610		16.00			19.00					
	138	5690		16.00			19.00					
	802.11be-EHT160 MCS0	114		5570			13.75			16.75		
<5.8GHz WLAN>												
5.8GHz WLAN	802.11a 6Mbps	149	5745	Not Required	16.00	Not Required	Not Required	16.00	Not Required	Not Required	19.00	Not Required
		157	5785		16.00			19.00				
		165	5825		16.00			19.00				
	802.11n-HT20 MCS0	149	5745	Not Required	16.00	Not Required	Not Required	16.00	Not Required	Not Required	19.00	Not Required
		157	5785		16.00			19.00				
		165	5825		16.00			19.00				
	802.11n-HT40 MCS0	151	5755	15.70	16.00	99.26	15.30	16.00	100.00	Not Required	19.00	Not Required
		159	5795	15.70	16.00			16.00			19.00	
	802.11ac-VHT20 MCS0	149	5745	Not Required	16.00	Not Required	Not Required	16.00	Not Required	Not Required	19.00	Not Required
		157	5785		16.00			19.00				
		165	5825		16.00			19.00				
	802.11ac-VHT40 MCS0	151	5755	Not Required	16.00	Not Required	Not Required	16.00	Not Required	Not Required	19.00	Not Required
		159	5795		16.00			19.00				
	802.11ac-VHT80 MCS0	155	5775	15.60	16.00	99.26	15.30	16.00	100.00	Not Required	19.00	Not Required
	802.11ax-HE20 MCS0	149	5745	Not Required	16.00	Not Required	Not Required	16.00	Not Required	Not Required	19.00	Not Required
		157	5785		16.00			19.00				
		165	5825		16.00			19.00				
	802.11ax-HE40 MCS0	151	5755	Not Required	16.00	Not Required	Not Required	16.00	Not Required	Not Required	19.00	Not Required
		159	5795		16.00			19.00				
	802.11ax-HE80 MCS0	155	5775	Not Required	16.00	Not Required	Not Required	16.00	Not Required	Not Required	19.00	Not Required
	802.11be-EHT20 MCS0	149	5745	Not Required	16.00	Not Required	Not Required	16.00	Not Required	Not Required	19.00	Not Required
		157	5785		16.00			19.00				
		165	5825		16.00			19.00				
	802.11be-EHT40 MCS0	151	5755	Not Required	16.00	Not Required	Not Required	16.00	Not Required	Not Required	19.00	Not Required
		159	5795		16.00			19.00				
	802.11be-EHT80 MCS0	155	5775	Not Required	16.00	Not Required	Not Required	16.00	Not Required	Not Required	19.00	Not Required



<5.9GHz WLAN UNII 4>												
5.9GHz WLAN UNII 4	Mode	Channel	Frequency (MHz)	Main Ant			Aux Ant			Main+Aux Ant		
				Average power (dBm)	Tune-Up Limit	Duty Cycle %	Average power (dBm)	Tune-Up Limit	Duty Cycle %	Average power (dBm)	Tune-Up Limit	Duty Cycle %
	802.11a 6Mbps	169	5845	Not Required	15.25	Not Required	Not Required	15.25	Not Required	Not Required	18.25	Not Required
		173	5865		15.25			18.25				
		177	5885		15.25			18.25				
	802.11n-HT20 MCS0	169	5845	Not Required	15.75	Not Required	Not Required	15.75	Not Required		18.75	
		173	5865		15.75			18.75				
		177	5885		14.50			17.50				
	802.11n-HT40 MCS0	167	5835	15.80	16.00	99.26	15.70	16.00	100.00		19.00	
		175	5875	15.70	16.00			16.00			19.00	
	802.11ac-VHT20 MCS0	169	5845	Not Required	15.75	Not Required	Not Required	15.75	Not Required		18.75	
		173	5865		15.75			18.75				
		177	5885		14.50			17.50				
	802.11ac-VHT40 MCS0	167	5835	Not Required	16.00	Not Required	Not Required	16.00	Not Required		19.00	
		175	5875		16.00			19.00				
	802.11ac-VHT80 MCS0	171	5855	15.90	16.00	99.26	15.20	16.00	100.00		19.00	
	802.11ac-VHT160 MCS0	163	5815	Not Required	13.50	Not Required	Not Required	13.50	Not Required		16.50	
	802.11ax-HE20 MCS0	169	5845		15.75			18.75				
		173	5865		15.75			18.75				
		177	5885		14.50			17.50				
		167	5835		16.00			19.00				
	802.11ax-HE40 MCS0	175	5875		16.00			19.00				
171		5855	16.00		19.00							
802.11ax-HE80 MCS0	171	5855	16.00		19.00							
802.11ax-HE160 MCS0	163	5815	13.50		16.50							
802.11be-EHT20 MCS0	169	5845	15.75		18.75							
	173	5865	15.75		18.75							
	177	5885	14.50		17.50							
802.11be-EHT40 MCS0	167	5835	16.00		19.00							
	175	5875	16.00		19.00							
802.11be-EHT80 MCS0	171	5855	16.00		19.00							
802.11be-EHT160 MCS0	163	5815	13.50		16.50							



6GHz WLAN (LPI Mode)

<WiFi 6E_LPI>												
Mode	Channel	Frequency (MHz)	Main Ant			Aux Ant			Main+Aux Ant			
			Average power (dBm)	Tune-Up Limit	Duty Cycle %	Average power (dBm)	Tune-Up Limit	Duty Cycle %	Average power (dBm)	Tune-Up Limit	Duty Cycle %	
802.11a 6Mbps	1	5955	Not Required	-1.50	Not Required	Not Required	-1.50	Not Required	Not Required	1.50	Not Required	
	57	6235		-1.50			1.50					
	113	6515		0.00			3.00					
	173	6815		-0.25			2.75					
802.11ax-HE20 MCS0	233	7115	0.25	3.25								
	1	5955	-1.00	2.00								
	57	6235	-1.00	2.00								
	113	6515	0.75	3.75								
802.11ax-HE40 MCS0	173	6815	0.50	3.50								
	233	7115	-10.75	-7.75								
	3	5965	3.00	6.00								
	59	6245	3.00	6.00								
802.11ax-HE80 MCS0	107	6485	3.25	6.25								
	171	6805	3.25	6.25								
	227	7085	3.50	6.50								
	7	5985	6.00	9.00								
802.11ax-HE160 MCS0	71	6305	6.00	9.00								
	119	6545	6.00	9.00								
	167	6785	6.00	9.00								
	215	7025	6.25	9.25								
802.11ax-HE160 MCS0	215	7025	6.25	9.25								
	15	6025	10.50	13.50								
	47	6185	9.75	12.75								
	111	6505	10.25	13.25								
802.11ax-HE160 MCS0	143	6665	10.25	13.25								
	207	6985	10.00	13.00								
	1	5955	-1.00	2.00								
	57	6235	-1.00	2.00								
802.11be-EHT20 MCS0	113	6515	0.75	3.75								
	173	6815	0.50	3.50								
	233	7115	-10.75	-7.75								
	3	5965	3.00	6.00								
802.11be-EHT40 MCS0	59	6245	3.00	6.00								
	107	6485	3.25	6.25								
	171	6805	3.25	6.25								
	227	7085	3.50	6.50								
802.11be-EHT80 MCS0	7	5985	6.00	9.00								
	71	6305	6.00	9.00								
	119	6545	6.00	9.00								
	167	6785	6.00	9.00								
802.11be-EHT160 MCS0	215	7025	6.25	9.25								
	15	6025	10.50	13.50								
	47	6185	9.75	12.75								
	111	6505	10.25	13.25								
802.11be-EHT160 MCS0	143	6665	10.25	13.25								
	207	6985	10.00	13.00								
	31	6105	10.60	14.50								
	63	6265	10.60	14.50								
802.11be-EHT320 MCS0	95	6425	10.70	14.50								
	127	6585	10.90	14.50								
	159	6745	10.90	14.50								
	191	6905	10.60	14.50								



6GHz WLAN (SP Mode)

<WiFi 6E_SP>																
Mode	Channel	Frequency (MHz)	Main Ant			Aux Ant			Main+Aux Ant							
			Average power (dBm)	Tune-Up Limit	Duty Cycle %	Average power (dBm)	Tune-Up Limit	Duty Cycle %	Average power (dBm)	Tune-Up Limit	Duty Cycle %					
WiFi 6E	802.11a 6Mbps	1	5955	Not Required	11.50	Not Required	Not Required	11.50	Not Required	Not Required	14.50	Not Required				
		57	6235		11.50			14.50								
		93	6415		11.50			14.50								
		117	6535		11.50			14.50								
		181	6855		11.50			14.50								
	802.11ax-HE20 MCS0	1	5955		11.50			14.50								
		57	6235		11.50			14.50								
		93	6415		11.50			14.50								
		117	6535		11.50			14.50								
		181	6855		11.50			14.50								
	802.11ax-HE40 MCS0	3	5965		11.50			14.50								
		59	6245		11.50			14.50								
		91	6405		11.50			14.50								
		123	6565		11.50			14.50								
		179	6845		11.50			14.50								
	802.11ax-HE80 MCS0	7	5985		11.50			14.50								
		55	6225		11.50			14.50								
		87	6385		11.50			14.50								
		135	6625		11.50			14.50								
		167	6785		11.50			14.50								
	802.11ax-HE160 MCS0	15	6025		11.50			14.50								
		47	6185		11.50			14.50								
		79	6345		11.50			14.50								
		143	6665		11.50			14.50								
	802.11be-EHT20 MCS0	1	5955		11.50			14.50								
		57	6235		11.50			14.50								
		93	6415		11.50			14.50								
		117	6535		11.50			14.50								
		181	6855		11.50			14.50								
	802.11be-EHT40 MCS0	3	5965		11.50			14.50								
		59	6245		11.50			14.50								
		91	6405		11.50			14.50								
		123	6565		11.50			14.50								
		179	6845		11.50			14.50								
	802.11be-EHT80 MCS0	7	5985		11.50			14.50								
		55	6225		11.50			14.50								
		87	6385		11.50			14.50								
		135	6625		11.50			14.50								
		167	6785		11.50			14.50								
	802.11be-EHT160 MCS0	15	6025		11.50			14.50								
		47	6185		11.50			14.50								
		79	6345		11.50			14.50								
		143	6665		11.50			14.50								
	802.11be-EHT320 MCS0	31	6105		10.60			11.50			97.74		10.40	11.50	98.30	14.50
		63	6265		10.60			11.50								14.50
		95	6425		10.70			11.50								14.50
		127	6585		10.90			11.50								14.50



<DBS>

<2.4GHz WLAN>												
2.4GHz WLAN	Mode	Channel	Frequency (MHz)	Main Ant			Aux Ant			Main+Aux Ant		
				Average power (dBm)	Tune-Up Limit	Duty Cycle %	Average power (dBm)	Tune-Up Limit	Duty Cycle %	Average power (dBm)	Tune-Up Limit	Duty Cycle %
802.11b 1Mbps	1	2412	15.30	15.50	98.52	15.40	15.50	98.52	Not Required	18.50	Not Required	
	6	2437	15.40	15.50		15.40	15.50			18.50		
	11	2462	15.20	15.50		15.40	15.50			18.50		
	12	2467	12.59	12.75		12.69	12.75			15.75		
	13	2472	12.48	12.75		12.62	12.75			15.75		
802.11g 6Mbps	1	2412	Not Required	15.50	Not Required	15.50	Not Required	Not Required	18.50	Not Required		
	6	2437		15.50		15.50			18.50			
	11	2462		15.50		15.50			18.50			
	12	2467		9.75		9.75			12.75			
	13	2472		7.75		7.75			10.75			
802.11n-HT20 MCS0	1	2412	Not Required	10.25	Not Required	10.25	Not Required	Not Required	13.25	Not Required		
	6	2437		15.50		15.50			18.50			
	11	2462		12.25		12.25			15.25			
	12	2467		9.50		9.50			12.50			
	13	2472		6.25		6.25			9.25			
802.11n-HT40 MCS0	3	2422	Not Required	10.50	Not Required	10.50	Not Required	Not Required	13.50	Not Required		
	6	2437		15.50		15.50			18.50			
	9	2452		11.00		11.00			14.00			
	10	2457		9.00		9.00			12.00			
	11	2462		3.25		3.25			6.25			
802.11ac-VHT20 MCS0	1	2412	Not Required	10.25	Not Required	10.25	Not Required	Not Required	13.25	Not Required		
	6	2437		15.50		15.50			18.50			
	11	2462		12.25		12.25			15.25			
	12	2467		9.50		9.50			12.50			
	13	2472		6.25		6.25			9.25			
802.11ac-VHT40 MCS0	3	2422	Not Required	10.50	Not Required	10.50	Not Required	Not Required	13.50	Not Required		
	6	2437		15.50		15.50			18.50			
	9	2452		11.00		11.00			14.00			
	10	2457		9.00		9.00			12.00			
	11	2462		3.25		3.25			6.25			
802.11ax-HE20 MCS0	1	2412	Not Required	10.25	Not Required	10.25	Not Required	Not Required	13.25	Not Required		
	6	2437		15.50		15.50			18.50			
	11	2462		12.25		12.25			15.25			
	12	2467		9.50		9.50			12.50			
	13	2472		6.25		6.25			9.25			
802.11ax-HE40 MCS0	3	2422	Not Required	10.50	Not Required	10.50	Not Required	Not Required	13.50	Not Required		
	6	2437		15.50		15.50			18.50			
	9	2452		11.00		11.00			14.00			
	10	2457		9.00		9.00			12.00			
	11	2462		3.25		3.25			6.25			
802.11be-EHT20 MCS0	1	2412	Not Required	10.25	Not Required	10.25	Not Required	Not Required	13.25	Not Required		
	6	2437		15.50		15.50			18.50			
	11	2462		12.25		12.25			15.25			
	12	2467		9.50		9.50			12.50			
	13	2472		6.25		6.25			9.25			
802.11be-EHT40 MCS0	3	2422	Not Required	10.50	Not Required	10.50	Not Required	Not Required	13.50	Not Required		
	6	2437		15.50		15.50			18.50			
	9	2452		11.00		11.00			14.00			
	10	2457		9.00		9.00			12.00			
	11	2462		3.25		3.25			6.25			



<5.2GHz WLAN>												
5.2GHz WLAN	Mode	Channel	Frequency (MHz)	Main Ant			Aux Ant			Main+Aux Ant		
				Average power (dBm)	Tune-Up Limit	Duty Cycle %	Average power (dBm)	Tune-Up Limit	Duty Cycle %	Average power (dBm)	Tune-Up Limit	Duty Cycle %
5.2GHz WLAN	802.11a 6Mbps	36	5180	Not Required	13.00	Not Required	Not Required	13.00	Not Required	Not Required	16.00	Not Required
		40	5200		13.00			16.00				
		44	5220		13.00			16.00				
		48	5240		13.00			16.00				
	802.11n-HT20 MCS0	36	5180		13.00			16.00				
		40	5200		13.00			16.00				
		44	5220		13.00			16.00				
		48	5240		13.00			16.00				
	802.11n-HT40 MCS0	38	5190		13.00			16.00				
		46	5230		13.00			16.00				
	802.11ac-VHT20 MCS0	36	5180		13.00			16.00				
		40	5200		13.00			16.00				
		44	5220		13.00			16.00				
		48	5240		13.00			16.00				
	802.11ac-VHT40 MCS0	38	5190		13.00			16.00				
		46	5230		13.00			16.00				
	802.11ac-VHT80 MCS0	42	5210		12.00			15.00				
		42	5210		12.00			15.00				
	802.11ax-HE20 MCS0	36	5180		13.00			16.00				
		40	5200		13.00			16.00				
		44	5220		13.00			16.00				
		48	5240		13.00			16.00				
	802.11ax-HE40 MCS0	38	5190		13.00			16.00				
		46	5230		13.00			16.00				
802.11ax-HE80 MCS0	42	5210	12.00	15.00								
	42	5210	12.00	15.00								
802.11be-EHT20 MCS0	36	5180	13.00	16.00								
	40	5200	13.00	16.00								
	44	5220	13.00	16.00								
	48	5240	13.00	16.00								
802.11be-EHT40 MCS0	38	5190	13.00	16.00								
	46	5230	13.00	16.00								
802.11be-EHT80 MCS0	42	5210	13.00	16.00								
	42	5210	13.00	16.00								



<5.3GHz WLAN>																		
5.3GHz WLAN	Mode	Channel	Frequency (MHz)	Main Ant			Aux Ant			Main+Aux Ant								
				Average power (dBm)	Tune-Up Limit	Duty Cycle %	Average power (dBm)	Tune-Up Limit	Duty Cycle %	Average power (dBm)	Tune-Up Limit	Duty Cycle %						
5.3GHz WLAN	802.11a 6Mbps	52	5260	Not Required	13.00	Not Required	Not Required	13.00	Not Required	Not Required	16.00	Not Required						
		56	5280		13.00			16.00										
		60	5300		13.00			16.00										
		64	5320		13.00			16.00										
	802.11n-HT20 MCS0	52	5260		13.00			16.00										
		56	5280		13.00			16.00										
		60	5300		13.00			16.00										
		64	5320		13.00			16.00										
	802.11n-HT40 MCS0	54	5270		13.00			16.00										
		62	5310		13.00			16.00										
	802.11ac-VHT20 MCS0	52	5260		13.00			16.00										
		56	5280		13.00			16.00										
		60	5300		13.00			16.00										
		64	5320		13.00			16.00										
	802.11ac-VHT40 MCS0	54	5270		13.00			16.00										
		62	5310		13.00			16.00										
	802.11ac-VHT80 MCS0	58	5290		12.90			10.25			99.26		12.70	10.25	100.00	Not Required	13.25	Not Required
	802.11ac-VHT160 MCS0	50	5250		13.00			13.00			99.00		13.00	13.00	98.75	Not Required	16.00	Not Required
	802.11ax-HE20 MCS0	52	5260		13.00			16.00										
		56	5280		13.00			16.00										
		60	5300		13.00			16.00										
		64	5320		13.00			16.00										
	802.11ax-HE40 MCS0	54	5270		13.00			16.00										
		62	5310		13.00			16.00										
802.11ax-HE80 MCS0	58	5290	10.25	13.25	Not Required	10.25	13.25	Not Required	16.00	Not Required								
802.11ax-HE160 MCS0	50	5250	13.00	16.00	Not Required	13.00	16.00	Not Required	16.00	Not Required								
802.11be-EHT20 MCS0	52	5260	13.00	16.00														
	56	5280	13.00	16.00														
	60	5300	13.00	16.00														
	64	5320	13.00	16.00														
802.11be-EHT40 MCS0	54	5270	13.00	16.00														
	62	5310	13.00	16.00														
802.11be-EHT80 MCS0	58	5290	10.25	13.25	Not Required	10.25	13.25	Not Required	16.00	Not Required								
802.11be-EHT160 MCS0	50	5250	13.00	16.00	Not Required	13.00	16.00	Not Required	16.00	Not Required								



<5.5GHz WLAN>													
5.5GHz WLAN	Mode	Channel	Frequency (MHz)	Main Ant			Aux Ant			Main+Aux Ant			
				Average power (dBm)	Tune-Up Limit	Duty Cycle %	Average power (dBm)	Tune-Up Limit	Duty Cycle %	Average power (dBm)	Tune-Up Limit	Duty Cycle %	
802.11a 6Mbps		100	5500	Not Required	13.00	Not Required	Not Required	13.00	Not Required	Not Required	16.00	Not Required	
		116	5580		13.00			16.00					
		124	5620		13.00			16.00					
		132	5660		13.00			16.00					
		144	5720		13.00			16.00					
802.11n-HT20 MCS0		100	5500	Not Required	13.00	Not Required	Not Required	13.00	Not Required	Not Required	16.00	Not Required	
		116	5580		13.00			16.00					
		124	5620		13.00			16.00					
		132	5660		13.00			16.00					
802.11n-HT40 MCS0		102	5510	Not Required	13.00	Not Required	Not Required	13.00	Not Required	Not Required	16.00	Not Required	
		110	5550		13.00			16.00					
		126	5630		13.00			16.00					
		134	5670		13.00			16.00					
802.11ac-VHT20 MCS0		100	5500	Not Required	13.00	Not Required	Not Required	13.00	Not Required	Not Required	16.00	Not Required	
		116	5580		13.00			16.00					
		124	5620		13.00			16.00					
		132	5660		13.00			16.00					
802.11ac-VHT40 MCS0		102	5510	Not Required	13.00	Not Required	Not Required	13.00	Not Required	Not Required	16.00	Not Required	
		110	5550		13.00			16.00					
		126	5630		13.00			16.00					
		134	5670		13.00			16.00					
802.11ac-VHT80 MCS0		106	5530	Not Required	12.80	99.26	Not Required	13.00	100.00	Not Required	16.00	Not Required	
		122	5610		12.60			13.00			12.70		16.00
		138	5690		12.50			13.00			12.60		16.00
		114	5570		12.70			13.00			99.00		13.00
802.11ax-HE20 MCS0		100	5500	Not Required	13.00	Not Required	Not Required	13.00	Not Required	Not Required	16.00	Not Required	
		116	5580		13.00			16.00					
		124	5620		13.00			16.00					
		132	5660		13.00			16.00					
		144	5720		13.00			16.00					
802.11ax-HE40 MCS0		102	5510	Not Required	13.00	Not Required	Not Required	13.00	Not Required	Not Required	16.00	Not Required	
		110	5550		13.00			16.00					
		126	5630		13.00			16.00					
		134	5670		13.00			16.00					
802.11ax-HE80 MCS0		106	5530	Not Required	13.00	Not Required	Not Required	13.00	Not Required	Not Required	16.00	Not Required	
		122	5610		13.00			16.00					
		138	5690		13.00			16.00					
802.11ax-HE160 MCS0		114	5570	Not Required	13.00	Not Required	Not Required	13.00	Not Required	Not Required	16.00	Not Required	
802.11be-EHT20 MCS0		100	5500		13.00			16.00					
		116	5580		13.00			16.00					
		124	5620	13.00	16.00								
		132	5660	13.00	16.00								
802.11be-EHT40 MCS0		102	5510	Not Required	13.00	Not Required	Not Required	13.00	Not Required	Not Required	16.00	Not Required	
		110	5550		13.00			16.00					
		126	5630		13.00			16.00					
		144	5720		13.00			16.00					



Mode	Channel	Frequency (MHz)	Main Ant			Aux Ant			Main+Aux Ant				
			Average power (dBm)	Tune-Up Limit	Duty Cycle %	Average power (dBm)	Tune-Up Limit	Duty Cycle %	Average power (dBm)	Tune-Up Limit	Duty Cycle %		
802.11be-EHT80 MCS0	134	5670	Not Required	13.00	Not Required	Not Required	13.00	Not Required	Not Required	16.00	Not Required		
	142	5710		13.00			16.00						
	106	5530		13.00			16.00						
	122	5610		13.00			16.00						
	138	5690		13.00			16.00						
	114	5570		13.00			16.00						
802.11be-EHT160 MCS0	114	5570	13.00	16.00									
<5.8GHz WLAN>													
5.8GHz WLAN	802.11a 6Mbps	149	Not Required	13.00	Not Required	Not Required	13.00	Not Required	Not Required	Not Required	16.00	Not Required	
		157		5785			13.00				16.00		
		165		5825			13.00				16.00		
	802.11n-HT20 MCS0	149	Not Required	13.00	Not Required	Not Required	13.00	Not Required	Not Required	Not Required	Not Required	16.00	Not Required
		157		5785			13.00					16.00	
		165		5825			13.00					16.00	
	802.11n-HT40 MCS0	151	12.60	13.00	99.26	12.70	13.00	100.00	100.00	Not Required	Not Required	16.00	Not Required
		159		5795			13.00					16.00	
	802.11ac-VHT20 MCS0	149	Not Required	13.00	Not Required	Not Required	13.00	Not Required	Not Required	Not Required	Not Required	16.00	Not Required
		157		5785			13.00					16.00	
		165		5825			13.00					16.00	
	802.11ac-VHT40 MCS0	151	12.60	13.00	99.26	12.70	13.00	100.00	100.00	Not Required	Not Required	16.00	Not Required
		159		5795			13.00					16.00	
	802.11ac-VHT80 MCS0	149	Not Required	13.00	Not Required	Not Required	13.00	Not Required	Not Required	Not Required	Not Required	16.00	Not Required
		157		5785			13.00					16.00	
		165		5825			13.00					16.00	
	802.11ax-HE20 MCS0	151	12.60	13.00	99.26	12.70	13.00	100.00	100.00	Not Required	Not Required	16.00	Not Required
		159		5795			13.00					16.00	
	802.11ax-HE40 MCS0	149	Not Required	13.00	Not Required	Not Required	13.00	Not Required	Not Required	Not Required	Not Required	16.00	Not Required
		157		5785			13.00					16.00	
		165		5825			13.00					16.00	
	802.11ax-HE80 MCS0	151	12.60	13.00	99.26	12.70	13.00	100.00	100.00	Not Required	Not Required	16.00	Not Required
		159		5795			13.00					16.00	
	802.11be-EHT20 MCS0	149	Not Required	13.00	Not Required	Not Required	13.00	Not Required	Not Required	Not Required	Not Required	16.00	Not Required
		157		5785			13.00					16.00	
		165		5825			13.00					16.00	
	802.11be-EHT40 MCS0	151	12.60	13.00	99.26	12.70	13.00	100.00	100.00	Not Required	Not Required	16.00	Not Required
159		5795		13.00			16.00						
802.11be-EHT80 MCS0	149	Not Required	13.00	Not Required	Not Required	13.00	Not Required	Not Required	Not Required	Not Required	16.00	Not Required	
	157		5785			13.00					16.00		
	165		5825			13.00					16.00		



<5.9GHz WLAN UNII 4>												
5.9GHz WLAN UNII 4	Mode	Channel	Frequency (MHz)	Main Ant			Aux Ant			Main+Aux Ant		
				Average power (dBm)	Tune-Up Limit	Duty Cycle %	Average power (dBm)	Tune-Up Limit	Duty Cycle %	Average power (dBm)	Tune-Up Limit	Duty Cycle %
802.11a 6Mbps	169	5845	Not Required	13.00	Not Required	Not Required	13.00	Not Required	16.00	Not Required	16.00	
	173	5865					13.00					16.00
	177	5885					13.00					16.00
802.11n-HT20 MCS0	169	5845	Not Required	12.75	Not Required	Not Required	12.75	Not Required	15.75	Not Required	15.75	
	173	5865					12.75					15.75
	177	5885					11.50					14.50
802.11n-HT40 MCS0	167	5835	Not Required	13.00	Not Required	Not Required	13.00	Not Required	16.00	Not Required	16.00	
	175	5875					13.00					16.00
802.11ac-VHT20 MCS0	169	5845	Not Required	12.75	Not Required	Not Required	12.75	Not Required	15.75	Not Required	15.75	
	173	5865					12.75					15.75
	177	5885					11.50					14.50
802.11ac-VHT40 MCS0	167	5835	Not Required	13.00	Not Required	Not Required	13.00	Not Required	16.00	Not Required	16.00	
	175	5875					13.00					16.00
	171	5855					12.90					13.00
802.11ac-VHT80 MCS0	163	5815	12.90	13.00	99.00	13.00	13.00	98.75	16.00	Not Required	16.00	
802.11ac-VHT160 MCS0	169	5845	Not Required	12.75	Not Required	Not Required	12.75	Not Required	15.75	Not Required	15.75	
	173	5865					12.75					15.75
	177	5885					11.50					14.50
802.11ax-HE20 MCS0	167	5835	Not Required	13.00	Not Required	Not Required	13.00	Not Required	16.00	Not Required	16.00	
	175	5875					13.00					16.00
802.11ax-HE40 MCS0	167	5835	Not Required	13.00	Not Required	Not Required	13.00	Not Required	16.00	Not Required	16.00	
	175	5875					13.00					16.00
	171	5855					13.00					16.00
802.11ax-HE80 MCS0	163	5815	Not Required	13.00	Not Required	Not Required	13.00	Not Required	16.00	Not Required	16.00	
	169	5845					12.75					15.75
	173	5865					12.75					15.75
802.11ax-HE160 MCS0	169	5845	Not Required	12.75	Not Required	Not Required	12.75	Not Required	15.75	Not Required	15.75	
	173	5865					12.75					15.75
	177	5885					11.50					14.50
802.11be-EHT20 MCS0	167	5835	Not Required	13.00	Not Required	Not Required	13.00	Not Required	16.00	Not Required	16.00	
	175	5875					13.00					16.00
	171	5855					13.00					16.00
802.11be-EHT40 MCS0	167	5835	Not Required	13.00	Not Required	Not Required	13.00	Not Required	16.00	Not Required	16.00	
	175	5875					13.00					16.00
	171	5855					13.00					16.00
802.11be-EHT80 MCS0	167	5835	Not Required	13.00	Not Required	Not Required	13.00	Not Required	16.00	Not Required	16.00	
	175	5875					13.00					16.00
	171	5855					13.00					16.00
802.11be-EHT160 MCS0	163	5815	Not Required	13.00	Not Required	Not Required	13.00	Not Required	16.00	Not Required	16.00	
	169	5845					12.75					15.75
	173	5865					12.75					15.75



6GHz WLAN (LPI Mode)

<WiFi 6E_LPI>												
Mode	Channel	Frequency (MHz)	Main Ant			Aux Ant			Main+Aux Ant			
			Average power (dBm)	Tune-Up Limit	Duty Cycle %	Average power (dBm)	Tune-Up Limit	Duty Cycle %	Average power (dBm)	Tune-Up Limit	Duty Cycle %	
WiFi 6E	802.11a 6Mbps	1	5955		-1.50		-1.50		1.50			
		57	6235		-1.50		-1.50		1.50			
		113	6515		0.00		0.00		3.00			
		173	6815		-0.25		-0.25		2.75			
		233	7115		0.25		0.25		3.25			
	802.11ax-HE20 MCS0	1	5955		-4.00		-4.00		-1.00			
		57	6235		-4.00		-4.00		-1.00			
		113	6515		-2.25		-2.25		0.75			
		173	6815		-2.50		-2.50		0.50			
		233	7115		-13.75		-13.75		-10.75			
	802.11ax-HE40 MCS0	3	5965		0.00		0.00		3.00			
		59	6245		0.00		0.00		3.00			
		107	6485		0.25		0.25		3.25			
		171	6805		0.25		0.25		3.25			
		227	7085		0.50		0.50		3.50			
	802.11ax-HE80 MCS0	7	5985		3.00		3.00		6.00			
		71	6305		3.00		3.00		6.00			
		119	6545		3.00		3.00		6.00			
		167	6785		3.00		3.00		6.00			
		215	7025		3.25		3.25		6.25			
802.11ax-HE160 MCS0	15	6025		7.50		7.50		10.50				
	47	6185		6.75		6.75		9.75				
	111	6505	Not Required	7.25	Not Required	7.25	Not Required	10.25				
	143	6665		7.25		7.25		10.25				
	207	6985		7.00		7.00		10.00				
802.11be-EHT20 MCS0	1	5955		-4.00		-4.00		-1.00	Not Required	Not Required		
	57	6235		-4.00		-4.00		-1.00				
	113	6515		-2.25		-2.25		0.75				
	173	6815		-2.50		-2.50		0.50				
	233	7115		-13.75		-13.75		-10.75				
802.11be-EHT40 MCS0	3	5965		0.00		0.00		3.00				
	59	6245		0.00		0.00		3.00				
	107	6485		0.25		0.25		3.25				
	171	6805		0.25		0.25		3.25				
	227	7085		0.50		0.50		3.50				
802.11be-EHT80 MCS0	7	5985		3.00		3.00		6.00				
	71	6305		3.00		3.00		6.00				
	119	6545		3.00		3.00		6.00				
	167	6785		3.00		3.00		6.00				
	215	7025		3.25		3.25		6.25				
802.11be-EHT160 MCS0	15	6025		7.50		7.50		10.50				
	47	6185		6.75		6.75		9.75				
	111	6505		7.25		7.25		10.25				
	143	6665		7.25		7.25		10.25				
	207	6985		7.00		7.00		10.00				
802.11be-EHT320 MCS0	31	6105	8.50	8.50		8.50	8.50		11.50			
	63	6265	8.10	8.50		8.50	8.50		11.50			
	95	6425	8.30	8.50	97.74	8.30	8.50	98.30	11.50			
	127	6585	8.10	8.50		8.20	8.50		11.50			
	159	6745	8.50	8.50		8.50	8.50		11.50			
	191	6905	8.10	8.50		8.20	8.50		11.50			



6GHz WLAN (SP Mode)

WiFi 6E_SP														
Mode	Channel	Frequency (MHz)	Main Ant			Aux Ant			Main+Aux Ant					
			Average power (dBm)	Tune-Up Limit	Duty Cycle %	Average power (dBm)	Tune-Up Limit	Duty Cycle %	Average power (dBm)	Tune-Up Limit	Duty Cycle %			
802.11a 6Mbps	1	5955	Not Required	8.50	Not Required	Not Required	8.50	Not Required	Not Required	Not Required	11.50	Not Required		
	57	6235		8.50			8.50							
	93	6415		8.50			8.50							
	117	6535		8.50			8.50							
	181	6855		8.50			8.50							
	1	5955		8.50			8.50							
	57	6235		8.50			8.50							
	93	6415		8.50			8.50							
	117	6535		8.50			8.50							
	181	6855		8.50			8.50							
	3	5965		8.50			8.50							
	59	6245		8.50			8.50							
802.11ax-HE40 MCS0	91	6405	8.50	8.50	8.50	8.50	8.50	8.50	8.50	8.50	11.50	Not Required		
	123	6565	8.50	8.50	8.50	8.50	8.50	8.50	8.50	8.50	11.50	Not Required		
	179	6845	8.50	8.50	8.50	8.50	8.50	8.50	8.50	8.50	11.50	Not Required		
	7	5985	8.50	8.50	8.50	8.50	8.50	8.50	8.50	8.50	11.50	Not Required		
802.11ax-HE80 MCS0	55	6225	8.50	8.50	8.50	8.50	8.50	8.50	8.50	8.50	11.50	Not Required		
	87	6385	8.50	8.50	8.50	8.50	8.50	8.50	8.50	8.50	11.50	Not Required		
	135	6625	8.50	8.50	8.50	8.50	8.50	8.50	8.50	8.50	11.50	Not Required		
	167	6785	8.50	8.50	8.50	8.50	8.50	8.50	8.50	8.50	11.50	Not Required		
802.11ax-HE160 MCS0	15	6025	Not Required	8.50	Not Required	Not Required	8.50	Not Required	Not Required	Not Required	11.50	Not Required		
	47	6185		8.50			8.50							
	79	6345		8.50			8.50							
	143	6665		8.50			8.50							
802.11be-EHT20 MCS0	1	5955	Not Required	8.50	Not Required	Not Required	8.50	Not Required	Not Required	Not Required	11.50	Not Required		
	57	6235		8.50			8.50							
	93	6415		8.50			8.50							
	117	6535		8.50			8.50							
	181	6855		8.50			8.50							
802.11be-EHT40 MCS0	3	5965	Not Required	8.50	Not Required	Not Required	8.50	Not Required	Not Required	Not Required	11.50	Not Required		
	59	6245		8.50			8.50							
	91	6405		8.50			8.50							
	123	6565		8.50			8.50							
802.11be-EHT80 MCS0	179	6845	Not Required	8.50	Not Required	Not Required	8.50	Not Required	Not Required	Not Required	11.50	Not Required		
	7	5985		8.50			8.50							
	55	6225		8.50			8.50							
	87	6385		8.50			8.50							
802.11be-EHT160 MCS0	135	6625	Not Required	8.50	Not Required	Not Required	8.50	Not Required	Not Required	Not Required	11.50	Not Required		
	167	6785		8.50			8.50							
	15	6025		8.50			8.50							
	47	6185		8.50			8.50							
802.11be-EHT320 MCS0	79	6345	Not Required	8.50	Not Required	Not Required	8.50	Not Required	Not Required	Not Required	11.50	Not Required		
	143	6665		8.50			8.50							
	31	6105		8.50			8.50							
	63	6265		8.10			8.50							
802.11be-EHT320 MCS0	95	6425	Not Required	8.30	97.74	Not Required	8.30	98.30	Not Required	Not Required	11.50	Not Required		
	127	6585		8.10			8.50				8.20		8.50	11.50

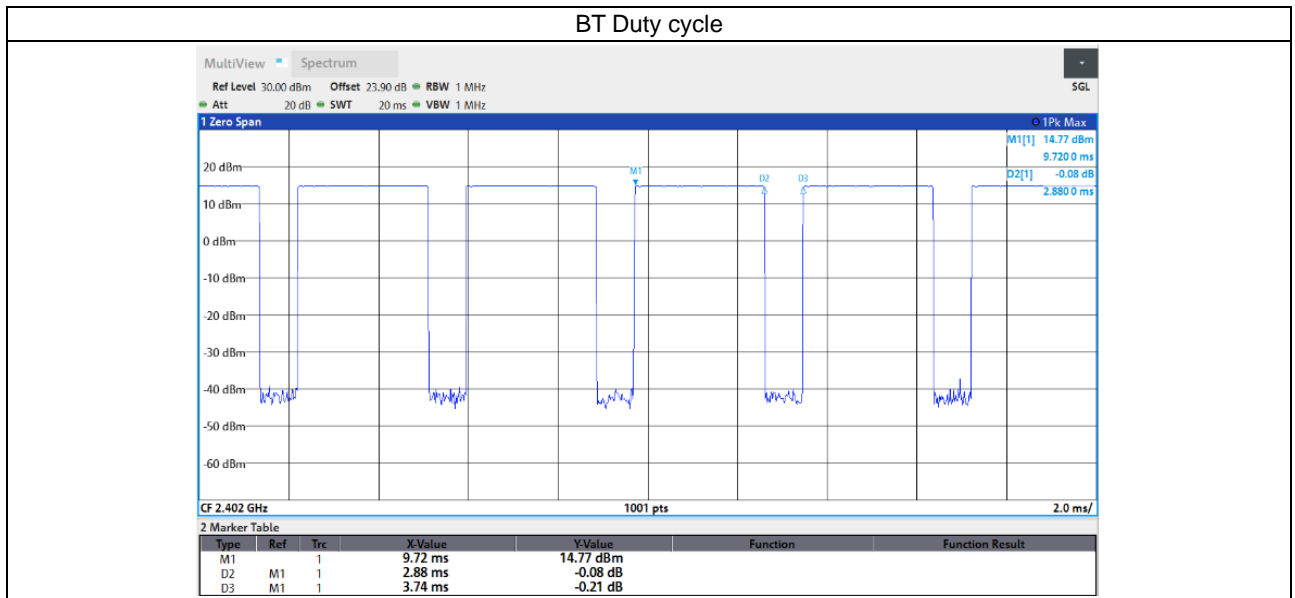


<2.4GHz Bluetooth>

	Mode	Channel	Frequency (MHz)	Main Ant			Aux Ant			Main+Aux Ant			
				Average power (dBm)	Tune-Up Limit	Duty Cycle %	Average power (dBm)	Tune-Up Limit	Duty Cycle %	Average power (dBm)	Tune-Up Limit	Duty Cycle %	
Bluetooth	BR / EDR 1Mbps	0	2402	15.61	16.00	77.01	15.10	16.00	77.01	Not Required	15.00	Not Required	
		39	2441	15.97	16.00		15.20	16.00			15.00		
		78	2480	15.00	16.00		14.10	16.00			15.00		
	BR / EDR 2Mbps	0	2402	Not Required	16.00	Not Required	Not Required	12.00	12.00		Not Required		13.00
		39	2441					12.00	12.00				13.00
		78	2480					12.00	12.00				13.00
	BR / EDR 3Mbps	0	2402					12.00	12.00				13.00
		39	2441					12.00	12.00				13.00
		78	2480					12.00	12.00				13.00
	LE 1Mbps	0	2402					16.00	16.00				15.00
		19	2440					16.00	16.00				15.00
		39	2480					16.00	16.00				15.00
	LE 2Mbps	0	2402					16.00	16.00				15.00
		19	2440					16.00	16.00				15.00
		39	2480					16.00	16.00				15.00

General Note:

- For 2.4GHz Bluetooth SAR testing was selected 1Mbps due to its highest average power and duty cycle is 77.01% considered in SAR testing, and the duty cycle would be scaled to theoretical 83.3% in reported SAR calculation.



11. SAR Test Results

General Note:

- Per KDB 447498 D01v06, the reported SAR is the measured SAR value adjusted for maximum tune-up tolerance.
 - Tune-up scaling Factor = tune-up limit power (mW) / EUT RF power (mW), where tune-up limit is the maximum rated power among all production units.
 - For SAR testing of WLAN signal with non-100% duty cycle, the measured SAR is scaled-up by the duty cycle scaling factor which is equal to "1/(duty cycle)"
 - For WLAN/Bluetooth: Reported SAR(W/kg)= Measured SAR(W/kg)* Duty Cycle scaling factor * Tune-up scaling factor
- Per KDB 447498 D01v06, for each exposure position, 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
 - ≤ 0.6 W/kg or 1.5 W/kg, for 1-g or 10-g respectively, when the transmission band is between 100 MHz and 200 MHz
 - ≤ 0.4 W/kg or 1.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≥ 200 MHz
- Per KDB 865664 D01v01r04, for each frequency band, repeated SAR measurement is required only when the measured SAR is ≥0.8W/kg.

WLAN Note:

- Per KDB 248227 D01v02r02, for 2.4GHz 802.11g/n SAR testing is not required 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.
- Per KDB 248227 D01v02r02, WLAN5.2GHz SAR testing is not required when the WLAN5.3GHz band highest reported SAR for a test configuration is ≤ 1.2 W/kg, SAR is not required for WLAN5.2GHz band.
- When the reported SAR of the test position is > 0.4 W/kg, SAR is repeated for the 802.11 transmission mode configuration tested in the initial test position to measure the subsequent next closet/smallest test separation distance and maximum coupling test position on the highest maximum output power channel, until the report SAR is ≤ 0.8 W/kg or all required test position are tested.
- For all positions / configurations, when the reported SAR is > 0.8 W/kg, SAR is measured for these test positions / configurations on the subsequent next highest measured output power channel(s) until the reported SAR is ≤ 1.2 W/kg or all required channels are tested.
- For WLAN SAR testing was performed on single antenna RF power in SISO mode is larger or equal to the single antenna RF power in MIMO mode, and for RF exposure assessment of MIMO mode simultaneous transmission exclusion analysis was performed with SAR test results of each antenna in SISO mode.
- Per KDB 248227 D01v02r02, the simultaneous SAR provisions in KDB publication 447498 should be applied to determine simultaneous transmission SAR test exclusion for WiFi MIMO. If the sum of 1g single transmission chain SAR measurements is < 1.6W/kg and SAR peak to location ratio ≤ 0.04, no additional SAR measurements for MIMO.
- During SAR testing the WLAN transmission was verified using a spectrum analyzer.

WLAN PD Note:

- The WiFi 6E PD was separate measured each transmit antenna, and spot check MIMO transmit antenna to ensure the result is compliance.
- The manufacturer has confirmed that the devices tested have the same physical, mechanical and thermal characteristics and are within operational tolerances expected for production units.
- Absorbed power density (APD) using a 4cm² averaging area is reported based on SAR measurements.
- Power density was calculated by repeated E-field measurements on two measurement planes separated by λ/4.
- The device was configured to transmit continuously at the required data rate, channel bandwidth and signal modulation, using the highest transmission duty factor supported by the test mode tools.
- Per FCC guidance and equipment manufacturer guidance, power density results were scaled according to IEC 62479:2010 for the portion of the measurement uncertainty > 30%. Total expanded uncertainty of 2.68 dB (85.4%) was used to determine the psPD measurement scaling factor.
- The measurement procedure consists of measuring the PD_{inc} at two different distances: 2 mm (compliance distance) and λ/5. The grid extents should be large enough to fully capture the transmitted energy. The grid step should be fine enough to demonstrate that the integrated Power Density iPD_n fulfill the criterion described below. Since iPD ratio between the two distances is ≥ -1dB, the grid step (0.0625) was sufficient for determining compliance at d=2mm.

$$10 \cdot \log_{10} \frac{iPD_n(2mm)}{iPD_n(\lambda/5)} \geq -1$$

11.2 6GHz WLAN SAR Test Result

Plot No.	Band	Mode	Test Position	Gap (mm)	Antenna	Antenna Vendor	Power State	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)	Measured APD (W/m ²)	Reported APD (W/m ²)
	WLAN6GHz	802.11be-EHT320 MCS0	Bottom of Laptop	0mm	Main	AWAN	Non-DBS	127	6585	10.90	11.50	1.148	97.74	1.023	0.03	0.297	0.349	1.930	2.267
	WLAN6GHz	802.11be-EHT320 MCS0	Bottom of Laptop	0mm	Main	AWAN	Non-DBS	31	6105	10.60	11.50	1.230	97.74	1.023	0.05	0.229	0.288	1.590	2.001
	WLAN6GHz	802.11be-EHT320 MCS0	Bottom of Laptop	0mm	Main	AWAN	Non-DBS	63	6265	10.60	11.50	1.230	97.74	1.023	-0.02	0.295	0.371	2.050	2.580
	WLAN6GHz	802.11be-EHT320 MCS0	Bottom of Laptop	0mm	Main	AWAN	Non-DBS	95	6425	10.70	11.50	1.202	97.74	1.023	-0.07	0.282	0.347	1.980	2.435
	WLAN6GHz	802.11be-EHT320 MCS0	Bottom of Laptop	0mm	Main	AWAN	Non-DBS	159	6745	10.90	11.50	1.148	97.74	1.023	0.01	0.269	0.316	1.840	2.161
	WLAN6GHz	802.11be-EHT320 MCS0	Bottom of Laptop	0mm	Main	AWAN	Non-DBS	191	6905	10.60	11.50	1.230	97.74	1.023	-0.09	0.226	0.284	1.540	1.938
	WLAN6GHz	802.11be-EHT320 MCS0	Bottom of Laptop	0mm	Main	Speed	Non-DBS	127	6585	10.90	11.50	1.148	97.74	1.023	-0.03	0.346	0.406	2.440	2.866
	WLAN6GHz	802.11be-EHT320 MCS0	Bottom of Laptop	0mm	Main	Speed	Non-DBS	63	6265	10.60	11.50	1.230	97.74	1.023	0.02	0.352	0.443	2.440	3.071
	WLAN6GHz	802.11be-EHT320 MCS0	Bottom of Laptop	0mm	Main	Speed	Non-DBS	31	6105	10.60	11.50	1.230	97.74	1.023	0.08	0.330	0.415	2.650	3.335
	WLAN6GHz	802.11be-EHT320 MCS0	Bottom of Laptop	0mm	Main	Speed	Non-DBS	95	6425	10.70	11.50	1.202	97.74	1.023	-0.05	0.243	0.299	1.770	2.177
06	WLAN6GHz	802.11be-EHT320 MCS0	Bottom of Laptop	0mm	Main	Speed	Non-DBS	159	6745	10.90	11.50	1.148	97.74	1.023	0.11	0.425	0.499	2.970	3.488
	WLAN6GHz	802.11be-EHT320 MCS0	Bottom of Laptop	0mm	Main	Speed	Non-DBS	191	6905	10.60	11.50	1.230	97.74	1.023	-0.01	0.316	0.398	2.260	2.844
	WLAN6GHz	802.11be-EHT320 MCS0	Bottom of Laptop	0mm	Main	Speed	DBS	159	6745	8.50	8.50	1.000	97.74	1.023	0.06	0.255	0.261	1.710	1.749
	WLAN6GHz	802.11be-EHT320 MCS0	Bottom of Laptop	0mm	Aux	AWAN	Non-DBS	159	6745	10.90	11.50	1.148	98.3	1.017	0.13	0.134	0.156	0.940	1.098
	WLAN6GHz	802.11be-EHT320 MCS0	Bottom of Laptop	0mm	Aux	AWAN	Non-DBS	31	6105	10.40	11.50	1.288	98.3	1.017	-0.02	0.167	0.219	1.170	1.533
	WLAN6GHz	802.11be-EHT320 MCS0	Bottom of Laptop	0mm	Aux	AWAN	Non-DBS	63	6265	10.40	11.50	1.288	98.3	1.017	-0.05	0.154	0.202	1.100	1.441
	WLAN6GHz	802.11be-EHT320 MCS0	Bottom of Laptop	0mm	Aux	AWAN	Non-DBS	95	6425	10.40	11.50	1.288	98.3	1.017	-0.11	0.168	0.220	1.190	1.559
	WLAN6GHz	802.11be-EHT320 MCS0	Bottom of Laptop	0mm	Aux	AWAN	Non-DBS	127	6585	10.60	11.50	1.230	98.3	1.017	0.01	0.121	0.151	0.848	1.061
	WLAN6GHz	802.11be-EHT320 MCS0	Bottom of Laptop	0mm	Aux	AWAN	Non-DBS	191	6905	10.60	11.50	1.230	98.3	1.017	-0.1	0.111	0.139	0.779	0.975
	WLAN6GHz	802.11be-EHT320 MCS0	Bottom of Laptop	0mm	Aux	Speed	Non-DBS	159	6745	10.90	11.50	1.148	98.3	1.017	0.06	0.211	0.246	1.490	1.740
	WLAN6GHz	802.11be-EHT320 MCS0	Bottom of Laptop	0mm	Aux	Speed	Non-DBS	31	6105	10.40	11.50	1.288	98.3	1.017	-0.05	0.247	0.324	1.760	2.306
	WLAN6GHz	802.11be-EHT320 MCS0	Bottom of Laptop	0mm	Aux	Speed	Non-DBS	63	6265	10.40	11.50	1.288	98.3	1.017	-0.03	0.172	0.225	1.210	1.585
	WLAN6GHz	802.11be-EHT320 MCS0	Bottom of Laptop	0mm	Aux	Speed	Non-DBS	95	6425	10.40	11.50	1.288	98.3	1.017	-0.09	0.177	0.232	1.050	1.376
	WLAN6GHz	802.11be-EHT320 MCS0	Bottom of Laptop	0mm	Aux	Speed	Non-DBS	127	6585	10.60	11.50	1.230	98.3	1.017	0.06	0.149	0.186	1.050	1.314
	WLAN6GHz	802.11be-EHT320 MCS0	Bottom of Laptop	0mm	Aux	Speed	Non-DBS	191	6905	10.60	11.50	1.230	98.3	1.017	-0.11	0.165	0.206	1.170	1.464
	WLAN6GHz	802.11be-EHT320 MCS0	Bottom of Laptop	0mm	Aux	Speed	DBS	31	6105	8.50	8.50	1.000	98.3	1.017	0.03	0.096	0.098	0.684	0.696

<Bluetooth SAR>

Plot No.	Band	Mode	Test Position	Gap (mm)	Antenna	Antenna Vendor	Power State	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
	Bluetooth	1Mbps	Bottom of Laptop	0mm	Main	AWAN	Non-DBS	39	2441	15.97	16.00	1.007	77.01	1.082	-0.05	0.297	0.324
	Bluetooth	1Mbps	Bottom of Laptop	0mm	Main	Speed	Non-DBS	39	2441	15.97	16.00	1.007	77.01	1.082	0.07	0.208	0.227
	Bluetooth	1Mbps	Bottom of Laptop	0mm	Aux	AWAN	Non-DBS	39	2441	15.20	16.00	1.202	77.01	1.082	0.06	0.135	0.176
07	Bluetooth	1Mbps	Bottom of Laptop	0mm	Aux	Speed	Non-DBS	39	2441	15.20	16.00	1.202	77.01	1.082	0.02	0.291	0.379



11.3 6GHz PD Test Result

Band	Mode	Test Position	Gap (mm)	Antenna	Antenna Vendor	Power State	Ch.	Freq. (MHz)	Average Power (dBm)	Grid Step (λ)	iPDn	iPD ratio (≥ -1)	Normal psPD (W/m ²)	Total psPD (W/m ²)
WLAN6GHz	802.11be-EHT320 MCS0	Bottom of Laptop	2mm	Main	Speed	Non-DBS	31	6105	10.60	0.0625	3.45	-1.08584631	2.660	2.790
WLAN6GHz	802.11be-EHT320 MCS0	Bottom of Laptop	9.82mm	Main	Speed	Non-DBS	31	6105	10.60	0.25	4.43		1.450	1.510
WLAN6GHz	802.11be-EHT320 MCS0	Bottom of Laptop	2mm	Main	Speed	Non-DBS	191	6905	10.60	0.0625	2.74	-0.57793775	2.350	2.550
WLAN6GHz	802.11be-EHT320 MCS0	Bottom of Laptop	8.68mm	Main	Speed	Non-DBS	191	6905	10.60	0.25	3.13		1.540	1.680

Plot No.	Band	Mode	Test Position	Gap (mm)	Antenna	Antenna Vendor	Power State	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Scaling Factor for Measurement Uncertainty	Power Drift (dB)	Normal psPD (W/m ²)	Scaled Normal psPD (W/m ²)	Total psPD (W/m ²)	Scaled Total psPD (W/m ²)
	WLAN6GHz	802.11be-EHT320 MCS0	Bottom of Laptop	2mm	Main	AWAN	Non-DBS	31	6105	10.60	11.50	1.230	97.74	1.023	1.5535	-0.03	1.150	2.248	1.320	2.581
	WLAN6GHz	802.11be-EHT320 MCS0	Bottom of Laptop	2mm	Main	AWAN	Non-DBS	63	6265	10.60	11.50	1.230	97.74	1.023	1.5535	0.14	1.270	2.483	1.450	2.835
	WLAN6GHz	802.11be-EHT320 MCS0	Bottom of Laptop	2mm	Main	AWAN	Non-DBS	95	6425	10.70	11.50	1.202	97.74	1.023	1.5535	0.11	1.500	2.866	1.720	3.286
	WLAN6GHz	802.11be-EHT320 MCS0	Bottom of Laptop	2mm	Main	AWAN	Non-DBS	127	6585	10.90	11.50	1.148	97.74	1.023	1.5535	-0.05	1.420	2.591	1.620	2.956
	WLAN6GHz	802.11be-EHT320 MCS0	Bottom of Laptop	2mm	Main	AWAN	Non-DBS	159	6745	10.90	11.50	1.148	97.74	1.023	1.5535	0.18	1.500	2.737	1.680	3.065
	WLAN6GHz	802.11be-EHT320 MCS0	Bottom of Laptop	2mm	Main	AWAN	Non-DBS	191	6905	10.60	11.50	1.230	97.74	1.023	1.5535	0.14	1.480	2.894	1.660	3.246
	WLAN6GHz	802.11be-EHT320 MCS0	Bottom of Laptop	2mm	Main	Speed	Non-DBS	31	6105	10.60	11.50	1.230	97.74	1.023	1.5535	0.04	2.660	5.201	2.790	5.455
	WLAN6GHz	802.11be-EHT320 MCS0	Bottom of Laptop	2mm	Main	Speed	Non-DBS	63	6265	10.60	11.50	1.230	97.74	1.023	1.5535	-0.17	1.830	3.578	2.060	4.028
	WLAN6GHz	802.11be-EHT320 MCS0	Bottom of Laptop	2mm	Main	Speed	Non-DBS	95	6425	10.70	11.50	1.202	97.74	1.023	1.5535	0.17	2.060	3.936	2.320	4.433
	WLAN6GHz	802.11be-EHT320 MCS0	Bottom of Laptop	2mm	Main	Speed	Non-DBS	127	6585	10.90	11.50	1.148	97.74	1.023	1.5535	-0.05	2.120	3.868	2.390	4.361
08	WLAN6GHz	802.11be-EHT320 MCS0	Bottom of Laptop	2mm	Main	Speed	Non-DBS	159	6745	10.90	11.50	1.148	97.74	1.023	1.5535	-0.05	3.240	5.912	3.570	6.514
	WLAN6GHz	802.11be-EHT320 MCS0	Bottom of Laptop	2mm	Main	Speed	Non-DBS	191	6905	10.60	11.50	1.230	97.74	1.023	1.5535	-0.17	2.350	4.595	2.550	4.986
	WLAN6GHz	802.11be-EHT320 MCS0	Bottom of Laptop	2mm	Aux	AWAN	Non-DBS	31	6105	10.40	11.50	1.288	98.30	1.017	1.5535	0.08	1.380	2.809	1.640	3.338
	WLAN6GHz	802.11be-EHT320 MCS0	Bottom of Laptop	2mm	Aux	AWAN	Non-DBS	63	6265	10.40	11.50	1.288	98.30	1.017	1.5535	0.01	1.400	2.849	1.660	3.379
	WLAN6GHz	802.11be-EHT320 MCS0	Bottom of Laptop	2mm	Aux	AWAN	Non-DBS	95	6425	10.40	11.50	1.288	98.30	1.017	1.5535	0.03	1.360	2.768	1.610	3.277
	WLAN6GHz	802.11be-EHT320 MCS0	Bottom of Laptop	2mm	Aux	AWAN	Non-DBS	127	6585	10.60	11.50	1.230	98.30	1.017	1.5535	-0.08	1.260	2.449	1.500	2.916
	WLAN6GHz	802.11be-EHT320 MCS0	Bottom of Laptop	2mm	Aux	AWAN	Non-DBS	159	6745	10.90	11.50	1.148	98.30	1.017	1.5535	-0.08	1.790	3.247	2.000	3.628
	WLAN6GHz	802.11be-EHT320 MCS0	Bottom of Laptop	2mm	Aux	AWAN	Non-DBS	191	6905	10.60	11.50	1.230	98.30	1.017	1.5535	0.1	1.710	3.324	1.910	3.712
	WLAN6GHz	802.11be-EHT320 MCS0	Bottom of Laptop	2mm	Aux	Speed	Non-DBS	31	6105	10.40	11.50	1.288	98.30	1.017	1.5535	-0.02	2.510	5.109	2.770	5.638
	WLAN6GHz	802.11be-EHT320 MCS0	Bottom of Laptop	2mm	Aux	Speed	Non-DBS	63	6265	10.40	11.50	1.288	98.30	1.017	1.5535	-0.18	2.140	4.356	2.360	4.803
	WLAN6GHz	802.11be-EHT320 MCS0	Bottom of Laptop	2mm	Aux	Speed	Non-DBS	95	6425	10.40	11.50	1.288	98.30	1.017	1.5535	0.1	2.360	4.803	2.610	5.312
	WLAN6GHz	802.11be-EHT320 MCS0	Bottom of Laptop	2mm	Aux	Speed	Non-DBS	127	6585	10.60	11.50	1.230	98.30	1.017	1.5535	0.12	1.560	3.032	1.720	3.343
	WLAN6GHz	802.11be-EHT320 MCS0	Bottom of Laptop	2mm	Aux	Speed	Non-DBS	159	6745	10.90	11.50	1.148	98.30	1.017	1.5535	0.08	2.420	4.390	2.680	4.861
	WLAN6GHz	802.11be-EHT320 MCS0	Bottom of Laptop	2mm	Aux	Speed	Non-DBS	191	6905	10.60	11.50	1.230	98.30	1.017	1.5535	-0.17	2.090	4.062	2.310	4.490



11.4 Repeated SAR Measurement

No.	Band	Mode	Test Position	Gap (mm)	Antenna	Antenna Vendor	Power State	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Ratio	Reported 1g SAR (W/kg)
1st	WLAN5GHz	802.11n-HT40 MCS0	Bottom of Laptop	0mm	Main	AWAN	Non-DBS	62	5310	15.90	16.00	1.023	100	1.000	0.02	1.060	-	1.085
2nd	WLAN5GHz	802.11n-HT40 MCS0	Bottom of Laptop	0mm	Main	AWAN	Non-DBS	62	5310	15.90	16.00	1.023	100	1.000	0.02	1.053	1.01	1.078
1st	WLAN5GHz	802.11ac-VHT80 MCS0	Bottom of Laptop	0mm	Main	AWAN	Non-DBS	138	5690	15.90	16.00	1.023	99.26	1.007	0.03	1.010	-	1.041
2nd	WLAN5GHz	802.11ac-VHT80 MCS0	Bottom of Laptop	0mm	Main	AWAN	Non-DBS	138	5690	15.90	16.00	1.023	99.26	1.007	0.03	0.965	1.05	0.994
1st	WLAN5GHz	802.11n-HT40 MCS0	Bottom of Laptop	0mm	Main	AWAN	Non-DBS	159	5795	15.70	16.00	1.072	99.26	1.007	-0.16	0.998	-	1.077
2nd	WLAN5GHz	802.11n-HT40 MCS0	Bottom of Laptop	0mm	Main	AWAN	Non-DBS	159	5795	15.70	16.00	1.072	99.26	1.007	-0.16	0.968	1.03	1.044
1st	WLAN5GHz	802.11ac-VHT80 MCS0	Bottom of Laptop	0mm	Main	AWAN	Non-DBS	171	5855	15.90	16.00	1.023	99.26	1.007	-0.05	1.010	-	1.041
2nd	WLAN5GHz	802.11ac-VHT80 MCS0	Bottom of Laptop	0mm	Main	AWAN	Non-DBS	171	5855	15.90	16.00	1.023	99.26	1.007	-0.05	0.985	1.03	1.015

General Note:

1. Per KDB 865664 D01v01r04, for each frequency band, repeated SAR measurement is required only when the measured SAR is ≥ 0.8 W/kg.
2. Per KDB 865664 D01v01r04, if the ratio among the repeated measurement is ≤ 1.2 and the measured SAR < 1.45 W/kg, only one repeated measurement is required.
3. The ratio is the difference in percentage between original and repeated *measured SAR*.
4. All measurement SAR result is scaled-up to account for tune-up tolerance and is compliant.

12. Simultaneous Transmission Analysis

NO.	Simultaneous Transmission Configurations	Body
Non-DBS		
1.	WLAN 2.4GHz Ant Main + Aux	Yes
2.	BT Ant Main + Aux	Yes
3.	WLAN 2.4GHz Ant Aux + BT Ant Main	Yes
4.	WLAN 5/6GHz Ant Main + Aux + BT Ant Main	Yes
5.	WLAN 5/6GHz Ant Main + Aux + BT Ant Aux	Yes
DBS		
6.	WLAN 2.4GHz Ant Main + Aux + WLAN 5/6GHz Ant Main + Aux	Yes

General Note:

1. The Scaled SAR summation is calculated based on the same configuration and test position.
2. Per KDB 447498 D01v06, simultaneous transmission SAR is compliant if,
 - i) Scalar SAR summation < 1.6W/kg.
 - ii) $SPLSR = (SAR1 + SAR2)^{1.5} / (\text{min. separation distance, mm})$, and the peak separation distance is determined from the square root of $[(x1-x2)^2 + (y1-y2)^2 + (z1-z2)^2]$, where (x1, y1, z1) and (x2, y2, z2) are the coordinates of the extrapolated peak SAR locations in the zoom scan.
 - iii) If $SPLSR \leq 0.04$, simultaneously transmission SAR measurement is not necessary.
 - iv) Simultaneously transmission SAR measurement, and the reported multi-band SAR < 1.6W/kg.
 - v) The SPLSR calculated results please refer to section 12.2.

12.1 Body Exposure Conditions

<Non-DBS>

Exposure Position	1	2	3	4	5	6	1+2	5+6	2+5	3+5	3+6	3+4+5	3+4+6	3+4+5	3+4+6	3+4+6	
	WLAN2.4GHz Main 1g SAR (W/kg)	WLAN2.4GHz Aux 1g SAR (W/kg)	WLAN5/6GHz Main 1g SAR (W/kg)	WLAN5/6GHz Aux 1g SAR (W/kg)	Bluetooth Main 1g SAR (W/kg)	Bluetooth Aux 1g SAR (W/kg)	Summed 1g SAR (W/kg)	Summed 1g SAR (W/kg)	Summed 1g SAR (W/kg)	Summed 1g SAR (W/kg)	Summed 1g SAR (W/kg)	Summed 1g SAR (W/kg)	Summed 1g SAR (W/kg)	SPLSR	Case No	SPLSR	Case No
Bottom of Laptop at 0mm	0.614	0.743	1.085	1.040	0.324	0.379	1.357	0.703	1.067	1.409	1.464	2.449	2.504	0.04	Case 1	0.04	Case 2

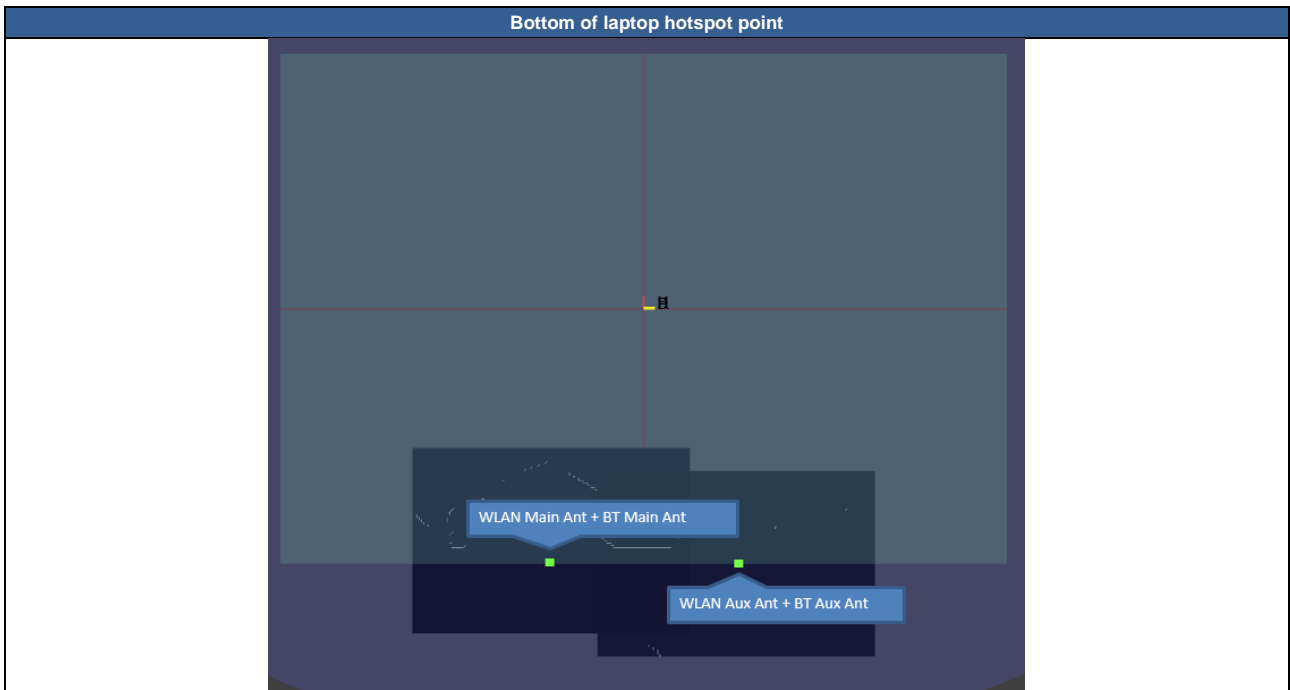
<DBS>

Exposure Position	1	2	3	4	1+2+3+4 Summed 1g SAR (W/kg)	1+2+3+4 SPLSR	1+2+3+4 Case No
	WLAN2.4GHz Main 1g SAR (W/kg)	WLAN2.4GHz Aux 1g SAR (W/kg)	WLAN5/6GHz Main 1g SAR (W/kg)	WLAN5/6GHz Aux 1g SAR (W/kg)			
Bottom of Laptop at 0mm	0.345	0.399	0.490	0.420	1.654	0.02	Case 3

12.2 SPLSR Evaluation and Analysis

General Note:

1. Simultaneous transmission SAR test exclusion is determined for each operating configuration and exposure condition according to the reported standalone SAR of each applicable simultaneously transmitting antenna. When the sum of 1-g or 10-g SAR of all simultaneously transmitting antennas in an operating mode and exposure condition combination is within the SAR limit, SAR test exclusion applies to that simultaneous transmission configuration. Therefore, the adjacent transmit antennas will be summed first, and then the SPLSR calculation will be evaluated with the farther transmitted antennas.
2. $SPLSR = (SAR_1 + SAR_2)^{1.5} / (min. \text{ separation distance, mm})$. If $SPLSR \leq 0.04$, simultaneously transmission SAR measurement is not necessary.
3. The detail hotspot point for each transmitter in each exposure condition are showing as below figure and the minimum 3D distance for each sum combination is used for SPLSR analysis.



Case	Band	Position	SAR (W/kg)	Gap (mm)	SAR peak location (mm)			3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
					X	Y	Z				
Case 1	WLAN5/6GHz Aux Ant	Bottom of Laptop	1.04	0mm	108.6	43.7	-177	88.2	1.36	0.02	Not required
	Bluetooth Main Ant		0.324	0mm	108	-44.5	-177				
	WLAN5/6GHz Main Ant+Bluetooth Main Ant	Bottom of Laptop	1.409	0mm	108	-44.5	-177	88.2	2.45	0.04	Not required
	WLAN5/6GHz Aux Ant		1.04	0mm	108.6	43.7	-177				
Case 2	WLAN5/6GHz Main Ant	Bottom of Laptop	1.085	0mm	106.3	-46.8	-177	91.3	1.46	0.02	Not required
	Bluetooth Aux Ant		0.379	0mm	106.5	44.5	-177				
	WLAN5/6GHz Main Ant	Bottom of Laptop	1.085	0mm	106.3	-46.8	-177	90.5	2.50	0.04	Not required
	WLAN5/6GHz Aux Ant+Bluetooth Aux Ant		1.419	0mm	108.6	43.7	-177				
Case 3	WLAN2.4GHz Main Ant+WLAN5/6GHz Main Ant	Bottom of Laptop	0.835	0mm	107.1	-46.5	-177	90.5	1.65	0.02	Not required
	WLAN2.4GHz Aux Ant+WLAN5/6GHz Aux Ant		0.819	0mm	108.5	44	-177				

Test Engineer : Sing Lim and Albert Chen



13. Uncertainty Assessment

Per KDB 865664 D01 SAR measurement 100MHz to 6GHz, when the highest measured 1-g SAR within a frequency band is < 1.5 W/kg and the measured 10-g SAR within a frequency band is < 3.75 W/kg. The expanded SAR measurement uncertainty must be $\leq 30\%$, for a confidence interval of $k = 2$. If these conditions are met, extensive SAR measurement uncertainty analysis described in IEEE Std 1528-2013 is not required in SAR reports submitted for equipment approval. For this device, the highest measured 1-g SAR is less 1.5W/kg. Therefore, the measurement uncertainty table is not required in this report.

Declaration of Conformity:

The test results with all measurement uncertainty excluded is presented in accordance with the regulation limits or requirements declared by manufacturers.

Comments and Explanations:

The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

14. References

- [1] FCC 47 CFR Part 2 “Frequency Allocations and Radio Treaty Matters; General Rules and Regulations”
- [2] ANSI/IEEE Std. C95.1-1992, “IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz”, September 1992
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- [4] SPEAG DASY System Handbook
- [5] FCC KDB 248227 D01 v02r02, “SAR Guidance for IEEE 802.11 (WiFi) Transmitters”, Oct 2015.
- [6] FCC KDB 447498 D01 v06, “Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies”, Oct 2015
- [7] FCC KDB 616217 D04 v01r02, “SAR Evaluation Considerations for Laptop, Notebook, Netbook and Tablet Computers”, Oct 2015
- [8] FCC KDB 865664 D01 v01r04, "SAR Measurement Requirements for 100 MHz to 6 GHz", Aug 2015.
- [9] FCC KDB 865664 D02 v01r02, “RF Exposure Compliance Reporting and Documentation Considerations” Oct 2015.
- [10] IEC/IEEE 62209-1528:2020, “Measurement procedure for the assessment of specific absorption rate of human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices – Part 1528: Human models, instrumentation, and procedures (Frequency range of 4 MHz to 10 GHz)”, Oct. 2020
- [11] SPEAG DASY6 System Handbook
- [12] SPEAG DASY6 Application Note (Interim Procedure for Device Operation at 6GHz-10GHz)